University of Colorado **Boulder**

# 2025–26 University Catalog



Prepared by the Office of the Registrar

Published July 2025

© Regents of the University of Colorado

# TABLE OF CONTENTS


University of Colorado Boulder ..... 16
About CU Boulder ..... 17
About the Catalog ..... 18
Administration ..... 18
Campus ..... 19
Research & Innovation ..... 20
Undergraduate Catalog ..... 22
Academic Advising ..... 22
Academic Calendar & Exams ..... 22
Academic Integrity ..... 24
Academic Offerings ..... 25
Academic Records ..... 26
Admissions ..... 29
General Admission Information ..... 29
Admission Requirements ..... 30
Application Process ..... 34
Credit by Examination ..... 37
Higher Education Admission Recommendations ..... 46
Transfer of College-Level Credit ..... 48
Credits & Grading ..... 50
Financial Aid ..... 52
Graduation ..... 56
Health & Wellness ..... 56
New Student & Family Programs ..... 57
Registration & Enrollment ..... 57
Student Affairs ..... 60
Housing ..... 60
Student Conduct & Colorado Creed ..... 61
Student Resources ..... 63
Student Data Privacy ..... 64
Student Finances ..... 65
Tuition Classification ..... 68
University Policies ..... 69
Colleges, Schools & Programs ..... 71
Arts & Sciences ..... 71
Policies & Requirements ..... 73
Programs of Study ..... 90
Actuarial Studies and Quantitative Finance ..... 90
Actuarial Studies and Quantitative Finance - Certificate ..... 90
Anthropology ..... 92
Anthropology - Bachelor of Arts (BA) ..... 102
Anthropology - Minor ..... 104
Applied Mathematics ..... 105
Statistics and Data Science - Bachelor of Arts (BA) ..... 113
Applied Mathematics - Minor ..... 116
Statistics - Minor ..... 118
Art and Art History ..... 118
Art History - Bachelor of Arts (BA) ..... 137
Art Practices - Bachelor of Arts (BA) ..... 138
Art Practices - Bachelor of Fine Arts (BFA) ..... 140
Art History - Minor ..... 141
Art Practices - Minor ..... 142
Asian Languages and Civilizations ..... 142
Chinese - Bachelor of Arts (BA) ..... 154
Japanese - Bachelor of Arts (BA) ..... 157
Arabic - Minor ..... 159
Chinese - Minor ..... 160
Hindi/Urdu - Minor ..... 161
Japanese - Minor ..... 161
Korean Language and Culture - Minor ..... 162
Asian Studies ..... 162
Asian Studies - Bachelor of Arts (BA) ..... 166
Asian Studies - Minor ..... 177
Tibetan and Himalayan Studies - Certificate ..... 178
Astrophysical and Planetary Sciences ..... 178
Astrophysical and Planetary Sciences - Bachelor of Arts (BA) ..... 183
Astrophysical and Planetary Sciences - Minor ..... 187
Atmospheric and Oceanic Sciences ..... 188
Atmospheric and Oceanic Sciences - Bachelor of Arts (BA) ..... 193
Atmospheric and Oceanic Sciences - Minor ..... 196
Biochemistry ..... 196
Biochemistry - Bachelor of Arts (BA) ..... 200
Biochemistry - Minor ..... 203
British and Irish Studies ..... 204
British and Irish Studies - Certificate ..... 204
Central and East European Studies ..... 205
Central and East European Studies - Certificate ..... 205

Chemistry ..... 208
Chemistry - Bachelor of Arts (BA) ..... 213
Chemistry - Minor ..... 216
Cinema Studies & Moving Image Arts ..... 217
Cinema Studies & Moving Image Arts - Bachelor of Fine Arts (BFA) ..... 224
Cinema Studies - Bachelor of Arts (BA) ..... 227
Cinema Studies - Minor ..... 231
Classics ..... 231
Classics - Bachelor of Arts (BA) ..... 238
Classics - Minor ..... 241
Cognitive Science ..... 242
Cognitive Science - Certificate ..... 242
Distributed Studies Program ..... 243
Ecology and Evolutionary Biology ..... 243
Ecology and Evolutionary Biology - Bachelor of Arts (BA) ..... 254
Ecology and Evolutionary Biology - Minor ..... 257
Economics ..... 257
Economics - Bachelor of Arts (BA) ..... 265
Economics - Minor ..... 266
English ..... 267
English - Bachelor of Arts (BA) ..... 281
Creative Writing - Minor ..... 284
English - Minor ..... 284
Writing and Public Engagement - Minor ..... 284
Environmental Studies ..... 285
Environmental Studies - Bachelor of Arts (BA) ..... 291
Environmental Studies - Minor ..... 294
Ethnic Studies ..... 295
Ethnic Studies - Bachelor of Arts (BA) ..... 304
Ethnic Studies - Minor ..... 306
Critical Sports Studies - Certificate ..... 306
French and Italian ..... 307
French - Bachelor of Arts (BA) ..... 316
Italian - Bachelor of Arts (BA) ..... 319
French - Minor ..... 321
Italian - Minor ..... 321
Art and Social Change - Certificate ..... 322
Geography ..... 323
Geography - Bachelor of Arts (BA) ..... 334
Geography - Minor ..... 338
Arctic Studies - Certificate ..... 340
GIS and Computational Science - Certificate ..... 341
Hydrology - Certificate ..... 342
Geological Sciences ..... 343
Geology - Bachelor of Arts (BA) ..... 352
Geology - Minor ..... 356
Germanic and Slavic Languages and Literatures ..... 357
German Studies - Bachelor of Arts (BA) ..... 374
Russian, East European and Eurasian Studies - Bachelor of Arts (BA) ..... 377
German Studies - Minor ..... 383
Nordic Studies - Minor ..... 384
Russian, East European and Eurasian Studies - Minor ..... 384
History ..... 386
History - Bachelor of Arts (BA) ..... 408
History - Minor ..... 410
Honors Program ..... 411
Interdisciplinary Honors Studies - Certificate ..... 414
Humanities ..... 415
Humanities - Bachelor of Arts (BA) ..... 422
Humanities - Minor ..... 424
Integrative Physiology ..... 424
Integrative Physiology - Bachelor of Arts (BA) ... 431
International Affairs ..... 434
International Affairs - Bachelor of Arts (BA) ..... 437
International Affairs - Minor ..... 442
European Union Studies - Certificate ..... 444
Global Environmental Affairs - Certificate ..... 444
Jewish Studies ..... 445
Jewish Studies - Bachelor of Arts (BA) ..... 452
Hebrew and Israel Studies - Minor ..... 457
Jewish Studies - Minor ..... 457
Latin American and Latinx Studies ..... 458
Latin American and Latinx Studies - Certificate ..... 459
Lesbian, Gay, Bisexual, Transgender and Queer Studies ..... 461
LGBTQ Studies - Certificate ..... 462
Linguistics ..... 462
Linguistics - Bachelor of Arts (BA) ..... 468
Linguistics - Minor ..... 473

Teaching English to Speakers of Other Languages - Minor ... 473
Mathematics ... 474
Mathematics - Bachelor of Arts (BA) ... 480
Mathematics - Minor ... 484
Medieval and Early Modern Studies ... 484
Medieval and Early Modern Studies - Certificate ... 485
Molecular, Cellular and Developmental Biology ... 485
Molecular, Cellular and Developmental Biology - Bachelor of Arts (BA) ... 495
Molecular, Cellular and Developmental Biology - Minor ... 498
Peace, Conflict and Security Studies ... 498
Peace, Conflict and Security - Certificate ... 500
Philosophy ... 500
Philosophy - Bachelor of Arts (BA) ... 509
Philosophy - Minor ... 513
Physics ... 514
Physics - Bachelor of Arts (BA) ... 523
Physics - Minor ... 527
Political Science ... 528
Political Science - Bachelor of Arts (BA) ... 539
Political Science - Minor ... 541
Psychology and Neuroscience ... 541
Neuroscience - Bachelor of Arts (BA) ... 551
Psychology - Bachelor of Arts (BA) ... 553
Neurosciences and Behavior - Certificate ... 556
Public Health ... 556
Public Health - Bachelor of Arts (BA) ... 557
Public Health - Certificate ... 559
Public Health - Minor ... 560
Religious Studies ... 562
Religious Studies - Bachelor of Arts (BA) ... 569
Religious Studies - Minor ... 571
Sociology ... 571
Sociology - Bachelor of Arts (BA) ... 579
Sociology - Minor ... 581
Animals and Society - Certificate ... 581
Care, Health and Resilience - Certificate ... 582
Social Innovation - Certificate ... 583
Spanish and Portuguese ... 584
Spanish - Bachelor of Arts (BA) ... 592
Portuguese - Minor ... 595
Spanish - Minor ... 596
Speech, Language and Hearing Sciences ... 596
Speech, Language and Hearing Sciences - Bachelor of Arts (BA) ... 599
Speech, Language and Hearing Sciences - Minor ... 601
Theatre & Dance ... 601
Dance - Bachelor of Arts (BA) ... 614
Dance - Bachelor of Fine Arts (BFA) ... 617
Theatre - Bachelor of Arts (BA) ... 619
Theatre - Bachelor of Fine Arts (BFA) ... 621
Dance - Minor ... 625
Theatre - Minor ... 625
Hip-Hop Studies - Certificate ... 625
Western American Studies ... 626
Western American Studies - Certificate ... 627
Western Civilization Studies ... 627
Foundations of Western Civilization - Certificate ... 628
Women and Gender Studies ... 629
Women and Gender Studies - Bachelor of Arts (BA) ... 638
Queer and Trans Studies - Minor ... 645
Women and Gender Studies - Minor ... 647
Global Gender and Sexuality Studies - Certificate ... 649
Writing and Rhetoric, Program for ... 650
Writing - Certificate ... 654
Writing and Public Engagement - Minor ... 284
Business ... 657
Policies & Requirements ... 662
Programs of Study ... 665
Business Administration ... 665
Business Administration - Bachelor of Science (BSBA) ... 671
Business - Minor ... 680
Business Leadership - Certificate ... 680
Entrepreneurial Studies - Certificate ... 682
Global Business - Certificate ... 682
Operations and Information Management - Certificate ... 685
Personal Financial Planning - Certificate ... 686
Social Responsibility and Ethics - Certificate ... 686

Communication, Media, Design & Information ..... 687
Policies & Requirements ..... 688
Programs of Study ..... 695
Advertising, Public Relations and Media Design ..... 695
Strategic Communication - Bachelor of Science (BS) ..... 701
Communication ..... 704
Communication - Bachelor of Arts (BA) ..... 708
Communication - Minor ..... 710
Critical Media Practices ..... 710
Media Production - Bachelor of Arts (BA) ..... 715
Media Production - Minor ..... 720
Environmental Design ..... 721
Architecture - Bachelor of Environmental Design (BEnvD) ..... 737
Environmental Products of Design - Bachelor of Environmental Design (BEnvD) ..... 739
Landscape Architecture - Bachelor of Environmental Design (BEnvD) ..... 742
Sustainable Planning and Urban Design - Bachelor of Environmental Design (BEnvD) ..... 744
Environmental Planning - Minor ..... 746
Information Science ..... 746
Information Science - Bachelor of Science (BS) ..... 752
Data Science - Minor ..... 754
Information Science - Minor ..... 755
Journalism ..... 756
Journalism - Bachelor of Arts (BA) ..... 761
Journalism - Minor ..... 763
Media Studies ..... 764
Media Studies - Bachelor of Arts (BA) ..... 768
Media Studies - Minor ..... 770
Sports Media ..... 771
Sports Media - Minor ..... 772
Education ..... 772
Policies & Requirements ..... 773
Programs of Special Interest ..... 776
Programs of Study ..... 777
Education Studies - Bachelor of Arts (BA) ..... 792
Elementary Education - Bachelor of Arts (BA) ..... 794
Leadership and Community Engagement - Bachelor of Arts (BA) ..... 798
Middle and High School Teaching - Bachelor of Arts (BA) ..... 800
Education - Minor ..... 808
Leadership Studies - Minor ..... 809
STEM Education - Certificate ..... 813
Teacher Licensure Program ..... 814
Post-Baccalaureate ..... 814
Undergraduate Teacher Licensure ..... 821
Engineering & Applied Science ..... 829
Policies & Requirements ..... 831
Programs of Study ..... 835
Aerospace Engineering Sciences ..... 835
Aerospace Engineering Sciences - Bachelor of Science (BSAE) ..... 842
Applied Mathematics ..... 846
Applied Mathematics - Bachelor of Science (BSAM) ..... 854
Biomedical Engineering ..... 859
Biomedical Engineering - Bachelor of Science (BSBM) ..... 865
Biomedical Engineering - Minor ..... 870
Chemical and Biological Engineering ..... 871
Biological Engineering - Bachelor of Science (BSBE) ..... 877
Chemical Engineering - Bachelor of Science (BSCHE) ..... 880
Biological Engineering - Minor ..... 883
Chemical Engineering - Minor ..... 884
Civil, Environmental & Architectural Engineering ..... 885
Architectural Engineering - Bachelor of Science (BSARE) ..... 900
Civil Engineering - Bachelor of Science (BSCV) ..... 904
Environmental Engineering - Bachelor of Science (BSEV) ..... 907
Architectural Engineering - Minor ..... 911
Civil Engineering - Minor ..... 912
Sustainability Engineering - Minor ..... 912
Global Engineering - Minor ..... 914
Computer Science ..... 922
Computer Science - Bachelor of Arts (BA) ..... 937
Computer Science - Bachelor of Science (BSCS) ..... 941
Applied Computer Science - Post-Baccalaureate Bachelor of Science (BSACS) ..... 945

Computational Biology - Minor ..... 947
Computer Science - Minor ..... 948
Creative Technology and Design ..... 949
Creative Technology and Design - Bachelor of Science (BSCTD) ..... 956
Creative Technology and Design - Minor ..... 958
Design Technologies - Certificate ..... 959
User Experience - Certificate ..... 959
Electrical, Computer & Energy Engineering ..... 959
Electrical and Computer Engineering - Bachelor of Science (BSEC) ..... 970
Electrical Engineering - Bachelor of Science (BSEE) ..... 975
Computer Engineering - Minor ..... 978
Electrical Engineering - Minor ..... 979
Quantum Engineering - Minor ..... 980
Signals and Systems - Minor ..... 980
Engineering and Applied Science ..... 981
Engineering Leadership - Certificate ..... 984
Lighting Design - Certificate ..... 985
Engineering Management ..... 986
Engineering Entrepreneurship - Minor ..... 988
Engineering Management - Minor ..... 988
Engineering Physics ..... 989
Engineering Physics - Bachelor of Science (BSEP) ..... 994
Engineering, Ethics & Society ..... 997
Engineering, Ethics and Society - Certificate .... 1001
Integrated Design Engineering ..... 1002
Integrated Design Engineering - Bachelor of Science (BSIDE) ..... 1003
Materials Science & Engineering ..... 1017
Materials Science & Engineering - Minor ..... 1017
Mechanical Engineering ..... 1018
Mechanical Engineering - Bachelor of Science (BSME) ..... 1029
Energy Engineering - Minor ..... 1033
Exploratory Studies ..... 1034
Music ..... 1036
Policies & Requirements ..... 1037
Programs of Study ..... 1039
Music ..... 1039
Music - Bachelor of Arts in Music (BAMus) ..... 1052
Music - Bachelor of Music (BMus) ..... 1055
Music - Minor ..... 1067
Music Entrepreneurship - Certificate ..... 1067
Music Technology - Certificate ..... 1068
Music Theory - Certificate ..... 1069
Singing Health Specialist - Certificate ..... 1069
Music Education ..... 1070
Music Education - Bachelor of Music Education (BMusEd) ..... 1081
Academic Enrichment Programs ..... 1086
Education Abroad ..... 1086
Library Research ..... 1087
Preprofessional Programs ..... 1089
Presidents Leadership Class ..... 1089
Reserve Officers Training Corps (ROTC) ..... 1091
Air Force Aerospace Studies (U.S. Air Force) ..... 1091
Military Science (U.S. Army) ..... 1092
Naval Science (U.S. Navy & U.S. Marine Corps) ..... 1094
Undergraduate Residential Programs ..... 1096
Cross-College Programs ..... 1099
International Media - Certificate ..... 1099
Native American and Indigenous Studies - Certificate ... 1100
Space - Minor ..... 1102
Graduate Catalog ..... 1103
Academic Calendar & Exams ..... 1103
Academic Integrity ..... 1104
Academic Offerings ..... 1106
Academic Records ..... 1107
Academic Standards & Advising ..... 1108
Admissions ..... 1109
Credits & Grading ..... 1110
Degree Requirements ..... 1113
Master's Degree Requirements ..... 1113
Doctoral Degree Requirements ..... 1114
Distance Education ..... 1117
Graduation ..... 1117
Health & Wellness ..... 1118
New Student & Family Programs ..... 1118
Registration & Enrollment ..... 1119
Student Affairs ..... 1121
Housing ..... 1121
Student Conduct & Colorado Creed ..... 1121
Student Resources ..... 1123

Student Data Privacy ..... 1124
Student Finances ..... 1125
Tuition Classification ..... 1129
University Policies ..... 1130
Colleges & Schools ..... 1132
Arts & Sciences ..... 1132
Programs of Study ..... 1132
Anthropology ..... 1132
Anthropology - Master of Arts (MA) ..... 1138
Anthropology - Doctor of Philosophy (PhD) ..... 1140
Applied Mathematics ..... 1142
Applied Mathematics - Master of Science (MS) ..... 1150
Applied Mathematics - Professional Master of Science (MSAM) ..... 1152
Applied Mathematics - Doctor of Philosophy (PhD) ..... 1154
Art and Art History ..... 1156
Art History - Master of Arts (MA) ..... 1166
Art Practices - Master of Fine Arts (MFA) ..... 1168
Arts of the Americas - Doctor of Philosophy (PhD) ..... 1172
Asian Languages and Civilizations ..... 1175
Asian Languages and Civilizations - Master of Arts (MA) ..... 1179
Asian Languages and Civilizations - Doctor of Philosophy (PhD) ..... 1181
Asian Studies ..... 1182
Asian Studies - Graduate Certificate ..... 1182
Astrophysical and Planetary Sciences ..... 1184
Astrophysical and Planetary Sciences - Master of Science (MS) ..... 1188
Astrophysical and Planetary Sciences - Doctor of Philosophy (PhD) ..... 1188
Atmospheric and Oceanic Sciences ..... 1190
Atmospheric and Oceanic Sciences - Master of Science (MS) ..... 1194
Atmospheric and Oceanic Sciences - Doctor of Philosophy (PhD) ..... 1196
Atmospheric and Oceanic Sciences - Graduate Certificate ..... 1196
Oceanography - Graduate Certificate ..... 1197
Behavioral Genetics ..... 1197
Behavioral Genetics - Graduate Certificate ..... 1197
Biochemistry ..... 1199
Biochemistry - Master of Science (MS) ..... 1203
Biochemistry - Doctor of Philosophy (PhD) ..... 1203
Molecular Biophysics - Graduate Certificate ..... 1204
Chemistry ..... 1205
Chemistry - Master of Science (MS) ..... 1211
Chemical Physics - Doctor of Philosophy (PhD) ..... 1211
Chemistry - Doctor of Philosophy (PhD) ..... 1213
Classics ..... 1215
Classics - Master of Arts (MA) ..... 1220
Classics - Doctor of Philosophy (PhD) ..... 1222
Cognitive Science ..... 1223
Cognitive Science - Doctor of Philosophy (PhD) ..... 1224
Ecology and Evolutionary Biology ..... 1226
Ecology and Evolutionary Biology - Master of Arts (MA) ..... 1231
Ecology and Evolutionary Biology - Doctor of Philosophy (PhD) ..... 1232
Economics ..... 1232
Economics - Master of Arts (MA) ..... 1236
Economics - Doctor of Philosophy (PhD) ..... 1237
English ..... 1239
Creative Writing - Master of Fine Arts (MFA) ..... 1243
English - Master of Arts (MA) ..... 1245
English - Doctor of Philosophy (PhD) ..... 1247
Environmental Studies ..... 1249
Environment - Master of the Environment (MENV) ..... 1253
Environmental Studies - Master of Science (MS) ..... 1255
Outdoor Recreation Economy - Master of Science (MS) ..... 1257
Building Resilient Communities through the Outdoor Recreation Economy - Graduate Certificate ..... 1258
Inclusivity and Belonging in the Outdoor Recreation Economy - Graduate Certificate ..... 1259
Introduction to the Outdoor Recreation Economy - Graduate Certificate ..... 1259
Leading a Sustainable Business in the Outdoor Recreation Industry - Graduate Certificate ..... 1260
Public Lands and Natural Resources Policy - Graduate Certificate ..... 1260

Environmental Studies - Doctor of Philosophy (PhD) ..... 1261
Ethnic Studies ..... 1262
Critical Ethnic Studies - Doctor of Philosophy (PhD) ..... 1265
Critical Ethnic Studies - Graduate Certificate ... 1266
French and Italian ..... 1267
French - Master of Arts (MA) ..... 1269
French - Doctor of Philosophy (PhD) ..... 1270
Geography ..... 1273
Geography - Master of Arts (MA) ..... 1278
Geography - Doctor of Philosophy (PhD) ..... 1279
Development Studies - Graduate Certificate ..... 1280
Population Studies - Graduate Certificate ..... 1281
Geological Sciences ..... 1282
Geology - Master of Science (MS) ..... 1290
Geology - Doctor of Philosophy (PhD) ..... 1290
Geophysics - Doctor of Philosophy (PhD) ..... 1291
Geophysics - Graduate Certificate ..... 1292
Germanic and Slavic Languages and Literatures .... 1292
German Studies - Master of Arts (MA) ..... 1298
Russian, East European and Eurasian Studies - Master of Arts (MA) ..... 1300
German Studies - Doctor of Philosophy (PhD) .. 1302
Critical Theory - Graduate Certificate ..... 1304
History ..... 1305
History - Master of Arts (MA) ..... 1313
History - Doctor of Philosophy (PhD) ..... 1314
Integrative Physiology ..... 1315
Integrative Physiology - Master of Science (MS) ..... 1319
Integrative Physiology - Doctor of Philosophy (PhD) ..... 1319
Jewish Studies ..... 1320
Jewish Studies - Graduate Certificate ..... 1321
Linguistics ..... 1322
Linguistics - Doctor of Philosophy (PhD) ..... 1327
Linguistics - Master of Arts (MA) ..... 1328
Cognitive Science - Graduate Certificate ..... 1329
Culture, Language and Social Practice - Graduate Certificate ..... 1329
Human Language Technology - Graduate Certificate ..... 1331
Teaching English to Speakers of Other Languages - Graduate Certificate ..... 1331
Mathematics ..... 1332
Mathematics - Master of Arts (MA) ..... 1338
Mathematics - Doctor of Philosophy (PhD) ..... 1339
Molecular, Cellular and Developmental Biology ..... 1339
Molecular, Cellular and Developmental Biology - Master of Arts (MA) ..... 1343
Molecular, Cellular and Developmental Biology - Doctor of Philosophy (PhD) ..... 1343
Museum and Field Studies ..... 1344
Museum and Field Studies - Master of Science (MS) ..... 1347
Museology - Graduate Certificate ..... 1349
Philosophy ..... 1350
Philosophy - Master of Arts (MA) ..... 1354
Philosophy - Doctor of Philosophy (PhD) ..... 1356
Physics ..... 1357
Physics - Master of Science (MS) ..... 1364
Physics - Doctor of Philosophy (PhD) ..... 1365
Political Science ..... 1366
Political Science - Master of Arts (MA) ..... 1373
Political Science - Doctor of Philosophy (PhD) ..... 1373
Psychology and Neuroscience ..... 1375
Psychology - Master of Arts (MA) ..... 1383
Neuroscience - Doctor of Philosophy (PhD) ..... 1383
Psychology - Doctor of Philosophy (PhD) ..... 1384
Religious Studies ..... 1385
Religious Studies - Master of Arts (MA) ..... 1387
Sociology ..... 1388
Sociology - Master of Arts (MA) ..... 1393
Sociology - Doctor of Philosophy (PhD) ..... 1393
Spanish and Portuguese ..... 1395
Spanish - Master of Arts (MA) ..... 1399
Spanish - Doctor of Philosophy (PhD) ..... 1401
Speech, Language and Hearing Sciences ..... 1402
Speech, Language and Hearing Sciences - Master of Arts (MA) ..... 1409
Audiology - Doctor of Audiology (AuD) ..... 1411
Speech, Language and Hearing Sciences - Doctor of Philosophy (PhD) ..... 1412
Speech-Language Pathology Assistant - Graduate Certificate ..... 1413

Theatre & Dance ..... 1414
Dance - Master of Fine Arts (MFA) ..... 1422
Theatre and Performance Studies - Master of Arts (MA) ..... 1426
Theatre and Performance Studies - Doctor of Philosophy (PhD) ..... 1429
Applied Shakespeare - Graduate Certificate ..... 1431
Hip-Hop Studies - Graduate Certificate ..... 1431
Women and Gender Studies ..... 1432
Gender and Sexuality Studies - Master of Arts (MA) ..... 1433
Women and Gender Studies - Graduate Certificate ..... 1435
Business ..... 1435
Programs of Study ..... 1439
Business Administration ..... 1463
Business Administration - Master of Business Administration (MBA) ..... 1486
Business Administration - Doctor of Philosophy (PhD) ..... 1493
Accounting - Master of Science (MS) ..... 1494
Business Analytics - Master of Science (MS) ..... 1495
Finance - Master of Science (MS) ..... 1496
Marketing Analytics - Master of Science (MS) ..... 1498
Real Estate - Master of Science (MS) ..... 1499
Supply Chain Analytics - Master of Science (MS) ... 1500
Taxation - Master of Science (MS) ..... 1502
Business Analytic Methods - Graduate Certificate .. 1503
Healthcare Analytics - Graduate Certificate ..... 1503
Marketing Analytics - Graduate Certificate ..... 1504
Supply Chain Analytics - Graduate Certificate ..... 1505
Supply Chain Foundations - Graduate Certificate ... 1506
Communication, Media, Design & Information ..... 1507
Programs of Study ..... 1507
Advertising, Public Relations and Media Design ..... 1507
Corporate Communication - Master of Arts (MA) ..... 1512
Strategic Communication Design - Master of Arts (MA) ..... 1513
Communication ..... 1514
Communication - Master of Arts (MA) ..... 1518
Communication - Doctor of Philosophy (PhD) .. 1520
Critical Media Practices ..... 1520
Interdisciplinary Documentary Media Practices - Master of Fine Arts (MFA) ..... 1523
Emergent Technologies and Media Art Practices - Doctor of Philosophy (PhD) ..... 1524
Emergent Technologies and Media Arts Practices - Graduate Certificate ..... 1525
Interdisciplinary Documentary Media Practices - Graduate Certificate ..... 1525
Information Science ..... 1525
Information Science - Master of Science (MS) ..... 1530
Information Science - Doctor of Philosophy (PhD) ..... 1531
Journalism ..... 1533
Journalism - Master of Arts (MA) ..... 1538
Media Research and Practice - Doctor of Philosophy (PhD) ..... 1538
Media Studies ..... 1539
Media and Public Engagement - Master of Arts (MA) ..... 1543
Media Research and Practice - Doctor of Philosophy (PhD) ..... 1544
Education ..... 1547
Policies & Requirements ..... 1547
Programs of Special Interest ..... 1548
Programs of Study ..... 1549
Curriculum and Instruction ..... 1567
Education - Curriculum and Instruction - Master of Arts (MA) ..... 1567
Education - Learning Sciences and Human Development ..... 1569
Learning Sciences and Human Development - Master of Arts (MA) ..... 1569
Educational Foundations, Policy and Practice ..... 1570
Educational Foundations, Policy and Practice - Master of Arts (MA) ..... 1570
Higher Education - Master of Arts (MA) ..... 1572
Equity, Bilingualism and Biliteracy ..... 1573
Equity, Bilingualism and Biliteracy - Master of Arts (MA) ..... 1574
Research and Evaluation Methodology ..... 1576
Education - Doctor of Philosophy (PhD) ..... 1577
Teacher Leadership ..... 1583
Teacher Leadership - Master of Arts (MA) ..... 1584
Cultivating Compassion and Dignity in Ourselves and Our Schools - Graduate Certificate ..... 1584
Designing for Learning: Inquiry-Based Pedagogy for K–12 Educators - Graduate Certificate ..... 1585

Inclusive and Special Education - Graduate Certificate ..... 1585
Leading for Change in Science Assessment Practice - Graduate Certificate ..... 1586
Social and Emotional Learning - Graduate Certificate ..... 1586
Teachers Leading Change - Graduate Certificate ..... 1587
Teaching Culturally and Linguistically Diverse Students - Graduate Certificate ..... 1587
Graduate Teacher Licensure ..... 1588
Engineering & Applied Science ..... 1592
Policies & Requirements ..... 1592
Programs of Study ..... 1593
Aerospace Engineering Sciences ..... 1593
Aerospace Engineering Sciences - Master of Science (MS) ..... 1606
Aerospace Engineering Sciences - Professional Master of Science (MSAES) ..... 1609
Aerospace Engineering Sciences - Doctor of Philosophy (PhD) ..... 1610
Astrodynamics and Satellite Navigation Systems - Graduate Certificate ..... 1611
Hypersonics - Graduate Certificate ..... 1612
Radio Frequency Engineering for Aerospace - Graduate Certificate ..... 1613
Remote Sensing - Graduate Certificate ..... 1613
Architectural Engineering ..... 1614
Architectural Engineering - Master of Science (MS) ..... 1620
Architectural Engineering - Professional Master of Science (MSAE) ..... 1621
Architectural Engineering - Doctor of Philosophy (PhD) ..... 1623
Biomedical Engineering ..... 1624
Biomedical Engineering - Master of Science (MS) ..... 1628
Biomedical Engineering - Doctor of Philosophy (PhD) ..... 1628
Chemical Engineering ..... 1629
Chemical Engineering - Master of Science (MS) ..... 1633
Biological Engineering - Doctor of Philosophy (PhD) ..... 1634
Chemical Engineering - Doctor of Philosophy (PhD) ..... 1634
Civil Engineering ..... 1635
Civil Engineering - Doctor of Philosophy (PhD) ..... 1649
Civil Engineering - Master of Science (MS) ..... 1649
Civil Engineering - Professional Master of Science (MSCVE) ..... 1650
Global Engineering - Graduate Certificate ..... 1652
Computer Science ..... 1653
Computer Science - Master of Science (MS) .... 1672
Computer Science - Master of Science (MS) Online ..... 1674
Computer Science - Professional Master of Science (MSCPS) ..... 1676
Network Engineering - Master of Science (MSNE) ..... 1681
Computer Science - Doctor of Philosophy (PhD) ..... 1683
Artificial Intelligence - Graduate Certificate (Online) ..... 1684
Creative Technology and Design ..... 1685
Creative Technology and Design - Professional Master of Science (MS) ..... 1690
Creative Technology and Design - Traditional Master of Science (MS) ..... 1692
Creative Technology and Design - Doctor of Philosophy (PhD) ..... 1692
Data Science ..... 1692
Data Science - Master of Science (MS) ..... 1693
Data Science - Master of Science (MS) Online . 1695
Data Science - Graduate Certificate ..... 1698
Data Science - Graduate Certificate (Online) .... 1698
Electrical & Computer Engineering ..... 1699
Electrical & Computer Engineering - Master of Engineering (ME) ..... 1716
Electrical & Computer Engineering - Master of Science (MS) ..... 1716
Electrical & Computer Engineering - Master of Science (MSECE) Online ..... 1717
Electrical & Computer Engineering - Professional Master of Science (MSECE) ..... 1721
Electrical & Computer Engineering - Doctor of Philosophy (PhD) ..... 1725
Photonics - Graduate Certificate ..... 1725
Engineering & Applied Science ..... 1726
Robotics - Master of Science (MS) ..... 1726
Engineering Education - Doctor of Philosophy (PhD) ..... 1728
Robotics - Doctor of Philosophy (PhD) ..... 1729

Architectural Lighting - Graduate Certificate .... 1731
Embedded Systems Engineering - Graduate Certificate ..... 1731
Power Electronics - Graduate Certificate ..... 1732
Engineering Management ..... 1733
Engineering Management - Master of Engineering (ME) ..... 1736
Engineering Management - Master of Engineering (ME) Online ..... 1737
Design for the Circular Economy - Graduate Certificate (Online) ..... 1738
Engineering Management - Graduate Certificate (Online) ..... 1739
Design for the Circular Economy - Graduate Certificate ..... 1740
Engineering Management in the Aerospace Industry - Graduate Certificate ..... 1741
Innovation and Entrepreneurship in Engineering - Graduate Certificate ..... 1741
Leadership and Management - Graduate Certificate ..... 1741
Project Management - Graduate Certificate ..... 1742
Environmental Engineering ..... 1742
Environmental Engineering - Master of Science (MS) ..... 1745
Environmental Engineering - Professional Master of Science (MSENV) ..... 1746
Environmental Engineering - Doctor of Philosophy (PhD) ..... 1748
Materials Science and Engineering ..... 1748
Materials Science and Engineering - Master of Science (MS) ..... 1751
Materials Science and Engineering - Doctor of Philosophy (PhD) ..... 1752
Mechanical Engineering ..... 1752
Mechanical Engineering - Master of Science (MS) ..... 1764
Mechanical Engineering - Professional Master of Science (MSME) ..... 1764
Mechanical Engineering - Doctor of Philosophy (PhD) ..... 1765
Biomedical Engineering - Graduate Certificate ..... 1766
Food Engineering - Graduate Certificate ..... 1767
Advanced Mechanics and Failure Analysis - Graduate Certificate ..... 1767
Mechanical Design and Product Development - Graduate Certificate ..... 1768
Interdisciplinary Programs ..... 1769
Computational Linguistics, Analytics, Search and Informatics - Master of Science (MS) ..... 1769
Organizational Leadership - Master of Science (MS) ..... 1770
College Teaching - Graduate Certificate ..... 1772
Digital Humanities - Graduate Certificate ..... 1773
Earth Data Analytics - Foundations - Graduate Certificate ..... 1773
Environmental Justice - Graduate Certificate ..... 1774
Future Faculty Development - Graduate Certificate ..... 1775
Hydrologic Sciences - Graduate Certificate ..... 1775
Interdisciplinary Quantitative Biology - Graduate Certificate ..... 1777
International Affairs - Graduate Certificate ..... 1777
Native American and Indigenous Studies - Graduate Certificate ..... 1778
Quantitative Methods for Behavioral Sciences - Graduate Certificate ..... 1779
Satellite System Design - Graduate Certificate ..... 1780
Social Innovation - Graduate Certificate ..... 1781
Space Weather and Applications - Graduate Certificate ..... 1782
Water Engineering and Management - Graduate Certificate ..... 1783
Music ..... 1784
Policies & Requirements ..... 1785
Programs of Study ..... 1786
Music ..... 1786
Music - Master of Music (MMus) ..... 1797
Music - Doctor of Philosophy (PhD) ..... 1803
Artist Diploma: Chamber Music Performance - Graduate Certificate ..... 1805
Artist Diploma: Opera and Solo Vocal Performance - Graduate Certificate ..... 1805
Artist Diploma: Orchestral Performance - Graduate Certificate ..... 1806
Artist Diploma: Solo Instrumental Performance - Graduate Certificate ..... 1806
Artist Diploma: String Quartet Performance - Graduate Certificate ..... 1806
Artist Diploma: Vocal Coaching - Graduate Certificate ..... 1807
Arts Administration - Graduate Certificate ..... 1808
Music Theory - Graduate Certificate ..... 1808
Music Education ..... 1808

Music Education - Master of Music Education (MMusEd) ..... 1817
Musical Arts ..... 1818
Musical Arts - Doctor of Musical Arts (DMA) ..... 1821
Continuing Education Catalog ..... 1826
Academic Integrity ..... 1827
Student Affairs ..... 1828
Health & Wellness ..... 1828
Student Conduct & Colorado Creed ..... 1829
Student Resources ..... 1831
Student Data Privacy ..... 1832
Tuition Classification ..... 1833
University Policies ..... 1834
Law ..... 1837
Academic Calendar & Exams ..... 1841
Academic Integrity ..... 1841
Academic Records ..... 1842
Admissions ..... 1843
Credits & Grading ..... 1843
Graduation ..... 1844
Registration & Enrollment ..... 1845
Student Affairs ..... 1845
Health & Wellness ..... 1845
Housing ..... 1846
Student Conduct & Colorado Creed ..... 1847
Student Resources ..... 1849
Student Data Privacy ..... 1849
Student Finances ..... 1851
Tuition Classification ..... 1851
University Policies ..... 1852
Programs of Study ..... 1854
Law - Master of Laws (LLM) ..... 1883
Law - Master of Studies in Law (MSL) ..... 1884
Law - Juris Doctor of Laws (JD) ..... 1885
American Indian Law - Graduate Certificate ..... 1888
Civil Rights and Racial Justice - Graduate Certificate ..... 1889
Entrepreneurial Law - Graduate Certificate ..... 1890
Environmental, Natural Resources and Energy Law - Graduate Certificate ..... 1891
Health Law and Policy - Graduate Certificate ..... 1891
International Law - Graduate Certificate ..... 1892
Juvenile and Family Law - Graduate Certificate ..... 1893
Tax Emphasis - Graduate Certificate ..... 1894
CU Boulder Online Catalog ..... 1895
Academic Calendar ..... 1895
Academic Integrity ..... 1895
Academic Offerings ..... 1896
Academic Records ..... 1896
Academic Standards & Advising ..... 1898
Admissions ..... 1899
Registration & Enrollment ..... 1899
Student Data Privacy ..... 1900
Student Finances ..... 1902
Tuition Classification ..... 1904
University Policies ..... 1905
Micro-credential Programs Catalog ..... 1908
Programs of Study ..... 1908
Applied Public Writing - Micro-credential ..... 1908
Arduino - Design and Implementation Fundamentals - Micro-credential ..... 1908
Arts Administration - Micro-credential ..... 1908
Asynchronous Teaching & Course Design: Foundations - Micro-credential ..... 1909
Business Analytics - Micro-credential ..... 1909
Caregiving and Collaborative Problem Solving - Micro-credential ..... 1910
Climate Action for Business - Micro-credential ..... 1910
Climate Justice Leadership Ally - Micro-credential ..... 1910
College Teaching in Practice - Micro-credential ..... 1910
DEI-Informed Dialogic Pedagogy - Micro-credential ..... 1911
Designing and Executing Social Innovations - Micro-credential ..... 1911
Entrepreneurial Startup Skills - Micro-credential ..... 1911
Equity-Oriented Partnerships - Micro-credential ..... 1912
Foundations in Compassion & Mindfulness - Micro-credential ..... 1912
Foundations in High-Performance Computing - Micro-credential ..... 1913
Foundations in Research Skills for Community College - Micro-credential ..... 1913
Foundations in Science Communication for Community College - Micro-credential ..... 1913
Foundations in Sustainable Leadership - Micro-credential .. 1914
Foundations of Integrated Water Resources Management for WaSH Professionals - Micro-credential ..... 1914
Girls on Rock: Science, Art and Wilderness Skills - Micro-credential ..... 1914

Inclusive Research Mentoring - Micro-credential ..... 1915
Innovating Happiness - Micro-credential ..... 1915
Integrated Project Delivery for Construction - Micro-credential ..... 1915
Introduction to Environmental Data Science - Micro-credential ..... 1915
Just & Equitable Teaching - Micro-credential ..... 1916
Online Teaching Academy - Micro-credential ..... 1916
Principles of College Teaching - Micro-credential ..... 1917
Project Leadership Skills for Quantum Workers - Micro-credential ..... 1918
Research Communication & Presentation - Micro-credential ..... 1918
Research Data Foundations - Micro-credential ..... 1918
Solving Societal Problems - Micro-credential ..... 1919
Sustainability Innovation - Micro-credential ..... 1919
Teaching International Students - Micro-credential ..... 1920
Tech Frontiers - Data Science - Micro-credential ..... 1920
Tech Frontiers - Machine Learning - Micro-credential ..... 1920
The CHANGE Collective - Micro-credential ..... 1921
Universal Design for Learning - Micro-credential ..... 1922
Values-Based Leadership - Micro-credential ..... 1922
Workplace Skills for Student Employees - Micro-credential . 1923
Courses A-Z ..... 1924
Accounting (ACCT) ..... 1924
Advertising, PR and Media Design (APRD) ..... 1927
Aerospace Engineering (ASEN) ..... 1936
Air Force Aerospace Studies - ROTC (AIRR) ..... 1951
Anthropology (ANTH) ..... 1952
Applied Math (APPM) ..... 1965
Arabic Languages (ARAB) ..... 1973
Architectural Engineering (AREN) ..... 1975
Architecture (ARCH) ..... 1981
Art Film Studies (ARTF) ..... 1982
Art History (ARTH) ..... 1984
Art Studio and Non-Studio (ARTS) ..... 1992
Arts & Humanities (AHUM) ..... 2006
Arts and Sciences Courses (ARSC) ..... 2008
Asian Studies (ASIA) ..... 2011
Astrophysical and Planetary Sciences (ASTR) ..... 2013
ATLAS (ATLS) ..... 2019
Atmospheric and Oceanic Sciences (ATOC) ..... 2029
Baker Residential Academic Program (BAKR) ..... 2036
BCOR Applied Semester Experience (BASE) ..... 2036
Biochemistry (BCHM) ..... 2037
Biological Engineering (BIEN) ..... 2042
Biomedical Engineering (BMEN) ..... 2044
Business Administration (BADM) ..... 2049
Business Core (BCOR) ..... 2050
Business Environment and Policy (BPOL) ..... 2051
Business Law (BSLW) ..... 2053
Business Minor (BUSM) ..... 2053
Business of Nonprofit (BUSO) ..... 2055
Career Services (CSVC) ..... 2055
Center for Western Civilization (CWCV) ..... 2055
Center of the American West (CAMW) ..... 2055
Central and East European Studies (CEES) ..... 2056
Chemical Engineering (CHEN) ..... 2056
Chemistry (CHEM) ..... 2062
Chinese (CHIN) ..... 2070
Cinema Studies & Moving Image Arts (CINE) ..... 2075
Civil Engineering (CVEN) ..... 2082
Classics (CLAS) ..... 2099
College of Communication, Media, Design & Information (CMDI) ..... 2107
College of Engineering and Applied Science (COEN) ..... 2109
Communication (COMM) ..... 2111
Communication Residential Academic Program (COMR) ..... 2117
Comparative Literature (COML) ..... 2117
Computer Science (CSCI) ..... 2117
Computer Science Online (CSCA) ..... 2139
Computer Science Post-Baccalaureate (CSPB) ..... 2144
Critical Media Practices (CMDP) ..... 2147
Curriculum Emphasis in Social Responsibility (CESR) ..... 2153
Dance (DNCE) ..... 2154
Danish (DANE) ..... 2162
Data Science Online (DTSA) ..... 2163
Digital Humanities (DHUM) ..... 2169
Ecology and Evolutionary Biology (EBIO) ..... 2169
Economics (ECON) ..... 2181
Education (EDUC) ..... 2190
Electrical & Computer Engineering (ECEN) ..... 2218
Electrical & Computer Engineering Online (ECEA) ..... 2240
Energy Engineering (ENEN) ..... 2251
Engineering for Developing Communities (EDEN) ..... 2252

Engineering Honors (EHON) ..... 2252
Engineering Leadership Program (ENLP) ..... 2252
Engineering Management (EMEN) ..... 2253
Engineering Management Online (EMEA) ..... 2257
Engineering, Ethics & Society (ENES) ..... 2262
English (ENGL) ..... 2265
English as a Second Language (ESLG) ..... 2279
Entrepreneurial and Small Business Management (ESBM) ..... 2280
Environment and Sustainability (ENST) ..... 2280
Environmental Design (ENVD) ..... 2281
Environmental Engineering (EVEN) ..... 2289
Environmental Product of Design (EPOD) ..... 2293
Environmental Studies (ENVS) ..... 2294
Ethnic Studies (ETHN) ..... 2301
Executive MBA (MBAE) ..... 2312
Experience Design (TDXD) ..... 2314
Farrand Residential Academic Program (FARR) ..... 2315
Farsi (FRSI) ..... 2316
Finance (FNCE) ..... 2316
First Year Exploration (FYXP) ..... 2319
First Year Seminar (FYSM) ..... 2320
French (FREN) ..... 2320
General Engineering (GEEN) ..... 2326
Geography (GEOG) ..... 2328
Geological Sciences (GEOL) ..... 2342
German (GRMN) ..... 2356
Germanic and Slavic Languages and Literatures (GSLL) ..... 2363
Global Studies Residential Academic Program (GSAP) ..... 2363
Graduate School (GRAD) ..... 2364
Graduate Teacher Education (GRTE) ..... 2364
Greek Language (GREK) ..... 2364
Hebrew (HEBR) ..... 2365
Hindi/Urdu (HIND) ..... 2367
History (HIST) ..... 2368
Honors (HONR) ..... 2394
Humanities (HUMN) ..... 2396
Indonesian (INDO) ..... 2403
Information Management and Business Analytics (BAIM) ..... 2404
Information Science (INFO) ..... 2405
Integrative Physiology (IPHY) ..... 2413
Intermedia Art, Writing and Performance (IAWP) ..... 2420
International Affairs (IAFS) ..... 2420
International Business (INBU) ..... 2423
INVST Community Studies (INVS) ..... 2424
Italian (ITAL) ..... 2426
Japanese (JPNS) ..... 2430
Jewish Studies (JWST) ..... 2435
Journalism (JRNL) ..... 2441
Korean (KREN) ..... 2449
Landscape Architecture (LAND) ..... 2451
Language Technology (LGTC) ..... 2451
Latin American Studies (LAMS) ..... 2452
Latin Language (LATN) ..... 2452
Law School (LAWS) ..... 2454
Leadership (LEAD) ..... 2482
Lesbian, Gay and Bisexual Studies (LGBT) ..... 2483
Libby Residential Academic Program (LIBB) ..... 2484
Libraries (LIBR) ..... 2485
Linguistics (LING) ..... 2486
Management (MGMT) ..... 2494
Marketing (MKTG) ..... 2496
Master of the Environment (ENVM) ..... 2498
Materials Science and Engineering (MSEN) ..... 2507
Mathematics (MATH) ..... 2508
MBA Advanced Electives (MBAX) ..... 2517
MBA Core (MBAC) ..... 2526
Mechanical Engineering (MCEN) ..... 2528
Media Research and Practice (MDRP) ..... 2546
Media Studies (MDST) ..... 2546
Medieval and Early Modern Studies (MEMS) ..... 2553
Military Science - Army ROTC (MILR) ..... 2554
Molecular, Cellular and Developmental Biology (MCDB) ..... 2555
MS Business Core (MSBC) ..... 2565
MS Business Electives (MSBX) ..... 2566
Museum (MUSM) ..... 2569
Music (MUSC) ..... 2572
Music Electives (MUEL) ..... 2591
Music Ensemble (EMUS) ..... 2593
Natural Sciences (NASC) ..... 2598
Naval Science - ROTC (NAVR) ..... 2598
Neuroscience (NRSC) ..... 2599
Norlin Scholars (NRLN) ..... 2603
Operations and Information Management (OPIM) ..... 2603
Operations Management (OPMG) ..... 2604

Organization Management (ORMG) ..... 2604
Organizational Leadership (ORGL) ..... 2605
Outdoor Recreation (OREC) ..... 2608
Peace and Conflict Studies (PACS) ..... 2611
Performance Music (PMUS) ..... 2612
Philosophy (PHIL) ..... 2616
Physics (PHYS) ..... 2627
Planning and Urban Design (PLAN) ..... 2636
Political Science (PSCI) ..... 2636
Portuguese (PORT) ..... 2652
Presidents Leadership Class (PRLC) ..... 2654
Psychology (PSYC) ..... 2655
Quechua (QUEC) ..... 2664
Real Estate (REAL) ..... 2665
Religious Studies (RLST) ..... 2666
Robotics (ROBO) ..... 2673
Russian (RUSS) ..... 2674
Russian, East European and Eurasian Studies (REES) ..... 2676
Sanskrit (SNSK) ..... 2682
Scandinavian (SCAN) ..... 2682
Sewall Residential Academic Program (SEWL) ..... 2684
Social Sciences (SSCI) ..... 2684
Sociology (SOCY) ..... 2685
Spanish (SPAN) ..... 2695
Speech, Language and Hearing Sciences (SLHS) ..... 2703
Statistics (STAT) ..... 2711
Sustainability and Social Innovation Residential Academic Program (SSIR) ..... 2716
Swedish (SWED) ..... 2716
Technology, Cybersecurity & Policy (CYBR) ..... 2717
Telecommunications (TLEN) ..... 2720
Theatre (THTR) ..... 2721
Theatre and Dance (THDN) ..... 2731
Thesis Music (TMUS) ..... 2731
Tibetan (TBTN) ..... 2734
Women and Gender Studies (WGST) ..... 2735
Writing and Rhetoric (WRTG) ..... 2743
Yiddish (YIDD) ..... 2746
Faculty A-Z ..... 2747
Catalog Archive ..... 2834
Index ..... 2835

# UNIVERSITY OF COLORADO BOULDER

The 2025–26 *University of Colorado Boulder Catalog* contains a summary of campus offerings, policies and requirements; descriptions of colleges, schools and departments; and degree requirements, course descriptions and faculty listings as of March 2025. Students should refer to the degree, major, minor and certificate requirements listed at the time they formally enter a program. For more information, consult the appropriate dean's office.

Because the catalog is compiled in advance of the academic year it covers, changes may occur. For up-to-date information, consult departmental advisors, check departmental bulletin boards, visit Buff Portal (https://buffportal.colorado.edu/) and review registration materials distributed each semester. All catalog information is subject to change without notice or obligation.

To view previous years' catalogs, visit the catalog archive (p. 2834).

# ABOUT CU BOULDER

## General Information

As one of only 38 U.S. public research institutions in the Association for American Universities (AAU), the University of Colorado Boulder is all about realizing the positive impacts of new knowledge. From offering dozens of exciting programs in a range of academic fields, to serving as one of the world's most dynamic research and innovation hubs, to working closely through hundreds of public outreach efforts with communities across Colorado and the world, we take pride in helping our students, faculty, staff and partners turn new ideas into productive outcomes that change lives.

### Students

With an enrollment of more than 38,000 students, CU Boulder is the largest of the four-campus University of Colorado system. The student population comes from every state in the nation and almost 100 foreign countries. Many different ethnic, religious, academic and social backgrounds are represented, fostering the development of a multicultural academic community that enriches each student's educational experience.

### Faculty

CU Boulder has more than 1,200 tenured and tenure-track faculty, with 97% holding doctorates or appropriate terminal degrees. The faculty includes nationally and internationally recognized scholars with many academic honors and awards:

- David Wineland won the 2012 Nobel Prize in physics.
- Several CU Boulder research faculty from the National Snow and Ice Data Center shared the 2007 Nobel Peace Prize with former Vice President Al Gore for their contributions to the international report of the Intergovernmental Panel on Climate Change.
- John Hall won the 2005 Nobel Prize in physics.
- Carl Wieman and Eric Cornell won the 2001 Nobel Prize in physics.
- Tom Cech won the 1989 Nobel Prize in chemistry.
- Nine faculty have received MacArthur Fellowships.
- Twenty-six active or retired faculty are members of the National Academy of Sciences, all of whom are included in the membership of the American Academy of Arts and Sciences.
- Fifteen faculty are members of the National Academy of Engineering.
- Six faculty are members of the National Academy of Education.

Most faculty members, including full professors, teach both undergraduate and graduate classes. Faculty members incorporate their research and creative activities directly into instructional programs. Faculty participate in campus governance through the Faculty Senate and the Faculty Assembly. Students participate through the University of Colorado Student Government (CUSG) and the United Government of Graduate Students (UGGS).

### Academic Offerings

The Boulder campus offers approximately 4,600 different courses in approximately 160 distinct fields of study and 241 degree programs across the baccalaureate, master's, doctoral and professional levels. These courses represent a full range of disciplines in the humanities, the social sciences, the physical and biological sciences, engineering, the fine and performing arts, and the professions.

### Research

CU Boulder is home to more than 2,400 nationally and internationally recognized research faculty who have earned a global reputation for outstanding teaching, research and creative work across more than 160 academic disciplines. While the classroom is the location for most instructional activities, laboratories, seminars and field work also are important features of the undergraduate and graduate experience. Students can become involved in research and creative work as early as their first year.

CU Boulder's sponsored research portfolio continues to grow. Since fiscal year 2015, CU Boulder has experienced 74 percent growth in research awards. Federal agency funding remains the mainstay of CU research, with 67 percent of awards coming directly from those sources. Five federal agencies are consistently the largest funding sources for CU Boulder awards:

- NASA
- National Science Foundation
- Department of Commerce
- National Institutes of Health
- Department of Defense

CU Boulder remains the No. 1 public university recipient of NASA research awards, and continues to be a national leader in aerospace and space research. Additionally, university researchers are expanding their impact through collaborative projects with industry, other universities, nonprofits and international partners.

CU Boulder's research institutes and research centers significantly contribute to the university's research and education missions, as well as the regional economy. Research faculty in academic departments, institutes and centers are continually expanding CU Boulder's research capabilities and collaborations, resulting in new knowledge, technologies and creative work for the benefit of Colorado, the nation and the world.

For more information, see the Research (p. 20) section.

## Statutory Mission

CU Boulder's vision is grounded in its statutory mission as a national public research university. In Colorado statute, the university is defined as the "comprehensive graduate research university with selective admissions standards . . . offer(ing) a comprehensive array of undergraduate, master and doctoral degree programs" of what is now designated the University of Colorado system.

CU Boulder recognizes the exceptional opportunities associated with its role as a research university, and values the unique strength and character research achievements bring to undergraduate education. It is keenly aware of its responsibility for educating the next generation of citizens and leaders, and for fostering the spirit of discovery through research. Indeed, CU Boulder believes that its students, both graduate and undergraduate, benefit from the comprehensive mix of programs and research excellence that characterize a flagship university. Thus, CU Boulder's statutory mission is relevant today and will remain relevant tomorrow.

Since 2007, CU Boulder's strategic plan, *Flagship 2030*, has been guiding near-term actions and investments that will sustain CU's quality and competitiveness and, through visionary "flagship initiatives," will transform the university.

# University of Colorado History

At its first session in 1861, Colorado's territorial legislature passed an act providing for a university in Boulder. Between 1861 and 1876, Boulder residents donated land south of town and made gifts from $15 to $1,000 to match the $15,000 the state legislature appropriated for the university's construction. In 1875, Colorado residents laid the cornerstone for the university's first building, Old Main, and officially founded CU in 1876, the same year Colorado joined the Union. The university opened its doors the following year with 44 students, a president, and one instructor.

Today, the University of Colorado is a four-campus system that includes the University of Colorado Boulder, the University of Colorado Colorado Springs, the University of Colorado Denver and the University of Colorado Anschutz Medical Campus. The campuses have a combined enrollment of more than 67,000 students. To meet the needs of its students, the university system offers an extensive number of undergraduate, graduate and professional degree programs, as well as opportunities to study abroad, engage in public service and conduct research.

CU Boulder has a strong sponsored research portfolio, and the university also relies on revenues from tuition and fees, contracts and grants, investments and interest income, health services and the generous support of private foundations and donors.

An elected nine-member Board of Regents governs CU and is charged by the state constitution with the general supervision of the university and the exclusive control and direction of all its funds and appropriations, unless otherwise provided by law. The board conducts its business at regular meetings open to the public and through committees. The president is the chief administrative officer and is responsible for providing leadership to the university.

For more information, visit the CU Board of Regents (http://www.cu.edu/regents/) webpage, or the CU system (http://www.cu.edu) website.

# Enrollment and Graduation Rates

CU Boulder's fall 2024 enrollment was 38,428. The undergraduate enrollment was 31,939 of which 7,432 were entering first-year students. The number of new undergraduate transfer students who enrolled in fall 2024 was 1,608.

Among the undergraduates, 47.3 percent identified as female, 57.2 percent as residents of Colorado and 29.2 percent as racially/ethnically diverse (Black/African American, Asian Americans, Hispanic/Latino, American Indian and Pacific Islander). Forty-four percent enrolled in the College of Arts and Sciences, 20 percent in the College of Engineering and Applied Science, 13 percent in the Leeds School of Business, 12 percent in the Program in Exploratory Studies, and 11 percent, combined, enrolled in the College of Media, Communication and Information, the Program in Environmental Design, the College of Music and the School of Education.

Of the first-year students entering in summer or fall 2018 who enrolled full time, 59.2 percent had graduated within four years; 71.4 percent graduated within five years; and 74.1 percent graduated within six years. Of the students who entered in fall 2023, 90.2 percent returned for their second fall semester.

CU Boulder enrolled 6,489 graduate and professional students in master's, doctoral, law and graduate certificate programs in fall 2024. Of these, 43% were females. The five most enrolled majors for masters students were Computer Science, Aerospace Engineering Sciences, Electrical Engineering, Data Science and Master of the Environment. The most enrolled doctorate majors were Physics, Aerospace Engineering Sciences, Computer Science, Chemistry and Mechanical Engineering.

# CU Boulder Accreditation and Affiliation

Since 1913, CU Boulder has been accredited by the Higher Learning Commission (http://www.hlcommission.org/) (HLC) (800-621-7440 or 312-263-0456). In addition, several academic programs have specialized and programmatic accreditation (https://www.colorado.edu/accreditation/).

As one of 35 U.S. public research institutions belonging to the prestigious Association of American Universities (AAU), a goal at CU Boulder is to directly affect Colorado communities through collaborative research, innovation and entrepreneurship. CU Boulder faculty, staff and students work with the broader community to establish unique connections that have lasting outcomes across Colorado and around the world.

# About the Catalog

The *2025–26 University of Colorado Boulder Catalog* is an academic publication containing information about academic programs, policies and services, descriptions of colleges, schools and individual departments, academic requirements for degrees and other credentials, course descriptions and faculty listings as of Spring 2025.

The catalog is published only online in an accessible format. In accordance with requirements under the Americans with Disability Act (ADA), alternate formats are available upon request.

Because the catalog is compiled in advance of the published academic year, changes in programs and policies, while rare, may occur. Catalog information is subject to change without notice or obligation, and the University of Colorado Boulder reserves the right to change any rules or curriculum requirements at any time. The most current information may be obtained by consulting academic departments, colleges, schools or programs, and by reviewing registration materials distributed each semester.

The catalog is produced by the Office of the Registrar (http://www.colorado.edu/registrar/) at the University of Colorado Boulder (http://www.colorado.edu). Previous academic catalogs can be found in the catalog archive (p. 2834). Questions concerning the catalog may be directed to catalog@colorado.edu.

# Administration

## Board of Regents

**Nolbert Chavez** – District 7; term expires 2027
**Elliott Hood** – At large; term expires 2031
**Wanda James** – District 1; term expires 2029
**Frank McNulty** – District 4; term expires 2029
**Ken Montera** – District 5; term expires 2031
**Callie Rennison** – District 2; term expires 2027
**Ray Scott** – District 3; term expires 2031
**Ilana Dubin Spiegel** – District 6; term expires 2027
**Mark VanDriel** – District 8; term expires 2029

## University Leadership

### CU System President and President's Executive Team

**Todd Saliman** – President. BA, University of Colorado Boulder.

**Michele Ames** – Vice president of communication. BA, Wittenberg University; MA, University of Minnesota-Twin Cities.
**Annie Baccary** – Vice president for advancement administration. BA, Colorado State University.
**Judi Diaz Bonacquisti** – Vice president for collaboration. BS, Colorado State University; MBA, University of Colorado Colorado Springs; EdD, University of Colorado Denver.
**Leonard Dinegar** – Senior vice president for internal operations and chief of staff. BA, Catholic University of America; MA, University of Colorado Denver.
**Jack Finlaw** – President and chief executive officer University of Colorado Foundation. BS, Georgetown University; JD, University of Denver.
**Michael Lightner** – Vice president for academic affairs. BS, MS, University of Florida; PhD, Carnegie-Mellon University.
**Chad Marturano** – Vice president and chief financial officer. BA, Colorado State University; MA, University of Colorado Denver.
**Felicity O'Herron** – Vice president and chief human resources officer. BA, Bryn Mawr College. JD, Catholic University of America.
**Danielle Radovich Piper** – Senior vice president for external relations and strategy. BA, Colorado State University.
**Heather Retzko** – Vice president for state relations. BA, University of Colorado Boulder; MPA, University of Colorado Denver.
**Tony Salazar** – Vice president for outreach and engagement. BA, University of Denver.
**Valerie Simons** – Vice president of compliance and equity & system Title IX coordinator. BA, University of California, Berkeley; JD, Georgetown University.
**Kerry C. Tipper** – Vice president of university counsel. BA, University of Denver. JD, Northeastern School of Law.

### CU Boulder Chancellor and Chancellor's Cabinet

**Justin Schwartz** – Chancellor. BS, University of Illinois Urbana-Champaign; PhD, Massachusetts Institute of Technology.
**Russell L. Moore** – Provost. BS, University of California, Davis; PhD, Washington State University.
**Sonia DeLuca Fernández** – Senior vice chancellor for leadership support and programming. BA, MA, University of Iowa; PhD, University of Michigan.
**Katherine Eggert** – Vice chancellor and senior vice provost for academic planning and assessment. BA, Rice University; PhD, University of California Berkeley.
**Chris Ewing** – Vice chancellor for infrastructure and resilience. BEnvD, University of Colorado Boulder; MBA Colorado State University.
**Robyn Fergus** – Vice chancellor for human resources. BA, Michigan State University.
**Rick George** – Athletic director. BA, University of Illinois.
**Todd Haggerty** – Senior vice chancellor for finance and business. BS, Metropolitan State University of Denver; MPA, University of Colorado Denver.
**Amy Hutton** – Vice chancellor for enrollment management. BA, DePauw University; MA, PhD, Virginia Commonwealth University.
**Katy Kotlarczyk** – Vice chancellor for advancement. BA, MA, Stanford University; MBA, DePaul University.
**Jon Leslie** – Vice chancellor for strategic communications. BA, Towson University.
**Marlon Lynch** – Vice chancellor for public safety. BA, Michigan State University; MA, Boston University.
**Andrew Mayock** – Vice chancellor for sustainability. BA, University of Illinois; JD, George Washington University; MPA, Harvard University.
**Jennifer McDuffie** – Interim senior vice chancellor for operations. BS, Mississippi University for Women; MS, Mississippi State University; EdD, University of Colorado Denver.
**D'Andra Mull** – Vice chancellor for student affairs. BA, Kent State University; MA, Michigan State University; PhD, The Ohio State University.
**Massimo Ruzzene** – Senior vice chancellor for research and innovation & dean of the institutes. PhD, Politecnico di Torino.
**Ann Schmiesing** – Interim vice chancellor for strategic initiatives. BA, Willamette University; MA, University of Washington; PhD, University of Cambridge.
**Marin Stanek** – Vice chancellor for information technology. BA, Colorado College; MA, PhD, University of Wisconsin-Madison.

# Campus

## The Campus Setting

CU Boulder (https://www.colorado.edu/map/) is located at the foot of the Rocky Mountains, at an altitude of 5,400 feet. The Flatirons geologic formation is visible from nearly everywhere on campus. The climate is temperate, with generally pleasant days and cool evenings. On average, Boulder enjoys about 300 sunny days each year. The main campus covers 600 acres and includes about 200 buildings constructed of rough-cut Colorado sandstone with red tile roofs. The rural Italian (or Tuscan vernacular) architectural style evolved from a master plan developed by Philadelphia architect Charles Klauder in 1919. The Norlin Quadrangle, including the original Old Main building, is listed in the State and *National Register of Historic Places*. The campus has been noted as one of the most aesthetically pleasing in the country.

Boulder County encompasses five ecological zones, from 5,000 feet above sea level (plains grassland) to 14,000 feet (alpine tundra). Downtown Boulder is only 20 miles from the Continental Divide and boasts some of the most spectacular scenery in the United States. The city of Boulder, population 103,000, is committed to preserving its beautiful natural environment and is surrounded by 45,000 acres of open space.

Denver, the state's capital city, is 30 miles from Boulder. Denver offers the attractions and resources of a large metropolitan area and is accessible from Boulder by traveling on U.S. 36, also known as the Denver–Boulder Turnpike. Denver's international airport is served by most major carriers and is located approximately 60 minutes southeast of Boulder. Boulder and the Denver International Airport are connected by a public transportation system.

## Campus Map

For an interactive version of the CU Boulder campus map, along with downloadable and printable versions, visit the Campus Map (https://www.colorado.edu/map/) webpage.

## Extension Campus Information

The VA extension/branch campus information for the University of Colorado Boulder is as follows:

**Main Location – Facility Code 11802106**
University of Colorado Boulder
1725 Euclid Avenue
200 UCB
Boulder, CO 80309

**Grand Junction Location – Facility Code 11X08106**
Colorado Mesa University
1100 North Avenue

Grand Junction, CO 81501

**South Denver Location – Facility Code 11X01506**
10035 Peoria St.
Lone Tree, CO 80134

**Gunnison Location – Facility Code Pending**
Western Colorado University
1 Western Way
Gunnison, CO 80601

**Brighton Center Location – Facility Code 11X04406**
Community Reach Center
1850 Egbert St.
Brighton, CO 80601

# Research & Innovation

Research and innovation at CU Boulder is changing the world. While CU Boulder researchers, faculty and staff lead the charge, this transformational work increasingly includes collaborations with undergraduate and graduate students, postdocs, entrepreneurs, and government and industry partners.

At the heart of this focus are the diverse contributions of a wide range of world-class experts, working together in new and innovative ways to accelerate ideas through the entire innovation life cycle, from idea to impact.

Explore the diverse avenues through which CU Boulder innovators are creating impact around the world—and learn how you can participate.

# Major Research & Innovation Services and Initiatives

## Office of Contracts and Grants

The Office of Contracts and Grants (http://www.colorado.edu/ocg/) (OCG) partners with faculty and staff to prepare and submit proposals, including budgets, for external research funding. OCG is authorized to negotiate and accept sponsored research agreements on behalf of the Regents, monitor and provide guidance throughout the life of an award, and ensure final project closeout.

## Office of Research Integrity

The Office of Research Integrity (http://www.colorado.edu/innovate/ori/) supports CU Boulder's commitment to scientific and ethical integrity, as well as academic excellence in all research activities with which our students, faculty and staff are associated.

## Office of Animal Resources

The Office of Animal Resources (http://www.colorado.edu/innovate/office-animal-resources-oar/) is a service center responsible for providing high quality animal care, veterinary care and support for the research and teaching missions of CU Boulder.

## Office of Postdoctoral Affairs

The Office of Postdoctoral Affairs (http://www.colorado.edu/postdoctoralaffairs/) enhances and supports postdoctoral training and career development, helps build a sense of community among postdocs, and serves as a resource to campus and affiliated national labs.

## Research Development and Funding Opportunities

Research Development (http://www.colorado.edu/researchinnovation/fundingawards/) offers a variety of tools and resources to help faculty, students and staff identify and develop opportunities for scholarly activities.

## Industry & Foundation Relations

The Industry & Foundation Relations (https://www.colorado.edu/industry/) (IFR) team is dedicated to building collaborative, mutually beneficial relationships with industry partners and foundations. The IFR team is part of the university's effort to deliver "a partner-centric strategy and an on-campus support team that aligns financial investment in the research, discovery and creativity of Boulder's faculty and students with satisfied corporate and foundation partners."

## Venture Partners at CU Boulder

As the commercialization arm of CU Boulder, Venture Partners (https://www.colorado.edu/venturepartners/) prepares campus innovators to bring technologies and ideas to market through IP and licensing consultation, startup formation and support, early-stage funding and more.

## AeroSpace Ventures

The CU Boulder AeroSpace Ventures (http://www.colorado.edu/aerospaceventures/) initiative creates a collaborative environment in which CU Boulder's aerospace engineering and earth and space science faculty, students and industrial researchers work together to solve complex problems that lead to new discoveries and innovations.

## Grand Challenge

CU Boulder's response to the Grand Challenge (http://www.colorado.edu/grandchallenges/), *Our Space. Our Future.*, fuses CU Boulder's unique strengths in earth, space and social sciences with new technologies and partners to address the pace and pattern of changes for our environment, our resources and our planet.

## Innovation & Entrepreneurship

CU Boulder fosters an environment for innovative thinking and entrepreneurial mindsets, offering a variety of programs and resources (http://www.colorado.edu/entrepreneurship/) developed to foster and support creative ideas for new initiatives. From academic programs and student groups to community-wide support, you will find the resources and people to help you develop and launch ideas.

## Research Institutes

CU Boulder's 12 research institutes (http://www.colorado.edu/research/research-institutes/) account for more than half of all sponsored research dollars at the university—and they employ some of the most productive researchers in the country. With more than 900 researchers, students and supporting staff, the institutes make a major contribution to the university's research and education missions, as well as the local and area economy.

## Research Centers

In addition to the large research institutes, there are more than 75 research centers (http://www.colorado.edu/research/research-centers/) housed within academic departments or as subsets of the research institutes themselves. They can be found in all fields of the university, including humanities and the arts, social sciences, natural sciences, engineering, business and law.

## Research Computing

Research Computing (https://rc.colorado.edu/) provides services for researchers that include large-scale computing resources, storage of research data, high-speed data transfer capabilities, and support for data sharing. Additionally, Research Computing provides consulting in computational science and data management, and will support grant proposals by partnering or providing letters of support.

To learn more about our major research and innovation services and initiatives, visit the Research & Innovation Office (http://www.colorado.edu/researchinnovation/) webpage.

# UNDERGRADUATE CATALOG

The Office of the Vice Provost for Undergraduate Education is charged with overseeing the entire undergraduate student experience, including assessing outcomes and launching and supporting student-facing campus initiatives. The Office of Undergraduate Education develops and oversees first-year seminars and first-year interest groups; coordinates undergraduate academic policy; coordinates the campus advising structure; and is responsible for the coordination and assessment of campus retention and persistence initiatives.

The vice provost for undergraduate education oversees a variety of programs and offices that aren't affiliated with any single college but that serve all students across campus, including Air Force, Army and Naval ROTC; the Office of International Education; the presidents leadership class; special undergraduate enrichment programs, including the Boettcher and Norlin Scholars and the undergraduate research opportunities program; and the Student Academic Success Center.

Academic policies governing undergraduate education are initiated by the faculty in accordance with the laws of the Board of Regents. The Boulder Faculty Assembly is the largest of the faculty governance organizations and it interfaces with additional faculty governance groups in the colleges through a series of liaison relationships. Several advisory bodies are in place for the vice provost for undergraduate education, comprised of students, faculty and administrators  The Office of Undergraduate Education works closely with the offices of the vice chancellor for student affairs and the associate vice chancellor for enrollment management. The vice provost for undergraduate education reports to the provost.

## Academic Advising

Academic advising is a critical component in the success of undergraduate students. Its goal is to assist students in creating and achieving educational, career and life goals. Advising is more than offering information about academic courses and programs; it also involves encouraging students to formulate important questions about the nature and direction of their education. Advisors help students to explore their options and personalize their academic experience.

## Advising Centers

There are several advising centers across the Boulder campus, primarily housed in colleges and schools. Academic advisors are professional staff or faculty members who have an expertise in navigating the entire curriculum and in developing mentoring relationships with students. Students are encouraged to meet with an advisor at least once each semester.

**College of Arts & Sciences**: Serving students pursuing the natural sciences, social sciences, and arts and humanities.

**Leeds School of Business**: Serving students pursuing accounting, finance, management and marketing.

**School of Education**: Serving students pursuing Bachelor of Arts in elementary education, Bachelor of Arts in leadership and community engagement, education minor, leadership studies minor and teacher licensure.

**College of Engineering & Applied Science**: Serving students pursuing aerospace engineering; chemical and biological engineering; civil, environmental and architectural engineering; electrical, computer and energy engineering; mechanical engineering; and computer science.

**Program in Exploratory Studies**: Serving students in the Program in Exploratory Studies as well as students in any college, school or program interested in exploring different academic paths.

**College of Communication, Media, Design and Information**: Serving students pursuing advertising, PR and media design; communication; critical media practices; information science; intermedia art, writing and performance; journalism; media studies; design studies; architecture; planning; and landscape architecture.

**College of Music**: Serving students pursuing music and music performance.

**Continuing Education**: Serving students interested in evening or online courses, or who took CU Boulder classes previously and are interested in returning.

# Academic Calendar & Exams

## Academic Calendar

CU Boulder operates with standard fall and spring semesters of 15 weeks. In addition to a winter session offered in between fall and spring semesters (considered part of spring semester), classes may be offered during special sessions that run for five or seven weeks. Because of their length, special sessions have shortened add, drop and withdrawal deadlines.

The campus also offers a summer term that includes two three-week sessions (Maymester and Augmester), two five-week sessions, an eight-week session and a 10-week session. Summer sessions also have shortened deadlines (add, drop and withdrawal).

For a complete calendar of academic and financial dates and deadlines, visit the Office of the Registrar's academic calendar webpage (http://www.colorado.edu/registrar/students/academic-calendar/). (http://colorado.edu/registrar/)

The University of Colorado Boulder has a legal and moral obligation to accommodate all students who must be absent from classes or miss scheduled exams in order to observe religious holidays; and takes care to not inhibit or penalize these students for exercising their rights to religious observance. For further information, see the university policy on the observance of religious holidays and absences from classes and/or exams (http://www.colorado.edu/policies/observance-religious-holidays-and-absences-classes-andor-exams/).

### Summer 2025

| | |
|---|---|
| May 12 (Mon.) | Classes begin for Session M (Maymester) |
| May 26 (Mon.) | **Memorial Day holiday**; campus closed |
| May 30 (Fri.) | Last day of classes and final exams for Session M (Maymester) |
| June 2 (Mon.) | Classes begin for Sessions A, C and D |
| June 19 (Thurs.) | **Juneteenth holiday**; campus closed |
| July 3 (Thurs.) | Last day of classes and final exams for Session A (first five-week session) |

| | |
|---|---|
| July 4 (Fri.) | **Independence Day holiday**; campus closed |
| July 8 (Tues.) | Classes begin for Session B (second five-week session) |
| July 25 (Fri.) | Last day of classes and final exams for Session C (eight-week session) |
| Aug. 4 (Mon.) | Classes begin for Session G (Augmester) |
| Aug. 8 (Fri.) | Last day of classes and final exams for Sessions B and D (second five-week session, 10-week session) |
| Aug. 20 (Weds.) | Last day of classes and final exams for Session G (Augmester) |
| Aug. 20 (Weds.) | Degree conferral date (no campuswide ceremony) |

### Fall 2025

| | |
|---|---|
| Aug. 21 (Thurs.) | Classes begin |
| Sept. 1 (Mon.) | **Labor Day holiday**; campus closed |
| Oct. 9 (Thurs.) | Midterm reading day |
| Nov. 24–28 (Mon.–Fri.) | Fall break; no classes |
| Nov. 27–28 (Thurs.–Fri.) | **Thanksgiving holiday**; campus closed |
| Dec. 5 (Fri.) | Last day of classes |
| Dec. 6–7 (Sat.–Sun.) | End of term reading days |
| Dec. 8–12 (Mon.–Fri.) | Final exams |
| Dec. 12 (Fri.) | Degree conferral date (no campuswide ceremony) |

### Spring 2026

| | |
|---|---|
| Jan. 8 (Thurs.) | Classes begin |
| Jan. 19 (Mon.) | **Martin Luther King Jr. holiday**; campus closed |
| Feb. 26 (Thurs.) | Midterm reading day |
| March 16–20 (Mon.–Fri.) | Spring break (campus closed Friday, March 20) |
| April 24 (Fri.) | Last day of classes |
| April 25–26 (Sat.–Sun.) | End of term reading days |
| April 27–May 1 (Mon.–Fri.) | Final exams |
| May 2 (Sat.) | Degree conferral date (commencement ceremony) |

### Summer 2026

| | |
|---|---|
| May 4 (Mon.) | Classes begin for Session M (Maymester) |
| May 21 (Thurs.) | Last day of classes and final exams for Session M (Maymester) |
| May 25 (Mon.) | **Memorial Day holiday**; campus closed |
| May 26 (Tues.) | Classes begin for Sessions A, C and D |
| June 19 (Fri.) | **Juneteenth holiday**; campus closed |
| June 26 (Fri.) | Last day of classes and final exams for Session A (first five-week session) |
| Jun 30 (Tues.) | Classes begin for Session B (second five-week session) |
| July 3 (Fri.) | **Independence Day holiday (observed)**; campus closed |
| July 17 (Fri.) | Last day of classes and final exams for Session C (eight-week session) |
| July 27 (Mon.) | Classes begin for Session G (Augmester) |
| July 31 (Fri.) | Last day of classes and final exams for Sessions B and D (second five-week session, 10-week session) |
| Aug. 13 (Thurs.) | Last day of classes and final exams for Session G (Augmester) |
| Aug. 13 (Thurs.) | Degree conferral date (no campuswide ceremony) |

# Final Examinations

It is the policy of the University of Colorado Boulder to adhere to the final examination schedule as published by the Office of the Registrar each semester. Unless notified otherwise in writing during the first week of classes, students enrolled in undergraduate courses should assume that an examination will be given. While it may be appropriate not to give a final in some undergraduate courses, such as independent studies, laboratory courses, seminars, project-based courses and colloquia, final examinations are integral parts of the instructional program and should be given in all other undergraduate courses. Graduating seniors are not exempt from final examinations. Students enrolled in graduate courses should consult with their instructors on whether final examinations will be administered.

1. The final examination in a course should be given as scheduled by the Office of the Registrar and not at other times, even if the instructor and all students in a course agree to such a change. An instructor may allow individual students to take the final examination at an earlier or later time if the instructor is satisfied that an exception is based on good and sufficient reasons and if such an exception is unlikely to materially advantage or disadvantage the interests of other students in the course.
2. Students should consult with their instructors and course syllabi for final examination information for courses that are scheduled at non-standard times and are not included in the published final examination schedule.
3. Final examinations in summer courses and in courses offered during special (variable length) sessions in fall and spring semesters are typically administered on the last regular meeting day of the course. No Common Exams for multiple sections of a single course may be scheduled for special session courses.
4. The week of classes preceding the scheduled final examination period should be used primarily for continued instruction and may include the introduction of new material. For courses in sessions of ten weeks or longer, no examinations may be given during the week of classes preceding the start of the campus's final examination period; however, assignments listed in the syllabus such as papers, lab practicums, presentations, portfolios and projects may be due during that week.
5. Class sessions or graded assignments of any kind, including papers, lab practicums, presentations, portfolios and projects, may not take place or be due on a day designated in the academic calendar as a Reading Day.

6. When students have three or more final examinations on the same day, they are entitled to arrange an alternative examination time for the last exam or exams scheduled on that day. When students have two final examinations scheduled to meet at the same time, they are entitled to arrange an alternative examination time for the course that meets later in the week during the term or, if the two courses meet on the same day during the term, the course that meets later in the day. Students must make arrangements with the instructor of the affected course(s) by the standard deadline to drop a course in that term and are expected to provide supporting written information of these situations to qualify for exceptions.
7. The submission deadline for grades each semester or special session is 96 hours after the conclusion of the final examination, excluding designated university holidays.
8. The Provost (or designee), in consultation with the Senior Vice Chancellor (or designee), may either reschedule or cancel final examinations in response to inclement weather or other emergencies that result in a campus closure during the final examination period. The administration's determination of whether to reschedule or to cancel final examinations is based on the number of exam periods affected by the closure and the timing of the closure.

### Rescheduled Exams

A final examination may be rescheduled within the final examination period. Students who do not participate in a rescheduled final examination are not guaranteed any make-up examination or alternative assignment, and in such cases students will be assigned course grades based on tests, assignments and other graded work completed up to the end of the term.

### Canceled Exams

If a final examination is canceled, course grades will be assigned based on tests, assignments and other graded work completed up to the end of the term. Faculty may also offer a make-up examination and/or allow for an alternative assignment to be submitted after the final examination period. However, such opportunities must be made available to all students enrolled in the course, all final work must be received and graded no later than the end of the first week of the subsequent term (inclusive of summer session), and faculty must then submit change of record information for students whose course grades change due to their work on make-up examinations or alternative assignments.

For information about final exams, including the final exam schedules, visit the Office of the Registrar's Final Exam Schedules (https://www.colorado.edu/registrar/students/calendar/finals/) webpage.

# Academic Integrity

## Why Do We Have a Student Honor Code?

### Mission

The mission of the Honor Code at the University of Colorado Boulder is to secure an environment where academic integrity can flourish.

### Values

The Honor Code recognizes the importance of honesty, trust, fairness, respect, and responsibility and aims to instill these principles as essential features of the University of Colorado Boulder campus. The Honor Code allows all students to have responsibility for, and the ability to attain, appropriate recognition for their academic and personal achievements.

## What is a Violation?

**Academic Misconduct** includes any act in which a student gains or provides, or attempts to gain or provide, an unfair academic advantage over other students. These acts include, but are not limited to the following and also include any attempts to engage in the following:

1. **Cheating:**
   a. Use of prohibited notes, study aids, or other explicitly prohibited course materials;
   b. Allowing another party to do one's work/exam and turning in that work/exam as one's own;
   c. Copying coursework from another student or from an unauthorized source (including but not limited to internet sources);
   d. Collaborating on coursework when prohibited;
   e. Failing to abide by the specific written course instructions including, but not limited to,
      i. the extent artificial intelligence is permitted,
      ii. exams, homework assignments, and syllabi;
   f. Clicker Fraud. Using, or having someone else use, clicker technology improperly in an effort to receive academic credit.
2. **Plagiarism.** This includes, but is not limited to:
   a. Portrayal of another's work or ideas as one's own;
   b. Improper citation of another's work;
   c. Improper citation of one's own previous work;
   d. Use of paper writing services or technology (such as essay bots or other artificial intelligence) whether paid or unpaid.
3. **Resubmission.** Submitting the same or similar work for credit, including, but not limited to, homework more than once without permission from all course faculty involved.
4. **Fabrication.** Falsification or creation of data, research, or resources, or altering graded work without the prior consent of the course faculty.
5. **Lying.** Deliberate falsification with the intent to deceive as it relates to an academic submission.
6. **Bribery.** Providing, offering, or taking rewards in exchange for a grade, an assignment, or in the aiding of Academic Misconduct.
   a. Rewards include, but are not limited to: currency, tangible items, services, or recompense.
7. **Threat.** Acting to intimidate a student, staff, or faculty member for the purpose of affecting a grade or in an effort to prevent the reporting of an Honor Code allegation, or in connection with any other form of Academic Misconduct.
   a. **Retaliation.** Retaliating against or discouraging, directly or through third parties, an individual from participating in the Honor Code process. To be considered retaliation, there must be a causal connection between a materially adverse action and the act of reporting a violation or participating in an Honor Code process. A materially adverse action is one that would dissuade a reasonable person from reporting a violation, and includes, but is not limited to, intimidation, 5 threats, or coercion. A determination of whether an action is materially adverse is a fact-dependent inquiry made on a case-by-case basis by Student Conduct and Conflict Resolution (SCCR) staff.
8. **Unauthorized Access.** Gaining access to, giving access to, or use of, protected academic information including, but not limited to: CU-SIS; a faculty, student, or staff member's computer, files, and/or physical space; and/or secure information on an online server.

9. **Aiding Academic Misconduct.** Facilitating any act which may help a student to gain an unfair academic advantage including, but not limited to, any of the aforementioned acts.
    a. **Sharing course materials,** including but not limited to, personal notes, in an unauthorized online bank or forum, or crowdsourcing site whether for profit or for free, is strongly discouraged and may result in a referral to the Honor Code process.
    b. **Sharing personal authentication credentials/login information** to third party sites is strongly discouraged and may result in a referral to the Honor Code process.

## Resolution Processes

SCCR resolves alleged academic misconduct through the informal resolution process or the formal resolution process. Resolution specialists have the authority and sole discretion to determine the type of resolution process without Honor Code Advisory Board (HCAB) consultation.

### Informal Resolution

This process may generally include, but is not limited to, a meeting with a resolution specialist, completion of the assigned resolution outcomes and/or participation in the CU Restorative Justice process.

During the meeting, if the resolution specialist determines that the informal resolution process may be appropriate, the resolution specialist will offer it as an option to the responding student and address any questions the responding student may have about the process. If the responding student accepts responsibility for the alleged academic misconduct, agrees to, and completes the agreement developed during the meeting, then SCCR will consider the matter to be resolved informally. In some cases, the HCAB will also review the referrals before a final determination is made.

### Formal Resolution

This process generally includes: i. written notice of the factual allegations and alleged academic misconduct; ii. the opportunity to meet with the resolution specialist to address the allegations and provide information to the resolution specialist; iii. the resolution specialist reviewing the allegations and making factual and violation determinations based on preponderance of the evidence; and iv. written notice to the responding student of the resolution specialist's determinations.

The resolution specialist will consider the following in making this determination: i. the allegations in the Resolution Meeting Notice and the student's response to those allegations; ii. all documents and/or information that the resolution specialist finds relevant, including, without limitation, relevant documents presented by the responding student, reporting party, or any other interested party; iii. the oral or written statements of any witnesses with relevant information, as presented by the responding student, any reporting party, or other interested party, as it appears in a referral, and/or as requested by the resolution specialist; and iv. the recommendations of HCAB regarding responsibility and Resolution Outcomes related to the incident or precedent.

Questions regarding academic integrity should be directed to Student Conduct & Conflict Resolution, studentconduct@colorado.edu, 10 UCB Boulder, CO 80309, phone 303-492-5550.

The full Student Honor Code can also be viewed on the Student Conduct & Conflict Resolution (https://www.colorado.edu/sccr/) website.

# Academic Offerings

## Degrees & Majors

In order to earn a baccalaureate degree from the University of Colorado Boulder, students must meet all degree and major requirements for their program of study and earn a minimum of 120 cumulative credit hours and a minimum of a 2.00 GPA. It is important to note that some degree and program requirements are higher than these minimum standards. See college and school sections of this catalog for specific degree policies and requirements.

In addition, students at CU Boulder may pursue dual degrees, double degrees or concurrent (bachelor's–accelerated master's) degrees, or additional majors, minors and/or certificates. See the Change or Add a Major, Minor or Certificate (https://www.colorado.edu/registrar/students/degree-planning/change-add-program/#business-522) webpage for more direction.

## Dual Degrees

Dual degree programs are formally approved combined or integrated curricula for two degrees (typically at the graduate or professional levels) in complementary fields of study. These may be offered by two or more CU colleges/schools. Typically, students earn both degrees in less time than if each degree is pursued individually.

## Double Degrees

In contrast, double degrees are two (or more) degrees from the same college, school, or program (e.g., BA and BFA from Arts and Sciences) or two (or more) degrees from different colleges/schools that are earned/awarded concurrently (not approved as part of a dual-degree program (see above). Students must meet all requirements for each degree.

Students who wish to pursue an additional baccalaureate degree *after* graduating with a baccalaureate degree from CU Boulder must apply for readmission to the university. In addition, students should work with an academic advisor in the intended degree program to determine appropriate procedures and additional requirements (e.g., additional residency requirements may apply beyond course requirements for the second degree and major). Not every college and school permits students to complete an additional baccalaureate degree after graduation.

## Bachelor's–Accelerated Master's Degrees

Bachelor's–accelerated master's (BAM) degree programs are offered in several departments. These programs allow a student to receive both a bachelor's and master's degree in a shorter period of time without compromising the academic integrity of either degree.

BAM programs are open only to highly qualified CU Boulder undergraduates. Students are typically admitted during the junior year with an intent application reviewed by their program. BAM students must apply online to graduate with their bachelor's degree for the semester in which degree requirements are complete, and must also apply at that time to be formally admitted to continue with the accelerated master's program. Students wishing to continue studying toward a doctorate must formally apply for admission to the Graduate School.

Students interested in a BAM program should inquire with their program of interest for information regarding admissions and detailed program guidelines and requirements.

Please see below for currently approved BAM degree programs offered, listed by college and school. Or, explore BAM program options in the Programs A-Z section (https://catalog.colorado.edu/programs-a-z/#filter=filter_53) of the catalog.

### College of Arts and Sciences

- Art and Art History
- Chinese/Asian Languages and Civilizations
- Cinema Studies/Art and Art History
- Classics
- Ecology and Evolutionary Biology
- Ethnic Studies/Education
- French
- German Studies/German
- Integrative Physiology
- Japanese/Asian Languages and Civilizations
- Linguistics/Linguistics or Computational Linguistics, Analytics, Search and Informatics
- Mathematics
- Mathematics/Applied Mathematics
- Philosophy
- Physics
- Religious Studies
- Russian, East European and Eurasian Studies
- Statistics and Data Science/Applied Mathematics
- Theatre

### Leeds School of Business

- Accounting/Accounting or Accounting Taxation
- Finance/Accounting or Accounting Taxation
- Real Estate

### School of Education

- Ethnic Studies/Education

### College of Engineering and Applied Science

- Aerospace Engineering
- Applied Mathematics
- Architectural Engineering/Architectural Engineering or Civil Engineering
- Biomedical Engineering
- Chemical Engineering or Chemical and Biological Engineering/Chemical Engineering or Materials Science and Engineering
- Civil Engineering/Architectural Engineering or Civil Engineering
- Computer Science/Computer Science, Computational Linguistics, Analytics, Search and Informatics, Data Science or Network Engineering
- Electrical Engineering or Electrical and Computer Engineering/Electrical Engineering
- Engineering Physics/Physics
- Environmental Engineering/Civil Engineering, Environmental Engineering, or Mechanical Engineering
- Integrated Design Engineering/Environmental Engineering or Mechanical Engineering
- Mechanical Engineering/Mechanical Engineering or Materials Science and Engineering

### College of Media, Communication and Information

- Information Science

### Post Baccalaureate-Accelerated Master's Degrees

Post Baccaulaureate Accelerated Master's (PBAM) programs in engineering offer an integrated degree plan for post-bacc students. A list of PBAM programs is below.

### College of Engineering and Applied Science

- Applied Computer Science/Computer Science, Data Science, Network Engineering, or Computational Linguistics, Analytics, Search and Informatics

## Additional Majors

Some colleges and schools permit students pursuing a baccalaureate degree to graduate with more than one major (e.g., economics and French) under the same degree (e.g., BA) by completing all requirements for each major. The majors must be completed concurrently and will post to a degree record with the same graduation date. A minimum of 120 total credit hours is required for a degree with additional majors.

## Minors

Students earning a baccalaureate degree may participate in a minor program. Minors are offered in a number of undergraduate colleges, schools and programs.

## Certificates

Undergraduate students may pursue formal certificates in a variety of academic or interdisciplinary subjects. Each certificate program has unique requirements. Degree-seeking students who been verified to have completed certificate requirements will have the certificate/s posted to their academic record at the time of graduation. Nondegree students who are approved to pursue select certificate programs must be admitted through Continuing Education.

## Degree Audit

Degree audit reports are available for most degree and certificate programs to help students and advisors track requirements and progress in order to help them graduate on time. The degree audit outlines courses needed for the degree and applies college or school-defined policies, including transfer credit applicability and repeated course rules. The audit also provides hypothetical "what if" degree information. Students and advisors can access the degree audit tool through Buff Portal (https://buffportal.colorado.edu/).

# Academic Records

## Diplomas

A diploma is issued for each different degree type earned at the University of Colorado Boulder. A diploma will list degree, and dependent on the college, a student's major(s). Diplomas will not list any minors earned or a specific track or option. Undergraduate diplomas will list Latin or academic honors earned based on eligible GPA or successful participation in a honors program. Graduate students are not awarded Latin or academic honors based on GPA. Minors and eligible certificates earned will appear on the official transcript. Diplomas are mailed to all graduating students approximately eight weeks after the close of the semester in which degree requirements were completed and the student applied for graduation. Delivery windows are posted to the graduation and diplomas calendar (https://www.colorado.edu/registrar/students/

calendar/graduation/) webpage. *Note:* International students must resolve all financial obligations with CU before a diploma is issued.

CU Boulder also offers a certified electronic diploma (CeDiploma) (http://www.colorado.edu/registrar/students/graduation/cediploma/) for students who complete a university-approved degree from Fall 2015 and onwards.

Graduating students with Federal Perkins/NDSL loans must complete a loan exit interview and clear all outstanding financial balances before leaving the university. Failure to do so results in a hold on the student's record. The hold prevents registration for future terms. Students can complete a loan exit interview by contacting Heartland ECSI at 1-888-549-3274 or via the Heartland ECSI (http://www.heartlandecsi.com/)website. Questions may be directed to University Student Loans & Debt Management in the Bursar's Office at 303-492-5571, toll free at 800-925-9844.

Display diplomas or replacement diplomas may be ordered online after graduation. For more information, visit the Office of the Registrar's diplomas (http://www.colorado.edu/registrar/alumni/diplomas/)webpage.

# Enrollment & Degree Certification

Through Buff Portal (https://buffportal.colorado.edu/), students may print an official enrollment certification at no charge. Advanced registration enrollment verifications (https://www.colorado.edu/registrar/students/records/info/verifications/#after_you_039_ve_registered_amp_before_the_first_day_of_classes-1771) are available three weeks prior to the term start, and will remain available until the day before the first day of classes, to students enrolled in at least a half-time enrollment status for an upcoming term. Official certification of enrollment is available after the third week of classes of a semester. This certification may be for car insurance, loan deferments, medical coverage, scholarship purposes, etc. The Office of the Registrar can provide written confirmation of registration, enrollment or degree status upon request by current or former students.

CU Boulder has authorized the National Student Clearinghouse (NSC) to act as its agent for purposes of third party enrollment and degree verification. The NSC verifies degrees and enrollment for students who have not placed a privacy restriction on their academic record. The student's name when enrolled, social security number or student ID, and date of birth will be required for identification purposes for enrollment or degree verification. All third parties should contact the National Student Clearinghouse by phone or visit its web site for current enrollment and degree verification information, instructions and fees.

University policy determines the *academic* enrollment status and federal regulation determines the *financial aid* enrollment status. CU Boulder is required to report enrollment based on the financial aid enrollment status to the NSC. Please refer to the Office of the Registrar's enrollment status grid on the Check Your Enrollment Status (https://www.colorado.edu/registrar/students/registration/register/status/) webpage to determine your academic/financial aid enrollment status.

Students are considered to generally be in good standing with the university if they are eligible to enroll or enrolled in classes in a given term. This status applies to participation in club sports and other student organizations, unless club or association rules specify different standards for eligibility.

Students may also obtain verification of degree by ordering an official transcript or requesting an official degree certification through the Office of the Registrar.

# Transcripts

## Official Transcripts

Current and former students may order transcripts online (https://exchange.parchment.com/send/adds/?main_page=login&s_id=7i3anAeWu6K3ErXO); no IdentiKey is required. Official transcripts are available in electronic PDF or paper format. Transcripts may be ordered as either a complete academic record of courses taken at all University of Colorado campuses or as a select career (undergraduate, graduate, law or noncredit) for coursework taken after 1988.

In certain circumstances, transcripts can be withheld for ongoing financial obligations to the university or for disciplinary actions.

Official transcripts bear the signature of the registrar and the official seal of the university (not applicable to noncredit transcripts).

## Unofficial Transcripts

Currently enrolled students and alumni who have access to the student portal may view and print unofficial transcripts free of charge through Buff Portal (https://buffportal.colorado.edu/). Unofficial transcripts display the complete academic record of courses taken at the University of Colorado. However, academic institutions and potential employers generally do not accept the unofficial transcript as evidence of a student's career at CU Boulder, as this transcript does not carry the registrar's signature, the seal of the university or other security features. Unofficial transcripts are primarily used for advising and counseling in offices at University of Colorado campuses.

# Educational Record Changes

Students whose degrees have been conferred are not eligible for retroactive changes to their educational record.

# Class Level

Class level is based on the total number of credit hours passed, as follows:

| | |
|---|---|
| **Freshman** | 0–29.9 credit hours |
| **Sophomore** | 30–59.9 credit hours |
| **Junior** | 60–89.9 credit hours |
| **Senior** | 90–123.9 credit hours |
| **Fifth-Year Senior** | 124 and above credit hours |

The normal course load for most undergraduates is 15 credit hours each semester.

# Course Load

Full-time status for undergraduate students is 12 or more credit hours for fall, spring and summer semesters for financial aid purposes. For enrollment verification and academic purposes (not related to financial aid), 12 credit hours is considered a full-time load in the fall and spring semester, and 6 credit hours is considered full time in the summer. For further information, please consult the Office of Financial Aid (https://www.colorado.edu/financialaid/apply-aid/) website.

Students who receive financial aid or veterans benefits or who live in university housing should check with the appropriate office regarding course-load requirements for eligibility purposes.

# Intra-University Transfer Students

Students wishing to change colleges or schools within the CU Boulder campus follow the intra-university transfer (IUT) guidelines from the college or school into which they wish to transfer.

For more information on recommended coursework in preparation for an IUT and other criteria, students need to consult college and school sections of this catalog or talk with an academic advisor in the program to which they plan to transfer. Some colleges and schools do not accept IUT students during the summer. It is important to note that admission to a college through the IUT process is competitive, and not all students who apply are admitted. Decisions are based on course preparation, credit hours completed, grade point average and other criteria required by the specific college or school. See the Change or Add a Major, Minor or Certificate (https://www.colorado.edu/registrar/students/degree-planning/change-add-program/#business-522) webpage for more direction.

# Academic Standing

Academic standing is a measure of a student's academic success at CU Boulder. It is based upon a collective review of term GPA and cumulative CU GPA.

Academic standing is processed in fall and spring terms based on all CU classes taken, including Continuing Education classes.

A student is considered to be in good academic standing when their most recent cumulative CU GPA is 2.000 or higher. A status of "good academic standing" is not recorded on the official academic transcript.

When a student falls below the minimum standards for good academic standing with CU Boulder, they are placed on one of the following standings listed below.

## Academic Alert

The academic standing of a *first-semester* student whose cumulative CU GPA does not meet the minimum academic standard of 2.000. Academic alert is not recorded on the official transcript. Students who do not earn a cumulative CU GPA of 2.000 while on academic alert will be placed on academic warning.

## Academic Warning

The academic standing of a *continuing* student whose cumulative CU GPA does not meet the minimum academic standard of 2.000. Academic warning is not recorded on the official transcript. Students who earn a term GPA of 2.300 or higher while on academic warning can continue on academic warning for one additional term.

## Academic Agreement

The academic standing of a student whose cumulative CU GPA does not meet the minimum academic standard but who is allowed to enroll in lieu of academic suspension or academic dismissal. Academic agreements are offered by a student's home college, school or program. Academic agreement is not recorded on the official transcript.

## Academic Suspension

The academic standing of a student who did not meet the requirements of academic warning, or an academic agreement made with their college, school or program. Academic suspension is recorded on the official transcript. When a student previously on academic suspension meets the minimum academic standard of 2.000 cumulative CU GPA, they earn a status of "return to good academic standing," and this is also noted on the official transcript.

## Academic Dismissal

The academic standing of a student on academic suspension, who while conditionally enrolled, has not met the terms of their reinstatement option. Academic dismissal is recorded on the official transcript. When a student previously on academic dismissal meets the minimum academic standard of 2.000 cumulative CU GPA, they earn a status of "return to good academic standing," and this is also noted on the official transcript.

## Conditionally Enrolled

The academic standing of a student who is approved to enroll at CU Boulder under the reinstatement options for academic suspension or academic dismissal. Conditional enrollment is recorded on the official transcript.

## Reinstatement Options

Subsequent to an academic suspension, a student may be permitted to re-enroll at CU Boulder under one or more of the following conditions:

- Completes coursework through the CU Division of Continuing Education
- Completes summer coursework at any University of Colorado Campus
- Completes coursework at another institution and has a calculated virtual 2.000 GPA, and who subsequently must raise their cumulative CU GPA to the minimum academic standard of 2.000.
- A student who has not enrolled at any institution for at least one calendar year, and who subsequently must raise their cumulative CU GPA to the minimum academic standard of 2.000.

Subsequent to an academic dismissal, a student is only permitted to re-enroll at CU Boulder in summer coursework. Students who enroll in summer classes following academic dismissal are reviewed according to the following standards at the close of the summer term:

- A student who raises their cumulative CU GPA to at least a 2.000 will return to good academic standing.
- A student who earns at least a 2.500 summer term GPA, but who still has a cumulative CU GPA below 2.000, may be considered for an academic performance plan (APP) for a subsequent fall or spring semester.
- A student who earns a summer term GPA below 2.500 and whose CU cumulative GPA remains below 2.000 may not enroll again until the following summer term.

## Return to Good Academic Standing

The academic standing of a student previously on academic alert, academic warning, academic agreement, academic suspension or academic dismissal whose cumulative CU GPA meets the minimum academic standard of 2.000. "Returned to good academic standing" is recorded on the official transcript after an academic suspension or academic dismissal.

Students can use summer to return to good academic standing, but summer enrollment that negatively impacts GPA is not subject to academic standing processing.

## Additional Information

Federal regulations require students to make satisfactory academic progress in a program of study to be eligible for financial aid. For additional information, see the Satisfactory Academic Progress (SAP) Policy (http://www.colorado.edu/financialaid/policies/satisfactory-academic-progress-sap-policy/) webpage.

## Class Rank

After an undergraduate student graduates, they can receive a document that indicates their class rank among graduating students within the last year. Students in the College of Arts and Sciences and the College of Engineering and Applied Science will have a ranking within their major degree program. Students in other schools, colleges and programs will have a ranking within their college. Class rank can be viewed in Buff Portal (https://buffportal.colorado.edu/).

# Admissions

The Office of Admissions welcomes inquiries from prospective students regarding undergraduate admission. Through the admission process, the university seeks to identify applicants who will successfully complete a collegiate academic program. Admission is based on many criteria, including high school GPA (GED test scores also accepted), high school rank (if applicable), the rigor and course selection of coursework, college entrance test scores (optional), personal essays and the extent to which the Higher Education Admission Recommendations (HEAR) (p. 46) have been met.

For additional undergraduate admission information, visit the Admissions (http://www.colorado.edu/admissions/) web page.

## Visiting the Campus

Prospective students and their families are welcome to visit the Office of Admissions in Regent Administrative Center, room 125, between 9 a.m. and 5 p.m. (summer hours are 9 a.m. to 4 p.m.), Monday through Friday, except on holidays. Daily information sessions, campus tours and special all-day visit programs are offered on the fourth floor of the Center for Academic Success and Engagement (CASE) Building. Although interviews are not used in the decision-making process, you are invited to visit the campus.

The best time to see the campus is when classes are in session (September through mid-December and mid-January to the end of April, with the exception of spring break); see the academic calendar (https://www.colorado.edu/registrar/students/calendar/) for specific dates. There are dates when information sessions, campus tours and visit programs are not held due to holidays or university closures. It is important to check our website (https://www.colorado.edu/discover/) for the most current information.

## Reservations

Reservations are required for all information sessions, tours and visit programs and can be made through our Admission Visit Programs (http://www.colorado.edu/visit/admissions/) webpage. There, you'll also find complete visit program descriptions, dates, reservation forms and campus maps. If you have been admitted, you can reserve your spot through your application status page. Visit program dates for future academic years are added to the website as they become available (usually in August each year).

## Daily Information Sessions and Campus Tours

Information sessions and campus tours are held on most weekdays at 9:30 a.m. and 1:30 p.m., and select Saturdays at 10:30 a.m., during the fall and spring semesters. During the summer, information sessions and campus tours are held on most weekdays at 8:30 a.m. and 11:00 a.m.

## Campus Visit Programs

An excellent way to become acquainted with the campus is to participate in one of the campus visit programs specially designed for prospective students and their families.

These programs are offered throughout the year and provide prospective students and their families the chance to participate in information sessions, take a campus tour, learn more about residence hall life, talk with student and parent panels and meet with campus representatives. For more information about any or all of these visit programs or instructions on how to register, go to the Admission Visit Programs (https://www.colorado.edu/admissions/visit/) webpage or call the Office of Admissions.

# General Admission Information

## Choosing a Program of Study

When applying for admission, students need to choose a major in one of CU Boulder's colleges or schools. Applicants who have not decided on a major can select the Program in Exploratory Studies. This allows students to work with a group of highly-skilled advisors who can help them explore their various interests, set academic goals and customize their educational path. At the end of the first year, students can apply to transfer to one of the degree-granting academic options on campus or opt to continue with Exploratory Studies through their third semester. Students can also change their area of study, but this can result in additional course requirements that may add to the number of semesters necessary to complete a degree.

Although applicants can apply to only one CU Boulder college or school, after enrollment they can apply for transfer to another CU Boulder college or school through the intra-university transfer (IUT) process. The criteria for transferring are competitive, with each college or school establishing its own standards. Admission depends on the college or school they apply to and the timing of their IUT application.

## Double Degrees, Double Majors, Minors and Certificate Programs

There are several programs that allow students to include additional areas of academic concentration beyond their chosen major. Two different degrees, either from the same college or school, or degrees from different colleges or schools, may be earned, providing certain conditions are met. Students are admitted to one major and degree program initially but may pursue a second degree as early as their first semester of enrollment, with the exception of College of Music applicants, who can select a double degree at the time of application. Minor programs are offered in all colleges and schools except for the Program in Exploratory

Studies. Certificate programs in arts and sciences, business, engineering and music fields are also available.

## Preprofessional Study

Preprofessional advisors are available to help students interested in medicine, dentistry, physical therapy, veterinary medicine, nursing, pharmacy, physician assistant and other health professions or law. Students interested in these fields may apply to any of the majors open to new undergraduates, including the open option major in the College of Arts and Sciences. Students interested in one of the undergraduate or graduate health sciences programs offered at the University of Colorado Anschutz Medical Campus may complete preprofessional work on the Boulder campus.

For more information, see the Preprofessional Programs (p. 1089) section or visit the Pre-Health (https://www.colorado.edu/programs/prehealth-advising/) webpage.

## Music Applicants

Prospective music majors must submit both an undergraduate application for admission to the Office of Admissions, and a College of Music supplemental application.

Direct applicants to the College of Music will not receive an early action decision regardless of when they submit their application, as they must audition before receiving a decision. These applicants can expect a decision by April 1. Direct applicants to other majors who have indicated an interest in a double degree in music are able to receive an early action decision to their primary majors if their application materials are received by the early action deadline. They will learn of their music decision after auditioning and will retain their admission to their primary major regardless of the music decision.

Live auditions are required for Colorado residents and are preferred for non-residents. Live auditions are scheduled for select weekends in January and February. Other live audition times may be arranged; high quality recordings also may be submitted in lieu of a live audition.

College of Music scholarships are awarded to music majors only. First-year and college transfer students are automatically considered for merit-based music scholarships upon completion of the application process, including the audition. Transfer students who are receiving a music scholarship from their current institution must submit a scholarship release form before they can be awarded a music scholarship.

The College of Music Supplemental Application can be accessed through the application status page after submitting an application to CU Boulder. To obtain more detailed information about audition requirements, faculty and degree programs, visit the College of Music's Admissions (http://www.colorado.edu/music/admissions/) webpage.

## Teacher Education Applicants

The School of Education offers multiple pathways for teacher candidates interested in transformative careers in education.

Undergraduate students interested in K–6 Elementary Education pursue the bachelor's degree in elementary education. Students interested in K–12 Music Education complete the teacher licensure requirements while earning a Music Education degree from the College of Music. Students interested in Secondary (6–12) teacher education will complete the teacher licensure requirements while earning a bachelor's degree in a corresponding field. CU Boulder offers secondary programs in English Language Arts, Mathematics, Science, Social Studies and the following world languages: French, German, Japanese, Latin and Spanish.

Students interested in an undergraduate degree combined with teaching licensure will apply to both in the application for admission.

To understand whether CU Boulder's Teacher Licensure Programs will meet professional licensure requirements in the state where you are located and to get more information about professional licensure requirements, please visit our licensure website (https://www.colorado.edu/accreditation/professional-licensure-programs-degrees/) for information.

Refer to the School of Education section for more information about teacher education. For application and deadline information, interested students may also visit the School of Education (http://www.colorado.edu/education/) website, email EdAdvise@colorado.edu or call 303-492-6555.

## College Readiness in English and Mathematics

The state of Colorado mandates that all undergraduate students entering public institutions of higher education in Colorado be screened for college readiness in reading, writing and mathematics. To pass the screening requirements, students must present minimum test scores.

Students who have successfully completed four years each of college preparatory English and college preparatory math courses are deemed to have met the respective requirements regardless of the test score.

Students who do not meet CU Boulder's criteria for college readiness will be required to demonstrate readiness through an additional examination or to enroll in preparatory courses prior to completing the first 30 credit hours of coursework on the Boulder campus. Students who have not demonstrated reading, writing and/or mathematics readiness will receive additional details after they confirm their intent to enroll at CU Boulder.

# Admission Requirements

## First-Year Students

Students are first-year applicants if they are currently enrolled in high school, or if they have earned a high school diploma or its equivalent and have not enrolled in a college or university since graduation.

### Admission Criteria

Many factors are considered in evaluating students' applications for admission to CU Boulder. Although academic performance in high school context (high school GPA and the quality of coursework) is the most important indicator of success, other factors are also considered. These include students' college entrance test scores, should they choose to provide them (either the SAT or ACT), the trend in their grades and the extent to which the Higher Education Admission Recommendations (HEAR) have been met. For information on HEAR, see the HEAR table (p. 46).

Applicants whose records reflect nontraditional grading systems, unusual curricula or high school equivalency such as the GED test will receive individual consideration.

## College Entrance Tests

CU Boulder is test optional and does not require test scores for admission consideration. If students would like to have test scores considered, they should indicate this on their Common Application. Please note, as of April 2025 the Writing and Science section of the ACT are not accepted or considered. To submit scores, students can self-report in the application, upload an unofficial score report to their application status page or submit an official score report to CU Boulder. For more information, see the Application Process (p. 34) section.

## Higher Education Admission Recommendations (HEAR)

First-year students applying to undergraduate programs are strongly encouraged to meet the following Higher Education Admission Recommendations (HEAR) (https://cdhe.colorado.gov/sites/highered/files/Section%20I%20-%20Part%20F%20-%20Revised%2004-07-2023.pdf).

Students may be admitted to CU Boulder even though they have not completed all of the HEAR courses. There are no consequences if HEAR is not met. However, not completing HEAR might result in taking additional courses to meet the graduation requirements of individual majors.

## Policies Concerning Not Meeting HEAR

Students not meeting HEAR may be considered for admission on an individual basis based on the rigor of units completed as well as other admission criteria (e.g., optional test scores, GPA and world language proficiency). The policies of the Boulder campus with respect to completing HEAR coursework after enrollment are as follows.

1. Missing HEAR coursework might result in taking additional courses to meet the graduation requirements of individual majors.
2. If additional HEAR coursework is needed to meet graduation requirements, the course work must be taken for a letter grade and not pass/fail.

## Advanced Placement

CU Boulder participates in the Advanced Placement program of the College Board. Half of Boulder's entering first-year students submit Advanced Placement (AP) test scores each year. Official scores must be sent to the admissions office directly from the College Board for both first-year students and transfer students. For a guide to specific equivalencies, see the Advanced Placement (AP) Credit Table (p. 37).

For more information, write or call:

**AP Exams**
P.O. Box 6671
Princeton, NJ 08541-6671
609-771-7300 or toll free 888-225-5427
aphighered.collegeboard.org (http://aphighered.collegeboard.org)

## International Baccalaureate

The International Baccalaureate (IB) Diploma programs provide pre-university study. IB examinations, whether leading to a full IB diploma or to an IB certificate often qualify students for advanced standing at CU Boulder. In general, credit hours are granted for approved IB examinations at the higher level with a score of 4 or better.

Students admitted to the University of Colorado Boulder who graduated from high school having successfully completed the International Baccalaureate Diploma Program—and earned a score of 4 or higher on each IB subject exam—shall be granted 24 hours of college credit. If a student scores lower than 4 on any IB subject exam, the credit hours granted will be reduced accordingly. Students should check with their college or school to determine if or how the earned college credit hours apply toward degree requirements.

An official copy of the diploma with test scores must be sent to the admissions office directly from the IB organization. For a guide to specific equivalencies, see International Baccalaureate (IB) Credit Table (p. 40). For the most current information on how CU Boulder evaluates IB credit hours, visit the Credit for Coursework or Exams section of the First-Year Student Selection Process (https://www.colorado.edu/admissions/first-year/selection/) webpage.

For more information on test administration, write or call:

**International Baccalaureate Organization**
475 Riverside Drive
16th floor
New York, NY 10115
212-696-4464
www.ibo.org (http://www.ibo.org)

## First-Year Applicants Not Granted Admission

Students who are not granted admission as entering first-year students may consider transferring to CU Boulder after successful study elsewhere. Students are encouraged to look at the Transfer Guidelines (https://www.colorado.edu/admissions/transfer/credit/).

# Transfer Students

Applicants are considered transfer students if they enrolled in any college-level coursework (at another college or university, or other campus of the University of Colorado), full time or part time, since graduating from high school. Applicants are not considered transfer students if the only college-level classes they have taken were while enrolled in high school. To be considered for admission, transfer students must report all previous college work and have a high school diploma or its equivalent.

## Competitive Admission Criteria

Transfer applicants are considered for admission on the basis of transfer as well as first-year student criteria (when relevant).

CU Boulder's aim is to offer highly qualified and intellectually curious transfer students the opportunity to continue pursuing their educational goals. We practice a holistic admission review process, taking into account a variety of primary academic and secondary factors as they relate to your projected success in our competitive academic environment. You will be considered on an individual basis relative to a prediction of your academic success in the college, school or program to which you apply. For more information on competitive transfer admission guidelines, visit the Transfer Students (https://www.colorado.edu/admissions/transfer/) webpage.

### Program in Exploratory Studies

A cumulative college GPA of 2.50 or better in appropriate general education courses is required. Students are encouraged to meet the Higher Education Admission Recommendations (HEAR) (p. 46).

Note: HEAR is effective for students whose first enrollment is Summer 2023 or later; students with earlier enrollments will be held to previous CU Boulder MAPS requirements (https://catalog.colorado.edu/

archive/2022-2023/undergraduate/admissions/minimum-academic-preparation-standards/).

### College of Arts and Sciences

A cumulative college GPA of 2.50 or better in appropriate general education courses is required. Students who complete 30 credit hours of transfer-level work with a cumulative GPA of 2.70 at a Colorado community college and who apply by the equal consideration deadline are assured admission to the College of Arts and Sciences. Students are encouraged to meet the Higher Education Admission Recommendations (HEAR) (p. 46).

*Note*: Effective for students whose first enrollment is Summer 2023 or later; students with earlier enrollments will be held to previous CU Boulder MAPS requirements (https://catalog.colorado.edu/archive/2022-2023/undergraduate/admissions/minimum-academic-preparation-standards/).

### Leeds School of Business

A cumulative college GPA of 3.2 or higher and completion of microeconomics, macroeconomics and statistics (business statistics strongly preferred, but general statistics is accepted). All three prerequisite courses must be completed with a grade of B or higher.

### School of Education

The School of Education offers four bachelor's degree programs: Elementary Education, Leadership & Community Engagement, Education Studies, and Middle and High School Teaching. A cumulative college GPA of 2.75 or better as well as 24 completed college credits in general education requirements are preferred for admission consideration. Applicants with a GPA lower than 2.75 will be considered on a case by case basis. Applicants with fewer than 24 completed college credit hours will be evaluated based on both their high school and college coursework.

Elementary Education and Middle and High School Teaching are bachelor's degree + licensure programs, and have requirements beyond coursework, such as fieldwork (including student teaching), Praxis exams and professional disposition. The Elementary Education program includes an endorsement in Culturally and Linguistically Diverse Education along with the recommendation for initial teacher licensure. Secondary licensure in English, world languages, mathematics, science and social studies can be completed with or without the Middle and High School Teaching bachelor's degree, but those pursuing secondary licensure must also complete a bachelor's degree in a content area major outside of the School of Education, regardless of whether they pursue the BA. Applicants interested in K-12 music education licensure should apply directly to the College of Music.

Refer to the School of Education (p. 772) section for more information about teacher education. Interested students may also visit the School of Education (http://www.colorado.edu/education/) website.

### College of Engineering and Applied Science

A cumulative college GPA of 3.0 or higher is required. Transfer applicants must have taken courses relevant to an engineering curriculum, including at least two semesters of college-level calculus and one semester of calculus-based physics or one semester of college-level chemistry, or one semester of intro to computer programming, C++ strongly preferred. Chemical and Environmental Engineering majors must take one semester of chemistry but are encouraged to take two semesters. (Exception: students [resident or nonresident] who apply for admission for a semester which occurs within 18 months of their high school graduation date may also be competitive without having taken the above coursework, as long as their high school academic record is competitive. In addition, if any college-level work has been completed, an overall GPA should be 3.0 or higher). All prerequisite courses must be completed with a grade of B or higher. Prerequisites must be completed with a grade of B or better.

The college guarantees admission to any of its baccalaureate degree programs to students transferring from Colorado public institutions of higher education who meet the College of Engineering and Applied Science Guaranteed Admission Criteria for Colorado Transfers (https://www.colorado.edu/engineering/admissions/transfer/).

### College of Communication, Media, Design and Information

For all CMDI transfer students an overall college GPA of 3.0 or higher is required.

For all majors **except environmental design majors**, students with more than 36 credit hours must have completed an introductory course in the major they intend to pursue with a grade of B or better and with a GPA of 3.0 or higher.

- Communication majors: Public Speaking OR Group Communication
- Information Science majors: Intro to Computer Science OR Intro to Programming
- Journalism majors: Media News and Reporting OR New Media/Internet Media
- Media Production majors: Intro to Film Art (Colorado community colleges only) or Intro to Critical Media Practices (non-Colorado community colleges)
- Media Studies majors: Intro to Mass Media
- Strategic Communication majors: Intro to Public Relations OR an equivalent Principles of Public Relations course

For **Environmental Design majors**, a college GPA of 3.0 or higher is required. Preference is given to students who have had drafting, architecture and/or fine arts courses in college. A good math and science background is also essential.

### College of Music

A cumulative college GPA of 2.75 or higher and an audition of all applicants is required. More information may be found at the College of Music Undergraduate Transfer Students (https://www.colorado.edu/music/admissions/transfer-students/) webpage.

## College Entrance Tests

ACT or SAT scores are not required for transfer students, but students may provide self-reported scores if they would like us to take their scores into consideration when reviewing their application.

Students' highest scores are used in the admission decision. If the same test is taken more than once, the scores on each subsection are combined to give the highest overall score. SAT subject test scores are not required. For more information, visit the Selection Process (https://www.colorado.edu/admissions/process/transfer/) website.

## Higher Education Admission Recommendations (HEAR)

Transfer students applying to undergraduate programs are strongly encouraged to meet the following Higher Education Admission Recommendations (HEAR) (https://cdhe.colorado.gov/sites/highered/files/Section%20I%20-%20Part%20F%20-%20Revised%2004-07-2023.pdf).

Students may be admitted to CU Boulder even though they have not completed all of the HEAR courses. There are no consequences if HEAR is not met. However, not completing HEAR might result in taking

additional courses to meet the graduation requirements of individual majors.

# International Students

## International Degree-Seeking Students

The university invites applications from qualified international students. International applicants are those who already have, or will be applying for, a temporary U.S. visa such as F-1 and J-1. Applicants who are United States citizens, permanent residents, asylees or refugees are not considered international. These students should follow application and admission procedures for undergraduates or graduates as described elsewhere in this catalog.

More than 2,500 international students from more than 100 countries study at CU Boulder. Applications for admission are processed by the Office of Admissions. International students who wish to pursue a full-time program of study at the undergraduate or graduate level should visit the Admissions (https://www.colorado.edu/admissions/) website for admission information and online application forms.

Assistance after admission is provided by International Student and Scholar Services (https://www.colorado.edu/isss/), located in the Office of International Education. CU Boulder offers a full range of services to international students, including a host family program, orientation, special programs and activities for international students and personal attention to individual needs. For information, visit the International Student and Scholar Services Student Resources (https://www.colorado.edu/isss/student-resources/) webpage.

Intensive English language instruction is also offered by the International English Center (http://iec.colorado.edu/). For information, email ieccu@colorado.edu or call +1-303-492-5547.

Prospective graduate students should visit the Graduate School Admissions (https://www.colorado.edu/graduateschool/admissions/) website for information and application forms specific to the academic department in which they are interested. Prospective graduate students can also call the campus telephone operator at +1-303-492-1411 and ask to have the call transferred to the department of interest or write to the specific department, University of Colorado Boulder, Boulder, CO 80309.

## International Nondegree Students

The University of Colorado Boulder welcomes nondegree visiting international students from around the world. International students who are requesting a form I-20 (for an F-1 visa) are required to enroll full-time (6 credit hours in summer and 12 credit hours in fall and spring semesters). In order to maintain F-1 status, international students should not drop below full-time enrollment. Students on B-1/B-2 visas may be eligible to take one course. Visiting international students must meet relevant prerequisite courses and English proficiency requirements in order to enroll.

Email ceadvise@colorado.edu (ceadvisor@colorado.edu) for additional information.

# Readmit Students

CU Boulder undergraduate degree-seeking students who have not attended the Boulder campus for three semesters (including summer) since their last graded semester must submit the undergraduate Application for Readmission (https://www.colorado.edu/admissions/transfer/apply/readmit/) to the Office of Admissions. No application fee is required. Students who have attended any other college or university since attending CU Boulder must submit official transcripts directly from the issuing institution(s) to the Office of Admissions.

Continuing undergraduate degree-seeking students who do not attend for three or fewer semesters (including summer), and who were not academically suspended are automatically eligible to return without having to readmit (does not apply to graduate students). This policy includes degree-seeking undergraduates who are only taking classes through Continuing Education. During these semesters of non-enrollment, students' CU Boulder email and student portal accounts remain open. To return, students should register for classes during the regular enrollment period for the returning term. Students who received a refund of the confirmation deposit must repay it when returning. Consult the Withdrawal Return Chart (https://www.colorado.edu/registrar/students/withdraw-cu/) for important details.

Students who wish to pursue a second undergraduate degree must apply to a major different from the one in which they received their degree. Students may not apply for a second bachelor's degree in the Leeds School of Business or the College of Communication, Media, Design and Information.

# Nondegree Students

Students who wish to take CU Boulder courses but are not currently admitted to a degree program at the university are classified as "nondegree students." Students apply as nondegree students through the Division of Continuing Education (https://ce.colorado.edu/). Nondegree students may enroll in credit classes through the ACCESS (Available Credit Courses for Eligible Special Students) Program, the Evening Credit Program, the Online Credit Program, the Applied Music Program and Summer Session.

All nondegree students must have completed high school or have a high school equivalency diploma. Nondegree applicants under the age of 23 not enrolled in high school must meet criteria similar to first-year students entering CU Boulder. To determine eligibility, applicants must provide an unofficial copy of their high school transcripts or their high school equivalency scores. If students have been denied admission to an undergraduate degree program, they may not enroll as nondegree students in the ACCESS Program for the semester for which they sought degree program admission. Nondegree student admission does not guarantee future admission to any degree program.

Nondegree students may also enroll for courses on a pass/fail basis. These courses are counted toward credit hours of pass/fail coursework permitted according to the rules of the college or school to which students are admitted once they achieve degree status.

Nondegree students must maintain a 2.00 cumulative GPA. Failure to maintain the required GPA will result in the inability to continue taking classes as a nondegree student.

High school students interested in taking courses at CU Boulder apply as nondegree students through the High School Dual Enrollment Program (https://ce.colorado.edu/programs/high-school-access/) administered by the Division of Continuing Education.

International students who want to apply to the university as nondegree students should read the International Students section above. Students interested in teacher licensure should refer to the School of Education section.

### Nondegree Students Transferring to a Degree Program

Students who are currently enrolled or have been enrolled at any CU campus as nondegree students may apply for admission to an undergraduate degree program.

Students wishing to transfer to a graduate degree program should refer to the Graduate School section and individual college and school sections.

A degree-seeking applicant may transfer an unlimited number of credit hours taken as a nondegree student on any University of Colorado campus. However, applicability of these credit hours toward degree requirements is established by the colleges and schools. It is suggested that a student apply to a degree program as soon as admission requirements, including the Higher Education Admission Recommendations (HEAR) have been met. It is essential that former nondegree students actively seek academic advising in the respective college or school once they have been accepted into a degree program.

## Second Undergraduate Degree Applicants

Students may apply for a second undergraduate degree at the University of Colorado Boulder, but should explore the various options in graduate study available at the university before doing so. Students applying for a second undergraduate degree must follow transfer admission guidelines, and those students who are admitted must keep in mind that all college and major requirements must be met in order to complete degree programs satisfactorily. Restrictions mandated by general university policies, as well as specific college and school policies, include the following:

- Applicants may not apply to the major in which they received their first undergraduate degree.
- Applicants must apply to a specific major; applications for an open option or undetermined major cannot be considered.
- The Leeds School of Business, the College of Communication, Media, Design and Information, and the School of Education do not consider students who have already completed an undergraduate degree. These students are strongly encouraged to investigate graduate study.
- Students who already have an undergraduate degree from the College of Engineering and Applied Science and who desire a second undergraduate degree are strongly encouraged to investigate graduate study as an option.
- Credit hours earned as a nondegree student at the University of Colorado may not be used toward major degree requirements for a second degree in the College of Arts and Sciences.

## Students from Other CU Campuses

Students who wish to transfer to Boulder from another University of Colorado campus (Colorado Springs, Denver or Anschutz), from CU Study Abroad or from CU Continuing Education should refer to the Transfer Applicants (p. 31) section. Students should refer to their application status page for required documents. Currently enrolled degree students are not required to pay the application fee, but must complete the academic interest essay. Special consideration is given to applicants transferring from degree programs at other campuses of the University of Colorado. Coursework completed at other campuses in the University of Colorado System will be a part of the student's cumulative university record and will not be considered as transfer credit hours. However, the applicability of this coursework toward specific CU Boulder degree requirements will be determined solely by CU Boulder colleges and schools. External transfer credit presented by students to other University of Colorado campuses will be evaluated by CU Boulder guidelines upon the student's matriculation into a degree program at CU Boulder.

## Secondary Admissions Committee Review

If a student does not meet the admission criteria, an admission reader or other authorized CU Boulder employee may use their professional judgment to refer a student to a secondary committee review. Applicants referred must demonstrate academic preparation, talent and/or personal values that suggest the student will be successful given the opportunity to leverage campus support services. The secondary committee will consist of Admissions staff and authorized CU Boulder employees (as relevant). The decision of the secondary committee is final and unreviewable within the university.

# Application Process

## Application Priority Dates and Admission Notification

Applications for undergraduate degree candidates may be submitted beginning in August for the following spring, summer and fall terms.

The university reserves the right to deny admission to applicants whose total credentials reflect an inability to assume those obligations of performance and behavior deemed essential by the university and relevant to any of its lawful missions, processes and functions as an educational institution.

## First-Year Applicants

Students can apply to CU Boulder using the Common Application. Complete applications include transcripts, essays, a letter of recommendation, application fee and optional test scores.

### Spring First-Year Applicants

Spring applications are processed on a rolling basis. The Office of Admissions begins notifying applicants about admission decisions in October. Decisions are made approximately four to six weeks after an application is complete. Students with completed applications by October 1 are guaranteed an admission decision. Applications completed after this date will be reviewed on a space available basis.

### Summer and Fall First-Year Applicants

There are two admission notification periods for fall and summer candidates.

#### Non-Binding Early Action

First-year applicants who complete their file by Nov. 15 are considered early action and will receive an admission decision on or before Feb. 1.

Students meeting the non-binding, early action deadline may be admitted, deferred to Regular Decision, or denied admission. Deferred students will receive an additional review and are strongly encouraged to submit additional academic information to strengthen their applications. Students who are deferred may not receive an admission decision until April 1.

Early action students are not required to enroll at CU Boulder, but should, if they choose to attend, confirm their intent to enroll by May 1.

#### Regular Decision Application Deadline

The first-year regular decision application deadline is Jan. 15. All applicants with completed files by Jan. 15 will be notified of their admission decision no later than April 1.

Students should, if they choose to attend, confirm their intent to enroll by May 1.

# Transfer Applicants

If a student submits a complete application on or before the transfer application deadline, they will receive an admission decision within four to six weeks. A complete application includes transcripts (high school and college), academic interest response and application fee.

## Transfer Application Deadlines

- Spring Term: Oct. 1
- Summer Term: March 15
- Fall Term Early Notification: March 15
- Fall Term Regular Decision: June 1

Applications are processed on a rolling basis in the order in which they are received and completed.

# Where to Send the Application, Fee and Credentials

Materials that cannot be submitted electronically, may be mailed to:

Office of Admissions
Regent Administrative Center 125
University of Colorado Boulder
552 UCB
Boulder, CO 80309-0552

# Email and Mailing Addresses

Applicants must keep both their email and mailing addresses current at all times. We use email to communicate with students before, during and after the admissions process. The mailing address is used for mailings until the applicant arrives on campus. Notices are also sent to this address regarding admission, registration and New Student Welcome, as well as other information. If an address changes or is no longer valid, students may update this information in their application status page or notify the Office of Admissions at 303-492-6301.

# Application Checklist

- Online application for admission
- $65 nonrefundable ($70 USD for international students) application fee, payable online (if a student cannot pay the fee online, contact the Office of Admission at at 303-492-6301 or at admissions@colorado.edu)
- Unofficial high school transcript (if applicable)
- Unofficial college transcripts (if applicable)
- SAT or ACT test scores (optional)
- Common Application essay and one academic interest response (first-year applicants) or one academic interest response (transfer applicants)
- Letter of recommendation (first-year applicants only)
- Résumé or activities list (optional for first-yaer applicants)

# Confirmation Procedures

All admitted students are encouraged to confirm their intent to enroll through their application status page as soon as possible after receiving their admission notification. If a student cannot confirm their intent to enroll through their application status page, they must contact the Office of Admissions at 303-492-6301 or at admissions@colorado.edu.

## Confirmation Deadlines

- First-Year Students
  - Summer: May 1
  - Fall: May 1
  - Spring: Dec. 1
- Transfers: varies; see confirmation instructions on application status page

If students register for classes and then decide not to attend, they may be assessed tuition depending upon the circumstances. For spring and fall semester policies, visit the Office of the Registrar's Withdraw from CU (http://www.colorado.edu/registrar/students/withdraw-cu/) web page; for summer, visit Summer Session's Withdrawal (http://www.colorado.edu/summer/resources/now-youve-enrolled/withdrawal/) web page. Important policy differences exist for continuing students versus new, readmitted and transfer students.

The confirmation deposits are used as registration deposits each semester as long as registration is completed by the published deadline. Once students have attended CU Boulder, the deposit (minus any fees or other charges owed) will be returned when they graduate.

# International Students

International students need to provide additional materials before they can accept their offer of admission and submit the $200 confirmation deposit. Students must complete the Next Steps Form found on their application status page. Once the Office of Admissions receives these materials they will review them to determine if they are sufficient.

# Application Fees

## Nonrefundable Application Fee ($65/$70 for international students)

#### University of Colorado Boulder Application

Pay online when submitting the application or by check or money order (made payable to the University of Colorado) after submission. If submitting a check or money order, include the student's full legal name and birth date. We recognize that some students may be faced with financial constraints in paying the application fee. Waivers can be granted for documented hardships if the student submits an application fee waiver form. Students currently enrolled in an undergraduate degree program at another University of Colorado campus who are applying to an undergraduate degree program on the Boulder campus are not required to pay the application fee.

#### Common Application

Pay online when submitting the application. We recognize that some students may be faced with financial constraints in paying the application fee. Waivers can be granted for documented hardships if the student answers the fee waiver question indicating that one or more of the listed financial need criteria are met.

# Required Credentials

Credentials or information uploaded by an applicant will be accepted as unofficial documentation. Do not submit samples or photographs of design or artwork. A portfolio is not used for admission purposes and cannot be returned.

# Submission of Altered College Transcripts

All students applying for admission to the University of Colorado Boulder are required to provide unofficial or official, unaltered transcripts from all colleges or universities previously attended. Official transcripts are sent directly to the Office of Admissions by the former institutions and are in a sealed envelope. Digital transcripts sent directly from the institution to the Office of Admissions are also accepted.

The submission of altered, falsified or counterfeit transcripts is strictly prohibited. Altered transcripts include:

- forged signatures
- tampered grades
- any other modifications that are not in accordance with the issuing institution's official document.

The University of Colorado Boulder reserves the right to verify the authenticity of submitted transcripts by contacting the issuing institution. Applicants found to have submitted altered or falsified transcripts may be subject to a range of possible disciplinary actions, including admission revocation, expulsion or revocation of course credit, grades and degree.

Applicants who believe their transcripts were mistakenly identified as altered or falsified may have the opportunity to appeal the decision. The appeal process, including the required documentation and timeline, will be communicated to the affected individual.

## Unofficial Transcripts

For admission review purposes, we prefer official transcripts but accept unofficial transcripts. Transcripts can be uploaded to your status page in the "upload materials" section, mailed or sent to transcripts@colorado.edu.

Transcripts that are marked, for example, "student copy," "issued to student" or "unofficial" are not accepted as official.

Unofficial transcripts cannot be used to approve transfer credit hours. Your class standing will remain a first year student, regardless of the number of transfer credits you received, until official transcripts are processed. You will be required to submit official transcripts before you can register for classes or receive financial aid toward your tuition bill. Official final transcripts are required upon enrollment to verify credentials. Official transcripts are mailed or sent electronically directly to CU Boulder by the issuing institution or by the student if the transcript is still in its original sealed envelope.

## High School Transcript

All undergraduate degree-seeking students are required to have graduated from high school or received a high school equivalency prior to their first term of enrollment at CU Boulder regardless of their age at the time of application. Students should request that their high school send an official transcript of all work completed, equivalent to U.S. grade 9, directly to the Office of Admissions, regardless of the number of college hours the student has completed (if any) or the date of graduation from high school.

Transfer applicants who have completed 24 or more semester hours of work after high school graduation at the time of application do not need to submit a high school transcript unless they enroll at CU Boulder.

Students who have attended more than one high school and whose most recent transcript does not include the complete high school record must submit official transcripts from each school.

If any part of the high school record is missing from the transcript, the processing of the application will be delayed.

Students who have not graduated and do not plan to graduate from high school must request an official certificate of high school equivalency and official GED scores, plus an official transcript of any high school work (grades 9–12) completed, to be sent to the Office of Admissions.

Official transcripts must be sent to the Office of Admissions from the issuing institution either via email to transcripts@colorado.edu, via electronic transcript services (i.e Parchment), or by mail and must have the appropriate seals and signatures. All credentials written in languages other than English must be accompanied by a literal certified English translation.

## College Transcripts

Students should request that their official transcripts from each collegiate institution attended (except any campus of the University of Colorado) be sent directly from the issuing institution to the Office of Admissions. Be sure to include all institutions, regardless of the length of attendance, whether or not courses were completed and whether or not the record might affect admission or transfer credit. Also include any institutions attended during summers, interim terms and during high school.

Failure to list and submit transcripts from all institutions previously attended before enrolling at CU Boulder is considered a violation of academic ethics and may result in the cancellation of admission or dismissal from the university.

## SAT or ACT Test Scores (Optional)

ACT or SAT scores are not required for first-year students, but you may provide self-reported scores if you would like us to take your scores into consideration when reviewing your application. Please note, as of April 2025 the Writing and Science section of the ACT are not accepted or considered.

CU Boulder's SAT code is **4841** and the ACT code is **0532**.

If a student would like their scores considered, they should indicate this on their Common Application. To submit scores, a student can self-report in the application, upload an unofficial score report to their application status page, or submit an official score report to CU Boulder.

The easiest and fastest way for a student's ACT and/or SAT scores to be received by CU Boulder is to self report them using their application status page.

The student's highest scores are used in the admission decision. If a student takes the same test more than once, we combine their highest score from each subsection to give them the highest overall score. Results from SAT or ACT tests taken in December or later may not be

received in time if the student wishes to be considered for summer or fall admission of the following year.

For further information:

- consult a high school counselor
- visit the SAT website (http://www.collegeboard.com/), call 609-771-7600 or write to the College Board (SAT), P.O. Box 6200, Princeton, NJ 08541-6200
- visit the ACT website (http://www.act.org/), call 319-337-1270 or write to ACT Registration, P.O. Box 414, Iowa City, IA 52243-0414

# Personal Essays

CU Boulder requires first-year applicants to submit one short personal essay and one academic interest response and transfer applicants to submit one academic interest response. Applications without essays are considered incomplete and will not be reviewed. Personal essays are the best way for the Office of Admissions to learn about applicants as individuals and to evaluate a student's academic performance within the appropriate context. There are no "correct" answers to the questions—responses should reflect the unique aspects and experiences of the applicant. The specific essay questions are available on the application.

# Letters of Recommendation

One academic letter of recommendation will be required for all first-year applicants. The recommender can be a teacher or a school counselor. The student's full legal name should be included at the top of recommendation letters.

## Optional Documents

Applicants may submit additional letters of recommendation if they wish, however, doing so is optional. Applicants may also choose to submit a resume or list of co-curricular activities, work experience, leadership positions and awards.

College of Music applicants must also complete a College of Music application after their admission application has been submitted, submit a music essay, provide a letter of reference and schedule an audition.

# Credit by Examination

## Advanced Placement (AP) Credit

Advanced Placement (AP) credit is evaluated upon receipt of an official score report from the College Board. Credit is not granted for an AP score if the student has completed a college course that is equivalent to the course for which the student would receive AP credit.

When the credit granted for a score of 3 on an AP exam is an Arts & Sciences credit that fulfills a specific Arts & Sciences General Education or CMDI Core category, CU Boulder advises students that they are likely to be more successful in their college career if they fulfill that Core category with a CU Boulder course and use their AP credit as elective credit. There is no guarantee that all AP credit will apply to a specific degree program. The dean's office of each college and school makes the final determination for AP credits that apply toward degree requirements.

| AP Subject | Examination Title | Exam Score | CU Boulder Course Equivalent[1] | Credit Hours |
|---|---|---|---|---|
| **African American Studies** | African American Studies | 4,5 | 3 lower-division Ethnic Studies (ETHN) credits that count toward Social Science category of the A&S Gen. Ed. Distribution Requirement | 3 |
| | | 3 | 3 lower-division Arts & Sciences (ARSC) credits that count toward Social Science category of the A&S Gen. Ed. Distribution Requirement | 3 |
| **Biology** | Biology | 5, 4 | EBIO 1210, EBIO 1220, EBIO 1230 and EBIO 1240 | 8 |
| | | 3 | 4 lower-division Arts & Science credits that fulfill the lab portion of and count toward the A&S Gen. Ed. Natural Science requirement and the CMDI Core Natural World requirement | 4 |
| **Capstone** | Capstone Research | 5,4 | WRTG 1250 | 3 |
| | Capstone Seminar | 5,4 | 3 lower-division Arts & Science credits | 3 |
| **Chemistry** | Chemistry | 5 | CHEM 1113 and CHEM 1114 | 5 |
| | | 4 | CHEM 1021 | 4 |
| | | 3 | 4 lower-division Arts & Science credits that fulfill the lab portion of and count toward the A&S Gen. Ed. Natural Science requirement and the CMDI Core Natural World requirement | 4 |
| **Classics** | Latin | 5 | LATN 1024, LATN 2114 and LATN 2124 | 12 |
| | | 4 | LATN 1024 and LATN 2114 | 8 |
| | | 3 | LATN 1024 | 4 |
| **Computer Science** [1] | Computer Science A | 5 | CSCI 1300 | 4 |
| | Computer Science Principles | 5 | CSCI 1300 | 4 |
| **Economics** | Economics: Micro | 5, 4 | ECON 2010 | 4 |

| | | | | |
|---|---|---|---|---|
| | | 3 | 3 lower-division Arts & Science credits that count toward the A&S Gen. Ed. Social Science Requirement and the CMDI Core People and Society requirement | 3 |
| | Economics: Macro | 5, 4 | ECON 2020 | 4 |
| | | 3 | 3 lower-division Arts & Science credits that count toward the A&S Gen. Ed. Social Science Requirement and the CMDI Core People and Society requirement | 3 |
| **English** | English Literature and Composition | 5,4 | ENGL 1500 | 3 |
| | | 3 | 3 lower-division Arts & Science credits that count toward the A&S Gen. Ed. Arts and Humanities requirement and the CMDI Core Humanities and the Arts requirement | 3 |
| | English Language and Composition | 5,4 | WRTG 1150 | 3 |
| | | 3 | 3 lower-division Arts & Science credits that count toward the A&S Gen. Ed. and the CMDI Core lower-division writing requirements | 3 |
| **Environmental Science** | Environmental Science | 5, 4 | ENVS 1000 and 1 lower-division ENVS credit that fulfill the lab portion of and count toward the A&S Gen. Ed. Natural Science requirement | 4 |
| | | 3 | 4 lower-division Arts & Science credits that fulfill the lab portion of and count toward the A&S Gen. Ed. Natural Science requirement and the CMDI Core Natural World requirement | 4 |
| **Fine Arts** | Studio-Drawing Portfolio or Studio-General Portfolio | 5, 4 | 3 lower-division ARTS elective credits that count toward the A&S Gen. Ed. Arts and Humanities requirement and the CMDI Core Humanities and the Arts requirement | 3 |
| | Art History | 5, 4 | 3 lower-division ARTH credits that count toward ARTH and ARTS majors and the A&S Gen. Ed. Arts and Humanities requirement and the CMDI Core Humanities and the Arts requirement | 3 |
| **Geography** | Human Geography | 5, 4 | GEOG 1992 | 3 |
| | | 3 | 3 lower-division Arts & Science credits that count toward the A&S Gen. Ed. Social Science requirement and the CMDI Core People and Society requirement | 3 |
| **Government** | Comparative | 5, 4 | PSCI 2012 | 3 |
| | | 3 | 3 lower-division Arts & Science credits that count toward the A&S Gen. Ed. Social Science requirement and the CMDI Core People and Society requirement | 3 |
| | United States | 5, 4 | PSCI 1101 | 3 |
| | | 3 | 3 lower-division Arts & Science credits that count toward the A&S Gen. Ed. Social Science requirement and the CMDI Core People and Society requirement | 3 |
| **History** | US History | 5, 4 | HIST 1025 | 3 |
| | | 3 | 3 lower-division Arts & Sciences credits that count toward the A&S Gen. Ed. Arts & Humanities requirement and the CMDI Core Humanities & the Arts and Historical Perspectives requirements | 3 |
| | European History | 5, 4 | HIST 1012 | 3 |
| | | 3 | 3 lower-division Arts & Sciences credits that count toward the A&S Gen. Ed. Arts & Humanities requirement and the CMDI Core Humanities & the Arts and Historical Perspectives requirements | 3 |
| | World History | 5, 4 | 3 lower-division History credits that count toward the A&S Gen. Ed. Arts & Humanities requirement and the CMDI Core Humanities & the Arts and Historical Perspectives requirements | 3 |

| | | | | |
|---|---|---|---|---|
| | | 3 | 3 lower-division Arts & Sciences credits that count toward the A&S Gen. Ed. Arts & Humanities requirement and the CMDI Core Humanities & the Arts and Historical Perspectives requirements | 3 |
| **Mathematics** | Math-Calculus AB | 5, 4 | MATH 1300 | 5 |
| | | 3 | 3 lower-division Arts & Science credits that count toward the A&S Gen. Ed. Quantitative Reasoning & Mathematical Skills requirements and the CMDI Core Quantitative Thinking requirement | 3 |
| | Math-Calculus BC | 5, 4 | MATH 1300 and MATH 2300 | 10 |
| | Math-Calculus BC | 3 | | |
| | and AB subscore | 5,4 | MATH 1300 | 5 |
| | or AB subscore | 1,2,3 | 3 lower-division Arts & Science credits that count toward the A&S Gen. Ed. Quantitative Reasoning & Mathematical Skills requirements and the CMDI Core Quantitative Thinking requirement | 3 |
| | Precalculus | 4,5 | MATH1150 | 4 |
| | | 3 | 3 lower-division Math credits that count toward the A&S Gen. Ed. Quantitative Reasoning & Mathematical Skills requirements | 3 |
| | Statistics | 5, 4 | MATH 2510 | 3 |
| | | 3 | 3 lower-division Arts & Science credits that count toward the A&S Gen. Ed. Quantitative Reasoning & Mathematical Skills requirements and the CMDI Core Quantitative Thinking requirement | 3 |
| **Music** | Music Theory | 5 | MUSC 1101, MUSC 1111, MUSC 1121 and MUSC 1131 | 6 |
| | | 4 | MUSC 1101 and MUSC 1121 | 3 |
| | | 3 | MUSC 1081 | 3 |
| **Physics** | Physics 1 | 5, 4 | PHYS 2010 | 5 |
| | | 3 | 4 lower-division Arts & Science credits that fulfill the lab portion of and count toward the A&S Gen. Ed. Natural Science requirement and the CMDI Core Natural World requirement | 4 |
| | Physics 2 | 5, 4 | PHYS 2020 | 5 |
| | | 3 | 4 lower-division Arts & Science credits that fulfill the lab portion of and count toward the A&S Gen. Ed. Natural Science requirement and the CMDI Core Natural World requirement | 4 |
| | Physics C-Mechanics | 5 | PHYS 1110 | 4 |
| | | 4,3 | 4 lower-division Arts & Science credits that count toward the A&S Gen. Ed. Natural Science requirement and the CMDI Core Natural World requirement | 4 |
| | Physics C-Electricity and Magnetism | 5 | PHYS 1120 | 4 |
| | | 4,3 | 4 lower-division Arts & Science credits that count toward the A&S Gen. Ed. Natural Science requirement and the CMDI Core Natural World requirement | 4 |
| **Psychology** | Psychology | 5, 4 | PSYC 1001 | 3 |
| | | 3 | 3 lower-division Arts & Science credits that count toward the A&S Gen. Ed. Social Science requirement and the CMDI Core People and Society requirement | 3 |
| **World Language** | Chinese Language and Culture | 5 | CHIN 1020, CHIN 2110 and CHIN 2120 | 15 |
| | | 4 | CHIN 1020 and CHIN 2110 | 10 |
| | | 3 | CHIN 1020 | 5 |
| | French Language and Culture | 5 | FREN 2110, FREN 2120 and FREN 3050 | 9 |
| | | 4 | FREN 2110 and FREN 2120 | 6 |
| | | 3 | FREN 2110 | 3 |

| | | | | |
|---|---|---|---|---|
| | German Language and Culture | 5 | GRMN 2020 and GRMN 3010 | 7 |
| | | 4 | GRMN 2010 and GRMN 2020 | 8 |
| | | 3 | GRMN 2010 | 4 |
| | Japanese Language and Culture | 5 | JPNS 1020, JPNS 2110 and JPNS 2120 | 15 |
| | | 4 | JPNS 1020 and JPNS 2110 | 10 |
| | | 3 | JPNS 1020 | 5 |
| | Italian Language and Culture | 5 | ITAL 1020, ITAL 2110 and ITAL 2120 | 11 |
| | | 4 | ITAL 1020 and ITAL 2110 | 8 |
| | | 3 | ITAL 1020 | 5 |
| | Spanish Language and Culture[2] | 5 | SPAN 2110, SPAN 2120 and SPAN 3000 | 11 |
| | | 4 | SPAN 2110 and SPAN 2120 | 6 |
| | | 3 | SPAN 2110 | 3 |
| | Spanish Literature and Culture[2] | 5 | SPAN 1000 and SPAN 3002 | 6 |
| | | 4 | SPAN 1000 | 3 |

1 Engineering Students: Check with academic advisor in major department. Students will need the ability to learn additional programming languages for further computer science courses.

2 Students who want to continue taking Spanish courses beyond their AP credit level must take the Spanish department placement test. If the results of this test place them below their AP level, the Spanish department strongly recommends enrolling at the lower of the two levels.

*Note*: This table was prepared based on Spring 2024 exams. Credit awarded is subject to change based on faculty review of Spring 2025 exams. The credit in this table is for students who began classes at CU Boulder in the 2025–26 academic year. Students who started at CU Boulder in previous academic years must refer to the tables in the catalog for that year to find the appropriate credit.

# International Baccalaureate (IB) Credit

International Baccalaureate (IB) credit is evaluated upon receipt of an official score report from the International Baccalaureate Organization. Credit is not granted for an IB score if the student has completed a college course that is equivalent to the course for which the student would receive IB credit.

In general, credit is granted for approved International Baccalaureate (IB) examinations at the higher level with a score of 4 or better. Students admitted to the University of Colorado Boulder who have graduated from high school with an International Baccalaureate Diploma shall be granted 24 hours of college credit. This credit will be applied toward degree requirements *only* if approved by the college or school. Students admitted to the University of Colorado Boulder who graduated from high school having successfully completed the International Baccalaureate Diploma Program —and earned a score of 4 or higher on each IB subject exam—shall be granted 24 hours of college credit. If a student scores lower than 4 on any IB subject exam, the credit hours granted will be reduced accordingly. Students should check with their college or school to determine if or how the earned college credit hours apply toward degree requirements.

When the credit granted for a Standard Level IB exam is an Arts & Sciences credit that fulfills a specific Arts & Sciences General Education or CMDI Core category, CU Boulder advises students that they are likely to be more successful in their college career if they fulfill that General Education or Core category with a CU Boulder course and use their IB credit as elective credit. There is no guarantee that all IB credit will apply to a specific degree program. The dean's office of each college and school makes the final determination for IB credits that apply toward degree requirements.

| IB Subject Examination Title | Exam Level | Exam Score | CU Boulder Course Equivalent[1] | Credit Hours |
|---|---|---|---|---|
| **Anthropology** | Higher | 4 | ANTH 2100 and 3 lower-division credit hours that count toward the A&S Gen. Ed. Social Science requirement and the CMDI Core People and Society requirement | 6 |
| | Standard | 4 | 3 lower-division Arts & Sciences credits that count toward the A&S Gen. Ed. Social Science requirement and the CMDI Core People and Society requirement | 3 |
| **Biology** | Higher | 4 | EBIO 1210, EBIO 1220, EBIO 1230 and EBIO 1240 | 8 |
| | Standard | 4 | 4 lower-division Arts & Science credits that fulfill the lab portion of and count toward the A&S Gen. Ed. Natural Science requirement and the CMDI Core Natural World requirement | 4 |
| **Business and Management** | Higher | 4 | 6 lower-division BADM credit hours | 6 |
| **Chemistry** | Higher | 7 | CHEM 1113, CHEM 1114, CHEM 1133 and CHEM 1134 | 10 |
| | Higher | 6 | CHEM 1113 and CHEM 1114 | 5 |

| | | | | |
|---|---|---|---|---|
| | Higher | 5,4 | 4 lower-division Arts & Science credits that fulfill the lab portion of and count toward the A&S Gen. Ed. Natural Science requirement and the CMDI Core Natural World requirement | 4 |
| | Standard | 4 | 4 lower-division Arts & Science credits that fulfill the lab portion of and count toward the A&S Gen. Ed. Natural Science requirement and the CMDI Core Natural World requirement | 4 |
| **Chinese A: Language and Literature** | Higher | 4 | CHIN 3110, CHIN 3120 | 10 |
| | Standard | 4 | CHIN 2110, CHIN 2120 | 10 |
| **Computer Science** | Higher | 4 | CSCI 1300 | 4 |
| **Dance** | Higher | 4 | Elective DNCE credit hours; performance scores required to determine credit hours awarded | 1-3 |
| **Design Technology** | Higher | 4 | Elective credit hours | 6 |
| **Economics** | Higher | 4 | 4 lower-division ECON credits that count toward the A&S Gen. Ed. Social Science requirement and the CMDI Core People and Society requirement | 4 |
| | Standard | 4 | 3 lower-division Arts & Science credits that count toward the A&S Gen. Ed. Social Science requirement and the CMDI Core People and Society requirement | 3 |
| **English A: Literature** | Higher | 4 | ENGL 1500 | 3 |
| | Standard | 4 | 3 lower-division Arts & Science credits that count toward the A&S Gen. Ed. Arts and Humanities requirement and the CMDI Core Humanities and the Arts requirement | 3 |
| **English A: Language and Literature** | Higher | 4 | WRTG 1150 | 3 |
| | Standard | 4 | 3 lower-division Arts & Science credits that count toward the A&S Gen. Ed. and the CMDI Core lower-division writing requirements | 3 |
| **Environmental Systems & Societies** | Standard | 4 | 3 lower-division Arts & Science credits that count toward the A&S Gen. Ed. Natural Science requirement and the CMDI Core Natural World requirement | 3 |
| **French B** | Higher | 7 | FREN 2120 and FREN 2500 | 6 |
| | Higher | 6, 5 | FREN 2110 and FREN 2120 | 6 |
| | Higher | 4 | FREN 2110 | 3 |
| **French B** | Standard | 7 | FREN 2110 and FREN 2120 | 6 |
| | Standard | 6 | FREN 2110 | 3 |
| | Standard | 5 | FREN 1050 | 5 |
| | Standard | 4 | FREN 1010 | 5 |
| **French AB** | Initio | 7 | FREN 1050 | 5 |
| | Initio | 6, 5 | FREN 1010 | 5 |
| **Geography** | Higher | 4 | GEOG 1992 and 3 lower-division GEOG credits that count toward the A&S Gen. Ed. Social Science requirement and the CMDI Core People and Society requirement | 6 |
| | Standard | 4 | 3 lower-division Arts & Science credits that count toward the A&S Gen. Ed. Social Science requirement and the CMDI Core People and Society requirement | 3 |
| **German B** | Standard | 6, 7 | GRMN 1010 and GRMN 1020 | 8 |
| | Standard | 5, 4 | GRMN 1010 | 4 |
| **Global Politics** | Higher | 4 | 3 lower division PSCI credits that count toward the A&S Gen. Ed. Social Science requirement and the CMDI Core People and Society requirement | 3 |

| | | | | |
|---|---|---|---|---|
| **History—Rt.1: Europe and the Islamic World** | Higher | 4 | HIST 1011 and 3 lower-division HIST credits that count toward the A&S Gen. Ed. Arts and Humanities requirement and the CMDI Core Humanities and the Arts and Historical Perspectives requirements | 6 |
| **History—Rt.2: Africa** | Higher | 4 | HIST 1228 and 3 lower-division HIST credits that count toward the A&S Gen. Ed. Arts and Humanities requirement and the CMDI Core Humanities and the Arts and Historical Perspectives requirements | 6 |
| **History—Rt.2: Americas** | Higher | 4 | HIST 1025 and 3 lower-division HIST credits that count toward the A&S Gen. Ed. Arts and Humanities requirement and the CMDI Core Humanities and the Arts and Historical Perspectives requirements | 6 |
| **History—Rt.2: Asia and Oceania** | Higher | 4 | Two 3-credit lower division HIST that count toward the A&S Gen. Ed. Arts and Humanities requirement and the CMDI Core Humanities and the Arts and Historical Perspectives requirements | 6 |
| **History—Rt.2: Europe and the Middle East** | Higher | 4 | HIST 1012 and 3 lower-division HIST credits that count toward the A&S Gen. Ed. Arts and Humanities requirement and the CMDI Core Humanities and the Arts and Historical Perspectives requirements | 6 |
| **History—Rt.2: 20th Century World** | Standard | 4 | 3 lower-division Arts & Science credits that count toward the A&S Gen. Ed. Arts and Humanities requirement and the CMDI Core Humanities and the Arts and Historical Perspectives requirements | 3 |
| **Italian B** | Higher | 7, 6, 5 | ITAL 2110 and ITAL 2120 | 6 |
| | Higher | 4 | ITAL 2110 | 3 |
| **Italian B** | Standard | 7 | ITAL 2110 and ITAL 2120 | 6 |
| | Standard | 6 | ITAL 2110 | 3 |
| | Standard | 5 | ITAL 1020 | 5 |
| | Standard | 4 | ITAL 1010 | 5 |
| **Italian AB** | Initio | 7 | ITAL 1020 | 5 |
| | Initio | 6, 5 | ITAL 1010 | 5 |
| **Japanese A: Language and Literature** | Higher | 4 | JPNS 3110, JPNS 3120 | 10 |
| | Standard | 4 | JPNS 2110, JPNS 2120 | 10 |
| **Japanese AB** | Initio | 5 | JPNS 1010, JPNS 1020 | 10 |
| **Japanese B** | Higher | 7, 6 | JPNS 3110, JPNS 3120 | 10 |
| | Higher | 5, 4 | JPNS 2120, JPNS 3110 | 10 |
| | Standard | 4 | JPNS 2110, JPNS 2120 | 10 |
| **Korean** | Higher | 4 | Semester hours awarded and course equivalent are determined by oral exam | |
| **Latin** | Higher | 6, 7 | LATN 1024, LATN 2114, LATN 2124 | 12 |
| | Higher | 5 | LATN 1024, LATN 2114 | 8 |
| | Higher | 4 | LATN 1024 | 4 |
| **Further Mathematics** | Higher | 5 | 10 lower-division MATH credits fulfilling the A&S Gen. Ed. Quantitative Reasoning & Mathematical Skills requirement and the CMDI Core Quantitative Thinking requirement | 10 |
| **Mathematics: Analysis and Approaches** | Higher | 7 | MATH1300 | 5 |
| | Higher | 4, 5, 6 | MATH 1150 | 4 |
| | Standard | 4 | 3 lower-division MATH credits fulfilling the A&S Gen. Ed. Quantitative Reasoning & Mathematical Skills requirement and the CMDI Core Quantitative Thinking requirement | 3 |
| **Mathematics: Applications and Interpretation** | Higher | 4 , 5, 6, 7 | MATH 2510 | 3 |

| | | | | |
|---|---|---|---|---|
| | Standard | 4 | 3 lower-division MATH credits fulfilling the A&S Gen. Ed. Quantitative Reasoning & Mathematical Skills requirement and the CMDI Core Quantitative Thinking requirement | 3 |
| **Mathematics** | Higher | 5 | 5 lower-division MATH credits fulfilling the A&S Gen. Ed. Quantitative Reasoning & Mathematical Skills requirement and the CMDI Core Quantitative Thinking requirement | 5 |
| | Higher | 4 | 3 lower-division MATH credits fulfilling the A&S Gen. Ed. Quantitative Reasoning & Mathematical Skills requirement and the CMDI Core Quantitative Thinking requirement | 3 |
| | Standard | 4 | 3 lower-division Arts & Science credits fulfilling the A&S Gen. Ed. Quantitative Reasoning & Mathematical Skills requirement and the CMDI Core Quantitative Thinking requirement | 3 |
| **Mathematical Studies** | Standard | 4 | 3 lower-division Arts & Science credits fulfilling the A&S Gen. Ed. Quantitative Reasoning & Mathematical Skills requirement and the CMDI Core Quantitative Thinking requirement | 3 |
| **Music** | Higher | 4 | Elective credit hours | 6 |
| **Philosophy** | Higher | 4 | PHIL 1000 and 3 lower-division PHIL credits that count toward the A&S Gen. Ed. Arts and Humanities requirement and the CMDI Core Humanities and the Arts requirement | 6 |
| | Standard | 4 | 3 lower-division Arts and Sciences credits that count toward the A&S Gen. Ed. Arts and Humanities requirement and the CMDI Core Humanities and the Arts requirement | 3 |
| **Physics** | Higher | 4 | PHYS 2010 and PHYS 2020 | 10 |
| | Standard | 4 | 4 lower-division Arts & Science credits that fulfill the lab portion of and count toward the A&S Gen. Ed. Natural Science requirement and the CMDI Core Natural World requirement | 4 |
| **Psychology** | Higher | 4 | PSYC 1001 and 3 lower-division PSYC credits that count toward the A&S Gen. Ed. Social Science requirement and the CMDI Core People and Society requirement | 6 |
| | Standard | 4 | 3 lower-division Arts & Science credits that count toward the A&S Gen. Ed. Social Science requirement and the CMDI Core People and Society requirement | 3 |
| **Russian B** | Higher | 4 | RUSS 2010 and RUSS 2020 | 8 |
| | Standard | 5 | RUSS 2010 and RUSS 2020 | 8 |
| **Spanish A: Language and Literature** | Higher | 4 | SPAN 3000 and SPAN 3100 | 8 |
| **Spanish B** | Higher | 7, 6 | SPAN 2110, SPAN 2120 and SPAN 3000 | 11 |
| | Higher | 5, 4 | SPAN 2110 and SPAN 2120 | 6 |
| | Standard | 4 | SPAN 1010 and SPAN 1020 | 10 |
| **Spanish AB** | Standard | 6 | SPAN 1010 | 5 |
| **Swedish A: Language and Literature** | Standard | 4 | SCAN 3020 | 3 |
| **Theatre** | Higher | 4 | THTR 1019 and 3 lower-division THTR credits that count toward the A&S Gen. Ed. Arts and Humanities requirement and the CMDI Core Humanities and the Arts requirement | 6 |
| **Visual Art** | Higher | 4 | 6 lower-division ARTS credits that count toward the A&S Gen. Ed. Arts and Humanities requirement and the CMDI Core Humanities and the Arts requirement. (Consult faculty with portfolio for further consideration of fine arts course equivalents) | 6 |
| | Standard | 4 | 3 lower-division Arts & Science credits that count toward the A&S Gen. Ed. Arts and Humanities requirement and the CMDI Core Humanities and the Arts requirement | 3 |

*Note*: This table was prepared based on Spring 2024 exams. Credit awarded is subject to change based on faculty review of Spring 2025 exams. The credit in this table is for students who began classes at CU Boulder in the 2025–26 academic year. Students who started at CU Boulder in previous academic years must to refer to the tables in the catalog for that year to find the appropriate credit.

# College Level Examination Program (CLEP) - gtPathways

Credit for College Board College-Level Examination Program (CLEP) in subject areas of composition and literature, humanities, history and social sciences, biological and physical sciences, and mathematics may be granted for a score of 50 or above. Examinations in languages require minimum scores between 59–63. Credit award and course equivalency information listed in this table applies only to degree programs completed entirely at the Boulder Campus.

*Beginning Spring 2019, select exams taken January 1, 2019 and later will receive gtPathways designation.*

For exams taken in prior or future catalog years, consult those academic catalogs for exam equivalency information. Exams with a CU Boulder equivalent course of ARSC 1999TC will *not* fill a requirement in any major or minor at CU Boulder but will fulfill a requirement in the general education curriculum of most schools and colleges at CU Boulder.

| Subject Area | Examination Title | Credit Hours | Minimum Score | CU Boulder Course Equivalent | State of Colorado gtPathways Category | CU Boulder A&S General Education Requirement |
|---|---|---|---|---|---|---|
| **Composition and Literature** | American Literature | 3 | 50 | ARSC 1999TC | AH2 | Arts and Humanities |
| | Analyzing and Interpreting Literature | 3 | 50 | ARSC 1999TC | AH2 | Arts and Humanities |
| | College Composition | 6 | 50 | ARSC 1999TC | CO1 & CO2 | Written Communication |
| | College Composition Modular | 3 | 50 | ARSC 1999TC | CO1 | Written Communication |
| | English Literature | 3 | 50 | ARSC 1999TC | AH2 | Arts and Humanities |
| **Humanities** | Humanities | 3 | 50 | ARSC 1999TC | AH1 | Arts and Humanities |
| **Languages** | French Language: Level 2 | 9 | 59 | ARSC 1999TC | AH4 | 3 credits of Arts and Humanities and 6 credits of Electives |
| | German Language: Level 2 | 9 | 60 | ARSC 1999TC | AH4 | 3 credits of Arts and Humanities and 6 credits of Electives |
| | Spanish Language: Level 2 | 9 | 63 | ARSC 1999TC | AH4 | 3 credits of Arts and Humanities and 6 credits of Electives |
| **History and Social Sciences** | American Government | 3 | 50 | ARSC 1999TC | SS1 | Social Sciences |
| | History of the United States I | 3 | 50 | ARSC 1999TC | HI1 | Arts and Humanities |
| | History of the United States II | 3 | 50 | ARSC 1999TC | HI1 | Arts and Humanities |
| | Human Growth and Development | 3 | 50 | ARSC 1999TC | SS3 | Social Sciences |
| | Introduction to Educational Psychology | 3 | 50 | ARSC 1999TC | SS3 | Social Sciences |
| | Introductory Psychology | 3 | 54 | PSYC 1001 | | Social Sciences |
| | | 3 | 50-53 | ARSC 1999TC | SS3 | Social Sciences |
| | Introductory Sociology | 3 | 54 | SOCY 1001 | SS3 | Social Sciences |
| | | 3 | 50-53 | ARSC 1999TC | SS3 | Social Sciences |
| | Principles of Macroeconomics | 4 | 54 | ECON 2020 | | Social Sciences |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 3 | 50-53 | ARSC 1999TC | SS1 | Social Sciences |
| | Principles of Microeconomics | 4 | 54 | ECON 2010 | | Social Sciences |
| | | 3 | 50-53 | ARSC 1999TC | SS1 | Social Sciences |
| | Social Sciences and History | 3 | 50 | ARSC 1999TC | HI1 or SS1 | Social Sciences |
| | Western Civilization I: Ancient Near East to 1648 | 3 | 50 | ARSC 1999TC | HI1 | Arts and Humanities |
| | Western Civilization II: 1648 to the Present | 3 | 50 | ARSC 1999TC | HI1 | Arts and Humanities |
| **Biological and Physical Sciences** | Biology | 6 | 54 | EBIO 1210, EBIO 1220 | SC2 | Natural Science |
| | | 6 | 50-53 | ARSC 1999TC | SC2 | 3 credits of Natural Sciences and 3 credits of Electives |
| | Chemistry | 6 | 54 | CHEM 1113, ARSC1999TC | SC2 | 4 credits of Natural Sciences and 2 credits of Electives |
| | | 6 | 50-53 | ARSC 1999TC | SC2 | 3 credits of Natural Sciences and 3 credits of Electives |
| | Natural Science | 6 | 50 | ARSC 1999TC | SC2 | 3 credits of Natural Sciences and 3 credits of Electives |
| **Mathematics** | Calculus | 5 | 54 | MATH 1300 | MA1 | Quantitative Reasoning |
| | | 4 | 50-53 | ARSC 1999TC | MA1 | Quantitative Reasoning |
| | College Algebra | 3 | 50 | ARSC 1999TC | MA1 | Quantitative Reasoning |
| | College Mathematics | 3 | 50 | ARSC 1999TC | MA1 | Quantitative Reasoning |
| | Precalculus | 3 | 50 | ARSC 1999TC | MA1 | Quantitative Reasoning |

Any credit earned from CLEP exams that counts toward the Arts and Humanities or Social Sciences requirements in A&S General Education will also count toward the Humanities and Social Sciences requirement in the College of Engineering and Applied Science.

For students in CMDI, translate the A&S General Education categories in the following way: Arts and Humanities = CMDI's Humanities and Arts; Social Sciences = CMDI's People and Society; Natural Sciences = CMDI's Natural World; QRMS = CMDI's Quantitative Thinking

# DSST Examinations- gtPathways

Credit for DANTES Subject Standardized Tests (DSST) in the humanities, mathematics, physical science and social sciences areas may be granted for a score of 400 or above. Credit award and course equivalency information listed in this table applies only to degree programs completed entirely at the Boulder Campus.

*Beginning Spring 2019, select exams taken January 1, 2019 and later will receive gtPathways designation.*

Exams with a CU Boulder equivalent course of ARSC 1999TC will *not* fill a requirement in any major or minor at CU Boulder but will fulfill a requirement in the general education curriculum of most schools and colleges at CU Boulder.

For exams taken in prior or future catalog years, consult those academic catalogs for exam equivalency information.

| Subject Area | Examination Title | Credit Hours | Minimum Score | CU Boulder Course Equivalent | State of Colorado gtPathways Category | CU Boulder A&S General Education Requirement |
|---|---|---|---|---|---|---|
| **Humanities** | Art of the Western World | 3 | 400 | ARSC 1999TC | AH1 | Arts and Humanities |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Ethics in America | 3 | 400 | ARSC 1999TC | AH3 | Arts and Humanities |
| | Introduction to World Religions | 3 | 400 | ARSC 1999TC | AH3 | Arts and Humanities |
| **Biological and Physical Sciences** | Astronomy | 6 | 400 | ARSC 1999TC | SC2 | Natural Science |
| | Environmental Science | 6 | 400 | ARSC 1999TC | SC2 | Natural Science |
| | Introduction to Geology | 3 | 400 | ARSC 1999TC | SC2 | Natural Science |
| | Principles of Physical Science I | 6 | 400 | ARSC 1999TC | SC2 | Natural Science |
| **Composition** | Principles of Advanced English Composition | 3 | 400 | ARSC 1999TC | CO1 | Written Communication |
| **History and Social Sciences** | A History of the Vietnam War | 3 | 400 | ARSC 1999TC | HI1 | Arts and Humanities |
| | General Anthropology | 3 | 400 | ARSC 1999TC | SS3 | Social Sciences |
| | Health & Human Development | 3 | 400 | ARSC 1999TC | SS3 | Social Sciences |
| | History of the Soviet Union | 3 | 400 | ARSC 1999TC | HI1 | Arts and Humanities |
| | Introduction to Geography | 3 | 400 | ARSC 1999TC | SS2 | Social Sciences |
| | Lifespan Developmental Psychology | 3 | 400 | ARSC 1999TC | SS3 | Social Sciences |
| | Organizational Behavior | 3 | 400 | ARSC 1999TC | SS3 | Social Sciences |
| | Substance Abuse | 3 | 400 | ARSC 1999TC | SS3 | Social Sciences |
| | The Civil War and Reconstruction | 3 | 400 | ARSC 1999TC | HI1 | Arts and Humanities |
| **Mathematics** | Fundamentals of College Algebra | 3 | 400 | ARSC 1999TC | MA1 | Quantitative Reasoning |
| | Math for Liberal Arts | 3 | 400 | ARSC 1999TC | MA1 | Quantitative Reasoning |
| | Principles of Statistics | 3 | 400 | ARSC 1999TC | MA1 | Quantitative Reasoning |

# Higher Education Admission Recommendations

First-year and transfer students applying to undergraduate programs are strongly encouraged to meet the following Higher Education Admission Recommendations (HEAR) (https://cdhe.colorado.gov/sites/highered/files/Section I - Part F - Revised 04-07-2023.pdf) when applying to any Colorado four-year public college or university. Students with enrollments prior to Summer 2023 will be held to the previous CU Boulder MAPS requirements. Please consult the catalog of your first enrollment term for the MAPS requirements of the college/school/program in which you are earning your degree. (See catalog archive (p. 2834).)

# CU Boulder's Recommendations to Meet HEAR

| Subject Area | State of Colorado HEAR | CU Boulder Strong Candidate | Additional CU Boulder College/ School/Program Recommendations |
|---|---|---|---|
| **English** | **4 years** (Two units of ESL English may count for these recommendations when combined with two units of successfully completed college preparatory English) | **4 years** | |

| | | | |
|---|---|---|---|
| **Mathematics** | **4 years** (Must include Algebra I, Geometry, Algebra II or equivalents. College-preparatory ESL mathematics/science courses that include content and academic rigor/level comparable to other acceptable courses may satisfy these recommendations) | **4 years** (For the fourth year of Mathematics, a class at or above the level of Algebra 2. (Examples include: Statistics, Pre-Calculus, Trigonometry) | |
| **Natural/Physical science** | **3 years** (two units must be lab based) | **3 years** | **1 unit of Physics** (College of Engineering & Applied Science) |
| | | | **1 unit of Physics** (Environmental Design majors within the College of Communication, Media, Design and Information) |
| **Social sciences** | **3 years** (Including at least one unit of U.S. or world history) | **3 years** | |
| **World language** | **1 year** (American Sign Language courses can count) | **2-3 consecutive years, in the same language** | **Up to 3rd level in the same language** (Arts & Sciences) |
| **Academic electives** | **2 years** (Acceptable academic electives include additional courses in English, mathematics, natural/physical sciences and social, foreign languages, art, music, journalism, drama, computer science, honors, Advanced Placement, International Baccalaureate courses and appropriate CTE courses) | **2 years** | **Includes one or more design or art based classes** (Environmental Design majors within the College of Communication, Media, Design and Information) |
| **Additional admission factors considered by college/school/program** | | | **Rigorous coursework** (Leeds School of Business) |
| | | | **Course grades, academic rigor (taking advanced classes if offered), leadership experience (sustained involvement and commitment to activities or a job) and shown STEM interest (reflected through activities or essay questions)** (College of Engineering & Applied Science) |
| | **Total credit units: 17** | **Total credit units: 18-19** | |

## General Coursework Details

- One year of a high school course *or* one semester of a college course equals one unit.
- Grades of C- or better are preferred. Grades of D, F or P (pass) may not be competitive in a selective admission environment.
- Students not meeting HEAR may be considered for admission on an individual basis based on the rigor of units completed as well as other admission criteria (e.g., test scores [optional], GPA and world language proficiency).

## World Language

Unrelated to the admissions process, students will need to fulfill certain courses to meet CU Boulder's graduation requirements.

In order to have the world language graduation requirement satisfied through high school coursework, students are strongly encouraged to take three consecutive years of the same world language and up to third level proficiency in high school regardless of what major they are applying to.

If a student has only taken one or two consecutive years of the same world language in high school, the third year must be taken once enrolled at CU Boulder and the credit hours will be applied towards graduation.

The graduation requirement in world language for the following colleges, schools and programs may be found below:

### Third-Level Proficiency

- College of Arts & Sciences
- College of Communication, Media, Design & Information* (except Environmental Design majors)

- College of Music - BA
- School of Education

**None**

- College of Engineering & Applied Science
- College of Music - BM and BME
- Leeds School of Business
- Environmental Design majors within the College of Communication, Media, Design & Information*

*For the Fall 2025 entering class.

# Transfer of College-Level Credit

## Evaluation of Credit

The Office of Admissions performs an initial evaluation of transfer credit after applicants have been admitted. A complete evaluation of transfer credit, including approved transfer credit hours, cannot be made until official transcripts have been received.

Unofficial transcripts can be used during the application process. If a student submits unofficial transcripts for admission purposes, they will be required to submit official transcripts if they are admitted and choose to attend CU Boulder. Official transcripts are mailed or sent electronically directly to CU Boulder Office of Admissions by the issuing institution or by the student if the transcript is still in its original sealed envelope. Official transcripts sent via a third party to the student and then uploaded to the application status page are considered unofficial transcripts.

Transferability is based on the practices of the leading university, as reported to the American Association of Collegiate Registrars and Admissions Officers (AACRAO), in the state where the institution is located. CU Boulder will make the decision on transferability based on the above criteria for institutions within the state of Colorado.

Coursework of comparable content and scope to the CU Boulder curriculum will generally be transferred if it was completed at colleges or universities accredited by the Higher Learning Commission, or other regional associations at the time the work was completed. For international colleges or universities, the international equivalent of regional accreditation or Ministry of Education recognition will be considered.

If coursework was completed at a school not regionally accredited, the student may specifically request that their coursework be considered for transfer. CU Boulder will utilize the recommendations of AACRAO when making its decision. These recommendations include but are not limited to:

- Educational quality of the sending institution.
- Comparability of credit to be transferred to CU Boulder.
- Applicability of the credit in relation to the programs being offered at CU Boulder.
- Additional documentation that students may be required to provide regarding the coursework for transferability.

### Criteria for Acceptance of Credit

Only courses taken at a college or university of recognized standing with grades of C- (1.70) or better are accepted for transfer.

Each college and school at CU Boulder determines:

- How transferred course semester credit hours are applied toward graduation requirements in accordance with the policies of the college or school.
- The maximum number of semester credit hours that may transfer from a two-year or four-year post-secondary institution.
- The minimum number of semester credit hours that must be completed on the Boulder campus in order to receive a degree.
- The minimum number of semester credit hours that must be completed as a degree student in residence on the Boulder campus to receive an undergraduate degree.
- The maximum number of semester credit hours earned through correspondence or in a similar format that are accepted toward a baccalaureate degree.

Credit hours should have been earned no more than 10 years prior to transferring into an undergraduate degree program at CU Boulder. Any determination of acceptance of semester credit hours toward the degree based on the content and the age of the credit is made in the college or school dean's office or by the student's major department.

### Coursework Requiring Additional Review

The following coursework will require additional information before a decision can be made on acceptance for transfer credit:

- Independent study courses
- Internships
- Workshops
- Graduate coursework
- Military credit
- Professional programs

### Coursework Not Accepted for Transfer Credit

The following coursework will *not* be accepted for transfer credit and will not count toward a degree at CU Boulder.

- Any courses in which the grade earned is below a C- (1.70)
- Courses identified by CU Boulder as remedial, such as remedial English, mathematics, science and developmental reading
- Vocational-technical courses that are offered at two-year and proprietary institutions (exceptions may be granted only by the CU Boulder dean responsible for the student's curriculum—when exceptions appear to be warranted, appropriate department heads make recommendations to their respective deans regarding credit for such courses)
- Courses in religion that constitute specialized religious training or that are doctrinal in nature

- Credits earned for work experience or through a cooperative education program
- Outdoor leadership education coursework
- Credits earned in physical education activity courses
- Courses or programs identified as college orientation

## Appeals Process

Students who wish to appeal the transferability of coursework must write a letter within the first semester after the work is posted on CU Boulder record or after receiving notice from the Office of Admissions that the coursework was not accepted for transfer credit. The letter must be addressed to the Transfer Credit Department, Office of Admissions, and include:

- The name(s) of the previous institution(s) attended, the course number and title of each course for which the student was denied transfer credit and the date(s) of enrollment in each course.
- A copy of the catalog description (from the appropriate year) for each course in question.
- A copy of the syllabus or course outline (from the appropriate year) for each course in question. This information can be obtained from the sending institution.
- A statement indicating why the credit(s) should be accepted.

The Office of Admissions will re-evaluate the course(s) for which the student is requesting reconsideration in consultation with the appropriate dean or chair. A written response will be delivered to the student in a timely manner once the appropriate faculties have reviewed the course materials, past practices and the student's specific circumstances.

## Transfer Credit From University of Colorado Campuses

Coursework completed at other campuses in the University of Colorado system will be a part of the student's cumulative university record and, unlike other transfer credit, will be included in calculations of the overall University of Colorado grade point average (GPA). However, the applicability of this coursework towards specific CU Boulder degree requirements will be determined solely by CU Boulder colleges and schools. External transfer credit presented by students to other University of Colorado campuses will be evaluated by CU Boulder guidelines upon the student's matriculation into a degree program at CU Boulder.

## Number of Credit Hours Required for Graduation

Transfer students are held to the same residency and degree requirements as students who begin their undergraduate degree program on the Boulder campus. This assumes that transfer credit hours are in courses comparable in level and content to those required for graduation from an undergraduate degree program at the Boulder campus. College or school residency requirements, meaning the number of credit hours required to be taken as a degree student once admitted on the Boulder campus, are the same for transferring and non transferring students.

## Credit for Correspondence and Online Work

Each college and school determines the maximum number of credits taken through correspondence and online programs that are accepted toward a baccalaureate degree.

## Transfer Credit Conversion

CU Boulder operates on a semester system. Most campuses, including CU Boulder, operate on a two-term or semester system. Course credits from quarter system institutions must be converted from quarter hours to semester hours or credits. One quarter credit is equivalent to two-thirds of a semester credit. To convert quarter hours to semester hours, multiply the number of quarter hours by two-thirds and round off the total to the nearest tenth. For example, 4 quarter hours x 2/3 = 2.67 or 2.7 semester hours of credit, or 3 quarter hours x 2/3 = 2 semester hours of credit.

## College-Level Work Taken during High School

College-level work taken during high school is evaluated in accordance with general guidelines for transfer credit at CU Boulder. Only courses taken at a college or university of recognized standing with grades of C- or better are accepted for transfer. Students must have an official college transcript sent directly to the Office of Admissions in order for transfer credit to be evaluated.

If a student has earned concurrent college credit for a high school course for which the student also earned college credit via an Advanced Placement (AP) or International Baccalaureate (IB) score, either the concurrent college credit or the credit earned for the AP or IB score will be granted, but not both. The credit granted will be determined in accordance with state policy and the student's educational best interests.

For more information and a guide to equivalencies for exam credit, see the charts in Credit by Examination (p. 37) section of this catalog, and refer to the First-year Applicants (p. 30) or Transfer Students (http://www.colorado.edu/admissions/transfer/) webpage.

### Posting of Hours

All transfer coursework assessed by CU Boulder will be reflected on the student's official CU Boulder transcript upon enrollment. The CU Boulder transcript will include the name of the transfer institution and total hours accepted for transfer credit.

# Military Credit

Credit for military schooling, both for courses and for occupations, is evaluated upon receipt of Form DD 214, Service Separation Certificate, a Joint Services Transcript (JST) or a transcript from the Community College of the Air Force (CCAF). For military courses and occupations that have been approved for gtPathways credit by the Colorado Department of Higher Education students will be awarded gtPathways credit, which will fill General Education requirements in most, but not all, programs at CU Boulder. For qualifying scores at the American Council on Education (ACE) recommended cut scores on Defense Language Proficiency tests students will be awarded gtPathways World Language credit (GT-AH4), which will fill General Education requirements, usually as a humanities course, in most, but not all, programs at CU Boulder.

Students can also be awarded credit for other military courses and occupations listed on a JST or a transcript from the CCAF if ACE recommends that the work should be granted upper-division baccalaureate credit. This work, however, transfers to CU Boulder as lower-division elective credit. World language courses taken through the State Department, Department of Defense or Defense Language Institute are assigned credit based on ACE's recommendation, which usually results in credit for an equivalent world language course at CU Boulder. The applicability of military credit toward specific degree requirements beyond General Education requirements is determined by the dean's office of the college/school to which a student has been admitted.

To receive credit for College-Level Examination Program (CLEP) or DANTES Subject Standardized Tests (DSST) that are listed on a JST or a transcript from the CCAF, students must have their test scores sent

directly to the CU Boulder Office of Admissions from the College Board (CLEP) or Prometric (DSST).

For more information and a guide to equivalencies, see the charts in Credit by Examination (p. 37) section of this catalog, and refer to the First-year Applicants (p. 30) or Transfer Students (http://www.colorado.edu/admissions/transfer/) webpage.

Regardless of whether or not you anticipate receiving any credit, submission of a JST or a transcript from the CCAF is required if you plan to use any VA educational benefits for which you are eligible.

## Reverse Transfer

The Colorado Reverse Transfer program allows students who have transferred from a Colorado community college to a Colorado university to combine and apply credits from both institutions toward an associate's degree from the community college.

For transfer students, this means an associate's degree from their previously-attended community college may be awarded at no additional cost while they work toward a bachelor's degree at CU Boulder.

CU Boulder's Office of the Registrar contacts students eligible for Reverse Transfer each year, with more information about opting in to the program. For more information, visit the Colorado Reverse Transfer (https://highered.colorado.gov/colorado-reverse-transfer-contact-information/) website to learn more.

# Credits & Grading

## Grading System

The following grading system is standardized for all colleges and schools of the university. Each instructor is responsible for determining the requirements for a class, determining the grading scale used, and for assigning grades on the basis of those requirements and grading scale by the grade submission deadline each term.

### Standard Grade Points per Hour of Credit

| | |
|---|---|
| **A** | superior/excellent, 4.0 |
| **A-** | 3.7 |
| **B+** | 3.3 |
| **B** | good/better than average, 3.0 |
| **B-** | 2.7 |
| **C+** | 2.3 |
| **C** | competent/average, 2.0 |
| **C-** | 1.7 |
| **D+** | 1.3 |
| **D** | 1.0 |
| **D-** | minimum passing, 0.7 |
| **F** | failing, 0.0 |

### Other Grade Symbols

| | |
|---|---|
| **CR** | Credit. Excluded from GPA. |
| **I** | Incomplete; changed to F if not completed within one year |
| **IP** | In progress; thesis at the graduate level or specified graduate-level courses |
| **NC** | No credit |
| **NR** | Class grades were not reported when final grades were processed |
| **P** | Passing; effective spring 2020, under pass/fail option, grades of D +, D or D- convert to P. Law School requires a grade of 72 or above to Pass. Excluded from GPA. |
| **P+** | Passing; effective spring 2020, under pass/fail option, grades of C- and above convert to P+. Excluded from GPA. |
| **S** | Satisfactory (effective fall 2022; formerly pass/fail only). Excluded from GPA. |
| **U** | Unsatisfactory (effective fall 2022; formerly pass/fail only). Excluded from GPA. |
| **W** | Withdrew |
| *** | Student is currently enrolled in a class; in progress |

### Incomplete (I) Grades

An incomplete (I) grade indicates that the student did not complete the requirements for the class by the end of the grading period for that semester. Requests for incomplete grades must be initiated by the student and only when, for reasons beyond their control, the student is unable to complete the class requirements within the semester of enrollment. A substantial amount of work (at least two-thirds) must have been satisfactorily completed before approval for such an incomplete grade is given.

If an instructor grants a request for an incomplete, the instructor sets the conditions under which the coursework can be completed and the time limit for its completion or if the class should be retaken. Incomplete grades, along with a last date of attendance (for financial aid purposes) must be submitted by the grading deadline of the term.

If the student does not complete the class requirements within one year from the end of the semester in which the Incomplete was assigned, the I grade is converted to a failing (F) grade.

If an incomplete-graded class is retaken, it must be completed on the Boulder campus or through Boulder Continuing Education coursework, and the student must re-register for the course and pay the appropriate tuition. The initial grade of I is not removed from the transcript if the course is completed within one year of the end of the term of the previous enrollment. When a final grade has been assigned, the transcript states, "Originally graded as Incomplete."

For graduating students, I grades assigned in courses required for a degree must be resolved before degrees may be posted. Unresolved I grades in required coursework will result in graduation being postponed. Students must reapply for graduation in a subsequent term. I grades assigned in courses not required for their degree must be resolved no later than the grading deadline of the term of graduation. If left unresolved, I grades become permanent and subsequent grade changes are not honored.

### Not Reported (NR) and In Progress (IP)

Similar to Incomplete grades, graduating students who have either NR or IP status in courses required for a degree must have them resolved and converted to an official grade before degrees will be posted. Unresolved NR and IP status grades in required coursework will result in graduation

being postponed. Students must reapply for graduation in a subsequent term. NR and IP status grades assigned in courses not required for a degree must be resolved by the last regular class day of the term of graduation. If left unresolved, NR and IP grades become permanent and subsequent grade change requests are not honored.

### Grade Changes

Students who believe a grade was assigned in error must request a grade change by the published deadline of their home college or school. However, grade changes for graduating students must be submitted and processed prior to degrees being posted to academic records. Grade changes will not be processed to an academic record with a conferred degree.

It is left to the discretion of the faculty member to determine if a grade change is warranted. This policy does not apply to grading grievances. See Student Appeals, Complaints & Grievances (https://www.colorado.edu/policies/student-appeals-complaints-grievances-brief-guide/).

## Grade Point Average

The overall University of Colorado grade point average (GPA) is computed as follows: the credit hours and credit points are totaled for all courses and across all campuses within the same career (UGRD, GRAD or LAW); then the total credit points are divided by the total credit hours. Courses with grade symbols of P, P+, NC, *** (grade not yet entered), W, I and IP are excluded from calculations. All standard letter grades (A-F) are included in the GPA, including grades of F earned for courses graded on a pass/fail basis. Grades of I that are not completed within one year are converted to F grades and calculated in the GPA at the end of the one-year grace period. Below is an example GPA calculation for a hypothetical semester:

| | |
|---|---|
| Grade Earned: A; | Credit Points per Hour: 4.0; x Credit Hours: 4.0 = Credit Points in Course: 16.0 |
| Grade Earned: A-; | Credit Points per Hour: 3.7; x Credit Hours: 4.0 = Credit Points in Course: 14.8 |
| Grade Earned: B+; | Credit Points per Hour: 3.3; x Credit Hours: 4.0 = Credit Points in Course: 13.2 |
| Grade Earned: P or P+; | Credit Points per Hour: —; x Credit Hours: 3.0 = Credit Points in Course: — (excluded) |
| Grade Earned: F; | Credit Points per Hour: 0; x Credit Hours: 3.0 = Credit Points in Course: 0 |
| | Total of 15 credit hours with 44 credit points, so 44/15 = 2.93 GPA |

For individual GPA calculations related to graduation requirements for a college or school, students should refer to their academic dean's office.

Numeric GPAs displayed on the transcript are carried out to three decimal points and are not rounded up to the nearest whole number.

# No Credit

Students who wish to take coursework for no credit (also known as 'audit') must indicate this through the no-credit request form, after they register for classes for a given term. Changes in credit registration are not permitted after the third Friday of the regular 16-week fall or spring session, or after the add/drop deadline of any special fall or spring session or Summer Session. Tuition is the same whether or not credit is received in a class. Classes taken for no credit won't fulfill degree requirements or count toward a student's enrollment totals for enrollment status or financial aid.

# Pass/Fail (P/F)

Students should refer to the college and school sections of this catalog to determine the number of pass/fail credit hours that may be taken in a given semester or credited toward a specific bachelor's degree. Exceptions to the pass/fail regulations are permitted for certain courses that are offered only on a pass/fail basis. Effective Fall 2022, courses graded on a pass/fail only basis were replaced with the satisfactory/unsatisfactory grading basis (see below).

The pass/fail grading student option is only available if the department offering the course allows the student option. Students who opt to register for a class on a pass/fail basis should do so during registration, but not later than the published grading basis change deadline for a given term.

Changes to or from a pass/fail student option basis are not permitted after the tenth Friday of the regular 16-week fall or spring session, or after the add/drop deadline of any special fall or spring session or Summer Session. Prior to that date, students wishing to change a class's grading status from letter graded to the pass/fail student option can do so in Buff Portal (https://buffportal.colorado.edu/). From the change your schedule card, students can select the class they want to change and select "Edit This Class."

Passing grades (P or P+) are included in credit totals, but do not affect student GPAs. Grades of D+, D and D- are considered passing grades of P. Grades of C- and above are considered passing grades of P+.

Classes that are graded on a pass/fail-only basis are not eligible to be taken for letter grades, and do not include the P+ grade. Pass/fail-only basis was replaced with satisfactory/unsatisfactory (see below) for undergraduate and graduate classes beginning fall 2022. Colorado Law still use pass/fail-only basis in select classes.

# Satisfactory/Unsatisfactory (S/U)

Effective Fall 2022, the satisfactory/unsatisfactory grading basis is assigned to undergraduate and graduate courses that are predominantly experiential, field-based, practical in nature, or seminar-based, as well as for candidacy for degree enrollments (some exceptions apply). These courses were previously graded on a pass/fail only basis.

Satisfactory (S) grades are included in credit totals, but are not calculated in GPAs. Unsatisfactory (U) grades are neither included in credit totals nor GPA calculations. S or U grades are assigned directly by instructors based on whether course requirements are satisfied or expectations met.

# Variable Credit

Select courses, such as independent study courses, are offered as variable credit. Students should consult their academic advisor and designate the number of credit hours they wish to receive for the class at the time of registration.

CU Boulder recognizes that learning may be acquired outside of traditional learning environments and will consider the award of credit for such learning in one of three ways. These include standardized

examinations, individual course challenges, and assessments of learning experiences out of of institutions of higher education.

See the university's Credit for Prior Learning policy or the Office of the Registrar site for more detailed information on requirements, eligibility and procedures.

# Course Challenge

Course challenge is a process by which students may seek to demonstrate knowledge and competencies in a specific CU Boulder course through an approved assessment in order to earn academic credit for that course. Per Colorado law, course challenge is available for GT Pathways courses. For non-GT Pathways CU Boulder undergraduate courses, an academic unit determines if a particular course is suitable for course challenge.

Successful course challenges are recorded as resident credit with a grade of CR (credit earned) within the term the challenge was completed, and are calculated in credit totals, but not in GPAs. Unsuccessful challenge exams are recorded on academic transcripts with a grade of U (Unsuccessful). U grades are not calculated in credit totals or in GPA calculations. CU Boulder assesses a per-credit administrative surcharge for Course Challenges.

# Credit from Learning Experiences Outside of Higher Education

Prior learning may occur in settings outside of institutions of higher learning, such as in the workplace, business or industry, or the community, and CU Boulder academic units may give programmatic credit for prior learning for relevant work-related experience. Prior learning arrangements for specific academic programs must be approved by the respective dean(s), must clearly define expected learning outcomes and must have an associated assessment plan to monitor achievement of the learning objectives.

Earned credit for learning experiences outside of accredited institutions of higher learning is awarded as a block of external Credit for Prior Learning. It is calculated in credit totals, but not in GPAs. CU Boulder may assess a surcharge for CPL for external learning experiences.

# Credit through Standardized Exam

Nationally recognized exams such as CLEP, AP, IB and DANTES allow students to earn college credit by achieving specific scores in select subject areas.

See the Office of Admissions' Credit by Examination page for information about earning credit through standardized exams.

# Grade Replacement

CU Boulder students (excluding Law students) who previously earned a low grade in an eligible course may repeat that course in a later term and be eligible for grade replacement. Grade replacement affords students the opportunity to improve their cumulative GPA.

Grade replacement is applied automatically at the end of each term to eligible courses and students.

Under grade replacement, the grade earned in the most recent prior attempt of a course will still appear on the transcript, but it will be replaced in cumulative GPA and credit totals as long as the latest grade earned is the same or better. If a lower grade is earned in the latest attempt, grade replacement is not applied and the grades from both attempts will be used in computing cumulative and major grade point averages, total credits and academic standing.

When students repeat courses that are not eligible for grade replacement, the grade and credits earned in each attempt are included in student credit and GPA totals and calculations.

Some academic programs have limits on the number of course repeats allowed for specific courses or the number of attempts for degree applicability.

## General Eligibility

### Course Requirements

Only courses offered by and taken through CU Boulder are eligible for grade replacement. To qualify for grade replacement, the course also must:

- Be taken at CU Boulder for a letter grade (i.e., not taken pass/fail, satisfactory/unsatisfactory or for no credit).
- Not be a special topics course or any other course designated in the catalog as repeatable for credit (e.g., independent study, field experience, dissertation hours). *Exceptions*: Topics courses WRTG 1100, WRTG 1150, WRTG 1160, WRTG 1250, WRTG 3020, WRTG 3030, WRTG 3035 and WRTG 3040 are eligible for grade replacement regardless of topic.

### Student Requirements

To quality for grade replacement, students must:

- Be an active student at CU Boulder (law students are not eligible). Students who have graduated cannot use grade replacement for a course taken in a completed academic career.
- Have earned a C- or lower (undergraduate students), or a C+ or lower (graduate students) in the most recent prior attempt of a course.

## Opting Out of Grade Replacement

Students may repeat courses at any point in their academic career without invoking grade replacement by submitting an opt-out request to Office of the Registrar by the last day of classes of the term. In those cases, the grade and credits earned in each attempt are included in student credit and GPA totals and calculations.

# Additional Information

For more information on grade replacement, visit the Office of the Registrar website (https://www.colorado.edu/registrar/students/degree-planning/grade-replacement/) or view the grade replacement policy in full (https://www.colorado.edu/registrar/students/degree-planning/grade-replacement/policy/).

# Financial Aid

The Office of Financial Aid works to ensure students have access to resources to pay for college each year. CU Boulder students may be eligible to receive financial aid from federal, state, university and private sources.

# Applying for Financial Aid

Students must apply for financial aid (https://www.colorado.edu/financialaid/apply-aid/) each year they wish to receive it. Once the student lists CU Boulder on their aid application (using school code

001370), the Office of Financial Aid receives results digitally and uses them to help determine a student's eligibility for grants, work-study and loans, as well as some scholarships.

Submit the **2025-26 Free Application for Federal Student Aid (FAFSA)** to be considered for financial aid for Fall 2025, Spring 2026, and Summer 2026. The FAFSA opens October 1 each year for the upcoming academic year.

## Eligibility

Financial aid is based on a combination of factors, such as the student's FAFSA, the cost to attend CU Boulder and the availability of funding.

The FAFSA calculates the Student Aid Index (SAI), which is used by schools to determine a student's eligibility for financial aid. It's **not** the amount of money a student will pay for college, nor is it the amount of financial aid a student will receive.

Each year the Office of Financial Aid calculates the estimated cost of attendance for an academic year. This estimate includes both university-billed costs like tuition, fees, on-campus housing and food, as well as out-of-pocket expenses like books and supplies, transportation, and personal expenses.

View more information on cost and budget examples (https://www.colorado.edu/financialaid/node/51/).

# Types of Financial Aid

Financial aid offers begin as early as March for the upcoming fall semester, but aid is continually offered as long as funds are available. First-year and transfer students applying for aid for the 2025–26 school year are encouraged to submit their Free Application for Federal Student Aid (FAFSA) (https://studentaid.gov/h/apply-for-aid/fafsa/) and any additional documentation requested **as soon as possible.**

Types of financial aid available to CU Boulder students are listed below.

## Grants

Grants (https://www.colorado.edu/financialaid/node/71/) are a type of aid that don't have to be repaid. Students should submit the FAFSA to be considered for federal, state and university grants (including Pell, Colorado Student Grant, etc.).

## Loans

Students submit the FAFSA (https://studentaid.gov/h/apply-for-aid/fafsa/) to be considered for the following loan programs:

### Federal Direct Subsidized and Unsubsidized Loans

Federal Direct Loans (https://www.colorado.edu/financialaid/node/98/) are federal student loans offered and disbursed by CU Boulder. Undergraduate students may qualify for a combination of subsidized (i.e., federal government pays the interest) and unsubsidized loans. The interest rates for federal loans are determined annually. An origination/loan fee is charged based on when the loan is disbursed. Annual limits depend on the year in school: first-year students can be offered up to $5,500, sophomores $6,500, and juniors and seniors $7,500. Independent students may borrow an additional amount of unsubsidized loans (first-year students and sophomores $4,000 and juniors and seniors $5,000).

Interest on unsubsidized loans can be paid while the student is in school. Loan repayment begins six months after the student graduates or ceases to be enrolled at least half-time (6 credit hours for undergraduates; 3 credit hours for graduates).

### Federal Parent PLUS Loan

Federal PLUS loans (https://www.colorado.edu/financialaid/node/23/) are available to parents of dependent undergraduate students. The origination fee and interest rates are dependent on when the loan is paid to the student's university bill, but interest rates are fixed for the life of the loan.

The FAFSA (https://studentaid.gov/h/apply-for-aid/fafsa/) has to be done every year in order to apply for a Parent PLUS Loan. Borrowers must complete a credit check, but it's possible for a borrower to qualify for a PLUS loan with a bad credit score, as long as they don't have an adverse credit history.

*Note: Parents borrowing a PLUS loan for their student will be regarded as parental support on in-state residency petitions for dependent students. Parents may request a deferment on payments until their student has finished with school.*

## Work-Study

Students offered work-study (https://www.colorado.edu/studentemployment/node/8/) are provided an amount of money they can work to earn through approved on- or off-campus employers. Students don't get the money up-front, and it's not applied to their tuition and fee bill; they will receive a paycheck for hours worked just like any other hourly job. Students should submit the FAFSA (https://studentaid.gov/h/apply-for-aid/fafsa/) to be considered for work-study, since it's based on financial need.

Students may apply for a variety of work-study jobs at competitive rates. Jobs can be found online through the CU Boulder Student Job (https://ofa.colorado.edu/studentjobs/) database.

# Scholarships

Donations from private individuals, corporations, foundations and the University of Colorado are all sources for scholarships (http://www.colorado.edu/scholarships/). Incoming students are automatically considered for some scholarships through their admissions application.

## CU Boulder Scholarship Application

Students may apply for scholarships (http://www.colorado.edu/scholarships/cuboulder-scholarship-app/) offered by the Office of Scholarship Services each year. For scholarships that have a financial-need requirement, applicants must have submitted a FAFSA (https://studentaid.gov/h/apply-for-aid/fafsa/) before the scholarship deadline in order to be considered. The scholarship application is open November 1 to mid-March each year, with some scholarship opportunities closing as early as February 15.

Prospective students don't need to wait to be accepted to CU Boulder before applying for financial aid or scholarships.

Scholarships are highly competitive at CU Boulder. The selection committee considers academic achievement, honors, leadership, school activities and service to the community. Students should also search for scholarship opportunities within their academic program, college, club or campus organization.

## Private Scholarships

Students who receive a private scholarship (https://www.colorado.edu/scholarships/node/48/) from an organization outside the university

will need to make sure the check is mailed or dropped off with a completed donor form (https://www.colorado.edu/scholarships/media/6/). The Office of Scholarship Services must receive scholarship checks by 5 p.m. on the first day of classes to guarantee no late fees.

When a scholarship donor does not specify how to disburse the funds through a donor form (https://www.colorado.edu/scholarships/media/6/), the Office of Scholarship Services equally divides scholarships of $2,500 or more between the fall and spring semesters. Private scholarships less than $2,500 are applied in full to the current semester bill.

Donors should mail their checks, payable to the University of Colorado, to:

University of Colorado Boulder
Scholarship Services
77 UCB
Boulder, CO 80309-0077

If a student's scholarship check is not submitted before the bill due date, they should make other arrangements to pay the bill.

# Special Scholarships & Grants

Students can apply directly to the following programs to be considered for their scholarships, grants and programming.

## Boettcher Scholars

The Boettcher Scholarship is a merit-based, full cost of attendance scholarship awarded annually to Colorado high school seniors who can apply those funds to any four-year institution in Colorado. With a history of scholars on campus dating from 1952, the University of Colorado Boulder has a large, vibrant Boettcher Scholar community. At CU, Boettcher Scholars are housed in Undergraduate Enrichment Programs (UEP).

Benefits of being a Boettcher Scholar include:

- An on-campus Boettcher Scholar Mentor.
- The largest Boettcher Scholar peer community in the state.
- The longest-standing Boettcher Scholar Alumni network in the state.
- Individual, peer and group mentoring.
- Academic, professional and personal support.
- Social activities with Daniels Scholars and Norlin Scholars.
- Access to enrichment, research and Top Scholarship (https://www.colorado.edu/topscholarships/) advising.
- A fifth-year tuition benefit for concurrent degree seekers.

High school students apply for the scholarship directly through the Boettcher Foundation (http://boettcherfoundation.org/colorado-scholarships/) in the fall of their senior year of high school. Once selected, scholarship recipients have the opportunity to choose which campus they will attend.

## Daniels Scholars

The Daniels Scholarship (https://www.danielsfund.org/scholarships/daniels-scholarship-program/overview/) is a four-year, annually-renewable award that can be used at any two or four-year, nonprofit, accredited college or university in the United States. Daniels Scholars at CU Boulder receive a full cost of attendance scholarship.

The Daniels Scholarship was first awarded in the year 2000, with the passing of Bill Daniels, founder of the Daniels Fund. Awardees are chosen from the four-state region of Colorado, New Mexico, Utah and Wyoming. Daniels Scholars have been attending CU since 2000. The Daniels Scholar Success Program (DSSP) started at CU in 2008.

CU Daniels Scholars are housed in and supported by Undergraduate Enrichment Programs (UEP).

Benefits of being a CU Daniels Scholar include:

- An on-campus Daniels Scholar Liaison, plus Daniels ambassadors.
- The largest Daniels Scholar peer community in the state.
- Individual, peer and group mentoring.
- Academic, professional and personal support.
- Social activities with Boettcher Scholars and Norlin Scholars.
- Access to enrichment, research and Top Scholarship (https://www.colorado.edu/topscholarships/) advising.

## Norlin Scholars

In this interdisciplinary learning community, Norlin Scholars shape their scholar's path with special classes, engaged learning experiences and self-reflection. The program takes a holistic approach to scholar development. Upon graduation, students are in a strong position for whatever comes next: the job market, graduate and professional schools or fellowships.

Students can apply as high school seniors for a four-year scholarship or as second-year college students for a two-year scholarship. Norlin applicants must apply to CU first, though they do not need to be admitted to be considered.

Benefits of being a Norlin Scholar include:

- Annual scholarship of $6,000.
- Small, invigorating courses (NRLN 2000 and NRLN 3500).
- Engaged learning opportunities (internships, research, service).
- Individual, group and peer mentoring.
- Access to top scholarship advising and guidance.
- Opportunities for professional training and development.
- A stimulating, interdisciplinary peer group.
- Shared activities with CU Boettcher and Daniels Scholars

The Norlin Scholars program builds community through shared experiences and support.

Visit the Norlin Scholars (https://www.colorado.edu/boettcher-norlin-scholars/norlin-scholars/) website for application information.

## Professional and Academic Conference Endowment (PACE)

PACE provides funding, support and mentoring to qualified undergraduates to present their work at conferences. Conference presentations may be oral presentations, poster sessions, round-table discussions, or creative or performance pieces. Students from all majors, departments, colleges and schools are welcome to apply for PACE grants.

Aside from receiving funds toward conference expenses, recipients benefit from faculty and peer supported conference preparation and exposure to working professionals and cutting edge scholarship in the field. Additionally, conference presentations:

- Complement classroom learning
- Take undergraduate research to the next level
- Provide a range of professional credentials

To accommodate the year-round schedule of professional conferences, PACE deadlines are rolling. Consult the PACE website (https://www.colorado.edu/pace/) for more information.

### Top Scholarships

Top Scholarships helps you prepare a thoughtful application to some of the most prestigious, nationally competitive scholarships offered, like the Rhodes, Marshall, Truman and Goldwater, among others. This office helps high-achieving students already enrolled at CU, usually in their sophomore, junior or senior years. For help with scholarships for incoming first-year students, or to inquire about scholarships already awarded, please contact the Office of Scholarship Services (https://www.colorado.edu/scholarships/contact-us/).

Top Scholarships provides:

- Guidance in selecting a fellowship or scholarship that fits your plans
- Expert advice on scholarship opportunities listed
- Individualized assistance preparing applications, essays, and proposals
- Practice interviews and interview strategies

Please see our Top Scholarships (https://www.colorado.edu/topscholarships/) website for more information, including benefits of making an application to Top Scholarships and how to apply.

### Undergraduate Research Opportunities Program (UROP)

CU Boulder has a rich culture for cultivating undergraduates as emerging scholars, artists and practicing researchers. UROP provides consultation services, informational workshops and grants to promote undergraduate research as a high-impact learning practice for student success.

Each year UROP funds hundreds of students who produce new knowledge and creative work in partnership with CU's world-class faculty. We serve students and faculty whose learning and teaching goals include outside-the-classroom enrichment.

In a UROP project, students:

- Explore academic interests *beyond* the classroom
- Get hands-on experience with research or creative production
- Develop student-faculty relationships for professional references
- Acquire academic and professional skills and credentials
- Demonstrate successful grant-writing skills
- Refine their academic and career goals

From development of a research interest or question to completion of an application takes some time. UROP deadlines precede the academic year in which the research or creative work will be undertaken and students apply in partnership with the faculty mentor. Visit the UROP website (https://www.colorado.edu/urop/) for more information.

## Policies

The Office of Financial Aid follows regulations provided by the Department of Education, the Higher Education Reconciliation Act of 2005, the Family Education Rights & Privacy Act (FERPA) and in-house policies to administer federal, state and university funding.

### Adjustments to Financial Aid

There are a variety of circumstances that may require an adjustment to a student's financial aid (https://www.colorado.edu/financialaid/node/31/). Students should understand how dropping and adding courses, receiving other aid, or corrections on their financial aid application will impact their aid.

### Education Abroad

Students must be enrolled in a CU Boulder education abroad (https://www.colorado.edu/financialaid/node/81/) program to be eligible for financial aid. Students participating in an education abroad program through another university are not eligible.

### FERPA

The Family Education Rights & Privacy Act (FERPA (https://www.colorado.edu/financialaid/node/25/)) is a Federal law that protects the privacy of student educational records (which includes financial aid).

### Repeat Coursework

Students may only repeat a course (https://www.colorado.edu/financialaid/node/13/) once and be eligible to receive financial aid if they previously received a grade of "D-" or better in that course.

### Return to Title IV Funds and Refund Policy

If a student enrolls at CU Boulder, receives financial aid, then withdraws, their financial aid is adjusted according to federal regulations (https://www.colorado.edu/financialaid/node/376/). The student may owe a bill to the university after the financial aid is adjusted.

### Satisfactory Academic Progress (SAP)

Students who apply for financial aid are responsible for knowing and complying with the satisfactory academic progress policy (https://www.colorado.edu/financialaid/node/33/). Briefly, the policy outlines the requirements to maintain satisfactory progress (i.e., minimum grade point average [GPA], completion rate, etc.), the consequences of failing to meet the requirements, and the process for appealing if the student loses eligibility.

### Student Loan Code of Conduct

The Office of Financial Aid has established a set of principles and policies to govern educational lending practices for undergraduate, graduate and professional students. Our staff will follow the Student Loan Code of Conduct (https://www.colorado.edu/financialaid/node/41/) to ensure the integrity of the student loan process.

### Students Rights and Responsibilities

Students who receive any form of financial aid, have certain rights and responsibilities (https://www.colorado.edu/financialaid/node/43/). The university is also required to disclose certain information to all students. Also view CU Boulder Consumer Information (http://www.colorado.edu/about/your-right-know/).

### Verification

Students may be asked to provide additional information as part of the verification (https://www.colorado.edu/financialaid/node/298/) process. Verification checks the accuracy of answers provided on a student's financial aid application.

### Drug Conviction

Students who have been convicted under federal or state law for possession or sale of a controlled substance (https://www.colorado.edu/

financialaid/node/348/) while receiving Title IV aid are no longer suspended from receiving financial aid.

A summary of the most pertinent policies are available as financial aid guides on the Office of Financial Aid's policy webpage (https://www.colorado.edu/financialaid/node/13/).

# Student Employment

Research studies indicate that students who work while attending college are as successful academically as those who do not. Jobs provide students with income, work experience and the opportunity to explore career options. Student Employment, within the Office of Financial Aid, supports students and employers with work-study employment, finding and posting job opportunities and providing guidance on student employment policy.

## Work-Study

Students offered work-study (https://www.colorado.edu/studentemployment/node/8/) are provided an amount of money they can work to earn through approved on and off-campus employer. Students don't get the money up-front, and it's not applied to their tuition and fee bill. These students receive a paycheck for hours worked just like any other hourly job. Work-study students should submit the FAFSA (https://studentaid.gov/h/apply-for-aid/fafsa/) to be considered for work-study, since it's based on financial need.

## Find a Job

Student Employment posts part-time on-campus and off-campus jobs (https://www.colorado.edu/studentemployment/node/4/) for both work-study and regular hourly positions. In addition, an on-call temporary employment service allows students to register for occasional work including one-time child care, yard work and clerical jobs.

## Student Employee Work Hours Policy

Undergraduate student employees are limited to working a maximum of 25 hours per week during the fall and spring semesters and 40 hours per week during the summer, per the Student Hourly Employee Work Hours Policy (https://www.colorado.edu/studentemployment/node/12/). The policy does not affect students working in non-university off-campus jobs, though we encourage students to prioritize their academics first when considering outside work commitments. View more information about this policy and other student employment policies on the Student Employment policy webpage (https://www.colorado.edu/studentemployment/node/12/). (http://www.colorado.edu/studentemployment/)

## Contact Student Employment

Student Employment is here to help connect students and employers. Visit Student Employment in Regent Administrative Center 175 (http://www.colorado.edu/campusmap/map.html?bldg=RGNT&x=24&y=9), call 303-492-5091 or ask a question (https://www.colorado.edu/studentemployment/ask-us-question/) for more information.

# Graduation

## Graduation

Students are eligible to graduate at the close of the term in which they successfully complete all requirements for their degree program. Degrees and certificates are typically conferred at the close of fall semester, spring semester and summer session. Credentials in select programs may be conferred mid-semester.

Students must apply for graduation through Buff Portal by the published deadline for the term in which they complete degree requirements. Instructions for applying and important dates and deadlines are available on the Office of the Registrar's Graduation & Commencement (http://www.colorado.edu/registrar/students/graduation/) webpage. Individual colleges and schools may require additional processes for students completing their degrees.

## Commencement

A general commencement ceremony is held in May for all students who have graduated or anticipate to graduate in a given academic year (fall, spring and summer). This ceremony is open to the public and no tickets are required. Many departments, colleges and schools hold recognition ceremonies in both fall and spring semesters. For dates and details about the ceremony, visit CU Boulder's Commencement (http://www.colorado.edu/commencement/) website.

## Diplomas

Please see the Academic Records (p. 26) section.

## Academic Program Discontinuance

In the event a degree program is discontinued, students currently enrolled in the program have a six-year period in which to complete their degree requirements. This six-year period starts at the end of the academic year in which the Colorado Department of Higher Education (CDHE) takes action to discontinue the program. No new or returning students will be admitted into a discontinued degree program. Students not completing the degree requirements in the six-year period are not permitted to receive the discontinued degree. In such cases, credit hours accumulated may be applied to the overall number of credit hours required toward graduation, but the student must seek the advice of their college or school to determine how these credit hours might apply to a new degree program.

# Health & Wellness

## Health and Wellness Services

Health and Wellness Services is a part of CU Boulder Strategic Resources and Support. As part of Strategic Resources and Support, we are collectively committed to the success and wellbeing of all our students as well as the faculty and staff we serve.

All CU Boulder undergraduate and graduate students have access to a full range of on-campus health and wellness services in addition to a variety of virtual offerings.

To learn more, visit Health and Wellness Services (http://www.colorado.edu/health/).

## Administrative Services

The Administrative Services team oversees all aspects of medical insurance, billing and medical records at CU Boulder. To learn more, visit Administrative Services (https://www.colorado.edu/healthcenter/insurance-billing-medical-records/).

### Counseling and Psychiatric Services

Counseling and Psychiatric Services (CAPS) offers confidential, on-campus short-term mental health and psychiatric services for all fee-paying students. CAPS addresses a variety of concerns such as academics, anxiety, body image, depression, relationships, substance use and more. To learn more, visit CAPS (http://www.colorado.edu/health/counseling/).

### Center for Disability and Access

The Center for Disability and Access is dedicated to providing students with disabilities an equal opportunity to participate in university programs, courses and activities through reasonable accommodations and services. Our office is here to support students, staff and faculty with accommodation requests, implementation, guidance and general information. To learn more, visit the Center for Disability and Access (https://www.colorado.edu/disabilityservices/).

### Health Promotion

Health Promotion provides outreach and education on a variety of health topics to help students make informed decisions about their health and wellbeing. Health Promotion collaborates with student groups and campus departments to provide programs and services that positively influence student health. To learn more, visit Health Promotion (https://www.colorado.edu/health/promotion/).

### Medical Services

Medical Services is the primary healthcare resource for CU Boulder students. Through comprehensive care and education we strive to give students the skills and knowledge they need to develop healthy life-long habits. To learn more, visit Medical Services (https://www.colorado.edu/healthcenter/). (https://www.colorado.edu/healthcenter/)

### Recovery Community

The CU Collegiate Recovery Community (CUCRC) provides community, support and connection for students, faculty and staff in recovery or seeking recovery from a wide range of behaviors. Our mission is to help develop peer-to-peer connections, support resiliency and contribute to their overall wellbeing through a welcoming and supportive community. To learn more, visit Recovery Center (https://www.colorado.edu/recoverycenter/).

### The Office of Victim Assistance

The Office of Victim Assistance (OVA) provides free and confidential information, consultation, support, advocacy and short term counseling services to University of Colorado Boulder students, graduate students, faculty and staff who have experienced a traumatic, disturbing or life-disruptive event. Call 303-492-8855 to connect with an OVA counselor or to receive after-hours support. To learn more, visit The Office of Victim Assistance (https://www.colorado.edu/ova/).

### CU Boulder Student Health Insurance Plan (SHIP)

All students are required to carry a comprehensive medical insurance plan while attending CU Boulder. CU Boulder would like students to have financial protection should they suffer a serious illness or injury during their time here. Our hope is that an insurance plan will help them through these times so that they can continue with their educational endeavors.

**Students may elect health insurance coverage through:**

- Anthem Gold Student Health Insurance Plan (SHIP) - A plan exclusively for CU students.
- Private or personal insurance (an individual health insurance plan through a family member, employer or government-sponsored)

Students must meet this requirement their first semester at CU Boulder and at the beginning of each academic year. Those taking six (6) or more undergraduate credit hours or one (1) or more graduate credit hours are required to complete the health insurance requirement process. Once a student is registered for their semester credits, the student will begin receiving email communications from Academic HealthPlans. These emails explain the insurance requirement and outline the process of enrolling or waiving the Anthem Gold SHIP.

All fee-paying students, regardless of their insurance plan, have full access to the services provided by Health and Wellness Services.

For more information, visit the Health Insurance Requirement (http://www.colorado.edu/health/insurance/health-insurance/)webpage.

*Note*: Plans available through the health insurance marketplace meet CU's health insurance requirement. Colorado students may sign up through the Connect for Health Colorado (http://connectforhealthco.com/)website. Nonresident students may sign up through their home state health exchange or through the national HealthCare.gov (https://www.healthcare.gov/)website.

# New Student & Family Programs

New Student & Family Programs (NSFP) supports new students and families throughout their transition and involvement at the University of Colorado Boulder.

In order to aid in the transition to CU Boulder, all incoming undergraduate students must complete the Online Experience (https://www.colorado.edu/orientation/online-experience/) in order to attend New Student Orientation and register for classes. The Online Experience requires activation of a student's IdentiKey (https://identikey.colorado.edu/) and can be accessed in Buff Portal (https://buffportal.colorado.edu/). The Online Experience and New Student Orientation are critical to the college experience as they help incoming students learn more about student success, advising, registration and campus resources. New students should check their CU Boulder email account (https://oit.colorado.edu/services/messaging-collaboration/microsoft-365/applications/exchange-online/) for more information about the Online Experience and other important next steps.

New Student & Family Programs also collaborates with campus partners to plan fall and spring welcome events surrounding the first day of classes. Students participate in programs and have opportunities to connect with current students, faculty and staff to create a healthy and positive transition to CU Boulder.

For more information, visit the New Student & Family Programs (http://www.colorado.edu/orientation/) website.

# Registration & Enrollment

## Registration

Visit the Office of the Registrar's Academic Calendar (http://www.colorado.edu/registrar/students/academic-calendar/) webpage for specific academic and financial dates and deadlines. Students should also consult individual college and school sections of this catalog and their dean's office for additional information on special requirements and

deadlines. The following registration policies are intended to serve as general guidelines.

Students who require accommodations because of a disability should visit the Disability Services (http://www.colorado.edu/disabilityservices/) website or call 303-492-8671.

# Confirmation Deposit

All new degree students pay a one-time $200 confirmation deposit when they confirm their intent to enroll at CU Boulder. Students are not permitted to complete the New Student Welcome Experience or register for classes if the university has not received the deposit.

Confirmation deposits are non-refundable except upon graduation from CU Boulder. All refunds are reduced by any outstanding financial obligations. Interest earned from confirmation deposits is used for student financial aid.

Questions regarding the confirmation deposit policy should be directed to the Office of Admissions, 303-492-6301.

# Buff Portal

Student registration and other important information and services are available through Buff Portal (https://buffportal.colorado.edu/). Students access the portal using a secure CU login name and IdentiKey password and Duo Multi-Factor Authentication. For more information and registration instructions, visit the Registration (http://www.colorado.edu/registrar/students/registration/) webpage.

# Registering for Classes

Students enroll in (or register for) classes using CU Boulder Class Search, which may be accessed through Buff Portal. In Buff Portal, students may also check their assigned enrollment dates, view any holds that may prevent registration (see "Holds"), see to-do lists and obtain their advisor's name and contact information.

New incoming students and transfer undergraduate students receive their registration instructions and information as part of the New Student Welcome Experience. Continuing students may consult the academic calendar or view their registration dates in Buff Portal; they are also notified by email each semester of upcoming registration periods.

If a student misses their assigned enrollment date, they must wait until open enrollment to register for classes.

Registration instructions are also available on the Enroll in Classes (http://www.colorado.edu/registrar/students/registration/enroll/) webpage.

# Enrollment Dates

Each term, students are assigned enrollment dates based on the number of credits they have completed. Accessible in Buff Portal, the enrollment assignment indicates the dates and times during which the student may enroll, as well as the maximum number of credits they can take. Students who miss their assigned enrollment window must wait until the open enrollment period to register for classes.

Priority registration has been formally approved for specific populations of students who have unique scheduling needs. Priority registration does not override university or departmental policies, holds, permissions, etc., nor does it guarantee the provision of classes at specific times. Student populations with priority registration, which often occurs within the enrollment period specified for their class (i.e., freshmen, sophomores), may include students with disabilities, military veterans and student athletes.

# Holds

A hold may be placed on a student's record for a number of reasons, including but not limited to financial, advising, scholastic, conduct and health. A hold may prevent a student from registering, receiving a housing assignment, returning to school, or obtaining an official transcript. Students should resolve holds as quickly as possible by contacting the appropriate campus office identified in the hold details in Buff Portal.

# Special Registrations

## Intercampus Enrollment Program

CU Boulder students enrolled in at least one Boulder main campus class may be allowed to register for up to two classes totaling no more than six credit hours on another University of Colorado campus.

Classes taken at other CU campuses must be required for graduation or unavailable on the Boulder campus in a given term, or the classes must conflict with another required class in which the student is enrolled.

Boulder students exercising this option pay tuition for their total credit hours at Boulder campus rates. Intercampus Enrollment forms and instructions are available on the Registration Programs (http://www.colorado.edu/registrar/students/registration/registration-programs/) webpage.

Students receiving VA educational benefits are not eligible to receive funding for intercampus enrollment. Contact your campus's veteran and military affairs office for more information.

Intercampus students are registered in host campus classes after continuing home students have had the chance to enroll. Students must adhere to the add/drop deadlines of the host campus when making changes to their intercampus enrollment.

Boulder campus students who wish to take coursework on another campus of the University of Colorado, but not through the Intercampus Enrollment program, may be able to register on that campus independent of Boulder-campus registration. However, they must apply for admission to and follow the registration procedures established by the other campus. Students should check with their dean's office for approval and course applicability to their degree program. Students who want to complete degrees or certificates at another University of Colorado campus must apply to that program on the non-Boulder campus.

## Late Registration

We recommend students register for classes as soon as their registration period begins. For more information, visit the Add a Class (https://www.colorado.edu/registrar/students/registration/register/add/) webpage. Please note that late registration may prevent the timely review of financial aid eligibility, may result in a graduate program being discontinued, limit the number of open classes and more. As of Spring 2025, there is no longer a late registration fee.

## University Employees and Dependents

CU Boulder offers a tuition assistance benefit to eligible employees and their dependents. For current benefit information, visit Employee Services' Tuition Assistance (https://www.cu.edu/employee-services/employee-tuition-benefit/) website.

## Continuing Education Auditors Program

Community members aged 18 and older, who are not registered students but wish to listen in on regularly scheduled lectures, are eligible to audit courses during the fall, spring and summer semesters. Community members may do so by obtaining auditor status.

The university's primary commitment is to degree-seeking and credit-seeking students. Auditors' course requests will be processed after these groups have registered. Auditors must receive permission and obtain a signature from course instructors to be added to the roster.

Audited courses will not appear on any transcript, formal or informal, as no credit is awarded. Registered auditors receive class instruction, learning management system access and library privileges. Being an auditor at the University of Colorado Boulder does not guarantee eligibility for regular degree or nondegree status.

*Note:* Admitted degree students, either enrolled or suspended, are not permitted to audit courses. If an admitted degree student is interested in participating in a class without receiving credit, the student must enroll in the course and request to take the course as no-credit (https://www.colorado.edu/registrar/students/registration/register/edit/#what_it_is-1719). A course must be offered with the student option grading basis to be eligible for no-credit. Courses taken for no credit are assessed the same tuition rate as courses taken for credit. Contact ceregistration@colorado.edu or call 303-492-5148 for more information.

The Senior Auditors program, formerly offered by the CU Boulder Alumni Association, along with the Community Auditors program previously offered by Continuing Education, have been incorporated into the new Continuing Education Auditors program. Please refer to the Auditors enrollment page (https://ce.colorado.edu/programs/auditors/) (https://ce.colorado.edu/resources/topics/enrollment-auditors/)for information on how to register for courses and current auditor restrictions.

# Dropping & Adding Classes

## Procedures

Students can add or drop classes in Buff Portal. For more information, visit the Enroll in Classes (http://www.colorado.edu/registrar/students/registration/enroll/) webpage.

## Deadlines

For specific drop and add deadlines for both the regular full-semester and special fall and spring sessions, visit the Academic Calendar (http://www.colorado.edu/registrar/students/academic-calendar/) and Special Session Calendars (https://www.colorado.edu/registrar/students/calendar/sessions/) webpages. For summer deadlines, visit the Summer Session Calendars (http://www.colorado.edu/summer/resources/calendars/) webpage.

### Add a Class

- Students may add classes in Buff Portal during designated registration periods each term.
- After this time period, students must contact the instructor or the instructor's department and request to be added to a class. Their request may be denied based on lack of attendance, fire code capacity being met, lack of pre-requisites, etc. If a student is added to a class after their designated registration period, then the university cannot guarantee timely review of the student's financial aid or processing of the tuition and fee bill. Students who are added late and then decide to drop will be subject to the normal tuition adjustment and course withdrawal deadlines.
- After the COF-eligibility deadline has passed, classes will not receive COF funding unless the class was added late due to a university error.

### Drop a Class

- **Class drop (without a W grade**): Students may drop individual classes with a refund (if applicable) and no record (no W grades) through the three-week class drop deadline of a regular full-semester fall/spring session and through the equivalent class drop deadline of any special session (dates vary).
- **Class withdrawal**: After the class drop (without a W grade) deadline of a full-semester fall/spring session or the equivalent drop deadline of any special session, students may continue to withdrawal from classes without instructor/advisor approval through the class withdrawal deadline of a full-semester fall/spring session or the equivalent class withdrawal deadline of any special session (dates vary). However, tuition and fees are assessed and grades of W appear on the transcript.
- **Late class withdrawal**: After the 10-week class withdrawal deadline, or equivalent special session class withdrawal deadline, approval via a petition with extenuating circumstances is required. Students should contact their advisor to discuss their options. If approved, tuition and fees are assessed and grades of W appear on the transcript.

Students dropping all of their classes should see the Withdrawal section.

# Withdrawing from the Semester

A withdrawal from a Main Campus semester occurs if the student:

- Never registers for classes in a fall or spring semester
- Drops all classes for a semester
- Submits a withdrawal request to the Office of the Registrar

A student who desires to withdraw from the university and drop all Main Campus classes should visit the Office of the Registrar's Withdraw from the Semester (https://www.colorado.edu/registrar/students/withdraw/) webpage and review the current term's withdrawal calendar and the withdrawal checklist to understand the potential impacts of withdrawing. Failure to withdraw properly may result in failing grades recorded for every class and liability for the full amount of tuition and fees for that term.

Rules for withdrawing may vary with each college and school. Students anticipating a withdrawal should consult their advisor to understand the potential impacts to their degree requirements.

Withdrawing students (including students applying for a graduate leave of absence) with Federal Perkins/NDSL loans must complete a loan exit interview and clear all outstanding financial balances before leaving the university. Failure to do so results in a hold on the student's record. This hold prevents registration for future terms. Students can complete a loan exit interview by contacting University Student Loans & Debt Management in the Bursar's Office at 303-492-5571, toll free at 800-925-9844 or TTY 303-492-3528.

Undergraduate students who withdraw and then wish to return to the university have two semesters (plus summer) from their last graded semester to return to the university without having to reapply for admission. Graduate students can apply for an approved leave of absence.

Details are available on the Withdraw from the Semester (https://www.colorado.edu/registrar/students/withdraw/) webpage. For more information, contact the Office of the Registrar at 303-492-6970 or withdraw@colorado.edu. For information about tuition and fee obligations for withdrawing students, see either the Undergraduate Tuition and Fee Policies (p. 67) or the Graduate Tuition and Fee Policies (p. 1126) sections.

### Active Duty

Students who are military personnel, fire fighters and police officers called to active duty and/or to help with disasters may request to go on a leave of absence. These students should contact the Office of the Registrar. For more information, visit the Withdraw from the Semester (https://www.colorado.edu/registrar/students/withdraw/) webpage.

### Undergraduate Leave of Absence

Undergraduate students can take a leave of absence from the university for up to two semesters (plus summer) without having to reapply to CU Boulder. Eligible degree-seeking undergraduate students may maintain certain university benefits while taking leave from the university. Some benefits (such as Recreation Center access and health insurance through Health & Wellness Services) are only available for an additional fee. Signing up for these elective benefits requires submitting an application.

For an application and more information, visit the Leave of Absence (https://www.colorado.edu/registrar/students/withdraw/leave-of-absence/) webpage.

### Retroactive Withdrawal

In certain situations, students may petitions for retroactive withdrawals from one or more completed semesters. Students must clearly demonstrate that they experienced extenuating circumstances that prevented them from withdrawing by the deadline. These requests are infrequently granted and cover specifically mental health or physical health problems and family or financial problems that led to an abnormally poor academic performance. Students who believe they may be eligible for a retroactive withdrawal should speak with an academic advisor or coach and visit the Office of Undergraduate Education's Retroactive Withdrawal (https://www.colorado.edu/office-undergraduate-education/retroactive-withdrawal/) webpage for more information.

While there is no guaranteed timeframe for petitions to be reviewed, generally petition review takes between 30 to 60 days after the petition is marked as complete. Campus closures and holidays can also impact the review process timeline. For petitions that are approved, the student will be fully withdrawn from the semester(s) requested. Grades will be replaced with withdrawals (W) for all classes taken in the the semester(s) irrespective of the original grades.

Students who withdraw within a given term due to extenuating circumstances should review the academic and financial considerations on the Withdraw from the Semester (https://www.colorado.edu/registrar/students/withdraw/#military_personnel_amp_emergency_workers-466) webpage.

# Student Affairs

# Housing

## Residence Halls

Living on campus in a university residence hall is considered an important part of student life. Over 8,000 students are accommodated in double rooms, multiple-occupancy rooms, singles and apartments in 24 residence halls. All halls are coeducational and range in sizes from 100 to 700 students. Each fall the residence halls provide a new home for more than 7,000 entering first-year students. Subject to the availability of space, all first-year students are required to live in a residence hall for two academic semesters (a summer term does not count as an academic semester), unless they are married or live with parents and have permission to commute. Requests for permission to reside off campus for other reasons are considered on their merits, taking into account individual circumstances.

The residence halls provide a range of services and programs designed to support the intellectual, social and personal growth of single student residents. For example, all first year students are eligible for free tutoring, often within their residence hall. Additionally, a variety of academic and social programs are sponsored by residence hall and other university staff.

The dining centers' service hours are planned to be convenient for most students' schedules. Campus Dining Services provides healthy food choices to diverse students which emphasizes convenience, value and variety. The dining program permits students (regardless of hall assignment) to eat in any dining center. A Registered Dietician is available to provide consultation for students with dietary needs.

For more information about university housing options (https://www.colorado.edu/living/) and/or permission to reside off campus (https://www.colorado.edu/living/policies-forms-and-accommodations/), prospective students may contact:

University Housing
Center for Community, Room S300
159 UCB
Boulder, CO 80309-0159
Email: universityhousing@colorado.edu
Phone: 303-492-6673

### Application for Residence Hall Housing

New first-year and transfer students receive information from University Housing about applying for housing 3-5 business days after they have confirmed their intent to attend the university. Learn more about the housing application process (https://www.colorado.edu/living/housing/undergraduate-housing/application-process/). (Please note that University Housing does not guarantee assignment to a particular building or program, type of accommodation or specific roommate.)

Note: Application for admission to the university and application for housing are two separate transactions. For information regarding admission notification and confirmation procedures, see the undergraduate Admissions (p. 29) section.

All housing contracts are for the full two-semester academic year or remainder thereof. An early termination of contract is subject to cancellation charges as stated in the residence halls contract.

### Housing Security Deposit

All students who live in campus housing are required to pay $300 at the time of application. Of this total, $50 is nonrefundable application fee and is used to cover administrative costs. The remaining $250 is a refundable deposit, held by University Housing and is released to the tuition and fee account within 60 days after the expiration of the housing contract.

The security deposit required for housing is in addition to the confirmation deposit required for admission to the university.

### Housing and Food Rates per Semester

Campus housing room and food rates per semester can be viewed on the University Housing website. Learn more about housing and food rates (https://www.colorado.edu/living/housing/undergraduate-housing/contracts-and-rates/).

### Undergraduate Residential Programs

A number of the residence halls are home to residential academic programs. Additionally, several communities offer themed housing in the form of living and learning communities. Visit the respective pages of the catalog to learn more about residential academic programs (p. 1096) and living and learning communities (p. 1097).

## Off-Campus Housing

Off-Campus Housing & Neighborhood Relations (a service of CUSG) maintains listings of apartments, houses and rooms for rent in the Boulder area. Currently enrolled students may view listings and connect with potential roommates on Ralphie's List, CU's rental database, on the Off-Campus Housing & Neighborhood Relations (http://offcampushousing.colorado.edu/) website. The office also maintains a detailed list of apartments and property management companies available for download or pickup in the office.

The department has a staff attorney available on Tuesdays and Fridays to advise students about leases, security deposits, maintenance issues and roommate and landlord conflicts. Office assistants will help students locate properties and answer questions about the surrounding neighborhoods.

During the academic year, the office sponsors several off-campus housing fairs where landlords, property managers and related businesses offer their services to students in a trade-show format.

For additional information, visit the Off-Campus Housing & Neighborhood Relations (http://offcampushousing.colorado.edu/) website or call 303-492-7053. Office hours are 9 a.m.–5 p.m., Monday–Friday. Summer hours are 7:30 a.m.–4:30 p.m.

Note: First-year students must receive written permission from University Housing before obtaining off-campus accommodations for the fall and spring semesters of their first year, as well as for the summer session preceding their fall start date.

## Graduate & Family Housing

The University of Colorado Children's Center provides childcare for the children of students, staff, faculty and Graduate & Family Housing residents.

Graduate & Family Housing offers an affordable, convenient and comfortable living environment that serves the needs of a diverse population of students at CU Boulder. We are home to residents from over 70 nations and offer a variety of apartment types and sizes, flexible leases and community-building programs and events. To learn more, visit the Housing and Dining (https://living.colorado.edu) website or call, write or email the Graduate & Family Housing Office at the address provided.

Graduate & Family Housing Office
1350 20th Street, #A10
University of Colorado Boulder
Boulder, CO 80302
T: 303-492-6384
graduatefamilyhousing@colorado.edu

# Student Conduct & Colorado Creed

## Student Conduct & Conflict Resolution

### What We Believe

Student Conduct & Conflict Resolution (SCCR) strives to provide students with individualized responses to support community standards and conflict resolution that emphasize accountability and growth by:

- Fostering reflection on the impact of their behaviors;
- Promoting responsible community membership and repairing harm; and
- Cultivating the wellbeing and safety of the CU Boulder community.

#### What Is Important to Us

1. The student will understand the impact of their behavior on others.
2. The student will demonstrate ethical development, will comply with institutional policy and will engage in no further violations of policy.
3. The student will gain an understanding of the institutional values reflected in institutional policies.
4. The student will gain a better understanding of the importance of personal integrity.
5. Through SCCR processes, the student will be asked to reflect on their beliefs, ethics and values.
    a. The student will be able to articulate their personal ethics and values, will act in congruence with those ethics and values, and will make decisions that reflect their beliefs.
6. The student will contribute positively to the CU Boulder community and beyond.
7. The student will gain a better understanding of the consequences and potential consequences of their personal actions and will learn the purposes of institutional policies.
8. The student will employ critical thinking in problem solving and ultimately obtain a degree.

### Why Do We Have a Student Code of Conduct? (Authority)

Article 7, Part B, of the Laws of the Regents of the University of Colorado requires each campus to develop a student code of conduct. Student Conduct & Conflict Resolution (SCCR) is authorized to establish and administer this policy. Any questions regarding interpretation of this code or any of its provisions should be directed to the Dean of Students or their designee for final determination.

Questions regarding student behavior should be directed to Student Conduct & Conflict Resolution, studentconduct@colorado.edu, Center for Community, S485, 10 UCB Boulder, CO 80309, phone 303-492-5550.

## When and Where Does the Student Code of Conduct Apply? (Jurisdiction)

1. The Student Code of Conduct applies to:
   a. Student conduct that occurs on, or as it relates to, CU Boulder property or at official functions and CU Boulder sponsored programs conducted away from the campus.
   b. Student conduct that occurs off CU Boulder property is subject to this policy if it:
      i. Adversely affects the health, safety or security of any member of the CU Boulder community, including the student alleged to have violated CU Boulder policy or the mission of CU Boulder; or
      ii. Involves any records or documents of CU Boulder;
      iii. Involves conduct that may be a violation of federal, state or local law, as determined by SCCR.
   c. For this policy's purposes, CU Boulder's mission is broadly defined to include its academic goals and the importance of developing civic responsibility in our students.
2. Recognized Student Organizations and Recognized Social Greek Organizations:
   a. Wherever the Student Code of Conduct refers to "responding student," the same also applies to Recognized Student Organizations (RSOs) and Recognized Social Greek Organizations (RSGOs). RSOs, as described in the Student Organization Handbook (https://www.colorado.edu/involvement/), are general student organizations recognized by the Center for Student Involvement (CSI) and CU Boulder. Recognized Social Greek Organizations are recognized by Fraternity & Sorority Life (FSL) and CU Boulder.
      i. RSOs and RSGOs, as well as their members and other students, may be held collectively and/or individually responsible for violations.
      ii. The RSO and RSGO officers, leaders, signers or individuals currently listed in an official position in the Center for Student Involvement records or Fraternity & Sorority Life records may be held collectively and/or individually responsible for violations when such violations are committed by persons associated with the organization who have received consent or encouragement from the organization's officers or leaders, if those officers or leaders knew, or reasonably should have known, that such violations were being or would be committed.
      iii. The officers or leaders of a student organization may be directed by CU Boulder officials to take action designed to prevent or end violations by the organization or by any persons associated with the organization. Failure to comply with a directive may be considered a violation of the Student Code of Conduct, both by the officers or leaders of the organization and by the organization.
3. Actions taken under a resolution process are separate and apart from any law enforcement or other court process or proceeding, such as a civil lawsuit or criminal prosecution, that may relate to the same underlying factual incident. SCCR's jurisdiction does not depend on whether a responding student is criminally charged through the criminal justice system. A resolution process is not postponed while criminal or civil proceedings are pending unless otherwise determined by the resolution specialist. Dismissal of criminal charges or acquittal in a criminal case does not prevent SCCR from investigating and resolving an incident.
4. The unexcused failure of a responding student to appear and/or respond to a resolution process does not prevent CU Boulder from proceeding with or completing a resolution process.
5. For jurisdictional information related to sexual misconduct (including sexual assault, sexual harassment, intimate partner violence and gender/sex-based stalking), protected class discrimination, harassment and any related retaliation, see Section M of the Student Code of Conduct.
6. For jurisdictional information pertaining to academic misconduct, see Section M of the Student Code of Conduct.
7. Questions or concerns regarding policy and procedures for students charged or convicted of a crime that occurred prior to being admitted should be directed to SCCR.

## Student Resolution Processes

SCCR resolves alleged prohibited conduct through the informal resolution process, the formal resolution process or the restorative justice process. Resolution specialists have the authority and sole discretion to determine the type of resolution process. This decision is primarily based on, but not limited to, the following factors:

- If the responding student admits or otherwise takes responsibility for the alleged prohibited conduct;
- The responding student's prior conduct record;
- The nature and severity of the alleged prohibited conduct;
- The alleged impact and/or harm caused to another person or community;
- Whether the alleged conduct would violate the Student Code of Conduct; and/or
- Any other factors that the resolution specialist finds relevant to the specific allegations.

The formal resolution process is an adjudication of the alleged prohibited conduct, considered an educational and disciplinary process, and may result in resolution outcomes and a disciplinary conduct record. The informal resolution process and restorative justice process are intended as forms of alternative dispute resolution, are voluntary, primarily educational in nature, not an adjudication of the allegations, not considered a disciplinary process and instead will result in a written agreement with the responding student. Because SCCR does not consider the informal resolution process or restorative justice process to be disciplinary processes, they do not result in a disciplinary conduct record or file. Informal resolutions and restorative justice will never result in resolution outcomes such as suspension or expulsion.

The first step in each resolution process is initiated by the resolution specialist issuing a written Resolution Meeting Notice to the responding student, which prompts the responding student to attend a scheduled meeting with the resolution specialist as outlined in the notice.

### Informal Resolution

This process may generally include, but is not limited to, a meeting with a resolution specialist, completion of the assigned resolution outcomes and/or participation in the restorative justice process.

During the meeting, if the resolution specialist determines that the informal resolution process may be appropriate, the resolution specialist will offer it as an option to the responding student and address any questions the responding student may have about the process. If the

responding student accepts responsibility for the alleged prohibited conduct and completes educational resolution outcomes assigned by the resolution specialist, then SCCR will consider the matter to be resolved informally.

### Formal Resolution

This process generally includes:

1. Written notice of the factual allegations and alleged violations of the Student Code of Conduct;
2. The opportunity to meet with the resolution specialist to address the allegations and provide information to the resolution specialist;
3. The resolution specialist reviewing the allegations and making factual and violation determinations based on preponderance of the evidence; and
4. Written notice to the responding student of the resolution specialist's determinations.

The resolution specialist will consider the following in making this determination:

1. The allegations in the Resolution Meeting Notice and the responding student's response to those allegations;
2. Any documents or information that the resolution specialist finds relevant, including without limitation, relevant documents presented by the responding student, complainant or any other interested party; and/or
3. The oral or written statements of any witnesses with relevant information, as presented by the responding student, any alleged victim or other interested party, as appears in a report, or as requested by the resolution specialist.

All students residing in Housing & Dining Services facilities are subject to Residential Handbook policies and any policy properly communicated through Housing & Dining Services staff. For more information, visit the Housing & Dining Policies (https://www.colorado.edu/living/housing/policies-forms-and-accommodations/) webpage.

Cases involving sexual misconduct (including sex assault, sexual harassment, sexual exploitation, intimate partner violence and gender/sex-based stalking), protected class discrimination and harassment, and any related retaliation are subject to the Office of Institutional Equity and Compliance (OIEC) process and procedures (https://www.colorado.edu/oiec/policies/). For more information about these policies and procedures, contact the OIEC at (303) 492- 2127 or visit the OIEC (https://www.colorado.edu/oiec/) website.

Excerpts from the Colorado Revised Statutes regarding hazing, ethnic intimidation and riots are also presented. Colorado law prohibits persons convicted of rioting from enrolling in state-supported universities/colleges for 12 months following the date of a conviction.

For information about student classroom and course-related behavior, visit the policies (https://www.colorado.edu/compliance/policies/student-classroom-course-related-behavior/) webpage.

## Colorado Creed

The Colorado Creed, developed by students in 2003, is a social code of conduct and a lifestyle by which students at CU Boulder live. The text of the creed is:

As a member of the Boulder community and the University of Colorado, I agree to:

- Act with honor, integrity and accountability in my interactions with students, faculty, staff and neighbors.
- Respect the rights of others and accept our differences.
- Contribute to the greater good of this community.

I will strive to uphold these principles in all aspects of my collegiate experience and beyond.

For more information, visit the Colorado Creed (http://www.colorado.edu/creed/) website.

## Student Resources

The Division of Student Affairs (http://www.colorado.edu/studentaffairs/) offers many on-campus resources for our students. Visit our offices to learn more.

## Student Life & Involvement

- Center for Inclusion and Social Change (https://www.colorado.edu/cisc/): Explore identity and inclusivity, participate in educational programs, attend events and build community with others.
- Center for Student Involvement (https://www.colorado.edu/involvement/): Be involved! Find your community by connecting with student organizations, campus-wide events and leadership opportunities.
- CU Student Government (https://www.colorado.edu/cusg/): Make a difference! Get involved with your student government representatives, elected by students, for students. CUSG is your voice on campus.
- Environmental Center (https://www.colorado.edu/ecenter/): Help CU Boulder become a global leader in sustainability through recycling, student bus pass, bicycle and educational programs.
- Fraternity & Sorority Life (https://www.colorado.edu/greeks/): Find opportunities for friendship, leadership and growth in CU's vibrant and diverse Greek community.
- Housing & Dining (https://www.colorado.edu/living/): Explore information about on-campus life including residence halls, meal plans and dining options!
- New Student & Family Programs (https://www.colorado.edu/orientation/): The campus resource for new students and families as they begin their journey at CU Boulder. Ask questions and be sure to join for welcome events throughout the year.
- Off-Campus Housing & Neighborhood Relations (https://www.colorado.edu/offcampus/): Explore off-campus rentals on Ralphie's List, register your party and learn about the legal aspects of off-campus living.
- Recreation Services (https://www.colorado.edu/recreation/): Get moving with all that The Rec has to offer, including intramural sports, fitness classes, nutritional services and Outdoor Pursuits.
- Residence Life (https://www.colorado.edu/living/): Explore the opportunities that residence life provides, from on-campus housing and employment to student resources like free tutoring.
- University Memorial Center (https://www.colorado.edu/umc/): Visit the CU Book Store, student services and student organization offices, as well as plenty of entertainment, dining and hangout options.

## Student Support & Development

- Basic Needs Center (https://www.colorado.edu/support/basicneeds/): Get connected to essential resources when you need them most. Access the Buff Pantry and other assistance with food, housing and other on-campus and community services.
- Career Services (https://www.colorado.edu/career/): Become more employable and find meaningful work through learning how to fine-tune your resume, develop your skills, land an internship and make connections with employers.
- Student Conduct & Conflict Resolution (https://www.colorado.edu/sccr/): Get support for resolving conflicts and learn more about the Student Code of Conduct and the Honor Code.
- Student Legal Services (https://www.colorado.edu/studentlegal/): Access low-cost legal advice and education regarding your rights and responsibilities, and how to navigate the legal system.
- Student Support & Case Management (https://www.colorado.edu/studentaffairs/sscm/): Find individual support for students and advocates for their needs in all aspects of campus life.
- Veteran and Military Affairs (https://www.colorado.edu/veterans/): Prospective and current student veterans and veteran dependents: find program information, policies, pay and support services.
- Volunteer Resource Center (https://www.colorado.edu/volunteer/): Explore volunteer and leadership opportunities on campus and throughout the greater Boulder community.

# Student Data Privacy

## Annual Notice to Students

As a CU Boulder student, it's important to understand your rights regarding access to and disclosure of information in your education record. The Family Educational Rights and Privacy Act (https://www.colorado.edu/registrar/students/records/ferpa/) (FERPA) affords you the right to:

- Inspect and review your education record
- Request amendment of your education record
- Consent to disclosure of personally identifiable information in your education record
- File a complaint with the U.S. Department of Education (Family Policy Compliance Office, U.S. Department of Education, 400 Maryland Avenue, SW, Washington, DC 20202)

To review or request an amendment to your record, contact the Office of the Registrar or the university office that maintains the record. This does not apply to grade changes, which are at faculty discretion.

Under FERPA, the university may release education record information if the disclosure is:

- To CU Boulder officials who have a legitimate educational interest (https://www.colorado.edu/registrar/students/records/ferpa/glossary/)
- To officials of another institution at which you seek or intend to enroll
- To authorized representatives of federal, state or local educational authorities
- To connection with financial aid you've applied for or received
- To an organization conducting studies for or on behalf of the university
- To your parents or guardians (if you are a dependent student for tax purposes)
- To an accrediting organization
- To comply with a judicial order or lawfully issued subpoena
- In connection with a health or safety emergency or other exception under FERPA (https://www.colorado.edu/registrar/students/records/ferpa/exceptions/)
- To fulfill a request for data that CU Boulder defines as directory information (https://www.colorado.edu/registrar/students/records/ferpa/directory-info/)

Student data that is *not* directory information may only be released with your documented consent.

To authorize third-party access to your non-directory information, see CU Guest Access (https://www.colorado.edu/registrar/students/records/privacy/guest-access/) and FERPA Consent to Release (https://www.colorado.edu/registrar/students/records/privacy/consent/). You may restrict the release of directory information by placing full privacy (https://www.colorado.edu/registrar/students/records/privacy/full/) on your record.

Questions may be directed to the Office of the Registrar.

## Directory Information

The following items of student information have been designated by the University of Colorado Boulder as public or "directory" information:

- student name[1]
- hometown (city, state)
- campus email address[2]
- dates of attendance
- previous educational institutions attended
- school/college or division of enrollment
- majors, minors and fields of study
- classification level (e.g., first-year, sophomore, etc.)
- university-recognized honors and awards
- degree status (e.g., expected graduation date and/or conferral dates/terms)
- enrollment status
- employment related to student status (e.g., teaching assistant, resident assistant or work-study) and dates for positions held
- participation in officially recognized activities/sports, including height and weight of athletes.
- photos and videos taken or maintained by the university

Directory information shall not be provided to anyone outside of the CU community (except to vendors/organizations with which the university has contracted in order to provide goods or services to students). The university retains the discretion to refuse disclosure of directory information if it believes such disclosure would be an infringement on student privacy rights. In an effort to protect student privacy, CU directories may only contain a student's name, email address, class and major field of study.

[1] If a student provides a preferred name, the university uses it when communicating directly with the student and in campus systems, rosters, etc., unless there is a documented business or legal reason to use a student's primary name. When communicating with outside third parties, including parents, the university generally uses a student's primary (legal) name. Students may also select a diploma name (https://www.colorado.edu/registrar/students/graduation/) for graduation and commencement materials.

[2] Campus email addresses may not be used for solicitation.

### Withholding Directory Information (Full Privacy)

Students have the right to request full privacy which withholds directory information from being released to inquirers. To request full privacy and restrict the release of directory information, students must bring a photo ID to the Office of the Registrar during business hours to complete a privacy form.

### Student Consent for Release of Non-directory (Confidential) Information

Students may authorize the university to release educational records to parents, spouses or other third parties by granting consent in their student portal. The Privacy Settings (http://www.colorado.edu/registrar/students/records/privacy/) webpage has more information about various options for granting and restricting access to student records.

### Release of Disciplinary Information

Provisions of the Family Educational Rights and Privacy Act of 1974, as amended by the Higher Education Amendments of 1998, govern access to a student's academic transcript or conduct file. The student and/or those university officials who demonstrate a legitimate educational need for disciplinary information may have access to the student's conduct file.

Parent(s) who provide proof that a student is a dependent as defined in Section 152 of the Internal Revenue Code of 1954 (i.e., a copy of the last federal income tax return listing the student as a dependent) may have access to the student's conduct file without written consent of the student. In this case, parents may have access to a conduct file, even if the student has requested otherwise.

In addition, parent(s) may be notified if a student under 21 is found responsible for a violation involving use or possession of alcohol and controlled substances. All other inquiries, including but not limited to inquiries from employers, government agencies, news media, family, friends or police agencies, require a written release from the student before access to university conduct files is granted. Exception: information may be released pursuant to a lawfully issued subpoena and as provided by the Campus Security Act as amended by the Higher Education Amendments of 1992.

The Campus Security Act permits higher education institutions to disclose to alleged victims of any crime of violence (e.g., murder, robbery, aggravated assault, burglary, motor vehicle theft, arson) the results of the conduct proceedings conducted by the institution against an alleged perpetrator with respect to such crime. The Campus Security Act also requires that both the accused and the accuser be informed of campus conduct proceedings involving a sexual assault.

# Student Finances

## Costs

### College Opportunity Fund (COF)

The College Opportunity Fund (COF), created by the Colorado Legislature, provides a stipend to eligible undergraduate students. The stipend pays a portion of total in-state tuition for eligible undergraduate students who attend a Colorado public institution or a participating private institution. Eligible undergraduate students must be admitted and enrolled at a participating institution to use the stipend for eligible classes.

To receive the COF stipend, students must both apply for COF and authorize CU Boulder to use the stipend on their behalf (two separate steps). New accounts offer 145 available undergraduate credit hours. COF-eligible students who exceed 145 eligible COF hours toward their degree may apply for additional semesters of eligibility. For more information, visit the Office of the Registrar's College Opportunity Fund (http://www.colorado.edu/registrar/students/cof/) webpage.

Details of the COF program are determined by the Colorado Department of Higher Education (CDHE) and the College Assist Program (https://cof.college-assist.org/). Students with questions about COF may contact the Office of the Registrar (http://www.colorado.edu/registrar/about/contact-us/).

### Confirmation Deposit

All new students (residents, nonresidents and international) must confirm their intent to enroll and pay the $200 confirmation deposit. The deposit is nontransferable, nonrefundable in most cases and must be paid by all students regardless of financial aid awards. Students who have paid the deposit and who decide not to attend CU Boulder forfeit their deposit. Students who submit deposits after enrollment levels have been reached will not be accepted, and their deposits will be returned.

The confirmation deposit is not applied to the tuition bill. It is refunded after graduation or official withdrawal within established dates and guidelines, and after paying any outstanding university obligations.

### Housing Deposit

Please see the Housing (p. 60) section for details.

### Estimated Costs

Costs for students attending CU Boulder vary depending on housing (on or off campus); start term; area of study; residency classification; personal needs and individual interests. Visit the Bursar's Office (https://www.colorado.edu/bursar/) website to view cost information. Tuition and fees are approved annually by the Board of Regents in accordance with the level of cash fund appropriations set for the university by the Colorado General Assembly. Next year's rates are usually published on the Bursar's Office website by June 1. Please check back for current information. Additional costs such as on- and off-campus housing and food, books and supplies, transportation and personal expenses are considered indirect costs and are not charged on the university bill, but should be considered for planning purposes. Please visit Understand Your Cost of Attendance (https://www.colorado.edu/understand-your-cost-attendance/) for a full description of costs.

The figures below are direct cost (university-billed) estimates based on a single undergraduate student enrolled full time for academic year 2024–25 (two semesters). For details, visit the Bursar's Office (https://

www.colorado.edu/bursar/) website. The difference in tuition depends upon the student's area of study.

**2024–25 Colorado Resident Costs (one academic year; resident for tuition purposes)**
Tuition and Fees: $14,002–$19,882
On-Campus Housing and Food *(based on double occupancy, standard room, 19 meals per week)*: $17,794
Books and Supplies: $1,200
On-Campus Estimated Total: $32,996–$38,876

**2024–25 Nonresident Costs (one academic year; nonresident for tuition purposes)**
Tuition and Fees: $43,622–$47,520
On-Campus Housing and Food *(based on double occupancy, standard room, 19 meals per week)*:$17,794
Books and Supplies: $1,200
On-Campus Estimated Total: $62,616–$66,514

**2024–25 International Costs (one academic year; international nonresident for tuition purposes)**
Tuition and Fees: $45,676–$49,570
On-Campus Housing and Food (*based on double occupancy, standard room, 19 meals per week*): $17,794
Student Health Insurance Plan (SHIP): $3,976 *(included in estimated total)*
Books and Supplies: $1,200
On-Campus Estimated Total: $64,670–$68,564

Notes:

- The in-state tuition amount assumes eligibility for and authorization of the College Opportunity Fund (COF) stipend, which was $116 per credit hour in 2024–25. Colorado resident undergraduate students must apply for and authorize the COF stipend to help offset part of their tuition. See the undergraduate COF section above.
- Residency classification (https://www.colorado.edu/registrar/students/state-residency/) for tuition is determined by Colorado law.
- These estimates do not include a one-time new student fee of $232–$500 or the Student Health Insurance Plan ($2,420 per semester based on 2024–25 rates). Health insurance coverage is mandatory but students have the option to submit proof of private insurance coverage if they choose. See the Health & Wellness (https://catalog.colorado.edu/undergraduate/student-affairs/health-wellness/) section. Different health insurance guidelines apply to international students. See International Student and Scholar Services Health Insurance & Immunizations for more information.
- In-state tuition is charged per credit hour. Out-of-state and international tuition is a flat rate, regardless of the number of credit hours.
- CU Boulder provides a high-quality educational experience backed by predictable four-year tuition for all of our undergraduate students. See Undergraduate Tuition Guarantee (https://www.colorado.edu/bursar/costs/cu-boulder-tuition-guarantee/) for more information.
- Students planning to attend summer session can visit the Bursar's Office (https://www.colorado.edu/bursar/) website for summer rates.
- Tuition for no-credit (NC) courses (p. 51) is the same as for courses taken for credit.
- Students simultaneously enrolled in programs leading to two different degrees or two different majors will be assessed tuition for the area of study with the higher tuition rate.

# Bills & Payments

## Online Bills

The university bill includes tuition, fees, on-campus room and board (p. 60), residential academic program (RAP) fees, student health insurance (see health insurance requirement (https://catalog.colorado.edu/undergraduate/student-affairs/health-wellness/)) and other direct costs. Costs are billed one semester at a time. Textbooks, digital course materials and supplies up to $1,500 from the CU Book Store can be charged to the student bill. Adjustments made throughout the semester will appear on the student account (e.g. health insurance waiver, dropping or adding courses, etc.).

Bills for fall are available in mid-August. Spring bills are available in mid-January. Emails are sent to students' colorado.edu addresses and to authorized payers when bills are available online. New and unpaid charges are billed each subsequent month. Failure to check email or receive an email notification of the bill does not relieve any student of responsibility for payment by the published deadline. Students can log in to Buff Portal (https://buffportal.colorado.edu) and authorized payers can log in to CUBill&Pay (https://quikpayasp.com/cu/boulder/tuition/authorized.do) at any time to view the bill.

Any student who completes registration agrees to pay CU Boulder according to the payment terms in the Tuition and Fee Agreement and Disclosure (https://www.colorado.edu/bursar/payments/payment-agreement/).

## Authorized Payers

Family members do not automatically have access to view and pay the tuition bill because of federal privacy laws (http://www.colorado.edu/registrar/students/records/ferpa/). If they are helping pay the bill on the student's behalf, students must give them access to CUBill&Pay by authorizing them as payers (https://www.colorado.edu/bursar/billing/#give_parents_others_access_to_the_bill_authorized_payer_access_-939). Students can authorize payers in Buff Portal (https://buffportal.colorado.edu). Students are ultimately responsible for payment of the bill.

Authorized Payer access is separate and distinct from CU Guest Access (https://www.colorado.edu/registrar/students/records/privacy/guest-access/) and FERPA Consent to Release (https://www.colorado.edu/registrar/students/records/privacy/consent/). If a family member is helping pay tuition and fees on a student's behalf, we recommend giving them authorized payer access and CU Guest Access.

If a third, non-related party is helping pay the bill (e.g., military, countries sponsoring international students), please see 3rd Party Sponsorships (https://www.colorado.edu/bursar/payments/payment-options/3rd-party-sponsorships/).

## Payments

Payment due dates are the 5th of the month. Primary payment deadlines are Sept. 5 for fall semester and Feb. 5 for spring semester. Dates may be subject to change.

### Payment Methods

Payments can be made online from a traditional U.S. checking or savings account via electronic check (eCheck). No fees are associated with this payment method making it the most cost-effective option.

We also accept American Express, Mastercard, Visa and Discover. A nonrefundable 2.85% fee (charged by NelNet Campus Commerce) applies

to all credit and debit card transactions. We encourage payment from a checking or savings account to save money and avoid paying the service fee.

We have partnered with Flywire to accept payments from international students worldwide. Students and families can easily and securely make education payments in their own currency, using local payment methods from their home. Flywire offers real-time tracking, 24x7 multilingual support and a best price guarantee on exchange rates.

Learn about other Payment Options (https://www.colorado.edu/bursar/payments/payment-options/) on the Bursar's Office website.

**Payment Plans**
Payment plans are available for students and authorized payers to pay tuition and fees in monthly installments over the course of the semester. For more information, visit the Payment Plans (https://www.colorado.edu/bursar/payments/payment-plans/) webpage.

Also see the Policies (p. 67) section.

# Tuition and Fee Policies

## Add/Drop Tuition Adjustment

Adjustment of tuition and fees is made accordingly based on dates in the Add/Drop Calendar (https://www.colorado.edu/registrar/students/calendar/).

## Credit and Debit Card Service Fee

A nonrefundable 2.85% service fee charged by NelNet Campus Commerce applies to all credit and debit card transactions. To avoid paying this fee, we encourage payment from a U.S. checking or savings account via electronic check (eCheck).

## Appeal Rights

To appeal tuition and mandatory fee charges, students must make a formal request to the Bursar's Office by the last day of finals of the semester immediately following the one being appealed. Appeals will only be considered under extenuating circumstances, such as university error, recent medical condition, immediate family emergency, recent unanticipated financial problems and verified nonattendance. Official documentation must be provided to substantiate the circumstances. Learn more about the process, complete the tuition appeal form and submit the documentation online on the Tuition Appeals (https://www.colorado.edu/bursar/billing/tuition-appeals/) webpage. If you disagree with the charges and fail to avail yourself of the appeal process by the deadline, you will have waived your right to appeal the charges.

## Failure to Make Payment

Failure to make the required payment in accordance with the scheduled payment deadline may result in any or all of the actions described below.

A financial hold may be placed on the student record and remain until the balance is paid in full. The hold may prevent students from being able to:

- Adjust their current schedule (drop or add classes).
- Register for future classes.
- Receive a diploma or certification materials.
- Be re-admitted.

A late payment charge is assessed once per semester based on the amount due.

## Balance Due and Late Charges

| Balance Due | Late Charge |
|---|---|
| $10–99.99 | $5 |
| $100–299.99 | $10 |
| $300–499.99 | $20 |
| $500–699.99 | $30 |
| $700–899.99 | $40 |
| $900 and over | $50 |

In addition, finance charges of one percent (1%) per month are assessed on the unpaid principal balance. Finance charges are calculated by applying the periodic rate of one percent (1%) per month (annual percentage rate of twelve percent) to the unpaid principal balance less any payments or credits made.

Past due accounts are referred to the university's Student Debt Management department for collection. Students will have an opportunity to establish a university-approved repayment arrangement. Establishing a repayment arrangement does not result in release of financial holds.

If the balance is not paid or a university-approved repayment agreement does not exist after six months, Colorado law requires the university to place all delinquent accounts with a private collection agency at which time the delinquency is reported to national credit bureaus.

Student accounts referred to an outside collection agency may incur collection agency costs, expenses and fees. Such collection costs, expenses and fees may include percentage-based fees charged to the university by the collection agency, including percentage-based fees of up to 30% of the debt collected. Any collection costs stated above are charged in addition to the principal, fees and interest due on the student's account. Students may be responsible for reasonable attorneys' fees and court costs associated with collecting or enforcing payment on the past due account as allowed under Colorado law. Pursuant to Colorado Revised Statutes § 23-5-115, in the event the student defaults on the amount owed to the university, the university may certify information to the Colorado Department of Revenue as required for the recovery of past due debt.

## Nondegree Students

Nondegree students enrolled in undergraduate courses are assessed tuition at the Arts & Sciences rate or undergraduate Base Rate (effective Fall 2022 and later). Nondegree students enrolled in graduate courses are assessed tuition at the Arts & Sciences graduate rate. Nondegree students in both graduate and undergraduate courses are assessed tuition at the undergraduate rate.

## Returned Payments

A $20 fee is charged for all payments (regardless of the amount) returned due to insufficient funds, closed account, payment stopped, or for other reasons. A $35 fee is charged by NelNet Campus Commerce for returned payment plan payments. In addition, late and finance charges may be assessed and certified funds may be required when payment is made. An additional financial hold may be placed on the student's account and students may be liable for collection costs and attorneys' fees as allowed by Colorado laws.

## Students Registered on More than One Campus

Students registering for courses on more than one campus during a single semester pay tuition and fees to each campus at the rate

appropriate to the number of credit hours for which they are registered on that campus. Students may be eligible to use the intercampus enrollment program (https://www.colorado.edu/registrar/students/registration/registration-programs/), in which case they pay the tuition rate of their home campus for the total hours enrolled at all campuses.

### Tuition and Fee Agreement and Disclosure

Any student who completes registration agrees to pay CU Boulder according to the payment terms in the Tuition and Fee Agreement and Disclosure (https://www.colorado.edu/bursar/payments/payment-agreement/).

### Tuition Classification

Students are classified as residents, nonresidents or international nonresidents for tuition purposes on the basis of answers provided on their application for admission and other relevant information. For more information, go to Tuition Classification (http://www.colorado.edu/registrar/students/state-residency/).

### Withdrawal Policy Regarding Tuition and Fees

Students who pay the $200 confirmation deposit and register for classes for any given semester are obligated to pay full tuition and fees for that semester, unless they officially withdraw from the university by published deadlines.

Tuition and fee obligations for students withdrawing from fall or spring semesters:

- Continuing students: Students who withdraw during the full-refund periods will have their confirmation deposit refunded unless there are any outstanding charges.
- New and readmitted students: New, readmitted and new transfer students are not eligible for a refund of the confirmation deposit.

Deadlines to withdraw with no financial penalty vary by session and semester. For the current refund and assessment schedule, visit the Withdraw from the Semester (https://www.colorado.edu/registrar/students/withdraw/) webpage.

For students withdrawing from all full-semester classes after the deadline to drop without a W grade, (the first drop deadline), there are three additional assessment periods:

- For two weeks after the last day to drop without a W grade, students will be charged 40 percent of total tuition (not including the portion of tuition paid by College Opportunity Fund (COF) for in-state undergraduate students) and mandatory fees (CUSG student fees and the athletic fee). COF credit hours are expended and not refunded for withdrawals after the published deadline.
- For two weeks after the 40 percent assessment deadline, students will be charged 60 percent of total tuition (not including the portion of tuition paid by COF for in-state undergraduate students) and mandatory fees (CUSG student fees and the athletic fee).
- After the 60 percent assessment deadline, tuition will not be adjusted. In the case of extenuating circumstances (university error, recent medical condition, immediate family emergency, recent unanticipated financial problems or verification of non-attendance), students may appeal tuition and mandatory fee charges through the Bursar's Office through the last day of finals.

Special session withdrawals only follow the 100 percent and 0 percent adjustment periods. See Session Withdrawals (https://www.colorado.edu/registrar/students/withdraw/#ucb-accordion-id--7-content7).

To comply with federal financial aid regulations, financial aid recipients' loan and scholarship awards may be adjusted.

Visit the Withdraw from the Semester (https://www.colorado.edu/registrar/students/withdraw/) webpage for current information. The Board of Regents reserves the right to revise this schedule at any time. Refer to the Summer Session (http://www.colorado.edu/summer/) website for information on the withdrawal policy and refund schedule for summer terms.

Students who do not pay the full amount due to the university at the time of withdrawal must make arrangements for payment with the Bursar's Office. Withdrawals are handled through the Office of the Registrar.

# Tuition Classification

## In-State and Out-of-State Tuition Classification

Tuition classification is governed by state law and by judicial decisions that apply to all public institutions of higher education in Colorado. Since tuition classification is governed by state law (https://www.colorado.edu/registrar/students/state-residency/guidelines/), the University of Colorado cannot alter or waive the eligibility criteria for any reason, including financial hardship or academic excellence.

New students are classified as Colorado residents (in-state) or nonresidents (out-of-state) for tuition purposes based on information provided on their admission application and other relevant information. Applicants may be required to submit evidence substantiating their claim of in-state eligibility.

Current nonresident students who believe they have become eligible for a change to resident classification must submit a petition with documentation to have their eligibility reviewed. The petition requirements, deadlines for submission, explanation of Colorado tuition classification statutes, specific legal residency exceptions and Office of the Registrar contact information are available on the Tuition Classification (http://www.colorado.edu/registrar/students/state-residency/) webpage.

- For undergraduate students who are not yet 23 years old when a term begins, classification is based upon the domicile of a biological parent or court-appointed legal guardian.
- In order for a student to qualify for resident classification through their own domicile information, they must be one of the following: at least 23 years old on the first day of the term, or married for at least one year before the first day of the term, or entering the second year of a graduate program.
- There are rare individuals who may qualify for resident classification as an emancipated minor (under the age of 23) if they are able to prove that they are totally financially and residentially independent.

## Basic Requirements for Establishing Colorado Residency

To become eligible for resident classification, a person must establish legal residence in Colorado. Legal residence, or "domicile," is defined as a person's true, fixed, and permanent home and place of habitation. No

person may establish domicile in Colorado solely for the purpose of obtaining in-state tuition benefits.

The qualifying person must demonstrate at least 12 consecutive months of Colorado domicile immediately preceding the beginning of the term for which the student is seeking resident classification. Domicile includes both physical presence and evidence of intent to stay, which is demonstrated by establishing legal ties to Colorado.

To be eligible to *begin* the 12-month period to establish Colorado domicile, an individual must be at least one of the following:

- 22 years of age or older
- Married
- A graduate student
- An emancipated student
- The parent of a student under the age of 23

## Unemancipated Minors

Students under age 23 who depend on their parents for support may qualify for in-state tuition if either of their parents, regardless of custody, has been domiciled in Colorado for 12 consecutive months preceding the first day of class in a given semester, even if the student resides elsewhere. In certain circumstances, students may qualify through their parents up to age 23.

## Emancipation

An emancipated minor is an individual under age 23 who demonstrates total financial and residential independence. This means the student's parents and all others have entirely surrendered the right to the student's care, custody and earnings, and make no provision for support of any kind. Emancipation is very rare; undergraduates under age 23 who do not have a parent domiciled in Colorado are highly unlikely to be classified as a Colorado resident student.

Students who provide false information to evade payment of out-of-state tuition or who fail to provide timely notice of their loss of in-state eligibility as an emancipated minor are subject to retroactive assessment of out-of-state tuition, as well as disciplinary and legal actions.

## Evidence of Domicile

Establishing Colorado domicile includes actions that would be expected of any permanent resident. Pursuant to Colorado law, the following are actions that may be considered evidence of domicile:

- Filing a tax return in Colorado and, if applicable, payment of Colorado state income tax.
- Colorado driver's license or Colorado ID card within 120 days of move to Colorado.
- Colorado vehicle registration within 180 days of move to Colorado.
- Voter registration in Colorado.
- Graduation from a Colorado high school.
- Lease or deed showing permanent occupancy of residential real property in Colorado.
- Continued residence in Colorado while not enrolled as a student and during semester breaks.
- Permanent employment or acceptance of future employment in Colorado
- Any other factor particular to the individual that tends to establish the necessary intent to make Colorado a permanent home.

No single factor constitutes proof of domicile. All evidence, both positive and negative, is considered. Not all of the listed items are necessary, however individuals should take action on all factors that are applicable to their circumstances. For more information on all requirements, see the Tuition Classification (http://www.colorado.edu/registrar/students/state-residency/) webpage.

## Domicile Exceptions

Colorado tuition law provides the following rare exceptions to the one-year domicile requirement in certain circumstances:

- Colorado National Guard members
- Members of American Indian Tribes with Historical Ties to Colorado
- Active duty military stationed in Colorado and their dependents
- Honorably discharged members of the U.S. Armed Forces and their dependents
- Returning active-duty military members
- Canadian military stationed in Colorado
- ASSET law qualified students with one year Colorado High School attendance (must have attended a Colorado high school for at least one year preceding the date of graduation; also requires Colorado high school graduation/Colorado GED ***and*** 12 consecutive months of physical presence in Colorado prior to enrolling at the institution)
- Children of new faculty members at Colorado state colleges and universities
- Employees of companies moving to Colorado receiving government economic incentives
- Western Regional Graduate Program enrollees in specific major fields of study
- Olympic athletes training in Colorado
- Others (see Residency Exceptions for Domicile (http://www.colorado.edu/registrar/students/state-residency/domicile-exceptions/) webpage)

Requirements, including spouse and child eligibility, and a list of qualifying tribes are detailed on the Residency Exceptions for Domicile (http://www.colorado.edu/registrar/students/state-residency/domicile-exceptions/) webpage.

# University Policies

## Alcohol and Other Drugs

In order to create the best possible environment for teaching and learning, the University of Colorado Boulder affirms its support for a responsible campus policy that addresses the inappropriate use of alcohol and other drugs.

In compliance with the federal Drug Free Schools and Communities Act, the University of Colorado Boulder prohibits the unlawful manufacture, possession, use or distribution of a controlled substance (illicit drugs and alcohol) of any kind and in any amount. These prohibitions cover any individual's actions that are part of any university activities, including those occurring while on university property or in the conduct of university business away from the campus.

Information on policies, penalties, health effects and resources available to students and staff regarding alcohol and other drugs can be found

on the Alcohol & Other Drugs Information (http://www.colorado.edu/aod/) website.

These policies are also described by various university offices in several publications:

- **Campus housing:** See the Residential Handbook (https://www.colorado.edu/living/housing/policies-forms-and-accommodations/#residential_handbook-1317) webpage.
- **Student Code of Conduct:** See the Student Code of Conduct (https://www.colorado.edu/sccr/).
- **Safety:** Annual Security and Fire Safety Report (https://www.colorado.edu/clery/annual-security-fire-safety-report-asfsr/).

Individual and group counseling for students with substance abuse concerns is available through Counseling and Psychiatric Services. For more information, visit the Counseling and Psychiatric Services (https://www.colorado.edu/counseling/services/substance-use-services/) webpage or call 303-492-2277.

### Smoking

For student health and the health of our community, smoking is prohibited in all campus buildings and on all campus grounds.

At this time, the use of smoking products of any sort shall be prohibited on all university-owned and operated campus grounds both indoors and outdoors. This smoking ban does not apply to public rights-of-way (sidewalks, streets) on the perimeter of the campus.

"Smoking," as used in this policy, means smoking any substance, including but not limited to, tobacco, cloves or marijuana. "Smoking products" include, but are not limited to, all cigarette products (cigarettes, bidis, kreteks, e-cigarettes, etc.) and all smoke-producing products (cigars, pipes, hookahs, etc.). University-owned and operated campus grounds include, but are not limited to: all outdoor common and educational areas; all university buildings; university-owned on-campus housing; campus sidewalks; campus parking lots; recreational areas; outdoor stadiums; and university-owned and leased vehicles (regardless of location). In keeping with university policy, the sale, distribution and sampling of all tobacco products and tobacco-related merchandise is prohibited on all university-owned and operated property and at university-sponsored events. Littering campus with remains of smoking products is prohibited.

This policy applies to all employees, students, visitors, contractors and externally affiliated individuals or companies renting university-owned space on university-owned and operated property campus grounds.

## Campus Safety

### Personal Safety on Campus

While the University of Colorado Boulder is a relatively safe place to be, the campus is not a haven from community problems. Through the joint effort of various organizations on campus, CU is committed to providing ample safety resources for faculty, staff and students.

Specific efforts to promote safety on campus include the provision of adequate lighting, police protection, educational programs and special prevention programs, such as the CU NightRide escort services and laptop and bicycle registration programs.

In compliance with the federal Clery Act, students and employees receive information on campus security policies and programs, including crime statistics, in an Annual Security and Fire Safety Report (https://www.colorado.edu/clery/annual-security-fire-safety-report-asfsr/). This report will be sent to CU Boulder affiliates by Oct. 1 of each year. In any emergency or life-threatening situation, always call 9-1-1.

Members of the university community are encouraged to report any incident of threatening or harmful behavior to the CU Boulder Police by calling 9-1-1 in an emergency or the non-emergency line, 303-492-6666. Visit Don't Ignore It (http://www.colorado.edu/dontignoreit/) for more information about the wide range of campus and community resources and reporting options available.

Additional safety information can be found on the CU Police Department (http://www.colorado.edu/police/) website. For information on crime alerts, trends and safety tips, follow the CU Police Department on Twitter (@ (https://twitter.com/cuboulderpolice/)CUBoulderPolice) and Facebook (CUBoulderPolice (https://www.facebook.com/CUBoulderPolice/)).

## Communication

### Student Email

All CU students receive an email account from the university, which is an official means of sending information to students. Students are responsible for maintaining this CU email address. The official email address can be used by professors to contact students and provide course-related information. Administrative offices, such as the Office of the Registrar, use official email addresses to contact students and provide important information. Students are responsible for frequently checking their official CU email address. For more information on the student email policy, visit the Student E-mail Policy (http://www.colorado.edu/policies/student-e-mail-policy/) webpage, call the IT Service Center at 303-735-HELP or email HELP@colorado.edu. To learn more about student email accounts, visit the Office of Information Technology's Messaging and Collaboration webpage (https://oit.colorado.edu/node/237/).

## Copyright & Fair Use

The University of Colorado Boulder community respects the intellectual property of others, regardless of the medium by which it is transmitted. This is a cornerstone of academic integrity. We prohibit the use of unauthorized distribution of copyrighted material, which is subject to both civil and criminal penalties as well as university procedures.

Distributing copyrighted materials using peer-to-peer or file-sharing programs is illegal and the university uses technological solutions to deter this activity. Still, the university regularly receives notices of copyright violations and is required by law to take action. Common consequences include loss of network access and referral to the Office of Judicial Affairs. Guidance on campus fair use and copyright issues is provided on the University Libraries (http://www.colorado.edu/libraries/copyright-information/) website.

## Diversity & Nondiscrimination

### Commitment to Diversity

The Division of Student Affairs supports and contributes to creating and sustaining a diverse, multicultural, socially just and inclusive campus climate by learning about, recognizing and honoring the diverse backgrounds, histories, identities and life experiences of all our students, faculty and staff. Our goal is to create an environment in which all campus community members can thrive while feeling welcomed, safe and at home.

At the University of Colorado Boulder, we are committed to building a campus community in which diversity is a fundamental value. People are different and the differences among us are what we call diversity —a natural and enriching hallmark of life. Diversity includes, but is not limited to, ethnicity, race, gender, age, class, sexual orientation, religion, disability, veteran status, gender identity/expression, veteran status, political affiliation or political philosophy, and health status. A climate of healthy diversity is one in which people value individual and group differences, respect the perspectives of others and communicate openly.

"Diversity is a key to inclusive excellence in education. A diverse learning environment better prepares all students for the world that awaits them. CU Boulder is committed to enriching the lives of our students, faculty and staff by providing a diverse campus where the exchange of ideas, knowledge and perspectives is an active part of learning."—from the Guidelines for Diversity Planning *(*https://www.colorado.edu/odece/diversity-plan/*)*.

### Nondiscrimination Statement

The University of Colorado Boulder does not discriminate on the basis of race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy in admission and access to, and treatment and employment in, its educational programs and activities. The university takes affirmative action to increase ethnic, cultural, and gender diversity; to employ qualified disabled individuals; and to provide equal access and opportunity to all students and employees.

## Equity & Compliance

The University of Colorado Boulder is committed to maintaining a positive learning, working, and living environment free from discrimination and harassment. The Office of Institutional Equity and Compliance (OIEC) (http://www.colorado.edu/oiec/) addresses all claims of sexual misconduct, harassment and/or discrimination, or related retaliation by students, staff and faculty under the University of Colorado Sexual Misconduct, Intimate Partner Violence and Stalking Policy, the University of Colorado Boulder Policy on Protected-Class Discrimination and Harassment, and the University of Colorado Policy on Conflict of Interest in Cases of Amorous Relationships. The university is committed to addressing concerns and taking appropriate action against those found in violation of these policies.

In response to a report, OIEC determines what immediate and long-term support and safety measures are needed to minimize disruptions to education or employment and to help keep the involved parties and the campus safe. OIEC also provides education and assessment to identify areas in need of improvement to foster a more welcoming and inclusive culture.

To learn more about university policy or the role and programs offered by OIEC, please visit the Office of Institutional Equity and Compliance (https://www.colorado.edu/oiec/) website or call 303-492-2127.

# Colleges, Schools & Programs

## Arts & Sciences

The College of Arts & Sciences is the liberal arts college at CU Boulder. Its mission is to provide an outstanding liberal arts education for its undergraduates, cutting-edge graduate education and world-class research, scholarship and creative work. In addition to gaining the knowledge and skills of their areas of study, students learn how new information is acquired and can participate in original research and creative work with individual faculty members.

The college offers a wide variety of fields of study, with nearly 50 undergraduate majors. The environment and advantages of a small liberal arts college are created through "academic neighborhoods" in which students can meet and interact with other students and faculty in small group settings. In addition, more than 60 percent of undergraduate classes are small, with 25 or fewer students.

As the liberal arts college of CU Boulder, the College of Arts & Sciences has several goals in the education of its students:

- Educate citizens who can think for themselves, understand the rapidly changing world and make wise choices within a democratic system.
- Impart a love of learning so that students can continue to grow throughout life.
- Teach ways of thinking about and approaching new problems. For some students, this will enable them to further advance knowledge and scholarship in the academy. For all students, this is important for enriching their lives.
- Prepare students to help enrich the lives of others. Arts & Sciences graduates become lifelong resources for their families, neighbors, friends and co-workers.
- Provide students with a well-rounded education. Arts & Sciences students acquire a broad knowledge and an integrated understanding of art and music, great literary works, philosophy, history and politics, the social world, science and technology. They learn how to critically evaluate and think about morals, ethics and values. The General Education requirements give students a broad, liberal-arts education that develops the whole person, not just the specialist.
- Educate students for careers and a productive life. Arts & Sciences students gain the most current knowledge and skills in their major fields of study. In addition, they learn how to acquire new skills to contend with-and lead-the changes that will occur in the decades to come. Education for a productive life also requires that students learn how to analyze situations, solve problems and speak and write effectively.

The College of Arts & Sciences is also dedicated to outstanding graduate education. Advanced degrees are offered by nearly every academic department in the college, and the PhD is offered in approximately 30 different disciplines. In addition, an increasing number of departments offer combined bachelor's/master's degrees that can be earned in five years. Graduate training focuses on teaching and research careers as well as on professional careers in the public and private sector.

The strength of the College of Arts & Sciences comes from its outstanding faculty. In addition to being dedicated teachers, they are active scholars in disciplines throughout the arts and humanities, social and behavioral sciences, biological sciences and physical and mathematical sciences. They are the recipients of numerous national awards and honors for their research, scholarship and creative work. Faculty and staff of the College of Arts & Sciences join together to create an intellectual community of students and scholars to discover, critically examine, integrate, preserve and transmit knowledge, wisdom and values.

## Miramontes Arts and Sciences Program

The Miramontes Arts and Science Program (MASP) (https://www.colorado.edu/masp/) is a community of diverse scholars

dedicated to academic achievement. MASP accepts highly motivated students with strong academic records who are also members of traditionally underrepresented groups and/or are first-generation college students. MASP supports students through mentoring, instruction, skills workshops, enrichment opportunities, community activities and participation scholarships.

For most members of MASP, support begins the summer before freshman year with the Program for Excellence in Academics and Community (PEAC) (https://www.colorado.edu/masp/peac/), a summer residential program that helps first year students transition to the university. PEAC is an intensive and challenging academic program where students take a rigorous set of non-credit classes, learn valuable skills for academic success, are introduced to resources and opportunities on campus and in the College of Arts & Sciences, and participate in advanced enrichment and community-building activities. Continuing students interested in MASP can also apply to the Learning, Inclusion, Networking and Community (LINC) bridge program (https://www.colorado.edu/masp/linc/).

Students receiving a participation scholarship in MASP commit to participating in a range of programming that include one-credit hour seminars on unique and advanced topics in Arts & Sciences, research colloquia where they meet and network with faculty members, skills workshops and community conversations. Students are encouraged to participate in undergraduate research and/or other scholarly activities such as internships and study abroad programs. MASP students are also required to be involved with our community space and to participate in community activities to help develop a strong sense of group cohesiveness and spirit. And more!

For more information, call the MASP office at 303-492-8229.

# Arts and Sciences Residential Academic Programs (RAPs)

Residential Academic Programs (RAPs) are elective programs in which students live together in a residence hall, share common academic interests, participate in specially-tailored small first-year classes, have unique access to faculty and engage in co-curricular activities that reinforce the program's academic theme. RAP classes satisfy A&S Gen Ed or major requirements and are taught by dynamic, award-winning faculty specializing in the first-year experience. Courses are taught in classrooms within the residence hall, with an average of only 20 students per class. The RAPs generate a sense of belonging among their students through the intertwined efforts of the teaching faculty, staff and student employees. Students apply to participate in a RAP by selecting a residence hall with a RAP in their housing choices. With a focus on student academic success and wellness, the RAPs help students transition to CU.

In the College of Arts & Sciences, there are six RAPs to choose from, each with their own theme.

## A&S Honors RAP

A&S Honors RAP (https://www.colorado.edu/honors/honorsrap/), located in Smith Hall, is an inclusive, challenging and supportive co-educational living-learning community open to Honors-qualified students. By becoming part of the Honors RAP community, students surround themselves with other bright, highly motivated students, enjoy small seminar-style classes and have the opportunity to work closely with Honors faculty. Through its classes and its extra-curricular activities, Honors RAP integrates the diverse disciplines of the College of Arts and Sciences with the opportunities and challenges of real-world experiences. In short, we to offer the best educational experience possible to qualified CU undergraduates.

Incoming first-year honors-qualified students receive a Welcome Letter from the A&S Honors Program inviting them to participate in Honors. Being in the Arts & Sciences Honors Program qualifies students to join the A&S Honors RAP; a separate Honors RAP qualification is not required. Honors-qualified students are not guaranteed a space in the Honors RAP. Housing applications and assignments are a product of the Housing Office. Applications are processed as described on Housing's website, according to the date of the completed Housing application.

## Creative Minds RAP

The Creative Minds RAP (https://www.colorado.edu/libbyrap/) at Libby Hall is a vibrant living and learning community that unites classes exploring a variety of arts disciplines with diverse courses fulfilling A&S Gen Ed and Major Requirements, dedicated to our core mission of creativity, curriculum and community as well as our motto: "Where creative minds come alive."

Creativity, touted by the *World Economic Forum* as the number one job skill for the future, is essential for developing strategies to navigate our ever-changing world. Encouraging our students to be inventive, adaptable and courageous enables them to face inevitable challenges and find new pathways to success in any field or endeavor. Our mission is to cultivate creative minds who become innovative leaders and active and engaged citizens.

Our curriculum includes courses in dance, drawing, painting, writing, storytelling, cinema studies, digital art, pop culture and music, as well as a range of popular A&S Gen Ed classes such as anthropology, economics, math, nutrition and philosophy.

The Creative Minds RAP at Libby builds community through small classes, engaged faculty and a range of inclusive, co-curricular activities such as Sushi Night, our famous Art Melt Ice Cream Social, and monthly diversity celebrations such as Lunar New Year, African drumming and Drag Queen Bingo, as well as visits to museums, theater performances and movie nights. Each semester culminates in a Celebration of the Arts showcasing student work.

## Environment and Natural Sciences RAP

The Environment and Natural Sciences RAP (https://www.colorado.edu/bakerrap/) in Baker Hall is ideal for students who see the importance of scientific awareness in their daily lives and career paths. Intellectual development in environmental issues, health sciences, biology, sustainability and stewardship are emphasized. Our courses include offerings in environmental studies, biology, atmosphere and ocean sciences, geology, sociology, philosophy and anthropology. Other courses allow students to complete requirements for their major or to fulfill Gen Ed requirements.

Our co-curricular programming encourages active lifestyles, promotes professional development and inspires intellectual curiosity about the environment. Students often state how much they value our co-curricular offerings, which include weekly coffee hours, monthly environmental film series, outdoor activities like hiking, camping and yoga, guest speakers and holiday special events. Trusting and long-term relationships between RAP faculty, administration and students are established because of extensive, daily interactions both in and out of the classroom.

### Global Studies RAP

The Global Studies RAP (https://www.colorado.edu/globalstudiesrap/) in Arnett Hall draws on insights from disciplines across the humanities and social sciences to give students the theoretical and methodological skills and the knowledge base necessary to understand this complex and rapidly changing world. As CU educates the leaders of the future, G-RAP must prepare them to deal with the great issues facing the world—health, peace, prosperity, environmental sustainability—from a basis of cultural and historical understanding as well as a basis of scientific analysis.

G-RAP promotes engaged learning in order to grasp the main currents of global studies, the cultural challenges and opportunities and the ethical values that are at stake. Students and faculty in G-RAP are engaged in a variety of ways. Through lively class discussions, numerous co-curricular and extra-curricular events, and projects nurtured in this residential setting, G-RAP students take great pleasure in studying countries and peoples, cultural norms and values, documents and texts. Students develop understanding and compassion for the people in different countries and in diverse communities. The global flux in cultural goods, human capital and natural resources have given the traditional problems of poverty, hunger and war greater complexity and urgency. Students at G-RAP learn to compose their thoughts more clearly, communicate them more effectively and reflect on them more cooperatively so that they can be of use in the world. G-RAP students and faculty recognize the wisdom of past generations and their legacies.

### Health Professions RAP

The Health Professions RAP (HPRAP) (https://www.colorado.edu/hprap/) resides in Kittredge West Hall and serves approximately 300 first year students. HPRAP is the logical choice for students who have declared or are interested in the life sciences majors and careers in the health professions. The HPRAP offers classes that satisfy requirements for the Integrative Physiology (IPHY), Molecular Biology (MCDB) and Neuroscience (NRSC) majors or are recommended prerequisites for admission into medical or health professional schools. HPRAP offers two different introductory biology course sequences, two sequences for chemistry, as well as a variety of courses on bioethics, global public health, writing and the social sciences. We also offer second year coursework in human anatomy, physiology, and biostatistics. Students can select up to two HPRAP courses per semester and then fill the rest of their schedule with courses taught by the rest of the campus. A representative schedule of course offerings can be found on the program's website. In addition to course offerings, the HPRAP offers a variety of programs to help students explore their major and career opportunities.

HPRAP hosts an evening lecture series featuring practicing clinicians and medical researchers. We offer an exclusive shadowing program at two comprehensive care clinics, workshops on study skills and test-taking, no-cost tutoring by advanced students, and we offer a variety of community-building activities throughout the year, including fieldtrips, dinners and weekly coffee hours. Faculty and advising offices are on-site and provide students drop-in advising and assistance. While the Health Professions RAP invites any College of Arts & Sciences student regardless of major who is interested in exploring healthcare careers to join us, our curriculum is best suited for IPHY, MCDB and NRSC majors. We are a good but not perfect fit for students majoring in biochemistry or chemistry, and students who are primarily interested in social or environmental sciences or engineering are encouraged to explore other residential programs that are better tailored to their interests. The Health Professions RAP will help like-minded students make life-long friends and will maximize student success in exploration of the life sciences and healthcare career opportunities. For more information about the program fee and course offerings visit the HPRAP website (https://www.colorado.edu/hprap/) or contact us at hprap@colorado.edu.

### Stories and Societies RAP

Located in the beautiful and centrally-located Sewall Hall, the Stories and Societies RAP (https://www.colorado.edu/srap/) is for first-year students in the College of Arts & Sciences with an interest in how their own narratives connect to the past, to current societies and to the future. Our courses and co-curricular activities emphasize the connections between modern culture and its historical roots. Our RAP is open to students in all majors in the college and offers courses from departments across all three divisions of the college, including anthropology, biology, economics, history, philosophy, sociology and writing.

# Policies & Requirements

## Admissions

### First-Year Applicants

When students apply to the College of Arts & Sciences from high school, they may select one of the 44 majors available in the college or they may enter the college as an Arts & Sciences Open Option (https://www.colorado.edu/artsandsciences/academics/open-option/) major (when they are unsure about their major and want to explore the wide variety of majors, minors and certificates offered by the college). To ensure that students graduate in a timely manner, Open Option majors are required to enter a specific degree program by the time they have completed 60 credit hours. To maintain eligibility for the four-year guarantee, students must declare and enter a degree-granting major by the start of the second semester (or earlier for certain majors).

Specific admission requirements are detailed in the Admissions (https://catalog.colorado.edu/undergraduate/admissions/) section of this catalog. Contact the campus Admissions Office (http://www.colorado.edu/admissions/) for more information.

### Transfer Students

Students desiring to transfer (https://www.colorado.edu/artsandsciences/student-resources/transfer-students/) from other accredited collegiate institutions are considered for admission on an individual basis. Admission criteria for students transferring from the other University of Colorado campuses are the same as for other transfer students. Students seeking to transfer from a Colorado Community College should visit this resource page (https://www.colorado.edu/artsandsciences/colorado-community-colleges/) developed specifically for them.

Like incoming first-year students, transfer students may select any one of the 44 degree-granting bachelor of arts majors available in the college or they may enter the college as an Arts & Sciences Open Option (https://www.colorado.edu/artsandsciences/academics/open-option/) major if they will be transferring with fewer than 60 credits.

To earn a degree from the College of Arts & Sciences at CU Boulder, transfer students, like all other Arts & Sciences students, must complete at least 45 credit hours at CU, at least 30 upper-division credit hours in College of Arts & Sciences coursework, and at least 12 upper-division credit hours in their major area at CU Boulder.

## Intra-University Transfer (IUT)

Students enrolled in another college, school or program on the CU Boulder campus, who wish to transfer into the College of Arts & Sciences must meet the following minimum requirements.

Minimum requirement to IUT into the College of Arts & Sciences:

- Cumulative CU GPA of at least 2.000 in completed coursework

Students who apply to IUT must choose a degree-granting major offered by the college. A student cannot IUT into Arts & Sciences and declare an Open Option major.

Student should visit the Office of Undergraduate Education website (https://www.colorado.edu/advising/intra-university-transfer/) for official IUT deadlines and should contact an academic advisor in their intended major (https://www.colorado.edu/artssciences-advising/team/) for additional information about the IUT process.

## Readmission

Students who have not been active at CU Boulder for 3 or more semesters including students on academic suspension who have been reinstated, may need to apply for readmission to the University of Colorado Boulder through the Admissions Office. Students are encouraged to submit readmission requests well in advance of the semester for which they plan to return.

## Credit by Examination

### Advanced Placement Program

CU Boulder participates in the Advanced Placement program of the College Board. General Arts & Sciences (ARSC) credit that is applicable only to the college's General Education requirements is granted for scores of 3 on most AP exams, but credit for a specific Arts & Sciences course that would be applicable to a major or a minor usually requires a score of 4 or in a few cases a score of 5. Official scores must be sent to the Admissions Office directly from the College Board for both first-year students and transfer students. See Undergraduate Admission (https://catalog.colorado.edu/undergraduate/admissions/) for more info and the Advanced Placement Table (https://catalog.colorado.edu/undergraduate/admissions/credit-examination/) for specific equivalencies.

### International Baccalaureate

Any student admitted to a University of Colorado campus after June 30, 2003, who has graduated from high school having successfully completed an International Baccalaureate (IB) diploma program will be granted 24 credit hours of college credit. No tuition will be charged for these credits. These credits will be granted, however, only if the student receives a score of 4 or better on an examination administered as part of the IB diploma program. Students admitted to the College of Arts & Sciences for the Fall 2018 semester or thereafter with an IB diploma will be waived from the Lower-Division Written Communication portion of the college's General Education Skills Requirement.

In addition, CU Boulder grants specific course credit, which would be applicable to a major or a minor, for International Baccalaureate examinations at the higher level with a score of 4 or higher and general Arts and Sciences (ARSC) credit, which is applicably only to the college's General Education requirements, for examinations at the standard level with a score of 4 or higher. For specific equivalencies see the International Baccalaureate (IB) Credit Table (https://catalog.colorado.edu/undergraduate/admissions/credit-examination/#internationalbaccalaureateibcredittext).

### College-Level Examination Program (CLEP)

CU Boulder grants credit for most, but not all, CLEP subject examinations. In the College of Arts & Sciences the credit earned by passing most CLEP examinations may be used to fulfill General Education requirements but *not* to fulfill major or minor requirements. Credits from a CLEP exam may not be used to fulfill any of the college's residency requirements. For specific equivalencies see the College Level Examination Program Table (p. 44). More information about CLEP exams and how to register to take one either online or in person a local community college can be found on the College Board's (https://clep.collegeboard.org/) website.

### DANTES Subject Standardized Tests (DSST) Examinations

CU Boulder grants credit for many, but not all, DSST subject examinations. In the College of Arts & Sciences the credit earned by passing most DSST examinations may be used to fulfill General Education requirements but *not* to fulfill major or minor requirements. Credits from a DSST exam may not be used to fulfill any of the college's residency requirements. For specific equivalencies see the DSST Examinations Table (p. 45). More information about DSST exams, which can be taken only by members of the United States Armed Forces, and how to register to take one can be found on the Prometric (https://www.prometric.com/test-takers/search/dantes/) website.

## Transfer Credit Policies

### Transfer of credit from other institutions of higher education

Work from another accredited institution of higher education that has been completed with a grade of C- (1.70) or better may be transferred to the University of Colorado. Categories of transfer coursework not accepted by the university are described in the undergraduate Transfer of College-Level Credit (https://catalog.colorado.edu/undergraduate/admissions/transfer-college-level-credit/) section.

All courses transferred from junior and community colleges carry lower-division credit. Courses transferred from four-year institutions carry credit at the level at which they were taught at the previous institution, but, if the level at the sending institution is unclear, courses will be reviewed on a course-by-course basis. Upper-division courses from another four-year institution sometimes will transfer to CU Boulder as lower-division credit while lower-division courses will always carry lower-division credit even if they are allowed to fulfill a requirement usually filled by an upper-division course at CU Boulder.

Transfer courses evaluated to be equivalent to a CU Boulder course do not always carry the same number of credits as the equivalent CU Boulder course. For example, a 4-credit hour transfer Calculus course could be judged to be equivalent to MATH 1300 Calculus 1 at CU Boulder, which is a 5-credit hour course. While the transfer Calculus course would fulfill all the same major, minor and prerequisite requirements as MATH 1300, it would only count as 4, not 5, credits toward any specific credit requirements for graduation.

### Colorado Student Bill of Rights

In the interests of promoting timely graduation and facilitating the transfer of students among the institutions of higher education in the state of Colorado, the College of Arts & Sciences and the University of Colorado Boulder adhere to the Student Bill of Rights as presented in Colorado Statute 23-1-125.

**23-1-125. Commission directive—student bill of rights—degree requirements—implementation of core courses—competency test—prior learning**

1. Student bill of rights. The general assembly hereby finds that students enrolled in public institutions of higher education shall have the following rights:
   a. Students should be able to complete their associate of arts and associate of science degree programs in no more than sixty credit hours or their baccalaureate programs in no more than one hundred twenty credit hours unless there are additional degree requirements recognized by the commission;
   b. A student can sign a two-year or four-year graduation agreement that formalizes a plan for that student to obtain a degree in two or four years, unless there are additional degree requirements recognized by the commission;
   c. Students have a right to clear and concise information concerning which courses must be completed successfully to complete their degrees;
   d. Students have a right to know which courses are transferable among the state public two-year and four-year institutions of higher education;
   e. Students, upon completion of core general education courses, regardless of the delivery method, should have those courses satisfy the core course requirements of all Colorado public institutions of higher education;
   f. Students have a right to know if courses from one or more public higher education institutions satisfy the student's degree requirements;
   g. A student's credit for the completion of the core requirements and core courses shall not expire for ten years from the date of initial enrollment and shall be transferable.

### Statewide Guaranteed Transfer of General Education Courses

As of fall 2003, the two-year and four-year transfer articulation agreements among Colorado institutions of higher education were replaced by a statewide guaranteed transfer of approved general education courses taken at any Colorado public institution of higher education. Under the statewide guaranteed transfer program (gtPathways), up to 31-33 credits of successfully (C- or better) completed coursework will automatically transfer and apply towards the general education requirements at the receiving institution. The coursework must be drawn from the list of approved gtPathways courses and must meet the distribution requirements of the guaranteed transfer program. Further information about the statewide transfer program, including the list of approved courses and distribution requirements, can be found on the Colorado Department of Higher Education (https://highered.colorado.gov/Academics/Transfers/Students.html) website.

As of fall 2018, a student graduating with an associate of arts or an associate of science degree from a Colorado community college and entering the College of Arts & Sciences is exempt from the General Education requirements of the College. Additional information on the evaluation of transfer credit from Colorado community colleges and its application to the College's General Education requirements can also be found at the College of Arts & Sciences Guide for Colorado Community College Students (https://www.colorado.edu/artsandsciences/student-resources/transfer-students/guide-colorado-community-college-students/) webpage. Students are required to follow the graduation requirements listed in this catalog at the time of their initial entry into the College of Arts & Sciences.

### Concurrent or Dual Enrollment College Credits Earned While in High School

College-level work taken during high school is evaluated in accordance with general guidelines for transfer credit at CU Boulder. Only courses taken at a college or university of recognized standing with grades of C- or better are accepted for transfer. Students must have an official college transcript sent directly to the Office of Admissions in order for transfer credit to be evaluated.

If a student has earned college credit for a high school course for which the student also earned college credit via an Advanced Placement (AP) or International Baccalaureate (IB) score, either the concurrent college credit or the credit earned for the AP or IB score will be granted, but not both. The credit granted will be determined in accordance with state policy and the student's educational best interests.

Students should be prepared to provide syllabi for any and all college credit they earned while in high school. Such syllabi should be nearly identical to those used when the course is taught at the accredited college or university granting the concurrent/dual enrollment credit.

For more information and a guide to equivalencies for exam credit, see the charts in Credit by Examination (p. 37) section of this catalog, and refer to the First-year Applicants (p. 30) or Transfer Students (http://www.colorado.edu/admissions/transfer/) webpage.

# Requirements

Students are subject to the general degree requirements in effect at the time that they first enter the College of Arts & Sciences at CU Boulder and are subject to the major requirements in force at the time they declare the major. All degrees offered by the College of Arts & Sciences require the completion of a specific number of credits, a major and the General Education (Gen Ed) requirements.

Students must complete a degree within 10 years. If it has been more than 10 years since matriculation into the College of Arts & Sciences and no degree has been completed, students may be subject to new curricula in place at the time of re-enrollment.

Students may contact A&S Academic Advising and Coaching (https://www.colorado.edu/artssciences-advising/) for further assistance.

## Graduation Requirements

Students in the College of Arts & Sciences must fulfill the following requirements for graduation:

- Pass a total of 120 credit hours.
- Maintain a 2.00 (C) GPA in all University of Colorado coursework and a 2.00 (C) in all coursework attempted for the major. (Some majors may require a higher minimum GPA.)
- Pass a minimum 45 credit hours of upper-division work (courses numbered in the 3000s and 4000s).
- Pass a minimum of 45 credit hours in University of Colorado courses on the Boulder campus. Of these 45 credit hours, a minimum of 30 credit hours must be in upper-division courses offered by a department or program in the College of Arts & Sciences. A maximum of 6 credit hours taken at other University of Colorado campuses (CU Denver and UCCS) can be counted toward the minimum 45 credit hours required on the Boulder campus but cannot be counted toward the 30 upper-division credit hours in arts and sciences coursework. Courses taken

while on CU Boulder study abroad programs or through CU Boulder Continuing Education are considered to be in residence.

- Students must complete a major offered by the College of Arts & Sciences. Students are subject to the major requirements in force when they declare the major.
- Complete the General Education (Gen Ed) requirements with the following limitations:
  - Students may not use a course to fulfill any area of the Gen Ed Skills requirement and also use this course to fulfill part of the Gen Ed Distribution or Diversity requirements. This restriction applies to first- and second-semester world language courses taken as prerequisites to a third-semester language course that satisfies the world language category of the Gen Ed Skills Requirement.
  - Students may not use thesis hours, independent study, internship or practicum courses to satisfy any of the Gen Ed requirements.
  - Students may not use a course taken using the pass/fail option and in which they earn a P or P+ grade to fulfill any Gen Ed requirements. (Courses taken pass/fail during Spring 2020 when pass/fail rules were altered because of the COVID-19 pandemic are exempt from this restriction.)

## Credit Limitations

### Credit for World Language Courses

Students will not receive credit for a lower level world language course after credit has been given for a higher level course in the same sequence. For example, students who have passed a 2000-level class will not receive credit for a 1000-level class in the same sequence. Consult each world language department for specific restrictions, requirements and prerequisites.

Students must receive a grade of C or better to enroll in the next level of a language sequence in Arabic, Chinese, Farsi, Hindi, Indonesian, Japanese and Korean. Students must receive a grade of C- or better to enroll in the next level of a language sequence in American Sign Language, Danish, Finnish, French, German, Greek, Hebrew, Italian, Latin, Norwegian, Portuguese, Russian, Spanish and Swedish.

Introductory language courses (numbered at the 1000 and 2000 level) are designed for non-native speakers. Fluent speakers of a language are prohibited from enrolling in introductory courses in the language and can be dropped from these courses by the department or by the course instructor. Fluent speakers should consult the department website and this catalog or consult with the course instructor or department language coordinator about eligibility to enroll in upper-division language courses (numbered at the 3000 and 4000 level) before enrolling in such courses. Departments can exclude fluent speakers from upper-division language courses based on course content and/or instructional resources. Speakers who have not formally studied the language but have spoken the language in their home should consult with the associate chair of the language department or the department language coordinator about appropriate placement before enrolling in a language course.

### Credit taken outside the College of Arts & Sciences

Students may apply 30 credit hours from the other colleges and schools at CU Boulder as well as specified ROTC and President's Leadership Class courses toward the fulfillment of requirements for the BA and BFA degrees. Within these 30 total credit hours, up to 8 credit hours in activities courses (applied music and ensembles) may be used. Transferred courses that were taught by departments considered to be outside the College of Arts & Sciences are counted as part of the allowed 30 credit hours. If a course has been approved to meet a General Education requirement or to count as Arts & Sciences credit and the course is taught outside the College of Arts and Sciences, the credit for this course will not be included as part of the 30-credit-hour limitation.

### Independent Study Credit

With departmental approval, students may register for independent study during the normal registration periods for each semester. Students may not register for more than 6 credit hours of independent study credit during any term. No more than 8 credit hours of independent study taken in a single department or program can be applied toward the total credit hours needed for graduation. A maximum of 16 credit hours of independent study may count toward the degree. The minimum expectation for each hour of credit is 25 hours of work.

A student may not use independent study credit to fulfill the college's General Education requirements. Some departments further restrict the use of independent study hours toward meeting major requirements.

### Internship Credit

Students in the College of Arts & Sciences may receive up to nine credit hours for a department-sponsored internship. A maximum of six of the nine internship credits can be taken in the same department. Each internship project must be approved by the chair or associate chair of the department awarding the credit before the student enrolls in the course in order for the student to receive credit. Students are encouraged to contact their major department office or Career Services for information regarding the possibility of enrolling in an internship in their major. Many internships are graded on a pass/fail basis only. Participation in an internship with mandatory pass/fail grading does not affect the total credit hours of pass/fail a student may apply toward a degree.

A student may not use internship credit to fulfill the college's General Education requirements. Some departments further restrict the use of internship credit toward meeting major requirements.

### Pass/Fail Credit

Students in the College of Arts & Sciences can count a maximum of 6 credit hours of pass/fail coursework in which they earn a grade of P or P+ toward the 120 credit hours required for graduation. The pass/fail option may be used only in classes taken as free electives.

Except for courses taken in the Spring 2020 semester, students may not use courses in which they earned a grade of P or P+ to fulfill General Education requirements or to fulfill major or minor requirements. A grade of F when earned in a course taken pass/fail will calculate into the GPA as a failing grade. While a course in which a students earns a grade of P+ can fulfill pre-requisite requirements for a course, as stated above, it cannot fulfill specific degree requirements (Gen Ed, major or minor) unless it was taken during the Spring 2020 semester.

Courses with the satisfactory/unsatisfactory (S/U) grading basis are excluded from the pass/fail credit restriction.

### Required Credit Hours Outside the Major

To complete the Bachelor of Arts degree, students are required to complete a minimum of 75 credit hours outside their major area.

To complete the Bachelor of Fine Arts degree, students are required to complete a minimum of 53 credit hours outside their major area.

Exceptions to these minimums are:

- Students who complete designated departmental honors courses in their major and/or in honors thesis credit can reduce the number

of credit hours required outside the major area by a corresponding number of credits, up to a maximum of six.

- Courses that are cross-listed in two or more departments are credited in the department in which the student has the most credit hours, irrespective of the department in which the student formally enrolled for the course.

### Credit from Repeated Courses

Students can take a course more than once. In fact, in Arts & Sciences there is no limit on how many times a student make repeat a course. However, the course credit hours only count toward the credit hours needed to graduate once, unless a course description specifically states that a course can be taken more than once for credit. Such repeatable courses, usually topics courses, have a limit to how many times you may receive credit for that course.

### ROTC Credit

The ROTC courses listed below have been certified as acceptable college-level coursework by the faculty of the College of Arts & Sciences or by other colleges and schools on the Boulder campus. These courses are counted as elective credit toward the degree, subject to the 30-credit-hour limitation on coursework taken outside the college for students in the BA, BFA, and BS programs. All other ROTC courses that do not appear on this list **do not** count toward any degree requirements in the College of Arts & Sciences including the 120 total credits required to graduate. Transfer ROTC coursework must be evaluated as equivalent to the coursework on this list to count toward degree requirements.

| Code | Title | Credit Hours |
|---|---|---|
| AIRR 3010 & AIRR 3020 | Leading People and Effective Communication 1 and Leading People and Effective Communication 2 | 6 |
| AIRR 4010 & AIRR 4020 | National Security, Leadership Responsibilities/Commissioning Preparation 1 and National Security/Leadership Responsibilities/Commissioning Preparation 2 | 6 |
| MILR 1011 & MILR 1021 | Adventures in Leadership 1 and Adventures in Leadership 2 | 4 |
| MILR 2031 & MILR 2041 | Methods of Leadership and Management 1 and Methods of Leadership and Management 2 | 6 |
| MILR 4072 & MILR 4082 | Leadership 1: Adaptive Leadership and Leadership 2: Leadership in a Complex World | 6 |
| NAVR 2020 | Seapower and Maritime Affairs | 3 |
| NAVR 3030 | Naval Engineering Systems | 3 |
| NAVR 3040 | Weapons and Systems Analysis | 3 |
| NAVR 3101 | Evolution of Warfare | 3 |
| NAVR 4010 & NAVR 4020 | Leadership and Management and Leadership and Ethics | 6 |
| NAVR 4030 | Navigation | 3 |

### Other Credit not applicable to Arts and Sciences Degrees

Any other CU Boulder coursework that is not applicable to a degree in the College of Arts & Sciences will appear in the "Courses not applicable to A&S degree requirements" section of a student's degree audit.

## Majors, Minors and Certificates

### Majors

All students pursuing a bachelor's degree in the College of Arts & Sciences must enter a degree-granting major by the end of their sophomore year (i.e., the semester in which they will complete 60 credit hours of work, including transfer work).

Students have 10 years to complete the requirements for a declared major. If the 10-year limit is exceeded, the student may be required to satisfy current major requirements. Students pursuing a major degree program identified for discontinuation by decision of the Board of Regents and the Colorado Commission on Higher Education have four years from the formal announcement of discontinuation to complete the degree program and graduate.

#### Bachelor of Arts (BA) Minimum Major Requirements

The following minimum requirements are specified by the college. In many cases departmental requirements may be higher than the minimums listed here.

- A minimum of 30 credit hours in the major area.
- A minimum of 18 credit hours of upper-division courses in the major area.
- A minimum of 12 credit hours of upper-division coursework in the major area taken on the CU Boulder campus.
- All coursework applied to the major area and ancillary requirements must be completed with a grade of C- or better (no courses taken using the pass/fail option in which a grade of P or P+ is earned may be applied except for those courses taken during the Spring 2020 semester.)
- The GPA for all coursework attempted in the major area must be equal to 2.00 (C) or higher.
- Special requirements as stipulated by the major department.
- No more than 8 credit hours of independent study.

#### Bachelor of Fine Arts (BFA) Minimum Major Requirements

The following minimum requirements are specified by the college. In many cases departmental requirements may be higher than the minimums listed here.

- A minimum of 50 credit hours in the major area.
- A minimum of 18 credit hours of upper-division courses in the major area.
- A minimum of 12 credit hours of upper-division coursework in the major area taken on the CU Boulder campus.
- All coursework applied to the major area and ancillary requirements must be completed with a grade of C- or better (no courses taken using the pass/fail option in which a grade of P or P+ is earned may be applied except for those courses taken during the Spring 2020 semester.)
- The GPA for all coursework attempted in the major area must be equal to 2.00 (C) or higher.
- Special requirements as stipulated by the major department.
- No more than 8 credit hours of independent study.

### Double Majors

Students pursuing a BA or BFA degree in the College of Arts & Sciences may graduate from CU Boulder with more than one major that is offered within their degree (i.e., Economics and French majors in the BA or Dance and Art Practices majors in the BFA). Students must complete all requirements for both majors. A minimum of 120 total credit hours is required for double majors within the college.

Students pursuing both a BA major and a BFA major are considered double degree rather than double major students (see Double degree section below).

A student is allowed to add a major to an existing degree from the College of Arts & Sciences provided that the additional major is in the same degree as the existing degree. For example, a History major (BA), could be added to an existing BA in English but *not* to an existing BFA in Dance.

### Minors

Many but not all departments and programs in the College of Arts & Sciences offer minor programs. Participation in a minor program is optional for students pursuing a bachelor's degree. Students may not earn a major and a minor in the same program of study. Minors can be interdisciplinary (span multiple units.) All requirements for the minor must be completed by the time the baccalaureate degree is conferred, and a minor cannot be converted into a major in the same program of study after graduation.

Although the structure of specific minor programs may differ, all minors offered in the College of Arts & Sciences must have the following restrictions or minimum requirements:

- A minimum of 18 credit hours must be taken in the minor area.
- A minimum of 9 of the 18 credit hours must be completed at the upper-division level.
- All coursework applied to the minor must be completed with a grade of C- or better (no courses taken using the pass/fail option in which a grade of P or P+ is earned may be applied).
- The GPA for all coursework attempted in the minor department must be equal to 2.00 (C) or higher.
- Interdisciplinary minors must be structured in such a way as to ensure that no more than half the required credits overlap with the required credits of an individual major or another minor.
- Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor.
- Students must complete all requirements for a minor by the time they graduate.

### Certificates

The college also sponsors undergraduate certificates in a number of fields of study. A certificate constitutes a shorter program of that concentrates on a specific field of expertise rather than an entire course of study. Students interested in a certificate should contact the director of the appropriate certificate.

Although the structure of specific certificates may differ, all certificates offered in the College of Arts & Sciences must have the following restrictions or minimum requirements:

- A certificate cannot be a subset of existing major or minor requirements in the same way a student cannot earn a minor within the same department as their major.
- A minimum of 12 and a maximum of 17 credit hours of specified coursework.
- A minimum of 6 of the (minimum) 12 credit hours must be completed at the upper-division level.
- A minimum of 8 credit hours must be take on the CU Boulder campus.

## Multiple Degrees

### Double Degrees

Students may earn multiple degrees from CU Boulder from different schools or colleges or within a single school or college. This includes students pursuing a BA and a BFA from the College of Arts & Sciences. The following conditions must be fulfilled:

- The student meets the residency requirements of, and is enrolled in, both the College of Arts & Sciences and the college or school granting the second degree.
- When the degrees are offered by two different colleges, the student completes all requirements for both degrees, including all the General Education and major requirements of the College of Arts & Sciences.
- When the two degrees are offered by the College of Arts and Sciences, the majors in the two degrees must be different. For instance, a student may *not* earn both a BA with a major in Cinema Studies and BFA with a major in Cinema Studies and Moving Image Arts. *(Students also cannot earn a BA degree with a major in physics from the College of Arts and Sciences and a BS in engineering physics from the College of Engineering and Applied Sciences.)*
- Both degrees must be awarded at the same time.

## Second Baccalaureate Degrees

A student who has been awarded a baccalaureate degree, either from the College of Arts & Sciences or elsewhere, may be granted a second baccalaureate degree provided the following conditions have been fulfilled:

- The subject of the major in the second baccalaureate degree is substantially different from the subject of the major or minor in the first baccalaureate degree earned.
- All general requirements for the degree to be awarded by the College of Arts & Sciences have been met. (Students are subject to the general degree requirements in effect the semester they enter the second baccalaureate degree program.)
- Arts and sciences students must complete a minimum of 45 credit hours in University of Colorado Boulder courses after matriculation in the second baccalaureate degree program. Of these 45 post-matriculation credit hours, a minimum of 30 credit hours must be in upper-division courses offered by a department in the College of Arts & Sciences, and at least 12 of these 30 upper-division credit hours must be in major area. Courses taken as a non-degree student or as part of a graduate degree program do not count in these minimum credit hour requirements.

## Applying for Graduation

Arts & Sciences students who have earned 90 or more credit hours and wish to walk in a commencement ceremony and/or graduate at the close of a term must submit an online application to graduate in Buff Portal (https://buffportal.colorado.edu/), meeting all appropriate application deadlines published by the Office of the Registrar.

Students who intend to complete their degree in summer (August) and want their name to appear in the spring (May) commencement program should apply online for the summer graduation term, submitting their application prior to the published spring commencement program deadline. Summer applicants who apply prior to the spring program

deadline will automatically be included in the spring commencement program.

Students who apply to graduate but fail to fulfill all degree requirements by the deadline for that term/year must submit a new online graduation application for a future term/year in order for the college to confer the degree once all remaining requirements are complete. To be certified as having completed all degree and major/minor requirements, all credit hours and grades (including transfer coursework and Continuing Education credit hours and grades) must be posted to the student records system by the deadline for reporting degrees for that term/year.

## Four-Year Graduation

CU Boulder guarantees that if the scheduling of essential courses is found to have prevented a student in the College of Arts & Sciences from completing all coursework necessary for a BA or BFA degree from the university by the end of the student's eighth consecutive fall and spring semester, the college will provide tuition plus any course fees for all courses required for completion of the degree requirements.

The College of Arts & Sciences has adopted a set of guidelines to define the conditions under which a student should expect to graduate in four years. More information is available through the Arts & Sciences Academic Advising Center (https://www.colorado.edu/advising/) and major program and departmental offices. This guarantee extends to all students who enrolled the summer of 1994 or after into the College of Arts & Sciences as first-semester freshmen who satisfy all the requirements described below. This guarantee cannot be extended to include completion of a second major, a double degree, a minor, a teaching certificate or other certificate program. Some CU Boulder study abroad programs may not provide a sufficient range of courses to allow students to meet the requirements and thus students who participate in study abroad are not included in this guarantee.

### Four-Year Guarantee Requirements

- Students should enroll in University of Colorado Boulder coursework for eight consecutive fall and spring semesters.
- No fewer than 60 credit hours of applicable coursework should be completed with passing grades by the end of the second year (24 calendar months), 90 credit hours by the end of the third year (36 calendar months) and 120 credit hours by the end of the fourth year. Students should enroll in and pass an average of 15 credit hours each semester.
- A minimum of 30 credit hours of college General Education courses should be completed by the end of the second year, including General Education courses that also meet major requirements. All remaining college General Education requirements must be fulfilled by the end of the eighth semester.
- Students should complete 45 upper-division credit hours by the end of the eighth semester of study.
- A GPA of at least 2.00 must be earned each semester.
- Grades of *C-* or better in all coursework required for the major should be earned, and students should have a cumulative GPA of 2.00 in all major coursework attempted.
- A recommended plan of study must be started toward the major no later than the start of the second semester of study and thereafter students must make adequate progress toward completing the major (defined by each major). A statement of adequate progress is available from the major or departmental office at the time the major is declared.
- The major must be declared no later than the start of the second semester of study, and students must remain in that major until graduation.
- Students should meet with their assigned primary advisor each semester.
- Students must register each semester within one week of the assigned registration time.
- Students should avoid taking courses that are in conflict with the advice of their assigned primary advisor.
- Students should adhere to the Graduation Requirements listed above.
- Courses in conflict with major or college General Education requirements should be avoided.
- The student should apply online to graduate no later than the beginning of the seventh semester of study (see Graduation Deadlines section).
- Documentation should be kept proving that these requirements were satisfied (e.g., records of advising meetings attended, advising records and instructions, etc.).

## Academic Advising

Students are advised by the professional academic advisors and academic coaches in Arts & Sciences Academic Advising and Coaching (https://www.colorado.edu/advising/) and by faculty mentors from their respective major department/program, typically at least once a semester. Students use Buff Portal Advising (https://www.colorado.edu/buffportaladvising/) to communicate with advisors, schedule appointments, explore majors, etc. Academic advisors are responsible for advising students and also for certifying the completion of those students' programs for graduation.

Students in the college are expected to assume responsibility for planning their academic program in conjunction with their academic advisor in accordance with college rules and policies and with departmental major requirements. Any questions concerning these provisions are to be directed to the student's academic advisor.

# General Education Requirements

## Mission Statement

The College of Arts & Sciences (A&S) General Education (Gen Ed) requirements are the heart of a liberal arts education at CU Boulder. This set of requirements allows students to pursue their passions while also ensuring that they venture into diverse areas of learning. The flexibility of the Gen Ed requirements enables students to explore areas of particular interest in depth, and in so doing facilitates the addition of minors or second majors. The Gen Ed requirements are straightforward, streamlined, rigorous and timeless; as society changes and technology advances, the courses of study that comprise these requirements will evolve naturally within the Gen Ed framework. These requirements reflect the Arts and Sciences identity and learning goals.

## Identity Statement

The College of Arts & Sciences at CU Boulder consists of teachers, scholars, researchers and artists who strive to understand, and find meaning in, the natural world, social structures, history, art, morals and the human experience. The college comprises a wide range of departments and programs, but woven throughout are the college's fundamental values: academic excellence, intellectual honesty, creative freedom, open inquiry and the pursuit of knowledge. We are dedicated to a pedagogy that recognizes our responsibility in developing a diverse community of students and scholars. Our students can expect to have

their critical thinking skills honed, their understanding of themselves deepened, their vision of the natural world and its peoples expanded, and their ability to communicate enhanced. As a result, our graduates leave the college as well-rounded adults, prepared to participate productively as citizens in a democracy and to flourish in their careers.

## Learning Goals

### 1. Develop the Skills of Communication, Expression and Reasoning

Students hone their communication skills through writing and speaking for various purposes (informing, instructing, persuading) and audiences (academic, civic, professional). They learn to design their message ethically and effectively using appropriate evidence and technologies, which may include alphabetic, visual and aural elements. Students explore the breadth of human experience through diverse expressive forms. To develop problem-solving and analytical skills, students exercise various forms of reasoning—logical, computational and mathematical.

### 2. Understand Our World, In All Its Dimensions, Through Critical Inquiry

Students apply humanistic and scientific principles and methods to investigate local and global issues. Through exposure to multiple viewpoints, intellectual frameworks and cultural contexts, students prepare to respond ethically, creatively and collaboratively to open-ended questions.

## Overview

The Arts & Sciences General Education curriculum consists of 45 credits in three requirement areas: Skills, Distribution, and Diversity.

- Skills Requirement: 9 credits (6 written communication, 3 quantitative reasoning and mathematical skills, plus world language proficiency). Courses taken to fulfill this requirement *may not* also count toward the Distribution or Diversity requirements.
- Distribution Requirement: 36 credits (12 arts and humanities, 12 social sciences, 12 natural sciences).
- Diversity Requirement: 0–6 credits. Courses taken to fulfill this requirement *may* also count toward the Distribution Requirement but not the Skills Requirement.

## Policies

Students who take approved CU Boulder coursework to fulfill their Gen Ed requirements must take those courses for a letter grade and receive a grade of D- or higher (courses in which a student earns a P or P+ grade cannot be used to fulfill Gen Ed requirements unless those course were taken in Spring 2020.) Students may not use thesis hours, independent study, internship or practicum courses to fill any of the Gen Ed requirements. All courses approved to fulfill specific Arts & Sciences Gen Ed requirements are identified as such in this catalog and are searchable in the CU Boulder Class Search (https://classes.colorado.edu/) tool.

## Skills Requirement

This requirement is designed to assure that each student has attained a minimum level of competency in a world language other than English, quantitative reasoning & mathematical skills, and written communication. Students may not use a course to fulfill any area of the Skills Requirement and also use that course to fulfill part of the Distribution or Diversity Requirements. This restriction applies to first- and second-semester language courses taken as prerequisites to a third-semester language course that is satisfying the World Language category of this requirement.

### 1. World Language (third-level proficiency)

The goal of the language requirement is to encourage students to examine the formal and semantic structure of a language other than English, significant and difficult works in that language, and one or more aspects of the culture lived in that language. This enables students to understand their own language and culture better, analyze texts more clearly and effectively, and appreciate more vividly the dangers and limitations of using a translated document. The language requirement concentrates on reading, although in some languages other abilities may be emphasized as well. Understanding what it means to read a significant text in its original language is essential for a liberal education according to the standards of this university.

All students are required to demonstrate third-level proficiency in a single modern or classical language other than English. Students may demonstrate this proficiency and thus fulfill the World Language category of the Gen Ed Skills Requirement by:

- passing an appropriate third-semester college course in a language other than English that is part of a three-course sequence of at least 12 semester credit hours, or earning AP or IB credit equivalent to such a course; or
- passing a CU Boulder approved world language proficiency examination *(these exams test reading and writing ability)*; or
- completing a Level III course (typically the third of three consecutive years) of a language other than English while in high school; or*
- graduating from a high school that uses a language other than English as its principal mode of instruction, or receiving, in high school, a Colorado or other state-sponsored Seal of Biliteracy;**

Third-semester language courses offered at CU Boulder that meet the World Language Requirement are listed below.

**A Level III course is defined as a high school course clearly designated as such (e.g. Spanish 3, Chinese 3, German III, etc) on the high school transcript or third-semester college course if the third-year course taken in high school is a concurrent/dual enrollment college course. Concurrent/dual enrollment college courses taken while in high school that are below the third-semester college level will not fulfill this requirement.*

*** The Seal of Biliteracy must appear on the student's high school transcript.*

| Code | Title | Credit Hours |
|---|---|---|
| **1. Third-semester World Language courses** | | |
| ARAB 2110 | Intermediate Arabic 1 | 5 |
| CHIN 2110 | Intermediate Chinese 1 | 5 |
| GREK 3113 | Intermediate Classical Greek 1 | 3 |
| DANE 2010 | Intermediate Danish I - DILS | 4 |
| FREN 2110 | Second-Year French Grammar Review and Reading 1 | 3 |
| GRMN 2010 | Intermediate German 1 | 4 |
| or GRMN 2030 | Intensive Intermediate German | |
| HEBR 2110 | Intermediate Modern Hebrew, First Semester | 4 |
| HIND 2110 | Intermediate Hindi 1 | 5 |
| ITAL 2110 | Intermediate Italian Reading, Grammar, and Composition 1 | 4 |
| JPNS 2110 | Intermediate Japanese 1 | 5 |
| KREN 2110 | Intermediate Korean 1 | 5 |

| | | |
|---|---|---|
| LATN 2114 | Intermediate Latin 1 | 4 |
| PORT 2110 | Second-Year Portuguese 1 | 3 |
| QUEC 2010 | Intermediate Quechua 1 | 4 |
| RUSS 2010 | Second-Year Russian 1 | 4 |
| SPAN 2110 | Second-Year Spanish 1 | 3 |
| or SPAN 2130 | Spanish for Heritage Speakers in the United States I | |
| or SPAN 2150 | Intensive Second-Year Spanish | |
| SLHS 2325 | American Sign Language 3 | 4 |
| SWED 2010 | Intermediate Swedish 1 -DILS | 4 |
| or SWED 2110 | Second-Year Swedish Reading and Conversation 1 | |

### 2. Quantitative Reasoning and Mathematical Skills (QRMS) (3–6 credit hours)

This requirement has two principal objectives. The first is to provide students with the analytical tools used in some of their other Gen Ed courses and used in their major areas of study. The second is to help students acquire the reasoning skills necessary to assess adequately the data that will confront them in their daily lives. Students completing this requirement should be able to: construct a logical argument based on the rules of inference; analyze, present and interpret numerical data; estimate orders of magnitude as well as obtain exact results when appropriate; and apply mathematical methods to solve problems in their university work and in their daily lives.

To fulfill the QRMS category of the Gen Ed Skills Requirement, student must:

- Earn credit for one of the approved QRMS courses or sequences of courses listed below
- Earn at least 3 credits in a mathematics courses numbered MATH 1300 or higher or applied mathematics courses numbered APPM 1350 or higher
- Have Prior Learning Assessment credit (PLA), like AP, IB or CLEP credit, that has been judged equivalent to one of the courses below or has been approved to fill QRMS

| Code | Title | Credit Hours |
|---|---|---|
| **2. Quantitative Reasoning and Mathematical Skills courses** | | |
| AHUM 1825 | Inclusive Interdisciplinary Data Science for All | 4 |
| APPM 1340 | Calculus 1 with Algebra, Part A | 4 |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| EBIO 1010 | Introduction to Statistics and Quantitative Thinking for Biologists | 3 |
| EBIO 4410 | Biological Statistics | 4 |
| ECEN 1500 | Sustainable Energy | 3 |
| ECON 1078 | Mathematical Tools for Economists 1 | 3 |
| ECON 1088 | Mathematical Tools for Economists 2 | 3 |
| EDUC 2130 | Teaching and Learning Math: Calculus, Trig and Adv Functions | 3 |
| GEOG 3023 | Statistics and Geographic Data | 4 |
| IPHY 3280 | Intro to Data Science and Biostatistics | 4 |
| LING 4622 | Statistical Analysis for Linguistics | 3 |
| MATH 1011 | College Algebra | 3 |
| MATH 1012 | Quantitative Reasoning and Mathematical Skills | 3 |
| MATH 1112 | Mathematical Analysis in Business | 4 |
| MATH 1110 & MATH 1120 | Mathematics for Elementary Educators 1 and Mathematics for Elementary Educators 2 | 6 |
| MATH 1130 | Mathematics from the Visual Arts | 3 |
| MATH 1150 | Precalculus Mathematics | 4 |
| MATH 1212 | Data and Models | 3 |
| MATH 1300 | Calculus 1 | 5 |
| MATH 1310 | Calculus for Life Sciences | 5 |
| MATH 1330 | Calculus for Economics and the Social Sciences | 4 |
| MATH 2380 | Mathematics for the Environment | 3 |
| MATH 2510 | Introduction to Statistics | 3 |
| PHYS 1010 | Physics of Everyday Life 1 | 3 |
| PSCI 2075 | Quantitative Research Methods | 3 |
| PSCI 3105 | Designing Social Inquiry: An Introduction to Analyzing Political Phenomena | 3 |
| SOCY 2061 | Introduction to Social Statistics | 3 |

### 3. Written Communication (3 lower-division and 3 upper-division credit hours)

Writing is a skill that is fundamental to all intellectual endeavors. In fulfilling this requirement, students hone their communication skills by writing for various purposes (informing, instructing, persuading) and audiences (academic, civic, professional). They learn to design their message ethically and effectively using appropriate evidence and technologies.

Lower-division written communication courses focus on the central rhetorical elements of purpose, audience and context to help students craft effective writing in a variety of situations. They emphasize the relationships among these elements, including a writer's choices of content, structure, style and use of language conventions. In addition, courses in this area develop students' analytical reading skills and introduce them to principles and practices of information literacy.

By the end of a lower-division written communication course, students will:

- Demonstrate their rhetorical knowledge through their writing choices
- Construct effective and ethical arguments
- Analyze texts in a variety of genres
- Refine and reflect on their writing process
- Practice information literacy
- Apply appropriate language conventions, including grammar, spelling, punctuation and format

In upper-division written communication courses, students apply the rhetorical elements of purpose, audience, and context to investigate and practice writing using disciplinary language, forms, and genres. These courses emphasize the application of students' disciplinary knowledge to a variety of writing situations, adjusting content, format, style and language conventions to accomplish specific purposes and communicate with specific audiences.

By the end of an upper-division written communication course, students will:

- Demonstrate specialized rhetorical knowledge through composing texts in a variety of disciplinary forms and genres for specific audiences and purposes
- Argue persuasively and with evidence, using discipline-specific forms and genres to present ideas and information
- Demonstrate enhanced critical reading skills
- Refine and reflect on their writing process
- Demonstrate specialized information literacy through applying research to disciplinary questions/issues
- Apply language conventions appropriately, including format, documentation, spelling, grammar and punctuation.

To fulfill the lower-division part of the Written Communication category of the Gen Ed Skills Requirement, students must either:

- Pass a one of the 3-credit courses approved as Skills – Lower-Division Written Communication listed below, *or*
- Earn an International Baccalaureate diploma, *or*
- Have Prior Learning Assessment credit (PLA), like AP, IB or CLEP credit, that has been approved to fill Skills – Lower-Division Written Communication

| Code | Title | Credit Hours |
|---|---|---|
| **3. Lower-division Written Communication courses** | | |
| ARSC 1080 | College Writing and Research | 4 |
| CLAS 1020 | Argument from Evidence: Critical Writing about the Ancient World | 3 |
| EBIO 1940 | Introduction to Scientific Writing | 3 |
| ENGL 1001 | Writing, Reading, Culture | 3 |
| ENVS 1150 | First-Year Writing in Energy, Environment and Sustainability | 3 |
| IPHY 1950 | Introduction to Scientific Writing in Integrative Physiology | 3 |
| PHIL 1500 | Reading, Writing and Reasoning | 3 |
| WRTG 1100 | Extended First-Year Writing and Rhetoric | 4 |
| WRTG 1150 | First-Year Writing and Rhetoric | 3 |
| WRTG 1160 | CMCI First-Year Writing and Rhetoric | 3 |
| WRTG 1250 | Advanced First-Year Writing and Rhetoric | 3 |

To fulfill the upper-division part of the Written Communication category of the Gen Ed Skills Requirement, students must either:

- Pass a one of the 3-credit courses approved as Skills – Upper-Division Written Communication listed below *or*
- Pass the CLEP College Composition Exam, which by Colorado state policy fills both the lower- and upper-division parts of the written communication Gen Ed Skills requirement.

| Code | Title | Credit Hours |
|---|---|---|
| **3. Upper-division Written Communication courses** | | |
| ARSC 3100 | Multicultural Perspective and Academic Discourse | 3 |
| ARTS 4050 | Writing Across the Arts: Culture Writing in the 21st c | 3 |
| CHIN 3200 | Adv Wrtg Topics on Chinese & Japanese Literature and Civilization | 3 |
| EBIO 3940 | Written Communication in the Sciences | 3 |
| EBIO 4940 | Honors Thesis Writing for Science Majors | 3 |
| ENGL 3016 | Writing in the Age of AI | 3 |
| ENGL 3026 | Syntax, Citation, Analysis: Writing About Literature | 3 |
| ENGL 3830 | Topics in Advanced Writing and Research | 3 |
| ENGL 4206 | Writing for the Real World | 3 |
| ENVS 3020 | Advanced Writing in Environmental Studies | 3 |
| FREN 3050 | French Composition | 3 |
| GEOL 3090 | Developing Scientific Writing Skills | 3 |
| IPHY 3700 | Scientific Writing in Integrative Physiology | 3 |
| ITAL 3025 | Advanced Composition 2: Introduction to Literary Writing | 3 |
| HIST 3020 | Historical Thinking & Writing | 3 |
| HONR 3220 | Advanced Honors Writing Workshop | 3 |
| JPNS 3200 | Adv Wrtg Topics on Chinese & Japanese Literature and Civilization | 3 |
| PHIL 3480 | Critical Thinking/Writing in Philosophy | 3 |
| PHYS 3050 | Writing in Physics: Problem-Solving and Rhetoric | 3 |
| RLST 3020 | Advanced Writing in Religious Studies | 3 |
| SPAN 3010 | Advanced Rhetoric and Composition | 3 |
| WGST 3800 | Advanced Writing in Feminist Studies | 3 |
| WRTG 3007 | Writing in the Visual Arts | 3 |
| WRTG 3020 | Topics in Writing | 3 |
| WRTG 3030 | Writing on Science and Society | 3 |
| WRTG 3035 | Technical Communication and Design | 3 |
| WRTG 3040 | Writing on Business and Society | 3 |
| WRTG 3045 | Writing for Emerging Workplaces | 3 |
| WRTG 3070 | Advocating with Data | 3 |

## Distribution Requirement

For the Gen Ed Distribution Requirement, students must pass a minimum of 12 credits in each of the three Arts & Sciences divisions (Arts & Humanities, Social Sciences and Natural Sciences). At least four different course prefixes must be represented in a student's Distribution requirement coursework. *No more than two lower-division (1000- and 2000-level) courses with the same course prefix may count toward the distribution requirement.*

As part of, or in addition to, the 12 credits in the natural sciences division, students must meet the natural sciences lab requirement. (*One- and 2-credit NS lab courses are excepted from the restriction to two lower-division courses with the same course prefix counting toward the Distribution requirement.*)

### 4. Arts & Humanities (12 credits)

Courses in the arts and the humanities explore the variety of human creative and intellectual experiences, as well as the history and foundations of culture, through the examination of human languages, literatures and other artistic, material, social, cultural and political products, the forms they have taken in different places and eras, and the way these have changed over time. As a result, these courses cultivate perspectives and intellectual skills necessary to comprehend and

respond adeptly to the world in which we live, offering frameworks for thinking critically about the universe and the smaller societies we inhabit. In particular, these courses help students develop the ability to appreciate and evaluate human efforts to explain, translate, and transform their diverse experiences of the world, as these efforts take shape in language, literature, philosophical systems, historical contexts, religious experience, material culture, images, sounds and performances.

The Arts & Humanities category of the Gen Ed Distribution Requirement is meant to ensure that students:

- Study the fundamental intellectual and ethical dimensions of human experience.
- Investigate the relations between artistic, humanistic, and scientific inquiry and interpretation.
- Understand and are prepared to navigate successfully the complex and ever-changing world in which we live.

To fulfill the Arts & Humanities category of the Gen Ed Distribution Requirement, students must pass a minimum of 12 credits in courses approved as Distribution – Arts & Humanities courses. (*Students may apply more than two lower-division courses with the DNCE prefix to this part of the requirement at long as the credit total in such courses is 6 or less.*)

### 5. Natural Sciences (12 credits including a lab)

Natural science courses examine the physical and biological world, exploring the nature of matter, life and the universe. They are designed to demonstrate that science is not a static list of facts, but a dynamic process that leads to knowledge. By combining observation, experimentation and theory, students learn to formulate interpretations and conclusions through unbiased, critical application of scientific principles. Through a combination of lecture courses and laboratory or field experiences, students gain hands-on experience with scientific research. They develop expertise in measurement techniques and data interpretation, and learn the relevance of this expertise to the formation and testing of scientific hypotheses. As a result, natural science courses cultivate perspectives and intellectual skills necessary to enhance knowledge of one or more scientific disciplines, and to probe scientific issues in the context of important past discoveries and new developments.

The Natural Sciences category of the Gen Ed Distribution Requirement is meant to ensure that students:

- Understand the evolving state of knowledge in at least one scientific discipline
- Gain experience in scientific observation and measurement, in organizing and quantifying results, in drawing conclusions from data, and in understanding the uncertainties and limitations of the results
- Learn sufficient general scientific vocabulary and methodology to acquire additional information, evaluate it critically and make informed decisions

*Laboratory or Field Experience*: The Laboratory or Field Experience requirement is satisfied with a stand-alone lab of at least one credit, or another course with a substantial lab component, as approved by the Natural Sciences division. The lab requirement is broadly defined to include different types of hands-on learning, including—but not limited to—bench work, fieldwork, instrumentation and data analysis.

To fulfill the Natural Sciences category of the Gen Ed Distribution Requirement, students must pass a minimum of 12 credits in courses approved as Distribution – Natural Sciences courses, including a laboratory or field experience.

### 6. Social Sciences (12 credits)

Social science courses examine the individual, social, ideological, cultural, political and economic dimensions of human activities and behaviors. They address a broad range of topics through diverse theoretical and empirical approaches. As a result, these courses cultivate perspectives and intellectual skills necessary to apply qualitative and quantitative methods of inquiry to issues of societal significance. Students in social science courses are taught to analyze and interpret data from many different sources, such as fieldwork, interviews, surveys, peer-reviewed literature, published and unpublished repositories and electronic media. These courses also discuss applications of the social sciences, which range from developing fundamental theories of the social world to solving problems and informing advocacy and activism.

The Social Sciences category of the Gen Ed Distribution Requirement is meant to ensure that students:

- Explore the development of the institutions and functioning of human society
- Understand the interpersonal relationships of individuals as members of social groups
- Gain experience with social science vocabulary, methods and tools in systematic studies of the social world

To fulfill the Social Sciences category of the Gen Ed Distribution Requirement, students must pass a minimum of 12 credits in courses approved as Distribution – Social Sciences courses.

Thousands of courses offered by units in the College of Arts & Sciences and in other schools and colleges at CU Boulder have been approved to count toward the Distribution Requirement. To find those that are being offered in any particular term, use the "General Education / Core Courses Search" in the CU Boulder Class Search (https://classes.colorado.edu/) tool.

## Diversity Requirement

For the Diversity Requirement, students must pass a minimum of 3 credits in each of the two diversity categories for a total of 6 credits in courses that have been identified as fulfilling diversity learning goals. Students may use the same course to fulfill one of the Diversity categories and part of the Distribution requirement.

The Diversity requirement addresses the need to prepare students to navigate the complexities of living and working in a diverse and increasingly interconnected world. Diversity courses are designed to provide students with the necessary understanding and analytical skills to successfully function and lead in a multicultural, multiethnic, transnational and global society. All diversity courses promote historical and/or contemporary understanding of how social differences shape, and have been shaped by, political, economic, and cross-cultural relationships within the United States and the world. Generally diversity courses in either category of this requirement will explore the ways in which marginalization has occurred and the reasons for this marginalization.

### 7. United States Perspective (3 credits)

United States perspective diversity courses promote historical and/or contemporary understanding of how social differences have shaped social, political, economic and cross-cultural relationships within the United States. These courses must substantially address one or more

forms of diversity (for example: race, ethnicity, gender, gender identity, sexual orientation, socioeconomic class, religion, disability).

To fulfill the United States Perspective category of the Gen Ed Diversity Requirement, students must pass a minimum of 3 credits in a course from the United States Perspective course list below.

### 8. Global Perspective (3 credits)

Global perspective diversity courses address the need for students to learn and think critically about historical and/or contemporary global forces and transnational connections. These courses might: 1) focus in-depth on a particular country or culture outside the U.S., placing it within transnational and global context; 2) address a problem or phenomenon in the context of two or more countries, cultures, or regions; 3) examine global affairs through a comparative framework; 4) be courses with a substantial cross-cultural curricular component that are part of a study abroad experience

To fulfill the Global Perspective category of the Gen Ed Diversity Requirement, students must pass a minimum of 3 credits in a course from the Global Perspective course list below.

The lists below contain all of the CU Boulder courses that can count toward the Diversity Requirement. All of these courses, however, are not offered every term. To find courses that are being offered in any particular term, use the "General Education / Core Courses Search" in CU Boulder Class Search (https://classes.colorado.edu/).

| Code | Title | Credit Hours |
|---|---|---|
| **7. United States Perspective courses** | | |
| ANTH 1120 | Exploring a Non-Western Culture: Pueblo Indians of the Southwest | 3 |
| ANTH 1125 | Exploring Cultural Diversity in the U.S. | 3 |
| ARTH 1600 | U.S. Art Across Cultures | 3 |
| CINE 3013 | Women and Film | 3 |
| CINE 3014 | Black Radical Cinema | 3 |
| COMM 2400 | Discourse, Culture and Identities | 3 |
| COMM 2410 | The Practice of Intercultural Communication | 3 |
| COMM 3420 | Gender and Communication | 3 |
| DNCE 4047 | Hip-Hop Dance History | 3 |
| ECON 4626 | The Economics of Inequality and Discrimination | 3 |
| EDUC 2919 | Renewing Democracy in Communities and Schools | 3 |
| EDUC 3013 | School and Society | 3 |
| ENGL 1270 | Introduction to American Literature by Women | 3 |
| ENGL 1800 | American Ethnic Literatures | 3 |
| ENGL 2707 | Introduction to Queer Literature | 3 |
| ENGL 2737 | Introduction to African American Literature | 3 |
| ENGL 2747 | Introduction to Chicana/o/x Literature | 3 |
| ENGL 4677 | Jewish-American Literature | 3 |
| ENGL 4697 | Special Topics in Ethnic US Literatures | 3 |
| ETHN 1023 | Introduction to Native American and Indigenous Studies | 3 |
| ETHN 1025 | Introduction to Asian American Studies | 3 |
| ETHN 2013 | Critical Issues in Native North America | 3 |
| ETHN 2053 | Introduction to BIPOC Horror | 3 |
| ETHN 2215 | The Japanese American Experience | 3 |
| ETHN 2232 | Contemporary African American Social Movements | 3 |
| ETHN 2242 | African American Social and Political Thought | 3 |
| ETHN 2432 | African American History | 3 |
| ETHN 2500 | Race, Ethnicity, and Language | 3 |
| ETHN 2536 | Survey of Chicana/o History and Culture | 3 |
| ETHN 2546 | Chicana and Chicano Fine Arts and Humanities | 3 |
| ETHN 2703 | Native American and Indigenous Religious Traditions | 3 |
| ETHN 2732 | Introduction to African American Literature | 3 |
| ETHN 2746 | Introduction to Chicana/o/x Literature | 3 |
| ETHN 3136 | Chicana Feminisms and Knowledges | 3 |
| ETHN 3201 | Social Justice, Leadership and Community Engagement Internships | 3 |
| ETHN 3213 | American Indian Women | 3 |
| ETHN 3671 | People of Color and Social Movements | 3 |
| ETHN 4692 | Special Topics in Ethnic US Literatures | 3 |
| GEOG 3612 | Reimagining Cities: Spaces of Power, Privilege, and Possibility | 3 |
| GEOG 3742 | Place, Power, and Contemporary Culture | 3 |
| GEOG 3782 | Environmentalism, Race, and Justice | 3 |
| GEOG 4292 | Migration, Immigrant Adaptation, and Development | 3 |
| GSLL 2350 | Introduction to Jewish Culture | 3 |
| GSLL 3600 | Contemporary Jewish Societies | 3 |
| HIST 2437 | African American History | 3 |
| HIST 2616 | History of Gender in America | 3 |
| HIST 4125 | Early American History to 1763 | 3 |
| HIST 4326 | Epidemic Disease in US History | 3 |
| HIST 4447 | African American History, 1865 - Present | 3 |
| HIST 4527 | Mexican-American History since 1848 | 3 |
| HIST 4726 | A Nation of Immigrants: Immigration in American History | 3 |
| HONR 1125 | Heroines and Heroic Traditions | 3 |
| HONR 1810 | Honors Diversity Seminar | 3 |
| HONR 3004 | Women in Education | 3 |
| HONR 3270 | Journey Motif in Women's Literature | 3 |
| HONR 4025 | Heroines and Heroic Tradition | 3 |
| HONR 4075 | Environmental Justice | 3 |
| HUMN 2145 | African America in the Arts | 3 |
| HUMN 3290 | Foundations of Disability Studies | 3 |
| HUMN 4050 | Representations of People with Disabilities | 3 |
| IAFS 3600 | Contemporary Jewish Societies | 3 |
| INVS 2919 | Renewing Democracy in Communities and Schools | 3 |
| INVS 2989 | Dialogue Across Difference | 3 |
| JWST 2350 | Introduction to Jewish Culture | 3 |

| | | |
|---|---|---|
| JWST 3600 | Contemporary Jewish Societies | 3 |
| JWST 4200 | Religion and Reproductive Politics in the United States | 3 |
| JWST 4677 | Jewish-American Literature | 3 |
| LGBT 2000 | Introduction to Lesbian, Gay, Bisexual, and Transgender Studies | 3 |
| LGBT 2707 | Introduction to Queer Literature | 3 |
| LIBB 1233 | First Person Voices: Identity and Image | 3 |
| LIBB 1600 | Gender and Film | 3 |
| LING 1000 | Language in U.S. Society | 3 |
| LING 2400 | Language, Gender and Sexuality | 3 |
| LING 2500 | Race, Ethnicity, and Language | 3 |
| LING 3220 | American Indigenous Languages in their Social and Cultural Context | 3 |
| PHIL 2270 | Philosophy and Race | 3 |
| PHIL 2290 | Philosophy and Gender | 3 |
| PHIL 3110 | Feminist Practical Ethics | 3 |
| PSCI 3101 | Black Politics | 3 |
| PSCI 3184 | Race, Power, and Politics | 3 |
| PSCI 3211 | The Politics of Economic Inequality in the United States | 3 |
| PSCI 3294 | Theories of Identity | 3 |
| PSCI 3301 | Gender, Sexuality and U.S. Law | 3 |
| PSCI 4131 | Latinos and the U.S. Political System | 3 |
| PSYC 2700 | Psychology of Gender and Sexuality | 3 |
| RLST 2202 | Islam | 3 |
| RLST 2500 | Religions in the United States | 3 |
| RLST 2700 | Native American and Indigenous Religious Traditions | 3 |
| RLST 2800 | Women and Religion | 3 |
| SOCY 1006 | The Social Construction of Sexuality | 3 |
| SOCY 1016 | Sex, Gender, and Society 1 | 3 |
| SOCY 1021 | United States Race and Ethnic Relations I | 3 |
| SOCY 4052 | Social Inequalities in Health | 3 |
| SPAN 4215 | Spanish in the United States | 3 |
| SLHS 1010 | Disabilities in Contemporary American Society | 3 |
| THTR 1009 | Theatre and Society | 3 |
| THTR 3011 | American Musical Theatre History | 3 |
| WGST 1006 | The Social Construction of Sexuality | 3 |
| WGST 1016 | Sex, Gender, and Society 1 | 3 |
| WGST 1270 | Introduction to American Literature by Women | 3 |
| WGST 2000 | Introduction to US Gender, Race and Sexuality Studies | 3 |
| WGST 2020 | Femininities, Masculinities, Alternatives | 3 |
| WGST 2030 | Introduction to Lesbian, Gay, Bisexual, and Transgender Studies | 3 |
| WGST 2050 | Gender, Sexuality, and Popular Culture | 3 |
| WGST 2290 | Philosophy and Gender | 3 |
| WGST 2700 | Psychology of Gender and Sexuality | 3 |
| WGST 2800 | Women and Religion | 3 |
| WGST 3110 | Feminist Practical Ethics | 3 |
| WGST 3135 | Chicana Feminisms and Knowledges | 3 |
| WGST 3210 | American Indian Women | 3 |
| WGST 3300 | Gender, Sexuality and U.S. Law | 3 |
| WGST 3610 | Gender, Race, Science and Technology | 3 |
| WGST 4200 | Religion and Reproductive Politics in the United States | 3 |

| Code | Title | Credit Hours |
|---|---|---|
| **8. Global Perspective courses** | | |
| ANTH 1100 | | 3 |
| ANTH 1105 | Exploring a Non-Western Culture: Tibet | 3 |
| ANTH 1110 | Anthropology of Japan: Culture, Diversity, and Identity | 3 |
| ANTH 1115 | | 3 |
| ANTH 1120 | Exploring a Non-Western Culture: Pueblo Indians of the Southwest | 3 |
| ANTH 1140 | Exploring a Non-Western Culture: The Maya | 3 |
| ANTH 1141 | Indigenous Imperialism on the Andes: The Inca Realm and its People | 3 |
| ANTH 1145 | Indigenous Imperialism in Pre-Columbian Mexico: The Aztecs | 3 |
| ANTH 1150 | | 3 |
| ANTH 1155 | Exploring Global Cultural Diversity | 3 |
| ANTH 1156 | Class and Consumption: Global Cultures of Inequality, Anxiety, and Shopping | 3 |
| ANTH 1170 | Exploring Culture and Gender through Film | 3 |
| ANTH 1190 | Origins of Ancient Civilizations | 3 |
| ANTH 2100 | Introduction to Cultural Anthropology | 3 |
| ANTH 2525 | Environmental Anthropology | 3 |
| ANTH 2600 | Plagues and the Human Response from Past to Present | 3 |
| ANTH 3760 | Exploring Culture and Media in Southeast Asia | 3 |
| ANTH 4320 | Tourism, Development, and Belonging in Costa Rica | 3 |
| ANTH 4525 | Global Islams | 3 |
| ARAB 1011 | Introduction to Arab and Islamic Civilizations | 3 |
| ARAB 2320 | The Muslim World, 600-1250 | 3 |
| ARAB 3410 | Gender, Sexuality and Culture in the Modern Middle East | 3 |
| ARTH 1500 | Global Art and Visual Culture | 3 |
| ARTH 1509 | Trash and Treasure, Temples and Tombs: Art and Archaeology of the Ancient World | 3 |
| ARTH 2029 | Art and Archaeology of Ancient Egypt | 3 |
| ARTH 4269 | Art and Archaeology of the Ancient Near East | 3 |
| ARTH 4769 | Gender Studies in Early Modern Visual Culture | 3 |
| ASIA 1000 | Origins of Contemporary Southeast Asia | 3 |
| ASIA 2000 | Gateway to Modern Asia: Exploring Regional Connections | 3 |

| | | |
|---|---|---|
| ASIA 2852 | Contemporary Southeast Asia: Environmental Politics | 3 |
| ASTR 2000 | Ancient Astronomies of the World | 3 |
| CHIN 1012 | Introduction to Chinese Civilization | 4 |
| CLAS 1509 | Trash and Treasure, Temples and Tombs: Art and Archaeology of the Ancient World | 3 |
| CLAS 2029 | Art and Archaeology of Ancient Egypt | 3 |
| CLAS 2100 | Gender and Sexuality in Ancient Greece | 3 |
| CLAS 2110 | Gender and Sexuality in Ancient Rome | 3 |
| CLAS 4101 | Greek and Roman Slavery | 3 |
| COMM 3410 | Intercultural Communication | 3 |
| DNCE 1027 | Dance in Cultural Perception and Expression | 3 |
| ECON 4784 | Economic Development | 3 |
| ENGL 1250 | Introduction to World Literature by Women | 3 |
| ENGL 2767 | Race, Empire, and the Postcolonial | 3 |
| ENGL 3005 | The Literature of New World Encounters | 3 |
| ENGL 3767 | Feminist Fictions | 3 |
| ENGL 4717 | Native American and Indigenous Studies Capstone Seminar | 3 |
| ETHN 1022 | Introduction to Africana Studies | 3 |
| ETHN 2761 | Race, Empire, and the Postcolonial | 3 |
| FREN 1350 | Introduction to Social Change in the Arts | 3 |
| FREN 1400 | Sexuality and Gender Wars in Italy and France | 3 |
| FREN 1950 | French Feminisms | 3 |
| FREN 3400 | Culture, Performance and Development in Dakar, Senegal | 3 |
| FREN 3800 | France and the Muslim World | 3 |
| GEOG 1962 | Geographies of Global Change | 3 |
| GEOG 1972 | Sustainable Futures, Environment and Society | 3 |
| GEOG 2852 | Contemporary Southeast Asia: Environmental Politics | 3 |
| GEOG 3672 | Who Runs the World? Sex, Power, and Gender in Geography | 3 |
| GEOG 3682 | International Development: Economics, Power, and Place | 3 |
| GEOG 3692 | Introduction to Global Public Health | 4 |
| GEOG 3742 | Place, Power, and Contemporary Culture | 3 |
| GEOG 3812 | Mexico, Central America, and the Caribbean | 3 |
| GEOG 3822 | China¿s Diverse Geographies: Environment, Society, Politics | 3 |
| GEOG 3862 | Global Africa: Environment, Development, and Culture | 3 |
| GEOG 4292 | Migration, Immigrant Adaptation, and Development | 3 |
| GEOG 4732 | Population Geography | 3 |
| GEOG 4812 | Political Ecology & Latin America | 3 |
| GRMN 3501 | The German-Jewish Experience: From the Enlightenment to the Present | 3 |
| GRMN 3601 | German Women Writers | 3 |
| GRMN 4231 | The Invention of Sexuality | 3 |
| GRMN 4301 | Gender, Race and Immigration in Germany and Europe | 3 |
| GSLL 2350 | Introduction to Jewish Culture | 3 |
| GSLL 3600 | Contemporary Jewish Societies | 3 |
| HIND 1011 | Introduction to South Asian Civilizations | 3 |
| HIND 3811 | The Power of the Word: Subversive and Censored 20th Century Indo-Pakistani Literature | 3 |
| HIST 1028 | Latin American History since Independence | 3 |
| HIST 1218 | Introduction to Sub-Saharan African History to 1850 | 3 |
| HIST 1228 | Introduction to Sub-Saharan African History Since 1850 | 3 |
| HIST 1818 | Jewish History to 1492 | 3 |
| HIST 1828 | Jewish History Since 1492 | 3 |
| HIST 1830 | Global History of Holocaust and Genocide | 3 |
| HIST 2166 | The Vietnam Wars | 3 |
| HIST 2810 | Antisemitism: Histories, Concepts, Practices | 3 |
| HIST 4101 | Greek and Roman Slavery | 3 |
| HIST 4218 | Lost Kingdoms & Caliphates: West Africa to 1900 | 3 |
| HIST 4238 | History of Southern Africa | 3 |
| HIST 4258 | Africa under European Colonial Rule | 3 |
| HIST 4320 | The History of the Mediterranean, 600 CE-1600 CE | 3 |
| HIST 4339 | Borderlands of the British Empire | 3 |
| HIST 4349 | Decolonization of the British Empire | 3 |
| HIST 4359 | The Global History of Modern Arabia | 3 |
| HIST 4448 | Wars of Liberation in Southeast Asia | 3 |
| HIST 4554 | Researching European Jewish Life | 3 |
| HIST 4619 | Women in East Asian History | 3 |
| HIST 4830 | Human Trafficking in Global Perspective | 3 |
| HUMN 3280 | Social Justice and the Humanities | 3 |
| HUMN 3801 | Muslims, Christians, Jews and the Mediterranean Origins of the West | 3 |
| HUMN 3850 | The Mediterranean: Religion Before Modernity | 3 |
| HUMN 4150 | Boccaccio's Decameron: Tales of Sex and Death in the Middle Ages | 3 |
| HUMN 4730 | Italian Feminisms: Culture, Theory, and Narratives of Difference | 3 |
| IAFS 3010 | Islam, Geopolitics and Society: Gender, Identity and Place | 3 |
| IAFS 3530 | Global Seminar: Jews and Muslims - The Multiethnic History of Istanbul | 3 |
| IAFS 3540 | Migration, Human Rights, and Conflict in the Mediterranean | 3 |
| IAFS 3600 | Contemporary Jewish Societies | 3 |
| IAFS 3850 | International Conflict Resolution and Peacebuilding | 3 |
| ITAL 1350 | Introduction to Social Change in the Arts | 3 |

| | | |
|---|---|---|
| ITAL 1400 | Sexuality and Gender Wars in Italy and France | 3 |
| ITAL 4150 | Boccaccio's Decameron: Tales of Sex and Death in the Middle Ages | 3 |
| ITAL 4300 | Multiculturalism in Italy | 3 |
| ITAL 4730 | Italian Feminisms: Culture, Theory, and Narratives of Difference | 3 |
| JPNS 1012 | Introduction to Japanese Civilization | 4 |
| JPNS 3881 | Environment, Nature and Disaster in Japanese Literature and Culture | 3 |
| JPNS 3891 | Travel/Travel Writing in Japanese Literature and Culture | 3 |
| JPNS 4050 | Japanese Sociolinguistics | 3 |
| JWST 1818 | Jewish History to 1492 | 3 |
| JWST 1828 | Jewish History Since 1492 | 3 |
| JWST 1830 | Global History of Holocaust and Genocide | 3 |
| JWST 1900 | Introduction to the Hebrew Bible/Old Testament | 3 |
| JWST 2350 | Introduction to Jewish Culture | 3 |
| JWST 3202 | Women, Gender & Sexuality in Jewish Texts & Traditions | 3 |
| JWST 3501 | The German-Jewish Experience: From the Enlightenment to the Present | 3 |
| JWST 3530 | Global Seminar: Jews and Muslims - The Multiethnic History of Istanbul | 3 |
| JWST 3600 | Contemporary Jewish Societies | 3 |
| KREN 1011 | Introduction to Korean Civilization | 3 |
| KREN 2441 | Film and Korean Culture | 3 |
| KREN 3841 | Modern Korean Literature in English Translation | 3 |
| LAMS 1000 | Introduction to Latin American and Latinx Studies | 3 |
| LING 1020 | Languages of the World | 3 |
| LING 3545 | World Language Policies | 3 |
| LING 4050 | Japanese Sociolinguistics | 3 |
| MUEL 2772 | World Musics: Asia and Oceania | 3 |
| MUEL 2782 | World Music: Africa, Europe, and the Americas | 3 |
| PACS 2500 | Introduction to Peace, Conflict and Security Studies | 3 |
| PACS 3540 | Migration, Human Rights, and Conflict in the Mediterranean | 3 |
| PACS 3850 | International Conflict Resolution and Peacebuilding | 3 |
| PHIL 1040 | Introduction to African Philosophy | 3 |
| PHIL 1250 | Poverty, Power, and Patriotism: Issues of Global Justice | 3 |
| PHIL 2270 | Philosophy and Race | 3 |
| PHIL 2290 | Philosophy and Gender | 3 |
| PHIL 3040 | African Philosophy: Personhood and Morality | 3 |
| PHIL 3260 | Philosophy and the International Order | 3 |
| PSCI 3052 | Gender and Politics in Latin America | 3 |
| PSCI 4012 | Global Development | 3 |
| PORT 3170 | Lisbon as a Global City: Cosmopolitanism, Diversity, and Innovation | 3 |
| RLST 1818 | Jewish History to 1492 | 3 |
| RLST 1828 | Jewish History Since 1492 | 3 |
| RLST 1830 | Global History of Holocaust and Genocide | 3 |
| RLST 1900 | Introduction to the Hebrew Bible/Old Testament | 3 |
| RLST 2202 | Islam | 3 |
| RLST 2320 | The Muslim World, 600-1250 | 3 |
| RLST 2612 | Yoga: Ancient and Modern | 3 |
| RLST 3202 | Women, Gender & Sexuality in Jewish Texts & Traditions | 3 |
| RLST 3530 | Global Seminar: Jews and Muslims - The Multiethnic History of Istanbul | 3 |
| RLST 3801 | Muslims, Christians, Jews and the Mediterranean Origins of the West | 3 |
| RLST 3850 | The Mediterranean: Religion Before Modernity | 3 |
| REES 3705 | Crimes of Passion: Gender and Sexual Politics in Tolstoy's Russia | 3 |
| REES 4471 | Women in 20th-21st Century Russian, East European and Eurasian Cultures | 3 |
| SCAN 3206 | Nordic Colonial History and Legacy | 3 |
| SCAN 3208 | Women in Nordic Society: Modern States of Welfare | 3 |
| SOCY 3012 | Gender and Development | 3 |
| SOCY 3161 | Global Perspectives on Race and Ethnicity | 3 |
| SPAN 3270 | Barcelona: Understanding Local and Immigrant Cultures | 3 |
| SPAN 3290 | Argentine Culture and History in a Latin American Context | 3 |
| WGST 1250 | Introduction to World Literature by Women | 3 |
| WGST 2100 | Gender and Sexuality in Ancient Greece | 3 |
| WGST 2110 | Gender and Sexuality in Ancient Rome | 3 |
| WGST 2200 | Women, Gender, Literature, and the Arts | 3 |
| WGST 2290 | Philosophy and Gender | 3 |
| WGST 2600 | Introduction to Global Gender, Race and Sexuality Studies | 3 |
| WGST 3012 | Gender and Development | 3 |
| WGST 3201 | Women, Gender & Sexuality in Jewish Texts & Traditions | 3 |
| WGST 3208 | Women in Nordic Society: Modern States of Welfare | 3 |
| WGST 3410 | Gender, Sexuality and Culture in the Modern Middle East | 3 |
| WGST 3510 | Gender, Sexuality and Global Health | 3 |
| WGST 3520 | Gender and Sexuality in Africa | 3 |
| WGST 3601 | German Women Writers | 3 |
| WGST 3650 | Gender and Politics in Latin America | 3 |
| WGST 3670 | Gender, Race, Sexuality and Global Migration | 3 |

| | | |
|---|---|---|
| WGST 3672 | Who Runs the World? Sex, Power, and Gender in Geography | 3 |
| WGST 3767 | Feminist Fictions | 3 |
| WGST 4301 | Gender, Race and Immigration in Germany and Europe | 3 |
| WGST 4471 | Women in 20th-21st Century Russian, East European and Eurasian Cultures | 3 |
| WGST 4619 | Women in East Asian History | 3 |

# Academic Standards

Students in the College of Arts & Sciences must abide by all policies and procedures as outlined in the university catalog and on the Arts & Sciences' Academic Advising website (https://www.colorado.edu/advising/). Students should refer to these webpages often since policies, procedures and forms may be updated throughout the academic year.

## Attendance

Successful work in the College of Arts & Sciences is dependent upon regular attendance in all classes. Students who are unavoidably absent should make arrangements with instructors to make up any work missed. Failure to attend regularly may result in receipt of an "F" in a course. Students who, for illness or other legitimate reason, miss a final examination must notify the instructor no later than the end of the day on which the examination is given. Failure to do so may result in receipt of an F in the course. The instructor determines whether the reason is legitimate and whether to make an accommodation.

## Registration and Enrollment

It is the students' responsibility to enroll each semester in the requisite number of credit hours in accordance with the students' individual degree plan. To be considered a full-time student, a minimum of 12 credit hours each fall and spring semester is required. Part-time enrollment (less than 12 credit hours) may impact student's financial aid and scholarships, health insurance, on-campus housing and the four-year graduation guarantee. Students must petition to be enrolled in more than 21 credit hours in any given fall or spring semester and in more than 16 credit hours in Summer Session as a whole. Students may enroll in a maximum of 4 credit hours in Maymester, Augmester or Winter Session.

### Sequence of Courses

Students are expected to follow the curriculum outlined by their major department/program. A student, who does earned the required a grade in a course that is prerequisite to another, may not enroll in the succeeding course without approval from the student's major department/program or the instructor of the succeeding course. Students should check the registration system and with the major department/program to ascertain specific prerequisite course grades.

All courses are not necessarily offered each semester. According to college policy, undergraduate courses having an enrollment of fewer than 14 students may be canceled. Students can minimize scheduling problems by closely following the curricular sequence outlined by their major department/program.

### Add and Drop Policies

See the Office of the Registrar's website (http://www.colorado.edu/registrar/) for university add and drop policies and specific deadline dates for a given semester/term.

### Late Drop Policy

After the final drop deadline, students must file a detailed college petition to request a late drop from an individual course, which may be approved under the following conditions:

- After the tenth week of class during the fall or spring, of the equivalent during a summer term and before the last day of class in the term, a student may be approved to late drop a class with documentation to verify extenuating circumstances beyond their control or a university error.
- Students who are approved for a late drop of a class will receive a grade of "W" for that class on their transcript.

Students are responsible for being aware of the consequences of a late drop(s), including impacts on financial aid/scholarships, health insurance, on-campus housing eligibility, academic progress towards degree requirements, etc.

## Term Withdrawal

Arts & Sciences students may withdraw from all classes for a term through the last day that classes are taught by requesting a withdrawal in the Office of the Registrar. In the event of extenuating circumstances, after the conclusion of the term, students may petition for a retroactive term withdrawal through the Office of Undergraduate Education. For specific withdrawal procedures and university policies, see the Withdrawal (p. 59) section.

### Consecutive Term Withdrawal

Students in the College of Arts & Sciences who withdraw from two fall and spring terms in a row will have a dean's stop placed on their registration. Summer Session is not counted within the context of this policy. Students with a consecutive withdrawal dean's stop will not be permitted to return to CU Boulder before one full academic year has elapsed (not including their last term of withdrawal).

## Academic Standing

For information about what constitutes good academic standing at CU Boulder and what type of academic performance could lead to an undergraduate student being placed on academic alert, academic warning, academic suspension or academic dismissal please see the University's Academic Standing (p. 28) page in this catalog.

## Academic Ethics

The College of Arts & Sciences follows the policies and procedures governing acts of academic dishonesty can be found on CU Boulder's Student Conduct & Conflict Resolution website (https://www.colorado.edu/sccr/students/honor-code-and-student-code-conduct/). A university's intellectual reputation depends on the maintenance of the highest standards of intellectual honesty. Commitment to those standards is a responsibility of every student and faculty member at the University of Colorado.

## Policy on Grade Appeals

The following shall be the official policy of the academic units of the College, unless an academic unit submits an alternative procedure to the Dean for approval.

When a student believes that a grade has been improperly assigned, and discussions between the instructor and the student have not led to any resolution of the problem:

1. The student shall have the option of making a formal written appeal to the Department Chair. The appeal must specify the remedy desired

by the student, and it must be submitted within 45 days of the end of the academic term in which the course was taken. (The date when grades are posted to transcripts is considered the end of the academic term.)

2. The chair or designee will meet (together or separately) with the student and with the faculty member who taught the course. If the Chair/designee is unable to broker a solution mutually acceptable to both student and instructor, then:
3. The chair shall appoint an ad hoc Grade Appeals Committee, which will review the dispute. This committee shall consist of at least three impartial faculty members competent in the subject matter of the course in question. The chair will provide the committee with the student's appeal and a written response from the faculty member.
4. Within 45 days, the committee will submit a report and recommendation to the chair, and the chair will recommend to the instructor either (1) that the originally assigned grade stand; or (2) that a new grade be assigned.
5. In cases where a change of grade is recommended and the instructor does not wish to accept the recommendation of their colleagues, the chair shall forward the written materials associated with the appeal to the Arts and Sciences' Dean's Office.
6. At the Dean's office, a Grade Appeals Advisory Committee (GAAC), made up of one faculty member from each of the three divisions, serves as a reviewing body for departmental grade appeal committees' procedures and decisions. The committee looks at the case with a focus on the initial student appeal request and at the processes used by the departmental appeal committee. In an effort to honor the disciplinary home of the course in question, the GAAC looks primarily at whether or not the departmental appeal committee took into appropriate consideration the facts presented by the student and course instructor, and made a determination that was fair, compassionate and aligned with the educational mission of the department and university. The GAAC makes recommendations to the Associate Dean for Student Success, who will make the final decision as the designee of the Dean. There is no appeal of the decision of the Dean or designee.

## Policy on Incomplete Grades

An incomplete grade of "I" is given at the discretion of the course instructor only when a student has satisfactorily completed a substantial portion of a course and, for reasons beyond the student's control, is prevented from completing all work for the course within the term. Incomplete grades must be requested by the student and should not be awarded by the instructor for non-attendance. (In the case of non-attendance, the instructor should award the student the grade[s] earned.) If an incomplete grade is given, the instructor is required to document the reasons/grounds for the awarding of the incomplete grade, the specific work and conditions for completion of the course and the time frame within which the coursework must be completed. The maximum time the instructor can allow for the completion of the coursework and subsequent award of a course grade is one year from the end of the term the course was taken. After one year, if no final grade is awarded, the "I" grade will change to the grade of "F." A copy of a departmental Incomplete Agreement signed by the student and instructor and accompanied by documentation of the extenuating circumstances that resulted in the awarding of an incomplete should be filed with the instructor's department office, and a copy should be given to the student. (No copy of this agreement needs to be sent to the Arts & Sciences' Dean's Office.)

## Policy on Exceptions to Academic Rules and Policies

The College of Arts & Sciences does not waive degree requirements or excuse students from completing degree requirements. Petitions for exceptions to the College of Arts & Sciences academic rules and policies stated in this catalog may be submitted to the Appeals Committee on Academic Rules and Policies (ACARP). Such petitions will be considered only if they meet all three of the following conditions:

1. The student must document that they have made every effort to fulfill the policy or requirement as defined and must demonstrate that no other options exist for fulfilling the requirement as defined in this catalog.
2. The student must document the compelling reasons beyond their control that are preventing them from fulfilling the policy or meeting the requirement as defined in the catalog.
3. The student must demonstrate to the satisfaction of the faculty committee that they have fulfilled or will fulfill the intent of the policy or the requirement through an appropriate alternative.

Students who believe that their circumstances meet the conditions to submit a petition must first consult with their academic advisor. If the advisor offers options for meeting the requirement or policy as defined here, the student must pursue those options and should not submit a petition. Usually ACARP only accepts petitions from students who are in their final year at CU Boulder.

The ACARP petitions should be filed with the College of Arts & Sciences' Office of Academic and Curricular Affairs.

# Academic Excellence

## Arts & Sciences Honors Program

The Arts & Sciences Honors Program (https://www.colorado.edu/honors/) provides a community for highly motivated and academically engaged undergraduate students and offers opportunities for intellectual engagement through Honors courses, academic-inspired events and honors thesis research and creative work. It is an enrichment program for Arts & Sciences students who want to add something extra to their experience at the University of Colorado Boulder at no extra cost. The Honors Program awards Latin honors (*cum laude*, *magna cum laude* or *summa cum laude*) to graduating seniors in the College of Arts & Sciences who have successfully written and defended honors theses. Honors-qualified students are eligible to take Honors Program courses and attend Honors Community events. The Honors Program also sponsors the Honors Journal (http://www.colorado.edu/honorsjournal/), a student-run publication which publishes works from all academic disciplines represented on the CU Boulder campus, and offers the certificate in Interdisciplinary Honors Studies (p. 414), which allows undergraduate students to develop skills in interdisciplinary theory and practice that they can draw on to address social problems.

## Honors Residential Academic Program

The **Honors Residential Academic Program (HRAP**), located in Smith Hall, is an inclusive, challenging and supportive co-educational living-learning community open to honors-qualified Arts & Sciences students. By becoming part of the Honors RAP community, students are surrounded with other bright, highly motivated students, enjoy small seminar-style classes and have the opportunity to work closely with Honors faculty. Through its classes and its extra-curricular activities, Honors RAP integrates the diverse disciplines of the College of Arts &Sciences with

the opportunities and challenges of real-world experiences. In short, offer the best educational experience possible to qualified CU undergraduates.

Incoming first-year honors-qualified students receive a Welcome Letter from the A&S Honors Program inviting them to participate in Honors. Being in the Arts & Sciences Honors Program qualifies students to join the A&S Honors RAP; a separate Honors RAP qualification is not required. Honors-qualified students are not guaranteed a space in the Honors RAP. Housing applications and assignments are a product of the Housing Office. Applications are processed as described on Housing's website, according to the date of the completed Housing application.

For more information about program requirements and to access the application, visit the Honors RAP website (https://www.colorado.edu/hrap/)

### Graduation with Honors

Undergraduate students in the College of Arts & Sciences are eligible to earn Latin honors at graduation—*cum laude, magna cum laude* or *summa cum laude*. The Arts & Sciences Honors Council confers Latin honors award based on several criteria, including the quality of original scholarly and creative work. Latin Honors are not conferred on a graduate simply by virtue of high grades. To pursue Latin honors, students intending to pursue honors register with the Honors Program by the deadlines published on the Honors Program (https://www.colorado.edu/honors/graduation/) website. Interested students should consult the the Honors Program website (https://www.colorado.edu/honors/graduation/) or visit their office in Norlin Library.

### Graduation with Distinction

Students will graduate "With Distinction" if they have completed at least 30 credit hours with a letter grade at the University of Colorado Boulder and have a grade point average of 3.750 or higher for all coursework completed at the University of Colorado. The average includes all grades except P, S or U. Students graduating "With Distinction" receive a medal from the Dean's Office to wear at graduation.

### Dean's List

Students in the College of Arts & Sciences who have completed at least 12 credit hours of CU Boulder coursework for a letter grade in any single semester with a term GPA of 3.750 or better are included on the dean's list and receive a notation on their transcript and a letter from the dean. Coursework completed with grades of P, S or U are not considered completed for a letter grade and will not be counted toward dean's list eligibility. CU Boulder students who are pursuing a double degree in more than one school or college at CU Boulder are eligible for the Dean's list only in their primary college not in their secondary college.

### Phi Beta Kappa

All upper-division students in the College of Arts & Sciences whose undergraduate academic records are outstanding are eligible for election to Phi Beta Kappa, the nation's oldest and most prestigious honor society. The CU Boulder chapter was established in 1904. Membership in this distinguished honors society recognizes superlative scholastic achievement in the liberal arts and sciences and at CU is only open to Arts & Sciences students. Students are notified by mail of their nomination; students do not apply for Phi Beta Kappa membership.

# Programs of Study

# Actuarial Studies and Quantitative Finance

The Actuarial Studies and Quantitative Finance Certificate Program is an interdisciplinary undergraduate program housed in the College of Arts and Sciences and the Leeds School of Business. The curriculum is designed to provide the necessary mathematics, economics and finance training needed to pursue a career as an actuary or in quantitative finance.

The program appeals to quantitatively strong students who are excited about applying these skills in a business setting.

Students with these skills and interests are in high demand in the job market. Students who succeed in the program will also be well-prepared for graduate study in these fields.

## Certificate

- Actuarial Studies and Quantitative Finance - Certificate (p. 90)

# Actuarial Studies and Quantitative Finance - Certificate

## Program Tracks

The actuarial studies and quantitative finance certificate program offers two tracks:

- Actuarial studies track
- Quantitative finance track

### Actuarial Studies Track

The actuarial studies track, offered by the College of Arts and Sciences, is designed to help students obtain the expertise in mathematics, economics and finance necessary to become actuaries—the mathematical planners of the insurance and pension industries.

Students in the program can be of any major or college, or can be classified as nondegree. The entrance requirement is three semesters of calculus completed with grades of B+ or better. There are a number of courses in mathematics, economics and business required to earn the certificate. The certificate is awarded by the dean of the College of Arts and Sciences.

Besides taking courses, students are encouraged to take the professional exams offered by the various actuarial societies. The entrance requirements can be waived for students who pass the first actuarial examination.

Interested students should contact one of the co-directors: David Grant at 303-492-7208 or Anne Dougherty at 303-492-4011, who will also provide advice on actuarial studies to students who are not in the program. For more information, visit the Actuarial Studies and Quantitative Finance Certificate Program (http://www.colorado.edu/asqf/) webpage.

### Quantitative Finance Track

The quantitative finance track, offered jointly by the College of Arts and Sciences and the Leeds School of Business, was initiated in the fall of 2004 and is designed to prepare students for financial and economics analyst positions that require outstanding quantitative skills. Often employers hire graduate students for such positions due to a shortage of

undergraduates with the required combination of skills and training. This program is designed to meet this need.

The required curriculum is extensive and rigorous. Potential participants are encouraged to begin work early in their studies, preferably during the first year. Coursework draws from the Departments of Mathematics, Applied Mathematics and Economics; and the Leeds School of Business. Qualified students enrolled in any college are invited to participate.

For admittance to the program, a student must earn a GPA of 2.87 or higher in Calculus I through III. However, students may be provisionally admitted after completion of Calculus I (MATH 1300 or APPM 1350) with a grade of B or better or through advanced placement. Additional GPA requirements must be met to earn the certificate. Participants may be given preference when enrolling in certain courses in the Leeds School of Business.

Interested students should contact Daniel Brown, Leeds School of Business, at daniel.brown@colorado.edu. For more information, visit the Actuarial Studies and Quantitative Finance Certificate Program (http://www.colorado.edu/asqf/) webpage.

# Requirements

## Overview

Curricula are rigorous and multi-disciplinary, with required coursework drawing from the Mathematics, Applied Mathematics and Economics Departments, as well as the Finance Division of the Leeds School of Business. The confluence of such widely varying material is one of the unique features of the program. Successful completion of the program requirements is a significant accomplishment.

## Actuarial Studies Track

The courses listed below are the minimum required in order to complete the actuarial studies track of the program. You must achieve a grade of C- or better in all courses.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Mathematics Courses** | | |
| MATH 1300 | Calculus 1 | 4-5 |
| or APPM 1350 | Calculus 1 for Engineers | |
| MATH 2300 | Calculus 2 | 4-5 |
| or APPM 1360 | Calculus 2 for Engineers | |
| MATH 2400 | Calculus 3 | 4-5 |
| or APPM 2350 | Calculus 3 for Engineers | |
| or APPM 2340 | Calculus 3 for Statistics and Data Science | |
| MATH 2130 | Introduction to Linear Algebra for Non-Mathematics Majors | 3 |
| or APPM 3310 | Matrix Methods and Applications | |
| MATH 4510 | Introduction to Probability Theory | 3 |
| or APPM 3570 | Applied Probability | |
| MATH/STAT 4520 | Introduction to Mathematical Statistics | 3 |
| MATH/STAT 4540 | Introduction to Time Series | 3 |
| **Required Economics Course** | | |
| ECON 3070 | Intermediate Microeconomic Theory | 4 |
| ECON 3080 | Intermediate Macroeconomic Theory | 3 |
| ECON 4070 | Topics in Microeconomics | 3 |
| **Required Finance/Accounting Courses** | | |
| BCOR 2203 & BCOR 2204 | Principles of Accounting I and Principles of Financial Management | 3 |
| FNCE 3010 | Corporate Finance | 3 |
| **Additional Recommended Courses** | | |
| APPM 4560 | Markov Processes, Queues, and Monte Carlo Simulations | |
| ECON 3818 | Introduction to Statistics with Computer Applications | |
| ECON 4818 | Introduction to Econometrics | |
| FNCE 3030 | Investment and Portfolio Management | |
| FNCE 4040 | Derivative Securities | |
| MATH/APPM 4120 | Introduction to Operations Research | |
| MATH/APPM 4650 | Intermediate Numerical Analysis 1 | |
| STAT 4610 | Statistical Learning | |
| **Total Credit Hours** | | **40-43** |

## Quantitative Finance Track

Program requirements are extensive and challenging. Students must meet two separate GPA requirements:

1. The overall GPA for all courses applied to certificate requirements must be at least 3.00.
2. Students must meet a requirement specifically for mathematics and statistics courses applied to certificate requirements. This requirement can be met one of two ways, either by achieving a GPA of 2.7 or greater in calculus courses or a GPA of 3.00 or greater in the six mathematics and statistics courses required for the certificate.

Most students will begin study during their freshman year and continue throughout their undergraduate career. The number of credit hours taken may vary according to the specific courses completed.

The courses listed below are the minimum required in order to complete the quantitative finance track of our program. Please note that students must pass Calculus I, II, and III with a B grade or better in order to be admitted into the program. Students are encouraged to go beyond the minimum requirements, and most students do.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Calculus Courses** | | |
| MATH 1300 | Calculus 1 | 4-5 |
| or APPM 1350 | Calculus 1 for Engineers | |
| MATH 2300 | Calculus 2 | 4-5 |
| or APPM 1360 | Calculus 2 for Engineers | |
| MATH 2400 | Calculus 3 | 4-5 |
| or APPM 2350 | Calculus 3 for Engineers | |
| or APPM 2340 | Calculus 3 for Statistics and Data Science | |
| **Linear Algebra** | | |
| MATH 2130 | Introduction to Linear Algebra for Non-Mathematics Majors | 3 |
| or MATH 2135 | Introduction to Linear Algebra for Mathematics Majors | |
| or APPM 3310 | Matrix Methods and Applications | |

| | | |
|---|---|---|
| **Probability** | | |
| MATH 4510 | Introduction to Probability Theory | 3 |
| or APPM 3570 | Applied Probability | |
| or STAT 4000 | Statistical Methods and Application I | |
| **Statistics** | | |
| MATH/STAT 4520 | Introduction to Mathematical Statistics | 3 |
| or STAT 4010 | Statistical Methods and Applications II | |
| **Economics Course Requirements** | | |
| ECON 2010 | Principles of Microeconomics | 4 |
| ECON 2020 | Principles of Macroeconomics | 4 |
| ECON 3070 | Intermediate Microeconomic Theory | 4 |
| ECON 4818 | Introduction to Econometrics | 3 |
| or ECON 4848 | Applied Econometrics | |
| or ECON 4858 | Financial Econometrics | |
| **Principals** | | |
| BCOR 2203 | Principles of Accounting I | 1.5 |
| or BUSM 2020 | Principles of Accounting | |
| BCOR 2204 | Principles of Financial Management | 1.5 |
| or BUSM 2021 | Principles of Finance | |
| **Finance Requirements** | | |
| FNCE 3010 | Corporate Finance | 3 |
| FNCE 3030 | Investment and Portfolio Management | 3 |
| FNCE 4040 | Derivative Securities | 3 |
| **Accounting/Computer Science** | | |
| ACCT 3220 | Corporate Financial Reporting 1 | 3 |
| or CSCI 2270 | Computer Science 2: Data Structures | |
| or APPM 3650 | Algorithms and Data Structures in Python | |
| **Mathematical Finance or Finance & Institutions** | | |
| FNCE 4070 | Financial Markets and Institutions Topic for FNCE 4820/APPM 4720 must be Mathematical Finance | 3 |
| or FNCE 4820 | Topics in Finance | |
| or APPM 4720 | Open Topics in Applied Mathematics | |
| **Elective** | | |
| FNCE 4000 level, ACCT 4000 level, or CSCI 3000/4000 level | | 3 |
| **Computer Science** | | **3-4** |
| CSCI 1300 | Computer Science 1: Starting Computing | 4 |
| or APPM 1650 | Python for Math and Data Science Applications | |
| **Total Credit Hours** | | **64-68** |

For a complete list of requirements and further information regarding the quantitative finance track and the related actuarial studies track, see the Actuarial Studies and Quantitative Finance Certificate Program (https://www.colorado.edu/program/asqf/) webpage. Interested students should contact Daniel Brown, daniel.brown@colorado.edu (Daniel.Brown@colorado.edu), Leeds School of Business.

# Anthropology

Anthropology is the study of humans and our biological relatives across time and space. It is the only field to address the diversity of the human experience in its biological, cultural and historical contexts. The discipline necessarily incorporates a wide range of theoretical and methodological traditions, drawing on and contributing to approaches in the humanities, social sciences and natural sciences. It is the breadth of our vision of what it means to be human, as well as the breadth of our theoretical and methodological approaches, that constitute our unique mission and role within the university. We feel it is of crucial importance to communicate this broad vision of diversity and complexity to students so that they come to have a deeper understanding of what it means to be human.

We view the three subdisciplines of anthropology (archaeology, biological anthropology and cultural anthropology) as important foundations of our program because of their well-defined fields of study. Yet we also believe that recent trends in anthropological thought offer creative new directions that cut across and bridge the subdisciplines. We see our long-term vision as a department that addresses and analyzes social, biological and environmental problems. We have identified four broad themes that address these problems and potential solutions in ways that cut across the subdisciplines: ecology and evolution; human responses to local and global crises; cultural, ethical, and political practices of worldmaking; and collaborative and public anthropology. These serve as intellectual bridges to create powerful new collaborations within the department and with other programs and institutions that will advance our research and teaching missions as well as create a more integrated departmental vision.

**Course code for this program is ANTH.**

## Bachelor's Degree

- Anthropology - Bachelor of Arts (BA) (p. 102)

## Minor

- Anthropology - Minor (p. 104)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Bamforth, Douglas (https://experts.colorado.edu/display/fisid_101027/)
Professor; PhD, University of California, Santa Barbara

Bernstein, Robin Miriam (https://experts.colorado.edu/display/fisid_152968/)
Associate Professor; PhD, University of Illinois at Urbana–Champaign

Cameron, Catherine M.
Professor Emerita

Cool, Alison Collier (https://experts.colorado.edu/display/fisid_154599/)
Assistant Professor; PhD, New York University

Covert, Herbert
Professor Emeritus; PhD, Duke University

DeWitte, Sharon
Professor; PhD, Pennsylvania State University

Drybread, Kristen (https://experts.colorado.edu/display/fisid_156523/)
Lecturer

Dufour, Darna L. (https://experts.colorado.edu/display/fisid_100213/)
Professor Emerita; PhD, SUNY at Binghamton

Fischer, Kate (https://experts.colorado.edu/display/fisid_155474/)
Lecturer; PhD, University of Colorado Boulder

Goldfarb, Kathryn Elissa (https://experts.colorado.edu/display/fisid_156471/)
Associate Professor; PhD, University of Chicago

Goldstein, Donna M. (https://experts.colorado.edu/display/fisid_100448/)
Professor; PhD, University of California, Berkeley

Greene, David Lee
Professor Emeritus

Gutierrez, Gerardo (https://experts.colorado.edu/display/fisid_146867/)
Professor; PhD, Pennsylvania State University

Hammons, Christian Stanford (https://experts.colorado.edu/display/fisid_152915/)
Teaching Professor; PhD, University of Southern California

Hosek, Lauren (https://experts.colorado.edu/display/fisid_167102/)
Assistant Professor; PhD, Syracuse University

Jacka, Jerry Keith (https://experts.colorado.edu/display/fisid_156067/)
Associate Professor; PhD, University of Oregon

Jones, Carla Mae (https://experts.colorado.edu/display/fisid_134172/)
Professor; PhD, University of North Carolina, Chapel Hill

Jones, Eric
Associate Professor; PhD, Pennsylvnia State University

Joyce, Arthur A. (https://experts.colorado.edu/display/fisid_115421/)
Professor; PhD, Rutgers University–New Brunswick

Kaschube, Dorothea V.
Professor Emerita

Kurnick, Sarah (https://experts.colorado.edu/display/fisid_155915/)
Associate Professor; PhD, University of Pennsylvania

Leigh, Steven Robert (https://experts.colorado.edu/display/fisid_151706/)
Professor; PhD, Northwestern University

Lekson, Steve
Professor Emeritus

Lyons, Colleen Scanlan (https://experts.colorado.edu/display/fisid_148419/)
Assistant Professor Adjunct; PhD, University of Colorado Boulder

McCabe, J Terrence
Professor; PhD, SUNY at Binghamton

McGilvray, Dennis B.
Professor Emeritus

McGoodwin, James Russell
Professor Emeritus

McGranahan, Carole Ann (https://experts.colorado.edu/display/fisid_122673/)
Professor, Chair; PhD, University of Michigan Ann Arbor

O'Brien, Jonathan (https://experts.colorado.edu/display/fisid_152072/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Ortman, Scott Graham (https://experts.colorado.edu/display/fisid_152978/)
Associate Professor; PhD, Arizona State University

Sauther, Michelle Linda (https://experts.colorado.edu/display/fisid_107236/)
Professor; PhD, Washington University

Shankman, Paul
Professor Emeritus

Shannon, Jennifer A. (https://experts.colorado.edu/display/fisid_147612/)
Associate Professor; PhD, Cornell University

Sponheimer, Matthew James (https://experts.colorado.edu/display/fisid_129957/)
Professor; PhD, Rutgers University New Brunswick

Stevens, Nancy
Professor; PhD, Stonybrook University

Taylor, William T. (https://experts.colorado.edu/display/fisid_165652/)
Assistant Professor, Museum Associate Curator; PhD, University of New Mexico

Van Gerven, Dennis P.
Professor Emeritus

Villanea, Fernando (https://experts.colorado.edu/individual/fisid_168227/)
Assistant Professor; PhD, Washington State University

Walker, Deward E. Jr
Professor Emeritus

# Courses

**ANTH 1030 (3) Principles of Anthropology 1**
Evolution of humanity and culture from beginnings through early metal ages. Covers human evolution, race, prehistory, and rise of early civilizations. This course is taught through Continuing Education.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Social Science

**ANTH 1040 (3) Principles of Anthropology 2**
Surveys the world's major culture areas. Covers components of culture, such as subsistence, social organization, religion, and language. This course is taught through Continuing Education.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
MAPS Course: Social Science

**ANTH 1105 (3) Exploring a Non-Western Culture: Tibet**
Introduction to Tibetan culture, history, religion, and society from an anthropological perspective, including traditional as well as contemporary dimensions. Topics will include Tibetan Buddhism, politics, nomadism, gender, refugee issues, and the global Tibetan diaspora, all framed within the larger methods and concepts of cultural anthropology.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**ANTH 1110 (3) Anthropology of Japan: Culture, Diversity, and Identity**
Focusing on diverse facets of lived experience, this course introduces students to the cultural anthropology of contemporary Japan. Students will gain an understanding of the anthropological fieldwork process, theoretical issues within cultural anthropology, and key debates in Japanese studies about Japanese identity and internal diversity.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 1120 (3) Exploring a Non-Western Culture: Pueblo Indians of the Southwest**
Examines the geography, kinship, politics and religious values of Pueblo Indian peoples of the US Southwest in historical and contemporary context through an anthropological perspective. Specific details of Pueblo Indian languages, cultures, and histories are used to illustrate basic ideas and debates in anthropology including: the concept of culture, the influence of language on thought, the grounding of culture in human biology, religion and reason, the nature of oral traditions, and archaeological interpretation.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ANTH 1121 (3) Indigenous Cultures of the Eastern U.S.: From the Pleistocene to Present Day**
Anthropology, the field of study that explores culture relativistically and holistically, is uniquely positioned to teach us about how social differences shape and have been shaped by political, economic, and cross-cultural relationships within the U.S. We will do so in this class by examining topics through the disciplinary frameworks of Indigenous archaeology, post- colonial anthropology, and decolonization. We will explore the cultures of several Indigenous societies in Eastern North America from their first arrival in the region to today. We will examine past and present societies and their connections through archaeology, ethnohistory, and ethnography. We will also focus on three consistent themes: diversity, colonization, and resilience.
**Additional Information:** Arts Sci Gen Ed: Diversity-U.S. Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 1125 (3) Exploring Cultural Diversity in the U.S.**
Examines the geography, kinship, politics and religious values of various cultures in the United States in historical and contemporary context through an anthropological perspective. Check with department for semester offerings.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ANTH 1140 (3) Exploring a Non-Western Culture: The Maya**
Explores the culture of the Maya of Central America, emphasizing their material adaptations, social organizations, ideals and values, and artistic achievements in the past and the present.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 1141 (3) Indigenous Imperialism on the Andes: The Inca Realm and its People**
Uses archaeological and anthropological approaches to the study of non-Western imperialism examining the origins of inequality and marginalization in Indigenous pre-European empires and their maintenance during European colonialism. We will use the Inca Empire, the largest Indigenous political system of the American continent by 1530 AD. Learning about the Indigenous and Spanish cultural heritage of South America will equip the students to appreciate present-day Latin America societies with an anthropological perspective.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 1143 (3) Civilization, The Early Years: Ancient Mesopotamia in the Second Millennium BC**
Introduces you to the peoples and cultures of ancient Mesopotamia during the second millennium B.C. In conjunction with the political history of shifting dynasties, wars, and power struggles, we will examine a number of issues in various cultural contexts. These include the interplay of texts and archaeological data in reconstructing the past; societal `collapse¿-what it is and what it isn¿t; legitimation of power; Mesopotamian mythology, and the role of women. Previously offered as a special topics course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 1145 (3) Indigenous Imperialism in Pre-Columbian Mexico: The Aztecs**
Explores the culture of the Aztec people of Central Mexico: their subsistence, society, religion, and achievements, as well as the impact of the Aztec empire in Mesoamerica. Also reviews the clash of a non-western society with the western world with the arrival of the Spanish conquistadors.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 1155 (3) Exploring Global Cultural Diversity**
Examines the geography, kinship, politics and religious values of various cultures globally in historical and contemporary context through an anthropological perspective. Check with department for semester offerings.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 1156 (3) Class and Consumption: Global Cultures of Inequality, Anxiety, and Shopping**
Introduces students to the cultural contours of the political and economic conditions that generate social class. Students learn about classical theories of social class that have traditionally focused on labor, production, education or status, and adds consumption to these analyses. By inviting students to think anthropologically about how consumption facilitates and generates class differentiation, the course equips them to recognize and analyze the ways that class is experienced and reproduced.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective

**ANTH 1157 (3) Global Politics of Reproduction**
How do experiences of reproduction differ around the world? What are the ways that cultural, socio-economic, and political conditions shape questions about who can reproduce and how? What constitutes ¿reproduction,¿ anyway? Taking reproduction as a central way to think about how social life is organized over generations, this class explores how reproduction is not only an individual biological but also a social process shaped by cultural values, inequalities, and regulations across multiple spheres of influence.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-Global Perspective

**ANTH 1170 (3) Exploring Culture and Gender through Film**
Explores the concepts of culture and gender from an anthropological perspective, using films and other media, as well as written texts. By analyzing media about other ways of life, students will learn the basic concepts of cultural anthropology and be able to apply them to any society. In addition, students will learn to think critically about documentary and ethnographic media.
**Equivalent - Duplicate Degree Credit Not Granted:** CMDP 2820
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 1180 (3) Maritime People: Fishers and Seafarers**
Explores important milestones in the development of human societies and cultures that live from the sea. Emphasizes the evolution of maritime adaptations associated with fishing and seafaring from more than 10,000 years ago through the present.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 1190 (3) Origins of Ancient Civilizations**
Examines origins of the world's first civilizations in Mesopotamia, Egypt, the Indus Valley, Mesoamerica, and the Andes. Covers archaeology of ancient cities, trade, economy, politics, warfare, religion, and ideology. Seeks insights into general processes of cultural evolution.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 1200 (3) Culture and Power**
Compares contemporary sociopolitical systems across cultures, from non-Western tribal groups to modern states. Introduces students to anthropological approaches for understanding and analyzing political forces, processes, and institutions that affect cultures such as colonialism, warfare, violence,ethnicity, migration, and globalization.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 2010 (3) Introduction to Biological Anthropology 1**
Detailed consideration of human biology, the place of humans in the animal kingdom, primate ecology and fossil evidence for human evolution. Required for ANTH majors.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**ANTH 2020 (3) Human Biological Variation and Adaptation**
Introduction to human biology, variation, and adaptation. Explores humans as a species through an understanding of biological variation and adaptation.
**Recommended:** Prerequisite ANTH 2010.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 2030 (1) Laboratory in Biological Anthropology 1**
Lab in human osteology and musculoskeletal system emphasizing comparative primate morphology, adaptation, and the fossil record documenting the natural history of primates. Meets the MAPS requirement for natural science: lab, when taken with ANTH 2010.
**Recommended:** Corequisite ANTH 2010.
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science Lab or Lab/Lec

**ANTH 2040 (1) Laboratory in Human Biological Variation and Adaptation**
Experiments and hands-on exercises designed to enhance understanding of human genetics, anatomy, and function of the principles and concepts presented in ANTH 2020. One two-hour class per week.
**Recommended:** Corequisite ANTH 2020.
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 2070 (3) Bones, Bodies, and Disease**
Studies the human skeleton and introduces techniques used to evaluate demographic variables. Applies techniques through evaluation of photographic images of an excellently preserved mummified skeletal population from ancient Nubia to reconstruct prehistoric patterns of adaptation and biocultural evolution. Offered through Continuing Education only.
**Recommended:** Prerequisite ANTH 2010.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 2100 (3) Introduction to Cultural Anthropology**
Covers current theories in cultural anthropology and discusses the nature of field work. Explores major schools of thought and ethnographic fieldwork in a range of cultures studied by anthropologists. Required for Anthropology majors.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 2200 (3) The Archaeology of Human History**
Where do we come from? This course provides a brief introduction to the practice of archaeology and then emphasizes the evidence for major events/transitions in human history over the last 2.5 million years. Required for ANTH majors.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 2210 (1) Laboratory Course in Archaeological Methods**
Studies analytical methods in archaeological research including those employed both in the field and in the laboratory. Deals with practical exercises illustrating many of the theoretical principles covered in ANTH 2200.
**Recommended:** Corequisite ANTH 2200.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 2525 (3) Environmental Anthropology**
Examines the impacts of human impacts on the planet from a cross-cultural perspective. This course will explore how different cultures have impacted their environments, and the diverse responses that cultures make to ecosystem changes. Also studies what different human groups have done, and are doing, to mitigate and adapt to ecological degradation, biodiversity loss, and climate change.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 2600 (3) Plagues and the Human Response from Past to Present**
This course uses an anthropological perspective to explore important infectious diseases in human history. We will learn about how human behavior affects the emergence, spread, and control of disease, how human culture, social inequalities, and demography influence the variety of diseases we are exposed to, and how diseases have shaped human biology and culture. We will emphasize the ways in which the study of disease in the past may benefit people today and in the future.

**ANTH 3000 (3) Primate Behavior**
Surveys naturalistic primate behavior. Emphasizes social behavior, behavioral ecology, and evolution as they lead to an understanding of human behavior.
**Requisites:** Requires a prerequisite course of ANTH 2010 or EBIO 1220 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 3009 (3) Modern Issues, Ancient Times**
Considers issues of vital importance to humans, both now and in ancient times. Topics such as food, death, sex, family, literacy, or power are explored to consider how ancient societal norms and attitudes evolved and how they relate to modern culture. Draws on material and literary evidence to develop an understanding of the complexities of ancient life.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 3009
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 3010 (3) The Human Animal**
Identifies genetic, anatomical, physiological, social, and behavioral characteristics humans share with other mammals and primates. Explores how these characteristics are influenced by modern culture.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2010.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 3100 (3) Africa: Peoples and Societies in Change**
Examines culture and politics in Africa through works by anthropologists and historians, as well as novels, films, and journalistic accounts. Special attention is devoted to the ways in which various African cultures have creatively and resiliently responded to the slave trade, European colonialism, and post-colonialism.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 3110 (3) Ethnography of Mexico and Central America**
A broad overview, focusing on Mexico and Guatemala. Major topics include ethnohistory, indigenous and mestizo peoples, and contemporary problems and issues.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 3119 (3) The Archaeology of Death**
Consider Death. It is a universal human phenomenon. Humans across time and space have caused, planned for, reacted to, and carried out death practices in extraordinarily different ways. Mortuary practice provides a fascinating insight into human history and culture in both the modern and ancient world.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 3119
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 3160 (3) Peoples of the South Pacific**
Surveys traditional island cultures and contemporary changes in the Pacific, focusing on how the Pacific Islands were first settled, some of the great anthropologists who studied the islanders, and how current environmental changes, such as global warming, threaten the future existence of the islands.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 3170 (3) America: An Anthropological Perspective**
Historical and contemporary aspects of American life are considered from an anthropological perspective.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 3180 (3) Gender, Culture, and Sexuality**
Focuses on gender, that is, the making of men and women, and how gender is culturally constructed in different societies. Gender describes many areas of behavior, feelings, thoughts, and fantasies that cannot be understood as primarily biologically produced. Sexuality and sexual systems are sometimes viewed as products of particular genderizing practices, but recent theories suggest that sexual systems themselves constitute gender.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 3300 (3) Elements of Religion**
Explores universal components of religion, as inferred from religions of the world, ranging from smaller-scale oral to larger-scale literate traditions.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 3301
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 3505 (3) Our World Heritage: The Archaeology of Cultural and Digital Heritage**
Introduces students to the concept and management process of World Heritage Sites (WHS) and how the discipline of archaeology is involved in this management which involves a diverse range of actors, including local stakeholders and indigenous groups. Students will be given five case studies of prominent World Heritage Sites where these concepts and practices are worked out in detail, and where impacts upon the local communities and indigenous groups are examined.
**Recommended:** junior or senior level.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 3760 (3) Exploring Culture and Media in Southeast Asia**
Introduces students to the ethnographic method and critical media practices through immersion in the cultural politics of Indonesia. Students will learn to conduct ethnographic research and to use media-making as a research method. Students will learn the ethnography of Southeast Asia by focusing on the cultural diversity of Indonesia, with special attention to religious and political issues among marginalized groups.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 3770 (3) Primates of Vietnam: Conservation in a Rapidly Developing Country**
Immersive global seminar that will take place in southern and central Vietnam. We will travel to Ho Chi Minh City to begin an exploration into the conservation of primates in this country. Vietnam is home to 25 primate species and a rapidly growing human population. This course will examine challenges, success, and failures in the conservation of these creatures within the context of development within the historical context of Vietnam.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 4000 (3) Quantitative Methods in Anthropology**
Surveys ways of deriving meaning from anthropological data by numerical means, including but not confined to basic statistical procedures.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5000
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites ANTH 2010 and ANTH 2020.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4020 (3) Explorations in Anthropology**
Special topics in cultural and physical anthropology, as well as archaeology. Check with the department for semester offerings.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5020
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4045 (3) Introduction to Museum Anthropology**
Traces the development of Anthropology and museums in America from late 19th century to present day. Students are encouraged to: explore museum theory and practice; think critically about the history of relations among Native Americans, Anthropology, and museums; consider the legacy of collecting and challenges of representing others; and, examine the interplay of Anthropology, material culture, and colonialism.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5045 and MUSM 5045
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4050 (3) Anthropology of Jews and Judaism**
Explores topics in Jewish anthropology. Uses the lens of anthropological inquiry to explore, discover and analyze different concepts within Jewish culture. Topics explored will include customs, religious practices, languages, ethnic and regional subdivisions, occupations, social composition, and folklore. Explores fundamental questions about the definition of Jewish identity, practices and communities.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4050
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ANTH 4060 (3) Nutrition and Anthropology**
Overview of the evolution of human diet and ecological and cultural factors shaping modern diets. Introduces fundamentals of nutrition and analysis of nutritional status. Analyzes ecological, social, and cultural factors leading to hunger and undernutrition, as well as biological and behavioral consequences of undernutrition.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5060
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites ANTH 2010 and ANTH 2020 or EBIO 1210 and EBIO 1220 or EBIO 1030 and EBIO 1040.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 4070 (3) Methods in Biological Anthropology**
Provides laboratory-based research experience in selected areas of biological anthropology. Research designs, methods and applications will be used to develop research skills. Students will read original research papers and carry out a research project of their own design. Area of emphasis within biological anthropology will depend on instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5070
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisites ANTH 2010 and ANTH 2020 and ANTH 2030 and ANTH 2040 and ANTH 4000 and students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 4080 (3) Anthropological Genetics**
Considers data and theory of human genetics. Emphasizes analytical techniques relating to a genetic analysis of individual, family, and populations.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5080
**Requisites:** Requires prerequisite courses of ANTH 2010 and 2020 or EBIO 1210 and 1220 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4110 (3) Human Evolutionary Biology**
Detailed consideration of the fossil evidence for human evolution. Covers the discovery of important fossils and interpretations; descriptive information about the fossils; and data and theory from Pleistocene studies relating to ecology, ecological and behavioral data on modern apes and molecular studies that have bearing on the study of human evolution.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5110
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 4120 (3) Advanced Biological Anthropology**
Selected topics in physical anthropology emphasizing faculty specialties. Topics may include population genetics and its application to understanding modern human diversity, human population biology, and primate ecology and evolution. Check with department for semester offerings.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5120
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2010 or ANTH 2020 or EBIO 1210 or EBIO 1220.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 4125 (3) Evolution and the Human Life Cycle: A Primate Life History Perspective**
Surveys primate biology, behavior and ecology using a life history approach. Using a comparative approach, explores life history as mammals, as primates and as humans by focusing on evolutionary decisions that occur during different life stages.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5125
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 4129 (3) Aegean Art and Archaeology**
Detailed study of the cultures of prehistoric Greece, the Cycladic Islands and Crete, their art and archaeology and their history within the broader context of the eastern Mediterranean, from earliest human settlement to the collapse of the Bronze Age at about 1100 B.C.E. Emphasis is on palace states.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5129 and ARTH 4129 and CLAS 4129 and CLAS 5129
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ANTH 4130 (3) Advanced Osteology**
Detailed study of the human skeleton with special attention to health and demographic conditions in prehistoric cultures and the evaluation of physical characteristics and genetic relationships of prehistoric populations.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5130
**Recommended:** Prerequisites ANTH 2010 and ANTH 2020 and ANTH 4000 and students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 4135 (3) Skeletons in the Closet: Curation and Care of Human Remains**
This project-based course will examine how human skeletal collections are curated universities, including here at CU Boulder. We will also explore politics and practices of care surrounding human remains, both historically and as new generations inherit responsibility for these collections. We will discuss the roles of marginalization, racism, colonialism, and structural violence in the formation of many of these collections, and possible futures of repatriation, descendant community involvement, respectful use, and purposeful care. Recommended restrictions: Jr/Sr standing.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5135
**Recommended:** Prerequisites ANTH 4130/5130 Advanced Osteology.
**Grading Basis:** Letter Grade

**ANTH 4160 (3) Early Hominin Paleoecology**
Explores current thinking about the diets, environments and lives of early human ancestors and their close kin. Strong emphasis on the methods used to construct such knowledge.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5160
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 4170 (3) Primate Evolutionary Biology**
Focuses on the fossil record of primates excluding the Hominini). Special emphasis is placed on delineating the origins of the order Primates, the origins of the primate suborders Strepsirhini and Haplorhini and the adaptations of extinct primates in light of our understanding of the modern primate adaptive radiations.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5170
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2010 or EBIO 1210.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 4180 (3) Anthropological Perspectives: Contemporary Issues**
Students read, discuss, and write critical evaluations of contemporary publications in anthropology. Identifies basic themes that inform major anthropological perspectives. Students then bring these perspectives to bear on issues currently facing the human species.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4210 (3) Southwestern Archaeology**
Explores the prehistory of the American Southwest from the earliest entry of humans into the area to the Spanish entrada. Focuses on important themes in cultural development: the adoption of agricultural strategies, sedentism, population aggregation, population movement, and social complexity.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5210
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2200.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4220 (3) From Olmec to Aztec: The Archaeology of Mexico**
Examines the archaeology of Mexico from the initial peopling of the Americas to the Spanish conquest of the Aztec empire. Studies origins of complex societies; ancient Mexican cities, states and empires; religion and politics; trade and interaction; ecology and economy; and social organization.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5220
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2200.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4224 (3) Archaeology of the Maya and Their Neighbors**
Begins with the environment and describes the earliest inhabitants and the Olmec civilization, then shifts to the earliest Maya and the emergence and collapse of classic Maya civilization. Compares and contrasts the societies of lower Central America.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5224
**Recommended:** Prerequisite ANTH 2200.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4235 (3) Landscape Archaeology**
Explores how humans and the environment have influenced each other throughout history. Considers what landscapes are, how archaeologists study them, and why such study is important. Examines the most prominent theoretical and methodological approaches to the study of landscapes and explores a series of different types of landscapes, including sacred landscapes, political landscapes, and landscapes of movement. Previously offered as a special topics course.
**Recommended:** Prerequisite ANTH 2200.

**ANTH 4240 (3) Geoarchaeology**
Applies geological principles and instruments to help solve archaeological problems. Focuses on site formation processes, soils, stratigraphy, environments, dating, remote sensing and geophysical exploration. Environmental and ethical considerations are included.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5240
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2200.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 4245 (3) Ceramics in Archaeology**
Examines how archaeologists use ceramics to reconstruct the past. Topics include: the relationship between form and function; typology and classification; chronology and seriation; compositional analysis; production and exchange; social, cognitive and ideological aspects of style; and ethnoarchaeological studies of pottery use in contemporary societies. Includes two hours of lecture and two-hours of hands-on laboratory practicum per week.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5245
**Requisites:** Requires prerequisite of ANTH 2200 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4270 (3) Plains Archaeology**
Archaeological evidence for Native American ways of life on the North American Great Plains from the initial peopling of the region into the 19th century.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5270
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2200.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4300 (3) From Cloud People to the Land of the Sky: The Archaeology of Oaxaca**
Examines the prehispanic and colonial history of the Zapotec, Mixtec, and Chatino peoples of Oaxaca, Mexico. Explores their diverse histories and cultures from Ice Age arrival to the Spanish Conquest in the 1520s. A major feature will be trips to archaeological sites, museums, and Indigenous markets as well as colonial-period churches and Mixtec palaces. Students will need passports.
**Recommended:** Prerequisite ANTH 2200: The Archaeology of Human History.

**ANTH 4320 (3) Tourism, Development, and Belonging in Costa Rica**
This course introduces students to ethnographic methods through immersion and study in Costa Rica. We will apply cultural anthropology research methods to the overlapping fields of tourism and development with a focus on what it means to belong. Topics will include: the "culture" concept, particularly in relation to Costa Rican national identity and belonging; tourism as a field of study; development politics and practices; and ethnographic methods, ethics, and techniques of anthropological research and fieldwork.
**Requisites:** Restricted to students with 27-180 credits (Sophomore, Junior or Senior) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Arts Sci Gen Ed: Diversity-Global Perspective

**ANTH 4330 (3) Human Ecology: Archaeological Aspects**
Surveys archaeological approaches to ecology, economy and landscape: glaciation, geomorphology and other physical processes creating and affecting sites and regions; environmental reconstruction; theories of human-environment interaction; landscape formation by forager, agricultural and complex societies; and ideologically structured landscapes.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5330
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2200.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4340 (3) Archaeological Method and Theory**
Surveys archaeological theories and methods within the context of the history of archaeology. Includes archaeological approaches to data recovery, analysis, and interpretation as well as an overview of cultural resources management and ethical issues in contemporary archaeology.
**Recommended:** Prerequisites ANTH 2200 and students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4350 (2-6) Archaeological Field and Laboratory Research**
Students participate in archaeological field research or conduct laboratory analysis of archaeological materials and data. Students work with faculty on archaeological research projects with a field or lab focus, depending on the project undertaken.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5350
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisites ANTH 2200 and students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4380 (3) Lithic Analysis and Replication**
Uses diversity of approaches to the analysis of ancient stone tools, including fracture mechanics, lithic technology, materials, heat treatment and functional analysis. Percussion and pressure-flaking experiments are performed.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5380
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2200.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4390 (3) Research Methods in Archaeology I**
Method and theory of archaeology, emphasizing the interpretation of materials and data and the relationship of archaeology to other disciplines. Instructor consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5390
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2200.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4465 (3) The Archaeology of Inequality**
Examines the theoretical and archaeological literature to understand how inequality develops, how it is maintained over time, and how it is negated. Presents an understanding of, and critically evaluates, the most prominent paradigms for understanding socially unequal relationships, and considers the vital role archaeology plays in understanding inequality.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4470 (3) Collections Research Practicum in Cultural Anthropology**
Designed as a practicum, introduces students to research and practice in museum anthropology, utilizing the extensive anthropology collections at CU-Boulder Museum. Students will gain skills in primary and secondary research, collections and object research and narrative story development for the exhibition of anthropological material culture.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5470 and MUSM 4912 and MUSM 5912
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4500 (3) Cross-Cultural Aspects of Socioeconomic Development**
Examines goals of international agencies that support development in underdeveloped countries. Anthropological perspective is provided for such issues as urban planning, health care and delivery, population control, rural development and land reform.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5500
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4505 (3) Globalization and Transnational Culture**
Covers the historical foundations for contemporary global change, addressing colonialism, global outsourcing, and cultural imperialism, with a particular emphasis on gender, class, and consumerism.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Asia Content

**ANTH 4525 (3) Global Islams**
Examines the historical formation of Islam in Indonesia and Southeast Asia so as to situate contemporary Islamic practices in a global context.
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4530 (3) Theoretical Foundations of Sociocultural Anthropology**
Critically examines the pivotal schools of 20th century social theory that have shaped modern sociocultural anthropology, including the ideas of cultural evolutionism, Marxism, Durkheim, Weber, Freud, structuralism, postmodernism and contemporary anthropological approaches. Includes primary readings and seminar-style discussion.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5530
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4570 (3) Anthropology of Fishing**
Examines fishing methods, peoples, societies and cultures, emphasizing anthropology's role in shaping fisheries management and development policy.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5570
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4580 (3) The Holocaust: An Anthropological Perspective**
Focuses on the Holocaust during the Third Reich, which involved the murder of millions of people, including six million Jews. Reviews the Holocaust's history, dynamics and consequences as well as other genocides of the 20th century, using an anthropological approach.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4580
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ANTH 4605 (3) Anthropology of Neuroscience**
Examines the connections between the production and social uptake of neuroscientific knowledge, and explores how transformations in neuroscience shape understandings of human nature. Focusing on anthropological, philosophical, and popular literature, this course addresses the following themes through a cultural and anthropological lens: subjectivity and neuroimaging, "disability" and "neurodiversity," child development, gender, "risk" and neoliberal governance, and the production of scientific expertise.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5605
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4610 (3) Medical Anthropology**
Examines health, illness, disease and treatment across a diversity of cases, all of which involve political economic inequalities, individual and collective experiences of medical systems and the historical and contemporary treatment of distinct populations. A demanding upper-level cultural anthropology course in the field of Medical Anthropology, a subfield of cultural anthropology, designed for advanced undergraduate students and early graduate students with an emphasis on the intersections of science, medicine and populations.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5610
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4615 (3) Kinship: Being and Belonging**
Explores interpersonal relationships as foundational objects of analysis. This course takes a comparative approach to examine both large-scale social movements and intimate practices, examining how the ideologies and practices of relatedness intersect with and are shaped by gender and sexuality, national identity and state building, race and ethnicity, embodiment, ways of understanding signs in the world (semiotics), the law, and economic relationships. Previously offered as a special topics course.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite ANTH 2100.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4620 (3) Nationalism and Cultural Citizenship**
Explores the nature of ethnic conflict, nationalism, and cultural citizenship in different contexts, including the United States. Is the nation-state dead? What effect do extranational and transnational organizations/institutions (e.g., European Union) have on the development of nationalism? Through the exploration of contemporary theory and case studies, this class will address these important contemporary concerns.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4630 (3) Nomadic Peoples of East Africa**
Examines the issues of current concern in the study of East African pastoral peoples. First half of the course is devoted to historical perspectives and the second half explores the transition from subsistence to market oriented economies.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5630
**Recommended:** Prerequisite students with 57-180 credits (Junior or Senior) Anthropology (ANTH) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4690 (3-6) Anthropology of Tibet**
Explores the culture of Tibet in both historical and thematic manners, considering the long-term development of Tibetan cultural practices and institutions as well as many of the abrupt changes introduced to Tibet in the 20th century. Topics covered include region, politics, gender, warfare, poetry and literature, and life under Chinese rule and as refugees around the world.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Anthropology (ANTH) majors only.
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**ANTH 4700 (3) Practicing Anthropology**
Learn ethnographic methods in the classroom and implement these skills in placements with community organizations, where students pursue an applied research project. This course teaches students how to use anthropological theory and methods to investigate social problems, and to consider how ethnographic research techniques can be applied to positively impact society.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5700
**Requisites:** Requires prerequisite course of ANTH 2100 (minimum grade B). Restricted to students with 87-180 credits (Junior or Senior) Anthropology (ANTH) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4710 (3) Departmental Honors in Anthropology 1**
Course work built around theme of research design as a means of integrating previous training in the field of anthropology as well as providing an opportunity to perform creative scientific investigations. Prepares students to write an honors thesis in ANTH 4720. Required of students doing Anthropology departmental honors.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sciences Honors Course

**ANTH 4720 (3) Departmental Honors in Anthropology 2**
Continuation of ANTH 4710.
**Recommended:** Prerequisite ANTH 4710.
**Additional Information:** Arts Sciences Honors Course

**ANTH 4730 (3) Latin American Politics and Culture through Film and Text**
Introduces students to the political cultures and societies of Latin America. Through historical and ethnographic text and documentary and non-documentary cinema, this course will explore class relations, ideology and resistance from the conquest to the present.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5730
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4735 (3) Contemporary Cuban Culture: Race, Gender and Power**
Ground students' understanding of contemporary Cuba within the global context. How do those outside the island imagine Cuba and why? What are the realities? In a world of U.S. dominated globalization, only recently have we relaxed a forceful economical blockade on the island: what does the U.S. mean in the Cuban imaginary, both in the past and present? To attend to global processes as they affect local (Cuban) experience, texts from anthropology, history, policy, literature, film and music will be drawn upon. Students will learn how long-standing patterns regarding race, color, class and gender relations have evolved into the socialist and now the "post-socialist" context.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5735
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4740 (3) Peoples and Cultures of Brazil**
Thematically surveys theoretical and ethnographic issues that have been important in understanding Brazil. Read and write critically about textual and visual representations of Brazil presented in the course.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites ANTH 2100 and three or more cultural anthropology courses.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4745 (3) Science, Technology and Society**
Explores the cultural work of science and technology in contemporary societies. The course will focus on anthropological studies of technoscientific works ranging from high-energy particle physics and marine biology to hackathons and space exploration. Discussion topics include the relationship between science, technology and political power; scientific controversies; paradigm shifts and scientific revolutions; and ideas of objectivity, representation and abstraction.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5745
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4750 (3) Culture and Society in South Asia**
Intensive analysis of major issues in anthropological research on South Asia (India, Pakistan, Bangladesh, Nepal and Sri Lanka), including kinship, gender, marriage, caste system, religion and ritual, ethnic conflict and social change.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5750
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Asia Content

**ANTH 4755 (3) Cultures of Expertise: Science, Power and Knowledge**
Examines the expertise as a cultural category. Students will consider the historical and cultural contexts of various forms of expertise and the social roles of experts from car mechanics to civil engineers, doctors and scientists. Students will be given opportunities to reflect analytically on their own experiences with increasingly specialized education as they develop "professional vision" in their chosen fields.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5755
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4760 (3) Ethnography of Southeast Asia and Indonesia**
Introduces the historical, political, and cultural dimensions of Southeast Asia, focusing primarily on Malaysia, the Philippines, Singapore and Indonesia, with some coverage of mainland Southeast Asia.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5760
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Asia Content

**ANTH 4770 (3) Anthropology of Tourism**
Introduces students to anthropological theories on tourism and considers those theories in the contexts of the varied sites and forms of tourism practiced around the world today. We will ask: why do people tour? Where do they go? And most centrally: how do the hosts to tourism feel about these outside visitors? Having been exposed to questions of globalization, development, belonging, race, gender, and desire, students will then be asked to reflect upon and theorize their own touristic experiences.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4800 (3) Language and Culture**
Principles of language structure and how language and culture interrelate, how language and language use are affected by culture and how culture may be affected by use of, or contact with, particular languages.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4800
**Recommended:** Prerequisites ANTH 2100 or LING 1000 or LING 2400 and students with 57-180 credits (Junior or Senior) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4840 (1-8) Independent Study**
For upper-division undergraduate students.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**ANTH 4910 (1-3) Teaching Anthropology**
Practicum by special arrangement only. Students learn to teach anthropology by serving as recitation leaders or tutors in introductory courses or as small group leaders in advanced courses.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**ANTH 4919 (3) Collections Research Practicum: Archaeology**
Focuses on Museum collections management from archaeological sites mainly in the American Southwest and Mongolia. The course involves readings, discussion, and collections analysis and archival documentation. Extra time outside of class is required for the practicum aspect of this course. Each student will need to schedule with the professor an additional 3 hours each week when they will focus on an aspect of their project, to be discussed below under grading criteria.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 5919 and ANTH 5919
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**ANTH 4930 (1-6) Anthropology Internship**
Provides academically supervised opportunities for junior and senior anthropology majors to work in public and private sectors on projects related to students' career goals. Relates classroom theory to practice. Requires at least 48 hours on the job per credit hour and evidence (paper, employer evaluation, work journal) of significant learning.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5930
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Recommended:** Prerequisites ANTH 2010 and ANTH 2100 and ANTH 2200 and students with 57-180 credits (Junior or Senior) Anthropology majors, with a minimum 3.25 GPA.

# Anthropology - Bachelor of Arts (BA)

Anthropology is the study of humans and our biological relatives across time and space. The field involves a global look at human cultures from prehistoric times to the present, integrating findings from the social sciences, natural sciences and humanities. Students of anthropology learn to appreciate biological, social and cultural diversity throughout human history and to understand the meaning of human biological and cultural development.

The undergraduate degree in anthropology emphasizes knowledge and awareness of:

- Basic methods, concepts, alternative theories and approaches and modes of explanation appropriate to each of the three main subfields of the discipline (archaeology, biological anthropology and cultural anthropology).
- Basic archaeological techniques, including stratigraphy, dating and inference of human behavior from archaeological data, as well as human history from its beginning through the emergence of complex societies.
- Variation, patterning and creativity in human communities and symbolic systems, including ecological, social structural and cultural factors exemplified in a diverse array of the world's societies, including those undergoing change as a result of globalization and the impact of contemporary social and political movements.

- Theories of primate and human evolution and the basic data of the hominid fossil record, as well as biological variation in contemporary human populations.

In addition, students completing the degree in anthropology are expected to acquire the ability and skills to:

- Identify trends or patterns in anthropological data from different cultures or periods, identify an appropriate context of explanation or interpretation and formulate a testable explanation or reasonable interpretation, including the ability to identify data that constitute credible evidence for an explanation or interpretation.
- Identify and define a significant problem or topic in anthropology and analyze and interpret data in a systematic manner.

# Requirements

## Program Requirements

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. A minimum of 30 credit hours in anthropology is required for the degree, 18 of which must be upper-division.

All required major courses must be passed with a C- or better and cannot be taken pass/fail. Students must have a grade point average of at least 2.000 in the major in order to graduate, and no more than 45 credits in ANTH may be applied to overall graduation requirements.

Through the required coursework for the major, students will complete all 12 credits in the Social Sciences area and a minimum of 6 credits in the Natural Sciences area of the Gen Ed Distribution Requirement, and the Global Perspective component of the Gen Ed Diversity Requirement. Depending on elective courses selected within the major, students can complete the rest of the Natural Sciences area in the Gen Ed Distribution Requirement and the US Perspective component of the Gen Ed Diversity Requirement.

Additional notes for the ANTH major:

- Archaeology and Cultural Anthropology classes are within the Gen Ed Social Sciences division.
- Biological Anthropology classes are within the Gen Ed Natural Sciences division.

### Required Courses and Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ANTH 2010 | Introduction to Biological Anthropology 1 | 3 |
| ANTH 2100 | Introduction to Cultural Anthropology | 3 |
| ANTH 2200 | The Archaeology of Human History | 3 |
| One upper-division course in cultural anthropology | | 3 |
| One upper-division course in archaeology | | 3 |
| One upper-division course in biological anthropology | | 3 |
| **Electives in Anthropology** | | |
| Lower or Upper-division ANTH Elective | | 3 |
| Upper-division ANTH Electives (students planning to pursue graduate work in anthropology are advised to take ANTH 4000 and ANTH 4530) | | 9 |
| **Total Credit Hours** | | **30** |

In addition, students planning to pursue writing a senior honor's thesis or graduate work in anthropology are advised to take ANTH 4000 and an upper-division anthropology theory course.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for more information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in anthropology, students should meet the following requirement:

- By the beginning of the second semester, declare the anthropology major.

# Recommended Four-Year Plan of Study

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| ANTH 2010 | Introduction to Biological Anthropology 1 (counts towards Gen Ed Natural Science) | 3 |
| ANTH 2030 | Laboratory in Biological Anthropology 1 (not required of the major, but fulfills Gen Ed Natural Science Lab Requirement) | 1 |
| ANTH 2100 | Introduction to Cultural Anthropology (counts toward Gen Ed Social Sciences & fulfills Gen Ed Diversity: Global Perspective) | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/Diversity: US Perspective) | | 3 |
| Elective/MAPS (if needed) | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| ANTH 2020 | Human Biological Variation and Adaptation (counts toward Gen Ed Natural Science - recommended not required) | 3 |
| ANTH 2200 | The Archaeology of Human History (counts toward Gen Ed Social Sciences - May be taken sophomore year) | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Gen. Ed. Natural Science | | 3 |
| Elective/MAPS (if needed) | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ANTH upper-division elective (57 credits completed or in-progress required) | | 3 |

| | |
|---|---|
| Free elective | 3 |
| Free elective | 3 |
| Free elective | 3 |
| Free elective | 3 |
| **Credit Hours** | **15** |
| **Year Three** | |
| **Fall Semester** | |
| ANTH upper-division course (Cultural area - counts toward Gen Ed Social Sciences)) | 3 |
| ANTH upper-division course (Biological area - counts toward Gen Ed Natural Sciences) | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | 3 |
| Upper-division elective | 3 |
| Upper-division elective | 3 |
| **Credit Hours** | **15** |
| **Spring Semester** | |
| ANTH upper-division course (Archaeology area - counts toward Gen Ed Social Sciences) | 3 |
| ANTH upper-division elective | 3 |
| Upper-division Arts & Humanities | 3 |
| Upper-division elective | 3 |
| Elective | 3 |
| **Credit Hours** | **15** |
| **Year Four** | |
| **Fall Semester** | |
| ANTH upper-division elective | 3 |
| Upper-division elective | 3 |
| Upper-division elective | 3 |
| Free elective | 3 |
| Free elective | 3 |
| **Credit Hours** | **15** |
| **Spring Semester** | |
| Upper-division elective | 3 |
| Upper-division elective | 3 |
| Free elective | 3 |
| Free elective | 3 |
| Free elective | 3 |
| **Credit Hours** | **15** |
| **Total Credit Hours** | **121** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Understand the concepts of cultural relativism and ethnocentrism by studying other cultures.
- Understand the range of human diversity, both biological and cultural, across space and throughout time, by examining human evolution, early complex polities, and contemporary groups.
- Analyze the ways the environment influenced/influences humans and the ways humans influenced/influences the environment, by studying the long- and short-term trajectory of human development.
- Apply anthropological knowledge to pressing social issues by debating current events.

# Anthropology - Minor

Anthropology is the study of humans and our biological relatives across time and space. Anthropology is the only field to address all aspects of the human experience—cultural, biological, historical—so the discipline necessarily incorporates a wide range of theoretical and methodological traditions, drawing on and contributing to approaches in the humanities, social sciences and natural sciences. It is the breadth of our vision of what it means to be human, as well as the breadth of our theoretical and methodological approaches, that constitutes our unique mission and role within the university. Thus, a minor in anthropology would provide a rich intellectual complement to a wide range of majors within the College of Arts and Sciences.

# Requirements

A minimum of 18 credit hours of anthropology courses, including a minimum of 9 upper-division credit hours, are required for the minor. All coursework applied to the minor must be completed with a grade of C- or better; no pass/fail work may be applied. The grade point average for all anthropology coursework must equal 2.00 (C) or higher.

Students will be allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work towards a minor in anthropology.

Coursework applied towards a minor in anthropology may also be applied towards Gen. Ed. requirements.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ANTH 2010 | Introduction to Biological Anthropology 1 | 3 |
| ANTH 2100 | Introduction to Cultural Anthropology | 3 |
| ANTH 2200 | The Archaeology of Human History | 3 |
| **Electives** | | |
| Nine hours of upper-division electives in anthropology | | 9 |
| **Total Credit Hours** | | **18** |

The three introductory courses will provide all minors with an appreciation of the range of scholarship encompassed by contemporary anthropology.

Students are recommended to select upper-division coursework to best complete their majors. For example, the following subjects work well with the majors listed:

- **Cultural anthropology**: Asian studies, communications, economics, ethnic studies, film studies, history, international affairs, Jewish studies, linguistics, media studies, political science, religious studies, sociology or women and gender studies majors.
- **Archaeology**: Art history, classics or environmental design majors.
- **Biological anthropology**: Ecology and evolutionary biology, integrated physiology or molecular, cellular and developmental biology majors.
- **Archaeology or biological anthropology**: History or humanities majors.

- **Any of the anthropology sub-disciplines**: Environmental studies or geography majors.

# Applied Mathematics

The Department of Applied Mathematics in the College of Arts and Sciences offers courses that focus on providing students with the mathematical tools and problem-solving strategies that are useful in science and engineering. The department offers a range of courses and research opportunities in many areas, including computational mathematics, mathematical biology, nonlinear phenomena, physical applied mathematics and probability and statistics. Each of these areas is described below.

The undergraduate Bachelor of Science degree (p. 846) in Applied Mathematics is offered through the College of Engineering and Applied Science. The undergraduate Bachelor of Science and Bachelor of Arts degrees in Statistics and Data Science are offered through the College of Arts and Sciences.

**Course codes for this program include APPM and STAT.**

## Computational Mathematics

Computational mathematics encompasses the techniques that allow practitioners to approximate quantities via a computer. These techniques are used to do a wide range of things including simulations of physical phenomena, reducing the cost of product design and providing the basis of machine learning. Some applications include weather forecasting, optimal design of materials and simulating flight paths of rockets. This field continues to grow as computational resources and needs of users change. The fast developments in this area have allowed mathematicians to answer questions and develop insights not possible only 20-30 years ago. Modern computational methods require an in-depth knowledge of a variety of mathematical subjects which include linear algebra, analysis, ordinary and partial differential equations, asymptotic analysis, elements of harmonic analysis and nonlinear equations.

Since computers are invaluable tools for an applied mathematician, students are expected to attain a highly professional level of computer literacy, to program in a language such as Python, know how to maintain a Git repository and understand the basics of parallel computing.

Computational mathematics courses include the study of numerical linear algebra, numerical integration, approximation of functions, optimization, numerical solution of ordinary and partial differential equations, and solution of nonlinear equations. There are two advanced seminars related to this topic: computational mathematics and optimization.

## Mathematical Biosciences

Recent advances in our ability to quantitatively study biological phenomena have provided a tremendous number of exciting opportunities for applied mathematicians. The careful modeling, analysis and simulation of these systems using the standard tools of applied mathematics has led to novel and non-intuitive insights into biology.

Furthermore, deeper understanding of the inherently complex and multiscale nature of biological systems, in many cases, requires the development of new mathematical tools, techniques and methodologies (a challenge to which applied mathematics is particularly well suited). Research areas in APPM encompass cell migration, ecology, infectious diseases, neuroscience, population genetics and social systems as well as data-driven methods in biology. For more information, see the Mathematical Biology Group (http://mathbio.colorado.edu/) webpage.

## Mathematical Geosciences

Mathematical geosciences encompass quantitative modeling, analysis and simulation of all aspects of the Earth system. Our faculty's research intersects a broad range of geosciences: from the geodynamo to ocean circulation, from computational methods for seismic imaging to the impacts of weather on epidemiology, from tsunamis to stochastic weather generators. The complex and multiscale nature of geophysical systems, in many cases, requires the development of new mathematical models and simulation strategies, a challenge to which applied mathematics is particularly well suited.

Appropriate coursework includes analysis and computation, probability and statistics, as well as background courses in one of the sciences or engineering fields in which one intends to do research.

## Nonlinear Waves and Dynamical Systems

In recent years there has been an explosion of interest in the study of nonlinear waves and dynamical systems with analytical results often motivated by the use of computers. The faculty in the department is actively and intensively involved in this growing field; research areas include integrable and near-integrable systems, conservative and dissipative chaos, as well as numerical computation.

Topics of interest include solitons, dispersive shock waves, integrable systems, cellular automata, pattern formation, qualitative structure and bifurcation theory, onset of chaos and turbulence, analytic dynamics and transport phenomena. Program courses in this field include dynamical systems, nonlinear wave motion and many advanced seminars.

Suitable background courses are: analysis, computation, partial differential equations and methods in applied mathematics. Valuable supplemental courses include mechanics and fluid dynamics.

## Physical Applied Mathematics

Physical applied mathematics is a term which generally refers to the study of mathematical problems with direct physical application. This area of research is intrinsically interdisciplinary. In addition to mathematical analysis, it requires a deep understanding of the underlying applications area, and usually requires knowledge and experience in numerical computation.

The department's affiliated faculty have a wide variety of expertise in various areas of application, e.g. atmospheric and fluid dynamics, theoretical physics, plasma physics, genetic structure, etc. The course requirements of the program are designed to provide students with a foundation for their study (analysis and computation).

The department also requires supplemental courses in one of the science or engineering fields which are needed to begin doing thesis research in physical applied mathematics.

See the Dispersive Hydrodynamics Lab (https://www.colorado.edu/amath/dispersive-hydrodynamics-lab/) page, APPM's own fluid dynamics laboratory.

# Statistics, Data Science and Applied Probability

Almost all natural phenomena in the technological, biological, physical and social sciences have random components. Applied probability is the application of probabilistic methods to understand the random elements in real-life problems. Statistics and data science is the science of using data, which typically arises from the randomness inherent in nature, to gain new knowledge.

Research areas of the applied math and affiliated faculty exhibit this interplay between mathematics and real-life problems. Areas of current interest include optimization of stochastic networks; the study of stochastic processes and stochastic differential equations in hydrology, finance and telecommunications; probabilistic models and statistical tests based on these models, in genetics and RNA sequencing; extreme value theory in estimation of maximal wind speeds; applied deep learning; and the theory of machine learning.

Appropriate coursework includes analysis, probability and statistics, as well as background courses in one of the sciences or engineering fields in which one intends to do research.

For details on the range of courses and research opportunities available, visit the Department of Applied Mathematics (https://www.colorado.edu/amath/) website.

## Bachelor's Degree

- Statistics and Data Science - Bachelor of Arts (BA) (p. 113)

## Minors

- Applied Mathematics - Minor (p. 116)
- Statistics - Minor (p. 118)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ablowitz, Mark J. (https://experts.colorado.edu/display/fisid_100691/)
Distinguished Professor; PhD, Massachusetts Institute of Technology

Appelö, Daniel E. (https://experts.colorado.edu/display/fisid_159438/)
Assistant Professor Adjunct; PhD, KTH Royal Institute of Technology (Sweden)

Becker, Stephen R. (https://experts.colorado.edu/display/fisid_154263/)
Associate Professor; PhD, California Institute of Technology

Benim, W. Robert (https://experts.colorado.edu/display/fisid_167716/)
Assistant Teaching Professor

Beylkin, Gregory (https://experts.colorado.edu/display/fisid_100437/)
Professor; PhD, New York University

Bhat, Yermal Sujeet (https://experts.colorado.edu/display/fisid_146506/)
Associate Teaching Professor; PhD, University of Florida

Bortz, David Matthew (https://experts.colorado.edu/display/fisid_143348/)
Professor; PhD, North Carolina State University

Chang, Silva (https://experts.colorado.edu/display/fisid_145582/)
Teaching Professor; MS, Yale University

Chi, Jocelyn T.
Assistant Professor; PhD, North Carolina State University

Corcoran, Jem (https://experts.colorado.edu/display/fisid_118142/)
Associate Professor Emeritus; PhD, Colorado State University

Cox, Rachel (https://experts.colorado.edu/display/fisid_158450/)
Assistant Teaching Professor; MS, University of Colorado Boulder

Curry, James H. (https://experts.colorado.edu/display/fisid_105730/)
Professor; PhD, University of California, Berkeley

Dougherty, Anne Margaret (https://experts.colorado.edu/display/fisid_101349/)
Associate Chair, Teaching Professor; PhD, University of Wisconsin–Madison

Dukic, Vanja (https://experts.colorado.edu/display/fisid_148718/)
Professor; PhD, Brown University

Fornberg, Bengt (https://experts.colorado.edu/display/fisid_108048/)
Professor Emeritus; PhD, University of Uppsala (Sweden)

Gillman, Adrianna (https://experts.colorado.edu/display/fisid_165224/)
Associate Professor; PhD, University of Colorado Boulder

Grooms, Ian G. (https://experts.colorado.edu/display/fisid_155588/)
Associate Professor; PhD, University of Colorado Boulder

Hoefer, Mark (https://experts.colorado.edu/display/fisid_154264/)
Professor; PhD, University of Colorado Boulder

Huang, Yu-Jui (https://experts.colorado.edu/display/fisid_157746/)
Assistant Professor; PhD, University of Michigan Ann Arbor

Kilpatrick, Zachary Peter (https://experts.colorado.edu/display/fisid_155782/)
Associate Professor; PhD, University of Utah

Kish, Jonathan (https://experts.colorado.edu/individual/fisid_153629/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Kleiber, William Paul (https://experts.colorado.edu/display/fisid_151943/)
Associate Professor; PhD, University of Washington

Law, Judith (https://experts.colorado.edu/individual/fisid_167501/)
Assistant Teaching Professor; PhD, The University of Maryland, College Park

Li, Congming
Professor Emeritus

Lindsey, Daniel Seneca (https://experts.colorado.edu/display/fisid_156477/)
Assistant Teaching Professor

Lladser, Manuel E. (https://experts.colorado.edu/display/fisid_134170/)
Associate Professor; PhD, The Ohio State University

Manteuffel, Thomas A.
Professor Emeritus

Martinsson, Per-Gunnar
Visiting Professor

McCormick, Steven
Professor Emeritus

Mcnamara, Rich (https://experts.colorado.edu/display/fisid_167770/)
Lecturer

Meiss, James D. (https://experts.colorado.edu/display/fisid_103702/)
Professor; PhD, University of California, Berkeley

Meyer, Francois Georges (https://experts.colorado.edu/individual/fisid_115559/)
Professor; PhD, INRIA (France)

Mitchell, Colin
Lecturer

Nixon, Sean (https://experts.colorado.edu/display/fisid_167600/)
Instructor

Norris, Jan Adam (https://experts.colorado.edu/display/fisid_101412/)
Teaching Professor; PhD, University of Colorado Boulder

Pruitt, Kris
Associate Teaching Professor

Reichenbach, Matt
Assistant Teaching Professor; PhD, University of Nebraska Lincoln

Restrepo, Juan G. (https://experts.colorado.edu/display/fisid_145811/)
Associate Professor; PhD, University of Maryland, College Park

Rodriguez, Nancy (https://experts.colorado.edu/display/fisid_164028/)
Assistant Professor; PhD, University of California-Los Angeles

Segur, Harvey (https://experts.colorado.edu/display/fisid_102287/)
Professor Emeritus; PhD, University of California, Berkeley

Thaler, Eric R. (https://experts.colorado.edu/display/fisid_155505/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Vance, Eric (https://experts.colorado.edu/display/fisid_158342/)
Associate Professor; PhD, Duke University

Zaharatos, Brian R. (https://experts.colorado.edu/display/fisid_156225/)
Teaching Professor, Faculty Director; PhD, Colorado School of Mines

# Courses

**APPM 1235 (4) Pre-Calculus for Engineers**
Prepares students for the challenging content and pace of the calculus sequence required for all engineering majors. Covers algebra, trigonometry and selected topics in analytical geometry. Prepares students for the calculus courses offered for engineering students. Requires students to engage in rigorous work sessions as they review topics that they must be comfortable with to pursue engineering course work. Structured to accustom students to the pace and culture of learning encountered in engineering math courses. For more information about the math placement referred to in the "Enrollment Requirements", please contact your academic advisor. Formerly GEEN 1235.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 1021 or MATH 1150
**Requisites:** Requires an ALEKS math exam taken in 2016 or earlier, or placement into pre-calculus based on your admissions data and/or CU Boulder coursework.

**APPM 1236 (1) Precalculus Work Group**
Develops and enhances problem solving skills for students enrolled in APPM 1235. Course is conducted in a collaborative learning environment with students working in groups under the guide of a facilitator.
**Requisites:** Requires enrollment in corequisite course of APPM 1235.

**APPM 1340 (4) Calculus 1 with Algebra, Part A**
Studies selected topics in analytical geometry and calculus: rates of change of functions, limits, derivatives and their applications. This course and APPM 1345 together are equivalent to APPM 1350. The sequence of this course and APPM 1345 is specifically designed for students whose manipulative skills in the techniques of high school algebra and precalculus may be inadequate for APPM 1350. For more information about the math placement referred to in the "Enrollment Requirements", please contact your academic advisor.
**Requisites:** Requires prerequisite course of APPM 1235 or MATH 1021 or MATH 1150 or MATH 1160 (minimum grade C-) or an ALEKS math exam taken in 2016 or earlier, or placement into pre-calculus based on your admissions data and/or CU Boulder coursework.
**Additional Information:** Arts Sci Gen Ed: Quantitative Reasoning Math

**APPM 1345 (4) Calculus 1 with Algebra, Part B**
Continuation of APPM 1340. Studies selected topics in calculus: derivatives and their applications, integration, differentiation and integration of transcendental functions. Algebraic and trigonometric topics are studied throughout, as needed.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1350 or ECON 1088 or MATH 1081 or MATH 1300 or MATH 1310 or MATH 1330
**Requisites:** Requires prerequisite course of APPM 1340 (minimum grade C-).

**APPM 1350 (4) Calculus 1 for Engineers**
Topics in analytical geometry and calculus including limits, rates of change of functions, derivatives and integrals of algebraic and transcendental functions, applications of differentiations and integration. Students who have already earned college credit for calculus 1 are eligible to enroll in this course if they want to solidify their knowledge base in calculus 1. For more information about the math placement referred to in the "Enrollment Requirements", contact your academic advisor.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1345 or ECON 1088 or MATH 1081 or MATH 1300 or MATH 1310 or MATH 1330
**Requisites:** Requires prerequisite course of APPM 1235 or MATH 1021 or MATH 1150 or MATH 1160 or MATH 1300 (minimum grade C-) or an ALEKS math exam taken in 2016 or earlier, or placement into calculus based on your admissions data and/or CU Boulder coursework.
**Additional Information:** GT Pathways: GT-MA1 - Mathematics
Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**APPM 1351 (1) Calculus 1 Work Group**
Provides problem-solving assistance to students enrolled in APPM 1350. Student groups work in collaborative learning environment. Student participation is essential.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Requires enrollment in corequisite course of APPM 1350 or APPM 1345.

**APPM 1360 (4) Calculus 2 for Engineers**
Continuation of APPM 1350. Focuses on applications of the definite integral, methods of integration, improper integrals, Taylor's theorem, and infinite series.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 2300
**Requisites:** Requires prerequisite course of APPM 1345 or APPM 1350 or MATH 1300 (minimum grade C-).

**APPM 1361 (1) Calculus 2 Work Group**
Provides problem solving assistance for students enrolled in APPM 1360. Conducted in a collaborative learning environment. Student work groups solve calculus problems with assistance of facilitator.
**Requisites:** Requires enrollment in corequisite course of APPM 1360.

**APPM 1390 (1) A Game for Calculus**
Coaches students to implement study strategies geared specifically toward APPM Calculus in a structured, supportive, small group environment. Department consent required.
**Repeatable:** Repeatable for up to 3.00 total credit hours.

**APPM 1650 (4) Python for Math and Data Science Applications**
Uses Python to teach the fundamentals of computer programming with an emphasis on mathematical and statistical applications. Topics will include data types, data structures, iteration, visualization, and simulations. Techniques covered will be applicable to many scientific and technical fields. No prior programming experience is required. Formerly offered as a special topics course.
**Requisites:** Requires prerequisite or corequisite courses of APPM 1350 or APPM 1345 or MATH 1300 or MATH 1310 (all minimum grade C-).

**APPM 2340 (4) Calculus 3 for Statistics and Data Science**
Covers vectors and vector analysis, partial derivatives and the multivariable Taylor theorem, and multiple integrals. Introduces matrices and statistical applications.
**Requisites:** Requires prerequisite courses APPM 1360 or MATH 2300 (both minimum grade C-).

**APPM 2350 (4) Calculus 3 for Engineers**
Covers multivariable calculus, vector analysis, and theorems of Gauss, Green, and Stokes.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 2400
**Requisites:** Requires prerequisite course of APPM 1360 or MATH 2300 (minimum grade C-).

**APPM 2351 (1) Calculus 3 Work Group**
Provides problem solving assistance to students enrolled in APPM 2350. Conducted in a collaborative learning environment. Student work groups solve calculus problems with the assistance of a facilitator.
**Requisites:** Requires enrollment in corequisite course of APPM 2350.

**APPM 2360 (4) Introduction to Differential Equations with Linear Algebra**
Introduces ordinary differential equations, systems of linear equations, matrices, determinants, vector spaces, linear transformations, and systems of linear differential equations.
**Equivalent - Duplicate Degree Credit Not Granted:** both MATH 2130 and MATH 3430
**Requisites:** Requires prerequisite course of APPM 1360 or MATH 2300 (minimum grade C-).

**APPM 2361 (1) Differential Equations Work Group**
Provides problem solving assistance to students enrolled in APPM 2360. Conducted in a collaborative learning environment. Student work in groups solve ordinary differential equations and linear algebra problems with the assistance of a facilitator.
**Requisites:** Requires corequisite course of APPM 2360.

**APPM 2450 (1) Calculus 3 Computer Lab**
Selected topics in analytic geometry and calculus with a focus on symbolic computation using Mathematica.
**Requisites:** Requires a corequisite course of APPM 2350.

**APPM 2460 (1) Differential Equations Computer Lab**
Selected topics in differential equations and linear algebra with a focus on symbolic computation using MATLAB.
**Requisites:** Requires enrollment in a corequisite course of APPM 2360.

**APPM 2720 (1-3) Open Topics in Lower Division Applied Mathematics**
Provides a vehicle for the development and presentation of new topics that are accessible to lower division Applied Mathematics students. These topics have the potential to be incorporated into the core APPM curriculum.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of APPM 1350 or MATH 1300 (minimum grade C-).
**Grading Basis:** Letter Grade

**APPM 2750 (4) Java: Training, Mathematical Algorithms, and Mobile Apps**
Preparatory course for Java programming. Provides necessary background for Java language: basic object-oriented concepts, analysis, and design. Learn to create Java applets, applications and mobile apps, create graphic context, and identify the key features of Java foundation classes as well as other Java-related technology. Material is taught in the context of mathematical algorithms from calculus. Department enforced requisite, knowledge of a programming language.
**Requisites:** Requires prerequisite course of APPM 1350 or MATH 1300 (minimum grade C-).

**APPM 3010 (3) Chaos in Dynamical Systems**
Introduces undergraduate students to chaotic dynamical systems. Topics include smooth and discrete dynamical systems, bifurcation theory, chaotic attractors, fractals, Lyapunov exponents, synchronization and networks of dynamical systems. Applications to engineering, biology and physics will be discussed.
**Requisites:** Requires prerequisite course of APPM 2360 or MATH 3430 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 3050 (3) Scientific Computing in Matlab**
Topics covered include: approximations in computing, computer arithmetic, interpolation, matrix computations, nonlinear equations, optimization, and initial-value problems with emphasis on the computational cost, efficiency, and accuracy of algorithms. The problem sets are application-oriented with examples taken from orbital mechanics, physics, genetics, and fluid dynamics.
**Requisites:** Requires prerequisite course of APPM 2360 or MATH 3430 (minimum grade C-).

**APPM 3170 (3) Discrete Applied Mathematics**
Introduces students to ideas and techniques from discrete mathematics that are widely used in science and engineering. Mathematical definitions and proofs are emphasized. Topics include formal logic notation, proof methods; set theory, relations; induction, well-ordering; algorithms, growth of functions and complexity; integer congruences; basic and advanced counting techniques, recurrences and elementary graph theory. Other selected topics may also be covered.
**Requisites:** Requires a prerequisite of APPM 1360 or MATH 2300 (all minimum grade C-).

**APPM 3310 (3) Matrix Methods and Applications**
Introduces linear algebra and matrices with an emphasis on applications, including methods to solve systems of linear algebraic and linear ordinary differential equations. Discusses vector space concepts, decomposition theorems, and eigenvalue problems.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 2130 and MATH 2135
**Requisites:** Requires prerequisite course of APPM 2340 or APPM 2350 or APPM 2360 or MATH 2400 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 3311 (1) Matrix Methods Workgroup**
Provides problem-solving assistance to students enrolled in APPM 3310. Student groups work in collaborative learning environment. Student participation is essential.
**Requisites:** Requires enrollment in corequisite course of APPM 3310.

**APPM 3350 (3) Advanced Engineering Calculus**
Extends the treatment of engineering mathematics beyond the topics covered in Calculus 3 and differential equations. Topics include non-dimensionalization, elementary asymptotics and perturbation theory, Reynold's transport theorem and extensions of Leibnitz's rule, as applied to continuum conservation equations, Hamiltonian formulations, Legendre and Laplace transforms, special functions and their orthogonality properties.
**Requisites:** Requires prerequisite course of APPM 2350 or MATH 2400 and APPM 2360 (all minimum grade C-).

**APPM 3570 (3) Applied Probability**
Studies axioms, counting formulas, conditional probability, independence, random variables, continuous and discrete distribution, expectation, joint distributions, moment generating functions, law of large numbers and the central limit theorem.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3810 or MATH 4510 STAT 3100
**Requisites:** Requires a prerequisite or corequisite course of APPM 2350 or APPM 2340 or MATH 2400 (prereq minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 3650 (3) Algorithms and Data Structures in Python**
Covers data structures (stacks, queues, linked lists, hash tables, heaps), algorithms (divide and conquer, sorting, greedy, graph, dynamic programming), and asymptotic complexity with an emphasis on applied math topics. Assignments will include programming projects written in Python
**Requisites:** Requires prerequisite courses of APPM 1650 and (APPM 1360 or MATH 2300) (minimum grade C-) or instructor consent.

**APPM 4120 (3) Introduction to Operations Research**
Studies linear and nonlinear programming, the simplex method, duality, sensitivity, transportation and network flow problems, some constrained and unconstrained optimization theory, and the Kuhn-Tucker conditions, as time permits.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5120 and MATH 4120 and MATH 5120
**Requisites:** Requires a prerequisite course of APPM 3310 or MATH 2130 or MATH 2135 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4320 (3) Introduction to Dynamics on Networks**
Introduces modern approaches to model and analyze dynamical processes on complex networks. Many dynamical processes such as epidemic propagation, opinion formation, synchronization, and cascading processes take place on complex social or technological networks. This course will introduce the tools to understand the interplay between network structure and the outcome of these dynamical processes. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5320
**Requisites:** Requires prerequisite courses of APPM 2360 and APPM 3310 (all minimum grade C-).
**Grading Basis:** Letter Grade

**APPM 4350 (3) Methods in Applied Mathematics: Fourier Series and Boundary Value Problems**
Reviews ordinary differential equations, including solutions by Fourier series. Physical derivation of the classical linear partial differential equations (heat, wave, and Laplace equations). Solution of these equations via separation of variables, with Fourier series, Fourier integrals, and more general eigenfunction expansions.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5350
**Requisites:** Requires prerequisite courses of APPM 2350 or MATH 2400 and APPM 2360 (all minimum grade C-) and a prerequisite or corequisite course of APPM 3310 (prereq minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4360 (3) Methods in Applied Mathematics: Complex Variables and Applications**
Introduces methods of complex variables, contour integration and theory of residues. Applications include solving partial differential equations by transform methods, Fourier and Laplace transforms and Reimann-Hilbert boundary-value problems, conformal mapping to ideal fluid flow and/or electrostatics.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5360
**Requisites:** Requires prerequisite courses of APPM 2350 or MATH 2400 and APPM 2360 (all minimum grade C-) and a prerequisite or corequisite course of APPM 3310 (prereq minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4370 (3) Computational Neuroscience**
Applies mathematical and computational methods to neuroscience. Techniques from linear algebra, differential equations, introductory dynamical systems, probability, stochastic processes, model validation, and machine learning will be learned and used. Neuroscience topics include neural spiking, network dynamics, probabilistic inference, learning, and plasticity. Will learn how the brain uses computational principles to enact decision making, vision, and memory. Recommended background includes linear algebra, differential equations, probability, and programming. Students will hone programming skills in MATLAB/Python and TensorFlow.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5370
**Requisites:** Requires prerequisite courses of APPM 2360 and APPM 3310 (all minimum grade C-).
**Recommended:** Prerequisite APPM 3570/STAT 3100, STAT 2600 or CSCI 3022.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4380 (3) Modeling in Applied Mathematics**
An exposition of a variety of mathematical models arising in the physical and biological sciences. Students' modeling projects are presented in class. Topics may include: GPS navigation, medical imaging, ocean waves, and computerized facial recognition.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5380
**Requisites:** Requires prerequisite courses of APPM 2350 or MATH 2400 and APPM 2360 (all minimum grade C-).
**Recommended:** Prerequisites APPM 3310 and APPM 4350 and APPM 4650.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4390 (3) Modeling in Mathematical Biology**
Investigates how complex systems in biology can be studied using applied mathematics. Examines several case studies which include topics from microbiology, enzyme reaction kinetics, neuroscience, ecology, epidemiology, physiology and bioengineering.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5390
**Requisites:** Requires prerequisite courses of APPM 2360 and APPM 3310 or MATH 3130 or MATH 3135 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4440 (3) Undergraduate Applied Analysis 1**
Provides a rigorous treatment of topics covered in Calculus 1 and 2. Topics include convergent sequences; continuous functions; differentiable functions; Darboux sums, Riemann sums, and integration; Taylor and power series and sequences of functions.
**Requisites:** Requires prerequisite courses of APPM 2350 or MATH 2400 and APPM 2360 (all minimum grade C-) and a prerequisite or corequisite course of APPM 3310 (prereq minimum grade C-).

**APPM 4450 (3) Undergraduate Applied Analysis 2**
Continuation of APPM 4440. Study of multidimensional analysis including n-dimensional Euclidean space, continuity and uniform continuity of functions of several variables, differentiation, linear and nonlinear approximation, inverse function and implicit function theorems, and a short introduction to metric spaces.
**Requisites:** Requires prerequisite course of APPM 4440 or MATH 3001 (minimum grade C-).

**APPM 4490 (3) Theory of Machine Learning**
Presents the underlying theory behind machine learning in proofs-based format. Answers fundamental questions about what learning means and what can be learned via formal models of statistical learning theory. Analyzes some important classes of machine learning methods. Specific topics may include the PAC framework, VC-dimension and Rademacher complexity.
**Requisites:** Requires prerequisite course of APPM 4440 (minimum grade C-).
**Recommended:** Prerequisite CSCI 5622 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4510 (3) Data Assimilation in High Dimensional Dynamical Systems**
Develops and analyzes approximate methods of solving the Bayesian inverse problem for high-dimensional dynamical systems. After briefly reviewing mathematical foundations in probability and statistics, the course covers the Kalman filter, particle filters, variational methods and ensemble Kalman filters. The emphasis is on mathematical formulation and analysis of methods.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5510, STAT 4250 and STAT 5250
**Requisites:** Requires prerequisite courses of APPM 3310 and (STAT 4520 or MATH 4520). All minimum grade C-.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4515 (3) High-Dimensional Probability for Data Science**
Provides students with an exposition of the most recent methods of high-dimensional probability for the analysis of high dimensional datasets. Applications include randomized algorithms and high-dimensional random models of datasets.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5515
**Requisites:** Requires prerequisite courses of APPM 3310 and APPM 3570 (minimum grade C-).

**APPM 4530 (3) Stochastic Analysis for Finance**
Studies mathematical theories and techniques for modeling financial markets. Specific topics include the binomial model, risk neutral pricing, stochastic calculus, connection to partial differential equations and stochastic control theory.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5530, STAT 4230 and STAT 5230
**Requisites:** Requires prerequisite courses of APPM 3310 and APPM 3570, or STAT 3100, or MATH 4510 (all minimum grade C-).

**APPM 4560 (3) Markov Processes, Queues, and Monte Carlo Simulations**
Brief review of conditional probability and expectation followed by a study of Markov chains, both discrete and continuous time, including Poisson point processes. Queuing theory, terminology and single queue systems are studied with some introduction to networks of queues. Uses Monte Carlo simulation of random variables throughout the semester to gain insight into the processes under study.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5560 and STAT 4100
**Requisites:** Requires prerequisite courses of APPM 3570 or STAT 3100 or MATH 4510 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4565 (3) Random Graphs**
Introduces mathematical techniques, including generating functions, the first- and second-moment method and Chernoff bounds to study the most fundamental properties of the Erdos-Renyl model and other celebrated random graph models such as preferential attachment, fixed degree distribution, and stochastic block models.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5565
**Requisites:** Requires prerequisite APPM 3570 or MATH 4510 (both minimum grade C).

**APPM 4600 (4) Numerical Methods and Scientific Computing**
Provides an introduction to numerical analysis and scientific computing. Numerical analysis topics include root finding, interpolation, quadrature, linear system solution techniques, and techniques for approximating eigenvalues. Scientific computing topics include code development and repository management in addition to an introduction to shared and distributed memory computing. Involves hands-on learning with weekly group interactions and a final project including a report and in-class presentation.
**Requisites:** Requires prerequisite course of APPM 3310 (minimum grade C-).
**Recommended:** Prerequisite knowledge of a programming language such as Python, and C++.

**APPM 4610 (3) Numerical Differential Equations**
Provides an introduction to the most commonly used techniques for numerically solving boundary value problems and time dependent problems and the corresponding linear systems. Topics include finite difference methods, the finite element method, the spectral method, spectral collocation methods, Euler and Runge-Kutta methods. Scientific computing skills such as advanced code and memory management will be developed. Involves hands-on learning with weekly group interactions and a final project. Department enforced prerequisite: Knowledge of a programming language such as Python, and C++ is required.
**Requisites:** Requires prerequisite courses of APPM 2360 and APPM 4600 (all minimum grade C-).

**APPM 4650 (3) Intermediate Numerical Analysis 1**
Focuses on numerical solution of nonlinear equations, interpolation, methods in numerical integration, numerical solution of linear systems, and matrix eigenvalue problems. Stresses significant computer applications and software. Department enforced prerequisite: knowledge of a programming language.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4650
**Requisites:** Requires a prerequisite course of MATH 3430 or APPM 2360 and APPM 3310 (minimum grade C-).

**APPM 4720 (1-3) Open Topics in Applied Mathematics**
Provides a vehicle for the development and presentation of new topics that may be incorporated into the core courses in applied mathematics. Department enforced prerequisite: variable, depending on the topic, see instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5720
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.

**APPM 4840 (1-3) Reading and Research in Applied Mathematics**
Introduces undergraduate students to the research foci of the Department of Applied Mathematics. Department enforced prerequisite: variable depending on the topic.
**Repeatable:** Repeatable for up to 9.00 total credit hours.

**APPM 4950 (1-3) Seminar in Applied Mathematics**
Introduces undergraduate students to the research foci of the program in applied mathematics. It is also designed to be a capstone experience for the program's majors. Department enforced prerequisite: variable depending on the topic.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**STAT 2600 (4) Introduction to Data Science**
Introduces students to importing, tidying, exploring, visualizing, summarizing, and modeling data and then communicating the results of these analyses to answer relevant questions and make decisions. Students will learn how to program in R using reproducible workflows. During weekly lab sessions students will collaborate with their teammates to pose and answer questions using real-world datasets.
**Requisites:** Requires prerequisite or corequisite of APPM 1350 or APPM 1345 or MATH 1300 (minimum grade C-).
**Grading Basis:** Letter Grade

**STAT 3100 (3) Applied Probability**
Studies axioms, counting formulas, conditional probability, independence, random variables, continuous and discrete distribution, expectation, joint distributions, moment generating functions, law of large numbers and the central limit theorem.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3810 or MATH 4510 APPM 3570
**Requisites:** Requires a prerequisite or corequisite course of APPM 2350 or APPM 2340 or MATH 2400 (prereq minimum grade C-).

**STAT 3101 (1) Probability Workgroup**
Provides problem-solving assistance to students enrolled in STAT 3100 and APPM 3570. Student groups work in collaborative learning environment. Student participation is essential.
**Requisites:** Requires enrollment in corequisite course of STAT 3100 or APPM 3570.

**STAT 3400 (3) Applied Regression**
Introduces methods, theory, and applications of linear statistical models, covering topics such as estimation, residual diagnostics, goodness of fit, transformations, and various strategies for variable selection and model comparison. Examples will be demonstrated using statistical programming language R.
**Requisites:** Requires prerequisite STAT 2600 and STAT 3100 or MATH 4510 (all minimum grade C-). Requires corequisite APPM 3310.
**Grading Basis:** Letter Grade

**STAT 4000 (3) Statistical Methods and Application I**
Introduces exploratory data analysis, probability theory, statistical inference, and data modeling. Topics include discrete and continuous probability distributions, expectation, laws of large numbers, central limit theorem, statistical parameter estimation, hypothesis testing, and regression analysis. Considerable emphasis on applications in the R programming language.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5000
**Requisites:** Requires prerequisite APPM 1360 or MATH 2300 (both minimum grade C-).
**Grading Basis:** Letter Grade

**STAT 4010 (3) Statistical Methods and Applications II**
Expands upon statistical techniques introduced in STAT 4000. Topics include modern regression analysis, analysis of variance (ANOVA), experimental design, nonparametric methods, and an introduction to Bayesian data analysis. Considerable emphasis on application in the R programming language.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5010
**Requisites:** Requires prerequisite STAT 4000 (minimum grade C-).
**Grading Basis:** Letter Grade

**STAT 4100 (3) Markov Processes, Queues, and Monte Carlo Simulations**
Brief review of conditional probability and expectation followed by a study of Markov chains, both discrete and continuous time, including Poisson point processes. Queuing theory, terminology and single queue systems are studied with some introduction to networks of queues. Uses Monte Carlo simulation of random variables throughout the semester to gain insight into the processes under study.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4560 and APPM 5560
**Requisites:** Requires prerequisite courses of APPM 3570 or STAT 3100 or MATH 4510 (all minimum grade C-).

**STAT 4230 (3) Stochastic Analysis for Finance**
Studies mathematical theories and techniques for modeling financial markets. Specific topics include the binomial model, risk neutral pricing, stochastic calculus, connection to partial differential equations and stochastic control theory.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4530, APPM 5530 and STAT 5230
**Requisites:** Requires prerequisite courses of APPM 3310 and APPM 3570, or STAT 3100, or MATH 4510 (all minimum grade C-).

**STAT 4250 (3) Data Assimilation in High Dimensional Dynamical Systems**
Develops and analyzes approximate methods of solving the Bayesian inverse problem for high-dimensional dynamical systems. After briefly reviewing mathematical foundations in probability and statistics, the course covers the Kalman filter, particle filters, variational methods and ensemble Kalman filters. The emphasis is on mathematical formulation and analysis of methods.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5510, APPM 4510 and STAT 5250
**Requisites:** Requires prerequisite courses of APPM 3310 and (STAT 4520 or MATH 4520). All minimum grade C-.

**STAT 4350 (3) Applied Deep Learning 1**
Introduces students to state-of-the-art deep learning techniques employed in the industry. This course will focus on training neural networks and computer vision, including image classification and transformation, object detection, and facial recognition. Advanced topics will include domain adaptation and learning techniques. There will be an emphasis on reading current literature.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5350
**Requisites:** Requires prerequisite courses of APPM 3570 or STAT 3100 and STAT 3400 or STAT 4520 and APPM 4650 or APPM 4600 (all minimum grade C-).
**Recommended:** Prerequisite knowledge of Python is required, and familiarity with TensorFlow and PyTorch is a plus but is not a requirement.

**STAT 4360 (3) Applied Deep Learning 2**
Introduces students to state-of-the-art deep learning techniques employed in the industry. This course will focus on natural language processing, multimodal learning, generative and graph neural networks, speech and music recognition, and reinforcement learning. Students will learn software engineering techniques using Python. There will be an emphasis on reading current literature.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5360
**Requisites:** Requires prerequisite course of STAT 4350 (minimum grade C-).

**STAT 4400 (3) Advanced Statistical Modeling**
Introduces methods, theory and applications of modern statistical models, from linear to hierarchical linear models, to generalized hierarchical linear models, including hierarchical logistic and hierarchical count regression models. Topics such as estimation, residual diagnostics, goodness of fit, transformations, and various strategies for variable selection and model comparison will be discussed in depth. Examples will be demonstrated using statistical programming language R.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5400
**Requisites:** Requires prerequisite STAT 3400 and (STAT 4520 or STAT 5010) (all minimum grade C-).
**Grading Basis:** Letter Grade

**STAT 4430 (3) Spatial Statistics**
Introduces the theory of spatial statistics with applications. Topics include basic theory for continuous stochastic processes, spatial prediction and kriging, simulation, geostatistical methods, likelihood and Bayesian approaches, spectral methods and an overview of modern topics such as nonstationary models, hierarchical modeling, multivariate processes, methods for large datasets and connections to splines.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5430
**Requisites:** Requires prerequisite courses of STAT 3400 AND APPM 3310 (all minimum grade C-).
**Recommended:** Prerequisites STAT 4520 OR STAT 5520 OR MATH 4520 OR MATH 5520.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**STAT 4520 (3) Introduction to Mathematical Statistics**
Examines point and confidence interval estimation. Principles of maximum likelihood, sufficiency, and completeness: tests of simple and composite hypotheses, linear models, and multiple regression analysis if time permits. Analyzes various distribution-free methods.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5520 and MATH 4520 and MATH 5520
**Requisites:** Requires prerequisites APPM 3570 or STAT 3100 or MATH 4510 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**STAT 4540 (3) Introduction to Time Series**
Studies basic properties, trend-based models, seasonal models modeling and forecasting with ARIMA models, spectral analysis and frequency filtration.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5540 and MATH 4540 and MATH 5540
**Requisites:** Requires prerequisite course of APPM 4520 or STAT 4520 or MATH 4520 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**STAT 4610 (3) Statistical Learning**
Consists of applications and methods of statistical learning. Reviews multiple linear regression and then covers classification, regularization, splines, tree-based methods, support vector machines, unsupervised learning and Gaussian process regression.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5610
**Requisites:** Requires prerequisite course of STAT 3400 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**STAT 4630 (3) Computational Bayesian Statistics**
Introduces Bayesian statistics, normal and non-normal approximation to likelihood and posteriors, the EM algorithm, data augmentation, and Markov Chain Monte Carlo (MCMC) methods. Additionally, introduces more advanced MCMC algorithms and requires significant statistical computing. Examples from a variety of areas, including biostatistics, environmental sciences, and engineering, will be given throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5630
**Requisites:** Requires prerequisite courses of (APPM 4560 or STAT 4100) and STAT 3400 and (STAT 4520 or MATH 4520) (minimum grade C-).
**Recommended:** Prerequisite prior programming experience.

**STAT 4640 (3) Capstone in Statistics and Data Science**
Course provides senior-level and graduate students the opportunity to apply the knowledge, skills, and abilities developed throughout the Statistics and Data Science major. Working in teams, students undertake a data-driven problem presented by domain experts from government, industry, or academia. The course provides valuable real-world experience for students intending to pursue graduate education or technical careers. Topics include team building, problem solving, research methods, project management, data ethics, and clear communication (oral, written, and visual).
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5640
**Requisites:** Requires prerequisite course of STAT 4400 or STAT 4610 (minimum grade C-)
**Grading Basis:** Letter Grade

**STAT 4680 (3) Statistics and Data Science Collaboration**
Educates and trains students to become effective interdisciplinary collaborators by developing the communication and collaboration skills necessary to apply technical statistics and data science skills to help domain experts answer research or policy questions. Topics include structuring effective meetings and projects; communicating statistics to non-statisticians; using peer feedback, self-reflection and video analysis to improve collaboration skills; creating reproducible statistical workflows; working ethically.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5680
**Requisites:** Requires a prerequisite course of STAT 4400 or STAT 4010 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**STAT 4690 (2) Advanced Statistical Collaboration**
Educates and trains students to become advanced interdisciplinary collaborators by developing and refining the communication, collaboration and technical statistics and data science skills necessary to collaborate with domain experts to answer research questions. Students work on multiple projects. Discussions center on technical skills necessary to solve research problems and video analysis to improve communication and collaboration skills.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5690
**Requisites:** Requires prerequisite course of STAT 4680 or STAT 5680 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**STAT 4700 (3) Philosophical and Ethical Issues in Statistics**
Introduces students to philosophical issues that arise in statistical theory and practice. Topics include interpretations of probability, philosophical paradigms in statistics, inductive inference, causality, reproducible, and ethical issues arising in statistics and data analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5700
**Requisites:** Requires prerequisites STAT 4520 or STAT 3400 or STAT 4000 (all minimum grade C-).
**Grading Basis:** Letter Grade

**STAT 4720 (1-3) Open Topics in Statistics and Data Science**
Provides a vehicle for the development and presentation of new topics that may be incorporated into the core courses in statistics and data science. Department enforced prerequisite: variable, depending on the topic, see instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5720
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.

**STAT 4840 (1-3) Reading and Research in Statistics**
Introduces undergraduate students to research in statistics and data science. Department enforced prerequisite: variable depending on the topic.
**Repeatable:** Repeatable for up to 9.00 total credit hours.

# Statistics and Data Science - Bachelor of Arts (BA)

The Department of Applied Mathematics offers a Bachelor of Arts degree in statistics and data science through the College of Arts and Sciences. The BA degree is designed with an emphasis on inter- and cross-disciplinary training, and is intended to prepare students for a wide range of careers in areas such as statistics, data analytics, data science, business, engineering, economics, public health, epidemiology, insurance, forestry, psychology, social justice and human rights.

Courses at the undergraduate level are designed to provide foundational skills in both traditional statistical methods and cutting-edge data analysis techniques. These skills are in high demand in the current job market and prepare students for desirable careers in statistics and data science. Statisticians and data scientists are often involved in interdisciplinary work; the BA degree requires in-depth training in some area of science, engineering, social science or liberal arts that uses statistics to solve important problems. This knowledge prepares graduates to successfully communicate and collaborate with practitioners in these fields. A capstone course in statistical collaboration provides the opportunity for students to synthesize their previous coursework.

The Department of Applied Math offers a broad range of undergraduate research opportunities funded by a variety of federal agencies. Working with faculty, students interested in statistics and data science have developed solutions to various problems in fluids, dynamical systems, data analysis, probability and statistics, networks, signal processing, math biology, math education and numerics. Students can gain professional exposure through the student chapter of the Society of Industrial and Applied Mathematics (SIAM) or through the Data Buffs, the student chapter of the American Statistical Association. Applied Math also has a local chapter of AWM, the Association for Women in Mathematics.

# Outside Area of Emphasis/Application

Students will choose an outside area of emphasis/application to acquire knowledge in a discipline-specific area, where statistical applications are prevalent. Students will take a minimum of 18 credits in a department or certificate program outside of APPM/STAT, including a minimum of 6 credits at the upper-division level. Final course selection will be made in consultation with advisors and faculty from the departments, as well as faculty advisors within the Department of Applied Mathematics.

# Laboratory for Interdisciplinary Statistical Analysis (LISA)

After learning the communication and collaboration skills necessary to help domain experts answer their research, business or policy questions, students have the opportunity to join LISA to gain additional practical experience. Students will collaborate with a variety of researchers around campus and in the community to apply statistics and data science to solve real problems. Students in LISA will also work with graduate students and faculty to engage in outreach activities to improve statistics and data science skills and literacy in the wider community.

# Requirements

## Course Requirements

To earn a BA in statistics and data science, a student must complete the requirements of the College of Arts and Sciences.

Students must earn a grade of C- or better in all coursework applied to the major and have at least a C average for all attempted work for the major. Calculus 1 & 2 (usually APPM 1350 and APPM 1360) are considered introductory courses and are prerequisites for entry into the major.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| *Mathematical Foundations* | | |
| APPM 2340 | Calculus 3 for Statistics and Data Science | 4 |
| or APPM 2350 | Calculus 3 for Engineers | |
| or MATH 2400 | Calculus 3 | |
| APPM 3310 | Matrix Methods and Applications | 3 |
| *Computation* | | |
| STAT 2600 | Introduction to Data Science | 4 |
| *Statistics Theory* | | |
| STAT 3100 | Applied Probability | 3 |
| STAT 4520 | Introduction to Mathematical Statistics | 3 |
| *Statistical Modeling* | | |
| STAT 3400 | Applied Regression | 3 |
| STAT 4610 | Statistical Learning | 3 |
| *One of the following courses:* | | |
| STAT 4640 | Capstone in Statistics and Data Science | 3 |
| or STAT 4680 | Statistics and Data Science Collaboration | |
| Three of the following courses: [1] | | 9 |
| STAT 4100 | Markov Processes, Queues, and Monte Carlo Simulations | |
| STAT 4250 | Data Assimilation in High Dimensional Dynamical Systems | |
| STAT 4350 | Applied Deep Learning 1 | |
| STAT 4360 | Applied Deep Learning 2 | |
| STAT 4400 | Advanced Statistical Modeling | |
| STAT 4430 | Spatial Statistics | |
| STAT 4540 | Introduction to Time Series | |
| STAT 4630 | Computational Bayesian Statistics | |
| STAT 4700 | Philosophical and Ethical Issues in Statistics | |
| APPM 3650 | Algorithms and Data Structures in Python | |
| APPM 4370 | Computational Neuroscience | |
| APPM 4440 | Undergraduate Applied Analysis 1 | |
| APPM 4490 | Theory of Machine Learning | |
| APPM 4515 | High-Dimensional Probability for Data Science | |
| APPM 4530 | Stochastic Analysis for Finance | |
| APPM 4565 | Random Graphs | |
| **Total Credit Hours** | | **35** |

[1] Any APPM or STAT 3-credit special topics courses in probability or statistics may also be used to meet this requirement.

### Ancillary Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Computing Requirement** | | |
| APPM 1650 | Python for Math and Data Science Applications [1] | 4 |
| or CSCI 1300 | Computer Science 1: Starting Computing | |
| or CSCI 2750 | Computing, Ethics and Society | |
| or ASEN 1320 | | |
| **Outside Area of Emphasis Requirement** | | |
| Additional coursework in a department or certificate program outside of APPM/STAT, including a minimum of 6 credits at the upper-division level. [2] | | 18 |
| **Total Credit Hours** | | **22** |

[1] Or another department-approved course in Python with Mathematical Applications.

[2] Can be used to fulfill Gen. Ed. requirements when applicable.

## Graduating in Four Years

Consult the four-year graduation guarantee (https://www.colorado.edu/engineering-advising/get-your-degree/first-year-freshmen/four-year-graduation-guarantee/) for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility

for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in Statistics and Data Science, students should meet the following requirement:

- In the first semester, declare the statistics and data science major.

Students must consult with a major advisor to determine adequate progress toward completion of the major.

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will fulfill 12 credits in the Natural Science area, but not the laboratory requirement, of the Gen Ed Distribution Requirement and will complete the QRMS component of the Gen Ed Skills Requirement. Students can also possibly fulfill some of the required credit hours in the other areas Gen Ed Distribution and Diversity Requirements with the courses they take to complete the required Outside Area of Emphasis.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| STAT 2600 | Introduction to Data Science | 4 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| APPM 1650<br>or CSCI 1300 | Python for Math and Data Science Applications<br>or Computer Science 1: Starting Computing | 4 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/US Perspective) | | 3 |
| Elective | | 4 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| APPM 2340<br>or APPM 2350 | Calculus 3 for Statistics and Data Science<br>or Calculus 3 for Engineers | 4 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Outside Area of Emphasis course | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| APPM 3310 | Matrix Methods and Applications | 3 |
| STAT 3100 | Applied Probability | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Outside Area of Emphasis course | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| STAT 3400 | Applied Regression | 3 |
| STAT 4520 | Introduction to Mathematical Statistics | 3 |
| Outside Area of Emphasis Course (Upper-division) | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| STAT 4610 | Statistical Learning | 3 |
| Upper-division STAT elective | | 3 |
| Outside Area of Emphasis Course (Upper-division) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| STAT 4640<br>or STAT 4680 | Capstone in Statistics and Data Science<br>or Statistics and Data Science Collaboration | 3 |
| Upper-division STAT elective | | 3 |
| Gen. Ed. Distribution course (Social Sciences) | | 3 |
| Outside Area of Emphasis (upper-division) course or elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| Upper-division STAT elective | | 3 |
| Outside Area of Emphasis (upper-division) course or elective | | 3 |
| Elective(s) | | 8 |
| | **Credit Hours** | **14** |
| | **Total Credit Hours** | **120** |

# Content Knowledge

Students completing the undergraduate degree in statistics and data science will be broadly knowledgeable in the following areas:

- Mathematics, statistics and data science
  - Foundational knowledge in the areas of mathematics, statistics and data science that are most important to the analysis of data.
  - Statistical intuition and thinking.
  - Skills to write efficient, reproducible code related to data analysis in at least two programming languages (e.g., R, Python, C/C++, Julia, MATLAB, etc.).
  - Skills necessary to complete complex data analysis projects.
- A domain of application
  - The ability to utilize their knowledge of mathematics, statistics and computing to develop algorithms and apply methods for solving real-world data analysis problems.
  - The ability to contribute to at least one domain of application as data scientists.
- Professional skills in communication, collaboration and ethics
  - The ability to effectively communicate statistical results to experts and non-experts.

- The ability to effectively collaborate with domain experts.
- The ability to think critically about the relationship between data, ethics, and society.

# Student Outcomes

By the completion of the program, students will be able to:

- Have acquired problem-solving and modeling skills that allow them to analyze and visualize data and answer statistical questions.
- Understand mathematical statistics, including probability.
- Have acquired foundational mathematical knowledge, including calculus and linear algebra, as it pertains to statistics and data science.
- Be proficient in at least two programming languages and their data science packages.
- Be able to write efficient, reproducible code related to data analysis.
- Have acquired an in-depth knowledge of an area of application, as well as skills to collaborate with domain experts.
- Have the ability to clearly and concisely communicate statistical results in oral, written and visual forms.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BA in Statistics and Data Science, MS in Applied Mathematics

### Admissions Requirements

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Complete a minimum of 6 credits (two courses) of STAT coursework at the 3000 or 4000 level.
- Complete all prerequisite courses with a minimum grade of B.
- Have a cumulative GPA of 3.4 or higher.
- Have a cumulative GPA of 3.4 in all APPM and STAT coursework. If a student's cumulative GPA or APPM/STAT GPA is between 3.0 and 3.4, then one letter of reference is required. The letter can be written either by a faculty member or by a student's undergraduate academic advisor. The letter should justify why the student should be considered for admission into the program and should attest to the student's ability to complete the MS program.
- Have at least junior class standing.

## Program Requirements

Students may take up to and including 12 credit hours while in the undergraduate program which can later be used toward the master's degree. However, only six credit hours may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

Though not required for admission, students must complete APPM 4440 Undergraduate Applied Analysis 1 before they graduate with their BA.

Please see the BAM degree program (https://www.colorado.edu/amath/academics/bachelors-degree-statistics-data-science-masters-degree-applied-mathematics-specialization/)web page for more information.

# Applied Mathematics - Minor

A minor is offered in applied mathematics. Declaration of a minor is open to any student enrolled at CU Boulder, regardless of college or school.

The minor in applied mathematics was developed to provide in-depth training in mathematical techniques and computational methods well beyond the training usually received by science and engineering majors. The minor currently offers three tracks: general emphasis, scientific computing and mathematical software, or probability and statistics. The goals of each track are to introduce students to more advanced mathematical techniques and problem-solving strategies. Such skills are becoming increasingly important for students who expect to participate in areas requiring analysis or modeling of real world situations.

The department also offers a minor in statistics (p. 118) which was developed to provide in-depth training in statistical methods and techniques well beyond the training usually received by science and engineering majors. The ability to understand, visualize and analyze data is becoming an increasingly important skill in many disparate fields. This minor offers undergraduate students from any major the opportunity to develop their statistical knowledge.

# Requirements

## Prerequisites

Prerequisites for the applied math minor are two semesters of calculus and computing experience, as provided by APPM 1650, CSCI 1300, CSCI 2275 or CHEN 1310.

## Residency

A minimum of 20 credits at the 2000 level and above is required. At least three APPM or STAT courses, two of which must be at the 3000 level or above, need to be taken on the Boulder campus. No more than 9 credits may be applied from transfer work; of those, no more than 6 credits may be 3000 level or above.

## Minimum Grades

A cumulative GPA of 2.00 or better is required in the courses that are used to satisfy the requirements for this minor. Each individual course that is counted towards these degree requirements must be passed with a grade of C- or better.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Course Requirements** | | **20** |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| or MATH 2400 | Calculus 3 | |

| | | |
|---|---|---|
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| APPM 3310 | Matrix Methods and Applications | 3 |
| **Choose one area of emphasis:** | | |
| *General Emphasis:* | | |
| Choose two of the following three courses: | | |
| APPM 4350 | Methods in Applied Mathematics: Fourier Series and Boundary Value Problems | |
| APPM 4360 | Methods in Applied Mathematics: Complex Variables and Applications | |
| APPM 4600 | Numerical Methods and Scientific Computing | |
| One 3-credit upper division APPM or STAT course at the 3000 or 4000 level | | |
| *Scientific Computation Emphasis:* | | |
| APPM 3050 | Scientific Computing in Matlab [1] | |
| or APPM 3650 | Algorithms and Data Structures in Python | |
| APPM 4600 & APPM 4610 | Numerical Methods and Scientific Computing and Numerical Differential Equations | |
| *Probability and Statistics Emphasis:* [2] | | |
| APPM 3570 | Applied Probability | 3 |
| One of the following sequences: | | |
| STAT 4000 & STAT 4010 | Statistical Methods and Application I and Statistical Methods and Applications II | |
| APPM 4560 & STAT 4520 | Markov Processes, Queues, and Monte Carlo Simulations and Introduction to Mathematical Statistics | |

[1] APPM 3050 is not appropriate for junior or senior aerospace engineering sciences majors. These students should substitute another upper division applied math course.

[2] A student cannot earn a minor in statistics (p. 118) and a minor in applied mathematics with probability and statistics emphasis.

# Plan(s) of Study

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| APPM 1350 | Calculus 1 for Engineers | 4 |
| APPM 1650 or CSCI 1300 or CSCI 2275 or ASEN 1320 | Python for Math and Data Science Applications or Computer Science 1: Starting Computing or Programming and Data Structures or | 3 |
| | **Credit Hours** | **7** |
| **Spring Semester** | | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| | **Credit Hours** | **4** |

**Year Two**

| **Fall Semester** | | |
|---|---|---|
| APPM 2350 | Calculus 3 for Engineers | 4 |
| | **Credit Hours** | **4** |
| **Spring Semester** | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| | **Credit Hours** | **4** |

**Year Three**

| **Fall Semester** | | |
|---|---|---|
| APPM 3310 | Matrix Methods and Applications | 3 |
| | **Credit Hours** | **3** |
| **Spring Semester** | | |
| One of the following for 3 credit hours: | | 3 |
| General Emphasis: | | |
| APPM 4600 or APPM 4360 | Numerical Methods and Scientific Computing or Methods in Applied Mathematics: Complex Variables and Applications | |
| Scientific Computing Emphasis | | |
| APPM 3050 or APPM 3650 | Scientific Computing in Matlab [1] or Algorithms and Data Structures in Python | |
| Probability and Statistics Emphasis | | |
| APPM 3570 or STAT 3100 | Applied Probability or Applied Probability | |
| | **Credit Hours** | **3** |

**Year Four**

| **Fall Semester** | | |
|---|---|---|
| Course based on Minor Track: | | 3 |
| General Emphasis | | |
| APPM 4350 | Methods in Applied Mathematics: Fourier Series and Boundary Value Problems | |
| Scientific Computation Emphasis | | |
| APPM 4600 | Numerical Methods and Scientific Computing | |
| Probability and Statistics (Choose ONE) | | |
| STAT 4000 | Statistical Methods and Application I | |
| STAT 4520 | Introduction to Mathematical Statistics | |
| | **Credit Hours** | **3** |
| **Spring Semester** | | |
| Course based on Minor Track | | 3 |
| General Emphasis | | |
| ONE 3-credit APPM or STAT course at the 3000 or 4000 level | | |
| Scientific Computation | | |
| APPM 4610 | Numerical Differential Equations | 3 |
| Probability and Statistics | | |
| If STAT 4000 was taken in the Fall: | | |
| STAT 4010 | Statistical Methods and Applications II | |
| If STAT 4520 was taken in Fall: | | |
| STAT 4100 | Markov Processes, Queues, and Monte Carlo Simulations | |
| | **Credit Hours** | **6** |
| | **Total Credit Hours** | **34** |

# Statistics - Minor

The Department of Applied Mathematics offers a minor in statistics and data science. Declaration of a minor is open to any undergraduate student enrolled at CU Boulder, regardless of college or school. For more information, see the university's minor requirements on the Policies & Requirements (p. 75) page.

The minor in statistics and data science was developed to provide in-depth training in data science, statistical methods and techniques well beyond the training usually received by science and engineering majors. The ability to understand, visualize and analyze data is becoming an increasingly important skill in many disparate fields. This minor offers undergraduate students from any major the opportunity to develop their statistical knowledge.

## Requirements

Prerequisites for the Statistics and Data Science minor are two semesters of calculus and computing experiences such as provided by APPM 1650 (preferred), CSCI 1300 or CHEN 1310. A student cannot earn both a minor in statistics and data science and a minor in applied mathematics (p. 116) with the probability and statistics emphasis.

Students may earn both a BS in Applied Mathematics and a minor in Statistics and Data Science. However, the 12 upper-division credits of statistics required for the minor may not be counted towards the 25 credits of upper-division applied math courses. The 12 upper-division credits of statistics may, however, count towards the 24 credits of Area of Application required for all applied math majors.

### Residency

A *minimum* of 23 credits at the 2000 level and above is required. At least three APPM or STAT courses, two of which must be at the 3000 level or above, need to be taken on the Boulder campus. No more than nine credit hours may be applied from transfer work; of those nine, no more than six may be 3000 level or above.

### Minimum Grades

A cumulative GPA of 2.00 or better is required in the courses that are used to satisfy the requirements for this minor. Each individual course that is counted towards these degree requirements must be passed with a grade of C- or better.

### Required Courses and Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| APPM 2350 | Calculus 3 for Engineers | 4-5 |
| or MATH 2400 | Calculus 3 | |
| or APPM 2340 | Calculus 3 for Statistics and Data Science | |
| APPM 3310 | Matrix Methods and Applications | 3 |
| STAT 2600 | Introduction to Data Science | 4 |
| APPM 3570/ STAT 3100 | Applied Probability | 3 |
| STAT 3400 | Applied Regression | 3 |
| **Elective Courses** | | |
| Select two of the following courses: [1] | | 6 |
| STAT 4230 | Stochastic Analysis for Finance | |
| STAT 4250 | Data Assimilation in High Dimensional Dynamical Systems | |
| STAT 4350 & STAT 4360 | Applied Deep Learning 1 and Applied Deep Learning 2 | |
| STAT 4400 | Advanced Statistical Modeling | |
| STAT 4430 | Spatial Statistics | |
| APPM 4490 | Theory of Machine Learning | |
| APPM 4515 | High-Dimensional Probability for Data Science | |
| STAT 4520 | Introduction to Mathematical Statistics | |
| STAT 4540 | Introduction to Time Series | |
| APPM 4560 | Markov Processes, Queues, and Monte Carlo Simulations | |
| or STAT 4100 | Markov Processes, Queues, and Monte Carlo Simulations | |
| APPM 4565 | Random Graphs | |
| STAT 4610 | Statistical Learning | |
| STAT 4630 | Computational Bayesian Statistics | |
| **Total Credit Hours** | | **23-24** |

[1] Any one of APPM's 3-credit special topics courses in probability or statistics may also be used to meet this requirement.

# Art and Art History

The Department of Art and Art History (AAH) comprises two programs at the undergraduate level: art history and art practices. The art history program offers the BA and the art practices program is divided into five areas that offer degree tracks for the BA and the BFA: ceramics, integrated media arts practices (photography, digital media, video, integrated arts), painting & drawing, printmaking and sculpture & post-studio practice. The department offers a rigorous curriculum that crosses disciplines and attracts inquisitive, dedicated students with wide-ranging interests, encouraging creative investigation as an essential skill informed by the highest standards of critical thought. Our diverse faculty, students and staff are committed to ongoing engagement with communities locally and globally.

**Course codes for these programs are ARTH and ARTS.**

## Honors

Students may graduate with departmental honors. Those interested in pursuing this program should contact the Honors Department and/or the Department of Art and Art History honors representative as early as possible. The minimum GPA requirement is 3.300 overall and 3.500 in the major. Students may take Art Practices or Art History Honors Thesis to complete individual work.

## Special Programs

### The CU Art Museum

The CU Art Museum is a cultural gateway to the University of Colorado Boulder, facilitating engagement with larger societal issues through a greater understanding of the arts in a global context. The CU Art Museum is committed to enhancing understanding and appreciation of the visual arts within the academic community and among regional, national and international audiences. It provides access to art of the highest quality through exhibitions, publications and related educational events that reflect diversity, critical thinking and creative research. The

museum also facilitates student training in museum practices. As a collecting institution, the CU Art Museum promotes the excellence, preservation, scholarly interpretation, exhibition and growth of its comprehensive permanent collection, which includes artworks from numerous time periods, artistic traditions and cultures. The state of the art 25,000-square-foot CU Art Museum contains five galleries including permanent collection galleries, changing exhibition galleries and a video gallery. The CU Art Museum also includes a collections study center, allowing students, faculty and researchers the opportunity to schedule appointments to view, research and study works in its permanent collection.

### The CU Art Museum's Permanent Collection

The Permanent Collection of the CU Art Museum contains over 8,800 works of art. The collection includes works from numerous time periods and cultures including ancient Greek pottery, Roman Glass, ancient Iranian pottery, Southwestern and South American santos, Southeast Asian pottery, African sculpture, Old Master works on paper, British 18th century prints, 19th and 20th century American prints and paintings, Japanese *ukiyo-e* prints, 19th century photography, Pop art, Minimalist works on paper and modern and contemporary ceramics, contemporary New Mexican Santos, sculpture, works on paper, paintings, photography, video and new media art.

### Visiting Scholar Program

This program is organized to explore the discipline of art history—its cultural connections, methodological pursuits and its changing nature—by focusing extensively on the research and insights of individual academic experts. Three to five highly regarded art historians and/or art critics speak at a public lecture, presenting current research and published papers.

### Visiting Artist Program

Artists of national and international reputation interact with graduate and advanced undergraduate students and discuss their studio work at seminar meetings. Artists present a public lecture during their visit, providing continuous input of significant developments and a comprehensive view of contemporary issues in the arts.

### Visual Resources Center (VRC)

The mission of the VRC is to provide and facilitate access to images, imaging and related information resources for teaching and research in the Department of Art and Art History. This includes:

1. A departmental image collection and support for other important image resources;
2. Resources, training and support in digital imaging and image presentation software; and
3. Equipment for use in creative work, documentation and classrooms within the department.

The digital image collection contains works by faculty, MFA thesis recipients, visiting artists and other contemporary and historical works. Digital imaging resources include slide and flatbed scanning stations, with training available in digitization standards and best practices. VRC equipment includes laptops, data projectors, digital SLR cameras, video cameras, tripods and other equipment for use in the department. The VRC also circulates its collection of DVDs containing lectures and interviews from the department's Visiting Artist Program. More information is available on the department's Visual Resources Center (http://cuart.colorado.edu/resources/vrc/) webpage.

### Rural Environments Field School

The Art & Rural Environments Field School (http://www.ruralenvironments.org/) is an intensive off-campus course designed for students interested in the intersection of art and the rural environment. The Field School experience puts students in touch with various rural landscapes and focuses on site and context-based approaches to art creation. While living and working together in the field and on the road, students create site-interpretation artworks exploring various mediums including photography, sculpture and drawing, as well as dialogical projects, social actions and collaborative experiments.

Based out of CU Boulder, sessions are open to both CU students and students from further afield. The Field School also partners with various other schools. For students from other universities: in most cases, the 6 hours of Art Practices course credit will transfer to the home institution. This is an advanced or 4000-level course and is also open to graduate students at the 5000 level.

For more information, visit the Department of Art & Art History (http://cuart.colorado.edu/) website.

## Bachelor's Degrees

- Art History - Bachelor of Arts (BA) (p. 137)
- Art Practices - Bachelor of Arts (BA) (p. 138)
- Art Practices - Bachelor of Fine Arts (BFA) (p. 140)

## Minors

- Art History - Minor (p. 141)
- Art Practices - Minor (p. 142)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Alhadeff, Albert (https://experts.colorado.edu/display/fisid_100711/)
Associate Professor; PhD, New York University

Ambrose, Kirk T. (https://experts.colorado.edu/display/fisid_115914/)
Professor; PhD, University of Michigan Ann Arbor

Amerika, Mark (https://experts.colorado.edu/display/fisid_116523/)
Professor; MFA, Brown University

Brown, Marilyn Ruth (https://experts.colorado.edu/display/fisid_143782/)
Professor Emerita; PhD, Yale University

Chamberlin, H. Scott (https://experts.colorado.edu/display/fisid_105456/)
Professor; MFA, New York State College of Ceramics at Alfred University

Chong, Albert (https://experts.colorado.edu/display/fisid_100586/)
Professor; MFA, University of California, San Diego

Christie, Matt
Instructor; MFA, Virginia Commonwealth University

Cline, Clinton C.
Professor Emeritus

Cohen, Brianne Caitlin (https://experts.colorado.edu/display/fisid_159724/)
Assistant Professor; PhD, University of Pittsburgh

Cordova, James M. (https://experts.colorado.edu/display/fisid_146415/)
Associate Professor, Associate Chair; PhD, Tulane University

Day, Robert E.
Professor Emeritus

de Stecher, Annette W. (https://experts.colorado.edu/display/fisid_155095/)
Assistant Professor, Associate Chair; PhD, Carleton University

Dickey, Kimberly (https://experts.colorado.edu/display/fisid_115735/)
Professor; MFA, New York State College of Ceramics at Alfred University

Duresse-Stimilli, Francoise
Associate Professor; MFA, Temple University

Ecker, Robert R.
Professor Emeritus

Farago, Claire Joan (https://experts.colorado.edu/display/fisid_101552/)
Professor Emerita; PhD, University of Virginia

Forsman, Charles S.
Professor Emeritus

Foster, Suzanne R.
Professor Emeritus

Frost, Steven (https://experts.colorado.edu/display/fisid_156502/)
Instructor; MFA, School of Art Institute of Chicago

Geck, Francis J.
Professor Emeritus

Gregorio, Alvin P. (https://experts.colorado.edu/display/fisid_143596/)
Associate Professor; MFA, Claremont Graduate School

Iwamasa, Ken
Professor Emeritus

Kassianidou, Marina (https://experts.colorado.edu/display/fisid_157948/)
Assistant Professor; PhD, Chelsea College of Arts (UK)

Kunkel, Jerry W.
Professor Emeritus

Liotta, Jeanne M. (https://experts.colorado.edu/display/fisid_145808/)
Associate Professor; BFA, New York University

Miller, Kay
Professor Emerita

Minor, Vernon H.
Professor Emeritus

Nauman, Robert (https://experts.colorado.edu/display/fisid_106835/)
Senior Instructor; PhD, University of New Mexico

Potter, Thomas J.
Professor Emeritus

Qualley, Charles A.
Professor Emeritus

Quinn, Jeanne (https://experts.colorado.edu/display/fisid_111658/)
Professor, Chair; MFA, University of Washington

Rivera, George F. Jr. (https://experts.colorado.edu/display/fisid_103055/)
Professor; PhD, SUNY at Buffalo

Roth, Yumi J. (https://experts.colorado.edu/display/fisid_126287/)
Associate Professor; MFA, SUNY College at New Paltz

Sampson, John Franklin
Professor Emeritus

Saxton, Richard W. (https://experts.colorado.edu/display/fisid_144756/)
Associate Professor; MFA, Indiana University Bloomington

Shell, Hanna Rose (https://experts.colorado.edu/display/fisid_163199/)
Associate Professor; PhD, Harvard University

Stevens, Charlene
Associate Professor; MFA, Indiana University Bloomington

Su, Stephanie Wenhui (https://experts.colorado.edu/display/fisid_164186/)
Assistant Professor; PhD, University of Chicago

Sweetman, Alex John (https://experts.colorado.edu/display/fisid_100531/)
Associate Professor; MFA, SUNY at Buffalo

Theodore, Michael (https://experts.colorado.edu/display/fisid_113318/)
Associate Professor; PhD, University of California, San Diego

Tsouhlarakis, Georgianna (https://experts.colorado.edu/display/fisid_165957/)
Assistant Professor; MFA, Yale University

Valdovino, Luis Hector (https://experts.colorado.edu/display/fisid_101863/)
Professor; MFA, University of Illinois at Urbana–Champaign

Vandersall, Amy L.
Professor Emerita

Walker, Melanie (https://experts.colorado.edu/display/fisid_101750/)
Associate Professor; MFA, Florida State University

Wilson, John B.
Professor Emeritus

Wolfe, Lynn Robert
Professor Emeritus

Womack, Mike Fitzgerald (https://experts.colorado.edu/display/fisid_148502/)
Associate Professor, Associate Chair; MFA, Pratt Institute

Woodman, Elizabeth A.
Professor Emerita

Yazzie, Melanie A. (https://experts.colorado.edu/display/fisid_143620/)
Professor; MFA, University of Colorado Boulder

# Courses

## Art History

**ARTH 1500 (3) Global Art and Visual Culture**
Introduces critical issues in the study and interpretation of the arts and visual cultures of Africa, the Americas, Asia, Europe, and Oceania. This course serves as a complement to U.S. Art Across Cultures (ARTH 1600). Themes explored include the conceptual and social status of the artist, cultural exchange, the environment, gender, and power. In lecture and in recitations sections, you will be introduced to methods of object-based research and principles of museum exhibition curation. You will leave this class with an understanding of key concepts and methods in the history of art, as well as familiarity with an array of global visual cultures.
**Recommended:** Corequisite ARTH 1600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**ARTH 1509 (3) Trash and Treasure, Temples and Tombs: Art and Archaeology of the Ancient World**
Introduces the art and archaeology of ancient Egypt, Mesopotamia, Greece and Rome, examining various ancient approaches to power, religion, death and the human body. Analyzes art, architecture and everyday trash to learn about ancient humanity.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 1509
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Art History

**ARTH 1600 (3) U.S. Art Across Cultures**
Examines historical and contemporary issues in American arts and visual culture, emphasizing issues of race, gender, class, cross-cultural interactions, diversity of artistic traditions, and the global position of the United States in the modern world. We will focus on key monuments, objects, artists, and concepts relevant to the American context and impactful across geopolitical borders, ethnic groups, and genders.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ARTH 1709 (3) Critical Introduction to Art History**
Provides a broad introduction to understanding and appreciating art and art history within a critical lecture seminar and discussion format. The focus of this course is a selected Particularly directed to nonmajors.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 2029 (3) Art and Archaeology of Ancient Egypt**
Emphasizes the origin of the Egyptian culture, its importance and its impact on other cultures. In addition, the different points of view of various scholars are discussed with a comparative study of the ancient Egyptian culture and modern culture of Egypt and the Middle East. Formerly ANTH 1160.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 2029
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Art History

**ARTH 2039 (3) Greek Art and Archaeology**
Covers prehistoric Aegean through the fourth century B.C.E., considering architecture, pottery, painting, sculpture and personal ornament. Societal customs such as use of space and burial patterns are considered as well as art and its uses, to help understand developments in Greek culture. Formerly CLAS 3039.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 2039
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 2049 (3) Introduction to Roman Art and Architecture**
Introduces the monuments and sites of the ancient Roman world from the foundation of Rome (753 B.C.E.) to Constantine (306-307 C.E.). Emphasizes the relationship of art, architecture, and artifacts to the political, social, and religious institutions of Italy and the provinces.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 2049
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 2409 (3) Intro to Asian Art**
Designed for those having no previous experience in the study of Asian art. Traces development of sculpture, painting, architecture, and the other visual arts of South Asia, the Far East, and Southeast Asia, with a synopsis of developments from 1453 through the 18th century.
**Additional Information:** GT Pathways: GT-AH1 - Arts Hum: Arts Expression
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History
Departmental Category: Asia Content

**ARTH 3009 (3) Critical Thinking in Art History**
Through structured discussions, selected readings, and written assignments provides an understanding of how art history has evolved as an academic discipline and how art historians evaluate complex issues of style, form, content, and theory in the visual arts.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3019 (3) Pompeii and the Cities of Vesuvius**
Introduces the towns and villas buried by the eruption of Mt. Vesuvius in 79 C.E. Explores the layout and decoration of ancient Roman houses, the variety of artifacts uncovered as evidence for daily life and the history of the excavations.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 3019
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3079 (3) Medieval Art Survey**
Surveys the history of Western art from Constantine to around the year 1300, including Carolingian, Ottonian, Anglo-Saxon, Romanesque, and Gothic. Considers "Barbarian," Byzantine, and Islamic influences.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3109 (3) Art in Contemporary Society**
Examines writings by philosophers and art critics as they address the question: What is art for? Readings focus on the 19th and 20th centuries, including current theories and some non-Western theories. Students are encouraged to develop their own responses to the question.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3241 (3) Art in Islamic Cultures**
Offers an overview of art in Islamic cultures. Discusses a range of literary texts and images in order to understand these cultures. Offers an opportunity for undergraduates to expand their understanding of literature and art history. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** ARAB 3241
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3301 (3) Modern Art and Design at the Bauhaus**
Introduces the art, architecture, and design of the Bauhaus, the most influential European art school in the twentieth century. Examines the Bauhaus as a utopian project to design a new modern lifestyle. The course explores the relation of the Bauhaus to its cultural, political, gendered, and economic contexts.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 3301

**ARTH 3329 (3) Art in France: Revolution to 1870**
Covers major art movements and theories in France from 1793 to 1870 on location in Paris. Students study ceramics, painting, sculpture, photography and some architecture. Political and cultural events are considered for their influence on art: excavations at Pompeii, colonial expansion in Middle East and Africa, influx of Asian art, exploration of Americas and various technical inventions.
**Recommended:** Prerequisites ARTH 1500/1600 and second semester sophomore, junior or senior standing.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3339 (3) Art in France: 1870-1970**
Covers major art movements and theories in France from the Paris Commune through 1970 on location in Paris. Students study ceramics, painting, sculpture, photography and some architecture. Political and cultural events are considered for their influence on art: excavations at Pompeii, colonial expansion in Middle East and Africa, influx of Asian art, exploration of Americas and various technical inventions.
**Recommended:** Prerequisite ARTH 1500/1600 and second semester sophomore, junior or senior standing.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3359 (3) Art in Spain: Goya to 1900**
Explores the scope of Goya's works in context of his contemporaries and antecedent, Velazquez; Moorish influences, genre painting costumbrismo, Romanticism and historical narratives are considered in relation to Enlightenment ideals, French Neoclassicism, Romanticism, Orientalism and the Napoleonic invasion. Teaching occurs mostly on site: Alhambra, Prado, Bellas Artes, Palacio Real, Museo de Romanticismo; seminars and tests are in Madrid classrooms.
**Recommended:** Prerequisite ARTH 1500/1600.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3369 (3) Art in Spain: 1900-1990**
Covers Gaudi, Picasso and artists of Modernismo movement as well as Dali are studied in Barcelona; Dada and Surrealism are explored through works of Picasso, Gonzalez, Gris, Varo, Dali, Bunuel and others. Photography and film of Spanish Civil War and thereafter are studied in seminar in Madrid classroom; students experience flamenco performances and Q&A with performers. Tests administered in class.
**Recommended:** Prerequisite ARTH 1500/1600.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3419 (3) Modern Art Survey**
Surveys the loss of beauty in art and discusses whether or not that loss is regrettable. Questions the function and historical meaning of modern and postmodern art: is it all hype and strategic positioning by artists for fame and fortune? Is it serious? Are the fine arts still fine?
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3429 (3) Native North American Art I**
This course is the first half of a two-semester survey of historic Native American art of North America. We explore the historical arts of Indigenous peoples of the Southwest, Northwest Coast, and Arctic regions of North America. As a survey of the arts of these regions, the aim of the course is to engage students with Native North American art forms in their richness, diversity, and temporal depth, from arts known through the archaeological record to arts of the twentieth and twenty-first centuries.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ARTH 3439 (3) Native North American Art II**
This course explores the historical and contemporary arts of Indigenous peoples of the Southeast, Eastern Woodlands, Great Plains, and California, in their richness, diversity, and temporal depth. We will explore the value and role of these art forms to Indigenous nations and communities. We will address issues of DEI and colonial histories, and themes of cultural continuity, survivance, and gender.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ARTH 3509 (3) American Art**
Surveys American art and material culture from the precolonial era to the present day. Considers cultural and artistic interaction, ethnic expressions, patronage, European and non-Western influences, and the struggle to develop a uniquely American artistic identity.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3519 (3) Modern Architecture, 1780--1960**
Introduces the major movements and developments in European and American architecture from Neoclassicism to Postmodernism. Considers the impact of exhibitions, expositions, and vernacular architecture.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3529 (3) Black Art in America**
The course explores the work of Black artists in the United States, from the late nineteenth century to the present. Lectures will cover a range of visual media, including painting, sculpture, prints, photography, video, and performance.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ARTH 3539 (3) Contemporary Art**
Examines contemporary art and theory in the transition from modern to postmodern expression. Discusses painting, sculpture, installations, performance, video, photography, and architecture with attention to historical context and criticism. Considers neoexpressionist, feminist, minority, political, and public art.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3619 (3) The Arts of China**
Surveys Chinese painting, sculpture, architecture, and other arts from neolithic to modern times.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History
Departmental Category: Asia Content

**ARTH 3629 (3) The Arts of Japan**
Offers an appreciation and chronological development of the arts of Japan. Emphasizes the arts of Shintoism and Buddhism as well as the particular Japanese aesthetic from prehistoric times to the present.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History
Departmental Category: Asia Content

**ARTH 3719 (3) History of Media Arts**
Surveys the development of technological media both as sources of information and as art. Photography and related media, film, video, holography, and electronic imaging systems are surveyed as art and as technologies, emphasizing major artists, movements, exhibitions, and other productions in the 19th and 20th centuries.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3729 (3) Foundations in Latin American Art**
Examines Latin America's cultural pluralism and visual production beginning in Pre-Colombian times and following through to the present day. Considers the various functions of art as well as the relationship between objects, artists, and the cultures from which they come. Focuses on how visual objects and images communicate across cultures including in times of political and social conflict. Provides students with a broad frame of reference for many historical periods, cultural/ethnic groups, and equips students to evaluate images and objects and their proper cultural contexts.
**Recommended:** Prerequisites ARTH 1500 and/or ARTH 1600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3919 (3) Seminar: Topics in Art History**
Seminar course dealing with selected areas or problems within the history of art. Consult current online Schedule Planner for seminar topic.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**ARTH 3929 (1-3) Special Topics in Art History**
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4029 (1) Art History Research Methods**
In this class we will investigate how art scholarship is formed and organized; learn to expertly navigate the vast array of art research resources; and explore advanced techniques for searching both online and offline sources of art information. We will work to develop a critical understanding of our own research processes and reflect on the tools and techniques that lead to both expert research and successful participation in art discourse.
**Equivalent - Duplicate Degree Credit Not Granted:** LIBR 4029 and ARTH 5029
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4069 (3) Medieval Manuscripts**
Surveys decorated books from late antiquity to the advent of the printing press. Examines the various roles manuscripts played within different medieval communities.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4079 (3) Early Medieval Art**
Addresses critical issues in art and architecture from the late Roman Empire (approximately 250 CE) to approximately 1000 CE. The course covers a broad geographic range, including Byzantium, the early Islamic empires, and the Silk Road, in addition to Western Europe. The course will consider the religious, social, and economic roles of art and architecture and will explore the process of creating art and the agency of artists in the early middle ages.
**Recommended:** Prerequisite ARTH 1500 or ARTH 3079.

**ARTH 4089 (3) Romanesque and Gothic Art**
Examines major artistic trends in Europe between the years 1000 and 1300, a period that witnessed, among others, the development of gothic cathedrals and the rise of the professional artist. Particular attention will be given to exchange with other cultures.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4099 (3) Ancient Greek Sculpture**
Understanding that Greek sculpture, like all visual media, was part of the fabric of ancient Greek life and expressed the values of its creators and audience is a valuable way to gain insights into the social, economic, and political world of ancient Greece. This course will examine the work of Greek sculptors from the Archaic to the Hellenistic period. Key stylistic and technical developments, as well as significant works of art, sculptors and workshops will be discussed in detail. Some issues we will consider are the physical, religious and/or socio-historical context of individual freestanding sculptures and how specific sculptural programs illustrate aspects of Greek culture. Iconographic and narrative choices made by artists working in stone, compared to other material, will also be addressed.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5099, CLAS 4099 and ARTH 5099

**ARTH 4109 (3) Ancient Italian Painting**
Explores the problems, theories and methods for understanding the iconography, styles, topologies, contexts and techniques of fresco wall painting in ancient Italy from the 6th century B.C.E. to the 4th century C.E. Topics covered include Etruscan tomb paintings, late Republican and early imperial fresco paintings from Rome and Campania and later Roman wall paintings, including the painted images in ancient catacombs. Previous coursework on ancient Italy or the history of pre-modern art is highly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 5109 and CLAS 4109 and CLAS 5109
**Recommended:** Prerequisite CLAS 1509 or ARTH 1509 or CLAS 2049 or ARTH 2049.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Art History

**ARTH 4119 (3) Roman Sculpture**
Examines ancient Roman sculpture, emphasizing the display, iconography, and production of private and public monuments in the Roman Empire. Explores sculpture as evidence for historical developments, societal and gender attitudes, and state ideologies in the ancient Roman world.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 5119 and CLAS 4119 and CLAS 5119
**Recommended:** Prerequisite ARTH 1500/1600 or CLAS 2049.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Art History

**ARTH 4129 (3) Aegean Art and Archaeology**
Detailed study of the cultures of prehistoric Greece, the Cycladic Islands and Crete, their art and archaeology and their history within the broader context of the eastern Mediterranean, from earliest human settlement to the collapse of the Bronze Age at about 1100 B.C.E. Emphasis is on palace states.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4129 and ANTH 5129 and CLAS 4129 and CLAS 5129
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Art History

**ARTH 4139 (3) Greek Vase Painting**
A comprehensive overview of Greek vase painting, from prehistoric through the fourth century B.C.E. Emphasis is on learning the development of primary decorative styles and on refining skills of visual analysis, scholarly research, critical thinking, oral commentary and written presentation.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 5139 and CLAS 4139 and CLAS 5139
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Art History

**ARTH 4149 (3) Greek Cities and Sanctuaries**
Examines Greek architecture in context, from the ninth century B.C.E. into the Hellenistic period, considering the use of space, both in religious and in civic settings and using texts as well as material culture. Emphasis is on developing analytical skills.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4149 and CLAS 5149
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Art History

**ARTH 4169 (3) Topics in Ancient and Classical Art and Archaeology**
In-depth consideration of an aspect of ancient Mediterranean culture. Topics vary and may include ancient wall painting, Greek sculpture, artists and patrons, the ancient Near East, Egyptian art and archaeology, or Etruscan art and archaeology.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5169 and CLAS 4169 and ARTH 5169
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Art History

**ARTH 4189 (3) Medieval Art**
Focuses on one area of medieval art. Topics vary, but may include Carolingian, Ottonian, Romanesque, or Gothic art. Emphasizes critical thinking, methods of scholarly research, and development of writing skills.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Art History

**ARTH 4199 (3) Roman Architecture**
Examines the designs, functions and construction methods of ancient Roman towns, temples, baths, houses and civic structures, as well as utilitarian structures including roads and aqueducts. Emphasizes Roman architectural forms and spaces as vehicles for political propaganda and empire consolidation.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4199 and CLAS 5199
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Art History

**ARTH 4209 (6) Classical Archaeological Field Methods**
Offers experiential learning in theories and methods of archaeological fieldwork in the western Argolid in Greece. Applies methods for extensive survey, stratigraphic excavation, GIS modeling, ceramic analysis, numismatic analysis, architectural studies, artifact and data processing and documentation. Offered abroad only.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4209 and CLAS 5209
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Recommended:** Prerequisites CLAS 1509 or ARTH 1509 or CLAS/ARTH 2039 or CLAS/ARTH 2049.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Art History

**ARTH 4229 (3) Ancient Egyptian Art and Archaeology**
Archaeology of ancient Egypt in light of recent excavations; the history of excavations of the different sites; and the art of ancient Egypt through time. Formerly ANTH 4420.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 5229 and CLAS 4229 and CLAS 5229
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Art History

**ARTH 4259 (3) Afrofuturism**
This course will introduce students to core concepts of Afrofuturism and demonstrate how the artistic works associated with this movement offers a distinct form of black cultural knowledge. Together we will engage visual art, visual culture, film, and other media to explore how artists and other cultural producers have deployed science fiction, speculative fiction, and fantasy to imagine alternative futures as well as to interrogate current racial formations.

**ARTH 4269 (3) Art and Archaeology of the Ancient Near East**
Examines the diverse multicultural civilizations of the Iran-Iraq region and Anatolia from the rise of urbanism in Mesopotamia through the era of the first 'world empire,' Achaemenid Persia. Emphasizes the material record of religious and state institutions of the ancient Near East, especially monuments that illustrate concepts of power and communication. Explores notions of style, symbolism, visual rhetoric, text-image synthesis, patronage, creativity, trade, religion, gender, identity and roles of artists. How do inter-communal relations, cross-cultural exchange, innovation and artistic production, movement and migration, relate to the development and expression of hegemonic power and of empire, and the marginalization of some? What is the role of economics and commerce in these processes? May be repeated twice for credit if the topic is different.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5269 and CLAS 4269 and ARTH 5269
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite CLAS 1509 or ARTH 1509.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Art History
Departmental Category: Asia Content

**ARTH 4279 (3) Michelangelo (1475-1564)**
Focuses on Michelangelo's long career, marked by outstanding achievements in sculpture, painting, architecture and poetry. Emphasizes his projects and achievements in light of 16th century artistic theory, including relationships to his contemporaries in the arts and literature.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4309 (3) Neoclassicism and Romanticism: 1760-1840**
Surveys painting and sculpture in England and France from the last quarter of the 18th century through the first half of the 19th century.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4319 (3) European Art from 1830 to 1886**
Surveys the major movements in painting in France and England from the Revolution of 1830 to the impressionist crisis of 1886. Emphasizes and discusses painting and major expressions in sculpture and architecture.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4329 (3) Modern Art 1**
Provides an in-depth study of the fin de siecle, stressing postimpressionism, art nouveau and symbolism. Concludes with fauvism in France and the expressionist movement in Germany.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4339 (3) Modern Art 2**
Begins with early Picasso and cubism, including analytic and synthetic cubism and emphasizing the various isms of the 20th century. Also studies Italian futurism, de Stijl and the Bauhaus, dada and surrealism.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4419 (3) The Arts of Colonial Mexico and Peru**
Examines important works, artists, and themes that comprise the artistic production of colonial Mexico and Peru. Focuses on the intermingling, convergence, and conflict of European, Amerindian, Creole, mestizo, and African groups, which established the foundation of Latin America's cultural pluralism.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 4419
**Recommended:** Prerequisites ARTH 1500, ARTH 1600, ARTH 3729.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4449 (3) Arts of India and Southeast Asia**
Surveys Indian painting, sculpture and architecture from its earliest phases in the Indus Valley through the Mughal Empire. Encompasses Hindu, Buddhist and Islamic art of the subcontinent and Southeast Asia, as well as Himalayan cultures directly impacted by India's artistic legacies. Department enforced prerequisite: one 3000-level art history course (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4459 (3) Precolumbian Art of Mesoamerica**
Introduces students to the art, architecture, and cultures of Mesoamerica, a region that encompasses modern-day Mexico, Guatemala, Belize, and parts of El Salvador, and Honduras. Focuses on major Pre-Columbian art objects and monuments to learn about the societies and cultures from which they came. Also considers the various roles that the visual arts and architecture played in these societies. Covers Olmec through Aztec civilizations.
**Recommended:** Prerequisite ARTH 3729.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4559 (3) Twentieth-Century Architecture**
Examines the major movements and development in European and American architecture, 1900-1960's. Considers the major styles, as well as cultural interactions, race/ethnicity, gender and class concerns as they relate to both the practice and profession of architecture.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4569 (3) United States Architecture**
Examines architecture as it developed in the area now defined as the continental United States from early cultures to the present. Considers the major styles and issues of cultural interaction, race/ethnicity, gender and class concerns as they relate to the practice, theory, and profession of architecture.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4599 (3) Contemporary Architecture**
Examines the history and theory of contemporary architecture. In the field of architecture, theory and history differ in that the former describes and analyzes past work, while theory offers alternative solutions or new strategies for approaching the discipline. Both of these components are key to understanding contemporary architecture, and this course will work between the two modes of understanding.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4609 (3) Critical Issues in Photography**
Examines the history and theory of photography and the relationship of photography to the other arts, as well as to literary, political, social and philosophical issues. Analyzes the critical issues that inform photography through the writings of critics, historians, and photographers using both thematic and chronological approaches.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4639 (3) Manet Seminar**
Introduces current Manet studies and research methods by drawing upon recent books, exhibition catalogues, and scholarly journal articles. Fulfills requirement for ARTH 4919, Capstone Seminar.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4649 (3) Impressionism & Post-Impressionism**
Fosters creative study of the background and foundation in modern art. Considers 19th-century European painting and, to a lesser degree, sculpture, in relation to social, cultural, and political history from 1863 to 1900. Focuses on France, but gives attention to other countries as well.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4669 (3) Romanticism & Realism**
Fosters creative study of the background and foundation of modern art. Considers 19th-century European (and, to a lesser degree, American) painting and sculpture in relation to social, cultural, and political history from 1789 (the French Revolution) to 1863 (the Salon des refuses). Focuses on France, but gives attention to other countries as well.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4689 (3) Post-Impressionism Seminar**
Introduces current Post-Impressionism studies and research methods by drawing upon recent books, exhibition catalogues, and scholarly journal articles.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4699 (3) The Idea of Art**
Studies contemporary critiques of historical ideas about the twin institutions of the university and the museum and the role of art history in the cultural mission of both. Explores fundamental questions about the role of art in society through weekly discussions of readings, a class presentation, and final research. Fulfills ARTH 4919 capstone seminar required for art history majors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4739 (3) The Intellectual Roots of Italian Renaissance Art**
Studies critical issues raised in the literature on art, focusing on Renaissance interpretations of key historical themes such as imitation and decorum. Carefully examines the language used in primary sources (available in English).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4749 (3) Italian Renaissance Art: Studies in the Exchange between Theory and Practice**
Addresses how artists developed new compositional procedures, graphic techniques and audiences, and how these procedures were theorized in an age when artists' intellectual and social status rose dramatically. Explores reception of new graphic technology. Studies specific commissions and primary texts in depth.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4769 (3) Gender Studies in Early Modern Visual Culture**
Examines 15th and 16th century European ideas about women from a variety of feminist perspectives. Focuses on recent contributions to history of women as they intersect with the visual arts.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4769
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Art History

**ARTH 4909 (1-3) Independent Study---Art History**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Art History

**ARTH 4919 (3) Capstone Seminar: Topics in Art History**
Seminar course dealing with selected areas or problems within the history of art. Consult current online Schedule Planner for seminar topic.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4929 (1-3) Special Topics in Art History**
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 5929
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4939 (3-6) Art Museum Internship**
Focuses on opportunities at the Denver Art Museum, working with individual curators and master teachers in selected areas, such as audience interpretation, interpretive research files, and public school curriculums. Introduces students to the professional culture and activities of art museums.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 5939
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Art History

**ARTH 4959 (3) Art History Honors Thesis**
May be elected during the final semester. Consists of a substantial, original written thesis. Requires faculty sponsorship. Does not guarantee a student will receive honors.
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Art History

## Art Studio and Non-Studio

**ARTS 1003 (3) Printmaking for Non-Majors**
An introduction to basic printmaking processes. The course will focus on two projects using drypoint methods and two projects focused on relief methods to introduce concepts used in the field of printmaking. This course encourages further study into other printmaking courses.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Printmaking

**ARTS 1010 (3) Introduction to Studio Art**
Presents creative activity conceptually, and art history thematically, with an interdisciplinary, experimental, and multicultural focus. Fine arts majors explore visual literacy and culture through presentations and student-centered projects that emphasize individual development.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Foundations

**ARTS 1012 (3) Drawing for Non-Majors**
Explores varied drawing techniques and media. Introduces concepts relevant to the understanding of drawing and the creative process. May not be repeated.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Painting/Drawing

**ARTS 1020 (3) Introduction to Studio Art 2**
Presents creative activity conceptually and art history thematically, with an interdisciplinary, experimental, and multicultural focus. Art and art history majors explore visual literacy and culture through presentations and student-centered projects that emphasize individual development.
**Requisites:** Requires prerequisite course of ARTS 1010 (minimum grade C-). Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Foundations

**ARTS 1030 (3) Principles of Color**
Introduces the relative effects of color as used by the artist. Emphasizes the practice of color relations including basic characteristics, mixtures, illusions, optical mixture, color intervals, and color quantity. May not be repeated.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Foundations

**ARTS 1171 (3) Photography for Non-Majors**
An introduction to contemporary photographic practice. The course introduces photographic technique, history, and image evaluation while emphasizing visual literacy, conceptual development and personal expression.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 2171
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Photography

**ARTS 1212 (3) Painting for Non-Majors**
Explores varied painting techniques. Introduces concepts relevant to the understanding of painting and the creative process. May not be repeated.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Painting/Drawing

**ARTS 1514 (3) Sculpture for Non-Majors**
Offers an orientation involving three-dimensional form and application. Studies expressive and conceptual problems based on non-objective form relationships in various sculptural materials. May not be repeated.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 1875 (3) Ceramics for Non-Majors**
Encompasses broad and fundamental uses of clay. Basic instruction and demonstration of throwing, hand building, and other clay forming methods. Investigates utility, function, and ceramics in the broader context of contemporary art. Slide presentations explore historical and contemporary attitudes involving ceramics.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Ceramics

**ARTS 2004 (3) Participatory Objects (Sculpture and Post-Studio Practice)**
Looks at the tendency in contemporary sculpture to create interactive objects and experiences for the viewer. Students in this course are required to create hands-on projects, participate in group critiques and develop presentations and research projects.
**Recommended:** Prerequisite ARTS 1010 with (minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 2022 (3) Beginning Drawing**
Emphasizes proportion and perspective through observation based drawing. Students are introduced to various drawing materials and learn to translate what they see into drawing media using two basic subjects: still-life and the figure.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Painting/Drawing

**ARTS 2085 (3) Ceramics 2: Handbuilding**
Introduces techniques of hand-built clay forms as they relate to functional and sculptural projects. Various conceptual themes, as well as construction, glazing and firing methods are explored. Emphasizes ceramic art making within the broader context of historical ceramic traditions and contemporary art practices. May not be repeated. Priority registration will be given to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Recommended:** Prerequisites ARTS 1010, ARTS 1020, ARTH 1500, and ARTH 1600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Ceramics

**ARTS 2095 (3) Ceramics 2: Wheelthrowing**
Introduces techniques of wheel-thrown forms as they relate to functional and nonfunctional vessel making. Various conceptual themes, as well as construction, glazing and firing methods are explored. Emphasizes ceramic art making within the broader context of historical ceramic traditions and contemporary art practices. May not be repeated. Priority registration will be given to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Recommended:** Prerequisites ARTS 1010, ARTS 1020, ARTH 1500, and ARTH 1600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Ceramics

**ARTS 2104 (3) Colossal Objects (Sculpture and Post-Studio Practice)**
Focuses on the conception, design and production of art works that are larger than human scale. Each object will be the result of individual and team design collaboration. Primarily focuses on sculpture constructed and engineered from metal although other materials are welcome.
**Recommended:** Prerequisite ARTS 1010 (with a minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 2126 (3) Digital Art 1**
An introductory course in the use of the personal computer to create and process images in the visual arts.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Media Arts

**ARTS 2171 (3) Photography 1**
An introduction to contemporary photographic practice. The course introduces photographic technique, history, and image evaluation while emphasizing visual literacy, conceptual development and personal expression.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 1171
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Photography

**ARTS 2191 (3) Photography 2**
Explores more sophisticated technical and conceptual skills to the creative process.
**Requisites:** Requires prerequisite course of ARTS 1171 or ARTS 2171 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Photography

**ARTS 2194 (3) Nothing Flat: Project a Week (Sculpture and Post-Studio Practice)**
Provides students the opportunity to work with a range of sculptural materials through a series of quick projects (e.g. installation, objects, writing). Students will learn to generate ideas quickly, engage issues and formats particular to sculpture, and produce a wide range of work over 15 weeks.
**Requisites:** Requires prerequisite course of ARTS 1010 (minimum grade C-).
**Grading Basis:** Letter Grade

**ARTS 2222 (3) Beginning Painting**
Emphasizes color and descriptive mark making through observation based painting. Students are introduced to various painting materials and learn to translate what they see into painting media using two basic subjects: still-life and the figure.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Painting/Drawing

**ARTS 2244 (3) Drawing for Sculpture (Sculpture and Post-Studio Practice)**
Explores and examines many relationships between sculpture and drawing. Projects will explore 2-D drawing and mixed media projects through the lens of sculptural practice. Scale, materials and styles will be researched along with topics such as the artists proposal, investigative processes, drawing and sculptural installations.
**Recommended:** Prerequisite ARTS 1010 (with a minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 2284 (3) Nothing Flat 1: Project a Week (Sculpture & Post-Studio Practice)**
Provides students the opportunity to work with a range of sculptural materials through a series of quick projects (e.g. installation, objects, writing). Students will learn to generate ideas quickly, engage issues and formats particular to sculpture, and produce a wide range of work over 15 weeks.
**Requisites:** Requires prerequisite course of ARTS 1010 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ARTS 2303 (3) Beginning Relief**
Emphasis on introductions to the concepts and techniques of relief processes, including white line, black line and four color reductive processes. Students will gain a working knowledge of fundamental relief processes, plus safe and appropriate use of all materials and equipment in the studio.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Printmaking

**ARTS 2384 (3) Fleeting and Found 1: Ephemeral Sculpture 1**
Focuses on introductory level processes of creating sculpture projects which are ephemeral and temporary. Themes of process, lifespan, migration, tension, entropy, and degradation will be explored. This course will include lectures, readings and discussions, writing assignments, studio projects, and visual presentations.
**Requisites:** Requires prerequisite course of ARTS 1010 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 2403 (3) Beginning Intaglio**
Introduction to techniques of Intaglio and a focus on working with copper and ferric chloride. Historical approaches and use through contemporary materials/concepts. Emphasizes interrelationship of process, materials, and ideas/aesthetics.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Printmaking

**ARTS 2413 (3) Beginning Lithography**
Exploration into stone lithography and aluminum plate is presented in this class. Individual direction and development of conceptual focus and studio techniques are important objectives in this class. Safer ways to make lithographs is highlighted and the toxic traditional methods are left behind.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Printmaking

**ARTS 2423 (3) Beginning Screenprinting**
Exploration into screenprinting at the basic level, using stencil-making processes for screenprinting with acrylic-based screenprinting inks. Emphasis is placed on exploring and developing challenging concepts, mastering basic techniques and creating compositions and visual images that successfully convey your concept and challenge the viewer. Course is focused on the art of fine art printing on paper.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Printmaking

**ARTS 2433 (3) Beginning Alternative Printmaking**
Presents creative development of concepts in printmaking beyond the traditional two-dimensional image on paper that is contained in a portfolio or frame. Focus will be made on expanding the concept of what is a print will be explored in relation to each student's studio practice and interests.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Printmaking

**ARTS 2453 (3) Beginning Monotype**
Introduces the monoprint and monotype methods. Students will learn the about making non-editioned prints using a variety of four or more technical approaches. These processes will be discussed and demonstrated in depth. Students will develop a portfolio of finished prints during the semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Printmaking

**ARTS 2504 (3) Basic Sculpture: Materials and Techniques**
Introduces the basic properties of metal, wood and mold making. Students will explore and demonstrate an understanding of basic fabrication methods involved in each element. Students will investigate both traditional and non-traditional working methods and will consider how materials and techniques inform sculptural concepts.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 2524 (3) Visual Thinking (Sculpture and Post-Studio Practice)**
Explores ideas concerning the structure and nature of visual thinking and their relationship to the creative thought process. Investigates form in terms of the organizing principles of three-dimensional design and its application to contemporary sculpture. Includes lecture and studio projects.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 3004 (3) Land and Environmental Art (Sculpture and Post-Studio Practice)**
Covers land and environmental art, providing an historical survey along with hands on projects in the landscape. Focusing on themes of site, environment, landforms, weather and earth materials, students will design and realize art projects on the land. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 3012 (3) Figure Drawing**
Explores varied drawing techniques and media. Introduces concepts relevant to the understanding of drawing and the creative process. May not be repeated. Formerly ARTS 2002.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Students are also eligible to take this class with instructor permission if they have taken a non-majors class in Drawing.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Painting/Drawing

**ARTS 3014 (3) Art and Social Practice (Sculpture and Post-Studio Practice)**
Covers social art practice, providing an historical survey along with hands on projects in social environments. Focusing on issues of public space, economic and cultural marginalization and political causes, this course provides students a forum for expressions of social reality. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 3017 (1-3) Special Topics in Studio Arts**
Introduces timely subjects in studio arts courses that cannot be offered on a regular basis. Information concerning the topics in any given semester is available prior to pre-registration from the department of Art and Art History.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Requires prerequisite courses of ARTS 1010 and ARTS 1020 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Seminars/Special Topics

**ARTS 3020 (3) Color Theory**
Color Theory is a 3000-level stand-alone course that is far more involved and complex than the brief color segments offered in a traditional foundations program. The implications are consequential to painting specifically, but also any other media that involves color. Color will be investigated from three main vantage points--theoretical: students will learn the underlying properties and relationships that exist within a complete palette of color; phenomenological: students will learn how color is observed in the world on a 3-dimensinoal object and on a flat surface; and psychological: students will learn various techniques for understanding the emotional interpretation and symbolic meaning of an array of colors.
**Requisites:** Requires perquisite courses of ARTS 1010 or ARTS 1020 or ARTS 1212 or ARTS 1012 (min grade C-).
**Grading Basis:** Letter Grade

**ARTS 3022 (3) Intermediate Drawing**
In addition to being a continuation of Beginning Drawing, Intermediate Drawing will focus on a non-traditional approach to making images encouraging conceptual development, experimentation and research. Moving beyond observation based drawings multiple thematic possibilities will be explored. Emphasis will be placed equally on ideas and technical execution.
**Requisites:** Requires prerequisite courses of ARTS 1010, 1020 and 2022 (all minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Painting/Drawing

**ARTS 3054 (3) Sculpture: Modules and Multiples 2**
Exposes students to the practice of creating large works through smaller multiples and modules. By learning about the practices of artists such as Andy Warhol, Joseph Beuys, Rachel Whlteread and Robert Gober, along with many others, students will generate an understanding and appreciation for the module and multiple in contemporary art practice. Students will learn to cast using plaster and other type of molds, will be introduced to jigs as a way to streamline production of multiple objects and will work with found objects. Students will be required to complete 3 projects, participate in group critiques of projects, produce a slide presentation on a contemporary artist whose work/practice fits within the theme of the course and prepare a final portfolio. Studio work and demonstrations will be augmented by readings and discussions on contemporary art.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisite ARTS 2504.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 3075 (3) Ceramics 2: Wheelthrowing**
Introduces techniques of wheel-thrown forms as they relate to functional and nonfunctional vessel making. Various conceptual themes, as well as construction, glazing and firing methods are explored. Emphasizes ceramic art making within the broader context of historical ceramic traditions and contemporary art practices. May not be repeated. Priority registration will be given to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Recommended:** Prerequisites ARTS 1010, ARTS 1020, ARTH 1500, and ARTH 1600.

**ARTS 3085 (3) Ceramics 3**
Further exploration of techniques approached in ARTS 2085 and ARTS 3075. Students are encouraged to develop personal concentration in relation to ceramic medium. More advanced technical concepts are introduced such as slip-casting, mold making and glaze palette development. Research, reading and writing addressing contemporary ceramic art is required. Must be taken twice before registering for ARTS 4085 - Advanced Ceramics.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of (ARTS 2085 or ARTS 1875) and ARTS 3075 (all minimum grade C-). Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Ceramics

**ARTS 3097 (1-3) Special Topics - Non-Studio**
Introduces timely subjects in fine arts that cannot be offered on a regular basis. Information concerning the topics offered in any given semester is available prior to preregistration from the Department of Art and Art History.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Requires prerequisite courses of ARTS 1010 and ARTS 1020 (all minimum grade C-). Restricted to Studio Arts (AASA) or Fine Arts-Studio (BASA and BFAS) or Fine Arts-Art History (BAAH) or Art History (AAAH) majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Seminars/Special Topics

**ARTS 3124 (3) Intervention, Exchange, and Duration (Sculpture & Post-Studio Practice)**
Focuses on the production of works of art outside of the traditional studio, museum and gallery. Projects will be designed to interrupt, intervene, co-opt, provide a service, exist for a defined amount of time, or engage a site, community or situation. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisite ARTS 2504.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 3171 (3) Photography 2**
Explores more sophisticated technical and conceptual skills to the creative process.
**Requisites:** Requires prerequisite course of ARTS 1171 or ARTS 2171 (minimum grade C-).

**ARTS 3184 (3) Nothing Flat: Project a Week (Sculpture & Post-Studio Practice)**
Provides students the opportunity to work with a range of sculptural materials through a series of quick projects (e.g. installation, objects, writing). Students will learn to generate ideas quickly, engage issues and formats particular to sculpture, and produce a wide range of work over 15 weeks. Formerly ARTS 2184.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisite ARTS 2504.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 3191 (3) Photography 3**
Continues the exploration of the possibility of individual photographic expression. Students are encouraged to discover and develop a personal position in relation to the medium.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 3171 (minimum grade C-). Restricted to Studio Arts (AASA) or Art History (AAAH) majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Photography

**ARTS 3212 (3) Figure Painting**
Explores varied painting techniques. Introduces concepts relevant to the understanding of painting and the creative process. Student is also eligible to take this class if they have taken a Non-Majors class in Drawing. Please contact the instructor for permission. May not be repeated. Formerly ARTS 2202.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Painting/Drawing

**ARTS 3222 (3) Intermediate Painting**
In addition to being a continuation of Beginning Painting, this course focuses on a non-traditional approach to making paintings encouraging conceptual development, experimentation and research. Moving beyond observation based painting multiple thematic possibilities will be explored. Emphasis will be placed equally on ideas and technical execution.
**Requisites:** Requires prerequisite courses of ARTS 1010 and ARTS 1020 and ARTS 2222 (all minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Painting/Drawing

**ARTS 3224 (3) Picturing Sculpture**
Explores the many ways photography and other forms of imagery have been utilized in the field of sculpture. Students will start from the sculptural, but those objects and installations will function as an intermediary to creating final work that will rest in the image. Include lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 3284 (3) Nothing Flat 2: Project a Week (Sculpture and Post-Studio Practice)**
Provides students the opportunity to work with a range of sculptural materials through a series of quick projects (e.g. installation, objects, writing). Students will learn to generate ideas quickly, engage issues and formats particular to sculpture, and produces a wide range of work over 15 weeks. This course builds on ideas introduced in Nothing Flat 1.
**Requisites:** Requires prerequisite course of ARTS 1020 and prerequisite or corequisite course of ARTS 2504 (all minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ARTS 3303 (3) Relief 1**
Continued exploration of relief processes: various techniques of the collage process in combination with the art and process of the collograph. Examining the collage aesthetic, creating collages and collograph prints from found materials and objects. Other skills to be focused on include registration methods, blend rolls and the experimentation with rubbings.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of ARTS 1010 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Recommended:** Prerequisite ARTS 1020.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Printmaking

**ARTS 3354 (3) Bend, Build, Burn: Sculpture in Wood**
Focuses on the production of works of art in wood. Class projects explore building, bending, and burning with wood. Focuses on sculptural constructed objects although possibilities of installation, site-specific and public art will also be explored.
**Requisites:** Requires prerequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 3384 (3) Fleeting and Found 2: Ephemeral Sculpture 2**
Focuses on creating sculpture projects which are ephemeral and temporary. Themes of process, lifespan, migration, tension, entropy and degradation will be explored. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite course of ARTS 1010 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 3403 (3) Intaglio 1**
Intaglio 1 is a continued exploration of techniques of intaglio processes, including non-acid and ferric chloride techniques with copper as the main plate being used. Focus on the following methods such as line etch, aquatint, soft ground and an introduction to multiple plate printing.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of ARTS 1010 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Recommended:** Prerequisite ARTS 1020.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Printmaking

**ARTS 3413 (3) Lithography 1**
Introduces the study of stone and metal plate lithography, emphasizing individual creative development in black and white and further development in color printing processes. Not available to freshmen.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of ARTS 1010 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Recommended:** Prerequisite ARTS 1020.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Printmaking

**ARTS 3423 (3) Screen Printing 1**
Introduces the study of silkscreen techniques, emphasizing creativity, individual development, and experimentation in contemporary silkscreen processes.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 1010 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Recommended:** Prerequisite ARTS 1020.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Printmaking

**ARTS 3433 (3) Alternative Printmaking 1**
Continued exploration into the development of alternative techniques and materials, methods of extending the print beyond 2-dimensions and expanding the concept of what is a print will be explored in relation to each student's studio practice and interests.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of ARTS 1010 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Recommended:** Prerequisite ARTS 1020.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Printmaking

**ARTS 3434 (3) Collaboration: Art and Collective Action**
Covers both historical background and hands on projects that are collaborative in nature. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 3453 (3) Monotype 1**
A continued exploration in the monoprint and monotype methods. Use of a varied grouping of matrixes will be the focus of this class. Students will develop a portfolio of finished prints during the semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of ARTS 1010 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Recommended:** Prerequisite ARTS 1020.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Printmaking

**ARTS 3604 (3) Beyond the Studio: Post-Studio Art Practice**
Overview of post-studio art practice and covers the historical landscape of artists and projects that have pushed "beyond the studio" since 1970. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 3614 (3) Lost in Space: Installation Art**
Students learn how to develop ideas in relation to installation art, exhibition spaces, and explore practical skills to help carry out their ideas. Includes lectures, readings and discussion, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 3714 (3) Experimental Structures (Sculpture and Post-Studio Practice)**
Explores the interface of sculpture and architecture. Looks at individuals and collectives that have become renowned for their work with experimental structures and students will have the opportunity to build hands-on experiments. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 3841 (1-3) Undergraduate Independent Study---Photography**
Reserved only for special projects in photography, not offered in the curriculum. Requires a detailed proposal, instructor's signature and departmental approval.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 3191 or ARTS 4161 (minimum grade C-).
**Additional Information:** Departmental Category: Photography

**ARTS 3842 (1-3) Undergraduate Independent Study---Painting**
Reserved for special projects in painting not offered in the curriculum. Requires a detailed proposal, instructor's sponsorship, and departmental approval.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 3202 (minimum grade C-).
**Additional Information:** Departmental Category: Painting/Drawing

**ARTS 3845 (1-3) Undergraduate Independent Study---Ceramics**
Reserved for special projects in ceramics not offered in the curriculum. Requires a detailed proposal, instructor's sponsorship, and departmental approval.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of ARTS 3085 (minimum grade C-).
**Additional Information:** Departmental Category: Ceramics

**ARTS 3847 (1-3) Independent Study**
Reserved for special projects not offered in the curriculum. Department enforced prerequisite: detailed proposal, instructor sponsorship, and departmental approval.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Seminars/Special Topics

**ARTS 3906 (1-3) Undergraduate Independent Study---Video**
Reserved for special projects in video not offered in the curriculum. Requires a detailed proposal, instructor's sponsorship, and departmental approval.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 4246 (minimum grade C-).
**Additional Information:** Departmental Category: Media Arts

**ARTS 3937 (1-6) Internship**
Gives upper-division students the opportunity to work in public or private organizations on assignments relating to their career goals, and allows them to explore the relationship between theory and practice in their major.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Additional Information:** Departmental Category: Seminars/Special Topics

**ARTS 4002 (3) Advanced Drawing/Portfolio**
Continuation of Drawing 3. Advanced studio class in drawing for creative expression and individual portfolio development. Emphasis varies by semester;contact individual instructor for more information.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite courses of ARTS 1020 and ARTS 2022 and ARTS 3022 (all minimum C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Painting/Drawing

**ARTS 4004 (3) Land and Environmental Art (Sculpture and Post-Studio Practice)**
Covers land and environmental art, providing an historical survey along with hands on projects in the landscape. Focusing on themes of site, environment, landforms, weather, and earth materials, students will design and realize art projects on the land. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 4014 (3) Art and Social Practice (Sculpture and Post-Studio Practice)**
Covers social art practice, providing an historical survey along with hands on projects in social environments. Focusing on issues of public space, economic and cultural marginalization and political causes, provides students a forum for expressions of social reality. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 4017 (1-3) Special Topics in Studio Arts**
Introduces timely subjects in studio art courses that cannot be offered on a regular basis. Information on topics in any given semester is available prior to pre-registration in departmental office.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5017
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Seminars/Special Topics

**ARTS 4024 (3) Public Art**
Focuses on the two areas 1) lecture/discussion, both based on political, historical and the aesthetic evolution regarding examples of public art and 2) current practice, in reference to how to use such information to generate new more innovative and original ideas regarding public art and its application. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5024
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524 and ARTS 3504.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 4050 (3) Writing Across the Arts: Culture Writing in the 21st c**
In this culture writing class, we¿ll listen in on and contribute to the conversation, touching on many forms of expression, from fine art to pop culture. Art, of course, does not exist solely in a museum or gallery, and we will consider¿both in our reading and in written assignments-- its social context as well as, more personally, art¿s capacity to challenge us, to incite empathy or self-scrutiny, to provoke and inspire.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5050 and AHUM 4050
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Written Communication-Upper

**ARTS 4060 (3) Art Writing As Practice**
This seminar is designed for visual artists (MFA/Phd candidates), supporting them in building a regular writing practice that will allow them to reflect upon and lend critical context to their creative work. Through written prompts, presentations and discussions--as well as looking to the example of artists we count as influences--we'll craft a narrative about our work and where it fits into larger conversations about art, identity, history, and our own times. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5060
**Grading Basis:** Letter Grade

**ARTS 4085 (3) Ceramics 4**
Develop a personal creative practice through self-generated, independent projects. The focus is on developing an individual studio discipline through experimentation, research, reading and writing and examining the work in individual critiques.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 3085 (minimum grade C-). Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Ceramics

**ARTS 4087 (3) Selected Topics in Contemporary Art**
Selectively studies significant areas of visual art of the last decade including major critical opinions.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5087
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Seminars/Special Topics

**ARTS 4095 (3) Special Topics in Ceramics**
Designed for students majoring in studio arts or art history. Covers many subjects related to contemporary art practice and ceramics. The topics change from semester to semester from the raw material science behind ceramics to the relation between object making and poetic practice, to food and contemporary art explorations, to political and social art movements, to many other relevant subjects for those interested in the arts. May be repeated for up to 9 total credit hours.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5095
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 3085 (minimum grade C-). Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Ceramics

**ARTS 4097 (1-3) Special Topics-Non-Studio**
Introduces timely subjects in the visual arts that cannot be offered on a regular basis. Information concerning the topics offered in any given semester is available prior to preregistration from the fine arts department.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5097
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Seminars/Special Topics

**ARTS 4104 (3) Performance/Installation**
Primarily focuses upon personal imagery as a live situation occurring in either an invented constructed reality or real environment. Work may be individual or group configuration and may also take on the visual linguistic form of a solo performance or of a multimedia presentation.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5104
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 4126 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 4107 (1-3) Special Topics**
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Seminars/Special Topics

**ARTS 4117 (3) BFA Seminar**
For students intending to pursue graduate work and/or a professional career in art. Emphasizes the development of a critical overview of their work and interests and how they relate to the problems of professional activity. This is typically offered in the Spring Semester only.
**Requisites:** Restricted to Studio Arts (AASF) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Seminars/Special Topics

**ARTS 4118 (3) Visiting Artist Program**
Artists of national and international reputation, interacting with graduate and advanced undergraduate students, discuss their studio work at seminar meetings and at public lectures or events. Provides continuous input of significant developments and a comprehensive view of contemporary issues in the arts. Permission from Instructor is required. Department enforced prerequisite: portfolio review.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5118
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 87-180 credits (Senior) Studio Arts (AASA or AASF) or Art History (AAAH) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Visiting Artist Program

**ARTS 4126 (3) Digital Art 2**
Offers studio experience using personal computer in the generation and processing of imagery in the visual arts.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5126
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 2126 (minimum grade C-). Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Media Arts

**ARTS 4130 (3) Integrated Media**
Encourages experimentation with media and integration of traditional areas of drawing, painting, sculpture and photography. Covers two- and three-dimensional collage/assemblage, correspondence art, artist's books, site-specific, performance, audio and video art.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5130
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Integrated Arts

**ARTS 4154 (3) Metalsmithing 1**
Introduces students to the fundamental techniques used in metalsmithing, including cold and hot fabrication techniques, forming and coloring. Through projects, discussions, readings and demonstrations, students will learn how to create, analyze, understand and critique contemporary metalwork. Projects will focus on design and concept development, while enhancing students' technical and problem-solving skills.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5154
**Requisites:** Requires prerequisite courses of ARTS 1010, 1020, at least one 2000-level ARTS course, and at least one 3000-level ARTS course (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 4161 (3) Photography 4**
Explores advanced techniques and concepts of photography as art. Emphasizes photography as a means to formal and expressive ends.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 3191 (minimum grade C-). Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Photography

**ARTS 4171 (3) New Directions in Photography**
Investigates the use of the photographic image in new, antique, or nonstandard ways including nonsilver, photosculpture, various color processes, photolanguage, photoinstallations, electronic media, performance, filmmaking, electrostatic art (copy machine), photobooks, photocollage, and audio/visual art. Course content changes each semester.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5171
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of ARTS 3191 (minimum grade C-). Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Photography

**ARTS 4176 (3) New Directions in Digital Art**
Explores the integration of digital art across diverse contexts, including digital narrative, conceptual art, and visual literacy, while engaging with the most cutting-edge tools and technologies in the field. This includes video AI, Virtual Reality, Augmented Reality, and other emerging technologies with open-ended possibilities for future innovations. This course may be repeated for up to 9 total credit hours.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5176
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite courses of ARTS 2126 and ARTS 4126 (minimum grade C-). Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Media Arts

**ARTS 4202 (3) Advanced Painting/Portfolio**
Continuation of Painting 3. Advanced studio class in painting for creative expression and individual portfolio development. Emphasis varies by semester;contact individual instructor for more information.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 1010 and 1020 and 2222 and 3222 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Painting/Drawing

**ARTS 4222 (3) Drawing + Painting Specialized Investigation**
This course is a concentrated study of a narrow topic (rotating) chosen by a Drawing & Painting faculty member. Experiments in the expanded field of drawing and painting will allow students to study course materials that defy conventional academic course classifications and approaches. This intermittent course is intended to compliment the Drawing & Painting area¿s continuously offered 4000 level courses (Advanced Drawing and Advanced Painting) and 5000 level course (Graduate Painting Seminar). For non-ARTS or non-ARTH Grads, permission of instructor required.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5222
**Requisites:** Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.

**ARTS 4246 (3) Beginning Video Production**
Presents a studio course on basic single camera video production strategies and concepts. Through class screenings, projects, demonstrations, discussions, and readings, students gain an introductory familiarity with camera, lighting, sound, editing and the organization and planning involved in a video project. Explores a basic theoretical understanding of video as an art form and its relationship to television, film, art, history, culture.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5246
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Media Arts

**ARTS 4303 (3) Relief 2**
Continued exploration into the expressive/formal aesthetics of relief processes. Studio practice/investigation of artistic attitudes as exemplified through historical perspectives, traditional/contemporary usages.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite or corequisite courses of ARTS 1010 and any 3000 level printmaking course. ARTS 3303, 3403, 3413, 3423, 3433 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Printmaking

**ARTS 4316 (3) History and Theory of Digital Art**
Explores the history and theory of digital art. Discussion topics include the emergence of Internet art, hypertext, new media theory, online exhibitions, web publishing, virtual reality and the networked interface. Includes collaborative and individual projects.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5316
**Requisites:** Requires prerequisite course of ARTS 2126 (minimum grade C-). Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Media Arts

**ARTS 4403 (3) Intaglio 2**
Intaglio 2 is a continued exploration of techniques of intaglio processes, including non-acid and ferric chloride techniques with copper as the main plate being used. Possible processes focused on photo etching using solar plates and introduction to printing ala poupee wiping, chine colle and basic color. Building a unified body of work is the main focus.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite or corequisite courses of ARTS 1010 and any 3000 level printmaking course: ARTS 3303, or 3403, or 3413, or 3423, or 3433 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Printmaking

**ARTS 4413 (3) Lithography 2**
Continues the study of stone and metal plate lithography, emphasizing individual creative development in black and white and further development in color printing processes. Digital imaging and nontoxic processes are emphasized as much as possible.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite or corequisite courses of ARTS 1010 and any 3000 level printmaking course: ARTS 3303, or 3403, or 3413, or 3423, or 3433 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Printmaking

**ARTS 4423 (3) Screen Printing 2**
Introduces advanced screen printing technology, emphasizing individual creativity and the ability to resolve problems of two-dimensional form.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite or corequisite courses of ARTS 1010 and any 3000 level printmaking course: ARTS 3303, or 3403, or 3413, or 3423, or 3433 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Printmaking

**ARTS 4433 (3) Alternative Printmaking 2**
Continued research into developing a sharper critical response, both aesthetically and conceptually, to their own work, as well as the work of other artists. Various alternative printmaking methods will be introduced and each student is expected to explore and examine these processes through a body of work. Emphasis is put on the interrelationship of processes, materials and ideas/aesthetics.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite or corequisite courses of ARTS 1010 and any 3000 level printmaking course: ARTS 3303, or 3403, or 3413, or 3423, or 3433 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Printmaking

**ARTS 4434 (3) Collaboration: Art & Collective Action**
Covers both historical background and hands on projects that are collaborative in nature. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite courses of ARTS 1010 and ARTS 1020 (all minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 4444 (6) Art and Environments Field School**
Puts students in touch with various landscapes in Colorado. Takes place off campus each summer. Focuses on site-based approaches to art creation and is designed as an experiential course, meaning that students learn through the experience of place and then by the process of making. After introductions to each site, students will be responsible for a site interpretation piece utilizing various mediums including photography, drawing, land art and collaboration.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5444
**Requisites:** Requires prerequisite courses of ARTS 1010 and ARTS 1020 (all minimum grade C-).
**Recommended:** Prerequisite ARTS 2504.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 4453 (3) Monotype 2**
Continued research into developing techniques of using a varied grouping of matrixes will be the focus of this class. Students will be expected to develop sharper critical responses both aesthetically and conceptually, to their own work, as well as the work of other artists.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite or corequisite courses of ARTS 1010 and any 3000 level printmaking course: ARTS 3303, or 3403, or 3413, or 3423, or 3433 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Printmaking

**ARTS 4457 (3) Sound Art Seminar**
Covers the history of sound art from Luigi Russolo and his noise machine during the Futurist Movement to today's experimental music/sound art contributions. Students will listen to sound art works by artists in all areas of sound art, as well as read about theoretical views on sound art.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5457
**Requisites:** Requires prerequisite courses of ARTH 1500 and ARTH 1600 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Seminars/Special Topics

**ARTS 4504 (3) Advanced Sculpture Studio**
Students in this course will be required to complete projects, participate in group critiques of projects, produce a slide presentation on a contemporary artist whose work/practice fits within the theme of the course and prepare a final portfolio. Studio work and demonstrations will be augmented by readings and discussions on contemporary art.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Prereq of ARTS 3004, ARTS 3014, ARTS 3054, ARTS 3124, ARTS 3184, ARTS 3224, ARTS 3354, ARTS 3384, ARTS 3434, ARTS 3604, ARTS 3614, or ARTS 3714 (min grade C-). Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 4604 (3) Beyond the Studio: Post-Studio Art Practice**
Overview of Post-Studio art practice and covers the historical landscape of artists and projects that have pushed "beyond the studio" since 1970. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite courses of ARTS 1010 and ARTS 1020 (all minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 4641 (3) String Instrument Building**
As a prelude to sculptural art making processes, this course explores a variety of materials, methods and techniques and their application to the making of a musical string instrument, i.e. planning, designing, material selection and a wide variety of woodworking processes. We will also cover theoretical discussions into what is being made.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5641
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 4714 (3) Experimental Structures (Sculpture and Post Studio Practice)**
Explores the interface of sculpture and architecture. Looks at individuals and collectives that have become renowned for their work with experimental structures and students will have the opportunity to build hands-on experiments. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite courses of ARTS 1010 and ARTS 1020 (all minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 4717 (1-3) Studio Critique**
Consists of consultations with faculty on individual studio problems and projects. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Seminars/Special Topics

**ARTS 4934 (3) Art, Design, and Engineering: Thinking and Making**
Examines the aesthetics, design, and engineering of sculpture, installation, and public art. Through research presentations, readings, and field trips, students learn about the process of making art. In addition to classroom learning, students engage in internships with artists and art fabricators. Highlights national and international hybrid art, design, and engineering advanced degree programs and additional art-related internships and job opportunities. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5934 and COEN 4934
**Requisites:** Restricted to Art History (AAAH) or Engineering and Applied Science (COEN) majors or minors with a minimum of 50 credits only.
**Recommended:** Prerequisites ARTS 1010, ARTS 1020, ARTH 1500, ARTH 1600, COEN 1400, COEN 3930.
**Grading Basis:** Letter Grade

# Art History - Bachelor of Arts (BA)

The art history program teaches students how to analyze art within many contexts, including historical, intellectual, cultural, political, social and stylistic. In addition to examining diverse methodologies, introductory and upper-division courses cover artistic production from a wide range of cultures and periods, including medieval art, early modern art, pre-Columbian art, Colonial Latin American art, Asian art, Native North American art, modern art and architecture, contemporary art, critical theory and museology.

# Requirements

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. A minimum of 33 credit hours are required for the major, 21 of which must be upper-division. Of those 21 upper-division credit hours at least 12 must be completed on the CU Boulder campus.

All required major courses must be passed with a C- or better and cannot be taken pass/fail. Students must have a GPA of at least 2.000 in the major in order to graduate and no more than 45 credits in ARTH may be applied to overall graduation requirements.

## Required Courses

| Code | Title | Credit Hours |
|---|---|---|
| **Introductory Studio Art Sequence** | | |
| ARTS 1010 & ARTS 1020 | Introduction to Studio Art and Introduction to Studio Art 2 | 6 |
| **Introductory Art History Sequence** | | |
| ARTH 1500 & ARTH 1600 | Global Art and Visual Culture and U.S. Art Across Cultures | 6 |
| **Upper-division Art History Courses** | | |
| 3000 or 4000-level art history courses | | 9 |
| 4000-level art history courses | | 9 |
| ARTH 4919 | Capstone Seminar: Topics in Art History | 3 |
| **Total Credit Hours** | | **33** |

## Distribution Requirements

It is strongly recommended that students take classes in a wide variety of time periods and cultures. It is recommended that students complete at least three hours at the 3000- or 4000-level in at least three of the four following areas: Africa, Americas, Europe and Asia.

# Recommended Four-Year Plan

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BA in art history, it is recommended that students should:

- Declare the major by the beginning of the fourth semester.
- By the end of the fifth semester, complete lower-division studio courses, lower-division art history courses and two classes in upper-division art history.

Through the required coursework for the major, students will fulfill all 12 credits of the Arts & Humanities area of the Gen Ed Distribution Requirement.

| **Year One** | | |
|---|---|---|
| **Fall Semester** | | **Credit Hours** |
| ARTS 1010 | Introduction to Studio Art | 3 |
| ARTH 1500 | Global Art and Visual Culture (Global Perspective) | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ARTS 1020 | Introduction to Studio Art 2 | 3 |
| ARTH 1600 | U.S. Art Across Cultures (US Perspective) | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Year Two** | | |
| **Fall Semester** | | |
| ARTH 3000 or 4000 course | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ARTH 3000 or 4000 course | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |

| | | |
|---|---|---|
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| ARTH 4000 level course | | 3 |
| Upper-Division Elective | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Upper-Division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ARTH 4000 level course | | 3 |
| ARTH 3000 or 4000 level course | | 3 |
| Upper-Division Elective | | 3 |
| Elective or Upper-Division Elective (if needed) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| ARTH 4000 level course | | 3 |
| Upper-Division Elective | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-Division Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ARTH 4919 | Capstone Seminar: Topics in Art History | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **121** |

# Learning Outcomes

The undergraduate degree in art history emphasizes knowledge and awareness of:

- The major artistic traditions of the world in a historical and theoretical context.
- Varied methodologies used to study art historically.
- Artistic media and techniques.

By the completion of the program, students will be able to:

- Think and write critically about art in its cultural and historical contexts.
- Interpret historical and critical information about works of art, artists and related issues.
- Know the methods by which art can be evaluated.
- Carry out scholarly research on art historical topics.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BA and MA in Art History

The BAM program in art history is a demanding, accelerated program aimed primarily at our best undergraduates who are planning to pursue a PhD. The typical student will be a student writing an honors thesis who will use that project as the basis for developing the MA thesis. It is expected that the BAM program be completed within five years. For details about admission into the program and degree requirements, visit the department's BAM webpage (https://www.colorado.edu/artandarthistory/degrees/bachelors-accelerated-masters-bam-art-history/).

### Admission Requirements

In order to gain admission to the BAM program, a student must meet the following criteria:

- Secure a faculty sponsor from the Department of Art and Art History.
- Have a GPA of 3.6 or higher in the art history major, with a cumulative GPA of 3.3 or higher.
- If a transfer student, have completed a minimum of 24 credit hours at CU Boulder.
- Have completed all MAPS deficiencies (students admitted to CU Boulder prior to Summer 2023 only).

### Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only 6 credits may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

If you are interested in the BAM degree program, please contact the graduate program coordinator for the Department of Art and Art History at art.grad@colorado.edu.

# Art Practices - Bachelor of Arts (BA)

The BA in art practices allows students to explore their interests and refine their skills in ceramics, integrated media arts practices (IMAP; photography, digital media, video, integrated arts), painting and drawing, printmaking, and sculpture and post-studio practice. Students gain a broad understanding of the field of contemporary art and experience in

contemporary art practices while pursuing a liberal arts degree at the university.

*Portfolio submission is **not** required to declare art practices as a major or minor.*

# Required Courses

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. Students must complete 33 credits in the major. See the Art Practices - Bachelor of Fine Arts (BFA) (p. 140) page for information about admission to the BFA program.

All required major courses must be passed with a C- or better and cannot be taken pass/fail. Students must have a GPA of at least 2.000 in the major in order to graduate and no more than 45 credits in ARTS may be applied to overall graduation requirements.

| Code | Title | Credit Hours |
|---|---|---|
| **Introductory Studio Art Sequence** | | |
| ARTS 1010 & ARTS 1020 | Introduction to Studio Art and Introduction to Studio Art 2 | 6 |
| **Introductory Art History Sequence** | | |
| ARTH 1500 & ARTH 1600 | Global Art and Visual Culture and U.S. Art Across Cultures | 6 |
| **Studio Art Courses** | | |
| One 2000-level ARTS courses in area of emphasis | | 3 |
| Upper-division studio emphasis (minimum) | | 12 |
| **Major Electives** | | |
| Upper-divison ARTS | | 6 |
| **Total Credit Hours** | | **33** |

# Recommended Four-Year Plan of Study

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BA in studio arts, students should meet the following requirements:

- Declare major by the beginning of the second semester.
- Complete ARTS 1010 and ARTS 1020, two level-1 studio classes and lower-division art history courses by the end of the third semester.
- Complete 30–33 credits in the major by the end of the sixth semester.

Students must also complete at least 12 upper-division ARTS/ARTH courses on the Boulder campus after starting the program.

Through the required coursework for the major, students will fulfill all 12 credits of the arts & humanities area of the Gen Ed Distribution Requirement, as well as fulfilling both categories (Global Perspective and U.S. Perspective) of the Gen Ed Diversity Requirement.

The BA degree requires a minimum of 45 upper-division (3000- and 4000-level courses) credits. Students are encouraged to consult with their advisor to ensure this general BA degree requirement is met by the fourth year.

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| ARTS 1010 | Introduction to Studio Art | 3 |
| ARTH 1500 | Global Art and Visual Culture | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ARTS 1020 | Introduction to Studio Art 2 | 3 |
| ARTH 1600 | U.S. Art Across Cultures | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |

**Year Two**

| **Fall Semester** | | |
|---|---|---|
| ARTS Studio Emphasis, 2000 level course | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ARTS Studio Emphasis (Upper-Division) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |

**Year Three**

| **Fall Semester** | | |
|---|---|---|
| ARTS Studio Emphasis (Upper-Division) | | 3 |
| Upper-Division course | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Upper-Division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ARTS Studio Emphasis (Upper-Division) | | 3 |
| ARTS Studio Emphasis (Upper-Division) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Upper-Division Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |

**Year Four**

| **Fall Semester** | | |
|---|---|---|
| ARTS Studio Emphasis (Upper-division) | | 3 |
| ARTS Lower or Upper-division(major elective) | | 3 |

| | |
|---|---|
| Upper-division Elective | 3 |
| Elective (or Upper-division elective) | 3 |
| Elective (or Upper-division elective) | 3 |
| **Credit Hours** | **15** |
| **Spring Semester** | |
| ARTS Studio Emphasis (Upper-Division) | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | 3 |
| Upper-division Elective | 3 |
| Upper-division Elective | 3 |
| Upper-division Elective | 3 |
| **Credit Hours** | **15** |
| **Total Credit Hours** | **120** |

# Learning Outcomes

The undergraduate degree in art practices emphasizes knowledge and awareness of:

- The significance of the major traditions in art history.
- At least one discipline of art practices.
- Related critical issues in art practice.
- A wide range of stylistic approaches.

By the completion of the program, students will be able to:

- Generate novel and intentional ideas, and demonstrate those ideas through making art that is responsive to their own interests and the world around them. (Creativity and making)
- Demonstrate mastery of the skills and techniques intrinsic to at least one chosen discipline. (Disciplinary skill and technique)
- Examine the historical and contemporary issues surrounding their art, the art of others and the broader global art discourse. (Recognize current and historical frameworks)
- Communicate in dialogue and in writing the multilayered concepts and relative contexts of their own and other's art. (Develop criticality and analyze complexity)
- Demonstrate curiosity, initiative, rigor and persistence, while seeking knowledge. Students will be able to work independently or collaboratively to achieve their goals. (Develop concepts, understand contexts, synthesize research)

# Art Practices - Bachelor of Fine Arts (BFA)

The BFA in art practices is a more in-depth degree intended for motivated students interested in and committed to pursuing a professional career in the arts. Students gain training in studio techniques and post-studio practice, an overview of historical and contemporary artists and movements, and an introduction to criticism. Additionally, students participate in the BFA Seminar, are eligible to enroll in the Visiting Artist Seminar and present work in the culminating BFA exhibition.

# Requirements

## Admission Requirements

The BFA is a highly selective program. Only art majors may apply to the program with a portfolio and application materials, which are reviewed once in the fall and once in the spring.

For application information, please visit the department's website (https://www.colorado.edu/artandarthistory/degrees/bfa-degree-information-application/). For overall degree requirements, students should run a degree audit and consult with their advisor. Students must have completed or be in progress of completing 24 credits in the major to apply for the BFA.

## Required Courses and Credits

Students must complete 57 credits toward the major, of which at least 12 upper-division credits must have been completed at CU Boulder.

Students must present and pass a portfolio review to be eligible for the BFA degree (a minimum of 24 ARTS/ARTH credits are required to be completed or in progress to apply).

| Code | Title | Credit Hours |
|---|---|---|
| **Introductory Studio Art Sequence** | | |
| ARTS 1010 & ARTS 1020 | Introduction to Studio Art and Introduction to Studio Art 2 | 6 |
| **Introductory Art History Sequence** | | |
| ARTH 1500 & ARTH 1600 | Global Art and Visual Culture and U.S. Art Across Cultures | 6 |
| **Studio Art Courses** | | |
| Two 2000-level studio courses in area of emphasis | | 6 |
| Upper-division studio courses | | 18 |
| Painting and drawing majors must take any sequence of courses culminating in ARTS 4002 or ARTS 4202. | | |
| Ceramics majors must take ARTS 4085 and ARTS 4095. | | |
| ARTS 4117 | BFA Seminar | 3 |
| **Upper-division Art History Courses** | | |
| Any two 3000- or 4000-level ARTH courses | | 6 |
| **Major Electives** | | |
| Upper- or lower-division electives in ARTS or ARTH | | 12 |
| **Total Credit Hours** | | **57** |

Students must also complete at least 12 upper-division ARTS/ARTH courses on the Boulder campus after starting the program.

# Recommended Four-Year Plan of Study

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BFA in studio arts or divisional studio arts, students should meet the following requirements:

- Declare the major by the beginning of the first semester, freshman year.
- By the end of the third semester, complete ARTS 1010 , ARTS 1020 , ARTH 1500 and ARTH 1600, two 2000-level courses and one lower-

division or upper-division studio or art history course (21 credit hours).

- Apply for the BFA in the fourth or fifth semester, with a minimum of 24 credit hours in the major.
- By the end of the sixth semester, complete up to 48 credit hours in the major.
- A total of 12 credit hours in ARTS/ARTH electives are required. Up to 6 credit hours of electives may be taken outside the department with advisor permission.

Through the required coursework for the major, students will fulfill all 12 credits of the arts & humanities area of the Gen Ed Distribution Requirement, as well as fulfilling both categories (Global Perspective and U.S. Perspective) of the Gen Ed Diversity Requirement.

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| ARTS 1010 | Introduction to Studio Art | 3 |
| ARTH 1500 | Global Art and Visual Culture | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3-5 |
| Elective | | 3 |
| | **Credit Hours** | **15-17** |
| **Spring Semester** | | |
| ARTS 1020 | Introduction to Studio Art 2 | 3 |
| ARTH 1600 | U.S. Art Across Cultures | 3 |
| Gen Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |

**Year Two**

| **Fall Semester** | |
|---|---|
| ARTS Studio Emphasis, 2000 level course | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | 4 |
| Gen. Ed. Distribution course (example: Social Sciences) | 3 |
| Elective | 3 |
| Elective | 3 |
| **Credit Hours** | **16** |
| **Spring Semester** | |
| ARTS Studio Emphasis, 2000 level course | 3 |
| ARTS Studio Emphasis (Upper-Division) | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | 3 |
| Upper-division Elective | 3 |
| Elective | 3 |
| **Credit Hours** | **15** |

**Year Three**

| **Fall Semester** | |
|---|---|
| ARTS Studio Emphasis (Upper-Division) | 3 |
| ARTS Studio Emphasis (Upper-Division) | 3 |
| ARTH Upper-Division course | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) - Upper-division | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | 3 |
| Note: Student has reached 24 credit hours of ARTS/ARTH courses and may apply for the BFA. | |
| **Credit Hours** | **15** |
| **Spring Semester** | |
| ARTS Studio Emphasis (Upper-Division) | 3 |
| ARTS Studio Emphasis (Upper-Division) | 3 |
| ARTH/ARTS Elective | 3 |
| ARTH/ARTS Elective | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | 3 |
| **Credit Hours** | **15** |

**Year Four**

| **Fall Semester** | |
|---|---|
| ARTS Studio Emphasis (Upper-Division) | 3 |
| ARTH/ARTS Elective - Upper-division | 3 |
| Elective | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | 3 |
| Upper-division Elective | 3 |
| **Credit Hours** | **15** |
| **Spring Semester** | |
| ARTH Upper-Division course | 3 |
| ARTS 4117 BFA Seminar | 3 |
| ARTH/ARTS Elective - Upper-division | 3 |
| Elective | 3 |
| Gen. Ed. Distribution Course (example: Social Sciences) - Upper-division | 3 |
| **Credit Hours** | **15** |
| **Total Credit Hours** | **121-123** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Generate novel and intentional ideas, and demonstrate those ideas through making art that is responsive to their own interests and the world around them. (Creativity and making)
- Demonstrate mastery of the skills and techniques intrinsic to at least one chosen discipline. (Disciplinary skill and technique)
- Examine the historical and contemporary issues surrounding their art, the art of others and the broader global art discourse. (Recognize current and historical frameworks)
- Communicate in dialogue and in writing the multilayered concepts and relative contexts of their own and other's art. (Develop criticality and analyze complexity)
- Demonstrate curiosity, initiative, rigor and persistence, while seeking knowledge. Students will be able to work independently or collaboratively to achieve their goals. (Develop concepts, understand contexts, synthesize research)

# Art History - Minor

The Department of Art and Art History offers a minor in art history for undergraduate students, regardless of college or school, who are interested in the field.

## Requirements

All coursework applied to the minor must be completed with a grade of C- or better; no pass/fail work may be applied. The grade point average for all minor degree coursework must be equal to 2.000 (C) or higher.

Students are allowed to apply no more than 9 credits, including 6 upper-division credits of transfer work, toward a minor. Art practices majors may apply ARTH 1500 and ARTH 1600 (both major requirements) toward the completion of an art history minor but may not apply major electives toward completion of the minor.

## Required Courses

The minor in art history requires a minimum of 18 credit hours in art history coursework, as follows:

| Code | Title | Credit Hours |
|---|---|---|
| **Art History Sequence** | | |
| ARTH 1500 & ARTH 1600 | Global Art and Visual Culture and U.S. Art Across Cultures | 6 |
| **Minor Electives** | | |
| Select 12 credits of ARTH courses at the 3000 or 4000 level, with at least two courses at the 4000 level. It is strongly recommended that students take classes in a wide variety of time periods and cultures. It is recommended that students complete at least three hours at the 3000- or 4000-level in at least three of the four following areas: Africa, Americas, Europe and Asia. | | 12 |
| **Total Credit Hours** | | **18** |

# Art Practices - Minor

The Department of Art and Art History offers a minor in art practices for undergraduate students who are interested in studio arts.

## Requirements

The requirements for the minor in art practices include:

- a minimum of 18 credit hours in art practices coursework, including 9 credit hours at the upper-division level.
- all coursework applied to the minor must be completed with a grade of C- or better; no pass/fail work may be applied. The grade point average for all minor degree coursework must be equal to 2.00 (C) or higher
- students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor

Art history majors may apply ARTS 1010 and ARTS 1020 (both major requirements) toward the completion of an art practices minor, but may not apply non-major electives toward completion of the minor.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| ARTS 1010 | Introduction to Studio Art | 3 |
| ARTS 1020 | Introduction to Studio Art 2 | 3 |
| At least 3 credits of ARTS courses at the 2000-level | | 3 |
| At least 9 credits of ARTS courses at the 3000- or 4000-level | | 9 |
| **Total Credit Hours** | | **18** |

## Learning Outcomes

- Creativity and making: Students will be able to generate novel and intentional ideas, and demonstrate those ideas through making art that is responsive to their own interests and the world around them.
- Disciplinary skill and technique: Students will demonstrate mastery of the skills and techniques intrinsic to at least one chosen discipline.
- Recognize current and historical frameworks: Students will examine the historical and contemporary issues surrounding their art, the art of others, and the broader global art discourse.
- Develop criticality and analyze complexity: Students will communicate in dialogue and in writing the multilayered concepts and relative contexts of their own and other's art.
- Students will demonstrate curiosity, initiative, rigor, and persistence, while seeking knowledge. Students will be able to work independently or collaboratively to achieve their goals.

# Asian Languages and Civilizations

The Department of Asian Languages and Civilizations, founded in 1982, offers undergraduate majors in Chinese and Japanese, minors in Arabic, Chinese, Hindi/Urdu, Japanese and Korean, as well as language, literature and culture courses in Arabic, Chinese, Hindi/Urdu, Japanese and Korean.

Undergraduate students receive a thorough grounding in the modern language, an introduction to the classical language and literature and a broad familiarity with the literary and cultural history of their selected area.

Students interested in Chinese or Japanese are encouraged to broaden their academic horizon through a double major, combining either language with another field of interest. Likewise, students in all Asian Languages and Civilizations programs as well as programs outside the department can pursue one of the department's minors as a way of broadening their career options.

Before registering for specific courses, students should consult with a departmental advisor (https://www.colorado.edu/alc/our-people/undergraduate-advising/) concerning appropriate placement in language classes beyond the beginning level.

In addition to language instruction courses, the department offers several courses taught in English. These courses provide an excellent introduction to the literary and cultural histories of the areas involved. They are open to all interested students and do not require previous study of the language or subjects addressed.

The department strongly encourages all students to participate in Study Abroad to enrich their studies in our programs. For information about programs throughout the world, contact the Education Abroad office (http://abroad.colorado.edu/).

Recent graduates have found positions in such fields as government service, international business and secondary-school teaching; others have gone on to graduate study in Chinese or Japanese. Additional career opportunities can be found on the Career Services website (http://www.colorado.edu/career/).

For more information about the Department of Asian Languages and Civilizations, please visit the department website (https://www.colorado.edu/alc/).

**Course codes for the department's five programs are ARAB, CHIN, HIND, JPNS and KREN.**

# Bachelor's Degrees

- Chinese - Bachelor of Arts (BA) (p. 154)
- Japanese - Bachelor of Arts (BA) (p. 157)

# Minors

- Arabic - Minor (p. 159)
- Chinese - Minor (p. 160)
- Hindi/Urdu - Minor (p. 161)
- Japanese - Minor (p. 161)
- Korean Language and Culture - Minor (p. 162)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Alexander, Katherine Laura Bos (https://experts.colorado.edu/display/fisid_157674/)
Assistant Professor; PhD, University of Chicago

Arya, Nidhi (https://experts.colorado.edu/display/fisid_150006/)
Teaching Assistant Professor

Asano, Yukiko (https://experts.colorado.edu/display/fisid_168457/)
Teaching Assistant Professor; PhD, SUNY at Stony Brook

Attwa, Mona Farrag (https://experts.colorado.edu/display/fisid_155976/)
Teaching Associate Professor; MA, American University in Cairo (Egypt)

Brown, Janice Carole (https://experts.colorado.edu/display/fisid_143612/)
Professor; PhD, University of British Columbia (Canada)

Burge, Marjorie (https://experts.colorado.edu/display/fisid_166114/)
Assistant Professor; PhD, University of California, Berkeley

Hsu, Chun-ling
Instructor Emeritus; MEd, University of Wisconsin–River Falls

Kawakami, Kiyomi (https://experts.colorado.edu/display/fisid_163648/)
Teaching Assistant Professor; MA, University of Wisconsin–Madison

Kim, Sangbok (https://experts.colorado.edu/display/fisid_149220/)
Teaching Professor; PhD, University of California, Los Angeles

Kimbrough, Randle Keller (https://experts.colorado.edu/display/fisid_141167/)
Professor, Chair; PhD, Yale University

Kleeman, Faye Yuan (https://experts.colorado.edu/display/fisid_113313/)
Professor Emeritus; PhD, University of California, Berkeley

Kleeman, Terry F. (https://experts.colorado.edu/display/fisid_114181/)
Professor Emeritus; PhD, University of California, Berkeley

Kroll, Paul W.
Professor Emeritus

Li, Yingjie (https://experts.colorado.edu/display/fisid_164322/)
Teaching Associate Professor; PhD, University of Kansas

Matsunaga, Yumiko (https://experts.colorado.edu/display/fisid_149899/)
Teaching Professor of Distinction; PhD, University of Wisconsin–Madison

Maude, Daryl (https://experts.colorado.edu/display/fisid_175537/)
Assistant Professor; PhD, University of California, Berkeley

Richter, Antje (https://experts.colorado.edu/display/fisid_145310/)
Associate Professor; Dr habil, University of Kiel (Germany)

Richter, Matthias Ludwig (https://experts.colorado.edu/display/fisid_144864/)
Associate Professor, Chair; PhD, University of Hamburg (Germany)

Rodd, Laurel Rasplica
Professor Emerita

Schibli, Hisako (https://experts.colorado.edu/display/fisid_148621/)
Teaching Assistant Professor; MA, University of Colorado Boulder; BA, Sophia University (Japan)

Shih, Evelyn Ming Whai (https://experts.colorado.edu/display/fisid_163646/)
Assistant Professor; PhD, University of California, Berkeley

Waddell, Ethan
Assistant Professor; PhD, University of Chicago

# Courses

## Arabic

**ARAB 1010 (4) Beginning Arabic 1**
Introduces students to speaking, listening, reading, and writing skills in the standard means of communication in the Arab world. This course is proficiency-based. All activities within the course are aimed at placing the student in the context of the native-speaking environment from the very beginning.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic
Departmental Category: Asia Content

**ARAB 1011 (3) Introduction to Arab and Islamic Civilizations**
Provides an interdisciplinary overview of the cultures of the Arabic-speaking peoples of Southwest Asia and North Africa from the rise of Islam in the 7th century to the present. Readings include historical, religious, literary and cultural texts from both the medieval and modern eras. Taught in English.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Arabic Courses in English
Departmental Category: Asia Content

**ARAB 1020 (4) Beginning Arabic 2**
Continuation of ARAB 1010.
**Requisites:** Requires prerequisite course of ARAB 1010 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic
Departmental Category: Asia Content

**ARAB 2110 (4) Intermediate Arabic 1**
Proficiency-based course emphasizes speaking, listening, reading, and writing. Covers a variety of topics. Students give classroom presentations and write short essays in Arabic. Speaking ability is assessed through an oral proficiency interview.
**Requisites:** Requires prerequisite course of ARAB 1020 (minimum grade C).
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Arabic
Departmental Category: Asia Content

**ARAB 2120 (4) Intermediate Arabic 2**
Continuation of ARAB 2110.
**Requisites:** Requires prerequisite course of ARAB 2110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic
Departmental Category: Asia Content

**ARAB 2231 (3) Love, Loss and Longing in Classical Arabic Literature**
Surveys Arabic literature from the sixth through the eighteenth centuries. It offers an introduction to Arabic literature, namely prose and poetry, through its key texts as well as the range of themes and techniques found in this literature, and it lays the groundwork for contextualizing the literature in the framework of other literary traditions. Taught in English.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic Courses in English
Departmental Category: Asia Content

**ARAB 2320 (3) The Muslim World, 600-1250**
Focusing on the history of the Muslim World in the age of the caliphates, this course takes an interdisciplinary, comparative approach to the development of Islamicate society, focusing on social structure, politics, economics and religion. Students will use primary and secondary sources to write a research paper, and make in-class presentations to cultivate critical thinking, research and writing skills. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 2320
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Arabic Courses in English
Departmental Category: Asia Content

**ARAB 3110 (4) Advanced Arabic 1**
Designed to train students further in the four language skills (writing, speaking, reading, listening/comprehension) at an advanced level. Enables students to acquire a better and broader understanding of Arabic culture and texts drawn from various genres of Arabic letters.
**Requisites:** Requires prerequisite course of ARAB 2120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic
Departmental Category: Asia Content

**ARAB 3120 (4) Advanced Arabic 2**
Continues training in the four language skills (writing, speaking, reading, listening/comprehension) at an advanced level. Enables students to acquire a better and broader understanding of Arabic culture and texts drawn from various genres of Arabic letters.
**Requisites:** Requires prerequisite course of ARAB 3110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic
Departmental Category: Asia Content

**ARAB 3220 (3) Arabian Nights, Arabian Days: Popular Literature in the Arab World and Beyond**
Explores the development of popular literature in Arabic, studying the Arabian Nights and related genres including tribal epics, poetry, and plays. We will interrogate the cultural, class, and textual boundaries between popular literature and courtly, elite works across time. We will also explore the modern, Western enterprise of ¿discovering¿ and engaging with Arabic literary works, examining how global excitement for texts like the Nights has created new possibilities for cultural production and exchange.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ARAB 3221 (3) The Making of Middle Eastern Identities: Arabs and Their ¿Others¿**
Who is ¿Arab,¿ anyway? When did Arabs first develop a sense of ethnic identity, and out of what raw materials did it grow and take shape? How did this identity play off of, merge with, or get challenged by contact with different peoples as the horizons of the Arab world grew and changed, and how does this manifest in literature and the historical record? This course offers a discussion-oriented, upper-level seminar that focused on sources in which the author, protagonists, or intended audience engage with ethno-racially non-Arab cultures.
**Recommended:** Prerequisite Intro to Religion or other course focusing on Islam and/or Middle Eastern history or culture.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ARAB 3230 (3) Islamic Culture and the Iberian Peninsula**
Examines Islamic, especially Arab, culture and history as it relates to the Iberian Peninsula from 92 Ah/711 Ce to the present. Taught in English.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic Courses in English
Departmental Category: Asia Content

**ARAB 3231 (3) In the Footsteps of Travelers: Travel Writing in Arabic Lit**
Offers an excursion into the role and significance of travel and travel writing in Arabic literature in translation. We will read and discuss a range of literary works written by, about, and for travelers. More broadly, this course will offer an opportunity for undergraduates to expand their understanding of literature and the arts. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic Courses in English
Departmental Category: Asia Content

**ARAB 3241 (3) Art in Islamic Cultures**
Offers an overview of art in Islamic cultures. Discusses a range of literary texts and images in order to understand these cultures. Offers an opportunity for undergraduates to expand their understanding of literature and art history. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 3241
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic Courses in English

**ARAB 3251 (3) Language in Arab Society**
This course introduces the multilingual situation of Arab societies and presents fundamental concepts in sociolinguistics. Students study the major theories and frameworks of language variation and change and the influence of variables such as gender, social class, religion, and colonization on language choice. Students will understand the relationship between language, identity and ideology revealing power dynamics in Arab communities. The course is taught in English and no prior knowledge of Arabic language is required.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 3251
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ARAB 3330 (3) The Arabic Novel**
Focusing on the origins and development of the novel genre in the Arabic tradition, this course examines both the aesthetic qualities of the genre as an artistic form and the ways that it has depicted and intervened in the modern social, political, and cultural upheavals that have shaped the Arab world in the 20th century. Authors include Najib Mahfuz, Abd al Rahman Munif, Hanan al-Shaykh, and Ghassan Kanafani. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic Courses in English
Departmental Category: Asia Content

**ARAB 3331 (3) Arabic Poetry**
Introduces students to the vibrant world of Arabic poetic production, which has defined the cultural landscape of the Arab world and the broader Middle East for over one thousand years and continues to play a central part in the Arabic literary scene today. Some of this poetry has been translated into English, and translated Arabic poetry will serve as our gateway to better understanding why poetry is the diwan, or record, of the Arabs.

**ARAB 3340 (3) Representing Islam**
Explores the cultural politics of representations of the Arab and Islamic worlds both with an emphasis on literary representations of the Islamic world in travel narratives and novels from both the West and the Arab world. Examines historical, anthropological, and visual texts to consider how Islam has been narrated in colonial European imaginings about the Islamic world as well as contemporary representations. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic Courses in English
Departmental Category: Asia Content

**ARAB 3350 (3) Narrating the City: Literary Mappings of the Urban Landscape**
Examines literary narratives primarily from the Arabic tradition through focusing on the relationship of literature to the development and transformations of cities and urban spaces in the modern period. Begins with readings of 19th century European narratives that chronicle the changing space of the modern city followed by urban narratives from the Arabic literary tradition in order to comparatively examine how "universal" processes of modernization, development, and globalization in the modern world have been narrated. Writers include Mahfouz, Munif, al-Takarli, al-Aswani, Celik, Abu Lughod. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic Courses in English
Departmental Category: Asia Content

**ARAB 3360 (3) Truth and Prophecy in Islam**
Introduces students to the Islamic genre of hadith, or Prophetic traditions. The main concern of the course is to develop an understanding of how prophetic religious authority was understood and communicated in written form and what the relationship of the hadith form has been to alternative claims on prophetic authority in Islam. Finally, the course examines the role that the Prophetic hadith -- and their contestation -- have played in Islamic reform movements during the modern period.
**Recommended:** Prerequisite ARAB 1011.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ARAB 3410 (3) Gender, Sexuality and Culture in the Modern Middle East**
Examines the issues of gender and sexuality in the modern Middle East and North Africa from the colonial period to the present, focusing on how feminist movements, Arab women's writing, and constructions of gender and sexuality have been shaped by local, national and international factors. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3410
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Arabic Courses in English
Departmental Category: Asia Content

**ARAB 4200 (3) Advanced Readings in Arabic**
Develops student proficiency and communication in modern standard Arabic at the advanced (4th year) level. Emphasis placed on developing reading comprehension, speaking, and writing skills.
**Requisites:** Requires prerequisite course of ARAB 3120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic
Departmental Category: Asia Content

**ARAB 4250 (3) Arabic Media**
Designed to provide students with advanced Arabic language skills for use in the media. By negotiating authentic materials in Arabic, students will gain a perspective on global issues in the Arab and Islamic world and will attain a better awareness of Arab and Islamic culture.
**Requisites:** Requires prerequisite course of ARAB 3120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic
Departmental Category: Asia Content

**ARAB 4840 (1-3) Independent Study**
Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Arabic
Departmental Category: Asia Content

## Chinese

**CHIN 1010 (5) Beginning Chinese 1**
An introduction to the fundamentals of modern standard Chinese (Mandarin), including pronunciation, Chinese characters, grammar, and conversation. Students develop all four skills (listening, speaking, reading, and writing) with an emphasis on oral communication. Texts are in simplified characters with vocabulary in both simplified and traditional characters. Students with pre-existing competence in Chinese must take a placement exam or consult with the language coordinator before enrollment.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 1012 (4) Introduction to Chinese Civilization**
An interdisciplinary introduction from ancient to modern times. Arts, literature, politics, social relations, religion, and material culture are studied in terms of significant themes and ideas pertaining to the civilization of China. Taught in English.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 1020 (5) Beginning Chinese 2**
Continuation of CHIN 1010. Students with pre-existing competence in Chinese must take a placement exam or consult with the language coordinator before enrollment.
**Requisites:** Requires prerequisite course of CHIN 1010 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 1051 (3) Masterpieces of Chinese Literature in Translation**
Surveys Chinese thought and culture through close reading and discussion of selected masterworks of Chinese literature in translation. Texts include significant works of poetry, fiction, and drama, as well as philosophical and historical writings from various eras. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 2110 (5) Intermediate Chinese 1**
This course continues the training in all four skills as developed in the first year. Students enhance communicative skills in listening and speaking and expand reading and writing vocabulary in modern Chinese. Texts are in simplified characters with vocabulary in both simplified and traditional characters. Students with competence in Chinese obtained from a program, institution, or experiences external to CU must take a placement exam or consult with the language coordinator before enrollment.
**Requisites:** Requires prerequisite course of CHIN 1020 (minimum grade C).
**Additional Information:** Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 2120 (5) Intermediate Chinese 2**
Continuation of CHIN 2110. Students with pre-existing competence in Chinese must take a placement exam or consult with the language coordinator before enrollment.
**Requisites:** Requires prerequisite course of CHIN 2110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 2441 (3) Film and the Dynamics of Chinese Culture**
Through studying a group of Chinese films in light of modern Chinese history and literature, students examine a series of cultural dilemmas and issues in 20th century China and develop skills in analyzing literary and filmic texts. Taught in English.
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 2442 (3) Modern Chinese Media Cultures**
An introduction Chinese media cultures of the 20th century, with an emphasis on photography, cinema, popular music, and print. The course places these productions in context, examining the complex intertwinement of culture, technology, and politics in China, Hong Kong, and Taiwan from the turn of the last century to the beginning of the twenty-first. We will be thinking about the ways in which media inscribe or problematize global racial hierarchies, gender dynamics, and membership in collectivities. Students will also be introduced to a number of methodologies in media historiography and cultural studies.
**Recommended:** Prerequisite CHIN 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**CHIN 3110 (5) Advanced Chinese 1**
Surveys a variety of authentic language materials, including films, plays, newspaper articles, essays, and short stories. Texts are studied with an emphasis on more sophisticated grammar structures and an attention to issues of social and cultural background. Texts and vocabulary are in both simplified and traditional characters. Students with competence in Chinese obtained from a program, institution, or experiences external to CU must take a placement exam or consult with the language coordinator before enrollment.
**Requisites:** Requires prerequisite course of CHIN 2120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 3120 (5) Advanced Chinese 2**
Continuation of CHIN 3110. Students with pre-existing competence in Chinese must take a placement exam or consult with the language coordinator before enrollment.
**Requisites:** Requires prerequisite course of CHIN 3110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 3200 (3) Adv Wrtg Topics on Chinese & Japanese Literature and Civilization**
Provides an introduction to the academic study of Chinese and Japanese literature and culture with a focus on writing skills in English through a survey of standard academic writing conventions. Review and assessment of selected textual materials, class presentation, critique, and revision. Recommended for majors. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** JPNS 3200
**Requisites:** Restricted to students with a minimum of 45 credits completed.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Upper
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**CHIN 3321 (3) Political Thought in Ancient China**
Focuses on the political, religious, philosophical and literary aspects of ancient Chinese civilization (1500 B.C.-A.D. 200). Special attention is paid to foundational works that influenced later developments in Chinese culture. All readings are in English and taught in English. Recommended restriction: students with 57-180 credits (Juniors or Seniors).
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3321
**Recommended:** Prerequisite CHIN 1012 or CHIN 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 3331 (3) Urban Entertainment Culture in Early Modern China**
The early modern period was marked by growth of metropolitan areas, expanded entertainments, and vibrant popular culture. The course focuses on aspects of the popular literature and culture of this era and how defenders of traditional culture and state power reacted to it. May also consider growing contacts with the West and the transition to the modern period. All readings are in English. Taught in English. Recommended restrictions: for students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite CHIN 1012 or CHIN 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 3333 (3) Race and Ethnicity in Chinese Literature: Sinophone Culture, Diaspora, and Identity**
Surveys Sinophone thought and culture through close reading and discussion of selected works of Chinese-language fiction in translation. Students will learn about the historical contexts of migration, racial and ethnic conflict, and colonialism in which this literature was produced. Hyphenate identities such as Chinese-Malaysian and Asian-American will take center stage as we bring more complexity to the idea of "Chineseness." Taught in English. Recommended restrictions: for students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite CHIN 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**CHIN 3334 (3) Premodern Chinese Fiction**
Examines the major works of Chinese narrative tradition from the fourth to the nineteenth century. Emphasizes the reading and analysis of selected texts and understanding of the cultural and social contexts of text production and circulation. Text selections vary from year to year. Taught in English. Recommended restrictions: for students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite CHIN 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 3341 (3) Literature and Popular Culture in Modern China**
Surveys 20th century Chinese literature and popular culture against the historical background of rebellion, revolution and reform. Emphasizes close and critical reading skills and an understanding of how aesthetic texts reflect and critically engage with historical and cultural experiences. Assignments include novels, essays, short stories, poems, plays, songs, films and scholarly articles. Taught in English. Recommended restrictions: for students with 57-180 credits (Juniors or Seniors).
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3341
**Recommended:** Prerequisite CHIN 1012 or CHIN 1051.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 3342 (3) Sinophone Literature in the Contemporary World**
A survey of Chinese literature with a focus on exiled, diaspora, colonial, and semi-colonial writers. Students will be asked to discern how Chinese literature has made an intervention in world literature and how it has engaged with the world. Emphasizes close and critical reading skills and an understanding of how aesthetic texts critically engage within historical and cultural experiences. Assignments include novels, essays, short stories, poems, plays, songs, films, and scholarly articles. Taught in English. Recommended restrictions: for students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite CHIN 1012 or CHIN 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 3343 (3) Chinese Science Fiction**
This is a survey course on Chinese science fiction in literature, comics, and film. 21st century Chinese sci-fi has recently gained prominence in world literature, and this course will introduce its genealogies going back to the 19th century. We will explore concepts such as futurism, civilizational discourse, techno-orientalism, utopian thought, dystopian critique, genre, and translation. Students will be encouraged to think in a cross-cultural context about diverse visions of the future. Recommended restrictions: for students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite CHIN 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**CHIN 3351 (3) Reality and Dream in Chinese Literature**
Explores the role of dreams in Chinese literature and culture. Sources may range from religious, philosophical, medical and historical writings to poetry to genres of fiction in various media. Taught in English. Recommended restrictions: for students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite CHIN 1012 or CHIN 1051.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 3361 (3) Women and the Supernatural in Chinese Literature**
Explores the relationship between the worlds of women and the supernatural in Chinese literature, from ancient to modern times. Focuses on selected significant works of classical and vernacular fiction, religious texts, and poetry. Taught in English. Recommended restrictions: for students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite CHIN 1012 or CHIN 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 3371 (3) Topics in Chinese Film**
Offers in-depth, critical analysis of key issues in Chinese culture as represented in Chinese film. Focuses on various topics, such as specific directors, regions, representation of gender in Chinese film, historical periods, etc. Varies from year to year. Requires no knowledge of Chinese. Taught in English.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisite CHIN 1012 or CHIN 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 3372 (3) Chinese Media and the Environment**
This course works through Chinese literature and film to deal with ecological crisis and media environment from a Chinese perspective. We will ask: how do contemporary authors and filmmakers present a distinctly Chinese ecopoetics? Furthermore, how does the Chinese media ecology change the world both within and outside of China? Our methodological points of entry will include ecocriticism, environmental philosophy, animal studies, architecture and urban studies, infrastructure, sound studies, media archaeology, and spatial and information theory. Recommended restrictions: for students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite CHIN 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**CHIN 3381 (3) Chinese Travel Literature: Journeys Within and Without, Real and Imaginary**
Explores the world of travel writing in Chinese literature and culture. Widely different forms of real and imaginary travel have inspired a broad spectrum of travel literature in China. We will read and discuss different examples, from landscape poetry describing a hike through ragged mountains to travelogues about officials moving across the country, from factual geographical and environmental reports to fantastical novels about intercultural and interspecies encounters of the strangest kind. Taught in English. Formerly offered as a special topics course.
**Recommended:** for students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**CHIN 4041 (3) Introduction to Classical Chinese**
Develops basic competence in the Classical Chinese, the language in which the foundational texts of Chinese culture are written. Classical Chinese forms the basis for the literary language used in China until the early 20th century. We will begin to read parts of early Chinese philosophical texts, such as Laozi and the Analects of Confucius. Formerly CHIN 4210.
**Equivalent - Duplicate Degree Credit Not Granted:** CHIN 5041
**Requisites:** Requires prerequisite course of CHIN 2120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 4042 (3) Readings in Classical Chinese**
Introduces a wide spectrum of texts from pre-modern China: philosophical, historical, ghost stories, and poems (including the Ballad of Mulan). We will read these texts closely, focusing on their linguistic and literary features and on their cultural background. Formerly CHIN 4220.
**Equivalent - Duplicate Degree Credit Not Granted:** CHIN 5042
**Requisites:** Requires prerequisite course of CHIN 4041, formerly CHIN 4210 (minimum grade C) or instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 4110 (3) Advanced Readings in Modern Chinese 1**
Surveys a wide variety of 20th- and 21st-century texts that are of recognized literary or cultural importance. Focuses on translation, including discussion of content and style.
**Requisites:** Requires prerequisite course of CHIN 3120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 4120 (3) Advanced Readings in Modern Chinese 2**
Surveys a wide variety of 20th- and 21st-century texts that are of recognized literary or cultural importance. Focuses on translation, including discussion of content and style.
**Requisites:** Requires prerequisite course of CHIN 3120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 4300 (3) Open Topics: Readings in Chinese Literature**
Studies selected texts on a particular topic taught by regular or visiting faculty. Topics change each term.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 4900 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 4950 (3) Honors Thesis**
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Chinese
Departmental Category: Asia Content

## Hindi/Urdu

**HIND 1010 (4) Beginning Hindi 1**
Provides a thorough introduction to the modern Hindi language, emphasizing speaking, listening, reading, and writing skills. This course is proficiency-based. Activities aim to place the student in the context of the native-speaking environment from the very beginning. Students will be provided with opportunities to participate in local South Asian cultural events.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi
Departmental Category: Asia Content

**HIND 1011 (3) Introduction to South Asian Civilizations**
Survey of traditional and modern world views and experiences of people on the Indian subcontinent through literature and film, beginning with the Ramayana and including medieval tales, modern novels, and feature films. Taught in English.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Hindi Courses in English
Departmental Category: Asia Content

**HIND 1020 (4) Beginning Hindi 2**
Continuation of HIND 1010. Provides a thorough introduction to the modern Hindi language, emphasizing speaking, listening, reading and writing skills. Proficiency-based course aims to place the student in the context of the native-speaking environment from the beginning of the course. Provides opportunities to participate in local South Asian cultural activities and events.
**Requisites:** Requires prerequisite course of HIND 1010 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi
Departmental Category: Asia Content

**HIND 2110 (4) Intermediate Hindi 1**
Emphasizes speaking, listening, reading and writing skills and culturally appropriate language use.
**Requisites:** Requires prerequisite course of HIND 1020 (minimum grade C).
**Additional Information:** Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Hindi
Departmental Category: Asia Content

**HIND 2120 (4) Intermediate Hindi 2**
Continuation of HIND 2110. Enhances students' speaking, listening, reading and writing skills and culturally appropriate language use.
**Requisites:** Requires prerequisite course of HIND 2110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi
Departmental Category: Asia Content

**HIND 3110 (4) Advanced Hindi 1**
Emphasizes speaking, listening and conversational fluency in Hindi, with a focus on cultural appropriate expression and practical knowledge.
**Requisites:** Requires prerequisite course of HIND 2120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi
Departmental Category: Asia Content

**HIND 3120 (4) Advanced Hindi 2**
Continuation of HIND 3110. Emphasizes reading, listening, and speaking fluency in Hindi/Urdu, with a focus on literary, cinematic and cultural themes in modern and contemporary Hindi/Urdu media and culture. Thematic focus of the course may change each semester. An effort will be made to encourage students to put their language skills into literary and cultural context.
**Requisites:** Requires prerequisite course of HIND 3110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi
Departmental Category: Asia Content

**HIND 3400 (3) Special Topics**
Topics in Hindi. No prerequisites.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi
Departmental Category: Asia Content

**HIND 3441 (3) Screening India: A History of Bollywood Cinema**
Provides a critical overview of one of the world's largest and most beloved film industries, the popular Hindi cinema produced in Bombay (Mumbai) and consumed around the world under the label "Bollywood". Focus on the post-Independence era to the present, with introduction to key films, directors, stars, genres, formal techniques, and themes, as well as critical analyses of these and other topics. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi Courses in English
Departmental Category: Asia Content

**HIND 3651 (3) Living Indian Epics: The Ramayana and the Mahabharata in the Modern Political Imagination**
Explores the Ramayana and Mahabharata, two fundamental mythological pillars of Indian society, through literature, comic books, film, television, and political rhetoric as a means of examining major issues of religion, gender, popular culture, and social politics in contemporary India. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi Courses in English
Departmental Category: Asia Content

**HIND 3661 (3) South Asian Diasporas: Imagining Home Abroad**
Examines fundamental questions of home, nation, identity, ethnicity, and foreignness in the context of the enormous South Asian diaspora. By means of literature, ethnography, and film, the various connotations of diaspora will be explored along with the cultural productions of members of the South Asian diaspora (both Indian and Pakistani). Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi Courses in English
Departmental Category: Asia Content

**HIND 3811 (3) The Power of the Word: Subversive and Censored 20th Century Indo-Pakistani Literature**
Provides an overview of a selection of writings by important 20th century Indo-Pakistani authors, which will permit students to get acquainted with Indian literature. Provides insight into the experience of social and political events in the 20th century and the reaction of the government to the critical analysis and portrayal of these events. Taught in English.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Hindi Courses in English
Departmental Category: Asia Content

**HIND 3831 (3) The Many Faces of Krishna in South Asia Literature and Culture**
Using both textual and visual sources, the multiple facets of Krishna in Indian religious experience will be explored through poetry and prose, painting and sculpture, music, dance, and drama. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi Courses in English
Departmental Category: Asia Content

**HIND 3851 (3) Devotional Literature in South Asia**
Focuses on the medieval and modern periods (1200-present), and the languages of North India and Pakistan (Hindi, Urdu, Panjabi). Students engage with English translations of works by Tulsidas, Surdas, Kabir, Mirabai, Nanak, Khusrau, Ghalib, Anis and Iqbal. Recurring themes include issues of authorship and interpretation; religious and aesthetic encounter; and the legacy of these traditions in modern South Asian society and literature. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi Courses in English
Departmental Category: Asia Content

**HIND 4900 (1-3) Independent Study**
Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Hindi

## Japanese

**JPNS 1010 (5) Beginning Japanese 1**
Provides a thorough introduction to modern Japanese, emphasizing speaking, listening, reading, and writing in a cultural context.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 1012 (4) Introduction to Japanese Civilization**
An interdisciplinary introduction to the cultural history of peoples of the Japanese archipelago from prehistory to the present through the exploration of literature, material life, art forms, politics, religious practices, and intellectual currents. Taught in English; no prior knowledge of Japanese language, culture, or history is necessary or expected.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 1020 (5) Beginning Japanese 2**
Continuation of JPNS 1010.
**Requisites:** Requires prerequisite course of JPNS 1010 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 1051 (3) Portals to Japanese Literature**
Surveys Japanese thought and culture through careful reading and discussion of selected significant works of Japanese literature in translation. Texts may include works of poetry, fiction, drama, diaries, and essays, from ancient times to the present. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 2110 (5) Intermediate Japanese 1**
Continued study of oral and written modern Japanese in a cultural context.
**Requisites:** Requires prerequisite course of JPNS 1020 (minimum grade C).
**Additional Information:** Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 2120 (5) Intermediate Japanese 2**
Continuation of JPNS 2110.
**Requisites:** Requires prerequisite course of JPNS 2110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 2441 (3) Japanese Culture through Film and Anime**
Examines 20th century Japanese culture through cinematic and animated films. Studies films by Ozu, Kurosawa, Mizoguchi, and contemporary animators Tezuka, Miyazaki, and Kon Satoshi. Considers cultural issues raised in film and anime in light of modern Japanese history and literature. Requires no knowledge of Japanese. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 2811 (3) Heroes and the Supernatural: Word and Image in Old Japan**
Examines the fusion of literary and visual arts in twelfth- to nineteenth-century Japan, focusing on illustrated handscrolls and narrative paintings. Students will explore tales of monsters, samurai, fantastic journeys to other worlds, anthropomorphic animals, and the eighteenth- and nineteenth-century precursors of contemporary Japanese comics. This course seeks to analyze visual-literary texts in their historical contexts as both literature and art. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 3110 (5) Advanced Japanese 1**
Enhances student competence and performance in Japanese language in a holistic and integrative manner.
**Requisites:** Requires prerequisite course of JPNS 2120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 3120 (5) Advanced Japanese 2**
Continuation of JPNS 3110. Enhances student competence and performance in Japanese language in a holistic and integrative manner.
**Requisites:** Requires prerequisite course of JPNS 3110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 3200 (3) Adv Wrtg Topics on Chinese & Japanese Literature and Civilization**
Provides an introduction to the academic study of Chinese and Japanese literature and culture with a focus on writing skills in English through a survey of standard academic writing conventions. Review and assessment of selected textual materials, class presentation, critique, and revision. Recommended for majors. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** CHIN 3200
**Requisites:** Restricted to students with a minimum of 45 credits completed.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Upper
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**JPNS 3311 (3) Japanese Minority and Transnational Literature**
Explores the diversity and complexity of literature produced in the 20th and 21st century by Japanese racial, ethnic, and other minorities. We will examine works by Chinese, Korean, Ainu, Okinawan and Taiwanese writers, as well as writers from the Japanese diaspora in North and South America. Topics include empire, migration, colonialism, race, and indigenous identity. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English

**JPNS 3321 (3) Japanese Sci-Fi and Speculative Fiction**
Examines the genres of fantasy and sci-fi across Japanese media, including literature, film, anime, and manga. We will consider what the Japanese speculative imagination about different worlds can teach us, and consider subgenres of cyberpunk, space opera, mythological fantasy, cli-fi, and feminist speculation. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English

**JPNS 3331 (3) Business Japanese**
Designed to teach Japanese with emphasis on using Japanese for professional purposes. The course aims to foster the skills and the knowledge of effective cross-cultural and interpersonal communication in Japanese and to develop intercultural competence in business contexts.
**Requisites:** Requires prerequisite course of JPNS 2120 (minimum grade C).
**Recommended:** Prerequisite JPNS 3110.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 3511 (3) Paper Worlds, Screen Worlds: Contemporary Japanese Literature**
Explores Japanese literature from the 1980s to the present day, also drawing on film, manga, and visual media. Topics covered include the rise of electronic media, video games, responses to disasters, social deviance, sexualities and bodies, and imaginations of the future. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English

**JPNS 3611 (3) Speaking the Truth: Women's Counter-narratives of Korea and Japan**
Explores the rich history of women¿s writing in premodern Japan and Korea, focusing on works produced by and for women in vernacular scripts (kana and han'g¿l) during the Heian (794-1185), Kamakura (1185-1333), and Chos¿n (1392-1910) periods. Topics covered include the textual construction and subversion of idealized femininity, the representation of women's real lived experiences, and the subjective nature of historical truth.
**Equivalent - Duplicate Degree Credit Not Granted:** KREN 3611
**Recommended:** Prerequisite JPNS 1012, JPNS 1051 or KREN 1011.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**JPNS 3811 (3) The World of the Shining Prince: The Tale of Genji and Heian Literature**
An exploration of the literary landscape of Classical Japan focusing on The Tale of Genji (early 11th century), a brilliantly provocative work of fiction sometimes called ¿the world¿s first novel.¿ Covers the extensive world drawn within Genji and provides context for understanding its origins and reception through readings of other important works of Heian-era (794-1185) literature. Taught in English; no prior knowledge of Japanese language, culture, or history is necessary or expected.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3811
**Recommended:** Prerequisite JPNS 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 3821 (3) Monsters, Monks, and Mayhem: Medieval Japanese Literature in Translation**
Surveys the major works and authors of medieval Japanese (poetry, prose, and drama) from the Kamakura and Muromachi periods (1185-1600). Taught in English.
**Recommended:** Prerequisite JPNS 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 3831 (3) The Floating World in the Literature of Early Modern Japan**
Explores the seventeenth- and eighteenth-century concept of the ¿floating world¿ of fleeting urban pleasures in the fiction, drama, and ukiyo-e art of Tokugawa-period Japan, focusing on the great city centers of Edo and Osaka and their celebrity courtesans, kabuki actors, and samurai devotees. Taught in English; no prior knowledge of Japanese language, culture, or history is necessary or expected.
**Recommended:** Prerequisite JPNS 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 3841 (3) Transforming Worlds: Japanese Literature in Modernity**
Explores works of modern Japanese literature from the late 1800s to 1970s, placing novels, short stories, and poetry in their historical and cultural contexts. Topics covered include literary responses to Japan¿s modernisation and encounters with the West, the individual in society, mass culture and popular literature, the rise of fascism and colonialism, and visual media, including film. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3841
**Recommended:** Prerequisite JPNS 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 3851 (3) Japanese Popular Culture**
Introduces aspects of Japanese popular culture from the early 1990s economic collapse until the present through a variety of artistic mediums including manga, anime, literature, live-action cinema, video gaming, music, and the visual arts. Taught in English.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 3861 (3) Imagining the Samurai in Japanese Literature and Culture**
Explores the rich history of samurai in the Japanese popular imagination, from fiction and drama to cinema and the visual arts. Encompasses both fantastical and realistic representations of warrior culture from the twelfth through twentieth centuries. Taught in English; no prior knowledge of Japanese language, culture, or history is necessary or expected.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 3871 (3) Horror and the Macabre in Japanese Literature, Film, Culture**
Explores Japanese horror texts from both the pre-modern and modern eras in a variety of genres, including the monogatari, kaidan, kabuki, contemporary horror fiction, film and anime. Texts will be considered in historical and cultural context with attention being given to interactions with and within popular culture. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 3881 (3) Environment, Nature and Disaster in Japanese Literature and Culture**
Explores the significance of the environment, nature and disaster in Japanese literature and culture through readings in a variety of genres, including fiction, essay, poetry, sci-fi, film and anime. Attention will also be given to environmental/ecological issues, such as conservation, pollution, biodiversity and industrial development. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 3891 (3) Travel/Travel Writing in Japanese Literature and Culture**
Explores selected Japanese literary and cultural texts that treat travel and travel writing, including short and long fiction, poetry, memoir, nonfiction, biography and travel commentary. Taught in English.
**Recommended:** Prerequisite JPNS 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 4030 (3) Japanese Syntax**
Deals with syntactic phenomena from five areas of Japanese grammar that cause the most difficulty for learners. Their characteristics are explored in forms and discoursal functions that go beyond the explanations in basic, prescriptive grammars of Japanese.
**Requisites:** Requires prerequisite course of JPNS 3120 or JPNS 4120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 4050 (3) Japanese Sociolinguistics**
Explores issues related to contemporary Japanese language and society, such as language and identity, language and ideology, and language variation and change in Japan. More specifically, we will reconsider topics such as diversity in gender language, honorifics, dialects, and use of English in Japanese society that have been unidirectionally taught in Japanese language classrooms. The course aims to provide students opportunities to incorporate critical perspectives of sociolinguistics into analyses of Japanese literature and Japanese language education.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4050
**Requisites:** Requires prerequisite course of JPNS 3110 (minimum grade C).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 4080 (3) Kanji in Japanese Orthography**
Covers the issues in kanji research from historical, sociolinguistic, linguistic, cognitive perspective and vocabulary acquisition theories in the context of teaching and learning the Japanese language.
**Equivalent - Duplicate Degree Credit Not Granted:** JPNS 5080
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 4110 (3) Advanced Readings in Modern Japanese 1**
Surveys a variety of material written in modern Japanese, including texts from literature, the social sciences, religion, and cultural history. Emphasizes content and style. Texts and selections vary from year to year.
**Requisites:** Requires prerequisite course of JPNS 3120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 4120 (3) Advanced Readings in Modern Japanese 2**
Continuation of JPNS 4110. Texts and selections vary from year to year.
**Requisites:** Requires prerequisite course of JPNS 4110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 4300 (3) Open Topics: Readings in Japanese**
Examines selected texts on a particular topic taught by regular or visiting faculty. Topics change each term.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 4310 (3) Classical Japanese 1**
Introduces reference tools for reading classical Japanese, and grammar, vocabulary, and use of scripts in premodern Japanese, focusing on the 10th century Taketori Monogatari and the 13th century Hojoki.
**Requisites:** Requires prerequisite course of JPNS 3110 (minimum grade C).
**Recommended:** Prerequisites JPNS 3120 and JPNS 3811 and JPNS 3821.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 4320 (3) Classical Japanese 2**
Continuation of JPNS 4310. Surveys changes in Japanese literary language from the Nara (eighth century) to Meiji (late 19th century) periods. Attention given to changes in grammar, vocabulary, and use of scripts in premodern Japanese. Introduces representative works of classical Japanese literature of all periods.
**Requisites:** Requires prerequisite course of JPNS 4310 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 4900 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 4950 (3) Honors Thesis**
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Japanese
Departmental Category: Asia Content

## Korean

**KREN 1010 (5) Beginning Korean 1**
This course is designed to develop students' basic communication skills in various everyday topics through an integrated practice of listening, speaking, reading, writing, and presentation. Additionally, students will engage in free unlimited 1:1 conversation practice online with AI Korean speakers as their language partners to enhance their pronunciation and conversation skills through real-time interaction.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Korean
Departmental Category: Asia Content

**KREN 1011 (3) Introduction to Korean Civilization**
Introduces the history of Korean culture within the context of political, social, and economic history. Covers the old Choson dynasty to present day Korea. Taught in English.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Korean Courses in English
Departmental Category: Asia Content

**KREN 1020 (5) Beginning Korean 2**
Continuation of KREN 1010. This course is designed to develop students' basic communication skills in various everyday topics through an integrated practice of listening, speaking, reading, writing, and presentation. Additionally, students will engage in free unlimited 1:1 conversation practice online with AI Korean speakers as their language partners to enhance their pronunciation and conversation skills through real-time interaction.
**Requisites:** Requires prerequisite course of KREN 1010 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Korean
Departmental Category: Asia Content

**KREN 2110 (5) Intermediate Korean 1**
Extends the conversational and written skills acquired at the elementary level. Although emphasis remains on spoken Korean, readings are increased, elementary writing skills are introduced gradually, and some Sino Korean characters are taught.
**Requisites:** Requires prerequisite course of KREN 1020 (minimum grade C).
**Additional Information:** Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Korean
Departmental Category: Asia Content

**KREN 2120 (5) Intermediate Korean 2**
Continuation of KREN 2110.
**Requisites:** Requires prerequisite course of KREN 2110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Korean
Departmental Category: Asia Content

**KREN 2441 (3) Film and Korean Culture**
Introduces students to major works, genres, and trends of Korean cinema from the colonial period to the present. We will explore how cinema registers Korea's experience with modernity, colonialism, national division, the Cold War, and globalization, paying particular attention to class, gender, nation, race and migration. Taught in English. No prior knowledge of Korea or film art is required.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Korean Courses in English
Departmental Category: Asia Content

**KREN 3110 (5) Advanced Korean 1**
Promotes an advanced level of speaking, reading, and writing. Focuses on contemporary business Korean language as reflected in various Korean media such as newspapers, magazines, and television. The goal is to acquire Korean language skills at a level that allows students to conduct business activities.
**Requisites:** Requires prerequisite course of KREN 2120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Korean
Departmental Category: Asia Content

**KREN 3120 (5) Advanced Korean 2**
This second semester of Korean offers advanced level speaking and writing. Focuses on understanding contemporary Korean languages as reflected in various communication media, such as print, TV, and films to help students understand Korean in a variety of contexts.
**Requisites:** Requires prerequisite course of KREN 3110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Korean
Departmental Category: Asia Content

**KREN 3611 (3) Speaking the Truth: Women's Counter-narratives of Korea and Japan**
Explores the rich history of women¿s writing in premodern Japan and Korea, focusing on works produced by and for women in vernacular scripts (kana and han'g¿l) during the Heian (794-1185), Kamakura (1185-1333), and Chos¿n (1392-1910) periods. Topics covered include the textual construction and subversion of idealized femininity, the representation of women's real lived experiences, and the subjective nature of historical truth.
**Equivalent - Duplicate Degree Credit Not Granted:** JPNS 3611
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**KREN 3841 (3) Modern Korean Literature in English Translation**
Surveys masterpieces of modern Korean literature written by significant Korean/Korean American authors in English. Provides various literary and theoretical frameworks to understand Korean literature within the context of Asian global culture. Covers from colonial period to the present. Taught in English. No prior knowledge of Korea or Korean literature is required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Korean Courses in English
Departmental Category: Asia Content

**KREN 3851 (3) Studies in Korean Popular Culture**
Introduces Korean popular culture, considering its ideological, economic, and socio-political function, its reception and use, and medium-specific textual operations of individual works, drawing from music, cinema, dance, music videos, literature, comics, and other forms of texts and events. The course moves from the Japanese colonial period to the contemporary moment, providing coverage of North and South Korea. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Korean Courses in English

**KREN 4110 (3) Advanced Reading Through Pre-Modern Korean History**
In this advanced-level Korean course, students will explore pre-modern Korean history through the lens of culture and society. The primary course materials consist of written Korean texts from the main textbook, supplemented by various resources such as news articles, movies, literature, songs, photographs, and television/radio content. Students will analyze these texts thematically and write concise paragraphs based on their readings, covering pre-modern history from the Three Kingdoms period to the Joseon Dynasty.
**Requisites:** Requires prerequisite course of KREN 3110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**KREN 4900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Korean
Departmental Category: Asia Content

# Chinese - Bachelor of Arts (BA)

The undergraduate degree in Chinese emphasizes knowledge and awareness of:

- Chinese literary and cultural history, focusing on widely recognized works.
- The historical and cultural contexts in which particular works were written or created.
- Critical approaches to the study of Chinese language and civilization.
- The challenges, deficiencies and possible gains inherent in the process of translating from one language to another.

With a Chinese major, students will have skills, information and concepts that are relevant to careers in virtually every area. Competency in a foreign language is a highly desirable skill in all fields. A knowledge of Chinese is particularly beneficial and useful in business, engineering, industry, commerce, the civil or foreign service, law, library science, natural and social sciences, the media, economics, public administration, journalism, government and teaching at all levels. In addition, China is an increasing source of a wide variety of excellent careers, as it is among the world's largest economies (http://databank.worldbank.org/data/download/GDP.pdf) and trading partners with the U.S. and Colorado.

Students are encouraged to consider combining their Chinese language training with courses in these or other fields. Additional career opportunities can be found on the Career Services website (http://www.colorado.edu/career/).

# Requirements

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. CHIN 1010, CHIN 1020 and CHIN 2110 do not count toward the maximum of 45 credit hours in the major department.

The major program for the BA degree in Chinese requires successful completion of 30 credits, of which at least 18 credits must be at the upper-division level.

All required major courses must be passed with a C- or better and cannot be taken pass/fail. Students must have a grade point average of at least 2.000 in the major in order to graduate, and no more than 45 credits in CHIN courses may be applied to overall graduation requirements.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CHIN 2120 | Intermediate Chinese 2 | 5 |
| CHIN 3110 | Advanced Chinese 1 | 5 |
| CHIN 3120 | Advanced Chinese 2 | 5 |
| CHIN 4041 | Introduction to Classical Chinese [1] | 3 |
| **Electives** | | |
| The remaining 12 credit hours (at least 5 of which much be upper-division) may be chosen from the courses listed below; 3 of these credit hours may be satisfied by courses focusing wholly or substantially on China offered in other departments, subject to approval by the Chinese undergraduate faculty advisor. [2] | | 12 |
| CHIN 1012 | Introduction to Chinese Civilization | |

| | |
|---|---|
| CHIN 1051 | Masterpieces of Chinese Literature in Translation |
| CHIN 2441 | Film and the Dynamics of Chinese Culture |
| CHIN 2442 | Modern Chinese Media Cultures |
| CHIN 3200 | Adv Wrtg Topics on Chinese & Japanese Literature and Civilization [3] |
| CHIN 3321 | Political Thought in Ancient China |
| CHIN 3331 | Urban Entertainment Culture in Early Modern China |
| CHIN 3333 | Race and Ethnicity in Chinese Literature: Sinophone Culture, Diaspora, and Identity |
| CHIN 3334 | Premodern Chinese Fiction |
| CHIN 3341 | Literature and Popular Culture in Modern China |
| CHIN 3342 | Sinophone Literature in the Contemporary World |
| CHIN 3351 | Reality and Dream in Chinese Literature |
| CHIN 3361 | Women and the Supernatural in Chinese Literature |
| CHIN 3371 | Topics in Chinese Film (taught in English) |
| CHIN 3372 | Chinese Media and the Environment |
| CHIN 3381 | Chinese Travel Literature: Journeys Within and Without, Real and Imaginary |
| CHIN 4042 | Readings in Classical Chinese [1] |
| CHIN 4110 | Advanced Readings in Modern Chinese 1 [1] |
| CHIN 4120 | Advanced Readings in Modern Chinese 2 [1] |
| CHIN 4300 | Open Topics: Readings in Chinese Literature |
| CHIN 4900 | Independent Study |
| CHIN 4950 | Honors Thesis |
| **Total Credit Hours** | **30** |

1 Transfer credit for these courses, whether from universities in this country or abroad, will be considered only in exceptional cases; normally, no credit toward the major will be given for these courses unless taken in residence.

2 The following courses from other departments may satisfy up to 3 credits of the elective requirements, subject to approval by the Chinese undergraduate faculty advisor: ASIA 4300 (Tibetan Literature & Culture, or Memory Politics in Taiwan), ASIA 4700, ARTH 4929, ECON 4534, ENES 3750, GEOG 3822, GEOG 4822, HIST 1618, HIST 1628 HIST 2629 HIST 3628, HIST 4618, HIST 4628, HIST 4638, HIST 4648, HIST 4658, HIST 4688, IAFS 4500 (China in the Global Economy), RLST 2620, RLST 3800, PSCI 4022, and PSCI 4052.

3 Fulfills both a major elective requirement and a component of the Gen Ed Skills Requirement.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in Chinese, students should meet the following requirements:

- Declare the major by the first semester of sophomore year.
- Students wishing to major in Chinese and who have no prior knowledge of the language should begin the required major courses no later than the sophomore year.
- Students must consult with the department's undergraduate academic advisor (https://www.colorado.edu/alc/our-people/undergraduate-advising/) to determine adequate progress toward completion of the major.

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will fulfill all 12 credits of the Arts & Humanities area of the Gen Ed Distribution Requirement. Average 30 credits per year. Credits may vary due to 5 credit language courses. Expect to take 14-17 credits per term. Keep the first year schedule closer to 14. Not all courses will be taught in the semester listed below. Be flexible with course options and speak with your advisor for specific recommendations.

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| CHIN 1010 | Beginning Chinese 1 (does not fulfill CHIN major credit requirement) | 5 |
| CHIN 1051 or CHIN 1012 | Masterpieces of Chinese Literature in Translation or Introduction to Chinese Civilization | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3-5 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| | **Credit Hours** | **14-16** |
| **Spring Semester** | | |
| CHIN 1020 | Beginning Chinese 2 (language prerequisite, does not fulfill CHIN major credit requirement) | 5 |
| Gen. Ed. Distribution course (example: Natural Science with Lab) | | 4 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |

**Year Two**

| **Fall Semester** | | |
|---|---|---|
| CHIN 2110 | Intermediate Chinese 1 (Language Prerequisite, does not fulfill CHIN major credit requirement) | 5 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Natural Science) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| CHIN 2120 | Intermediate Chinese 2 | 5 |

| | | |
|---|---|---|
| CHIN 3200 | Adv Wrtg Topics on Chinese & Japanese Literature and Civilization (fulfills Upper-division CHIN elective as well as Gen Ed Skills course: Upper-division Written Communication) or any upper division writing course such as WRTG 3020) [1] | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Natural Science) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **17** |
| **Year Three** | | |
| **Fall Semester** | | |
| CHIN 3110 | Advanced Chinese 1 | 5 |
| CHIN 4041 | Introduction to Classical Chinese | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Gen. Ed. Distribution (example: Social Science) | | 3 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| CHIN 3120 | Advanced Chinese 2 | 5 |
| CHIN Upper-division Major Elective (e.g., CHIN 4042) | | 3 |
| Gen. Ed. Distribution course (example: Natural Science) | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| | **Credit Hours** | **17** |
| **Year Four** | | |
| **Fall Semester** | | |
| CHIN Upper-division Major Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **121-123** |

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BA in Chinese, MA in Asian Languages and Civilizations

The BAM degree program in Chinese recognizes the need for master's-level training upon entering the job market in a variety of sectors that call for highly advanced proficiency in the Chinese language, knowledge of the culture of China and its literature and the skills acquired by BA and MA graduates in the humanities: research, analysis, interpretation, translation and communication.

This degree offers a challenging and focused academic experience for exceptional students (particularly those who enter the university with significant preparation in Chinese studies from high school or with other backgrounds, or those who participate in study abroad opportunities at CU) who demonstrate the ability to express their ideas clearly, both orally and in written form, using standard English.

### Admissions Requirements

Students interested in applying for this option must consult with the department's undergraduate academic advisor (https://www.colorado.edu/alc/our-people/undergraduate-advising/) early in their career at CU to establish their program of study. In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Be a current CU Boulder undergraduate student.
- Have a cumulative GPA of 3.25 or higher for all courses taken at CU Boulder.
- If a transfer student, have completed a minimum of 24 credit hours at CU Boulder.

Students must submit the following materials by Sept. 1 of their junior year (or, in exceptional circumstances, during the student's senior year) to the director of graduate studies in Chinese (https://www.colorado.edu/alc/people/graduate-advising/):

- Intent application
- Statement of purpose
- Writing sample
- Three letters of recommendation (at least one from a full-time member of the Chinese faculty)

Applications will be reviewed by the Chinese graduate faculty.

### Program Requirements

Students are required to fulfill separately all requirements for the BA in Chinese and MA in Chinese, with the exception of the following courses that can satisfy requirements for both the BA and the MA:

- CHIN 4042 Readings in Classical Chinese (3 credits)
- CHIN 5010 Sinological Methods (3 credits)

Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

Additional information about the BAM requirements and curriculum (https://www.colorado.edu/alc/graduate/academics/bachelors-accelerated-master-bam/#chinese-5) can be found on the department website.

## Learning Outcomes

By the completion of the program, students will be able to:

- Converse in Chinese with confidence and ease about routine tasks and topics familiar to students from their daily lives.
- Read and comprehend a variety of texts and other materials in Chinese.
- Write about familiar topics in Chinese in a style resembling students' oral discourse.
- Recognize and discuss, in English, major works of Chinese literature, thought and other representational media from the earliest eras to the present.
- Analyze, interpret and write in English about Chinese literature and culture according to contemporary academic conventions.

# Japanese - Bachelor of Arts (BA)

The undergraduate degree in Japanese emphasizes knowledge and awareness of:

- The outlines of the history of Japanese literature from the earliest periods to the present.
- The outlines of Japanese historical and cultural development.
- Appropriate research strategies for Japanese language, literature and culture.

With a Japanese major (https://www.colorado.edu/alc/undergraduate/majors/), students will have skills, information and concepts that are relevant to careers in virtually every area. Competency in a foreign language is a highly desirable skill in all fields. A knowledge of Japanese is particularly beneficial and useful in business, engineering, industry, commerce, the civil or foreign service, law, library science, natural and social sciences, the media, economics, public administration, journalism, government and teaching at all levels. In addition, Japan is an increasing source of a wide variety of excellent careers, as it is among the world's largest economies (http://databank.worldbank.org/data/download/GDP.pdf) and trading partners with the U.S. and Colorado.

Students are encouraged to consider combining their Japanese language training with courses in these or other fields. Additional career opportunities can be found on the Career Services website (http://www.colorado.edu/career/).

## Requirements

### Program Requirements

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. JPNS 1010, JPNS 1020 and JPNS 2110 do not count toward the maximum of 45 credit hours in the major department.

The major program for the BA degree in Japanese requires successful completion of 30 credit hours, of which at least 18 credit hours must be at the upper-division level.

All required major courses must be passed with a C- or better and cannot be taken pass/fail. Students must have a grade point average of at least 2.000 in the major in order to graduate, and no more than 45 credits in JPNS may be applied to overall graduation requirements.

**Required Courses and Credits**

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| JPNS 2120 | Intermediate Japanese 2 | 5 |
| JPNS 3110 | Advanced Japanese 1 | 5 |
| JPNS 3120 | Advanced Japanese 2 | 5 |
| **Electives** | | |
| The remaining 15 credit hours should be chosen from the courses listed below; 6 of these credit hours may be satisfied by courses focusing wholly or substantially on Japan offered in other departments, subject to approval by the Japanese undergraduate faculty advisor; and 9 of these credit hours must be at the upper-division level. [1] | | 15 |
| JPNS 1012 | Introduction to Japanese Civilization | |
| JPNS 1051 | Portals to Japanese Literature | |
| JPNS 2441 | Japanese Culture through Film and Anime | |
| JPNS 2811 | Heroes and the Supernatural: Word and Image in Old Japan | |
| JPNS 3200 | Adv Wrtg Topics on Chinese & Japanese Literature and Civilization (recommended) | |
| JPNS 3311 | Japanese Minority and Transnational Literature | |
| JPNS 3321 | Japanese Sci-Fi and Speculative Fiction | |
| JPNS 3331 | Business Japanese | |
| JPNS 3511 | Paper Worlds, Screen Worlds: Contemporary Japanese Literature | |
| JPNS 3811 | The World of the Shining Prince: The Tale of Genji and Heian Literature | |
| JPNS 3821 | Monsters, Monks, and Mayhem: Medieval Japanese Literature in Translation | |
| JPNS 3831 | The Floating World in the Literature of Early Modern Japan | |
| JPNS 3841 | Transforming Worlds: Japanese Literature in Modernity | |
| JPNS 3851 | Japanese Popular Culture | |
| JPNS 3871 | Horror and the Macabre in Japanese Literature, Film, Culture | |
| JPNS 3881 | Environment, Nature and Disaster in Japanese Literature and Culture | |
| JPNS 3891 | Travel/Travel Writing in Japanese Literature and Culture | |
| JPNS 4050 | Japanese Sociolinguistics | |
| JPNS 4110 | Advanced Readings in Modern Japanese 1 [1] | |
| JPNS 4120 | Advanced Readings in Modern Japanese 2 [1] | |
| JPNS 4150 | | |
| JPNS 4210 | | |
| JPNS 4300 | Open Topics: Readings in Japanese | |
| JPNS 4310 | Classical Japanese 1 [2] | |
| JPNS 4320 | Classical Japanese 2 [2] | |
| JPNS 4400 | | |
| JPNS 4900 | Independent Study [3] | |

| | | |
|---|---|---|
| JPNS 4950 | Honors Thesis | |
| **Total Credit Hours** | | **30** |

1 The following courses from other departments may satisfy up to 6 credits of the elective requirements, subject to approval by the Japanese undergraduate faculty advisor: ANTH 1110, ARTH 3629, ARTH 4929, EMUS 3467, HIST 1708, HIST 3718, HIST 4718, HIST 4728, HIST 4758, HIST 4808, RLST 2620 or RLST 3400.

2 Transfer credit for these courses, whether from universities in the U.S. or abroad, will be considered only in exceptional cases; normally, no credit toward the major will be given for these courses unless taken in residence.

3 Independent Study will be considered only in exceptional cases. Please consult with the Japanese Undergraduate Faculty Advisor.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in Japanese, students should meet the following requirements:

- Declare the major by the first semester of sophomore year.
- Students wishing to major in Japanese and who have no prior knowledge of the language should begin the required major courses no later than the sophomore year.
- Students must consult with the department's undergraduate academic advisor (https://www.colorado.edu/alc/undergraduate/advising/) to determine adequate progress toward completion of the major. An example four-year plan is available on the department website (https://www.colorado.edu/alc/undergraduate/majors/).

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will fulfill all 12 credits of the Arts & Humanities area of the Gen Ed Distribution Requirement, and potentially, the Upper-division Written Communication component of the Gen Ed Skills Requirement and the Global Perspective category of the Gen Ed Diversity Requirement.

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| JPNS 1010 | Beginning Japanese 1 (does not fulfill JPNS major credit requirement) | 5 |
| JPNS 1051 or JPNS 1012 | Portals to Japanese Literature [1] or Introduction to Japanese Civilization | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| JPNS 1020 | Beginning Japanese 2 (language prerequisite, does not fulfill JPNS major credit requirement) | 5 |
| HIST 1708 | Japan from Clay Pots to Robots (optional: fulfills 3 credit hour non-JPNS elective) | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **14** |

**Year Two**

| **Fall Semester** | | |
|---|---|---|
| JPNS 2110 | Intermediate Japanese 1 (language prerequisite, does not fulfill JPNS major credit requirement) | 5 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences and Lab) | | 4 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| JPNS 2120 | Intermediate Japanese 2 | 5 |
| JPNS 3200 | Adv Wrtg Topics on Chinese & Japanese Literature and Civilization (optional: fulfills upper division JPNS elective as well as Gen. Ed. Skills course: Upper-division Writing Communication) or any upper division writing course such as WRTG 3020) | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| | **Credit Hours** | **14** |

**Year Three**

| **Fall Semester** | | |
|---|---|---|
| JPNS 3110 | Advanced Japanese 1 | 5 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| JPNS Upper-division Major Elective | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| JPNS 3120 | Advanced Japanese 2 | 5 |
| JPNS Upper-division Major Elective | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) - Upper-division | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| | **Credit Hours** | **17** |

**Year Four**

| **Fall Semester** | | |
|---|---|---|
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **15** |

| | |
|---|---|
| **Spring Semester** | |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences) | 3 |
| Upper-division Elective | 3 |
| Upper-division Elective | 3 |
| Upper-division Elective | 3 |
| Upper-division Elective | 3 |
| **Credit Hours** | **15** |
| **Total Credit Hours** | **121** |

[1] JPNS 1012 recommended; fulfills both JPNS major requirement and the Global Perspective category in the Gen. Ed. Diversity Requirement.

# Learning Outcomes

By the completion of the program, students will be able to:

- Draw upon a foundation in Japanese in the four linguistic skills of listening, speaking, reading, and writing, at a level of proficiency adequate for basic practical applications in academic and professional fields.
- Comprehend the contents and cultural context of a variety of aural and written materials in Japanese.
- Convey thoughts and opinions in Japanese in a culturally appropriate manner in both speaking and writing.
- Recognize and discuss, in English, major works of Japanese literature, thought and other representational media from the earliest eras to the present.
- Analyze, interpret and write in English about Japanese literature and culture according to contemporary academic conventions.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BA in Japanese, MA in Asian Languages and Civilizations

The BAM degree program in Japanese recognizes the need for master's-level training upon entering the job market in a variety of sectors that call for highly advanced proficiency in the Japanese language, knowledge of the culture of Japan and its literature and the skills acquired by BA and MA graduates in the humanities: research, analysis, interpretation, translation and communication.

This degree offers a challenging and focused academic experience for exceptional students (particularly those who enter the university with significant preparation in Japanese studies from high school or with other backgrounds, or those who participate in study abroad opportunities at CU) who demonstrate the ability to express their ideas clearly, both orally and in written form, using standard English.

### Admissions Requirements

Students interested in applying for this option must consult with the department's undergraduate academic advisor (https://www.colorado.edu/alc/our-people/undergraduate-advising/)early in their career at CU to establish their program of study. In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Be a current CU Boulder undergraduate student.
- Have a cumulative GPA of 3.25 or higher for all courses taken at CU Boulder.
- If a transfer student, have completed a minimum of 24 credit hours at CU Boulder.

Students must submit the following materials by Sept. 1 of their junior year (or, in exceptional circumstances, during the student's senior year) to the director of graduate studies in Japanese: (https://www.colorado.edu/alc/people/graduate-advising/)

- Intent application
- Statement of purpose
- Writing sample
- Three letters of recommendation (at least one from a full-time member of the Japanese faculty)

Applications will be reviewed by the Japanese graduate faculty.

### Program Requirements

Students are required to fulfill separately all requirements for the BA in Japanese and MA in Japanese, with the exception that 6 credits of coursework can satisfy requirements for both the BA and the MA. Selection of the overlap courses should be made in consultation with the director of graduate studies in Japanese (https://www.colorado.edu/alc/people/graduate-advising/).

Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

Specific information about the BAM requirements and curriculum (https://www.colorado.edu/alc/graduate/academics/bachelors-accelerated-master-bam/#japanese-5) can be found on the department website.

# Arabic - Minor

A minor in Arabic studies can be selected by students who wish to gain a basic understanding of the language as well as history, culture and literary traditions of the Middle East and North Africa. Please contact the department's undergraduate academic advisor (https://www.colorado.edu/alc/our-people/undergraduate-advising/) for any questions.

# Requirements

Requirements: A minimum of 18 credits must be taken in Arabic language and literature courses, including a total of 9 upper-division credits. A cumulative GPA of 2.00 or better is required in all ARAB courses attempted. Each course that is counted towards these degree

requirements must be passed with a grade of C- or better. Pass/fail work will not apply to the minor. Students are allowed to apply no more than 9 credits, including 6 upper-division credits, of transfer work toward a minor. ARAB 1010 and ARAB 1020 do not count toward minor.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ARAB 2110 | Intermediate Arabic 1 | 4 |
| ARAB 2120 | Intermediate Arabic 2 | 4 |
| ARAB 3110 | Advanced Arabic 1 | 4 |
| **Electives** | | **6** |
| At least two additional upper-division, 3-credit-hour ARAB courses. At least one of the content courses must focus on the premodern period. | | |
| ARAB 3120 | Advanced Arabic 2 | |
| ARAB 3220 | Arabian Nights, Arabian Days: Popular Literature in the Arab World and Beyond | |
| ARAB 3221 | The Making of Middle Eastern Identities: Arabs and Their "Others" | |
| ARAB 3230 | Islamic Culture and the Iberian Peninsula | |
| ARAB 3231 | In the Footsteps of Travelers: Travel Writing in Arabic Lit | |
| ARAB 3241 | Art in Islamic Cultures | |
| ARAB 3330 | The Arabic Novel | |
| ARAB 3331 | Arabic Poetry | |
| ARAB 3340 | Representing Islam | |
| ARAB 3350 | Narrating the City: Literary Mappings of the Urban Landscape | |
| ARAB 3360 | Truth and Prophecy in Islam | |
| ARAB 3410 | Gender, Sexuality and Culture in the Modern Middle East | |
| **Total Credit Hours** | | **18** |

# Plan(s) of Study

This is a recommended plan. Students are encouraged to speak with their advisors for specific recommendations.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| ARAB 1010 | Beginning Arabic 1 (do not apply to minor) | 4 |
| | **Credit Hours** | **4** |
| **Spring Semester** | | |
| ARAB 1020 | Beginning Arabic 2 (do not apply to minor) | 4 |
| | **Credit Hours** | **4** |
| **Year Two** | | |
| **Fall Semester** | | |
| ARAB 2110 | Intermediate Arabic 1 | 4 |
| | **Credit Hours** | **4** |
| **Spring Semester** | | |
| ARAB 2120 | Intermediate Arabic 2 | 4 |
| | **Credit Hours** | **4** |
| **Year Three** | | |
| **Fall Semester** | | |
| ARAB 3110 | Advanced Arabic 1 | 4 |
| | **Credit Hours** | **4** |
| **Spring Semester** | | |
| ARAB 3120 | Advanced Arabic 2 (or ARAB Upper-division Electives) | 4 (or 3) |
| | **Credit Hours** | **0-3** |
| **Year Four** | | |
| **Fall Semester** | | |
| ARAB Upper-division Elective | | 3 |
| | **Credit Hours** | **3** |
| **Spring Semester** | | |
| ARAB Upper-division Elective | | 3 |
| | **Credit Hours** | **3** |
| | **Total Credit Hours** | **26-29** |

# Chinese - Minor

A minor in Chinese can be selected by students who wish to gain a basic understanding of the language as well as the history, culture and literary traditions of China.

Please contact the department's undergraduate academic advisor (https://www.colorado.edu/alc/our-people/undergraduate-advising/) for any questions.

# Requirements

A minimum of 18 credits must be taken in Chinese language and literature courses, including a total of 13 upper-division credits. All coursework applied to the minor must be completed with a grade of C- or better. The GPA for all minor coursework must equal 2.00 or higher.

Pass/fail work and CHIN 3200 will not apply to the minor. Students are allowed to apply no more than 9 credits, including 6 upper-division credits, of transfer work toward a minor. CHIN 1010, CHIN 1020 and CHIN 2110 do not count toward minor.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CHIN 2120 | Intermediate Chinese 2 | 5 |
| CHIN 3110 | Advanced Chinese 1 | 5 |
| CHIN 3120 | Advanced Chinese 2 | 5 |
| **Electives** | | |
| At least one additional upper-division, 3-credit-hour CHIN course. | | 3 |
| **Total Credit Hours** | | **18** |

# Hindi/Urdu - Minor

A minor in Hindi/Urdu studies can be selected by students who wish to gain a basic understanding of the language as well as history, culture and literary traditions of South Asia.

Please contact the department's undergraduate academic advisor (https://www.colorado.edu/alc/our-people/undergraduate-advising/) for any questions.

## Requirements

A minimum of 18 credit hours must be taken in Hindi/Urdu language and literature courses, including a total of 9 upper-division credit hours.

All coursework applied to the minor must be completed with a grade of C- or better. The GPA for all minor coursework must equal 2.00 or higher. No pass/fail work may be applied. Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Language Requirement** | | |
| HIND 2110 | Intermediate Hindi 1 | 4 |
| HIND 2120 | Intermediate Hindi 2 | 4 |
| HIND 3110 | Advanced Hindi 1 | 4 |
| **Electives** | | |
| Choose at least two upper-division, 3-credit-hour HIND courses: | | 6 |
| HIND 3120 | Advanced Hindi 2 | |
| HIND 3441 | Screening India: A History of Bollywood Cinema | |
| HIND 3651 | Living Indian Epics: The Ramayana and the Mahabharata in the Modern Political Imagination | |
| HIND 3661 | South Asian Diasporas: Imagining Home Abroad | |
| HIND 3811 | The Power of the Word: Subversive and Censored 20th Century Indo-Pakistani Literature | |
| HIND 3831 | The Many Faces of Krishna in South Asia Literature and Culture | |
| HIND 3851 | Devotional Literature in South Asia | |
| Or other elective options approved by the department | | |
| **Total Credit Hours** | | **18** |

## Plan(s) of Study

This is a recommended plan. Students are encouraged to speak with their advisors for specific recommendations.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| HIND 1010 | Beginning Hindi 1 (do not apply to minor) | 4 |
| | **Credit Hours** | **4** |
| **Spring Semester** | | |
| HIND 1020 | Beginning Hindi 2 (do not apply to minor) | 4 |
| | **Credit Hours** | **4** |
| **Year Two** | | |
| **Fall Semester** | | |
| HIND 2110 | Intermediate Hindi 1 | 4 |
| | **Credit Hours** | **4** |
| **Spring Semester** | | |
| HIND 2120 | Intermediate Hindi 2 | 4 |
| | **Credit Hours** | **4** |
| **Year Three** | | |
| **Fall Semester** | | |
| HIND 3110 | Advanced Hindi 1 | 4 |
| | **Credit Hours** | **4** |
| **Spring Semester** | | |
| HIND 3120 | Advanced Hindi 2 (or HIND Upper-division Elective) | 4 (or 3) |
| | **Credit Hours** | **0-3** |
| **Year Four** | | |
| **Fall Semester** | | |
| HIND Upper-division Elective | | 3 |
| | **Credit Hours** | **3** |
| **Spring Semester** | | |
| HIND Upper-division Elective | | 3 |
| | **Credit Hours** | **3** |
| | **Total Credit Hours** | **26-29** |

# Japanese - Minor

A minor in Japanese can be selected by students who wish to gain a basic understanding of the language as well as history, culture and literary traditions of Japan.

Please contact the department's undergraduate academic advisor (https://www.colorado.edu/alc/our-people/undergraduate-advising/) for any questions.

## Requirements

A minimum of 18 credit hours must be taken in Japanese language and literature courses, including a total of 13 upper-division credit hours.

Pass/fail work and JPNS 3200 will not apply to the minor. Students are allowed to apply no more than 9 credits, including 6 upper-division credits, of transfer work toward a minor.

All coursework applied to the minor must be completed with a grade of C- or better (no pass/fail work may be applied). The GPA for all coursework taken in the minor department must be equal to 2.00 (C) or higher. JPNS 1010, JPNS 1020 and JPNS 2110 do not count toward minor.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| JPNS 2120 | Intermediate Japanese 2 | 5 |

| | | |
|---|---|---|
| JPNS 3110 | Advanced Japanese 1 | 5 |
| JPNS 3120 | Advanced Japanese 2 | 5 |
| **Electives** | | |
| At least one additional upper-division, 3-credit-hour JPNS course. | | 3 |
| **Total Credit Hours** | | **18** |

# Korean Language and Culture - Minor

A minor in Korean Language and Culture can be selected by students who wish to gain a basic understanding of the language as well as history, culture and literary traditions of Korea.

Please contact the department's undergraduate academic advisor (https://www.colorado.edu/alc/our-people/undergraduate-advising/) for any questions.

## Requirements

A minimum of 18 credit hours must be taken in Korean language and literature courses, including a total of 13 upper-division credit hours.

All coursework applied to the minor must be completed with a grade of C- or better (no pass/fail work may be applied). The GPA for all coursework taken in the minor department must be equal to 2.00 (C) or higher.

Pass/fail work will not apply to the minor. Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor. KREN 1010, KREN 1020 and KREN 2110 do not count toward minor.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| KREN 2120 | Intermediate Korean 2 | 5 |
| KREN 3110 | Advanced Korean 1 | 5 |
| KREN 3120 | Advanced Korean 2 | 5 |
| **Electives** | | **3** |
| At least one additional 3000-level Korean content course. | | |
| KREN 3611 | Speaking the Truth: Women's Counter-narratives of Korea and Japan | |
| KREN 3841 | Modern Korean Literature in English Translation | |
| KREN 3851 | Studies in Korean Popular Culture | |
| **Total Credit Hours** | | **18** |

## Plan(s) of Study

This is a recommended plan. Students are encouraged to speak with their advisors for specific recommendations.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| KREN 1010 | Beginning Korean 1 (does not apply to minor) | 5 |
| | **Credit Hours** | **5** |
| **Spring Semester** | | |
| KREN 1020 | Beginning Korean 2 (does not apply to minor) | 5 |
| | **Credit Hours** | **5** |
| **Year Two** | | |
| **Fall Semester** | | |
| KREN 2110 | Intermediate Korean 1 (does not apply to minor) | 5 |
| | **Credit Hours** | **5** |
| **Spring Semester** | | |
| KREN 2120 | Intermediate Korean 2 | 5 |
| | **Credit Hours** | **5** |
| **Year Three** | | |
| **Fall Semester** | | |
| KREN 3110 | Advanced Korean 1 | 5 |
| | **Credit Hours** | **5** |
| **Spring Semester** | | |
| KREN 3120 | Advanced Korean 2 | 5 |
| | **Credit Hours** | **5** |
| **Year Four** | | |
| **Fall Semester** | | |
| KREN Upper-division Elective | | 3 |
| | **Credit Hours** | **3** |
| **Spring Semester** | | |
| KREN Upper-division Elective | | 3 |
| | **Credit Hours** | **3** |
| | **Total Credit Hours** | **36** |

# Asian Studies

The Center for Asian Studies offers a broad, interdisciplinary undergraduate major and minor in Asian studies.

Students planning to major in Asian studies may obtain credit when they participate in study abroad programs in Asia with prior approval from the Asian Studies Program and Education Abroad.

For additional information on the major program, see Asian Studies - Bachelor of Arts (BA) (p. 166) or email Dr. Lauren Collins (lauren.collins@colorado.edu).

**Course code for this program is ASIA.**

## Bachelor's Degree

- Asian Studies - Bachelor of Arts (BA) (p. 166)

## Minor

- Asian Studies - Minor (p. 177)

## Certificate

- Tibetan and Himalayan Studies - Certificate (p. 178)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Collins, Lauren (https://experts.colorado.edu/display/fisid_147078/)
Assistant Teaching Professor, Program Director; PhD, University of Denver

Fydenlund, Shae
Teaching Assistant Professor; PhD, University of Colorado Boulder

Hirschberg, Dan (https://experts.colorado.edu/display/fisid_172774/)
Associate Teaching Professor; PhD, Harvard University

Rinaldo, Rachel Ann (https://experts.colorado.edu/display/fisid_156309/)
Faculty Director; PhD, University of Chicago

# Courses

**ASIA 1000 (3) Origins of Contemporary Southeast Asia**
Explores the dynamic present of Southeast Asia in light of its complex past. Introduces the shared historical experiences that have shaped diverse Southeast Asian societies, with a focus on the continuing effects of colonialism, nationalism, and globalization in the region. Examines key issues facing contemporary Southeast Asian communities, including current debates around gender, faith, human rights, democracy, development, etc. Engages with Southeast Asian literature, film, art, journalism, and museum collections from a transdisciplinary perspective.
**Recommended:** Prerequisite students may find some prior coursework in history, anthropology, or Asian Studies to be helpful, but this is not required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**ASIA 1700 (3) Introduction to Tibetan Civilization**
Surveys the dynamic history of Tibet from its earliest known origins to the present. Offers interdisciplinary perspectives on Tibetan civilization, including religion and politics, society and culture, arts, and literature. Topics include the role of Buddhism in Tibetan society, from the early empire through the rule of the Dalai Lamas; diverse narratives that inform the memory of Tibet¿s past and construct a shared cultural identity; civil war, sectarian conflict, and ecumenical projects; and modern Tibetan responses to Chinese policies, both domestically and in diaspora abroad.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ASIA 2000 (3) Gateway to Modern Asia: Exploring Regional Connections**
Introduces main themes, intellectual approaches used in Asian Studies through a transdisciplinary perspective that focuses on interactions and links between geographic regions and national boundaries. Presents Asia as a concept, a powerful imaginary geography, and historically dynamic construct that has shaped / been shaped by global patterns of economic development, nation building, war and diplomacy, colonialism and aspirations for better lives.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**ASIA 2300 (3) Himalayan Arts of Enlightenment**
Incorporating experiential learning and contemplative practice, this course explores Himalayan art and iconography informed by doctrinal, devotional, and philosophical principles grounded in historical context. These forms benefit from the diverse, cross-cultural transmission and innovation of techniques, materials, and aesthetics. At its heart Himalayan art acts as functional support for contemplative practice and devotional inspiration, but the act of creating art itself can be contemplative practice as a path to awakening. This course introduces the deeply interconnected and transnational history of the Himalayas as exemplified by its art forms and investigates their modern practice, economy, and innovation. Students are taught secular contemplative techniques to enhance their analysis.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ASIA 2500 (3) Catastrophe and Resilience: Asia's Experiences of Climate Change**
This course introduces Asia¿s battle with climate change and explores scholarship related to climate change and its impacts on Asia, particularly from a community perspective. Explores the resilience and strategies that different parts of Asia have developed in response to a changing climate. This interdisciplinary course will survey ideas from climate sciences, paleoclimate, anthropology, environmental studies, archeology, geography, and history.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ASIA 2852 (3) Contemporary Southeast Asia: Environmental Politics**
Examines globally pressing questions of environmental sustainability, regional inequality and development in the dynamic and heterogeneous landscapes of contemporary Southeast Asia. Focuses on interactions between histories of uneven development and contemporary debates over energy and infrastructure, food security, governance and access to land, forest and water-based resources.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 2852
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ASIA 3300 (3) Sex and Gender in Asian Film and Literature**
Explores issues of sex and gender in traditional and contemporary Asian cultures by looking at how sex and gendered roles are configured and play out in Asian cultures. Employs film and literary sources which reflect, subvert and act as agents of change in the dominant cultures.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**ASIA 3550 (3) Tibetan Buddhism**
Explores Tibetan Buddhism through literature and film, including sacred biographies, treatises on the Buddhist path and films providing a visual window into Tibetan life worlds. We examine different kinds of Tibetan journeys: moving through the life cycle, treading the path of self-cultivation, embarking on solitary retreat, traversing from death to rebirth and traveling on pilgrimage and into exile.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 3550

**ASIA 3900 (3) Discovering Urban China: Tradition, Modernity, Nostalgia**
Explores the ways Chinese cities, especially Beijing and Shanghai, are depicted in scholarly articles, films, literature and population culture in terms of tradition, modernity and nostalgia. Begins by defining the terms then discusses texts dealing with these themes. Discussions are linked to what the students observe first-hand as they explore the cities. Takes place in China.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**ASIA 4001 (1) Advanced Language Co-Seminar Arts and Humanities**
Acts as a Co-Seminar for advanced Asian Studies students.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Pass/Fail
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ASIA 4002 (1) Advanced Language Co-Seminar Social Sciences**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ASIA 4100 (3) China's Space Dream: Long March to the Moon and Beyond**
This class will explore the history of China's interest in and development of space technology from the Mao era through today. China became the third country ever to launch a human into space in 2003 and has been expanding its space program ever since. Beijing has poured billions into its military-run space program, with hopes of having a crewed space station by 2022 and eventually sending humans to the Moon. Tracing the development of China's space industry chronologically, this class will consider the long-term policy and industry implications of the growing U.S. - China Space rivalry. Course texts will draw on primary source documents, policy analysis, business case analyses, and contemporary Chinese science fiction to understand the current context for this rivalry and make policy recommendations for the future.
**Recommended:** Prerequisites ASIA 2000 and/or ASEN 1969.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Arts Sci Gen Ed: Distribution-Arts Humanities

**ASIA 4200 (3) Politics of Memory and Heritage in Asia**
Explores the uses of memory and heritage in the present-day politics of Asia. Examines how the past ¿ historical events, heritage sites, shared memories ¿ fuels nationalist movements, diplomatic disputes, grassroots activism, nostalgic tourism, and popular media. Delves especially into the legacies of colonialism and conflict in the region, highlighting how communities today seek justice and reconciliation in the wake of historical trauma. Engages with films, graphic novels, public art, photography, museums, monuments, archaeological sites, and more.
**Recommended:** Prerequisite Familiarity with Asian history, social science or humanities courses.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ASIA 4300 (3) Open Topics in Asian Studies**
Examines selected texts on a particular topic in the Arts & Humanities. Taught by regular or visiting faculty. Topics change each term.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Asia Content

**ASIA 4400 (3) Open Topics in Asian Studies**
Explores special social science topics in Asian Studies, including, but not limited to, social, political, economic, cultural, and international relations topics. Taught by regular or visiting faculty. Topics change each term.
**Equivalent - Duplicate Degree Credit Not Granted:** ASIA 5400
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ASIA 4448 (3) Wars of Liberation in Southeast Asia**
Uses the contemporary nations of Indonesia, Myanmar, and Singapore as case studies to examine the making and unmaking of European and Japanese colonialism in Southeast Asia in the years surrounding World War II. In what ways did diverse communities understand and narrate imperialism and independence? How can we understand wars of liberation as local, regional, and global experiences, with legacies for today?
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5448 and HIST 4448
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**ASIA 4500 (3) Urban Asia: Tradition, Modernity, Challenges**
Explores change in urban Asia, the representation of Asian cities, and the challenges of urban life through a transdisciplinary and thematic approach using academic articles, documentaries, and literary materials. The class discusses the role of tradition, concepts of modernity, the impact of tourism, rural to urban migration, poverty, the effects of war, legacies of colonialism, and environmental challenges.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Asia Content

**ASIA 4600 (3) Encounters: Tibet, the Himalayas, and the West**
Provides a history of encounters and interactions between Tibet and the West from the classical times till the twentieth century. Explores the early medieval European knowledge about Tibet, followed by the historical accounts of various western missionaries, travelers, imperialists, and spiritualists to Tibet and the Himalayas including the growth of Tibetan Buddhism in the West from the last century, and Tibetan diaspora and migration to the West.
**Recommended:** Prerequisite ASIA 1700.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ASIA 4650 (3) Art and Science of Meditation**
Broadly interdisciplinary and skill-based, this course offers an in-depth theoretical, practical, and experiential exploration of meditation informed by cutting-edge scientific studies. Students read traditional contemplative masterworks in translation, survey current neuroscientific and psychological research on meditation, and employ critical subjectivity in the application of evidence-based contemplative techniques. That is, students train in secularized meditation that is proven to develop three specific skillsets: relaxation and stress reduction; attentional focus and distraction reduction; and compassion and emotional resilience.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ASIA 4700 (3) Enlightened Visionaries, Dirty Tricksters and Warrior Heroes: Masterworks of Tibetan Literature**
This course surveys an array of Tibetan literary masterworks from ancient times to the present. Students read English Translations of Tibetan materials that are informed and contextualized by modern scholarship. Rather than focus on doctrinal works that comprise the majority of Tibet¿s textual corpus, this course explores Tibet¿s great narrative traditions, in both prose and verse, from folktales and trickster stories to heroic warrior epics to the aftermath of enlightenment in Buddhist biographies. Through this literature, students become familiar with the various cultural, intellectual, and historical movements that have shaped the Tibetan literary landscape. This is a discussion-based seminar where students take active roles in directing the conversation towards the topics of their greatest interest.
**Recommended:** Prerequisite ASIA 1700.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ASIA 4830 (3) Senior Seminar in Asian Studies**
Participates in a discussion seminar on topics in Asian Studies, conducts research and writes a final paper or creates a final project on an approved Asian Studies topic, following guidelines established by the program director. Required for Asian Studies majors but open to non-Asian Study majors.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Asia Content

**ASIA 4840 (1-3) Independent Study**
Provides an independent study opportunity, by special arrangement with Asian Studies faculty, for students with particular Asian Studies interests.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Asian Studies (ASIA) majors only.
**Additional Information:** Departmental Category: Asia Content

**ASIA 4842 (3) Global Frontiers in Southeast Asia**
Uses the theme of the global frontier to examine and compare three key moments in the modern history of Southeast Asia: the colonial encounter, the rise of the modern territorial state, and the age of contemporary globalization. Examines case studies from earlier eras to analyze emerging global frontiers at the junction of state territoriality and transnational economic expansion.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5842 and GEOG 4842
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Distribution-Social Sciences

**ASIA 4930 (1-6) Engage Asia: Internship in Asian Studies**
Matches students with supervised internships relevant to academic topics in Asian studies. Students work with CAS faculty and internship supervisors, i.e., intern with companies or non-profits doing Asia-related business or project.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Requisite Asian language and culture courses.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Asia Content

**INDO 1110 (3) Beginning Indonesian 1- DILS**
Provide students with an integrated introductory Basic Indonesian Course using the Directed Independent Language Study (DILS) method. Classes will also employ "flipped" task-based learning approaches. Reading assignments will include reading, listening and grammar, which students will demonstrate during class sessions, in which they will offer reading summaries, answer questions and practice speaking. Grades will be based on mastery of the assignments and demonstrated proficiency of written and spoken Indonesian, through in-class performance and mid-term and final examinations.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Asia Content

**INDO 1120 (3) Beginning Indonesian 2 - DILS**
A continuation of Beginning Indonesian 1 (INDO 1110), this is an integrated course. Classes are offered in person or remotely using the Directed Independent Language Study method. Classes will employ "flipped" task-based learning approaches. Coursework includes reading, listening, grammar, answering questions, and speaking practice. Grades are based on demonstrated proficiency of written and spoken Indonesian through in-class performance and examinations.
**Requisites:** Requires prerequisite course of INDO 1110 (minimum grade C).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**INDO 2110 (3) Intermediate Indonesian 1- DILS**
Building on Beginning Indonesian, students are exposed to active communication in Bahasa Indonesia. Offered in person or remotely using the Directed Independent Language Study (DILS) method, employing "flipped" task-based learning approaches. Assignments develop the four language skills, with vocabulary, grammar and cultural instruction. Students demonstrate progress during class sessions through reading summaries, answering questions and practicing speaking. Grades are based on demonstrated proficiency of written and spoken Indonesian, through in-class performance and midterm and final examinations.
**Requisites:** Requires prerequisite course of INDO 1120 or 1020 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**INDO 2120 (3) Intermediate Indonesian 2- DILS**
Continuation of Intermediate Indonesian 1. In the second year, students will be exposed to more active communication The structure, vocabulary and language features and the four language skills are embedded within various topics. Throughout the semester, students will be exposed to Indonesian vocabulary, structure, and culture.
**Requisites:** Requires prerequisite course of INDO 2110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**TBTN 1010 (4) Beginning Colloquial Tibetan 1**
Provides a thorough introduction to colloquial forms of Tibetan. Focuses on conversation practice, the acquisition of basic vocabulary and grammar in colloquial usage, learning the alphabet, and training in the skills of pronunciation, spelling and handwriting.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Tibetan

**TBTN 1020 (4) Beginning Colloquial Tibetan 2**
Provides a thorough introduction to colloquial forms of Tibetan. Continues the development of vocabulary and grammar begun in Tibetan I and expands the range of conversation topics. While students focus on oral and aural skills, they begin to learn to read and write modern Tibetan to produce an overall knowledge of the language.
**Requisites:** Requires prerequisite course of TBTN 1010 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Tibetan

**TBTN 1110 (3) Beginning Tibetan I - DILS**
Provides a thorough introduction to the colloquial Tibetan language, emphasizing speaking and listening in the Lhasa dialect. Trains students in basic conversations and the idiomatic and syntactical features of Tibetan through drills and dialogues.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**TBTN 1120 (3) Beginning Tibetan II - DILS**
Continuation of TBTN 1110; provides a thorough introduction to the colloquial and literary Tibetan language, emphasizing speaking and listening in the Lhasa dialect. Trains students in basic conversations and the idiomatic and syntactical features of Tibetan through drills and dialogues.
**Requisites:** Requires prerequisite course of TBTN 1110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**TBTN 1210 (2) Modern Literary Tibetan I - DILS**
Provides a thorough introduction to the modern literary Tibetan, emphasizing reading and writing. Trains students in the Tibetan script, elementary grammar, and reading authentic materials, including Tibetan maxims, pop song lyrics, and children¿s stories.

**TBTN 1220 (2) Modern Literary Tibetan II - DILS**
Continuation of TBTN 1210; provides a thorough introduction to the modern literary Tibetan, emphasizing reading and writing. Trains students in the Tibetan script, elementary grammar, and reading authentic materials, including Tibetan maxims, pop song lyrics, and children¿s stories.
**Requisites:** Requires prerequisite course of TBTN 1210 (minimum grade C).

**TBTN 2010 (4) Intermediate Colloquial Tibetan 1**
Aims at increasing students' proficiency in colloquial forms of Tibetan. Expands knowledge of the vocabulary and grammar of spoken Tibetan and engages in more advanced conversation topics while also continuing to develop reading knowledge of modern Tibetan.
**Requisites:** Requires prerequisite courses of TBTN 1010 and 1020 (all minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Tibetan

**TBTN 2020 (4) Intermediate Colloquial Tibetan 2**
Aims at increasing students' proficiency in colloquial forms of Tibetan. Expands knowledge of the vocabulary and grammar of colloquial Tibetan and also continues to develop knowledge of reading and writing modern Tibetan.
**Requisites:** Requires prerequisite course of TBTN 2010 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Tibetan

**TBTN 2110 (3) Intermediate Tibetan I - DILS**
This DILS (Directed Independent Language Study) course on Intermediate Tibetan will introduce students to intermediate grammar, sentence construction, conversation topics, and readings in modern Tibetan. This will include introduction to Tibetan grammatical markers and particles, morphology, syntax, and vocabularies using a range of authentic materials.
**Requisites:** Requires prerequisite course of TBTN 1120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**TBTN 2220 (3) Intermediate Tibetan II DILS**
This DILS (Directed Independent Language Stud) course on Intermediate Tibetan will introduce students to intermediate grammar, sentence construction, conversation topics, and readings in modern Tibetan. This will include introduction to Tibetan grammatical markers and particles, morphology, syntax, and vocabularies using a range of authentic materials.
**Requisites:** Requires prerequisite course of TBTN 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**TBTN 3210 (4) Beginning Literary Tibetan 1**
Provides a thorough introduction to literary and colloquial forms of Tibetan. Focuses on the grammatical foundation of the language, the acquisition of basic vocabulary, and training in the skills of pronunciation, conversation, handwriting and spelling.
**Requisites:** Requires prerequisite course of TBTN 2020 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Tibetan

**TBTN 3220 (4) Beginning Literary Tibetan 2**
Continuation of TBTN 3210. Provides a thorough introduction to literary and colloquial forms of Tibetan. Continues the grammar and vocabulary work begun in Tibetan 1 by studying actual Tibetan text and moving to more advanced conversation topics. Students develop oral, aural and written skills to produce an overall knowledge of the language.
**Requisites:** Requires prerequisite course of TBTN 3210 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Tibetan

**TBTN 4210 (4) Intermediate Literary Tibetan 1**
Aims at increasing students' proficiency in literary and colloquial forms of Tibetan. Expands knowledge of the grammar and vocabulary of literary Tibetan through translating texts in a variety of genres and also continues to develop knowledge of spoken modern Tibetan.
**Requisites:** Requires prerequisite courses of TBTN 3210 and 3220 (all minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Tibetan

# Asian Studies - Bachelor of Arts (BA)

The study of Asia is critical in our global age. Throughout history and in the present day, communities and countries across Asia have had an enormous influence on the world's economics, politics, culture, international relations, social movements, music, arts, entertainment, religion and more. Regardless of one's profession or discipline, understanding the past and present of this diverse region will be a key advantage in any future career.

The Asian studies major at CU Boulder offers students an interdisciplinary approach to studying Asia, encompassing a wide variety of courses that reflect the region's astonishing diversity and complexity. Many students choose Asian studies as a second major that complements their study of other subjects like anthropology, history, geography, international affairs, religious studies, Asian languages, business, and economics. As part of the Asian studies major requirements, students will receive a thorough grounding in the history of Asia and will study an Asian language: Arabic, Chinese, Hindi/Urdu, Indonesian, Japanese, Korean, Sanskrit or Tibetan. Majors are also encouraged to take advantage of the numerous study abroad experiences and international internship opportunities offered through the Center for

Asian Studies and CU Boulder Education Abroad. All majors complete their Asian studies degree with the Senior Capstone in Asian Studies, a cumulative learning experience that guides students in producing an original research paper or creative project that deepens their knowledge of the field and gives them a unique opportunity to explore an Asian studies-related topic of their interest.

Upon completion of this course of study, students will have received a highly individualized and broad education in the region of Asia that equips them to better understand the region's complex history and diverse cultures, as well as its current dynamics.

# Optional Program Tracks

Students have several options when majoring in Asian studies. One is the general Asian Studies Bachelor of Arts degree. Alternately, if a student wishes to choose a particular area of sub-regional emphasis that will appear on their transcript, they may decide in their coursework to follow one of four available tracks:

- Korea track
- South Asia track
- Southeast Asia track
- West Asia/Middle East track

View the Program Tracks tab (p. 173) for more information.

# Requirements

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below: 42 credits minimum, 18 of which must be upper division (College of Arts and Sciences minimum). Other courses not listed here, including some study abroad courses and special topics courses, may be applicable toward the Asian studies major, but they must first be approved by the Asian studies faculty advisor.

All required major courses must be passed with a C- or better and cannot be taken pass/fail. Students must have a grade point average of at least 2.000 in the major in order to graduate.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ASIA 2000 | Gateway to Modern Asia: Exploring Regional Connections | 3 |
| ASIA 4830 | Senior Seminar in Asian Studies | 3 |
| **Asian Language** | | |
| Four semesters of a single Asian language: | | 12-20 |
| Arabic [1] | | |
| Chinese [2] | | |
| Farsi [2] | | |
| Hindi [1] | | |
| Indonesian [4] | | |
| Japanese [2] | | |
| Korean [1] | | |
| Nepali [4] | | |
| Sanskrit [3] | | |
| Tibetan [4] | | |
| **Traditional Asian Civilizations** | | |
| Choose two introductory courses in different areas from Traditional Asian Civilizations course list (see below). | | 6 |
| **Modern Asian Civilizations** | | |
| Choose one course from Modern Asian Civilizations course list (see below). | | 3 |
| **Electives** | | |
| Upper-division courses from Electives list (see below). | | 15-12 |
| **Total Credit Hours** | | **42-47** |

1. Sequence of three years offered.
2. Sequence of four years offered.
3. Available through Continuing Education.
4. One year plus study abroad/transfer credit option offered.

## Traditional Asian Civilizations

Students take any two of the following introductory courses, focusing on two different civilizations: East Asia, South Asia, West Asia or Southeast Asia (6 credits minimum, lower division).

| Code | Title | Credit Hours |
|---|---|---|
| **East Asian Civilization** | | |
| CHIN 1012 | Introduction to Chinese Civilization | |
| HIST 1618 | Great Wall Exchange: China and the Nomadic Conquerors, 500 BC – 1500 AD | |
| HIST 1708 | Japan from Clay Pots to Robots | |
| JPNS 1012 | Introduction to Japanese Civilization | |
| HIST 1438 | Episodes in Korean History | |
| KREN 1011 | Introduction to Korean Civilization | |
| RLST 2620 | Religions of East Asia | |
| **South Asian Civilization** | | |
| ASIA 2300 | Himalayan Arts of Enlightenment | 3 |
| HIND 1011 | Introduction to South Asian Civilizations | |
| HIST 1518 | The History of India from Aryans to Maratha Warriors, 2500 BCE-1757 CE | |
| RLST 2610 | Happiness and Nirvana: Enlightenment in Indian Religions | |
| ASIA 1700 | Introduction to Tibetan Civilization | |
| **West Asian Civilization** | | |
| ARAB 1011 | Introduction to Arab and Islamic Civilizations | |
| ARAB 2231 | Love, Loss and Longing in Classical Arabic Literature | |
| ARAB 2320 | The Muslim World, 600-1250 | |
| HIST 1308 | Introduction to Middle Eastern History | |
| RLST 2202 | Islam | |
| RLST/ARAB 2320 | The Muslim World, 600-1250 | |
| **Southeast Asian Civilization** | | |
| ASIA 1000 | Origins of Contemporary Southeast Asia | |

## Modern Asian Civilizations

Students take one course (3 credits, lower division or upper division).

| Code | Title | Credit Hours |
|---|---|---|
| **ANTH (all modern Asian anthropology courses)** | | |
| ANTH 1105 | Exploring a Non-Western Culture: Tibet | |
| ANTH 3760 | Exploring Culture and Media in Southeast Asia | |
| ANTH 4020 | Explorations in Anthropology (Ethnography of Southeast Asia; Global Islams) | |
| ANTH 4180 | Anthropological Perspectives: Contemporary Issues (Theory in Cultural Anthropology: Nepal and the Himalayas) | |
| ANTH 4505 | Globalization and Transnational Culture | |
| ANTH 4690 | Anthropology of Tibet | |
| ANTH 4750 | Culture and Society in South Asia | |
| ANTH 4760 | Ethnography of Southeast Asia and Indonesia | |
| **ARTH** | | |
| ARTH 4919 | Capstone Seminar: Topics in Art History (Contemporary Asian Art; China!; Contemporary Art in the Middle East; Contemporary Art of the Himalayas ) | |
| **ASIA** | | |
| ASIA 2500 | Catastrophe and Resilience: Asia's Experiences of Climate Change | 3 |
| ASIA 4600 | Encounters: Tibet, the Himalayas, and the West | 3 |
| ASIA 1000 | Origins of Contemporary Southeast Asia | |
| ASIA 3300 | Sex and Gender in Asian Film and Literature | |
| ASIA 3900 | Discovering Urban China: Tradition, Modernity, Nostalgia | |
| ASIA 4200 | Politics of Memory in Asia | |
| ASIA 4300 | Open Topics in Asian Studies (Depending on topic) | |
| ASIA 4400 | Open Topics in Asian Studies | |
| ASIA 4500 | Urban Asia: Tradition, Modernity, Challenges | |
| ASIA 4840 | Independent Study (Depending on topic) | |
| **ECON** | | |
| ECON 4534 | Chinese Economic History in Comparative Perspective | |
| **ENGL** | | |
| ENGL 4018 | Literature and Globalization (Israel/Palestine) | |
| ENGL 4287 | Special Topics in Queer Literature (Multicultural and Postcolonial Literature: Post-Orientalism) | |
| **ETHN** | | |
| ETHN 3015 | Asian Pacific American Communities | |
| **GEOG (all modern Asian geography courses)** | | |
| GEOG 3822 | China's Diverse Geographies: Environment, Society, Politics | |
| GEOG 3832 | Love & War Geographies: Imperialism, Militarism, and Development in South Asia | |
| GEOG 4762 | Geographies of Political Islam | |
| GEOG 4822 | Environment and Development in China | |
| GEOG 4832 | Geography of Tibet | |
| **HIST (all modern Asian history courses)** | | |
| HIST 4619 | Women in East Asian History | 3 |
| HIST 1528 | Introduction to South Asian History since 1757 | |
| HIST 1628 | Introduction to Chinese History since 1644 | |
| HIST 2110 | Topics in Early Modern History (Early Modern China 960-1842) | |
| HIST 2166 | The Vietnam Wars | |
| HIST 3628 | Seminar in Recent Chinese History | |
| HIST 4020 | Topics in Comparative History (British Empire India 1760-1947; Modernity in China and Japan ) | |
| HIST 4109 | World War II in Asia and the Pacific | |
| HIST 4166 | The Vietnam War in US Politics and Culture | |
| HIST 4328 | The Modern Middle East, 1600 to the Present | |
| HIST 4329 | Islam in the Modern World: Revivalism, Modernism, and Fundamentalism, 1800-2001 | |
| HIST/JWST 4338 | History of Modern Israel/Palestine | |
| HIST 4538 | History of Modern India | |
| HIST 4548 | Women in Modern India | |
| HIST 4558 | Buddha to Gandhi: A History of Indian Nonviolence | |
| HIST 4618 | From Genghis Khan to the Opium War: Early Modern China | |
| HIST 4628 | Modern China: Collapse of Imperial Brilliance, 1644-1949 | |
| HIST 4638 | Contemporary China: Radicalism and Reform, 1949 to Present | |
| HIST 4648 | Inventing Chinese Modernity, 1800 to Present | |
| HIST 4658 | Between Beijing and Baghdad: China and Islam | |
| HIST 4688 | Window on Modern China | |
| HIST 4728 | Japan's Empire: Birth and Death | |
| HIST 4738 | Japan's Great Peace, 1590-1868 | |
| HIST 4758 | Japan after World War II | |
| **HUMN** | | |
| HUMN 3341 | Literature and Popular Culture in Modern China | |
| HUMN 3841 | Transforming Worlds: Japanese Literature in Modernity | |
| **IAFS** | | |
| IAFS 4500 | The Post-Cold War World (Contemporary China - International Views; Cultural Revolution - China 1966-79; China in the Global Economy; Afghanistan and Iraq; South Asia-Conflict/Resolution ) | |
| **JWST** | | |

| | | |
|---|---|---|
| JWST 4338 | History of Modern Israel/Palestine | |
| **MDST** | | |
| MDST 4211 | Asian Media and Culture | |
| **PSCI (all modern Asian politics courses)** | | |
| PSCI 3072 | Government and Politics in Southeast Asia | |
| PSCI 3102 | South Asian Politics | |
| PSCI 4022 | Chinese Foreign Policy | |
| PSCI 4052 | Chinese Politics | |
| PSCI 4242 | Middle Eastern Politics | |
| **RLST (all modern Asian religion courses)** | | |
| RLST 3550 | Tibetan Buddhism | 3 |
| RLST 4200 | Topics in Hinduism | 3 |
| RLST 4280 | Body and Magic in India | 3 |
| RLST 4610 | Topics in Islam | 3 |
| RLST 4780 | New Religions of East Asia | 3 |
| RLST 3820 | Topics in Religious Studies (Religion in Modern China) | |
| RLST 4250 | Topics in Buddhism | |
| RLST 4650 | Islam in the Modern World | |
| **WGST (all Asian Women's Studies courses)** | | |
| WGST 3220 | Women in Islam | |
| WGST 3410 | Gender, Sexuality and Culture in the Modern Middle East | |
| **All modern Asian literature courses** | | |
| ARAB 3230 | Islamic Culture and the Iberian Peninsula | |
| ARAB 3330 | The Arabic Novel | |
| ARAB 3350 | Narrating the City: Literary Mappings of the Urban Landscape | |
| ARAB/WGST 3410 | Gender, Sexuality and Culture in the Modern Middle East | |
| ARAB 4250 | Arabic Media | |
| CHIN 2441 | Film and the Dynamics of Chinese Culture | |
| CHIN 3331 | Urban Entertainment Culture in Early Modern China | |
| CHIN/HUMN 3341 | Literature and Popular Culture in Modern China | |
| CHIN 3342 | Sinophone Literature in the Contemporary World | |
| CHIN 3371 | Topics in Chinese Film | |
| CINE 2513 | Major Asian Filmmakers | |
| CINE 4023 | Topics in International Cinema (Contemporary Asian Cinema) | |
| HIND 3400 | Special Topics | |
| HIND 3441 | Screening India: A History of Bollywood Cinema | |
| HIND 3651 | Living Indian Epics: The Ramayana and the Mahabharata in the Modern Political Imagination | |
| HIND 3661 | South Asian Diasporas: Imagining Home Abroad | |
| HIND 3811 | The Power of the Word: Subversive and Censored 20th Century Indo-Pakistani Literature | |
| HIND 3831 | The Many Faces of Krishna in South Asia Literature and Culture | |
| JPNS 2441 | Japanese Culture through Film and Anime | |
| JPNS 3331 | Business Japanese | |
| JPNS 3511 | Paper Worlds, Screen Worlds: Contemporary Japanese Literature | |
| JPNS 3831 | The Floating World in the Literature of Early Modern Japan | |
| JPNS/HUMN 3841 | Transforming Worlds: Japanese Literature in Modernity | |
| JPNS 3851 | Japanese Popular Culture | |
| JPNS/LING 4050 | Japanese Sociolinguistics | |
| KREN 2441 | Film and Korean Culture | |
| KREN 3841 | Modern Korean Literature in English Translation | |
| KREN 3851 | Studies in Korean Popular Culture | |
| CHIN 3381 | Chinese Travel Literature: Journeys Within and Without, Real and Imaginary | 3 |
| CHIN 3372 | Chinese Media and the Environment | 3 |

## Electives

After meeting the requirements for coursework in Traditional Asian Civilization and Modern Asian Civilization (listed above), additional courses from those categories may also be be taken as upper-division electives. Upper-division Asian language courses can act as electives, when approved by the Asian studies faculty advisor.

| Code | Title | Credit Hours |
|---|---|---|
| ANTH 1105 | Exploring a Non-Western Culture: Tibet | 3 |
| ANTH 1170 | Exploring Culture and Gender through Film | 3 |
| ANTH 4020 | Explorations in Anthropology (Islam; Ethnography of Southeast Asia; Global Cultures: Islam; Global Islams) | 3-6 |
| ANTH/JWST 4050 | Anthropology of Jews and Judaism (Cultures of Israel and Palestine) | 3 |
| ANTH 4180 | Anthropological Perspectives: Contemporary Issues (Theory in Cultural Anthropology: Nepal and the Himalayas) | 3 |
| ANTH 4505 | Globalization and Transnational Culture | 3 |
| ANTH 4690 | Anthropology of Tibet | 3-6 |
| ANTH 4750 | Culture and Society in South Asia | 3 |
| ANTH 4760 | Ethnography of Southeast Asia and Indonesia | 3 |
| ARAB 1011 | Introduction to Arab and Islamic Civilizations | 3 |
| ARAB 2231 | Love, Loss and Longing in Classical Arabic Literature | 3 |
| ARAB 2320 | The Muslim World, 600-1250 | 3 |
| ARAB 3230 | Islamic Culture and the Iberian Peninsula | 3 |
| ARAB 3231 | In the Footsteps of Travelers: Travel Writing in Arabic Lit | 3 |
| ARAB 3241 | Art in Islamic Cultures | 3 |
| ARAB 3330 | The Arabic Novel | 3 |

| | | |
|---|---|---|
| ARAB 3340 | Representing Islam | 3 |
| ARAB 3350 | Narrating the City: Literary Mappings of the Urban Landscape | 3 |
| ARAB 3410 | Gender, Sexuality and Culture in the Modern Middle East | 3 |
| ARAB 4200 | Advanced Readings in Arabic | 3 |
| ARAB 4250 | Arabic Media | 3 |
| ARAB 4840 | Independent Study | 1-3 |
| ARTH 2409 | Intro to Asian Art | 3 |
| ARTH 3619 | The Arts of China | 3 |
| ARTH 3241 | Art in Islamic Cultures | 3 |
| ARTH 3629 | The Arts of Japan | 3 |
| ARTH 3929 | Special Topics in Art History (Asian Art: Gods, Kings and Power; Art in Asian Religions) | 1-3 |
| ARTH/CLAS 4169 | Topics in Ancient and Classical Art and Archaeology (Persian Empire) | 3 |
| ARTH/CLAS 4269 | Art and Archaeology of the Ancient Near East | 3 |
| ARTH 4449 | Arts of India and Southeast Asia | 3 |
| ARTH 4919 | Capstone Seminar: Topics in Art History (Contemporary Asian Art; China!; Contemporary Art in the Middle East; Contemporary Art of the Himalayas) | 3 |
| ARTH 4929 | Special Topics in Art History (Art of Buddhism; Art of the Himalayas/Tibet; Politics/Propaganda Asian Art) | 1-3 |
| ASIA 1000 | Origins of Contemporary Southeast Asia | 3 |
| ASIA 1700 | Introduction to Tibetan Civilization | 3 |
| ASIA 2852 | Contemporary Southeast Asia: Environmental Politics | 3 |
| ASIA 3300 | Sex and Gender in Asian Film and Literature | 3 |
| ASIA 3900 | Discovering Urban China: Tradition, Modernity, Nostalgia | 3 |
| ASIA 4001 | Advanced Language Co-Seminar Arts and Humanities | 1 |
| ASIA 4002 | Advanced Language Co-Seminar Social Sciences | 1 |
| ASIA 4200 | Politics of Memory in Asia | 3 |
| ASIA 4300 | Open Topics in Asian Studies | 3 |
| ASIA 4400 | Open Topics in Asian Studies | 3 |
| ASIA 4448 | Wars of Liberation in Southeast Asia | 3 |
| ASIA 4500 | Urban Asia: Tradition, Modernity, Challenges | 3 |
| ASIA 4840 | Independent Study | 1-3 |
| ASIA 4842 | Global Frontiers in Southeast Asia | 3 |
| ASIA 4930 | Engage Asia: Internship in Asian Studies | 1-6 |
| CHIN 1012 | Introduction to Chinese Civilization | 4 |
| CHIN 1051 | Masterpieces of Chinese Literature in Translation | 3 |
| CHIN 2441 | Film and the Dynamics of Chinese Culture | 3 |
| CHIN/JPNS 3200 | Adv Wrtg Topics on Chinese & Japanese Literature and Civilization | 3 |
| CHIN/HUMN 3321 | Political Thought in Ancient China | 3 |
| CHIN 3331 | Urban Entertainment Culture in Early Modern China | 3 |
| CHIN 3334 | Premodern Chinese Fiction | 3 |
| CHIN 3341 | Literature and Popular Culture in Modern China | 3 |
| CHIN 3342 | Sinophone Literature in the Contemporary World | 3 |
| CHIN 3351 | Reality and Dream in Chinese Literature | 3 |
| CHIN 3361 | Women and the Supernatural in Chinese Literature | 3 |
| CHIN 3371 | Topics in Chinese Film | 3 |
| CHIN 4300 | Open Topics: Readings in Chinese Literature | 3 |
| CHIN 4900 | Independent Study | 1-3 |
| CINE 2513 | Major Asian Filmmakers | 3 |
| CINE 4023 | Topics in International Cinema (Contemporary Asian Cinema) | 3 |
| CLAS 4169 | Topics in Ancient and Classical Art and Archaeology (Persian Empire) | 3 |
| CLAS 4269 | Art and Archaeology of the Ancient Near East | 3 |
| ECON 4534 | Chinese Economic History in Comparative Perspective | 3 |
| EDUC 4800 | Special Topics (Asia) | 1-9 |
| EMUS 1467 | World Music Ensemble (Japanese; Gamelan ) | 1 |
| EMUS 3467 | World Music Ensemble (Japanese; Gamelan ) | 1 |
| ENES 3750 | Xi'an, China: Self-Awareness and Images of the Other | 3 |
| ENES 3843 | Special Topics (China through the Eyes of the West) | 1-3 |
| ENGL 4018 | Literature and Globalization (Israel/Palestine) | 3 |
| ENGL 4287 | Special Topics in Queer Literature (Post-orientalism) | 3 |
| ENVD 4364 | Special Topics: History and Historiography of Environmental Design (Topic: Dushanbe Teahouse Restoration) | 1-6 |
| ETHN 3015 | Asian Pacific American Communities | 3 |
| ETHN 3105 | Selected Topics in Asian American Studies (Bruce Lee and Transpacific ) | 3 |
| GEOG 3822 | China's Diverse Geographies: Environment, Society, Politics | 3 |
| GEOG 3832 | Love & War Geographies: Imperialism, Militarism, and Development in South Asia | 3 |
| GEOG 4762 | Geographies of Political Islam | 3 |
| GEOG 4742 | Topics in Environment and Society (Depending on topic) | 3 |
| GEOG 4822 | Environment and Development in China | 3 |
| GEOG 4832 | Geography of Tibet | 3 |
| GEOG 4842 | Global Frontiers in Southeast Asia | 3 |
| HIND 1011 | Introduction to South Asian Civilizations | 3 |
| HIND 3400 | Special Topics | 3 |

| | | |
|---|---|---|
| HIND 3441 | Screening India: A History of Bollywood Cinema | 3 |
| HIND 3651 | Living Indian Epics: The Ramayana and the Mahabharata in the Modern Political Imagination | 3 |
| HIND 3661 | South Asian Diasporas: Imagining Home Abroad | 3 |
| HIND 3811 | The Power of the Word: Subversive and Censored 20th Century Indo-Pakistani Literature | 3 |
| HIND 3831 | The Many Faces of Krishna in South Asia Literature and Culture | 3 |
| HIND 3851 | Devotional Literature in South Asia | 3 |
| HIND 4900 | Independent Study | 1-3 |
| HIST 1308 | Introduction to Middle Eastern History | 3 |
| HIST 1438 | Episodes in Korean History | 3 |
| HIST 1518 | The History of India from Aryans to Maratha Warriors, 2500 BCE-1757 CE | 3 |
| HIST 1528 | Introduction to South Asian History since 1757 | 3 |
| HIST 1618 | Great Wall Exchange: China and the Nomadic Conquerors, 500 BC – 1500 AD | 3 |
| HIST 1628 | Introduction to Chinese History since 1644 | 3 |
| HIST 1708 | Japan from Clay Pots to Robots | 3 |
| HIST 1800 | Introduction to Global History (Maritime Asia 1500-1800) | 3 |
| HIST/JWST 1818 | Jewish History to 1492 | 3 |
| HIST 1828 | Jewish History Since 1492 | 3 |
| HIST 2110 | Topics in Early Modern History (Early Modern China 960-1842) | 3 |
| HIST 2166 | The Vietnam Wars | 3 |
| HIST 2220 | History of War and Society (Warfare and Culture in South Asia; Militarism in Japense History; Korea through Wars ) | 3 |
| HIST 2629 | China in World History | 3 |
| HIST 3109 | Seminar in Asian History | 3 |
| HIST 3328 | Seminar in Middle Eastern History | 3 |
| HIST 3628 | Seminar in Recent Chinese History | 3 |
| HIST 3718 | Seminar in Japanese History | 3 |
| HIST 4020 | Topics in Comparative History (British Empire India 1760-1947; Modernity in China and Japan) | 3 |
| HIST 4109 | World War II in Asia and the Pacific | 3 |
| HIST 4166 | The Vietnam War in US Politics and Culture | 3 |
| HIST 4328 | The Modern Middle East, 1600 to the Present | 3 |
| HIST 4329 | Islam in the Modern World: Revivalism, Modernism, and Fundamentalism, 1800-2001 | 3 |
| HIST 4338 | History of Modern Israel/Palestine | 3 |
| HIST 4339 | Borderlands of the British Empire | 3 |
| HIST/JWST 4348 | Topics in Jewish History (Tel Aviv—Urban History and Culture; Jews Under Islam) | 3 |
| HIST 4349 | Decolonization of the British Empire | 3 |
| HIST 4359 | The Global History of Modern Arabia | 3 |
| HIST/JWST 4378 | Jews in and of the Middle East | 3 |
| HIST 4528 | | 3 |
| HIST 4538 | History of Modern India | 3 |
| HIST 4548 | Women in Modern India | 3 |
| HIST 4558 | Buddha to Gandhi: A History of Indian Nonviolence | 3 |
| HIST 4618 | From Genghis Khan to the Opium War: Early Modern China | 3 |
| HIST/WGST 4619 | Women in East Asian History | 3 |
| HIST 4628 | Modern China: Collapse of Imperial Brilliance, 1644-1949 | 3 |
| HIST 4638 | Contemporary China: Radicalism and Reform, 1949 to Present | 3 |
| HIST 4648 | Inventing Chinese Modernity, 1800 to Present | 3 |
| HIST 4658 | Between Beijing and Baghdad: China and Islam | 3 |
| HIST 4688 | Window on Modern China | 3 |
| HIST 4718 | | 3 |
| HIST 4728 | Japan's Empire: Birth and Death | 3 |
| HIST 4738 | Japan's Great Peace, 1590-1868 | 3 |
| HIST 4758 | Japan after World War II | 3 |
| HIST 4808 | Special Topics in World Areas History (Chinese and Japanese Modernity) | 3 |
| HUMN 3093 | Topics in Humanities (Representing Islam; The Arabic Novel; Narrating the City ) | 3 |
| HUMN 3321 | Political Thought in Ancient China | 3 |
| HUMN 3341 | Literature and Popular Culture in Modern China | 3 |
| HUMN 3811 | The World of the Shining Prince: The Tale of Genji and Heian Literature | 3 |
| HUMN 3841 | Transforming Worlds: Japanese Literature in Modernity | 3 |
| HUMN 3850 | The Mediterranean: Religion Before Modernity | 3 |
| HUMN 4100 | Writing the World in Traditional China | 3 |
| IAFS 3000 | Special Topics in International Affairs (Political Economy/Middle East; Turkey—Mediator/Arab Spring; Gender, Geopolitics and Islam ) | 3 |
| IAFS 3010 | Islam, Geopolitics and Society: Gender, Identity and Place | 3 |
| IAFS 3520/ JWST 4302 | Global Seminar: Justice, Human Rights and Democracy in Israel | 6 |
| IAFS/JWST 3530 | Global Seminar: Jews and Muslims - The Multiethnic History of Istanbul | 3 |
| IAFS/JWST 3650 | History of Arab-Israeli Conflict | 3 |
| IAFS 4500 | The Post-Cold War World (Contemporary China/International Views; Cultural Revolution/China 1966-79; China and the Global Economy; Afghanistan and Iraq; South Asia/Conflict/Resolution; Arab Awakening) | 3 |
| INBU 3300 | International Business and Management | 3 |

| | | |
|---|---|---|
| INBU 3301 | Doing Business in China | 3 |
| INBU 4151 | International Operations in Hong Kong | 3 |
| INBU 4200 | International Financial Management | 3 |
| JPNS 1012 | Introduction to Japanese Civilization | 4 |
| JPNS 1051 | Portals to Japanese Literature | 3 |
| JPNS 2441 | Japanese Culture through Film and Anime | 3 |
| JPNS 2811 | Heroes and the Supernatural: Word and Image in Old Japan | 3 |
| JPNS 3200 | Adv Wrtg Topics on Chinese & Japanese Literature and Civilization | 3 |
| JPNS 3311 | Japanese Minority and Transnational Literature | 3 |
| JPNS 3321 | Japanese Sci-Fi and Speculative Fiction | 3 |
| JPNS 3331 | Business Japanese | 3 |
| JPNS 3511 | Paper Worlds, Screen Worlds: Contemporary Japanese Literature | 3 |
| JPNS/HUMN 3811 | The World of the Shining Prince: The Tale of Genji and Heian Literature | 3 |
| JPNS 3821 | Monsters, Monks, and Mayhem: Medieval Japanese Literature in Translation | 3 |
| JPNS 3831 | The Floating World in the Literature of Early Modern Japan | 3 |
| JPNS 3841 | Transforming Worlds: Japanese Literature in Modernity | 3 |
| JPNS 3851 | Japanese Popular Culture | 3 |
| JPNS 3861 | Imagining the Samurai in Japanese Literature and Culture | 3 |
| JPNS 3871 | Horror and the Macabre in Japanese Literature, Film, Culture | 3 |
| JPNS 3881 | Environment, Nature and Disaster in Japanese Literature and Culture | 3 |
| JPNS 3891 | Travel/Travel Writing in Japanese Literature and Culture | 3 |
| JPNS 4050 | Japanese Sociolinguistics | 3 |
| JPNS 4080 | Kanji in Japanese Orthography | 3 |
| JPNS 4300 | Open Topics: Readings in Japanese | 3 |
| JPNS 4310 | Classical Japanese 1 | 3 |
| JPNS 4320 | Classical Japanese 2 | 3 |
| JPNS 4900 | Independent Study | 1-3 |
| JWST 1818 | Jewish History to 1492 | 3 |
| HIND 3110 | Advanced Hindi 1 | 4 |
| HIND 3120 | Advanced Hindi 2 | 4 |
| JPNS 3110 | Advanced Japanese 1 | 5 |
| KREN 3110 | Advanced Korean 1 | 5 |
| KREN 3120 | Advanced Korean 2 | 5 |
| JWST/RLST 2600 | Judaism, Christianity, and Islam: Abrahamic Religions | 3 |
| JWST/RLST 3100 | Judaism | 3 |
| JWST 3530 | Global Seminar: Jews and Muslims - The Multiethnic History of Istanbul | 3 |
| JWST 4050 | Anthropology of Jews and Judaism (Cultures of Israel and Palestine) | 3 |
| JWST 4302 | Global Seminar: Justice, Human Rights and Democracy in Israel | 6 |
| JWST 4338 | History of Modern Israel/Palestine | 3 |
| JWST 4378 | Jews in and of the Middle East | 3 |
| KREN 1011 | Introduction to Korean Civilization | 3 |
| KREN 2441 | Film and Korean Culture | 3 |
| KREN 3841 | Modern Korean Literature in English Translation | 3 |
| KREN 4900 | Independent Study | 1-6 |
| MDST 4211 | Asian Media and Culture | 3 |
| MDST 4341 | International Media and Global Crises | 3 |
| MUEL 2772 | World Musics: Asia and Oceania | 3 |
| MUSC 2772 | World Musics: Asia and Oceania | 3 |
| MUSC 4152 | East Asian Music | 3 |
| PHIL 1600 | Philosophy and Religion | 3 |
| PHIL 3800 | Open Topics in Philosophy (Buddhism as Philosophy) | 3 |
| PSCI 3072 | Government and Politics in Southeast Asia | 3 |
| PSCI 3102 | South Asian Politics | 3 |
| PSCI 4022 | Chinese Foreign Policy | 3 |
| PSCI 4028 | Special Topics (Politics of Southeast Asia) | 3 |
| PSCI 4028 | Special Topics (Middle East Politics) | 3 |
| PSCI 4052 | Chinese Politics | 3 |
| PSCI 4242 | Middle Eastern Politics | 3 |
| PSCI 4243 | Modern Warfare: Terrorism, Ideology, Identity | 3 |
| RLST 2202 | Islam | 3 |
| RLST 2320 | The Muslim World, 600-1250 | 3 |
| RLST 2600 | Judaism, Christianity, and Islam: Abrahamic Religions | 3 |
| RLST 2610 | Happiness and Nirvana: Enlightenment in Indian Religions | 3 |
| RLST 2612 | Yoga: Ancient and Modern | 3 |
| RLST 2620 | Religions of East Asia | 3 |
| RLST 3040 | The Quran | 3 |
| RLST 3060 | Fundamentalism and Islam | 3 |
| RLST 3070 | Islamic Mysticism: Ibn Arabi, Rumi, and the Sufi Tradition | 3 |
| RLST 3100 | Judaism | 3 |
| RLST 3200 | Yoga, Castes and Magic: Hindu Society and Spirituality | 3 |
| RLST 3300 | Foundations of Buddhism | 3 |
| RLST 3530 | Global Seminar: Jews and Muslims - The Multiethnic History of Istanbul | 3 |
| RLST 3550 | Tibetan Buddhism | 3 |
| RLST/WGST 3750 | Women in Buddhism | 3 |
| RLST 3800 | Chinese Religions | 3 |
| RLST 3820 | Topics in Religious Studies (Tibetan Buddhism; Religion in Modern China; Islam, Politics and Militancy; Art in Asian Religions) | 3 |
| RLST 4200 | Topics in Hinduism | 3 |

| | | |
|---|---|---|
| RLST 4250 | Topics in Buddhism (Buddhist Literature in Tibet; Transnational Buddhism; Buddhist Ethics; Buddhist Ethics; Buddhist Philosophy; Buddhism and Society; Buddhist Esotericism) | 3 |
| RLST 4260 | Topics in Judaism (Bible in Judaism/ Christianity) | 3 |
| RLST 4280 | Body and Magic in India | 3 |
| RLST 4650 | Islam in the Modern World | 3 |
| RLST 4750 | | |
| RLST 4780 | New Religions of East Asia | 3 |
| SOCY 3046 | Topics in Sex and Gender (Sex, Gender, and Social Change in Southeast Asia ) | 3 |
| WGST 2600 | Introduction to Global Gender, Race and Sexuality Studies | 3 |
| WGST 3012 | Gender and Development | 3 |
| WGST 3201 | Women, Gender & Sexuality in Jewish Texts & Traditions | 3 |
| WGST 3220 | Women in Islam | 3 |
| WGST 3410 | Gender, Sexuality and Culture in the Modern Middle East | 3 |
| WGST 3500 | Global Gender Issues | 3 |
| WGST 3750 | Women in Buddhism | 3 |
| WGST 4619 | Women in East Asian History | 3 |
| ASIA 4100 | China's Space Dream: Long March to the Moon and Beyond | 3 |
| ASIA 4650 | Art and Science of Meditation | 3 |
| ASIA 4700 | Enlightened Visionaries, Dirty Tricksters and Warrior Heroes: Masterworks of Tibetan Literature | 3 |
| ASIA 4520 | Gender, Capitalism, and Climate Change in Asia | 3 |
| CHIN 3343 | Chinese Science Fiction | 3 |
| CHIN 3333 | Race and Ethnicity in Chinese Literature: Sinophone Culture, Diaspora, and Identity | 3 |
| HIST 4800 | Special Topics in Global History | 3 |
| INBU 3450 | International Business and Marketing | 3 |
| KREN 3851 | Studies in Korean Popular Culture | 3 |
| MDST 4871 | Special Topics | 1-3 |
| PHIL 1030 | Introduction to Global Philosophy | 3 |
| PHIL 3030 | Asian Philosophies | 3 |
| CHIN 4041 | Introduction to Classical Chinese | 3 |
| CHIN 4042 | Readings in Classical Chinese | 3 |

# Program Tracks

## Korea Track

Students must complete the general requirements of the College of Arts and Sciences and the required major courses listed below: 42 credit hours minimum, 18 of which must be upper-division (College of Arts and Sciences minimum). Other courses not listed here, including some study abroad courses and special topics courses, may be applicable toward the Asian Studies major, but must first be approved by the Asian Studies Faculty Advisor.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ASIA 2000 | Gateway to Modern Asia: Exploring Regional Connections | 3 |
| ASIA 4830 | Senior Seminar in Asian Studies (The Senior Thesis/Project should focus on a Korean topic.) | 3 |
| *Asian Language* | | |
| 4 semesters of Korean language (20 credit hours). Additional semesters can count as Asian Studies Electives. | | 20 |
| *Traditional Asian Civilizations* | | |
| Students take two introductory courses, one on Korea and one on South, West, or Southeast Asia; 6 credits minimum, lower division. | | 6 |
| Korean Civilization | | |
| HIST 1438 | Episodes in Korean History | |
| KREN 1011 | Introduction to Korean Civilization | |
| West, South, or Southeast Asian Civilization | | |
| West Asian Civilization | | |
| ARAB 1011 | Introduction to Arab and Islamic Civilizations | |
| ARAB 2231 | Love, Loss and Longing in Classical Arabic Literature | |
| FRSI 1011 | | |
| HIST 1308 | Introduction to Middle Eastern History | |
| RLST 2202 | Islam | |
| South Asian Civilization | | |
| HIND 1011 | Introduction to South Asian Civilizations | |
| ASIA 1700 | Introduction to Tibetan Civilization | |
| HIST 1518 | The History of India from Aryans to Maratha Warriors, 2500 BCE-1757 CE | |
| RLST 2610 | Happiness and Nirvana: Enlightenment in Indian Religions | |
| Southeast Asian Civilization | | |
| ASIA 1000 | Origins of Contemporary Southeast Asia | |
| **Modern Asian Civilizations** | | |
| Students take one course; 3 credit hours, lower division or upper division. | | 3 |
| **Electives** | | |
| Students take 12-15 upper-division credit hours, 6 credit hours of which focus on Korea. | | 15-12 |
| Courses with a Korean focus | | |
| KREN 3110 | Advanced Korean 1 | |
| KREN 3120 | Advanced Korean 2 | |
| KREN 3841 | Modern Korean Literature in English Translation | |
| KREN 3851 | Studies in Korean Popular Culture | |
| **Total Credit Hours** | | **50-47** |

## South Asia Track

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below: 42 credit hours minimum, 18 of which must be upper-division (College of Arts and Sciences minimum). Other courses not listed here, including some study

abroad courses and special topics courses, may be applicable toward the Asian Studies major, but must first be approved by the Asian Studies Faculty Advisor.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ASIA 2000 | Gateway to Modern Asia: Exploring Regional Connections | 3 |
| ASIA 4830 | Senior Seminar in Asian Studies (The Senior Thesis/Project should focus on a South Asian topic.) | 3 |
| *Asian Language* | | |
| 4 semesters of a single South Asian language (12-20 credit hours). Additional semesters can count as Asian Studies Electives. | | 12-20 |
| Hindi (sequence of three years offered) | | |
| Sanskrit (available through Continuing Education) | | |
| Tibetan and Nepali (offered for one year, plus study abroad and transfer credit options) | | |
| *Traditional Asian Civilizations* | | |
| Students take two introductory courses, one on South Asia and one on West, East, or Southeast Asia; 6 credits minimum, lower division. | | 6 |
| South Asian Civilization | | |
| HIND 1011 | Introduction to South Asian Civilizations | |
| ASIA 1700 | Introduction to Tibetan Civilization | |
| HIST 1518 | The History of India from Aryans to Maratha Warriors, 2500 BCE-1757 CE | |
| RLST 2610 | Happiness and Nirvana: Enlightenment in Indian Religions | |
| East, West, or Southeast Asian Civilization | | |
| West Asian Civilization | | |
| ARAB 1011 | Introduction to Arab and Islamic Civilizations | |
| ARAB 2231 | Love, Loss and Longing in Classical Arabic Literature | |
| FRSI 1011 | | |
| HIST 1308 | Introduction to Middle Eastern History | |
| RLST 2202 | Islam | |
| East Asian Civilization | | |
| CHIN 1012 | Introduction to Chinese Civilization | |
| HIST 1438 | Episodes in Korean History | |
| HIST 1618 | Great Wall Exchange: China and the Nomadic Conquerors, 500 BC – 1500 AD | |
| HIST 1708 | Japan from Clay Pots to Robots | |
| JPNS 1012 | Introduction to Japanese Civilization | |
| KREN 1011 | Introduction to Korean Civilization | |
| RLST 2620 | Religions of East Asia | |
| Southeast Asian Civilization | | |
| ASIA 1000 | Origins of Contemporary Southeast Asia | |
| *Modern Asian Civilizations* | | |
| Students take one course; 3 credit hours, lower division or upper division. | | 3 |
| *Electives* | | |
| Students take 12-15 upper-division credit hours, 6 credit hours of which must focus on South Asia. | | 15-12 |
| Courses with a South Asian Focus | | |
| ANTH 4690 | Anthropology of Tibet | |
| ANTH 4750 | Culture and Society in South Asia | |
| GEOG 3832 | Love & War Geographies: Imperialism, Militarism, and Development in South Asia | |
| GEOG 4832 | Geography of Tibet | |
| HIST 4339 | Borderlands of the British Empire | |
| HIST 4349 | Decolonization of the British Empire | |
| HIST 4528 | | |
| HIST 4538 | History of Modern India | |
| HIST 4548 | Women in Modern India | |
| HIST 4558 | Buddha to Gandhi: A History of Indian Nonviolence | |
| IAFS 4500 | The Post-Cold War World (South Asia) | |
| PSCI 3102 | South Asian Politics | |
| RLST 3200 | Yoga, Castes and Magic: Hindu Society and Spirituality | |
| HIND 3110 | Advanced Hindi 1 | |
| HIND 3120 | Advanced Hindi 2 | |
| HIND 3400 | Special Topics | |
| HIND 3441 | Screening India: A History of Bollywood Cinema | |
| HIND 3651 | Living Indian Epics: The Ramayana and the Mahabharata in the Modern Political Imagination | |
| HIND 3661 | South Asian Diasporas: Imagining Home Abroad | |
| HIND 3811 | The Power of the Word: Subversive and Censored 20th Century Indo-Pakistani Literature | |
| HIND 3831 | The Many Faces of Krishna in South Asia Literature and Culture | |
| HIND 3851 | Devotional Literature in South Asia | |
| RLST 3300 | Foundations of Buddhism | |
| RLST 3820 | Topics in Religious Studies (Tibetan Buddhism) | |
| RLST 4200 | Topics in Hinduism | |
| WGST 3750 | Women in Buddhism | |
| **Total Credit Hours** | | **42-47** |

## Southeast Asia Track

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below: 42 credit hours minimum, 18 of which must be upper-division (College of Arts and Sciences minimum). Other courses not listed here, including some study abroad courses and special topics courses, may be applicable toward the Asian Studies major, but must first be approved by the Asian Studies Faculty Advisor.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ASIA 2000 | Gateway to Modern Asia: Exploring Regional Connections | 3 |
| ASIA 4830 | Senior Seminar in Asian Studies (The Senior Thesis/Project should focus on a South Asian topic.) | 3 |
| *Asian Language* | | |
| 4 semesters of Indonesian language (12 credit hours) | | 12 |
| *Traditional Asian Civilizations* | | |
| Students take two introductory courses, one on Southeast Asia and one on South, West, or East Asia.; 6 credits minimum, lower division. | | 6 |
| Southeast Asian Civilization (required) | | |
| ASIA 1000 | Origins of Contemporary Southeast Asia | |
| West Asian Civilization | | |
| ARAB 1011 | Introduction to Arab and Islamic Civilizations | |
| ARAB 2231 | Love, Loss and Longing in Classical Arabic Literature | |
| FRSI 1011 | | |
| HIST 1308 | Introduction to Middle Eastern History | |
| RLST 2202 | Islam | |
| South Asian Civilization | | |
| HIND 1011 | Introduction to South Asian Civilizations | |
| ASIA 1700 | Introduction to Tibetan Civilization | |
| HIST 1518 | The History of India from Aryans to Maratha Warriors, 2500 BCE-1757 CE | |
| RLST 2610 | Happiness and Nirvana: Enlightenment in Indian Religions | |
| East Asian Civilization | | |
| CHIN 1012 | Introduction to Chinese Civilization | |
| HIST 1438 | Episodes in Korean History | |
| HIST 1618 | Great Wall Exchange: China and the Nomadic Conquerors, 500 BC – 1500 AD | |
| HIST 1708 | Japan from Clay Pots to Robots | |
| JPNS 1012 | Introduction to Japanese Civilization | |
| KREN 1011 | Introduction to Korean Civilization | |
| RLST 2620 | Religions of East Asia | |
| *Modern Asian Civilizations* | | |
| Students take one of the following courses on Southeast Asia. | | 3 |
| ANTH 3760 | Exploring Culture and Media in Southeast Asia | |
| ANTH 4760 | Ethnography of Southeast Asia and Indonesia | |
| ARTH 4919 | Capstone Seminar: Topics in Art History (Southeast Asia) | |
| ASIA/GEOG 2852 | Contemporary Southeast Asia: Environmental Politics | |
| ASIA 4200 | Politics of Memory in Asia | |
| ASIA/HIST 4448 | Wars of Liberation in Southeast Asia | |
| ASIA 4500 | Urban Asia: Tradition, Modernity, Challenges | |
| ENVS 4100 | Special Topics in Environmental Studies (Env Gov Mekong Delta, Vietnam) | |
| GEOG 4842 | Global Frontiers in Southeast Asia | |
| HIST 2166 | The Vietnam Wars | |
| HIST 4528 | | |
| PSCI 3072 | Government and Politics in Southeast Asia | |
| SOCY 3046 | Topics in Sex and Gender (Sex, Gender, and Social Change in Southeast Asia) | |
| *Major Electives* | | |
| Students take 15 additional upper-division credit hours, 3 credit hours of which focus on Southeast Asia (3 credit hours can be lower-division if Modern Asian Civilization filled by an upper-division course) | | 15 |
| See main catalog entry for the Asian Studies major for a full list of Asian Studies Major Electives. | | |
| **Total Credit Hours** | | **42** |

## West Asia/Middle East Track

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below: 42 credit hours minimum, 18 of which must be upper-division (College of Arts and Sciences minimum). Other courses not listed here, including some study abroad courses and special topics courses, may be applicable toward the Asian Studies major, but must first be approved by the Asian Studies Faculty Advisor.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ASIA 2000 | Gateway to Modern Asia: Exploring Regional Connections | 3 |
| ASIA 4830 | Senior Seminar in Asian Studies (The Senior Thesis/Project should focus on a West Asian topic.) | 3 |
| *Asian Language* | | |
| 4 semesters of a single West Asian language (14-20 credit hours). Additional semesters can count as Asian Studies Electives. | | 14-20 |
| Arabic (sequence of three years offered) | | |
| Farsi (sequence of three years offered) | | |
| *Traditional Asian Civilizations* | | |
| Students take two introductory courses, one on West Asia and one on South, East, or Southeast Asia; 6 credits minimum, lower division. | | 6 |
| West Asian Civilization | | |
| ARAB 1011 | Introduction to Arab and Islamic Civilizations | |
| ARAB 2231 | Love, Loss and Longing in Classical Arabic Literature | |
| FRSI 1011 | | |
| HIST 1308 | Introduction to Middle Eastern History | |
| RLST 2202 | Islam | |
| East, South, or Southeast Asian Civilization | | |
| East Asian Civilization | | |
| CHIN 1012 | Introduction to Chinese Civilization | |

| | | |
|---|---|---|
| HIST 1438 | Episodes in Korean History | |
| HIST 1618 | Great Wall Exchange: China and the Nomadic Conquerors, 500 BC – 1500 AD | |
| HIST 1708 | Japan from Clay Pots to Robots | |
| JPNS 1012 | Introduction to Japanese Civilization | |
| KREN 1011 | Introduction to Korean Civilization | |
| RLST 2620 | Religions of East Asia | |
| South Asian Civilization | | |
| HIND 1011 | Introduction to South Asian Civilizations | |
| ASIA 1700 | Introduction to Tibetan Civilization | |
| HIST 1518 | The History of India from Aryans to Maratha Warriors, 2500 BCE-1757 CE | |
| RLST 2610 | Happiness and Nirvana: Enlightenment in Indian Religions | |
| Southeast Asian Civilization | | |
| ASIA 1000 | Origins of Contemporary Southeast Asia | |
| *Modern Asian Civilizations* | | |
| Students take one course; 3 credit hours, lower division or upper division. | | 3 |
| *Electives* | | |
| Students take 15-12 upper-division credit hours, 6 credit hours of which must focus on West Asia. | | 15-12 |
| Courses with a West Asian Focus | | |
| ARAB 3110 | Advanced Arabic 1 | |
| ARAB 3120 | Advanced Arabic 2 | |
| ARAB 3220 | Arabian Nights, Arabian Days: Popular Literature in the Arab World and Beyond | |
| ARAB 3221 | The Making of Middle Eastern Identities: Arabs and Their "Others" | |
| ARAB 3230 | Islamic Culture and the Iberian Peninsula | |
| ARAB 3231 | In the Footsteps of Travelers: Travel Writing in Arabic Lit | |
| ARAB 3241 | Art in Islamic Cultures | |
| ARAB 3330 | The Arabic Novel | |
| ARAB 3331 | Arabic Poetry | |
| ARAB 3340 | Representing Islam | |
| ARAB 3350 | Narrating the City: Literary Mappings of the Urban Landscape | |
| ARAB 3360 | Truth and Prophecy in Islam | |
| ARAB 3410 | Gender, Sexuality and Culture in the Modern Middle East | |
| ARAB 4200 | Advanced Readings in Arabic | |
| ARAB 4250 | Arabic Media | |
| ARTH 4269 | Art and Archaeology of the Ancient Near East | |
| GEOG 4742 | Topics in Environment and Society (Geographies of Contemporary Muslim Societies: Islam, Biopolitics, and the Postcolonial) | |
| GEOG 4762 | Geographies of Political Islam | |
| HIST 3328 | Seminar in Middle Eastern History | |
| HIST 4328 | The Modern Middle East, 1600 to the Present | |
| HIST 4329 | Islam in the Modern World: Revivalism, Modernism, and Fundamentalism, 1800-2001 | |
| HIST/JWST 4338 | History of Modern Israel/Palestine | |
| HIST/JWST 4378 | Jews in and of the Middle East | |
| HUMN 3850 | The Mediterranean: Religion Before Modernity | |
| IAFS/JWST 3650 | History of Arab-Israeli Conflict | |
| IAFS 4500 | The Post-Cold War World (Afghanistan and Iraq) | |
| JWST/IAFS/RLST 3530 | Global Seminar: Jews and Muslims - The Multiethnic History of Istanbul | |
| JWST 4302/ IAFS 3520 | Global Seminar: Justice, Human Rights and Democracy in Israel | |
| PSCI 4242 | Middle Eastern Politics | |
| RLST 2202 | Islam | |
| RLST 2600 | Judaism, Christianity, and Islam: Abrahamic Religions | |
| RLST 3100 | Judaism | |
| **Total Credit Hours** | | **44-47** |

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will complete all 12 credits of the arts & humanities area and some of the credits in the social sciences area of the Gen Ed Distribution Requirement and the global perspective component of the Gen Ed Diversity Requirement. Depending on elective courses selected within the major, students can potentially also complete the social sciences area of the Gen Ed Distribution Requirement.

**Year One**

| **Fall Semester** | **Credit Hours** |
|---|---|
| Traditional Asian Civilization - Major course | 3 |
| 1st Semester Single Asian Language (example: 1010) | 5 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | 3 |
| Elective/MAPS | 3 |
| **Credit Hours** | **14** |
| **Spring Semester** | |
| Traditional Asian Civilization - Major course | 3 |
| 2nd Semester Single Asian Language (example: 1020) | 5 |
| Gen. Ed. Skills course (example: QRMS) | 3 |
| Elective/MAPS | 3 |
| **Credit Hours** | **14** |

**Year Two**

| **Fall Semester** | | |
|---|---|---|
| ASIA 2000 | Gateway to Modern Asia: Exploring Regional Connections | 3 |
| 3rd Semester Single Asian Language (ex: 2110) | | 5 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective/MAPS | | 3 |
| **Credit Hours** | | **17** |

| | | |
|---|---|---|
| **Spring Semester** | | |
| Modern Asian Civilization - Major course (Upper Division) | | 3 |
| 4th Semester Single Asian Language (ex: 2120) | | 5 |
| Gen. Ed. Distribution course (example: Natural Sciences with lab) | | 4 |
| Gen. Ed. Distribution (example: Social Sciences) | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| ASIA Elective (Upper Division) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ASIA Elective (Upper Division) | | 3 |
| Gen Ed. Skills course (example: Upper-Division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| ASIA Elective (Upper Division) | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ASIA 4830 | Senior Seminar in Asian Studies | 3 |
| Gen. Ed. Distribution course (example Social Sciences) | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **120** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Learn from Asia through self-critical and respectful, curiosity-based intellectual inquiry, demonstrating a deep and nuanced understanding of Asia as a complex and diverse region and recognizing its historical, cultural and geopolitical significance in both regional and global contexts.
- Articulate well-reasoned arguments in both written and oral forms and demonstrate their ability to be critical thinkers and communicators.
- Employ an interdisciplinary approach to understanding Asia by integrating methodologies and insights from the humanities, social sciences and natural sciences, fostering a holistic understanding of Asia's challenges and opportunities.
- Support cultural competency by achieving second year university-level language proficiency in at least one Asian language.
- Demonstrate regional expertise and skills in critical thinking, problem-solving and cross-cultural communication through activities such as hands-on, student-driven research projects, internships in Asia and Boulder and study abroad programs in Asia. Students will demonstrate their ability to analyze complex regional issues, adapt to diverse cultural contexts and apply their learning to real-world challenges.

# Asian Studies - Minor

The minor in Asian Studies allows students to pursue an interdisciplinary study of Asia, adding an important global perspective and depth to their primary studies. While the minor does not grant credit for foreign language, students are encouraged to study abroad in Asia and gain a strong foundation in the region's history and contemporary dynamics through an array of fascinating coursework. The Asian Studies Academic Advisor and Faculty Advisor encourage thematic or regional concentrations within the program, and they are both available for assistance in customizing the minor to meet the needs and interests of individual students.

For any questions, please email Dr. Lauren Collins (lauren.collins@colorado.edu). Visit the Asian Studies Minor (http://www.colorado.edu/cas/academics/asian-studies-minor/) webpage for additional information.

# Requirements

## Required Courses and Credit Hours

Students must take a minimum of 21 credit hours, 12 of which must be upper-division (usually four 3-credit courses). Up to, but no more than, 9 credit hours earned through study abroad can be counted toward the minor.

All coursework applied to the minor must be completed with a grade of C- or better; no pass/fail work may be applied. The grade point average for all minor degree coursework must be equal to 2.000 (C) or higher.

Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ASIA 2000 | Gateway to Modern Asia: Exploring Regional Connections | 3 |
| Traditional Asian Civilizations: Two courses from two different civilizations (see link below). | | 6 |
| Modern Asian Civilizations: One upper-division course (see link below). | | 3 |
| **Upper-Division Electives** | | |
| The remaining credits are fulfilled through a variety of available upper-division electives (see link below) | | 9 |
| **Total Credit Hours** | | **21** |

### Traditional Asian Civilizations

Students take two introductory courses, choosing one from each of two different civilizations (East Asia, South Asia, West Asia, or Southeast Asia); 6 credit hours minimum. For a list of possible courses see the requirements on the Asian Studies - Bachelor of Arts (BA) (p. 167) page and scroll down to the traditional Asian civilizations courses. One of the two required traditional Asian civilizations courses can be replaced by Asian language coursework that totals at least 3-credits.

### Modern Asian Civilizations

Students take one course; 3 credit hours. See the requirements on the Asian Studies - Bachelor of Arts (BA) (p. 167) page and scroll down to the modern Asian civilizations courses.

### Upper-Division Electives

Students take at least 3 courses (9 upper-division credits, minimum). See the requirements on the Asian Studies - Bachelor of Arts (BA) (p. 167) page and scroll down to the electives courses for possible choices. One upper-division Asian language course can count as an upper-division elective (as long as language coursework has not been applied already to the traditional Asian civilizations requirement).

After meeting the modern Asian civilizations requirement, additional upper-division courses from that category may also be be taken as electives. ASIA 4830 can also be taken as an elective.

# Tibetan and Himalayan Studies - Certificate

The Certificate in Tibetan and Himalayan Studies offers students interdisciplinary expertise in this critical region. Culturally and ethnically Tibetan areas constitute one-quarter of the land area of the People's Republic of China (roughly the size of Western Europe) as well as the country of Bhutan and parts of north India, Nepal and Pakistan. As a focus of tension between India and China, Asia's foremost superpowers, this region is geopolitically crucial. Also known as "the Third Pole", it is home to the headwaters of seven of Asia's major rivers and a hotspot for global climate change, biodiversity, and ecosystem services.

CU Boulder is a leading center of research, teaching and scholarship on Tibetan and Himalayan Studies and Environmental Sciences. Expertise on the region includes strong faculty leadership in the departments of Anthropology, the Center for Asian Studies, Geography and Religious Studies. Housed within the Center for Asian Studies, the Tibet Himalaya Initiative (THI) is a multidisciplinary hub for research, teaching and public engagement on Tibet and the greater Himalaya region. The city of Boulder itself is a significant location in the history and spread of Tibetan Buddhism in the West. Students have the flexibility within the program to focus their concentration on specific areas of interest. One-year of study in a language spoken in the Himalayan region provides a cultural and linguistic foundation to explore the region in greater depth, and study abroad is highly encouraged.

## Requirements

The certificate in Tibetan and Himalayan Studies entails 18 credit hours of coursework, of which 3 credit hours is an introductory class, ASIA 1700 or ANTH 1105. Students must complete 9 out of 18 hours at the upper division level, with a minimum of 12 credit hours taken on campus.

Students are welcome to use up to 6 transfer credit hours for either upper or lower division courses, including in language study and study abroad, and to petition for other electives to count for upper division credits.

| Code | Title | Credit Hours |
|---|---|---|
| **Requirements** | | |
| *Lower Division Requirements* | | |
| One Introductory Course | | 3 |
| ASIA 1700 | Introduction to Tibetan Civilization | |
| or ANTH 1105 | Exploring a Non-Western Culture: Tibet | |
| Language Courses | | |
| Six credit hours in Tibetan (TBTN), Chinese (CHIN) or Hindi (HIND) language courses at any relevant, offered level. | | 6 |
| Within these six credit hours must be at least one Tibetan (TBTN) language course. Tibetan is offered through DILS (Directed Independent Language Study). | | |
| *Upper Division Requirements* | | |
| One ASIA course focused on Tibet | | 3 |
| ASIA 4300 | Open Topics in Asian Studies (Tibetan Literature and Culture OR Encounters: Tibet and the West) | |
| ASIA 4600 | Encounters: Tibet, the Himalayas, and the West | |
| ASIA 4700 | Enlightened Visionaries, Dirty Tricksters and Warrior Heroes: Masterworks of Tibetan Literature | |
| One GEOG, ANTH, or RLST course focused on Tibet | | 3 |
| ANTH 4180 | Anthropological Perspectives: Contemporary Issues (The Himalayas) | |
| ANTH 4690 | Anthropology of Tibet | |
| GEOG 3822 | China's Diverse Geographies: Environment, Society, Politics | |
| GEOG 4832 | Geography of Tibet | |
| RLST 3550 | Tibetan Buddhism | |
| RLST 3750 | Women in Buddhism | |
| RLST 4250 | Topics in Buddhism (Buddhist Literature in Tibet) | |
| One additional course from either of the two upper-division categories above. | | 3 |
| **Total Credit Hours** | | **18** |

## Learning Outcomes

Upon completing the program, students will be able to:

- Specialized knowledge of peoples, cultures, religions, languages and environment/climate of Tibetan/Himalayan region.

# Astrophysical and Planetary Sciences

The Department of Astrophysical and Planetary Sciences is one of the few programs that combines both astrophysics and planetary science, providing a unified view of space sciences, the solar system and comparative planetology, stellar and galactic astronomy, and cosmology. Students are given hands-on experience with telescopes, optics, instrumentation, and computer-image processing and modeling.

For further information concerning undergraduate studies, contact the undergraduate program coordinator.

**Course code for this program is ASTR.**

# Bachelor's Degree

- Astrophysical and Planetary Sciences - Bachelor of Arts (BA) (p. 183)

# Minor

- Astrophysical and Planetary Sciences - Minor (p. 187)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Baker, Daniel N. (https://experts.colorado.edu/display/fisid_103264/)
Distinguished Professor; PhD, University of Iowa

Bally, John (https://experts.colorado.edu/display/fisid_105710/)
Professor Emeritus; PhD, University of Massachusetts at Amherst

Begelman, Mitchell C. (https://experts.colorado.edu/display/fisid_100446/)
Distinguished Professor; PhD, University of Cambridge (England)

Berta-Thompson, Zachory (https://www.colorado.edu/aps/zachory-berta-thompson/)
Assistant Professor; PhD, Harvard University

Blum, Lauren W. (https://experts.colorado.edu/display/fisid_167200/)
Assistant Professor; PhD, University of Colorado Boulder

Brain, David A. (https://experts.colorado.edu/display/fisid_149098/)
Associate Professor, Chair; PhD, University of Colorado Boulder

Brown, Benjamin P. (https://experts.colorado.edu/display/fisid_153758/)
Associate Professor; PhD, University of Colorado Boulder

Burns, Jack O.
Professor Emeritus, Faculty Fellow; PhD, Indiana University Bloomington

Cash, Webster C. Jr. (https://experts.colorado.edu/display/fisid_101759/)
Professor; PhD, University of California, Berkeley

Comerford, Julia M. (https://experts.colorado.edu/display/fisid_151471/)
Professor; PhD, University of California, Berkeley

Cranmer, Steven (https://experts.colorado.edu/display/fisid_155051/)
Associate Professor; PhD, University of Delaware

Curry, Shannon (https://experts.colorado.edu/display/fisid_169552/)
Associate Professor; PhD, University of Michigan

Darling, Jeremiah K. (https://experts.colorado.edu/display/fisid_141767/)
Professor; PhD, Cornell University

Dexter, Jason (https://experts.colorado.edu/display/fisid_164095/)
Assistant Professor; PhD, University of Washington Seattle

Ellingson, Erica (https://experts.colorado.edu/display/fisid_100118/)
Professor Emeritus; PhD, University of Arizona

Ergun, Robert E. (https://experts.colorado.edu/display/fisid_115912/)
Professor; PhD, University of California, Berkeley

Esposito, Larry Wayne (https://experts.colorado.edu/display/fisid_100502/)
Professor; PhD, University of Massachusetts at Amherst

Fleming, Brian (https://experts.colorado.edu/display/fisid_154011/)
Assistant Research Professor; PhD, Johns Hopkins University

France, Kevin Christopher (https://experts.colorado.edu/display/fisid_145201/)
Associate Professor, Associate Chair; PhD, Johns Hopkins University

Green, James C. (https://experts.colorado.edu/display/fisid_102344/)
Professor Emeritus; PhD, University of California, Berkeley

Halverson, Nils W. (https://experts.colorado.edu/display/fisid_134252/)
Professor; PhD, California Institute of Technology

Hamilton, Andrew J.S. (https://experts.colorado.edu/display/fisid_101517/)
Professor, Chair; PhD, University of Virginia

Hayne, Paul (https://experts.colorado.edu/display/fisid_163352/)
Associate Professor; PhD, University of California, Los Angeles

Hindman, Bradley W. (https://experts.colorado.edu/display/fisid_103726/)
Assistant Research Professor, Lecturer; PhD, University of Colorado Boulder

Hornstein, Seth D. (https://experts.colorado.edu/display/fisid_144237/)
Senior Instructor; PhD, University of California, Los Angeles

Kazachenko, Maria (https://experts.colorado.edu/display/fisid_160195/)
Associate Professor; PhD, Montana State University

Keller, John M. (https://experts.colorado.edu/display/fisid_163223/)
Senior Instructor; PhD, University of Arizona

Kowalski, Adam (https://www.colorado.edu/aps/adam-kowalski/)
Associate Professor; PhD, University of Washington

Linsky, Jeffrey
Professor Emeritus

Madigan, Ann-Marie (https://experts.colorado.edu/display/fisid_158298/)
Associate Professor; PhD, Leiden University (Netherlands)

Malaspina, David M. (https://experts.colorado.edu/display/fisid_148393/)
Assistant Professor; PhD, University of Colorado Boulder

Malville, J. McKim
Professor Emeritus

Nelson, Erica Lynn (https://experts.colorado.edu/display/fisid_166298/)
Assistant Professor; PhD, Yale University

Rast, Mark Peter (https://experts.colorado.edu/display/fisid_142997/)
Professor; PhD, University of Colorado Boulder

Reardon, Kevin Patrick (https://experts.colorado.edu/display/fisid_154925/)
Professor Adjunct

Rosario-Franco, Marialis (https://experts.colorado.edu/display/fisid_172547/)
Assistant Teaching Professor; PhD, University of Texas at Arlington

Schneider, Nicholas M. (https://experts.colorado.edu/display/fisid_102620/)
Professor; PhD, University of Arizona

Shull, J Michael
Professor Emeritus; PhD, Princeton University

Snow, Theodore P. Jr
Professor Emeritus

Stocke, John T.
Professor Emeritus; PhD, University of Arizona

Suess, Wren (https://experts.colorado.edu/display/fisid_174290/)
Assistant Professor; PhD, University of California Berkeley

Thomas, Gary E.
Professor Emeritus

Toomre, Juri (https://experts.colorado.edu/display/fisid_100767/)
Professor, Faculty Fellow, Professor Emeritus; PhD, University of Cambridge (England)

# Courses

**ASTR 1000 (3) The Solar System**
Introduction to the night sky, planets, moons and the life in our solar system. Highlights the latest discoveries from space. For non-science majors. Some lectures may be held at Fiske Planetarium. Offers opportunities for nighttime observations at Sommers-Bausch Observatory.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 1010, but without lab ASTR 1010 or ASTR 1030
**Requisites:** Restricted to non- Astronomy (ASTR) majors only.
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**ASTR 1010 (4) Introductory Astronomy: The Solar System w/Lab**
Introduction to the night sky, planets, moons and the life in our solar system. Highlights the latest discoveries from space. For non-science majors. Some lectures may be held at Fiske Planetarium. Requires nighttime observations at Sommers-Bausch Observatory. Degree credit granted for only one of ASTR 1000 or ASTR 1010.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 1000, but with additional lab
**Requisites:** Restricted to non- Astronomy (ASTR) majors only.
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science Lab or Lab/Lec

**ASTR 1020 (4) Introductory Astronomy: Stars & Galaxies w/Recitation**
Non-science majors learn the nature and workings of the Sun, stars, neutron stars, black holes, galaxies, quasars, structure and origins of the universe. Some lectures may be held at Fiske Planetarium. Offers opportunities for nighttime observations at Sommers-Bausch Observatory. Includes recitation.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 1040 or ASTR 1200
**Requisites:** Restricted to non-Astronomy (ASTR) majors only.
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 1030 (4) Accelerated Introductory Astronomy 1**
Covers principles of modern astronomy summarizing our present knowledge about the Earth, Sun, moon, planets and origin of life. Requires nighttime observation sessions at Sommers-Bausch Observatory. Required in ASTR major/minor. Like ASTR 1000 and 1010, but taught at a higher intellectual level, including a significant amount of quantitative analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 1000 or ASTR 1010
**Requisites:** Requires prerequisite or corequisite course of MATH 1300 or APPM 1350 or APPM 1340 and APPM 1345 (all minimum grade C-).
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 1040 (4) Accelerated Introductory Astronomy 2**
Covers principles of modern astronomy summarizing our present knowledge about the Sun, stars, birth and death of stars, neutron stars, black holes, galaxies, quasars, and the organization and origins of the universe. May require nighttime observing sessions at Sommers-Bausch Observatory. Required in ASTR major/minor. Includes a recitation. Taught at a higher intellectual level including a significant amount of quantitative analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 1020 or ASTR 1200
**Requisites:** Requires prerequisite course of ASTR 1010 or ASTR 1030 and MATH 1300 or APPM 1350 or APPM 1340 and APPM 1345 (all minimum grade C-).
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 1200 (3) Stars and Galaxies**
Non-science majors are introduced to the nature and workings of the Sun, stars, neutron stars, black holes, interstellar gas, galaxies, quasars, plus structure and origins of the universe. Some lectures may be held at Fiske Planetarium. Offers opportunities to attend nighttime observation sessions at Sommers-Bausch Observatory.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 1020 or ASTR 1040
**Requisites:** Restricted to non- Astronomy (ASTR) majors only.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**ASTR 2000 (3) Ancient Astronomies of the World**
Documents the numerous ways in which observational astronomy and cosmology have been features of ancient cultures. Includes naked eye astronomy, archaeoastronomy, ethnoastronomy, concepts of time, calendrics, cosmogony, and cosmology.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**ASTR 2010 (3) Modern Cosmology-Origin and Structure of the Universe**
Introduces modern cosmology to nonscience majors. Covers the Big Bang; the age, size, and structure of the universe; and the origin of the elements and of stars, galaxies, the solar system, and life.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**ASTR 2020 (3) Space Astronomy and Exploration**
Covers physical principles of performing astronomy from space for science and exploration. The basic design of launch vehicles and spacecraft, orbital dynamics, and instruments will be described in the context of specific space missions (e.g. Hubble Telescope, Mars rovers) as well as prospects for future space observatories in orbit and on the Moon.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**ASTR 2030 (3) Black Holes**
Black holes are one of the most bizarre phenomena of nature. Students are introduced to the predicted properties of black holes, astronomical evidence for their existence and formation, and modern ideas about space, time, and gravity.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**ASTR 2040 (3) The Search for Life in the Universe**
Introduces the scientific basis for the possible existence of life elsewhere in the universe. Includes origin and evolution of life on Earth and the search for evidence of life in our solar system, including Mars and Jupiter's moon Europa. Discusses the conditions necessary for life and whether they might arise on planets around other stars. Credit only for this course or ASTR 3300.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 2040
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 2050 (3) The Sun and Society: Living with an Active Star**
Introduces non-science majors to the many ways out Sun influences life and society. Covers how the Sun generates energy, how it evolves over billions of years, how it affects Earth's climate and biology, how it produces dangerous "space weather", how we can harness its power and how life in other solar systems would depend on the properties of their Suns.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**ASTR 2100 (3) Fundamental Concepts in Astrophysics**
Covers topics in modern physics required for upper-level astrophysics and planetary science courses, including quantum mechanics, electromagnetic spectra, atomic and nuclear physics, and thermodynamics, in the context of astrophysics, planetary and space sciences. Also introduces key topics in mathematics to support these topics.
**Requisites:** Requires prerequisite course of PHYS 1120 or PHYS 1125 and APPM 1360 or MATH 2300 (minimum grade C-).
**Grading Basis:** Letter Grade

**ASTR 2500 (3) Gateway to Space**
Introduces the basics of atmosphere and space sciences, space exploration, spacecraft design, rocketry and orbits. Students design, build, and launch a miniature satellite on a high altitude balloon. Explores the current research in space through lectures from industry.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 1400, ASEN 1403, ECEN 1400 and GEEN 1400
**Requisites:** Restricted to Astronomy (ASTR) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 2600 (3) Introduction to Scientific Programming**
Introduces principles, methods and tools of scientific programming commonly used in research. Topics include an introduction to programming in Python, data structures, numerical methods for calculus and data manipulation/visualization. Techniques covered are relevant to many technical fields but emphasis is placed on application to problems in astronomy and planetary science. Class time is split between lectures and in-lab tutorials.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 2600
**Requisites:** Requires prerequisite course of MATH 1300 or APPM 1350 and PHYS 1110 or PHYS 1115 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 2840 (1-3) Independent Study**
Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ASTR 3300 (3) Extraterrestrial Life**
Discusses the scientific basis for the possible existence of extraterrestrial life. Includes origin and evolution of life on Earth; possibility of life elsewhere in the solar system, including Mars; and the possibility of life on planets around other stars. Department enforced prerequisite: one-year sequence in a natural science. Credit only for this course or ASTR 2040.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 3300
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3400 (3) Research Methods in Astronomy**
Introduces research methods in astronomy and engages students in an active research project. The research projects will vary and may include astronomical observations, data analysis, scientific programming, theoretical models and statistical inference. As part of their research, students will read scientific papers, attend local seminars and prepare oral and written research proposals and reports. Elective for ASTR majors.
**Requisites:** Requires prerequisite courses of ASTR 1040 and PHYS 1125 or 1120 (all minimum grade C-). Requires co-requisite or prerequisite of ASTR 2600 or PHYS 2600 (minimum grade C-). Restricted to ASTR majors.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3510 (4) Observations and Instrumentation 1**
Lab course in astronomical observation and instrumentation. Hands-on exercises include obtaining and analyzing multi-wavelength data, basic optical design and instrumentation and statistical analysis of data, with emphasis on imaging applications. A significant number of night time observation sessions are required. Practical Python knowledge required (ASTR/PHYS 2600 or equivalent strongly recommended.) Elective for APS majors. Elective for APS minors on space available basis.
**Requisites:** Requires a prerequisite or corequisite core of APPM 1360 or MATH 2300 and ASTR 1020 or ASTR 1040 and PHYS 1120 (all minimum grade C-). Restricted to Astronomy (ASTR) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3520 (4) Observations and Instrumentation 2**
Lab course in observation and instrumentation. Hands-on exercises include obtaining and analyzing multi-wavelength data, optical design and instrumentation, and statistical analysis, with emphasis on spectroscopy. A significant number of night time observation sessions are required. Elective for APS majors. Elective for APS minors on space available basis.
**Requisites:** Requires a prerequisite course of ASTR 3510 (minimum grade C-). Restricted to Astrophysics (ASTR) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3560 (3) Astronomical Instrumentation Laboratory**
Teaches students aspects of astronomical instrument design in a hands-on setting. Students will learn elementary principles of geometrical optics, diffraction, light detection, signal conditioning, data acquisition and motion control, and mechanical design. Students will apply these principles working in groups to design and build optical spectrometers.
**Requisites:** Requires prerequisite courses of ASTR 1040 and (PHYS 2130 or PHYS 2170 or ASTR 2100) (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3710 (3) Formation & Dynamics of Planetary Systems**
Covers the origin of planetary systems and their dynamical evolution. Topics include the physics and chemistry of planetary formation, orbital mechanics and extrasolar planets. This course and ASTR 3720 and ASTR 3750 may be taken in any order. Elective for APS major and minor.
**Requisites:** Requires prerequisite course of PHYS 1120 and MATH 2300 or APPM 1360 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3720 (3) Planets and Their Atmospheres**
Explores the physics and chemistry of the atmospheres of Mars, Venus, Jupiter, Saturn, and Titan. Examines evolution of the atmospheres of Earth, Venus, and Mars; and the escape of gases from the Galilean satellites, Titan and Mars; the orbital characteristics of moons, planets, and comets. Uses recent results of space exploration. Elective for APS major and minor.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 3720
**Requisites:** Requires prerequisite courses of PHYS 1120 and (APPM 1360 or MATH 2300) and prerequisite or corequisite course of ASTR 2100 or MATH 2400 or APPM 2350 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3730 (3) Astrophysics 1 - Stellar and Interstellar**
Provides a quantitative introduction to the radiative and gravitational physics relevant to stellar and galactic astrophysics, as applied to understanding observations of tars, stellar evolution, stellar remnants and the structure of the Milky Way. Elective for APS major and minor.
**Requisites:** Requires prerequisite courses of PHYS 2130 or PHYS 2170 or ASTR 2100 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3740 (3) Cosmology and Relativity**
Special and general relativity as applied to astrophysics, cosmological models, observational cosmology, experimental relativity and the early universe. Elective for APS major and minor.
**Requisites:** Requires prerequisite courses of PHYS 2130 or PHYS 2170 or ASTR 2100 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3750 (3) Planets, Moons, and Rings**
Approaches the physics of planets, emphasizing their surfaces, satellites, and rings. Topics include formation and evolution of planetary surfaces, history of the terrestrial planets, and dynamics of planetary rings. This course and ASTR 3720 may be taken for credit in any order. Elective for APS major and minor.
**Requisites:** Requires prerequisite courses of PHYS 1120 and (APPM 1360 or MATH 2300) and prerequisite or corequisite course of ASTR 2100 or MATH 2400 or APPM 2350 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3760 (3) Solar and Space Physics**
Explores the physical processes linking the Sun and planets, emphasizing solar radiative and particulate variability and the response of planetary atmospheres and magnetospheres. Topics include the solar dynamo, solar wind, coronal mass ejections, cosmic ray modulation, magnetospheres, aurora, the space environment, and climate variability. Elective for APS major and minor.
**Requisites:** Requires prerequisite courses of PHYS 2130 or PHYS 2170 or ASTR 2100 (all minimum grade C-).
**Recommended:** Prerequisite PHYS 3310.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3800 (3) Introduction to Scientific Data Analysis and Computing**
Introduces scientific data analysis from a practical perspective. Covers statistical analysis, model fitting, error analysis, theoretical compliance and image analysis with examples from space-based and ground-based astronomy. Elective for APS major. Opened to qualified non-majors with instructor consent.
**Requisites:** Requires prerequisite course of (ASTR 2600 or PHYS 2600) and prerequisite or corequisite courses of (ASTR 1020 or ASTR 1040) and PHYS 1120 and (APPM 1360 or MATH 2300) (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3830 (3) Astrophysics 2 - Galactic and Extragalactic**
The second semester of a year-long introduction to astrophysical processes. The physical processes developed in ASTR 3730 are applied to topics in extragalactic astronomy, including galaxies, supermassive black holes, galaxy clusters and cosmology. Elective for APS major and minor.
**Requisites:** Requires prerequisite course of ASTR 3730 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 4330 (3) Cosmochemistry**
Investigates chemical and isotopic data to understand the composition of the solar system: emphasis on the physical conditions in various objects, time scales for change, chemical and nuclear processes leading to change, observational constraints, and various models that attempt to describe the chemical state and history of cosmological objects in general and the early solar system in particular.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5330 and GEOL 4330 and ASTR 5330
**Requisites:** Requires prerequisite courses of (CHEM 1113 or CHEM 1400 or CHEN 1211) and (PHYS 1110 or PHYS 1115); all minimum grade C-.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 4500 (1-3) Special Topics in Astrophysical and Planetary Sciences**
Topics vary each semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 4800 (3) Space Science: Practice and Policy**
Exposes students to current controversies in science that illustrate the scientific method and the interplay of observation, theory, and science policy. Students research and debate both sides of the issues, which include strategies and spin-offs of space exploration, funding of science, big vs. small science, and scientific heresy and fraud.
**Recommended:** Prerequisite one year of college level astronomy or physics.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 4840 (1-3) Independent Study**
Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ASTR 4841 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours.

# Astrophysical and Planetary Sciences - Bachelor of Arts (BA)

The APS Department is one of the few programs to combine both astrophysics and planetary science. As a result, we provide a unified view of solar and space sciences, planetary systems (our Solar System and others), stellar and galactic astronomy, and cosmology. We also offer hands-on experience with telescopes, optics, instrumentation, computer image processing and computer modeling. These skills are useful for students wishing to pursue graduate degrees or careers in aerospace, technical or computer industries.

The University of Colorado is recognized as a top university in the exploration and study of space. Our faculty members carry out forefront research in a wide range of disciplines, from theoretical cosmology to finding planets around other stars, from observing cosmic microwave background in Antarctica to building space probes to explore Mars' atmosphere. We offer many types of research opportunities for undergraduates including research-based courses, student positions that support research programs and individual research projects with faculty. Students can apply for funding from the Undergraduate Research Opportunities Program. The Honors Program (https://www.colorado.edu/aps/undergraduate-students/honors-program/) encourages students to write research theses to qualify for Latin Honors upon graduation.

We encourage all students to explore and share their enthusiasm for science and we support a wide range of extra-curricular activities. These include student groups, the Learning Assistant program, research activities and public outreach. The Sommers-Bausch Observatory (http://www.colorado.edu/sbo/) and Fiske Planetarium (http://www.colorado.edu/fiske/) offer opportunities for undergraduate students to become involved.

We offer students the ability to graduate with honors. Students must maintain a minimum GPA and write and defend an honors thesis. More information can be obtained from the APS department office and/or the Honors Council Representative (Mark Rast (https://www.colorado.edu/aps/mark-rast/)). More general information about the honors thesis is on CU Boulder's Honors Program page (http://www.colorado.edu/honors/).

## Interdisciplinary Emphasis

The interdisciplinary emphasis highlights the science of astronomy, observation and technology. In this path of the major, students receive core training in astronomy, mathematics, physics and computational and instrumental technology. These skills prepare students for professions in space sciences and a range of other careers in education, science and technology. This path of the astrophysical and planetary sciences major is also designed to provide opportunities for students to explore a minor or second major in a complementary area of study. Students are mentored in groups during the first 2–3 semesters, but meet individually with an APS faculty member every semester thereafter to discuss their academic progress and post-graduation plans.

## Physics Emphasis

The physics emphasis shares the same foundational astronomy, math and physics course sequences as the interdisciplinary emphasis for the first two semesters, but then focuses on more advanced work in these topics. Students may declare this option when beginning their coursework or wait until completion of their foundational courses in astronomy, physics and mathematics (usually after the first two-three semesters). This option is jointly administered with the Department of Physics and requires substantial upper-division work in this field. Upon graduation, students should have solid theoretical and applied training for careers or graduate studies in the space sciences. For more detailed information, visit the department website (https://www.colorado.edu/aps/node/1293/).

# Requirements

The degree requirements are listed for the astrophysical and planetary sciences major for both the interdisciplinary emphasis and the physics emphasis. APS students will need to take the listed courses specific to their emphasis in order to complete their astrophysical and planetary sciences degree. In either emphasis, all required major courses and all required ancillary courses must be passed with a C- or better and cannot be taken pass/fail. No more than 45 credits in ASTR may be applied to overall graduation requirements. Students must have a GPA of at least 2.000 in the major in order to graduate.

## Interdisciplinary Emphasis

This is appropriate for someone aiming for a career in K–12 education, science journalism, science policy, information technology, science management or technical work who does not expect to pursue a graduate degree.

Students must complete a minimum of 32 credit hours in astrophysical and planetary sciences (this must include at least 18 upper-division credit hours) and a minimum of 9 credit hours in physics.

Through the required coursework for this path of the major, students will fulfill all 12 credits of the Natural Sciences area of the Gen. Ed. Distribution Requirement, including the lab component, and the QRMS component of the Gen. Ed. Skills Requirement. If ASTR 2000 is selected, a student could also complete the Global Perspective component of the Gen. Ed. Diversity Requirement.

For more information, view the Interdisciplinary Emphasis Flowchart (https://www.colorado.edu/aps/node/1295/).

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ASTR 1030 & ASTR 1040 | Accelerated Introductory Astronomy 1 and Accelerated Introductory Astronomy 2 [1] | 8 |
| PHYS 1115 & PHYS 1125 & PHYS 1140 | General Physics 1 for Majors and General Physics 2 for Majors and Experimental Physics 1 [2] | 9 |
| *Select one of the following:* | | *3* |
| ASTR 2100 | Fundamental Concepts in Astrophysics | |
| PHYS 2130 | Introduction to Quantum Mechanics and Its Applications | |
| PHYS 2170 | Foundations of Modern Physics | |
| *Select a minimum of two of the following:* | | *6* |
| ASTR 2000 | Ancient Astronomies of the World | |
| ASTR 2010 | Modern Cosmology-Origin and Structure of the Universe | |
| ASTR 2020 | Space Astronomy and Exploration | |
| ASTR 2030 | Black Holes | |
| ASTR 2040 | The Search for Life in the Universe | |
| ASTR 2050 | The Sun and Society: Living with an Active Star | |
| ASTR 2500 | Gateway to Space | |
| ASTR 2600 | Introduction to Scientific Programming | |
| *Select one of the following upper-division course sequences:* | | *6* |
| ASTR 3720 & ASTR 3750 | Planets and Their Atmospheres and Planets, Moons, and Rings | |
| ASTR 3730 & ASTR 3830 | Astrophysics 1 - Stellar and Interstellar and Astrophysics 2 - Galactic and Extragalactic | |
| *Major Electives* | | |
| Select four additional courses from the following or from those sequence courses not used for the upper-division sequence requirement above: | | 12-15 |
| ASTR 3400 | Research Methods in Astronomy | |
| ASTR 3510 | Observations and Instrumentation 1 | |
| ASTR 3520 | Observations and Instrumentation 2 | |
| ASTR 3560 | Astronomical Instrumentation Laboratory | |
| ASTR 3710 | Formation & Dynamics of Planetary Systems | |
| ASTR 3740 | Cosmology and Relativity | |
| ASTR 3760 | Solar and Space Physics | |
| ASTR 3800 | Introduction to Scientific Data Analysis and Computing | |
| ASTR 4330 | Cosmochemistry | |
| ASTR 4800 | Space Science: Practice and Policy | |
| ASTR 5760 | Astrophysical Instrumentation | |
| ATOC 4710 | Introduction to Atmospheric Physics | |
| ATOC 4720 | Atmospheric Dynamics | |
| **Total Credit Hours** | | **44-47** |

1. Or ASTR 1010 and ASTR 1020 with permission from Lead APS Faculty Mentor.
2. Or equivalent PHYS 1110, PHYS 1120 & PHYS 1140 sequence.

### Required Ancillary Coursework

| Code | Title | Credit Hours |
|---|---|---|
| **Required Ancillary Calculus Coursework** | | |
| Select one of the following sequences: | | 8-10 |
| APPM 1350 & APPM 1360 | Calculus 1 for Engineers and Calculus 2 for Engineers | |
| MATH 1300 & MATH 2300 | Calculus 1 and Calculus 2 | |
| **Required Ancillary Science Sequence with Lab** | | |
| Select one other science sequence with lab, such as: [2] | | 7-10 |
| *CHEM Sequence* | | |
| CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 | |
| CHEM 1133 & CHEM 1134 | General Chemistry 2 and Laboratory in General Chemistry 2 | |
| *EBIO Sequence* | | |
| EBIO 1210 & EBIO 1230 | General Biology 1 and General Biology Laboratory 1 | |
| EBIO 1220 & EBIO 1240 | General Biology 2 and General Biology Laboratory 2 | |
| *GEOL Sequence* | | |
| GEOL 1010 & GEOL 1030 | Exploring Earth and Introduction to Geology Laboratory 1 | |
| GEOL 1020 | Dodos, Dinos, and Deinococcus: The History of a Habitable Planet | |
| *ATOC Sequence* | | |
| ATOC 1050 & ATOC 1070 | Weather and the Atmosphere and Weather and the Atmosphere Laboratory | |
| ATOC 1060 | Our Changing Environment: El Nino, Ozone, and Climate | |
| **Total Credit Hours** | | **15-20** |

## Physics Emphasis

The physics emphasis is jointly administered by the APS and Physics Departments. Students in this path are not eligible to pursue a Physics Plan 2 (with Astrophysics focus) major or a physics minor.

For students aiming for a graduate program in astrophysics or planetary sciences. Similar to Physics Plan 2 (Astrophysics focus), with additional astrophysics instrumentation labs and different electives.

Students must complete a minimum of 23 credits in astrophysical and planetary sciences and a minimum of 28 credits in physics (this must include at least 15 upper-division credits in astronomy and 12 in physics).

Through the required coursework for this path of the major, students will fulfill all 12 credits of the Natural Sciences area of the Gen. Ed. Distribution Requirement, including the lab component, and the QRMS component of the Gen. Ed. Skills Requirement.

For more information, view the Physics Emphasis Flowchart (https://www.colorado.edu/aps/node/1293/).

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Lower-Division Coursework** | | |
| The following courses are required: | | |
| ASTR 1030<br>& ASTR 1040 | Accelerated Introductory Astronomy 1<br>and Accelerated Introductory Astronomy 2 | 8 |
| PHYS 1115<br>& PHYS 1125<br>& PHYS 1140 | General Physics 1 for Majors<br>and General Physics 2 for Majors<br>and Experimental Physics 1 [1] | 9 |
| PHYS 2170<br>& PHYS 2150 | Foundations of Modern Physics<br>and Experimental Physics 2 | 4 |
| PHYS 2210 | Classical Mechanics and Mathematical Methods 1 | 3 |
| **Upper-Division Coursework** | | |
| The following physics courses are required: | | |
| PHYS 3310 | Principles of Electricity and Magnetism 1 | 3 |
| PHYS 3320 | Principles of Electricity and Magnetism 2 | 3 |
| PHYS 3210 | Classical Mechanics and Mathematical Methods 2 | 3 |
| PHYS 3220 | Quantum Mechanics 1 | 3 |
| Select one of the following two astronomy sequences (6-hour minimum): | | 6 |
| ASTR 3720<br>& ASTR 3750 | Planets and Their Atmospheres<br>and Planets, Moons, and Rings | |
| ASTR 3730<br>& ASTR 3830 | Astrophysics 1 - Stellar and Interstellar<br>and Astrophysics 2 - Galactic and Extragalactic | |
| **Astronomy Electives** | | |
| Select three additional courses from the following or from those sequence courses not used above (9-hour minimum): | | 9 |
| ASTR 3400 | Research Methods in Astronomy | |
| ASTR 3510 | Observations and Instrumentation 1 | |
| ASTR 3520 | Observations and Instrumentation 2 | |
| ASTR 3560 | Astronomical Instrumentation Laboratory | |
| ASTR 3710 | Formation & Dynamics of Planetary Systems | |
| ASTR 3740 | Cosmology and Relativity | |
| ASTR 3760 | Solar and Space Physics | |
| ASTR 3800 | Introduction to Scientific Data Analysis and Computing | |
| ASTR 4330 | Cosmochemistry | |
| ATOC 4710 | Introduction to Atmospheric Physics | |
| ATOC 4720 | Atmospheric Dynamics | |
| Any ASTR 5000- or 6000-level course with instructor's permission | | |
| **Total Credit Hours** | | **51** |

[1] Or equivalent PHYS 1110, PHYS 1120 & PHYS 1140 sequence.

### Required Ancillary Calculus Coursework

| Code | Title | Credit Hours |
|---|---|---|
| Select one of the following sequence of courses: | | 16-19 |
| APPM 1350<br>& APPM 1360<br>& APPM 2350<br>& APPM 2360 | Calculus 1 for Engineers<br>and Calculus 2 for Engineers<br>and Calculus 3 for Engineers<br>and Introduction to Differential Equations with Linear Algebra | |
| MATH 1300<br>& MATH 2300<br>& MATH 2400<br>& APPM 2360 | Calculus 1<br>and Calculus 2<br>and Calculus 3<br>and Introduction to Differential Equations with Linear Algebra | |
| **Total Credit Hours** | | **16-19** |

### Recommended Physics Electives

| Code | Title | Credit Hours |
|---|---|---|
| PHYS 4150 | Plasma Physics | |
| PHYS 4230 | Thermodynamics and Statistical Mechanics | |
| PHYS 4410 | Quantum Mechanics 2 | |
| PHYS 4420 | Nuclear and Particle Physics | |
| PHYS 4510 | Optics | |

## Four-Year Plans of Study

Through the required coursework for either track in the major, students will fulfill all 12 credits of the Natural Sciences area of the Gen Ed Distribution Requirement, including the Lab requirement, and the QRMS component of the Gen Ed Skills Requirement. For more information, view the Astrophysical and Planetary Sciences Degree Requirements Flowchart (https://www.colorado.edu/aps/sites/default/files/block/astronomy_flowchart_0.jpg).

### Interdisciplinary Emphasis

| Year One | | |
|---|---|---|
| **Fall Semester** | | **Credit Hours** |
| ASTR 1030 | Accelerated Introductory Astronomy 1 | 4 |
| APPM 1350<br>or MATH 1300 | Calculus 1 for Engineers<br>or Calculus 1 | 4-5 |
| PHYS 1115<br>or PHYS 1110 | General Physics 1 for Majors<br>or General Physics 1 | 4 |
| Gen Ed Skills course/Elective/FYSM | | 3 |
| | **Credit Hours** | **15-16** |
| **Spring Semester** | | |
| ASTR 1040 | Accelerated Introductory Astronomy 2 | 4 |
| APPM 1360<br>or MATH 2300 | Calculus 2 for Engineers<br>or Calculus 2 | 4-5 |

| | | |
|---|---|---|
| PHYS 1125<br>or PHYS 1120 | General Physics 2 for Majors<br>or General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| Gen Ed Distribution course /Elective | | 3 |
| | **Credit Hours** | **16-17** |
| **Year Two** | | |
| **Fall Semester** | | |
| ASTR 2600 | Introduction to Scientific Programming | 3 |
| PHYS 2170 | Foundations of Modern Physics (or an Elective) | 3 |
| PHYS 2150 | Experimental Physics 2 | 1 |
| APPM 2350 | Calculus 3 for Engineers (or an Elective) | 4 |
| Ancillary Science Sequence + LAB (CHEM 1113 & CHEM 1114 or EBIO 1210 & EBIO 1230 or GEOL 1010 & GEOL 1030, or ATOC 1050 & ATOC 1070) | | 4-5 |
| | **Credit Hours** | **15-16** |
| **Spring Semester** | | |
| ASTR 2100<br>or ASTR 3400 | Fundamental Concepts in Astrophysics (If Phys 2170 or 2130 not taken)<br>or Research Methods in Astronomy | 3 |
| ASTR 3800 | Introduction to Scientific Data Analysis and Computing (Or Upper Division ASTR-Elective) | 3 |
| ASTR 2000-level course | | 3 |
| Ancillary Science Sequence Continued (Chem 1133, EBIO 1220, GEOL 1020, or ATOC 1060) | | 3-4 |
| Gen Ed Distribution/Diversity course/Elective/Minor | | 3 |
| | **Credit Hours** | **15-16** |
| **Year Three** | | |
| **Fall Semester** | | |
| ASTR 3720<br>or ASTR 3730 | Planets and Their Atmospheres (part one of required sequence)<br>or Astrophysics 1 - Stellar and Interstellar | 3 |
| ASTR Upper division or Elective/Minor | | 3 |
| Gen Ed Skills course/Elective/Minor | | 3 |
| Gen Ed Distribution Course | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ASTR 3750<br>or ASTR 3830 | Planets, Moons, and Rings (part two of required sequence)<br>or Astrophysics 2 - Galactic and Extragalactic | 3 |
| ASTR Upper-Division Elective | | 3 |
| Upper Division Elective/Minor | | 3 |
| Gen Ed Distribution course | | 3 |
| Gen Ed Distribution course | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| ASTR Upper-division Elective | | 3 |
| ASTR Upper-Division Elective | | 3 |
| Gen Ed Distribution course - Upper Division | | 3 |
| Upper-Division Elective / Minor/ Research/ Independent Study (Independent Study does not count for Upper Division ASTR credit | | 3 |
| Upper-Division Elective / Minor | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ASTR Upper-Division Elective | | 3 |
| Gen Ed Distribution course- Upper-division | | 3 |
| Upper-Division Elective / Minor/ Research/ Independent Study (Independent Study does not count for Upper Division ASTR credit | | 3 |
| Upper-Division Elective / Minor | | 3 |
| Upper-Division Elective / Minor | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **121-125** |

## Physics Emphasis

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| ASTR 1030 | Accelerated Introductory Astronomy 1 | 4 |
| PHYS 1115 | General Physics 1 for Majors | 4 |
| APPM 1350<br>or MATH 1300 | Calculus 1 for Engineers<br>or Calculus 1 | 4-5 |
| Gen Ed Skills course / FYSM | | 3 |
| | **Credit Hours** | **15-16** |
| **Spring Semester** | | |
| ASTR 1040 | Accelerated Introductory Astronomy 2 | 4 |
| APPM 1360<br>or MATH 2300 | Calculus 2 for Engineers<br>or Calculus 2 | 4-5 |
| PHYS 1125 | General Physics 2 for Majors | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| Gen Ed Distribution/Diversity course | | 3 |
| | **Credit Hours** | **16-17** |
| **Year Two** | | |
| **Fall Semester** | | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| PHYS 2170 | Foundations of Modern Physics | 3 |
| PHYS 2150 | Experimental Physics 2 | 1 |
| Gen Ed Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| PHYS 2210 | Classical Mechanics and Mathematical Methods 1 | 3 |
| ASTR 2600 | Introduction to Scientific Programming (recommended, not required) | 3 |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| Gen Ed Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |

| | | |
|---|---|---|
| **Year Three** | | |
| **Fall Semester** | | |
| ASTR 3730<br>or ASTR 3710 | Astrophysics 1 - Stellar and Interstellar (part one of required sequence)<br>or Formation & Dynamics of Planetary Systems | 3 |
| ASTR 3400 | Research Methods in Astronomy (Or Upper Division ASTR-Elective) | 3 |
| PHYS 3210 | Classical Mechanics and Mathematical Methods 2 | 3 |
| PHYS 3310 | Principles of Electricity and Magnetism 1 | 3 |
| Gen Ed Distribution course | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ASTR 3830<br>or ASTR 3720 | Astrophysics 2 - Galactic and Extragalactic (part two of required sequence)<br>or Planets and Their Atmospheres | 3 |
| PHYS 3220 | Quantum Mechanics 1 | 3 |
| PHYS 3320 | Principles of Electricity and Magnetism 2 | 3 |
| Gen Ed Skills Course (Upper Division Writing) | | 3 |
| Gen Ed Upper Division course / Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| ASTR Upper-division Elective | | 3 |
| PHYS 4230 | Thermodynamics and Statistical Mechanics (recommended, not required) | 3 |
| Gen Ed Course or Upper Division Elective | | 3 |
| Upper-Division Elective or ASTR Independent Study or Research (would not count for ASTR Upper Division Credit) | | 3 |
| Upper-Division Elective or ASTR Upper-Division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| PHYS 4410 | Quantum Mechanics 2 (recommended, not required) | 3 |
| ASTR Upper-division Elective or ASTR Independent Study or Research (would not count for ASTR Upper Division Credit) | | 3 |
| ASTR Upper-division Elective | | 3 |
| Upper-Division Elective | | 3 |
| Gen Ed Distribution course | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **121-123** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Students will be able to solve quantitative or conceptual problems across the core areas of astrophysics and planetary sciences by applying relevant models, theories and technical approaches.
- Students will be able to analyze and evaluate scientific information in order to describe a question at the frontier of an astronomical discipline.
- Students will be able to follow scientific practices to conduct experiments, collect and analyze data, and report findings in a scientific manner.
- Students will be able to present a scientific concept to a variety of audiences including experts and/or the general public.
- Students will be able to use computational programming to perform quantitative analysis and/or produce data visualizations.

# Astrophysical and Planetary Sciences - Minor

Declaration of a minor in Astrophysical and Planetary Sciences is open to any student enrolled at CU-Boulder (except the Physics Plan 2 astrophysics focus major). Coursework applied to the astronomy minor may be applied to another major or towards general education requirements.

# Requirements

Coursework applied to the minor may be applied toward General Education requirements or to a major offered by another department (except the Physics Plan 2 astrophysics focus major). Minimum requirements for a minor include:

- A minimum of six ASTR courses (18-21 credits), including at least three advanced courses (numbered above 3500; 9-10 credits).
- All coursework applied to a minor must be completed with a grade of C- or better; no pass/fail work may be applied. The GPA for all coursework completed in the minor department must be equal to 2.00 (C) or higher.
- Students pursuing an individually structured major or a major in distributed studies are not eligible to earn a minor.
- Students are allowed to apply no more than three courses (9 credits), including two advanced courses (6 credits), of transfer work toward a minor.
- Many of the classes listed below have corequisite or prerequisite mathematics and/or physics courses. Students are responsible to check and meet these requisites.

## Required Courses and Credits

The minor requires a minimum of 6 approved courses.

| Code | Title | Credit Hours |
|---|---|---|
| **Elementary** | | |
| Select a maximum of two courses from the following: | | 6-8 |
| ASTR 1030 | Accelerated Introductory Astronomy 1 [1] | |
| ASTR 1040 | Accelerated Introductory Astronomy 2 [1] | |
| ASTR 2000 | Ancient Astronomies of the World | |
| ASTR 2010 | Modern Cosmology-Origin and Structure of the Universe | |
| ASTR 2020 | Space Astronomy and Exploration | |
| ASTR 2030 | Black Holes | |
| ASTR 2040 | The Search for Life in the Universe | |
| ASTR 2500/ ASEN 1400 | Gateway to Space | |
| ASTR 2600 | Introduction to Scientific Programming | |
| ASTR 3300 | Extraterrestrial Life | |

| | | |
|---|---|---|
| **Intermediate** | | |
| ASTR 2100 | Fundamental Concepts in Astrophysics [2, 3] | 3 |
| **Advanced** | | |
| Select one of the following upper-division course sequences: | | 6 |
| *Planetary Sequence:* | | |
| ASTR 3720 & ASTR 3750 | Planets and Their Atmospheres and Planets, Moons, and Rings | |
| *Astrophysics Sequence:* | | |
| ASTR 3730 & ASTR 3830 | Astrophysics 1 - Stellar and Interstellar and Astrophysics 2 - Galactic and Extragalactic | |
| Select a minimum of one of the following: | | 3-4 |
| ASTR 3400 | Research Methods in Astronomy | |
| ASTR 3510 | Observations and Instrumentation 1 | |
| ASTR 3520 | Observations and Instrumentation 2 | |
| ASTR 3560 | Astronomical Instrumentation Laboratory | |
| ASTR 3710 | Formation & Dynamics of Planetary Systems | |
| ASTR 3720 | Planets and Their Atmospheres | |
| ASTR 3730 | Astrophysics 1 - Stellar and Interstellar | |
| ASTR 3740 | Cosmology and Relativity | |
| ASTR 3750 | Planets, Moons, and Rings | |
| ASTR 3760 | Solar and Space Physics | |
| ASTR 3830 | Astrophysics 2 - Galactic and Extragalactic | |
| ASTR 4330 | Cosmochemistry | |
| ASTR 4840 | Independent Study | |
| ATOC 4720 | Atmospheric Dynamics | |
| **Total Credit Hours** | | **18-21** |

1 Or ASTR 1010 and/or ASTR 1020 with permission.

2 If they plan to take Calculus 3 (MATH 2400 or APPM 2350), then students should replace ASTR 2100 with an additional ASTR class (either upper or lower division).

3 Some upper division ASTR courses require a prerequisite of Modern Physics (PHYS 2130 or PHYS 2170) or ASTR 2100. We recommend students discuss the classes they're interested in with an ASTR advisor to plan accordingly.

Additional information is available from any faculty mentor. See the department's Undergraduate Studies (https://www.colorado.edu/aps/undergraduate-students/prospective-students/) webpage.

# Atmospheric and Oceanic Sciences

The Department of Atmospheric and Oceanic Sciences (ATOC) is an interdisciplinary program that provides an educational and research environment to examine the dynamical, physical and chemical processes in the atmosphere, ocean and land surface, and the manner in which they interact. A major theme is the establishment of a physical basis for understanding, observing and modeling climate and global change.

ATOC began offering an undergraduate degree in fall 2016. This baccalaureate degree is the first of its kind at CU Boulder for students interested in an in-depth understanding of the physical basis for the role of the atmosphere and oceans in Earth's climate system. In addition, ATOC offers a minor in atmospheric and oceanic sciences for students pursuing a bachelor's degree in another academic department. ATOC also offers many courses approved for the Natural Science Distribution Area of the College of Arts & Sciences General Education Requirements.

For more information about ATOC programs and application procedures, call the ATOC office at 303-492-6633 or visit the Atmospheric and Oceanic Sciences (http://www.colorado.edu/atoc/) website.

**Course code for this program is ATOC.**

## Bachelor's Degree

- Atmospheric and Oceanic Sciences - Bachelor of Science (BA) (p. 193)

## Minor

- Atmospheric and Oceanic Sciences - Minor (p. 196)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Brown, Derek Philip (https://experts.colorado.edu/display/fisid_150027/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Cassano, John J. (https://experts.colorado.edu/display/fisid_121781/)
Professor; PhD, University of Wyoming

Friedrich, Katja (https://experts.colorado.edu/display/fisid_133607/)
Professor; PhD, Ludwig-Maximilians-Universität München (Germany)

Han, Weiqing (https://experts.colorado.edu/display/fisid_115493/)
Professor; PhD, Nova University

Jahn Hall, Alexandra (https://experts.colorado.edu/display/fisid_155096/)
Assistant Professor; PhD, McGill University

Karnauskas, Kristopher Benson (https://experts.colorado.edu/display/fisid_155094/)
Associate Professor, Associate Chair; PhD, University of Maryland, College Park

Kay, Jennifer E. (https://experts.colorado.edu/display/fisid_153815/)
Associate Professor; PhD, University of Washington

Keen, Richard A.
Instructor Emeritus

Lemone, Margaret Anne
Professor Adjoint

Li, Jianghanyang (https://experts.colorado.edu/display/fisid_169049/)
Assistant Professor; PhD, Purdue University

Lovenduski, Nicole Suzanne (https://experts.colorado.edu/display/fisid_147557/)
Associate Professor; PhD, University of California, Los Angeles

Moriarty, Julia (https://experts.colorado.edu/display/fisid_165830/)
Assistant Professor; PhD, William & Mary/Virginia Institute of Marine Science

Pilewskie, Peter Andrew (https://experts.colorado.edu/display/fisid_134466/)
Professor; PhD, University of Arizona

Randall, Cora Einterz (https://experts.colorado.edu/display/fisid_102010/)
Distinguished Professor Emeritus; PhD, University of California, Santa Cruz

Sanchez, Sara (https://experts.colorado.edu/display/fisid_167959/)
Assistant Professor; Ph.D., University of California- San Diego

Schmidt, Sebastian (https://experts.colorado.edu/display/fisid_140121/)
Associate Professor; PhD, Leipzig University (Germany)

Toohey, Darin W. (https://experts.colorado.edu/display/fisid_110652/)
Professor; PhD, Harvard University

Toon, Owen Brian (https://experts.colorado.edu/display/fisid_110521/)
Professor; PhD, Cornell University

Wang, Xinyue (https://experts.colorado.edu/display/fisid_173884/)
Assistant Professor; PhD, Purdue University

Weiss, Jeffrey B. (https://experts.colorado.edu/display/fisid_102145/)
Chair, Professor; PhD, University of California, Berkeley

Winters, Andrew (https://experts.colorado.edu/display/fisid_165835/)
Assistant Professor; PhD, University of Wisconsin–Madison

# Courses

**ATOC 1050 (3) Weather and the Atmosphere**
Introduces principles of modern meteorology for nonscience majors, with emphasis on scientific and human issues associated with severe weather events. Includes description, methods of prediction, and impacts of blizzards, hurricanes, thunderstorms, tornadoes, lightning, floods, and firestorms.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**ATOC 1060 (3) Our Changing Environment: El Nino, Ozone, and Climate**
Discusses the Earth's climate for nonscience majors, focusing on the role of the atmosphere, oceans, cryosphere and land surface. Describes the water cycle, atmospheric circulations and ocean currents, and how they influence global climate, El Nino and the ozone hole. Discusses human impacts from climate change.
**Recommended:** Prerequisite ATOC 1050.
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 1070 (1) Weather and the Atmosphere Laboratory**
Illustrates fundamentals of meteorology with laboratory experiments. Covers collection, analysis and discussion of data related to local weather. Uses computers for retrieval and interpretation of weather data from Colorado and across the U.S. Optional lab for ATOC 1050.
**Recommended:** Prerequisite or corequisite ATOC 1050.
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science Lab or Lab/Lec

**ATOC 2050 (3) Introduction to Atmospheric Research**
Uses real world data to investigate the basic physical processes that drive the coupled atmosphere-ocean system (e.g., energy distribution, phase changes, stability, winds and currents). Students will apply logic to predict how processes are impacted as different environmental characteristics change and develop skills in graphical literacy, investigative thinking, societal and personal relevancy, and communication.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 2500 (1-3) Special Topics in Atmospheric and Oceanic Sciences - Lower Division**
Acquaints students at the lower division level with current research in atmospheres, oceans and climate (Topics may vary each semester). Students may register for more than one section of this course in the same semester. Recommended restriction: students with 0-56 credits (Freshmen or Sophomores).
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite or corequisite will vary depending on topic.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 3050 (3) Principles of Weather**
Explores the processes that influence middle latitude weather including atmospheric thermodynamics, cloud and precipitation processes, atmospheric dynamics, air masses and fronts, and mid-latitude cyclones. Recitations and homework assignments will allow students to apply these concepts to real weather data through analysis of weather maps, thermodynamics diagrams and conceptual models.
**Recommended:** Prerequisites ATOC 1050 or ATOC major.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 3070 (3) Introduction to Oceanography**
Explores Earth's dynamic oceans. Discusses the disciplines of oceanography including marine geology, chemistry, biology and physical oceanography with emphasis on global change. Specific topics may include: tectonics, currents, biogeochemical cycles, ecology and global warming.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 3070
**Recommended:** Prerequisite any 1000-level ATOC or GEOL course or ATOC major.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 3180 (3) Aviation Meteorology**
Familiarizes students with a wide range of atmospheric behavior pertinent to air travel: rudiments of aerodynamics; aircraft stability and control; atmospheric circulation, vertical motion, turbulence and wind shear; fronts, clouds and storms.
**Recommended:** Prerequisite ATOC 1050 or ATOC major.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 3300 (3) Analysis of Climate and Weather Observations**
Discusses instruments, techniques and statistical methods used in atmospheric observations. Covers issues of data accuracy and analysis of weather maps. Provides application to temperature and precipitation records, weather forecasting and climate change trends. Uses computers to access data sets and process data.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 3301
**Recommended:** Prerequisites ATOC 1050 or ATOC 1060 or ATOC 3600 or GEOG 3601 or ENVS 3600 or GEOG 1001 and one semester calculus.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 3500 (3) Air Chemistry and Pollution**
Examines the composition of the atmosphere and sources of gaseous and particulate pollutants: their chemistry, transport and removal from the atmosphere. Applies general principles to acid rain, smog and stratospheric ozone depletion.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 3151
**Recommended:** Prerequisite one semester of college-level chemistry or one year of high school chemistry.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 3600 (3) Principles of Climate**
Describes the basic components of the climate system: the atmosphere, ocean, cryosphere and lithosphere. Investigates the basic physical processes that determine climate and link the components of the climate system. Covers the hydrological cycle and its role in climate, climate stability and global change.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 3601 and ENVS 3600
**Recommended:** Prerequisites one semester of calculus and ATOC 1060 or ATOC 3300 or GEOG 3301 or GEOG 1001 or ATOC major.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 3700 (3) Course-Based ATOC Research Experience**
In this course-based research experience in Atmospheric and Oceanic Sciences, students will learn about how scientific research works as well as gain first research experience in Atmospheric and Oceanic Sciences by working on an authentic research project. Specifically, students will learn how to understand scientific articles, how to develop subject-matter expertise, how to design a scientific research project, how to analyze and interpret data, and how to present their results to other scientists. Formerly offered as a special topics course.
**Recommended:** Prerequisite ATOC 1060 or ATOC 3600, and 1 semester of programming or equivalent self-study before the beginning of the class is required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 3720 (3) Planets and Their Atmospheres**
Explores the physics and chemistry of the atmospheres of Mars, Venus, Jupiter, Saturn, and Titan. Examines evolution of the atmospheres of Earth, Venus, and Mars; and the escape of gases from the Galilean satellites, Titan and Mars; the orbital characteristics of moons, planets, and comets. Uses recent results of space exploration. Elective for APS major and minor.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 3720
**Requisites:** Requires prerequisite courses of PHYS 1120 and (APPM 1360 or MATH 2300) and prerequisite or corequisite course of ASTR 2100 or MATH 2400 or APPM 2350 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4020 (1) Seminar in Atmospheric and Oceanic Sciences**
Explores current research areas; students read selected papers, give presentations and participate in discussions; fellowship and internship opportunities; discussion on practical skills necessary for academic and professional life; career-building activities with outside speakers from academia and industry. May be repeated for a total of 6 credit hours within the degree as long as the topic is different. May be repeated for a total of 3 credit hours within a semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**ATOC 4200 (3) Biogeochemical Oceanography**
Provides a large-scale synthesis of the processes impacting ocean biogeochemistry. Transforms theoretical understanding into real-world applications using oceanographic data and models. Topics include: chemical composition, biological nutrient utilization and productivity, air-sea gas exchange, carbonate chemistry, ocean acidification, ocean deoxygenation, iron fertilization, biogeochemical climate feedbacks and more.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5200
**Recommended:** Prerequisites one semester of calculus and one semester of chemistry.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4215 (3) Descriptive Physical Oceanography**
Introduces descriptive and dynamical physical oceanography, focusing on the nature and dynamics of ocean currents and their role in the distribution of heat and other aspects of ocean physics related to the Earth's climate. Dynamical material limited to mathematical descriptions of oceanic physical systems.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4500 (1-3) Special Topics in Atmospheric and Oceanic Sciences - Upper Division**
Acquaints students at the upper division level with current research in atmospheres, oceans, and climate. Topics may vary each semester. Students may register for more than one section of this course in the same semester.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4550 (3) Mountain Meteorology**
Investigating main processes that control weather and climate in the western United States and other mountain ranges around the world is the emphasis of this course. Provides an advanced survey of synoptic, mesoscale, and microscale meteorology in complex terrain including orographically modified cyclone evolution, front-mountain interactions, terrain and thermally driven flows, mountain waves, downslope winds, and orographic precipitation.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5550
**Recommended:** Prerequisite ATOC 1050 or ATOC major.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4700 (3) Weather Analysis & Forecasting**
Utilizing a range of operational weather observations to analyze current weather conditions, providing hands-on experience interpreting observations and relating those observations to the physical principles that govern atmospheric behavior is the course emphasis. It focuses on how to read weather reports, analyze observations, and how to prepare weather maps to analyze current conditions and how to interpret numerical weather forecasts.
**Recommended:** Prerequisite ATOC 1050 or ATOC 1060 or ATOC 4720 or ATOC major.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4710 (3) Introduction to Atmospheric Physics**
Provides a fundamental overview of the physics of Earth's atmosphere. Topics include atmospheric composition and structure, atmospheric radiation and optics (rainbows, halos and other phenomena), atmospheric thermodynamics, cloud physics and atmospheric electricity and lightning. Including both descriptive and quantitative approaches to the subject material. Where applicable, observations from the ATOC Skywatch Observatory will be introduced.
**Recommended:** Prerequisite one year of calculus and one year of physics with calculus.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4720 (3) Atmospheric Dynamics**
Introduces the fundamental physical principles that govern the atmospheric circulations across a range of spatial and temporal scales and provides a quantitative description and interpretation of a wide range of atmospheric phenomena. Topics include atmospheric forces, governing equations, balanced and unbalanced flows, atmospheric waves and mid-latitude cyclones.
**Recommended:** Prerequisite one year of calculus and one semester of physics with calculus.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4730 (3) Physical Oceanography and Climate**
Introduces the field of physical oceanography, with emphasis on the ocean's interaction with the global atmosphere. Analysis of the ocean's heat, salt, and momentum budgets, wind-driven and thermohaline circulations, climate cycles including El Nino, and the ocean's role in climate change. Theory complemented by state-of-the-art observations and models. Department recommended prerequisites: ATOC 1060 or ATOC 3070 or ATOC 3600 and one semester of calculus.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5730
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4740 (3) Dynamics of Past Climate Changes: Lessons for the Future**
Studies past changes in the Earth¿s climate and their application to predict future climate changes. Combines theoretical understanding of the climate system, computer models, and records of past changes from geological archives to understand drivers of past and future changes in climate. Emerging and inter-disciplinary area in climate research including paleoclimatology, climate theory, and modelling. Students work individually and in groups to formulate hypotheses that ca be tested using paleoclimate records and model simulations. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5720
**Recommended:** Prerequisite Prior college-level coursework in Chemistry and Physics, and least two of the following courses - ATOC 1060, ATOC 4730, ATOC 5730, GEOL 3040, GEOL 3070, GEOL 3820, GEOL 4060, or GEOL 4070.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4750 (3) Desert Meteorology and Climate**
Introduces students to the dynamic causes of deserts in the context of atmospheric processes and land-surface physics. Discusses desert severe weather, desert microclimates, human impacts and desertification, inter-annual variability in aridity (drought), the effects of deserts on global climate and the impact of desert climate on humans.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5750
**Recommended:** Prerequisites one semester of calculus and ATOC 1050 or ATOC 1060 or ATOC 3600 or ATOC major.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4760 (3) Physics and Chemistry of Clouds and Aerosols**
Clouds and aerosols are important components of the climate system, impact remote sensing, affect human health, and are tightly coupled to radiation, chemistry and dynamics. This class covers the basic concepts in cloud and aerosol physics and chemistry in the context of the leading problems in climate, Earth history, air pollution, and weather. Examples include: dust storms; volcanic eruptions and climate; the extinction of the dinosaurs; nuclear winter; clouds and climate; thunderstorms, and lightning.
**Recommended:** junior and senior level students.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4770 (3) Renewable Energy Meteorology**
Explores the complex interactions of the atmosphere and wind energy generation. Surveys wind turbine designs. Explores planetary boundary layer dynamics, traditional and novel wind measurement methods, forecasting methods, wind turbine and wind farm wakes, wind farm optimization, sound propagation from wind plants, climate change impacts on wind resources and the impacts of wind plants on local environments.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5770
**Recommended:** Prerequisite ATOC 1050 or ATOC major.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4780 (3) Ice Sheets and Climate**
Covers the role of ice sheets in the climate system over a range of time (millions of years ago to the long-term future) scales, and presents the interactions between ice sheets, the ocean, and the atmosphere. Students will be introduced to, and work with, observational and modeling methods and data that conceptualize ice sheet climate and related topics.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5780
**Recommended:** Prerequisite Basic programming experience (python, Matlab, or equivalent), basic knowledge of calculus, basic knowledge of algebra and at least one ATOC course at the 1000, 2000, or 3000 level with a grade of C- or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4800 (3) Policy Implications of Climate Controversies**
Examines controversial issues related to the environment, including climate change. Covers scientific theories and the intersection between science and governmental policy. Includes discussion, debate and critical reading of textual materials. Department enforced prerequisite: ATOC 1060 or ATOC 3600.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5000 and ENVS 5830
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4815 (3) Scientific Programming, Data Analysis and Visualization Laboratory**
Teaches programming in python, as well as analysis skills for accessing, analyzing and visualizing data that are commonly used in the atmospheric and oceanic sciences. Basic data analysis includes curve fitting and re-gridding/aggregation of satellite observations or meteorological data for global climatologies. The course content is primarily conveyed through hands-on code development. A final project, involving the independent analysis and visualization of a scientific data set, integrates skills acquired throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5815
**Recommended:** Requisites prior experience with Python or a basic programming course such as CSCI 1300 or equivalent, basic knowledge of calculus and algebra.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4830 (3) Remote Sensing Lab**
Fundamentals of remote sensing of the atmosphere and ocean including fundamentals of atmospheric radiation and inverse methods for deriving geophysical variables from measurements. Principles of satellite and ground-based active (lidar and radar) and passive remote sensing methods, instrumentations, and applications. Lectures will include both descriptive and quantitative approaches to the subject material and include in-class demonstrations and measurements and data from the ATOC Skywatch Observatory and NASA satellites.
**Recommended:** Prerequisites one year of calculus and one year of physics with calculus.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4840 (3) Field Observations and Measurements Laboratory**
This course introduces students to all aspects of observing the atmospheric state including issues associated with observational and instrument errors, planning and executing measurement campaigns and analyzing and presenting results based on data collected during field campaigns. During the semester students will plan, conduct and analyze data from two atmospheric field campaigns conducted near Boulder, CO using a suite of meteorological sensors.
**Recommended:** Prerequisites ATOC 1050 or ATOC 3050.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4850 (3) Numerical Methods Laboratory**
Teach students how to convert physical descriptions of the earth system into numerical models. Students will learn how to make assumptions to simplify complex systems, how to discretize and code mathematical equations so they can be solved on a computer, and how to assess if the results are reasonable. The course content is primarily conveyed through hands-on code development in python. A final project integrates skills acquired throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5850
**Recommended:** Prerequisites ATOC 4815 or ATOC 5815, Calculus 1, Calculus 2, Differential Equations, Linear Algebra, and a basic knowledge of/interest in atmospheric, oceanic, climatic, or cryospheric physics.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4860 (3) Data Science Lab**
The goals of this course are twofold: 1) providing a working knowledge of basic data science methods used for temporal and spatial analysis of atmospheric and oceanic data, to turn the data into clear insights via a computer program, 2) develop skills to work in a group and explain data science techniques to an audience with a broad range of expertise. The course covers: probability distributions and statistical indices; hypothesis testing; linear and multilinear regression; an intro to machine learning; an intro to Gaussian processes. This ¿learning-by-doing¿ course is recommended for senior level students. Formerly offered as a special topics course.

**ATOC 4870 (3) Climate Modeling Laboratory**
Climate models solve equations describing the earth system. This course provides an overview of climate modeling. Standard climate model approaches and experiments are presented, and then used in companion exercises. This course will provide students with real-world experience running a climate model used internationally for climate science and policy. This course is aimed at upper level undergraduate students. Recommended restriction: Junior or Senior ATOC students.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5870
**Recommended:** Prerequisite Experience with programming, Calculus, Differential Equations and Linear Algebra.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Distribution-Natural Sci Lab

**ATOC 4875 (3) Weather Modeling Laboratory**
In this laboratory course, students simulate the atmosphere using a numerical weather prediction model (WRF) and explore the physical and numerical basis of the system of equations that underpin numerical weather prediction models. In addition to developing technical skills with WRF and visualizing its output with python, students explore applications of numerical modeling of the atmosphere, such as land-sea breezes, hurricanes, mesoscale convective systems, and the daily cycle of the boundary layer. Recommended restriction: Junior or Senior class standing. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5875
**Requisites:** Requires prerequisite course of ATOC 1050 or ATOC 3050 or ATOC 4700 or ATOC 4710 or ATOC 4720 (all minimum grade C-).
**Recommended:** Prerequisite Experience with computer science and data visualization such as ATOC 4815 and some experience with Unix/Linux.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4880 (3) Mesoscale Meteorology**
Provides a comprehensive study of the structure, evolution, and dynamics of atmospheric phenomena on the mesoscale, which have horizontal scales ranging from a few to several hundred kilometers. Topics include land/sea breezes, horizontal convective rolls, drylines, deep convective storms, outflow boundaries, tornadoes, mesoscale convective systems, terrain induced airflows, mountain waves and the mesoscale aspects of extratropical cyclones. Previously offered as a special topics course. Recommended restriction: Senior or Fifth-Year Senior standing.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5880
**Recommended:** Prerequisites One year of Calculus, one year of Physics with Calculus, and at least one ATOC fundamental or core course, preferably ATOC 3050 or ATOC 4720.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4890 (3) Synoptic Dynamic Meteorology**
Weather conditions at middle latitudes are characterized by complex interactions between air masses, fronts, cyclones, and anticyclones. These interactions are governed by a set of elegant mathematical equations that describe the behavior of the atmosphere. Students will manipulate and apply these equations in real time in order to diagnose the development and evolution of a variety of synoptic-scale weather systems, including fronts, jet streams, and extratropical cyclones. Recommended restriction: Junior and Senior-level students. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5890
**Recommended:** Prerequisite ATOC 3050, ATOC 4720, one year of Calculus, and one semester of Physics with Calculus.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Arts Sci Gen Ed: Distribution-Natural Sci Lab

**ATOC 4900 (1-3) Independent Study**
Department enforced prerequisite: instructor consent.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ATOC 4950 (1-3) Honors Thesis**
Students work independently on a research topic under the guidance of a faculty member. A written thesis and an oral presentation of the work are required. Registration by arrangement and with consent of faculty mentor. Department enforced prerequisite: minimum 3.00 GPA.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sciences Honors Course

**ATOC 4990 (1-3) Internship**
This course is designed to provide junior and senior ATOC majors with the opportunity to work hands-on in the community and to gain practical knowledge and experience in both research and industry. Participation in the program requires both on-site and academic work. 0.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Students should have junior or senior standing (at the time of the internship) and have a minimum cumulative GPA of 2.

# Atmospheric and Oceanic Sciences - Bachelor of Arts (BA)

The atmospheric and oceanic sciences (ATOC) Bachelor of Arts degree is the first of its kind at CU Boulder for students interested in an in-depth understanding of the physical basis for the role of the atmosphere and oceans in Earth's climate system. An ATOC degree will prepare students to pursue a wide range of careers in areas as diverse as the energy sector, insurance, military, air and water quality monitoring, weather and aerospace industries. It will provide a solid foundation for advanced degrees in the atmospheric and oceanic sciences, and for professions in scientific research and academia.

ATOC's curriculum responds to demands of current students for more interactive learning opportunities and to demands of employers for graduates who have been trained to provide quantitative solutions to real-world problems. It is designed to provide students with a core set of knowledge and skills related to atmospheric and oceanic sciences, and to engage students in hands-on, interactive learning early and often. To that end, it requires students to take several "methods" courses that emphasize quantitative problem-solving by focusing on some combination of data analysis, observations and/or modeling; all of these courses will incorporate some level of computer programming or scientific computing. ATOC strongly recommends that every student have a laptop computer if it is financially feasible. Students who intend to purchase a computer and wish to have its cost included in their financial aid calculations are strongly encouraged to consult the Office of Financial Aid before purchase.

ATOC's curriculum is also designed to take advantage of our unique position as a university in the center of a world-renowned mecca for earth system science. Scientists from the local community contribute their expertise to the ATOC curriculum, particularly in the interactive methods courses, and mentor seniors in their thesis research.

## Contact Information

Director of Undergraduate Education: Dr. Derek Brown (derek.brown@colorado.edu)

Academic Advising Center First-Year Liaison: Gretchen Lang (gretchen.lang@colorado.edu)

Academic Advising Center for ATOC majors beyond first year: Tabs Lannom (tabitha.lannom@colorado.edu)

For further information concerning undergraduate studies, contact ATOC's graduate and undergraduate program assistant, Laurie Conway (laurie.conway@colorado.edu).

# Requirements

Students receiving a BA in atmospheric and oceanic sciences (ATOC) must satisfy the basic requirements of the College of Arts and Sciences (General Education, graduation, and credit requirements) and fulfill the requirements listed below.

Students are required to complete 45 credits in lower and upper-division ATOC coursework, including 21 credits of core ATOC courses, 12 credits of methods in ATOC, and 12 credits of designated upper-division ATOC electives. The requirements for the ATOC major also include 32–37 hours of ancillary science and mathematics. All required major courses and all required ancillary courses must be passed with a C- or better.

Under normal circumstances, no more than 45 credits in ATOC may be used toward a student's total University of Colorado graduation requirements. However, up to 6 hours of designated department honors courses are exempted from this credit-hour maximum. Students must have a grade point average of at least 2.000 in the major in order to graduate.

## Required Courses and Credits

### ATOC Major Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Introductory Atmospheric and Oceanic Sciences Requirement** | | |
| Select one of the following: | | 3 |
| ATOC 1050 | Weather and the Atmosphere | |
| ATOC 1060 | Our Changing Environment: El Nino, Ozone, and Climate | |
| ATOC 2050 | Introduction to Atmospheric Research | |
| ATOC 2500 | Special Topics in Atmospheric and Oceanic Sciences - Lower Division | |
| FYSM 1000 | First Year Seminar (ATOC offered sections) | |
| **Core Atmospheric and Oceanic Sciences Requirements** | | |
| Select three of the following courses: | | 9 |
| ATOC 3050 | Principles of Weather | |
| ATOC/GEOL 3070 | Introduction to Oceanography | |
| ATOC 3300 | Analysis of Climate and Weather Observations | |
| or ATOC 3700 | Course-Based ATOC Research Experience | |
| ATOC 3500/ CHEM 3151 | Air Chemistry and Pollution | |
| ATOC 3600 | Principles of Climate | |
| **Fundamentals of Atmospheric and Oceanic Sciences** | | |
| Select three of the following courses: | | 9 |
| ATOC 4200 | Biogeochemical Oceanography | |
| ATOC 4710 | Introduction to Atmospheric Physics | |
| ATOC 4720 | Atmospheric Dynamics | |
| ATOC 4730 | Physical Oceanography and Climate | |
| **Methods in Atmospheric and Oceanic Sciences** | | |
| Select 12 credit hours of the following, 6 of which can be from independent research (ATOC 4900, ATOC 4950 or ATOC 4990). Some courses offered as ATOC 4500 Special Topics may satisfy this requirement. | | 12 |
| ATOC 4500 | Special Topics in Atmospheric and Oceanic Sciences - Upper Division (Choose from the following: topics: Weather Modeling Lab, Instrument Lab, Remote Sensing, Field Observations and Measurements, Numerical Methods and Modeling, Objective Data Analysis, Synoptic Dynamic Meteorology, and Applications of Numerical Models) | |
| ATOC 4700 | Weather Analysis & Forecasting | |
| ATOC 4815 | Scientific Programming, Data Analysis and Visualization Laboratory | |
| ATOC 4830 | Remote Sensing Lab | |
| ATOC 4840 | Field Observations and Measurements Laboratory | |
| ATOC 4850 | Numerical Methods Laboratory | |
| ATOC 4860 | Data Science Lab | |
| ATOC 4870 | Climate Modeling Laboratory | |
| ATOC 4875 | Weather Modeling Laboratory | |
| ATOC 4890 | Synoptic Dynamic Meteorology | |
| ATOC 4900 | Independent Study | |
| ATOC 4950 | Honors Thesis | |
| ATOC 4990 | Internship | |
| **ATOC Electives** | | |
| (At least 12 credit hours in ATOC courses not used to fulfill a requirement above.) | | |
| Upper-Division ATOC Electives | | 9 |
| Upper- or Lower-Division ATOC Elective | | 3 |
| **Total Credit Hours** | | **45** |

### Required Ancillary Coursework from Outside ATOC

| Code | Title | Credit Hours |
|---|---|---|
| **Ancillary Science and Mathematics Requirements** | | |
| The field of atmospheric and oceanic sciences is highly interdisciplinary; therefore, students must develop a basic understanding of physics, chemistry, and mathematics to be successful. The required courses in the physical sciences and math departments outside of ATOC are a critical part of the major; they are needed to build a strong foundation upon which the remaining curriculum is based. All courses must be passed with a grade of C- or better required. | | |
| APPM 1350 | Calculus 1 for Engineers | 4-5 |
| or MATH 1300 | Calculus 1 | |
| APPM 1360 | Calculus 2 for Engineers | 4-5 |
| or MATH 2300 | Calculus 2 | |
| APPM 2350 | Calculus 3 for Engineers | 4-5 |
| or MATH 2400 | Calculus 3 | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra (Or MATH 2130 and MATH 3430) | 4-6 |
| CHEM 1113 | General Chemistry 1 | 4 |
| CSCI 1200 | Introduction to Computational Thinking | 3 |
| PHYS 1110 | General Physics 1 | 4 |

| | | |
|---|---|---|
| PHYS 1120 | General Physics 2 | 4 |
| **Total Credit Hours** | | **31-36** |

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in ATOC, students should meet the following requirements:

- In the first semester, declare the Atmospheric and Oceanic Sciences major.

Students must consult with a major advisor to determine adequate progress toward completion of the major.

# Sample Four-Year Plan of Study

Through the required coursework for the major, students will complete all 12 credits of the Natural Sciences area of the Gen Ed Distribution Requirement and the QRMS component of the Gen Ed Skills Requirement.

Not all ATOC 4500 courses satisfy all requirements. See department for more information.

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| FYSM 1000<br>or ATOC 1050<br>or ATOC 1060<br>or ATOC 2050<br>or ATOC 2500 | First Year Seminar (ATOC section)<br>or Weather and the Atmosphere<br>or Our Changing Environment: El Nino, Ozone, and Climate<br>or Introduction to Atmospheric Research<br>or Special Topics in Atmospheric and Oceanic Sciences - Lower Division | 3 |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| PHYS 1110 | General Physics 1 | 4 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| PHYS 1120 | General Physics 2 | 4 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/US Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| | **Credit Hours** | **14** |

**Year Two**

| **Fall Semester** | | |
|---|---|---|
| CHEM 1113 | General Chemistry 1 | 4 |
| CHEM 1114 | Laboratory in General Chemistry 1 | 1 |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| Core ATOC course (see requirements) | | 3 |
| CSCI 1200 | Introduction to Computational Thinking | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| Core ATOC course (see requirements) | | 6 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| | **Credit Hours** | **16** |

**Year Three**

| **Fall Semester** | | |
|---|---|---|
| Fundamentals ATOC course (see requirements) | | 3 |
| Fundamentals ATOC course (see requirements) | | 3 |
| ATOC Methods course (see above) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| Fundamentals ATOC course (see requirements) | | 3 |
| ATOC Methods course (see requirements) | | 3 |
| ATOC Upper-division Elective | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |

**Year Four**

| **Fall Semester** | | |
|---|---|---|
| ATOC Methods Course (see requirements) | | 3 |
| ATOC Upper-division Elective | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective or Upper-division Elective (if needed) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ATOC Methods Course (see requirements) | | 3 |
| ATOC Upper-division Elective | | 3 |
| ATOC Upper-division Elective | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 4 |
| | **Credit Hours** | **16** |
| | **Total Credit Hours** | **120** |

# Learning Outcomes

ATOC's curriculum responds to demands of current students for more interactive learning opportunities and to demands of employers for graduates who have been trained to provide quantitative solutions to real-world problems. It is designed to provide students with a core set of knowledge and skills related to atmospheric and oceanic sciences, and to engage students in hands-on, interactive learning early and often.

To that end, it requires students to take several "methods" courses that emphasize quantitative problem-solving by focusing on some combination of data analysis, observations, and/or modeling; all of these courses will incorporate some level of computer programming or scientific computing.

ATOC course learning goals include graphical literacy, investigative thinking, societal and personal relevance, and knowledge of the physical processes of weather and climate. In addition, ATOC majors should demonstrate skill in communication scientific concepts elegantly and clearly.

# Atmospheric and Oceanic Sciences - Minor

The Department of Atmospheric and Oceanic Sciences (ATOC) offers an undergraduate minor for students pursuing a bachelor's degree in another academic department. Students who successfully complete a major at CU Boulder in a quantitative field, such as physics or chemistry, and a minor in ATOC, will be prepared for graduate work in atmospheric and oceanic sciences. The ATOC minor is offered through the College of Arts and Sciences and is noted on the official CU Boulder transcript.

Although the ATOC minor is primarily designed for students who are interested in developing a knowledge base in atmospheric and oceanic sciences with an emphasis on the earth's climate, there is considerable latitude within the minor program for students to design a course of study that is tailored to their individual interests.

Students who wish to declare the ATOC minor should contact the ATOC Undergraduate & Graduate Program Assistant by email at atocasst@colorado.edu or by phone at 303-492-6633. Questions regarding coursework or advising should be directed to the ATOC minor advisor, Dr. Kris Karnauskas, at kristopher.karnauskas@colorado.edu (katja.friedrich@colorado.edu).

## Requirements

A minimum of 18 credits is required for the minor, at least 9 of which must be upper-division (see list below). The other 9 may be lower-division, upper-division or a combination of both.

All coursework applied to the minor must be completed with a grade of C- or better; no pass/fail work may be applied. Students must have at least a C (2.00) average for all attempted work in atmospheric and oceanic sciences.

Courses toward a minor may also be applied toward graduation requirements, as well as the major requirements for a non-ATOC major. Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work to a minor.

### Available Courses

| Code | Title | Credit Hours |
|---|---|---|
| **Lower-Division** | | |
| FYSM 1000 | First Year Seminar (Stratospheric Explorations) | |
| ATOC 1050 | Weather and the Atmosphere | |
| ATOC 1060 | Our Changing Environment: El Nino, Ozone, and Climate | |
| ATOC 2050 | Introduction to Atmospheric Research | |
| ATOC 2500 | Special Topics in Atmospheric and Oceanic Sciences - Lower Division | |
| **Upper-Division** | | |
| ATOC 3050 | Principles of Weather | |
| ATOC/GEOL 3070 | Introduction to Oceanography | |
| ATOC 3180 | Aviation Meteorology | |
| ATOC 3300 | Analysis of Climate and Weather Observations | |
| ATOC 3500/ CHEM 3151 | Air Chemistry and Pollution | |
| ATOC/ENVS 3600/ GEOG 3601 | Principles of Climate | |
| ATOC 3700 | Course-Based ATOC Research Experience | |
| ATOC/ASTR 3720 | Planets and Their Atmospheres | |
| ATOC 4200 | Biogeochemical Oceanography | |
| ATOC 4215 | Descriptive Physical Oceanography | |
| ATOC 4500 | Special Topics in Atmospheric and Oceanic Sciences - Upper Division | |
| ATOC 4550 | Mountain Meteorology | |
| ATOC 4700 | Weather Analysis & Forecasting | |
| ATOC 4710 | Introduction to Atmospheric Physics | |
| ATOC 4720 | Atmospheric Dynamics | |
| ATOC 4730 | Physical Oceanography and Climate | |
| ATOC 4740 | Dynamics of Past Climate Changes: Lessons for the Future | |
| ATOC 4750 | Desert Meteorology and Climate | |
| ATOC 4760 | Physics and Chemistry of Clouds and Aerosols | |
| ATOC 4770 | Renewable Energy Meteorology | |
| ATOC 4780 | Ice Sheets and Climate | |
| ATOC 4800 | Policy Implications of Climate Controversies | |
| ATOC 4815 | Scientific Programming, Data Analysis and Visualization Laboratory | |
| ATOC 4830 | Remote Sensing Lab | |
| ATOC 4840 | Field Observations and Measurements Laboratory | |
| ATOC 4850 | Numerical Methods Laboratory | |
| ATOC 4860 | Data Science Lab | |
| ATOC 4870 | Climate Modeling Laboratory | |
| ATOC 4875 | Weather Modeling Laboratory | |
| ATOC 4880 | Mesoscale Meteorology | |
| ATOC 4890 | Synoptic Dynamic Meteorology | |
| ATOC 4900 | Independent Study | |
| ATOC 4950 | Honors Thesis | |
| ATOC 4990 | Internship | |

# Biochemistry

The biochemistry major provides interdisciplinary training, education and experience in the chemical and biological sciences. Biochemistry focuses on understanding the chemical processes of living organisms, the reaction pathways that sustain life, the principles of how structure defines function and the physical basis of biomolecular interactions. Students who major in biochemistry are prepared for diverse careers in medicine, scientific research, biotechnology, pharmacy, biomedical consulting, teaching and education, among other professions.

Because biochemistry connects to scientific disciplines ranging from genetics, human physiology, microbiology, neuroscience, cell

biology, chemistry and geology, biochemistry majors are given the freedom to explore advanced electives in many of these subjects. Additional information about the biochemistry degree can be found on the Biochemistry Department website (https://www.colorado.edu/biochemistry/).

**Course code for this program is BCHM.**

# Bachelor's Degree

- Biochemistry - Bachelor of Science (BA) (p. 200)

# Minor

- Biochemistry - Minor (p. 203)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ahn, Natalie (https://experts.colorado.edu/display/fisid_106044/)
Distinguished Professor; PhD, University of California, Berkeley

Aydin, Halil (https://experts.colorado.edu/display/fisid_167398/)
Assistant Professor; PhD, University of Toronto

Batey, Robert T. (https://experts.colorado.edu/display/fisid_122668/)
Professor; PhD, Massachusetts Institute of Technology

Cameron, Jeffrey C. (https://experts.colorado.edu/display/fisid_156473/)
Assistant Professor; PhD, Washington University

Caruthers, Marvin H. (https://experts.colorado.edu/display/fisid_103328/)
Distinguished Professor; PhD, Northwestern University

Cech, Thomas R. (https://experts.colorado.edu/display/fisid_103252/)
Distinguished Professor; PhD, University of California, Berkeley

Falke, Joseph J. (https://experts.colorado.edu/display/fisid_101970/)
Professor; PhD, California Institute of Technology

Goodrich, James (https://experts.colorado.edu/display/fisid_109239/)
Professor, Chair; PhD, Carnegie Mellon University

Khanal, Akhil
Instructor; PhD, University of Delaware

Kuchta, Robert (https://experts.colorado.edu/display/fisid_100844/)
Professor; PhD, Brandeis University

Kugel, Jennifer F. (https://experts.colorado.edu/display/fisid_109472/)
Research Professor; PhD, University of Colorado Boulder

Liu, Xuedong (https://experts.colorado.edu/display/fisid_118458/)
Professor; PhD, University of Wisconsin–Madison

Mchenry, Charles
Professor Emeritus; PhD, University of California, Santa Barbara

Palmer, Amy E. (https://experts.colorado.edu/display/fisid_141901/)
Professor; PhD, Stanford University

Pardi, Arthur
Professor Emeritus; PhD, University of California, Berkeley

Parker, Roy Robert (https://experts.colorado.edu/display/fisid_151440/)
Distinguished Professor; PhD, University of California, San Francisco

Rinn, John (https://experts.colorado.edu/display/fisid_159338/)
Professor; PhD, Yale University

Schnizer-Luger, Karoline (https://experts.colorado.edu/display/fisid_156579/)
Endowed Chair, Professor; PhD, Univ of Basel (Switzerland)

Sousa, Marcelo Carlos (https://experts.colorado.edu/display/fisid_122806/)
Professor; PhD, Univ of Buenos Aires (Argentina)

Spencer, Sabrina Leigh (https://experts.colorado.edu/display/fisid_154911/)
Associate Professor; PhD, Massachusetts Institute of Technology

Stephen, Ricardo Hugh (https://experts.colorado.edu/display/fisid_145994/)
Senior Instructor; PhD, University of Colorado Boulder

Taatjes, Dylan J. (https://experts.colorado.edu/display/fisid_102436/)
Professor; PhD, University of Colorado Boulder

Whiteley, Aaron (https://experts.colorado.edu/display/fisid_166299/)
Assistant Professor; PhD, University of California, Berkeley

Whiteley, Alexandra (https://experts.colorado.edu/display/fisid_166300/)
Assistant Professor; PhD, University of California, San Francisco

Wuttke, Deborah S. (https://experts.colorado.edu/display/fisid_108412/)
Professor, Associate Chair; PhD, California Institute of Technology

# Courses

**BCHM 1020 (1) A Path to Success: Introduction to the Biochemistry Major**
This course will help students navigate their first year of college and develop the skills needed for academic success as Biochemistry majors. Students will improve academic strategies (i.e. time management, problem-solving and study skills), identify available campus resources, learn how to get involved in clubs and gain research experience, and explore career opportunities as a biochemistry graduate. This is a first-year elective course specifically designed for first year and other students exploring their educational and career opportunities.
**Recommended:** New BCHM majors.

**BCHM 1041 (3) Biotechnology and Society**
Covers recent advances in biotechnology and how those impact society. Content and discussion will focus on both the science behind technological advances, their impact on society, and the ethical issues raised by new technologies. Topics change each semester but can include: GMO crops, genome editing, drug discovery and development, stem cell therapies, development and use of new cancer treatments, human genome sequencing and its impact on diagnosis and treatments, human microbiome, neurodegenerative diseases. Formerly CHEM 1041.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 1701 (1) Biochemistry Program for Research Exploration and Planning**
Biochem PREP is focused on developing first and second year student interest and engagement in undergraduate research. The program is designed to present participants with mentorship and opportunities to identify whether research is an opportunity students wish to participate in, and if so, get students connected to potential research opportunities. Participants will be provided with a cohort of their peers to explore and plan for research together through preparation workshops, research information sessions, and mentorship. The ultimate goal of the program is for participants to understand their research interests, possess the necessary skills to identify and obtain a research opportunity, and develop community with their peers and the Department of Biochemistry at large.
**Requisites:** Restricted to Biochemistry (BCHM) majors and minors only.

**BCHM 2700 (4) Foundations of Biochemistry**
Covers chemistry of aqueous solutions; energetics in biology; structure of proteins, nucleic acids, carbohydrates, and membranes; protein evolution; macromolecular interactions; enzyme kinetics, mechanism and regulation. Will be taught from a strong chemical perspective and mastery of basic concepts of general and organic chemistry will be required. Familiarity with basic concepts of molecular and cellular biology encouraged.
**Requisites:** Requires prerequisite course of CHEM 3311 or CHEM 3451 (minimum grade C-). Restricted to Biochemistry (BCHM) majors and minors only.

**BCHM 3100 (2) Engineering RNA Aptamers**
Provides laboratory experience working on an RNA sensor research project. Students will generate libraries of RNA aptamers and select and isolate aptamers that bind a novel ligand of interest. Topics covered include principles of RNA molecular recognition, polymerase chain reaction and molecular cloning, bacterial transformation, fluorescence reporter assays and high throughput screening.
**Requisites:** Requires prerequisite or corequisite course of BCHM 2700 or BCHM 4611 (minimum grade C-).

**BCHM 3110 (1) Literature-based Co-seminar for BCHM 3100 CURE Laboratory Course**
This course involves reading and discussion of primary literature. Each week students will read a scientific research article, and engage in a class discussion about the significance and impact, the scientific merits, the underlying premise of the research question and experimental plan, and whether data support conclusions of the paper. Papers will be focused on RNA structure and function, RNA molecular recognition, RNA aptamers, RNA engineering, RNA as a drug target, and fluorescent probes for RNA. Students will be responsible for reading each paper, one student will prepare a powerpoint and lead a class discussion each week, and all students are expected to participate in the discussion.
**Requisites:** Requires corequisite course of BCHM 3100. Requires prerequisite or corequisite course of BCHM 2700 or BCHM 4611 (minimum grade C-).

**BCHM 3300 (3) Genetic Engineering: Science, Technology, and Society**
This course explores the frontiers of genetic engineering, starting with a brief historical perspective and moving forward through time to current and future technologies. Students will learn how CRISPR-Cas and other gene editing methodologies are used to engineer proteins, bacteria, viruses, fungi, plants, animals, and humans. The course includes critical analysis of social, environmental, and economic implications of genetic engineering, including discussions on bioethics, regulatory frameworks, and sustainability. Students will gain a nuanced understanding of how this technology shapes our world and will emerge prepared to engage in the ongoing dialogue about its impact on society and our environment.
**Requisites:** Prerequisite course of: MCDB 2150, MCDB 2222, or EBIO 2070 (minimum grade C-).

**BCHM 3400 (3) Mechanisms of Cancer**
This course is devoted to the mechanisms that drive cancer, with an emphasis on how the biochemistry of normal cells teaches us how regulation goes awry in cancer cells. The course will include an analysis of historical and current developments in cancer biology. Topics covered: principles of transformation, viral and cellular oncogenes, tumor suppressor genes, signal transduction, cell cycle, cell death, DNA damage and repair, cancer genetics, cancer genomics, cancer risk factors, carcinogens, chemotherapies, targeted therapies, drug resistance, modern technologies in cancer research.
**Requisites:** Requires prerequisite course of MCDB 2150 or MCDB 2222 or EBIO 2070 or BCHM 4740 (all minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 3450 (3) Principles of Pharmacology and Toxicology**
This is an introductory course presenting the fundamentals of Pharmacology and Toxicology. This course will be divided into four sections. Section I introduces the mechanisms of drug action, their cellular targets, their absorption and distribution, and elimination pharmacokinetics. Section II will discuss the interaction of drugs with physiological systems via the role of chemical mediators and how this affects major organ systems. This will introduce broad principles of pharmacology, pharmacokinetics, pharmacodynamics, toxicology, membrane transporters, metabolism, cell signaling, and an introduction to pharmacogenetics. Section III will focus on specific cases of drugs used for the treatment of cancer, antibacterials, and antifungals. Section IV will discuss the harmful nature of drugs, their use in lifestyle and in sports.
**Requisites:** Requires prerequisite course of CHEM 1133 or CHEM 1400 (minimum grade C-).
**Grading Basis:** Letter Grade

**BCHM 3491 (4) Organic Chemistry 2 for Biochemistry Majors**
Covers amines, alkylation reactions, additions to unsaturated C-C bonds, aromaticity and aromatic reactivity, organic materials, biomolecules, nomenclature of organic compounds, reaction mechanism. Department enforced corerquisite: CHEM 3341 or CHEM 3381. Formerly CHEM 3491.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 3471 and CHEM 3331
**Requisites:** Requires prerequisite courses of CHEM 3451 and CHEM 3321 or CHEM 3361 (all minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 4312 (3) Quantitative Optical Imaging**
Explores the fundamentals of optical imaging in biology, especially molecular and cellular biology. Covered topics include an introduction to optics and microscopes, fluorescence microscopy and image analysis, and biological applications. MATLAB will be taught at the beginning of the course and used throughout for image processing. Prior experience with MATLAB (or Python) is highly recommended but not required.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4312, MCDB 5312 and BCHM 5312
**Grading Basis:** Letter Grade

**BCHM 4400 (4) Core Concepts in Physical Chemistry for Biochemists**
Introduces thermodynamics, kinetics and spectroscopy, emphasizing macromolecule and biochemical applications. Includes thermodynamics, chemical and physical equilibriums, solution chemistry, rates of chemical and biochemical reactions, chemical bonds and principles and selected examples of spectroscopies applied to biological systems. Department enforced prerequisite or corequisite: PHYS 1120 or PHYS 2020. Formerly CHEM 4411.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 5400 CHEM 4511
**Requisites:** Requires prerequisite courses BCHM 2700 or BCHM 4611 and PHYS 1110 or PHYS 2010 and MATH 2300 or APPM 1360 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 4491 (3) Modern Biophysical Methods**
Covers the basic theory of biophysical methods widely employed in biochemistry and biology, including: electrophoresis, mass spec, calorimetry, evanescent waves, plasmon resonance, Xray diffraction, absorbance and fluorescence spectroscopy, magnetic resonance, electron and optical microscopy and single molecule methods. Discusses ways to maximize rigor and reproducibility in biophysical studies. Department enforced prerequisites: undergraduate chemistry (general, organic physical); physics; calculus. Formerly CHEM 4491.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 5491
**Requisites:** Requires prerequisite courses of PHYS 1110 or PHYS 2010 and MATH 2300 or APPM 1360 and BCHM 2700 or BCHM 4611 (all minimum grade C-).
**Recommended:** Prerequisite or corequisite BCHM 4400 or CHEM 4531.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 4611 (3) Principles of Biochemistry**
One-semester overview of the main themes of modern biochemistry: biomolecular structure/function, metabolism, biosynthesis, DNA from genome to proteome and cellular signaling. For biology and engineering majors and others wanting an overview of biochemistry. Formerly CHEM 4611.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 5611
**Requisites:** Requires prerequisite course of CHEM 3311 or CHEM 3451 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 4631 (3) Computational Genomics Lab**
Designed as an inquiry based computational genomics laboratory course. Students will learn fundamental principles of BASH, R, NEXTFLOW, GIT and more by applying these skills to publicly available genomic data. The course aims to mimic a real world genomics research project. Overall this course aims to provide students with key skills needed for future research and career opportunities.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 4720 (4) Metabolic Pathways and Human Disease**
Covers energy metabolism and anabolic/catabolic pathways; metabolism of carbohydrates, lipids, amino acids, and nucleic acids; photosynthesis; special topics on human diseases with pathologies and metabolic pathways. Formerly CHEM 4720.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 5720
**Requisites:** Requires prerequisite courses of BCHM 2700 and CHEM 3331 or CHEM 3471 or BCHM 3491 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 4740 (4) Biochemistry of Gene Transmission, Expression and Regulation**
Covers biosynthesis and function of macromolecules including DNA, RNA and proteins; molecular basis of replication, transcription and translation; biochemistry of subcellular systems; signaling and regulation of gene expression in eukaryotes; and special topics. Formerly CHEM 4740.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 5740
**Requisites:** Requires a prerequisite course of BCHM 2700 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 4751 (3) Current Topics in Biochemical Research**
Lec. Covers current topics in modern biochemical research through lectures, reading recent research articles, critical thinking and class discussion. Topics include protein and nucleic acid structure and function, biomolecular interactions, enzyme function and cellular signaling and regulation. Formerly CHEM 4751.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 5751
**Requisites:** Requires prerequisite courses of MCDB 3135 or BCHM 4700 or BCHM 2700 and BCHM 4740 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 4761 (3) Biochemistry Laboratory**
Two 4-hour periods per week. Introduction to modern biochemical techniques. Topics include enzymology, spectrophotometry, electrophoresis, multi-step protein purification, recombinant DNA techniques and molecular cloning. Formerly CHEM 4761.
**Requisites:** Requires prerequisite courses of BCHM 2700 or CHEM 4700 and CHEM 3341 or 3381 (all minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 4850 (3) Therapeutic and Diagnostic Nucleic Acids**
A comprehensive course in topics of the application of nucleic acids to the advancement of human health. Topics will include an introduction to the basic principles of pharmacology and drug development, action of small molecule therapeutics based upon nucleosides and nucleotides, antisense oligonucleotides and emerging CRISPR-based therapeutics, gene therapy, application of nucleic acids in commonly used diagnostics and emerging applications of nucleic acids.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 5850
**Requisites:** Requires prerequisite course of BCHM 2700 or BCHM 4611 (minimum grade C-).
**Grading Basis:** Letter Grade

**BCHM 4901 (1-6) Independent Study in Biochemistry**
For undergraduate study. Department consent required.
**Repeatable:** Repeatable for up to 8.00 total credit hours.

**BCHM 4906 (1-3) Internship in Biochemistry**
Provides an opportunity for Biochemistry majors to gain real world experience by performing research in a company or institute outside of the CU Boulder academic environment. May be repeated for 6 total credit hours.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Biochemistry (BCHM) majors only.

# Biochemistry - Bachelor of Arts (BA)

The biochemistry major provides interdisciplinary training, education and experience in the chemical and biological sciences. Biochemistry focuses on understanding the chemical processes of living organisms, the reaction pathways that sustain life, the principles of how structure defines function and the physical basis of biomolecular interactions. Students who major in biochemistry are prepared for diverse careers in medicine, scientific research, biotechnology, pharmacy, biomedical consulting, teaching and education, among other professions.

The undergraduate degree in biochemistry emphasizes knowledge and understanding of:

- Foundational principles of biology and chemistry.
- The building blocks of life (DNA, RNA and proteins), how they evolved, how they interact and how organisms make and degrade these building blocks.
- How living organisms maintain homeostasis and regulate metabolism.
- The molecular mechanisms of how living systems respond to changes, such as environmental perturbations, disease and chemical therapeutics.
- How chemical reactions impact human health.

The undergraduate degree in biochemistry also emphasizes and cultivates development of the following skills:

- Quantitative problem solving.
- Critical thinking and analytical reasoning.
- Communication of scientific concepts and ideas.

Because biochemistry connects to scientific disciplines ranging from genetics, human physiology, microbiology, neuroscience, cell biology, chemistry and geology, biochemistry majors are given the freedom to explore advanced electives in many of these subjects. Additional information about the biochemistry BA can be found on the Biochemistry Department website (https://www.colorado.edu/biochemistry/).

Biochemistry major students are prepared for many different careers after graduation. Career Services (http://www.colorado.edu/careerservices/) offers a number of programs and services designed to help students plan their career, including workshops, internships and placement services after graduation. For an appointment with a career counselor or for more information, call 303-492-6541 or stop by Center for Community, N352.

# Undergraduate Research

Undergraduates are encouraged to participate in research to prepare themselves for graduate school, professional school or industry. There are multiple opportunities for undergraduates to be involved in research within the Department of Biochemistry. For more information, visit our Departmental Undergraduate research page (https://www.colorado.edu/biochemistry/current-students/undergraduate/undergraduate-research/).

# Study Abroad

The experience of studying abroad can prove invaluable. For information about study abroad programs, visit the Education Abroad (https://abroad.colorado.edu/) website.

# Teaching Certification

Biochemistry majors can also earn certification as teachers through the School of Education. The program for a secondary school science-teaching certificate is challenging requiring a broad, strong background in science, as well as coursework in education and practice teaching. It usually requires at least five years of study. Students interested in teacher certification are encouraged to contact the School of Education (http://www.colorado.edu/education/).

# Requirements

## Program Requirements

The biochemistry major provides interdisciplinary training in the biological and chemical sciences, including courses in general chemistry, organic chemistry, physical chemistry and biochemistry, as well as in biology, calculus and physics.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. No more than 45 credits of CHEM and BCHM courses can be applied to the 120-credit minimum to graduate. All courses counted towards the major must be completed with a grade of C- or better and none of the courses may be taken for a pass/fail grade. The cumulative GPA in courses that can count toward the major must be at least 2.0.

Transfer students who plan to complete a BA degree in biochemistry must complete at the Boulder campus a minimum of 12 credits of upper-division courses in biochemistry covering at least two of the sub-disciplines in their major: organic, physical and biochemistry.

Students may want to consult each semester's Registration Handbook and Schedule of Courses (http://www.colorado.edu/registrar/), as well as the Professor Performance Guide (http://www.colorado.edu/pba/fcq/) for further information about course offerings and faculty.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **General Chemistry** | | |
| CHEM 1400<br>& CHEM 1401 | Foundations of Chemistry<br>and Foundations of Chemistry Lab (Recommended) | 5 |
| or CHEM 1113<br>& CHEM 1114<br>& CHEM 1133<br>& CHEM 1134 | General Chemistry 1<br>and Laboratory in General Chemistry 1<br>and General Chemistry 2<br>and Laboratory in General Chemistry 2 | |
| **Organic Chemistry** | | |
| CHEM 3451 | Organic Chemistry 1 for Chemistry and Biochemistry Majors (Recommended) | 4 |
| or CHEM 3311 | Organic Chemistry 1 | |
| CHEM 3321 | Laboratory in Organic Chemistry 1 | 1 |

| | | |
|---|---|---|
| BCHM 3491 | Organic Chemistry 2 for Biochemistry Majors (Recommended) | 4 |
| or CHEM 3471 | Organic Chemistry 2 for Chemistry Majors | |
| or CHEM 3331 | Organic Chemistry 2 | |
| CHEM 3341 | Laboratory in Organic Chemistry 2 | 1-2 |
| or CHEM 3381 | Laboratory in Advanced Organic Chemistry | |
| **Biochemistry** | | |
| BCHM 2700 | Foundations of Biochemistry | 4 |
| BCHM 4720 | Metabolic Pathways and Human Disease | 4 |
| BCHM 4740 | Biochemistry of Gene Transmission, Expression and Regulation [1] | 4 |
| BCHM 4761 | Biochemistry Laboratory | 3 |
| **Physical Chemistry** | | |
| BCHM 4400 | Core Concepts in Physical Chemistry for Biochemists [2] | 4 |
| **Advanced Major Electives** | | |
| Select three of the following elective courses: | | 9-12 |
| BCHM 3100 & BCHM 3110 | Engineering RNA Aptamers and Literature-based Co-seminar for BCHM 3100 CURE Laboratory Course | |
| BCHM 3300 | Genetic Engineering: Science, Technology, and Society | |
| BCHM 3400 | Mechanisms of Cancer | |
| BCHM 3450 | Principles of Pharmacology and Toxicology | |
| BCHM 4491 | Modern Biophysical Methods | |
| BCHM 4631 | Computational Genomics Lab | |
| BCHM 4751 | Current Topics in Biochemical Research | |
| BCHM 4850 | Therapeutic and Diagnostic Nucleic Acids | |
| BCHM 5341 | Chemical Biology and Drug Design | |
| APPM 3310 | Matrix Methods and Applications | |
| APPM 3570 | Applied Probability | |
| APPM 4360 | Methods in Applied Mathematics: Complex Variables and Applications | |
| ATOC 4200 | Biogeochemical Oceanography | |
| CHEM 4011 | Modern Inorganic Chemistry | |
| CHEM 4171 | Instrumental Analysis - Lecture and Laboratory 1 | |
| CHEM 4181 | Instrumental Analysis - Lecture and Laboratory 2 | |
| CHEN 3010 | Applied Data Analysis | |
| CHEN 3200 | Chemical Engineering Fluid Mechanics | |
| CHEN 3210 | Chemical Engineering Heat and Mass Transfer | |
| MCDB 2150 | Principles of Genetics (cannot also count EBIO 2070 as a required ancillary course or an advanced elective) | |
| MCDB 3000 | Synthetic Biology: Engineering Biomolecular Systems in the Laboratory | |
| MCDB 3145 | Cell Biology | |
| MCDB 3150 | Biology of the Cancer Cell | |
| MCDB 3160 | Infectious Disease | |
| MCDB 3350 | Fertility, Sterility, and Early Mammalian Development | |
| MCDB 3450 | Biological Data Science | |
| MCDB 3501 | Structural Methods for Biological Macromolecules | |
| MCDB 3650 | The Brain - From Molecules to Behavior | |
| MCDB 3990 | Introduction to Systems Biololgy for Biologists | |
| MCDB 4300 | Immunology (cannot also count IPHY 4600 as a required Advanced Major Elective) | |
| MCDB 4310 | Microbial Genetics and Physiology | |
| MCDB 4350 | Microbial Diversity and the Biosphere | |
| MCDB 4410 | Human Molecular Genetics | |
| MCDB 4426 | Cell Signaling and Developmental Regulation | |
| MCDB 4444 | Cellular Basis of Disease | |
| MCDB 4471 | Mechanisms of Gene Regulation in Eukaryotes | |
| MCDB 4520 | Bioinformatics and Genomics | |
| MCDB 4615 | Biology of Stem Cells | |
| MCDB 4750 | Animal Virology | |
| MCDB 4790 | Oocytes, Stem Cells, Organisms: Experiments to Discoveries | |
| EBIO 2070 | Genetics: Molecules to Populations (cannot also count MCDB 2150 as a required ancillary course or an advanced elective) | |
| EBIO 3040 | Conservation Biology | |
| EBIO 3080 | Evolutionary Biology | |
| EBIO 3180 | Global Ecology | |
| EBIO 3190 | Tropical Marine Ecology | |
| EBIO 3240 | Animal Behavior | |
| EBIO 3400 | Microbiology | |
| EBIO 3523 | The Art and Strategy of Science Communication: Branding Climate Change | |
| EBIO 3590 | Plants and Society | |
| EBIO 3630 | Parasitology | |
| EBIO 3850 | Animal Diversity: Invertebrates | |
| EBIO 4030 | Limnology | |
| EBIO 4060 | Landscape Ecology | |
| EBIO 4080 | Freshwater Phycology | |
| EBIO 4140 | Plant Ecology | |
| EBIO 4155 | Ecosystem Ecology | |
| EBIO 4290 | Phylogenetics and Comparative Biology | |
| EBIO 4410 | Biological Statistics | |
| EBIO 4420 | Computational Biology | |
| EBIO 4440 | Animal Developmental Diversity | |
| EBIO 4500 | Plant Biodiversity and Evolution | |
| EBIO 4510 | Plant Anatomy and Development | |
| EBIO 4800 | Critical Thinking in Biology | |
| IPHY 3410 | Human Anatomy | |
| IPHY 3430 | Human Physiology | |
| IPHY 3490 | Introduction to Epidemiology | |
| IPHY 4440 | Endocrinology | |

| | |
|---|---|
| IPHY 4470 | Biology of Human Reproduction |
| IPHY 4600 | Immunology (cannot also count MCDB 4300 as a required Advanced Major Elective) |
| IPHY 4720 | Neurophysiology |
| MATH 4520 | Introduction to Mathematical Statistics |
| MCDB 4202 | The Python Project |
| MCDB 4650 | Developmental Biology |
| MCDB 4777 | Molecular Neurobiology |
| NRSC 2100 | Introduction to Neuroscience |
| NRSC 4032 | Neurobiology of Learning and Memory |
| NRSC 4082 | Neural Circuits of Learning and Decision Making |
| NRSC 4092 | Behavioral Neuroendocrinology |
| NRSC 4132 | Neuropharmacology |
| NRSC 4545 | Neurobiology of Addiction |
| PSYC 3102 | Behavioral Genetics |
| GEOL 3320 | Introduction to Geochemistry |
| GEOL 4160 | Introduction to Biogeochemistry |
| GEOL 4270 | Marine Chemistry and Geochemistry |
| GEOL 4330 | Cosmochemistry |
| GEOL 4670 | Isotope Geology |
| GEOL 4675 | Stable Isotopes in Paleoclimate and Paleoecology |
| PHIL 3140 | Environmental Ethics (cannot also count PHIL 3160 as a required Advanced Major Elective) |
| PHIL 3160 | Bioethics (cannot also count PHIL 3140 as a required Advanced Major Elective) |
| **Total Credit Hours** | **43-47** |

**Required Ancillary Coursework from Outside Biochemistry**

| Code | Title | Credit Hours |
|---|---|---|
| **Physics** | | |
| PHYS 1110 | General Physics 1 | 4 |
| PHYS 1120 | General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| **Calculus** | | |
| MATH 1300 | Calculus 1 | 4-5 |
| or MATH 1310 | Calculus for Life Sciences | |
| or APPM 1350 | Calculus 1 for Engineers | |
| MATH 2300 | Calculus 2 | 4-5 |
| or APPM 1360 | Calculus 2 for Engineers | |
| **Biology Sequence with Labs** | | |
| *Lectures (One of the following sequences)* | | *6* |
| MCDB 1150 & MCDB 2150 | Introduction to Cellular and Molecular Biology and Principles of Genetics | |
| EBIO 1210 & EBIO 1220 | General Biology 1 and General Biology 2 | |
| *Labs (One of the following sequences)* | | *2* |
| MCDB 1161 | From Dirt to DNA: Phage Genomics Laboratory I | |
| or MCDB 1171 | Antibiotics Discovery Through Hands-on Screens I | |
| or MCDB 2171 | Chemotherapeutic Discovery Through Hands-On Screens 2 | |
| EBIO 1230 & EBIO 1240 | General Biology Laboratory 1 and General Biology Laboratory 2 | |
| **Total Credit Hours** | | **25-27** |

1 BCHM 4740 can be waived upon completion of the MCDB major.

2 Or CHEM 4511 and CHEM 4531

All students, and especially those intending to go onto graduate school in biochemistry, will benefit from additional advanced courses. Recommended electives include graduate courses in various fields of chemistry or advanced courses in biology or mathematics.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain progress in biochemistry, students should declare the biochemistry major in the first semester.

Students must consult with a major advisor to determine adequate progress toward completion of the major.

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will fulfill all 12 credits of the Natural Sciences area of the Gen Ed Distribution Requirement, including the required laboratory or field experience, and the QRMS component of the Gen Ed Skills Requirement.

| **Year One** | | |
|---|---|---|
| **Fall Semester** | | **Credit Hours** |
| CHEM 1400 | Foundations of Chemistry | 4 |
| CHEM 1401 | Foundations of Chemistry Lab | 1 |
| MATH 1300 or MATH 1310 or APPM 1350 | Calculus 1 or Calculus for Life Sciences or Calculus 1 for Engineers | 4-5 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| | **Credit Hours** | **15-16** |
| **Spring Semester** | | |
| CHEM 3451 | Organic Chemistry 1 for Chemistry and Biochemistry Majors | 4 |
| CHEM 3321 | Laboratory in Organic Chemistry 1 | 1 |
| MATH 2300 or APPM 1360 | Calculus 2 or Calculus 2 for Engineers | 4-5 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/US Perspective) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| | **Credit Hours** | **15-16** |
| **Year Two** | | |
| **Fall Semester** | | |
| BCHM 3491 | Organic Chemistry 2 for Biochemistry Majors | 4 |

| | | |
|---|---|---|
| CHEM 3341 | Laboratory in Organic Chemistry 2 | 1 |
| MCDB 1150<br>or EBIO 1210 | Introduction to Cellular and Molecular Biology<br>or General Biology 1 | 3 |
| MCDB 1161<br>or MCDB 1171<br>or EBIO 1230 | From Dirt to DNA: Phage Genomics Laboratory I<br>or Antibiotics Discovery Through Hands-on Screens I<br>or General Biology Laboratory 1 | 2 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| BCHM 2700 | Foundations of Biochemistry | 4 |
| MCDB 2150<br>or EBIO 1220 | Principles of Genetics<br>or General Biology 2 | 3 |
| MCDB 1171<br>or MCDB 2171<br>or EBIO 1240 | Antibiotics Discovery Through Hands-on Screens I<br>or Chemotherapeutic Discovery Through Hands-On Screens 2<br>or General Biology Laboratory 2 | 2 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| BCHM 4720 | Metabolic Pathways and Human Disease | 4 |
| PHYS 1110 | General Physics 1 | 4 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| BCHM 4740 | Biochemistry of Gene Transmission, Expression and Regulation | 4 |
| PHYS 1120 | General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| BCHM 4400 | Core Concepts in Physical Chemistry for Biochemists | 4 |
| Advanced Major Elective | | 3 |
| Advanced Major Elective | | 3 |
| Gen. Ed. Distribution (example: Arts & Humanities) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| BCHM 4761 | Biochemistry Laboratory | 3 |
| Advanced Major Elective | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **121-123** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Master the foundational concepts of general and organic chemistry, including equilibrium, kinetics, bonding (covalent and non-covalent) and reactivity and apply these concepts to biological systems.
- Explain how biomolecules (DNA, RNA, proteins, lipids, carbohydrates and metabolites) are synthesized and control biological processes.
- Identify the factors that determine the three-dimensional structures of biological macromolecules (DNA, RNA, proteins) and membranes (including organelles), and explain how structure relates to function.
- Describe how cells sense their environment and use this information to regulate cellular functions such as DNA replication, gene expression, signal transduction, cell division and cell death.
- Develop a conceptual, mechanistic and mathematical understanding of biomolecular interactions, including binding and catalysis.
- Explain how energy is stored, transformed and harnessed in biological systems.
- Analyze data, interpret graphs, solve quantitative problems to interpret results of scientific studies. Evaluate the rigor and reproducibility of scientific results.
- Learn and apply the rigorous scientific methods on which (bio)chemical knowledge is built: making observations, formulating hypotheses, executing experiments, evaluating rigor and reproducibility.
- Effectively communicate scientific information in oral, written and visual formats to specialized and general audiences.

# Biochemistry - Minor

A minor is offered in biochemistry. Declaration of a biochemistry minor is open to any student enrolled at CU Boulder, regardless of college or school.

# Requirements

A minimum of 21 credits is required for the minor, at least 9 of which must be upper-division. The College of Arts & Sciences will allow a maximum of 9 hours of transfer credit, including 6 upper-division credit hours to count toward a minor. Students may transfer courses through organic chemistry only. All courses required for the minor must be completed with a grade of C- or better, and the overall GPA in all BCHM and CHEM courses taken must be a 2.00.

Students who have taken CHEN 1211/CHEM 1221 may substitute them for CHEM 1113/CHEM 1114.

| Code | Title | Credit Hours |
|---|---|---|
| **General Chemistry** | | **5-10** |
| Select one of the following two options: | | |
| *Option 1:* | | |
| CHEM 1113<br>& CHEM 1114 | General Chemistry 1<br>and Laboratory in General Chemistry 1 | |

| | | |
|---|---|---|
| CHEM 1133 & CHEM 1134 | General Chemistry 2 and Laboratory in General Chemistry 2 | |
| *Option 2:* | | |
| CHEM 1400 & CHEM 1401 | Foundations of Chemistry and Foundations of Chemistry Lab | |
| **Organic Chemistry** | | **10-11** |
| CHEM 3311 | Organic Chemistry 1 | |
| or CHEM 3451 | Organic Chemistry 1 for Chemistry and Biochemistry Majors | |
| CHEM 3321 | Laboratory in Organic Chemistry 1 | |
| CHEM 3331 | Organic Chemistry 2 | |
| or CHEM 3471 | Organic Chemistry 2 for Chemistry Majors | |
| or BCHM 3491 | Organic Chemistry 2 for Biochemistry Majors | |
| CHEM 3341 | Laboratory in Organic Chemistry 2 | |
| or CHEM 3381 | Laboratory in Advanced Organic Chemistry | |
| **Biochemistry** [1] | | **6-8** |
| Select one of the following: | | |
| BCHM 2700 | Foundations of Biochemistry | |
| or BCHM 4611 | Principles of Biochemistry | |
| Select one of the following: | | |
| BCHM 3300 | Genetic Engineering: Science, Technology, and Society | |
| BCHM 3400 | Mechanisms of Cancer | |
| BCHM 3450 | Principles of Pharmacology and Toxicology | |
| BCHM 4400 | Core Concepts in Physical Chemistry for Biochemists | |
| BCHM 4631 | Computational Genomics Lab | |
| BCHM 4720 | Metabolic Pathways and Human Disease | |
| BCHM 4740 | Biochemistry of Gene Transmission, Expression and Regulation | |
| BCHM 4850 | Therapeutic and Diagnostic Nucleic Acids | |
| **Total Credit Hours** | | **21-29** |

[1] Must be completed at CU Boulder.

## Learning Outcomes

By the completion of the program, students will be able to:

- Master the foundational concepts of general and organic chemistry, including equilibrium, kinetics, bonding (covalent and non-covalent) and reactivity and apply these concepts to biological systems. \
- Explain how biomolecules (DNA, RNA, proteins, lipids, carbohydrates and metabolites) are synthesized and control biological processes.
- Identify the factors that determine the three-dimensional structures of biological macromolecules (DNA, RNA, proteins), and membranes (including organelles) and explain how structure relates to function.
- Describe how cells sense their environment and use this information to regulate cellular functions such as DNA replication, gene expression, signal transduction, cell division and cell death.
- Develop a conceptual, mechanistic and mathematical understanding of biomolecular interactions, including binding and catalysis.
- Explain how energy is stored, transformed and harnessed in biological systems.
- Analyze data, interpret graphs, solve quantitative problems to interpret results of scientific studies. Evaluate the rigor and reproducibility of scientific results.
- Learn and apply the rigorous scientific methods on which (bio)chemical knowledge is built: making observations, formulating hypotheses, executing experiments, evaluating rigor and reproducibility.
- Effectively communicate scientific information in oral, written and visual formats to specialized and general audiences.

# British and Irish Studies

The Center for British & Irish Studies encourages students to develop programs that focus on global British and Irish history, society and culture from a variety of disciplinary perspectives. The Center offers a Certificate in British and Irish Studies for students who have taken 24 credits in British and Irish literature, history and/or other fields.

## Certificate

- British and Irish Studies - Certificate (p. 204)

# British and Irish Studies - Certificate

Undergraduates interested in the literature, history and culture of Britain and Ireland from a local, regional and/or global perspective are encouraged to develop an interdisciplinary concentration in British and Irish studies. Completed in addition to a regular departmental major, this work will lead to a certificate in British and Irish studies. The certificate demonstrates that the student has done serious work in several aspects of British and Irish studies and will be advantageous when applying to graduate school or for jobs. It is open to students in any school or college.

## Requirements

A total of 24 credits in British and Irish studies (normally eight courses of 3 credits each) with a grade of C- or better in all classes.

The courses should be distributed as follows:

- In the department of primary focus (either English or history, depending on the student's own interests), any four courses in British or Irish studies. CBIS will provide a list of possible courses (see below).
- In the secondary department (either history, English or political science, depending upon primary area), a minimum of two courses and a maximum of four courses. CBIS will provide a list of possible courses (see below). Topics courses may be substituted with approval of the director.
- Students may take one or two courses in departments other than English, history or political science, chosen from the list below, in place of courses in the secondary department. Students are encouraged to do some work of an explicitly interdisciplinary nature such as team-taught courses offered by two departments or an independent study or honors thesis spanning two disciplines.
- Studying in Britain or Ireland would be a fine addition to the certificate. Contact the Office of International Education, Center for Community S355, 303-492-6016, for information on CU's Study Abroad programs.

### Approved Courses

| Code | Title | Credit Hours |
|---|---|---|
| ECON 4514 | Economic History of Europe | 3 |
| ENGL 1500 | Introduction to British Literature | 3 |
| ENGL 2503 | Medieval and Renaissance | 3 |
| ENGL 2504 | Enlightenment and Modernity | 3 |
| ENGL 2767 | Race, Empire, and the Postcolonial | 3 |
| ENGL 3000 | Shakespeare for Nonmajors | 3 |
| ENGL 3068 | Modernisms and Modernity, 1900-1945 | 3 |
| ENGL 3078 | Contemporary Literature: 1945 to the Present | 3 |
| ENGL 3164 | History and Literature of Georgian Britain | 3 |
| ENGL 3523 | Renaissance Literature | 3 |
| ENGL 3544 | The Long Eighteenth Century | 3 |
| ENGL 3553 | Chaucer and the Invention of English Literature | 3 |
| ENGL 3563 | Shakespeare in Dialogue | 3 |
| ENGL 3564 | Romantic Literature and its Revolutions | 3 |
| ENGL 3573 | Shakespeare in Performance | 3 |
| ENGL 3583 | Milton's Worlds | 3 |
| ENGL 3604 | Victorian Literature | 3 |
| ENGL 4003 | Old English 1: Introduction to Old English | 3 |
| ENGL 4113 | Medieval Worlds | 3 |
| ENGL 4048 | The Modernist Novel | 3 |
| ENGL 4513 | British Medieval Literature | 3 |
| ENGL 4514 | Advanced Topics: The Long 18th Century | 3 |
| ENGL 4524 | Advanced Topics: Romanticism | 3 |
| ENGL 4624 | Topics in Transnational Literature 1660-1900 | 3 |
| ENGL 4634 | Advanced Topics: The Victorian Era | 3 |
| ENGL 4693 | Advanced Topics in British Literature to 1660 | 3 |
| HIST 1113 | Introduction to British History to 1660 | 3 |
| HIST 1123 | Introduction to British History Since 1660 | 3 |
| HIST 3113 | Seminar in Medieval and Early Modern English History | 3 |
| HIST 3133 | | 3 |
| HIST 4013 | | 3 |
| HIST 4053 | | 3 |
| WGST 4063 | | 3 |
| HIST 4123 | Kings & Commoners in an Age of Crisis: English History 1327-1487 | 3 |
| HIST 4125 | Early American History to 1763 | 3 |
| HIST 4133 | Tudor England, 1485-1603 | 3 |
| HIST 4143 | The Making of Great Britain: British History 1603-1714 | 3 |
| HIST 4339 | Borderlands of the British Empire | 3 |
| HIST 4349 | Decolonization of the British Empire | 3 |
| PSCI 2004 | Survey of Western Political Thought | 3 |
| PSCI 3172 | Democracy and Its Citizens in the US and EU | 3 |
| PSCI 4002 | Western European Politics | 3 |
| PSCI 4213 | Europe and the International System | 3 |
| PSCI 4302 | European Union Politics | 3 |

# Central and East European Studies

The Central and East European Studies certificate offers students the opportunity for the integrated, interdisciplinary study of the history, politics, language, literature, and culture of Russia, Central and Eastern Europe.

The program serves to foster new knowledge and understanding of Central and Eastern Europe, and to train a new generation by providing the knowledge, tools and experience necessary for understanding these societies and for playing productive roles in their reconstruction.

The program offers students a broad understanding of the cultures and societies of Central and Eastern Europe for which it draws upon the expertise of faculty from a variety of campus departments.

**Course code for this program is CEES.**

## Certificate

- Central and East European Studies - Certificate (p. 205)

**CEES 1623 (3) Introduction to Central and East European History since 1770**
Examines major themes and events in the history of East-Central Europe from the late 1700s to the present. Themes include the impacts of nationalism, fascism, liberal democracy and communism in shaping the history of the region. Topics include World War I, World War II and the Holocaust, the Cold War, the fall of Communism, the Ukrainian revolution and more.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 1623
**Additional Information:** Arts Sci Core Curr: Historical Context
Departmental Category: Arts Sciences Special Courses

# Central and East European Studies - Certificate

Students who seek in-depth, interdisciplinary knowledge of the region are encouraged to pursue the certificate in Central and East European studies (CEES). The certificate program offers students the opportunity to explore the cultures, history and politics of the nations of Central and Eastern Europe from a variety of disciplinary perspectives.

The purpose of the certificate program is to enhance, rather than to replace, the department major. Students work with CEES faculty advisors to plan an appropriate certificate program. The certificate is awarded in addition to a bachelor's degree in another field.

## Requirements

Completion of the certificate requires the completion of 18 credits (9 upper-division) of approved courses with grades of C- or higher. No more than 9 credits in courses with the same course prefix can be used to fulfill CEES certificate requirements, and only 6 semester credit hours transferred from other institutions can be used to fulfill certificate requirements.[1]

Students pursuing the CEES certificate are strongly encouraged to take advantage of a recognized study abroad program in eastern Europe affiliated with CU Boulder. Courses taken on such a program, as approved

by the certificate director, count toward the certificate in CEES even though it is not possible to list them below.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Core Course** | | |
| CEES 1623 | Introduction to Central and East European History since 1770 | 3 |
| **Electives** | | |
| 15 additional credit hours of approved CEES coursework from the list below. At least 9 credits need to be upper-division. [2] | | 15 |
| **Total Credit Hours** | | **18** |

[1] International Affairs majors must complete 9 credits that do not count towards major.

[2] Two German and/or Russian language courses beyond the third semester can also count as CEES Electives.

## Electives

| Code | Title | Credit Hours |
|---|---|---|
| **Art History** | | |
| ARTH 4929 | Special Topics in Art History [1] | 1-3 |
| **German Culture (Taught in English)** | | |
| GRMN 1601 | Germany Today | 3 |
| GRMN 1602 | Metropolis and Modernity | 3 |
| GRMN 1701 | Nature, Climate and Environment in German Culture | 3 |
| GRMN 2141 | Topics in Modern German Culture and Society | 3 |
| GRMN 2301 | Inside Nazi Germany: Politics, Culture, and Everyday Life in the Third Reich | 3 |
| GRMN 2402 | Sports and Athleticism in German and Global Culture | 3 |
| GRMN 2501 | Miniatures of Modern Life: From Berlin to Vienna and Beyond | 3 |
| GRMN 2504 | Gothic, Horror, and Fantasy | 3 |
| GRMN 2502 | Representing the Holocaust | 3 |
| GRMN 2503 | Fairy Tales of Germany | 3 |
| GRMN 2601 | Kafka and the Kafkaesque | 3 |
| GRMN 2603 | | 3 |
| GRMN 3141 | Topics in Modern German Culture and Society | 3 |
| GRMN 3301 | Modern Art and Design at the Bauhaus | 3 |
| GRMN 3501 | The German-Jewish Experience: From the Enlightenment to the Present | 3 |
| GRMN 3502 | The Creation of the Modern Individual in German Culture | 3 |
| GRMN 3503 | German Film Through World War II | 3 |
| GRMN 3504 | Topics in German Film | 3 |
| GRMN 3505 | The Enlightenment: Tolerance and Emancipation | 3 |
| GRMN 3506 | Tracing the Criminal: Crime in 19th C Society and Culture | 3 |
| GRMN 3507 | Engineering and the Practice of Literature | 3 |
| GRMN 3508 | Masters of Suspicion: Marx, Nietzsche, Freud | 3 |
| GRMN 3513 | German Film and Society 1945-1989 | 3 |
| GRMN 3514 | German Film & Society After 1989 | 3 |
| GRMN 3601 | German Women Writers | 3 |
| GRMN 3681 | Refugees in German Culture | 3 |
| GRMN 3702 | Dada and Surrealist Literature | 3 |
| GRMN 3802 | Politics and Culture in Berlin 1900-1939 | 3 |
| GRMN 4051 | Critical Theory of the Frankfurt School | 3 |
| GRMN 4231 | The Invention of Sexuality | 3 |
| GRMN 4251 | Marxism | 3 |
| GRMN 4301 | Gender, Race and Immigration in Germany and Europe | 3 |
| GRMN 4501 | Seminar: Literature in Cultural Context | 3 |
| GRMN 4502 | Nietzsche: Literature and Values | 3 |
| GRMN 4503 | Issues in German Thought | 3 |
| GRMN 4504 | Goethe's Faust | 3 |
| **German Culture (Taught in German)** | | |
| GRMN 3050 | German for Science and Engineering | 3 |
| GRMN 3110 | | 3 |
| GRMN 3120 | German Literature from the Enlightenment to Expressionism | 3 |
| GRMN 3130 | Issues in German Philosophy and Literature | 3 |
| GRMN 3140 | Current Issues in German Culture | 3 |
| GRMN 3150 | Issues in German Politics, Literature and Media | 3 |
| GRMN 3520 | Open Topics in the Cultural Context | 3 |
| GRMN 3900 | Independent Study | 1-6 |
| GRMN 3930 | Internship | 1-6 |
| GRMN 4330 | The Age of Goethe | 3 |
| GRMN 4340 | Seminar in German Literature | 3 |
| GRMN 4450 | Methods of Teaching German | 3 |
| GRMN 4460 | High School German Teaching | 6 |
| GRMN 4550 | Senior Seminar in German Studies | 3 |
| GRMN 4900 | Independent Study | 1-6 |
| **History** | | |
| HIST 1012 | Empire, Revolution and Global War: European History Since 1600 | 3 |
| HIST 1830 | Global History of Holocaust and Genocide | 3 |
| HIST 2100 | Revolution in History [1] | 3 |
| HIST 2110 | Topics in Early Modern History [1] | 3 |
| HIST 2220 | History of War and Society [1] | 3 |
| HIST 3012 | Seminar in Modern European History [1] | 3 |
| HIST 3212 | Seminar in Early Modern Europe [1] | 3 |
| HIST 3414 | Seminar in Modern European Thought and Culture [1] | 3 |
| HIST 3713 | Seminar in Russian History | 3 |
| HIST 4040 | | 3 |
| HIST 4050 | | 3 |
| HIST 4122 | | 3 |

| | | |
|---|---|---|
| HIST 4212 | The Age of Religious Wars: Reformation Europe,1500-1648 | 3 |
| HIST 4222 | War and the European State, 1618-1793 | 3 |
| HIST 4232 | From Revolt to Revolution: Europe in an Age of Global Enlightenment, 1648-1789 | 3 |
| HIST 4312 | | 3 |
| HIST 4412 | Europe, 1890-1945 | 3 |
| HIST 4414 | | 3 |
| HIST 4422 | | 3 |
| HIST 4423 | German History 1848-1989: Weimar Republic, Nazism, State Socialism | 3 |
| HIST 4424 | | 3 |
| HIST 4442 | Europe since 1945 | 3 |
| HIST 4433 | Nazi Germany and the Holocaust | 3 |
| HIST 4444 | [1] | 3 |
| HIST 4623 | History of Eastern Europe Since 1914 | 3 |
| HIST 4643 | | 3 |
| HIST 4713 | History of Russia through the 17th Century | 3 |
| HIST 4723 | Imperial Russia | 3 |
| HIST 4803 | Special Topics in European History [1] | 3 |
| HIST 4733 | The Russian Revolution and the Soviet Regime | 3 |
| **Jewish Studies** | | |
| JWST 1828 | Jewish History Since 1492 | 3 |
| JWST 1830 | Global History of Holocaust and Genocide | 3 |
| JWST 2350 | Introduction to Jewish Culture | 3 |
| JWST 2502 | Representing the Holocaust | 3 |
| JWST 2551 | Modern Jewish Literature | 3 |
| JWST 3100 | Judaism | 3 |
| JWST 3110 | Of Jewish Legends, Folktales and the Supernatural | 3 |
| JWST 3401 | The Heart of Europe: Filmmakers and Writers in 20th Century Central Europe | 3 |
| JWST 3501 | The German-Jewish Experience: From the Enlightenment to the Present | 3 |
| JWST 3600 | Contemporary Jewish Societies | 3 |
| JWST 3681 | Refugees in German Culture | 3 |
| JWST 4122 | Music in Jewish Culture | 3 |
| JWST 4180 | Is God Dead? | 3 |
| JWST 4534 | | 3 |
| JWST 4544 | | 3 |
| JWST 4580 | The Holocaust: An Anthropological Perspective | 3 |
| JWST 4800 | Ethics, Medicine and the Holocaust: Legacies in Health and Society | 3 |
| **Russian Culture (Taught in English)** | | |
| RUSS 1112 | | 3 |
| RUSS 2121 | | |
| RUSS 2211 | | 3 |
| RUSS 2221 | | 3 |
| RUSS 2222 | | 3 |
| RUSS 2231 | | 3 |
| RUSS 2241 | | 3 |
| RUSS 2261 | | 3 |
| RUSS 2271 | | 3 |
| RUSS 2311 | | 3 |
| RUSS 2471 | | 3 |
| RUSS 2501 | | 3 |
| RUSS 3121 | | |
| RUSS 3221 | | 3 |
| RUSS 3231 | | 3 |
| RUSS 3241 | | 3 |
| RUSS 3301 | | 3 |
| RUSS 3251 | | 3 |
| RUSS 3333 | | 3 |
| RUSS 3601 | | 3 |
| RUSS 3701 | | 3 |
| RUSS 3705 | | 3 |
| RUSS 4120 | | 3 |
| RUSS 4210 | | 3 |
| RUSS 4211 | | 3 |
| RUSS 4221 | | 3 |
| RUSS 4251 | | 3 |
| RUSS 4301 | | 3 |
| RUSS 4321 | | 3 |
| RUSS 4431 | | 3 |
| RUSS 4441 | | 3 |
| RUSS 4451 | | 3 |
| RUSS 4471 | | 3 |
| RUSS 4481 | | 3 |
| RUSS 4811 | | 3 |
| RUSS 4821 | | 3 |
| RUSS 4831 | | 3 |
| RUSS 4851 | | 3 |
| RUSS 4861 | | 3 |
| RUSS 4871 | | |
| **Russian Culture (Taught in Russian)** | | |
| RUSS 3900 | | 1-6 |
| RUSS 3930 | | 1-6 |
| RUSS 4050 | Professional Russian | 4 |
| RUSS 4220 | Topics in Russian, East European and Eurasian Culture (in Russian) | 3 |
| RUSS 4230 | Russian Cultural Idioms | 3 |
| RUSS 4850 | Russian Film and Society | 4 |
| RUSS 4900 | | 1-6 |
| **Social Science** | | |
| ANTH 4580 | The Holocaust: An Anthropological Perspective | 3 |
| ECON 4514 | Economic History of Europe | 3 |
| GEOG 3842 | Human Geography of Czechia: Political, Economic and Social Transitions | 3 |
| GEOG 3882 | Geography of the Former Soviet Union | 3 |
| LIBB 2100 | Russian Revolutions: Social and Artistic | 3 |
| PSCI 3022 | Russian Politics | 3 |
| PSCI 3062 | Revolution and Political Violence [1] | 3 |

| | | |
|---|---|---|
| PSCI 4002 | Western European Politics | 3 |
| PSCI 4062 | East European Politics | 3 |
| PSCI 4213 | Europe and the International System | 3 |
| GRMN 3681 | Refugees in German Culture | 3 |

[1] Only when topic is related to Central or Eastern Europe.

# Chemistry

The undergraduate degree in chemistry emphasizes knowledge and awareness of:

- The basic principles of chemistry—atomic and molecular theory, reactivities and properties of chemical substances and the states of matter.
- The basic subfields of chemistry—organic, physical, analytical and inorganic.
- Mathematics sufficient to facilitate the understanding and derivation of fundamental relationships and to analyze and manipulate experimental data.
- The basic principles of physics.
- Safe chemical practices, including waste handling and safety equipment.

In addition, students completing a degree in chemistry are expected to acquire the ability and skills to:

- Read, evaluate and interpret information on a numerical, chemical and general scientific level.
- Assemble experimental chemical apparatus, design experiments and use appropriate apparatus to measure chemical composition and properties.
- Communicate results of scientific inquiries verbally and in writing.

**Course code for this program is CHEM.**

## Bachelor's Degree

- Chemistry - Bachelor of Arts (BA) (p. 213)

## Minor

- Chemistry - Minor (p. 216)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Asirvatham, Margaret (https://experts.colorado.edu/display/fisid_103670/)
Senior Instructor Emerita; PhD, Kansas State University

Bierbaum, Veronica (https://experts.colorado.edu/display/fisid_101124/)
Professor Emerita; PhD, University of Pittsburgh

Birks, John
Professor Emeritus

Bouwman, Jordy (https://experts.colorado.edu/display/fisid_167913/)
Assistant Professor; PhD, Leiden University (Netherlands)

Broering, Ellen (https://experts.colorado.edu/individual/fisid_167610/)
Instructor; PhD, University of Georgia

Brown, Steven S. (https://experts.colorado.edu/display/fisid_119987/)
Professor Adjoint; PhD, University of Wisconsin–Madison

Browne, Eleanor Carol (https://experts.colorado.edu/display/fisid_156464/)
Associate Professor; PhD, University of California, Berkeley

Cuk, Tanja (https://experts.colorado.edu/display/fisid_159751/)
Associate Professor; PhD, Stanford University

Damrauer, Niels Harley (https://experts.colorado.edu/display/fisid_129797/)
Professor; PhD, University of California, Berkeley

de Gouw, Joost (https://experts.colorado.edu/display/fisid_105125/)
Professor, Associate Chair; PhD, University of Utrecht (Netherlands)

Dukovic, Gordana (https://experts.colorado.edu/display/fisid_147414/)
Professor; PhD, Columbia University

Eaves, Joel David (https://experts.colorado.edu/display/fisid_147419/)
Professor; PhD, Massachusetts Institute of Technology

George, Steven (https://experts.colorado.edu/display/fisid_103289/)
Professor; PhD, University of California, Berkeley

Gough, Raina V. (https://experts.colorado.edu/display/fisid_149207/)
Instructor; PhD, University of Colorado

Hendrickson, Susan Marie (https://experts.colorado.edu/display/fisid_145101/)
Senior Instructor; PhD, Colorado State University

Hynes, James T.
Distinguished Professor Emeritus; PhD, Princeton University

Jimenez, Ralph (https://experts.colorado.edu/display/fisid_132670/)
Professor Adjoint; PhD, University of Chicago

Jimenez-Palacios, Jose Luis (https://experts.colorado.edu/display/fisid_125580/)
Distinguished Professor; PhD, Massachusetts Institute of Technology

Jonas, David (https://experts.colorado.edu/display/fisid_107145/)
Professor; PhD, Massachusetts Institute of Technology

Kelly, Christine
Instructor Emeritus

Koch, Tad H.
Professor Emeritus; PhD, Iowa State University

Koval, Carl A.
Professor Emeritus; PhD, California Institute of Technology

Lineberger, William Carl
Distinguished Professor Emeritus; PhD, Georgia Institute of Technology

Luca, Oana (https://experts.colorado.edu/display/fisid_157952/)
Assistant Professor; PhD, Yale University

Marder Seth (https://experts.colorado.edu/display/fisid_167617/)
Professor; PhD, University of Wisconsin-Madison

Minton, Timothy K. (https://experts.colorado.edu/display/fisid_167230/)
Professor; PhD, University of California Berkeley

Montoya Castillo, Andres (https://experts.colorado.edu/display/fisid_167156/)
Assistant Professor; PhD, Columbia University In the City of New York

Nesbitt, David J. (https://experts.colorado.edu/display/fisid_100333/)
Professor Adjoint; PhD, University of Colorado

Noble D., Richard
Research Professor; PhD, University of California--Davis

Nozik, Arthur (https://experts.colorado.edu/display/fisid_113395/)
Professor Emeritus; PhD, Yale University

Parson, Rahul Bjorn (https://experts.colorado.edu/display/fisid_156069/)
Professor Emeritus, Associate Chair; PhD, University of California, Berkeley

Parson, Robert (https://experts.colorado.edu/display/fisid_101032/)
Professor Emeritus, Associate Chair; PhD, University of Michigan Ann Arbor

Peters, Kevin
Professor Emeritus; PhD, Yale University

Pierpont, Cortlandt G.
Professor Emeritus; PhD, Brown University

Rumbles, Garry (https://experts.colorado.edu/display/fisid_147479/)
Professor Adjoint; PhD, University of London (England)

Sammakia, Tarek (https://experts.colorado.edu/display/fisid_101597/)
Professor Emeritus, Chair; PhD, Yale University

Sievers, Robert E. (https://experts.colorado.edu/display/fisid_102866/)
Professor Emeritus; PhD, University of Illinois at Urbana–Champaign

Skodje, Rex T. (https://experts.colorado.edu/display/fisid_103448/)
Professor Emeritus; PhD, University of Minnesota Twin Cities

Tolbert, Margaret A. (https://experts.colorado.edu/display/fisid_104976/)
Distinguished Professor; PhD, California Institute of Technology

Vaida, Veronica (https://experts.colorado.edu/display/fisid_100313/)
Professor Emeritus; PhD, Yale University

Volkamer, Rainer (https://experts.colorado.edu/display/fisid_144988/)
Professor; PhD, University of Heidelberg (Germany)

Walba, David M. (https://experts.colorado.edu/display/fisid_105830/)
Professor; PhD, California Institute of Technology

Walczak, Maciej Andrzej (https://experts.colorado.edu/display/fisid_153323/)
Associate Professor; PhD, University of Pittsburgh

Wang, Xiang (https://experts.colorado.edu/display/fisid_145812/)
Associate Professor; PhD, Boston University

Weber, Jorg Mathias (https://experts.colorado.edu/display/fisid_142930/)
Professor; PhD, University of Kaiserslautern (Germany)

Wise, Matthew Eric (https://experts.colorado.edu/display/fisid_143977/)
Senior Instructor, Faculty Director, Associate Chair; PhD, University of Colorado Boulder

Zhang, Wei (https://experts.colorado.edu/display/fisid_146429/)
Professor, Chair; PhD, University of Illinois at Urbana–Champaign

Ziemann, Paul Jeffrey (https://experts.colorado.edu/display/fisid_153281/)
Professor; PhD, Pennsylvania State University

# Courses

**CHEM 1011 (3) Environmental Chemistry 1**
Introduces basic principles of chemistry with applications to current environmental issues including toxic chemicals, air and water pollution, energy sources and their environmental impact, and climate change resulting from the greenhouse effect. No credit given to chemistry or biochemistry majors for this course if students already have credit in any college-level chemistry course numbered 1113/1114 or higher.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Chemistry
MAPS Course: Natural Science
MAPS Course: Physics

**CHEM 1021 (4) Introductory Chemistry**
For students with no high school chemistry or a very weak chemistry background. Remedies a deficiency in natural science MAPS requirements and prepares students for CHEM 1113 and CHEM 1114 or CHEM 1400 and CHEM 1401. No credit given to chemistry or biochemistry majors for this course if students already have credit in any college-level chemistry course numbered 1113/1114 or higher. Department enforced prerequisite: one year high school algebra or concurrent enrollment in MATH 1011.
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science Lab or Lab/Lec

**CHEM 1031 (4) Environmental Chemistry 2**
Applications of chemical principles to current environmental issues including acid rain, stratospheric ozone depletion, the Antarctic ozone hole, solar energy conversion and fuel cells, and the environmental consequences of nuclear war. Laboratory experience is included. No credit given to chemistry or biochemistry majors this course if students already have credit in any college-level chemistry course numbered 1113/1114 or higher.
**Requisites:** Requires prerequisite course of CHEM 1011 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 1113 (4) General Chemistry 1**
Intended for first-semester students whose academic plans require advanced work in chemistry. Subjects: components of matter, stolchiometry, classes of reactions, gases, thermochemistry, atomic structure, electron configuration, chemical bonding, molecular shapes, covalent bonding, organic compounds, intermolecular forces, equilibrium. Department enforced prerequsites: one year high school chemistry or CHEM 1021 (min grade C-); high school math through pre-calculus. Not recommended for students with grades below B- in CHEM 1021. Department enforced corequsite: CHEM 1114. Not open to engineering students with exception of EPEN majors.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 1400 and CHEN 1211 and MCEN 1024 and CHEN 1201
**Requisites:** AMEN, AREN, ASEN, CHEN, CSEN, CVEN, ECEN, EEEN, EVEN, MCEN, OPEN or CBEN majors are not allowed to take this class.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 1114 (1) Laboratory in General Chemistry 1**
Lab. Intended for first-semester students whose academic plans require advanced work in chemistry. Instruction in experimental techniques which coordinate with lecture topics in CHEM 1113. Department enforced prerequisites: one year high school chemistry or CHEM 1021 (min grade C-); high school math through pre-calculus. Not recommended for students with grades below B- in CHEM 1021. Department enforced corequisites: CHEM 1113 or CHEN 1201.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 1401 or CHEM 1221
**Requisites:** ASEN, ECEN, EEEN, EVEN, and MCEN majors may not enroll in this course.
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 1133 (4) General Chemistry 2**
Intended for second-semester students whose academic plans require advanced work in chemistry. Subjects: acid-base equilibria, buffers and titrations, thermodynamics, redox reactions, electrochemistry, transition elements and their coordination compounds, solubility/solubility equilibria, crystal field theory, kinetics, nuclear chemistry. Department enforced corequisite: CHEM 1134.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 2100
**Requisites:** Requires prerequisite courses of CHEM 1113 and CHEM 1114 or CHEM 1400 and CHEM 1401 or CHEN 1211 and CHEM 1221 or CHEN 1201 and CHEM 1114 or CHEN 1203 and CHEM 1221 (all minimum grade C-).
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 1134 (1) Laboratory in General Chemistry 2**
Intended for second-semester students whose academic plans require advanced work in chemistry. Instruction in experimental techniques which coordinate with lecture topics in CHEM 1133. Department enforced corequisite: CHEM 1133.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 2101
**Requisites:** Requires prerequisite courses of CHEM 1113 and CHEM 1114 or CHEM 1400 and CHEM 1401 or CHEN 1211 and CHEM 1221 or CHEN 1201 and CHEM 1114 or CHEN 1203 and CHEM 1221 (all minimum grade C-).
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 1221 (1) Engineering General Chemistry Lab**
Meets general chemistry laboratory requirement for engineering students. Designed to illustrate chemical concepts and introduce basic techniques in chemical measurement and synthesis. Department enforced prerequisites: one year of high school chemistry or CHEM 1021 (min. grade C-) and high school algebra; B- in CHEM 1021 recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 1114 or CHEM 1401
**Requisites:** Requires prerequisite course of CHEN 1211 or CHEM 1133 (minimum grade C-), or corequisite course of CHEN 1211 or CHEM 1133. Restricted to undergraduate engineering students and IUT On Track applicants.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 1400 (4) Foundations of Chemistry**
Covers core concepts in chemistry: nature of matter (atomic and molecular structure, bonding and macroscopic properties), transformations of matter (chemical reactivity), and quantifying chemical transformations (thermochemistry, thermodynamics and kinetics). Emphasizes critical thinking and cultivate core problem solving skills utilized by scientists. Intended for first semester CHEM/BCHM majors. Department enforced prerequisites: one year high school chemistry or CHEM 1021 (minimum grad C-) and high school math through pre-calculus. Not recommended for students with grades below B- in CHEM 1021. Department enforced corequisite: CHEM 1401.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 1113 and MCEN 1024 and CHEN 1211 and CHEN 1201
**Requisites:** Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 1401 (1) Foundations of Chemistry Lab**
Coordinates with lecture topics in CHEM 1400. Intended for first-semester CHEM and BCHM majors. Emphasizes the development of hands-on practical laboratory skills, experimental design, data interpretation, problem solving and open inquiry. Department enforced prerequisites: one year high school chemistry or CHEM 1021 (minimum grad C-) and high school math through pre-calculus. Not recommended for students with grades below B- in CHEM 1021. Department enforced corequsite: CHEM 1400.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 1114 or CHEM 1221
**Requisites:** Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 2100 (4) Foundations of Chemistry 2**
Covers the energetic principles that determine when chemical reactions occur and the dynamic principles that determine how rapidly they will occur. Applications include ionic equilibria in solution (acids and bases, buffers and titrations), oxidation-reduction reactions, electrochemistry and chemical kinetics. These applications will be situated in a context of current research problems in areas such as renewable energy and atmospheric chemistry. Department enforced corequisite: CHEM 2101.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 1133
**Requisites:** Requires prerequisite courses of CHEM 1400 and CHEM 1401 (minimum grade C-) or CHEM 1113 and CHEM 1114 (minimum grade B) and prerequisite or corequisite of MATH 2300 or APPM 1360 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 2101 (1) Laboratory in Foundations of Chemistry 2**
Coordinates with the lectures topics in CHEM 2100. Emphasizes the acquisition of more advanced laboratory skills, experimental design, data interpretation and analysis. Department enforced corequisite: CHEM 2100.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 1134
**Requisites:** Requires prerequisite courses of CHEM 1400 and CHEM 1401 (minimum grade C-) or CHEM 1113 and CHEM 1114 (minimum grade B) and prerequisite or corequisite of MATH 2300 or APPM 1360 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 3151 (3) Air Chemistry and Pollution**
Examines the composition of the atmosphere, and sources of gaseous and particulate pollutants: their chemistry, transport and removal from the atmosphere. Applies general principles to acid rain, smog and stratospheric ozone depletion. Department enforced prerequisite: two semesters of chemistry.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 3500
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 3251 (3) Sustainable Energy from a Chemistry Perspective**
Explores qualitative and quantitative chemical aspects of energy systems (production, transmission, storage, utilization) including fossil, wind, solar, nuclear and biomass energy. Applies chemical principles including composition, structure, bonding, physical properties, thermodynamics, equilibrium and kinetics to energy systems and sustainability, especially environmental implications. Describes the importance of energy to the chemical industries and society as a whole.
**Requisites:** Requires prerequisite course of CHEM 1133 and 1134 or CHEM 2100 and 2101 or CHEN 1211 and CHEM 1221 (all minimum grade C-).

**CHEM 3311 (4) Organic Chemistry 1**
Intended primarily for nonmajors. Topics include structure and reactions of alkanes, alkenes, alkynes, alkyl halides, and aromatic molecules; nomenclature of organic compounds; stereochemistry; reaction mechanisms and dynamics. Department enforced corequisite: CHEM 3321.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 3451
**Requisites:** Requires prerequisite course of (CHEM 1133 and CHEM 1134) or (CHEM 1400 and CHEM 1401) or (CHEM 2100 and CHEM 2101) or (CHEN 1211 and CHEM 1221) or (CHEN 1203 and CHEM 1221) (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 3321 (1) Laboratory in Organic Chemistry 1**
Instruction in experimental techniques of modern organic chemistry emphasizing chemical separations and reactions of alkanes, alkenes, and aromatic compounds. Stereochemical modeling and the identification of organic unknowns by spectroscopic and chemical methods are also introduced. Department enforced corequsite: CHEM 3311 or CHEM 3451.
**Requisites:** Requires prerequisite course of (CHEM 1133 and CHEM 1134) or (CHEM 1400 and CHEM 1401) or (CHEM 2100 and CHEM 2101) or (CHEN 1211 and CHEM 1221) or (CHEN 1203 and CHEM 1221) (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 3331 (4) Organic Chemistry 2**
Lect. and rec. Intended primarily for nonmajors. Topics include structure and reactions of alkyl halides, alcohols, ethers, carboxylic acids, aldehydes, ketones, and amines; introduction to the chemistry of heterocycles, carbohydrates, and amino acids; nomenclature of organic compounds; synthesis; and reaction mechanisms. Department enforced corequsite: CHEM 3341 or CHEM 3381.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 3471 or BCHM 3491
**Requisites:** Requires prerequisite courses of (CHEM 3311 or CHEM 3451) and CHEM 3321 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 3341 (1) Laboratory in Organic Chemistry 2**
Lab. Instruction in experimental techniques of modern organic chemistry emphasizing reactions involving alcohols, ketones, carboxylic acids, and their derivatives. Department enforced corequsite: CHEM 3331 or CHEM 3471 or BCHM 3491.
**Requisites:** Requires prerequisite courses of (CHEM 3311 or CHEM 3451) and CHEM 3321 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 3381 (2) Laboratory in Advanced Organic Chemistry**
Lab. Instruction in experimental techniques of modern organic chemistry, emphasizing chemical literature, advanced spectroscopy, and reactions involving organometallic compounds, microwave chemistry, and column chromatography. Multistep syntheses are also introduced, including an independent synthesis project.
**Requisites:** Requires prerequisite courses of (CHEM 3331 or CHEM 3471 or BCHM 3491) and CHEM 3341 (all minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 3451 (4) Organic Chemistry 1 for Chemistry and Biochemistry Majors**
Covers bonding, acidity, reaction mechanisms, nomenclature of organic compounds; stereochemistry; structure and reactions of aldehydes, ketones, and carboxylic acids and derivatives. Department enforced corequisite: CHEM 3321.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 3311
**Requisites:** Requires prerequisite courses of (CHEM 1133 and CHEM 1134) or (CHEM 1400 and CHEM 1401) or (CHEM 2100 and CHEM 2101) or (CHEN 1211 and CHEM 1221) or (CHEN 1203 and CHEM 1221) (all min grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) mjrs
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 3471 (4) Organic Chemistry 2 for Chemistry Majors**
Covers Amines, alkylation reactions, additions to unsaturated C-C bonds, aromaticity, and aromatic reactivity, organic materials, biomolecules, nomenclature of organic compounds, reaction mechanisms. Department enforced corequsite: CHEM 3341.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 3331 or BCHM 3491
**Requisites:** Requires prerequisite courses of (CHEM 3311 or CHEM 3451) and CHEM 3321 (all minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4011 (3) Modern Inorganic Chemistry**
Required course for chemistry majors. Introduces modern inorganic chemistry for undergraduates. Includes atomic structure, chemical periodicity, structure and bonding in molecules and crystals, reaction mechanisms, chemistry of selected main group and transition elements, and emphasis on catalyst, materials, bioinorganic, and organometallic systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 5011
**Requisites:** Requires prerequisite course of CHEM 3331 or CHEM 3471 or CHEM 3491 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4021 (3) Inorganic Laboratory**
One lect. and two 3-hour labs per week. Instruction in experimental techniques of modern inorganic chemistry. Includes syntheses and spectroscopic characterizations of transition metal and main group compounds, experience in manipulation of air sensitive compounds, and techniques involving unusual conditions of pressure or temperature.
**Requisites:** Requires prerequisite course of CHEM 4011 (minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4141 (3) Environmental Water and Soil Chemistry**
Application of basic chemical principles to understanding the processes that determine the chemical composition of oceans, lakes, rivers, soils and sediments. Topics include air-water exchange; acid-base, redox, coordination, precipitation and dissolution, ion exchange and sorption reactions; nutrient chemistry; and the use of simple equilibrium and kinetic models for describing the chemistry of inorganic and organic species in air-water-soil systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 5141
**Requisites:** Requires prerequisite course of CHEM 2100 and CHEM 2101 or CHEM 1133 and CHEM 1134 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4171 (3) Instrumental Analysis - Lecture and Laboratory 1**
Two Lect. and 3 hours of lab per week. Instruction and experience in using instrumental methods of chemical analysis to address problems in chemistry, biochemistry, industrial chemistry and environmental chemistry.
**Requisites:** Requires prerequisite course of CHEM 3331 or CHEM 3471 or CHEM 3491 and CHEM 3341 or CHEM 3381 and PHYS 1140 or CHEM 4400 or CHEM 4511 (minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4181 (3) Instrumental Analysis - Lecture and Laboratory 2**
Two lect. and 3 hours of lab per week. Instruction and experience in using instrumental methods of chemical analysis. Builds on material learned in CHEM 4171.
**Requisites:** Requires prerequisite course of CHEM 4171 (minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4251 (3) Materials Chemistry and Properties**
Lec. Understanding of materials from chemistry perspective including metals, oxides, semiconductors and polymers. Basic description of chemical preparation of materials. Overview of fundamental properties of materials including structural, chemical, mechanical, thermal, electrical, and optical properties. Description of behavior of materials and various applications in modern technology. Discussion of materials characterization methods.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 5251
**Requisites:** Requires prerequisite course of CHEM 3331 or CHEM 3471 or CHEM 3491 and CHEN 4521 or CHEM 4531 (all minimum grade grade C-).

**CHEM 4261 (3) Organic Materials: Structures and Functions**
Overview of the preparation and functioning mechanism of novel organic materials that have recently been developed, including conductive polymers, 2-D macrocyclic structures, 3-D molecular cages, molecular machines/muscles/switches, fullerene derivatives and carbon nanotube composites. Emphasizes the use of organic and physical chemistry as tools to develop novel materials and probe their structure-property relationship.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 5261
**Requisites:** Requires prerequisite courses of CHEM 3331 or CHEM 3471 or CHEM 3491 and CHEM 4531 (all minimum grade grade C-).

**CHEM 4271 (3) Chemistry of Solar Energy**
Chemical principles of conversion of solar energy into electricity and fuels in molecular and semiconductor-based systems. Overview of solid-state electronic structure of materials and interfaces, light-matter interactions, principles of harvesting photoexcited currents and useful chemical species. Description of processes utilized in established and emerging solar energy technologies.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 5271
**Requisites:** Requires prerequisite courses of CHEM 3331 or CHEM 3471 or CHEM 3491 and CHEM 4531 (all minimum grade grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4511 (3) Physical Chemistry 1**
Chemical thermodynamics and kinetics. Includes study of laws of thermodynamics, thermochemistry, entropy, free energy, chemical potential, chemical equilibriums, and the rates and mechanisms of chemical reactions. Department enforced prereq or coreq., PHYS 1120 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 4400 and BCHM 5400
**Requisites:** Requires prereq courses of CHEM 1133 CHEM 1134 or CHEM 2100 CHEM 2101 or CHEN 1211 CHEM 1221 and MATH 2400 or APPM 2350 and PHYS 1110 or PHYS 1115 or PHYS 2020 (all minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4531 (3) Physical Chemistry 2**
Lect. Introduces the quantum theory of atoms, molecules and chemical bonding, and statistical thermodynamics. Includes principles of quantum mechanics and their application to atomic structure, molecular spectroscopy, symmetry properties, and the determination of molecular structure. Also includes principles of statistical mechanics and their applications to properties of gases, liquids, and solids.
**Requisites:** Requires prerequisite courses of CHEM 4511 and PHYS 1120 or PHYS 2020, and MATH 2400 or APPM 2350 (all minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4555 (4) Theoretical and Computational Chemistry**
Explores computational methods to understand chemical systems. Topics include: atomic and molecular electronic structure calculations, Monte Carlo and molecular dynamics simulations and thermodynamic calculations. Not recommended for students with a grade below B- in the prerequisite course.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 5555
**Requisites:** Requires prerequisite course of CHEM 4531 (minimum grade C-).
**Grading Basis:** Letter Grade

**CHEM 4581 (1) Physical Chemistry Lab 1**
One 3-hour lab per week. Instruction in experimental techniques of modern physical chemistry. Experiments illustrate the fundamental principles of thermodynamics and chemical kinetics. Illustrates the material discussed in CHEM 4511.
**Requisites:** Requires prerequisite or corequisite course of CHEM 4511 (minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4591 (2) Physical Chemistry Lab 2**
One lect. and one 3-hour laboratory every two weeks. a continuation of CHEM 4581, but may be taken concurrently with CHEM 4531. Experiments illustrate the principles of quantum chemistry and spectroscopy discussed in CHEM 4531.
**Requisites:** Requires prerequisite courses of CHEM 4511 and CHEM 4581 (all minimum grade C-). Requires prerequisite or corequisite course of CHEM 4531 (minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4901 (1-6) Independent Study in Chemistry**
For undergraduate study. Department consent required. Repeatable up to 8 total credit hours.
**Repeatable:** Repeatable for up to 8.00 total credit hours.

# Chemistry - Bachelor of Arts (BA)

Chemistry major students are prepared for many different careers after graduation. About 50 percent of chemistry majors enter directly into industry or government positions that require scientific expertise, such as chemical, oil, electronics, mining and manufacturing industries, water districts, crime laboratories, biotechnology, health and safety, atmospheric science and environmental quality.

Approximately 25 percent of chemistry graduates are attracted by specialized graduate education in chemistry or biochemistry. Graduate work is often in one of the traditional areas of analytical, inorganic, organic or physical chemistry and, increasingly, in interdisciplinary areas such as atmospheric, bio-organic or organo-metallic chemistry, molecular biology, biotechnology and chemical physics for their advanced work. Another 25 percent of a typical graduating class goes on to professional school, pursuing advanced degrees in medicine, dentistry, pharmacy, law, business, engineering and computer science.

Career Services (http://www.colorado.edu/careerservices/) offers a number of programs and services designed to help students plan their career, including workshops, internships, and placement services after graduation. For an appointment with a career counselor or for more information call 303-492-6541 or stop by Center for Community, S440.

## Announcements

See the CU Chemistry (https://www.colorado.edu/chemistry/) website for announcements, events and important information. Some examples include:

- Contact information and general announcements.
- Student opportunities: internship/job announcements, summer programs, events/programs offered by other campus offices and departments that may be of interest.
- Scholarship announcements: announcements of scholarships opportunities and information meetings.
- Seminars and conferences: seminar and conference announcements.
- Academic support: SASC workshop schedule, tutors, and other academic support opportunities.
- Career services: schedule of events offered by this office.
- Courses: information about new and/or interesting courses for core and elective credit.

# Chemistry Honors Program

Opportunity is provided for qualified chemistry and chemistry/biochemistry double majors to participate in the departmental honors program and graduate with honors (*cum laude*, *magna cum laude*, or *summa cum laude*) in chemistry. Students interested in the honors program should contact the departmental honors advisor during their junior year.

# American Chemical Society Certified Degree

The American Chemical Society maintains a certification program in which a student graduating with a specified minimum program is certified to the society upon graduation. To be certified, a graduate must satisfy requirements in addition to the minimum for graduation. The department offers this certificate for chemistry or chemistry/biochemistry double majors only. More information can be found here (https://www.colorado.edu/chemistry/undergraduate/major-minor/acs-certification/).

# Research Opportunities

## Undergraduate Research Opportunities Program

The Undergraduate Research Opportunities Program (UROP) offers students a chance to work alongside a faculty sponsor on original research. Learn to write proposals, conduct research, pursue creative work, analyze data, and present the results. For more information please visit the Undergraduate Research Opportunities Program (http://www.colorado.edu/suep/about-urop/) website.

# Independent Study

Independent study (CHEM 4901), provides an opportunity for a student to work on a research project with an individual faculty member outside of the regular class structure. This generally provides an experience much more like real-life chemistry or biochemistry, where new results are being sought and the outcome of the research is not known in advance. The student may have a totally independent project or may become part of a research team working at the forefront of science. In favorable cases the project may result in publication of the results of the independent study in the scientific literature. As part of the research team in a particular group the student will usually participate in group seminars and informal discussions with other members of the group.

# Teaching Certification

Chemistry majors can also earn certification as teachers through the School of Education. The program for a secondary school science-teaching certificate is challenging, requiring a broad, strong background in science, as well as coursework in education and practice teaching. It usually requires at least five years of study. Students interested in teacher certification are encouraged to contact the School of Education (http://www.colorado.edu/education/).

# Requirements

## Program Requirements

The chemistry major requires 30 credits of upper-division chemistry coursework, including courses in general, organic, physical and analytical/instrumental chemistry, as well as an introductory general chemistry sequence and ancillary work in calculus and physics.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. No more than 45 credits of CHEM and BCHM courses can be applied to the 120-credit minimum to graduate. All courses counted towards the major must be completed with a grade of C- or better and none of the courses may be taken for a pass/fail grade. The cumulative Grade Point Average (GPA) in courses that can count toward the major must be at least 2.0.

Transfer students who plan to take a chemistry major must complete at the Boulder campus a minimum of 12 credits of upper-division work covering at least two subdisciplines: organic, physical, analytical and inorganic for chemistry majors.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **General Chemistry** | | |
| Select one of the following general chemistry sequence options: | | 10 |
| *Option 1* | | |
| CHEM 1400 & CHEM 1401 | Foundations of Chemistry and Foundations of Chemistry Lab | |
| CHEM 2100 & CHEM 2101 | Foundations of Chemistry 2 and Laboratory in Foundations of Chemistry 2 | |
| *Option 2* | | |
| CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 | |
| CHEM 1133 & CHEM 1134 | General Chemistry 2 and Laboratory in General Chemistry 2 | |
| **Organic Chemistry** | | |
| *Organic Chemistry 1 Lecture* | | |
| Choose one of the following lectures: | | 4 |
| CHEM 3451 | Organic Chemistry 1 for Chemistry and Biochemistry Majors | |
| or CHEM 3311 | Organic Chemistry 1 | |
| *Organic Chemisty 2 Lecture* | | |
| Choose one of the following lectures: | | 4 |
| CHEM 3471 | Organic Chemistry 2 for Chemistry Majors | |
| or BCHM 3491 | Organic Chemistry 2 for Biochemistry Majors | |
| or CHEM 3331 | Organic Chemistry 2 | |
| *Organic Chemistry Labs* [1] | | *4* |
| CHEM 3321 & CHEM 3341 | Laboratory in Organic Chemistry 1 and Laboratory in Organic Chemistry 2 | |
| In addition, choose one or more of the following to satisfy the organic chemistry lab requirement: | | |
| CHEM 3381 | Laboratory in Advanced Organic Chemistry | |
| or CHEM 4021 | Inorganic Laboratory | |
| or CHEM 4901 | Independent Study in Chemistry | |
| **Required Advanced CHEM Coursework** | | |
| CHEM 4011 | Modern Inorganic Chemistry | 3 |
| CHEM 4171 | Instrumental Analysis - Lecture and Laboratory 1 | 3 |
| CHEM 4181 | Instrumental Analysis - Lecture and Laboratory 2 | 3 |

| | | |
|---|---|---|
| CHEM 4511<br>& CHEM 4581 | Physical Chemistry 1<br>and Physical Chemistry Lab 1 | 4 |
| CHEM 4531<br>& CHEM 4591 | Physical Chemistry 2<br>and Physical Chemistry Lab 2 | 5 |
| **Total Credit Hours** | | **40** |

**Required Ancillary Coursework from Outside Chemistry**

| Code | Title | Credit Hours |
|---|---|---|
| **Required Physics Courses** | | |
| PHYS 1110<br>& PHYS 1120 | General Physics 1<br>and General Physics 2 | 8 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| **Calculus** | | **12-15** |
| Complete three semesters of calculus (through Calculus 3): | | |
| MATH 1300 | Calculus 1 | |
| or APPM 1350 | Calculus 1 for Engineers | |
| MATH 2300 | Calculus 2 | |
| or APPM 1360 | Calculus 2 for Engineers | |
| MATH 2400 | Calculus 3 | |
| or APPM 2350 | Calculus 3 for Engineers | |
| **Total Credit Hours** | | **21-24** |

### Recommended Chemistry Electives

All students, and especially those intending to go on to graduate school in chemistry, will benefit from additional advanced courses. Recommended electives include the following:

| Code | Title | Credit Hours |
|---|---|---|
| CHEM 3151 | Air Chemistry and Pollution | |
| CHEM 3251 | Sustainable Energy from a Chemistry Perspective | |
| CHEM 4021 | Inorganic Laboratory | |
| CHEM 4141 | Environmental Water and Soil Chemistry | |
| CHEM 4251 | Materials Chemistry and Properties | |
| CHEM 4261 | Organic Materials: Structures and Functions | |
| CHEM 4271 | Chemistry of Solar Energy | |
| BCHM 4611 | Principles of Biochemistry | |
| BCHM 4720 | Metabolic Pathways and Human Disease | |
| BCHM 4740 | Biochemistry of Gene Transmission, Expression and Regulation | |
| CHEM 4901 | Independent Study in Chemistry | |
| Graduate courses in various fields of chemistry | | |
| Advanced courses in mathematics or physics | | |

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain progress in chemistry students should declare the chemistry major in the first semester.

Students must consult with a major advisor to determine adequate progress toward completion of the major.

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will fulfill all 12 credits of the Natural Sciences area of the Gen Ed Distribution Requirement, including the lab component, and the QRMS component of the Gen Ed Skills Requirement.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| CHEM 1400 | Foundations of Chemistry | 4 |
| CHEM 1401 | Foundations of Chemistry Lab | 1 |
| MATH 1300<br>or APPM 1350 | Calculus 1<br>or Calculus 1 for Engineers | 4-5 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| | **Credit Hours** | **15-16** |
| **Spring Semester** | | |
| CHEM 3451 | Organic Chemistry 1 for Chemistry and Biochemistry Majors | 4 |
| CHEM 3321 | Laboratory in Organic Chemistry 1 | 1 |
| MATH 2300<br>or APPM 1360 | Calculus 2<br>or Calculus 2 for Engineers | 4-5 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15-16** |
| **Year Two** | | |
| **Fall Semester** | | |
| CHEM 3471 | Organic Chemistry 2 for Chemistry Majors | 4 |
| CHEM 3341 | Laboratory in Organic Chemistry 2 | 1 |
| PHYS 1110 | General Physics 1 ((Calculus-based)) | 4 |
| MATH 2400<br>or APPM 2350 | Calculus 3<br>or Calculus 3 for Engineers | 4-5 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| | **Credit Hours** | **16-17** |
| **Spring Semester** | | |
| CHEM 2100 | Foundations of Chemistry 2 | 4 |
| CHEM 2101 | Laboratory in Foundations of Chemistry 2 | 1 |
| PHYS 1120 | General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Year Three** | | |
| **Fall Semester** | | |
| CHEM 4511 | Physical Chemistry 1 | 3 |
| CHEM 4581 | Physical Chemistry Lab 1 | 1 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Elective | | 3 |
| Elective | | 3 |

| | | |
|---|---|---|
| Elective | | 3-0 |
| | **Credit Hours** | **16-13** |
| **Spring Semester** | | |
| CHEM 4531 | Physical Chemistry 2 | 3 |
| CHEM 4591 | Physical Chemistry Lab 2 | 2 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **14** |
| **Year Four** | | |
| **Fall Semester** | | |
| CHEM 4011 | Modern Inorganic Chemistry | 3 |
| CHEM 4171 | Instrumental Analysis - Lecture and Laboratory 1 | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-division Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| CHEM 4181 | Instrumental Analysis - Lecture and Laboratory 2 | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **122** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Use chemical models to describe the behavior of matter and analyze chemical problems.
- Make quantitative predictions based on chemical models.
- Know and demonstrate appropriate safety practices in the laboratory.
- Develop a scientific hypothesis and conduct an appropriate investigation using a safe and technically sound approach.
- Communicate chemical knowledge and research results clearly in both written and oral format.
- Utilize a range of scientific apparatus and instruments to synthesize molecules, measure their properties and quantify the amount of a substance.
- Demonstrate critical thinking skills and logical approaches to problem solving.

# Chemistry - Minor

The department offers a minor in chemistry. Declaration of a chemistry minor is open to any student enrolled at CU Boulder, regardless of college or school.

# Requirements

The College of Arts and Sciences will allow a maximum of 9 hours of transfer credit, including 6 upper-division credit hours, to count toward a minor. Students may only transfer courses through organic chemistry. All courses required for the minor must be completed with a grade of C- or better, and the overall GPA in all CHEM courses taken must be a 2.00.

Students who have taken CHEN 1211 and CHEM 1221 may substitute them for General Chemistry 1. Engineering students who have taken CHEN 4521 may *not* use this to satisfy the physical chemistry requirement. CHEM 4511 requires prerequisites of calculus 3 and general physics 1.

| Code | Title | Credit Hours |
|---|---|---|
| **General Chemistry** | | |
| *Introductory Chemistry:* | | *10* |
| Complete one of the two introductory chemistry courses (includings labs): | | |
| CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 | |
| CHEM 1400 & CHEM 1401 | Foundations of Chemistry and Foundations of Chemistry Lab | |
| Complete one of the two secondary chemistry courses (includings labs): | | |
| CHEM 1133 & CHEM 1134 | General Chemistry 2 and Laboratory in General Chemistry 2 | |
| CHEM 2100 & CHEM 2101 | Foundations of Chemistry 2 and Laboratory in Foundations of Chemistry 2 | |
| **Advanced Coursework** | | |
| *Organic Chemistry* | | *10-12* |
| *Organic Chemistry 1* | | |
| Lecture | | |
| CHEM 3311 | Organic Chemistry 1 | |
| or CHEM 3451 | Organic Chemistry 1 for Chemistry and Biochemistry Majors | |
| Lab | | |
| CHEM 3321 | Laboratory in Organic Chemistry 1 | |
| or CHEM 3361 | | |
| *Organic Chemistry 2* | | |
| Lecture | | |
| CHEM 3331 | Organic Chemistry 2 | |
| or CHEM 3471 | Organic Chemistry 2 for Chemistry Majors | |
| or BCHM 3491 | Organic Chemistry 2 for Biochemistry Majors | |
| Lab | | |
| CHEM 3341 | Laboratory in Organic Chemistry 2 | |
| or CHEM 3381 | Laboratory in Advanced Organic Chemistry | |
| *Physical Chemistry* | | *3* |
| CHEM 4511 | Physical Chemistry 1 | |
| *Elective* | | *3* |
| Select one of the following: | | |
| CHEM 4011 | Modern Inorganic Chemistry | |
| CHEM 4171 | Instrumental Analysis - Lecture and Laboratory 1 | |
| CHEM 4531 | Physical Chemistry 2 | |
| **Total Credit Hours** | | **26-28** |

# Cinema Studies & Moving Image Arts

The Department of Cinema Studies & Moving Image Arts educates students in the history and development of film as an art form, from its inception to its contemporary forms. The curriculum instills an informed analytic awareness of the ways in which cinema has evolved, its artistic and stylistic evolution and the contexts of international cinemas. For students in the creative BA and BFA tracks, the curriculum also provides the resources for significant cutting edge and original creative exploration of the medium in all its forms.

The undergraduate degrees in cinema studies emphasize knowledge and awareness of:

- The major artistic contributions to the evolution of cinema, from the advent of the moving image to the present.
- The general outlines of world cinema from the silent period to the present, with emphasis on the historical contributions of major national cinemas.
- Film criticism, aesthetics and film theory.

Students completing either the BA or the BFA degree in cinema studies are expected to acquire the ability and skills to:

- Analyze and interpret films critically.
- Communicate critical interpretations competently in essay form.
- Make several short creative film or video works (BA production emphasis and BFA only).

*Note*: Admission to any class after the third meeting of the class is contingent on professor permission. The department may drop a student from a class if the student misses the first two classes of the semester.

**Course code for this program is CINE.**

## Bachelor's Degrees

- Cinema Studies - Bachelor of Arts (BA) (p. 227)
- Cinema Studies & Moving Image Arts - Bachelor of Fine Arts (BFA) (p. 224)

## Minor

- Cinema Studies - Minor (p. 231)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Acevedo-Muñoz, Ernesto R. (https://experts.colorado.edu/display/fisid_113061/)
Professor; PhD, University of Iowa

Aragon, Manuel
Lecturer; BFA, New York University

Barlow, Melinda B. (https://experts.colorado.edu/display/fisid_109696/)
Associate Professor; PhD, New York University

Casey, Emett
Lecturer; BA, Chapman University

Conway, Laura (https://experts.colorado.edu/display/fisid_167653/)
Teaching Assistant Professor; M.F.A, University of Colorado Boulder

Espelie, Erin Marie (https://experts.colorado.edu/display/fisid_148671/)
Associate Professor, Chair; MFA, Duke University

Farmer, James Clark (https://experts.colorado.edu/display/fisid_130603/)
Assistant Teaching Professor; PhD, University of Iowa

Ganguly, Suranjan (https://experts.colorado.edu/display/fisid_102045/)
Professor Emeritus; PhD, Purdue University

Gilbert, Andrew
Lecturer; PhD, University of Colorado

Gluckstern, J.
Lecturer; MFA, University of Colorado Boulder

Hernstrom, Ben
Lecturer; MFA, University of Colorado Boulder

Lack, Jonathan
Scholar in Residence; PhD, University of Iowa

Lawson, Angelica Marie (https://experts.colorado.edu/display/fisid_154727/)
Assistant Professor; PhD, University of Arizona

Liotta, Jeanne M. (https://experts.colorado.edu/display/fisid_145808/)
Associate Professor, Associate Faculty Director; BFA, New York University

Marslett, Geoffrey C. (https://experts.colorado.edu/display/fisid_155970/)
Assistant Professor, Associate Chair; MFA, University of Texas at Austin

Myers, Skinner (https://experts.colorado.edu/display/fisid_168622/)
Assistant Professor; M.A., Brooklyn College, City University of New York

Osborn, Christopher (https://experts.colorado.edu/display/fisid_142982/)
Teaching Associate Professor; MFA, University of Colorado Boulder

Palmer, James
Professor Emeritus; PhD, Claremont Graduate School

Pearce, Chris (https://experts.colorado.edu/display/fisid_139688/)
Lecturer; MFA, University of Florida

Sears, Kelly L. (https://experts.colorado.edu/display/fisid_154467/)
Associate Professor; MFA, University of California, San Diego

Shell, Hanna Rose (https://experts.colorado.edu/display/fisid_163199/)
Professor; PhD, Harvard University

Shoup, Eileen
Lecturer; MFA, University of Colorado Boulder

Yannacito, Donald R. (https://experts.colorado.edu/display/fisid_103944/)
Senior Instructor Emeritus; MA, University of Colorado Denver

# Courses

**CINE 1002 (3) Film Analysis for Non-Majors**
Introduces the critical study of film, exploring theoretical, historical and technical concerns while presenting a survey of important film periods and genres. Students will hone critical-thinking, close-analysis,and writing skills. Covers a wide variety of films, approaching them from numerous perspectives, considering both the effects films have on individual viewers and their ability to reflect culture. Formerly FILM 1002.
**Additional Information:** Departmental Category: Genre and Movements

**CINE 1502 (3) Introduction to Cinema Studies**
Introduces basic media literacy by exploring the technical and aesthetic principles behind the production, analysis and interpretation of films. Explores comprehension and thinking about movies critically as technological, cultural and artistic products. Study of films in different social and historical contexts and discussion of the importance of movies as cultural products. Formerly FILM 1502.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Genre and Movements

**CINE 2000 (3) Moving Image Foundations I**
Introduces students to basic image making technology, aesthetics and methods. Students will investigate the qualities of the medium of cinema: light, time, motion, sound, and structure. Through these explorations, they will develop a personal relationship to artistic filmmaking through individual projects and in-class workshops. Formerly FILM 2000.
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade C-). Restricted to Cinema Studies (FILM/CINE) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Production

**CINE 2001 (3) Space Odysseys: Astrophys/Astronomy via Cinema/Arts**
Understanding representation of space in cinematic arts, as well as the underlying science. What are the political, societal, scientific and commercial motives in attempting to show our species venturing beyond Earth? These adventures highlight our hopes and fears for the future, while simultaneously clarifying contemporary anxieties. From the director G. Melies to the screenwriter B. Marling. Formerly FILM 1003.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**CINE 2002 (3) Recent International Cinema**
Familiarizes students with current trends and major directors in international cinema. Students attend specific films screened in class and/or offered in the International Film Series, and read and write about these films. Formerly FILM 2002.
**Recommended:** Prerequisite CINE 1502 or 6 hours humanities courses involving critical writing.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Genre and Movements

**CINE 2003 (3) Film Topics**
Varying topics on important individuals, historical developments, groupings of films, film directors, critical and theoretical issues in film. Formerly FILM 2003.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Topics

**CINE 2004 (3) CU Cinema Studies Seminar: Film Festival Cultures**
Offers students a unique first-hand understanding of the significance of the film festival circuit in the context of global film culture and scholarship. Students will attend Telluride Film Festival screenings, discussions and Q&A sessions. Restricted to Cinema Studies majors and minors. Formerly FILM 2004.
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade C-). Restricted to Cinema Studies majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Intensive and Small Courses

**CINE 2005 (3) Form, Structure, and Narrative Analysis**
Analyzes the form and structure of narrative, experimental non-narrative, and documentary films. Familiarizes students with the general characteristics of the classic three-act structure, principles of adaptation, form and content of experimental films, structural approaches, and the basic formal, narrative, and rhetorical strategies of documentary filmmaking. Formerly FILM 2005.
**Requisites:** Requires prerequisite or corequisite course of CINE 1502 (minimum grade C-). Restricted to Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Workshops

**CINE 2010 (3) Moving Image Computer Foundations**
Provides students with artistic foundational hands-on experience in integrated use of media software in both the PC and Mac creative imaging making digital working environments. Includes fundamentals in general computer maintenance, creative and practical audio editing, image management and manipulation, and creative moving image practice. Formerly FILM 2010.
**Requisites:** Requires prerequisite course of CINE 1502 (minium grade C-). Restricted to Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Production

**CINE 2105 (3) Introduction to the Screenplay**
Explores, through close reading and original student work, the form and structure of the screenplay. Students will learn to analyze structural and character elements of classic screenplays, and breaking down such elements as character, motivation, and arc. Students may learn some very basics of screenwriting form, develop a treatment, explore formal and technical issues, etc. Formerly FILM 2105.
**Requisites:** Requires prerequisite or corequisite course of CINE 1502 (minimum grade C-). Restricted to Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Workshops

**CINE 2203 (3) American Indians in Film**
Surveys representations of American Indians in American (especially Hollywood) film with an emphasis on "revisionist," or ¿breakthrough¿ films. It follows the creation of "the Hollywood Indian" from early literature to contemporary motion pictures. Films are analyzed within historical, social, and artistic contexts, and examined in terms of the impact their images have exerted upon American society at large, as well as Native communities. Near the end of the course we will look at what happens when Native Americans write, direct, and act in independent films or streaming television series.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 2203

**CINE 2300 (3) Beginning Filmmaking - Aesthetics**
This course explores the aesthetics of film in the Avant-garde genre. Students will look at films, make films using their phones and any simple editing apps they may have access to. There will be discussions on the unique aspects of moving visual images as an art form. A few brief papers will be required, as well as several short experimental films made by each student. Formerly FILM 2300.
**Requisites:** Restricted to Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 2302 (3) Nazis on Screen: Hollywood, War, Propaganda**
Explores representations of Nazism in Hollywood films from the early 1940s until today. How does the film image of the Nazi change from World War II through the Cold War era and beyond? From Chaplin's "The Great Dictator" to "Star Wars" and Tarantino's "Inglorious Basterds," this course focuses on how representations of Nazism and fascism informed American self-conceptions and strengthened the belief and trust in democratic institutions. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 2302

**CINE 2312 (3) Film Trilogies**
Study of films designed as trilogies, drawing on a wide range of international cinema. Films include Satyajit Ray's Apu Trilogy (India), Krzysztof Kieslowski's Three Colors Trilogy (Poland), Francois Truffaut's Antoine Doinel cycle (France), and Abbas Kiarostami's Iran Trilogy (Iran). Restricted to CINE majors and minors. Non-majors/minors will need instructor's consent. Formerly FILM 2312.
**Requisites:** Restricted to Cinema Studies majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Genre and Movements

**CINE 2500 (3) Moving Image Foundations II**
Instructs students in developing a technical and aesthetic understanding of complex camera, lighting, sound, and editing moving image production. Students will explore interpretive cinematography, sound design and mixing, preproduction workflows, and move deeper into the mechanics of editing through individual projects and in-class workshops. Formerly FILM 2500.
**Requisites:** Requires prerequisite courses of CINE 1502 and CINE 2000 (all minimum grade C-). Restricted to Cinema Studies majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 2513 (3) Major Asian Filmmakers**
Surveys the major Asian directors from China, India, Japan, Taiwan, and Vietnam. Restricted to CINE majors and minors. Non-majors/minors will need instructor's consent. Formerly FILM 2513.
**Requisites:** Restricted to Cinema Studies majors and minors.
**Recommended:** Prerequisite CINE 1502.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Topics
Departmental Category: Asia Content

**CINE 2521 (3) Classics of the Foreign Cinema: 1960s to Present**
Surveys the classics of international cinema from the 1960s to the present. Restricted to CINE majors/minors. Non-majors/minors will need instructor's consent. Formerly FILM 2521.
**Requisites:** Restricted to Cinema Studies majors and minors.
**Recommended:** Prerequisite CINE 1502.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: History

**CINE 2610 (3) Animation Production**
Includes analysis of independent and experimental animation and an introduction to various animation techniques (object, line, collage, sand or paint on glass, Xerox, cameraless, pixellation, etc.). Students produce exercise films and a final film exploring these techniques. Formerly FILM 2610.
**Requisites:** Requires prerequisite course of CINE 2000 or CINE 2300 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 2900 (3) Lighting**
Covers the basics of "why you need lighting", color temp, as well as camera techniques, lighting theory, and lighting set-ups for still and motion picture film video. Emphasizes hands on as well as theory. Formerly FILM 2900.
**Requisites:** Requires prerequisite course of CINE 2000 or CINE 2300 (minimum grade C-). Restricted to Cinema Studies majors only.
**Recommended:** Prerequisite CINE 1502.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 3002 (3) Major Film Movements**
Historical-aesthetic survey dealing with various styles, movements, genres or national cinemas. Can be taught in conjunction with the appropriate language department. Typical offers are in the French, the German or the Russian films, etc. Also offers detailed approaches to specific styles, subjects or genres: film comedy, melodrama, the Western, women filmmakers, German expressionist cinema, Italian neorealism, etc. Formerly FILM 3002. Restricted to Cinema Studies majors and minors. Non-majors/minors may be admitted with instructor's consent.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Cinema Studies majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Genre and Movements

**CINE 3003 (3) Major Film Directors**
Focuses on the work of a single director or a group of related directors. Course content varies each semester. Consult the online Schedule Planner for specific topic. Non-majors/minors need instructor consent. Formerly FILM 3003.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Cinema Studies majors and minors.
**Recommended:** Prerequisite students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Topics

**CINE 3004 (3) Alfred Hitchcock: The American Films**
Intensive survey of Hitchcock's American films from 1940 (Rebecca) to 1964 (Marnie). We will concentrate on in-depth analysis of the most influential and significant films made by the most important movie director of the Hollywood era. We will pay special attention to Hitchcock's deep understanding of the intricacies of film language, style and form in relation to the themes and subjects that interested him: guilt, sex, gender relations, crime and punishment, "mothers". Restricted to CINE majors and minors. Non-majors will need instructor's consent. Formerly FILM 3004.
**Requisites:** Restricted to Cinema Studies majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Intensive and Small Courses

**CINE 3010 (1-3) Film Production Topics**
Offers students both theoretical and practical experience in various specialized areas of cinematic production. Topics vary but include production in the documentary, fictional narrative, animation, computer animation, and experimental genres. Formerly FILM 3010.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of CINE 2000 or CINE 2300 (minimum grade C-). Restricted to Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 3012 (3) Documentary Film**
Provides a historical and theoretical introduction tothe documentary film. Examines the historical beginnings of documentary film as well as exploring contemporary documentary practice. Canonical moments of documentary history and lesser known examples of documentary film work will be explored. Formerly FILM 3012.
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade D-).
**Recommended:** Prerequisite CINE 3051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Genre and Movements

**CINE 3013 (3) Women and Film**
Examines the representation of women in film, the role of women in the filmmaking process, and the contributions made by women as critics and scholars of the cinema. Its orientation is therefore both historical and theoretical. Organized chronologically, the course examines how women have been addressed and "constructed" as spectators in and through cinema over the last 120 years, the relationship between cinema and social history, how films express ideology, and how feminist films scholarship has changed from the 1970's to the present day. The course focuses on American and international narrative, documentary, and experimental films from 1895 to present directed by or about women. Formerly FILM 3013.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Topics

**CINE 3014 (3) Black Radical Cinema**
This class will cover historical and theoretical radical film concepts of Black Cinema from Oscar Micheaux, Melvin Van Peeples, Julie Dash, Haile Gerima, Djibril Diop Mambety to Ousmane Sembene and Merawi Gerima. This class will include creating two video essays. Student participation during class is crucial. Two essay films, and one end of the semester paper per student is required.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite CINE 1502.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**CINE 3020 (3) Filmmaking Abroad: Acting & Directing Internationally**
Offers an intensive three-week production seminar to realize a short narrative film. Students immerse themselves in a city abroad, in collaboration with fellow CU students and the host population, as they scout locations and film their projects. Requires production responsibilities on both sides of the camera. A Global Seminar offered during Maymester through CU International Education.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 3020

**CINE 3041 (3) Environmental Cinema**
Interrogates how fiction and nonfiction filmmakers, writers, cinematographers, and moving-image editors have creatively responded to discoveries made In the field of environmental science. Using books by Rachel Carson and Scott MacDonald as a framework, we will examine a broad spectrum of filmmakers (e.g. Wes Anderson, Todd Haynes, Jennifer Baichwal, Bruce Conner, Percy Smith) alongside the most pressing environmental issues. Formerly FILM 3041.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) Cinema Studies majors/minors or Environmental Studies (ENVS) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: History

**CINE 3042 (3) Horror Film: History, Contexts, Aesthetics**
Surveys the most exemplary and significant films in the Horror film genre from the 1920s to the present. With a historical emphasis, the course explores the ways in which the Horror genre has evolved in response to shifting social anxieties and cultural developments, and its reflections on society in various national or international contexts. Expect disturbing content and images. Formerly FILM 3042. Non-majors will need department consent to enroll.
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade C-). Restricted to Cinema Studies majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Genre and Movements

**CINE 3043 (3) Topics in Critical Film Studies**
Prepares students for advanced Film Critical Studies work. Subject matter varies from semester to semester. Formerly FILM 3043.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite CINE 1502.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Topics

**CINE 3045 (3) I Saw the TV Glow: Voyeurism, Surveillance and Obsession in American Cinema**
This course will track the increasingly fractured, panoptical state of image culture, which has been explosively fueled by the internet. We will track how the hybridization of cinema¿beginning with the post-war introduction of television to the multi-platform present day¿has impacted the aesthetic form and political content of film viewing, pivoting on the work of director Jane Schoenbrun, as well as that of Elia Kazan, Sidney Lumet, Penny Lane, and more.
**Requisites:** Requires prerequisite course of CINE 1502 and CINE 3051 (minimum grade C-). Restricted to CINE Majors and Minors. Non-majors allowed with instructor permission.

**CINE 3051 (4) Film History 1**
Intensive introduction to film history from 1895 to 1959. Topics covered include the beginnings of motion picture photography, the growth of narrative complexity from Lumiere to Griffith, American silent comedy, Soviet theories of montage, German expressionist films, and the transition to sound. Formerly FILM 3051.
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: History

**CINE 3061 (4) Film History 2**
Starts in 1959 and follows the historical growth and evolution of film aesthetics to the present. Studies Italian neorealist, French new wave, and recent experimental films, as well as the films of major auteur figures such as Bergman, Kurosawa, Fellini, Hitchcock, Bunuel, Antonioni, and Coppola. Formerly FILM 3061.
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade D-).
**Recommended:** Prerequisite CINE 3051 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: History

**CINE 3081 (3) Contemporary American Cinema: 1980 to Present**
Examines the relationship between American films from 1980 to the present and their cultural and historical context. Includes films by Bigelow, Fincher, Scorsese, Lee, Linklater, Lynch, Stone, the Coen brothers, and Jenkins. This course is open to Cinema Studies majors: juniors and seniors. Non-majors need instructor consent to enroll. Formerly FILM 3081.
**Requisites:** Restricted to Cinema Studies majors only. Restricted to students with 57-180 credits (Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 3104 (3) Film Criticism and Theory**
Surveys the range and function of film criticism, introduces major positions and concepts of film theory and focuses on students' abilities to write about film.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3104
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Cinema Studies or Humanities (HUMN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Intensive and Small Courses

**CINE 3400 (4) Cinema Production I**
Exploration of creative cinema production through short production and post-production projects. A short final project will be required. Focuses on the tactics and strategies of independent cinema production, examining a variety of approaches to genre. Explores a range of film and digital technologies. Formerly FILM 3400.
**Requisites:** Requires prerequisites courses of CINE 1502 and CINE 2000 and CINE 2500 (all min grade C-). Restricted to Cinema Studies majors only.
**Recommended:** Prerequisites CINE 2005 or 2105.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 3402 (3) European Film and Culture**
Studies the relationships between European film, art and culture. Offered each summer in a different European city (Rome, Paris, London, Athens, Barcelona). There will be regular in-class lectures, film screenings, field trips and on-site teaching. Formerly FILM 3402.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Recommended:** Prerequisite introductory film and art history courses.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Genre and Movements

**CINE 3422 (3) The Hollywood Musical**
Second only to jazz, some critics regard the Hollywood musical as the greatest American popular art form of the 20th century. Proposes a historical, formal and theoretical approach to the musical through its several iterations, from the classical, to the revisionist, to the unusual, placing the changes in the genre's form, structure, and ideology in the context of America's changing social, political and religious values. Non-majors/minors require instructor consent. Formerly FILM 3422.
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade C-). Restricted to Cinema Studies majors and minors.
**Recommended:** Prerequisite CINE 3051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Genre and Movements

**CINE 3503 (3) German Film Through World War II**
History and theory of Weimar and Nazi film with sociocultural emphasis. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 3503
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Topics

**CINE 3513 (3) German Film and Society 1945-1989**
Introduces issues in German society through film during the Cold War. Focus on East and West Germany, though some other German language films may be included. Emphasis is on reading films in their social, historical and political contexts. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 3513
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Topics

**CINE 3514 (3) German Film & Society After 1989**
Introduces post-1989 German culture through film. Emphasizes films in their socio-historical contexts and explores developments in German culture during and after the unification. Formerly known as FILM 3514.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 3514
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Intensive and Small Courses

**CINE 3515 (3) Lights, Camera, Action**
In this practical and technical lecture course, students will gain an understanding of a variety of models for creative use of camera, lighting, and sound equipment. A broad survey of production topics, including mise-en-scene, single-camera cinematography, multi-camera cinematography, cinematic lighting design, and sync-sound capture will be introduced/outlined in support of CINE 3400. Formerly FILM 3515.
**Requisites:** Requires prerequisites courses of CINE 1502 and CINE 2000 (all min grade C-). Restricted to Cinema Studies majors only.
**Recommended:** Prerequisites CINE 2005 or 2105.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Workshops

**CINE 3525 (3) Post Production Lecture**
Covers the essentials of working with captured material to produce crafted art and messages in conjunction with CINE 3400. We will look at: the technical aspects of managing a wide range of digital formats; how to balance and mix audio; how to work with color and picture adjustments and how to use graphics and animation. The class leads students through all the steps to produce technically proficient material and gives students the tools, concepts and workflows to understand how to solve common production problems in filmmaking and video. Formerly FILM 3525.
**Requisites:** Requires prerequisites courses of CINE 1502 and CINE 2000 (all min grade C-). Restricted to Cinema Studies majors only.
**Recommended:** Prerequisites CINE 2005 or 2105.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Workshops

**CINE 3563 (3) Producing the Independent Film**
Introduces the role of the producer from development through production and sales, distribution. Students will practice pitching, develop pitch decks and apply for funding for one project. The role of labs, residencies, markets and film festivals will be addressed as well as modes of financing including crowd funding, tax incentives, equity finance, pre-sales, co-productions and gap financing. Formerly FILM 3563.
**Requisites:** Requires prerequisite courses of CINE 1502 and CINE 2000 or CINE 2300 and CINE 2500 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Topics

**CINE 3620 (3) Experimental Digital Animation**
Explores boundaries of traditional animation construction and delve into contemporary animation history. Small projects will involve experimentation with animation techniques that integrate with analog animation, frame-by-frame digital processes and live-action footage. Ideal for students who have taken CINE 2010 or CINE 2610 or CINE 3525. Students familiar with animation and digital imaging or those eager to explore the process are encouraged to enroll. Formerly FILM 3620.
**Requisites:** Restricted to Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Production

**CINE 3700 (3) Cinema Audio Design**
Studies and applies Pro Tools as a post-production audio toolbox. Applied techniques include sound recording, field recording, foley, vocal recording and editing, plug-in generated sound creation, MIDI, basic scoring principles, audio sweetening and audio mixing. Students will be required to complete regular editing assignments in addition to a final soundscape project. Formerly FILM 3700.
**Requisites:** Requires prerequisite course of CINE 2010 or CINE 2500 (minimum grade C-). Restricted to Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Production

**CINE 3900 (1-3) Independent Study (Production)**
Limit of 3 credit hours per semester. Formerly FILM 3900.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Production

**CINE 3901 (1-3) Independent Study (Critical Study)**
Limit of 3 credit hours per semester. Formerly FILM 3901.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: History

**CINE 3920 (1-3) Professional Seminar**
Learning aspects of professional development in the field of cinema. Through workshops and assignments students will learn of the many opportunities found within all areas of production. Guests will help inform the students of professional options and expectations. Topics will include: crew work, fund raising, marketing festivals, low budget filmmaking, and alternative venues. Students may have an internship concurrently with this course. Formerly FILM 3920.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of CINE 2500 (minimum grade C-).
**Recommended:** Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Production

**CINE 3940 (1-6) Cinema Studies Internship**
Provides students with professional internship experiences with film, video, new media production companies, governmental agencies, production units, audio recording studios and new media industries. Students will be responsible for securing their own internship position. Formerly FILM 3940.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to Cinema Studies majors only.
**Recommended:** Prerequisite CU GPA of at least 2.00 and upper-division standing and a 3.00 GPA as a BA or BFA Cinema Studies major.
**Additional Information:** Departmental Category: Production

**CINE 3990 (1) Film Practicum**
Offers creative and technical experience in aspects of film, video and media production for students in the BFA track and BA production emphasis. Students earn credit by working in any number of "crew" positions for Upper Division Production, MFA productions or faculty projects under the supervision of the course instructor. Formerly FILM 3990.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Production

**CINE 4000 (3) Advanced Digital Postproduction**
The world of video changes with blinding speed. This class lays the groundwork to keep up with the changing technology and all the technical details of working in commercial post. We will look at distributed rendering, color grading, film scanning, multi-editor collaboration, live production virtual reality and distribution. Every week students will have a technological challenge and work as a team to solve it. Strong familiarity with Adobe, Avid and DaVinci is recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5000
**Requisites:** Requires prerequisite courses CINE 1502 and CINE 2000 or CINE 2300 and CINE 2500 and CINE 3525 or CINE 4400 (all minimum grade C-). Restricted to Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Production

**CINE 4001 (3) Screening Race, Class & Gender in the U.S. and the Global Borderland**
Engaging with the ways in which racial, class, gender and sexual oppression intersect, this class examines several film productions by and about diasporic and subaltern subjects (especially children and women) in the U.S./Mexico borderlands, and the urban ethnic metropoles of the global borderlands.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4001 and ETHN 5001
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: History

**CINE 4003 (3) Film and Literature**
Explores similarities and differences between literature and film as narrative arts. Studies several novels, short stories and plays and films made from them. Examines problems in point of view, manipulation of time, tone, structure, and setting. Restricted to juniors and seniors.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5003
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Topics

**CINE 4004 (3) Topics in Film Theory**
Provides topic-centered analyses of controversial areas in film theory. Students read extensive materials in the topic area, analyze and summarize arguments as presented in the literature, write "position" papers and make oral presentations in which they elaborate their own arguments about specific assigned topic, establishing critical dialogue with the primary materials.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 4004 and ARTF 5004
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Cinema Studies or Humanities (HUMN) majors only.
**Recommended:** Prerequisite CINE 3051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Intensive and Small Courses

**CINE 4005 (3) Screenwriting Workshop: Short Form**
A writing intensive course that focuses on the art of the short form screenplay. Students will complete regular writing exercises, presentations, and several short scripts. Formerly FILM 4005.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of CINE 1502 and CINE 2005 or CINE 2105 (all minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Workshops

**CINE 4010 (1-3) Topics in Film Production**
Prepares students for advanced Cinema Studies production courses. Subject matter varies each semester. Formerly FILM 4010.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5010
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of CINE 1502 and CINE 2000 or CINE 2300 and CINE 2500 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Production

**CINE 4020 (3) Analog Alternatives**
Introduction to small gauge analog moving image formats and technologies with a focus on process and experimentation through hands-on exploration and demonstrations. This process-oriented class will utilize DIY methods and Alternative Process Photography approaches to work creatively with silver based holographic mediums. Students will create moving image works with Super 8mm and 16mm film while exploring the implications and possibilities of working with these mediums within our current digital paradigm.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5020
**Requisites:** Requires prerequisite courses of CINE 1502 and CINE 2000 (all minimum grade C-).

**CINE 4021 (3) Directing/Acting for the Camera**
Offers an intensive production seminar to prepare actors and directors to work collaboratively and effectively for the medium of the camera. Directing vocabulary, script interpretation, film terminology and acting techniques are applied. Explores situations in which actors and directors interact, from auditions to rehearsals to filming. Requires attendance, textbook readings, research and production responsibilities on both sides of the camera. Formerly FILM 4021.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5021
**Recommended:** Prerequisite CINE 1502.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: History

**CINE 4023 (3) Topics in International Cinema**
Focuses on major international filmmakers who have had a decisive impact on world cinema. Students will learn how directors create their own innovative body of work with specific formal and thematic patterns and will also learn to place such work within multiple frameworks that will cover film history, theory, aesthetics, philosophy and social and cultural analysis. Formerly FILM 4023.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5023
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade C-). Restricted to Cinema Studies (CINE) majors and minors or Fine Arts - Creative Arts (ARTC) majors only.
**Recommended:** Prerequisite CINE 3051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Topics

**CINE 4024 (3) Advanced Research Seminar**
Focuses on a specific topic, director, or genre chosen by the professor. Research skills and critical thinking are emphasized. With faculty guidance, students determine individual projects and present them to the class. Class participation is mandatory. Each student submits a thorough and original research paper for a final grade. Department enforced requisite: restricted to students with 57-180 credits (Juniors or Seniors) with a minimum GPA of 3.0. Formerly FILM 4024.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5024
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisites CINE 3051 and CINE 3061.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Intensive and Small Courses

**CINE 4040 (3) Advanced Analog Alchemy**
Investigating, developing, and re-interpreting historical approaches and processes involved in the creation of Analog motion picture works. Students will work with Analog mediums in alternative modes and unestablished ways and develop their personal process towards the goal of producing a unique moving image work to be presented in a final analog format for exhibition.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5040
**Requisites:** Requires prerequisite course of CINE 4020, formerly CINE 3030 (minimum grade C-). Restricted to Cinema Studies majors only.

**CINE 4043 (1-3) Topics in Cinema Critical Studies**
Prepares students for advanced Cinema Studies critical studies courses. Subject matter varies each semester. Formerly FILM 4043.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5043
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Cinema Studies majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Topics

**CINE 4105 (3) Advanced Screenwriting**
Introduces professional screenwriting in the form of a creative writing workshop. Admission by portfolio (see film department). Students write scenes and scripts for short films, feature treatments, etc., and are graded on a final portfolio.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5105
**Requisites:** Requires prerequisite course of CINE 4005 (minimum grade C-).
**Recommended:** Prerequisites CINE 3051 and CINE 3061 and an approved writing sample.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Workshops

**CINE 4200 (3) Flow Visualization**
Explores techniques for the visualization of the physics of fluid flows including seeding with dyes, particles and bubbles, and shadowgraphy and schlieren. Reviews optics and fluid physics, especially atmospheric clouds. Assignments are student-driven, to individuals and mixed teams of graduates, undergraduates, engineering majors and photography/video majors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 4211 (3) History of Russian and Soviet Cinema**
Explores groundbreaking works of Russian and Soviet cinema in historical context and with an emphasis on the connections between politics and cinematic form. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4211 and REES 5211 and ARTF 5211
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade D-).
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 4400 (3) Digital Post-Production**
Through projects, discussions, and screenings, this class explores the practices and aesthetics of computer-based moving-image art editing. Formerly FILM 4400.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5400
**Requisites:** Requires prerequisite course of CINE 3525 (minimum grade C-). Restricted to Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 4453 (3) History of Avant-Garde Film**
Surveys the history, aesthetics, and contexts of the American avant-garde cinema from its 1920s roots in Europe to the highlights of the 1940s, `50s, `60s and beyond. May cover a variety of periods, developments, filmmakers, and movements up to and including contemporary experimental film, multimedia, installation, etc. Formerly FILM 4453.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5453
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Topics

**CINE 4500 (3) Cinema Production 2**
Advanced exploration of creative cinema production through short production and post-production projects. Course focuses on the tactics and strategies of independent cinema production leading to the completion of a BFA thesis project exploring either documentary, experimental, or narrative genres. Formerly FILM 4500.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5500
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of CINE 3400 and CINE 3515 and CINE 3525 (all minimum grade C). Restricted to Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 4505 (3) Screenwriting Workshop: Long Form**
Creative writing workshop in which students plan and write a feature-length screenplay with emphasis on format, dialogue, characterization, and story.
**Requisites:** Requires prerequisite course of CINE 1502 and CINE 2000 (all minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Workshops

**CINE 4604 (3) Colloquium in Film Aesthetics**
Seminar for the serious round table discussion and critique of film as an art form, emphasizing development of appropriate verbal and written language skills for description of film. Department enforced prerequisite: restricted to students with 57-180 credits (Juniors or Seniors) with a minimum GPA of 3.0 or instructor consent required. Formerly FILM 4604.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5604
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Intensive and Small Courses

**CINE 4959 (3-6) Honors Senior Thesis**
For exceptional Film Studies majors who wish to write an honors thesis based on independent research or creative work under the direction of a faculty member. Formerly FILM 4959.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Intensive and Small Courses

# Cinema Studies & Moving Image Arts - Bachelor of Fine Arts (BFA)

The Bachelor of Fine Arts is a competitive degree program requiring an application and selection procedure. All students begin their Cinema Studies & Moving Image Arts track declaring the Bachelor of Arts (BA) in Cinema Studies as their major. Students wishing to declare a BFA in Cinema Studies & Moving Image Arts as their major must first satisfy

specific prerequisites. The mission of the BFA is to prepare artists who will be competitive and original as independent filmmakers, who may aspire to advanced graduate degrees beyond the BFA, or who are considering an artistic approach to their filmmaking portfolio.

In addition to acquiring the skills to make creative films and video works, students completing the BFA will also advance their ability to analyze and interpret films critically, and to communicate and express themselves about film competently in written form.

# Requirements

## Admission Requirements

The Department of Cinema Studies & Moving Image Arts educates students in the history and development of film as an art form and contemporary medium. The curriculum instills an informed analytic awareness of the ways in which film has evolved artistically, stylistically and provides the resources for significant creative exploration of the medium.

The Bachelor of Fine Arts degree is competitive. In order to graduate with a BFA degree, students must first satisfy a number of prerequisites and then submit a formal application to the BFA program at the prescribed time (deadline will be posted each semester on the Cinema Studies website (https://www.colorado.edu/cinemastudies/degree-options/bachelor-fine-arts/)). There are two rounds of applications a year, at the end of the fall and spring semesters. Students are encouraged to apply to the BFA program at the end of their sophomore year.

Applicants must have a cumulative GPA at CU Boulder of 2.3 or higher and a CINE GPA of 3.2 or higher. Students are required to have completed CINE 1502, 2000 and 2500 to apply. Applicants must submit an online application, an essay, and two creative samples of Moving Image. Admission into the BFA program is contingent upon approval of the application materials by the BFA committee. The program recommends that BFA students purchase film and sound media-capable Apple computing systems.

For more information, visit the department website (https://www.colorado.edu/cinemastudies/undergraduate-advising-0/). Students are encouraged to consult with the cinema atudies advisor in order to obtain advice and current information.

## Program Requirements

No more than 6 credit hours of independent study may be credited toward the major. Students must complete the required cinema courses with a grade of C or better.

Students must complete the general requirements of the College of Arts and Sciences as well as the required courses listed below. The Department of Cinema Studies & Moving Image Arts requires a minimum of 57 credit hours in support of the BFA degree requirements.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Critical Studies Courses** | | **17** |
| CINE 1502 | Introduction to Cinema Studies [1] | |
| CINE 3051 & CINE 3061 | Film History 1 and Film History 2 [2] | |
| CINE 2005 | Form, Structure, and Narrative Analysis | |
| or CINE 2105 | Introduction to the Screenplay | |
| CINE 4604 | Colloquium in Film Aesthetics | |
| **Required Production Courses** | | **22** |
| CINE 2000 | Moving Image Foundations I | |
| CINE 2500 | Moving Image Foundations II | |
| CINE 3400 | Cinema Production I | |
| CINE 3515 | Lights, Camera, Action | |
| CINE 3525 | Post Production Lecture | |
| CINE 4500 | Cinema Production 2 (Part I) | |
| CINE 4500 | Cinema Production 2 (Part II) | |
| **Production Course Electives** | | **9** |
| Select 9 credit hours (6 hours must be upper-division)—see degree audit for specifics | | |
| CINE 2010 | Moving Image Computer Foundations | |
| CINE 2300 | Beginning Filmmaking - Aesthetics | |
| CINE 2610 | Animation Production | |
| CINE 2900 | Lighting | |
| CINE 3010 | Film Production Topics [3] | |
| CINE 3020 | Filmmaking Abroad: Acting & Directing Internationally | |
| CINE 3563 | Producing the Independent Film | |
| CINE 3620 | Experimental Digital Animation | |
| CINE 3700 | Cinema Audio Design | |
| CINE 3900 | Independent Study (Production) [4] | |
| CINE 3920 | Professional Seminar | |
| CINE 3940 | Cinema Studies Internship | |
| CINE 4000 | Advanced Digital Postproduction | |
| CINE 4005 | Screenwriting Workshop: Short Form | |
| CINE 4010 | Topics in Film Production [5] | |
| CINE 4021 | Directing/Acting for the Camera | |
| CINE 4040 | Advanced Analog Alchemy | |
| CINE 4105 | Advanced Screenwriting | |
| CINE 4400 | Digital Post-Production | |
| CINE 4505 | Screenwriting Workshop: Long Form | |
| **Critical Studies Elective Requirements** | | **9** |
| Select 9 credit hours (6 credit hours must be upper-division) from the following: | | |
| CINE 2001 | Space Odysseys: Astrophys/Astronomy via Cinema/Arts | |
| CINE 2002 | Recent International Cinema | |
| CINE 2003 | Film Topics [3] | |
| CINE 2004 | CU Cinema Studies Seminar: Film Festival Cultures | |
| CINE 2005 | Form, Structure, and Narrative Analysis | |
| CINE 2312 | Film Trilogies | |
| CINE 2203 | American Indians in Film | |
| CINE 2302 | Nazis on Screen: Hollywood, War, Propaganda | |
| CINE 2513 | Major Asian Filmmakers | |
| CINE 2521 | Classics of the Foreign Cinema: 1960s to Present | |
| CINE 3002 | Major Film Movements [3] | |
| CINE 3003 | Major Film Directors [3] | |
| CINE 3004 | Alfred Hitchcock: The American Films | |

| | |
|---|---|
| CINE 3012 | Documentary Film |
| CINE 3013 | Women and Film |
| CINE 3041 | Environmental Cinema |
| CINE 3042 | Horror Film: History, Contexts, Aesthetics |
| CINE 3043 | Topics in Critical Film Studies [3] |
| CINE 3081 | Contemporary American Cinema: 1980 to Present |
| CINE 3104 | Film Criticism and Theory |
| CINE 3422 | The Hollywood Musical |
| CINE 3503 | German Film Through World War II |
| CINE 3513 | German Film and Society 1945-1989 |
| CINE 3901 | Independent Study (Critical Study) [4] |
| CINE 3940 | Cinema Studies Internship |
| CINE 4001 | Screening Race, Class & Gender in the U.S. and the Global Borderland |
| CINE 4003 | Film and Literature |
| CINE 4004 | Topics in Film Theory [3] |
| CINE 4023 | Topics in International Cinema [3] |
| CINE 4024 | Advanced Research Seminar [3] |
| CINE 4043 | Topics in Cinema Critical Studies |
| CINE 4105 | Advanced Screenwriting |
| CINE 4211 | History of Russian and Soviet Cinema |
| CINE 4453 | History of Avant-Garde Film |
| CINE 4604 | Colloquium in Film Aesthetics |
| Any CINE class crosslisted with another department (i.e., foreign language) that has been approved by the cinema studies chair | |
| **Total Credit Hours** | **57** |

1 This course is a prerequisite for CINE 2000 and CINE 3051.

2 It is recommended that these courses be taken in chronological order.

3 Course may be taken for credit more than once, provided the topics vary.

4 Total number of independent study credit hours cannot exceed 6, and they cannot be used to duplicate regular course offerings.

5 Course may be taken for credit more than once.

## Graduating in Four Years with a BFA

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BFA in cinema studies & moving image arts, students should meet the following requirements:

- Declare and start the cinema studies major the first semester freshman year.
- Complete CINE 1502, CINE 2000, CINE 2005 or CINE 2105 and one lower- or upper-division critical studies course for 3 credit hours by the end of the third semester.
- Complete 3 credit hours upper-division Critical Studies Elective, CINE Production Elective (3 credit hours) and CINE 2500 by the end of the fourth semester.
- Note: In order to graduate in four years, a student must apply and be accepted into the BFA program at the end of the fourth semester. See the admission requirements section above for details of the application process.
- Complete CINE 3051, CINE 3400, CINE 3515, CINE 3525 and CINE 3061, and two production elective (6 credit hours) by the end of the sixth semester.
- Complete CINE 4500, 3 credit hours upper-division critical studies elective by the end of the seventh semester.
- Complete 3 additional credit hours of CINE 4500, CINE 4604, by the end of the eighth semester.

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will complete all 12 credits of the the Arts & Humanities area of the Gen Ed Distribution Requirement.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| CINE 1502 | Introduction to Cinema Studies | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| CINE 2005<br>or CINE 2105 | Form, Structure, and Narrative Analysis<br>or Introduction to the Screenplay | 3 |
| CINE 2000 | Moving Image Foundations I | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| CINE 2500 | Moving Image Foundations II | 3 |
| CINE Critical Studies Elective (Lower or Upper-division) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| CINE Critical Studies Elective (Upper-division) | | 3 |
| CINE 2010<br>or CINE 2300<br>or CINE 2610<br>or CINE 2900 | Moving Image Computer Foundations<br>or Beginning Filmmaking - Aesthetics<br>or Animation Production<br>or Lighting | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 4 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |

| | | |
|---|---|---|
| **Year Three** | | |
| **Fall Semester** | | |
| CINE 3051 | Film History 1 | 4 |
| CINE 3400 | Cinema Production I | 4 |
| CINE 3515 | Lights, Camera, Action | 3 |
| CINE 3525 | Post Production Lecture | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| CINE 3061 | Film History 2 | 4 |
| CINE 3620<br>or CINE 3700<br>or CINE 4400 | Experimental Digital Animation<br>or Cinema Audio Design<br>or Digital Post-Production | 3 |
| CINE 3010<br>or CINE 3940<br>or CINE 4005<br>or CINE 4010<br>or CINE 4021 | Film Production Topics<br>or Cinema Studies Internship<br>or Screenwriting Workshop: Short Form<br>or Topics in Film Production<br>or Directing/Acting for the Camera | 1-3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **14-16** |
| **Year Four** | | |
| **Fall Semester** | | |
| CINE 4500 | Cinema Production 2 | 3 |
| CINE 4604 | Colloquium in Film Aesthetics | 3 |
| CINE 4000 | Advanced Digital Postproduction | 3 |
| Elective | | 3 |
| | **Credit Hours** | **12** |
| **Spring Semester** | | |
| CINE 4500 | Cinema Production 2 | 3 |
| CINE Critical Studies Elective (Upper-division) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **120-122** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate substantial to advanced technical proficiency in various film, video and media-making formats including (but not limited to) analog and digital capture cameras, as well as analog and digital editing, sound and general post-production skills.
- Develop advanced creative principles of screenwriting, producing and directing film and video projects.
- Exhibit significant understanding of cinema aesthetics in narrative, experimental, animation and/or documentary practices.
- Apply safety protocols, crew etiquette and other related professional practices.
- Demonstrate significant understanding of film criticism, aesthetics, history and theory.

# Cinema Studies - Bachelor of Arts (BA)

CU Boulder's Bachelor of Arts in cinema studies emphasizes the critical study of film as an art form. The cinema studies BA is designed to give students a solid knowledge of the history and aesthetics of international film, as well as exposure to the various methodological approaches of cinema studies as an academic discipline. Cinema studies courses take a multi-faceted approach comprised of film screenings, readings and lectures, while students are expected to practice their film analysis skills in writing assignments and class discussion.

Like many programs in the arts and humanities, the BA program in cinema studies aims more broadly to teach two fundamental skills: critical thinking and writing ability. These skills are developed in our program specifically through the examination of films, but they are also broadly useful well beyond the realm of cinema studies. Students also have the option to pursue a BA with emphasis in production. The BA program enrolls approximately 425 majors.

# Requirements

## General Requirements

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed within the emphasis that the student is pursuing.

No more than 6 credit hours of independent study may be credited toward the major. Students must complete the required cinema studies courses with a grade of C- or better. These courses cannot be taken pass/fail. The College of Arts and Sciences 18 credit hour minimum of upper-division credit hours must be fulfilled with CU cinema studies courses. Students must have a grade point average of at least 2.000 in the major in order to graduate, and no more than 45 credits in CINE may be applied to overall graduation requirements.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major.

To maintain adequate progress toward a BA in cinema studies, students should meet the following requirements (see the recommended four-year plans of study on the Areas of Emphasis (https://catalog.colorado.edu/undergraduate/colleges-schools/arts-sciences/programs-study/film-studies/film-studies-bachelor-arts-ba/#areasofemphasistext) tab).

- Declare a cinema studies major by the beginning of the second semester.
- Complete 3 hours of lower-division critical studies electives and CINE 1502 by the end of the fourth semester.
- Complete 3 hours of upper-division critical studies electives and CINE 3051 and CINE 3061 by the end of the sixth semester.
- Complete 6 critical studies elective credit hours and 6 CINE elective credit hours by the end of the seventh semester (at least 3 of these credit hours must be upper-division credit hours).
- Complete an additional 9 credit hours of critical studies elective courses and CINE 3104 or all required production courses by the eighth semester.

# Areas of Emphasis

## Critical Studies Emphasis

In addition to the general requirements of the College of Arts and Sciences and the required cinema studies core, the critical studies emphasis requires a minimum of 41 credit hours in support of the BA requirements.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Cinema Studies Core Courses** | | **14** |
| CINE 1502 | Introduction to Cinema Studies [1] | |
| CINE 3051 & CINE 3061 | Film History 1 and Film History 2 [2] | |
| CINE 3104 | Film Criticism and Theory | |
| **Critical Studies Elective Requirements** | | **21** |
| Select 21 credit hours from the following (at least 15 must be upper division): | | |
| CINE 2001 | Space Odysseys: Astrophys/Astronomy via Cinema/Arts | |
| CINE 2002 | Recent International Cinema | |
| CINE 2003 | Film Topics | |
| CINE 2004 | CU Cinema Studies Seminar: Film Festival Cultures | |
| CINE 2005 | Form, Structure, and Narrative Analysis | |
| CINE 2203 | American Indians in Film | |
| CINE 2312 | Film Trilogies | |
| CINE 2302 | Nazis on Screen: Hollywood, War, Propaganda | |
| CINE 2513 | Major Asian Filmmakers | |
| CINE 2521 | Classics of the Foreign Cinema: 1960s to Present | |
| CINE 3002 | Major Film Movements [3] | |
| CINE 3003 | Major Film Directors [3] | |
| CINE 3004 | Alfred Hitchcock: The American Films | |
| CINE 3012 | Documentary Film | |
| CINE 3013 | Women and Film | |
| CINE 3041 | Environmental Cinema | |
| CINE 3042 | Horror Film: History, Contexts, Aesthetics | |
| CINE 3043 | Topics in Critical Film Studies [3] | |
| CINE 3081 | Contemporary American Cinema: 1980 to Present | |
| CINE 3422 | The Hollywood Musical | |
| CINE 3503 | German Film Through World War II | |
| CINE 3513 | German Film and Society 1945-1989 | |
| CINE 3901 | Independent Study (Critical Study) [4] | |
| CINE 3940 | Cinema Studies Internship | |
| CINE 4001 | Screening Race, Class & Gender in the U.S. and the Global Borderland | |
| CINE 4003 | Film and Literature | |
| CINE 4004 | Topics in Film Theory [3] | |
| CINE 4023 | Topics in International Cinema [3] | |
| CINE 4024 | Advanced Research Seminar [3] | |
| CINE 4043 | Topics in Cinema Critical Studies [3] | |
| CINE 4105 | Advanced Screenwriting | |
| CINE 4211 | History of Russian and Soviet Cinema | |
| CINE 4453 | History of Avant-Garde Film | |
| CINE 4604 | Colloquium in Film Aesthetics | |
| | Certain classes from other departments (i.e., foreign language) that have been approved by the cinema studies chair. | |
| **Cinema Elective Requirements** | | **6** |
| In addition to required cinema classes,Cinema Studies majors must complete an additional six credit hours of CINE courses. | | |
| **Total Credit Hours** | | **41** |

1. This course is a prerequisite forCINE 2000 and CINE 3051 .
2. It is recommended that these courses be taken in chronological order.
   CINE 1502 is a prerequisite.
3. Course may be taken for credit more than once, provided that the topics vary.
4. Total number of independent study credit hours cannot exceed 6.

## Production Emphasis

In addition to the general requirements of the College of Arts & Sciences and the required cinema studies core, the production emphasis requires a minimum of 45 credit hours in support of the BA requirements, including cinema studies courses and courses taken in other departments.

The Department of Cinema Studies & Moving Image Arts strongly urges students pursuing production classes in the BA degree program to purchase film and sound media-capable Apple computing systems.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Cinema Studies Core Courses** | | **11** |
| CINE 1502 | Introduction to Cinema Studies [1] | |
| CINE 3051 & CINE 3061 | Film History 1 and Film History 2 [2] | |
| **Critical Studies Elective Requirements** | | **9** |
| Select 9 credit hours from the following (at least 6 credit hours must be upper division): | | |
| CINE 2001 | Space Odysseys: Astrophys/Astronomy via Cinema/Arts | |
| CINE 2002 | Recent International Cinema | |
| CINE 2003 | Film Topics [3] | |
| CINE 2004 | CU Cinema Studies Seminar: Film Festival Cultures | |
| CINE 2005 | Form, Structure, and Narrative Analysis | |
| CINE 2203 | American Indians in Film | |
| CINE 2312 | Film Trilogies | |
| CINE 2513 | Major Asian Filmmakers | |
| CINE 2521 | Classics of the Foreign Cinema: 1960s to Present | |
| CINE 3002 | Major Film Movements [3] | |
| CINE 3003 | Major Film Directors [3] | |
| CINE 3004 | Alfred Hitchcock: The American Films | |
| CINE 3012 | Documentary Film | |
| CINE 3013 | Women and Film | |
| CINE 3041 | Environmental Cinema | |

| | | |
|---|---|---|
| CINE 3042 | Horror Film: History, Contexts, Aesthetics | |
| CINE 3043 | Topics in Critical Film Studies [3] | |
| CINE 3081 | Contemporary American Cinema: 1980 to Present | |
| CINE 3422 | The Hollywood Musical | |
| CINE 3503 | German Film Through World War II | |
| CINE 3513 | German Film and Society 1945-1989 | |
| CINE 3901 | Independent Study (Critical Study) [4] | |
| CINE 3940 | Cinema Studies Internship | |
| CINE 4001 | Screening Race, Class & Gender in the U.S. and the Global Borderland | |
| CINE 4003 | Film and Literature | |
| CINE 4004 | Topics in Film Theory [3] | |
| CINE 4023 | Topics in International Cinema [3] | |
| CINE 4024 | Advanced Research Seminar [3] | |
| CINE 4043 | Topics in Cinema Critical Studies [3] | |
| CINE 4105 | Advanced Screenwriting | |
| CINE 4211 | History of Russian and Soviet Cinema | |
| CINE 4453 | History of Avant-Garde Film | |
| CINE 4604 | Colloquium in Film Aesthetics | |
| Certain classes from other departments (i.e., foreign language) that have been approved by the cinema studies chair. | | |
| **Production Core Courses** | | **16** |
| CINE 2000 | Moving Image Foundations I | |
| CINE 2500 | Moving Image Foundations II | |
| CINE 3400 | Cinema Production I | |
| CINE 3515 | Lights, Camera, Action | |
| CINE 3525 | Post Production Lecture | |
| **Structure Foundations Elective** | | **3** |
| Select 3 credit hours from the following: | | |
| CINE 2005 | Form, Structure, and Narrative Analysis | |
| CINE 2105 | Introduction to the Screenplay | |
| **Production Electives** | | **3** |
| Select 3 credit hours from the following: | | |
| CINE 2010 | Moving Image Computer Foundations | |
| CINE 2300 | Beginning Filmmaking - Aesthetics | |
| CINE 2610 | Animation Production | |
| CINE 2900 | Lighting | |
| CINE 3010 | Film Production Topics | |
| CINE 3020 | Filmmaking Abroad: Acting & Directing Internationally | |
| CINE 3563 | Producing the Independent Film | |
| CINE 3620 | Experimental Digital Animation | |
| CINE 3700 | Cinema Audio Design | |
| CINE 3940 | Cinema Studies Internship | |
| CINE 4000 | Advanced Digital Postproduction | |
| CINE 4005 | Screenwriting Workshop: Short Form | |
| CINE 4010 | Topics in Film Production | |
| CINE 4021 | Directing/Acting for the Camera | |
| CINE 4040 | Advanced Analog Alchemy | |
| CINE 4400 | Digital Post-Production | |
| **Total Credit Hours** | | **42** |

1 This course is a prerequisite for CINE 2000 and CINE 3051.

2 It is recommended that these courses be taken in chronological order. CINE 1502 is a prerequisite.

3 Course may be taken for credit more than once, provided that the topics vary.

4 Total number of independent study credit hours cannot exceed 6.

# Recommended Four-Year Plans of Study

## Critical Studies Emphasis

Through the required coursework for the major, students will fulfill all 12 credits of the Arts & Humanities area of the Gen Ed Distribution Requirement.

| Course | Title | Credit Hours |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | |
| CINE 1502 | Introduction to Cinema Studies | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3-5 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Elective/MAPS course | | 3 |
| Elective/MAPS course | | 3 |
| | **Credit Hours** | **15-17** |
| **Spring Semester** | | |
| CINE Critical Studies Elective - Lower or Upper-division | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective/MAPS course | | 3 |
| Elective/MAPS course | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| CINE Critical Studies Elective - Lower or Upper-division | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Elective/MAPS | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| CINE Critical Studies Elective - Upper-division | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| CINE 3051 | Film History 1 | 4 |

| | | |
|---|---|---|
| CINE Critical Studies Elective - Upper-division | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| CINE 3061 | Film History 2 | 4 |
| CINE Critical Studies Elective - Upper-division | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Elective or Upper-division Elective (if needed) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Year Four** | | |
| **Fall Semester** | | |
| CINE 3104 | Film Criticism and Theory | 3 |
| CINE Critical Studies Elective - Upper-division | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Upper-division Elective | | 3 |
| Elective or Upper-division Elective (if needed) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| CINE Critical Studies Elective - Upper-division | | 3 |
| CINE Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **123-125** |

## Production Emphasis

Through the required coursework for the major, students will fulfill all 12 credits of the Arts & Humanities area of the Gen Ed Distribution Requirement.

| **Year One** | | |
|---|---|---|
| **Fall Semester** | | **Credit Hours** |
| CINE 1502 | Introduction to Cinema Studies | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3-5 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15-17** |
| **Spring Semester** | | |
| CINE 2005<br>or CINE 2105 | Form, Structure, and Narrative Analysis<br>or Introduction to the Screenplay | 3 |
| CINE 2000 | Moving Image Foundations I | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Year Two** | | |
| **Fall Semester** | | |
| CINE 2500 | Moving Image Foundations II | 3 |
| CINE Critical Studies Elective - Upper-division | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| CINE 2010<br>or CINE 2300<br>or CINE 2610<br>or CINE 2900 | Moving Image Computer Foundations<br>or Beginning Filmmaking - Aesthetics<br>or Animation Production<br>or Lighting | 3 |
| CINE Critical Studies Elective - Upper-division | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| CINE 3051 | Film History 1 | 4 |
| CINE 3515 | Lights, Camera, Action | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| CINE 3061 | Film History 2 | 4 |
| CINE 4005 | Screenwriting Workshop: Short Form | 3 |
| CINE Critical Studies Elective - Upper-division | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Year Four** | | |
| **Fall Semester** | | |
| CINE 3400 | Cinema Production I | 4 |
| CINE 3525 | Post Production Lecture | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **13** |
| **Spring Semester** | | |
| CINE 3010<br>or CINE 3940<br>or CINE 4005<br>or CINE 4010<br>or CINE 4021 | Film Production Topics<br>or Cinema Studies Internship<br>or Screenwriting Workshop: Short Form<br>or Topics in Film Production<br>or Directing/Acting for the Camera | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-division Elective | | 3 |

| | |
|---|---|
| Upper-division Elective | 3 |
| Upper-division Elective | 3 |
| **Credit Hours** | **15** |
| **Total Credit Hours** | **121-123** |

## Learning Outcomes

By the completion of the program, students will be able to:

- Define the major artistic contributions to the evolution of cinema, from the advent of the moving image to the present.
- Demonstrate familiarity with the general outlines of world cinema from the silent period to the present, with emphasis on the historical contributions of major national cinemas.
- Recognize the contexts of national and international film history and explain the ways in which cinemas reflect on social, historical and political developments through the medium's history.
- Effectively apply the uses and functions of film criticism, aesthetics and film theory in writing, oral and/or artistic forms.

# Cinema Studies - Minor

The cinema studies minor is open to students in any field who are interested in the study of cinema history, culture and aesthetics, but who are too busy to pursue the full major. Students who pursue the cinema studies minor have the opportunity to develop their interest by acquiring critical and comparative skills and understanding the place and importance of cinema as a cultural and social phenomenon. Students in the minor have access to lower- and upper-division courses on film history, aesthetics, criticism, social and historical contexts, classical genres and groundbreaking directors from the U.S. and abroad, acquiring an edge in visual analysis, critical thinking and media literacy.

## Requirements

Declaration of a minor is open to any student enrolled at CU Boulder, regardless of college or school. To obtain the cinema studies minor, students must declare a minor in cinema studies. Additional requirements:

- Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor.
- All coursework applied to the minor must be completed with a grade of C- or better (no pass/fail work may be applied). The GPA for all coursework taken in the minor department must be equal to 2.00 (C) or higher.
- Complete 19 credit hours of cinema studies coursework, including 12 credit hours at the upper-division level, as listed below.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CINE 1502 | Introduction to Cinema Studies | 3 |
| CINE 3051 | Film History 1 | 4 |
| or CINE 3061 | Film History 2 | |
| Note: Both CINE 3051 and 3061 may be taken, but one will count as an elective. | | |
| **Electives** | | **12** |
| Complete 12 credit hours from elective courses in the Cinema Studies Program. 9 credit hours of the elective courses must be at the upper-division (3000-4000) level. | | |
| **Total Credit Hours** | | **19** |

# Classics

The bachelor's degree in classics is tailored to the student's interests in the field. Major programs can be arranged with a concentration in (a) Latin and/or Greek Language and Literature or (b) Classical Studies more broadly, while the minor is exceptionally flexible. Classics students are encouraged to talk with the faculty for guidance on what classics courses to take in order to support their interests best. Prospective majors and minors should consult with the Associate Chair of Undergraduate Studies.

The undergraduate degree in classics emphasizes knowledge and awareness of:

- The literature, culture and thought of the ancient Mediterranean world.
- The social, cultural, religious and political history of ancient Greece and Rome.
- The art and archaeology of the ancient Mediterranean world, including Greece, Rome, Egypt, the eastern Mediterranean seaboard and Mesopotamia.

In addition, students completing the degree in classics are expected to acquire the ability and skills to:

- Read, understand and interpret written documents and works of literature in translation and/or in the original Greek and Latin.
- Communicate in spoken and written form clearly and effectively.
- Read and think critically.

Interested students are encouraged to consult the department's Undergraduate (https://www.colorado.edu/classics/undergraduate/) webpage for more information.

**Course codes for this program are CLAS, GREK and LATN.**

## Bachelor's Degree

- Classics - Bachelor of Arts (BA) (p. 238)

## Minor

- Classics - Minor (p. 241)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ambrose, Kirk T. (https://experts.colorado.edu/display/fisid_115914/)
Professor; PhD, University of Michigan Ann Arbor

Atnally, Diane L. (https://experts.colorado.edu/display/fisid_113062/)
Associate Professor Emerita; PhD, University of Michigan Ann Arbor

Bailey, Dominic (https://experts.colorado.edu/display/fisid_145110/)
Associate Professor; PhD, University of Cambridge

Cain, Andrew J. (https://experts.colorado.edu/display/fisid_129296/)
Professor, Chair; PhD, Cornell University

Callier, Reina (https://experts.colorado.edu/display/fisid_156049/)
Instructor; PhD, University of Colorado

Dusinberre, Elspeth Rogers Mcin (https://experts.colorado.edu/display/fisid_111649/)
Professor; PhD, University of Michigan Ann Arbor

Elliott, Jacqueline Michelle (https://experts.colorado.edu/display/fisid_140085/)
Associate Professor; PhD, Columbia University

Gibert, John C. (https://experts.colorado.edu/display/fisid_101680/)
Professor; PhD, Harvard University

Herz, Zachary (https://experts.colorado.edu/display/fisid_165410/)
Assistant Professor; PhD, Columbia University; JD, Yale University

Hunt, Peter (https://experts.colorado.edu/display/fisid_115394/)
Professor; PhD, Stanford University

James, Sarah Anne (https://experts.colorado.edu/display/fisid_151713/)
Associate Professor; PhD, University of Texas at Austin

King, Joy K.
Associate Professor Emerita

Köster, Isabel (https://experts.colorado.edu/display/fisid_157946/)
Assistant Professor; PhD, Harvard University

Lansford, Edwin Tyler (https://experts.colorado.edu/display/fisid_147620/)
Senior Instructor; PhD, University of Washington

Lee, Mi-Kyoung (https://experts.colorado.edu/display/fisid_141821/)
Associate Professor; PhD, Harvard University

Michaelis-Cummings, Laura A. (https://experts.colorado.edu/display/fisid_105599/)
Professor; PhD, University of California, Berkeley

Muller-Sievers, Helmut Heinz (https://experts.colorado.edu/display/fisid_147511/)
Professor; PhD, Stanford University

Nakassis, Dimitri (https://experts.colorado.edu/display/fisid_154917/)
Distinguished Professor; PhD, University of Texas at Austin

Newlands, Carole E. (https://experts.colorado.edu/display/fisid_147504/)
Distinguished Professor; PhD, University of California, Berkeley

Pasnau, Robert (https://experts.colorado.edu/display/fisid_115293/)
Professor; PhD, Cornell University

Reitzammer, Laurialan Blake (https://experts.colorado.edu/display/fisid_145810/)
Associate Professor; PhD, University of California, Berkeley

Rupp, Travis (https://experts.colorado.edu/display/fisid_148747/)
Assistant Teaching Professor; MA, University of Colorado Boulder

Schütrumpf, Eckart E.W.
Professor Emeritus

Trnka-Amrhein, Yvona (https://experts.colorado.edu/display/fisid_159294/)
Assistant Professor; PhD, Harvard University

Tzavella-Evjen, Terpsichori H.
Professor Emerita

# Courses

**CLAS 1010 (3) The Study of Words**
Study of English words of Latin and Greek origin, focusing on etymological meaning by analysis of component parts (prefixes, bases, suffixes) and on the ways in which words have changed and developed semantically. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 1010
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Literature, Culture, and Thought

**CLAS 1020 (3) Argument from Evidence: Critical Writing about the Ancient World**
Introduces students to writing about the ancient world, with special attention to the possibilities and the limitations of ancient source-material. Taught as a writing workshop, with emphasis on critical thinking, analysis, argument and inquiry. While the course reads foundational ancient texts, the skills acquired will be broadly useful among humanities disciplines.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Lower
Departmental Category: Literature, Culture, and Thought
MAPS Course: English

**CLAS 1030 (3) Introduction to Western Philosophy: Ancient**
Introduces major philosophical ideas originating in ancient Greece, including the concepts of eudaimonia (happiness), sophia (knowledge), philosophia, psychê (soul), aretê (virtue), erôs (love), and democracy, placing these in historical context and relating them to subsequent philosophical developments. Topics may include the nature of happiness; why philosophy and democracy flourished in ancient Greece; the ancient Greek origins of science; whether being a virtuous person makes you happier; and ancient Greek thinking about life, love, and death.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 1010
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 1051 (3) The World of the Ancient Greeks**
Surveys of the emergence, major accomplishments, failures and the decline of the ancient Greeks, from the Bronze Age civilizations of the Minoans and Mycenaeans through the Hellenistic Age (2000-30 B.C.). No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 1051
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 1061 (3) The Rise and Fall of Ancient Rome**
Surveys the rise of ancient Rome in the eighth century B.C. to its fall in the fifth century A.D. Emphasizes political institutions, foreign policy, leading personalities, and unique cultural accomplishments. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 1061
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 1071 (3) Ancient Sport and Spectacle**
Surveys the development, evolution and impact of sport and spectacle in the Greco-Roman world through the deconstruction of games during the Christian era of the Roman Empire. Examines, among other relevant topics, games in the Homeric tradition, the development of the Greek Olympics and Roman spectacles including the circus, amphitheaters and gladiators.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**CLAS 1100 (3) Greek and Roman Mythology**
Covers Greek and Roman myths as expressions of religious experience and imagination, of Greek and Roman culture and society, and as part of the fabric of Western cultural tradition. Of particular interest to students of literature and the arts, psychology, anthropology, and history. No Greek or Latin required.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 1110 (3) Gods, Monsters and Mortals: Literature of Ancient Greece**
Read about mythological heroes and historical individuals from Achilles to Socrates. Explore why Greek authors told stories the way they did and what those stories might have meant to them and might mean to us. Ancient texts in English translation.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 1115 (3) Masterpieces of Greek Literature in Translation**
Students read about mythological heroes and historical individuals from Achilles to Socrates in Greek literature. Class discusses why the Greeks told stories the way they did and what those stories might have meant to them and might mean to us.
**Additional Information:** Arts Sciences Honors Course
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Honors

**CLAS 1120 (3) Power and Passion in Ancient Rome**
Read about mythological heroes and historical individuals from Romulus to Catiline and the emperors Augustus and Nero. Explore why Roman authors told stories the way they did and what those stories might have meant and might mean to us. Ancient texts in English translation.
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 1140 (3) Bread and Circuses: Society and Culture in the Roman World**
Surveys the outstanding achievements of Roman culture and society as reflected in literature; philosophy and art; private and official religion; and legal and political thought. No Greek or Latin required.
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 1509 (3) Trash and Treasure, Temples and Tombs: Art and Archaeology of the Ancient World**
Introduces the art and archaeology of ancient Egypt, Mesopotamia, Greece and Rome, examining various ancient approaches to power, religion, death and the human body. Analyzes art, architecture and everyday trash to learn about ancient humanity.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 1509
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Art and Archaeology

**CLAS 2020 (3) Science in the Ancient World**
Covers the development of scientific modes of thought, theory, and research from mythological origins (e.g., Hesiod's poetry) through pre-Socratic philosophers. Culminates in theories and research of Plato and Aristotle, including the Roman Empire. Students read original sources in translation. No Greek or Latin required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 2029 (3) Art and Archaeology of Ancient Egypt**
Emphasizes the origin of the Egyptian culture, its importance and its impact on other cultures. In addition, the different points of view of various scholars are discussed with a comparative study of the ancient Egyptian culture and modern culture of Egypt and the Middle East. Formerly ANTH 1160.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 2029
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Art and Archaeology

**CLAS 2030 (3) The Ancient Roots of Modern Medicine**
Students learn the meaning and use of the Greek and Latin roots in modern medical terminology; they gain an appreciation of ancient Roman and Greek medicine history and culture in their relation to the modern practice of Western medicine and the sciences; they become familiar with common ancient bioethical principles that govern the ancient practice of medicine and the sciences and learn to appreciate how these principles inform and influence modern medicine and the sciences.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 2030 and LING 2030
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**CLAS 2039 (3) Greek Art and Archaeology**
Covers prehistoric Aegean through the fourth century B.C.E., considering architecture, pottery, painting, sculpture and personal ornament. Societal customs such as use of space and burial patterns are considered as well as art and its uses, to help understand developments in Greek culture. Formerly CLAS 3039.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 2039
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 2041 (3) War and Society in Ancient Greece**
Studies Greek warfare in its cultural, social and economic contexts, in the light of anthropological comparisons and modern theories. No Greek or Latin required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 2049 (3) Introduction to Roman Art and Architecture**
Introduces the monuments and sites of the ancient Roman world from the foundation of Rome (753 B.C.E.) to Constantine (306-307 C.E.). Emphasizes the relationship of art, architecture, and artifacts to the political, social, and religious institutions of Italy and the provinces. Formerly CLAS 3049.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 2049
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 2100 (3) Gender and Sexuality in Ancient Greece**
Examines evidence of art, archaeology, and literature of Greek antiquity from a contemporary feminist point of view. Focuses on women's roles in art, literature, and daily life. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 2100
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Literature, Culture, and Thought

**CLAS 2110 (3) Gender and Sexuality in Ancient Rome**
Uses art, archaeology, and literature to study, from a contemporary feminist point of view, the status of women in works of Roman art and literature, the development of attitudes expressed toward them, and their daily life. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 2110
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Literature, Culture, and Thought

**CLAS 2610 (3) Paganism to Christianity**
Offers a cultural history of Greek and Roman religion. Students read ancient texts in translation and use evidence from archaeology to reconstruct the shift from paganism to Christianity in antiquity. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 2614
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 3009 (3) Modern Issues, Ancient Times**
Considers issues of vital importance to humans, both now and in ancient times. Topics such as food, death, sex, family, literacy, or power are explored to consider how ancient societal norms and attitudes evolved and how they relate to modern culture. Draws on material and literary evidence to develop an understanding of the complexities of ancient life.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 3009
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Art and Archaeology

**CLAS 3019 (3) Pompeii and the Cities of Vesuvius**
Introduces the towns and villas buried by the eruption of Mt. Vesuvius in 79 C.E. Explores the layout and decoration of ancient Roman houses, the variety of artifacts uncovered as evidence for daily life and the history of the excavations.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 3019
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 3119 (3) The Archaeology of Death**
Consider Death. It is a universal human phenomenon. Humans across time and space have caused, planned for, reacted to, and carried out death practices in extraordinarily different ways. Mortuary practice provides a fascinating insight into human history and culture in both the modern and ancient world.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 3119
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Art and Archaeology

**CLAS 3400 (3) Special Topics in Classics**
Topics in Greek, Latin or Classical civilization. Note that the topics "Classics and Film", and "Swords and Sandals on Screen" cannot both be taken for credit.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 4021 (3) Athens and Greek Democracy**
Studies Greek history from 800 B.C. (the rise of the city-state) to 323 B.C. (the death of Alexander the Great). Emphasizes the development of democracy in Athens. Readings are in the primary sources.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5021 and HIST 4021
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 4031 (3) Alexander the Great and the Rise of Macedonia**
Covers Macedonia's rise to dominance in Greece under Philip II and the reign and conquests of Alexander the Great.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5031 and HIST 4031
**Recommended:** Prerequisite one of the following CLAS 1051, 1509, 2039, 2041, 4021, 4041, 4071, 4139, 4149, GREK 3113, HIST 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 4040 (3) Seminar in Classical Antiquity**
Examines an advanced topic in classical language, literature, history, philosophy, art, or culture. Combines the techniques of philology with a critical approach to the literary and material legacy of the past.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Requisite second-year proficiency in Greek or Latin.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 4041 (3) Classical Greek Political Thought**
Studies main representatives of political philosophy in antiquity (Plato, Aristotle, Cicero) and of the most important concepts and values of ancient political thought. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5041 and HIST 4041 and PHIL 4210
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 4061 (3) Twilight of Antiquity**
Explores the reasons for the fall of the Roman Empire in the western Mediterranean and its survival in the East as Byzantium. Emphasizes Christianity; barbarians; social, economic and cultural differences; contemporary views of Rome; and modern scholarship. No Greek or Latin is required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5061 and HIST 4061 and HIST 5061
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 4071 (3) Seminar in Ancient Social History**
Considers topics ranging from demography, disease, family structure, and the organization of daily life to ancient slavery, economics, and law. Focuses either on Persia, Greece, or Rome and includes a particular emphasis on the methodology required to reconstruct an ancient society, especially the interpretation of problematic literary and material evidence and the selective use of comparisons with better known societies. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5071 and HIST 4071
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 4081 (3) The Roman Republic**
Studies the Roman Republic from its foundation in 753 B.C. to its conclusion with the career of Augustus. Emphasizes the development of Roman Republican government. Readings are in the primary sources. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5081 and HIST 4081
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 4091 (3) The Roman Empire**
Intense survey of Imperial Rome from the Roman revolution to the passing of centralized political authority in the western Mediterranean. Emphasizes life, letters and personalities of the empire. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5091 and HIST 4091
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 4099 (3) Ancient Greek Sculpture**
Understanding that Greek sculpture, like all visual media, was part of the fabric of ancient Greek life and expressed the values of its creators and audience is a valuable way to gain insights into the social, economic, and political world of ancient Greece. This course will examine the work of Greek sculptors from the Archaic to the Hellenistic period. Key stylistic and technical developments, as well as significant works of art, sculptors and workshops will be discussed in detail. Some issues we will consider are the physical, religious and/or socio-historical context of individual freestanding sculptures and how specific sculptural programs illustrate aspects of Greek culture. Iconographic and narrative choices made by artists working in stone, compared to other material, will also be addressed.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5099, ARTH 4099 and ARTH 5099
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 4101 (3) Greek and Roman Slavery**
Surveys slavery in ancient Greece and Rome beginning with its growth, economics and political effects, moving to the life experiences of slaves, resistance and revolt, and finishing with the ideology of slavery. Focuses throughout on the challenge of understanding classical slavery on the basis of scattered and biased evidence and on the controversies that have surrounded this topic.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4101 and CLAS 5101
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**CLAS 4109 (3) Ancient Italian Painting**
Explores the problems, theories and methods for understanding the iconography, styles, topologies, contexts and techniques of fresco wall painting in ancient Italy from the 6th century B.C.E. to the 4th century C.E. Topics covered include Etruscan tomb paintings, late Republican and early imperial fresco paintings from Rome and Campania and later Roman wall paintings, including the painted images in ancient catacombs. Previous coursework on ancient Italy or the history of pre-modern art is highly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5109 and ARTH 4109 and ARTH 5109
**Recommended:** Prerequisite CLAS 1509 or ARTH 1509 or CLAS 2049 or ARTH 2049.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 4110 (3) Greek and Roman Epic**
Students read in English translation the major epics of Graeco-Roman antiquity such as the Iliad, Odyssey, Argonautica, Aeneid, and Metamorphoses. Topics discussed may include the nature of classical epic, its relation to the novel, and its legacy. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5110 and HUMN 4110
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 4119 (3) Roman Sculpture**
Examines ancient Roman sculpture, emphasizing the display, iconography, and production of private and public monuments in the Roman Empire. Explores sculpture as evidence for historical developments, societal and gender attitudes, and state ideologies in the ancient Roman world.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 5119 and ARTH 4119 and CLAS 5119
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 4120 (3) Greek and Roman Tragedy**
Intensive study of selected tragedies of Aeschylus, Sophocles, Euripides and Seneca in English translation. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5120 and HUMN 4120
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 4129 (3) Aegean Art and Archaeology**
Detailed study of the cultures of prehistoric Greece, the Cycladic Islands and Crete, their art and archaeology and their history within the broader context of the eastern Mediterranean, from earliest human settlement to the collapse of the Bronze Age at about 1100 B.C.E. Emphasis is on palace states.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5129 and ANTH 4129 and ANTH 5129 and ARTH 4129
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 4130 (3) Greek and Roman Comedy**
Studies Aristophanes, Plautus, and Terence in English translation. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5130 and HUMN 4130
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 4139 (3) Greek Vase Painting**
A comprehensive overview of Greek vase painting, from prehistoric through the fourth century B.C.E. Emphasis is on learning the development of primary decorative styles and on refining skills of visual analysis, scholarly research, critical thinking, oral commentary and written presentation.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5139 and ARTH 4139 and ARTH 5139
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 4140 (3) The Greek and Roman Novel**
Studies a number of complete Greek and Roman novels from Classical Antiquity and their predecessors and contemporary neighbors in the genres of Greek prose fiction. Ancient texts in English translation.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5140 and HUMN 4131
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 4149 (3) Greek Cities and Sanctuaries**
Examines Greek architecture in context, from the ninth century B.C.E. into the Hellenistic period, considering the use of space, both in religious and in civic settings and using texts as well as material culture. Emphasis is on developing analytical skills.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5149 and ARTH 4149
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 4169 (3) Topics in Ancient and Classical Art and Archaeology**
In-depth consideration of an aspect of ancient Mediterranean culture. Topics vary and may include ancient wall painting, Greek sculpture, artists and patrons, the ancient Near East, Egyptian art and archaeology, or Etruscan art and archaeology.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5169 and ARTH 4169 and ARTH 5169
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 4199 (3) Roman Architecture**
Examines the designs, functions and construction methods of ancient Roman towns, temples, baths, houses and civic structures, as well as utilitarian structures, including roads and aqueducts. Emphasizes Roman architectural forms and spaces as vehicles for political propaganda and empire consolidation.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5199 and ARTH 4199
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 4209 (6) Classical Archaeological Field Methods**
Offers experiential learning in theories and methods of archaeological fieldwork in the western Argolid in Greece. Applies methods for extensive survey, stratigraphic excavation, GIS modeling, ceramic analysis, numismatic analysis, architectural studies, artifact and data processing and documentation. Offered abroad only.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 4209 and CLAS 5209
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Recommended:** Prerequisites CLAS 1509 or ARTH 1509 or CLAS/ARTH 2039 or CLAS/ARTH 2049.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 4229 (3) Ancient Egyptian Art and Archaeology**
Archaeology of ancient Egypt in light of recent excavations; the history of excavations of the different sites; and the art of ancient Egypt through time. Formerly ANTH 4420.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5229 and ARTH 4229 and ARTH 5229
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 4269 (3) Art and Archaeology of the Ancient Near East**
Examines the diverse multicultural civilizations of the Iran-Iraq region and Anatolia from the rise of urbanism in Mesopotamia through the era of the first 'world empire,' Achaemenid Persia. Emphasizes the material record of religious and state institutions of the ancient Near East, especially monuments that illustrate concepts of power and communication. Explores notions of style, symbolism, visual rhetoric, text-image synthesis, patronage, creativity, trade, religion, gender, identity and roles of artists. How do inter-communal relations, cross-cultural exchange, innovation and artistic production, movement and migration, relate to the development and expression of hegemonic power and of empire, and the marginalization of some? What is the role of economics and commerce in these processes? May be repeated twice for credit if the topic is different.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5269 and ARTH 4269 and ARTH 5269
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite CLAS 1509 or ARTH 1509.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Art and Archaeology
Departmental Category: Asia Content

**CLAS 4761 (3) Roman Law**
Studies the constitutional and legal history of ancient Rome; emphasizes basic legal concepts and comparisons with American law. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5761 and HIST 4761 and HIST 5761
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 4840 (1-4) Independent Study**
No Greek or Latin required.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Literature, Culture, and Thought

**CLAS 4849 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 4852 (1-6) Honors Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Classical Philology

**GREK 1013 (4) Beginning Classical Greek 1**
For students with no previous knowledge of Greek. Introduces basic grammar and vocabulary.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Greek

**GREK 1023 (4) Beginning Classical Greek 2**
Completes the presentation of grammar and introduces reading of literature.
**Recommended:** Prerequisite GREK 1013.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Greek

**GREK 3013 (1) Readings in the Greek New Testament and Septuagint**
Readings in ancient (koine) Greek from the New Testament and the Septuagint. Students aim to achieve fluency in reading and to enrich their knowledge of key terms and ideas borrowed from the Greek past in the early Christian tradition. Formerly CLAS 3013.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Recommended:** Prerequisites GREK 1013 and GREK 1023.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Greek

**GREK 3113 (3) Intermediate Classical Greek 1**
Reading of selected prose texts of authors in ancient Greek such as Plato, Xenophon, Lysias, and selections from the Greek New Testament. Incorporates review of grammar.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisites GREK 1013 and GREK 1023.
**Additional Information:** Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Greek

**GREK 3123 (3) Intermediate Classical Greek 2**
Reading of selections from Homer or a Greek tragedy in ancient Greek, with attention to literary form and context as well as advanced grammar and syntax.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisites GREK 1013 and GREK 1023 and GREK 3113.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Greek

**GREK 4013 (3) Topics in Greek Prose**
Author or topic in ancient Greek specified in the online Schedule Planner (e.g., Thucydides, Herodotus, Plato, Aristotle, Attic Orators).
**Equivalent - Duplicate Degree Credit Not Granted:** GREK 5013
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Greek

**GREK 4023 (3) Topics in Greek Poetry**
Author or topic in ancient Greek specified in the online Schedule Planner (e.g., Homer, Hesiod, lyric poetry, tragedy, comedy).
**Equivalent - Duplicate Degree Credit Not Granted:** GREK 5023
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Greek

**GREK 4093 (3) Survey of Greek Literature**
Greek literary history in ancient Greek from Homer to the Hellenistic age.
**Equivalent - Duplicate Degree Credit Not Granted:** GREK 5093
**Recommended:** Prerequisites GREK 3113 and GREK 3123.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Greek

**GREK 4843 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Greek

**LATN 1014 (4) Beginning Latin 1**
Introduces basic grammar and vocabulary. For students with no previous knowledge of Latin.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 1024 (4) Beginning Latin 2**
Continues the presentation of grammar, incorporates review of fundamentals, and introduces the reading of literature. For students with previous experience of Latin.
**Recommended:** Prerequisite LATN 1014 or equivalent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 2004 (3) Accelerated Latin 1**
Intensive introductory course in Latin including a survey of grammar and practice reading and writing. No previous knowledge of Latin is required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 2044 (3) Accelerated Latin 2**
Continuation of LATN 2004. Reading of advanced texts: Caesar, Cicero, Ovid and others.
**Recommended:** Prerequisite LATN 2004.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 2114 (4) Intermediate Latin 1**
Completes the presentation of grammar and continues the reading of literature, from a variety of authors of poetry and prose.
**Recommended:** Prerequisite LATN 1024 or equivalent.
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Latin

**LATN 2124 (4) Intermediate Latin 2**
Selections from Virgil's Aeneid with attention to literary form and context as well as advanced grammar and syntax.
**Recommended:** Prerequisite LATN 2114.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 3014 (3) Introduction to Latin Prose**
Author or topic in Latin specified in the online Schedule Planner (e.g., Cicero, Livy, Pliny). Formerly CLAS 3014.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 3024 (3) Introduction to Latin Poetry**
Author or topic in Latin specified in the online Schedule Planner (e.g., Virgil, Ovid, Catullus, Horace).
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 4014 (3) Topics in Latin Prose**
Author or topic in Latin specified in the online Schedule Planner (e.g., Roman historians, Roman epistolography, Cicero, Roman novel).
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 5014
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Recommended:** Prerequisites LATN 3014 and LATN 3024.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 4024 (3) Latin Prose Composition**
Reviews grammar and syntax. Introduces Latin prose style and composition.
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 5024
**Recommended:** Prerequisites LATN 3014 and LATN 3024.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 4044 (3) Topics in Latin Poetry**
Author or topic specified in Latin specified in the online Schedule Planner (e.g., Roman elegy, Neronian poetry, Lucretius, Roman satire).
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 5044
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisites LATN 3014 and LATN 3024.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 4084 (3) Survey of Roman Literature Part 2: Imperial**
Covers Imperial Roman literary history from the mid-late Augustan Period to the start of Late Antiquity. Students read principal surviving works of Imperial Roman poetry and prose in the original Latin.
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 5084
**Recommended:** Prerequisites LATN 3014 and LATN 3024.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 4094 (3) Survey of Roman Literature Part 1: Republican to Augustan**
Introduces Roman literary history from its origins to the 30s BCE. Students read principal surviving works of the Roman Republican poetry and prose in the original Latin.
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 5094
**Recommended:** Prerequisites LATN 3014 and LATN 3024.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 4824 (3) Latin Teaching Methods: Open Topics**
Covers specialized topics in Latin pedagogy specified in the online Schedule Planner.
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 5824
**Additional Information:** Departmental Category: Latin

**LATN 4844 (1-3) Independent Study**
Formerly CLAS 4844.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Latin

# Classics - Bachelor of Arts (BA)

The bachelor's degree in classics is tailored to the student's interests in the field. Major programs can be arranged with a concentration in (a) Latin and/or Greek Language and Literature, or (b) Classical Studies more broadly, while the minor is exceptionally flexible. Classics students are encouraged to talk with the faculty for guidance on what classics courses to take in order to support their interests best. Prospective majors and minors should consult with the Associate Chair of Undergraduate Studies.

The undergraduate degree in classics emphasizes knowledge and awareness of:

- The literature, culture and thought of the ancient Mediterranean world.

- The social, cultural, religious and political history of ancient Greece and Rome.
- The art and archaeology of the ancient Mediterranean world, including Greece, Rome, Egypt, the eastern Mediterranean seaboard and Mesopotamia.

In addition, students completing the degree in classics are expected to acquire the ability and skills to:

- Read, understand and interpret written documents and works of literature in translation and/or in the original Greek and Latin.
- Communicate in spoken and written form clearly and effectively.
- Read and think critically.

Interested students are encouraged to consult the department's undergraduate (https://www.colorado.edu/classics/undergraduate/) webpage for more information.

# Requirements

## Program Requirements

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed in the Program Tracks (p. 239) section. Students must complete the major requirements in one of the listed tracks, including: a minimum of 36 credit hours, all with a grade of a C- or better, in the major; a minimum 2.000 GPA for courses in the major; a minimum of 18 upper-division credit hours in the major, and a minimum of 12 upper-division credit hours in the major taken on the CU Boulder campus.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here refers only to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To determine adequate progress towards graduation in classics within four years, students should consult their degree audit frequently. If questions remain, they should consult their academic department's advisor and/or the department's Associate Chair of Undergraduate Studies.

# Program Tracks

For more information about program tracks available, please visit the department website (https://www.colorado.edu/classics/undergraduate/).

## Greek and/or Latin Language and Literature Track

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| Greek and/or Latin language [1] | | 24 |
| CLAS electives (Literature, Culture, Thought; Ancient History; Art & Archaeology; Honors Thesis) [2] | | 12 |
| **Total Credit Hours** | | **36** |

[1] Students should designate either Greek or Latin as the primary field of language study. Only courses above the introductory sequence (GREK 1013-GREK 1023 and LATN 1014-LATN 1024) of the primary language count towards the major. If a student also takes the second language, all credit hours taken in that language as well as any other Greek and Latin credit hours above the 1000-level count toward the major. If a student has learned the equivalent of the introductory sequence in the primary language before beginning language study at CU and begins language instruction in the department at the 2000-level or above, all credit hours in both languages immediately count toward the major.

[2] With the approval of the department's Associate Chair of Undergraduate Studies, additional Greek or Latin courses may be substituted in place of classical literature, culture and thought or ancient history, art and archaeology courses.

### Approved Courses

| Code | Title | Credit Hours |
|---|---|---|
| All GREK courses (Greek) | | |
| All LATN courses (Latin) | | |
| All CLAS courses (Literature, Culture, Thought; Ancient History; Art & Archaeology; Honors Thesis) | | |
| All classes a student takes in another department that are cross-listed with CLAS | | |
| ARTH 4929 | Special Topics in Art History (when taught in conjunction with ARTH 4939 as part of an Art Museums Internships course) | |
| ARTH 4939 | Art Museum Internship | |
| PHIL 3000 | History of Ancient Philosophy | |

Students taking a course in another department that they think might pertain to their Classics major and wishing to have that course count toward the major in place of one of the approved courses listed above are encouraged to bring that course to the attention of the Associate Chair of Undergraduate Studies in Classics. Substitutions may be possible.

## Classical Studies Track

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| Greek and/or Latin language | | 3 |
| Literature, Culture, and Thought | | 3 |
| Ancient History | | 3 |
| Art & Archaeology | | 3 |
| Electives in GREK, LATN, or CLAS (including Honors Thesis) | | 24 |
| **Total Credit Hours** | | **36** |

### Approved Courses

| Code | Title | Credit Hours |
|---|---|---|
| All GREK courses (Greek) | | |
| All LATN courses (Latin) | | |
| All CLAS courses (Literature, Culture, Thought; Ancient History; Art & Archaeology; Honors Thesis) | | |
| All classes a student takes in another department that are cross-listed with CLAS | | |

| | |
|---|---|
| ARTH 4929 | Special Topics in Art History (when taught in conjunction with ARTH 4939 as part of an Art Museums Internships course) |
| ARTH 4939 | Art Museum Internship |
| PHIL 3000 | History of Ancient Philosophy |

Students taking a course in another department that they think might pertain to their classics major and wishing to have that course count toward the major in place of one of the approved courses listed above are encouraged to bring that course to the attention of the Associate Chair of Undergraduate Studies in Classics. Substitutions may be possible.

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will fulfill all 12 credits of the Arts & Humanities area of the Gen Ed Distribution Requirement. Students could also fill the Global Perspective category of the Gen Ed Diversity Requirement by choosing specific CLAS courses. The below plan is for the Greek and/or Latin Language and Literature track of the major. For other plans, please see the department.

**Year One**

| **Fall Semester** | **Credit Hours** |
|---|---|
| LATN/GREK Beginning Latin or Greek I (If needed, does not count toward 30 credit language requirement) | 4 |
| CLAS Elective Course or Elective | 3 |
| Gen. Ed. Skills course (example: QRMS) | 3-5 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | 3 |
| **Credit Hours** | **13-15** |
| **Spring Semester** | |
| LATN/GREK Beginning Latin or Greek II (If needed, does not count toward 30 credit language requirement) or CLAS Elective Course | 3-4 |
| CLAS Elective Course | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | 4 |
| Elective | 3 |
| Elective | 0-3 |
| **Credit Hours** | **16-14** |

**Year Two**

| **Fall Semester** | |
|---|---|
| LATN/GREK Intermediate/Accelerated Latin or Greek I or CLAS Elective Course | 3-4 |
| CLAS/GREK/LATN Elective | 3 |
| Gen. Ed. Distribution course or elective course (example: Social Sciences) | 3 |
| Gen. Ed. Distribution course or elective course (example: Natural Sciences) | 4 |
| Elective | 3 |
| **Credit Hours** | **16-17** |
| **Spring Semester** | |
| LATN/GREK Intermediate/Accelerated Latin or Greek II or CLAS Elective Course | 3-4 |
| CLAS/GREK/LATN Elective | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | 3 |
| Elective | 3 |
| Elective | 3 |
| **Credit Hours** | **15-16** |

**Year Three**

| **Fall Semester** | |
|---|---|
| CLAS/GREK/LATN Upper-division Course | 3 |
| CLAS/GREK/LATN Upper-division Course | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | 3 |
| Upper-division Elective | 3 |
| **Credit Hours** | **15** |
| **Spring Semester** | |
| CLAS/GREK/LATN Upper-division Course | 3 |
| CLAS/GREK/LATN Upper-division Course | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | 3 |
| Upper-division Elective | 3 |
| Upper-division Elective | 3 |
| **Credit Hours** | **15** |

**Year Four**

| **Fall Semester** | |
|---|---|
| CLAS/GREK/LATN Upper-division Course | 3 |
| Gen. Ed. Distribution/Diversity course (example: Natural Sciences/Global Perspective) | 3 |
| Upper-Division Elective | 3 |
| Upper-Division Elective | 3 |
| Upper-Division Elective | 3 |
| **Credit Hours** | **15** |
| **Spring Semester** | |
| CLAS/GREK/LATN Upper-division Course | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | 3 |
| Upper-Division Elective | 3 |
| Upper-division Elective | 3 |
| Elective | 3 |
| **Credit Hours** | **15** |
| **Total Credit Hours** | **120-122** |

# Learning Outcomes

By studying the literary, material and intellectual culture of the ancient world, students learn to think critically, argue effectively and communicate clearly in both speech and writing. More broadly, a rigorous and methodical engagement with the literature, history, thought and material culture of antiquity fosters thoughtful and creative reflection on contemporary society and the world at large. Students will thus engage with the complex intellectual, moral and historical questions presented by ancient cultures that are simultaneously familiar and strange. Students will gain exposure to Greek and/or Latin as an avenue to understanding a foreign culture. Classics is an inherently interdisciplinary field, with many threads of inquiry; students may focus on one track rather than another (e.g., literary and textual studies, history, or material and visual culture).

By the completion of the program, students will be able to:

- Share knowledge learned about the cultures and languages of the ancient world around the Mediterranean Sea.
- Evaluate and utilize the research methods of the discipline.
- Recognize the various impacts of the ancient world on the modern.
- Combine different categories of evidence—literary, historical, philosophical, religious and/or archaeological—to understand the ancient world.
- Read and interpret, with attention to literary and historical context, a variety of primary texts.
- Articulate persuasive arguments based on analysis of primary sources in light of modern interpretive frameworks.
- Demonstrate proficiency in Greek and/or Latin at the appropriate level.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

# BA and MA in Classics

The five-year BAM degree program in classics is designed for students who enter the University of Colorado ready to take courses in Latin or Greek at the 3000-level or above by the first semester of their sophomore year. The five-year degree combines the BA in Greek and/or Latin Language and Literature with the MA in Classics with a concentration in Greek or Latin. Students with strong research interests may be able to complete the BA with honors or the MA with a concentration in Greek or Latin.

## Admissions Requirements

In order to gain admission by application in the second semester of the sophomore year to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.0 or higher.
- Have completed a minimum of 60 credit hours of coursework.
- If a transfer student, have completed a minimum of 24 credit hours at CU Boulder.

The Department of Classics requires additional materials to evaluate the applicant's suitability for the program, including having earned a grade of B or higher in Latin and/or Greek courses at the 3000-level or above, transcript(s) and a list of three Classics professors who can attest to the applicant's abilities, as well as meetings with the Associate Chairs of Undergraduate and Graduate Studies.

## Program Requirements

Students may take up to and including 12 hours of graduate credit while in the undergraduate program which can later be used toward the master's degree. However, only 6 credits may be double counted toward the bachelor's degree and the master's degree; those 6 credits must be at the graduate level (5000-level or above) and may not be used to diminish the language class requirement for either degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

If you are interested in the BAM degree program, please contact the Classics graduate program for more information.

# Classics - Minor

Classics ranks among the most vibrant programs in humanistic studies at the University of Colorado. The department offers courses in language and literature, ancient history, art and archaeology, and philosophy. The department offers a minor in classics flexible enough to accommodate all interests within this wide-ranging field.

# Requirements

## Program Requirements

To earn a classics minor, students must:

- Take at least 18 Classics credits, including at least 9 upper-division Classics credits.
- Maintain at least a 2.0 GPA in all Classics courses, or any of a number of additional approved courses (see below).

Students may explore the great variety of the classical world or focus in on one or more aspects of it that ignite their curiosity and passion.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Approved Courses** | | |
| All GREK courses (Greek) | | |
| All LATN courses (Latin) | | |
| All CLAS courses (Literature, Culture, Thought; Ancient History; Art & Archaeology; Honors Thesis) | | |
| All classes a student takes in another department that are cross-listed with CLAS | | |
| ARTH 4929 | Special Topics in Art History (when taught in conjunction with ARTH 4939 as part of an Art Museums Internships course) | |
| ARTH 4939 | Art Museum Internship | |
| PHIL 3000 | History of Ancient Philosophy | |

If a student has taken a course in another department that they think might pertain to the Classics minor and wish to have that course count toward the minor in place of one of the approved courses listed above, they are encouraged to bring that course to the attention of the Associate Chair of Undergraduate Studies in Classics. Substitutions may be possible.

Note: Once a student begins taking upper-division (3000- or 4000-level) classes in Greek and/or Latin, they may not return to take lower-division classes in that language.

# Cognitive Science

Cognitive science is the study of human knowledge, of which one aspect is the study of how knowledge is acquired, stored and represented in the mind, including the mind's underlying biological mechanisms. Another aspect of cognitive science concerns how knowledge is understood, remembered, communicated and used in the performance of activities, including the acquisition and application of skills and information. This latter aspect provides the practical applications of cognitive science, and thereby ensures a demand for graduates in both academic and industrial markets.

Undergraduate students majoring in computer science; information science, integrative physiology; linguistics; philosophy; psychology and neuroscience; education; speech, language, hearing sciences may be interested in extending the breadth of their undergraduate studies to include the cognitive sciences and earn an undergraduate Certificate in Cognitive Science.

Training for graduates in cognitive science prepares students admirably for many of the fields that are targeted as the major growth fields of the 21st century: telecommunications, information processing, medical analysis, data retrieval, education and multimedia services.

The undergraduate program includes courses in the eight core departments with basic courses and two of five possible advanced skill sequences of courses. For more information, visit the Institute of Cognitive Science's Undergraduate Program (http://www.colorado.edu/ics/undergraduate-program/) webpage.

# Certificate

- Cognitive Science - Certificate (p. 242)

# Cognitive Science - Certificate

Undergraduate students majoring in psychology and neuroscience; philosophy; linguistics; computer science; speech, language and hearing sciences; education; integrative physiology; information science; or architecture and planning may be interested in extending the breadth of their undergraduate studies to earn a certificate in cognitive science.

Training in cognitive science prepares students admirably well for many of the fields that are targeted as the major growth fields of the 21st century: telecommunications, information processing, medical analysis, data retrieval, education and multimedia. As the world is enveloped by the information age, cognitive scientists will be uniquely positioned to deal with this information.

Students interested in the program can learn more on the department's Undergraduate Program (https://www.colorado.edu/ics/undergraduate-program/) webpage.

# Requirements

To earn the certificate, students must take at least six courses for a minimum of 18 credit hours. Students must receive a grade of C or better in all courses for the certificate and must have an overall grade point average of 3.0 or better.

Additional credit hours may be required as prerequisites to classes chosen to fulfill the certificate plan of study, but these courses usually also fulfill degree requirements. Proposed substitute courses must be preapproved by the ICS Academic Director.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| PSYC 2145 | Introductory Cognitive Psychology | 3 |
| CSCI 3702/ PHIL 3310/ LING 3005/PSYC 3005/SLHS 3003 | Cognitive Science | 3 |
| **Advanced Skills Requirements** | | **12-14** |
| Take a two-course advanced skills sequence from two of the following five areas, one sequence may be in the student's major. | | |
| *Psychology* | | |
| Taking classes in the psychology focus area would require a minimum of 7 units, and an aditional minimum of 4 units for prerequisites. | | |
| PSYC 4145 | Advanced Cognitive Psychology | |
| NRSC 4032 | Neurobiology of Learning and Memory | |
| PSYC 4155 | Cognitive Neuroscience/ Neuropsychology | |
| PSYC 4165 | Psychology of Perception | |
| PSYC 4175 | Computational Cognitive Neuroscience | |
| PSYC 4220 | Language and Mind | |
| *Linguistics* | | |
| Taking classes in the linguistics focus area would require a minimum of 6 units, and an additional minimum of 3 units for prerequisites. | | |
| LING 3100 | Language Sound Structures | |
| LING 3430 | Semantics | |
| LING 4220 | Language and Mind | |
| LING 4420 | Morphology and Syntax | |
| LING 4560 | Language Development | |
| *Computer Science* | | |
| Taking classes in the computer science focus area would require a minimum of 6 units and an additional minimum of 4 units for prerequisites. Choose two of the following: | | |
| CSCI 3002 | Fundamentals of Human Computer Interaction | |
| CSCI 3202 | Introduction to Artificial Intelligence | |
| CSCI 4830 | Special Topics in Computer Science | |
| *Philosophy* | | |
| Taking classes in the Philosophy focus area would require a minimum of 6 units, and an additional minimum of 3 units for prerequisites. Two of the following six courses in Philosophy: | | |
| PHIL 4300 | Philosophy of Mind | |
| PHIL 4340 | Epistemology | |
| PHIL 4400 | Philosophy of Science | |
| PHIL 4460 | Modal Logic | |
| PHIL 4490 | Philosophy of Language | |

| | |
|---|---|
| *Speech, Language and Hearing Sciences* | |
| Taking classes in the speech, language and hearing Sciences focus area would require a minimum of 6 units, and an additional 3 units for prerequisites. | |
| SLHS 3006 | Phonetics |
| SLHS 3106 | Hearing Science |
| SLHS 3116 | Anatomy, Physiology, and Science of Speech |
| SLHS 4502 | Language Disorders Across the Lifespan |
| SLHS 4560 | Language Development |
| **Total Credit Hours** | **18-20** |

# Distributed Studies Program

## Program Tracks

### Disciplinary & Divisional (D&D) Track

Admission to the disciplinary and divisional (D&D) track of the distributed studies (DIST) major requires completion of 60 credits or more, a one-year break in the student's academic career and permission from the College of Arts & Sciences dean's office.

The D&D track is intended for students who are returning to CU Boulder to complete their degree, have previously completed a significant number of credits toward the completion of one or more arts and sciences majors, are not able to continue and complete any A&S major and have taken a break in their academic career.

Students pursuing the D&D track must complete 54 total credits hours in the major broken down in the following way: They must complete 24 credit hours, including 12 at the upper-division level, in one of the disciplines offered by the college (e.g., chemistry, English, environmental studies or sociology) with grades of C- or better and complete 30 credit hours, including 15 at the upper-division level, in one of the college's three divisions (Arts and Humanities, Natural Sciences or Social Sciences) with grades of C- or better. Courses used to fulfill the disciplinary requirement in the major cannot also be used to fulfill the divisional part of the major.

Students must have a grade point average of at least 2.000 in all courses taken in both the disciplinary area and the divisional area of the major in order to graduate.

### Individually Structured Major (ISM) Track

An individually structured major (ISM) track also is available. Admission to this track of the distributed studies (DIST) major requires permission from the College of Arts & Sciences dean's office.

Before applying to pursue the ISM track, students must discuss their options with their A&S academic advisor and must work with a A&S faculty member to construct a major that focuses on some of aspect of the arts and sciences not adequately addressed by any other major, minor or certificate offered by the college or any combination of those majors, minors or certificates. An ISM cannot focus on an academic discipline taught in a different college at CU Boulder. (I.e., a student could not do an ISM focusing on some aspect of engineering, business, environmental design, education, music, communication, media or information science since other schools and colleges at CU Boulder offer majors in those fields.)

Any major constructed by a student pursuing the ISM track must meet the college's minimum major requirements of 30 credit hours and 18 upper-division credit hours in major coursework. Of the 18 upper-division credits 12 have to be in Arts & Sciences courses taught on the CU Boulder campus. Most ISMs, however, exceed these credit minimums. Students pursuing the ISM track must write and defend a thesis based on original scholarly or creative work. This thesis, which is overseen by the student's faculty sponsor, can be completed either by taking ARSC 4909 Senior Thesis for Individually Structured Major or in certain circumstance in a departmental honors program.

### Additional Information

Students pursuing either track in the distributed studies major cannot declare an additional major, minor or certificate and cannot pursue a double degree either within the College Arts and Sciences or in conjunction with another school or college at CU Boulder. No first-year course in a foreign language or a lower-division Written Communication course may be used to fulfill any requirements in a distributed studies major.

For more information about either of the tracks in the distributed studies major, students should consult with their College of Arts & Sciences academic advisor.

# Ecology and Evolutionary Biology

Ecology seeks to understand the processes that control the abundance and distribution of organisms and how they interact with one another in a changing environment. Evolutionary biology provides a unifying conceptual framework for all of biology, including the characteristics of organisms and biological diversity. Taken together, ecology and evolutionary biology form a fundamental, broad, diverse and interdisciplinary area of scientific inquiry. Study in both areas is necessary for understanding the complex biological issues of today, including fighting diseases, understanding of the responses of life and humankind to Earth's changing environment and learning how species develop, thrive and decline. Also, ecology and evolutionary biology are working toward solving some of the world's most demanding problems, including sustainability and the future of life on earth, human health and welfare and wise stewardship of our planet. Students majoring in ecology and evolutionary biology (EBIO) apply scientific approaches to issues in ecology and evolution, with an emphasis on critical evaluation of the literature, generating and testing hypotheses, designing and carrying out experiments to test predictions and articulating, in oral or written form, the results of investigations.

EBIO majors include students who:

- Have strong and compelling interests in the natural world and who are interested in making a difference.
- Are interested in pursuing advanced graduate degrees in science, especially biology.
- Want careers in the areas of natural resources management, environmental consulting, environmental law, environmental science, science teaching and scientific journalism, among other professions.
- Are passionate about making a difference in the lives of others by improving their physical and mental health.
- Are interested in many different areas of biology, from the molecular to ecosystem levels.
- Are fascinated with the complexity and diversity of nature.

The Bachelor of Arts in Ecology and Evolutionary Biology provides excellent training, education and experience, preparing students for many

successful careers and for admission to and success in graduate study or medical school and other health professions because:

- Ecology and evolution are subjects of central importance for understanding the ways all organisms live, grow and survive—everything from microbes to humans.
- The department and its classes provide students a broad learning experience in the biological sciences.
- The department's faculty provide EBIO majors with excellent classes and research opportunities.

**Course code for this program is EBIO.**

# Bachelor's Degree

- Ecology and Evolutionary Biology - Bachelor of Arts (BA) (p. 254)

# Minor

- Ecology and Evolutionary Biology - Minor (p. 257)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Adams, William (https://experts.colorado.edu/display/fisid_103612/)
Professor; PhD, Australian National University

Armstrong, David M.
Professor Emeritus

Barger, Nichole Nannette (https://experts.colorado.edu/display/fisid_131398/)
Associate Professor, Associate Chair; PhD, Colorado State University

Basey, John M. (https://experts.colorado.edu/display/fisid_105539/)
Senior Instructor; PhD, University of Nevada, Reno

Bekoff, Marc
Professor Emeritus

Bilinski, Teresa (https://experts.colorado.edu/display/fisid_166076/)
Instructor; PhD, University of Colorado Boulder

Bock, Carl L.E. (https://experts.colorado.edu/display/fisid_105580/)
Professor Emeritus; PhD, University of California-Berkeley

Bock, Jane H. (https://experts.colorado.edu/display/fisid_101979/)
Professor Emerita; PhD, University of California-Berkeley

Bonde, Erik K.
Professor Emeritus

Bowers, M. Deane
Professor, Chair; PhD, University of Massachusetts Amherst

Bowman, William D. (https://experts.colorado.edu/display/fisid_105191/)
Associate Chair, Professor; PhD, Duke University

Breed, Michael D. (https://experts.colorado.edu/display/fisid_103631/)
Professor; PhD, University of Kansas

Buchwald, Robert (https://experts.colorado.edu/display/fisid_148439/)
Instructor; PhD, University of Colorado Boulder

Carpenter, J. Harrison (https://experts.colorado.edu/display/fisid_115915/)
Senior Instructor; MS, Michigan Technological University

Clauset, Aaron (https://experts.colorado.edu/display/fisid_147554/)
Associate Professor; PhD, University of New Mexico

Corwin, Lisa A. (https://experts.colorado.edu/display/fisid_157940/)
Assistant Professor; PhD, University of California, Davis

Crumpacker, David W.
Professor Emeritus

Cundiff, Milford F. (https://experts.colorado.edu/display/fisid_105396/)
Associate Professor Emeritus; PhD, University of Colorado Boulder

Davies, Kendi F. (https://experts.colorado.edu/display/fisid_142304/)
Associate Professor; PhD, Australian National Univ (Australia)

Dee, Laura (https://experts.colorado.edu/display/fisid_166130/)
Assistant Professor; PhD, University of California, Santa Barbara

Demmig-Adams, Barbara (https://experts.colorado.edu/display/fisid_105649/)
Professor; Dr habil, University of Wurzburg (Germany)

Emery, Nancy Christine (https://experts.colorado.edu/display/fisid_156291/)
Assistant Professor; PhD, University of California, Davis

Evans, Luke M. (https://experts.colorado.edu/display/fisid_156753/)
Assistant Professor; PhD, Northern Arizona University

Fierer, Noah (https://experts.colorado.edu/display/fisid_142240/)
Professor; PhD, University of California, Santa Barbara

Flaxman, Samuel M. (https://experts.colorado.edu/display/fisid_145698/)
Associate Professor; PhD, Cornell University

Johnson, Pieter T.J. (https://experts.colorado.edu/display/fisid_143590/)
Professor; PhD, University of Wisconsin–Madison

Kane, Nolan Coburn (https://experts.colorado.edu/display/fisid_151238/)
Associate Professor; PhD, Indiana University Bloomington

Kelly, Caitlin (https://experts.colorado.edu/display/fisid_155528/)
Instructor; PhD, University of Colorado Boulder

Kociolek, John Patrick (https://experts.colorado.edu/display/fisid_145728/)
Professor; PhD, University of Michigan

Lewis, William M. Jr. (https://experts.colorado.edu/display/fisid_102314/)
Professor; PhD, Indiana University Bloomington

Li, Jingchun (https://experts.colorado.edu/display/fisid_157561/)
Assistant Professor; PhD, University of Michigan

Linhart, Yan B.
Professor Emeritus

Lynch, Carol B.
Professor Emeritus

Martin, Andrew (https://experts.colorado.edu/display/fisid_113238/)
Professor, Chair; PhD, University of Hawaii at Manoa

Mayer, Stephanie Susan (https://experts.colorado.edu/display/fisid_114948/)
Senior Instructor; PhD, University of California, Berkeley

McAdam, Andrew Graham (https://experts.colorado.edu/display/fisid_166624/)
Associate Professor; PhD, University of Alberta (Canada)

McCain, Christy (https://experts.colorado.edu/display/fisid_145010/)
Associate Professor; PhD, University of Kansas

McKenzie, Valerie J. (https://experts.colorado.edu/display/fisid_142951/)
Associate Professor, Associate Chair; PhD, University of California, Santa Barbara

Medeiros, Daniel Meulemans (https://experts.colorado.edu/display/fisid_145697/)
Associate Professor; PhD, California Institute of Technology

Melbourne, Brett Andrew (https://experts.colorado.edu/display/fisid_144966/)
Associate Professor; PhD, Australian National University

Mitton, Jeffry B. (https://experts.colorado.edu/display/fisid_101058/)
Professor; PhD, SUNY at Stony Brook

Monson, Russell K.
Professor Emeritus

Nichols, Harvey
Professor Emeritus

Quandt, Catherine Alisha (https://experts.colorado.edu/display/fisid_159414/)
Assistant Professor; PhD, Oregon State University

Resasco, Julian (https://experts.colorado.edu/display/fisid_153799/)
Assistant Professor; PhD, University of Florida

Safran, Rebecca J. (https://experts.colorado.edu/display/fisid_145518/)
Professor; PhD, Cornell University

Schmidt, Steve (https://experts.colorado.edu/display/fisid_103713/)
Professor; PhD, Cornell University

Seastedt, Timothy
Professor, Associate Chair; PhD, University of Georgia

Smith, Stacey Dewitt (https://experts.colorado.edu/display/fisid_153407/)
Associate Professor; PhD, University of Wisconsin–Madison

Stock, David W. (https://experts.colorado.edu/display/fisid_113762/)
Associate Professor; PhD, University of Illinois at Urbana–Champaign

Suding, Katharine Nash (https://experts.colorado.edu/display/fisid_116718/)
Distinguished Professor; PhD, University of Michigan Ann Arbor

Sweeney, Derek Michael (https://experts.colorado.edu/display/fisid_131083/)
Instructor; MA, University of Colorado Boulder

Taylor, Scott (https://experts.colorado.edu/display/fisid_156318/)
Assistant Professor; PhD, Queen's University (Canada)

Tripp, Erin Anne (https://experts.colorado.edu/display/fisid_152313/)
Associate Professor; PhD, Duke University

Turetsky, Merritt (https://experts.colorado.edu/display/fisid_165975/)
Professor; PhD, University of Alberta (Canada)

Wessman, Carol A. (https://experts.colorado.edu/display/fisid_100909/)
Professor Emerita; PhD, University of Wisconsin–Madison

Windell, John T.
Professor Emeritus

Winston, Paul W.
Professor Emeritus

# Courses

**EBIO 1010 (3) Introduction to Statistics and Quantitative Thinking for Biologists**
Focuses on the collection, visualization and analysis of data that are relevant for advancing critical thinking, student-directed learning, and the development of quantitative analysis skills, with an emphasis on using R and examples from ecology and evolutionary biology.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Arts Sci Gen Ed: Quantitative Reasoning Math

**EBIO 1020 (1) Introduction to Ecology and Evolutionary Biology**
Introduces students to EBIO. Provides an overview of the major and how it differs from other biology programs; how to get involved in clubs, research, and/or internship opportunities; strategies for succeeding in EBIO courses; and career options. This is a first-year colloquium course specifically designed for freshman and other students exploring their educational and career opportunities.

**EBIO 1100 (3) Biology and Society**
Lect. Studies the dynamic relationships between the biological sciences and society. Areas of inquiry include interconnections between ecological and evolutionary theory and concepts and emergent questions being raised on a societal level. Students will explore topics such as human populations and sexual reproduction; biological factors affecting sociability and social patterns; environmental change with a focus on global biodiversity and the services to people; natural resource management; and public health. Recommended for majors and non-majors.
**Requisites:** Requires corequisite course of EBIO 1110.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 1110 (1) Biology and Society Laboratory**
One two-hour lab per week. Provides experiments and exercises relating to concepts presented in EBIO 1100. Recommended for majors and non-majors. When taken with EBIO 1100, meets the MAPS requirement for natural science: lab.
**Requisites:** Requires corequisite course of EBIO 1100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 1210 (3) General Biology 1**
Lect. Provides a concentrated introduction to molecular, cellular, genetic, and evolutionary biology. Emphasizes fundamental principles, concepts, facts, and questions. Intended for science majors.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**EBIO 1220 (3) General Biology 2**
Provides a concentrated introduction to organisms, homeostasis, development, behavior, and ecology. Emphasizes fundamental principles, concepts, facts,and questions. Intended for science majors.
**Recommended:** Prerequisite EBIO 1210 (minimum grade C-).
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 1230 (1) General Biology Laboratory 1**
One 3-hour lab per week. Consists of experiments and exercises to provide an extension of basic concepts and scientific approaches presented in General Biology 1. Intended for science majors.
**Recommended:** Prerequisite or corequisite EBIO 1210 (minimum grade C-).
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science Lab or Lab/Lec
MAPS Course: Natural Science

**EBIO 1240 (1) General Biology Laboratory 2**
One 3-hour lab per week. Consists of experiments and exercises to provide an extension of basic concepts and scientific approaches presented in General Biology 2. Intended for science majors.
**Recommended:** Prerequisite or corequisite EBIO 1220 (minimum grade C-).
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 1250 (4) Introduction to Ecology and Evolutionary Biology Research**
Introduces students to research in ecology and evolutionary biology topics in the context of investigations about Boulder¿s local historic apple trees. Students will learn about the genetics, physiology, and urban ecology of the trees in the lecture and have the opportunity to research one of these topics more in depth in the laboratory courses. Results from the research on Boulder¿s Apples will be reported back to the Boulder community by student researchers.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 1300 (1-3) Topics in Biological Sciences**
Covers special topics in biology for freshmen or nonmajors. Introduces scientific methods and principles in biology, as well as issues of current interest in biology. Does not count toward the major in EBIO.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 1500 (3) Introduction to Marine Biology**
This course introduces students to marine ecosystems, with particular emphasis on how marine species interact with one another and with their physical environment, and how knowledge of these relationships can inform marine conservation. This course also introduces students to foundational principles of marine biology research, current research topics in marine biology, and the processes involved in conducting scientific research in marine ecosystems.
**Recommended:** Prerequisites EBIO 1210 and/or 1220 and/or 1100 and/or 1250.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 1940 (3) Introduction to Scientific Writing**
Introduces first- and second-year science majors to genres and strategies for communicating science in academic writing. Directs learning activities toward developing academic research projects, reading and analyzing published science journal articles, and writing to professional and lay audiences.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Lower

**EBIO 2010 (1-3) Environmental Issues and Biology**
Lect. Describes how the natural environment is currently stressed by a variety of human actions. Examines the nature of these environmental problems and their impact on living organisms, both human and nonhuman species.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 2040 (4) Principles of Ecology**
Lecture and laboratory. Introduces principles of ecology, emphasizing patterns and processes at various levels of biological organization. Scope global, but examples often from local environment. Laboratory emphasizes techniques of field biology. Uses animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 2640 and ENVS 2000
**Recommended:** Prerequisites EBIO 1030 and EBIO 1040 and EBIO 1050 or EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 2070 (4) Genetics: Molecules to Populations**
Lect. and rec. Covers principles of genetics and developmental biology at levels of molecules, cellular organelles, individuals and populations; asexual and sexual life cycles; heredity. Recitations allow discussion of genetics problems and implications of genetic principles and provide demonstrations and simulations of genetic processes. Intended for sophomore majors in EBIO.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 2640
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 2090 (3) Tropical Island and Marine Ecology**
Examines fundamental concepts of marine ecology, emphasizing organismal diversity, species interactions, dispersal, colonization, physiology and adaptations. Includes study of beach and coral formation, island organisms and their population dynamics. Students may also register for an optional 1 credit, one week, tropical island and coral reef trip that complements the lecture portion of the class but has an additional cost.
**Recommended:** Prerequisite EBIO 1220 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 2091 (3) Field Studies in Marine and Island Ecology and Oceanography**
Investigates tropical island and marine ecology as well as all four disciplines of oceanography. A three-credit course focused on a tropical island ecology and oceanography field trip that complements the lecture portion of EBIO 2090 and ATOC 3070 with an additional cost. Examines fundamental concepts of marine ecology, emphasizing organismal diversity, species interactions, study of beach and coral formation, island formation, organisms and their population dynamics. The course consists of a one-week field trip to the Keys Marine Laboratory in the Florida Keys and once-weekly class room meeting (of variable duration from 1-4 hours) throughout the semester.
**Requisites:** Requires a corequisite course of EBIO 2090 or ATOC 3070 or GEOL 3070.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 2640 (5) Honors Principles of Ecology**
Lect., lab, and rec. Introduces principles of ecology, emphasizing patterns and processes at various levels of biological organization. Scope global, but examples often from local environment. Laboratory emphasizes techniques of field biology. Uses animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 2040 and ENVS 2000
**Recommended:** Prerequisites EBIO 1030 and EBIO 1040 and EBIO 1050 or EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sciences Honors Course
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 2840 (1-6) Independent Study: Lower Division**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**EBIO 3000 (3) Basic Cannabis Science**
A comprehensive course that organizes its content around three key aspects: the plant, the people, and the culture. This course is designed to provide enthusiasts with or without a scientific background a foundational understanding of Cannabis sativa.
**Recommended:** Prerequisite basic biology.
**Grading Basis:** Letter Grade

**EBIO 3010 (1-2) Teaching Biology**
Provides an opportunity to assist in teaching of specific lecture or laboratory section in EBIO under direct faculty supervision. Students must first make arrangements with the appropriate faculty member and turn in a form to the EBIO office.
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.

**EBIO 3020 (1) Next Steps: Preparing for Life After Graduation**
Helps upper-division students prepare for what comes after graduation. Topics include exploring careers; how to write a resume or CV; interviewing tips; how to build your portfolio; asking for letters of recommendations. This course is specifically designed for juniors starting to prepare for the next stage post-graduation.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 3020 and MCDB 3020
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Pass/Fail

**EBIO 3040 (4) Conservation Biology**
Applies principles of population ecology, population genetics, biogeography, animal behavior, and paleobiology to the maintenance of biodiversity and natural systems. The resulting theory is then applied to conservation policy and management techniques.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3040
**Recommended:** Prerequisite EBIO 2040 or EBIO 2640 or ENVS 2000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3080 (4) Evolutionary Biology**
Lect. and lab. Emphasizes the fundamental evolutionary concepts that provide explanations for the diversification of life on Earth. Specific topics include the evidence for evolution, adaptation by natural selection, speciation, systematics, molecular and genome evolution, and macroevolutionary patterns and processes. Recitations allow students to explore specific topics in more depth and smaller groups.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 3680
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3110 (3) Population and Community Ecology**
Presents principles of ecology that relate to the niche, population growth, metapopulations, population interactions (within and between trophic levels), community structure and development, landscape ecology and species diversity.
**Recommended:** Prerequisite EBIO 1240 or EBIO 2640 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3170 (3) Mountain Ecology and Conservation**
Focuses on the ecology of mountain environments around the world, including climatic gradients, plant and animal diversity and distributions, habitat zonation, evolutionary processes, and various aspects of montane conservation from habitat change to climate change.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 2040 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3180 (3) Global Ecology**
Lect. Involves study of ecological principles and problems at the biosphere level. Presents a worldwide approach to populations, biotic resources, ecologic interactions, land use, deforestation, desertification, species extinctions, pollution, environmental quality, global change, and environmental ethics.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3190 (3) Tropical Marine Ecology**
Lect. Examines the biology and ecology of marine ecosystems, emphasizing those occurring in tropical regions such as coral reefs. Studies how these ecosystems are changing and the future impact of human stress on the marine environment.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite any two-semester introductory biology course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3240 (4) Animal Behavior**
Lect. and lab. Topics include basic concepts and history, methods of study, ethical issues, neurobiology, behavior, the development of behavior, predator-prey relationships, communication, aggression and dominance, mating systems, cognitive ethology, and parental care. When possible, life-history strategies, the evolution of behavior, and behavioral ecology are stressed. Uses animals and animal tissues.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3400 (3) Microbiology**
Surveys distinguishing characteristics of microorganisms based on structural-functional relationships, taxonomy, growth and physical-chemical agents of control including antibiotics, metabolism and genetics. Introduces applied microbiology emphasizing infectious diseases, basic concepts of immunology and microbial ecology. Uses animals and/or animal tissues.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3410 (2) Microbiology Lab**
Accompanies EBIO 3400.
**Requisites:** Requires a prerequisite or corequisite course of EBIO 3400 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3523 (3) The Art and Strategy of Science Communication: Branding Climate Change**
Integrating the science of climate change and science communication with the research, strategy and execution practices of strategic communication (e.g., advertising and public relations).
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 3523
**Grading Basis:** Letter Grade

**EBIO 3590 (4) Plants and Society**
A writing intensive course for majors and non-majors which acquaints students with the history of plant use in our society. Topics center on the evolving relationship between humans and plants as food sources, medicines, fuel, and other products, such as fibers and dyes.
**Recommended:** Prerequisite EBIO 1100 or EBIO 1210 or EBIO 1220 or EBIO 1250 (minimum grade C).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3630 (4) Parasitology**
Lect. and lab. Surveys animal parasites, including life histories; emphasizes parasites of humans. Uses animals and/or animal tissues.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3680 (5) Honors Evolutionary Biology**
Lect., rec., and co-sem. Emphasizes the fundamental evolutionary concepts that provide explanation for the diversification of life on Earth. Specific topics include the evidence for evolution, adaptation by natural selection speciation, systematics, molecular and genome evolution, and macroevolutionary patterns and process. Recitations allow students to explore specific topics in more depth and smaller groups.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 3080
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 and EBIO 2070 (minimum grade C-).
**Additional Information:** Arts Sciences Honors Course
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3850 (4) Animal Diversity: Invertebrates**
Lect. and lab. Offers a broad study of the biology of the most diverse group of organisms on Earth. Areas include ecology, physiology, evolution and morphology of aquatic and terrestrial forms. Uses animals and/or animal tissues.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3930 (1-6) Internship**
Provides course credit for upper-division students¿ experiential learning while employed in paid and non-paid positions associated with ecology and life sciences, including wildlife rehabilitation/reintroduction, STEM outreach/education, and lab/field research assistantships. Course credit dependent upon work hours. Repeatable for up to 6 total credit hours.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**EBIO 3940 (3) Written Communication in the Sciences**
Focuses upon written communication commonly practiced by scientists. Directs learning activities toward reporting and proposing research via the strategic use of typified genres, arguments, and visual representations. Prepares students for communication tasks within advanced study and science careers.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite Completion of two 2000-level classes and one 3000-level class in the student¿s science major or minor (all minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**EBIO 3980 (2) Seminar: Introduction to EBIO Honors**
Offers an opportunity for students who are either exploring the option of writing an Honors thesis, or are in the process of conducting Honors research, to receive guidance on the process of thesis writing, evaluation and presentation of research results and thesis defense. Thesis requirements and the role of the A&S Honors Council will be discussed. Also offers the opportunity to hear practice defense talks from the graduating Honors candidates.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sciences Honors Course

**EBIO 3990 (1-3) EBIO Honors Thesis Research**
Provides an introduction to the departmental Honors program. Consists of individual library research on a potential Honors thesis topic under the guidance of a faculty mentor.
**Requisites:** Restricted to Ecology and Evolutionary Biology (EBIO) majors only.
**Recommended:** Prerequisites minimum 3.2 GPA and approval by departmental honors committee.

**EBIO 4010 (3) Spatial Ecology: Concepts and Data Analysis**
Deals with the examination and modeling of the fundamental role of space in ecological patterns and process. Explicitly accounting for space is important for virtually all questions in basic and applied in ecology.
**Recommended:** Prerequisites EBIO 1010 (3) Introduction to Statistics and Quantitative Thinking for Biologists, EBIO 2040 (4) Principles of Ecology, Recommended: EBIO 4060 (3) Landscape Ecology.

**EBIO 4030 (3) Limnology**
Examines the ecology of inland waters, including a detailed consideration of physical, chemical and biological properties of freshwater ecosystems: origins and major characteristics of lakes and streams, survey of chemical and nutrient cycles in freshwater habitats and survey of biotic composition of freshwater environments. Important themes in modern freshwater ecology are considered, including energy flow, trophic structure, eutrophication and management of freshwater ecosystems.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5030
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4040 (3) Speciation**
The process by which new species arise is fundamental to understanding life¿s diversity, with implications for how we define and protect species. In this class, we will explore models of adaptive and non-adaptive speciation and how we test, find evidence for, and distinguish among these. Each class will include both a short lecture and discussion. Students will be able to choose and work on independent projects on any area of speciation research.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5040
**Recommended:** Prerequisite EBIO 1220 and EBIO 3080.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4050 (4) Fish Biology**
Explores the tremendous diversity of this group, which includes eyeless catfish named after Satan and cast out of underground aquifers by artesian wells, loaches that cling to rocks in mountain torrents with fin-derived suction cups, lungfish in mud cocoons that metabolize their own muscles while waiting for the rains to return, degenerate male anglerfish that parasitize their mates in the blackness of ocean depths, and flying fish that glide above the surface of the open sea to escape the slashing bills of sailfish below. Lectures will cover form and function, evolution, the fossil record, reproduction and development, genetics, behavior, ecology, distribution, and conservation of fishes. The laboratory will stress fish identification, anatomy, and development.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5050
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Arts Sci Gen Ed: Distribution-Natural Sci Lab

**EBIO 4060 (3) Landscape Ecology**
Studies distributional patterns of communities and ecosystems, ecological processes that affect those patterns, and changes in pattern and process over time. Consideration of spatial and temporal scales in ecological analyses is required to understand and predict response to broad-scale environmental change.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5060
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 and EBIO 2040 or EBIO 2640 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4080 (4) Freshwater Phycology**
Algae are a non-monophyletic group of organisms that play critical roles in ecosystem structure and function. They have a long history of being used in a variety of ways by the human species, but are increasingly being applied to modern issues of understanding water quality and climate change, engineering at the nano scale and in the production of renewable biofuels.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5080
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4090 (4) Coral Reef Ecology**
Combines classroom-based instruction in the Fall semester with an international, field-based SCUBA diving expedition to learn about the incredible coral reef ecosystems of the Caribbean, Curacao (in early January). Students learn about and observe a variety of organisms that make the reef their home. The course covers threats to coral reefs worldwide as well as ongoing efforts aimed at conservation. Scuba certification required.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite any ecology course is a highly recommended.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4100 (3) Advanced Ecology**
Emphasizes specific aspects of ecology based on specialties of faculty. One or more courses are offered most semesters. Topics have included dynamics of mountain ecosystems, tundra ecology, ethnoecology, population dynamics, tropical and insular biology, ecology of fishes, quantitative plant ecology, and arctic and alpine environments. May use animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5100
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 and EBIO 2040 or EBIO 2640 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4120 (2-4) Advanced Ecology**
Emphasizes specific aspects of ecology based on specialties of faculty. One or more courses are offered most semesters. Topics have included dynamics of mountain ecosystems, tundra ecology, ethnoecology, population dynamics, tropical and insular biology, ecology of fishes, quantitative plant ecology and arctic and alpine environments. May use animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5120
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 and EBIO 2040 or EBIO 2640 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4130 (3) Behavioral Ecology**
This course explores the general themes and important questions in the fascinating field of behavioral ecology. How do animals behave and why do they behave as they do? Students will come to understand both the historical foundations of the field and current research. Specific topics include cognition, learning, foraging strategies, mating systems, parenting, social behavior, and more. Formerly offered as a special topics course.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 (all minimum grade C-).

**EBIO 4140 (3) Plant Ecology**
Examines the relationships between plants and their physical and biological environments, encompassing physiology, competition, plant-soil and plant-animal interactions, population dynamics, diversity, and influence on ecosystem function.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4145 (4) Restoration Ecology**
Examines ecological theories that inform the practice of ecological restoration, with particular emphasis on grassland ecosystems near Boulder and linkages with social, political and economic factors. In conjunction with local partner organizations, students work on a current management challenge, generate novel data using accepted field techniques, and formulate a professional restoration management plan.
**Requisites:** Requires prerequisite EBIO 2040 or ENVS 3434 or CVEN 3434 (all minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4150 (1-2) Techniques in Ecology**
Emphasizes application of modern ecological techniques, such as stream biology, aquatic biology, environmental measurement and control, and techniques in geoecology.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5150
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 and EBIO 2040 or EBIO 2640 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4155 (4) Ecosystem Ecology**
Integrates information from physics (energetics), chemistry (element properties) and biology (evolutionary traits, photosynthetic pathways) to understand the structure and functioning of ecosystems. Provides an analysis of biotic community responses and feedbacks to environmental change drivers. Strong focus on water, nutrient cycling and carbon dynamics of diverse terrestrial and aquatic landscapes.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 4155, EBIO 5155 and ENVS 5155
**Recommended:** Prerequisites general biology, EBIO 2040 or equivalent.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4160 (3) Introduction to Biogeochemistry**
Covers fundamentals of biogeochemical cycling, emphasizing water, carbon and nutrient dynamics in terrestrial ecosystems; chemical interactions of atmosphere, biosphere, lithosphere and hydrosphere; natural and human-managed environments.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 4160 and GEOL 4160
**Recommended:** Prerequisites GEOL 3320 or EBIO 3270 and CHEM 1011 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4175 (3) The Scientific Basis for Ecosystem Management of Public Lands**
An advanced field ecology course emphasizing measurements, statistical procedures and biotic data information management relevant to land management issues. Develops concepts of adaptive ecosystem management using ongoing field studies on public land in the Colorado Front Range.
**Recommended:** Prerequisites EBIO 3270 and EBIO 4500 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4200 (4) Marine Ecological Research**
Examines marine community ecology and species interactions in tropical coral reef systems immersing students in field research, from conceptualization to final products. This course includes a significant writing component engaging students in original research experiences at an international research station. Weekly 1 hour meetings during the semester followed by an 18-day field international research trip immediately following finals week.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 and EBIO 2040 and EBIO 3080.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Arts Sci Gen Ed: Distribution-Natural Sci Lab

**EBIO 4220 (3) Advanced Cannabis Science**
This course provides a thorough exploration of Cannabis sativa, covering its phenotype, biochemistry, genetics, evolution, breeding, biotechnology, and intellectual property protection. Aimed at individuals with some knowledge about C. sativa, it delves deeper into recent scientific advancements. Topics include C. sativa biochemistry, genetics, modern cultivation techniques, sustainable practices, plant patents, and biotechnological applications. While no strict prerequisites exist, a background in science, biology, and chemistry is recommended. The course builds on EBIO 3000, and although not a requirement it is highly recommended. EBIO 4220 welcomes students with diverse backgrounds, provided they have exposure or experience in biology, genetics, and chemistry.
**Recommended:** of EBIO 3000.
**Grading Basis:** Letter Grade

**EBIO 4270 (4) Population Genetics**
Provides an in-depth applied introduction to population genetics. Lectures, discussions and labs will focus on exploring how evolutionary processes shape genetic variation through time and space and how population-level evolutionary processes can be inferred from patterns of genetic variation. While learning basic population genetic theory we will investigate current topics in the field and work with simulated and real data.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5270
**Requisites:** Requires prerequisite courses of EBIO 2070 and EBIO 3080 (all minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4290 (4) Phylogenetics and Comparative Biology**
Reviews the principles and methodology of phylogenetic inference using molecular data. Emphasizes the application of comparative approaches to hypothesis testing in evolution, ecology and medicine and provides a broad foundation in both theory and practice of phylogenetics.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5290
**Recommended:** Prerequisite EBIO 3080 (minimum grade C-) or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4300 (3) Ecology and Evolution in Ecuador: From the Amazon to the Galapagos**
This is a field¿based, experiential course that takes place in the Amazon Rainforest, the Ecuadorian Cloud Forest, and selected islands of the Galápagos Archipelago. Additionally, we meet 7 times during the fall semester on campus. The course is designed to introduce students to ecology and evolution in rainforests and islands; the value of field observations and keeping a notebook as a record of your observations and thoughts; the value of islands for understanding human influences on populations of plants and animals; the use of illustration for making observations of the characteristics, distribution, and abundance of animals and plants.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite EBIO 1220 (General Biology 2), EBIO 2040 (Principles of Ecology) and EBIO 3080 (Evolutionary Biology).
**Grading Basis:** Letter Grade

**EBIO 4320 (4) Conservation Planning and Structured Decision Making**
We are impacting our planet at unprecedented rates, creating policy challenges to conserve biological diversity, ecosystems, and the benefits that ecosystems provide to people (e.g., clean water, recreation, climate stabilization). But, how do we best tackle these challenges, given limited resources (time, money) for conservation, and multiple stakeholders with different objectives? This course will provide foundational knowledge in conservation planning and a tool-box to formulate and solve complex problems in ecosystem management and in life.
**Recommended:** Prerequisites (EBIO 1220 and EBIO 1240) or (EBIO 1250 and/or EBIO 1100 and EBIO 1110) or EBIO 2040.

**EBIO 4340 (4) Conservation Biology and Practice in Brazil's Atlantic Forest**
Field Studies. Examines the application of conservation principles in the Atlantic Forest of Brazil, a 'biodiversity-in-crisis' setting. Explores successful conservation strategies integrated with efforts to alleviate socioeconomic issues. Three-week Maymester, Study Abroad Global Seminar.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5340 and ENVS 4340 and ENVS 5340
**Recommended:** Prerequisite EBIO 2040 or ENVS 2000 or 2000/higher-level course in ANTH, EBIO, ENVS, EVEN, GEOG, IAFS or other discipline related to ecology or sustainability.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4360 (3) Lifestyle Medicine**
Student will self-select a semester-long personalized project for researching and learning about a topic they are passionate about in the context of the impact of environment and lifestyle on human health and wellbeing. Students will have continuous access to one-on-one instructor support and feedback, and credit will be given for completion of specific milestones throughout the semester.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5360

**EBIO 4370 (3) Genetically Engineered Organisms**
Explores the genetic engineering of microorganisms, fungi, plants, animals, coral reefs, and humans from the many demonstrated and anticipated benefits to the various concerns that have been raised by the explosive growth of research in this area. The course will be largely student-driven, in that each student will pursue different areas to research and present to the class. Students are encouraged to pursue a topic about which an interest and/or passion can be developed! Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5370

**EBIO 4410 (4) Biological Statistics**
Lect. and lab. Offers a demanding, problems-oriented methods course in statistical inference procedures, assumptions, limitations, and applications emphasizing techniques appropriate to realistic biological problems. Includes data file management using interactive computing techniques.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5410
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Arts Sci Gen Ed: Quantitative Reasoning Math

**EBIO 4420 (3) Computational Biology**
Covers a wide range of techniques for simulating biological systems, developing computer programs and scripts to interact with data and making research shareable and reproducible.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5420
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4440 (4) Animal Developmental Diversity**
Surveys development in a range of vertebrate and invertebrate systems to reconstruct the common bilatorian ancestor, and elucidate the developmental genetic changes underlying animal diversification. Lab focuses on vertebrate embryos and explores key methods in evolutionary developmental biology including in situ hybridization, embryo microinjection, and transgenesis.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5440 and MCDB 4441 and MCDB 5441
**Recommended:** Prerequisites MCDB 1150 or EBIO 1210 and MCDB 2150 or EBIO 2070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4460 (1-5) Special Topics**
Familiarizes students with specialized areas of biology.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5460
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4500 (4) Plant Biodiversity and Evolution**
Surveys plant types emphasizing diagnostic features of plants in general and major taxa in particular. Focuses on identity, morphology, anatomy, reproduction, ecology, geography, evolution, fossil record, and economic use of taxa.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5500
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4510 (4) Plant Anatomy and Development**
Lect. and lab. Introduces structures of seed plants, especially angiosperms, and developmental history of these structures. Studies cell types, and their location and function in plant tissues and organs. The laboratory provides an opportunity to examine plant tissues and to prepare tissues for examination by the light microscope. Stresses role of plant structures in the living plant.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5510
**Recommended:** Prerequisites, EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4511 (3) Microbial Ecology**
Aims to gain an understanding of the critical roles that microbes play in the biosphere, and why they play those roles. We start with with fundamental concepts (e.g. microbial physiology and evolution) and build up to an understanding of how the biosphere functions (e.g. biogeochemistry and nutrient dynamics at the ocean-sediment interface) by reading both current and classical literature in the field.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5511
**Requisites:** Requires prerequisite courses of EBIO 2040, EBIO 3080 and EBIO 3400 (all minimum grade C-).

**EBIO 4520 (4) Flowering Plant Diversity**
Emphasizes the morphology, evolution, classification, phylogeny, natural history, identification, and economic importance of plants, with a focus on flowering plants (angiosperms). Because flowering plants are dominant and keystone features of both our natural and developed world, capacity to understand them from an evolutionary and ecological perspective is an important skill for anyone interested in field biology, ecology, evolution, environmental resource management, or simply in being a good steward to the land and to your society.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5520 and MUSM 5520
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4560 (4) The Lichen Biome**
Focuses on lichens as biologically diverse hubs of interactions, and will cover numerous dimensions of diversity within the symbiosis (algae, bacteria, and ecological and evolutionary relationships therein) and beyond it (diversity of lichen symbioses in nature, their functions, and conservation).
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5560
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4590 (3) Soil Ecology**
This course explores soil ecology in both natural and managed systems, focusing on the biology of soils and the role of soil biota in nutrient cycling, soil formation, and the maintenance of soil fertility. Goal is to provide students with an appreciation of the soil system and build a comprehensive understanding of the relevance of soil biota to agriculture, global change, and ecosystem health, with a focus on the key issues/ unanswered questions in the field of soil ecology.

**EBIO 4600 (4) Evolutionary Ecology**
Evaluates how interactions within species, among species and between species and the environment evolve over time. Emphasizes the development of scientific skills, including ecological, genetic and statistical tools for testing hypotheses in evolutionary ecology. Lab activities include research projects that quantify natural selection, gene flow and phenotypic plasticity in natural systems, and a semester-long class experiment examining plant dispersal.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5600
**Requisites:** Requires prerequisite courses of EBIO 2040 and EBIO 3080 (all minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4620 (4) Mycology: the Biology of Fungi**
A broad taxonomic and biological survey of fungi. This is an upper division lecture, field, and lab-based course designed for biology majors interested in microbial science. Field and Laboratory components include two lab practicals in which students identify macro- and micro-fungi, preparation of a fungal specimen collection, and the use of light microscopy for identification and visualization of fungal structures. Formerly offered as a special topics course.
**Requisites:** Requires prerequisite course of (EBIO 1220 and EBIO 1240) or MCDB 2150 (all minimum grade C-).
**Recommended:** Prerequisites EBIO 2070 and EBIO 3080.
**Grading Basis:** Letter Grade

**EBIO 4640 (3) Plant Field Studies**
Includes field-oriented courses offered at irregular intervals during the academic year or during summer sessions.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of EBIO 2040 or EBIO 2640 or ENVS 2000 (all minimum grade C-).
**Recommended:** Prerequisites EBIO 2040 and EBIO 2640 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4660 (4) Insect Biology**
Lect. and lab. Introduction to evolution, ecology, physiology, and behavior of insects. Emphasizes how insects have solved problems, such as maintaining water balance or finding food, that are shared by all animals but for which there may be unique solutions among the insects. Agricultural and human health problems relative to entomology are discussed. Uses animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5660
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4700 (3) Quantitative Genetics**
Explores how the differences at the DNA level impact variability within and among individuals, and how that variation is shaped by interactions with environments. Quantitative genetics covers a range of topics, but in this course we will focus on the methods and approaches to investigate complex traits, those influenced by many genes and environmental factors, emphasizing the evolutionary forces that shape variation. We will analyze real genetic data (human, plant, mouse, etc.), and prepare our findings as written manuscripts or oral presentations. Some familiarity with basic genetic principles is assumed. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5700
**Requisites:** Prerequisite of EBIO 2070 or MCDB 2150 (min grade of C-).

**EBIO 4740 (3) Biology of Amphibians and Reptiles**
Comparative morphology, taxonomy, ecology, behavior and geographic distribution of amphibians and reptiles. Uses animals and animal tissue.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5740
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4750 (4) Ornithology**
Lect., lab, and field trips. Presents origin, evolution, ecology, physical and behavioral characteristics and taxonomy of orders and families of birds of North America; field work with local species emphasizing avian ecology. Uses animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5750
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4760 (4) Mammalogy**
Lect., lab, and field studies. Discusses origin, evolution and adaptation, geographic distribution, ecology and taxonomy of mammals; field and laboratory study of Coloradan species. Uses animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5760 and MUSM 5760
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 2040 and EBIO 2640 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4800 (3) Critical Thinking in Biology**
Lect. and discussion. Explores controversial issues, historical themes, or emerging developments in biology. Consult the EBIO Undergraduate Advising Center for current listings.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5800
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite minimum of 14 hours of EBIO course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4811 (3) Teaching and Learning Biology**
Provides an introduction to recent research into student learning on the conceptual foundations of modern biology, together with pedagogical methods associated with effective instruction and its evaluation. Students will be involved in active research into conceptual and practical issues involved in biology education, methods to discover student preconceptions, and the design, testing and evaluation of various instructional interventions.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 6811 and MCDB 4811 and MCDB 5811 and EDUC 4811

**EBIO 4840 (1-6) Independent Study: Upper Division**
.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**EBIO 4860 (1-2) Critical Thinking in Biology - Lab**

**EBIO 4870 (1-6) Independent Research: Upper Division**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**EBIO 4900 (1-6) Public Health Practicum**
Offers practical experience in Public Health with direct supervision.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4900 and MCDB 4900
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**EBIO 4940 (3) Honors Thesis Writing for Science Majors**
In this course, students will plan, write, and edit an Honors thesis based on a pre-approved Honors research project in the life sciences. The thesis will adhere to discipline-specific expectations and follow the format of a manuscript for submission to a non-specialty scientific journal. Following the thesis defense, students will continue to extend their writing into areas that will support them in persuading future employers or graduate programs of their ability to communicate, evaluate, and conduct scientific research.
**Recommended:** Students must be approved for an Honors thesis project and be planning to defend their Honors thesis by the end of the semester they are enrolled in the class.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Written Communication-Upper

**EBIO 4980 (2) Seminar: EBIO Honors Thesis**
Offers guidance to graduating Honors students during the process of thesis writing, evaluation and presentation of their research results and thesis defense. Thesis requirements and the role of the A&S Honors Council will be discussed. All graduating candidates will present a practice defense talk for peer feedback and will be expected to offer feedback to their peers.
**Recommended:** Prerequisites minimum 3.3 GPA and a declared EBIO major and approval by departmental honors committee.
**Additional Information:** Arts Sciences Honors Course

**EBIO 4990 (1-3) EBIO Honors Thesis Research**
To be taken during the final academic year prior to graduation. Consists of the final phase of honors research and thesis preparation under the guidance of a faculty mentor.
**Requisites:** Restricted to Ecology and Evolutionary Biology (EBIO) majors only.
**Recommended:** Prerequisites minimum 3.3 GPA and a declared EBIO major and approval by departmental Honors program.
**Additional Information:** Arts Sciences Honors Course

# Ecology and Evolutionary Biology - Bachelor of Arts (BA)

The undergraduate program in ecology and evolutionary biology offers a highly interactive, intellectual environment that prepares students for a career in the natural sciences.

Our program was specifically designed for students who are interested in a broad exposure to the concepts and methodologies of the biological sciences, as well as those interested in a more specific sub-discipline. We offer a broad range of learning opportunities, including traditional classroom experiences, field and laboratory research opportunities and independent study.

# Requirements

## AP & Transfer Credit

Students with scores of 4 or 5 on the AP biology test receive 8 hours of credit and are exempt from the general biology sequence (EBIO 1210 and EBIO 1220, and EBIO 1230 and EBIO 1240). Students who score in the 66th percentile or higher on the CLEP test in biology receive 6 hours of credit and are exempt from EBIO 1210 and EBIO 1220.

EBIO majors with transfer credit in biology from other institutions or advanced placement credits must consult with the EBIO undergraduate advisor. Transfer students must complete at least 12 upper-division (3000-level or above) EBIO credit hours on the Boulder campus.

## Program Requirements

In addition to the general College of Arts and Sciences requirements, students in EBIO must complete complete 9–15 credit hours in ancillary coursework, plus a statistics course and 38 credit hours of coursework in EBIO.

Up to 12 credit hours of courses taken in other departments may be counted toward the 38 credit hours required for the EBIO major. A list of acceptable courses can be obtained from the EBIO advisor. A maximum of 6 credit hours of Independent Study/Research may be applied toward the major. A maximum of 6 credit hours of internship may be applied toward the major.

All required major courses and all required ancillary courses must be passed with a C- or better and cannot be taken pass/fail. Students must have a grade point average of at least 2.000 in the major in order to graduate.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Introductory Biology Coursework** | | |
| Complete two of the following: | | 8 |
| EBIO 1210 & EBIO 1230 | General Biology 1 and General Biology Laboratory 1 | |
| EBIO 1220 & EBIO 1240 | General Biology 2 and General Biology Laboratory 2 | |
| EBIO 1250 | Introduction to Biology Research | |
| EBIO 1100 & EBIO 1110 | Biology and Society and Biology and Society Laboratory | |
| **Required Major Courses** | | |
| EBIO 2040 | Principles of Ecology | 4 |
| EBIO 2070 | Genetics: Molecules to Populations | 4 |
| EBIO 3080 | Evolutionary Biology | 4 |
| One EBIO laboratory or field course, 3000 level or above. Possible choices include: | | 3-4 |
| EBIO 3170 | Mountain Ecology and Conservation | |
| EBIO 3240 | Animal Behavior | |
| EBIO 3400 | Microbiology | |
| EBIO 3630 | Parasitology | |
| EBIO 3850 | Animal Diversity: Invertebrates | |
| EBIO 4100 | Advanced Ecology | |
| EBIO 4500 | Plant Biodiversity and Evolution | |
| EBIO 4510 | Plant Anatomy and Development | |
| EBIO 4520 | Flowering Plant Diversity | |
| EBIO 4660 | Insect Biology | |
| EBIO 4750 | Ornithology | |
| EBIO 4760 | Mammalogy | |
| EBIO 4000-level or above (at least 6 credit hours). Possible choices include: [1] | | 6 |
| EBIO 4030 | Limnology | |
| EBIO 4060 | Landscape Ecology | |
| EBIO 4140 | Plant Ecology | |
| EBIO 4100 | Advanced Ecology | |

| | |
|---|---|
| EBIO 4160 | Introduction to Biogeochemistry |
| EBIO 4175 | The Scientific Basis for Ecosystem Management of Public Lands |
| EBIO 4290 | Phylogenetics and Comparative Biology |
| EBIO 4410 | Biological Statistics [2] |
| EBIO 4740 | Biology of Amphibians and Reptiles |
| EBIO 4800 | Critical Thinking in Biology |
| EBIO 4840 | Independent Study: Upper Division |
| EBIO 4870 | Independent Research: Upper Division |
| **Electives** | |
| EBIO electives to bring total in major to 38 credit hours | 8-9 |
| **Total Credit Hours** | **38** |

### Other Required Coursework

| Code | Title | Credit Hours |
|---|---|---|
| **Statistics [2]** | | **0-4** |
| EBIO 1010 | Introduction to Statistics and Quantitative Thinking for Biologists | |
| IPHY 3280 | Intro to Data Science and Biostatistics | |
| MATH 2510 | Introduction to Statistics | |
| MATH 3510 | Introduction to Probability and Statistics | |
| PSYC 2111 | Psychological Science I: Statistics | |
| EBIO 4410 | Biological Statistics [2] | |
| **Ancillary Mathematics/Science Coursework** | | |
| Select three of the following: | | 9-15 |
| *Mathematics* | | |
| MATH 1212 | Data and Models | |
| MATH 1150 | Precalculus Mathematics | |
| MATH 1300 | Calculus 1 | |
| or MATH 1310 | Calculus for Life Sciences | |
| or APPM 1350 | Calculus 1 for Engineers | |
| MATH 2300 | Calculus 2 | |
| or APPM 1360 | Calculus 2 for Engineers | |
| MATH 2380 | Mathematics for the Environment | |
| *Chemistry* | | |
| CHEM 1021 | Introductory Chemistry | |
| CHEM 1011 | Environmental Chemistry 1 | |
| CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 [3] | |
| or CHEM 1400 & CHEM 1401 | Foundations of Chemistry and Foundations of Chemistry Lab | |
| CHEM 1133 & CHEM 1134 | General Chemistry 2 and Laboratory in General Chemistry 2 | |
| CHEM 3151/ ATOC 3500 | Air Chemistry and Pollution | |
| CHEM 4141 | Environmental Water and Soil Chemistry | |
| *Physics* | | |
| PHYS 1010 | Physics of Everyday Life 1 | |
| PHYS 2010 | General Physics 1 | |
| or PHYS 1110 | General Physics 1 | |
| PHYS 2020 | General Physics 2 | |
| or PHYS 1120 & PHYS 1140 | General Physics 2 and Experimental Physics 1 | |
| PHYS/ENVS 3070 | Energy and the Environment | |
| *Geology* | | |
| GEOL 1010 & GEOL 1030 | Exploring Earth and Introduction to Geology Laboratory 1 | |
| or GEOL 1012 & GEOL 1030 | Exploring Earth for Scientists and Introduction to Geology Laboratory 1 | |
| GEOL 1020 | Dodos, Dinos, and Deinococcus: The History of a Habitable Planet | |
| GEOL 1150 | Water, Energy and Environment: An Introduction to Earth Resources | |
| GEOL 1170 | Our Deadly Planet | |
| GEOL 1180 | Our Microbial Planet | |
| *Geography* | | |
| GEOG 1001 | Our Changing Planet: Climate and Vegetation | |
| GEOG 1011 | Our Changing Planet: Landscapes and Water | |
| GEOG 2271 | Introduction to the Arctic Environment | |
| *Geography - GIS* | | |
| GEOG 4103 | Geographic Information Science: Spatial Analytics | |
| GEOG 4203 | Geographic Information Science: Spatial Modeling | |
| GEOG 4303 | Geographic Information Science: Spatial Programming | |
| GEOG 4603 | GIS in the Social and Natural Sciences | |
| *Atmospheric and Oceanic Sciences* | | |
| ATOC 1060 | Our Changing Environment: El Nino, Ozone, and Climate | |
| ATOC 3070 | Introduction to Oceanography | |
| ATOC 4200 | Biogeochemical Oceanography | |
| ATOC 3500/ CHEM 3151 | Air Chemistry and Pollution | |
| *Computer Science* | | |
| CSCI 1200 | Introduction to Computational Thinking | |
| CSCI 1300 | Computer Science 1: Starting Computing | |
| **Total Credit Hours** | | **13-15** |

1 These 6 credit hours must include one course taken at the CU Boulder campus, the Mountain Research Station or on a CU Boulder Global Seminar, and may include a maximum of 3 credit hours of independent study or independent research.

2 Of these, only EBIO 4410 counts toward the 38 credit hours of EBIO required for the major.

3 Students must take the lecture and lab for these courses.

## Recommended Four-Year Plan of Study

Through the required coursework for the major, students will fulfill all 12 credits of the Natural Sciences area of the Gen Ed Distribution Requirement, including the Laboratory or Field Experience, and likely the QRMS component of the Gen Ed Skills Requirement.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| EBIO 1210 | General Biology 1 | 3 |
| EBIO 1230 | General Biology Laboratory 1 | 1 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Elective/MAPS | | 3 |
| | **Credit Hours** | **13** |
| **Spring Semester** | | |
| EBIO 1220 | General Biology 2 | 3 |
| EBIO 1240 | General Biology Laboratory 2 | 1 |
| EBIO 1010 | Introduction to Statistics and Quantitative Thinking for Biologists (or another statistics course) [2] | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Elective/MAPS | | 3 |
| | **Credit Hours** | **13** |
| **Year Two** | | |
| **Fall Semester** | | |
| EBIO 2040 | Principles of Ecology | 4 |
| EBIO Ancillary | | 5 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| EBIO Ancillary | | 5 |
| EBIO Upper-Division | | 3-4 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective/MAPS | | 3 |
| | **Credit Hours** | **14-15** |
| **Year Three** | | |
| **Fall Semester** | | |
| EBIO 2070 | Genetics: Molecules to Populations | 4 |
| EBIO Upper-Division | | 3-4 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **16-17** |
| **Spring Semester** | | |
| EBIO 3080 | Evolutionary Biology | 4 |
| EBIO Ancillary | | 5 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| EBIO Upper-Division | | 4 |
| EBIO Upper-Division | | 4 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/Global Perspective) | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| EBIO Upper-Division | | 4 |
| EBIO Upper-Division | | 4 |
| Gen. Ed. Distribution course (example: Arts & Humanities) - Upper-division | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **17** |
| | **Total Credit Hours** | **120-122** |

# Learning Outcomes

In light of the broad importance of ecology and evolution for fundamental understanding of living systems, the undergraduate EBIO degree emphasizes knowledge and problem-solving in the following areas:

- The ecology of organisms, populations and communities
- The distribution and function of terrestrial, freshwater and marine ecosystems
- Principles and patterns of evolution, including natural selection and the history of life on Earth
- Comparative, systematic, evolutionary and environmental aspects of botany, microbiology and zoology
- Adaptation of organisms to the physical and biotic environment
- Animal behavior and emotion
- Molecular evolution and population genetics
- Developmental biology and the evolution of development
- Conservation biology and management of ecosystems
- The relevance of mathematics, chemistry and physics to biology
- The development of biological thought
- Infectious disease ecology
- Landscape and ecosystem ecology
- Sustainability and human-nature systems
- Energy and biofuels
- Darwinian medicine
- Health and population genetics
- Genetically-engineered organisms

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated

master's program enables students to continue working with their established faculty mentors.

## BA and MA in Ecology and Evolutionary Biology

A combined bachelor's and master's degree with thesis is offered for highly motivated undergraduate students. The BAM program allows students to take advanced courses at an accelerated pace, engage in an independent research project and obtain both degrees in five years. In addition to preparing graduates for additional graduate study or medical school, the program is expected to position them for employment in areas such as environmental consulting, teaching at the high school or community college level or by businesses with an environmental or biomedical emphasis.

### Admissions Requirements

Students interested in this program are encouraged to consult with the EBIO associate chair for graduate studies early in their undergraduate career. In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 2.75 or higher.
- Have a major GPA in EBIO of 3.0 or higher.
- Have the support of a faculty research advisor.
- Have completed a minimum of 12 credit hours of coursework.
- If a transfer student, have completed a minimum of 24 credit hours at CU Boulder.
- Have completed prerequisite courses EBIO 2040, EBIO 2070 and EBIO 3080.

Applications from sophomores and juniors for the BAM degree are considered on a competitive basis. Applications are available from the EBIO graduate coordinator, and are due October 15 and March 15.

No financial support is available from the department for students enrolled in this program.

### Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only six undergraduate credits (at the 4000-level) may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

# Ecology and Evolutionary Biology - Minor

A minor is offered in ecology and evolutionary biology. Declaration of a minor is open to any student enrolled at CU Boulder, regardless of college or school.

We offer a broad range of learning opportunities, including traditional classroom experiences, field and laboratory research opportunities and independent study.

# Requirements

## Program Requirements

Students must complete:

- A total of 20 credit hours in EBIO with grades of C- or better.
- A 2.00 GPA or higher for all coursework attempted in EBIO.
- 9 hours of upper-division credit in EBIO.
- 3 hours of 4000-level credit in EBIO.
- A minimum of 12 credit hours must be taken on the Boulder campus, including a minimum of 6 of the 9 upper-division credit hours. Mountain Research Station is considered the Boulder campus.
- Up to 3 credit hours of any combination of the following can count toward the EBIO minor: Independent study, Independent research or internship credit.

All courses must have an EBIO subject code. EBIO 1030, EBIO 1040, EBIO 1050, EBIO 1300 and EBIO 3010 do not count toward the minor requirement.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| Complete any two of these four lecture/lab combinations | | 8 |
| EBIO 1210 & EBIO 1230 | General Biology 1 and General Biology Laboratory 1 | |
| EBIO 1220 & EBIO 1240 | General Biology 2 and General Biology Laboratory 2 | |
| EBIO 1250 | Introduction to Biology Research | |
| EBIO 1100 & EBIO 1110 | Biology and Society and Biology and Society Laboratory | |
| **Electives** | | |
| Complete 3 credits of lower- or upper-division EBIO courses. | | 3 |
| Complete 6 credits of 3000-or 4000-level EBIO courses. | | 6 |
| Complete 3 credits of 4000-level EBIO courses. | | 3 |
| **Total Credit Hours** | | **20** |

# Economics

The Department of Economics at CU Boulder is recognized for the high quality of its teaching and research.

Economics describes the processes by which scarce resources are allocated, how changes in these processes affect this allocation and how these processes can be improved. Economics is a quantitative, policy-oriented social science with a highly-developed body of theory and a vast range of applications. Theoretical and quantitative analyses are informed by and contribute to our understanding of our economic, social and political institutions.

Microeconomics is the study of the daily decisions that consumers, workers and business people make, and of the interactions between these decisions in markets. Macroeconomics is the study of how the decisions made by all individuals and businesses are together responsible for the size and growth of the economy, for recessions and for unemployment.

Among the major topics within economics are natural resource and environmental economics, international trade and finance, public economics, labor economics, urban and regional economics, development economics, economic history, industrial organization, law and economics, health economics, financial economics and monetary economics. In addition, econometrics is the study of how statistical

methods can be best applied to economic problems. Our department offers courses in most of these fields in every semester.

**Course code for this program is ECON.**

# Economics Honors Program

The honors program in economics provides an opportunity for highly motivated majors to undertake individualized research and to graduate with honors (*cum laude*, *magna cum laude*, *summa cum laude*) in economics. Economics majors with senior standing and both economics and overall GPAs of 3.40 or better are eligible to participate. Participants enroll in the economics honors seminars, which provide instruction in research methodology essential to the preparation of the honors thesis. Students interested in the economics honors program should contact the departmental honors advisor during their junior year.

# Bachelor's Degree

- Economics - Bachelor of Arts (BA) (p. 265)

# Minor

- Economics - Minor (p. 266)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Antman, Francisca Marie (https://experts.colorado.edu/display/fisid_144606/)
Professor; PhD, Stanford University

Avila, Sara (https://experts.colorado.edu/display/fisid_165935/)
Instructor; PhD, National University of Mexico

Barham, Tania C.J. (https://experts.colorado.edu/display/fisid_140077/)
Associate Professor; PhD, University of California, Berkeley

Bhatia, Alpna (https://experts.colorado.edu/display/fisid_143993/)
Instructor; PhD, University of Colorado Boulder

Boileau, Martin (https://experts.colorado.edu/display/fisid_113872/)
Professor, Chair; PhD, Queen's University (Canada)

Bottan, Daria (https://experts.colorado.edu/display/fisid_168423/)
Senior Instructor; PhD, LUISS Guido Carli (Italy)

Cadena, Brian C. (https://experts.colorado.edu/display/fisid_145740/)
Associate Professor; PhD, University of Michigan Ann Arbor

Carballo, Jeronimo Rafael (https://experts.colorado.edu/display/fisid_155949/)
Associate Professor; PhD, University of Maryland, College Park

Carlos, Ann M. (https://experts.colorado.edu/display/fisid_105534/)
Professor Emerita

Chen, Yongmin (https://experts.colorado.edu/display/fisid_108989/)
Professor, Endowed Chair; PhD, Boston University

De Bartolome, Charles A.M. (https://experts.colorado.edu/display/fisid_101302/)
Professor Emeritus; PhD, University of Pennsylvania

Flores, Nicholas E. (https://experts.colorado.edu/display/fisid_107603/)
Professor; PhD, University of California, San Diego

Gebhardt, Karen (https://experts.colorado.edu/display/fisid_159742/)
Senior Instructor; PhD, Colorado State University

Graves, Philip E. (https://experts.colorado.edu/display/fisid_102050/)
Professor Emeritus; PhD, Northwestern University

Greenwood, Michael J. (https://experts.colorado.edu/display/fisid_102361/)
Professor Emeritus; Ph.D., Northwestern University

Howe, Charles W.
Professor Emeritus

Hsiao, Frank S.T.
Professor Emeritus

Hughes, Jonathan Edward (https://experts.colorado.edu/display/fisid_147335/)
Associate Professor, Associate Chair; PhD, University of California, Davis

Iyigun, Fevzi Murat (https://experts.colorado.edu/display/fisid_118373/)
Professor; PhD, Brown University

Jaworski, Taylor Allen (https://experts.colorado.edu/display/fisid_159798/)
Associate Professor; PhD, University of Arizona

Kaempher, William H.
Professor Emeritus

Kaffine, Daniel Thomas (https://experts.colorado.edu/display/fisid_153280/)
Professor; PhD, University of California, Santa Barbara

Keller, Wolfgang (https://experts.colorado.edu/display/fisid_141891/)
Professor; PhD, Yale University

Kim, Jin-Hyuk (https://experts.colorado.edu/display/fisid_149615/)
Associate Professor; PhD, Cornell University

Kimball, Miles (https://experts.colorado.edu/display/fisid_157993/)
Endowed Chair, Professor; PhD, Harvard University

Klein, Jennifer Lynn (https://experts.colorado.edu/display/fisid_158332/)
Instructor; PhD, University of California, Santa Barbara

Lillydahl, Jane
Professor Emerita

Liu, Xiaodong (https://experts.colorado.edu/display/fisid_144508/)
Professor; PhD, The Ohio State University

Mansfield, Richard (https://experts.colorado.edu/display/fisid_157743/)
Assistant Professor; PhD, Yale University

Markusen, James R. (https://experts.colorado.edu/display/fisid_103187/)
Professor Emeritus, Distinguished Professor; PhD, Boston College

Martins-Filho, Carlos B. (https://experts.colorado.edu/display/fisid_147510/)
Professor; PhD, University of Tennessee, Knoxville

Maskus, Keith E. (https://experts.colorado.edu/display/fisid_103414/)
Professor Emeritus, Distinguished Professor; PhD, University of Michigan Ann Arbor

McCloskey, Adam (https://experts.colorado.edu/display/fisid_163644/)
Associate Professor; MA, Boston University

McKinnish-Harllee, Terra (https://experts.colorado.edu/display/fisid_115558/)
Professor; PhD, Carnegie Mellon University

McNown, Robert F.
Professor Emeritus

Mertens, William G. (https://experts.colorado.edu/display/fisid_105762/)
Senior Instructor; PhD, University of Colorado Boulder

Morey, Edward R.
Professor Emeritus

Nigai, Sergey K. (https://experts.colorado.edu/display/fisid_159293/)
Assistant Professor; PhD, ETH Zurich

Peri, Alessandro (https://experts.colorado.edu/display/fisid_157820/)
Assistant Professor; PhD, Universidad Carlos III de Madrid

Poulson, Barry
Professor Emeritus

Savage, Scott James (https://experts.colorado.edu/display/fisid_121239/)
Professor; PhD, Curtin University of Technology (Western Australia)

Shiue, Carol Hua (https://experts.colorado.edu/display/fisid_141892/)
Professor; PhD, Yale University

Song, Yangwei (https://experts.colorado.edu/display/fisid_167159/)
Assistant Professor; PhD, University of Rochester

Swanson, Shawn (https://experts.colorado.edu/display/fisid_168257/)
Instructor; PhD, University of Colorado Boulder

Valkovci, Mark
Lecturer; PhD, University of Colorado Boulder

Waldman, Donald M.
Professor Emeritus

Weber, Stephanie
Assistant Professor; PhD, Yale University

Zax, Jeffrey S. (https://experts.colorado.edu/display/fisid_100898/)
Professor, Associate Chair; PhD, Harvard University

# Courses

**ECON 1010 (1-3) Economics in Action**
Applies foundational concepts from microeconomics and microeconomics to current events to exemplify economic decision-making. Topics vary each term, and may include trade, environment, discrimination, government policy, technology, money, education, entrepreneurship, health, employment, immigration, inequality, or development. Credit given in this course is not included in the calculation of an economics major GPA.

**ECON 1078 (3) Mathematical Tools for Economists 1**
This course is the first of a two-course sequence (ECON 1078 and ECON 1088) designed to introduce a variety of mathematical concepts that will be used extensively in subsequent economics coursework. The fundamental skills covered in this class are essential for economic analysis. Topics include algebra, graphs, functions, and logic.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
Departmental Category: Quantitative Economics

**ECON 1088 (3) Mathematical Tools for Economists 2**
Continuation of ECON 1078. Teaches mathematical skills for use in economics. Topics include derivatives, optimization and integration. These skills are used on "real world" problems and illustrated with computer assignments. For more information about the math placement referred to in the "Enrollment Requirements", contact your academic advisor.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1345 or APPM 1350 or MATH 1081 or MATH 1300 or MATH 1310 or MATH 1330
**Requisites:** Requires prereq ECON 1078 or MATH 1011 or MATH 1071 or MATH 1150 or MATH 1160 or APPM 1235 (minimum grade C-) or an ALEKS math exam taken in 2016 or earlier, or placement into pre-calculus based on your admission data and/or CU Boulder coursework.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
Departmental Category: Quantitative Economics

**ECON 2010 (4) Principles of Microeconomics**
Examines basic concepts of microeconomics or the behavior and the interactions of individuals, firms and government. Topics include determining economic problems, how consumers and businesses make decisions, how markets work, and how they fail and how government actions affect markets.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Theory and History of Economic Thought
MAPS Course: Social Science

**ECON 2020 (4) Principles of Macroeconomics**
Provides an overview of the economy, examining the flows of resources and outputs and the factors determining the levels of income and prices. Explores policy problems of inflation, unemployment and economic growth.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Theory and History of Economic Thought
MAPS Course: Social Science

**ECON 3070 (4) Intermediate Microeconomic Theory**
Explores theory and application of models of consumer choice, firm and market organization, and general equilibrium. Extensions include intertemporal decisions, decisions under uncertainty, externalities, and strategic interaction.
**Requisites:** Requires prereq courses of ECON 2010 and (ECON 1088 or MATH 1081 or MATH 1300 or MATH 1310 or MATH 1330 or MATH 2300 or MATH 2400 or (APPM 1340 and 1345) or APPM 1350 or FNCE 2010) (all min grade C-). Restricted to students with 22-180 units completed.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Theory and History of Economic Thought

**ECON 3080 (3) Intermediate Macroeconomic Theory**
Introduces theories of aggregate economic activity including the determination of income, employment, and prices; economic growth; and fluctuations. Macroeconomic policies are explored in both closed and open economy models. ECON 3070 ECON and 3080 may be taken in any order; there is no recommended sequence.
**Requisites:** Requires prerequisite courses of ECON 2020 and (ECON 1088 or (APPM 1340 and APPM 1345) or APPM 1350 or FNCE 2010 or MATH 1081 or MATH 1300 or MATH 1310 or MATH 2300 or MATH 2400) (all min grade C-). Restricted to students with 22-180 units completed.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Theory and History of Economic Thought

**ECON 3403 (3) International Economics and Policy**
Examines national and supranational policies that affect the international economy, with attention to trade barriers, economic nationalism and regionalism, international political economy, exchange market intervention, and international transmission of economic perturbations. Economics (ECON) majors may be approved to enroll with advisor & instructor approval and count towards the major GPA. Majors must consult with assigned ECON advisor to determine eligibility to be enrolled. May not be taken after either ECON 4413 or ECON 4423.
**Requisites:** Requires prerequisite courses of ECON 2010 and ECON 2020 (all minimum grade C-). ECON minors are allowed to be enrolled.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Trade and Finance

**ECON 3535 (3) Natural Resource Economics**
Integrates economic analysis with life science aspects of natural resource systems to develop social policies for use of natural resources. Studies economists' approaches to resources policy analysis and applies them to energy, forestry, fisheries, mineral and water systems. Economics (ECON) majors may be approved to enroll with advisor & instructor approval and count towards the major GPA. Majors must consult with assigned ECON advisor to determine eligibility to be enrolled.
**Equivalent - Duplicate Degree Credit Not Granted:** ECON 4535
**Requisites:** Requires prerequisite course of ECON 2010 (minimum grade C-). ECON minors are allowed to be enrolled.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Natural Resources and Environmental Economics

**ECON 3545 (3) Environmental Economics**
Highlights causes of excessive environmental pollution and tools for controlling it through economic analysis, values of preservation and distribution of costs and benefits from environmental protection programs. Economics (ECON) majors may be approved to enroll with advisor & instructor approval and count towards the major GPA. Majors must consult with assigned ECON advisor to determine eligibility to be enrolled.
**Equivalent - Duplicate Degree Credit Not Granted:** ECON 4545
**Requisites:** Requires prerequisite course of ECON 2010 (minimum grade C-). ECON minors are allowed to be enrolled.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Natural Resources and Environmental Economics

**ECON 3616 (3) Employment, Wages and the Future of Work**
Examines how automation, globalization and information technology are changing which jobs get done, by whom and how much they pay. Illustrates how basic labor supply and demand theory helps predict the impact of technological progress on occupational composition, income inequality and the nature of work itself. These theoretical tools also guide our search for appropriate public policy responses. Economics (ECON) majors may be approved to enroll with advisor & instructor approval and count towards the major GPA. Majors must consult with assigned ECON advisor to determine eligibility to be enrolled.
**Requisites:** Requires a prerequisite course of ECON 2010 (minimum grade C-). ECON minors are allowed to enroll.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Labor and Human Resources

**ECON 3784 (3) Economic Development and Policy**
Introductory course in Economic Development, designed for non-majors. Students are introduced to the major issues in development economics. Explores empirical, theoretical and policy issues in economic development. Emphasis is placed on the controversial issues in this literature, requiring students to explore competing, and often conflicting, perspectives of these issues. Economics (ECON) majors may be approved to enroll with advisor & instructor approval and count towards the major GPA. Majors must consult with assigned ECON advisor to determine eligibility to be enrolled.
**Requisites:** Requires prerequisite courses of ECON 2010 and ECON 2020 (all minimum grade C-). ECON minors are allowed to be enrolled.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Economic Development

**ECON 3818 (4) Introduction to Statistics with Computer Applications**
Introduces statistical methods and their applications in quantitative economic analysis.
**Requisites:** Requires prerequisite courses of ECON 1088 or MATH 1081 or MATH 1300 or MATH 1310 or MATH 1330 or MATH 2300 or MATH 2400 or (APPM 1340 and 1345) or APPM 1350 or FNCE 2010 (all minimum grade C-). Restricted to students with 22-180 units completed.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Quantitative Economics

**ECON 4050 (3) Market Design**
Develops foundations for the modern market design practices. Economists are increasingly involved in studying and designing practical market mechanisms. Includes topics such as designing efficient matching markets (students to schools, doctors to hospitals), designing auction mechanisms (Google, Facebook, government) and designing market platforms (eBay, Amazon).
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Theory and History of Economic Thought

**ECON 4060 (3) Choice Theory**
How do individuals make choices? In economics, it is standard to assume that individuals are rational utility maximizers. This standard model usually provides a good approximation to people¿s behaviors. However, we will see in this course that sometimes the standard model fails to explain people¿s choices. The goal of this course is to understand how individuals make choices and their implications.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior).
**Recommended:** Prerequisite ECON 3080.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Theory and History of Economic Thought

**ECON 4070 (3) Topics in Microeconomics**
Studies utility maximization under uncertainty, risk, game theory, moral hazard, and adverse selection. Applications include insurance markets and the theory of contracts.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Theory and History of Economic Thought

**ECON 4080 (3) Economics in Action: Game Theory**
Game theory studies how individuals make decisions in situations where there are strategic interactions between decision makers. It plays an important role in modern economic analysis. This course explores game theory and its applications in economics. It will review and develop methods of game theoretical analysis. Students will learn how to model and analyze economic problems in various strategic settings to gain fundamental economic insights.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Recommended:** Prerequisite It will be expected that all students in this course are familiar with the differentiation and integration of simple functions, if you are on the waiting list and intend to enroll in the course you must attend the first-week of classes to learn whether you meet the prerequisites.

**ECON 4090 (3) Markets and Morality**
Examines concepts underlining the combined study of philosophy, politics, and economics. Provides an introduction to core areas of knowledge and methodologies used to understand individual behavior and the interactions that make up the social world. Topics include the moral and political dimensions of exchange and property, markets and competition, and economic growth.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).

**ECON 4111 (3) Money and Banking Systems**
Discusses money, financial institutions and the monetary-financial system in a modern economy.
**Requisites:** Requires prerequisite course of ECON 3080 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Money and Banking

**ECON 4211 (3) Public Economics: the Economics of the Government Sector**
Focuses on taxation and public expenditures. Topics include economic rationale for government action, economic theory of government behavior, and effects of government policies on allocation of resources and distribution of income.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Public Economics

**ECON 4221 (3) Political and Public Choice Economics**
Explores decision-making in non-traditional market settings, specifically political market settings, using economic models. We investigate policy outcomes as the product of interactions among individuals in politial markets, and analyze how governmental decisions are the result of rational optimizing behavior, even if they do not lead to policies that maximize national welfare.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Public Economics

**ECON 4231 (3) Applied Economic Analysis and Public Policy**
Applies economic analysis to current issues of public policy. Reviews basic public finance and economic justifications for government action. Examines structure and procedures of Colorado State Legislature. Chooses current legislative issues, reviews relevant economic literature and applies implications through briefing papers and testimony at legislative hearings. Explores the challenges of integrating informed economic analysis into legislative process.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Public Economics

**ECON 4242 (3) Urban Economics: The Economics of Cities**
Considers the economic forces which drive households and jobs to congregate in metropolitan areas. It then considers the forces within the city which determine how the established cities "look" - how rents vary with location, the distribution of jobs and households within a city, urban sprawl, and the sorting of households between neighborhoods. Finally it considers some government policies relating to land use and housing.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Urban and Regional Economics

**ECON 4262 (3) Economics of Crime and Corruption**
Focuses on economic models of crime and punishment, and on empirical evidence that evaluates the models. The first part of the course will introduce economic models of crime and study what factors motivate and deter criminal behavior. Then we will turn to empirical evidence and will discuss the role of higher fines, imprisonment, death penalty, abortion, drugs, guns and other factors in deterring crime. In the end of the course we will discuss corruption and whether it is harmful or beneficial to society.
**Requisites:** Requires prerequisite courses of (ECON 3070 and ECON 3818) or one of the following: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000 or STAT 4520 (all minimum grade C-).

**ECON 4292 (3) Migration, Immigrant Adaptation, and Development**
Examines historical and current patterns of migration with an emphasis in international movement. Looks at leading migration theories related to both origin- and destination-based explanations while critically looking at the role of development as a potential cause and consequence of population movement. Finally, covers some aspects of immigrants' social and economic adaptation to their host society.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Urban and Regional Economics

**ECON 4309 (3) Economics Honors Seminar 1**
For information consult the department's director of honors. Open only to qualified seniors.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3080 and ECON 3818 (all minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sciences Honors Course
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Independent Study and Other Courses

**ECON 4339 (3) Economics Honors Seminar 2**
For information consult the department's director of honors. This course does not count toward major requirements.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3080 and ECON 3818 (all minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Independent Study and Other Courses

**ECON 4413 (3) International Trade**
Focuses on theories of international trade and its impacts on economic welfare. Analyzes commercial policy, including tariffs, non-tariff barriers, retaliation, regional integration, and factor migration.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Trade and Finance

**ECON 4423 (3) International Finance**
Covers balance of payments; foreign exchange market, income, trade, and capital flows; asset markets adjustment mechanisms; stabilization policies in an open economy; and problems of international monetary systems.
**Requisites:** Requires prerequisite course of ECON 3080 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Trade and Finance

**ECON 4504 (3) The New Institutional Economics: Institutions, Contracts and Economic Outcomes**
Understand the conceptual tool kit of the New Institutional Economics. The concepts include transaction costs, property rights, credible commitment, and most importantly the roles of formal and informal institutions. We will examine the impact of institutions on contracting and organizations. The goal is to understand how the underlying institutions determine the degree to which societies improve their economic performance.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Economic History

**ECON 4514 (3) Economic History of Europe**
Covers evolution of modern economic growth and development in Europe, emphasizing institutional change.
**Requisites:** Requires prerequisite course of ECON 3070 or ECON 3080 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Economic History

**ECON 4524 (3) Economic History of the United States**
Evolution of modern economic growth and development in the U.S. from colonial times to the present emphasizing institutional change.
**Requisites:** Requires prerequisite courses of ECON 3070 or ECON 3080 (all minimum grade C-).
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Economic History

**ECON 4534 (3) Chinese Economic History in Comparative Perspective**
Surveys the economic history of China in a comparative perspective, to understand the history of economic development in China in terms of existing economic theories of growth. The approximate timeline is from the 18th century to the 20th century.
**Requisites:** Requires prerequisite courses of ECON 3070 or ECON 3080 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Economic History
Departmental Category: Asia Content

**ECON 4535 (3) Natural Resource Economics**
Analysis of problems associated with socially optimal use of renewable and nonrenewable natural resources over time. Problems of common property resources, irreversible forms of development, and preservation of natural areas.
**Equivalent - Duplicate Degree Credit Not Granted:** ECON 3535
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Natural Resources and Environmental Economics

**ECON 4545 (3) Environmental Economics**
Examines the effects of economic growth on the environment; application of economic theory of external diseconomies, cost-benefit analysis, program budgeting, and welfare economics to problems of the physical environment.
**Equivalent - Duplicate Degree Credit Not Granted:** ECON 3545
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Natural Resources and Environmental Economics

**ECON 4555 (3) Transportation Economics and Policy**
This is a course in transportation economics and policy for undergraduates. Students will combine large real-world data sets with economic theory and advanced artificial intelligence tools to analyze transportation markets and policies. The course combines topics from environmental economics and industrial organization including: aggregate demand for transportation; disaggregate demand and mode choice; externality theory; intercity passenger and freight transportation; and policies such as price regulation, fuel taxes and congestion pricing. Instruction will emphasize the current literature and examples from recent policies.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Natural Resources and Environmental Economics

**ECON 4616 (3) Labor Economics**
Examines the influence of markets, unions, and government on labor allocation and remuneration. Analyzes human capital, discrimination, mobility and migration, productivity, unemployment, and inflation. Compares outcomes under competition with those in a world marked by shared market power and bargaining.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Labor and Human Resources

**ECON 4626 (3) The Economics of Inequality and Discrimination**
Examines the unique insights available through economic analysis regarding the causes, mechanisms, and consequences of inequality and discrimination. Examines the extent of inequality, the varieties and extents of discrimination, and explores the economic models that suggest explanations.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Labor and Human Resources

**ECON 4646 (3) Topics in Health Economics**
Growth in health expenditures worldwide over the past three decades has led to an increase in research in health economics and its importance in public policy in developed and developing countries. The purpose of this course is to encourage students to read, think, and do research on issues in health economics. This course will cover issues that are pertinent to the US, other developed and developing countries. It will cover the basics of health economics such as health production functions and the role for government as well as touching on topical issues such as health care reform.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Recommended:** Prerequisites ECON 3818 or CSCI 3022.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Labor and Human Resources

**ECON 4697 (3) Industrial Organization and Regulation**
Explores neoclassical theory of the firm, the determinants of industrial structure, and the purposes and institutions of public policy to control or maintain a competitive environment.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Industrial Organization

**ECON 4705 (3) Managerial Economics**
Application of microeconomic principles and tools to business problems faced by decision makers. Examines decisions related to pricing, products and production, location of firms, vertical and horizontal integration, marketing, uncertainty, market structure, and government regulations and introduces key business communication, accounting and finance principles.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).

**ECON 4717 (3) Economics of Entrepreneurship**
Introduces economic analysis of entrepreneurship, its financing, performance and public policy issues. We will investigate in depth the business of venture capital and start-ups. Aims to understand both academic and practical implications from the burgeoning literature on economics of entrepreneurship and private equity.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Industrial Organization

**ECON 4727 (3) Economics of Organizations**
Introduces students to the economic analysis of relationship between firms and incentives within firms. The first part covers classical theories of firm boundaries and contractual relationship between firms. The second part focuses on compensation and incentive issues within firms.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Industrial Organization

**ECON 4774 (3) Topics in Economic Development, History and Political Economy**
Sustained economic growth is a relatively recent economic phenomenon that came about due to the Industrial Revolution and as a result of which the standards of living improved dramatically in the Anglo-Saxon West since the 18th century. However, global inequality has also risen to unprecedented levels because other parts of the world still significantly lag the West in economic, social and political terms. In this class, we shall study the comparative development paths of Anglo-Saxon Europe and the Middle East. In doing so, we shall primarily focus on an expansive list of influential and relevant articles published and the four books required for the class.
**Requisites:** Requires prerequisite course of ECON 3070 or ECON 3080 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Economic Development
Departmental Category: Asia Content

**ECON 4784 (3) Economic Development**
Explores empirical, theoretical, and policy issues in economic development. Examines topics with reference to the developing countries: income distribution and poverty, demographic change, labor force employment and migration, human capital, physical capital, natural resources and the environment, industrial structure, international trade, and finance.
**Requisites:** Requires prerequisite course of ECON 3070 or ECON 3080 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Economic Development
Departmental Category: Asia Content

**ECON 4794 (3) Economic Growth**
Introduces the latest theoretical tools and synthesizes the leading explanations for economic growth processes. We examine investment, inequality, population growth, returns to education, health, technological change, and efficiency. The course also explores how fundamentals of culture, institutions, geography, history, and human characteristics may underlie the differences in comparative economic development across countries.
**Requisites:** Requires prerequisite course of ECON 3070 or ECON 3080 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Economic Development

**ECON 4797 (3) Antitrust and Regulation**
Explores two major branches of Industrial Organization--antitrust and regulation. Focus is on developing qualitative and quantitative skills for the legal-economic analysis of issues and problems across a variety of industries. Case studies are used to illustrate concepts, including mergers, collusive agreements, monopolization, and networks. Individual and group projects help develop advocacy and public speaking skills.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Industrial Organization

**ECON 4808 (3) Introduction to Mathematical Economics**
Introduces the use of mathematics in economics. Topics include vectors and matrices, differential calculus, and optimization theory, with economic applications.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Quantitative Economics

**ECON 4818 (3) Introduction to Econometrics**
Provides undergraduate economics majors with an introduction to econometric theory and practice. Develops the multiple regression model and problems encountered in its application in lecture and individual applied projects.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Quantitative Economics

**ECON 4838 (3) Microcomputer Applications in Economics**
Teaches basic concepts in Java programming applied to economic models. Development of Web pages and dynamic modeling will be introduced. Students will gain a foundation that can be applied to creating advanced applications relating to analysis of statistical data and custom projects.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Quantitative Economics

**ECON 4848 (3) Applied Econometrics**
Introduces students to the practice of applied regression analysis. Summarizes and reviews the regression technique, explores U.S. census data sources, introduces an advanced statistical software package and provides structured exercises in regression analysis of census data. Concludes with independent research projects analyzing social and economic issues using regression analysis and census data.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or STAT 4520 or APPM 4570 or CHEN 3010 or CSCI 3022 or CVEN 3227 or MATH 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Quantitative Economics

**ECON 4858 (3) Financial Econometrics**
Introduces statistical models, estimation and testing procedures used in analyzing financial data for advanced undergraduates. Topics include the modeling of returns, portfolio theory, the capital asset pricing model, options pricing and fixed income securities.
**Requisites:** Requires prerequisite course: ECON 4818.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Quantitative Economics

**ECON 4868 (3) Simulation Modeling in Microeconomics**
Computer simulation modeling translates theory into computer code to examine questions numerically; for example, the effects of taxes or emissions permits on welfare and income distribution. We use GAMS (general algebraic modeling system); a version may be downloaded for free. Students must have access to a computer (not needed in the classroom).
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Quantitative Economics

**ECON 4909 (3-4) Independent Study**
Department enforced prerequisites: completion of at least 12 hours of ECON classes and a minimum GPA of 3.00. Department consent required.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of ECON 2010 and ECON 2020 and ECON 3070 or ECON 3080 (all minimum grade C-).
**Additional Information:** Departmental Category: Independent Study and Other Courses

**ECON 4929 (3) Special Topics In Economics**
This course number is assigned to upper-level Economics electives that become available on an incidental basis. Refer to the Economics Department for a detailed description of current content. Formerly ECON 4999.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3080 (all minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Independent Study and Other Courses Departmental Category: Asia Content

**ECON 4939 (2-6) Internship/Seminar**
Offers students the opportunity to integrate theoretical concepts of economics with practical experience in economics-related institutions. The theoretical portion arises from seminars and readings, the practical from activities in organizations related to the economics field. A maximum of 3 credit hours counts toward major requirements. Department consent required.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3080 and ECON 3818 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Economic (ECON) majors or minors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Independent Study and Other Courses

# Economics - Bachelor of Arts (BA)

The economics major provides a highly structured experience that develops increasing levels of sophistication. It begins with courses in economic principles, continues to intermediate courses in economic theory and empirical practice, and culminates with rigorous courses in the applied fields of economics. Successful graduates are well-equipped to perform economic analysis in most commercial and policy settings, and to continue on to graduate school.

# Special Emphasis Options

The Department of Economics offers four enhanced major tracks for students who have a relatively high GPA and want to focus their upper-division coursework in a specific area of interest. Interested students must have completed at least 6 credit hours of economics coursework at CU in order to declare the special emphasis. Students must have completed two out of three intermediate-level courses (ECON 3070, ECON 3080 and/or ECON 3818) with a minimum of 3.00 GPA in these courses, and must also have a minimum of 3.00 GPA in economics coursework at CU by the time of declaration and completion of the special emphasis. Requirements are listed on the Department of Economics (http://www.colorado.edu/economics/) website.

## Environmental and Natural Resources Emphasis

The environmental and natural resources emphasis is designed for economics majors who are considering careers in fields requiring a thorough understanding of a broad range of issues associated with business practices and public policies addressing natural resource use and environmental quality, including environmental regulation and compliance: energy production and consumption, development of energy transportation, urban, rural and regional infrastructures.

## International Emphasis

The international emphasis is designed for students who have an interest in courses with an international perspective both within economics and outside the department. Courses in international trade and finance are combined with selections of international courses in related social science disciplines. This program may be of particular interest to students seeking careers in international business, international organizations, nongovernmental organizations and government agencies.

## Public Economics Emphasis

The public economics emphasis is designed for students who have an interest in taking courses with a public policy perspective both within economics and outside the department. Courses in public economics are combined with selections of public policy oriented courses from various social sciences. This emphasis is recommended for students with interests in public policy seeking careers in local, state, national or international agencies.

## Quantitative Emphasis

The quantitative emphasis is designed for well-qualified majors with an interest in theoretical and/or applied mathematics. Economics courses in quantitative methods are combined with courses from the Department of Mathematics and the Department of Applied Mathematics. This program may be of interest to students planning to pursue graduate studies in economics or those seeking a career in applied quantitative research.

# Requirements

## Required Courses and Credits

Students must complete at least 33 credit hours of economics courses. The math requirement does not count toward either the minimum total economics credit requirement or in the major GPA calculation. At least 24 credit hours must be upper-division courses. Students transferring two 3-credit principles courses must complete at least 27 credit hours of upper-division economics.

All required major courses and the required mathematics course must be passed with a C- or better and cannot be taken pass/fail. No more than 45 credits in ECON may be applied to overall graduation requirements. Students must have a grade point average of at least 2.000 in the major in order to graduate.

| Code | Title | Credit Hours |
|---|---|---|
| **Economics Major Requirements** | | |
| ECON 2010 & ECON 2020 | Principles of Microeconomics and Principles of Macroeconomics | 8 |
| ECON 3070 & ECON 3080 | Intermediate Microeconomic Theory and Intermediate Macroeconomic Theory | 7 |
| ECON 3818 | Introduction to Statistics with Computer Applications | 4 |
| Select one of the following Econometrics courses: | | 3 |
| ECON 4818 | Introduction to Econometrics | |
| ECON 4848 | Applied Econometrics | |
| ECON 4858 | Financial Econometrics | |
| Electives in 4000-level ECON courses | | 12 |
| **Total Credit Hours** | | **34** |

| Code | Title | Credit Hours |
|---|---|---|
| **Ancilliary Mathematics Requirement** | | |
| Complete one of the following calculus courses: | | 3-5 |
| APPM 1350 | Calculus 1 for Engineers | |

| | | |
|---|---|---|
| ECON 1088 | Mathematical Tools for Economists 2 | |
| MATH 1300 | Calculus 1 | |
| MATH 1330 | Calculus for Economics and the Social Sciences | |
| **Total Credit Hours** | | **3-5** |

Note: Transfer students majoring in economics must complete at least 12 credit hours of upper-division economics courses at CU Boulder.

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in economics, students should to the extent feasible and in consultation with their economics advisor, follow the plan-of-study grid and declare economics as a major by the beginning of the second semester.

## Recommended Four-Year Plan of Study

Through the required coursework for the major, students will complete all 12 credits of the the Social Sciences area of the Gen Ed Distribution Requirement, as well as the QRMS component of the Gen Ed Skills Requirement.

| | | |
|---|---|---|
| **First Year** | | |
| **Fall Semester** | | **Credit Hours** |
| ECON 2010 | Principles of Microeconomics | 4 |
| Mathematics Requirement for Economics (may fulfill Gen. Ed. Skills course: QRMS) | | 3-5 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities/ Natural Sciences) | | 3 |
| Elective or MAPS (If needed) | | 3 |
| | **Credit Hours** | **16-18** |
| **Spring Semester** | | |
| ECON 2020 | Principles of Macroeconomics | 4 |
| Mathematics Requirement for Economics (3-5): If needed | | 3-5 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective or MAPS (If needed) | | 3 |
| | **Credit Hours** | **16-18** |
| **Second Year** | | |
| **Fall Semester** | | |
| ECON 3070 | Intermediate Microeconomic Theory | 4 |
| ECON 3818 | Introduction to Statistics with Computer Applications | 4 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| ECON 3080 | Intermediate Macroeconomic Theory | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Third Year** | | |
| **Fall Semester** | | |
| ECON 4818<br>or ECON 4848<br>or ECON 4858 | Introduction to Econometrics<br>or Applied Econometrics<br>or Financial Econometrics | 3 |
| ECON (3): 4000-level elective | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Upper-division Written Communication/US Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ECON (3): 4000-level elective | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Natural Sciences/Global Perspective) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Fourth Year** | | |
| **Fall Semester** | | |
| ECON (3): 4000-level elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ECON (3): 4000-level elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **121-125** |

## Learning Outcomes

The undergraduate degree in economics emphasizes the following preferred learning outcomes:

- Students will demonstrate knowledge of microeconomic theory tools.
- Students will demonstrate knowledge of macroeconomic theory tools.
- Students will demonstrate knowledge of statistical analysis tools.
- Students will apply economic tools to new contexts such as poliy analysis and discussion of world events.

# Economics - Minor

The Department of Economics at CU Boulder is recognized as a very high quality research and teaching department.

Economics is a quantitative, policy oriented social science with a highly developed body of theory and a wide range of real-world applications. Economists seek to describe the process by which societies use scarce resources to attain societal goals and predict the consequences of changes in those processes. Theoretical models, understanding of economic and policy making institutions, quantitative analysis and the examination of data are all part of this field of knowledge.

In general, economists are interested in the economic behavior of individuals. Investigations of the daily decisions that consumers, workers and firm managers make, as well as the interactions of such economic decisions in markets, constitute the subject of microeconomics. Macroeconomics refers to the analysis of economic activity of individuals aggregated over many markets. Some of the specific issues of macroeconomics include economic growth, inflation, recession and unemployment. Finally, international economics investigates the interrelationships among different economies and, in particular, studies the pattern of trade and payments between countries.

Faculty fields of specialization include international trade/finance, natural resource and environmental economics, public economics, urban and regional economics, development economics, labor economics and demography, political economics, economic history, industrial organization/game theory and econometrics.

The Department of Economics offers a minor. It is open to any student enrolled at CU Boulder, regardless of college or school, except for those pursuing an individually structured major or a major in distributed studies.

# Requirements

## Program Requirements

Completion of the minor requires a minimum of 20 credit hours in economics.

All coursework applied to the minor must be completed with a grade of C- or better. No pass/fail work may be applied. The GPA for all minor coursework must equal 2.00 or higher.

Students will be allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor. If transferred coursework includes replacements for ECON 2010 or ECON 2020 that are fewer than a combined 7 credit hours for both courses, an additional upper-division elective will be added to the requirements for a minor.

Students may elect to take the 3000-level ECON courses that are designed for non-economics majors (e.g., ECON 3403, ECON 3535, ECON 3545, ECON 3616 and ECON 3784).

ECON 3070, ECON 3080 and all 4000-level ECON courses require a prerequisite of calculus. Students may take one of the following courses to meet this prerequisite: ECON 1088, MATH 1300 MATH 1300MATH 1300, MATH 1310, MATH 1330 or APPM 1350.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ECON 2010 & ECON 2020 | Principles of Microeconomics and Principles of Macroeconomics | 8 |
| ECON 3070 & ECON 3080 | Intermediate Microeconomic Theory and Intermediate Macroeconomic Theory | 7 |
| **Electives** | | |
| One upper-division ECON course [1] | | 3 |
| One 4000-level ECON course | | 3 |
| **Total Credits** | | **20-22** |

1 ECON 3818 and equivalent substitutes are **not** allowed to count as an upper-division elective. If transferred coursework includes replacements for ECON 2010 or ECON 2020 that are fewer than a combined 7 credit hours for both courses, an additional upper-division elective will be required.

# Learning Outcomes

Upon completing the minor, students will:

- Understand how societies use scarce resources to attain societal goals and how to predict the consequences of changes in those processes.
- Gain knowledge of theoretical models and quantitative analysis.

# English

The literature and cultural studies track of the undergraduate degree in English emphasizes knowledge and awareness of:

- canonical and non-canonical works of English and American literature.
- the history of British and American literature.
- literary theories, including recent theoretical developments; and
- the social and historical contexts in which the traditions developed.

The creative writing track of the undergraduate degree in English emphasizes knowledge and awareness of:

- literary works, including the genres of fiction, poetry, creative nonfiction, playwriting and screenwriting, and the major texts of contemporary writers;
- literary history, including the origins and development of genres, major writers of the past and the role of the writer in society; and
- analysis of literary form, including theories of literary composition and critical theory.

**Course code for this program is ENGL.**

# Advising

Upon declaring an English major, students are assigned an English advisor. The advisors are available to meet with students by appointment and on a drop-in basis. The advisors monitor and evaluate student progress in completing the arts and sciences core curriculum and major requirements and certify students for graduation. The department encourages students to meet with their primary advisor at least once each semester to update their student file and ensure that they are making satisfactory progress in meeting the college and major requirements.

# Departmental Honors

Students interested in writing a senior thesis in order to earn Latin Honors should confer with the associate chair for undergraduate studies early on in their studies, but no later than the beginning of the spring term in their junior year. As students progress through their coursework, those interested in writing a thesis should make sure to take courses with full-

time instructors before and during their junior year so that they can ask a faculty member to advise their senior thesis. For additional information on departmental honors, visit the department's Undergraduate Studies (https://www.colorado.edu/english/current-students/undergraduates/) webpage.

## Students Who Contemplate Teaching

Sheets listing the curriculum required for a teaching license for secondary schools may be obtained from the School of Education. Since fulfilling requirements for both education and English makes a very tight schedule, students should seek early advising to complete their college requirements. For additional information, see the Teacher Licensure Program (p. 814).

## Bachelor's Degree

- English - Bachelor of Arts (BA) (p. 281)

## Minors

- Creative Writing - Minor (p. 284)
- English - Minor (p. 284)
- Writing and Public Engagement - Minor (p. 284)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Beechy, Tiffany R. (https://experts.colorado.edu/display/fisid_149775/)
Professor; PhD, University of Oregon

Bickman, Martin (https://experts.colorado.edu/display/fisid_100230/)
Professor; PhD, University of Pennsylvania

Brylowe, Thora (https://experts.colorado.edu/display/fisid_156063/)
Associate Professor; PhD, Carnegie Mellon University

Carr, Julia Alice (https://experts.colorado.edu/display/fisid_143349/)
Professor; PhD, University of California, Berkeley

Cox, Jeffrey N. (https://experts.colorado.edu/display/fisid_113253/)
Distinguished Professor; PhD, University of Virginia

Deagman Simonetta, Rachael Nicole (https://experts.colorado.edu/display/fisid_154125/)
Associate Teaching Professor; PhD, Duke University

DeShell, Jeffrey (https://experts.colorado.edu/display/fisid_118482/)
Professor; PhD, SUNY at Buffalo

Douglas, Marcia B. (https://experts.colorado.edu/display/fisid_122696/)
Professor, Associate Chair; PhD, SUNY at Binghamton

Eggert, Katherine (https://experts.colorado.edu/display/fisid_103618/)
Professor; PhD, University of California, Berkeley

Garrity, Jane Marie (https://experts.colorado.edu/display/fisid_105467/)
Associate Professor; PhD, University of California, Berkeley

Gladstone, Jason Daniel (https://experts.colorado.edu/display/fisid_154914/)
Assistant Professor; PhD, Johns Hopkins University

Glimp, David R. (https://experts.colorado.edu/display/fisid_143616/)
Associate Professor; PhD, Johns Hopkins University

Goodman, Nan (https://experts.colorado.edu/display/fisid_100633/)
Professor of Distinction; PhD, Harvard University

Green, Jeremy F. (https://experts.colorado.edu/display/fisid_113077/)
Associate Professor; PhD, University of Cambridge (England)

Gries, Laurie Ellen (https://experts.colorado.edu/display/fisid_155951/)
Associate Professor; PhD, Syracuse University

Harrington, Emily Marie (https://experts.colorado.edu/display/fisid_154601/)
Associate Professor, Associate Chair; PhD, University of Michigan Ann Arbor

Hasan, Raza Ali (https://experts.colorado.edu/display/fisid_146167/)
Associate Teaching Professor; MFA, Syracuse University

Heydt-Stevenson, Jillian (https://experts.colorado.edu/display/fisid_111683/)
Professor; PhD, University of Colorado Boulder

Higashida, Cheryl A. (https://experts.colorado.edu/display/fisid_126280/)
Associate Professor; PhD, Cornell University

Hurley, Kelly K. (https://experts.colorado.edu/display/fisid_105553/)
Associate Professor; PhD, Stanford University

Jacobs, Karen S. (https://experts.colorado.edu/display/fisid_100280/)
Associate Professor; PhD, University of California, Berkeley

Jones, Stephen Graham (https://experts.colorado.edu/display/fisid_146498/)
Distinguished Professor, Endowed Chair; PhD, Florida State University

Klages, Mary K. (https://experts.colorado.edu/display/fisid_101897/)
Associate Professor; PhD, Stanford University

Kocher, Ruth Ellen (https://experts.colorado.edu/display/fisid_143618/)
Distinguished Professor; PhD, Arizona State University

Kuskin, William (https://experts.colorado.edu/display/fisid_143742/)
Chair, Professor; PhD, University of Wisconsin–Madison

Labio, Catherine (https://experts.colorado.edu/display/fisid_147608/)
Associate Professor; PhD, New York University

Lamos, Steven Joseph (https://experts.colorado.edu/display/fisid_141169/)
Associate Professor; PhD, University of Illinois at Urbana–Champaign

Little, Katherine C. (https://experts.colorado.edu/display/fisid_149872/)
Professor; PhD, Duke University

Mattar, Karim (https://experts.colorado.edu/display/fisid_153056/)
Associate Professor; DPhil, Oxford Univ (England)

Mitchell, Dianne (https://experts.colorado.edu/display/fisid_165827/)
Assistant Professor; PhD, University of Pennsylvania

Mohabir, Rajiv (https://experts.colorado.edu/display/fisid_173865/)
Assistant Professor; PhD, University of Hawai'i Manoa

Nugent, Teresa L. (https://experts.colorado.edu/display/fisid_101477/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Rios, Gabriela (https://experts.colorado.edu/individual/fisid_167679/)
Assistant Professor; PhD, Texas AM University

Rivera, John-Michael (https://experts.colorado.edu/display/fisid_118393/)
Professor, Dean; PhD, University of Texas at Austin

Robertson, Benjamin John (https://experts.colorado.edu/display/fisid_146500/)
Assistant Professor; PhD, SUNY at Buffalo

Saxby, Justin
Assistant Teaching Professor

Shade-Johnson, Jaquetta
Assistant Professor; PhD, Michigan State University

Shanmugaraj, Nisha (https://experts.colorado.edu/display/fisid_173859/)
Assistant Professor; PhD, Carnegie Mellon University

Sheffield, Elisabeth Ann (https://experts.colorado.edu/display/fisid_123500/)
Professor; PhD, SUNY at Buffalo

Stevenson, John A. (https://experts.colorado.edu/display/fisid_101656/)
Professor; PhD, University of Virginia

Windell, Maria A. (https://experts.colorado.edu/display/fisid_154605/)
Associate Professor; PhD, University of Virginia

Winkiel, Laura Ann (https://experts.colorado.edu/display/fisid_145813/)
Associate Professor, Associate Chair; PhD, University of Notre Dame

Wood, Rachel
Assistant Teaching Professor

Wright, Nicole M. (https://experts.colorado.edu/display/fisid_153060/)
Associate Professor; PhD, Yale University

# Courses

**ENGL 1001 (3) Writing, Reading, Culture**
This course provides training and practice in writing and critical thinking with a focus on literary and cultural studies. We will emphasize reading, the writing process, the fundamentals of composition, and the structure of arguments. There will be varied writing assignments with opportunities for revision.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Lower
MAPS Course: English

**ENGL 1110 (1) Grammar Bootcamp**
Students will learn the basics of English grammar by practicing sentence analysis. The class will reinforce the words associated with parts of speech and parts of the sentence, tense, mood, and modification. Students will learn to use sentence diagrams as an analytical tool. By the end of the class, successful students will be to able wield the vocabulary of English grammar to analyze and explain the composition of complex English sentences.

**ENGL 1120 (1) Editing Bootcamp**
Students will learn the basics of editing English. The class will reinforce the rules of punctuation. By the end of the class, successful students will be to edit a 750-word document with 95% accuracy.

**ENGL 1130 (1) Citation Bootcamp**
Students will learn the basics of MLA Citation. By the end of the class, successful students will be able to responsibly cite paraphrases, partial quotations, full quotations and block quotations with 95% accuracy.

**ENGL 1191 (3) Introduction to Creative Writing**
Introduces techniques of fiction and poetry. Student work is scrutinized by the instructor and may be discussed in a workshop atmosphere with other students. May not be taken concurrently with ENGL 2021 or ENGL 2051. May not be repeated.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1210 (3) The Novel**
The ¿novel¿ means ¿the new.¿ And the novel is a new literary genre in history, a fresh young upstart compared to poetry and drama. This course introduces students to the novel form: its definitions, evolutions, and possibilities. Novels may be drawn from a range of British, American, European, and global traditions to expose students to the endless potential of how novels imagine the world.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1220 (3) From Gothic to Horror**
Explores literature in the Gothic mode and aesthetic and critical theories related to modern "horror" genres or their precursors. Introduces literary-critical concepts (such as notions of abjection, repression and anxiety) that developed alongside this branch of literature. Students read canonical works in British and American traditions while reflecting on notions of popular or marginalized literature.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1230 (3) Environmental Literature**
This course explores the conjunctions of literature and environments: natural, built, and/or virtual. Students consider literary confrontations with issues such as ecological crises, climate change, human impact on the planet, technics and indigeneity, non-human animals and inhuman agencies, future natures, and environmental justice. Readings may include novels, non-fiction, short fiction, poems, graphic novels, and more.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1240 (3) Planetarity**
Focuses on post-WWII American writing and thought about the planet and humanity. We explore how postwar efforts to transform the terrestrial environmental and conquer outer space raise questions about humanity, technology, and nature. We also study how earth and space serve novelists, artists, and film-makers as environments to confront large-scale questions about culture, identity, and power.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 1240
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1250 (3) Introduction to World Literature by Women**
This course considers how literature represents gendered experiences across multiple countries and continents. Students will read fiction and poetry by women from South Asia, East Asia, Africa, Europe, and the Americas, that address questions of sexuality, marriage, and family, politics, labor, and justice at the intersections of gender, race, and nation.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 1250
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**ENGL 1270 (3) Introduction to American Literature by Women**
This course investigates how literature by women has shaped the United States over time, from Indigenous authors, to abolitionists, to suffragists, to feminists of various waves. With attention to intersections between class, race, and sexual orientation, students will consider what it has meant and still means to be a woman writer in the United States and will explore how women have engaged, subverted, and resisted ideas about gender.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 1270
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ENGL 1280 (3) Plague and Pandemic**
Explores how literature has depicted the experience of plague across different historical periods and geographical areas (for instance, the Black Death in medieval times, smallpox in colonial America, the 1918 Spanish influenza, the HIV epidemic). Investigates how pandemics raise philosophical questions about what constitutes human communities and borders between insiders and outsiders, health and illness, self and other.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1290 (3) Crime, Policing, Detection**
Explores stories about crime and policing, deviance and detection, law and order. Students will learn how genres such as detective or crime fiction or police procedurals narrate anxieties about race, class, gender, sexuality, and nationality. Analyzes how categories of innocence and guilt, justice and punishment, are imagined and portrayed in short stories, films, novels, and TV shows.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1310 (3) The Modern Fairy Tale**
This course will introduce you to a great variety of fairy tales, folk tales, parables and legends written and composed in English, translated from other languages, and criticism around the form. By the end of the semester, you will have tools to understand these types of stories in terms of both reading and writing. We will discuss terminology, themes, tradition and innovation, as well as the ways that fairytales live in the world now.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1320 (3) The Short Story**
Short stories offer writers the freedom to build new worlds, create new characters, try out new narrative voices and structures, and explore new ideas¿again and again. You will read a range of authors and genres as you consider this dynamic, powerful, and widely varied form.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1340 (3) Mysticism and the Jewish American Literary Tradition**
Explores the mystical tradition within Judaism from ancient times to the present. With roots in the Hebrew Bible, Jewish mysticism is one of the oldest forms of mysticism and has had an influence on some of the greatest philosophical traditions of western civilization.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 1234
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Ideals and Values

**ENGL 1420 (3) Poetry**
Introduces students to how to read a poem by examining the great variety of poems written and composed in English from the very beginning of the English language until recently.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1500 (3) Introduction to British Literature**
Introduces students to the British literary tradition through intensive study of centrally significant texts and genres.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1600 (3) Introduction to American Literature**
Introduces students to the American literary tradition through intensive study of centrally significant texts and genres.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1700 (3) Introduction to Shakespeare**
This course introduces several of William Shakespeare¿s plays, including comedies, tragedies, and histories. Students will become familiar with Shakespeare¿s dramatic language, often by reading aloud, acting short scenes, or offering creative responses. We will also explore how filmmakers have adapted Shakespeare¿s dramas for the screen. No previous experience with Shakespeare is expected: all students at CU are welcome!
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 3000
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1800 (3) American Ethnic Literatures**
Students will learn how writings by African American, Native American and Indigenous, Chicana/o/x, Latina/o/x, Asian American, and/or Arab American authors are central to the US literary tradition. The class explores the significance of ethnic US literatures and cultures through short stories, novels, plays, films, and more.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ENGL 2006 (3) American Comics and Graphic Novels: An Ambivalent Art**
Immerse yourself in comics. Spanning all media platforms, comics are a global force in the twenty-first century culture. This course is an introduction to comics history and a headlong dive into comics today. It covers superheroes, movies, novels, as well as making comics. It proposes that comics help us understand ourselves in the world today. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 2006
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2016 (3) Children¿s Literature**
This course examines classics of children¿s literature. Students will read a wide range of genres written for children, from fantasy to adventure to fairy tales to realistic fiction. We will discuss how ideas about childhood change over time as well as how one of the most lucrative parts of the publishing industry wields a wide cultural influence.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2017 (3) World Literature**
Songs. Epics. Autobiographies. Novels. Tales. Plays. Films. These genres appear across cultures, languages, and historical periods. This course focuses on how genres work in a variety of cultures and time periods, reading work written in English and in translation. Students will gain a deep understanding of the possibilities of that genre as well as an introduction to the way that literature travels between cultures. Topics and focus will vary by instructor.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2021 (3) Introductory Poetry Workshop**
Introductory course in poetry writing.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of ENGL 1191 (minimum grade B).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2026 (3) Popular Culture, Critical Reading**
This course engages with forms of popular culture (for example, franchises, graphic novels, genre fiction, video games, trashy books) and considers how we can analyze these cultural forms critically. Students read a range of criticism written by amateurs, fans, journalists, social media, critics, and scholars, and will consider how the production of these cultural forms are shaped by different audiences.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2036 (3) Introduction to Media Studies in the Humanities**
Serves as an introduction to media studies specifically from a humanities perspective. Studies both histories and theories of media from the 20th and 21st centuries. Touches on methodologies for undertaking media studies (including distant ready and media archaeology). Objects of study may include such topics as film, radio, social media platforms and games, as well as digital art and literature.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 2036 and AHUM 2036
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2040 (3) Money Matters: Literature and Finance**
This course focuses on the interplay between literature, culture, and the world of money, trade, economics, and finance. Students may consider how literary, cultural, and visual artworks spread alongside trade routes; how writers and artists have depicted financial bubbles, boom and bust cycles, and economic crashes; and how culture is tied to capitalist systems that writers and artists have criticized and boosted. Students may visit Norlin¿s Special Collections and the CU Art Museum.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2046 (3) Future Histories of Technology**
This class explores both literature about future technologies and literary technologies that move across periods, regions, and disciplines. Our cultural and historical approach to future histories of technology will illuminate how race, gender and sexuality, class, and nationality structure seemingly neutral research and development, usage, and innovation. Ultimately, our goal is to see how we¿re not passive consumers but active participants in reimagining the present and future of technology.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 2046
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Diversity-U.S. Perspective

**ENGL 2051 (3) Introductory Fiction Workshop**
Introductory course in fiction writing.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of ENGL 1191 (mimimum grade B).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2058 (3) Introduction to Modern and Contemporary Literature**
This course explores how literature, art, and culture in the 20th and 21st centuries responded to the social, political, and economic upheavals that have occurred since 1900. Students will read a selection of modern and contemporary writers from Anglo-American and/or global traditions to help us understand our present moment and to see what made us who we are.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2102 (3) Literary Analysis**
Students will build skills in careful, detailed reading and critical writing. Focusing on poetry, prose, and plays, the course cultivates an understanding of literary forms and genres and introduces techniques and vocabulary essential for the study of literature.
**Requisites:** Restricted to English (ENGL) majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2112 (3) Introduction to Literary Theory**
This course introduces students to a wide range of critical theories essential to the study of literature. Critical theories have broad applications because they provide ways to interpret all cultural products, including visual arts, music, and writing. We will investigate some of the major movements relevant to literary studies, which may include, for example, cultural studies, structuralism, feminisms, ecocriticism, critical race theories, postmodern theory, media theories, etc.
**Requisites:** Restricted to English (ENGL) majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2115 (3) American Frontiers**
This course explores the power of the frontier myth in US literature and culture. The material we cover may range from stories of the American West and American empire to frontiers like cyberspace or outer space (the final frontier). Texts may include short stories, novels, movies, photographs, and computer games.
**Additional Information:** Arts Sci Core Curr: United States Context Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2212 (3) Science Fiction**
This course examines science fiction novels, short stories, and movies, paying close attention to what they teach us about our world. How do these works speculate about the future and alternative realms, and how do they portray our hopes and fears for the promises and limits of technology? Science fiction thinks about ways in which bodies, individuals, and societies might be different, and imagines ways of being and living other than our present.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2226 (3) Literature and Psychology**
Explores imaginative representations of mental life and connections between literature and psychology. Topics may include: Allegory, psychomachy, and affective language; Psychoanalytic concepts in literary and cultural studies; Psychoanalytic criticism; Narcissism and selfhood; Dreams, fantasies and interpretation; Family and socialization; Grief and trauma. Students read literary and theoretical texts concerned with affect, cognition and depictions of mind.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2503 (3) Medieval and Renaissance**
Surveys groundbreaking literature from the medieval period to the late seventeenth century. Topics of discussion may include gender and embodiment, technologies of communication and discovery, and premodern notions of race or cultural identity. Students will be encouraged to read aloud, explore unfamiliar literary forms, and share their ideas and questions.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2504 (3) Enlightenment and Modernity**
Surveys key trends and works in literature after 1660, focusing on issues such as modernity; national or colonial identities; political, economic, social, technologic and scientific revolutions; and reading and media technologies. Students will be encouraged to read aloud, explore unfamiliar literary forms, and share their ideas and questions. Formerly ENGL 2512.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2655 (3) American Literature to the Civil War**
Students will explore chaos, possibilities, and violence in American literature as Indigenous lands transform into British colonies transform into a nation that expands across the continent, but nearly implodes in civil war. This class considers how authors struggling to define America used a rising print culture and evolving literary landscape to confront issues of nation, empire, race, gender, sexuality, religion, modernity, and industrialization.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2665 (3) American Literature from the Civil War**
This course surveys the vibrant, diverse, and complex traditions of US writing from the aftermath of the Civil War through the present. Students will explore a period of literary innovation while asking how the United States has transformed into the nation it is today. Topics of discussion may include race, capital, empire, media, and culture.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2666 (3) Monsters**
As Neil Gaiman says when paraphrasing GK Chesterton: ¿Fairy tales are more than true¿not because they tell us dragons exist, but because they tell us dragons can be beaten¿ [my emphasis]. In here we¿ll look with wonder at the monsters, but always with an eye to how we can survive our encounters with them, and how, by beating them, by resisting them, by insisting that there¿s another way than brute strength, we can leave the world a little better than it was.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2707 (3) Introduction to Queer Literature**
How is literature shaped by cultural understandings of queer and non-normative genders and sexualities? How does it, in turn, shape those understandings? This class explores how genders, sexualities, and writing intersect with issues of race, class, nation, ability, and empire. Readings may include novels, short stories, poetry, graphic novels, films, essays, blogs, and more.
**Equivalent - Duplicate Degree Credit Not Granted:** LGBT 2707
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ENGL 2717 (3) American Indian Literature**
Surveys historical and contemporary North American Native American literature. Examines the continuity and incorporation of traditional stories and values in Native Literature, including novels, short stories and poetry.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 2713
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2737 (3) Introduction to African American Literature**
This course traces the roots of contemporary African American writings through the Harlem Renaissance to early Black poetry and slave narratives. Students will explore how African American authors have used genre, language, and publication to question intersections of race, gender, sexuality, class, nation, empire, colorism, and freedom in US and African American history.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 2732
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ENGL 2747 (3) Introduction to Chicana/o/x Literature**
This class explores the diverse and vibrant writings of Chicana/o/x authors from today back through a time when places like Colorado and California were part of Mexico. Readings consider how Chicana/o/x authors have used concepts such as Greater Mexico, Aztlán, la frontera, and Chicanidad to question intersections of language, race, class, gender, sexuality, indigeneity, nation, violence, and empire.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 2746
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ENGL 2767 (3) Race, Empire, and the Postcolonial**
When did the sun set on the British Empire? In the twentieth century, countries across Africa, Asia, and the Caribbean fought for their independence and built their own literary and cultural traditions while grappling with the legacies of empire. This course explores how authors from these new nation-states wrote about racial oppression; global economic inequalities; the promise of new national identities; the lingering effects of colonialism; and the use of English as a literary language.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 2761
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**ENGL 3000 (3) Shakespeare for Nonmajors**
Introduction to Shakespeare. Introduces students to 6-10 of Shakespeare's major plays. Comedies, histories, and tragedies will be studied. Some non-dramatic poetry may be included. Viewing of Shakespeare in performance is often required.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 1700
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only. English (ENGL) and Humanities (HUMN) majors are excluded from taking this class.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3005 (3) The Literature of New World Encounters**
This course explores how literary, cultural, and historical works stage intersections and encounters between European settlers and Indigenous peoples. Christopher Columbus¿s epochal journey brought the Old World (Asia, Africa, Europe) into contact with the New World (the Americas), setting in motion the diffusion of plants, animals, peoples, and pathogens. Students will think about the economic, cultural, historical, and biological consequences of the European invasion and settlement of the Americas.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**ENGL 3006 (3) Digital Editions & Web Publishing**
Introduces students to the theories and practices involved in making a scholarly edition. Students create their own digital editions and learn the requisite skills to publish scholarly research on the web.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3008 (3) The Novel After 1900**
This course explores developments in the novel after 1900. The twentieth and twenty-first centuries witness multiple experiments in the genre as the novel keeps being invented anew. Students will learn about a range of different novelistic styles and trends in the twentieth and twenty-first centuries, which may include: modernism, socialist realism, postmodernism, postcolonialism, proletariat writing, domestic and feminist fiction, queer fiction, autobiography, magical realism, encyclopedic novels, climate change fiction, middlebrow fiction, speculative fiction.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3016 (3) Writing in the Age of AI**
In this advanced-writing course, students will study the history of artificial intelligence (AI) technology and its current applications, develop hands-on skills for using AI text generators, and examine the ethical concerns and implications of AI technology. Students will learn how AI chatbots draw from vast amounts of data to generate responses to written prompts. They will explore different versions of AI language-generating tools and evaluate their strengths and weaknesses, and they will experiment with using AI at different stages of the writing process. They will practice formulating and revising prompts and verifying the authenticity of AI-produced responses and citations.
**Recommended:** Corequisite ENGL 1110, Grammar Bootcamp (1 credit) and recommended prerequisite of a lower-division writing course.
**Additional Information:** Arts Sci Gen Ed: Written Communication-Upper Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3020 (3) Climate Change Fiction**
This course explores climate change fiction. Popularly known as ¿CliFi,¿ such fiction attempts to represent the cascading impacts and disorienting realities of a planet reshaped by climate change. Rising sea levels, persistent droughts, viral pandemics, super-storms, failed states, collapsing ecosystems, extreme economic inequality, colossal geoengineering projects, reanimated extinct species, remade worlds: the fictions we read address all these aspects of climate change. We will also consider relevant non-fiction, poetry, graphic narratives, and non-literary media.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3021 (3) Intermediate Poetry Workshop**
Intermediate course in poetry writing.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of ENGL 2021 (minimum grade B). Restricted to Creative Writing minor students or students with a sub plan of Creative Writing.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Undergraduate Writing

**ENGL 3022 (3) Medical Humanities**
Explore concepts¿through multifaceted classic and contemporary literary works¿of culture, ethics, and interpretation within the medical field of today, with an eye to thinking critically about the health professions. In this challenging but rewarding course, students will focus on composition, critical thinking, information synthesis, and communication in a global context of conflicting values and assumptions; they will prepare themselves to address problems in healthcare through writing and critical reasoning.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3025 (3) America: Colony, Nation, World**
This course explores how literature creates, complicates, and nuances narratives of the United States from its early beginnings to the contemporary moment. The course may focus on a specific context (for example, the US and the Americas; regionalism; neoliberalism), period (for example, pre-Civil War, Reconstruction, post-1945), or genre (for example, travel narratives; political writing; legal cases).
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3026 (3) Syntax, Citation, Analysis: Writing About Literature**
Students hone their writing skills by closely analyzing the language in literary texts. The course will focus on the nuances of sentence structure and grammar, in order to help students become better writers and readers. Students will learn how to perform research in literary criticism and will write and revise a research paper, as well as a number of other short papers for different audiences. Students will learn and use citation methods within the discipline and will discuss the reasoning behind citational practice.
**Recommended:** Prerequisite completion of lower-division writing requirement.
**Additional Information:** Arts Sci Gen Ed: Written Communication-Upper

**ENGL 3031 (3) Studies in Creative Writing for Nonmajors**
How do stories work, and what's involved with writing them and then getting them out into the world? This course will, through lectures and recitation, work through the many techniques writers use to pull the reader ahead page by page¿dialogue, exposition, prose, structure, and the rest¿as well as the various mechanisms by which that writing can make its way out into the world.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**ENGL 3036 (3) Artist Books in Theory and Practice**
This course will introduce students to an exciting but neglected body of work: artist books. Beginning in the twentieth century, artist books joined the ranks of developed art forms, appearing in every major artistic movement. The first half of the course will introduce students to the wide diversity of styles and materials artist books employ. The second half will be a workshop, in which students will create their own unique books based on research projects.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 3036
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3041 (3) Studies in Fiction and Poetry**
Examines literary forms and themes with special emphasis on issues related to the craft of poetry and fiction. This course is taught in conjunction with visiting lectures by practicing writers. Does not count as Creative Writing workshop credit.
**Requisites:** Requires prerequisite course of ENGL 1191 (minimum grade B).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3046 (3) Literature and Architecture**
This course explores the role of storytelling in literature and architecture. It is part seminar and part studio/workshop. Stories invite readers to dwell in them. Buildings tell stories. Stories and buildings are hence sequential arts. Students study examples of narrative architecture from different periods and cultures and analyze literary and philosophical works that explore the connection between buildings and stories. Students also create literary adaptations of works of architecture and translate literary texts into three-dimensional structures.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 3046
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3051 (3) Intermediate Fiction Workshop**
Intermediate course in fiction writing.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course ENGL 2051 (minimum grade B). Restricted to Creative Writing minor students or students with a sub plan of Creative Writing.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3056 (3) Writing the Past**
In Writing the Past students will study and respond to innovative historical writing across genres and platforms including narrative histories, creative nonfiction, memoir, poetry, novels, graphic novels, and web-based historical projects. Students will respond in writing to an array of projects, generating short reading/viewing responses, and will produce a research project relevant to their own interests and in a genre/platform appropriate to their project. Final projects will be highly individualized.
**Requisites:** Requires prerequisite course of ARSC 1080 or ARSC 1150 or CLAS 1020 or ENGL 1001 or PHIL 1500 or WRTG 1100 or WRTG 1150 or WRTG 1250 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3060 (3) Modern and Contemporary Literature for Nonmajors**
Close study of significant 20th-century poetry, drama, and prose works. Readings range from 1920s to the present.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3068 (3) Modernisms and Modernity, 1900-1945**
What does it mean to be modern? This course explores the aesthetic and literary experiments that flourished in the early twentieth century, as authors confronted the experience of modernity¿urbanization, warfare, changing gender and sexual roles, revolutionary political ideologies, new media, anti-colonial struggles¿and sought to rethink the relationship of the present to the past. Students will learn what modernisms are and how writers transformed literary conventions to capture ways of being modern.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3078 (3) Contemporary Literature: 1945 to the Present**
This course explores contemporary literature written in English from 1945 to the twenty-first century. Students may read authors writing in British, American, or global Anglophone traditions, and will learn about the different historical trends that shaped experiments in literary and cultural production. We will consider how these texts engage with a range of issues contemporary to us, for instance, politics, racial and sexual identities, economics and globalization, families and intimacies.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3081 (3) Intermediate Nonfiction Workshop**
Discussion and practical criticism of student work and discussion of relevant works of literary nonfiction.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of ENGL 2021 or ENGL 2051 (minimum grade B).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3088 (3) Major Authors After 1900**
This course focuses on a single author writing in the twentieth or twenty-first centuries. We will study literary and historical influences and other contemporaneous writers as necessary for gaining a full understanding of an author¿s body of work. The author studied will vary each semester. Check department description for details.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3106 (3) Introduction to Literary Study with Data Science**
Introduces students to the use of data science methods in literary criticism. This course explores how computers and data science methods can provide insight into literature while also developing the necessary coding skills to perform such analysis. Students will learn both to perform and to think critically about computationally-based literary scholarship.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 3106
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3116 (3) Topics in Advanced Theory**
This course will focus on a specific topic in critical theory. The class is designed to give students a deeper understanding of a theoretical issue or problem. Topics will vary by semester. Check department description for details.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3164 (3) History and Literature of Georgian Britain**
The Georgian era (1714-1811) was a period of staggering political, social, economic, intellectual, and artistic transformations. This course studies how literary and artistic works have shaped and responded to the tumultuous history of the eighteenth century, a period both modern and strange. Students learn how writers embraced politeness and Enlightenment values while relying on crude satires to make sense of disease outbreaks, financial bubbles and crashes, changes to marriage, industrialization, slavery, and the French Revolution.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3204 (3) The Novel and its Origins**
Where do novels come from? What explains the emergence of this genre as a form invented alongside the rise of the middle classes, the spread of capitalism, the expansion of the reading public, the increasing visibility of women, and changes in print technology? What is the novel¿s relationship to other literary and cultural forms? Students will learn about the rise of the modern novel in the eighteenth century and its developments throughout the nineteenth century.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3217 (3) Topics in Gender and Sexuality**
This course will focus on a particular issue related to questions of gender, sexuality, identity and culture. Students will explore how literature represents and constructs ideas about gender identity and sexual orientation. Topics vary each semester. Check department description for details.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3227 (3) Sex in Shakespeare's Time**
It¿s easy to think about the 1500s and 1600s as a time of starched ruffs, strict morals, and silenced women. This class seeks to complicate this story by asking how Renaissance Englishmen and -women wrote about and imagined sex. Studying drama, poetry, recipes, letters, ballads, and more, we¿ll explore an erotic landscape full of surprises. How did women describe their desire for other women? Was heterosexual intercourse between consenting partners the norm? In what ways could writers express a desire for intimacy with the dead, or nature, or man-made objects? Could they experience asexuality? Did Renaissance authors recognize or celebrate trans identities? We¿ll pursue these questions and more, inviting each other to test out new ways of reading, writing, and sharing our ideas as a community.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**ENGL 3235 (3) American Novel**
This class explores how over two centuries of Americans have shaped the novel and how the novel has shaped America. What themes or crises define the ¿American novel¿? How do immigrant authors, writers of color, Indigenous novelists, and queer or working class authors unsettle the American stories we think we know? Together we¿ll ask how the transformation of America is made visible in the novel¿s shifting boundaries and forms.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3245 (3) American Poetry**
The poetry of America is as diverse as the peoples who inhabit it. This course offers a chance to spend time with some of the most exciting and challenging verse of the last few centuries, exploring poetic form as something continually remade and unmade. We¿ll read poetry written as protest and poetry as public memory, private poems and poems meant for singing, poetry from the margins and poetry that purports to speak for America itself.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3246 (3) Topics in Popular Culture**
Studies special topics in popular culture; specially designed for English majors. Topics vary each semester. May be repeated for a total of 6 credit hours for different topics.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3267 (3) Women Writers**
This course explores how women write about a range of issues, some explicitly gendered, such as desire, sexuality, marriage, and family, and others perhaps less so, such as politics, justice, race, and class. We¿ll consider how women think about their craft, how they approach questions of art and beauty, and whether we should consider writing by women a separate category. Students will examine a range of literature by women, aiming to be inclusive and intersectional.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3267
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3300 (3) Literary London**
Study the works of a major author, school or period of English literary history in London. Subject rotates each year, with possible topics ranging from medieval to contemporary literature. Course incorporates local sites, landmarks, museums, performances and scholars. Application through the Office of International Education required.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3306 (3) Global Comics**
Focuses on comics as a global narrative art defined by an ongoing process of formal and cultural hybridity. We begin by studying the intertwined history, distinct and shared formal characteristics, and respective cultural significance of the three ¿great traditions¿: American comics, Franco-Belgian bande dessinée, and Japanese manga. We then turn out attention to the study of the contemporary patterns of cross-pollination, dissemination, and globalization that characterize European, North and Latin American, Pan-Asian, and African comics.
**Recommended:** Prerequisite ENGL 2006 Comics and Graphic Novels: An Ambivalent Art.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3310 (3) The Bible as Literature**
No single book has been as influential to the English-speaking world as the Bible. We¿ll read the Hebrew Bible and the New Testament for stories, poetry, and wisdom traditions. We¿ll approach the Bible as literature by analyzing its plots, characters, and meanings. Students study its textual history, how there came to be a ¿Bible,¿ and the many writers, conflicts, and cultures from which it emerged. We¿ll consider the Bible¿s powerful influence on ethics and philosophy. Formerly ENGL 3312.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3310 and JWST 3310
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3347 (3) Asian American Literature**
Surveys the artistic practices and innovations of Asian American novelists, poets, and filmmakers. Through literary and cultural studies, history, and historiography, we will explore the ways that Asian Americans have worked within and against genres of sentimental fiction, realism, postmodernism, memoir, and the graphic novel. Our starting point is Lisa Lowe¿s assertion in Immigrant Acts that Asian American culture is: a site that shifts and marks alternatives to the national terrain by occupying other spaces, imagining different narratives and critical historiographies, and enacting practices that give rise to new forms of subjectivity and new ways of questioning the government of human life by the national state. Thus, we will approach Asian American literature itself as theory, historiography, and socio-historical practice as well as art.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Diversity-U.S. Perspective

**ENGL 3377 (3) Literatures of Race, Multiculturalism, Ethnicity**
Race-related controversies are constantly in the news, and college is when many of us form opinions on these topics. Exploring the literatures of race, multiculturalism, and ethnicity alongside and beyond traditional classics can help us become more informed members of society. This course will help students understand how reading literary and cultural texts and media consumption can shape our assumptions of shared belonging or unbridgeable differences. Topics vary each semester. Check department description for details.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3523 (3) Renaissance Literature**
Study the vibrant English literature of the sixteenth and seventeenth centuries, including the new genres of the public stage play and the love sonnet. Together, we¿ll trace how English writers used poetry, prose, and drama to re-tell Classical stories of transgressive desire, confront religious and social change, and represent cultural negotiations with Islam and the Indigenous inhabitants of the Americas. Students will have the opportunity to explore four-hundred year old books in CU¿s Special Collections. Formerly ENGL 4523.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3544 (3) The Long Eighteenth Century**
This course studies the long eighteenth century (approximately 1660-1815), a time of global wars, political revolutions, scientific innovation, and commercial and colonial expansion. Satire ruled, the novel rose to prominence, women actors and writers took the stage, philosophers challenged authority, and enlightenment ideas took hold. Students will consider how new ideas about democracy, capitalism, industrialization, and what it meant to be human emerged. They may visit Norlin¿s Special Collections and the CU Art Museum.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3553 (3) Chaucer and the Invention of English Literature**
This course explores the literary experiments and innovations of Geoffrey Chaucer¿s writing and those of his contemporaries during the end of the fourteenth century, a period that saw enormous social changes. Students will reflect on what literature is and does, both in the past and in our own time.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3563 (3) Shakespeare in Dialogue**
Shakespeare has often seemed to stand apart. This course proposes instead that the full power of Shakespeare¿s drama and poetry emerges in dialogue. Students will read his plays alongside those of talented contemporaries; explore the dynamic social and political contexts of his writing; ask how Shakespeare¿s works can participate in modern conversations about race, sexuality, nation, and ability; or consider how ¿Shakespeare¿ is transformed by the bodies that perform, edit, or simply read his writing.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3564 (3) Romantic Literature and its Revolutions**
Filled with revolutions and reforms, the Romantic period (1770-1830) saw writing and thinking that shifted the world toward contemporary configurations we recognize. The American, Haitian and French Revolutions changed conceptions of liberty. Poetry and the novel transformed, and women writers gained critical attention. As plantations and factories expanded, writers considered the individual¿s place in society and the natural world, changing gender expectations, and what it meant to be complicit in networks that included human bondage.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3573 (3) Shakespeare in Performance**
Focuses on Shakespeare the dramatist through the study of the three Shakespeare plays produced in the summer by the Colorado Shakespeare Festival. In addition to exploring the text, the historical context and performance conventions c. 1600, students meet the CSF teams (professional directors, dramaturgs, designers and actors) of the three plays and the Producing Artistic Director of the CSF.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3583 (3) Milton¿s Worlds**
This course studies the writings of John Milton within his turbulent political and literary landscape. We will focus on Milton¿s epic, Paradise Lost, which tells a story of worlds created and squandered. We will also explore art and literature that talks back to Milton¿s vision of paradise and evil.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3593 (3) Major Authors in Literature Before 1660**
This course focuses on a single author from the medieval or early modern period. We will study literary and historical influences and other contemporaneous writers as necessary for gaining a full understanding of an author¿s body of work. The author studied will vary each semester. Check department description for details.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3604 (3) Victorian Literature**
This course studies how literature and culture represent the upheavals of the nineteenth century, including industrialization, the science of evolution, and the expansion of the British Empire. Realist, Gothic, and Sensation novels thrived during this period and people turned to poetry to mourn, to celebrate, to seduce, and to inspire. This literature helped to establish literary forms and social and political ideas that remain influential today.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3675 (3) Majors Authors in American Literature**
This course focuses on a single author in American Literature. We will study literary and historical influences and other contemporaneous writers as necessary for gaining a full understanding of an author¿s body of work. The author studied will vary each semester. Check department description for details.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3767 (3) Feminist Fictions**
Examines a series of literary texts to consider how writers across the world have used fiction to creatively stage and reimagine gender and sexuality. Attends to the formal and narrative techniques by which these texts call attention to the fictionality--and thereby the creative malleability--of gender itself. Some cinematic and performance texts will also be included.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3767
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Diversity-Global Perspective

**ENGL 3796 (3) Queer Theory**
Surveys theoretical, critical, and historical writings in the context of lesbian, bisexual, transgender and gay literature. Examines relationships among aesthetic, cultural and political agendas, and literary and visual texts of the 20th century.
**Equivalent - Duplicate Degree Credit Not Granted:** LGBT 3796
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3830 (3) Topics in Advanced Writing and Research**
This reading and writing-intensive course provides students with the resources necessary to conceive, propose, and execute their own research projects. This course will introduce students to a range of critical methods in the study of literature and culture, while offering a writing-intensive experience in a small seminar environment. Readings for the course may include novels, poems, films, or other media as well as relevant historical and critical commentary. The topic of the course will vary.
**Additional Information:** Arts Sci Gen Ed: Written Communication-Upper

**ENGL 3846 (3) Real Analysis: Proofs, Poems, Poetic-Mathematical Analogues**
Focuses on the discovery of analogues, of the visual and metaphorical machinery similarly at work in both mathematical and poetic thought found in proofs and poems. Emphasis will be on building up mathematical and poetic literacy. Cross-genre student discussion and writing will highlight the inner workings of Calculus and 20th-century poetic aesthetics.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3856 (3) Topics in Genre Studies**
Studies special topics in genre studies; specially designed for English majors. Topics vary each semester. May be repeated for a total of 6 credit hours for different topics.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3930 (1-6) Internship**
Provides academically supervised opportunity for upper-division students to work in public or private organizations on projects related to students' career goals and to relate classroom theory to practice. Department enforced prerequisite: 3.0 GPA and faculty supervision.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: General Literature and Language

**ENGL 3940 (1-3) Service Learning Practicum**
Under faculty supervision, students participate in a service project in conjunction with an academic course.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: General Literature and Language

**ENGL 3950 (1-2) Career Exploration and Development**
Discover tools to facilitate the research and exploration of a wide variety of career opportunities. The class offers hands-on, practical job-search skills such as close reading job advertisements, creating polished resumes, and crafting persuasive cover letters. In addition, reflective activities encourage students to investigate their professional values, interests, strengths and skills. By the end of term, students will have a ready-to-use portfolio to begin the internship or job application process.

**ENGL 4003 (3) Old English 1: Introduction to Old English**
Introduces students to Old English, the ancient ancestor of Modern English (as Latin is the ancestor of Spanish and Italian, distinct from both). Course will focus on reading knowledge through grammar study and translation, and to a lesser extent on pronunciation. Provides basic parsing and translation skills and an introduction to the history, culture, and literature of early medieval Britain. Provides an introduction to grammar and to the history of the English language.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 5003
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4013 (3) Old English 2: Intermediate Old English**
Continues to develop skills in Old English reading and translation. Focuses on shorter canonical texts in verse and prose. Students will produce idiomatic translations for every class, write a midterm exam based on those translations, and write either a final exam or a final paper. Students will also memorize and present a short section of verse in the original language. Graduate students will read and present on secondary scholarship and produce original research.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 5013
**Requisites:** Requires prerequisite course of ENGL 4003 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4018 (3) Literature and Globalization**
This is a special topics course that studies how the rise of globalization, internationalism, and transnationalism has shaped literary and cultural works in the twentieth and twenty-first centuries. Topics vary each semester and may include, for instance, analyses of cross-cultural and economic exchanges, migrations and hybrid identities, the legacies of imperialism, or the globalization of English as a literary language. Check department description for details.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4021 (3) Advanced Poetry Workshop**
Advanced course in poetry writing.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course ENGL 3021 (minimum grade B). Restricted to Creative Writing minor students or students with a sub plan of Creative Writing.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4023 (3) Old English 3: Beowulf**
Continues to develop students' proficiency in Old English through the translation and literary study of the heroic poem _Beowulf_. Students will produce idiomatic translations for every class, write a midterm exam based on those translations, and write either a final exam or a final paper. Students will also memorize and present a short section of the poem. Graduate students will read and present on secondary scholarship and produce original research. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 5023
**Requisites:** Requires prerequisite courses of ENGL 4003 or ENGL 4013 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4026 (3) Special Topics in Genre, Media, and Advanced Writing**
Studies theoretical and historical approaches to genre, media, and writing at the advanced level.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4039 (3) Capstone in Literary Studies**
Topic varies by section, but all sections include small seminar discussions and focus on an individualized research project related to the topic. This course will draw on skills from previous courses in critical reading, thinking, and writing and will culminate in high-level discussions and in the final project.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of ENGL 2102 and ENGL 2112 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) English (ENGL) or Humnanities (HUMN) majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4048 (3) The Modernist Novel**
This course studies the experimental fiction that emerged during the modernist era from roughly 1880 to 1945. The fiction of this time sought to redefine its relationship to the realist novel of the nineteenth century; incorporated the innovations of new media, technologies, and popular forms (radio, film, advertising); responded to radical sociopolitical changes (wars, economic depression, sexual freedoms, extremist ideologies, racial and anticolonial struggles); and imagined the revolutionary possibilities of a new century. Formerly ENGL 4224.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4051 (3) Advanced Fiction Workshop**
Advanced course in fiction writing.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of ENGL 3051 (minimum grade B). Restricted to Creative Writing minor students or students with a sub plan of Creative Writing.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4061 (3) Undergraduate Publishing Workshop**
Students in this workshop will work together to read, rank and select a group of ten finalists from a pool of unsolicited manuscripts collected during an open call for submissions. The open call will be for "horror" novellas, but other genres may be considered in future years. After the judge has selected the contest winner, the class will work together to typeset the collection and to solicit a cover. At the conclusion of the course, the novella will be sent to the printer and will be published by Subito before the conclusion of the 25/26 academic year.
**Requisites:** Prerequisite courses of ENGL 3021 or ENGL 3051 (minimum grade of B).
**Recommended:** Prerequisite other 3000 or 4000 level literature courses.

**ENGL 4071 (3) Screenwriting Workshop**
Designed to give students practical criticism of their script writing and technical format requirements. Either stage plays or screenplays are studied, as announced.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 4071
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of ENGL 3021 or ENGL 3051 (minimum grade B). Restricted to Creative Writing minor students or students with a sub plan of Creative Writing.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4081 (3) Playwriting Workshop**
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of ENGL 3021 or ENGL 3051 (minimum grade B). Restricted to Creative Writing minor students or students with a sub plan of Creative Writing.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4098 (3) Special Topics in the Novel After 1900**
This is a special topics class where students will study particular historical trends, styles, or themes that shape the 20th- and/or the 21st-century novel. Topics will vary each semester. Check department description for details.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4106 (3) Literary Study with Data Science**
This course offers students an opportunity to explore how approaches to ¿big data¿ can be used to advance our understanding of literature. We will learn how to work with a range of intermediate-level computational techniques to generate insights about individual works of literature and about large collection of literary texts. This course will also examine some the methodological implications of enlisting computers in the analysis of literature.
**Recommended:** Prerequisite ENGL 3106.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4113 (3) Medieval Worlds**
This course introduces students to the time period when England and English emerged out of the intersections of Germanic (Viking and English), Celtic, French, and other influences, c. 500-1500 CE. The course offers a dialogue with texts and artifacts from this distant past to explore what is shared with and what distinguishes us from medieval people and their culture.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4116 (3) Advanced Topics in Media Studies**
This course explores specific topics in the history, theory, and practice of mediation. Past topics have included history of the book, theories of digital media, and the theory and practice of multimedia forms. Topics vary each semester. Check department description for details.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4206 (3) Writing for the Real World**
Trains students in advanced techniques of writing with a view toward ¿real world¿ application¿¿that is, usefulness after graduation. Emphasis on writing for a variety of audiences and techniques for achieving conciseness, clarity, expressiveness, logic, and appropriateness of diction and evidence. Readings include classic and contemporary writings about writing and exemplary professional essays from a variety of fields. Previously offered as a special topics course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Upper

**ENGL 4277 (3) Special Topics in Women Writers**
This course focuses on a special topic or issue in works written by women. Topics vary by semester, and may focus on a particular historical period or literary genre. Students may consider writing by women as itself a genre, asking what unites these works in terms of both subject and style. Check department description for details.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4277
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4287 (3) Special Topics in Queer Literature**
This course will focus on a special topic in queer literature and non-normative genders and sexualities. Students will consider how literature reflects and represents understandings of sexuality, gender, desire, and more; the course may engage a variety of genres. Topics vary by semester. Check department description for details.
**Equivalent - Duplicate Degree Credit Not Granted:** LGBT 4287 and WGST 4287
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4368 (3) Modern Drama**
This course surveys continental, British, and American playwrights, drama, and theatrical performance since the 1880s. Students will study significant theatrical movements like realism, absurdism, and postcolonialism. Whether questioning our ability to make sense of our world or arguing that we must change the world to liberate the excluded, plays speak to our moment, taking up everything from women¿s rights to queer identity to racial equality.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4468 (3) Modern Poetry**
This course studies the diverse themes and forms of poetry written across the 20th and 21st centuries. From structured forms to free verse, from songs to sonnets, from private lyrics to public commemorations, from the intimacy of feelings to political anthems, from grief to joy, modern poetry bears witness to how we felt and how the world transformed across the turmoil and turbulence of these centuries we call modern.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4513 (3) British Medieval Literature**
Intensive study of the major literary works of the Middle Ages in Britain.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4514 (3) Advanced Topics: The Long 18th Century**
Covers advanced topics in the Restoration and Eighteenth-century.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4524 (3) Advanced Topics: Romanticism**
Covers advanced topics in British Romanticism. Formerly ENGL 4574.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4624 (3) Topics in Transnational Literature 1660-1900**
This course explores a topic in British literature and culture in the period sometimes referred to as the ¿modernity¿ (1660-1900) that crosses the traditional divisions of nationality, history, and/or discipline. Topics vary by semester. Check department description for details.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4634 (3) Advanced Topics: The Victorians**
Covers advanced topics in Victorian literature. Formerly ENGL 4614.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4655 (3) Special Topics in American Literature to 1900**
This course will focus on a special topic in American literature prior to 1900: the class may cover anything in American literature from before Columbus arrived in the Americas through the excesses of the Gilded Age and the Spanish-American War. Topics vary by semester. Check department description for details.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4665 (3) Special Topics in American Literature after 1900**
This course will focus on a special topic in US literature after 1900: the class might study anything in US literature from the dawn of the twentieth century through our contemporary moment. Topics vary by semester. Check department description for details.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4677 (3) Jewish-American Literature**
This course explores a variety of Jewish-American literary works from the late-nineteenth century to the present, from Abraham Cahan to Philip Roth to Cynthia Ozick. We examine a number of issues, including what a Jewish-American writer is or is not, what role the immigrant experience plays in Jewish writing, how assimilation is represented, how this literature changes over time, what the significance is of gender roles, and how it draws from spiritual and mystical traditions. Formerly ENGL 3677.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4677
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ENGL 4693 (3) Advanced Topics in British Literature to 1660**
Explores a special topic in medieval or early modern literature. May be repeated for a total of 9 units for different topics.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4697 (3) Special Topics in Ethnic US Literatures**
This course will go in-depth into a special topic in ethnic US literatures through texts drawn from African American, Chicana/o/x, Latina/o/x, Native American and Indigenous, Asian American, and/or Arab American traditions. Topics vary by semester. Check department description for details.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4692
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ENGL 4717 (3) Native American and Indigenous Studies Capstone Seminar**
Engages a wide range of NAIS methodologies with a series of case studies. Focuses on print, visual, and digital texts encompassing wide swathe of Eurowestern disciplines, while seeking to recuperate and restore Indigenous epistemic practices within our scholarship. Refines students' skills in intellectual debate in the spirit of shared inquiry and challenges research and writing skills.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4717
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**ENGL 4820 (3) Honors Seminar**
Prepares prospective honors students to write honors theses. Focuses on sharpening the skills needed to write a successful thesis, including research techniques and the ability to evaluate and respond to secondary materials. Required for Honors in English Literature.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sciences Honors Course

**ENGL 4830 (3) Honors Thesis**
Students accepted to English Departmental Honors are enrolled in this course.
**Additional Information:** Arts Sciences Honors Course

**ENGL 4840 (1-3) Independent Study---Upper Division**
Creative writing.
**Repeatable:** Repeatable for up to 8.00 total credit hours.

**ENGL 4850 (1-3) Independent Study---Upper Division**
Literature/language.
**Repeatable:** Repeatable for up to 8.00 total credit hours.

# English - Bachelor of Arts (BA)

The English department offers two undergraduate major concentrations culminating in a Bachelor of Arts (BA) in English: the literature and cultural studies track and the creative writing track. Students concentrating in literature and cultural studies gain a breadth of cultural history, hone their analytical skills and can choose four electives in English based on their interests. Students concentrating in creative writing take a sequence of workshops in progressive order. In the foundational requirements for both, these programs overlap so that all English majors learn the skills of literary criticism and the art of excellent writing.

## Honors Program

Students interested in writing a senior thesis in order to earn Latin Honors should confer with the associate chair for undergraduate studies early on in their studies, but no later than the beginning of the spring term in their junior year. As students progress through their coursework, those interested in writing a thesis should make sure to take courses with full-time instructors before and during their junior year so that they can ask a faculty member to advise their senior thesis.

## Requirements

### General Requirements

The English department offers two undergraduate major tracks culminating in the Bachelor of Arts (BA) in English. Students must complete the general requirements of the College of Arts and Sciences and one of the two tracks listed on the Program Tracks (p. 281) tab.

A minimum of 12 credit hours of upper-division coursework for the English major must be completed on the Boulder campus. English courses taken at other colleges must be evaluated by the Department of English. Courses taken in other departments (except approved cross-listed courses) normally do not count toward the English major. English courses taken on a pass/fail basis do not fulfill major requirements. Independent study credit hours cannot fulfill a major requirement unless that requirement is not being offered or available within the year that the student graduates.

Students must have a grade point average of at least 2.000 in the major in order to graduate.

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information.
The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in English, students should meet the following requirements:

- Ideally by the beginning of the second semester, declare the English major and begin coursework in the major.
- By the end of the fourth semester, successfully complete one-third of the credit hour requirements for the major. For literature track majors, this includes ENGL 2102, an English elective and any 2000-level course for the major. For creative writing track majors, this includes ENGL 2102, ENGL 1191, and ENGL 2021 or ENGL 2051, as well as formal declaration of the creative writing track.
- By the end of the sixth semester, successfully complete two-thirds of the credit hour requirements for the major, including ENGL 2112.
- By the end of the eighth semester, successfully complete the remaining major requirements, including ENGL 4039.

## Program Tracks

### Literature and Cultural Studies Track

Students must complete the major requirements in effect at the time they formally declare the major. A minimum of 36 credit hours must be earned in the Department of English, 18 of which must be upper division. Requirements may be fulfilled by taking specific courses designated by the Department of English. All English classes must be completed with a C- or better. A maximum of 45 ENGL credit hours can be applied to the 120 total credits that are required to graduate from the College of Arts and Sciences.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ENGL 2102 | Literary Analysis | 3 |
| ENGL 2017 | World Literature | 3 |
| ENGL 2112 | Introduction to Literary Theory | 3 |
| One course from each of the following requirements: | | 12 |
| Medieval and Early Modern Period | | |
| 18th- or 19th-Century Literature | | |
| Studies in Ethnicity, Race, Disability, Gender, and Sexuality | | |
| Form, Genre, or Poetics | | |
| ENGL 4039 | Capstone in Literary Studies | 3 |
| Four required elective courses in English | | 12 |
| **Optional Electives** | | |
| In addition to the 36 credit hours required for the major, another 9 credit hours may be taken, for a maximum of 45 credit hours in English | | |
| **Total Credit Hours** | | **36** |

### Creative Writing Track

Students are subject to those major requirements in effect at the time they formally declare the major. A minimum of 36 credit hours must be earned in the Department of English, 18 of which must be upper division.

Students declare the creative writing track when declaring their English major with the help of an academic advisor. Students should declare no later than the second semester of their junior year. In order to take workshops beyond the 2000 level, students must declare the creative writing track or the creative writing minor. Each workshop may be taken three times for credit, except for ENGL 1191.

All students completing the creative writing track must take and complete a 4000-level writing workshop. Students may not take two poetry or two fiction workshops in the department in the same semester.

Students must satisfy all required creative writing workshop prerequisites in sequence, with a grade of B or better, before moving on to the workshop at the next level.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ENGL 2102 | Literary Analysis | 3 |
| ENGL 2112 | Introduction to Literary Theory | 3 |
| One course from the following requirements: | | 9 |
| Medieval and Early Modern Period | | |
| 18th and 19th -Century Literature | | |
| Studies in Ethnicity, Race, Disability, Gender, and Sexuality | | |
| ENGL 4039 | Capstone in Literary Studies | 3 |
| Six creative writing workshops taken in progressive order, three of which must be upper division, including one at the 4000-level [1] | | 18 |
| **Optional Electives** | | |
| In addition to the 36 credit hours required for the major, another 9 credit hours may be taken, for a maximum of 45 credit hours in English | | |
| **Total Credit Hours** | | **36** |

[1] The sequence of creative writing workshops must begin with ENGL 1191 and proceed according to genre through the 2000-level, 3000-level and 4000-level workshops. For example, the required prerequisites for ENGL 4021 are ENGL 1191, ENGL 2021 and ENGL 3021; and the required prerequisites for ENGL 4051 are ENGL 1191, ENGL 2051 and ENGL 3051.

# Recommended Four-Year Plans of Study

## Literature Track

Please speak with your advisor for specific recommendations; the following is intended to be a general outline only and there may be flexibility to this plan.

Through the required coursework for the major, students will fulfill all 12 credits of the Arts & Humanities area of the Gen Ed Distribution Requirement, and potentially one or both categories of the Gen Ed Diversity Requirement.

| Course | Title | Credit Hours |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | |
| ENGL 2102 | Literary Analysis | 3 |
| ENGL Required Elective | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Elective/MAPS | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ENGL 2017 World Literature | | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3-5 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective/MAPS | | 3 |
| | **Credit Hours** | **15-17** |
| **Year Two** | | |
| **Fall Semester** | | |
| ENGL 2112 | Introduction to Literary Theory | 3 |
| ENGL Requirement (example: Medieval and Early Modern Period) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective/MAPS | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| ENGL Requirement (example: 18th- or 19th-Century Literature) | | 3 |
| ENGL Requirement (example: Studies in Ethnicity, Race, Disability, Gender, and Sexuality) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective/MAPS | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| ENGL Requirement (example: Form, Genre, or Poetics) | | 3 |
| ENGL Required Elective | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Gen. Ed. Skills course (example: Upper-Division Written Communication) | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ENGL Required Elective | | 3 |
| ENGL Required Elective | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| ENGL 4039 | Capstone in Literary Studies | 3 |
| ENGL Optional Elective (consider ENGL 4000-level, internship, honors, etc.) [1] | | 3 |
| Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ENGL Optional Elective (consider ENGL 4000-level, internship, honors, etc.) [1] | | 3 |
| ENGL Optional Elective (consider ENGL 4000-level, internship, honors, etc.) [1] | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |

| | |
|---|---|
| Upper-division Elective | 3 |
| **Credit Hours** | **15** |
| **Total Credit Hours** | **121-123** |

[1] Students following the literature track of the English major can take up to three optional ENGL electives, with a maximum of 45 total hours in ENGL coursework allowed.

## Creative Writing Track

Please speak with your advisor for specific recommendations; the following is intended to be a general outline only and there may be flexibility to this plan.

Through the required coursework for the major, students will fulfill all 12 credits of the Arts & Humanities area of the Gen Ed Distribution Requirement, and potentially one or both categories of the Gen Ed Diversity Requirement.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| ENGL 2102 | Literary Analysis | 3 |
| ENGL 1191 | Introduction to Creative Writing | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Elective/MAPS | | 3 |
| **Credit Hours** | | **15** |
| **Spring Semester** | | |
| ENGL 2000-level Creative Writing Workshop | | 3 |
| ENGL Optional Elective [1] | | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3-5 |
| Elective/MAPS | | 3 |
| Elective/MAPS | | 3 |
| **Credit Hours** | | **15-17** |
| **Year Two** | | |
| **Fall Semester** | | |
| ENGL 2112 | Introduction to Literary Theory | 3 |
| ENGL 2000-level Creative Writing Workshop | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| **Credit Hours** | | **16** |
| **Spring Semester** | | |
| ENGL Requirement (example: Medieval and Early Modern Period) | | 3 |
| ENGL Upper-Division Creative Writing Workshop | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| **Credit Hours** | | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| ENGL Requirement (example: 18th or 19th-Centure Literature) | | 3 |
| ENGL Requirement (Studies in Ethnicity, Race, Disability, Gender, and Sexuality) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 4 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Upper-Division Elective | | 3 |
| **Credit Hours** | | **16** |
| **Spring Semester** | | |
| ENGL Upper-Division Creative Writing Workshop | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Gen. Ed Distribution course (example: Natural Sciences) | | 3 |
| ENGL Optional Elective (example: upper-division ENGL classes, internship) | | 3 |
| Upper-Division Elective | | 3 |
| **Credit Hours** | | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| ENGL 4000-level Creative Writing Workshop | | 3 |
| ENGL Optional Elective (example: upper-division ENGL classes, internship, honors) | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| Elective | | 3 |
| **Credit Hours** | | **15** |
| **Spring Semester** | | |
| ENGL 4039 | Capstone in Literary Studies | 3 |
| ENGL Optional Elective (example: another 4000-level Creative Writing Workshop, internship, honors, etc.) [1] | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| **Credit Hours** | | **15** |
| **Total Credit Hours** | | **122-124** |

[1] Students following the creative writing track of the English major can take up to three optional ENGL electives, with a maximum of 45 total hours in ENGL coursework allowed.

# Learning Outcomes

Students completing the literature track are expected to acquire the ability and skills to:

- Analyze literary and cultural forms and genres critically through close reading;
- Explain how literature reflects and contributes to the historical and political contexts of its production;
- Develop an argument about literature or cultural production based on in-depth research and synthesis of evidence;
- Understand how race, gender, class and sexuality inform different literary forms and traditions.

Students completing creative writing track are expected to acquire the ability and skills to:

- Understand and utilize the techniques of poetry, including but not limited to metaphor, symbolism, prosody, voice, allegory, tone, form and structure.
- Understand and utilize the techniques of prose, including but not limited to point of view, plot development, character development, genre, setting, tone, style, structure and voice.

# Creative Writing - Minor

Declaration of a minor is open to any student enrolled at CU Boulder, regardless of college or school. Students majoring in English, literature or creative writing track, cannot declare a creative writing minor. Students are subject to those minor requirements in effect at the time they formally declare the minor.

## Requirements

### Declaring the Minor

Students declare the creative writing minor with the help of an academic advisor. Three hours of transfer workshop credits can be applied with department approval. Students should ideally declare no later than the second semester of their junior year.

In order to take workshops beyond the 2000-level, students must declare the creative writing minor or the creative writing major track. Each workshop may be taken three times for credit, except for ENGL 1191. Students may not take two poetry or two fiction writing workshops in the department in the same semester. Students must satisfy all prerequisites in sequence with a grade of B or better before moving on to the workshop at the next level.

### Required Courses and Credit Hours

Completion of the minor requires 18 credit hours, at least 9 of which must be upper division.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ENGL 1191 | Introduction to Creative Writing | 3 |
| ENGL 3041 | Studies in Fiction and Poetry | 3 |
| Four creative writing workshops, taken in progressive order | | 12 |
| **Total Credit Hours** | | **18** |

# English - Minor

Declaration of a minor is open to any student enrolled at CU Boulder, regardless of college or school. Students can earn a minor in English literature with six courses in English, half of which must be upper division. Students majoring in English (literature or creative writing track) cannot declare a literature and cultural studies minor. Students are subject to those minor requirements in effect at the time they formally declare the minor.

## Requirements

Completion of the minor requires 18 credit hours with grades of C- or better, at least 9 of which must be upper division.

Students may not apply creative writing courses toward the literature minor, with the exception of ENGL 1191 Introduction to Creative Writing. ENGL 3041 Studies in Fiction and Poetry also may not be applied.

Students must maintain at least a 2.00 (C) GPA in all CU Boulder ENGL courses.

Students may apply no more than 9 credit hours of transfer work, including no more than 6 upper-division credit hours, towards a minor. This is a college residency rule for an 18-credit-hour minor.

There are no course distribution requirements for a minor in Literature and Cultural Studies. However, for a well-rounded course of study, the English Department *recommends* a course distribution as follows:

- ENGL 2102 Literary Analysis
- One course in studies of race, ethnicity, disability, gender and sexuality
- One course in Medieval and Early Modern period or one course in $18^{th}$- or $19^{th}$-century literature

# Writing and Public Engagement - Minor

The writing and public engagement (WPE) minor is designed to help students hone the arts of persuasive writing and storytelling in diverse public-facing genres and media. Through a unique curriculum offered by the Program for Writing and Rhetoric and the English Department, students learn how to leverage a wide variety of technologies to design, produce and distribute multi-modal compositions; write in professional settings and with community partners; and write individually and collaboratively for social change. From forwarding public arguments to designing social media content to composing for nonprofits, this minor enables students to learn valuable skills, practices and tools that are crucial for communication, work and civic engagement in the 21st century.

## Requirements

Requirements for the minor in writing and public engagement include:

1. Earn 18 credits in ENGL and WRTG courses with grades of C- or better. At least 12 credits must be in upper division, and at least 9 credits must be ENGL designated courses.
2. Students may apply no more than 9 credit hours of transfer work, including no more than 6 upper division credit hours, towards a minor. This is a college residency rule for an 18-credit minor.
3. Students may apply one lower- or upper-division Creative Writing or Literature ENGL course of their choice to count towards the minor.
4. Students must maintain at least a 2.00 (C) GPA in all courses counting toward the minor.
5. All courses applied to the writing and public engagement minor must be from the Department of English (ENGL) or the Program in Writing and Rhetoric (WRTG).
6. English majors (Creative Writing or Literature and Cultural Studies) are not eligible to declare/earn this minor.

7. Must have completed the 3-credit lower-division Written Communication requirement as required by all schools and colleges at CU Boulder prior to declaring the minor

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Theory** | | **3** |
| Choose one: | | |
| WRTG 2095 | Ideas for Social Change | |
| WRTG 3010 | Technology, Rhetoric and the Self in Contemporary Life | |
| ENGL 3377 | Literatures of Race, Multiculturalism, Ethnicity (Select topics only) | |
| **Practice** | | **3** |
| Choose one: | | |
| ENGL 3026 | Syntax, Citation, Analysis: Writing About Literature | |
| ENGL 3830 | Topics in Advanced Writing and Research (Select topics only) | |
| WRTG 2020 | Introduction to Creative Nonfiction | |
| WRTG 3020 | Topics in Writing (Select topics only) | |
| WRTG 3045 | Writing for Emerging Workplaces | |
| **Action** | | **3** |
| Choose one: | | |
| ENGL 3940 | Service Learning Practicum (Select topics only) | |
| ENGL 4116 | Advanced Topics in Media Studies (Select topics only) | |
| ENGL 4206 | Writing for the Real World (Select topics only) | |
| WRTG 2090 | Electives in Writing | |
| WRTG 2930 | Internship in Writing and Rhetoric | |
| WRTG 3035 | Technical Communication and Design | |
| WRTG 3070 | Advocating with Data | |
| WRTG 3095 | Journal Publishing | |
| WRTG 3930 | Internship in Writing and Rhetoric | |
| **Electives** | | **9** |
| Choose one of the following: | | |
| Choose 9 credits from any of the courses listed above not being used to fill the Theory, Practice or Action requirements. | | |
| Choose 6 credits from any of the courses listed above not being used to fill the Theory, Practice or Action requirements and 3 credits of any other ENGL course. | | |
| **Total Credit Hours** | | **18** |

# Learning Outcomes

Upon completing the program, students will be able to:

- Synthesize and apply theories of writing, rhetoric and publics with critical race, decolonial, queer and other critical theories to a variety of rhetorical situations central to public life.
- Use a wide range of research methods#including but not limited to rhetorical criticism, genre analysis, archival research, action#oriented research, iconographic tracking, case studies, ethnography, oral story telling to investigate and address a variety of complex contemporary cultural, political and environmental issues on local, national and transnational scales.
- Design, create and deliver persuasive compositions in a variety of genres, modes and media for diverse public audiences and rhetorical goals such as argument, advocacy, activism, policy change, community organizing, productive dialogue, networking and awareness raising.
- Put writing into practice with a variety of other strategic tactics to engage effectively in political and nonpolitical actions central to public life.
- Analyze, organize, create and circulate documents and artifacts that contribute to identity construction, institutional and cultural memory, organizational structures, public assemblage and policy making.
- Understand and manipulate how writing and information circulates and gets taken up in an era of misinformation, data overload, intense political division, racial intensity and algorithmic injustice.
- Design and manage an online presence for both self and community organizations through digital content and social media writing.

# Environmental Studies

The Department of Environmental Studies at CU Boulder is a hub for facilitating interdisciplinary collaboration in environment and sustainability. The department nurtures interdisciplinary academic training for undergraduate and graduate students, provides guidance for students with career aspirations in environment and sustainability venues, promotes diverse professional education experiences, fosters fundamental and applied research, forms meaningful connections with communities beyond the university, and integrates innovative, interdisciplinary programs unified by the themes of environment and sustainability.

**Course code for this program is ENVS.**

# Bachelor's Degree

- Environmental Studies - Bachelor of Arts (BA) (p. 291)

# Minor

- Environmental Studies - Minor (p. 294)

# Certificate

- Global Environmental Affairs (https://catalog.colorado.edu/undergraduate/colleges-schools/arts-sciences/programs-study/international-affairs/global-environmental-affairs-certificate/#text)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Bailey, Karen (https://experts.colorado.edu/display/fisid_164881/)
Assistant Professor; PhD, University of Florida

Boykoff, Maxwell Thomas (https://experts.colorado.edu/display/fisid_147562/)
Professor, Faculty Director; PhD, University of California, Santa Cruz

Brooks, Cassandra (https://experts.colorado.edu/display/fisid_159275/)
Assistant Professor; PhD, Stanford University

Burgess, Matthew (https://experts.colorado.edu/display/fisid_164178/)
Assistant Professor; PhD, University of Minnesota

Carrico, Amanda R. (https://experts.colorado.edu/display/fisid_153054/)
Associate Professor; PhD, Vanderbilt University

Ciplet, David (https://experts.colorado.edu/display/fisid_156064/)
Assistant Professor; PhD, Brown University

Dilling, Lisa
Professor, Associate Faculty Director; PhD, University of California, Santa Barbara

Doak, Daniel Forest (https://experts.colorado.edu/display/fisid_151963/)
Endowed Chair, Associate Faculty Director, Professor; PhD, University of Washington

Hale, Benjamin Slater (https://experts.colorado.edu/display/fisid_141456/)
Associate Professor; PhD, SUNY at Stony Brook

Hartter, Joel N. (https://experts.colorado.edu/display/fisid_154043/)
Faculty Director, Professor; PhD, University of Florida

Lambert, Joanna E. (https://experts.colorado.edu/display/fisid_156206/)
Professor; PhD, University of Illinois at Urbana–Champaign

Litt, Jill S. (https://experts.colorado.edu/display/fisid_140636/)
Professor; PhD, Johns Hopkins University

Miller, Dale Lee (https://experts.colorado.edu/display/fisid_115748/)
Senior Instructor; MA, University of Colorado Denver

Miller, Steve (https://experts.colorado.edu/display/fisid_166148/)
Assistant Professor; PhD, University of California, Santa Barbara

Neff, Jason C. (https://experts.colorado.edu/display/fisid_117652/)
Professor; PhD, Stanford University

Newton, Peter (https://experts.colorado.edu/display/fisid_154466/)
Assistant Professor; PhD, University of East Anglia (England)

Pielke, Roger A. Jr. (https://experts.colorado.edu/display/fisid_104166/)
Professor; PhD, University of Colorado Boulder

Vodehnal, Carrie (https://experts.colorado.edu/display/fisid_158066/)
Instructor; PhD, Washington University in Saint Louis

Wessman, Carol A. (https://experts.colorado.edu/display/fisid_100909/)
Professor Emerita; PhD, University of Wisconsin–Madison

White, James (https://experts.colorado.edu/display/fisid_102726/)
Professor; PhD, Columbia University

York, Jeffrey Glenn (https://experts.colorado.edu/display/fisid_148387/)
Associate Professor; PhD, University of Virginia

# Courses

**ENVS 1000 (4) Introduction to Environmental Studies**
This course provides students with an introduction to natural science topics and skill sets necessary to address multi-dimensional human-environment interactions. Students will survey biological and physical science aspects of environmental change, examining ecological, biological, chemical, and technological factors that influence the quality of life on Earth. The focus of the class is on developing a stronger science-based understanding of Earth¿s environmental systems and how they are altered by human activity. Required for ENVS majors.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 1001 (4) Introduction to Human Dimensions of Environmental Studies**
Examines the human dimensions of sustainability and environmental justice. Students examine a core set of human factors linked to the environment, including the production and use of knowledge, behavior, values, social movements, policy, market forces, and systems of power, exploitation, oppression, and inequality. Through hands-on activities, students learn how these factors impact and result from the human-environment interface. Students will build quantitative and writing skills to empirically study human dimensions of the environment.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 1150 (3) First-Year Writing in Energy, Environment and Sustainability**
Provides development of effective writing skills, knowledge and habits for success in the campus culture using topics related to the environmental sciences, energy, sustainability and academic/career interests. Focuses on the processes in rhetoric, emphasizing skills in creative, analytical and critical thinking, as well as research and presentation using digital and "old fashioned" methods and materials.
**Requisites:** Restricted to Environmental Studies (ENVS) students with 0-56 credits (Freshman or Sophomore) only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Lower

**ENVS 2000 (4) Applied Ecology for Environmental Studies**
Covers how ecological ideas and principles underlie both the problems and solutions of multiple environmental issues. Ecology of environmental concerns ranging from endangered species to global carbon cycling will be reviewed, including perspectives from physiological, behavioral, population, community and ecosystem ecology. Fulfills intermediate natural science requirement for Environmental Studies major.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 2040 and EBIO 2640
**Recommended:** Prerequisites ENVS 1000 and a course in introductory statistics and two courses in introductory biology or physical geography.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 2001 (3) Topical Seminar in Enivronmental Studies**
Serves as an introductory seminar to topics in environmental studies. Topics are diverse and include such areas as climate and conflict, food production, land use change, and other emerging areas in environmental studies.
**Grading Basis:** Letter Grade

**ENVS 2030 (3) Introduction to Human Dimensions of the Environment**
Reviews social science concepts and research important to the understanding of human interactions with the environment. Serves as an introduction to the study of demographic processes, human decision making, approaches to environmental governance, consumption patterns, among other foundational topics. Content will be grounded in contemporary case studies that will vary with instructor. Positions students to participate in interdisciplinary dialogue and practice related to solving environmental problems.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 2100 (2-4) Topics in Applied Environmental Studies**
Covers a variety of topics not currently offered in the curriculum: offered depending on instructor availability and student demand. Fulfills application requirement in Environmental Studies major.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite ENVS 1000.

**ENVS 2840 (1-6) Independent Study**
Students work with an approved faculty sponsor to explore a topic in greater depth and to pursue an interest that is not offered in the formal curriculum.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Recommended:** Prerequisite ENVS 1000.

**ENVS 3001 (3) Sustainable Solutions Consulting**
Introduces students to green design, industrial ecology, and life cycle analysis. Students use basic techniques of environmental auditing to analyze the CU Boulder campus. Fulfills application requirement for Environmental Studies major.
**Requisites:** Requires prerequisite course of ENVS 1000 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Environmental Studies (ENVS) majors only.
**Recommended:** Requisite any two-semester science sequence.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 3005 (3) Environmental Education: From Theory to Practice**
Learning to teach about the environment is an essential skill for helping to create a sustainable world. From urban school programs to nature centers, to fostering social justice and international collaboration - becoming an effective environmental educator can support many professional pursuits. It's fun too! This class will help you gain essential knowledge and skills for starting on this path.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3007 (3) Animal Ethics and Policy**
Explores the principles that underlie our treatment of and attitudes toward non-human animals. Analyzes how these principles impact environmental policy in the context of contemporary environmental issues and debates.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENVS 3020 (3) Advanced Writing in Environmental Studies**
Offers training in critical thinking and analytical writing skills appropriate to upper-division classes. Writing assignments integrate the subject matter of different topical areas. Fulfills writing requirement for Environmental Studies major.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Environmental Studies (ENVS) majors only.
**Recommended:** Prerequisite ENVS 1000.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**ENVS 3022 (3) Climate Politics and Policy**
Engages students in exploring the realm of contemporary and historical climate policy at three major levels of government: international, national and local/regional. Through course lectures, discussions, readings and activities, students will become conversant with the actors, mechanisms and concerns involved in climate policy and politics and develop their own sense of how to judge the success of climate policies. Fulfills intermediate social science requirement in Environmental Studies Major.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 3022
**Recommended:** Prerequisite ENVS 1000 or GEOG 1972.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3030 (3) Topics in Environmental Social Sciences**
Covers a variety of topics that may include human ecology, environment and society, and quantitative environmental social science. Offered depending upon instructor availability and student demand. Fulfills intermediate social science requirement for Environmental Studies major. Not repeatable for credit.
**Recommended:** Prerequisite ENVS 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3031 (3) Environmental Psychology**
Examines how people interact with the environment by examining theories and methods from Environmental Psychology. How does nature impact human well-being? How do people make decisions that have environmental consequences? How can we promote behavior change to reduce environmental degradation? Fulfills intermediate social science requirement for ENVS major.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3032 (3) Environment, Media and Society**
Examines how mass media influence our society, specifically with regard to environmental issues and outcomes. Focuses on media influence over environmental politics and policy, environmental public opinion, popular culture, and environmental/scientific knowledge. Fulfills intermediate social science requirement for Environmental Studies major.
**Recommended:** Prerequisite ENVS 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3033 (3) Governing the Environment**
Examines how, when, and why human communities succeed in conserving environmental commons. Using a marine lens and taking a social-ecological systems approach, this course will provide foundations in environmental governance while examining case studies from local to global scale. Utilizes lecture, discussion, group work, literature, film, guest speakers, and class projects to study environmental problems and their solutions, including the student¿s personal role in governing natural resources. Fulfills intermediate social science requirement for ENVS major.
**Recommended:** Prerequisite ENVS 1000.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3034 (3) Foundations of Environmental Justice**
Explores qualitative social science, forms of environmental inequality, and the underpinnings of environmental justice and social change. Environmental justice is the right to a safe and healthy environment for everyone, regardless of race, class, gender, or other considerations. Students engage in in-depth case study analysis and develop a social science research proposal on an environmental justice topic of their choosing. Previously offered as a special topics course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3040 (4) Conservation Biology**
Applies principles of population ecology, population genetics, biogeography, animal behavior, and paleobiology to the maintenance of biodiversity and natural systems. The resulting theory is then applied to conservation policy and management techniques.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 3040
**Recommended:** Prerequisite EBIO 2040 or EBIO 2640.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 3064 (3) Environmental Political Theory**
Examines environmental discourses as conceptual means for theorizing environmental politics, and applies normative political theories to contemporary environmental policy issues. Considers the roles of political actors (individuals, groups, the state) in defining and addressing environmental problems on local, national, and global levels.
**Equivalent - Duplicate Degree Credit Not Granted:** PSCI 3064
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3070 (3) Energy and the Environment**
Examines contemporary issues in energy consumption and its environmental impact, including fossil fuel use and depletion; nuclear energy and waste disposal; solar, wind, hydroelectric, and other renewable sources; home heating; energy storage; fuel cells; and alternative transportation vehicles. Includes some basic physical concepts and principles that often constrain choices. No background in physics is required.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 3070
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 3100 (2-4) Topics in Applied Environmental Studies**
Covers a variety of topics not currently offered in the curriculum; offered depending upon instructor availability and student demand. Fulfills application requirement for Environmental Studies major.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Recommended:** Prerequisite ENVS 1000.

**ENVS 3103 (3) Applied Environmental Studies: Mining in Four Corners**
Explores mining related issues that have pronounced impact on the environment, economy and politics of the Four Corners region. Students apply their basic knowledge of environmental science, policy and values toward the understanding of and productive discourse about the conflicts and opportunities brought about by the mining industry in the Four Corners region. Course includes a seven day field trip, visiting mining and reclamation sites in New Mexico, Utah and Colorado. Fulfills application requirement for Environmental Studies majors.
**Recommended:** Prerequisite ENVS 1000 and one year natural science.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 3140 (3) Environmental Ethics**
Examines major traditions in moral philosophy to see what light they shed on value issues in environmental policy and the value presuppositions of the economic, ecological, and juridical approaches to the environment.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 3140
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENVS 3173 (3) Creative Climate Communication**
We generate multimodal compositions on the subject of climate change and engage with various dimensions of issues associated with sustainability. We work to deepen our understanding of how issues associated with climate change are or can be communicated, by analyzing previously created expressions from a variety of media (interactive theatre, film, fine art, television programming, blogs, performance art, for example) and then be creating our own work.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 3173 and THTR 4173
**Recommended:** Prerequisite ENVS 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3434 (3) Introduction to Applied Ecology**
Emphasizes the integration of physical, chemical and biological processes in controlling terrestrial and aquatic ecosystems. Ecosystem concepts are applied to current environmental and water quality problems. Includes field trips and a group project.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 3434
**Requisites:** Requires prereq courses of (CHEN 1201 or CHEN 1211 or CHEM 1113 or CHEM 1400 or MCEN 1024) and (CHEM 1114 or CHEM 1221) (all min grade C-).Restricted to students w/ 57-180 credits (Jr or Sr) Civil (CVEN), Environ (EVEN) or Arch Eng (AREN) or (IDEN) mjrs
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 3520 (3) Energy and Climate Change: An Interdisciplinary Approach**
Examines sources of energy and other resources in light of their availability, use, environmental impact, as well as their impact on policy, economics and values. As fossil fuels are the dominant energy source today, particular emphasis is placed on climate impacts and the carbon cycle. All material is assessed through the lenses of the physical sciences, policy, ethics and economics.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 3520
**Recommended:** Prerequisite a two-course sequence in any natural science.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 3525 (3) Intermediate Environmental Problem Analysis: Topical Cornerstones**
Engages students in in-depth study of a topic such as climate change, energy, natural resources or sustainability. Through lectures, discussions, readings and activities, students will become conversant with how science, policy and values are integrated in environmental problem solving, and develop their own sense of how to critically engage with proposed solutions. Fulfills cornerstone requirement for Environmental Studies Major.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisite ENVS 1000.

**ENVS 3555 (3) Sustainable Economies**
Applies a holistic and transdisciplinary approach to answering the following questions: (i) What might an environmentally sustainable economy look like? (ii) What social and political challenges might such an economy face? (iii) What institutions might support an environmentally and socially sustainable economy? The course draws on concepts from several branches of economics¿especially macroeconomics, ecological economics, and public finance¿as well as other related disciplines, including history, psychology, politics, and evolutionary biology.
**Recommended:** Prerequisites ECON 2010 or ECON 2020 or other introductory-level economics course.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3600 (3) Principles of Climate**
Describes the basic components of the climate system: the atmosphere, ocean, cryosphere and lithosphere. Investigates the basic physical processes that determine climate and link the components of the climate system. Covers the hydrological cycle and its role in climate, climate stability and global change.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 3601 and ATOC 3600
**Recommended:** Prerequisites one semester of calculus and ATOC 1060 or ATOC 3300 or GEOG 3301 or GEOG 1001.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 3621 (3) Energy Policy and Society**
Examines how society makes decisions about energy, and how these decisions affect the environment and the economy. Uses tools from policy analysis, economics, and other disciplines to build an in-depth understanding of energy's role in U.S. contemporary society. Fulfills Cornerstone requirement of ENVS majors.
**Recommended:** Prerequisites ENVS 1000 and ENVS 3070 or PHYS 3070.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3640 (3) Data Analysis for Global Environmental Affairs**
Develops data analysis techniques for global environmental data including demographic, economic, agricultural, fisheries and energy sectors. Designed to support the development of basic and intermediate data analysis skills for students in the Global Environmental Affairs certificate program. Includes hands-on exploration of up-to-date global data sets from a variety of sources. Fulfills the application requirement for the ENVS major.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3640
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 3800 (3) The Art of Research: The Essential Elements of Research in Environmental Studies**
Introduces students to the practice of doing research in environmental studies. Examines how to define a research problem, select methods, design research, construct arguments and evaluate others' research. Aims to familiarize students with the process of doing research and enable them to proceed with confidence in pursuing their own research topics. Recommended for juniors planning to write ENVS honors theses. Fulfills capstone requirement in Environmental Studies major.
**Requisites:** Requires prerequisite course of ENVS 1000 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) majors only.
**Recommended:** Prerequisite ENVS 3020.

**ENVS 3930 (1-3) Internship**
Relates classroom theory to practice. Provides academically supervised opportunities for environmental studies majors to work in public and private organizations on projects related to students' career goals. Fulfills application requirement in Environmental Studies major.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite ENVS 1000.

**ENVS 4027 (3) Inequality, Democracy, and the Environment**
Focuses on the structural forces affecting environmental degradation and environmental behavior by examining the relationships between (a) inequality and democratic decision making and (b) undemocratic decision making; U.S. and corporate food and energy policy; and global environmental degradation. The course also focuses on the role that global inequality plays in fostering environmental degradation.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4027
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 4030 (3) Sociology of Climate Change**
Examines the human drivers and causes of climate change, the health and security risks it creates and the efforts of societies to mitigate and adapt to its effects.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4030
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 4050 (2-4) Field Methods in Ecosystem Science**
Studying the relationships among organisms, physical features, biogeochemistry and humans in ecological communities - this is ecosystem science. This course provides conceptual understanding and practical experience conducting research. Students will pose their own scientific questions, learn several field and lab methods, analyze data and design a project. Upon completion, they will have useful skills for internships, jobs and graduate school. Fulfills application requirement in ENVS major. Department enforced prerequisite: ENVS 1000 or two semesters of natural sciences; such as chemistry, geology or biology.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 4100 (3) Special Topics in Environmental Studies**
Various topics not normally covered in the curriculum: offered depending on student demand and specialties of faculty. Applied to specialization requirement for Environmental Studies major.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**ENVS 4135 (3) Dogs, Wolves, and Humans**
Humans have a closer and longer history with ancestral and domestic dogs than any other animal species. Ironically, the closest living relative of dogs (wolves) remain one of the world¿s most persecuted species ¿ an issue that rages today throughout the United States, including Colorado. This class centers on the biology of domestication, evolution of behavior, canid paleontology and genetics, wolf conservation, and the evolutionary, social, and cultural significance of wolves and dogs to humans. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 5135
**Recommended:** Prerequisite ANTH 2010 or EBIO 1030 or EBIO 1210 or EBIO 1220 or EBIO 2040 or ENVS 2000.

**ENVS 4155 (4) Ecosystem Ecology**
Integrates information from physics (energetics), chemistry (element properties) and biology (evolutionary traits, photosynthetic pathways) to understand the structure and functioning of ecosystems. Provides an analysis of biotic community responses and feedbacks to environmental change drivers. Strong focus on water, nutrient cycling and carbon dynamics of diverse terrestrial and aquatic landscapes.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4155, EBIO 5155 and ENVS 5155
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 4160 (3) Introduction to Biogeochemistry**
Covers fundamentals of biogeochemical cycling, emphasizing water, carbon and nutrient dynamics in terrestrial ecosystems; chemical interactions of atmosphere, biosphere, lithosphere and hydrosphere; natural and human-managed environments.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4160 and GEOL 4160
**Requisites:** Requires prerequisite courses of GEOL 3320 or EBIO 3270 and CHEM 1011 (all minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 4185 (3) Geomicrobiology**
Examines how microbial and chemical processes interact on the Earth¿s surface today and have shaped the planet throughout its history. Emphasis will be placed on how the life styles and chemical ingenuity of microorganisms drive key biogeochemical processes including weathering and transformations of carbon, oxygen, sulfur, iron and nitrogen. Towards this goal, major geologic and evolutionary events will be examined through the lens of microbial diversity, metabolic energetics, microbe-mineral interactions, and molecular biomarkers.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5185, GEOL 4185, and MCDB 4185
**Requisites:** Requires prerequisite courses of CHEM 1113 and CHEM 1114 or CHEM 1400 and CHEM 1401 (minimum grade C-).
**Recommended:** Prerequisites GEOL 1180 or MCDB 1150 or GEOL 3320 or EBIO 3400 or ENVS 4160 or EVEN 4484.
**Grading Basis:** Letter Grade

**ENVS 4201 (3) Biometeorology**
Learn about the interactions between atmospheric processes and living organisms (plants, animals, and humans) through a meteorology/ biology lens. Topics include carbon and water cycling through vegetation, the energy and water balances in the system, and human temperature regulation to better understand how organisms adapt to a changing environment using a practical, problem-solving approach.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4201
**Requisites:** Prereq GEOG 1001 any of: (APPM1340 and 1345) or APPM1350 or ECON1088 or ECON3818 or MATH1081 or MATH1300 or MATH1310 or MATH2510 or ANTH4000 or BCOR1020 or GEOG3023 or GEOL3023 or PSCI2075 or PSYC2111 or SOCY2061 or SOCY4061 or STAT4000 (min grade D-)
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 4340 (4) Conservation Biology and Practice in Brazil's Atlantic Forest**
Field Studies. Examines the application of conservation principles in the Atlantic Forest of Brazil, a 'biodiversity-in-crisis' setting. Explores successful conservation strategies integrated with efforts to alleviate socioeconomic issues. Three-week Maymester, Study Abroad Global Seminar.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 5340, EBIO 4340 and EBIO 5340
**Recommended:** Prerequisites EBIO 2040 or ENVS 2000 or 2000/higher-level course in ANTH, EBIO, ENVS, EVEN, GEOG, IAFS or other discipline related to ecology or sustainability.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 4795 (3) Field Methods in Zoology and Botany**
Class covers research and field methods for biological disciplines associated with natural history museums: vertebrates, invertebrates and plants. Emphasis is on field research techniques: observations, sampling, collection and preservation methods and comparisons among elevation zones. Includes 5 field labs, 2 weekend trips, 5 lab practica, experience with several taxonomic experts and individual research projects.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 4795 and MUSM 5795
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 4800 (3) Capstone: Critical Thinking in Environmental Studies**
Examines a specific environmental topic in depth, synthesizing information from complex and controversial issues. Different course sections present different topics. Fulfills capstone requirement for Environmental Studies major.
**Requisites:** Restricted to Environmental Studies (ENVS) majors only.
**Recommended:** Prerequisites ENVS 1000 and ENVS 3020.

**ENVS 4840 (1-6) Independent Study**
Students work with an approved faculty sponsor to explore a topic in greater depth and to pursue an interest that is not offered in the formal curriculum.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Recommended:** Prerequisite ENVS 1000.

**ENVS 4850 (1-3) ENVS Honors Thesis Research**
To be taken in final academic year prior to graduation. Consists of honors research and thesis preparation under the guidance of a faculty mentor. Department enforced restriction: Requires a minimum 3.3 GPA and a declared ENVS major and approval by departmental honors committee. If a student wishes to use ENVS 4850 to complete the ENVS Capstone degree requirement, at least 3 credit hours of ENVS 4850 are required (by graduation).
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade

**ENVS 4950 (3) Seminar: ENVS Honors Thesis**
Offers an opportunity for students who are either in the process of writing an Honors thesis, or are in the early process of conducting Honors research, to receive guidance on the process of thesis writing, evaluation and presentation of research results, and defending a thesis. Thesis requirements and the role of the A&S Honors Council will be discussed. Also offers the opportunity to hear practice defense talks from the graduating Honors candidates. Department enforced prerequisite: Requires a minimum 3.3 GPA and a declared ENVS major and approval by departmental honors committee.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**ENVS 4990 (3) Senior Thesis**
Supervised writing project involving original research. Fulfills Capstone requirement in Environmental Studies major. Open only to Environmental Studies majors.
**Requisites:** Requires prerequisite course of ENVS 1000 (minimum grade D-). Restricted to students with 87-180 credits (Senior) Environmental Studies (ENVS) majors only.
**Recommended:** Prerequisite ENVS 3020 and ENVS students should have completed a cornerstone class (ENVS 3520, ENVS 3525, ENVS 3555, or ENVS 3621).

# Environmental Studies - Bachelor of Arts (BA)

The Environmental Studies Program (ENVS) is an interdisciplinary program that combines and integrates different types of knowledge to address the complex environmental, resource, and sustainability challenges in coupled human environment systems. This is accomplished by addressing the grand challenges related to sustaining the planet and its people. How do we meet the needs of a growing human population while sustaining our life support systems—climate, air and water systems, natural resources, species assemblages, and ecosystems on land and in the oceans? How do we increase the well-being of those at risk of global environmental change in an unequal world while not compromising future generations? Our research expertise includes food systems; dimensions of global change; conservation biology, restoration ecology; ecosystem biogeochemistry; environmental governance, science and policy interactions; environmental inequality and climate justice; environmental ethics; sustainable livelihoods; and behavioral dimensions of climate change mitigation and adaptation.

Undergraduate students acquire an awareness of the complexity of factors relating to human interaction with the environment. They become acutely aware that environmental problems have both human and biophysical components, and gain knowledge of the general principles of human-environmental interactions, global habitability, environmental change and sustainable societies. The ENVS major includes introductory coursework in natural sciences, economics and mathematics; intermediate coursework in policy, ethics, economics and writing; and advanced coursework offered by several departments and programs across CU Boulder.

## Requirements

Students must complete:

- The general requirements of the College of Arts and Sciences.
- Foundational courses in sciences, policy, ethics, economics, writing and math.
- 12 credit hours of upper-division coursework to specialize in an area of interest.
- An internship or field course.
- A cornerstone course.
- A capstone course.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Introductory Sequence in Environmental Studies** | | |
| ENVS 1000 | Introduction to Environmental Studies | 4 |
| ENVS 1001 | Introduction to Human Dimensions of Environmental Studies | 4 |
| **Introductory Sequence in Biology or Earth Science** | | |
| Complete one of the following options. All classes from this combination must be in the same department. | | 7-8 |
| *Biology Option* | | |
| Complete any two of these lecture/laboratory combinations | | |
| EBIO 1210<br>& EBIO 1230 | General Biology 1<br>and General Biology Laboratory 1 | |
| EBIO 1220<br>& EBIO 1240 | General Biology 2<br>and General Biology Laboratory 2 | |
| EBIO 1250 | Introduction to Biology Research | |
| EBIO 1100<br>& EBIO 1110 | Biology and Society<br>and Biology and Society Laboratory [1] | |
| *Geology Option* | | |
| GEOL 1030 | Introduction to Geology Laboratory 1 | |
| and any two of the following introductory Geology courses | | |
| GEOL 1010<br>or GEOL 1012 | Exploring Earth<br>Exploring Earth for Scientists | |
| GEOL 1020 | Dodos, Dinos, and Deinococcus: The History of a Habitable Planet | |
| GEOL 1040 | Geology of Colorado | |
| GEOL 1060 | Global Change: An Earth Science Perspective | |
| GEOL 1150 | Water, Energy and Environment: An Introduction to Earth Resources | |
| GEOL 1170 | Our Deadly Planet | |
| GEOL 2001 | Planet Earth | |
| *Atmospheric and Oceanic Sciences Option* | | |
| Complete all courses | | |
| ATOC 1050<br>& ATOC 1070<br>& ATOC 1060 | Weather and the Atmosphere<br>and Weather and the Atmosphere Laboratory<br>and Our Changing Environment: El Nino, Ozone, and Climate | |
| *Physical Geography Option* | | |
| Complete both courses | | |
| GEOG 1001 | Our Changing Planet: Climate and Vegetation | |
| GEOG 1011 | Our Changing Planet: Landscapes and Water | |
| **Introductory Course in Chemisty or Physics** | | |
| Choose one course (and the lab, if required) from the following: | | 3-5 |
| CHEM 1011 | Environmental Chemistry 1 | |

| | | |
|---|---|---|
| CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 | |
| PHYS 1110 | General Physics 1 (calculus based) | |
| PHYS 2010 | General Physics 1 (algebra based) | |
| **Intermediate Natural Science Requirement** | | |
| Choose one course (and the lab, if required) from the following: | | 3-4 |
| ENVS 2000 | Applied Ecology for Environmental Studies | |
| ENVS/CVEN 3434 | Introduction to Applied Ecology | |
| ENVS/ATOC 3600/ GEOG 3601 | Principles of Climate | |
| EBIO 2040 | Principles of Ecology | |
| GEOG 3511 | The Water Cycle | |
| GEOL 2001 | Planet Earth | |
| GEOL 2005 | Introduction to Earth Materials | |
| **Intermediate Policy Requirement** | | |
| Choose one course from the following: | | 3 |
| PSCI 2106 | Introduction to Public Policy Analysis | |
| PSCI 2116 | Introduction to Environmental Policy and Policy Analysis | |
| PSCI 3206 | The Environment and Public Policy | |
| **Intermediate Social Science Requirement** | | |
| Choose one course from the following: | | 3-4 |
| ENVS/GEOG 3022 | Climate and Energy Justice | |
| ENVS 3030 | Topics in Environmental Social Sciences | |
| ENVS 3031 | Environmental Psychology | |
| ENVS 3032 | Environment, Media and Society | |
| ENVS 3033 | Governing the Environment | |
| **Economics Requirements** | | |
| ECON 2010 | Principles of Microeconomics | 4 |
| ECON 3535 | Natural Resource Economics | 3 |
| or ECON 3545 | Environmental Economics | |
| **Ethics Requirement** | | |
| Choose one course from the following: | | 3 |
| ENVS/PHIL 3140 | Environmental Ethics | |
| ENVS/PSCI 3064 | Environmental Political Theory | |
| **Statistics/Calculus Requirement** | | |
| Choose one course from the following (not all courses fulfill the Gen. Ed. QRMS requirement): | | 3-5 |
| EBIO 1010 | Introduction to Statistics and Quantitative Thinking for Biologists | |
| EBIO 4410 | Biological Statistics | |
| GEOG/GEOL 3023 | Statistics and Geographic Data | |
| MATH 2510 | Introduction to Statistics | |
| PSCI 2075 | Quantitative Research Methods | |
| PSYC 2111 | Psychological Science I: Statistics | |
| SOCY 2061 | Introduction to Social Statistics | |
| MATH 1300 | Calculus 1 | |
| MATH 1310 | Calculus for Life Sciences | |
| APPM 1350 | Calculus 1 for Engineers | |
| **Writing Requirement** | | |
| ENVS 3020 | Advanced Writing in Environmental Studies | 3 |
| **Application Requirement (An Internship or Field Course)** | | |
| Choose one course from the following: | | 2-6 |
| ENVS 2100 | Topics in Applied Environmental Studies | |
| ENVS 3001 | Sustainable Solutions Consulting | |
| ENVS 3100 | Topics in Applied Environmental Studies | |
| ENVS 3103 | Applied Environmental Studies: Mining in Four Corners | |
| ENVS 3173/ THTR 4173/ ATLS 3173 | Creative Climate Communication | |
| ENVS/IAFS 3640 | Data Analysis for Global Environmental Affairs | |
| ENVS 3930 | Internship | |
| ENVS 4050 | Field Methods in Ecosystem Science | |
| ENVS/EBIO 4340 | Conservation Biology and Practice in Brazil's Atlantic Forest | |
| ENVS/MUSM 4795 | Field Methods in Zoology and Botany | |
| ARTS 4444 | Art and Environments Field School | |
| CVEN 3434 | Introduction to Applied Ecology | |
| EBIO 4090 | Coral Reef Ecology | |
| EBIO 4100 | Advanced Ecology | |
| EDUC 4833 | Teaching and Learning Earth Systems | |
| EVEN 4100 | Environmental Sampling and Analysis | |
| GEOL 2700 | Introduction to Field Geology | |
| **Cornerstone Requirement** | | |
| Choose one course from the following: | | 3 |
| ENVS/GEOL 3520 | Energy and Climate Change: An Interdisciplinary Approach | |
| ENVS 3525 | Intermediate Environmental Problem Analysis: Topical Cornerstones | |
| ENVS 3621 | Energy Policy and Society | |
| **Capstone Requirement** | | |
| Choose one course from the following: | | 3 |
| ENVS 3800 | The Art of Research: The Essential Elements of Research in Environmental Studies | |
| ENVS 4800 | Capstone: Critical Thinking in Environmental Studies | |
| ENVS 4990 | Senior Thesis | |
| ENST 4150 | Energy Policy Project | |
| **Specialization Requirement** | | |
| Complete a minimum of 12 credits. Upper-division courses that fulfill the Intermediate Natural Science, Intermediate Social Science, Policy, Application, Cornerstone and Capstone requirements may apply toward the specialization requirement if those areas are already fulfilled with another course. No course may apply to two areas in the ENVS major. | | 12 |
| **Total Credit Hours** | | **63-74** |

[1] Students cannot receive credit for both GEOL 1010 and GEOL 1012. GEOL 2001 requires a prerequisite of any 1000-level GEOL lecture or ENVS 1000.

Approved courses that fulfill the major requirements are listed on the program's Curriculum (http://www.colorado.edu/envs/undergraduate-

students/curriculum/) webpage. To explore suggested focus areas and learn how to select courses that align with specific interests, visit the ENVS Guidance Documents (http://www.colorado.edu/envs/undergraduate-students/curriculum/guidance-documents/) webpage.

# Four-Year Plan of Study

Through the required coursework for the major, students will complete all 12 credits of both the Social Sciences and the Natural Sciences, including the lab, areas of the Gen Ed Distribution Requirement as well 3 credits of the Arts and Humanities part of this requirement and the QRMS component of the Gen Ed Skills Requirement.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| ENVS 1000 | Introduction to Environmental Studies (partially fulfills Gen. Ed. Distribution: Natural Sciences) | 4 |
| ENVS 1150 | First-Year Writing in Energy, Environment and Sustainability (fulfills Gen. Ed. Skills course: Lower-division Written Communication) | 3 |
| One mathematics course in preparation for statistics or calculus. (may fulfill Gen. Ed. Skills: QRMS) | | 3-4 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16-17** |
| **Spring Semester** | | |
| ENVS 1001 | Introduction to Human Dimensions of Environmental Studies | 4 |
| Statistics/Calculus requirement (may fulfill Gen. Ed. Skills: QRMS) | | 3-5 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **13-15** |
| **Year Two** | | |
| **Fall Semester** | | |
| Introductory biology or earth science, with Lab - first course - partially fulfills Gen. Ed. Distribution: Natural Sciences and Gen. Ed. Distribution: Natural Sciences with Lab | | 3-4 |
| Intermediate Policy requirement - may partially fulfill Gen. Ed. Distribution: Social Sciences | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/Global Perspective) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15-16** |
| **Spring Semester** | | |
| Introductory biology or earth science - second course | | 3-4 |
| ECON 2010 | Principles of Microeconomics (Economics requirement - first course - partially fulfills Gen. Ed. Distribution: Social Sciences) | 4 |
| Introductory course in chemisty or physics, and lab if required - may partially fulfill Gen. Ed. Distribution: Natural Sciences | | 3-5 |
| Elective(s) or Upper-division Elective(s) (if needed) | | 6-3 |
| | **Credit Hours** | **16** |
| **Year Three** | | |
| **Fall Semester** | | |
| Intermediate natural science requirement | | 3-4 |
| ENVS 3020 | Advanced Writing in Environmental Studies (ENVS Writing requirement - fulfills Gen. Ed. Skills: Upper-division written communication) | 3 |
| ECON 3535<br>or ECON 3545 | Natural Resource Economics (ENVS Economics requirement - second course - - partially fulfills Gen. Ed. Distribution: Social Sciences)<br>or Environmental Economics | 3 |
| ENVS Ethics requirement - may partially fulfill Gen. Ed. Distribution: Arts & Humanities | | 3 |
| Elective or Upper-division Elective (if needed) | | 3 |
| | **Credit Hours** | **15-16** |
| **Spring Semester** | | |
| ENVS Cornerstone requirement | | 3 |
| ENVS Application requirement | | 2-6 |
| ENVS Intermediate Social Science requirement - may partially fulfill Gen. Ed. Distribution: Social Sciences | | 3-4 |
| ENVS Specialization course | | 3 |
| Elective or Upper-division Elective (if needed) | | 3-0 |
| | **Credit Hours** | **14-16** |
| **Year Four** | | |
| **Fall Semester** | | |
| ENVS Capstone | | 3 |
| ENVS Specialization course | | 3 |
| ENVS Specialization course | | 4-3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective or Upper-division Elective (if needed) | | 3 |
| | **Credit Hours** | **16-15** |
| **Spring Semester** | | |
| ENVS Specialization course | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/US Perspective) | | 3 |
| Elective or Upper-division Elective (if needed) | | 3 |
| Elective or Upper-division Elective (if needed) | | 3 |
| Elective or Upper-division Elective (if needed) | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **120-126** |

# Learning Outcomes

Students will be able to:

- Integrate scientific principles of earth systems and human-environment interactions, understanding of perspectives and values, and practical responses in the study of environmental problems and proposed solutions.
- Evaluate different sources, claims and data for environmental topics and construct their own arguments.
- Produce an independent research-based analysis of an environmental issue.

- Evaluate contrasting perspectives on and values for environmental issues.
- Generate effective communication about environmental topics in written and oral format.
- Evaluate how environmental movements, policies, decision-making processes, benefits, information and burdens are shaped by and influence systems of exploitation and inequality.

### Curriculum Principles

For the classes that environmental studies faculty teach, we strive to build student skills and knowledge from freshman to senior year through designing a curriculum that deliberately scaffolds skills and knowledge. This will be accomplished through communication amongst the faculty as facilitated by the curriculum committee to make sure that each individual class is serving students' learning in light of the larger program goals. Curriculum mapping and analysis of assessments will help to ensure that we are delivering the curriculum we intend and serving the students' educational goals. For classes that are taught by other departments we will review and align major requirements so that those classes serve the overall learning outcomes of the major and the students' educational progress.

### Curriculum Goal Statement

The environmental studies undergraduate major is focused on training students rigorously in the multiple dimensions of environmental change through courses that integrate scientific understanding of human-environment interactions, practical responses to environmental problems, and the values that shape our decisions and behavior.

# Environmental Studies - Minor

The minor in environmental studies provides students with an understanding of the multiple dimensions of environmental change. They take a coursework that represents the essence of the major, providing foundational knowledge of concepts and methods that relate to environmental natural and social sciences and the humanities. The minor empowers students to explore how their core area of study (i.e., their major) relates to scientific understanding of human-environment interactions, practical responses to environmental problems and values that shape human decisions and behavior.

# Requirements

A minimum of 20 credit hours of Environmental Studies courses (ENVS), including a minimum of 9 upper-division credit hours, are required for the minor. All coursework applied to the minor must be completed with a grade of C- or better; no pass/fail work may be applied. The grade point average for all Environmental Studies coursework must equal 2.00 (C) or higher.

Students will be allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work towards a minor in Environmental Studies.

Coursework applied towards a minor in Environmental Studies can also be applied towards Gen. Ed. requirements.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| ENVS 1000 | Introduction to Environmental Studies | 4 |
| ENVS 1001 | Introduction to Human Dimensions of Environmental Studies | 4 |
| *Intermediate Social Science Courses* | | *3-4* |
| Choose one: | | |
| ENVS 3022 | Climate and Energy Justice | |
| ENVS 3030 | Topics in Environmental Social Sciences | |
| ENVS 3031 | Environmental Psychology | |
| ENVS 3032 | Environment, Media and Society | |
| ENVS 3033 | Governing the Environment | |
| ENVS 3034 | Foundations of Environmental Justice | |
| *Cornerstone Courses* | | *3* |
| Choose one: | | |
| ENVS 3520 | Energy and Climate Change: An Interdisciplinary Approach | |
| ENVS 3525 | Intermediate Environmental Problem Analysis: Topical Cornerstones | |
| ENVS 3555 | Sustainable Economies | |
| ENVS 3621 | Energy Policy and Society | |
| *Minor Electives* | | *6* |
| (ENVS courses not used to fill any of the requirements above.) | | |
| Take any 3- or 4-credit ENVS courses at the 2000-level or above | | |
| Take any 3- or 4-credit Upper-division ENVS course | | |
| **Total Credit Hours** | | **20-21** |

# Plan(s) of Study

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| ENVS 1000 | Introduction to Environmental Studies | 4 |
| | **Credit Hours** | **4** |
| **Spring Semester** | | |
| ENVS 1001 | Introduction to Human Dimensions of Environmental Studies | 4 |
| | **Credit Hours** | **4** |
| **Year Three** | | |
| **Fall Semester** | | |
| Intermediate Social Science ENVS course | | 3-4 |
| | **Credit Hours** | **3-4** |
| **Spring Semester** | | |
| Cornerstone ENVS course | | 3-4 |
| | **Credit Hours** | **3-4** |
| **Year Four** | | |
| **Fall Semester** | | |
| ENVS Elective course | | 3-4 |
| | **Credit Hours** | **3-4** |

| | |
|---|---|
| **Spring Semester** | |
| ENVS Elective course | 3-4 |
| **Credit Hours** | **3-4** |
| **Total Credit Hours** | **20-24** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Integrate scientific principles of earth systems and human-environment interactions, understanding of perspectives and values, and practical responses in the study of environmental problems and proposed solutions.
- Evaluate different sources, claims and data for environmental topics and construct their own arguments.
- Produce an independent research-based analysis of an environmental issue.
- Evaluate contrasting perspectives on and values for environmental issues.
- Generate effective communication about environmental topics in written and oral format.
- Evaluate how environmental movements, policies, decision-making processes, benefits, information and burdens are shaped by and influence systems of exploitation and inequality.

# Ethnic Studies

The Department of Ethnic Studies at the University of Colorado Boulder draws on a tradition of culturally sustaining pedagogy and engaged scholarship to examine how race and the interrelated categories of culture, ethnicity, indigeneity, gender, class, sexuality, religion and legal status impact the lives of people locally, regionally, nationally and internationally. The foundation of ethnic studies is comprised of four pillars of interrelated areas of scholarly research and pedagogy: Africana, Asian American, Chicanx/Latinx, and Native American & Indigenous studies. Our interdisciplinary department offers an undergraduate major and minor in ethnic studies and an undergraduate certificate in critical sports studies.

## Study Abroad

The Department of Ethnic Studies encourages students to participate in the study abroad programs offered through the Education Abroad office. The experience of studying abroad prepares students to live in an increasingly connected world. Students learn invaluable skills for their future careers, form important cross-cultural relationships and gain an international perspective that prepares them for the world beyond graduation.

Education Abroad offers over 300 pre-approved programs for students at CU Boulder, including many excellent options for Ethnic Studies majors and minors. There are numerous programs and courses available abroad which focus on social justice, Indigenous peoples, diaspora studies and more.

CU Boulder partners with several study abroad organizations that offer summer, semester and full-year programs in many locations around the world, most notably in Africa, Asia and Latin America. Programs of special interest include study abroad in Australia, Bolivia, Cuba, Dominican Republic, Ecuador, Ghana, Japan, Mexico, Morocco, Peru, South Africa, Spain and Taiwan.

For more information about studying abroad, students are encouraged to attend Study Abroad 101: Your First Step (http://studyabroad.colorado.edu/?go=studyabroad101). This 30-minute session is offered in-person and online multiple times each week and covers the basics of studying abroad as a CU Boulder student. Information on all CU-approved programs is available at the Education Abroad website (http://abroad.colorado.edu/). Students should always consult with their academic advisor prior to choosing their study abroad program.

# Bachelor's Degree

- Ethnic Studies - Bachelor of Arts (BA) (p. 304)

# Minor

- Ethnic Studies - Minor (p. 306)

# Certificate

- Critical Sports Studies - Certificate (p. 306)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Aldama, Arturo James (https://experts.colorado.edu/display/fisid_130739/)
Associate Professor, Chair; PhD, University of California, Berkeley

Belknap, Joanne Elizabeth (https://experts.colorado.edu/display/fisid_113617/)
Professor Emerita; PhD, Michigan State University

Browsh, Jared Bahir (https://experts.colorado.edu/display/fisid_163451/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Carroll, Clinton R. (https://experts.colorado.edu/display/fisid_154726/)
Associate Professor, Associate Chair; PhD, University of California, Berkeley

Dupris, Joseph
Visiting Assistant Professor; Ph.D., University of Arizona

Ho, Jennifer (https://experts.colorado.edu/display/fisid_165744/)
Professor; PhD, Boston University

King, William M.
Professor Emeritus

Lawson, Angelica Marie (https://experts.colorado.edu/display/fisid_154727/)
Assistant Professor; PhD, University of Arizona

Maeda, Daryl Joji (https://experts.colorado.edu/display/fisid_141460/)
Professor; PhD, University of Michigan Ann Arbor

Nyeck, S.N. (https://experts.colorado.edu/display/fisid_169704/)
Associate Professor; Ph.D., University of California-Los Angeles

O'Neal, Shawn Trenell (https://experts.colorado.edu/display/fisid_165586/)
Teaching Assistant Professor; M.A., University of Colorado Denver

Ordaz, Jessica (https://experts.colorado.edu/display/fisid_159142/)
Assistant Professor; PhD, University of California, Davis

Rabaka, Reiland (https://experts.colorado.edu/display/fisid_141463/)
Professor; PhD, Temple University

Rios, Gabriela (https://experts.colorado.edu/individual/fisid_167679/)
Assistant Professor; PhD, Texas AM University

Sepúlveda, Enrique (https://experts.colorado.edu/display/fisid_159858/)
Assistant Professor; PhD, University of California, Davis

Sohi, Seema (https://experts.colorado.edu/display/fisid_144616/)
Associate Professor; PhD, University of Washington

Upadhyay, Nishant (https://experts.colorado.edu/display/fisid_166101/)
Assistant Professor; PhD, York University

Villanueva, Nicholas (https://experts.colorado.edu/display/fisid_158252/)
Assistant Professor, Associate Chair; PhD, Vanderbilt University

Walker, Deward E. Jr
Professor Emeritus

# Courses

**ETHN 1022 (3) Introduction to Africana Studies**
Overview of Africana studies as a field of investigation, its origins and history.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 1023 (3) Introduction to Native American and Indigenous Studies**
Introduces critical terms, issues, and questions that inform the discipline of American Indian Studies. Examines "historical silences" and highlights how American Indian scholars, poets, and filmmakers use their work to address/redress historical subjects, and represent their Native communities.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: American Indian Studies

**ETHN 1025 (3) Introduction to Asian American Studies**
Examines the various factors that define minority groups and their positions in American society using Asian Americans as a case study. Emphasizes the perspectives and methodologies of the discipline of ethnic studies.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Asian American Studies

**ETHN 2001 (3) Foundations of Comparative Ethnic Studies: Race, Gender and Culture(s)**
Introduction to the study of race, ethnicity and gender in the United States. Overview of concepts, theories and analytic frames that shape the interdisciplinary field of Ethnic Studies. Focuses on historic, institutional, legal and cultural issues that impact African-Americans, Asian-Americans, Chicanas and Chicanos, European Americans, Native Americans and Indigenous peoples in the U.S.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 2004 (3) Themes in American Culture 1**
Enables students to explore various themes in pre-1865 American culture. Examines these themes, which vary each year, in their social context.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American Studies

**ETHN 2013 (3) Critical Issues in Native North America**
Explores a series of issues including regulations of population, land and resource holdings, water rights, education, religious freedom, military obligations, the sociopolitical role of men and women, self-governance, and legal standing as these pertain to American Indian life.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: American Indian Studies

**ETHN 2014 (3) Themes in American Culture 2**
Enables students to explore various themes in post-1865 American culture. Examines these themes, which vary each year, in their social context.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American Studies

**ETHN 2020 (3) Flourishing, Belonging, Liberation**
This course explores perspectives from the humanities (Indigenous, African-American, and Buddhist) and the sciences about what it means to flourish: an existence filled with wellness, purpose, connection, and justice. Human flourishing is considered in relation to theories of social and spiritual liberation given global legacies of colonialism, such as structural inequity and racialization. Students will engage in experiential learning where their bodies, minds, and communities are engaged as somatic laboratories and fields of exploration.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ETHN 2044 (3) Crime and Society**
Explores issues related to crime, the criminal justice system, and crime-related public policy. It addresses what we know about crime and how we know it, how our society responds to crime, how the institutions designed to address crime (police, courts, corrections) function, and diversity in experiences with the criminal justice system.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 2044
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 2053 (3) Introduction to BIPOC Horror**
Mainstream horror often centers on white fears and problematic representations of Black, Indigenous, and People of Color (BIPOC). This class will take a different approach by highlighting horror created by BIPOC in films, novels, and comics. Employing a critical Ethnic Studies lens, focusing on the intersections of race, class, gender, sexuality, and ability, we will interrogate the various and changing meanings of fear, fright, and despair and how they inform culture, identity, and community.
**Recommended:** Prerequisite ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ETHN 2203 (3) American Indians in Film**
Surveys representations of American Indians in American (especially Hollywood) film with an emphasis on "revisionist," or ¿breakthrough¿ films. It follows the creation of "the Hollywood Indian" from early literature to contemporary motion pictures. Films are analyzed within historical, social, and artistic contexts, and examined in terms of the impact their images have exerted upon American society at large, as well as Native communities. Near the end of the course we will look at what happens when Native Americans write, direct, and act in independent films or streaming television series.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 2203
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: American Indian Studies

**ETHN 2215 (3) The Japanese American Experience**
Surveys the Japanese American experience, emphasizing post-WWII developments. Gives attention to intragroup diversity having to do with generation, ethnicity, ecology, and gender.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Asian American Studies

**ETHN 2232 (3) Contemporary African American Social Movements**
Examines selected case studies of African American collective behavior in a historical context. Emphasizes an in-depth investigation of the continuing African American struggle for social/democratic rights.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Africana Studies

**ETHN 2242 (3) African American Social and Political Thought**
Introductory course designed to acquaint students with historical and contemporary thinking, writings, and speeches of African Americans.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Africana Studies

**ETHN 2304 (3-4) Introduction to Social Justice**
Provides undergraduate students with an understanding of how social systems, primarily the educational and health care systems, are key to understanding injustices and criminalization. Topics covered will include trauma and victimization, food and housing justice, educational justice, physical and mental health justice, mass incarceration, #BlackLivesMatter and restorative justice.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American Studies

**ETHN 2432 (3) African American History**
Surveys African American history. Studies, interprets and analyzes major problems, issues and trends affecting African Americans from about 1600 to the present.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 2437
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Africana Studies

**ETHN 2500 (3) Race, Ethnicity, and Language**
Explores the relationship between race, ethnicity, and language and how they are co-constructed. How do speakers of different racial and ethnic groups use language differently, and what are the social implications of these different language varieties? Discusses the implications of ethnolinguistic variation on racial stereotypes, education, and the law.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 2500
**Recommended:** Prerequisite LING 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ETHN 2536 (3) Survey of Chicana/o History and Culture**
Through historical and social scientific studies, novels, autobiographies, testimonies, films, music, and art, this course will provide students a survey of Chicana/o history and culture. Historical overviews of Chicana/o peoples from Mesoamerica; the Spanish Conquest; the historical presence of Chicana/o peoples in the Southwest; the rise of the Chicana/o student and community movements; immigration issues; and the gender, sexuality, and criminalization issues.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Chicana/o Studies

**ETHN 2546 (3) Chicana and Chicano Fine Arts and Humanities**
Provides foundation for study of Chicano literature, music, the plastic arts, theatre and film. Also introduces aesthetic and critical concepts and their applications in Chicana and Chicano studies.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Chicana/o Studies

**ETHN 2703 (3) Native American and Indigenous Religious Traditions**
Studies the religious lifeways of diverse Indigenous peoples in North America. The course considers how these religious lifeways facilitate healing, movements of social protest, and efforts for self-determination in response to ongoing forms of colonialism. Students will critically explore the impact of colonial structures on Native American religious traditions, such as missionization, and evaluate the meaning of decolonization as both a pathway and goal supporting Native liberation.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 2700
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: American Indian Studies

**ETHN 2713 (3) American Indian Literature**
Surveys historical and contemporary North American Native American literature. Examines the continuity and incorporation of traditional stories and values in Native Literature, including novels, short stories and poetry.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 2717
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: American Indian Studies

**ETHN 2732 (3) Introduction to African American Literature**
This course traces the roots of contemporary African American writings through the Harlem Renaissance to early Black poetry and slave narratives. Students will explore how African American authors have used genre, language, and publication to question intersections of race, gender, sexuality, class, nation, empire, colorism, and freedom in US and African American history.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 2737
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Africana Studies

**ETHN 2746 (3) Introduction to Chicana/o/x Literature**
This class explores the diverse and vibrant writings of Chicana/o/x authors from today back through a time when places like Colorado and California were part of Mexico. Readings consider how Chicana/o/x authors have used concepts such as Greater Mexico, Aztlán, la frontera, and Chicanidad to question intersections of language, race, class, gender, sexuality, indigeneity, nation, violence, and empire.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 2747
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Chicana/o Studies

**ETHN 2761 (3) Race, Empire, and the Postcolonial**
When did the sun set on the British Empire? In the twentieth century, countries across Africa, Asia, and the Caribbean fought for their independence and built their own literary and cultural traditions while grappling with the legacies of empire. This course explores how authors from these new nation-states wrote about racial oppression; global economic inequalities; the promise of new national identities; the lingering effects of colonialism; and the use of English as a literary language.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 2767
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3015 (3) Asian Pacific American Communities**
Covers the concepts, methods, and theories commonly used in community research, as well as substantive information on selected Asian/Pacific American communities. Emphasizes the ethical/political dimensions of community studies.
**Recommended:** Prerequisite ETHN 1025 or ETHN 2001.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asian American Studies

**ETHN 3024 (3) Introduction to Critical Sports Studies**
Learn to think in an informed and critical way about sports in society. Examine the socio-cultural significance of sports as it relates to topics such as youth, social class, race/ethnicity, gender, identity, and intercollegiate athletics. Readings, class discussions, videos, and guest speakers will help expand our understanding of this important social phenomenon.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3026 (3) Women of Color: Chicanas in U.S. Society**
Critically explores the Chicana experience and identity. Examines issues arising from the intersection of class, race, and gender. Focuses on controversies surrounding culture and gender through an analysis of feminism and feminismo.
**Recommended:** Prerequisite ETHN 2001 or ETHN 2536.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Chicana/o Studies

**ETHN 3044 (3) Race, Class, Gender, and Crime**
Overview of race, class, gender and ethnicity issues in offending, victimization and processing by the justice system. Examines women and people of color employed in the justice system.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 3044 and WGST 3044
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3101 (3) Selected Topics in Ethnic Studies**
Intensive examination of a particular topic, theme, issue, or problem in ethnic studies as chosen by the instructor.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3102 (3) Selected Topics in African American Studies**
Intensive examination of a particular topic, theme, issue, or problem concerning the African American presence, as chosen by the instructor. Sample offerings could include African American Pop Culture, the Civil Rights Movement, or other African American issues.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite ETHN 1022 or ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 3103 (3) Selected Topics in American Indian Studies**
Examines a particular topic, theme, issue, or problem in American Indian Studies.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite ETHN 2001 or ETHN 2203.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American Indian Studies

**ETHN 3104 (3) Selected Topics in American Studies**
Critically examines American identity and experiences, past and present, focusing on ethnicity, gender, popular culture, and political culture.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American Studies

**ETHN 3105 (3) Selected Topics in Asian American Studies**
Intensive examination of a topic or issue affecting Asian Americans, such as the Japanese American internment during World War II, or Asian American social movements or community organizations.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite ETHN 1025 or ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asian American Studies

**ETHN 3106 (3-6) Selected Topics in Chicana and Chicano Studies**
Intensive examination of a particular topic, theme, issue, or problem in Chicana and Chicano studies as chosen by the instructor.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite ETHN 2001 or ETHN 2536.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Chicana/o Studies

**ETHN 3136 (3) Chicana Feminisms and Knowledges**
Provides insight into the present socioeconomic condition of Chicanas and the concept of feminismo through interdisciplinary study of history, sociology, literary images, and film portrayals.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3135
**Recommended:** Prerequisite ETHN 2001 or ETHN 2536.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Chicana/o Studies

**ETHN 3201 (3) Social Justice, Leadership and Community Engagement Internships**
Focuses on leadership theories and skills necessary for effectiveness in social justice settings. Students gain understanding of traditional and culturally diverse approaches to leadership and change. Community service required.
**Equivalent - Duplicate Degree Credit Not Granted:** INVS 3100
**Requisites:** Restricted to Ethnic Studies (ETHN) majors or minors or INVST Community Studies (IVT) subplan students only.
**Recommended:** Prerequisite ETHN 2001.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3212 (3) Introduction to Hip Hop Studies**
Examines critical questions posed by hip hop culture. Accentuated in this course are hip hop's contributions to the political-economic, philosophical, and sociological study of race, racism, sexism and sexuality. Examines the ways in which hip hop, as a new social phenomenon, cultural force and aesthetic form, have influenced contemporary American and global culture.
**Recommended:** Prerequisite ETHN 1022 or ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 3213 (3) American Indian Women**
Explores the experiences, perspectives, and status of American Indian women in historical and contemporary contexts. Examines representations of Indigenous women in mainstream culture. Emphasizes the agency of American Indian women-their persistence, creativity, and activism, especially in maintaining Indigenous traditions.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3210
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite ETHN 1023 or ETHN 2001 or WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: American Indian Studies

**ETHN 3252 (3) African American Urban History**
Fosters a better understanding and appreciation of the role African Americans have played in the evolution and shaping of urban America. Employs techniques of urban studies to more effectively assess the many dimensions, subtitles, and insensitivities of life in the city. S. and Afro-American history.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ETHN 1022 or ETHN 2001 and a working knowledge of U.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 3301 (3) Elements of Religion**
Explores universal components of religion, as inferred from religions of the world, ranging from smaller-scale oral to larger-scale literate traditions.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 3300
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3314 (3) Violence Against Women and Girls**
Focuses on aspects of the victimization of women and girls that are "Gendered" - namely, sexual abuse and intimate partner abuse. Also explores the importance of race, class, and sexuality in gendered violence.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 3314 and WGST 3314
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3403 (3) Indigenous Rights and Red Power Movement**
Deals with historical events involving conflicts between the U.S. government and American Indians. Examples include the role of the FBI in the Pine Ridge Sioux Reservation (1972-76) or the 1864 massacre of the Cheyenne and Arapaho Indians in Colorado territory. Additional courses may relate to tribal governments.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ETHN 1023 or ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American Indian Studies

**ETHN 3501 (3) Theory/Methods/Writing in Ethnic Studies**
Preparation for empirical inquiry in Ethnic Studies. Emphasizes philosophy of social science and cultural studies. Students engage rigorous, theoretical concepts to understand research methods. Prepares students for writing a lengthy, cogent research paper.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) Ethnic Studies (ETHN) majors only.
**Recommended:** Prerequisite ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3575 (3) Japanese American Internment: Critical Thinking in Sociocultural Diversity**
Offers a historical overview of the Japanese American experience in the United States. Introduces and explores fundamental issues inherent in the study of human beings from the perspective of cultural social difference.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ETHN 1025 or ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asian American Studies

**ETHN 3671 (3) People of Color and Social Movements**
People of color the world over are struggling for sovereignty, independence, civil and human rights, food security, decent wages and working conditions, healthy housing, and freedom from environmental racism and other forms of imperialism. Course analyzes and brings alive these struggles.
**Equivalent - Duplicate Degree Credit Not Granted:** INVS 3671
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3692 (3) African Am Music: Fr Spirituals and the Blues to Rap/Hip Hop Soul**
Offers an overview of the origins and evolution of African American music. Guides students through the musical history, as well as the social, political and cultural history, of the spirituals, blues, ragtime, jazz, gospel, freedom songs, rhythm and blues, rock and roll, soul, funk, disco, techno, house, rap and hip hop soul.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites ETHN 1022 and ETHN 2001 and ETHN 3212.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Africana Studies

**ETHN 3701 (3) Gender, Sport and Culture**
Critically examines the experiences of girls and women in American sport from a psycho-socio-cultural perspective with a particular emphasis on the constructs of gender, race, class and sexuality and how these constructs both independently and collectively mediate the female sport experience. Explores theories and interpretive frameworks from sport studies, feminist studies, race studies, psychology and cultural studies.
**Recommended:** Prerequisite ETHN 3024.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3702 (3) African American Sport Experience**
Provides a socio-cultural and historical overview of the contributions of African Americans (men and women) to sport in America. Focus is on the macro (patterns of behavior related to large-scale social structures and processes) and micro (behaviors we observe in society, often readily observable in the context of sport and exercise) level of sport analysis.
**Recommended:** Prerequisite ETHN 3024.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 3704 (3) Athlete as a National Symbol: Nationhood/Nationalism, Sport**
This is a global seminar that explores the nationalistic terrain of sport as a way to understand how athletes became a symbol of nationhood and how they are influenced by, and themselves influence, other aspects of society and culture. Using historical and contemporary examples, this course examines how race, gender, sexuality, economics and the media constructed the nationalistic world of sports today.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3705 (3) Sport and Culture in Latin America and the Caribbean**
A critical examination of the changing relationship between sport and culture in Latin America and the Caribbean. Examines the historical evolution and current dynamics of Latin American sport and leisure from the post-colonial period through the 21st Century. A variety of sources examine specific examples from several cities, including Buenos Aires, Bogotá, Brasilia, Caracas, Havana, Santo Domingo, Mexico City, Lima, Rio de Janeiro, and São Paulo. Topics include colonialism, nationalism, transnationalism, consumer cultures, masculinity & femininity, and sports & leisure.
**Recommended:** Prerequisite ETHN 3024.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ETHN 3707 (3) Critical Study of Race and Ethnicity in Sports Films**
Examines how race/ethnicity, gender, identity, social class, and nationalism are represented in sport films. The films examined will follow historical social movements throughout the twentieth century, as well as socio-cultural topics today. Readings, class discussions, videos, and guest speakers will help expand our understanding of this important social phenomenon.
**Recommended:** Prerequisite ETHN 3024.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ETHN 3777 (3) Inside-Out: Prison and Social Justice**
Provides a unique experience for Inside (prisoner) and Outside (CU-B undergraduate) students to take a seminar course together in a prison. We address social justice through an ethnic studies, intersectional, and interdisciplinary lens, including social justice topics such as health, education, and work. Outside students must complete an application provided by the instructor and pass a criminal history check by the Colorado Department of Corrections to be enrolled and space is limited. Previously offered as a special topics course.
**Recommended:** Prerequisite ETHN 2001.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ETHN 3841 (1-6) Undergraduate Independent Study**
Consult the Department of Ethnic Studies for information. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite ETHN 2001.
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 4001 (3) Screening Race, Class & Gender in the U.S. and the Global Borderland**
Engaging with the ways in which racial, class, gender and sexual oppression intersect, this class examines several film productions by and about diasporic and subaltern subjects (especially children and women) in the U.S./Mexico borderlands, and the urban ethnic metropoles of the global borderlands.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4001 and ETHN 5001
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Crosscultural/Comparative Studies

**ETHN 4006 (3) Chicana/Chicano Native American Cultures of the U.S.**
Theoretically engaged seminar considers intersections of Chicana/o and Native American studies to shape our scholarly understanding of the U.S. and Mexico borderlands. Ethnographies, historical studies, novels, film, and music will be used to understand the processes of Spanish and Euro-American colonization, neocolonialism, identity formation, gender, syncretism, and mestizaje.
**Requisites:** Requires a prerequisite course of ETHN 2001 or ETHN 2536 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Chicana/o Studies

**ETHN 4009 (3) Chicana/os and Education**
Chicana/o and Mexican-origin communities make up the largest and oldest of U.S. Latinx peoples. In many urban school districts across the country they make up the majority of the school enrollment; yet they are grossly underrepresented in higher education. This course will examine the socio-historical, cultural, and political contexts that have shaped the educational experiences of Chicana/os in the U.S. including issues of race, language learning and identity formation as they intersect with nation building. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5009
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** this course is primarily designed for upper level (juniors and seniors) students but open to sophomores.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ETHN 4084 (3) Punishment, Law and Society**
Places the current state of punishment in the U.S. in historical and cross national context. Examines key features of penal systems and key sociological theories about the relationship between punishment and society. Department enforced prerequisite: SOCY 1001 or SOCY 1004.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4084
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 4102 (3) Special Topics in Africana Studies**
Variable topic that allows intensive coverage of a subject, theme, or issue in African American studies.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5102
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of ETHN 1022 or ETHN 2001 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 4106 (3) Special Topics in Chicana and Chicano Studies**
Examines a particular topic, theme, issue or problem concerning Chicana and Chicano studies.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4106
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of ETHN 2001 or ETHN 2536 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Chicana/o Studies

**ETHN 4116 (3) Spoken Word Latinx Poetics and Poetry**
This is a writing intensive workshop in contemporary poetry writing and Chicana/o and Latina/o poetics-specifically, Nuyorican and Afro-Latino (the Nuyorican Poets Cafe). The purpose of the course is dual-fold: 1) students will be encouraged and empowered to express and develop their poetic voice; 2) students will be challenged to develop and refine their poetic craft. Examines primarily Chicana and Latino specific poetic expression that reflects the cultural mestizaje of Chicano/a and Latina/o peoples.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5116
**Requisites:** Requires a prerequisite course of ETHN 2001 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Requisite 6 credits in any ETHN class.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chicana/o Studies

**ETHN 4213 (3) Indigenous Futurisms: Speculative Genres and Native Tomorrows**
Examines how Indigenous authors, artists and filmmakers have recently begun exploring the genres of Horror, Science Fiction and Fantasy. Considers this shift in light of past and present Native realities. Explores why this shift is happening now, how it helps communities and individuals make political statements, address/redress historical subjects and help to build better futures for us all.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: American Indian Studies

**ETHN 4232 (3) The Life and Thought of Martin Luther King Jr**
An intensive exploration and examination of the life and thought of the Rev. Dr. Martin Luther King Jr. Special emphasis on the stages of his life and their corresponding productions.
**Requisites:** Requires a prerequisite course of ETHN 1022 or ETHN 2001 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 4233 (3) Native American and Indigenous Environmental Issues**
Explores the unique knowledges, practices and perspectives of Native American and Indigenous peoples with regard to environmental issues, and how they both contrast with and complement dominant ways of knowing. Views central themes of Land, Plants, Animals, and Air/Water through political-ecological lenses. Critically assesses historical and contemporary Indigenous environmental matters in the contexts of colonial histories and tribal sovereignty.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5233
**Recommended:** Prerequisite ETHN 1023 or ETHN 2013.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American Indian Studies

**ETHN 4272 (3) W.E.B. Du Bois Seminar**
Analyzes the life and thought of W.E.B. Du Bois for its contributions to interdisciplinary and intersectional studies. Emphasis will be placed on the innovative interdisciplinary and intersectional nature of Du Bois's epistemology and research methodology, as well as his participation in radical political and social movements.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5272
**Requisites:** Requires a prerequisite course of ETHN 1022 or ETHN 2001 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Ethnic Studies (ETHN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 4306 (3) The Chicana and Chicano and U.S. Social Systems**
Gives special attention to ways U.S. institutions (i.e., legal, economic, educational, governmental and social agencies) affect Chicanas and Chicanos. Discusses internal colonialism, institutional racism, assimilation and acculturation, and identity.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5306
**Requisites:** Requires a prerequisite course of ETHN 2001 or ETHN 2536 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Chicana/o Studies

**ETHN 4353 (3) Indigenous Traditions and Law: A Global Perspective**
Explores intersections of indigenous religions and law through historical and contemporary case studies. American Indian and Hawaiian contexts will be featured, as well as the study of the United Nations Declaration on the Rights of Indigenous Peoples and its recent implementation in places as diverse as Bolivia, Norway and Nagaland. Theoretical issues in the academic study of religion and ethnic studies will be emphasized.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5353 and RLST 4353 and RLST 5353
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 4504 (3) Ethnic-American Autobiography**
Investigates the genre of autobiography in America from its inception to the present. American autobiography has been associated with the invention of national character and, thus, is a site of cultural contestation and identity formation. Its changing form crosses disciplinary lines and provides a site for discourses on ethnicity, class, gender, sexuality, age, family, religion and other American cultural conflicts.
**Requisites:** Requires a prerequisite course of ETHN 2001 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: American Studies

**ETHN 4552 (3) The Harlem Renaissance: Fr Black Wmn's Club Mvmnt to Hip Hop**
Offers an interdisciplinary and intersectional overview of the origins and evolution of the Harlem Renaissance. Explores classic texts, music and works of art emerging from the Harlem Renaissance and related events and movements of its epoch: the Black Women's Club Movement, New Negro Movement, Pan-African Movement, Lost Generation, Jazz Age, World War I and World War II.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 4552 and ETHN 5552
**Requisites:** Requires prerequisite course of ETHN 1022 or ETHN 2001 or ETHN 3212 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 4553 (3) Indigenous Representations in the United States**
Examines the relationship and negotiation of culture/status/place through representation(s) within and concerning Indigenous peoples/communities. Focuses on U.S. representational forms in popular experiences e.g., literature, film, media and the roots of those representations via legal and medical definitions. This investigation and analysis is supplemented with focus on gender as well as contextualization through global Indigenous portrayals.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5553
**Requisites:** Requires a prerequisite course of ETHN 2001 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ETHN 1023.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American Indian Studies

**ETHN 4632 (3) Frantz Fanon Seminar**
Analyzes the life and thought of Frantz Fanon for its contributions to interdisciplinary and intersectional studies. Emphasis will be placed on the innovative interdisciplinary and intersectional nature of Fanon's psychology, sociology and philosophical anthropology, as well as his participation in African and Caribbean anti-colonial movements.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5632
**Requisites:** Requires a prerequisite course of ETHN 1022 or ETHN 2001 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Ethnic Studies (ETHN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 4672 (3) Seminar on the Civil Rights and Black Power Movements**
A review of the ideas, events, persons, organizations oriented to the quest for African American social justice in the decade of the sixties.
**Requisites:** Requires a prerequisite course of ETHN 1022 or ETHN 2001 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 4692 (3) Special Topics in Ethnic US Literatures**
This course will go in-depth into a special topic in ethnic US literatures through texts drawn from African American, Chicana/o/x, Latina/o/x, Native American and Indigenous, Asian American, and/or Arab American traditions. Topics vary by semester. Check department description for details.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 4697
**Requisites:** Requires a prerequisite course of ETHN 1022 or ETHN 2001 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Africana Studies

**ETHN 4714 (3) Sport for Social Justice**
Takes a look at the nuanced and controversial relationship between sport and peace. Although sport is heralded as a powerful tool for social good, drawing attention to causes such as conflict resolution, HIV prevention, environmental initiatives and improved international relationships, it also continues to reflect and reproduce social inequalities in ways commonly overlooked.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5714
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior).
**Recommended:** Prerequisite ETHN 3024.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 4717 (3) Native American and Indigenous Studies Capstone Seminar**
Engages a wide range of NAIS methodologies with a series of case studies. Focuses on print, visual, and digital texts encompassing wide swathe of Eurowestern disciplines, while seeking to recuperate and restore Indigenous epistemic practices within our scholarship. Refines students' skills in intellectual debate in the spirit of shared inquiry and challenges research and writing skills.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 4717
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Grading Basis:** Letter Grade

**ETHN 4841 (1-6) Independent Study**
Work with an approved faculty sponsor to explore a topic in greater depth. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisite ETHN 2001.
**Additional Information:** Departmental Category: Crosscultural/Comparative Studies

**ETHN 4951 (3) Senior/Graduate Seminar in Ethnic Studies**
Capstone experience in Ethnic Studies. Includes an independent research project and public presentation.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5951
**Requisites:** Requires prerequisite courses of ETHN 2001 and ETHN 3501 (all minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 4961 (3) Honors Thesis 1**
Supervised original research project in the field of ethnic studies. The goal is to make substantial progress on a written honors thesis that will be orally defended and submitted to the Honors Program of the College of Arts and Sciences. Department enforced restriction: application and acceptance into the ETHN Honors Program.
**Requisites:** Requires a prerequisite course of ETHN 2001 (minimum grade D-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Ethnic Studies (ETHN) majors only.
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Crosscultural/Comparative Studies

**ETHN 4971 (3) Honors Thesis 2**
Supervised original research project in the field of ethnic studies. The goal is to complete progress on a written honors thesis that will be orally defended and submitted to the Honors Program of the College of Arts and Sciences. Department enforced prerequisite: application and acceptance into the ETHN Honors Program.
**Requisites:** Requires prerequisite courses of ETHN 2001 and ETHN 4961 (all minimum grade D-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Ethnic Studies (ETHN) majors only.
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Crosscultural/Comparative Studies

# Ethnic Studies - Bachelor of Arts (BA)

The department offers an undergraduate major and minor in ethnic studies.

The department offers courses in five areas of concentration: Africana Studies, Native American and Indigenous Studies, Asian American Studies, Latinx and Chicanx studies and Critical Ethnic Studies. In addition, students can take classes in the area of Critical Sports Studies (https://www.colorado.edu/ethnicstudies/undergraduate/critical-sports-studies/) to fulfill the undergraduate certificate in critical sports studies.

# Requirements

In addition to the general requirements of the College of Arts and Sciences, students must complete 33 credit hours of ethnic studies requirements: 12 credit hours of required ethnic studies core classes and an additional 21 credit hours in ethnic studies, 15 credit hours of which must be upper division for a total of 24 upper-division credit hours in the major (required courses mentioned below are included), 12 of the 24 upper-division credit hours in the major must be completed on the CU Boulder campus. The 21 credit hours in ethnic studies can be selected from the current ethnic studies course offerings; they may include courses that are cross-listed with the Department of Ethnic Studies, as listed in this catalog.

A grade of C- or better must be received in all courses used to satisfy the major requirements, with an overall average of 2.00 in the major. No more than 6 credit hours may be taken in independent study. No *pass/fail* graded courses may satisfy the 33-credit-hour minimum requirement. No more than 45 credits in ETHN may be applied to overall graduation requirements.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ETHN 2001 | Foundations of Comparative Ethnic Studies: Race, Gender and Culture(s) | 3 |
| ETHN 3501 | Theory/Methods/Writing in Ethnic Studies | 3 |
| ETHN 4951 | Senior/Graduate Seminar in Ethnic Studies | 3 |
| Select one of the following: | | 3 |
| ETHN 3101 | Selected Topics in Ethnic Studies | |
| ETHN 3102 | Selected Topics in African American Studies | |
| ETHN 3103 | Selected Topics in American Indian Studies | |
| ETHN 3105 | Selected Topics in Asian American Studies | |
| ETHN 3106 | Selected Topics in Chicana and Chicano Studies | |
| **Elective Courses** | | |
| A minimum of 21 credit hours in ETHN electives, 15 credit hours of which must be upper-division courses in the major. The 21 credit hours in electives can be selected from the current ETHN course offerings; they may also include coursework from outside the department, as approved by the department's curriculum committee and advisor. | | |
| Lower or Upper-division Major Electives | | 6 |
| Upper-Division Major Electives | | 15 |
| **Total Credit Hours** | | **33** |

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in ethnic studies, students should meet the following requirements:

- Declare ethnic studies as their major.
- Complete at least 12 credit hours toward the ethnic studies major requirements by the fourth semester.
- Complete at least 21 credit hours toward the ethnic studies major requirements by the end of the sixth semester.
- Complete ETHN 2001 no later than the fourth semester.
- Complete ETHN 3501 not later than the seventh semester.
- Complete at least one ethnic studies selected topics course selected from the following: ETHN 3101, ETHN 3102, ETHN 3103, ETHN 3105 or ETHN 3106 no later than the eighth semester.
- Complete ETHN 4951 no later than the eighth semester.

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will complete at least 12 credit hours across the Arts & Humanities and Social Sciences areas of the Gen Ed Distribution Requirement, and potentially one or both of the categories of the Gen Ed Diversity Requirement. (Most ETHN students will complete all of the Arts and Humanities and Social Sciences

areas of the Gen Ed Distribution Requirement and the U.S. Perspective category in the Gen Ed Diversity Requirement with major coursework.)

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| ETHN 2001 | Foundations of Comparative Ethnic Studies: Race, Gender and Culture(s) | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective or MAPS (if needed) | | 3 |
| Elective or MAPS (if needed) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ETHN Elective Lower or Upper-Division | | 3 |
| ETHN Elective Lower or Upper-Division | | 3 |
| Gen. Ed. Distribution course (Natural Sciences) | | 3 |
| Gen. Ed. Skills course (QRMS) | | 3 |
| Elective or MAPS (if needed) | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| ETHN Selected Topic Course Upper-Division | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Free Elective | | 3 |
| Free Elective | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| ETHN Elective Upper-Division | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution/Diversity course if needed (example: Social Sciences/Global Perspective) | | 3 |
| Free Elective | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| ETHN Elective Upper-Division | | 3 |
| ETHN Elective Upper-Division | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ETHN Elective Upper-Division | | 3 |
| Gen. Ed. Distribution/Diversity course if needed (example: Arts & Humanities/US Perspective) | | 3 |
| Upper-Division Elective | | 3 |
| Free Elective or Upper-Division Elective (if needed) | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| ETHN 3501 | Theory/Methods/Writing in Ethnic Studies | 3 |
| ETHN Elective Upper-Division | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ETHN 4951 | Senior/Graduate Seminar in Ethnic Studies | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **121** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Think critically about social disparities and use an intersectional epistemic frame to understand social justice and strategies for social liberation.
- Learn about the histories, cultures and world-views of marginalized communities (domestic and transnational).
- Make evidence-based written and oral arguments to address complex social problems, such as those sitting at the intersection of racism, classism, sexism and homophobia.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BA in Ethnic Studies, MA in Educational Foundations, Policy and Practice

The School of Education and Department of Ethnic Studies have partnered to support a BAM degree program that reflects each unit's commitment to educational opportunity, diversity, and engaged scholarship examining how race and the interrelated categories of

ethnicity, disabilities, language, gender, class and sexuality impact the lives of people locally and globally.

The program invites highly focused ethnic studies majors who are interested in applying their dedication to social justice and critical thinking skills to transformative careers in education. The program emphasizes policy and curricular issues, and the development of an interdisciplinary lens in graduate-level research.

The BAM degree program offers an efficient and rigorous path toward earning, in five years, a bachelor's degree in ethnic studies and a master's degree in educational foundations, policy and practice.

### Admissions Requirements

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.0 or higher.
- Have a minimum of 90 credit hours of coursework completed or in progress.
- Have declared ethnic studies as a major.
- Have completed all MAPS requirements (students admitted to CU Boulder prior to Summer 2023 only).

### Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only 6 credit hours may be double counted toward the bachelor's degree and the master's degree.

Students must complete 6 credit hours of graduate-level coursework by their eighth undergraduate semester. Students must also maintain a cumulative GPA of 3.0 or higher to continue in the program.

Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

### Contact Us

Completing the BAM degree program requires early and careful planning. To learn more about the program or how to apply, please contact an advisor at any time.

- Contact education advisors at edadvise@colorado.edu or 303-492-6555.
- Contact ethnic studies advisors at ethnicst@colorado.edu or 303-492-8852.

# Ethnic Studies - Minor

A minor is offered in ethnic studies. Declaration of a minor is open to any student enrolled at CU Boulder, regardless of college or school.

The minor emphasizes engaged scholarship that examines how race and the interrelated categories of culture, ethnicity, indigeneity, gender, class, sexuality, religion, dis/ability and legal status impact the past and present lives of people locally, regionally and globally.

To declare a minor, please schedule an appointment with our advisor (https://www.colorado.edu/ethnicstudies/undergraduate/advising/).

## Requirements

Students must complete 18 credits hours in ethnic studies (ETHN) coursework. All coursework applied to the minor must be completed with a grade of C- or better; no pass/fail work may be applied. The grade point average for all minor coursework must be equal to 2.0 (C) or higher.

Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| ETHN 2001 | Foundations of Comparative Ethnic Studies: Race, Gender and Culture(s) | 3 |
| ETHN lower or upper-division electives | | 6 |
| ETHN upper-division electives | | 9 |
| **Total Credit Hours** | | **18** |

# Critical Sports Studies - Certificate

Critical sports studies—which examines sports and their social, cultural, historical and economic contexts—is a rapidly growing interdisciplinary and intersectional field that engages cultural studies, the humanities, social sciences and professional fields such as business, journalism and law. At CU Boulder, critical sports studies is a multifaceted discipline that addresses the growing interest in examining social and cultural issues in sport today. Critical sports studies is focused on understanding how sport and play function in society, how United States and global society is impacted by the economic and cultural influence of sport and how it can be harnessed to support social and cultural change.

The certificate in critical sports studies is open to all degree-seeking undergraduate students pursuing any major at CU Boulder. The program framework demands that students analyze race, gender, politics and economics as they study sport, preparing students to engage in an increasingly diverse and globalized society. Students also participate in co-curricular and experiential activities to augment their understanding of the history, development, focus, functioning and future of sport in society.

## Requirements

### Admission Requirements

Applications for admission into the certificate program will be reviewed on a rolling basis. Contact the director of the program (https://www.colorado.edu/ethnicstudies/undergraduate-programs-and-resources/critical-sport-studies/) to apply. Degree-seeking undergraduate students may apply before they begin coursework, while they are engaged in required courses or after they have completed certificate requirements.

### Required Courses and Credits

A total of 18 hours of coursework are required to complete the certificate. Students are encouraged to take advantage of the interdisciplinary course offerings based in cultural studies, political science, history, study abroad, journalism, philosophy, communications, business, and writing and rhetoric.

All students are required to take ETHN 3024 Introduction to Critical Sports Studies. At least 6 additional credits must be taken within the Department of Ethnic Studies for a minimum total of 9 credits.

The remaining 9 credits must be taken in other departments and disciplines. Alternately students may take 6 credits in other departments plus 3 credits from an experiential learning course such as the Education

Abroad Summer Seminar: ETHN 3704 Athlete as a National Symbol: Nationhood/Nationalism, Sport (offered annually).

A grade of C- or higher is required to count a class toward the certificate. Students must achieve a minimum GPA of 2.0 in certificate coursework in order to earn the degree. Courses not on this list may count toward the certificate with program director approval. Syllabi for courses not listed must be submitted to the the director for approval.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Course** | | |
| ETHN 3024 | Introduction to Critical Sports Studies [1] | 3 |
| **Electives** | | |
| *Ethnic Studies* | | *6* |
| ETHN 3101 | Selected Topics in Ethnic Studies (Topic: Social Impact of the Olympics) | |
| ETHN 3104 | Selected Topics in American Studies (Topic: Culture, Identity, and the NBA OR The Governance of Sport) | |
| ETHN 3701 | Gender, Sport and Culture | |
| ETHN 3702 | African American Sport Experience [1] | |
| ETHN 3704 | Athlete as a National Symbol: Nationhood/Nationalism, Sport | |
| ETHN 3705 | Sport and Culture in Latin America and the Caribbean | |
| ETHN 3707 | Critical Study of Race and Ethnicity in Sports Films [1] | |
| ETHN 4714 | Sport for Social Justice | |
| *Outside Ethnic Studies* | | *9* |
| CLAS 1071 | Ancient Sport and Spectacle | |
| CLAS 3009 | Modern Issues, Ancient Times (Topic: Ancient Sports) | |
| COMM 3430 | Communication, Culture and Sport | |
| COMM 4300 | Senior Seminar: Rhetoric (Topic: Rhetoric & Sport) | |
| HIST 2516 | America Through Baseball [1] | |
| JRNL 2014 | Race and Sports Journalism | |
| JRNL 3251 | History of Sports Journalism | |
| JRNL 3704 | Sports Reporting I | |
| JRNL 3804 | Sports, Media and Society | |
| JRNL 3904 | Sports Journalism and Gender | |
| JRNL 4004 | The Sports Media Industry | |
| JRNL 4714 | Sports Broadcasting | |
| MDST 3331 | Sports-Media Complex | |
| PHIL 2240 | Philosophy and Sports | |
| PSYC 4031 | Sport Psychology [1] | |
| REES 2222 | Sports and the Cold War | |
| GRMN 2402 | Sports and Athleticism in German and Global Culture | |
| WRTG 3020 | Topics in Writing (Topic: Sports in American Culture) [1] | |
| **Total Credit Hours** | | **18** |

[1] Indicates course that could be take in an online format.

# French and Italian

The Department of French and Italian provides instruction in the languages, literatures, cinema, and cultures of France, Italy, and other areas where these languages are spoken.

We offer a wide selection of undergraduate courses (http://www.colorado.edu/frenchitalian/courses-0/), covering topics ranging from the Middle Ages to Italian-American culture and the Francophone literature of Africa, the Caribbean and the Middle East.

The department offers:

- Majors and minors in French (http://www.colorado.edu/frenchitalian/undergraduate/french/) and Italian (http://www.colorado.edu/frenchitalian/undergraduate/italian/)
- Joint BA/MA (http://www.colorado.edu/frenchitalian/undergraduate/french/bama/) in French
- A Certificate in Art and Social Change (https://catalog.colorado.edu/undergraduate/colleges-schools/arts-sciences/programs-study/french-italian/art-social-change-certificate/)

Study abroad opportunities in French (http://www.colorado.edu/frenchitalian/study-abroad/) and Italian (http://www.colorado.edu/frenchitalian/study-abroad/) to help students complete their international experience

**Course codes for these programs are FREN and ITAL.**

# Education Abroad

CU Boulder offers French study abroad programs in Annecy, Paris, Rennes, Strasbourg and Toulouse, France. In addition, students may study in Quebec, Brussels, Geneva and in the Francophone African nations of Cameroon, Madagascar, Mali and Senegal. CU Boulder offers Italian study abroad programs in Ferrara, Florence and Perugia, Italy. Students may obtain course-credit equivalences for work done while abroad. For further information about study abroad programs, students may visit departmental advisors or the Education Abroad office. Credit hours earned on this program may be applied to the Italian major. Students may also take a summer film class in Rome and/or Paris (in alternate years). This class is taught in English. The Ayer Romance Language Scholarship is available for French and Italian majors who plan to study abroad. The Il Circolo Italiano is also available for Italian majors who will be studying abroad. Both of these scholarships are awarded by the Department of French and Italian.

# Bachelor's Degrees

- French - Bachelor of Arts (BA) (p. 316)
- Italian - Bachelor of Arts (BA) (p. 319)

# Minors

- French - Minor (p. 321)
- Italian - Minor (p. 321)

# Certificate

- Art and Social Change - Certificate (p. 322)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ardizzoni, Michela (https://experts.colorado.edu/display/fisid_145152/)
Associate Professor, Associate Chair; PhD, Indiana University Bloomington

Bloomfield, Elisabeth Marie Arnould (https://experts.colorado.edu/display/fisid_125576/)
Associate Professor; PhD, University of California, San Diego

Braider, Christopher (https://experts.colorado.edu/display/fisid_100300/)
Professor of Distinction Emeritus; PhD, Trinity College, Dublin

Burba, Audrey (https://experts.colorado.edu/display/fisid_158272/)
Assistant Teaching Professor; PhD, Emory University

Craven, Priscilla (https://experts.colorado.edu/display/fisid_108033/)
Teaching Professor of Distinction, Senior Instructor; MA, University of Colorado Boulder

Frey, Julia B.
Professor Emerita

Kilbane, Aimee (https://experts.colorado.edu/display/fisid_153823/)
Assistant Teaching Professor; PhD, University of California, Santa Barbara

Magnanini, Suzanne M. (https://experts.colorado.edu/display/fisid_118145/)
Associate Professor, Chair; PhD, University of Chicago

Mortimer, Mildred
Professor Emeritus

Motte, Warren F. Jr. (https://experts.colorado.edu/display/fisid_100001/)
Distinguished Professor; PhD, University of Pennsylvania

Murphy, Kieran Marcellin (https://experts.colorado.edu/display/fisid_152976/)
Associate Professor; PhD, University of California, Santa Barbara

Samuelson, Charlie (https://experts.colorado.edu/display/fisid_163645/)
Assistant Professor; PhD, Princeton University

Saurini, Susanna (https://experts.colorado.edu/display/fisid_148725/)
Associate Teaching Professor; MA, University of L'Aquila

Seno, Cosetta (https://experts.colorado.edu/display/fisid_144515/)
Associate Professor; PhD, University of California, Berkeley

Torriani, Chiara (https://experts.colorado.edu/display/fisid_132725/)
Associate Teaching Professor; PhD, Universita Statale Di Milano

Valente-Quinn, Brian Dennis (https://experts.colorado.edu/display/fisid_155973/)
Associate Professor; PhD, University of California, Los Angeles

Van Nelson, Loredana Alina (https://experts.colorado.edu/display/fisid_142722/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Vandermarliere, Sandrine (https://experts.colorado.edu/display/fisid_143482/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Vasile, Olga (https://experts.colorado.edu/display/fisid_156596/)
Assistant Teaching Professor; MA, University of Notre Dame

Yamashita, Masano (https://experts.colorado.edu/display/fisid_147343/)
Associate Professor, Associate Chair; PhD, New York University

# Courses

**FREN 1010 (5) Beginning French 1**
For students with no previous knowledge of French. Presents basic grammar and most commonly used French vocabulary. Introduces students to Francophone culture.
**Equivalent - Duplicate Degree Credit Not Granted:** FREN 1050
**Additional Information:** Departmental Category: French

**FREN 1020 (5) Beginning French 2**
Continuation of FREN 1010. Completes the presentation of most basic structures and French vocabulary.
**Equivalent - Duplicate Degree Credit Not Granted:** FREN 1050
**Requisites:** Requires a prerequisite course of FREN 1010 (minimum grade C-).
**Additional Information:** Departmental Category: French

**FREN 1050 (5) Beginning French Review**
Covers the material of FREN 1010 and 1020 in one accelerated semester. Intended for students who know some French (i.e., four to five semesters in high school) but do not have skills adequate for 2000-level courses. Instructors enforce prerequisites: 2 years of high school French.
**Equivalent - Duplicate Degree Credit Not Granted:** FREN 1010 or FREN 1020
**Additional Information:** Departmental Category: French

**FREN 1200 (3) Medieval Epic Through Game of Thrones**
Covers the most important works of medieval literature, in English translation. Among the texts studied are the Song of Roland, and Arthurian romances, including the stories of Lancelot and Guinevere. Offers a general introduction for nonmajors to medieval literature and society. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 1350 (3) Introduction to Social Change in the Arts**
This course serves as an introduction to the Certificate in Art and Social Change. It introduces students to theories, concepts, and ideas that shape artistic productions and activist conversations around social change in a variety of geo-cultural contexts. The course is divided into three main units: theater and performance, media, and visual arts. Through these different lenses, students will learn about artistic practices in the US and in regions where Italian and French are spoken (North Africa, Sub-Saharan Africa, Latin America, and the Mediterranean region). This course allows students to engage with some of the most urgent issues in our societies, as they relate to justice, equality, and diversity. Artists and activists play an increasingly important role in advancing justice and promoting social change at the local, national, and global levels. The interdisciplinary approach of this course enables students to examine the role of different forms of artistic productions as a catalyst for social change.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Arts Humanities

**FREN 1400 (3) Sexuality and Gender Wars in Italy and France**
Introduces students to key participants and arguments in the debate on the status of women in Italy and France during the period 1300 to 1700. Explores writings and art by women and men addressing topics such as gender roles, sexuality, sex work, marriage, and access to education. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 1400
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: French

**FREN 1500 (3) Literature and Politics in the Age of Enlightenment**
Introduces political dimensions of 18th century French literature. Surveys political and social preoccupations that manifest themselves across genres (novels, scientific treatises, dialogues, erotic literature, etc.). Examines contributions made by 18th century French writers to the sociological and political imagination of Western tradition. Taught in English.
**Additional Information:** Departmental Category: French

**FREN 1550 (3) The Power of Fairy Tales in Italy and France**
Examines French and Italian fairy tales written between 1550 and 1750 and analyzes their connections to each other and to contemporary fairy tales literature, film, and the arts.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 1550
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**FREN 1610 (3) How to Be French, 1: The Ancien Regime**
Explores medieval and early modern French culture in the widest sense, encompassing masterpieces of French literature, architecture, and visual art as a key to the habits, customs, and practices of everyday life. Major themes are "living and dying," "heroes, villains, and kings," "courtliness, civility, and the art of love," and "crafty little guys.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 1620 (3) How To Be French? 2: Modernity**
Introduces students to French culture in its widest sense and in particular to reflect on major social and cultural contradictions inherited from the French Revolution, which still define "Frenchness" today. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 1700 (3) Francophone Literature in Translation**
Studies the literary expression of French-speaking peoples of Africa, the Caribbean, and Canada. Gives special attention to oral tradition, identity, question, and cultural conflict. Taught in English.
**Additional Information:** Departmental Category: French

**FREN 1750 (3) French Colonialism: North Africa and the Middle East**
Offers a general introduction to French and Francophone literature and visual arts (painting, photography, film) from the nineteenth century to the present depicting cultures and societies of the Middle East and North Africa. In English with English translations of French texts.
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: French

**FREN 1800 (3) Contemporary French Literature in Translation**
Reviews the major philosophical, political, and aesthetic issues in the 20th century French novel and drama. Beginning with existentialist literature, discussion focuses subsequently on the Theatre of the Absurd, the new novel, World War II and the Holocaust, and recent women writers. Taught in English.
**Additional Information:** Departmental Category: French

**FREN 1850 (3) Introduction to French Society and Culture through Cinema**
Introduces students to French society and culture through French films that focus thematically on historical events and cultural aspects of French Society( e.g., war; gender; post-colonial legacy; the environment). Taught in English.
**Additional Information:** Departmental Category: French

**FREN 1880 (3) The Zombie in History and Popular Culture**
Discusses the emergence of the zombie figure in the Caribbean and its evolution from colonial Haiti to present-day popular culture having passed through Hollywood. Through movies and literary, historical, and scientific documents, students will study critically how this mass-media icon came to represent deep-rooted anxieties about the modern world.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 1880
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 1900 (3) Modern Paris in Literature, Photographs, Paintings and Movies**
Explores the evolution of modern Paris through the eyes of its artists and writers, Parisians and expatriates alike, from the French Revolution (1789) to the present. Studies historical and contemporary changes in architecture and urban planning as the city adapts to growing population, social challenges, and sustainability. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 1950 (3) French Feminisms**
Introduces students to the central problematics that have defined French feminist studies. This course focuses on the various literary and historical contexts in which core concepts such as female subjectivity and agency, feminist writing and political engagement have arisen and developed in Early Modern and Modern France by looking at multiple media (literary text, film, painting). Taught in English.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: French

**FREN 2110 (3) Second-Year French Grammar Review and Reading 1**
A film based curriculum will expand the knowledge of francophone culture and will continue the development of communication skills begun in the first year. This third semester course will review essential beginning grammar before introducing intermediate structures, vocabulary, and cultural/literary readings.
**Requisites:** Requires a prerequisite course of FREN 1020 or FREN 1050 (minimum grade C-).
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Foreign Language
Departmental Category: French

**FREN 2120 (3) Second-Year French Grammar Review and Reading 2**
Completes the film-based study of intermediate grammar begun in FREN 2110. Continued reading in French literature and culture, with considerable practice in writing and speaking French. Fulfills the Graduate School language requirement for the Ph.D.
**Requisites:** Requires a prerequisite course of FREN 2110 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 2500 (3) Conversation in French**
Puts into practice all that has been learned in the first four semesters of college French. Builds conversational skills and confidence through acquisition of new vocabulary and a review of grammar essential to discussing different aspects of French culture. All work is in French.
**Requisites:** Requires a prerequisite course of FREN 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 3010 (3) French Phonetics and Pronunciation**
Improves students' ability to pronounce French correctly. Coursework involves mastering and using the International Phonetic Alphabet, understanding the differences between pairs of sounds, and recognizing the relationship between spelling and pronunciation. Required of all FREN majors.
**Requisites:** Requires a prerequisite course of FREN 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 3020 (3) French Phonetics Through Musical Performance**
Advanced oral practice and interpretation of a French Musical. This course of applied and corrective phonetics concentrates on developing good pronunciation and fluency through song. The course culminates with a public presentation of the musical studied in class.
**Requisites:** Requires a prerequisite course of FREN 3010 (minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 3050 (3) French Composition**
French third-year level composition course. Students practice and write different forms of formal French writing. They also hone their grammar skills and analytical reading of short literature pieces. This course is required for all French majors.
**Requisites:** Requires a prerequisite course of FREN 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Upper
Departmental Category: French

**FREN 3100 (3) Introduction to Critical Reading and Writing in French Literature**
An exploration of important moments in French culture and history as represented in major works of fiction, poetry, and drama. Emphasis on refining critical thought through compositions and oral expression in French.
**Requisites:** Requires a prerequisite or corequisite course of FREN 3050 (minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 3110 (3) Main Currents of French Literature 1**
An exploration of principal themes and texts from Medieval times to the Revolution. Students will become familiar with key moments of intellectual and cultural history.
**Requisites:** Requires a prerequisite or corequisite course of FREN 3100 (minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 3120 (3) Main Currents of French Literature 2**
A survey of important texts and artistic movements from the nineteenth century to the present that inform the contemporary French and Francophone world. Students will become familiar with the intellectual history crucial to understanding the present moment.
**Requisites:** Requires a prerequisite or corequisite course of FREN 3100 (minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 3200 (3) Introduction to Literary Theory and Advanced Critical Analysis**
Introduces important aspects of both classical and modern literary theory as an aid to reading and understanding literary texts. Covers theoretical works by figures ranging from Plato and Aristotle to modern French critics such as Barthes, Foucault, and Derrida in conjunction with selected literary works. Offers students more sophisticated means of understanding issues like gender, ethnicity, the roles of both author and reader in constructing meaning, the nature and functions of signs, and the relationship between literature and the larger society. Conducted in English, though French majors are required to read the texts in the original language. Required for students taking honors in French or Italian.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 3300 (3) French Culture Through Fashion**
Studies fashion as a means of identity construction as well as a means of resistance in France from 1789 until present day. Through an analysis of clothing trends, students will study the cultural significance of certain fads in French history that allowed marginalized demographics to define and assert their individuality.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**FREN 3400 (3) Culture, Performance and Development in Dakar, Senegal**
Offers students an immersive experience in Dakar, Senegal, one of Africa's most historically rich and electrifying capitals. Introduces the history, culture and religious practices of a country at the crossroads of global notions of African, Francophone and Muslim identities. Includes a capstone public presentation in collaboration with a Senegalese activist theater company.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**FREN 3450 (3) Underground Paris**
This Global Seminar explores the literal and figurative spaces of the Parisian underground (catacombs, metro, forgotten histories and subcultures) while also visiting the more iconic sites of the City of Light (the Louvre, the Centre Pompidou, Montmartre and more). Through readings, films, excursions and immersive assignments, students will learn about less commonly acknowledged spaces, populations and cultural movements that nonetheless constitute the life and past of this highly romanticized destination. Taught in English.

**FREN 3500 (3) French Current Events: Conversation and Composition**
Establishes a solid foundation of contemporary French civic and cultural life through the study of film, journalism, and other current media. Focuses on presentations, debates, discussions, readings and written work. Taught in French.
**Requisites:** Requires prerequisite course of FREN 2120 (minimum grade C-) and corequisite course of (FREN 3010 or FREN 3020 or 3050).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 3600 (3) Business French 1**
Gives students the tools needed to function in a French-speaking work environment. A culminating project involves creating a business in a francophone country.
**Requisites:** Requires a prerequisite course of FREN 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 3700 (3) French-American Cultural Differences**
Students will identify and consider key differences between French and American cultural, political and civic values through the analysis of film, literature, journalism, and personal observations.
**Requisites:** Requires prerequisite or corequisite course of FREN 3050 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 3800 (3) France and the Muslim World**
Introduces students to the polemic colonial, social, and cultural interactions of France and Islam. Close attention will be paid to paradigms of identities of one of the major European nations and the Islamic world. Readings and discussion topics for this course cover the social, cultural, and literary depictions of Islamic and French interactions, negotiations, and contradictions. Taught in English. Cannot be used for French major or minor credit.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: French

**FREN 4030 (3) Advanced Oral Practice and Interpreting**
Concentrates on developing (or preserving) speaking fluency, correct pronunciation, and a good working vocabulary.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of FREN 3050 and FREN 3100 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4110 (3) French Special Topics**
Topics vary each semester. Consult the online Schedule Planner for specific topics. See also FREN 4120.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires a prerequisite course of FREN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4120 (3) French Special Topics**
Topics vary each semester. Consult the online Schedule Planner for specific topics. See also FREN 4110.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4170 (3) Francophone Literature**
Studies the literary expression of French-speaking peoples of Africa, the Caribbean, and French Canada. Gives special attention to oral tradition, identity question, and cultural conflict.
**Requisites:** Requires prerequisite course of FREN 3100 (minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4250 (3) Medieval and Renaissance Readings**
Explores the complex and evolving cultural and historical contexts of medieval and/or Renaissance French. Introduces the masterpieces of French medieval and Renaissance literature, such as the Chanson de Roland, Arthurian romances, and the work of Christine de Pizan. Course explores a variety of literary genres, while focusing on specific themes, such as representations of licit or illicit desire.
**Requisites:** Requires prerequisite courses of FREN 3050 and FREN 3100 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4300 (3) Theatre and Modernity in 17th Century France**
Readings of plays by Corneille, Moliere and Racine introduce students to theatre's role as a mirror of the multifarious tensions shaping modern Western experience. Taught in English with English translations.
**Requisites:** Requires prerequisite courses of FREN 3050 and FREN 3100 (all minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4330 (3) Moliere and 17th Century French Comedy**
Close readings of farces and comedies of Moliere in context with selected comedies by Corneille, Rotrou and Cyrano de Bergerac and selected satires by Boileau and La Fontaine. Themes include comedy as a form of social criticism and the sociocultural significance of such episodes of Moliere's career as the scandalous quarrels of L'ecole des Femmes and Tartuffe.
**Requisites:** Requires prerequisite courses of FREN 3050 and FREN 3100 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4350 (3) French Enlightenment**
Studies fiction, essays, theatre, and philosophical tales. Emphasizes the Enlightenment in France through the texts of its major representatives: Montesquieu, Voltaire, Marivaux, Diderot, and Rousseau.
**Requisites:** Requires a prerequisite course of FREN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4430 (3) Survey of 19th Century French Literature**
Examines fiction, poetry and theatre in 19th century France. Focuses on developing and changing literary styles and subject matter throughout the century in historical, philosophical and social context.
**Requisites:** Requires prerequisite course of FREN 3050 or FREN 3100 (minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4470 (3) 20th Century French Theatre and Poetry**
Close readings of plays from the turn of the century to the contemporary period introduce the principal themes and techniques of modernist and postmodernist French theatre. Students are encouraged to consider problems commonly evoked by these texts and to compare the positions that each text takes on such problems as the status and uses of language, the function and limits of the theatre and the dialectic of appearance and reality.
**Equivalent - Duplicate Degree Credit Not Granted:** FREN 5470
**Requisites:** Requires prerequisite courses of FREN 3050 and FREN 3100 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4480 (3) 20th Century French Novel**
Close readings of novels from the 1930s to the contemporary period introduce the principal themes and techniques of the modernist and postmodernist French novel. Students are encouraged to analyze a variety of questions commonly evoked in these texts, such as the problem of representation, the uses and abuses of writing, the relation of fiction and history and the status of the subject in the world.
**Requisites:** Requires prerequisite courses of FREN 3050 and FREN 3100 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4600 (3) Topics in French Film**
Covers various topics in the French and some other Francophone cinemas (Belgian, Swiss, Quebecois) from 1895 to the present. Focuses on periods, schools, themes, and directors from Melies to Duras, and the critical approaches by which they are studied. Varies from year to year.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of FREN 3050 and FREN 3100 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4700 (3) Encountering Animals: Contemporary Discourse and the Dialog of Species**
Explores the Western tradition of thinking about animals as well as recent challenges to our beliefs in human exceptionality and radical animal difference. Themes include the ¿animal machine,¿ nature-culture dualism, animal representations in today¿s culture, philosophy and science, interspecies relations, post-humanism. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 4700
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4750 (3) Methods of Teaching French and Professional Orientation**
Presents current methodology and techniques for teaching foreign language for proficiency. Areas of study include ACTFL guidelines, National Standards, assessment, classroom activities, curriculum, and syllabus design.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: French

**FREN 4800 (3) Postmodernist French Novel in Translation**
Focuses upon recent innovations in the French novel, and upon the postmodernist literary aesthetic. Students will examine a variety of avant-garde novels, and analyze the kinds of literary experimentation that those novels propose. They will be asked to consider a series of questions concerning the changing nature of literary representation and the status of the novel as a cultural form. Taught in English. Cannot be used for major or minor credit.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4840 (1-6) Independent Study: Language**
Upon consultation only and at the undergraduate level.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: French

**FREN 4860 (3) War, Trauma, and Memory: Amnesias, Revisions, and Representations of Traumatic History**
Investigates how extreme historical events (war, genocides, terror attacks) function as "trauma" and how these extreme events are dealt with by personal and collective memory in historical narratives, literary and cinematic fiction, and memorials. Amnesia and other types of historical negations or revisions will be analyzed, along with representations of trauma and the difficulties raised by this memorializing. Taught in English.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4960 (6) High School French Teaching**
Offered as part of the supervised student teaching in a secondary school required for state licensure to teach French. These hours do not count toward student hours in the major nor in the maximum departmental hours allowed.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Departmental Category: French

**FREN 4980 (3) French Senior Honors Thesis**
The senior honor thesis is a 40 to 45 page original research paper, written in French, and constitutes a requirement for graduating with departmental honors.
**Requisites:** Requires a prerequisite course of FREN 3200 (minimum grade D-).
**Additional Information:** Arts Sciences Honors Course
Departmental Category: French

**FREN 4990 (3) Senior Seminar**
Preparation of a 15-page research paper in French presented to two members of the department faculty and defended orally in class.
**Recommended:** Prerequisite at least one course numbered FREN 4100 or above and all third-year requirements and advisor consent.
**Additional Information:** Departmental Category: French

**ITAL 1010 (4) Beginning Italian 1**
The four skills of listening, speaking, reading, and writing are developed progressively. Grammatical concepts are explained and practiced through dialogues, written exercises, and conversations. The cultural focus is on the personal world and life of students.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 1050
**Additional Information:** Departmental Category: Italian

**ITAL 1020 (4) Beginning Italian 2**
Continuation of ITAL 1010, with more difficult grammatical concepts explored. The cultural focus shifts to social and civic areas.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 1050
**Requisites:** Requires a prerequisite course of ITAL 1010 (minimum grade C-).
**Additional Information:** Departmental Category: Italian

**ITAL 1050 (4) Fast-Track Italian**
Two semesters of beginning Italian in one, for students who have studied other languages or have had previous exposure to Italian.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 1010 or ITAL 1020
**Additional Information:** Departmental Category: Italian

**ITAL 1300 (3) La Dolce Vita: How to Live a Good Life, Italian Style**
Introduces students to a critical appraisal of the Humanities in their world. Because the Humanities were rediscovered in the late Middle Ages in Italy, the course explores the Humanities from an Italian-centered perspective, though it broadens the scope of its analysis to make this perspective relevant for students who come from a variety of cultures and backgrounds.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 1350 (3) Introduction to Social Change in the Arts**
This course serves as an introduction to the Certificate in Art and Social Change. It introduces students to theories, concepts, and ideas that shape artistic productions and activist conversations around social change in a variety of geo-cultural contexts. The course is divided into three main units: theater and performance, media, and visual arts. Through these different lenses, students will learn about artistic practices in the US and in regions where Italian and French are spoken (North Africa, Sub-Saharan Africa, Latin America, and the Mediterranean region). This course allows students to engage with some of the most urgent issues in our societies, as they relate to justice, equality, and diversity. Artists and activists play an increasingly important role in advancing justice and promoting social change at the local, national, and global levels. The interdisciplinary approach of this course enables students to examine the role of different forms of artistic productions as a catalyst for social change.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Arts Humanities

**ITAL 1400 (3) Sexuality and Gender Wars in Italy and France**
Introduces students to key participants and arguments in the debate on the status of women in Italy and France during the period 1300 to 1700. Explores writings and art by women and men addressing topics such as gender roles, sexuality, sex work, marriage, and access to education. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** FREN 1400
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Italian

**ITAL 1500 (3) That's Amore: Introduction to Italian Culture**
Introduces students to representations of Italian society that have persisted through the ages. The course readings allow students to better understand how certain stereotypes about Italian society (e.g., Latin lover, Mafia) were born and persist in the present. Taught in English.
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 1550 (3) The Power of Fairy Tales in Italy and France**
Examines French and Italian fairy tales written between 1550 and 1750 and analyzes their connections to each other and to contemporary fairy tales literature, film, and the arts.
**Equivalent - Duplicate Degree Credit Not Granted:** FREN 1550
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ITAL 1600 (3) Strategies of Fear: Introduction to Italian Fantastic Literature**
Traces the development of the fantastic theme in Italian Literature from its origins (late nineteenth century) to contemporary times. Analyzes the modes of reception and appropriation of non-Italian gothic and fantastic narrative traditions through which Italian writers have subverted the national literary model proposed by realist narrative. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 2110 (4) Intermediate Italian Reading, Grammar, and Composition 1**
Enhances the skills learned in the first-year course and develops greater fluency in understanding and speaking Italian while exploring complex grammatical functions. More emphasis is placed on reading and writing through the use of activities featuring daily life themes that present a realistic portrait of contemporary Italy. Taught in Italian.
**Requisites:** Requires a prerequisite course of ITAL 1020 or ITAL 1050 (minimum grade C-).
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Italian

**ITAL 2120 (4) Intermediate Italian Reading, Grammar, and Composition 2**
Continuation of ITAL 2110. Increases students' reflection on more advanced grammatical concepts. Students read about social problems, culture, and some Italian literature as they acquire considerable practice in writing and speaking Italian. Fulfills the Graduate School language requirement for the Ph.D.
**Requisites:** Requires a prerequisite course of ITAL 2110 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 2130 (3) Readings in Italian: Sustainability**
This intermediate Italian course is designed specifically to improve a student's ability to understand and analyze out loud a variety of texts on the topic of sustainability in Italian. At the end of the course students will have improved their communicative abilities by discussing general sustainability issues with a particular focus on Italian culture. Taught in Italian.
**Requisites:** Requires a prerequisite or corequisite course of ITAL 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 2271 (3) Space, Invention, and Wonder in Fairy Tales, Literature and Film**
Explores the themes of space, invention, technology and wonder in fairy tales from Italian, Russian, French, German, and Spanish traditions in order to compare their transformation in different national and historical settings. Students analyze the intersection of fairy tales and science in literature and film. Counts for the Space Minor. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ITAL 3015 (3) Advanced Composition 1**
Teaches students to write in Italian in a variety of genres, focusing on the creative aspects of writing. Exercises and themes are drawn primarily from current events and culture (i.e., blogging, journaling, essays and films), but also allows students to develop their critical skills in other areas.
**Requisites:** Requires a prerequisite course of ITAL 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 3025 (3) Advanced Composition 2: Introduction to Literary Writing**
Introduces students to complex forms of writing within Italian studies. Focuses on the analysis of literary genres (e.g., autobiography, essays, short stories) through a step-by-step process that allows students to craft advanced arguments in Italian. Studies will read Italian literary texts and write and revise in workshop format (e.g., peer review, collaborative assignments).
**Requisites:** Requires a prerequisite course of ITAL 3015 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Upper
Departmental Category: Italian

**ITAL 3030 (3) Italian Conversation Through Art History**
Improves vocabulary and fluency in spoken Italian, and competence and confidence in correct and more sophisticated written Italian through the study of the history of Italian art. Exercises and themes focus on Italian Classical, Medieval, Renaissance, and Modern Art.
**Requisites:** Requires a prerequisite course of ITAL 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 3040 (3) Italian Conversation Through Cinema**
Taught in Italian, the course covers various topics of Italian Cinema from WWII to the present. Focus is on periods, genres, themes, and auteur/directors. Emphasis on review of language structures previously learned and acquisition of new vocabulary to enable students to discuss different aspects of Italian culture, in Italian.
**Requisites:** Requires a prerequisite course of ITAL 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 3140 (3) Main Current of Italian Culture and Literature 3**
Uses literary masterpieces as a springboard to explore the literature, visual arts, film, theater, and music produced in Italy from 1900 to today in its cultural and historical context. Emphasizes interpretation and critical analysis of major cultural figures, artistic forms, and ideas of the period. Taught in Italian.
**Requisites:** Requires prerequisite course of ITAL 2130 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 3150 (3) Main Current of Italian Culture and Literature 2**
Uses literary masterpieces as springboard to explore the literature, visual arts, film, theater, and music produced in Italy from 1800 to 1900 in its cultural and historical context. Emphasizes interpretation and critical analysis of major cultural figures, artistic forms, and ideas of the period. Taught in Italian..
**Requisites:** Requires prerequisite course of ITAL 2130 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 3160 (3) Main Currents of Italian Culture and Literature 1**
Uses literary masterpieces as springboard to explore the literature, visual arts, film, theater, and music produced in Italy from 1200 to 1800 in its cultural and historical context. Emphasizes interpretation and critical analysis of major cultural figures, artistic forms, and ideas of the period. Includes hands-on work with texts and arts from the period. Taught in Italian.
**Requisites:** Requires prerequisite course of ITAL 2130 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4010 (3) Problems in Translation, Advanced Grammar, and Stylistics 1**
Emphasizes practice in translating varying types of prose from Italian into English and English into Italian.
**Requisites:** Requires a prerequisite course of ITAL 2130 or ITAL 3015 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4030 (3) Contemporary Italian Culture, Politics, and the Media**
Serves as an introduction to the study of the effect that politics and the media have in shaping Italian culture. Makes use of the World Wide Web for instruction. Taught in Italian. Familiarity with Internet helpful.
**Requisites:** Requires a prerequisite course of ITAL 2130 or ITAL 3015 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4040 (3) Business Italian Style**
Provides an introduction to the Italian way of conducting business, with a close view on the company and its world through learning marketing and producing a real company project for the market. Analyzes topics of international marketing and trade using Italian and American economics websites. Focuses on building cross-cultural bridges between the U.S. and Italy to have smoother business relationships and enable students to participate more easily in joint international working teams.
**Requisites:** Requires a prerequisite course of ITAL 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4140 (3) What the Hell?: Dante¿s Divine Comedy and the Meaning of Life**
Focuses on close reading of Dante's poetry with emphasis on the intellectual, religious, political, and scientific background of the medieval world. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 4140 ITAL 4145 or ITAL 4147
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4145 (3) The Age of Dante in Italian**
Focuses on close readings of Dante's poetry with emphasis on the intellectual, religious, political, and scientific background of the medieval world. Taught in Italian.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 4140 or ITAL 4147 or HUMN 4140
**Requisites:** Requires prerequisite course of ITAL 2130 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4147 (3) Visualizing Dante's Inferno: A Global Seminar in Florence Italy**
Focuses on close reading of Dante's Inferno. Examines the specific sites and art in Florence and nearby cities that Dante references in the Inferno, as well as visual representations of Hell created both before and after Dante's poem. Taught in English. Offered through the CU Study Abroad Program.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 4140 or ITAL 4145 or HUMN 4140
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4150 (3) Boccaccio's Decameron: Tales of Sex and Death in the Middle Ages**
Studies Boccaccio's masterpiece, the Decameron, as emblematic of the post-Black Plague era in the late Middle Ages. Focuses on the art of storytelling through gendered perspectives to portray the complexity of the Middle Ages. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 4150
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Italian

**ITAL 4160 (3-5) Italian Literature Special Topics**
Topics vary each semester. Consult the online Schedule Planner for specific topics.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4170 (3) Italian Literature Special Topics**
Topics vary each semester. Consult the online Schedule Planner for specific topics.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4200 (3) Topics in Italian Culture and Civilization from the Origins through the Renaissance**
Taught in English. Topics vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4250 (3) History of Modern Italy**
Examines the major historical, economic and social factors that have shaped the identity of modern Italy, from the enthusiasm of young patriots during Italy's unification in the 1860s to the discontent and domestic terrorism of the 1960s-1980s. Focuses on Mussolini, the Fascist movement and on World War II, as well as the changing role of women. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4313
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4260 (3) Mafia and Terrorism: Organized Violence in Italy**
Investigates the origins and development of the Sicilian Mafia and Political Terrorism in Italy. In the first part of the course, the context of Italian politics, economy and society in which the mafia was born and flourished in the 19th and 20th century will be explored. The ramification of the Mafia in the United States in the 20th c. will also be studied.
In the second part of the course, the political and social causes of Italian left and right wing Terrorism will be examined, starting from the Piazza Fontana slaughter (1969) until the murder of Professor Marco Biagi (2002). Particular attention will be devoted to the kidnapping and murder of Democratic Christian Party President Aldo Moro and to the Red Brigades terrorist movement. The role of women in both Mafia and Terrorism will be explored.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4323
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ITAL 4280 (3) Topics in Italian Cinema**
Examines different aspects of Italian cinema from the origins of neorealism to the present. May focus on a particular director, the culture of a specific period, or certain themes (e.g., the representation of women, the relationship between cinema and literature, or socio-aesthetic movements like Futurism or Fascism). Taught in English.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4290 (3) Italian Culture Through Cinema**
Examines the representations of Italian culture through its cinema. Focusing especially on post-World War II cinema, examines how Italian filmmakers have portrayed Italian history and specific aspects of its culture (i.e., Fascism, post-war reconstruction, the Mafia, patriarchy) in the past 50 years. Taught in English.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4300 (3) Multiculturalism in Italy**
Focuses on multiculturalism and difference in contemporary Italian society. Readings assigned explore the experience and co-existence of ethnic and religious minorities in Italy. Students will study how specific minorities live in a major Western-European country and will investigate the connotations that the concept of 'multiculturalism' takes in the Italian context.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Italian

**ITAL 4350 (3) From Wops to Dons to Movers and Shakers: The Italian-American Experience**
Exposes students to the history of Italian immigration to the United States. By studying how Italians and Americans negotiated different ideas concerning identity, traditions and community, it helps students understand how Italians transformed themselves from a despised and marginalized minority into active participants in the success of the United States in the 20th and 21st centuries. Taught in English.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4500 (4) Italian Theatre**
Using theatre as a medium, this course helps students attain a higher level of proficiency in spoken and written Italian. Study of Italian theatre is integrated with acting activities and pronunciation exercises. Culminates in the production of a play. Performance is in Italian and the students participate in the writing of the script. Taught in Italian.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Requires a prerequisite course of ITAL 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4600 (3) Once Upon a Time in Italy**
Examines the evolution of the Italian fairy tale from the 1500s to the 2000s in literature, theater, and film. Considers the tales and their authors in their social-historical context.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4730 (3) Italian Feminisms: Culture, Theory, and Narratives of Difference**
Studies Italian women writers, artists and filmmakers. Literary and visual texts are analyzed in dialogue with readings of leading Italian gender theorists. Italian history and culture is reread by following the development of a discourse about women. Taught in English; readings in Italian for Italian majors.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 4730
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Italian

**ITAL 4840 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Italian

**ITAL 4930 (1-3) Languages Internship for Professions**
Offers opportunities to use Italian skills in service to various sectors of the community, including private industry, government, and education.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires a prerequisite course of ITAL 2120 (minimum grade C-).
**Additional Information:** Departmental Category: Italian

**ITAL 4980 (3) Italian Senior Honors Thesis**
The senior honors thesis is a 40 to 45 page original research paper, written in Italian, and constitutes a requirement for graduating with departmental honors.
**Requisites:** Requires a prerequisite course of ITAL 3015 (minimum grade C-).
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Italian

**ITAL 4990 (3) Senior Seminar**
Preparation of a 15-page research paper in Italian presented to two members of the faculty and defended orally in class.
**Requisites:** Requires a prerequisite course of ITAL 3015 (minimum grade C-).
**Additional Information:** Departmental Category: Italian

# French - Bachelor of Arts (BA)

The French major prepares students to live and work in a global society by developing multilingualism and intercultural competency. Students

will master French language skills (listening, speaking, reading, writing) needed for all purposes of daily life and gain diverse perspectives on French and Francophone culture though courses focusing on literature, history, visual arts, film, media and business.

Survey courses and upper-division seminars offer a range of exposure to the French cultural past and the vast ethnic and national diversity of the French-speaking present. The major explores distinctly French contributions to world culture and allows students to familiarize themselves with the history, forms and conventions of a rich literary and artistic tradition. In addition to focusing on a broad range of historical periods, transcultural approaches and topics ranging from Enlightenment political thought to animal studies and Francophone cultures of sub-Saharan Africa, the French curriculum brings far-flung periods and places to life. It links analysis of contemporary cultural phenomena with more distant historical epochs and texts. Medieval epic is studied in tandem with "Game of Thrones," for example, or the history of Caribbean slavery with the figure of the Zombie. All courses for the major and minor are interdisciplinary and associate elements of other disciplines such as media studies, art history, science studies, philosophy, sociology, ecology or anthropology with the study of literary texts and other cultural artifacts.

Recent course topics include:

| Code | Title | Credit Hours |
|---|---|---|
| FREN 1200 | Medieval Epic Through Game of Thrones | 3 |
| FREN 1350 | Introduction to Social Change in the Arts | 3 |
| FREN 1400 | Sexuality and Gender Wars in Italy and France | 3 |
| FREN 1550 | The Power of Fairy Tales in Italy and France | 3 |
| FREN 1610 | How to Be French, 1: The Ancien Regime | 3 |
| FREN 1620 | How To Be French? 2: Modernity | 3 |
| FREN 1700 | Francophone Literature in Translation | 3 |
| FREN 1750 | French Colonialism: North Africa and the Middle East | 3 |
| FREN 1800 | Contemporary French Literature in Translation | 3 |
| FREN 1850 | Introduction to French Society and Culture through Cinema | 3 |
| FREN 1880 | The Zombie in History and Popular Culture | 3 |
| FREN 1900 | Modern Paris in Literature, Photographs, Paintings and Movies | 3 |
| FREN 1950 | French Feminisms | 3 |
| FREN 3500 | French Current Events: Conversation and Composition | 3 |
| FREN 3700 | French-American Cultural Differences | 3 |
| FREN 4250 | Medieval and Renaissance Readings | 3 |
| FREN 4600 | Topics in French Film | 3 |
| FREN 4700 | Encountering Animals: Contemporary Discourse and the Dialog of Species | 3 |

Students must complete the general education requirements of the College of Arts and Sciences. Students wishing to pursue an Honors thesis should also consult the Honors requirements (https://www.colorado.edu/frenchitalian/frenchhonors/).

# Requirements

## Program Requirements

Students must complete the general education requirements of the College of Arts and Sciences and the required courses listed below. Students wishing to pursue an Honors thesis should also consult the Honors requirements listed below.

Note: Students undertaking a major in French should expect to meet regularly with a college advisor to ensure that they are making adequate progress and that requirements are being met in a timely way.

A minimum of 27 upper-division credit hours in French must be completed (see below for specific courses). FREN 2120 or its equivalent is the prerequisite for courses required for the major. Students may count one 1000-level class in English toward the major.

All required major courses must be passed with a C- or better and cannot be taken pass/fail. Students must have a GPA of at least 2.000 in the major in order to graduate.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| FREN 3010 | French Phonetics and Pronunciation | 3 |
| FREN 3050 | French Composition | 3 |
| FREN 3100 | Introduction to Critical Reading and Writing in French Literature | 3 |
| FREN 3110 | Main Currents of French Literature 1 | 3 |
| or FREN 3120 | Main Currents of French Literature 2 | |
| Five or more other courses at the 3000 or 4000 level, of which 9 credit hours must be at the 4100 level or above (6 of which must be completed at CU). Students may include one of the department's 1000-level classes taught in English toward this category. | | 18 |
| FREN 4990 | Senior Seminar [1] | |
| **Total Credit Hours** | | **30** |

[1] Note: The seminar runs concurrently with one of the three courses taken at the 4100 level or above. See the department's French Senior Seminar Requirements. (https://www.colorado.edu/frenchitalian/frenchseminar/)

### Honors Requirements

Honors candidates must meet all of the regular requirements for the major plus the following:

| Code | Title | Credit Hours |
|---|---|---|
| FREN 3200 | Introduction to Literary Theory and Advanced Critical Analysis | 3 |
| One semester of independent study [1] | | 3 |
| **Total Credit Hours** | | **6** |

[1] Note: The semester of independent study is taken concurrently with FREN 4980, and is devoted to one-on-one work on the senior honors thesis with a faculty advisor. See department for details.

## Graduating in Four Years

Consult the four-year guarantee requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in French, students should meet the following requirements (one option):

### First Year

- Fall semester: FREN 1010 Beginning French 1 (if needed; does not fulfill French major course requirements)
- French 1000-level content course.
- Spring semester: FREN 1020 Beginning French 2 (if needed; does not fulfill French major course requirements)

### Second Year

- Fall semester: FREN 2110 Second-Year French Grammar Review and Reading 1 (if needed; does not fulfill French major course requirements)
- Spring semester: FREN 2120 Second-Year French Grammar Review and Reading 2 (prerequisite for courses required for French major, but does not fulfill major course requirements); FREN 3010 French Phonetics and Pronunciation.

### Third Year

- Fall semester: FREN 3050 French Composition ; upper-division (3000 level and up) course.
- Spring semester: FREN 3100 Introduction to Critical Reading and Writing in French Literature; FREN 3110 Main Currents of French Literature 1 *or* FREN 3120 Main Currents of French Literature 2; upper-division (3000 level and up) FREN course.

### Fourth Year

- Fall semester: FREN 4990 Senior Seminar; upper-division (3000 level and up) FREN course.
- Spring semester: FREN 4100 or higher (3 credits required); upper-division (3000 level and up) FREN course.

*Note*: Completion of French requirements includes the successful written and oral presentation of a senior essay (FREN 4990) by the end of the fourth (senior) year.

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will complete all 12 credits of the Arts & Humanities area of the Gen Ed Distribution Requirement.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| FREN 1010 | Beginning French 1 (If needed, does not fulfill French major course requirements) | 5 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| French 1000-level content course | | 3 |
| Elective | | 1-3 |
| | **Credit Hours** | **15-17** |
| **Spring Semester** | | |
| FREN 1020 | Beginning French 2 (If needed, does not fulfill French major course requirements) | 5 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| FREN 2110 | Second-Year French Grammar Review and Reading 1 (If needed, does not fulfill French major course requirements) | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| FREN 2120 | Second-Year French Grammar Review and Reading 2 (prereq for courses required for French major but does not fulfill major course requirements) | 3 |
| FREN 3010 | French Phonetics and Pronunciation | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| FREN 3050 | French Composition | 3 |
| FREN Upper Division course | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| FREN 3100 | Introduction to Critical Reading and Writing in French Literature | 3 |
| FREN 3110 or FREN 3120 | Main Currents of French Literature 1 or Main Currents of French Literature 2 | 3 |
| FREN Upper Division course | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| FREN 3500 | French Current Events: Conversation and Composition | 3 |
| | **Credit Hours** | **18** |
| **Year Four** | | |
| **Fall Semester** | | |
| FREN 4990 | Senior Seminar | 3 |
| FREN course 4100 or higher | | 3 |

| | |
|---|---|
| Elective | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | 3 |
| Upper-division Elective | 3 |
| **Credit Hours** | **15** |
| **Spring Semester** | |
| FREN course 4100 or higher | 3 |
| FREN course 3000 or higher | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | 3 |
| Upper-division Elective | 3 |
| Upper-division Elective | 3 |
| **Credit Hours** | **15** |
| **Total Credit Hours** | **123-125** |

# Learning Outcomes

Upon completing an undergraduate degree in French studies, student will be able to:

- Communicate effectively in writing and speaking in the target language while developing proficiency in aural and written comprehension.
- Analyze and interpret a variety of texts and materials from an interdisciplinary perspective with attention to cultural, historical and social contexts.
- Demonstrate knowledge of French and Francophone literatures, cultures and thought by identifying, evaluating, and arguing from primary, and when appropriate, secondary sources.
- Engage with diverse perspectives with a view to building intercultural competence and critical-thinking skills.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BA and MA in French

The BAM degree program in French is normally a five-year program designed for currently enrolled CU Boulder students.

The BAM program is administered jointly by the Graduate School and the French and Italian Department. The department assumes primary administrative authority and responsibility reflecting the full authority and standards of both the undergraduate and graduate degrees.

### Admissions Requirements

Initial admission to the program typically occurs during the junior year. Any student inquiring should consult a college advisor and the associate chair for graduate studies in the French and Italian Department for details. Students admitted to the BAM program will be admitted at undergraduate status.

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.0 or higher.
- Have completed all MAPS deficiencies (students admitted to CU Boulder prior to Summer 2023 only).
- Be a full-time CU Boulder student.
- If a transfer student, have completed at least 24 credit hours as a degree-seeking student before applying.

### Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only 9 credits may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

If you are interested in the BAM degree program, please contact the graduate program assistant for more information.

# Italian - Bachelor of Arts (BA)

The Italian program promotes an understanding of the role of the Italian literary and cultural tradition within today's global society. By developing the knowledge and critical skills necessary to understand and engage with Italian culture in all its manifestations, Italian majors and minors acquire tools that are applicable to careers in virtually every area. While competency in a foreign language is always a highly desirable asset in our multicultural and multilingual society, proficiency in Italian is particularly beneficial and valuable in the fields of art, fashion, business, law, international affairs, music, the travel industry, translation studies, the foreign service and teaching. In addition to supplying the necessary background for advanced professional study and specialization in various disciplines, the Italian major introduces students to a rich literary, artistic and intellectual history at the roots of the modern world. Students are encouraged to explore career opportunities on the Career Services website (https://www.colorado.edu/career/).

# Requirements

## Program Requirements

Students must complete the general education requirements of the College of Arts and Sciences and the required courses listed below. Thirty-two credit hours beyond the first year of the Italian language with a 2.00 (C) grade point average or better are required, as listed below. All required major courses must be passed with a C- or better and cannot be taken pass/fail.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Italian Lower-Division Courses** | | |
| ITAL 2110 | Intermediate Italian Reading, Grammar, and Composition 1 | 4 |
| ITAL 2120 | Intermediate Italian Reading, Grammar, and Composition 2 | 4 |
| ITAL 2130 | Readings in Italian: Sustainability | 3 |

| | | |
|---|---|---|
| **Italian 3000-Level Courses** | | |
| ITAL 3015 | Advanced Composition 1 | 3 |
| Select one of the following: | | 3 |
| ITAL 3025 | Advanced Composition 2: Introduction to Literary Writing | |
| ITAL 3030 | Italian Conversation Through Art History | |
| ITAL 3040 | Italian Conversation Through Cinema | |
| Select two of the following (prereq. ITAL 2130): | | 6 |
| ITAL 3140 | Main Current of Italian Culture and Literature 3 | |
| ITAL 3150 | Main Current of Italian Culture and Literature 2 | |
| ITAL 3160 | Main Currents of Italian Culture and Literature 1 | |
| **Italian 4000-Level Courses** | | |
| Students must take at least three 4000-level courses in the Italian department, of which one will be: | | 9 |
| ITAL 4990 | Senior Seminar [1] | |
| **Total Credit Hours** | | **32** |

[1] Before registering for ITAL 4990, students must meet with the Italian advisor.

### Honors Requirements

Honors candidates must meet all of the regular requirements for the major, plus the following:

| Code | Title | Credit Hours |
|---|---|---|
| FREN 3200 | Introduction to Literary Theory and Advanced Critical Analysis [1] | 3 |
| Two semesters of independent study or research | | |
| ITAL 4840 | Independent Study | 6 |
| **Total Credit Hours** | | **9** |

[1] NOTE: FREN 3200 is taught in English and presupposes no knowledge of French.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. Keeping in mind that the outline below is only one possible option, to maintain adequate progress in Italian, students should meet the following requirements:

- Declare the Italian major as early as possible, preferably while enrolled in ITAL 1020 or ITAL 2110.
- Complete 12 credit hours of requirements (including ITAL 2110 and ITAL 2120) by the end of the second (sophomore) year.
- Complete 12 of the remaining 24 credit hours by the end of the third (junior) year.
- Complete the remainder of the major requirements in the fourth (senior) year.

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will fulfill all 12 credits of the Arts & Humanities area of the Gen Ed Distribution Requirement and possibly the Upper-division Written Communication component of the Gen Ed Skills Requirement.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| ITAL 1010 | Beginning Italian 1 (If needed, does not fulfill Italian major course requirements) | 4 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Elective/MAPS | | 3 |
| | **Credit Hours** | **13** |
| **Spring Semester** | | |
| ITAL 1020 | Beginning Italian 2 (If needed, does not fulfill Italian major course requirements) | 4 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective/MAPS | | 4 |
| | **Credit Hours** | **14** |
| **Year Two** | | |
| **Fall Semester** | | |
| ITAL 2110 | Intermediate Italian Reading, Grammar, and Composition 1 | 4 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Elective/MAPS | | 3 |
| Elective/MAPS | | 3 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| ITAL 2120 | Intermediate Italian Reading, Grammar, and Composition 2 | 4 |
| ITAL 2130 | Readings in Italian: Sustainability | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Year Three** | | |
| **Fall Semester** | | |
| ITAL 3015 | Advanced Composition 1 | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Upper-Division Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ITAL 3140<br>or ITAL 3150<br>or ITAL 3160 | Main Current of Italian Culture and Literature 3<br>or Main Current of Italian Culture and Literature 2<br>or Main Currents of Italian Culture and Literature 1 | 3 |

| | | |
|---|---|---|
| ITAL Upper-Division elective (options include courses outside of ITAL with an Italian topic) | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication, if necessary) | | 3 |
| Upper-Division Elective | | 3 |
| ITAL 3025<br>or ITAL 3030<br>or ITAL 3040 | Advanced Composition 2: Introduction to Literary Writing<br>or Italian Conversation Through Art History<br>or Italian Conversation Through Cinema | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| ITAL 3140<br>or ITAL 3150<br>or ITAL 3160 | Main Current of Italian Culture and Literature 3<br>or Main Current of Italian Culture and Literature 2<br>or Main Currents of Italian Culture and Literature 1 | 3 |
| ITAL Upper-Division elective (options include courses outside of ITAL with an Italian topic) | | 3 |
| ITAL 4000-level elective | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-Division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ITAL 4990 | Senior Seminar (4840 Independent Study if completing Honors) | 3 |
| ITAL 4000-level elective | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **120** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Communicate effectively in writing and speaking in the target language while developing proficiency in aural and written comprehension.
- Analyze and interpret a variety of texts and materials from an interdisciplinary perspective with attention to cultural, historical and social contexts.
- Demonstrate knowledge of Italian and Italophone literatures, cultures and thought by identifying, evaluating, and arguing from primary and, when appropriate, secondary sources.
- Engage with diverse perspectives with a view to building intercultural competence and critical-thinking skills.

# French - Minor

We offer undergraduate courses in French language, literature and culture.

The language classes are based on a flipped model using online platforms allowing maximum flexibility in language learning and rich audio-visual content. Coursework focuses on spoken and written language, literature, composition, conversation and business French.

Literature and culture courses focus on topics ranging from the Middle Ages to 21st-century literature and cinema. We also offer study abroad programs (http://www.colorado.edu/frenchitalian/study-abroad/) in a number of French-speaking locations.

Declaration of a minor is open to any student enrolled at CU Boulder, regardless of college or school. To declare a French minor, visit the Academic Advising Center (https://www.colorado.edu/buffportaladvising/).

# Requirements

## Prerequisites

Prerequisite course for the minor is FREN 2110 or equivalent.

## Program Requirements

A total of 18 credit hours (12 at the upper-division level) in FREN courses is required for the minor.  Courses taught by the department in English, do not, in general, apply to the minor, although students may count one 1000-level class English-language FREN course and FREN 3200 and/or FREN 3300 toward the minor requirements.

All courses for taken at CU Boulder for minor must be taken for a grade. Transfer courses from other accredited universities and courses taken on CU study abroad programs should be taken for a grade even though will transfer to CU Boulder as pass/fail courses.

Students must earn a minimum grade of C- in all courses counted for the minor. The GPA for all coursework taken in the minor department must be equal to 2.00 (C) or higher.

A maximum of 6 upper-division credit hours may be transferred from other universities or non-CU Boulder study abroad programs. Courses taken on CU Boulder study abroad programs are considered to be CU credit hours and are not subject to this limitation.

# Learning Outcomes

By the completion of the program, students will be able to:

- Communicate effectively in writing and speaking in the target language while developing proficiency in aural and written comprehension.
- Analyze and interpret a variety of texts and materials from an interdisciplinary perspective with attention to cultural, historical and social contexts.
- Demonstrate knowledge of French and Francophone literatures, cultures and thought by identifying, evaluating and arguing from primary, and when appropriate, secondary sources.
- Engage with diverse perspectives with a view to building intercultural competence and critical-thinking skills.

# Italian - Minor

A minor program is offered in Italian. Declaration of a minor is open to any student enrolled at CU Boulder, regardless of college or school.

To declare an Italian minor, go to the Academic Advising Center (https://www.colorado.edu/artssciences-advising/) website and make an appointment with the Italian advisor.

# Requirements

## Program Requirements

Students must consult with the Italian advisor during each registration period and before a study abroad program. All courses must carry an ITAL subject code, students may apply a maximum of 3 credit hours from Italian courses taught in English, and students may apply credit hours to the Italian minor earned through a CU Boulder Study Abroad program in Italy. Specific course equivalencies must be determined by the Italian advisor.

Students may apply a maximum of 9 transfer credit hours to the Italian minor, and a maximum of 6 credit hours at the upper-division level. Specific course equivalencies must be determined by an Italian faculty member.

Students must maintain an overall and Italian grade point average of 2.000 (C). They must earn a grade of C- or higher in ALL courses required for the Italian minor and may not take minor requirement courses pass/fail.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Lower-Division Courses** | | |
| ITAL 2110 | Intermediate Italian Reading, Grammar, and Composition 1 | 4 |
| ITAL 2120 | Intermediate Italian Reading, Grammar, and Composition 2 [1] | 4 |
| ITAL 2130 | Readings in Italian: Sustainability [1] | 3 |
| **Upper-Division Courses** | | |
| Select one of the following (prereq. of ITAL 2120 must be met): | | 3 |
| ITAL 3015 | Advanced Composition 1 | |
| ITAL 3030 | Italian Conversation Through Art History | |
| ITAL 3040 | Italian Conversation Through Cinema | |
| Select one of the following (prereq. of ITAL 2130 must be met): | | 3 |
| ITAL 3140 | Main Current of Italian Culture and Literature 3 | |
| ITAL 3150 | Main Current of Italian Culture and Literature 2 | |
| ITAL 3160 | Main Currents of Italian Culture and Literature 1 | |
| Select an additional Italian upper-division elective. | | 3 |
| **Total Credit Hours** | | **20** |

[1] ITAL 2120 and ITAL 2130 may be taken concurrently; see Italian advisor.

# Art and Social Change - Certificate

The Certificate in Art and Social Change allows students to engage with some of the most urgent issues in our societies as they relate to justice, equality and diversity. Artists and activists play an increasingly important role in advancing justice and promoting social change at the local, national and global levels.

The interdisciplinary approach of this certificate enables students to examine the role of different forms of artistic productions as a catalyst for social change. By intersecting disciplinary and geographic boundaries, courses in this certificate explore topics such as cinema and visual cultures, media activism, theater and environmental justice, creative design, migration and religious diversity, gender and community engagement. The certificate emphasizes a pedagogical and scholarly approach rooted in critical thinking, anti-oppression practices, and community building. Thanks to its interdisciplinary nature this certificate is suitable for students in different social sciences, humanities and business fields across colleges.

# Requirements

Students are required to complete a total of 18 credit hours. Nine credit hours must be completed at the upper-division level (3000- or 4000-level courses). A minimum of 12 credit hours must be taken on campus or with a CU-sponsored Study Abroad program. No more than 9 credits should be taken from any one department. No more than 3 semester transfer credit hours from other institutions will count towards the certificate.

The certificate is open to all degree-seeking undergraduate students at CU Boulder.

Students are required to take the introductory course ITAL 1350/FREN 1350 Introduction to Social Change in the Arts. Students will choose three courses from Category A "Arts, Media and Social Change" and two courses from the list of Electives.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Introductory Course** | | |
| FREN/ITAL 1350 | Introduction to Social Change in the Arts | 3 |
| **Category A: Arts, Media and Social Change** | | |
| Choose at least three: | | 9 |
| ARTS 4107 | Special Topics (Art and Social Change) | |
| CMDP 3910 | Media Production Topics (Engaged Documentary Media Practices) | |
| DNCE 5048 | Performance and Community Engagement | |
| FREN 3400 | Culture, Performance and Development in Dakar, Senegal | |
| ITAL 4170 | Italian Literature Special Topics (Documentary for Social Change in the Mediterranean) | |
| MDST 3002 | Digital Culture and Politics | |
| MDST 3341 | Designing Alternative Media Platforms | |
| MDST 4871 | Special Topics (Visual Culture / Human Rights, Media Activism/Public Engagement) | |
| THTR 4173 | Creative Climate Communication | |
| WGST 3302 | Facilitating Peaceful Community Change | |
| WRTG 3020 | Topics in Writing (New Media and Civic Engagement) | |
| **Electives** | | |
| Two additional courses from Category A above or any of the following: | | 6 |
| ANTH 1115 | | |
| ANTH 3100 | Africa: Peoples and Societies in Change | |

| | |
|---|---|
| ANTH 3760 | Exploring Culture and Media in Southeast Asia |
| ARTH 4929 | Special Topics in Art History (Public Art) |
| ARTS 4017 | Special Topics in Studio Arts (Art & Race/Ethnicity) |
| CINE/ETHN 2203 | American Indians in Film |
| CINE/ETHN 4001 | Screening Race, Class & Gender in the U.S. and the Global Borderland |
| DNCE 4047 | Hip-Hop Dance History |
| ETHN 2546 | Chicana and Chicano Fine Arts and Humanities |
| ETHN 3692 | African Am Music: Fr Spirituals and the Blues to Rap/Hip Hop Soul |
| ETHN 4116 | Spoken Word Latinx Poetics and Poetry |
| ETHN 4213 | Indigenous Futurisms: Speculative Genres and Native Tomorrows |
| ETHN 4552 | The Harlem Renaissance: Fr Black Wmn's Club Mvmnt to Hip Hop |
| HIST 4349 | Decolonization of the British Empire |
| ITAL 1500 | That's Amore: Introduction to Italian Culture |
| ITAL 4300 | Multiculturalism in Italy |
| WGST 3620 | Women of Color and Activism |
| WRTG 3020 | Topics in Writing (The Documentary) |
| **Total Credit Hours** | **18** |

# Geography

The Geography Department offers theoretical and applied work in human geography, environment and society geography, physical geography and geographic information science. Each subfield covers a broad range of topics. Human geography includes political, cultural, development, feminist, population and urban geography. Environment and society geography includes political ecology, natural hazards and conservation practice. Physical geography includes climatology, geomorphology, hydrology and biogeography. Geographic information science includes spatial analysis using GIS, remote sensing and cartography. The department also offers regionally focused courses on mountain geography and geographies of China, Latin America, Africa and South Asia. To complement its curriculum, the department also offers internship opportunities for geography majors.

The undergraduate degree in geography emphasizes knowledge and awareness of:

- The unique contributions of the discipline to understanding the spatial components of problems and the diverse factors relating to human interaction with the environment;
- The spatial distributions of physical and human characteristics on the Earth surface, the general patterns these form and the processes that have created and are changing these patterns;
- Major themes of geographical analysis, including human and physical characteristics of place; human-environmental relations; movement of people, ideas and products; and regionalization; and
- The general geographical principles of human-environment interaction, global change and human spatial organization.

In addition, students completing the degree in geography are expected to acquire proficiency in:

- One or more of the specific geographic skill areas of cartography, remote sensing and geographic information systems;
- Writing, quantitative methods, computer literacy, and library and field methods of data collection; and
- Identifying the geographic dimensions of a problem and analyzing, synthesizing and evaluating relevant data and applying geographic principles offering a geographic perspective on that problem.

**The course code for this program is GEOG.**

## Geography Honors Program

Students interested in earning honors with their work in geography should contact the departmental honors advisor during their junior year.

## Geography Internship Program

To complement its curriculum, the department offers geography majors internship opportunities that can be used to earn credit towards their degree. Students interested in pursuing an internship should contact the Department for information on eligibility and terms.

## Residential Academic Program

Students may visit the Geography Department Office to learn more about the Baker Residential Academic Program (https://www.colorado.edu/bakerrap/).

## Minimum Academic Preparation Standards (MAPS)

Students who matriculated at CU Boulder prior to the summer of 2023 and thus are still subject to MAPS can fill a MAP deficiency in geography by taking one of the following courses: GEOG 1962, GEOG 1972, GEOG 1982, GEOG 1992, GEOG 2092 or pass the Geography Exemption Exam. Arts and Sciences students, both continuing and transfer students, with a declared major and junior standing (57 credit hours minimum) may take GEOG 3682, GEOG 3742 or GEOG 4712 to fulfill the MAPS deficiency.

## Bachelor's Degree

- Geography - Bachelor of Arts (BA) (p. 334)

## Minor

- Geography - Minor (p. 338)

## Certificates

- Arctic Studies - Certificate (https://catalog.colorado.edu/undergraduate/colleges-schools/arts-sciences/programs-study/international-affairs/arctic-studies-certificate/)
- GIS and Computational Science - Certificate (p. 341)
- Hydrology - Certificate (p. 342)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Abdalati, Waleed (https://experts.colorado.edu/display/fisid_145800/)
Professor; PhD, University of Colorado Boulder

Balch, Jennifer Kakareka (https://experts.colorado.edu/display/fisid_154464/)
Associate Professor; PhD, Yale University

Barnard, Holly Rene (https://experts.colorado.edu/display/fisid_147417/)
Associate Professor, Associate Chair; PhD, Oregon State University

Blanken, Peter David (https://experts.colorado.edu/display/fisid_114026/)
Professor; PhD, University of British Columbia (Canada)

Boykoff, Maxwell Thomas (https://experts.colorado.edu/display/fisid_147562/)
Associate Professor Adjunct; PhD, University of California, Santa Cruz

Bryan, Joseph Henry (https://experts.colorado.edu/display/fisid_145802/)
Associate Chair, Associate Professor; PhD, University of California, Berkeley

Buttenfield, Barbara P. (https://experts.colorado.edu/display/fisid_107860/)
Professor Emerita; PhD, University of Washington

Caine, T. Nelson (https://experts.colorado.edu/display/fisid_104285/)
Professor Emeritus; PhD, Australian National University

Cao, Guofeng (https://experts.colorado.edu/display/fisid_167522/)
Assistant Professor; PhD, University of California Santa Barbara

Carroll, Clinton R. (https://experts.colorado.edu/display/fisid_154726/)
Assistant Professor Adjunct; PhD, University of California, Berkeley

Finlay, Jessica
Assistant Professor; PhD, University of Minnesota, Minneapolis

Fluri, Jennifer L. (https://experts.colorado.edu/display/fisid_154033/)
Chair, Professor; PhD, Pennsylvania State University

Goldman, Mara Jill (https://experts.colorado.edu/display/fisid_143542/)
Associate Professor; PhD, University of Wisconsin–Madison

Harrison, Jill Lindsey (https://experts.colorado.edu/display/fisid_149614/)
Associate Professor; PhD, University of California, Santa Cruz

Isaacs, Rachel (https://experts.colorado.edu/display/fisid_164240/)
Teaching Assistant Professor; PhD, Pennsylvania State University

Karimzadeh, Morteza (https://experts.colorado.edu/display/fisid_166081/)
Assistant Professor; PhD, Pennsylvania State University

Leyk, Stefan (https://experts.colorado.edu/display/fisid_145192/)
Professor, Associate Chair; PhD, University of Zurich (Switzerland)

Lininger, Katherine (https://experts.colorado.edu/display/fisid_163643/)
Assistant Professor; PhD, Colorado State University

Mohan, Taneesha
Teaching Assistant Professor; Ph.D., London School of Economics and Political Science

Molotch, Noah Paul (https://experts.colorado.edu/display/fisid_139374/)
Associate Professor; PhD, University of Arizona

Musselman, N. Keith (https://experts.colorado.edu/display/fisid_151215/)
Assistant Professor; Ph.D, University of California- Los Angeles

O'Loughlin, John (https://experts.colorado.edu/display/fisid_101339/)
Professor; PhD, Pennsylvania State University

Oakes, Tim (https://experts.colorado.edu/display/fisid_109269/)
Professor; PhD, University of Washington

Pitlick, John
Professor Emeritus

Reid, Colleen (https://experts.colorado.edu/display/fisid_157951/)
Assistant Professor; PhD, University of California, Berkeley

Rogers, Andrei
Professor Emeritus

Schlosser, Sarah (https://experts.colorado.edu/display/fisid_159679/)
Teaching Associate Professor; MA, University of South Florida

Schoennagel, Tania (https://experts.colorado.edu/display/fisid_139625/)
Assistant Professor Adjunct

Serreze, Mark (https://experts.colorado.edu/display/fisid_106334/)
Distinguished Professor; PhD, University of Colorado Boulder

Travis, William R. (https://experts.colorado.edu/display/fisid_101777/)
Associate Professor; PhD, Clark University

Truelove, Yaffa Elane (https://experts.colorado.edu/display/fisid_159271/)
Assistant Professor; PhD, University of Cambridge (England)

Veblen, Thomas T. (https://experts.colorado.edu/display/fisid_105842/)
Distinguished Professor Emeritus; PhD, University of California, Berkeley

Yeh, Emily Ting (https://experts.colorado.edu/display/fisid_130119/)
Professor; PhD, University of California, Berkeley

# Courses

**GEOG 1001 (4) Our Changing Planet: Climate and Vegetation**
Understanding our fragile planet and the life it harbors requires understanding how the distribution of the sun's energy at the surface, the atmosphere and its circulation, and the distribution of ocean and lands shape patterns of temperature, precipitation and vegetation across the globe. Along with providing a foundation for understanding planet Earth, this course addresses the growing impacts of human systems on climate change and environmental quality.
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography
MAPS Course: Natural Science Lab or Lab/Lec
MAPS Course: Natural Science

**GEOG 1011 (4) Our Changing Planet: Landscapes and Water**
In many ways, the Earth is defined by its abundance of water and vigorous hydrologic cycle. This course introduces how floodplains and their associated river systems, river deltas, erosional features such as the Grand Canyon, depositional features such as Cape Cod and Long Island, as well as mountain and even desert landscapes reflect the great power of water in shaping our planet and impacting life on Earth.
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography
MAPS Course: Natural Science Lab or Lab/Lec
MAPS Course: Natural Science

**GEOG 1100 (3) Colorado Geographies: Environment, Society and Change in the Centennial State**
This course offers an introduction to the interdisciplinary field of geography through an exploration of Colorado. It covers Colorado¿s physical geography, including mountain orogeny, weather and climate, hydrology, and bioregions. It delves into the social forces that shape current realities in the state, exploring Indigenous geographies, political economy, urban development, and environmental justice. Students will deepen their knowledge of diverse people and environments in Colorado while gaining skills in map literacy and spatial visualization.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOG 1200 (3) Climate Change Geographies: Science, Impacts, and Action**
Climate change is one of the greatest challenges of our time, and this course introduces students to the fundamental concepts they need to understand the problems and contribute to solutions by integrating perspectives from physical, social, and spatial sciences. . Students will review the scientific evidence for climate change, its impacts on human and environmental systems, and approaches to climate solutions via technology, policy, and social movements.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOG 1962 (3) Geographies of Global Change**
Familiarizes students with a geographic understanding of conflicts around the globe and of economic, political and cultural globalization. Analyzes the relationship between global forces, regions and local interests in contemporary territorial and geopolitical tensions and conflicts, emphasizing issues such as nationalism, migration, labor and natural resources. Formerly GEOG 2002.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Asia Content
MAPS Course: Geography

**GEOG 1972 (3) Sustainable Futures, Environment and Society**
Deepen your understanding of key global environmental issues, such as climate change, biodiversity loss, pollution, overconsumption, and environmental health hazards. We will discuss topics including conservation, water use, ethics, and environmental justice, and think about the relationship between politics, economy, culture and nature with case studies from around the globe.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment-Society Geography
MAPS Course: Geography

**GEOG 1982 (3) Global Geographies: Societies, Places, Connections**
Introduces a comparative framework for recognizing and understanding the diversity of the world¿s societies and cultures. Units explore both local scale issues such as economic growth, inequality, political conflict, ethnic and racial dynamics, and climate change impacts, as well as broader scale trends associated with globalization, international development, migration, and the historical legacies of colonialism and imperialism.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content
MAPS Course: Geography

**GEOG 1992 (3) Human Geographies**
Examines social, political, economic, and cultural processes creating the geographical worlds in which we live, and how these spatial relationships shape our everyday lives. Studies urban growth, geopolitics, agricultural development and change, economic growth and decline, population dynamics, and migration exploring both how these processes work at global scale as well as shape geographies of particular places.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
MAPS Course: Geography

**GEOG 2001 (1-4) Topics in Physical Geography**
Examines various topics in physical geography that are not typically covered in the curriculum for lower division students; offered intermittently depending on student demand and availability of instructors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOG 2053 (3) Mapping Our World**
Maps, geospatial data and technology play an important role in our understanding of the world and our geospatial literacy. Learn about the evolution of maps, the map as an art form, the map as a form of communication, and the ways maps influence our view of the world. Engage in critical thinking about maps and spatial data, and their use in society. In hands-on exercises students learn how to critically read and evaluate maps for expanding their spatial awareness of the world around them.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Techniques (Skills)

**GEOG 2092 (3) Advanced Introduction to Human Geography**
Provides a rigorous introduction to key analytical concepts of human geography - place, space, scale, regions, nature, landscapes and territory - while giving an overview of topics addressed in subfields including economic geography, political geography, cultural geography and development geography. Specific topics may vary slightly from semester to semester but will likely include borders and migration, maps, tourism, climate change and the Anthropocene, geopolitical conflict, development, urbanization, nationalism, gender, race, inequality and identity.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
MAPS Course: Geography

**GEOG 2212 (3) Location, Location, Location: Introduction to Affordable Housing and Urban Development Geographies**
This course examines the geographies of housing affordability and urban development in the United States. Students will engage with course readings and assignments toward an understanding of spatial marginalization through housing exclusion. The contemporary affordable housing crisis will be discussed through the lens of politics, economic, and societal marginalization associated with race, gender, class, ability/disability, geographic location, and the ways in which places are shaped by housing policies at different scales.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 2271 (3) Introduction to the Arctic Environment**
Rising temperatures, shrinking sea ice and melting glaciers are only the most visible indications of a rapidly changing Arctic. This course addresses the climate of the Arctic and the changes being observed at a non-mathematical level. It is intended to provide students with a basic understanding of the Arctic physical and biological environment as well as the impacts of Arctic change on human and environmental systems.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 2321 (3) Geography of Skiing and Snowboarding**
Skiing and snowboarding (hereafter, skiing) are sports that lie at the convergence of diverse Earth science disciplines. Skiing is about the unique interaction between mountains, climate, the physics of glissading, technological innovation, and human expression. This course studies skiing through the lens of geographic inquiry, introducing students to the science of geography, by investigating the physical processes that govern mountain weather, snow properties, and the dynamics by which humans glissade over snow.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOG 2421 (3-4) Visualizing Climate Change and Extreme Weather Events**
Climate change is one of the most important and contentious issues impacting every aspect of our society. So what is climate change and who will it impact? This course will address the environmental and societal consequences and more. You will graph, map, and view satellite data to provide evidence of climate change around the world. In these efforts, you will be introduced to basic graphing, GIS, and remote sensing skills.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOG 2692 (3) Foundations in Public Health**
Get a comprehensive overview of public health as well as an in-depth introduction to specific public health-related topics. Beginning with a historical overview, students will explore major public health concepts such as the basic principles of epidemiology, the biomedical basis of disease, social and behavioral determinants of health, and systems thinking. Learn about the concepts of measuring and evaluating the health of populations, principles of communicable and non-communicable diseases, environmental and occupational health, the economics of health, and the role of public health workers in society.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 2692 and PBHL 2692
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 2852 (3) Contemporary Southeast Asia: Environmental Politics**
Examines globally pressing questions of environmental sustainability, regional inequality and development in the dynamic and heterogeneous landscapes of contemporary Southeast Asia. Focuses on interactions between histories of uneven development and contemporary debates over energy and infrastructure, food security, governance and access to land, forest and water-based resources.
**Equivalent - Duplicate Degree Credit Not Granted:** ASIA 2852
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment-Society Geography

**GEOG 3022 (3) Climate Politics and Policy**
Engages students in exploring the realm of contemporary and historical climate policy at three major levels of government: international, national and local/regional. Through course lectures, discussions, readings and activities, students will become conversant with the actors, mechanisms and concerns involved in climate policy and politics and develop their own sense of how to judge the success of climate policies. Fulfills intermediate social science requirement in Environmental Studies Major.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3022
**Recommended:** Prerequisite ENVS 1000 or GEOG 1972.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment-Society Geography

**GEOG 3023 (4) Statistics and Geographic Data**
Learn how to use computational and statistical tools to solve problems in the geographic domain and apply introductory statistical concepts to real world problems through lab exercises. Using spatial data you will be trained in powerful specialized descriptive and predictive analysis technique. You will explore how to manipulate and visualize data and make inference using state-of-the art statistics software, applied to various social and Earth Science problems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 3023
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Quantitative Reasoning Math
Departmental Category: Techniques (Skills)

**GEOG 3053 (4) Geographic Information Science: Mapping**
Introduction to Geographic Information Systems (GIS) and the fundamentals of cartographic design. Learn about the science and art of map design in a GIS environment! Students will learn how to build a spatial database, implement best practice for processing various types of environmental and social spatial data and apply basic visual analytics to understand spatial patterns.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Recommended:** Prerequisite basic familiarity with computers and an introductory course in statistics (may be taken concurrently).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Techniques (Skills)

**GEOG 3251 (3) Mountain Geosystems**
Surveys mountain environments and their human use with illustrations from temperate and tropical mountain areas.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Physical Geography

**GEOG 3301 (3) Analysis of Climate and Weather Observations**
Discusses instruments, techniques and statistical methods used in atmospheric observations. Covers issues of data accuracy and analysis of weather maps. Provides application to temperature and precipitation records, weather forecasting and climate change trends. Uses computers to access data sets and process data.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 3300
**Requisites:** Requires prerequisite courses of APPM 1340 and 1345 or APPM 1350 or ECON 1088 or MATH 1081 or MATH 1300 or MATH 1310 and ATOC 1050 and ATOC 1060 or GEOG 3601 or ATOC 3600 or ENVS 3600 or GEOG 1011 (all minimum grade D-).
**Recommended:** Prerequisites ATOC 1050 or ATOC 1060 or ATOC 3600 or GEOG 3601 or ENVS 3600 or GEOG 1001 and one semester calculus.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 3351 (3) Biogeography**
Surveys and analyzes plant and animal distributions on a world scale from ecological and historical perspectives. Emphasizes human impact on species.
**Requisites:** Requires prerequisite course of GEOG 1001 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 3402 (3) Natural Hazards**
Explores the impacts of extreme geophysical events on human society. Emphasizes adaptations to extreme events and ways of reducing vulnerability and damage.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment-Society Geography

**GEOG 3412 (3) Conservation Practice and Resource Management**
Studies policy and management of natural resources. Emphasizes practical approaches to the conservation and management of soil, land, water and air resources.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment-Society Geography

**GEOG 3422 (3) Political Ecology**
Political ecology is an influential approach to understanding society-environment relationships. Learn about issues including different philosophies of nature and wilderness, the politics of conservation, causes of environmental degradation, environmental conflict and indigenous ecological knowledge and understand their importance in our society.
**Recommended:** Prerequisite GEOG 1972.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment-Society Geography

**GEOG 3511 (4) The Water Cycle**
The pathway a raindrop or snowflake takes from the atmosphere to the stream determines water quality and quantity society relies on. This course examines the water cycle and its relationship with climate, vegetation, and soil. Learn how to work with quantitative analysis tools used by water managers during labs.
**Requisites:** Requires a prerequisite course of GEOG 1011 or GEOL 1010 or GEOL 1012 (minimum grade D-).
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 3601 (3) Principles of Climate**
Describes the basic components of the climate system: the atmosphere, ocean, cryosphere and lithosphere. Investigates the basic physical processes that determine climate and link the components of the climate system. Covers the hydrological cycle and its role in climate, climate stability and global change.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 3600 and ENVS 3600
**Requisites:** Restricted to Geography (GEOG) or Environmental Studies (ENVS) majors or Atmospheric Oceanic Sciences (ATOC) minors only.
**Recommended:** Prerequisites one semester of calculus and ATOC 1060 or ATOC 3300 or GEOG 3301 or GEOG 1001.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 3612 (3) Reimagining Cities: Spaces of Power, Privilege, and Possibility**
Curious about what shapes your lifestyle, health, job opportunities, and how long you¿ll live? Your zip code! This course introduces the dynamics of American cities by investigating our country¿s built, social, and natural urban environments through a critical and applied lens. With engaging class exercises and independent local field trips, you¿ll explore how urban (re)development is a contested, socially and spatially uneven process. As a group, we will unpack how structural axes of power and privilege literally shape cities and create highly unequal opportunities for health, wellbeing, and opportunity. By the end of the course, students will be able to critically analyze urban spaces and apply insights to fields like urban planning, public health, social justice, and environmental sustainability. Whether pursuing further academic research or engaging in community-based work, students will gain practical skills in spatial analysis, policy evaluation, and the design of more equitable urban spaces.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**GEOG 3622 (3) Cities of the Global South**
Examines the geographies, processes, structural forces and everyday forms of urban life that are at the core of rapid urban transformation in the global South. Through using interdisciplinary scholarship, empirical case studies and key theoretical work, the course covers themes such as migration and urbanization, informality and governance, infrastructures of everyday life and urban environmental politics.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3670

**GEOG 3662 (3) Economic Geography**
Presents theories of the spatial organization of economic production, consumption and exchange systems. Geographical dynamics of industrialization, urbanization and economic growth. Examination of property, labor and social conflict, with a focus on political economy.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 3672 (3) Who Runs the World? Sex, Power, and Gender in Geography**
This course will examine how gender and sexuality is constructed locally, nationally, and globally, drawing on conversations about feminist pasts, presents, and futures. We will focus on how gender intersects with race, class, sexuality, ability, religion, ethnicity, and geopolitical location to structure the lived experiences of women across the globe. We will apply critical geographic perspectives to gender inequality, exploring the overlaps and differences in women¿s and LGBTQ+ struggles as they are shaped by ongoing socio-cultural, political, and economic conditions globally.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3672
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092 or WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography

**GEOG 3682 (3) International Development: Economics, Power, and Place**
Learn about global economic and political inequalities through international development programs. Understand why some countries are in conditions of cyclical poverty while others experience massive economic growth and wealth. We will examine different approaches to economic development and critically consider existing and future planning.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography
Departmental Category: Asia Content

**GEOG 3692 (4) Introduction to Global Public Health**
Introduces global health by putting its contemporary definition, determinants, development and direction as a field into a broad global context. The course is divided into four core topics: 1) the burden and distribution of disease and mortality; 2) the determinants of global health disparities; 3) the development of global health policies; and 4) the outcomes of global health interventions. Required for the Public Health Certificate.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography

**GEOG 3742 (3) Place, Power, and Contemporary Culture**
Examines the relationship between places, power, and the dynamics of culture. Explores how the globalization of economics, politics, and culture shapes cultural change. Looks at how place-based cultural politics both assist and resist processes of globalization.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1982 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Human Geography

**GEOG 3782 (3) Environmentalism, Race, and Justice**
Examines spatial inequalities in environmental problems and their relationships to environmentalism and racism. Examines the implications for human health, well-being, and sense of place. Identifies factors that contribute to environmental inequalities, with particular attention to environmentalism and racism. Explores efforts to reduce environmental inequality, including by social movements, researchers, students, journalists, political leaders, and government agencies. Introduces students to research methods for documenting and analyzing environmental inequality. Focuses geographically on the United States. Formerly offered as a special topics course.
**Recommended:** Prerequisite GEOG 1972.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 3812 (3) Mexico, Central America, and the Caribbean**
Introduces the geography of Latin America, focusing on the lands and peoples of Mexico, Central America, and the Caribbean. Examines regional and national culture, history, environment, and population, as well as ongoing environmental and socioeconomic changes.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography

**GEOG 3822 (3) China¿s Diverse Geographies: Environment, Society, Politics**
Get to know one of the world¿s most diverse countries, its physical and historical geography, urbanization and regional development, agriculture, population, energy, and the environment. Learn more about China and how to situate its development in a broader Asian and global context.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography
Departmental Category: Asia Content

**GEOG 3832 (3) India and Its Neighbors: Societies, Economies, and Geopolitics**
Experience the diverse societies and cultures of India, Nepal, Afghanistan, Pakistan, Bangladesh, Sri Lanka, Bhutan, and the Maldives. Learn about the different belief systems, cultural practices, and environments in this region and how international relations and politics in this region influence global trade/economics, politics, conflict, and security.
**Recommended:** Prerequisites GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography
Departmental Category: Asia Content

**GEOG 3840 (1-6) Undergraduate Independent Study**
Provides an independent study opportunity, by special arrangement with faculty, for students presenting strong geography preparation. Instructor consent required.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Geography (GEOG) majors only.

**GEOG 3842 (3) Human Geography of Czechia: Political, Economic and Social Transitions**
Excursions in Prague will begin with an understanding of Czech history through various imprints on the landscape, such as city planning, design, architecture and culture. This will be followed by a discussion of Prague in the 20th century and the various political, economic and social transitions. These transitions will be explored through field based study in and outside of Prague.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 3862 (3) Global Africa: Environment, Development, and Culture**
What comes to mind when you think about Africa as a place and its connectedness to the rest of the world? Learn about the cultures, politics, economies, and ecologies of very specific places across the continent -- from urban Nigeria to rural villages in Tanzania. Understand historic and present day flows of people, wealth, ideas, and more, to and from Africa to the rest of the world, from the slave trade, colonialism and wildlife conservation, to food, music and sports.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography

**GEOG 3882 (3) Geography of the Former Soviet Union**
Examines the contemporary social, political, population, cultural, ethnic and resource geography of the former Soviet Union. Relations between Russia and neighboring countries are also considered. Historical and physical geography are introduced as background to understanding post-Soviet developments and challenges.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 3930 (3) Internship**
Provides an academically supervised opportunity for advanced geography or environmental studies majors to work in public and private organizations on projects related to the student's career goals and to relate classroom theory to practice. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Geography (GEOG) or Environmental Studies (ENVS) majors only.

**GEOG 4001 (1-4) Topics in Physical Geography**
Examines various topics in physical geography that are not typically covered in the curriculum. Offered intermittently depending on student demand and availability of instructors.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOG 4002 (1-4) Topics in Human and Environment/Society Geography**
Examines various topics in human and environment / society geography that are not typically covered in the curriculum. Offered intermittently depending on student demand and availability of instructors.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 4003 (1-4) Topics in Geographic Skills**
Examines various topics in geographical skills and techniques that are not typically covered in the curriculum. Offered intermittently depending on student demand and availability of instructors.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOG 4023 (4) Advanced Quantitative Methods for Spatial Data**
Reviews fundamental statistical and quantitative modeling techniques and introduces more advanced statistical techniques widely used in geography today. Emphasizes geographic examples and spatial problems teaching hands-on skills in statistical programming. Topics covered include generalized linear models, spatial autocorrelation, spatial regression methods, and working with complex datasets.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5023
**Requisites:** Requires prerequisite course of GEOG 3023 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Methods

**GEOG 4043 (4) Advanced Geovisualization and Web Mapping**
Advanced technical course in web-based cartography and geovisualization stressing the important role digital cartography plays in cyberspace and society. Focuses on principles of effective cartographic design in multimedia and hypertext environments. Labs are organized around hands-on active learning projects demonstrating skills in geovisualization and cartographic practice.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5043
**Requisites:** Requires prerequisite course of GEOG 3053 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Methods

**GEOG 4093 (4) Remote Sensing of the Environment**
Covers acquisition and interpretation of environmental data by remote sensing. Discusses theory and sensors as well as manual and computerized interpretation methods. Stresses infrared and microwave portions of the spectrum.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5093 and GEOL 4093 and GEOL 5093
**Requisites:** Requires prerequisite course of APPM 1340 1345 or APPM 1350 or ECON 1088 or 3818 or MATH 1081 or 1300 or 1310 or 2510 or ANTH 4000 or BCOR 1020 or GEOG 3023 or GEOL 3023 or PSCI 2075 or PSYC 2111 or SOCY 2061 or 4061 or STAT 4000 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Methods

**GEOG 4103 (4) Geographic Information Science: Spatial Analytics**
Explores advanced topics in geospatial databases, spatial analytics and geoprocessing in a Geographic Information System (GIS). Emphasizes how geographic concepts are linked to methodological frameworks for recording, transforming, storing/retrieving, analyzing, and processing geographic data as well as various forms of uncertainty. Exercises demonstrate the application of GIS-based methods to real world scenarios in interdisciplinary settings.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5103
**Requisites:** Requires prereq of (GEOG 3053 or GEOG 4603) and ANTH 4000 or APPM 4570 or BCOR 1020 or ECON 3818 or GEOG 3023 or GEOL 3023 or MATH 2510 or PSCI 2075 or PSYC 2111 or SOCY 2061 or SOCY 4061 (all min C-). Restrictd to students with 57-180 credits (Jun/Sr).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: GIScience

**GEOG 4173 (3) Research Seminar**
Examines the nature of research and develops pregraduate skills for geographic research, emphasizing problem definition, methods, sources, data interpretation, and writing. Recommended for students pursuing honors.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Geography (GEOG) or Environmental Studies (ENVS) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Methods

**GEOG 4201 (3) Biometeorology**
Learn about the interactions between atmospheric processes and living organisms (plants, animals, and humans) through a meteorology/ biology lens. Topics include carbon and water cycling through vegetation, the energy and water balances in the system, and human temperature regulation to better understand how organisms adapt to a changing environment using a practical, problem-solving approach.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 4201
**Requisites:** Prereq of GEOG 1001 any of (APPM 1340 1345) or APPM 1350 or ECON 1088 or 3818 or MATH 1081 or 1300 or 1310 or 2510 or ANTH 4000 or BCOR 1020 or GEOG 3023 or GEOL 3023 or PSCI 2075 or PSYC 2111 or SOCY 2061 or 4061 or STAT 4000 (min grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 4203 (4) Geographic Information Science: Spatial Modeling**
Focuses on the use and development of advanced models for human and environmental applications in a geospatial environment integrating raster and vector data models. Covers terrain and hydrologic modeling, geostatistical modeling, dasymetric modeling, as well as multi-criteria modeling. Group projects critically design, implement and test spatial models to develop independent skillsets in a chosen problem setting.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5203
**Requisites:** Requires prerequisite course of GEOG 4103 (minimum grade C-).
**Recommended:** Requisite working knowledge of GIS software.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: GIScience

**GEOG 4241 (4) Earth Surface Processes**
Earth¿s surface is constantly reshaped by water, ice, wind, and life. This class investigates the earth's landscapes and the processes that modify them, both gradually by slow weathering and erosion, and abruptly through the action of floods, landslides, and other geologic events. We cover surface processes in hillslope, glacial, riverine, desert, and coastal environments. Upon completion of the course, students will have mastered knowledge about diverse surface processes and landforms and applied core geomorphic principles to a variety of landscapes. Students will also learn that understanding surface processes is important for managing natural hazards (e.g., landslides and floods). This course will draw from many disciplines, including geology, geography, physics, chemistry, and biology. The laboratory portion of the course will include quantitative problem solving and field trips to collect and analyze geomorphic data.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4241
**Requisites:** Requires prerequisite courses of GEOG 1011 or GEOL 2001 and a calculus course (MATH 1300 or APPM 1350 or (APPM 1340 and APPM 1345)), all minimum grade C-.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 4251 (3-4) River Systems and Landforms**
Rivers integrate the landscape, carrying water, sediment, and organic matter. Rivers also shape the landscape, eroding and depositing material. This course covers the physical (geomorphic) processes in river systems and the landforms that they create. Topics covered include drainage basin processes, river hydraulics, sediment transport, channel forms and patterns, interactions between ecological and geomorphic processes in rivers, and river restoration and management. The course will combine lectures, discussions, in-class activities, and field trips.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5251
**Requisites:** Requires prerequisite courses of GEOG 1011 and GEOG 3511 (minimum grade D-).
**Recommended:** Prerequisite GEOG 3023.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 4261 (3) Glaciers and Permafrost**
Surveys the major terrestrial components of the cryosphere, including permafrost, glaciers and ice sheets. Emphasizes physical processes involving ice, including thermal behavior, ice deformation and mass balance, but also considers biogeochemical processes and landforms associated with ice. The climate context, including human interactions and recent climate history, will be considered. Taught in a combination lecture-seminar format.
**Requisites:** Requires prerequisite course of GEOG 1011 or GEOL 1010 (minimum grade D-).
**Recommended:** Prerequisite GEOG 4241.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 4271 (3) The Arctic Climate System**
Understanding the climate of the Arctic requires a synthetic, system oriented approach. The course focuses on the intimate linkages between the atmosphere, ocean and land that give the Arctic region its unique character, link the Arctic to the larger global climate system, and promote understanding the rapid changes occurring in the Arctic.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5271
**Requisites:** Requires prerequisite course of GEOG 1001 or ATOC 1050 or ATOC 1060 (minimum grade D-).
**Recommended:** Prerequisites GEOG 3511 or GEOG 3601 or ATOC 3600 or ENVS 3600 and statistics.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 4292 (3) Migration, Immigrant Adaptation, and Development**
Examines historical and current patterns of migration with an emphasis in international movement. Looks at leading migration theories related to both origin- and destination-based explanations while critically looking at the role of development as a potential cause and consequence of population movement. Finally, covers some aspects of immigrants' social and economic adaptation to their host society.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5292
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Human Geography

**GEOG 4303 (4) Geographic Information Science: Spatial Programming**
Focuses on the extension of geographic information systems (GIS) through programming as well as on the development of algorithms for spatial analysis and information extraction in vector and raster data using open source tools. Covers concepts, principles and techniques of programming and solving spatial problems in natural and social science settings. Group projects will foster skillsets in implementing solutions to complex spatial problems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5303
**Requisites:** Requires prerequisite course of GEOG 4103 (minimum grade C-).
**Recommended:** Prerequisite GEOG 4203.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: GIScience

**GEOG 4311 (3) Watershed Biogeochemistry**
Emphasizes terrestrial-aquatic linkages in headwater catchments, focusing on hydrologic pathways, isotopic and geochemical tracers, nutrient cycling, water quality, experimental manipulations, and modeling.
**Requisites:** Requires prerequisite courses of GEOG 1011 and GEOG 3511 (minimum grade D-).
**Recommended:** Requisite parametric statistics.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 4321 (3-4) Snow Hydrology**
Offers a multidisciplinary and quantitative analysis of physico-chemical processes that operate in seasonally snow-covered areas, from the micro- to global-scale: snow accumulation, metamorphism, ablation, chemical properties, biological aspects, electromagnetic properties, remote sensing, GIS and quantitative methods.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5321
**Requisites:** Requires prerequisite course of APPM 1340 1345 or APPM 1350 or ECON 1088 or 3818 or MATH 1081 or 1300 or 1310 or 2510 or ANTH 4000 or BCOR 1020 or GEOG 3023 or GEOL 3023 or PSCI 2075 or PSYC 2111 or SOCY 2061 or 4061 or STAT 4000 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 4331 (3-4) Mountain Climatology**
Surveys and analyzes climatic characteristics of mountain environments worldwide.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5331
**Requisites:** Requires prerequisite course of GEOG 1001 or ATOC 1050 or ATOC 1060 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 4371 (3) Forest Geography: Principles and Dynamics**
Surveys principles of forest geography and ecology. Includes both individual tree responses to environmental factors and species interactions within communities. Emphasizes forest dynamics and their relation to management problems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5371
**Requisites:** Requires prerequisite course of GEOG 1001 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 4401 (3) Soils Geography**
Discusses chemical and physical properties of soils, soil development, distributions and management relevant to understanding plant-soil relationships in natural and human-altered landscapes.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5401
**Requisites:** Requires prerequisite course of GEOG 1011 (minimum grade D-).
**Recommended:** Prerequisite inorganic chemistry.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 4403 (3) Geographic Information Science: Space Time Analytics**
Focuses on understanding processes (human, natural, social or physical) through data driven analysis of patterns in spatio-temporal data. Covers a wide range of topics relevant to space time data, including pattern analysis, modeling and visualization as well as time geography and various contemporary issues in space time analytics. Utilizes a hands-on, flipped classroom approach with in-class development of technical skills.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5403
**Requisites:** Requires a prerequisite course of GEOG 3023 or GEOG 4023 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Departmental Category: GIScience

**GEOG 4430 (3) Seminar: Conservation Trends**
Provides environmental studies or geography majors with an undergraduate format for interdisciplinary discussion and research into current and future directions of conservation.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Environment-Society Geography

**GEOG 4463 (3) Earth Analytics Data Science Bootcamp**
Learn key skills to automate data processing and visualization workflows that support both repeatable analysis and collaborative project approaches using scientific programming, version control and project management tools. Covers working with heterogeneous, large spatio-temporal data derived from space, airborne and ground based sensors and other sources. Gain applied experience through group projects that address real world problems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5463
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Departmental Category: Methods

**GEOG 4501 (3) Water Issues in the American West**
Water scarcity is a perpetual issue facing communities in the western Unites States. This course critically evaluates water use, emphasizing problems associated with geographic maldistribution, appropriations, irrigation, industry, pollution and regional development. Interprets and analyzes hydroclimatic data, surface and groundwater.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5501
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Environment-Society Geography

**GEOG 4503 (3) Geographic Information Science: Project Management**
Managing a geospatial project encompasses problem identification, project design, analysis and supporting team dynamics. The class mixes lectures and class exercises with student-selected projects and works through all stages of a project from articulating an initial idea to project planning and scoping, building a work plan, timeline and budget, executing the work plan and evaluating a project's progress.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5503
**Requisites:** Requires prerequisite course of GEOG 3053 or GEOG 4103 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Departmental Category: GIScience

**GEOG 4542 (3) Public Health Capstone Research Methods: Environmental Interventions to the Mental Health Epidemic**
This course will introduce students to interdisciplinary research methods in public health, with a focus on environmental interventions to address mental health. Robust data shows that spending time in nature can positively impact mental health. This course will teach students about the many phases of the scientific research process through doing; students will work in small groups to do their own research project throughout the semester on a pre-picked topic that can change from year to year.
**Equivalent - Duplicate Degree Credit Not Granted:** PBHL 4542 and PSYC 4542
**Requisites:** Prerequisites: Restricted to Public Health majors or those pursuing the Public Health certificate. Also, must have taken one of the following: ANTH 4000, ECON 3818, GEOG 3023, IPHY 3280, MATH 2510, PSCI 2075, PSYC 2111, SOCY 2061, STAT 2600.
**Recommended:** Prerequisite Students who are interested in taking this course but do not meet these requirements must have instructor approval.

**GEOG 4563 (3) Earth Analytics**
Introduce students to major unanswered questions in Earth science and to the analytical tools, including data management, analysis and visualization, necessary to explore 'big data' from a suite of sensors. Aligns with Earth Lab, a new initiative of the University's Grand Challenge (http://www.colorado.edu/grandchallenges/) to use our expertise in space-based observation to address our world's most pressing problems. Comparable programming course work may be substituted for GEOG 4463 with instructor approval.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5563
**Requisites:** Requires prerequisite course of GEOG 4463 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Departmental Category: Methods

**GEOG 4603 (3) GIS in the Social and Natural Sciences**
Introduces Geographic Information Systems and their underlying principles through interactive lectures and lab exercises. Students get basic skills for working in a GIS environment and learn how to handle and manage geospatial data, create maps and conduct geospatial analysis focusing on project tasks typically encountered in the social and natural sciences.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5603
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Departmental Category: GIScience

**GEOG 4622 (3) City Life**
Analyzes social, behavioral, political and demographic factors that influence development and maintenance of communities in contemporary urban environments, with primary emphasis on U.S. cities.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5622
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 4632 (3) Development Geography**
Provides an overview of development policy and practice, surveying foundational works in Development Studies as well as critical interventions. Required for Graduate Certificate in Development Studies.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5632
**Requisites:** Requires prerequisite course of GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 (minimum grade D-).
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography

**GEOG 4692 (3) Climate Change and Health**
Climate change is one of the great societal challenges of our times and it not only threatens the physical environment but also threatens human health. The course will explore the ways that climate change is affecting public health now and is projected to affect health in the future. We will also explore the public health implications, positive and negative, of efforts to respond to climate change through mitigation and adaptation. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5692

**GEOG 4712 (3) Political Geography**
Systematic study of relations between geography and politics, especially as background for better understanding of international affairs. Includes topics such as frontiers and boundaries, power analysis, geopolitics, international political economy, and strategic concepts.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5712
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092 or IAFS 1000 or PSCI 2012 or PSCI 2223.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography

**GEOG 4722 (3) Field Methods in Human Geography**
Examines research methods associated with field work in human geography. Prepares students for fieldwork by focusing on geographic and interdisciplinary field work techniques; interpretation of field data; discussion of the politics, ethics and gender, race, class and cross-cultural issues related to field work.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5722
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Methods

**GEOG 4732 (3) Population Geography**
Emphasizes spatial aspects of population characteristics including fertility, mortality, migration, distribution and composition. Includes both theoretical and empirical considerations, in addition to field work and computer simulations.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5732
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography

**GEOG 4742 (3) Topics in Environment and Society**
Studies peoples and their environments, including human modification of nature and cultural interpretation and construction of rural and urban landscapes.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or 1982 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment-Society Geography

**GEOG 4762 (3) Geographies of Political Islam**
Explores the postcolonial landscape of political Islam through the lens of political and cultural geography. Develops a critical anti-essentialist framework for understanding the political crisis of the Muslim world in relation to broader questions of empire, nationalism, democracy, revolution, security, terrorism, globalization and modernity. Focuses on the post-1979 period, several key Muslim nation-states (Saudi-Arabia, Egypt, Iran, Turkey, Pakistan) and movements (Taliban, ISIS).
**Recommended:** Prerequisite GEOG 1982 or GEOG 1992 or GEOG 2092 or GEOG 3742.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography

**GEOG 4772 (3) Food and Power**
Analyzes people's relationships with food through lenses of power, justice, and sustainability. Topics covered include the political economy of global food systems, agroecology, agricultural technologies, alternative food movements, migration and labor politics, and influence of gender, race, class, and culture on food consumption. Draws on case studies from across the United States and around the globe.
**Recommended:** Prerequisites GEOG 1972 or GEOG 1982 or GEOG 2092.

**GEOG 4812 (3) Political Ecology & Latin America**
Presents theoretical approaches to the links between environment and development in Latin America and focuses on analytical discussion of contemporary (and controversial) issues in sustainable development in Latin America. Examines social, ecological, economic, and political forces influencing the use of natural resources.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1982 or GEOG 1992 or GEOG 2092 or GEOG 3682 or GEOG 3422 or GEOG 3812 or ANTH 3110 or PSCI 3032.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment-Society Geography

**GEOG 4822 (3) Environment and Development in China**
Examines key environmental problems in relation to China's rapid modernization and development.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1982 or GEOG 1992 or GEOG 2092 or HIST 1618.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment-Society Geography
Departmental Category: Asia Content

**GEOG 4832 (3) Geography of Tibet**
Rigorously examines contemporary Tibetan society, culture and nature from a geographical perspective. Uses readings on contemporary Tibet as an entry point into scholarly research about nationalism, representation, diaspora, landscape and place, sustainable development, natural resource management, identity and environmentalism.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5832
**Recommended:** Prerequisite GEOG 3822 or other classes on China.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Asia Content

**GEOG 4842 (3) Global Frontiers in Southeast Asia**
Uses the theme of the global frontier to examine and compare three key moments in the modern history of Southeast Asia: the colonial encounter, the rise of the modern territorial state, and the age of contemporary globalization. Examines case studies from earlier eras to analyze emerging global frontiers at the junction of state territoriality and transnational economic expansion.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5842 and ASIA 4842
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 4852 (3) Health and Medical Geography**
Examines geographical patterns of health and disease with an emphasis on global health issues. Focuses on three major approaches to medical geographic research: ecological approaches, which systematically analyze relationships between people and their environments; social approaches, including political economy and socio-behavioral approaches; and spatial approaches, which employ maps and spatial analysis to identify patterns of health and disease. Elective course for Public Health Certificate.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5852
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites GEOG 1001 or GEOG 1011 and GEOG 1962 or GEOG 1972 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Human Geography

**GEOG 4892 (3) Geography of Western Europe**
Provides a regional survey of cultural, political, economic, social, and physical geography of Western Europe, emphasizing the distinctive character and problems of each major area and the relationship of the region to the world.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Human Geography

**GEOG 4990 (3) Senior Thesis**
Offers thesis research under faculty supervision. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Geography (GEOG) majors only.

# Geography - Bachelor of Arts (BA)

The Department of Geography offers a Bachelor of Arts degree in Geography. The degree emphasizes knowledge and awareness of:

- The unique contributions of the discipline to understanding the spatial components of problems and the diverse factors relating to human interaction with the environment.
- The spatial distributions of physical and human characteristics on the Earth surface, the general patterns these form and the processes that have created and are changing these patterns.
- The major themes of geographical analysis, including absolute and relative location; human and physical characteristics of place; human and environmental relations; movement of people, ideas and products; and regionalization.
- The general geographical principles of human-environment interaction, global change and human spatial organization.

# Requirements

## General Requirements

Students must complete the general requirements of the College of Arts and Sciences and the required courses below.

In addition to a standard degree in geography, the department offers transcripted concentrations in environment-society geography, geographic information science and human geography. Coursework required for each concentration is listed on the Concentration Areas tab.

Students must complete at least 37 and no more than 45 credit hours in geography with grades of C- or better (23 credit hours must be upper-division). No pass/fail grades are allowed in the major. Students must have a grade point average of at least 2.000 in the major in order to graduate.

Transfer students majoring in geography must complete at least 12 credit hours of upper-division geography courses at CU Boulder. No course may be used to fulfill more than one requirement for the major.

### Required Courses and Credit Hours

Certain course selections are better preparation for certain concentrations.

| Code | Title | Credit Hours |
|---|---|---|
| GEOG 1001 | Our Changing Planet: Climate and Vegetation | 4 |
| GEOG 1011 | Our Changing Planet: Landscapes and Water | 4 |
| GEOG 3023 | Statistics and Geographic Data | 4 |
| Select one of the following human geography courses: | | 3 |
| GEOG 1962 | Geographies of Global Change | |
| GEOG 1972 | Sustainable Futures, Environment and Society | |
| GEOG 1982 | Global Geographies: Societies, Places, Connections | |
| GEOG 1992 | Human Geographies | |
| GEOG 2092 | Advanced Introduction to Human Geography | |
| Select one of the following mapping courses: | | 3-4 |
| GEOG 2053 | Mapping Our World | |
| or GEOG 3053 | Geographic Information Science: Mapping | |
| Select at least one of the following methods courses: | | 3-4 |
| GEOG 4023 | Advanced Quantitative Methods for Spatial Data | |

| | | |
|---|---|---|
| GEOG 4043 | Advanced Geovisualization and Web Mapping | |
| GEOG 4093 | Remote Sensing of the Environment | |
| GEOG 4103 | Geographic Information Science: Spatial Analytics [1] | |
| GEOG 4173 | Research Seminar | |
| GEOG 4463 | Earth Analytics Data Science Bootcamp | |
| GEOG 4563 | Earth Analytics | |
| GEOG 4722 | Field Methods in Human Geography | |
| *GEOG Electives to complete the major (See Concentration Areas Tab)* | | *16-14* |
| **Total Credit Hours** | | **37** |

[1] Does not count as a methods course for students pursuing the GIS concentration.

## Graduating in Four Years

This applies only to the general geography degree. Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee: it is not a requirement for the major. To maintain adequate progress in geography, students should meet the following requirements:

- By the end of the third semester, complete GEOG 1001, GEOG 1011 and one of the following: GEOG 1962, GEOG 1972, GEOG 1982, GEOG 1992 or GEOG 2092.
- By the end of the sixth semester, complete an approved upper-division human geography course and 9 credit hours of upper-division geography courses.
- By the end of the sixth semester, complete GEOG 2053 or GEOG 3053 and GEOG 3023.
- By the eighth semester, complete the remaining upper-division credit hours.

# Concentration Areas

## General Geography Concentration

In addition to the courses required of all concentrations, complete the following GEOG coursework.

| Code | Title | Credit Hours |
|---|---|---|
| At least one upper-division human or environment-society geography course (3XX2, 4XX2 or GEOG 4501). | | 3-4 |
| Upper-division Geography electives, to reach 23 upper-division credit hours in the major. | | 10-13 |
| **Total Credit Hours** | | **13-17** |

## Human Geography Concentration

In addition to the courses required of all concentrations, complete the following GEOG coursework.

| Code | Title | Credit Hours |
|---|---|---|
| GEOG 3742 | Place, Power, and Contemporary Culture | 3 |
| or GEOG 3682 | International Development: Economics, Power, and Place | |
| A third-year university-level proficiency in a foreign language appropriate to the geographic concentration is required. [1] | | |
| Select three of the following electives: [2] | | 9-10 |
| GEOG 3422 | Political Ecology | |
| GEOG 3612 | Reimagining Cities: Spaces of Power, Privilege, and Possibility | |
| GEOG 3622 | Cities of the Global South | |
| GEOG 3662 | Economic Geography | |
| GEOG 3672 | Who Runs the World? Sex, Power, and Gender in Geography | |
| GEOG 3682 | International Development: Economics, Power, and Place | |
| GEOG 3692 | Introduction to Global Public Health | |
| GEOG 3742 | Place, Power, and Contemporary Culture | |
| GEOG 3812 | Mexico, Central America, and the Caribbean | |
| GEOG 3822 | China's Diverse Geographies: Environment, Society, Politics | |
| GEOG 3832 | Love & War Geographies: Imperialism, Militarism, and Development in South Asia | |
| GEOG 3842 | Human Geography of Czechia: Political, Economic and Social Transitions | |
| GEOG 3862 | Global Africa: Environment, Development, and Culture | |
| GEOG 3882 | Geography of the Former Soviet Union | |
| GEOG 4002 | Topics in Human and Environment/ Society Geography [3] | |
| GEOG 4173 | Research Seminar (may be applied to the concentration on a case-by-case basis) | |
| GEOG 4292 | Migration, Immigrant Adaptation, and Development | |
| GEOG 4622 | City Life | |
| GEOG 4632 | Development Geography | |
| GEOG 4712 | Political Geography | |
| GEOG 4732 | Population Geography | |
| GEOG 4762 | Geographies of Political Islam | |
| GEOG 4832 | Geography of Tibet | |
| GEOG 4852 | Health and Medical Geography | |
| GEOG 3930 | Internship (may be applied to the concentration on a case-by-case basis) | |
| GEOG 4990 | Senior Thesis (may be applied to the concentration on a case-by-case basis) | |
| Take one upper-division elective in Geographic Information Science, Environment and Society, or Physical Geography. | | 3-4 |
| **Total Credit Hours** | | **15-17** |

[1] This requirement may be met by completion of one or two semester-long, third year, university-level grammar courses (depending on the language) with a grade of C- or better, while also satisfying language department requirements for advancement through the sequence.

[2] Unless otherwise noted, the department-enforced prerequisite for all courses is GEOG 1962, GEOG 1982, GEOG 1992 or GEOG 2092.

[3] Special topics courses may be used to satisfy upper-division concentration requirements with approval from the department.

## Environment and Society Geography Concentration

In addition to the courses required of all concentrations, complete the following GEOG coursework.

| Code | Title | Credit Hours |
|---|---|---|
| GEOG 3402 | Natural Hazards | 3 |
| or GEOG 3422 | Political Ecology | |
| ENVS 2000 | Applied Ecology for Environmental Studies | 4 |
| Select three of the following electives: [1] | | 9-10 |
| GEOG 3402 | Natural Hazards | |
| GEOG 3412 | Conservation Practice and Resource Management | |
| GEOG 3422 | Political Ecology | |
| GEOG 3672 | Who Runs the World? Sex, Power, and Gender in Geography | |
| GEOG 3682 | International Development: Economics, Power, and Place | |
| GEOG 3692 | Introduction to Global Public Health | |
| GEOG 3812 | Mexico, Central America, and the Caribbean | |
| GEOG 3822 | China's Diverse Geographies: Environment, Society, Politics | |
| GEOG 3862 | Global Africa: Environment, Development, and Culture | |
| GEOG 4002 | Topics in Human and Environment/ Society Geography [2] | |
| GEOG 4173 | Research Seminar (may be applied to the concentration on a case-by-case basis) | |
| GEOG 4501 | Water Issues in the American West | |
| GEOG 4742 | Topics in Environment and Society [2] | |
| GEOG 4812 | Political Ecology & Latin America | |
| GEOG 4822 | Environment and Development in China | |
| GEOG 3930 | Internship (may be applied to the concentration on a case-by-case basis) | |
| GEOG 4990 | Senior Thesis (may be applied to the concentration on a case-by-case basis) | |
| Take one upper-division elective from either the Geographic Information Science, Human Geography, or Physical Geography list. | | 3-4 |
| **Total Credit Hours** | | **19-21** |

1 Unless otherwise noted, the department-enforced prerequisite for all courses is GEOG 1962, GEOG 1982, GEOG 1992 or GEOG 2092.

2 Special topics courses may be used to satisfy upper-division concentration requirements with approval from the department.

## Physical Geography Concentration

In addition to the courses required of all concentrations, complete the following GEOG coursework as well as the **ancillary mathematics and science coursework**.

| Code | Title | Credit Hours |
|---|---|---|
| **Required GEOG Coursework** | | |
| Select at least two of the following: | | 6-8 |
| GEOG 3351 | Biogeography | |
| GEOG 3511 | The Water Cycle | |
| GEOG 3601 | Principles of Climate | |
| GEOG 4241 | Earth Surface Processes | |
| Select at least two of the following electives: | | 6-8 |
| GEOG 3251 | Mountain Geosystems | |
| GEOG 3301 | Analysis of Climate and Weather Observations | |
| GEOG 3351 | Biogeography | |
| GEOG 3511 | The Water Cycle | |
| GEOG 3601 | Principles of Climate | |
| GEOG 4001 | Topics in Physical Geography [1] | |
| GEOG 4173 | Research Seminar (may be applied to the concentration on a case-by-case basis) | |
| GEOG 4201 | Biometeorology | |
| GEOG 4241 | Earth Surface Processes | |
| GEOG 4251 | River Processes and Forms: Fluvial Geomorphology | |
| GEOG 4261 | Glaciers and Permafrost | |
| GEOG 4271 | The Arctic Climate System | |
| GEOG 4311 | Watershed Biogeochemistry | |
| GEOG 4321 | Snow Hydrology | |
| GEOG 4331 | Mountain Climatology | |
| GEOG 4371 | Forest Geography: Principles and Dynamics | |
| GEOG 4401 | Soils Geography | |
| GEOG 3930 | Internship (may be applied to the concentration on a case-by-case basis) | |
| GEOG 4990 | Senior Thesis (may be applied to the concentration on a case-by-case basis) | |
| Take one upper-division elective from the Geographic Information Science, Human Geography, or Environment and Society Geography list. | | 3-4 |
| **Total Credit Hours** | | **15-20** |

| Code | Title | Credit Hours |
|---|---|---|
| **Ancillary Mathematics & Science Coursework** | | |
| Select one of the following two-semester sequences in calculus: | | 8-10 |
| MATH 1300 & MATH 2300 | Calculus 1 and Calculus 2 | |
| APPM 1350 & APPM 1360 | Calculus 1 for Engineers and Calculus 2 for Engineers | |
| Select three of the following semesters of physics and chemistry, including related labs: | | 14-15 |
| PHYS 1110 | General Physics 1 | |
| PHYS 1120 & PHYS 1140 | General Physics 2 and Experimental Physics 1 | |
| CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 | |
| CHEM 1133 & CHEM 1134 | General Chemistry 2 and Laboratory in General Chemistry 2 | |
| **Total Credit Hours** | | **22-25** |

[1] Special topics courses may be used to satisfy upper-division concentration requirements with approval from the department.

## Geographic Information Science Concentration

In addition to the courses required of all concentrations, complete the following GEOG coursework.

| Code | Title | Credit Hours |
|---|---|---|
| **Required GEOG Coursework** | | |
| GEOG 4103 | Geographic Information Science: Spatial Analytics | 4 |
| Select three of the following electives: | | 9-12 |
| GEOG 4003 | Topics in Geographic Skills | |
| GEOG 4043 | Advanced Geovisualization and Web Mapping | |
| GEOG 4093 | Remote Sensing of the Environment | |
| GEOG 4173 | Research Seminar (may be applied to the concentration on a case-by-case basis) | |
| GEOG 4203 | Geographic Information Science: Spatial Modeling | |
| GEOG 4303 | Geographic Information Science: Spatial Programming | |
| GEOG 4403 | Geographic Information Science: Space Time Analytics | |
| GEOG 4503 | Geographic Information Science: Project Management | |
| GEOG 3930 | Internship (may be applied to the concentration on a case-by-case basis) | |
| GEOG 4990 | Senior Thesis (may be applied to the concentration on a case-by-case basis) | |
| Take one upper-division elective from the Human Geography, Environment and Society Geography, or Physical Geography list. | | 3-4 |
| **Total Credit Hours** | | **16-20** |

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will complete all 12 credit hours of the Natural Sciences area of the Gen Ed Distribution Requirement, including the lab component and at least 6 credits hours of the Social Sciences area of this requirement.

Depending on which track students follow and which elective courses they select within the track of the major, students can complete all of the Social Sciences area and 3 credits in the Arts and Humanities area of the Gen Ed Distribution Requirement and, potentially, the Global Perspective and United States Perspective component of the Gen Ed Diversity Requirement.

**First Year**

| Fall Semester | | Credit Hours |
|---|---|---|
| GEOG 1001 | Our Changing Planet: Climate and Vegetation | 4 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/US Perspective) | | 3 |
| Elective/MAPS | | 3 |
| Elective/MAPS | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| GEOG 1011 | Our Changing Planet: Landscapes and Water | 4 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/Global Perspective) | | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3-5 |
| Elective/MAPS | | 3 |
| Elective | | 3-0 |
| | **Credit Hours** | **16-15** |

**Second Year**

| Fall Semester | | |
|---|---|---|
| GEOG 1962<br>or GEOG 1972<br>or GEOG 1982<br>or GEOG 1992<br>or GEOG 2092 | Geographies of Global Change<br>or Sustainable Futures, Environment and Society<br>or Global Geographies: Societies, Places, Connections<br>or Human Geographies<br>or Advanced Introduction to Human Geography | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) (if needed) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| GEOG 2053<br>or GEOG 3053 | Mapping Our World<br>or Geographic Information Science: Mapping | 3-4 |
| GEOG 3023 | Statistics and Geographic Data | 4 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) (if needed) | | 3 |
| | **Credit Hours** | **13-14** |

**Third Year**

| Fall Semester | | |
|---|---|---|
| GEOG Upper-division Elective | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) (if needed) | | 3 |
| GEOG 3023 | Statistics and Geographic Data | 4 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| GEOG Upper-division Elective | | 3 |
| GEOG Methods course (Upper-division) | | 3-4 |
| Gen. Ed. Distribution course (example: Social Sciences) (if needed) | | 3 |
| Upper-division Elective | | 3 |

| | |
|---|---|
| Elective | 3 |
| **Credit Hours** | **15-16** |
| **Fourth Year** | |
| **Fall Semester** | |
| GEOG Upper-division Elective | 3-4 |
| GEOG Upper-division Elective | 4-3 |
| Upper-division Elective | 3 |
| Upper-division Elective | 3 |
| Elective | 3 |
| **Credit Hours** | **16** |
| **Spring Semester** | |
| GEOG Upper-division Elective | 3 |
| GEOG Upper-division Elective | 3 |
| Upper-division Elective | 3 |
| Upper-division Elective | 3 |
| Elective or Upper-division Elective (if needed) | 3 |
| **Credit Hours** | **15** |
| **Total Credit Hours** | **122-123** |

# Learning Outcomes

- Demonstrate knowledge of geographic theories and concepts in the discipline, and a thorough understanding of interactions between human and environmental processes, through a geographical lens.
- Demonstrate the ability to perform critical inquiry in the discipline, including acquiring, analyzing, and interpreting geographical data to be used in statistical analyses, creating basic maps, and performing geospatial analyses.
- Demonstrate information literacy in relevant geographic scholarship.
- Effectively communicate about geographical issues through scholarly writing, presentations, and visualizations.
- Demonstrate critical thinking skills and logical approaches to problem solving within interdisciplinary settings.
- Demonstrate the ability to address real-world problems by applying advanced analytical techniques ranging from qualitative, to quantitative, to spatial and field survey methodologies.

# Geography - Minor

The geography minor is meant for students who would like to acquire basic knowledge of geography in addition to their major area of study. The department also offers undergraduate certificates in GIS (https://www.colorado.edu/geography/undergrad-program/undergraduate-certificates/#GIS-Certificate) and Arctic Studies (https://www.colorado.edu/geography/undergrad-program/undergraduate-certificates/).

For more information, visit the Undergraduate Geography Major & Minor Degrees (https://www.colorado.edu/geography/undergrad-program/undergraduate-geography-major-minor-degrees/) webpage.

# Requirements

## Program Requirements

Declaration of a minor is open to any student enrolled at CU Boulder, regardless of college or school affiliation.

- A minimum of 18 credit hours must be taken in the Department of Geography, including a minimum of 9 upper-division credit hours.
- All coursework applied to the minor must be completed with a grade of C- or better. No pass/fail work may be applied. The GPA of all minor coursework must equal 2.00 (C) or greater.
- Student pursuing an individually structured major, or who are pursuing a major in distributed studies, will not be eligible to earn a minor.
- Students will be allowed to apply no more than 9 credit hours (including 6 upper-division) of transfer work toward a minor.
- Coursework applied toward a minor may also be applied toward Gen Ed as well as the requirements for other majors.

## Optional Concentrations

No specific concentration is required and is not noted on student transcripts. However, students who do wish to focus on one area of geography should see the suggested course lists below. The list of courses may change at the department's discretion.

### Physical Geography Focus

The following two courses are prerequisites to all upper-division courses listed further below.

| Code | Title | Credit Hours |
|---|---|---|
| GEOG 1001 | Our Changing Planet: Climate and Vegetation | 4 |
| GEOG 1011 | Our Changing Planet: Landscapes and Water | 4 |

An additional lower-division course is available.

| Code | Title | Credit Hours |
|---|---|---|
| GEOG 2271 | Introduction to the Arctic Environment | 3 |

Among upper-division courses, the following sequences are suggested:

| Code | Title | Credit Hours |
|---|---|---|
| **Climatology** | | |
| GEOG 3301 | Analysis of Climate and Weather Observations | 3 |
| GEOG 3601 | Principles of Climate | 3 |
| GEOG 4331 | Mountain Climatology | 3-4 |
| **Biogeography** | | |
| GEOG 3351 | Biogeography | 3 |
| GEOG 4371 | Forest Geography: Principles and Dynamics | 3 |
| GEOG 4401 | Soils Geography | 3 |
| **Hydrology and Geomorphology** | | |
| GEOG 3511 | The Water Cycle | 4 |
| GEOG 4241 | Earth Surface Processes | 4 |
| GEOG 4321 | Snow Hydrology | 3-4 |
| GEOG 4401 | Soils Geography | 3 |

In addition, you will find it important to complete one course in statistics at the time you commence upper-division work in physical geography. Students considering graduate school in physical geography are strongly

encouraged to complete a year of coursework in general chemistry, physics, calculus and statistics.

**Upper-Division Courses**

| Code | Title | Credit Hours |
|---|---|---|
| GEOG 3251 | Mountain Geosystems | 3 |
| GEOG 3301 | Analysis of Climate and Weather Observations | 3 |
| GEOG 3601 | Principles of Climate | 3 |
| GEOG 3351 | Biogeography | 3 |
| GEOG 3511 | The Water Cycle | 4 |
| GEOG 4201 | Biometeorology | 3 |
| GEOG 4241 | Earth Surface Processes | 4 |
| GEOG 4251 | River Processes and Forms: Fluvial Geomorphology | 4 |
| GEOG 4261 | Glaciers and Permafrost | 3 |
| GEOG 4271 | The Arctic Climate System | 3 |
| GEOG 4311 | Watershed Biogeochemistry | 3 |
| GEOG 4321 | Snow Hydrology | 3-4 |
| GEOG 4331 | Mountain Climatology | 3-4 |
| GEOG 4371 | Forest Geography: Principles and Dynamics | 3 |
| GEOG 4401 | Soils Geography | 3 |

## Human Geography Focus

One of the following four courses are prerequisites to all upper-division courses listed further below.

| Code | Title | Credit Hours |
|---|---|---|
| GEOG 1962 | Geographies of Global Change | 3 |
| GEOG 1982 | Global Geographies: Societies, Places, Connections | 3 |
| GEOG 1992 | Human Geographies | 3 |
| GEOG 2092 | Advanced Introduction to Human Geography | 3 |

**Upper-Division Courses**

Additional prerequisites are listed.

| Code | Title | Credit Hours |
|---|---|---|
| GEOG 3422 | Political Ecology | 3 |
| GEOG 3612 | Reimagining Cities: Spaces of Power, Privilege, and Possibility | 3 |
| GEOG 3622 | Cities of the Global South | 3 |
| GEOG 3662 | Economic Geography | 3 |
| GEOG 3672 | Who Runs the World? Sex, Power, and Gender in Geography | 3 |
| GEOG 3682 | International Development: Economics, Power, and Place | 3 |
| GEOG 3692 | Introduction to Global Public Health | 4 |
| GEOG 3742 | Place, Power, and Contemporary Culture | 3 |
| GEOG 3812 | Mexico, Central America, and the Caribbean | 3 |
| GEOG 3822 | China's Diverse Geographies: Environment, Society, Politics | 3 |
| GEOG 3832 | Love & War Geographies: Imperialism, Militarism, and Development in South Asia | 3 |
| GEOG 3842 | Human Geography of Czechia: Political, Economic and Social Transitions | 3 |
| GEOG 3862 | Global Africa: Environment, Development, and Culture | 3 |
| GEOG 3882 | Geography of the Former Soviet Union | 3 |
| GEOG 4023 | Advanced Quantitative Methods for Spatial Data | 4 |
| GEOG 4292 | Migration, Immigrant Adaptation, and Development | 3 |
| GEOG 4622 | City Life | 3 |
| GEOG 4632 | Development Geography | 3 |
| GEOG 4712 | Political Geography | 3 |
| GEOG 4732 | Population Geography | 3 |
| GEOG 4742 | Topics in Environment and Society | 3 |
| GEOG 4762 | Geographies of Political Islam | 3 |
| GEOG 4832 | Geography of Tibet | 3 |
| GEOG 4852 | Health and Medical Geography | 3 |

## Environment-Society Geography Focus

The following two courses are prerequisites to all upper-division physical geography courses listed further below.

| Code | Title | Credit Hours |
|---|---|---|
| GEOG 1001 | Our Changing Planet: Climate and Vegetation | 4 |
| GEOG 1011 | Our Changing Planet: Landscapes and Water | 4 |

An additional lower-division course is available.

| Code | Title | Credit Hours |
|---|---|---|
| GEOG 2852 | Contemporary Southeast Asia: Environmental Politics | 3 |

**Upper-Division Courses**

Additional prerequisites may be listed.

| Code | Title | Credit Hours |
|---|---|---|
| GEOG 3251 | Mountain Geosystems | 3 |
| GEOG 3301 | Analysis of Climate and Weather Observations | 3 |
| GEOG 3351 | Biogeography | 3 |
| GEOG 3402 | Natural Hazards | 3 |
| GEOG 3412 | Conservation Practice and Resource Management | 3 |
| GEOG 3422 | Political Ecology | 3 |
| GEOG 3511 | The Water Cycle | 4 |
| GEOG 3601 | Principles of Climate | 3 |
| GEOG 3612 | Reimagining Cities: Spaces of Power, Privilege, and Possibility | 3 |

| | | |
|---|---|---|
| GEOG 3672 | Who Runs the World? Sex, Power, and Gender in Geography | 3 |
| GEOG 3682 | International Development: Economics, Power, and Place | 3 |
| GEOG 3692 | Introduction to Global Public Health | 4 |
| GEOG 3812 | Mexico, Central America, and the Caribbean | 3 |
| GEOG 3822 | China's Diverse Geographies: Environment, Society, Politics | 3 |
| GEOG 3862 | Global Africa: Environment, Development, and Culture | 3 |
| GEOG 4401 | Soils Geography | 3 |
| GEOG 4430 | Seminar: Conservation Trends | 3 |
| GEOG 4501 | Water Issues in the American West | 3 |
| GEOG 4742 | Topics in Environment and Society | 3 |
| GEOG 4632 | Development Geography | 3 |
| GEOG 4812 | Political Ecology & Latin America | 3 |
| GEOG 4822 | Environment and Development in China | 3 |
| GEOG 4852 | Health and Medical Geography | 3 |

### Geographic Information Science Focus

Students undertaking the GIS Certificate as well as a GEOG minor must take at least 9 additional credit hours of non-GIS GEOG classes to satisfy the minor requirements.

The following is a lower-division course in this concentration.

| Code | Title | Credit Hours |
|---|---|---|
| GEOG 2053 | Mapping Our World | 3 |

The following are prereqs for all upper-division courses, unless otherwise noted.

| Code | Title | Credit Hours |
|---|---|---|
| GEOG 3023 | Statistics and Geographic Data | 4 |
| GEOG 3053 | Geographic Information Science: Mapping | 4 |

### Upper-Division Courses

| Code | Title | Credit Hours |
|---|---|---|
| GEOG 4023 | Advanced Quantitative Methods for Spatial Data | 4 |
| GEOG 4043 | Advanced Geovisualization and Web Mapping | 4 |
| GEOG 4093 | Remote Sensing of the Environment | 4 |
| GEOG 4103 | Geographic Information Science: Spatial Analytics | 4 |
| GEOG 4173 | Research Seminar | 3 |
| GEOG 4203 | Geographic Information Science: Spatial Modeling | 4 |
| GEOG 4303 | Geographic Information Science: Spatial Programming | 4 |
| GEOG 4403 | Geographic Information Science: Space Time Analytics | 3 |
| GEOG 4503 | Geographic Information Science: Project Management | 3 |
| GEOG 4603 | GIS in the Social and Natural Sciences | 3 |

# Arctic Studies - Certificate

The Department of Geography (GEOG) offers an interdisciplinary undergraduate certificate in Arctic Studies, in collaboration with the Program in Nordic Studies (SCAN), the International Affairs Program (IAFS), the Department of Environmental Studies (ENVS), the Department of Anthropology (ANTH), the Department of Ethnic Studies (ETHN) and the research entities of the Cooperative Institute for Research in Environmental Sciences (CIRES), the National Snow and Ice Data Center (NSIDC) and the Institute of Arctic and Alpine Research (INSTAAR).

This certificate prepares students to address pressing environmental, political and cultural issues in the far north. A laboratory for studying the effects of global climate change, the Arctic region spans three continents, with territories in Canada, Greenland (Denmark), Finland, Iceland, Norway, Sweden, Russia and the United States. Its population exhibits considerable ethnic, linguistic and sociopolitical diversity, and contains numerous indigenous peoples. Issues as critical as nationalism, territorial rights and law, security, economic development and resource technology place the arctic at the center of global, regional and national interests. Further, the region's natural and social characteristics have inspired influential and enduring expressive culture—produced by locals and outsiders—from antiquity to the present.

These features make study of the arctic ideal for students pursuing careers in international politics and diplomacy, indigenous rights, environmental science and climate change, humanistic scholarship or creative work.

For more information, and to apply to the certificate in arctic studies, please contact Professor Mark Serreze (https://www.colorado.edu/geography/mark-serreze-0/) at serreze@nsidc.org

# Requirements

The certificate is open to all CU undergraduates and requires the completion of six courses for a total of 18 credit hours.

Credit hours are distributed in three categories: (1) certificate core courses, (2) environment and policy and (3) Culture and Society. Students must complete all three courses in the core category and one course in each of the other two categories plus one elective course. Only one 1000-level course is allowed. Nine of the 18 credits must be upper-division.

Up to three credits of approved study abroad experience may be applied to either the environment and policy or culture and society categories.

## Required Courses and Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **Required Core Courses** | | |
| GEOG 2271 | Introduction to the Arctic Environment | 3 |
| IAFS/SCAN 3631 | Arctic Society and Culture | 3 |
| PSCI 3206 | The Environment and Public Policy | 3 |
| **Society and Culture** | | **3-6** |
| *One course required, plus one elective in this category or in the Environment and Policy category* | | |
| ETHN 2013 | Critical Issues in Native North America | |

| | |
|---|---|
| GEOG 3882 | Geography of the Former Soviet Union |
| REES 2501 | Russia Beyond the Headlines: Media, Politics, Culture, and Environment |
| REES 3251 | Arctic Thrillers: Environment, Landscape and Literature of the Far North |
| SCAN 2201 | Introduction to Modern Nordic Culture and Society |
| SCAN 2202 | The Viking Age |
| SCAN 3202 | Old Norse Mythology |
| SCAN 3204 | Medieval Icelandic Sagas |
| SCAN 3251 | Arctic Thrillers: Environment, Landscape and Literature of the Far North |
| SCAN 3301 | Radical Nationalism in Contemporary Northern Europe |
| SWED 3010 | Advanced Swedish 1-DILS |
| SWED 3020 | Advanced Swedish 2 - DILS |
| Study Abroad - Global Seminar: Identity, Arts & Ethics in Contemporary Norway (Oslo and Bergen) | |
| **Environment and Policy** | **3-6** |
| *One course required, plus one elective in this category or in the Society and Culture category* | |
| ATOC 1060 | Our Changing Environment: El Nino, Ozone, and Climate |
| ATOC 4500 | Special Topics in Atmospheric and Oceanic Sciences - Upper Division (only if topic is Icesheets and Climate) |
| ATOC 4780 | Ice Sheets and Climate |
| EBIO 3170 | Mountain Ecology and Conservation |
| ENVS 1000 | Introduction to Environmental Studies |
| ENVS 3022 | Climate and Energy Justice |
| GEOG 3022 | Climate and Energy Justice |
| GEOG 3682 | International Development: Economics, Power, and Place |
| GEOG 4271 | The Arctic Climate System |
| GEOG 4371 | Forest Geography: Principles and Dynamics |
| GEOL 1060 | Global Change: An Earth Science Perspective |
| IAFS 1000 | Global Issues and International Affairs |
| PSCI 2116 | Introduction to Environmental Policy and Policy Analysis |
| **Total Credit Hours** | **18** |

# Plan(s) of Study

To complete the interdisciplinary undergraduate certificate in Arctic studies, a student must complete 6 courses for a total of 18 credit hours.

Students must take all 3 core courses, one course from the environment and policy category, one course from the culture and society category and one additional elective course from either category.

Students may take the courses at any time during their undergraduate program, completing them by their last semester. Please contact Professor Mark Serreze prior to starting the certificate program. Students may also contact the Department with any questions.

# Learning Outcomes

By the completion of the program, students will be able to:

- Explain the key aspects of the Arctic's physical environment, biota and connections with global climate and of the rapid changes that are taking place.
- Demonstrate an understanding of ethnic, linguistic and sociopolitical diversity among the numerous indigenous peoples of the region.
- Explain critical issues such as nationalism, territorial rights and law, security, economic development and resource technology that place the Arctic at the center of global, regional and national interests.
- Describe ways the region's natural and social characteristics have inspired influential and enduring expressive culture—produced by locals and outsiders.

# GIS and Computational Science - Certificate

The Department of Geography (GEOG) and the Department of Computer Science (CSCI) are offering a joint undergraduate certificate in GIS and computational science. The program draws upon faculty expertise in both departments, providing interdisciplinary training in spatial data analysis and computation, both of which characterize GIS in most career paths.

Geographic Information Scientists (GIScientists) have an ongoing concern with the collection, analysis and display of high precision spatial data. Computational geospatial skills are in high demand on campus and in local, regional and national job markets such as government employment, industry or consulting careers, and graduate school.

The certificate is available for all majors to apply to and may be of particular interest for students in other earth science disciplines and social science disciplines.

Non-matriculated students may enroll at CU through Continuing Education and once admitted, may apply for the certificate.

# Requirements

## Admissions

Visit the GIS and Computational Science Certificate (https://www.colorado.edu/geography/undergraduate-certificate-gis-and-computational-science/) website for application and admissions details.

## Prerequisites

Two prerequisites are required for admission into the certificate program (7–8 credits; alternatively, some prerequisites can be met by completing AP coursework in high school or by completing an equivalent course that transfers from another college).

| Code | Title | Credit Hours |
|---|---|---|
| **Prerequisities** | | |
| GEOG 3023 | Statistics and Geographic Data (or equivalent course w/spatial statistics focus) | 4 |
| CSCI 1200 | Introduction to Computational Thinking | 3-4 |
| or CSCI 1300 | Computer Science 1: Starting Computing | |
| or INFO 1701 | Programming for Information Science 1 | |

## Required Courses and Credits

The certificate requires 18–20 hours of coursework, including required courses and electives (but excluding prerequisites). Courses required for this certificate are offered each semester, and geography electives are typically offered at least once per year. Required courses and electives must be taken at CU Boulder.

Students who fulfill the introductory statistics requirement through AP coursework in high school are eligible to take an additional elective. Students undertaking the certificate as well as a GEOG minor can count no more than 9 credits from the GIS GEOG courses listed below toward the GEOG minor requirements.

Students must earn a C- or better in all coursework in the certificate and may not take certificate courses Satisfactory/Unsatisfactory (S/U).

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| Three (3) core courses are required: | | 11-12 |
| GEOG 4103 | Geographic Information Science: Spatial Analytics (prereqs GEOG 3023 and 3053) | |
| INFO 2201 | Programming for Information Science 2 | |
| or CSCI 2270 | Computer Science 2: Data Structures | |
| GEOG 3053 | Geographic Information Science: Mapping (may be concurrent with GEOG 3023) [1] | |
| or GEOG 4603 | GIS in the Social and Natural Sciences | |
| **Electives** | | |
| Choose two or more GIS electives to fulfill 18-20 credit hours, note only one remote sensing-focused course may count towards the GIS certificate: | | 6-7 |
| GEOG 4043 | Advanced Geovisualization and Web Mapping | |
| GEOG/GEOL 4093 | Remote Sensing of the Environment | |
| GEOG 4203 | Geographic Information Science: Spatial Modeling | |
| GEOG 4303 | Geographic Information Science: Spatial Programming | |
| GEOG 4403 | Geographic Information Science: Space Time Analytics | |
| GEOG 4503 | Geographic Information Science: Project Management | |
| GEOL 3050 | GIS for Geologists | |
| One or two upper-division GIS-based courses in another A&S department (syllabi to be approved beforehand by the certificate oversight faculty committee) (2-4 credits apiece) | | |
| On occasion, a GIS-based Special Topics class in GEOG or a cognate unit will be considered for inclusion as an elective. Syllabi for any special topics electives must be approved by the certificate oversight faculty committee before a student enrolls in the class. | | |
| **Total Credit Hours** | | **18-20** |

[1] Students cannot apply both GEOG 3053 and GEOG 4603 to the certificate.

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate knowledge and skills to identify, analyze and understand spatial patterns, with an emphasis on computation and analytical problem solving.
- Demonstrate the ability to apply computational knowledge and skills in a GIS environment to tackle society's important and pressing environmental problems.
- Demonstrate the ability to describe the special characteristics (scale dependence, spatial autocorrelation) and perform spatial data analysis with the possibility of developing additional programming skills.

# Hydrology - Certificate

Hydrology is the study of water storage and movement in the Earth system, including the effects of hydrologic fluxes on the distribution of energy, chemicals and sediments.

Students may take the courses at any time during their undergraduate program, completing them by their last semester.

# Requirements

The certificate is composed of two core courses aimed at providing students with a solid foundation on hydrologic sciences and their water management implications as well in quantitative analysis, both of which will be integral for the deeper understanding of hydrologic and related processes. Students will also need to round up their training and obtain the knowledge and skills deemed as fundamental for students to have upon graduation in order to be competitive in water management, consulting and other water-related jobs.

Consistent with other programs' requirements (including the GEOG major), students will need to obtain a grade of C- or higher in each and all required courses and electives in order to obtain the certificate.

## Prerequisites

Two prerequisite courses are required for admission into the certificate program.

| Code | Title | Credit Hours |
|---|---|---|
| **Prerequisites** | | |
| GEOG 3511 | The Water Cycle | 4 |
| GEOG 3023 | Statistics and Geographic Data | 4 |
| **Total Credit Hours** | | **8** |

## Required Courses

Some of the classes listed below have co-requisite or prerequisite courses. Students should check to see if they meet these requisites.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Coursework** | | |
| Choose three of the followings: | | 9-12 |
| GEOG 3601 | Principles of Climate | |
| GEOG 4201 | Biometeorology | |
| GEOG 4241 | Earth Surface Processes | |

| | | |
|---|---|---|
| GEOG 4251 | River Processes and Forms: Fluvial Geomorphology | |
| GEOG 4321 | Snow Hydrology | |
| GEOG 4501 | Water Issues in the American West | |
| Choose three of the following from outside the Department of Geography: | | 9 |
| GEOL 3030 | Introduction to Hydrogeology | |
| EBIO 4030 | Limnology | |
| EBIO 4100 | Advanced Ecology (Lake and Stream Ecology) | |
| EBIO 4155 | Ecosystem Ecology | |
| EBIO 4160 | Introduction to Biogeochemistry | |
| CVEN 3434 | Introduction to Applied Ecology | |
| CVEN 4122 | The Colorado River Water Crisis: Water Policy, Hydrological Variability, and Climate Change | |
| **Total Credit Hours** | | **18-21** |

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate a holistic approach to understanding the hydrologic spatial connections and interactions between the physical and human environment.
- Demonstrate sound, defensible and rigorous quantitative and qualitative methods to analyze and interpret hydrologic data in a meaningful way.
- Explain analytical and interpretive findings to various audiences in a respectful and professional manner.

# Geological Sciences

The options available in the undergraduate program in geological sciences are geology and geophysics and lead to the BA degree. Both options provide a strong basis for understanding the functioning of the Earth system. Students who are uncertain as to which option best suits their needs should contact a departmental advisor or faculty mentor. In each option, the undergraduate program emphasizes coursework in theoretical, laboratory and field-oriented aspects of the geological sciences. The nearby Rocky Mountains provide a natural laboratory for many of these courses.

Students interested in the geological sciences may also wish to consider the Baker Residential Academic Program (see the Undergraduate Residential Programs (p. 1096) section). Students who do not wish to pursue a career in the geosciences, or who would like to combine a basic knowledge of geologic sciences with that of some other field, should consider a minor in geological sciences. Students who intend to pursue graduate study in the geological sciences are encouraged to consider developing an honors thesis as part of their undergraduate studies.

The two options available in the undergraduate major offer different focus areas of instruction. Both options offer excellent preparation for students interested in pursuing professional careers, or graduate study, in the geological sciences.

Each option emphasizes knowledge in:

- The ways in which Earth responds to internal and external forces; the physical, chemical and biological evolution of Earth; and the nature of the materials of which the Earth is made.
- The role of physics, chemistry, mathematics and biology in understanding geological processes.
- The history of discoveries and ideas that have contributed to our current knowledge of Earth and the planetary system.

**Course code for this program is GEOL.**

## Geology Honors Program

Opportunity is provided for qualified geology majors to participate in the geology honors program and graduate with honors (cum laude, magna cum laude or summa cum laude) in geology. Students interested in the honors program should contact the departmental honors advisor during their junior year.

## Professional Licensure

The State of Colorado does not require individuals working in Geology or the Geological Sciences to obtain Professional Geology Licensure, however many states require professional geologists to pass the ASBOG Fundamentals of Geology (FG) and/or Practice of Geology (PG) examinations. Information regarding ASBOG examination specifications can be found at the ASBOG (https://www.asbog.org/) website.

Students planning to seek professional licensure or certification for employment in a state other than Colorado, are strongly recommended to contact the appropriate licensing entity in the state in which they are, or plan to be, located in order to seek information and guidance regarding licensure or certification requirements and how the education received at CU Boulder may assist the student in their efforts to gain licensure in that state.

## Bachelor's Degree

- Geology - Bachelor of Arts (BA) (p. 352)

## Minor

- Geology - Minor (p. 356)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Abbott, Lon D. (https://experts.colorado.edu/display/fisid_145044/)
Teaching Professor of Distinction; PhD, University of California, Santa Cruz

Anderson, Robert S. (https://experts.colorado.edu/display/fisid_130117/)
Distinguished Professor; PhD, University of Washington

Anderson, Suzanne Prestrud (https://experts.colorado.edu/display/fisid_131099/)
Professor; PhD, University of California, Berkeley

Arthurs, Leilani A. (https://experts.colorado.edu/display/fisid_145087/)
Associate Professor; PhD, University of Notre Dame

Chin, Karen (https://experts.colorado.edu/display/fisid_122666/)
Professor; PhD, University of California, Santa Barbara

Clark, Alisha (https://experts.colorado.edu/display/fisid_164457/)
Assistant Professor; PhD, University of California-Davis

Crow, Carolyn Alicia (https://experts.colorado.edu/display/fisid_163334/)
Assistant Professor; PhD, University of California-Los Angeles

Eberle, Jaelyn J. (https://experts.colorado.edu/display/fisid_126544/)
Professor; PhD, University of Wyoming

Farmer, G. Lang (https://experts.colorado.edu/display/fisid_100498/)
Professor; PhD, University of California, Los Angeles

Flowers, Rebecca M. (https://experts.colorado.edu/display/fisid_144054/)
Professor; PhD, Massachusetts Institute of Technology

Ge, Shemin (https://experts.colorado.edu/display/fisid_101387/)
Distinguished Professor, Chair; PhD, Johns Hopkins University

Hynek, Brian Michael (https://experts.colorado.edu/display/fisid_130622/)
Professor; PhD, Washington University

Jones, Craig H. (https://experts.colorado.edu/display/fisid_105590/)
Professor; PhD, Massachusetts Institute of Technology

Kopf, Sebastian H. (https://experts.colorado.edu/display/fisid_155295/)
Assistant Professor; PhD, California Institute of Technology

Mahan, Kevin H. (https://experts.colorado.edu/display/fisid_143975/)
Professor; PhD, University of Massachusetts at Amherst

Marchitto, Thomas (https://experts.colorado.edu/display/fisid_128241/)
Professor, Associate Chair; PhD, Massachusetts Institute of Technology

Markle, Bradley R. (https://experts.colorado.edu/individual/fisid_167413/)
Assistant Professor; PhD, University of Washington

Mueller, Karl Jules (https://experts.colorado.edu/display/fisid_107629/)
Professor; PhD, University of Wyoming

Overeem, Irina (https://experts.colorado.edu/display/fisid_125258/)
Associate Professor; PhD, Delft University of Technology (Netherlands)

Rahman, Shaily (https://experts.colorado.edu/display/fisid_168587/)
Assistant Professor; PhD, SUNY at Stony Brook

Schulte-Pelkum, Vera (https://experts.colorado.edu/display/fisid_126623/)
Associate Research Professor, Lecturer; PhD, University of California-San Diego

Sepulveda Arellano, Julio Cesar (https://experts.colorado.edu/display/fisid_154923/)
Associate Professor; PhD, University of Bremen (Germany)

Sheehan, Anne (https://experts.colorado.edu/display/fisid_103645/)
Chair, Professor; PhD, Massachusetts Institute of Technology

Simpson, Carl (https://experts.colorado.edu/display/fisid_159652/)
Assistant Professor; PhD, University of Chicago

Tilton, Eric (https://experts.colorado.edu/display/fisid_126548/)
Professor, Associate Chair; PhD, University of California, Santa Cruz

Snell, Kathryn Elaine (https://experts.colorado.edu/display/fisid_155298/)
Associate Professor; PhD, University of California, Santa Cruz

Stempien, Jennifer (https://experts.colorado.edu/individual/fisid_143751/)
Associate Teaching Professor; PhD, Virginia Polytechnic Institute and State University

Templeton, Alexis S. (https://experts.colorado.edu/display/fisid_141202/)
Professor; PhD, Stanford University

Tiampo, Kristy F. (https://experts.colorado.edu/display/fisid_155908/)
Professor; PhD, University of Colorado Boulder

Trower, Lizzy (https://experts.colorado.edu/display/fisid_159463/)
Assistant Professor; PhD, Stanford University

Tucker, Gregory E. (https://experts.colorado.edu/display/fisid_130605/)
Professor; PhD, Pennsylvania State University

Wing, Boswell A. (https://experts.colorado.edu/display/fisid_158302/)
Associate Professor; PhD, Johns Hopkins University

# Courses

**GEOL 1010 (3) Exploring Earth**
Introductory geology for majors and non-majors. Studies Earth, its materials, its characteristics, its dynamic processes, and how it relates to people. Separate lab (GEOL 1030) is recommended. Degree credit not granted for both GEOL 1010 and GEOL 1012.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**GEOL 1012 (3) Exploring Earth for Scientists**
Studies Earth, its materials, its characteristics, its dynamic processes, and how it relates to people. This course is an introductory geology course suitable for geology and other STEM majors. Like GEOL 1010, but taught at a higher intellectual level with a greater amount of quantitative analysis. Separate lab (GEOL 1030) is recommended. Degree credit not granted for both GEOL 1010 and GEOL 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 1020 (3) Dodos, Dinos, and Deinococcus: The History of a Habitable Planet**
Examines how the solid, fluid, and living Earth interact, how changes in the oceans, atmosphere and life reflect that interaction over the immensity of geologic time, and how the rock record is analyzed to reconstruct the co-evolution of Earth and life.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**GEOL 1030 (1) Introduction to Geology Laboratory 1**
Features field trips to local points of geologic interest. Studies rocks and topographic and geologic maps. Meets the MAPS requirement for natural science lab, if taken with GEOL 1010 or GEOL 1012.
**Recommended:** Requisite Concurrent registration in any 1000-level geology course is beneficial but not required.
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science Lab or Lab/Lec

**GEOL 1040 (3) Geology of Colorado**
Reviews the geologic evolution and history of Colorado. It first develops the basic concepts needed to interpret the geology and then systematically shows how the state evolved through geologic time. Designed for those who enjoy understanding the beauty and splendor of the state.
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**GEOL 1060 (3) Global Change: An Earth Science Perspective**
Focuses on evidence for planetary warming, climate change, glacier and ice-sheet melting and sea level rise both now and in the recent past. Attempts to develop understanding of the interactions within the coupled Earth system that regulate such changes. Utilizes examples from the geological and instrumental records, and evaluates the global warming forecast.
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**GEOL 1150 (3) Water, Energy and Environment: An Introduction to Earth Resources**
Explores how geological processes and human populations together affect the quantitfy, quality and availability of Earth resources. Includes examination of the water cycle and how humans use and modify water; fossil-fuel and mineral resources, and renewable energy options. Sustainable versus non-sustainable use and population growth is considered.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**GEOL 1160 (3) Environmental Geoscience ¿ Where Science Meets Society**
This is an introductory-level course designed primarily for freshmen non-science majors. The course targets four main questions at the intersection of geoscience and society. (1) What is science and how is it useful to me? (2) How do Earth processes, particularly natural disasters, impact people? (3) How does the Earth, particularly its natural resources, allow people to live the way we do? (4) How do people impact the environment? The course is designed to not only support students in learning about how science and society intersect in the realm of environmental geoscience, it is also designed to support students¿ development of academic-success and career-ready skills including goal setting, time management, communication, collaboration and teamwork, and more.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 1170 (3) Our Deadly Planet**
This course investigates those events so dramatic and catastrophic that they have left evidence in the geologic record that suggest they significantly impacted life on the planet. These include. but are not limited to, violent volcanic eruptions, mega-earthquakes and associated tsunamis, landslides and sector collapse on volcanoes, megafloods, rapid climatic change, superstorms, and impacts from asteroids and comets. The intent is to use examples from recent events and processes to frame and interpret evidence for these types of events observed in the rock record.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**GEOL 1180 (3) Our Microbial Planet**
Examines how microorganisms shape the world around us, both throughout the Earth's history and today. Major topics include the origin and evolution of life, the interplay between microbes and the environment, roles of microbes in global change, and applications of microbiology in biotechnology and energy.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**GEOL 2001 (4) Planet Earth**
Explores the dynamics of planet Earth with particular emphasis on the factors that make the planet habitable. Includes examination of heat balance, hydrology, geomorphology, biogeochemistry and climate history through both lecture and lab-based activities. Required for the Geology major, introduces students to the major concepts in contemporary Earth system science.
**Requisites:** Requires prerequisite course of GEOL 1010 or GEOL 1012 or GEOL 1020 or GEOL 1040 or GEOL 1060 or GEOL 1150 or GEOL 1170 or GEOL 1180 or GEOL 2100 or ENVS 1000 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 2005 (4) Introduction to Earth Materials**
Provides introduction to the classification, composition and properties of the materials that compose the Earth, how these materials are studied, and how they are used to interpret Earth history and processes. Required for the Geology major.
**Requisites:** Requires prerequisite courses of (GEOL 1010 or GEOL 1012 or GEOL 1020 or GEOL 1040 or GEOL 1060 or GEOL 1150 or GEOL 1170 or GEOL 1180 or GEOL 2100) and CHEM 1113 and CHEM 1114 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 2040 (3) The Search for Life in the Universe**
Introduces the scientific basis for the possible existence of life elsewhere in the universe. Includes origin and evolution of life on Earth and the search for evidence of life in our solar system, including Mars and Jupiter's moon Europa. Discusses the conditions necessary for life and whether they might arise on planets around other stars.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 2040
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 2100 (3) Environmental Geology**
Introduces the influences of geologic processes on human lives and the changes human actions cause in geologic systems. Uses examples and case studies from Colorado and the West.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 2700 (2) Introduction to Field Geology**
Introduces basic field techniques necessary to collect geologic data and samples, and necessary to map geologic units.
**Requisites:** Requires prerequisite courses of GEOL 1030 and GEOL 2005 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3005 (3) Mesozoic Monsters ¿ Dinosaurs, Pterosaurs, and Sea Lizards**
Origin and evolution of the reptiles that lived during the Mesozoic Era, including dinosaurs, pterosaurs, mosasaurs, and plesiosaurs. Course will focus on evolution, paleobiology, paleoecology, and extinction of these extraordinary animals, and a history of their discoveries. The course also introduces students to the scientific method and how hypotheses in paleontology are formulated and tested.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3010 (3) Introduction to Mineralogy**
Covers origin, occurrence, identification, classification, and uses of minerals with emphasis on applications of mineralogy to economic geology and petrology. Two lectures and one lab per week.
**Requisites:** Requires prerequisite courses of CHEM 1113 and CHEM 1114 and GEOL 2005 and MATH 1300 or APPM 1350 (all minimum grade C-).
**Recommended:** Prerequisite GEOL 2005.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3020 (4) Petrology**
Studies field relations, petrography, petrology, chemistry, and origins of igneous and metamorphic rocks by means of lectures, reading, and lab and field experience. Labs include instruction in the fundamentals of optical petrography and the study of rocks in thin section.
**Requisites:** Requires prerequisite course of GEOL 2005 or GEOL 3010 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3023 (4) Statistics and Geographic Data**
Learn how to use computational and statistical tools to solve problems in the geographic domain and apply introductory statistical concepts to real world problems through lab exercises. Using spatial data you will be trained in powerful specialized descriptive and predictive analysis technique. You will explore how to manipulate and visualize data and make inference using state-of-the art statistics software, applied to various social and Earth Science problems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 3023
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Quantitative Reasoning Math

**GEOL 3030 (3) Introduction to Hydrogeology**
Introduces groundwater flow concepts, hydrologic cycle, physical and chemical properties, flow net, hydraulic potential, geologic controls on heterogeneity and anisotropy, aquifers and aquitards in a geologic system, saturated and unsaturated flow, flow to a well, pumping tests, and role of groundwater in geologic processes.
**Requisites:** Requires prerequisite courses of any 1000-level GEOL lecture course (GEOL 1010, 1012, 1020, 1040, 1060, 1150, 1170, or 1180), GEOL 2001, and (MATH 1300 or APPM 1350) (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3040 (3) Global Change: The Recent Geological Record**
Geological records in lakes, oceans, deserts, and around glaciers indicate the significant changes in the global systems that have taken place over the last few hundred or thousand years. Explores the timing and nature of these changes. Department enforced prerequisites: any two-course sequence of natural science core courses.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3050 (2) GIS for Geologists**
Provides an introduction to Geographic Information Systems (GIS) techniques focused on geological applications. Covers GIS analyzing, mapping and GPS use. Basic computer skills are a plus before entering the class.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3070 (3) Introduction to Oceanography**
Explores Earth's dynamic oceans. Discusses the disciplines of oceanography including marine geology, chemistry, biology and physical oceanography with emphasis on global change. Specific topics may include: tectonics, currents, biogeochemical cycles, ecology and global warming.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 3070
**Recommended:** Prerequisite any 1000-level ATOC or GEOL course or ATOC major.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3090 (3) Developing Scientific Writing Skills**
Focuses on the development of scientific writing skills. Enhances student ability to write professionally, revise text and review the work of others. Writing assignments integrate the subject matter of different topics in earth science. Department enforced prerequisites: a lower division writing course.
**Requisites:** Two of the following: GEOL 2001 or GEOL 2005 or GEOL 2700 or GEOL 3010 or GEOL 3030 or GEOL 3120 or GEOL 3320 or GEOL 3430 or GEOL 3820 (min grade C-).
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**GEOL 3120 (4) Structural Geology**
Introduces the basic principles and processes involved in deformation of natural rocks and minerals and the techniques used to analyze a variety of common geological structures (e.g., fractures, folds, fault zones).
**Requisites:** Requires prerequisite courses of GEOL 2001 and GEOL 2005 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3181 (4) Microbial Planet Laboratory**
Provides beginner friendly lab & research experience working on a microbiology project. The course teaches how to conduct original scientific research from hypothesis to experimentation, evaluation and reporting. Students study non-pathogenic microorganisms they isolate themselves from nature as part of the course. Hands-on topics covered in class include how to isolate & culture new microbes; how to observe, describe and classify them; and how to examine their metabolic capabilities such as the production of antibiotics.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 3181
**Requisites:** Requires prerequisite courses of CHEM 1113 and CHEM 1114 or CHEM 1400 and CHEM 1401 (all minimum grade C-).
**Recommended:** Prerequisite GEOL 1180 or MCDB 1150 or EBIO 1210.

**GEOL 3300 (3) Extraterrestrial Life**
Discusses the scientific basis for the possible existence of extraterrestrial life. Includes origin and evolution of life on Earth; the possibility of life elsewhere in the solar system, including Mars; and the possibility of life on planets around other stars. Department enforced prerequisite: one-year sequence in a natural science.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 3300
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3320 (3) Introduction to Geochemistry**
Students build upon principles introduced in general chemistry in order to predict and interpret chemical dynamics in Natural environmental systems. We explores the formation and chemical differentiation of the early Earth, how chemical weathering and mineral dissolution and precipitation modifies the Earth's surface, and how redox biogeochemistry shapes aquatic environments.
**Requisites:** Requires prerequisite courses of CHEM 1113, CHEM 1114, GEOL 2001, and (MATH 1300 or APPM 1350). All minimum grade C-.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3330 (3) Principles of Geophysics**
Provides an introduction to fundamental geophysics including seismology, geomagnetism, gravity, and electromagnetic methods with applications to plate tectonics and exploration of the subsurface.
**Requisites:** Requires prerequisite courses of MATH 1300 or APPM 1350 and PHYS 1110 or PHYS 1115 and GEOL 2001 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3410 (3) Paleobiology**
Surveys morphology, ecology and evolution of ancient animal and plant life and their interactions on Earth. Fossils used to solve geological and biological problems. Department enforced prerequisites: GEOL 1010 and GEOL 1020 or GEOL 2005 or EBIO 1030 and EBIO 1040 or EBIO 1210 and EBIO 1220 (all minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3430 (4) Sedimentology and Stratigraphy**
Introduces the study of sedimentary rocks emphasizing their origin, characteristics, and interpretation; and the principles and techniques for establishing the temporal order and spatial distribution of sedimentary layers.
**Requisites:** Requires prerequisite courses of GEOL 2001 and GEOL 2005 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3520 (3) Energy and Climate Change: An Interdisciplinary Approach**
Examines sources of energy and other resources in light of their availability, use, environmental impact, as well as their impact on policy, economics and values. As fossil fuels are the dominant energy source today, particular emphasis is placed on climate impacts and the carbon cycle. All material is assessed through the lenses of the physical sciences, policy, ethics and economics.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3520
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3540 (3) Introduction to Petroleum Geology**
Discusses the origin and distribution of conventional and unconventional petroleum resources, source rocks, types of traps and seals, reservoir rock properties, exploration methods (seismic data analysis and interpretation, formation evaluation, subsurface mapping), reservoir characterization and modeling, reserves calculations.
**Requisites:** Requires prerequisite courses of GEOL 2001 and GEOL 2005 (minimum grade C-).
**Recommended:** Corequisite GEOL 3430.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3600 (3) Introduction to Python Programming for Earth Scientists**
Introduces students to scientific computing and computer programming using the Python language. Emphasis is on scientific applications such as data input and analysis, plotting, and simulation. Examples are drawn from earth and environmental sciences. Course covers variables, operations, data types, conditionals, loops, data structures, array calculations, and libraries for data analysis and plotting. Coursework is primarily based on weekly programming assignments.
**Requisites:** Requires prerequisite course of GEOL 2001 (minimum grade C-).
**Recommended:** Prerequisite Introductory course in GEOL, ENVS, GEOG, ATOC, or EVEN.

**GEOL 3720 (3) Evolution of Life: The Geological Record**
Discusses the evolution of life on Earth, beginning with the earliest origins and surveying the major steps that led to the rise of higher plants and animals. Covers modern ideas on the causes of periodic mass extinctions in both the marine and terrestrial realms. Emphasizes geologic evidence for the pathways of evolution, using examples from the ordinary to the bizarre.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3820 (4) The Fluid Earth**
Examines the myriad forms of fluid behavior found on Earth, from the atmosphere to the inner core. Explores how basic principles of fluid physics may be used to understand a broad range of earth processes, including mantle convection, atmosphere and ocean dynamics, stream flow, lava spreading, and glacier motion, among others. Covers fundamental fluid concepts such as viscosity, pressure, convection, friction, and free-surface flow.
**Requisites:** Department enforced prerequisites: GEOL 2001 and (MATH 1300 or (APPM 1340 and APPM 1345) or APPM 1350) (all minimum grade of C-).
**Recommended:** Prerequisites Any 1000 level GEOL class and PHYS 1110.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3910 (4) Earth and Planetary Inference**
Introduces modern ways to interpret earth science observations in the context of conceptual models. We will learn how earth and planetary scientists synthesize geological, geochemical, and geophysical measurements and theoretical knowledge to make new discoveries and predictions. The tools that will be introduced in the course range from order-of-magnitude estimation techniques to a gentle intro to inverse thinking.

**GEOL 3950 (3) Natural Catastrophes and Geologic Hazards**
Surveys historic and prehistoric natural disasters, their cause and potential for recurrence. Meteorite impact, earthquakes, volcanic eruptions, tsunamis, landslides, floods, magnetic reversals and major extinction events. Department enforced prerequisite: one year of science.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4001 (1) Geology Majors Research Seminar**
Reading and discussion seminar to enhance students¿ critical evaluation of research design, assumptions, and presentation of results in the geosciences. Readings will focus on the events involved in the geologic evolution of the American West and its timing. Papers read will employ a variety of geologic and geophysical techniques. Geared towards students completing independent research and interested in pursuing a research-focused career. Development of career/graduate school plan and application materials is covered.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Requires Prerequisites of GEOL 2005 or GEOL 2001 (all minimum grade C-). Restricted to Geology majors only.
**Recommended:** Prerequisite or corequisite GEOL 2700.

**GEOL 4021 (4) Petrology: Evolution of Crustal and Mantle Rocks**
Origin, physical, and chemical properties of igneous and metamorphic rocks. This course develops a thermodynamic framework for the interpretation of geologic processes from observed mineral assemblages and rock textures. Laboratory component emphasizes the study of rocks in thin section and hand samples to understand earth processes in the mantle and crust.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5021
**Requisites:** Requires prerequisite courses of CHEM 1113 and CHEM 1114 and GEOL 2005 and (MATH 1300 or APPM 1350) (all minimum grade C-).
**Recommended:** Prerequisites GEOL 2001 and 2700.
**Grading Basis:** Letter Grade

**GEOL 4060 (4) Oceanography**
Examines the ocean as a system influencing the Earth's surficial processes and climate. Composition and properties of seawater, ocean circulation, waves, tides, coastal-, shallow-, and deep-water processes, biogeochemical cycles, deep sea sediments. Laboratory emphasizes the use of oceanographic data. Department enforced prerequisite: one semester chemistry or physics or geology.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5060
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4070 (3) Paleoclimatology**
Covers the primary forcings and feedbacks that determine Earth's energy balance and the resultant climate system on decadal to millennial time scales. Covers ocean/atmosphere circulation, the role of ice sheets in the climate system, monsoons, Holocene climate change and 20th Century warming. Includes coverage of the proxies available to reconstruct climates of the past and the archives that contain these proxies. Department enforced prerequisite: environmental science or geology introduction sequence courses.
**Requisites:** Requires prerequisite course of GEOL 2001 (minimum grade C-).
**Recommended:** Prerequisite natural science majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4093 (4) Remote Sensing of the Environment**
Covers acquisition and interpretation of environmental data by remote sensing. Discusses theory and sensors as well as manual and computerized interpretation methods. Stresses infrared and microwave portions of the spectrum.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5093 and GEOG 4093 and GEOL 5093
**Requisites:** Requires prerequisite course of APPM 1340 1345 or APPM 1350 or ECON 1088 or 3818 or MATH 1081 or 1300 or 1310 or 2510 or ANTH 4000 or BCOR 1020 or GEOG 3023 or GEOL 3023 or PSCI 2075 or PSYC 2111 or SOCY 2061 or 4061 or STAT 4000 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4120 (3) Advanced Structural Geology and Tectonics**
Provides valuable exposure to theory and applications related to deformation (rheology) of solid Earth materials as well as the structural and geophysical characteristics of the world's major orogenic belts. The processes that will be covered span a wide range of Earth's depths, from compaction in sedimentary rocks and flow of ice/salt near Earth's surface to cataclastic mechanisms in fault rocks to plastic flow of deep crust and mantle rock. The course will involve lectures, some in-class and take home problem sets, some local field exercises and field data analysis, classic and modern paper discussions, and a research term project (written and oral presentation).
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5120
**Requisites:** Requires prerequisite course of GEOL 3120 (minimum grade C-).
**Grading Basis:** Letter Grade

**GEOL 4150 (2) Planetary Field Geology**
Provides an overview of the geology, age and origins of the solid (rocky) planets, dwarf planets and moons of our solar system and the processes that form them from comparative studies from comparative geology. Includes modules on volcanism, rifting, aeolian processes, fluvial erosion, impacts, climate change and paleontology.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5150
**Requisites:** Requires prerequisite course of GEOL 2700 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4160 (3) Introduction to Biogeochemistry**
Covers fundamentals of biogeochemical cycling, emphasizing water, carbon and nutrient dynamics in terrestrial ecosystems; chemical interactions of atmosphere, biosphere, lithosphere and hydrosphere; natural and human-managed environments. Department enforced prerequisites: GEOL 3320 or EBIO 3270 and CHEM 1011.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4160 and ENVS 4160
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4185 (3) Geomicrobiology**
Examines how microbial and chemical processes interact on the Earth¿s surface today and have shaped the planet throughout its history. Emphasis will be placed on how the life styles and chemical ingenuity of microorganisms drive key biogeochemical processes including weathering and transformations of carbon, oxygen, sulfur, iron and nitrogen. Towards this goal, major geologic and evolutionary events will be examined through the lens of microbial diversity, metabolic energetics, microbe-mineral interactions, and molecular biomarkers.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5185, ENVS 4185, and MCDB 4185
**Requisites:** Requires prerequisite courses of CHEM 1113 and CHEM 1114 or CHEM 1400 and CHEM 1401 (minimum grade C-).
**Recommended:** Prerequisites GEOL 1180 or MCDB 1150 or GEOL 3320 or EBIO 3400 or ENVS 4160 or EVEN 4484.
**Grading Basis:** Letter Grade

**GEOL 4215 (2) Geochronology and Thermochronology**
Constraining the timing of events and rates of processes is fundamental to earth science research. The field of geochronology and thermochronology is rapidly evolving. Cutting-edge aspects of geochronologic methods and emerging techniques will be especially emphasized. Lectures will emphasize the principles and assumptions of each technique. Seminar discussions will focus on recent papers that demonstrate state-of-the-art applications to diverse problems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5215
**Requisites:** Requires prerequisite courses of GEOL 2001 and GEOL 2005 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4241 (4) Earth Surface Processes**
Earth¿s surface is constantly reshaped by water, ice, wind, and life. This class investigates the earth's landscapes and the processes that modify them, both gradually by slow weathering and erosion, and abruptly through the action of floods, landslides, and other geologic events. We cover surface processes in hillslope, glacial, riverine, desert, and coastal environments. Upon completion of the course, students will have mastered knowledge about diverse surface processes and landforms and applied core geomorphic principles to a variety of landscapes. Students will also learn that understanding surface processes is important for managing natural hazards (e.g., landslides and floods). This course will draw from many disciplines, including geology, geography, physics, chemistry, and biology. The laboratory portion of the course will include quantitative problem solving and field trips to collect and analyze geomorphic data.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4241
**Requisites:** Requires prerequisite courses of GEOG 1011 or GEOL 2001 and a calculus course (MATH 1300 or APPM 1350 or (APPM 1340 and APPM 1345)), all minimum grade C-.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4270 (3) Marine Chemistry and Geochemistry**
Examines the chemical, biological, geological and physical processes affecting (and affected by) the chemistry of the oceans. Topics include: chemical cycling in seawater; the marine carbon cycle and its long-term control on atmospheric CO2; the large-scale interdependence of nutrient distributions and biological productivity, chemical tracers of ocean circulation; the chemistry of marine sediments, including early diagenesis.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5270
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors). Requires prerequisite courses of CHEM 1113, CHEM 1114, CHEM 1133, CHEM 1134, and GEOL 2001 (minimum grade C-).
**Recommended:** Prerequisites introductory chemistry, introductory geology, introductory oceanography.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4330 (3) Cosmochemistry**
Investigates chemical and isotopic data to understand the composition of the solar system: emphasis on the physical conditions in various objects, time scales for change, chemical and nuclear processes leading to change, observational constraints, and various models that attempt to describe the chemical state and history of cosmological objects in general and the early solar system in particular.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5330 and ASTR 4330 and ASTR 5330
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors). Requires prerequisite courses of (CHEM 1113 or CHEM 1400 or CHEN 1211) and (PHYS 1110 or PHYS 1115); all minimum grade C-.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4341 (3) The Cryosphere: Earth's Icy Environments**
Serves as an advanced introductory course in to the cryosphere for science majors. The course covers the nature of ice and the icy component of the Earth System, and how changing ice affects society. The course will not cover sea ice. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5341
**Requisites:** Requires prerequisite course of GEOL 2001 or PHYS 1110 or PHYS 1115 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4380 (3) Fundamentals of Stable Isotope Geochemistry**
This course teaches students the fundamental principles of stable isotope fractionation during physical and biological processes, and the application of these behaviors to a wide range of important geologic questions. The course will use classic case studies from the geologic record to illustrate these principles.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5380
**Requisites:** Requires prerequisite courses of (MATH 1300 or APPM 1350) and CHEM 1113 (all minimum grade C-).

**GEOL 4474 (4) Vertebrate Paleontology**
Discusses the history and evolution of the vertebrates, including the phylogenetic relationships and evolutionary patterns of the major groups. Lab focuses on comparative vertebrate osteology and fossil representation of major groups. Department enforced prerequisites: GEOL 1020 and GEOL 3410 (or permission from the instructor).
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5474
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4611 (3) Organic Geochemistry**
Explores the ¿biomarker concept¿ as a tool to elucidate microbial, biogeochemical, and climatic processes in natural systems through three fundamental goals: a) characterization and classification of organic molecules in complex, natural mixtures; b) biosynthesis, transport, transformation, preservation and destruction of organic matter in nature; c) application of lipid biomarkers and their stable isotope composition to study biological, biogeochemical, and climatic processes in modern and ancient systems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5611
**Requisites:** Requires prerequisite courses of CHEM 1113, CHEM 1114, CHEM 1133, and GEOL 2001 (all minimum grade C-).
**Recommended:** Prerequisite GEOL 3320 or GEOL 4270.
**Grading Basis:** Letter Grade

**GEOL 4660 (3) Sedimentology and Geobiology of Carbonates**
Focuses on how carbonate sediments are formed, deposited, and lithified and what influences the preservation and alteration of textural and geochemical signals. We will cover facies identification, interpreting depositional environment, and carbonate geochemistry, with a particular emphasis on recent advances and unanswered questions at the intersection of carbonates and geobiology, including the role of microbial carbonate precipitation and/or dissolution in the formation and degradation of stromatolites, carbonate mud, ooids, etc.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5660
**Requisites:** Requires prerequisite course of GEOL 3430 (minimum grade C-).
**Recommended:** Prerequisites GEOL 3320, GEOL 4185.

**GEOL 4670 (3) Isotope Geology**
Introduces principles of stable and radiogenic isotope systematics in inorganic and organic geochemistry. Emphasizes application of isotope data to problems in igneous, metamorphic and sedimentary petrology, geobiochemistry, and petroleum genesis.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5670
**Requisites:** Requires prerequisite a course of MATH 1300 or APPM 1350 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4675 (3) Stable Isotopes in Paleoclimate and Paleoecology**
Explores the use of stable isotope geochemistry for research questions in paleoclimatology and paleoecology. Covers physical and biological drivers of isotopic fractionation, systematics and applications of light elements such as carbon, nitrogen, oxygen, hydrogen, sulfur and boron and some less traditional isotopic systems. Applications include marine and terrestrial paleoclimate proxies and some uses for ecology and paleoecology.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5675
**Requisites:** Requires prerequisite course of CHEM 1113 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4700 (1-4) Special Geological Topics**
Studies in selected geological subjects of special current interest (for undergraduates).
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4711 (2) Igneous and Metamorphic Field Geology**
Applies field techniques to interpretation of igneous and metamorphic rocks. Field exercises and lectures focus on collecting data required to map igneous and metamorphic rock units.
**Requisites:** Requires prerequisite courses of (GEOL 2001 or GEOL 2700) and GEOL 2005 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4712 (2) Structural Field Geology**
Explores methods of field study of structure of rocks, including observations, data collection and interpretation to understand geometry of deformation and causative processes and kinematics. Field projects are mapped using different scales, air photos, topographic maps and compass and tape.
**Requisites:** Requires prerequisite courses of GEOL 2700 and GEOL 3120 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4714 (2) Field Geophysics**
Applies geophysical field techniques and data interpretation to studying geological and engineering problems. Fieldwork includes seismic, gravity, magnetic, and electrical measurements.
**Requisites:** Requires prerequisite courses of GEOL 2001 or GEOL 2700 and GEOL 3330 and MATH 1300 and PHYS 1110 or PHYS 1115 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4715 (2) Field Techniques in Hydrogeology**
Introduces various field techniques and data analysis methods in hydrogeologic studies for students in geology, environmental studies, geography, and civil engineering. Exercises include mapping ground water levels, conducting slug and pumping tests, measuring stream flows, interpreting aquifer parameters from geophysical measurements, and using field data for water budget analysis.
**Requisites:** Requires prerequisite courses of GEOL 3030 and GEOL 2001 or GEOL 2700 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4716 (2) Environmental Field Geochemistry**
This is a critical thinking course that makes use of field and laboratory environments. Students learn methods and develop hands-on expertise needed to identify, characterize and interpret the reactions that govern the quality of water in natural systems, through activities in local watersheds.
**Requisites:** Requires prerequisite courses of (GEOL 2001 or GEOL 2700) and GEOL 3320 and (CHEM 1011 and CHEM 1031) or (CHEM 1113 and CHEM 1133). All minimum grade C-.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4717 (2) Field Seminar in Geology and Tectonics**
Studies geologic features in and around Colorado to gain an overview of the geologic and tectonic evolution of the western U.S.
**Requisites:** Requires perquisite courses of GEOL 2001 or GEOL 2700 and GEOL 3120 or GEOL 3320 or GEOL 3430 or GEOL 4241 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4719 (2) Field Analysis and Tectonics of Crystalline Rocks**
Introduces basic and advanced mapping tools and concepts for structural and tectonic analysis of solid-state and magmatic deformation, metamorphism, and fluid flow in igneous and metamorphic rocks. Includes some digital mapping concepts using smartpad and smartphone applications, and computer-based analysis of structure data. Includes multi-day mapping projects in the Front Range, and in western Colorado, southern Wyoming, or northern New Mexico. Also includes introductions to Precambrian tectonic history of western North America and mineral resources of Colorado.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5719
**Requisites:** Requires prerequisite courses of GEOL 2700 and GEOL 3120 (all minimum grade C-).
**Grading Basis:** Letter Grade

**GEOL 4721 (2) Field Methods in Active Tectonics**
Analysis of active geologic structures, including strike slip fault systems, secondary structures in stepovers and related eruptive centers. Includes the use of digital imagery, elevation models, offset geomorphic features and Quaternary deposits to determine local deformation rates and their relation to plate motions.
**Requisites:** Requires prerequisite courses of GEOL 2700 and GEOL 3120 (all minimum grade C-).
**Recommended:** Prerequisite GEOL 4712.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4723 (2) Field Studies in Sedimentology**
Provides students experience in observing and interpreting sedimentary rocks in the field. We will visit outcrops in CO and UT spanning a range of depositional environments, including eolian, lacustrine, fluvial, and marine. Developing observational and notetaking skills will be emphasized; students will be responsible for contributing to a group field guide based on their guided field observations at each site.
**Requisites:** Requires prerequisite courses of GEOL 2700 and GEOL 3430 (all minimum grade C-).

**GEOL 4725 (1-4) Field Based Special Topics in Geoscience**
Explores selected geological subjects of special interest in a field setting.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5725
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4747 (3) Unconventional Resources**
To introduce the concepts, principles, methods, and techniques of unconventional reservoirs. Unconventional reservoirs can be defined informally as those reservoirs that need artificial stimulation to produce. Accumulations in conventional traps are due to buoyancy. Seven common kinds of unconventional reservoirs: tight-gas sandstones, shale gas, shale oil, coal-bed methane, heavy-oil sands, oil shale, gas hydrates. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5747
**Requisites:** Requires prerequisite courses of GEOL 2001, GEOL 2005, GEOL 2700, and GEOL 3430 (all minimum grade C-).

**GEOL 4755 (2) Field Geobiology**
Provides students technical fieldwork skills in the interdisciplinary field of geobiology, spanning modern environments and to ancient environments in preserved in rock record, and spanning techniques from geochemistry, environmental microbiology, and sedimentology.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5755
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Requires prerequisite courses of GEOL 2700 and GEOL 3430 (all minimum grade C-).

**GEOL 4833 (3) Teaching and Learning Earth Systems**
Learn and develop pedagogically effective strategies for teaching and understanding Earth Science concepts. Particular emphasis is placed on understanding the importance of geoscience habits of mind (i.e. spatial/temporal reasoning, multiple working hypotheses, geographic context). Focuses upon inquiry and evaluation of evidence, the importance of background knowledge and misconceptions, and developing effective discourse within and outside the classroom.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5833 and EDUC 4833 and GEOL 5833
**Requisites:** Requires prerequisite course of ATOC 1060 or ENVS 1000 or GEOL 1010 or GEOL 1020 or GEOL 1060 (minimum grade C-).
**Grading Basis:** Letter Grade

**GEOL 4840 (1-3) Independent Study in Geology**
Time and credit to be arranged. For advanced undergraduates who have high scholastic standing. Open only upon consultation with department advisor.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**GEOL 4841 (1-3) Independent Study-Economic Geology**
Time and credit to be arranged. For advanced undergraduates who have high scholastic standing. Open only upon consultation with department advisor. May be repeated for a total of 7 credit hours.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**GEOL 4842 (1-3) Independent Study-Petrology**
Time and credit to be arranged. For advanced undergraduates who have high scholastic standing. Open only upon consultation with department advisor. May be repeated for a total of 7 credit hours.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**GEOL 4843 (1-3) Independent Study-Sedimentology**
Time and credit to be arranged. For advanced undergraduates who have high scholastic standing. Open only upon consultation with department advisor. May be repeated for a total of 7 credit hours.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**GEOL 4844 (1-3) Independent Study-Structure/Tectonics**
Time and credit to be arranged. For advanced undergraduates who have high scholastic standing. Open only upon consultation with department advisor. May be repeated for a total of 7 credit hours.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**GEOL 4845 (1-3) Ind Stdy-Geochemistry**
Time and credit to be arranged. For advanced undergraduates who have high scholastic standing. Open only upon consultation with department advisor. May be repeated for a total of 7 credit hours.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**GEOL 4846 (1-3) Independent Study-Geophysics**
Time and credit to be arranged. For advanced undergraduates who have high scholastic standing. Open only upon consultation with department advisor. May be repeated for a total of 7 credit hours.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**GEOL 4847 (1-3) Independent Study-Hydrology**
Time and credit to be arranged. For advanced undergraduates who have high scholastic standing. Open only upon consultation with department advisor. May be repeated for a total of 7 credit hours.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**GEOL 4849 (1-3) Indepedent Study-Paleontology**
Time and credit to be arranged. For advanced undergraduates who have high scholastic standing. Open only upon consultation with department advisor. May be repeated for a total of 7 credit hours.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**GEOL 4851 (1-3) Independent Study in Geoscience Education**
**Repeatable:** Repeatable for up to 3.00 total credit hours.

**GEOL 4862 (1-4) Geology Independent Study**
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5862
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite students may not enroll in this course without completing the Independent Study Contract.

**GEOL 4990 (1-3) Honors Thesis**
Supervised project involving original research in any area of the geological sciences. The thesis is submitted to the Honors Program of the College of Arts and Sciences and is orally defended. Must be accepted by the departmental honors committee. Department enforced prerequisite: minimum cumulative GPA of 3.30.
**Additional Information:** Arts Sciences Honors Course

# Geology - Bachelor of Arts (BA)

The options available in the undergraduate program in geological sciences are geology and geophysics and lead to the BA degree. Both options provide a strong basis for understanding the functioning of the Earth system. Students who are uncertain as to which option best suits their needs should contact a departmental advisor or faculty member. In each option, the undergraduate program emphasizes coursework in theoretical, laboratory and field-oriented aspects of the geological sciences. The nearby Rocky Mountains provide a natural laboratory for many of these courses.

Students interested in the geological sciences may also wish to consider the Baker Residential Academic Program. Students who do not wish to pursue a career in the geosciences, or who would like to combine a basic knowledge of geologic sciences with that of some other field, should consider using geological sciences as one subject in a distributed studies major or as a minor. Students who intend to pursue graduate study in the geological sciences are encouraged to consider developing an honors thesis as part of their undergraduate studies.

The two options available in the undergraduate major offer different focus areas of instruction. Both options offer excellent preparation for students interested in pursuing professional careers, or graduate study, in the geological sciences.

Each option emphasizes knowledge in:

- The ways in which Earth responds to internal and external forces; the physical, chemical and biological evolution of Earth; and the nature of the materials of which the Earth is made.
- The role of physics, chemistry, mathematics and biology in understanding geological processes.
- The history of discoveries and ideas that have contributed to our current knowledge of Earth and the planetary system.

# Program Tracks

## Geology Track

The geology option emphasizes processes that function both in the solid earth and at Earth's surface:

- The mineralogy and petrology of igneous, metamorphic and sedimentary rocks.
- The processes of sedimentation and the applications of stratigraphy and paleobiology in the reconstruction of Earth history.
- The role of geophysics and geochemistry in understanding the nature of Earth and its history.
- The study of faults, folds and other rock structures and the tectonic processes that create those structures.
- The methods used in the field to map and interpret the diverse variety of rock types and structures.
- The function of the integrated Earth system including the atmosphere, hydrosphere, biosphere and geosphere.
- The fundamental controls on surface Earth processes including energy balance, hydrology, geomorphology, geochemistry and biogeochemistry.
- The role of humans in the Earth system.

## Geophysics Track

The geophysics option emphasizes:

- Applications of fundamental mathematical formulations and physical principles to an understanding of the Earth.
- Methods utilized to map and characterize those portions of the planet that lie below the surface, from just beneath our feet down to the core.

# Requirements

## Required Courses and Credits

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

All required major courses and all required ancillary courses must be passed with a C- or better and cannot be taken pass/fail. Students must have a grade point average of at least 2.000 in the major in order to graduate.

Students in either the geology option or the geophysics option must take the following coursework in GEOL. For more information, view the Program Tracks (p. 353) section.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| One of the following introductory GEOL courses | | 3 |
| GEOL 1010 | Exploring Earth | 3 |
| or GEOL 1012 | Exploring Earth for Scientists | |
| or GEOL 1020 | Dodos, Dinos, and Deinococcus: The History of a Habitable Planet | |
| or GEOL 1040 | Geology of Colorado | |
| or GEOL 1060 | Global Change: An Earth Science Perspective | |

| | | |
|---|---|---|
| or GEOL 1150 | Water, Energy and Environment: An Introduction to Earth Resources | |
| or GEOL 1170 | Our Deadly Planet | |
| or GEOL 1180 | Our Microbial Planet | |
| GEOL 1030 | Introduction to Geology Laboratory 1 | 1 |
| GEOL 2001 | Planet Earth | 4 |
| GEOL 2005 | Introduction to Earth Materials | 4 |
| GEOL 2700 | Introduction to Field Geology | 2 |
| **Total Credit Hours** | | **17** |

## Ancillary Coursework

Students in either the geology option or the geophysics option must take the following coursework from outside GEOL.

| Code | Title | Credit Hours |
|---|---|---|
| Select one of the following Calculus 1 & 2 sequences: | | 8-10 |
| MATH 1300 & MATH 2300 | Calculus 1 and Calculus 2 | |
| APPM 1350 & APPM 1360 | Calculus 1 for Engineers and Calculus 2 for Engineers | |
| Complete a calculus-based general physics sequence with lab: | | 9 |
| PHYS 1110 | General Physics 1 | |
| PHYS 1120 | General Physics 2 | |
| PHYS 1140 | Experimental Physics 1 | |
| **Total Credit Hours** | | **17-19** |

Additional information on required courses and other departmental requirements may be obtained from the departmental office. Students should contact the department for a list of current major requirements.

Transfer students must satisfactorily complete a minimum of 12 credit hours of advanced work (3000-level or above) in the Department of Geological Sciences in Boulder if they wish to obtain a degree in geology from CU Boulder. Before registering for the first time, or within the first week of the semester, such students must see a geological sciences department undergraduate advisor to have previous coursework in geology, math and allied sciences evaluated.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here refers only to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in geology, students should meet all college requirements plus specific departmental requirements. These departmental requirements vary slightly between the two major options. Detailed information is available from the department office, but in general these requirements include:

- Declare a geology major and begin coursework in the major during the first semester freshman year.
- Meet with a departmental advisor prior to the second and fifth semesters and during the seventh semester.
- Complete at least 33 credit hours (geology option; 44 credit hours for geophysics option) required for the major by the end of the fourth semester.
- Complete at least 47 credit hours (geology option; 63 credit hours for geophysics option) required for the major by the end of the sixth semester.
- Complete the remaining requirements for the major by the end of the eighth semester.

# Program Tracks

## Geology Option

Students electing the geology option are required to take the following additional courses:

| Code | Title | Credit Hours |
|---|---|---|
| **Tier 3 Courses** | | |
| Select one of the following Solid Earth courses: [3] | | 3-4 |
| GEOL 3010 | Introduction to Mineralogy | |
| GEOL 3020 | Petrology | |
| GEOL 3120 | Structural Geology | |
| GEOL 3320 | Introduction to Geochemistry | |
| GEOL 3330 | Principles of Geophysics | |
| GEOL 3430 | Sedimentology and Stratigraphy | |
| Select one of the following Surface Processes courses: [3] | | 3-4 |
| GEOL 3030 | Introduction to Hydrogeology | |
| GEOL 3320 | Introduction to Geochemistry | |
| GEOL 3410 | Paleobiology | |
| GEOL 3430 | Sedimentology and Stratigraphy | |
| GEOL 3820 | The Fluid Earth | |
| GEOL 4060 | Oceanography | |
| GEOL 4160 | Introduction to Biogeochemistry | |
| GEOL 4241 | Earth Surface Processes | |
| Select one of the following Quantitative Geoscience courses: [3] | | 3 |
| GEOL 3010 | Introduction to Mineralogy | |
| GEOL 3030 | Introduction to Hydrogeology | |
| GEOL 3330 | Principles of Geophysics | |
| GEOL 3820 | The Fluid Earth | |
| GEOL 4241 | Earth Surface Processes | |
| Select two of the following advanced-field modules: | | 4-5 |
| GEOL 4150 | Planetary Field Geology | |
| GEOL 4711 | Igneous and Metamorphic Field Geology | |
| GEOL 4712 | Structural Field Geology | |
| GEOL 4714 | Field Geophysics | |
| GEOL 4715 | Field Techniques in Hydrogeology | |
| GEOL 4716 | Environmental Field Geochemistry | |
| GEOL 4717 | Field Seminar in Geology and Tectonics | |
| GEOL 4719 | Field Analysis and Tectonics of Crystalline Rocks | |
| GEOL 4721 | Field Methods in Active Tectonics | |
| GEOL 4723 | Field Studies in Sedimentology | |
| GEOL 4725 | Field Based Special Topics in Geoscience | |
| GEOL 4755 | Field Geobiology | |
| EVEN 4100 | Environmental Sampling and Analysis | |
| *Upper-division electives* | | |
| Sufficient additional upper-division coursework from following list to total 27 upper-division credits. (Of these 27, a minimum of 18 upper-division credits must be GEOL.) [1] | | 14 |
| Any GEOL 3000- to 4000-level course (with exceptions, see footnote) [2] | | |

| | |
|---|---|
| Or approved non-GEOL courses from following list: | |
| APPM 3050 | Scientific Computing in Matlab |
| ASTR 3710 | Formation & Dynamics of Planetary Systems |
| ASTR 3720 | Planets and Their Atmospheres |
| ASTR 3750 | Planets, Moons, and Rings |
| ASTR 4800 | Space Science: Practice and Policy [1] |
| ATOC 4720 | Atmospheric Dynamics |
| ATOC 4800 | Policy Implications of Climate Controversies [1] |
| CHEM 4511 | Physical Chemistry 1 |
| CVEN 4404 | Water Chemistry |
| CVEN 4718 | Mechanics and Dynamics of Glaciers |
| EBIO 3080 | Evolutionary Biology |
| EBIO 3850 | Animal Diversity: Invertebrates |
| EBIO 4030 | Limnology |
| EBIO 4060 | Landscape Ecology |
| EBIO 4155 | Ecosystem Ecology |
| EBIO 4410 | Biological Statistics |
| EBIO 4500 | Plant Biodiversity and Evolution |
| ECON 3403 | International Economics and Policy [1] |
| ENVD 4023 | Environmental Impact Assessment [1] |
| ENVS 3434 | Introduction to Applied Ecology |
| EVEN 4100 | Environmental Sampling and Analysis |
| GEOG/ENVS 4201 | Biometeorology |
| GEOG 4251 | River Processes and Forms: Fluvial Geomorphology |
| GEOG 4261 | Glaciers and Permafrost |
| GEOG 4321 | Snow Hydrology |
| GEOG 4401 | Soils Geography |
| MCDB 4350 | Microbial Diversity and the Biosphere |
| MUSM 4914 | Museum Practicum in Geology |
| PSCI 3183 | International Law |
| **Total Credit Hours** | **27-30** |

| Code | Title | Credit Hours |
|---|---|---|
| **Additional Ancillary Coursework for Geology Option:** | | |
| Complete a general chemistry sequence with labs: | | |
| CHEM 1113 | General Chemistry 1 | 4 |
| CHEM 1114 | Laboratory in General Chemistry 1 | 1 |
| CHEM 1133 | General Chemistry 2 | 4 |
| CHEM 1134 | Laboratory in General Chemistry 2 | 1 |
| **Total Credit Hours** | | **10** |

1 A maximum of 3 of these credit hours may consist of a policy course from the following list: ASTR 4800, ATOC 4800, ECON 3403, ENVD 4023 and PSCI 3183.

2 GEOL 3005, GEOL 3040, GEOL 3070, GEOL 3520, GEOL 3720 and GEOL 3950, cannot be used to fulfill the upper-division elective requirements within the major.

3 Note that some courses are listed in multiple major specific categories. Students can choose which category to apply the course to but, a given course can be applied to only one category.

## Geophysics Option

Students electing the geophysics option are required to take the following additional courses:

| Code | Title | Credit Hours |
|---|---|---|
| **Geophysics track courses** | | |
| GEOL 3120 | Structural Geology | 4 |
| GEOL 3330 | Principles of Geophysics | 3 |
| GEOL 4714 | Field Geophysics | 2 |
| *One Surface Processes course* | | *3-4* |
| GEOL 3030 | Introduction to Hydrogeology | 3-4 |
| or GEOL 3320 | Introduction to Geochemistry | |
| or GEOL 3410 | Paleobiology | |
| or GEOL 3430 | Sedimentology and Stratigraphy | |
| or GEOL 3820 | The Fluid Earth | |
| or GEOL 4060 | Oceanography | |
| or GEOL 4070 | Paleoclimatology | |
| or GEOL 4160 | Introduction to Biogeochemistry | |
| or GEOL 4241 | Earth Surface Processes | |
| *One additional Tier 3 approved GEOL course not used to satisfy Surface Processes course requirement.* | | *3-4* |
| *Select two of the following non-GEOL Geophysics Advanced Elective courses:* [1] | | *6* |
| APPM 4350 | Methods in Applied Mathematics: Fourier Series and Boundary Value Problems | |
| MATH 4470 | Partial Differential Equations | |
| PHYS 3210 | Classical Mechanics and Mathematical Methods 2 | |
| PHYS 3310 | Principles of Electricity and Magnetism 1 | |
| **Total Credit Hours** | | **24-27** |

1 The non-GEOL courses in this category count toward the credits in the Geology major and are factored into the Geology major GPA.

| Code | Title | Credit Hours |
|---|---|---|
| **Additional Ancillary Coursework for the Geophysics Option:** | | |
| CHEM 1113 | General Chemistry 1 | 4 |
| CHEM 1114 | Laboratory in General Chemistry 1 | 1 |
| APPM 2350 | Calculus 3 for Engineers | 4-5 |
| or MATH 2400 | Calculus 3 | |
| MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | 4-6 |
| or APPM 2360 | Introduction to Differential Equations with Linear Algebra | |
| PHYS 2130 | Introduction to Quantum Mechanics and Its Applications | 3 |
| PHYS 2210 | Classical Mechanics and Mathematical Methods 1 | 3 |
| One computing course | | 3-4 |
| APPM 1650 | Python for Math and Data Science Applications | |
| APPM 3050 | Scientific Computing in Matlab | |

| | | |
|---|---|---|
| CSCI 1200 | Introduction to Computational Thinking | |
| CSCI 1300 | Computer Science 1: Starting Computing | |
| GEOL 3600 | Introduction to Python Programming for Earth Scientists | |
| INFO 1701 | Programming for Information Science 1 | |
| **Total Credit Hours** | | **22-26** |

# Recommended Four-Year Plans of Study

## Geology Track

Through the required coursework for either track of the major, students will fulfill all 12 credits of the Natural Sciences area of the Gen Ed Distribution Requirement including the Lab Requirement, as well as the QRMS area of the Gen Ed Skills area.

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| GEOL 1012 | Exploring Earth for Scientists (Preferred, or any other GEOL 1000-level except GEOL 1030) | 3 |
| GEOL 1030 | Introduction to Geology Laboratory 1 | 1 |
| CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 | 5 |
| Gen. Ed. Skills course (example: Lower-Division Written Communication) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/US Perspective) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| GEOL 2005 | Introduction to Earth Materials | 4 |
| CHEM 1133 & CHEM 1134 | General Chemistry 2 and Laboratory in General Chemistry 2 | 5 |
| MATH 1300 or APPM 1350 | Calculus 1 or Calculus 1 for Engineers | 4-5 |
| Elective/MAPS | | 3 |
| | **Credit Hours** | **16-17** |

**Year Two**

| **Fall Semester** | | |
|---|---|---|
| GEOL 2001 | Planet Earth | 4 |
| GEOL 2700 | Introduction to Field Geology | 2 |
| MATH 2300 or APPM 1360 | Calculus 2 or Calculus 2 for Engineers | 4-5 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| | **Credit Hours** | **16-17** |
| **Spring Semester** | | |
| GEOL Surface Processes course | | 3-4 |
| GEOL Solid Earth course | | 3-4 |
| PHYS 1110 | General Physics 1 | 4 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16-18** |

**Year Three**

| **Fall Semester** | | |
|---|---|---|
| PHYS 1120 | General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| Elective approved for GEOL major - Upper-division | | 3-4 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **14-15** |
| **Spring Semester** | | |
| GEOL Quantitative Geoscience course | | 3-4 |
| GEOL 4000-level Field Geology course | | 2-3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **14-16** |

**Year Four**

| **Fall Semester** | | |
|---|---|---|
| GEOL 4000-level Field Geology course | | 2 |
| Elective approved for GEOL major - Upper-division | | 3-4 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) - Upper-division | | 3 |
| Upper-division Elevtive | | 3 |
| | **Credit Hours** | **14-15** |
| **Spring Semester** | | |
| Elective approved for GEOL major - Upper-division | | 3-4 |
| Elective approved for GEOL major - Upper-division | | 3-4 |
| Elective approved for GEOL major - Upper-division | | 3-4 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-division Elective | | 3-0 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **120-128** |

## Geophysics Track

Through the required coursework for either track of the major, students will fulfill all 12 credits of the Natural Sciences area of the Gen Ed Distribution Requirement including the Lab Requirement, as well as the QRMS area of the Gen Ed Skills area.

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| GEOL 1012 | Exploring Earth for Scientists (Preferred, or any other GEOL 1000-level except GEOL 1030) | 3 |
| GEOL 1030 | Introduction to Geology Laboratory 1 | 1 |
| MATH 1300 or APPM 1350 | Calculus 1 or Calculus 1 for Engineers | 4-5 |
| Gen. Ed. Skills course (example: Lower-Division Written Communication) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/US Perspective) | | 3 |
| | **Credit Hours** | **14-15** |

| | | |
|---|---|---|
| **Spring Semester** | | |
| GEOL 2001 | Planet Earth | 4 |
| MATH 2300<br>or APPM 1360 | Calculus 2<br>or Calculus 2 for Engineers | 5 |
| CHEM 1113<br>& CHEM 1114 | General Chemistry 1<br>and Laboratory in General Chemistry 1 | 5 |
| Elective/MAPS | | 3 |
| | **Credit Hours** | **17** |
| **Year Two** | | |
| **Fall Semester** | | |
| GEOL 2005 | Introduction to Earth Materials | 4 |
| CSCI 1200<br>or CSCI 1300 | Introduction to Computational Thinking<br>or Computer Science 1: Starting Computing | 3-4 |
| PHYS 1110 | General Physics 1 | 4 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| | **Credit Hours** | **14-15** |
| **Spring Semester** | | |
| GEOL 2700 | Introduction to Field Geology | 2 |
| GEOL 3330 | Principles of Geophysics | 3 |
| APPM 2350<br>or MATH 2400 | Calculus 3 for Engineers<br>or Calculus 3 | 4-5 |
| PHYS 1120 | General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| | **Credit Hours** | **14-15** |
| **Year Three** | | |
| **Fall Semester** | | |
| GEOL 3120 | Structural Geology | 4 |
| GEOL 4714 | Field Geophysics | 2 |
| PHYS 2130 | Introduction to Quantum Mechanics and Its Applications | 3 |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| Gen. Ed. Distribution course (example: Social Sciences) - Upper-division | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| GEOL surface processes course | | 3-4 |
| Tier 3 approved GEOL course | | 3-4 |
| PHYS 2210 | Classical Mechanics and Mathematical Methods 1 | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) - Upper-division | | 3 |
| | **Credit Hours** | **15-17** |
| **Year Four** | | |
| **Fall Semester** | | |
| Geophysics Advanced Elective | | 3 |
| Geophysics Advanced Elective | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Gen. Ed. Distribution course - Upper-division | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| Geophysics Advanced Elective | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Elective or Upper-division Elective (if needed) | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **120-125** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Make and record observations (e.g., in the field, from experiments, etc.).
- Analyze data.
- Interpret data.
- Reason through problems to derive solutions.
- Design a research study.

# Geology - Minor

The minor program in geological sciences is meant for students who would like to acquire a basic knowledge of earth science in addition to their major area of study.

For more information, please visit the Geological Sciences website (https://www.colorado.edu/geologicalsciences/academic/undergraduate/minor-requirements/).

# Requirements

The College of Arts and Sciences' requirements for a minor include a minimum of 18 credit hours in the minor area, including a minimum of 9 upper-division credit hours.

All coursework applied to the minor must be completed with a grade of C- or better; no pass/fail work may be applied. The grade point average for all minor degree coursework must be equal to 2.000 (C) or higher. Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor.

The departmental requirements for the minor are listed below. The department strongly urges students interested in pursuing a minor in geology to consult a departmental advisor.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Introductory Courses** | | |
| *Lectures* | | |
| Select two of the following 1000-level introductory courses: | | 6 |
| GEOL 1010 | Exploring Earth [1] | |
| or GEOL 1012 | Exploring Earth for Scientists | |
| GEOL 1020 | Dodos, Dinos, and Deinococcus: The History of a Habitable Planet [2] | |
| or GEOL 1040 | Geology of Colorado | |

| | | |
|---|---|---|
| GEOL 1060 | Global Change: An Earth Science Perspective | |
| GEOL 1150 | Water, Energy and Environment: An Introduction to Earth Resources | |
| GEOL 1170 | Our Deadly Planet | |
| GEOL 1180 | Our Microbial Planet | |
| *Introductory Laboratory Course* | | |
| GEOL 1030 | Introduction to Geology Laboratory 1 | 1 |
| **Laboratory or Field-Oriented Course** | | |
| Select at least one of the following laboratory or field-oriented courses: | | 2-4 |
| GEOL 2001 | Planet Earth | |
| GEOL 2700 | Introduction to Field Geology | |
| GEOL 3010 | Introduction to Mineralogy | |
| GEOL 3023 | Statistics and Geographic Data | |
| GEOL 3120 | Structural Geology | |
| GEOL 3330 | Principles of Geophysics | |
| GEOL 3410 | Paleobiology | |
| GEOL 3430 | Sedimentology and Stratigraphy | |
| GEOL 4060 | Oceanography | |
| GEOL 4093 | Remote Sensing of the Environment | |
| GEOL 4241 | Earth Surface Processes | |
| **Geology Electives** | | |
| Additional geology coursework to bring the total upper-division credit hours to 9 and total credit hours in geology to 18. | | 7-9 |
| **Total Credit Hours** | | **18** |

1 Students cannot take GEOL 1010 *and* GEOL 1012 as these two course are considered similar to each other and the student will lose credit for one of the courses.

2 Students cannot take GEOL 1020 *and* GEOL 1040 as these two course are considered similar to each other and the student will lose credit for one of the courses.

# Germanic and Slavic Languages and Literatures

Undergraduate students may choose to major in either German studies or Russian, East European and Eurasian studies; minors are offered in both. The department also offers a minor in Nordic studies.

To declare a major or minor with this department, please meet with the GSLL advisor, Christine Luft (christine.luft@colorado.edu), to start your application.

**Course codes for these programs are GRMN, GSLL, RUSS, REES, SCAN and SWED.**

## Bachelor's Degrees

- German Studies - Bachelor of Arts (BA) (p. 374)
- Russian, East European and Eurasian Studies - Bachelor of Arts (BA) (https://catalog.colorado.edu/undergraduate/colleges-schools/arts-sciences/programs-study/germanic-slavic-languages-literatures/russian-studies-bachelor-arts-ba/)

## Minors

- German Studies - Minor (p. 383)
- Nordic Studies - Minor (p. 384)
- Russian, East European and Eurasian Studies - Minor (https://catalog.colorado.edu/undergraduate/colleges-schools/arts-sciences/programs-study/germanic-slavic-languages-literatures/russian-studies-minor/)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Gerwig, Inger-Johanne
Senior Instructor Emerita

Greaney, Patrick F. (https://experts.colorado.edu/display/fisid_122807/)
Professor; PhD, Johns Hopkins University

Grove, Vicki Jean (https://experts.colorado.edu/display/fisid_103689/)
Teaching Professor of Distinction; PhD, University of Colorado Boulder

Hintz, Saskia Barbara (https://experts.colorado.edu/display/fisid_144506/)
Teaching Professor of Distinction; PhD, New York University

Hoecker, Arne (https://experts.colorado.edu/display/fisid_152973/)
Associate Professor; PhD, Johns Hopkins University

Jany, Berit (https://experts.colorado.edu/display/fisid_154411/)
Teaching Professor; PhD, The Ohio State University

Kostoglodova, Elena Yurievna (https://experts.colorado.edu/display/fisid_100976/)
Teaching Associate Professor Emerita ; PhD, University of Colorado Boulder

Merritt, Adrienne (https://experts.colorado.edu/display/fisid_168762/)
Assistant Professor; PhD, University of California, Berkeley

Muller-Sievers, Helmut Heinz (https://experts.colorado.edu/display/fisid_147511/)
Professor; PhD, Stanford University

Nordvig, Mathias (https://experts.colorado.edu/individual/fisid_156587/)
Associate Teaching Professor; PhD, University of Aarhus (Denmark)

Osipova, Anastasiya (https://experts.colorado.edu/individual/fisid_167066/)
Assistant Professor; PhD, New York University

Osterman, Laura Olson (https://experts.colorado.edu/display/fisid_109800/)
Professor, Associate Chair; PhD, Yale University

Plagmann, Natalia (https://experts.colorado.edu/display/fisid_168526/)
Teaching Assistant Professor; PhD, Princeton University

Plank, D. L.
Professor Emeritus

Raggio, Avedan (https://experts.colorado.edu/display/fisid_154482/)
Teaching Assistant Professor; MA, University of Colorado Boulder

Romanov, Artemi (https://experts.colorado.edu/display/fisid_100659/)
Professor; PhD, St. Petersburg University (Russia)

Salys, Rimgaila
Professor Emerita

Schindler, Patricia A.
Senior Instructor Emerita

Schmiesing, Ann C. (https://experts.colorado.edu/display/fisid_106248/)
Professor; PhD, University of Cambridge (England)

Siergiejczyk-Nicoll, Galina (https://experts.colorado.edu/display/fisid_148167/)
Teaching Assistant Professor; PhD, University of Colorado Boulder

Stimilli, David (https://experts.colorado.edu/individual/fisid_134650/)
Associate Professor Emeritus; PhD, Yale University

Stone, Lauren Shizuko (https://experts.colorado.edu/display/fisid_154888/)
Assistant Professor; PhD, New York University

Weber, Beverly Marie (https://experts.colorado.edu/display/fisid_144523/)
Chair, Professor; PhD, University of Massachusetts Amherst

# Courses

## Danish

**DANE 1010 (4) Beginning Danish 1-DILS**
Provides practical, communicative language skills for use in a variety of situations. Examines basic language structure and grammatical forms. Introduces students to Danish history and contemporary culture and society.
**Additional Information:** Departmental Category: Danish Courses

**DANE 1020 (4) Beginning Danish II-DILS**
Provides practical, communicative language skills for use in a variety of situations. Examines basic language structure and grammatical forms. Introduces students to Danish history and contemporary culture and society. Department enforce prerequisite: DANE 1010 (min grade C-).
**Additional Information:** Departmental Category: Danish Courses

**DANE 2010 (4) Intermediate Danish I - DILS**
Building on the skills that the students have acquired in Beginners Danish I-II, this course offers additional reading, writing, speaking and verbal comprehension. Students will learn to conduct business at a government office, talk about holidays and festivals and discuss conservation and environmental protection. They will read and write small texts, becoming exposed to differences between written and spoken Danish.
**Requisites:** Requires prerequisite course of DANE 1020 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Danish Courses

**DANE 2020 (4) Intermediate Danish II - DILS**
Offers extensive reading, writing, speaking and verbal comprehension skills in Danish. The students will discuss Danish history, cultural differences and stereotypes, politics, social groups, learn how to write letters and email in Danish, read short texts and write short essays on the above topics.
**Requisites:** Requires prerequisite course of DANE 2010 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Danish Courses

## German

**GRMN 1010 (4) Beginning German 1**
Introduction to language and culture of the German-speaking world, with emphasis on the acquisition of basic communication skills in cultural context. For students with no previous training in German.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 1030
**Additional Information:** Departmental Category: German

**GRMN 1020 (4) Beginning German 2**
Continued development of German-language skills and cultural knowledge for effective communication. Emphasis on more complex language structures and sustained interactions. Department enforced prerequisite: GRMN 1010 (min grade of C-).
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 1030
**Additional Information:** Departmental Category: German

**GRMN 1030 (5) Intensive Beginning German**
Covers the same material as GRMN 1010 and GRMN 1020 in one course. Focuses on acquiring ability to understand and speak everyday German; on developing reading and writing skills; and on learning about the cultures of the German-speaking countries.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 1010 and GRMN 1020
**Additional Information:** Departmental Category: German

**GRMN 1500 (3) German for Reading Knowledge**
Designed especially for graduate students. Emphasizes analytical skills for acquiring reading proficiency in specialized and technical German in one's field of research. Recommended for pass/fail registration. Does not satisfy the arts and sciences foreign language requirement. Does not count towards the German major.
**Additional Information:** Departmental Category: German

**GRMN 1601 (3) Germany Today**
Introduces contemporary debates in Germany, Austria and Switzerland through analysis of contemporary cultural products such as film, literature, graphic novels, and other media/art. Examines refugee migration, far-right parties, social justice movements, responses to climate change. Taught in English.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 1602 (3) Metropolis and Modernity**
An interdisciplinary introduction to the modern industrial city in Europe and the USA, with particular attention to the representation of urbanism in the visual arts. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 1701 (3) Nature, Climate and Environment in German Culture**
Critically examines cultural products from German-speaking contexts that thematize climate and environment. Depictions of nature, climate and environment are examined in relationship to understandings of race, nation, sexuality, gender, labor, and rural versus urban spaces. Discussions span Romantic conceptions of nature and nation, to colonial resource extraction, to fascist understandings of home and nature, to contemporary political debates around contemporary Germany's environmental policies. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 1701
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 2010 (4) Intermediate German 1**
Development of skills for independent use of German. Discussions, writing and listening/viewing activities that address topics of the contemporary German-speaking world. Department enforced prerequisite: GRMN 1020 or 1030 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 2030
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: German

**GRMN 2020 (4) Intermediate German 2**
Development of communication skills and knowledge about recent social, cultural and political developments in German speaking countries through texts, media and film. Department enforced prerequisite: GRMN 2010 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 2030
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 2030 (5) Intensive Intermediate German**
Covers the same material as GRMN 2010 and GRMN 2020 in one semester. Offers review and continuation of basic skills begun in the first year: reading, writing, speaking and oral comprehensive. Department enforced prerequisite: GRMN 1020 or GRMN 1030 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 2010 and GRMN 2020
**Additional Information:** Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: German

**GRMN 2141 (3) Topics in Modern German Culture and Society**
Examines topics in modern German culture, including German literature, film, art, and politics. Topics vary each semester. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**GRMN 2301 (3) Inside Nazi Germany: Politics, Culture, and Everyday Life in the Third Reich**
Examines social culture and everyday life in Nazi Germany. Topics include the role of propaganda in the media and entertainment industries, anti-Semitism and suppression of ethnic, social and religious minorities, the role of education and youth organizations, as well as the role of women, the churches, and the effects of a controlled economy before and during World War II. Taught in English.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 2302 (3) Nazis on Screen: Hollywood, War, Propaganda**
Explores representations of Nazism in Hollywood films from the early 1940s until today. How does the film image of the Nazi change from World War II through the Cold War era and beyond? From Chaplin's "The Great Dictator" to "Star Wars" and Tarantino's "Inglorious Basterds," this course focuses on how representations of Nazism and fascism informed American self-conceptions and strengthened the belief and trust in democratic institutions. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 2302
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**GRMN 2402 (3) Sports and Athleticism in German and Global Culture**
Examines development of sports and athleticism from ancient Greek and Roman games and spectacles to the present day. Particular emphasis is given to the role of sports in courtly societies, to the emergence of popular sports in 19th century Germany and Europe, and to the globalization of sports in the 20th century. Topics include the history of Olympic Games, cultural differences as differences in sports (Football vs. soccer, baseball vs. cricket), as well as alternative and niche sports. Taught in English. Formerly offered as a special topics course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**GRMN 2501 (3) Miniatures of Modern Life: From Berlin to Vienna and Beyond**
Offers an introduction to German, Austrian, and Swiss short fiction in the 20th and 21st centuries. Students will explore issues associated with modern life, such as: alienation and anxiety; cultures of spectatorship; gender roles, sexuality, and social life; technology, industry, and capitalism. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 2502 (3) Representing the Holocaust**
Examines representations of the Holocaust in film, memoirs, poetry, novels, graphic novels, memorials. Considers questions such as: How to depict an event that resists representation? How does the memory of the Holocaust transform over generations? How do representations of the Holocaust inform our understanding of other experiences of racism and genocide? What ethical issues are at stake? Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 2502
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 2503 (3) Fairy Tales of Germany**
Explores the origins, cultural significance, stylistic and thematic features of the German fairy tale, with emphasis on the Brothers Grimm; on artistic fairy tales by Goethe, Tieck, Brentano, and others; and, on modern retellings in literature and popular culture. Taught in English.
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 2504 (3) Gothic, Horror, and Fantasy**
Introduces students to gothic, horror, and fantasy with a multimedia approach. Investigates links between scary, creepy, and fantastical representations and their social and historical contexts. Explores German and Austrian films, images, fiction and poetry from a range of periods. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**GRMN 2601 (3) Kafka and the Kafkaesque**
Exposes the students to a wide selection of Kafka's literary output and aims to define the meaning of the Kafkaesque by looking not only for traces of Kafka's influence in the verbal and visual arts, but also for traces left in Kafka's own work by his precursors in the literary tradition. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 2601
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3010 (3) Advanced German 1**
Focuses on cultural topics and reviews grammatical topics, expands vocabulary and provides practice in reading, writing, listening and conversation skills. Students have the option of taking the internationally recognized exam Goethe-Zertifikat B1 after GRMN 3010. Department enforced prerequisite: four semesters of college German or equivalent. Open to freshmen with instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 3020 (3) Advanced German 2**
Expands and refines skills acquired in GRMN 3010. Improves overall fluency and deepens cultural understanding of the German-speaking countries. Develops an advanced skill level in the areas of listening, speaking, reading and writing. Students have the option of taking the internationally recognized exam Goethe-Zertifikat B1 or B2 after GRMN 3020. Department enforced prereq., GRMN 3010 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 3030 (3) Business German**
Introduces students to key issues in German society, politics, culture, institutions, economy, business and professional life. Topics and assignments are geared towards practicing and expanding all language skills with an emphasis on Business German. Students will have the option of taking the internationally recognized exam Goethe-Zertifikat B1 or B2 after GRMN 3030. Department enforced prereq., GRMN 2020 (minimum grade C-). Taught in German.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 3050 (3) German for Science and Engineering**
Introduces students to German technical language needed to engage in professional communication in STEM. Students will explore language used in mathematics, science, engineering, and technology through authentic resources in form of scientific texts, manuals, and interviews. They will acquire and practice vocabulary and structures to 1) make connections with STEM disciplines, and 2) speak and write effectively in professional settings. Department enforced prerequisite: completion of GRMN2020 with min. grade C-. Taught in German.

**GRMN 3120 (3) German Literature from the Enlightenment to Expressionism**
Examines selected literary texts of various periods. Emphasizes longer texts and critical skills. Department enforced prereq., GRMN 2020 (minimum grade C-). Taught in German.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 3130 (3) Issues in German Philosophy and Literature**
Examines selected interdisciplinary texts from the German literary and philosophical tradition. Topics address issues central to philosophical inquiry, and may include knowledge and its limits, mind and body, determinism and free will, reason and religious belief, and ethical problems. Department enforced prereq., GRMN 2020 or 2030 (minimum grade C-). Taught in German.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 3140 (3) Current Issues in German Culture**
Examines issues depicted in contemporary German film, tv series, news media, social media, literature, and more. Topics may include youth culture, feelings of belonging, racisms, gender, sexuality, work and labor, and more. Department enforced prerequisite: GRMN 2020, 2030 or comparable fluency. Topics vary by semester. Taught in German.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 3141 (3) Topics in Modern German Culture and Society**
Examines topics in modern German culture, including German literature, film, art, and politics. Topics vary each semester. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**GRMN 3150 (3) Issues in German Politics, Literature and Media**
Examines literary, film, and theoretical texts in German about the relationship between media, film, literature and politics. Topics may include migration, right-populism, revolution, student movements, protest art. Topics vary by semester. Taught in German. Department enforced prereq., GRMN 2020, GRMN 2030, or comparable fluency. Taught in German.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 3301 (3) Modern Art and Design at the Bauhaus**
Introduces the art, architecture, and design of the Bauhaus, the most influential European art school in the twentieth century. Examines the Bauhaus as a utopian project to design a new modern lifestyle. The course explores the relation of the Bauhaus to its cultural, political, gendered, and economic contexts.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 3301

**GRMN 3401 (3) The German Experience in North America**
Discusses German immigration to North America, particularly the history, culture, and literature of German-speaking immigrants and refugees from the seventeenth to the twenty-first century. Investigates factors that shape human activity through migration and the diaspora experience of Germans to the United States and Canada. Taught in English. Formerly GRMN 2401.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3501 (3) The German-Jewish Experience: From the Enlightenment to the Present**
Provides insight into the German-Jewish identity through essays, autobiographies, fiction and journalism from the Enlightenment to the post-Holocaust period. Examines the religious and social conflicts that typify the history of Jewish existence in German-speaking lands during the modern epoch. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3501
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: German Courses Taught in English

**GRMN 3502 (3) The Creation of the Modern Individual in German Culture**
Features the writings of Germany's major literary figures from 1749 to 1832. Special attention is paid to the formation of literary periods, genres, aesthetic, and socio-historical developments contributing to the birth of modernism in German intellectual history and literature. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3503 (3) German Film Through World War II**
History and theory of Weimar and Nazi film with sociocultural emphasis. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 3503
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3504 (3) Topics in German Film**
Analyzes key issues in German culture as they are represented in film and other media, e.g., technology, architecture, women and the Holocaust. Taught in English.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3505 (3) The Enlightenment: Tolerance and Emancipation**
Examines Enlightenment notions of reason, humanity and social progress. Topics include 18th century views on government, science, education, religion, slavery and gender roles. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3505
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3506 (3) Tracing the Criminal: Crime in 19th C Society and Culture**
Examines cultural and literary representations of crime from the Enlightenment to the early 20th century and contextualizes them within the history of judicial and medical approaches to criminality. Focusing on representations of the criminal as an object of knowledge, this survey of intellectual history introduces students to critical approaches in the humanities and the study of social phenomena in their historical context. Taught in English.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3507 (3) Engineering and the Practice of Literature**
Examines the relation between the practices of engineering and the production of fictional worlds in words and images. Focusing on the history of engineering and of literature, the course interlaces these seemingly disparate practices by showing commonalities and shared solutions to common problems. Readings highlight stages in the development of engineering in parallel with literary works from the end of the eighteenth century to the present. May include analysis of media like film and television. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**GRMN 3508 (3) Masters of Suspicion: Marx, Nietzsche, Freud**
Explores some of the most significant writings by Karl Marx, Friedrich Nietzsche, and Sigmund Freud, three authors who have radically shaped much of modern thinking. Students will practice the analysis of challenging theoretical texts from the German intellectual tradition and develop a critical, theoretically informed vocabulary. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**GRMN 3513 (3) German Film and Society 1945-1989**
Introduces issues in German society through film during the Cold War. Focus on East and West Germany, though some other German language films may be included. Emphasis is on reading films in their social, historical and political contexts. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 3513
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3514 (3) German Film & Society After 1989**
Introduces post-1989 German culture through film. Emphasizes films in their socio-historical contexts and explores developments in German culture during and after the unification. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3520 (3) Open Topics in the Cultural Context**
Examines topics in the cultures of German-speaking central Europe. Contact the departmental office for specific course offerings. Department enforced prereq., GRMN 3020 (minimum grade C-)
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 3601 (3) German Women Writers**
Explores writing by German/Austrian women from 1945 to the present, with special attention to the representation of the Holocaust, the continuation of avant-garde traditions, innovations in literary form, and feminism. Visual arts, film, and feminist theory will also be considered in their relation to literature. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3601
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: German Courses Taught in English

**GRMN 3681 (3) Refugees in German Culture**
Introduces the diversity of refugee migration in German culture through artistic and cultural "texts," including those created by or in collaboration with refugees (film, comic journalism, literature, blogs, hashtag campaigns, music, etc). These texts are discussed in relationship to theories of racism, precarity, and biopolitics together and contextualized by work from other disciplines. This interdisciplinary course is methodologically informed by the theory and practice of cultural studies. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3681, JWST 3681 and AHUM 3681
**Recommended:** for students with sophomore standing or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**GRMN 3702 (3) Dada and Surrealist Literature**
Surveys the major theoretical concepts and literary genres of the Dada and Surrealist movements. Topics include Dada performance and cabaret, the manifesto, montage, the ready made, the Surrealist novel, colonialism and the avant-garde, and literary and philosophical precursors to the avant-garde. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3702
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3802 (3) Politics and Culture in Berlin 1900-1939**
Examines early 20th century German culture, with emphasis on the Weimar Republic (1918-1933) in light of contemporaneous political discussions. The course presents modern art and literature (Expressionism, Dada, Brecht's epic theater) and architecture and design (Bauhaus, Werkbund) as well as political movements of women, sexual minorities, and Berlin's Jewish communities. Taught in English. Offered through CU Study Abroad Program.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3802
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: German

**GRMN 3930 (1-6) Internship**
Provides an academically supervised opportunity for upper-division students to earn credit while working for public or private organizations. Students apply skills and knowledge earned in the major, and supplement their work experience through directed readings and assignments.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) German Studies (GRMN) majors only.
**Additional Information:** Departmental Category: German

**GRMN 4010 (3) Advanced German III**
Emphasizes idiomatically correct spoken and written German in a variety of genres and culturally relevant contexts. Includes a comprehensive grammar review and readings, discussions, and writing on topics related to current cultural, social, and political issues in the German-speaking countries. Students have the option of taking the internationally recognized exam Goethe-Zertifikat B2 or C1 after GRMN 4010. Department enforced prereq., GRMN 3020 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 4051 (3) Critical Theory of the Frankfurt School**
Serves as an introduction to the "Frankfurt School" and Critical Theory with particular emphasis upon rationality, social psychology, cultural criticism, and aesthetics. Through close readings of key texts by members of the school (Horkheimer, Benjamin, Adorno, Habermas) we will work toward a critical understanding of the analytical tools they developed and consider their validity. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 5051
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: German Courses Taught in English

**GRMN 4231 (3) The Invention of Sexuality**
Traces the development of various concepts of sexuality, from ideas inherited from antiquity to the modern invention of homosexuality by German and Austrian sexologists and psychoanalysts, up to and including contemporary queer critiques. Students will also gain an understanding of how cultural beliefs and biases about queer sexualities are rooted in both the history of science and changing/persisting gendered norms. Explores the intersecting philosophical, literary, and ideological underpinnings of process(es) of marginalization of both women and queer sexualit(ies). Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 5231
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: German Courses Taught in English

**GRMN 4251 (3) Marxism**
Examines the economic, political, and philosophical thought of Karl Marx, placing it in the context of his predecessors in the classical German tradition and his successors (and critics) in the twentieth century. Themes may include the development of historical materialism; Marx¿s analysis of estranged labor; the critique of utopian socialism; the categories of Marxist economic analysis; the relation between politics, philosophy, and economics; theories of labor, surplus value, and exploitation; and the fate of communism.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4250
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: German Courses Taught in English

**GRMN 4301 (3) Gender, Race and Immigration in Germany and Europe**
Introduces students to debates surrounding migration and race in contemporary Germany with comparisons to other European contexts. Emphasis on reading texts in context using tools of cultural studies, integrating analyses of gender, race, nation, and sexuality. Texts may include film, literature, television, social media, news media, political posters, etc. Topics include: race and racisms, Black and women of color feminisms, Roma feminisms, Muslim feminisms, notions of integration and citizenship, and more. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4301 and AHUM 4301 and GRMN 5301
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: German Courses Taught in English

**GRMN 4330 (3) The Age of Goethe**
German literature from 1770 to 1830. Close examination of representative texts from the periods of Sturm und Drang, classicism, and romanticism. Emphasizes philosophical and social background. Department enforced prereq., GRMN 3020 (minimum grade C-). Taught in German.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 4340 (3) Seminar in German Literature**
Intensive study of a particular literary period, author, or genre. Secondary sources are used. Course content differs each time. Department enforced prereq., GRMN 3020 (minimum grade C-). Taught in German.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 4450 (3) Methods of Teaching German**
Required of students who desire the recommendation of the department for secondary school teaching positions. For student teaching in German, see EDUC 4712 under the School of Education.
**Requisites:** Restricted to School of Education (EDUC) undergraduates only
**Additional Information:** Departmental Category: German

**GRMN 4460 (6) High School German Teaching**
Part of the supervised student teaching in a secondary school required for state certification to teach German.
**Requisites:** Restricted to School of Education (EDUC) undergraduates only
**Additional Information:** Departmental Category: German

**GRMN 4501 (3) Seminar: Literature in Cultural Context**
Provides a broader basis for the work of literature, viewing it from various cultural perspectives. Specific content of course is defined by the instructor. Taught in English.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 4502 (3) Nietzsche: Literature and Values**
Emphasis is placed on Nietzsche's major writings spanning the years 1872-1888, with particular attention to the critique of Western values. A systematic exploration of doctrines, concepts and ideas leading to the values of creativity. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 4502
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 4503 (3) Issues in German Thought**
Provides the opportunity to examine major issues in German philosophical, social, and religious thought from the end of German idealism to existentialism and critical theory. Emphasizes the relationship between ideas and social and political action. Taught in English.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 4504 (3) Goethe's Faust**
Systematic study of the Faust motif in Western literature, with major emphasis on Faust I and II by Goethe and Thomas Mann's Doctor Faustus. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 5504 and HUMN 4504
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 4550 (3) Senior Seminar in German Studies**
This course provides students with a capstone experience through in-depth study of a topic in German Studies, and deepens students' engagement with theories and methodologies informing contemporary German Studies scholarship. Students work closely with faculty to develop a major final research paper or project. Topic varies by semester.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) German (GRMN) or School of Education (EDUC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 4900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: German

## Germanic & Slavic Languages & Literatures

**GSLL 2350 (3) Introduction to Jewish Culture**
Explores the development and expressions of Jewish cultures across the chronological and geographical map of the Jewish people, with an emphasis on the variety of Jewish ethnicities and their cultural productions, cultural syncretism, and changes, including such issues as sexuality and foodways. Sets the discussion in relevant contexts and looks at cultural representations that include literary, religious and visual texts.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 2350
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Germanic and Slavic Courses

**GSLL 2551 (3) Modern Jewish Literature**
Examines Jewish experience through the study of literary texts from around the world, mainly from the 20th and 21st centuries. Discusses issues pertaining to secularism and tradition; diasporas and homelands; modernity and questions of identity raised by the intellectual transitions brought about by political and social emancipation; sexualities; enormous changes wrought by population redistributions, world wars and rapid cultural transformations.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 2551
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Germanic and Slavic Courses

**GSLL 3401 (3) The Heart of Europe: Filmmakers and Writers in 20th Century Central Europe**
Surveys the major works of 20th century central and central east European film and literature. Examines cultural production in the non-imperial countries and non-national languages of the region including Yiddish, Belarusian, Czech, Hungarian, Polish and Romanian, among others. Traces the rise of nationalism over the course of the century from the age of empires through the "Cold War." Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3401
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Germanic and Slavic Courses

**GSLL 3600 (3) Contemporary Jewish Societies**
Uses transnational lens to explore contemporary debates about Jewish people, places and practices of identity and community; places that Jews have called 'home', and what has made, or continues to make those places 'Jewish'; issues of Jewish homelands and diasporars; gender, sexuality, food and the Jewish body; religious practices in contemporary contexts. Readings drawn primarily from contemporary journalism and scholarship.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3600 and IAFS 3600
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Germanic and Slavic Courses

## Russian

**RUSS 1010 (4) Beginning Russian 1**
For students with no previous training in Russian.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 1050
**Additional Information:** Departmental Category: Russian

**RUSS 1020 (4) Beginning Russian 2**
A continuation of RUSS 1010. Provides a basic introduction to Russian language and life. Covers the basics of Russian grammar; classroom activities develop speaking, reading and comprehension skills. Course will have midterm and final.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 1050
**Recommended:** Prerequisite RUSS 1010 (minimum grade C-).
**Additional Information:** Departmental Category: Russian

**RUSS 1050 (5) Intensive Beginning Russian**
Covers same material as RUSS 1010 and RUSS 1020 combined in one course. Focuses on acquiring basic grammar (all cases for nouns, adjectives and possessives, verb conjugations, in all three tenses), and ability to understand and speak basic everyday Russian. Develops basic reading and writing skills and provides exposure to the fundamentals of the Russian culture.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 1010 or RUSS 1020
**Additional Information:** Departmental Category: Russian

**RUSS 2010 (4) Second-Year Russian 1**
Review and continuation of basic skills learned in the first year: reading, writing, speaking, and oral comprehension. Department enforced prerequisite: RUSS 1020 or RUSS 1050 (minimum grade C-).
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Russian

**RUSS 2020 (4) Second-Year Russian 2**
Continuation of RUSS 2010. Department enforced prerequisite: RUSS 2010 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian

**RUSS 3000 (3) Advanced Conversation**
Enables students to speak and understand contemporary Russian. Discussion topics and source materials vary. Department enforced prerequisite: RUSS 2010 (minimum grade C-).
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian

**RUSS 3010 (4) Third-Year Russian 1**
Review of Russian grammar coordinated with reading, speaking, writing and understanding modern Russian. Uses some texts from modern Russian literature. Department enforced prerequisite: RUSS 2020 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian

**RUSS 3020 (4) Third-Year Russian 2**
Continuation of RUSS 3010. Department enforced prerequisite: RUSS 3010 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian

**RUSS 3060 (4) Advanced Russian for Heritage Speakers (Part 1)**
Enhances heritage student competence and performance in Russian language. Offers intensive review of Russian grammar and focuses on developing advanced reading, writing and translation skills. Readings are selected from a wide range of contemporary writings that reflect current issues in Russia.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4010 or RUSS 5010
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian

**RUSS 4010 (4) Advanced Conversation and Composition 1**
Review of all aspects of Russian grammar, with a focus on difficulties, vocabulary for communication at an advanced level and contextual usage. Includes intensive writing and editing of compositions on a variety of topics, reading of authentic Russian texts, interactive work with Russian media and fluent conversation in Russian that moves beyond functional proficiency. Department enforced prerequisite: RUSS 3020 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 3060 RUSS 5010
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian

**RUSS 4020 (4) Advanced Conversation and Composition 2**
Review of all aspects of Russian grammar, with a focus on difficulties, vocabulary for communication at an advanced level and contextual usage. Includes intensive writing and editing of compositions on a variety of topics, reading of authentic Russian texts, interactive work with Russian media and fluent conversation in Russian that moves beyond functional proficiency. Department enforced prerequisite: RUSS 4010 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4060 RUSS 5020
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian

**RUSS 4050 (4) Professional Russian**
Introduces stylistic and idiomatic forms of Russian used in business, politics, media and the Internet. Develops new vocabulary with a special focus on fluency of speech and written communication skills. Offers immersion into the world of contemporary Russian media, politics and culture. Formerly RUSS 3050.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 5050
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Recommended:** Prerequisite RUSS 3020.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian

**RUSS 4060 (4) Advanced Russian for Heritage Speakers (Part 2)**
Enhances heritage student competence and performance in Russian language. Offers intensive review of Russian grammar and focuses on developing advanced reading, writing and translation skills. Readings are selected from a wide range of contemporary writings that reflect current issues in Russia. Department enforced prerequisite: RUSS 3060 or RUSS 4010 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4020 or RUSS 5020
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian

**RUSS 4220 (3) Topics in Russian, East European and Eurasian Culture (in Russian)**
Selected topics in Russian, East European and Eurasian culture and society. Taught all or partly in Russian. Formerly RUSS 4220.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5220
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RUSS 4230 (3) Russian Cultural Idioms**
Focuses on the critical analysis of the Russian cultural discourse through Russian idioms. Taught in Russian. Department enforced prerequisite: RUSS 2020 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 5230
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian

**RUSS 4850 (4) Russian Film and Society**
Examines topics in Russian film and TV series from sociohistorial and cultural perspectives, while simultaneously developing students' auditing, comprehension, and speaking skills in Russian language. Critical thinking and analytical approaches will be key to working through the course's material. Screenings, discussions, and written assignments are in Russian.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 5850
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite RUSS 2020.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian

## Russian, East European and Eurasian Studies

**REES 1112 (3) Astronauts and Astropolitics: Space Exploration from the Cold War to the Future of Innovation**
Surveys the history of space exploration to equip students with critical learning skills to understand current trends and future innovations in space tourism, medicine, commerce and law. This course examines the relationships between history, science, and politics of the Space Age, beginning with the early space flight pioneers and the Cold War¿s Space Race, and concluding with the current advances in humanity¿s interstellar aspirations. Taught in English. Formerly offered as a special topics course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**REES 2121 (3) Topics in Russian, East European and Eurasian Culture**
Selected topics in Russian, East European and Eurasian culture. No knowledge of Russian required. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**REES 2211 (3) Russian Culture and Art Under Tsars Great and Terrible**
Explores the cultural history of Russia from the 9th century through 1917. Using visual presentations and reading of primary sources, we will examine closely those rulers whose actions had a significant impact on the development of Russian life, art, and architecture, such as Ivan the Terrible, and Peter I and Catherine II, the ¿Greats.¿ No knowledge of Russian required. Taught in English.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 2221 (3) Introduction to Modern Russian and Soviet Culture**
Introduces students to major trends in Russian and Soviet culture from the 1890's to the present, through the study of literature, art, architecture, music and film in an historical context. Addresses such questions as: how have past events affected Russian and post-Soviet society? How can we use knowledge about the past to understand social and cultural forces today? Taught in English. Formerly RUSS 2221.
**Equivalent - Duplicate Degree Credit Not Granted:** LIBB 2100
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 2222 (3) Sports and the Cold War**
Explores the multiple connections between sports and international politics during the Cold War in the Post-War period. Examines how the issues of class, nation, ethnicity, and gender intersect with sports and international politics by studying cases from various sport events since 1945. Taught in English.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Russian Courses Taught in English

**REES 2231 (3) Fairy Tales of Russia and Ukraine**
Provides a general introduction to fairy tales including various theoretical approaches to classifying and interpreting them; introduces students to a wide selection of Russian and Ukrainian folk and fairy tales. Examines the cultural, social and political values they reflect, as well as the continuing influence of fairy tales and folk beliefs in Russian and Ukrainian literature, music, folk art, and film, and in the political propaganda of the 20th century. Taught in English.
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 2241 (3) Death and the Undead in Slavic and Nordic Cultures**
Focuses on the study of beliefs and practices related to the dead as represented in popular culture. This interdisciplinary course will introduce students to representations of the vampire/revenant and other denizens of the undead in Icelandic sagas, Russian epic song, folktales, folklore, literature, and film from the medieval period through contemporary popular culture. Through close analysis of these various sources, this course will focus on the metaphoric usefulness of the ¿restless undead¿ in explaining its relentless appearance in cultural artifacts, and pursue the question of why the vampire will not ¿die,¿ but instead continues to appeal to modern and post-modern imaginations. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** SCAN 2241
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 2261 (3) Madness and Gambling: Russian Short Stories of Life on the Edge**
Traces themes of love, death, madness, gambling addiction, and other extreme emotional experiences within Russian short story form. Students will learn to make large-scale observations about cultural patterns and major artistic movements of Russia in the nineteenth to twenty-first centuries by reading classic short works by Pushkin, Gogol, Dostoyevsky, Tolstoy, Turgenev, Chekhov, Platonov, Shalamov, Ulitskaya, Petrushevskaya, among others. All readings will be in English. No knowledge of Russian required. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 2271 (3) Space, Invention, and Wonder in Fairy Tales, Literature and Film**
Explores the themes of space, invention, technology and wonder in fairy tales from Italian, Russian, French, German, and Spanish traditions in order to compare their transformation in different national and historical settings. Students analyze the intersection of fairy tales and science in literature and film. Counts for the Space Minor. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**REES 2311 (3) Energy Cultures: Oil, Coal, and Atoms in Modern Literature and Film**
Explores the concept of energy and its influence in world culture from the 19th century to the present, paying particular attention to how writers and filmmakers from the United States, Russia, and elsewhere have responded to the accelerating production and consumption of fossil fuels and nuclear power. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 2311 and HUMN 2311
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**REES 2471 (3) Women in Russian Culture: From Folklore to the Nineteenth Century**
Explores the changing role and cultural images of women as reflected in Russian folklore, historical documents, costumes, icons, paintings and literature from medieval times to 19th century. Focuses on the way Russian women have transgressed boundaries of patriarchy and secured powerful positions in society and culture. Taught in English. Formerly RUSS 2471.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 2501 (3) Russia Beyond the Headlines: Media, Politics, Culture, and Environment**
Explores Russia¿s role in global politics and culture through the analysis of Russia¿s diverse media spheres. Focusing on the key players who shape and transform our understanding of contemporary Russian society, we will examine such topics as protest, diversity, environmental activism, Internet, mass- and counter-culture, and fashion, among many others. Formerly RUSS 2501.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Russian Courses Taught in English

**REES 3121 (3) Topics in Russian, East European and Eurasian Culture**
Selected topics in Russian, East Europeanand Eurasian culture. No knowledge of Russian required. Taught in English.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**REES 3221 (3) Space Race in Russian and American Culture**
Explores facts and fantasies of American and Soviet cultural narratives accompanying the Space Race, focusing on the production of recorded history as a process of mythmaking during the Cold War. Ponders the significance of presenting astronauts as national heroes and constructing national identities around the triumphs and failures of the competing space programs in science, art, music, film, and journalism. Formerly RUSS 3221.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 3231 (3) Laughter in Slavic Cultures**
Examines forms, genres and social functions of laughter in Slavic cultures (Russian, Polish, Czech, Serbian and others) and provides an introduction to literature and film of Eastern Europe. All readings are in English. Taught in English. Formerly RUSS 3231.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 3241 (3) Red Star Trek: Russian Science Fiction Between Utopia and Dystopia**
Examines Russo-Soviet science fiction in literature and film. Within this popular genre, writers conceive and criticize social utopias, thus creating works situated between the poles of utopia and dystopia. Through discussions of Soviet and post-Soviet science fiction the course introduces a Russo-Soviet "alternative modernity" and studies its historical development. All readings are in English. Taught in English. Formerly RUSS 3241.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 3251 (3) Arctic Thrillers: Environment, Landscape and Literature of the Far North**
Explores 19th- and 20th-century Russian and Nordic literature, film and television with a special emphasis on the role of extremes of geography and climate and physical space on the development of plot and character. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** SCAN 3251
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**REES 3301 (3) Russia, Eastern Europe and Eurasia Today through Film and TV**
Introduces post-Soviet culture through films and TV shows. The course will expose students to the diversity of contemporary Russian, East European and Eurasian life and cinematic production. Among the themes and materials discussed will be gender and sexuality, regional cinema, the documentary turn, ecology, migrants on screen, changing visions of Russia¿s historical role and position, and others. No knowledge of Russian is required. Taught in English. Formerly RUSS 3301.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 3333 (3) Spies Like Us: Espionage in the Culture of the Cold War and Beyond**
Explores the figure of the spy in Western and Soviet/post-Soviet imagination of the Cold War period and after. Focuses on the constructions and transformations of the "enemy" concept in modern and post-modern societies. Taught in English. Formerly RUSS 3333.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 3601 (3) Russian Culture Past and Present**
Russian culture from the ninth century to the present. Focuses on interdisciplinary exploration of literature, folklore, art, architecture and music through study abroad in St. Petersburg. Taught in English. Offered abroad only. Formerly RUSS 3601.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 3701 (3) Slavic Folk Culture: Ideals and Values in the Contemporary World**
Explores contemporary Slavic and American folk practices and investigates the possible origins and consequences of such practices. Focuses upon the value systems these practices represent, and ways that core values help to define identities and cultures. Topics include folk religion, magic, healing, life cycle and calendar rituals and folk music. Taught in English. Formerly RUSS 3701.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 3705 (3) Crimes of Passion: Gender and Sexual Politics in Tolstoy's Russia**
Examines the historical evolution of gender and sexual politics and the status of women in the late Imperial Russian culture, with particular attention to the writings of Leo Tolstoy and his masterpiece Anna Karenina. Topics-based survey considers debates around marriage, sexuality and gender equality through analysis of primary text by Tolstoy and his contemporaries, as well as secondary materials in gender studies, literary criticism and intellectual history. Taught in English. Formerly RUSS 3705.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Russian Courses Taught in English

**REES 3900 (1-6) Independent Study**
Formerly RUSS 3900.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Russian

**REES 3930 (1-6) Russian, East European and Eurasian Studies Internship**
Provides an academically supervised opportunity for upper-division students to earn credit while working for public or private organizations. Students apply skills and knowledge earned in the major, and supplement their work experience through directed readings and assignments. Formerly RUSS 3930.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Russian, East European and Eurasian Studies (REES) majors only.
**Additional Information:** Departmental Category: Russian

**REES 4120 (3) Russia after Communism: Post-Soviet Politics and Culture**
Explores the process of the re-invention and re-shaping of the Russian national identity after the collapse of the communist society. Topics will include the formation of neoconservative and neo-imperialist agenda (Ukraine crisis), growth of the anti-western attitudes and the protest movement against Putin's politics. Taught in English. Formerly RUSS 4120.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5120
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Russian Courses Taught in English

**REES 4210 (3) Topics in Russian, East European and Eurasian Culture**
Selected topics in Russian, East European and Eurasian Cultures. No knowledge of Russian required. Taught in English. Formerly RUSS 4210.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5210
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4211 (3) History of Russian and Soviet Cinema**
Explores groundbreaking works of Russian and Soviet cinema in historical context and with an emphasis on the connections between politics and cinematic form. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4211 and REES 5211 and ARTF 5211
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4221 (3) Stalinism: Culture and Society**
Examines Soviet society and culture of Stalin period (1929-1953). The Great Terror, communist ideology, shady, commercial practice, political intrigues and show trials, as well as many other aspects of Stalinism will be discussed. Course materials include historical studies, documents, memoirs, diaries, novels and films of or about the period. Taught in English. Formerly RUSS 4221.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 5221
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4251 (3) Russian and Soviet Queer Culture**
Explores the contributions to Russian/Soviet literature, film, and the performing arts by such LGBTQ cultural icons as Nikolai Gogol, Marina Tsvetaeva, Sergei Eisenstein, and Pyotr Tchaikovsky. The course also surveys the history of social and legal restrictions on non-heteronormative behaviors in Russia from the medieval period to the present, with an emphasis on the emergence of LGBT rights activism and the reactionary rise of homophobia as a tool of nationalist politics in Putin¿s Russia. Taught in English. Formerly RUSS 4251.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5251
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**REES 4301 (3) American-Russian Cultural Relations**
Surveys the development of American-Russian cultural relations from the second half of the 18th century to the present. Examines the character and significance of Russian-American relations in social, intellectual, artistic, and other spheres from a comparative perspective. Taught in English. Formerly RUSS 4301.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5301
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Russian Courses Taught in English

**REES 4321 (3) Mythological Russia and Ukraine**
Examines folklore, popular culture, and everyday life in contemporary Russia and Ukraine to reveal beliefs, ideals, and ideologies. Subjects include witchcraft, shamanism, healing, death, remembrance, nostalgia, collective memory, obscenity. Students will learn to analyze artifacts, photographs, interviews, memoirs, songs, stories, and rituals. Taught in English. Formerly RUSS 4321.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5321
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**REES 4431 (3) Dostoevsky**
Focuses on close reading of major novels and other works by Dostoevsky, one of the most important psychological novelists in modern literature, a profound religious thinker and the greatest crime novelist in the world. Taught in English. Formerly RUSS 4431.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5431
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4441 (3) Tolstoy**
Examines the development of Tolstoy's thought and literary style through study of one of his novels and short works from different periods of Tolstoy's writing. Taught in English. Formerly RUSS 4441.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5441
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4451 (3) Chekhov**
Analyzes the life and creative works of the author of some of the funniest and some of the gloomiest stories in Russian literature. Examines Chekhov's major plays that laid the foundation for modernist theatre. Taught in English. Formerly RUSS 4451.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 5451
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4471 (3) Women in 20th-21st Century Russian, East European and Eurasian Cultures**
Examines issues facing women in 20th-21st century Russia, East Europe, Caucasus and Central Asia, based on study of current events, history, literature, posters and film. Studies images of women as Amazons and rebels, salon hostesses and poets, New Soviet Women and women in combat, prostitutes and mothers. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4471 and REES 5471
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Russian Courses Taught in English

**REES 4481 (3) Rogues to Revolutionaries: Russian Rebels, Past and Present**
Explores the tradition of dissent and opposition in Russian culture, from the medieval period to present, approaching forms of rebellion (religious, political, social, aesthetic) in historical context. This survey in intellectual history will trace this phenomenon across historical documents, literary texts, film, and the fine and performing arts, pairing these primary materials with readings in Russian history. Taught in English. Formerly RUSS 4481.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5481 IAFS 3621
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4811 (3) Seeds of Revolt: 19th-Century Russian Literature**
Explores Russian literature of the 1800s, a remarkable period in literary and political history that witnessed the emergence of nationalism, socialism, and feminism. Reading classic texts by Dostoevsky, Tolstoy and Chekhov alongside lesser-known works that speak to urgent social issues of our own time (identity, class disparity, environmental degradation, and the struggle for civil rights), students will learn interpretive skills that are relevant to a wide range of disciplines today. No knowledge of Russian culture required. Taught in English. Formerly RUSS 4811.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4821 (3) 20th-Century Russian Literature and Art**
Interdisciplinary course emphasizing the influence of literature and art in 20th century Russian literature. Follows the changing cultural landscape from the time when Russia was in the vanguard of modern European literature to the period of Stalinism. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 4821 and REES 5821
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4831 (3) Contemporary Russian Literature**
Acquaints students with the most representative works of Russian writers after the collapse of the Soviet regime. Examines the relationships between ideological concepts and aesthetics, and the treatment of moral and social issues in recent literary works. All readings are in English. Taught in English. Formerly RUSS 4831.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5831
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4851 (3) Critical Thinking: Russian Film and Society**
Through structured discussions, selected readings and written assignments, examines topics in Russian film from socio-historical and cultural studies perspectives. Taught in English. Formerly RUSS 4851.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5851
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4861 (3) Absurd and Supernatural in Russian Literature**
Studies themes of grotesque, bizarre, surreal, absurd, supernatural and fantastic in Russian short stories and novels of the 19th and 20th centuries. Discusses works by Pushkin, Gogol, Dostoevsky, Kharms, Bulgakov, Sinyavsky, Petrushevskaya and Pelevin within the contexts of Russian folklore, Freud and Jung's interpretations of jokes and dreams, and Romanticism. Taught in English. Formerly RUSS 4861.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5861
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4871 (3) Understanding Ukraine: Culture, Diversity, Conflict**
Introduces students to Ukraine¿s cultural diversity and orients them in the history of the country at the heart of contemporary world politics. This course will provide students with a necessary historical frame for understanding current and war-time cultural debates about Ukraine¿s contested heritage and future. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3622 RUSS 5871

**REES 4900 (1-6) Independent Study**
Formerly RUSS 4900.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Russian

**REES 5110 (3) Slavic Culture and Society**
Examines important ideologies and myths in Slavic societies, with emphasis on contemporary movements and their reinterpretation of history. Acquaints students with major tools for study of cultures of Eastern Europe and the post-Soviet states: research methods, bibliography, transliteration, critical thinking and writing skills. Required for Russian MA. Taught in English. Formerly RUSS 5110.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5120 (3) Russia after Communism: Post-Soviet Politics and Culture**
Explores the process of the re-invention and re-shaping of Russian national identity after the collapse of Communism. Topics will include the formation of a neoconservative and neo-imperialist agenda (as demonstrated by the Ukraine crisis), the growth of anti-Western attitudes, and the anti-Putin protest movement. Taught in English. Formerly RUSS 5120.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4120
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5210 (3) Topics in Russian, East European and Eurasian Culture**
Selected topics in Russian, East European and Eurasian culture. No knowledge of Russian required. Taught in English. Formerly RUSS 5210.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4210
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5211 (3) History of Russian and Soviet Cinema**
Surveys Russian cinema in historical and cultural context from early 20th century to the present. Taught in English. Formerly RUSS 5211.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5211 and REES 4211 and CINE 4211
**Requisites:** Restricted to graduate students only.

**REES 5221 (3) Stalinism: Culture and Society**
Examines Soviet society and culture of the Stalin period (1929-1953). The Great Terror, Communist ideology, commercial practices, political intrigues and show trials, as well as many other aspects of Stalinism will be discussed. Course materials include historical studies, documents, memoirs, diaries, novels and films of or about the period. Taught in English. Formerly RUSS 5221.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4221

**REES 5251 (3) Russian and Soviet Queer Culture**
Explores the contributions to Russian/Soviet literature, film, and the performing arts by such LGBTQ cultural icons as Nikolai Gogol, Marina Tsvetaeva, Sergei Eisenstein, and Pyotr Tchaikovsky. The course also surveys the history of social and legal restrictions on non-heteronormative behaviors in Russia from the medieval period to the present, with an emphasis on the emergence of LGBT rights activism and the reactionary rise of homophobia as a tool of nationalist politics in Putin¿s Russia. Taught in English. Formerly RUSS 5251.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4251

**REES 5301 (3) American-Russian Cultural Relations**
Surveys the development of American-Russian cultural relations from the second half of the 18th century to the present. Examines the character and significance of Russian-American relations in social, intellectual, artistic, and other spheres from a comparative perspective. Taught in English. Formerly RUSS 5301.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4301
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5321 (3) Mythological Russia and Ukraine**
Examines folklore, popular culture, and everyday life in contemporary Russia and Ukraine to reveal beliefs, ideals, and ideologies. Subjects include witchcraft, shamanism, healing, death, remembrance, nostalgia, collective memory, obscenity. Students will learn to analyze artifacts, photographs, interviews, memoirs, songs, stories, and rituals. Taught in English. Formerly RUSS 5321.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4321
**Recommended:** Prerequisite prior experience with folklore or Russian studies.

**REES 5352 (3) Russian Novel: Theory and Practice**
Examines the Russian novel and its evolution as well as Western and Russian theories of the novel as they engage and reflect upon the claims of modernity. Taught in English. Formerly RUSS 5352.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5431 (3) Dostoevsky**
Focuses on close reading of major novels and other works by Dostoevsky, one of the most important psychological novelists in modern literature, a profound religious thinker and the greatest crime novelist in the world. Taught in English. Formerly RUSS 5431.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4431
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5441 (3) Tolstoy**
Examines the development of Tolstoy's thought and literary style through study of one of his novels and short works from different periods of Tolstoy's writing. Taught in English. Formerly RUSS 5441.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4441
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5451 (3) Chekhov**
Analyzes the life and creative works of the author of some of the funniest and some of the gloomiest stories in Russian literature. Examines Chekhov's major plays that laid the foundation for modernist theatre. Taught in English. Formerly RUSS 5451.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4451
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5471 (3) Women in 20th-21st Century Russian, East European and Eurasian Cultures**
Examines issues facing women in 20th-21st century Russia, based on study of current events, history, literature, posters and film. Studies images of women as Amazons and rebels, salon hostesses and poets, New Soviet Women and women in combat, prostitutes and mothers. Taught in English. Formerly RUSS 5471.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4471 and WGST 4471
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5481 (3) Rogues to Revolutionaries: Russian Rebels, Past and Present**
Explores the tradition of dissent and opposition in Russian culture, from the medieval period to present, approaching forms of rebellion (religious, political, social, aesthetic) in historical context. This survey in intellectual history will trace this phenomenon across historical documents, literary texts, film, and the fine and performing arts, pairing these primary materials with readings in Russian history. Taught in English. Formerly RUSS 5481.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4481 IAFS 3621
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5821 (3) 20th Century Russian Literature and Art**
Interdisciplinary course emphasizing the influence of literature and art in 20th century Russian literature. Follows the changing cultural landscape from the time when Russia was in the vanguard of modern European literature to the period of Stalinism. Taught in English. Formerly RUSS 5821.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4821 AND HUMN 4821
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5830 (3) Topics in Literature and History**
Taught in English. Formerly RUSS 5830.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5831 (3) Contemporary Russian Literature**
Acquaints students with the most representative works of Russian writers after the collapse of the Soviet regime. Examines the relationships between ideological concepts and aesthetics, and the treatment of moral and social issues in recent literary works. All readings are in English. Taught in English. Formerly RUSS 5831.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4831
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5851 (3) Critical Thinking: Russian Film and Society**
Through structured discussions, selected readings and written assignments, examines topics in Russian film from socio-historical and cultural studies perspectives. Taught in English. Formerly RUSS 5851.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4851
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5861 (3) Absurd and Supernatural in Russian Literature**
Studies themes of grotesque, bizarre, surreal, absurd, supernatural and fantastic in Russian short stories and novels of the 19th and 20th centuries. Discusses works by Pushkin, Gogol, Dostoevsky, Kharms, Bulgakov, Sinyavsky, Petrushevskaya and Pelevin within the contexts of Russian folklore, Freud and Jung's interpretations of jokes and dreams, and Romanticism. Taught in English. Formerly RUSS 5861.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4861
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5871 (3) Understanding Ukraine: Culture, Diversity, Conflict**
Introduces students to Ukraine¿s cultural diversity and orients them in the history of the country at the heart of contemporary world politics. This course will provide students with a necessary historical frame for understanding current and war-time cultural debates about Ukraine¿s contested heritage and future. Taught in English. Degree credit not granted for IAFS 3622.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4871
**Requisites:** Restricted to graduate students only.

**REES 5900 (1-6) Independent Study**
See department for registration information. Department enforced requisite: graduate standing. Formerly RUSS 5900.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Russian

**REES 6940 (1-3) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree. Formerly RUSS 6940.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian

**REES 6950 (1-6) Master's Thesis**
Formerly RUSS 6950.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian

## Scandinavian

**SCAN 1202 (3) Tolkien's Nordic Sources and the Lord of the Rings**
Examines the Nordic aspect of J.R.R. Tolkien's work, especially The Lord of the Rings. Concentrates on the Nordic saga tradition, mythology, folklore and fairy tales Tolkien used as his sources. Students will explore the transformations of these sources from prehistoric times to contemporary cinematic adaptations, while paying special attention to cultural appropriations, national revisions and political alterations. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 1900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Nordic Studies Courses Taught in English

**SCAN 2201 (3) Introduction to Modern Nordic Culture and Society**
Provides a comprehensive introduction to modern Nordic culture and society. Surveys the history of Nordic countries and examines their culture using art, architecture, literature, and film. Studies social issues, environmental concerns, and political patterns. In profiling aspects of culture and society unique to Nordic countries, students arrive at a conception of a collective Nordic identity. Taught in English.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 2202 (3) The Viking Age**
Examines the social, political, technological, spiritual, and artistic background to the Viking Age, asking how Scandinavian society functioned in the Viking Age, why the Scandinavian expansion occurred, and what its lasting effects have been on the global stage. Taught in English.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 2241 (3) Death and the Undead in Slavic and Nordic Cultures**
Focuses on the study of beliefs and practices related to the dead as represented in popular culture. This interdisciplinary course will introduce students to representations of the vampire/revenant and other denizens of the undead in Icelandic sagas, Russian epic song, folktales, folklore, literature, and film from the medieval period through contemporary popular culture. Through close analysis of these various sources, this course will focus on the metaphoric usefulness of the ¿restless undead¿ in explaining its relentless appearance in cultural artifacts, and pursue the question of why the vampire will not ¿die,¿ but instead continues to appeal to modern and post-modern imaginations. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 2241
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**SCAN 2900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3020 (3) Advanced Readings in Scandinavian**
Develops the type of advanced reading knowledge of the four closely related Scandinavian languages (Swedish, Danish and the two Norwegian standards) that will prepare students for their senior thesis and for possible graduate work. Readings will help students see relationships and connections operating across national and linguistic borders within the Nordic region. Department enforced prerequisites: NORW 2120 and NORW 3900 or SWED 3900 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Norwegian
Departmental Category: Swedish

**SCAN 3101 (3) Global Seminar: Identity, Arts & Ethics in Contemporary Norway**
Explores contemporary Norwegian society from an interdisciplinary, global perspective. Norway is recognized throughout the world for a high standard of living, ethical business culture, and rich art, literature, and cinema. We will examine how Norwegian society has adapted to its recent transformation from being one of the poorest countries in Europe to being one of the richest in the world. Offered through Education Abroad. Taught abroad only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**SCAN 3102 (3) Global Seminar: Scandinavian Witchcraft and Magic in Iceland**
Examines witchcraft and magic in the broad perspective of Scandinavian cultural history. Explores folk culture and customs of Scandinavia's Viking Age and medieval past including visits to historical sites in Iceland. Offered through Education Abroad. Taught abroad only.

**SCAN 3110 (3) Topics in Contemporary Nordic Society and Culture**
Provides insight into cultural adaptations, political struggles and social transformations taking place in the contemporary Nordic world. Subjects treated vary according to current developments in the region, student interest and faculty availability.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3201 (3) Contemporary Nordic Society and Culture**
Explores contemporary Nordic culture and society with special focus on Iceland. Emphasis is on the relationship between historical, geographic, artistic, and political forces in Iceland and their effects on culture and society. Provides insight into the life and attitudes of contemporary Icelanders and stresses their place in the global culture of today. Taught in English.
**Recommended:** Prerequisite SCAN 2201.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3202 (3) Old Norse Mythology**
Presents Old Norse mythology as it is represented in medieval Nordic literature. Discusses strategies for analyzing Old Norse mythology as medieval literature that reflects social narratives in Scandinavia in the period 500-1300 AD. Interprets and contextualizes Old Norse mythology in relation to its codification in literature. Students will gain insight into the historical development and the complexity of transmission of Old Norse mythology in medieval literature and its subsequent reception in the global public. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3203 (3) 19th & 20th Century Nordic Literature**
Examines the Nordic region's influence on social realism, expressionism, and postwar literature, including such themes as women in society, nature and industrialization, and identity and angst. May include works by Ibsen, Strindberg, Dinesen, and Nobel Prize winners Lagerlof, Hamsun, Undset, and Lagerkvist. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3204 (3) Medieval Icelandic Sagas**
Advanced introduction to medieval Icelandic saga with readings in the family, outlaw, skald, and legendary sagas as well as the main scholarly approaches to this unique literature. Topics include honor, blood feud, fate, sexuality/gender, oral composition, and legend. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3205 (3) Scandinavian Folk Narrative**
Introduces the rich tradition of Scandinavian oral narrative. Looks at relationships between the various genres of oral narrative and their historical, social, and cultural contexts. Genres studied may include ballad, fairy tale, rural legend, and urban legend. Explores various interpretive methodologies. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3206 (3) Nordic Colonial History and Legacy**
Examines Nordic colonial enterprise and the relationship between the Scandinavian center and colonial peripheries from the Arctic to the Caribbean, Africa, and India. Studies colonial and postcolonial cultures, and postcolonial criticism and theory. Taught in English.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3207 (3) Beyond Middle Earth: Tolkien¿s Nordic Sources II**
Explores beyond The Lord of the Rings and reads Tolkien¿s sources for material in the Silmarillion as well as his re-imaginings of Nordic literature such as The Legend of Sigurd and Gudrun, The Story of Kullervo, and Old English elegiac and battle poems. Students will apply source criticism to Tolkien¿s inspirations, to his academic work and works of fiction. Students will gain insight into Tolkien¿s goals in his re-working of sources, and consider how Tolkien¿s work re-contextualizes the original texts for his contemporaries and for modern society. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**SCAN 3208 (3) Women in Nordic Society: Modern States of Welfare**
Examines the role and status of women and marginalized social classes in the Nordic countries, whose societies have been heralded as egalitarian models since the twentieth century. Texts include a variety of media, from literature to sociological works to artifacts of political and popular culture. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3208
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3209 (3) Contemporary Nordic Literature and Film**
Advanced introduction to contemporary Nordic literature and film. Readings/screenings of recent translated Nordic texts and films, presenting a broad spectrum of contemporary issues, along with current critique and theoretical approaches. Topics: history, culture, translation, gender/sexuality, nationalidentity, minority issues, etc. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3251 (3) Arctic Thrillers: Environment, Landscape and Literature of the Far North**
Explores 19th- and 20th-century Russian and Nordic literature, film and television with a special emphasis on the role of extremes of geography and climate and physical space on the development of plot and character. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 3251
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**SCAN 3301 (3) Radical Nationalism in Contemporary Northern Europe**
Examines the current rise of National Socialists, white supremacists, ethnic separatists, anti-Islam activists and social and cultural ultraconservatives in northern Europe. Treats extremist nationalism as a social, cultural, aesthetic, intellectual and political movement. Consults scholarship from sociology, criminology and political science, as well as music, literature, art and film. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3630
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3302 (3) Witchcraft and Magic in Scandinavia**
Investigates witchcraft and magic in Scandinavian cultures from the Viking Age to the Burning Age. The class examines witchcraft and magic in the broad perspective of Scandinavian cultural history, tracing traditions of magic from the earliest sources in runes to film and literature in the modern era. We will investigate the styles of magic and cultural attitudes to it in Iceland, Norway, Denmark, and Sweden.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**SCAN 3303 (3) Contemporary Norse Paganism**
This course introduces to the contemporary neopagan movement in North America known as Norse paganism or Ásatrú. It surveys the historical development of the movement, its attachment to Scandinavian pre-history, and the major socio-cultural components of its identity constructions. We will investigate the movement's attitudes and conceptualizations of modern Nordic-based spirituality in light of gender, race, ethnicity, and its ecosocial ethoses.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**SCAN 3506 (3) Scandinavian Drama**
Examines the many contributions of Scandinavian dramatists to world theater from the 18th century to the present. With emphasis on Holberg, Bjornson, Ibsen, Strindberg, and Bjorneboe, surveys Enlightenment comedy, national romanticism, realism, naturalism, symbolism, expressionism, and Brechtian epic theater. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3631 (3) Arctic Society and Culture**
Investigates representations of the Arctic in literature, art, cinema, media and scientific, and geographical writing over the past century and a half, spanning material from North America, Britain, continental Europe and the Nordic region. Interpretive approaches include ecocriticism; post-colonialism; literary studies; indigenous studies; visual, film and media theory; Cold War studies.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3631
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3632 (3) Scandinavia and the European Union**
Examining the role that the EU plays in the Nordic region, this course is an introduction to the complex relationship between the Nordic nation states and the European project. We explore how the EU is perceived in the Nordic countries and investigate why the Nordic region is reluctant in its relation to the European Union.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3632

**SCAN 3900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Nordic Studies Courses Taught in English

## Swedish

**SWED 1010 (4) Beginning Swedish 1**
**Additional Information:** Departmental Category: Swedish

**SWED 1020 (4) Beginning Swedish 2**
Department enforced prerequisite: SWED 1010 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** SWED 1120
**Additional Information:** Departmental Category: Swedish

**SWED 1110 (4) Beginning Swedish 1 - Directed Independent Language Study**
Provides practical, communicative language skills for use in a variety of situations. Examines basic language structure and grammatical forms. Introduces students to Swedish history and contemporary culture and society.
**Additional Information:** Departmental Category: Swedish

**SWED 1120 (4) Beginning Swedish 2 - DILS**
Continuation of SWED 1110 DILS. Provides practical, communicative language skills for use in a variety of situations. Examines basic language structure and grammatical forms. Introduces students to Swedish history and contemporary culture and society. Department enforced prerequisite: SWED 1110 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** SWED 1020
**Additional Information:** Departmental Category: Swedish

**SWED 1900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Swedish

**SWED 2010 (4) Intermediate Swedish 1 -DILS**
Continuation of SWED 1120 DILS. Provides practical, communicative language skills for use in a variety of situations. Examines basic language structure and grammatical forms. Introduces students to Swedish history and contemporary culture and society. Department enforced prerequisite: SWED 1120 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Swedish

**SWED 2020 (4) Intermediate Swedish 2 - DILS**
Develops intermediate reading, writing, speaking and verbal comprehension skills. Uses the Directed Independent Language Study (DILS) model that combines in-class exercises and lectures with independent study. Reviews and continues content of SWED 2010. Directed independent language study course requires work outside of class. Department enforced prerequisite: SWED 2010 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Swedish

**SWED 2110 (4) Second-Year Swedish Reading and Conversation 1**
Provides practical, communicative language skills for use in a variety of situations. Examines basic language structure and grammatical forms. Introduces students to Swedish history and contemporary culture and society. Department enforced prerequisite: SWED 1010 or SWED 1110 (minimum grade C-).
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Gen Ed: Foreign Language
Departmental Category: Swedish

**SWED 2120 (4) Second-Year Swedish Reading and Conversation 2**
Provides practical, communicative language skills for use in a variety of situations. Examines basic language structure and grammatical forms. Introduces students to Swedish history and contemporary culture and society. Department enforced prerequisite: SWED 1020 or SWED 1120 (minimum grade C-).
**Additional Information:** Departmental Category: Swedish

**SWED 3010 (3) Advanced Swedish 1-DILS**
Continuation of Intermediate Swedish 2. Provides advanced language skills for use in a variety of situations. Examines basic language structure and grammatical forms. Exposes students to historical and modern Swedish culture and society. Directed independent language study course, requires work outside of class. Department enforced prerequisite: SWED 2020 - DILS (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Swedish

**SWED 3020 (3) Advanced Swedish 2 - DILS**
Continuation of Advanced Swedish 1. Provides advanced language skills for use in a variety of situations. Examines basic language structure and grammatical forms. Exposes students to historical and modern Swedish culture and society. Directed independent language study course, requires work outside of class. Department enforced prerequisite: SWED 3010 - DILS (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Swedish

**SWED 3900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Swedish

# German Studies - Bachelor of Arts (BA)

The major in German studies is an interdisciplinary program focusing on the media, art, history and cultures of German-speaking societies in the past and the present; the major historical events and developments in German-speaking societies, the diverse perspectives and positionalities in those societies and the current political dynamics in Germany within the broader European and global contexts.

# Requirements

## Program Requirements

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

The major requirement in German studies is 32 hours beyond GRMN 1020 (with grades of C- or above). Students design their own major in consultation with the undergraduate advisor and a faculty mentor. At least 18 hours taken toward the major must be completed at the 3000 or 4000 level.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **German Language Courses** | | **14-17** |
| German language courses above GRMN 1020, to include either GRMN 3020 or GRMN 3030 (or both). | | |
| GRMN 2010 & GRMN 2020 | Intermediate German 1 and Intermediate German 2 | |
| or | | |
| GRMN 2030 | Intensive Intermediate German | |
| Upper-division German Language courses: | | |
| GRMN 3010 | Advanced German 1 | |
| GRMN 3020 | Advanced German 2 [1] | |
| or GRMN 3030 | Business German | |
| GRMN 4010 | Advanced German III [1] | |
| **German Culture, Literature and Other Electives** | | **15-18** |
| Take at least 5 German literature/culture courses. At least 3 courses must be upper division, and at least 3 must be taught in the German language. | | |
| *Courses Taught in German* | | |
| Select at least three of the following: | | |
| GRMN 3050 | German for Science and Engineering | |

| | |
|---|---|
| GRMN 3120 | German Literature from the Enlightenment to Expressionism |
| GRMN 3130 | Issues in German Philosophy and Literature |
| GRMN 3140 | Current Issues in German Culture |
| GRMN 3150 | Issues in German Politics, Literature and Media |
| GRMN 3520 | Open Topics in the Cultural Context |
| GRMN 3900 | Independent Study |
| GRMN 3930 | Internship |
| GRMN 4330 | The Age of Goethe |
| GRMN 4340 | Seminar in German Literature |
| GRMN 4450 | Methods of Teaching German |
| *Courses Taught in English* | |
| FYSM 1000 | First Year Seminar (Topic "Uncertainty") |
| GRMN 1601 | Germany Today |
| GRMN 1602 | Metropolis and Modernity |
| GRMN 1701 | Nature, Climate and Environment in German Culture |
| GRMN 2141 | Topics in Modern German Culture and Society |
| GRMN 2301 | Inside Nazi Germany: Politics, Culture, and Everyday Life in the Third Reich |
| GRMN 2302 | Nazis on Screen: Hollywood, War, Propaganda |
| GRMN 2402 | Sports and Athleticism in German and Global Culture |
| GRMN 2501 | Miniatures of Modern Life: From Berlin to Vienna and Beyond |
| GRMN 2502 | Representing the Holocaust |
| GRMN 2503 | Fairy Tales of Germany |
| GRMN 2504 | Gothic, Horror, and Fantasy |
| GRMN 2601 | Kafka and the Kafkaesque |
| GRMN 3141 | Topics in Modern German Culture and Society |
| GRMN 3301 | Modern Art and Design at the Bauhaus |
| GRMN 3401 | The German Experience in North America |
| GRMN 3501 | The German-Jewish Experience: From the Enlightenment to the Present |
| GRMN 3502 | The Creation of the Modern Individual in German Culture |
| GRMN 3503 | German Film Through World War II |
| GRMN 3504 | Topics in German Film |
| GRMN 3505 | The Enlightenment: Tolerance and Emancipation |
| GRMN 3506 | Tracing the Criminal: Crime in 19th C Society and Culture |
| GRMN 3507 | Engineering and the Practice of Literature |
| GRMN 3508 | Masters of Suspicion: Marx, Nietzsche, Freud |
| GRMN 3513 | German Film and Society 1945-1989 |
| GRMN 3514 | German Film & Society After 1989 |
| GRMN 3601 | German Women Writers |
| GRMN 3681 | Refugees in German Culture |
| GRMN 3702 | Dada and Surrealist Literature |
| GRMN 3802 | Politics and Culture in Berlin 1900-1939 |
| GRMN 4231 | The Invention of Sexuality |
| GRMN 4251 | Marxism |
| GRMN 4301 | Gender, Race and Immigration in Germany and Europe |
| GRMN 4501 | Seminar: Literature in Cultural Context |
| GRMN 4502 | Nietzsche: Literature and Values |
| GRMN 4503 | Issues in German Thought |
| GRMN 4504 | Goethe's Faust |
| **Total Credit Hours** | **32-35** |

1 Students have the option of taking the exam Goethe-Zertifikat B1 or B2 in GRMN 3020 and the Goethe-Zertifikat B2 or C1 in GRMN 4010.

2 With the approval of the German program faculty advisor, one course from another department may be taken in lieu of one of the four courses, provided that the course has a direct link to German studies.

3 GRMN 4450 and GRMN 4460 can be taken with faculty approval and in most cases only after full admission to the teacher education program in the School of Education.

## Secondary Teacher Certification Program

In addition to other requirements as stated by CU Boulder's School of Education, the following courses are required for students in the secondary teacher certification program:

- GRMN 4450 Methods of Teaching German (3)
- GRMN 4460 High School German Teaching (6)

## Study Abroad

The department recommends that all majors take part in study abroad. Students may study through the university program in Regensburg for a full academic year or for the spring semester. The Berlin program offers options for the full academic year, fall semester, spring semester and summer terms. The Berlin program also offers an internship opportunity. Students should consult with their major advisor (https://www.colorado.edu/alc/christine-luft/) and visit the Education Abroad (http://abroad.colorado.edu/) website for program-specific information. Scholarships are available to help cover the costs of study abroad.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in German studies, students should meet the following requirements:

- Begin to study the language in the freshman year, or have received AP credit.
- In consultation with the major advisor before the end of the drop/add period in the first semester, plan a tentative schedule of courses to be taken over eight semesters.
- Discuss progress toward the degree each semester with the major advisor.

*Note*: Although these requirements apply only in cases in which students are seeking to graduate under the terms of the four-year guarantee, they are good advice for all majors. Consult the major advisor about the major at any time.

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will complete all 12 credit hours of the Arts & Humanities area of the Gen Ed Distribution Requirement.

| Year One | | Credit Hours |
|---|---|---|
| GRMN 1010 and GRMN 1020 (8 credit hours) or GRMN 1030 (5 credit hours) which does not count toward the major [1] | | 8 |
| One lower-division GRMN literature or culture course | | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **30** |
| **Year Two** | | |
| GRMN 2010 & GRMN 2020 or GRMN 2030 | Intermediate German 1 [1,2] or Intensive Intermediate German | 8 |
| One GRMN literature or culture course | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Upper-division Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **32** |
| **Year Three** | | |
| Study Abroad recommended | | |
| GRMN 3010 & GRMN 3020 or GRMN 3030 | Advanced German 1 or Business German | 6 |
| Upper-division GRMN literature or culture course taught in German or English | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **30** |
| **Year Four** | | |
| GRMN 4010 | Advanced German III | 3 |
| Two Upper-Division GRMN literature or culture courses taught in German | | 6 |
| One Upper-Division GRMN culture course taught in English | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **30** |
| | **Total Credit Hours** | **122** |

1. Students who take intensive language courses (GRMN 1030 or GRMN 2030) may fulfill their additional language credits with GRMN 3030 or GRMN 4010.
2. Or placement credit. Students who place out of beginning and intermediate language requirements should see the major requirements for further flexible options.

# Learning Outcomes

By the completion of the program, students will be able to:

- Understand, articulate and critically reflect on key concepts of media, history and cultures of German-speaking societies.
- Expand historical understanding and cultivate intercultural competency.
- Engage critically and comparatively with diverse perspectives and positionalities within German-speaking societies.
- Conduct research and engage in critical analysis of the area of study.
- Develop German language skills, written and spoken, to enable communication, self-expression and creativity in a variety of situations and contexts.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BA and MA in German

The BAM degree program in German studies recognizes the need for master's-level training upon entering the job market in a variety of sectors that call for highly advanced proficiency in the German language, knowledge of the German-speaking central Europe and its cultures and the skills afforded to BA and MA graduates in the humanities (research, analysis, interpretation, translation and communication).

The degree gives highly motivated BA students the opportunity to earn an MA degree using an accelerated undergraduate program in combination with a fifth-year of study.

For more information, visit the department's concurrent BAM degree in German studies webpage (http://www.colorado.edu/gsll/german/undergraduate/concurrent-bama-degree-german-studies/).

### Admissions Requirements

In order to gain admission to the BAM program named above, students must have an overall GPA of 3.25 or higher and should have completed most of their MAPS/Gen Ed requirements by the end of their sophomore year. No GRE is required. It is recommended that applications be turned in by the spring semester of the sophomore year.

Students should apply for the German BAM online. Before filling out the online application, complete the German BAM application (https://www.colorado.edu/gsll/media/681/). The German BAM application should be uploaded to the online application, along with an unofficial CU transcript. Students should apply using the BAM intent application. (https://portal.prod.cu.edu/psc/epprod/UCB2/ENTP/s/WEBLIB_CU_EFORM.ISCRIPT1.FieldFormula.IScript_Populate_eForm/?form=UCB_STUDENT_BAM)

### Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only 6 credits may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

If you are interested in the BAM degree program, please contact the German MA program (https://www.colorado.edu/gsll/german/graduate/) for more information.

# Russian, East European and Eurasian Studies - Bachelor of Arts (BA)

The major in Russian, East European and Eurasian Studies (REEES) is an interdisciplinary program focusing on study of the current cultural and social context, and the literary, artistic and historical aspects of Russian, East European and Eurasian cultures in the past and present. The aim of the language curriculum is to equip students to read, write, speak and understand Russian on a level allowing communication with fluent Russian speakers. Before registering for a language course other than RUSS 1010, students should consult with the undergraduate faculty advisor (https://www.colorado.edu/gsll/german/undergraduate/advising/) concerning appropriate placement.

Students interested in Russian, East European and Eurasian Studies may consider a double major in order to increase their career opportunities. Prospective teachers might combine REEES with a major in another foreign language, while those preparing for a career in government, business or social services may benefit from a combination of REEES and a social science or business major. Students structure their curriculum according to the departmental checklist for majors, in close consultation with a departmental advisor.

## Study Abroad

The department strongly recommends that all Russian, East European and Eurasian Studies majors take part in an intensive language program, summer or semester long, in Russian-speaking countries or in the U.S.

For more information on CU Study Abroad programs, visit the Education Abroad (http://abroad.colorado.edu/) website.

## Courses Taught in English

Many of our content courses are offered in translation. These courses generally require no previous study in the language, history or culture of the area involved, and are open to all interested students, regardless of major.

## Requirements

### General Requirements

Students must complete at least 30 credit hours in Russian, East European and Eurasian Studies (REEES), at least 18 of which must be completed at the 3000 or 4000 level, with grades of C- or better (none may be taken as pass/fail).

- RUSS 1010 and RUSS 1020 do not count toward the 30 credit hours required for the REEES major.
- Students may not receive credit for both RUSS 3060 and RUSS 4010 or RUSS 4020 and RUSS 4060. Choose either the RUSS 3060/RUSS 4060 sequence or the RUSS 4010/RUSS 4020 sequence.
- Beginning or middle-level language course requirements may be met by transfer credit or by testing out of the course. Students who enter the program at the third-year level must complete at least 18 credit hours in residence in courses numbered 3000 or above with grades of C- or better (none may be taken pass/fail).
- Students who enter at and enroll in Russian language courses at the 3000- or 4000-level may not receive credit for lower-division Russian language courses, unless lower-division language coursework was completed prior to registration for 3000- and 4000-level Russian language courses.
- No course can be used for more than one category.

Students are required to structure their curriculum for the major in close consultation with the departmental advisor. (https://www.colorado.edu/artssciences-advising/christine-luft/) Students with advanced Russian language skills are strongly encouraged to meet with the undergraduate faculty advisor (https://www.colorado.edu/gsll/russian/programs-degrees/russian-advising/) to discuss language placement. Students who have Russian language transfer credit and/or students who are Russian language native or heritage speakers may enter the program at the upper-division level, up to RUSS 4010, with faculty permission.

In the case of advanced language placement, students will be required to meet with the REEES faculty advisor for Russian course substitutions and recommendations. Students who place out of Russian language courses required for the major must replace the credits with additional coursework in Russian, East European and Eurasian Studies. Any substitutions to major coursework must be pre-approved by the REEES faculty advisor.

*Note*: Study abroad is recommended after the second year of language study.

## Program Tracks

### Track A: Russian Language

| Code | Title | Credit Hours |
|---|---|---|
| **Required Russian Language Courses** | | |
| *All of the following:* | | |
| RUSS 2010 | Second-Year Russian 1 | 4 |
| RUSS 2020 | Second-Year Russian 2 | 4 |
| RUSS 3010 | Third-Year Russian 1 | 4 |
| RUSS 3020 | Third-Year Russian 2 | 4 |
| *Any two of the following:* | | *8* |
| RUSS 3060 | Advanced Russian for Heritage Speakers (Part 1) | |
| or RUSS 4010 | Advanced Conversation and Composition 1 | |
| RUSS 4020 | Advanced Conversation and Composition 2 | |
| or RUSS 4060 | Advanced Russian for Heritage Speakers (Part 2) | |
| *Any one of the following:* | | *3-6* |
| RUSS 4050 | Professional Russian | |
| RUSS 4220 | Topics in Russian, East European and Eurasian Culture (in Russian) | |
| RUSS 4230 | Russian Cultural Idioms | |
| RUSS 4850 | Russian Film and Society | |
| up to 6 credit hours of upper-division study-abroad Russian language class | | |
| **Culture Courses in English - the 19th Century and Earlier** | | **3** |
| *Select one of the following:* | | |
| REES 2121 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 2211 | Russian Culture and Art Under Tsars Great and Terrible | |
| REES 2231 | Fairy Tales of Russia and Ukraine | |
| REES 2241 | Death and the Undead in Slavic and Nordic Cultures | |
| REES 2261 | Madness and Gambling: Russian Short Stories of Life on the Edge [3] | |
| REES 2471 | Women in Russian Culture: From Folklore to the Nineteenth Century | |
| REES 3121 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 3251 | Arctic Thrillers: Environment, Landscape and Literature of the Far North | |
| REES 3601 | Russian Culture Past and Present [3] | |
| REES 3705 | Crimes of Passion: Gender and Sexual Politics in Tolstoy's Russia | |
| REES 4210 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 4251 | Russian and Soviet Queer Culture [3] | |
| REES 4301 | American-Russian Cultural Relations [3] | |
| REES 4431 | Dostoevsky | |
| REES 4441 | Tolstoy | |
| REES 4451 | Chekhov | |
| REES 4481 | Rogues to Revolutionaries: Russian Rebels, Past and Present [3] | |
| REES 4811 | Seeds of Revolt: 19th-Century Russian Literature | |
| REES 4861 | Absurd and Supernatural in Russian Literature [3] | |
| **Culture Courses in English - the 20th and 21st Centuries** | | **3** |
| *Select one of the following:* | | |
| REES 1112 | Astronauts and Astropolitics: Space Exploration from the Cold War to the Future of Innovation | |
| REES 2121 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 2221 | Introduction to Modern Russian and Soviet Culture | |
| REES 2222 | Sports and the Cold War | |
| REES 2261 | Madness and Gambling: Russian Short Stories of Life on the Edge [3] | |
| REES 2271 | Space, Invention, and Wonder in Fairy Tales, Literature and Film | |
| REES 2311 | Energy Cultures: Oil, Coal, and Atoms in Modern Literature and Film | |
| REES 2501 | Russia Beyond the Headlines: Media, Politics, Culture, and Environment | |
| REES 3121 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 3221 | Space Race in Russian and American Culture | |
| REES 3231 | Laughter in Slavic Cultures | |
| REES 3241 | Red Star Trek: Russian Science Fiction Between Utopia and Dystopia | |
| REES 3301 | Russia, Eastern Europe and Eurasia Today through Film and TV | |
| REES 3333 | Spies Like Us: Espionage in the Culture of the Cold War and Beyond | |
| REES 3601 | Russian Culture Past and Present [3] | |
| REES 3701 | Slavic Folk Culture: Ideals and Values in the Contemporary World | |
| REES 4120 | Russia after Communism: Post-Soviet Politics and Culture | |
| REES 4210 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 4211 | History of Russian and Soviet Cinema | |
| REES 4221 | Stalinism: Culture and Society | |
| REES 4251 | Russian and Soviet Queer Culture [3] | |
| REES 4301 | American-Russian Cultural Relations [3] | |
| REES 4321 | Mythological Russia and Ukraine | |
| REES 4471 | Women in 20th-21st Century Russian, East European and Eurasian Cultures | |
| REES 4481 | Rogues to Revolutionaries: Russian Rebels, Past and Present [3] | |
| REES 4821 | 20th-Century Russian Literature and Art | |
| REES 4831 | Contemporary Russian Literature | |
| REES 4851 | Critical Thinking: Russian Film and Society | |
| REES 4861 | Absurd and Supernatural in Russian Literature [3] | |

| | | |
|---|---|---|
| REES 4871 | Understanding Ukraine: Culture, Diversity, Conflict | |
| **Total Credit Hours** | | **33-36** |

1 Students may not receive credit for both RUSS 3060 and RUSS 4010 or RUSS 4020 and RUSS 4060. Choose either the RUSS 3060/RUSS 4060 sequence or the RUSS 4010/RUSS 4020 sequence.

2 Course counts for appropriate category depending on topic (Undergraduate Faculty Advisor determines category).

3 Course can only count for one category (student can choose).

## Track B: Russian, East European and Eurasian Culture and Literature

| Code | Title | Credit Hours |
|---|---|---|
| **Russian Language Courses** | | |
| *Both of the following:* | | |
| RUSS 2010 | Second-Year Russian 1 | 4 |
| RUSS 2020 | Second-Year Russian 2 | 4 |
| **Culture Courses in English and Optional Russian Language Courses** | | |
| Choose from the following (include at least 6 hours from culture courses on the 19th century and earlier, at least 3 of which must be upper division): | | 24 |
| *Culture Courses Taught in English (19th Century and Earlier):* | | |
| REES 2121 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 2211 | Russian Culture and Art Under Tsars Great and Terrible | |
| REES 2231 | Fairy Tales of Russia and Ukraine | |
| REES 2241 | Death and the Undead in Slavic and Nordic Cultures | |
| REES 2261 | Madness and Gambling: Russian Short Stories of Life on the Edge [3] | |
| REES 2471 | Women in Russian Culture: From Folklore to the Nineteenth Century | |
| REES 3121 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 3251 | Arctic Thrillers: Environment, Landscape and Literature of the Far North | |
| REES 3601 | Russian Culture Past and Present [3] | |
| REES 3705 | Crimes of Passion: Gender and Sexual Politics in Tolstoy's Russia | |
| REES 4210 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 4251 | Russian and Soviet Queer Culture [3] | |
| REES 4301 | American-Russian Cultural Relations [3] | |
| REES 4431 | Dostoevsky | |
| REES 4441 | Tolstoy | |
| REES 4451 | Chekhov | |
| REES 4481 | Rogues to Revolutionaries: Russian Rebels, Past and Present | |
| REES 4811 | Seeds of Revolt: 19th-Century Russian Literature | |
| REES 4861 | Absurd and Supernatural in Russian Literature [3] | |
| *Culture Courses in English (20th and 21st Centuries)* | | |
| REES 1112 | Astronauts and Astropolitics: Space Exploration from the Cold War to the Future of Innovation | |
| REES 2221 | Introduction to Modern Russian and Soviet Culture | |
| REES 2121 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 2222 | Sports and the Cold War | |
| REES 2261 | Madness and Gambling: Russian Short Stories of Life on the Edge [3] | |
| REES 2271 | Space, Invention, and Wonder in Fairy Tales, Literature and Film | |
| REES 2311 | Energy Cultures: Oil, Coal, and Atoms in Modern Literature and Film | |
| REES 2501 | Russia Beyond the Headlines: Media, Politics, Culture, and Environment | |
| REES 3121 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 3221 | Space Race in Russian and American Culture | |
| REES 3231 | Laughter in Slavic Cultures | |
| REES 3241 | Red Star Trek: Russian Science Fiction Between Utopia and Dystopia | |
| REES 3301 | Russia, Eastern Europe and Eurasia Today through Film and TV | |
| REES 3333 | Spies Like Us: Espionage in the Culture of the Cold War and Beyond | |
| REES 3701 | Slavic Folk Culture: Ideals and Values in the Contemporary World | |
| REES 4120 | Russia after Communism: Post-Soviet Politics and Culture | |
| REES 4211 | History of Russian and Soviet Cinema | |
| REES 4221 | Stalinism: Culture and Society | |
| REES 4301 | American-Russian Cultural Relations [3] | |
| REES 4251 | Russian and Soviet Queer Culture [3] | |
| REES 4321 | Mythological Russia and Ukraine | |
| REES 4471 | Women in 20th-21st Century Russian, East European and Eurasian Cultures | |
| REES 4481 | Rogues to Revolutionaries: Russian Rebels, Past and Present [3] | |
| REES 4821 | 20th-Century Russian Literature and Art | |
| REES 4831 | Contemporary Russian Literature | |
| REES 4851 | Critical Thinking: Russian Film and Society | |
| REES 4861 | Absurd and Supernatural in Russian Literature [3] | |
| REES 4871 | Understanding Ukraine: Culture, Diversity, Conflict | |
| Any one 3000- or 4000-level course in the REEES program or another department pertaining to Russia, upon consent of advisor. | | |
| **Optional Russian Language Courses** | | |
| RUSS 3010 | Third-Year Russian 1 | |

| | | |
|---|---|---|
| RUSS 3020 | Third-Year Russian 2 | |
| Upper-division study-abroad language class. | | |
| **Total Credit Hours** | | **32** |

1 Students may not receive credit for both RUSS 3060 and RUSS 4010 or RUSS 4020 and RUSS 4060. Choose either the RUSS 3060/RUSS 4060 sequence or the RUSS 4010/RUSS 4020 sequence.

2 Course counts for appropriate category depending on topic (Undergraduate Faculty Advisor determines category).

3 Course can only count for one category (student can choose).

## Track C: Russian, East European and Eurasian Studies for Heritage Speakers

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| RUSS 3060 | Advanced Russian for Heritage Speakers (Part 1) [1] | 4 |
| RUSS 4060 | Advanced Russian for Heritage Speakers (Part 2) (or any other upper-division Russian language course ) [1] | 4 |
| or RUSS 4010 | Advanced Conversation and Composition 1 | |
| or RUSS 4020 | Advanced Conversation and Composition 2 | |
| or RUSS 4050 | Professional Russian | |
| or RUSS 4220 | Topics in Russian, East European and Eurasian Culture (in Russian) | |
| or RUSS 4230 | Russian Cultural Idioms | |
| or RUSS 4850 | Russian Film and Society | |
| **Culture Courses in English and Optional Russian Language Courses** | | |
| Choose from the following (include at least 6 hours from culture courses on the 19th century and earlier, at least 3 of which must be upper division): | | 24 |
| *Culture Courses in English (19th Century and Earlier):* | | |
| REES 2121 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 2211 | Russian Culture and Art Under Tsars Great and Terrible | |
| REES 2231 | Fairy Tales of Russia and Ukraine | |
| REES 2241 | Death and the Undead in Slavic and Nordic Cultures | |
| REES 2261 | Madness and Gambling: Russian Short Stories of Life on the Edge [3] | |
| REES 2471 | Women in Russian Culture: From Folklore to the Nineteenth Century | |
| REES 3121 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 3251 | Arctic Thrillers: Environment, Landscape and Literature of the Far North | |
| REES 3601 | Russian Culture Past and Present [3] | |
| REES 3705 | Crimes of Passion: Gender and Sexual Politics in Tolstoy's Russia | |
| REES 4210 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 4251 | Russian and Soviet Queer Culture [3] | |
| REES 4301 | American-Russian Cultural Relations [3] | |
| REES 4431 | Dostoevsky | |
| REES 4441 | Tolstoy | |
| REES 4451 | Chekhov | |
| REES 4481 | Rogues to Revolutionaries: Russian Rebels, Past and Present [3] | |
| REES 4811 | Seeds of Revolt: 19th-Century Russian Literature | |
| REES 4861 | Absurd and Supernatural in Russian Literature [3] | |
| **Culture Courses Taught in English (20th and 21st Centuries)** | | |
| REES 1112 | Astronauts and Astropolitics: Space Exploration from the Cold War to the Future of Innovation | |
| REES 2221 | Introduction to Modern Russian and Soviet Culture | |
| REES 2121 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 2222 | Sports and the Cold War | |
| REES 2261 | Madness and Gambling: Russian Short Stories of Life on the Edge [3] | |
| REES 2271 | Space, Invention, and Wonder in Fairy Tales, Literature and Film | |
| REES 2311 | Energy Cultures: Oil, Coal, and Atoms in Modern Literature and Film | |
| REES 2501 | Russia Beyond the Headlines: Media, Politics, Culture, and Environment | |
| REES 3121 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 3221 | Space Race in Russian and American Culture | |
| REES 3231 | Laughter in Slavic Cultures | |
| REES 3241 | Red Star Trek: Russian Science Fiction Between Utopia and Dystopia | |
| REES 3301 | Russia, Eastern Europe and Eurasia Today through Film and TV | |
| REES 3333 | Spies Like Us: Espionage in the Culture of the Cold War and Beyond | |
| REES 3601 | Russian Culture Past and Present [3] | |
| REES 3701 | Slavic Folk Culture: Ideals and Values in the Contemporary World | |
| REES 4120 | Russia after Communism: Post-Soviet Politics and Culture | |
| REES 4211 | History of Russian and Soviet Cinema | |
| REES 4221 | Stalinism: Culture and Society | |
| REES 4301 | American-Russian Cultural Relations [3] | |
| REES 4321 | Mythological Russia and Ukraine | |
| REES 4251 | Russian and Soviet Queer Culture [3] | |
| REES 4471 | Women in 20th-21st Century Russian, East European and Eurasian Cultures | |
| REES 4481 | Rogues to Revolutionaries: Russian Rebels, Past and Present [3] | |
| REES 4821 | 20th-Century Russian Literature and Art | |
| REES 4831 | Contemporary Russian Literature | |

| | |
|---|---|
| REES 4851 | Critical Thinking: Russian Film and Society |
| REES 4861 | Absurd and Supernatural in Russian Literature [3] |
| REES 4871 | Understanding Ukraine: Culture, Diversity, Conflict |
| Any one 3000- or 4000-level course in the REEES program or another department pertaining to Russia, upon consent of advisor. | |
| **Optional Russian Language and Culture Courses** | |
| RUSS 4050 | Professional Russian |
| RUSS 4230 | Russian Cultural Idioms |
| RUSS 4220 | Topics in Russian, East European and Eurasian Culture (in Russian) |
| RUSS 4850 | Russian Film and Society |
| **Total Credit Hours** | **32** |

1 Students may not receive credit for both RUSS 3060 and RUSS 4010 or RUSS 4020 and RUSS 4060. Choose either the RUSS 3060/RUSS 4060 sequence or the RUSS 4010/RUSS 4020 sequence.

2 Course counts for appropriate category depending on topic (Undergraduate Faculty Advisor determines category).

3 Course can only count for one category (student can choose).

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements (https://www.colorado.edu/advising/programs-requirements/germanic-slavic-languages-literatures/) for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major.

Recommended four-year plans of study appear on the Plans of Study tab. To maintain adequate progress in Germanic or Russian, East European and Eurasian studies, students should meet the following requirements:

- Begin to study the language in the freshman year, or have received AP credit.
- In consultation with the major program advisor before the end of the drop/add period in the first semester, plan a tentative schedule of courses to be taken over eight semesters.
- Discuss progress toward the degree each semester with the major advisor.

*Note*: Although these requirements apply only in cases in which students are seeking to graduate under the terms of the four-year guarantee, they are good advice for all majors. Consult the program advisor about the major at any time.

# Recommended Four-Year Plans of Study

Through the required coursework for all tracks of the major, students can complete all 12 credit hours of the Arts & Humanities area of the Gen Ed Distribution Requirement. Depending on the courses selected from options, students can potentially complete some credit hours in the Social Sciences area of the Gen Ed Distribution Requirement and the Global Perspective component of the Gen Ed Diversity Requirement.

## Track A: Russian Language

| **Year One** | | **Credit Hours** |
|---|---|---|
| RUSS 1010 and 1020 (which do not count toward the major) | | 8 |
| RUSS course on 19th century or earlier periods | | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) (if needed) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with lab) | | 4 |
| Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **33** |
| **Year Two** | | |
| RUSS 2010 & RUSS 2020 | Second-Year Russian 1 and Second-Year Russian 2 (or Study Abroad) | 8 |
| RUSS course on 20th-21st centuries | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **29** |
| **Year Three** | | |
| RUSS 3010 & RUSS 3020 | Third-Year Russian 1 and Third-Year Russian 2 (or Study Abroad) | 8 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Upper-division Elective | | 3 |
| Elective or Upper-division Elective (if needed) | | 3 |
| Elective or Upper-division Elective (if needed) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **29** |
| **Year Four** | | |
| RUSS 4010 & RUSS 4020 or RUSS 3060 ***and*** RUSS 4060 | Advanced Conversation and Composition 1 ( (or Study Abroad) ) or Advanced Russian for Heritage Speakers (Part 1) ***and*** Advanced Russian for Heritage Speakers (Part 2) | 8 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| REES 4210 | Topics in Russian, East European and Eurasian Culture | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |

| | |
|---|---|
| Upper-division Elective | 3 |
| Upper-division Elective | 3 |
| **Credit Hours** | **29** |
| **Total Credit Hours** | **120** |

## Track B: Russian, East European and Eurasian Culture and Literature

| **Year One** | | **Credit Hours** |
|---|---|---|
| RUSS 1010 and RUSS 1020 (which do not count toward the major) | | 8 |
| RUSS 2000-level Aspects of Russian/Soviet/Post-Soviet Culture course | | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 4 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) (if needed) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **30** |
| **Year Two** | | |
| RUSS 2010 & RUSS 2020 | Second-Year Russian 1 and Second-Year Russian 2 (or Study Abroad) | 8 |
| RUSS 2000-level Russian literature or film course | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **30** |
| **Year Three** | | |
| REES 4821 | 20th-Century Russian Literature and Art | 3 |
| REES 4811 | Seeds of Revolt: 19th-Century Russian Literature | 3 |
| RUSS Upper-division Aspects of Russian/Soviet/Post-Soviet Culture course | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) (if needed) | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **30** |
| **Year Four** | | |
| Two 3000-4000 level RUSS literature or film courses | | 6 |
| Elective 3000-4000 level RUSS or GSLL culture, literature or language course | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) (if needed) | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **30** |
| | **Total Credit Hours** | **120** |

## Track C: Russian, East European and Eurasian Studies Major for Heritage Speakers

| **Year One** | | **Credit Hours** |
|---|---|---|
| RUSS 3060 & RUSS 4060 | Advanced Russian for Heritage Speakers (Part 1) and Advanced Russian for Heritage Speakers (Part 2) | 8 |
| One of the REES courses on 19th century or earlier periods OR Study Abroad | | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **30** |
| **Year Two** | | |
| One of the RUSS courses on 20th-21st centuries | | 3 |
| One of the 2000-level RUSS culture courses | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) (if needed) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **30** |
| **Year Three** | | |
| One 4000 level RUSS literature course | | 3 |
| Two 3000-4000 level RUSS culture courses | | 6 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) (if needed) | | 3 |

| | |
|---|---|
| Upper-division Elective | 3 |
| Upper-division Elective | 3 |
| Elective or Upper-division Elective (if needed) | 3 |
| Elective | 3 |
| **Credit Hours** | **30** |
| **Year Four** | |
| One 3000-4000 level RUSS or REES culture course | 3 |
| One elective 3000-4000 level RUSS, REES or GSLL culture, literature or language course | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) (if needed) | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | 3 |
| Upper-division Elective | 3 |
| Upper-division Elective | 3 |
| Upper-division Elective | 3 |
| Upper-division Elective | 3 |
| Elective or Upper-division Elective (if needed) | 3 |
| Elective or Upper-division Elective (if needed) | 3 |
| **Credit Hours** | **30** |
| **Total Credit Hours** | **120** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Understand, articulate and critically reflect on key concepts, events and movements as they relate to the study of Russian, East European and Eurasian literature, history and culture.
- Cultivate historical understanding and intercultural competency.
- Recognize, describe and engage critically and comparatively with diverse perspectives and positionalities within Russophone societies.
- Conduct research and engage in critical analysis of the area of study.
- Develop proficiency in Russian language skills, written or spoken, to enable culturally appropriate communication, self-expression and creativity.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BA and MA in Russian Studies

Highly motivated undergraduates majoring in Russian studies at CU Boulder have the opportunity to enter a BAM program, thereby earning both the BA and the MA in five years. The accelerated degree program offers a unique academic credential designed to produce skilled graduates for a variety of occupations.

### Admissions Requirements

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.0 or higher and a minimum GPA of 3.25 for all Russian Studies courses.
- Have completed a minimum of 75 credit hours of coursework.
- If a transfer student, have completed a minimum of 24 credit hours at CU Boulder.

It is recommended that applications be submitted the spring semester of the third year of study, but late applications will also be considered. Two letters of recommendation indicating strong potential for advanced, intensive work in Russian also required. Students should have completed most of their MAPS/Gen Ed requirements by the end of the sophomore year. Only CU Boulder students may apply.

### Program Requirements

Students may take up to and including 12 hours while in the undergraduate program, which can later be used toward the master's degree. However, only 6 credits may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

BAM students are expected to take graduate courses in the fourth and fifth years only.

If you are interested in the BAM degree program, please contact the Russian MA program (https://www.colorado.edu/gsll/graduate/). For more information, visit the BA/MA degree in Russian studies webpage (https://www.colorado.edu/gsll/russian/undergraduate/concurrent-bama-degree-russian-studies/).

# German Studies - Minor

The minor in German studies is an interdisciplinary program focusing on the media, art, history and cultures of German-speaking societies in the past and present, the major historical events and developments in German-speaking societies, the diverse perspectives and positionalities in those societies and the current political dynamics in Germany within the broader European and global contexts.

Declaration of a minor in German studies is open to any student enrolled at CU Boulder, regardless of college or school.

# Requirements

Students must complete 20 credit hours as directed below, with grades of C- or above. The GPA for all coursework taken in the minor department must be equal to 2.00 (C) or higher. Students may not apply more than 9 hours of transfer credit (including 6 upper-division credits) toward the minor. Transfer courses must be approved by the department.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| GRMN 2010 & GRMN 2020 | Intermediate German 1 and Intermediate German 2 [1] | 8 |
| or GRMN 2030 | Intensive Intermediate German | |
| GRMN 3010 | Advanced German 1 (or any 3000-4000 level German literature, film, or culture course taught in German or English) | 3 |
| GRMN 3020 | Advanced German 2 (or any 3000-4000 level GRMN literature, film, or culture course taught in German or English) [2] | 3 |
| **Electives** | | |
| At least one of the following upper-division courses taught in German: | | 3 |
| GRMN 3030 | Business German | |
| GRMN 3050 | German for Science and Engineering | |
| GRMN 3120 | German Literature from the Enlightenment to Expressionism | |
| GRMN 3130 | Issues in German Philosophy and Literature | |
| GRMN 3140 | Current Issues in German Culture | |
| GRMN 3150 | Issues in German Politics, Literature and Media | |
| GRMN 3520 | Open Topics in the Cultural Context | |
| GRMN 4010 | Advanced German III | |
| GRMN 4330 | The Age of Goethe | |
| GRMN 4340 | Seminar in German Literature | |
| One additional GRMN literature, film or culture course (any level) taught in English (listed below) or German (listed above) | | 3 |
| GRMN 1601 | Germany Today | |
| GRMN 1602 | Metropolis and Modernity | |
| GRMN 1701 | Nature, Climate and Environment in German Culture | |
| GRMN 2141 | Topics in Modern German Culture and Society | |
| GRMN 2301 | Inside Nazi Germany: Politics, Culture, and Everyday Life in the Third Reich | |
| GRMN 2302 | Nazis on Screen: Hollywood, War, Propaganda | |
| GRMN 2501 | Miniatures of Modern Life: From Berlin to Vienna and Beyond | |
| GRMN 2402 | Sports and Athleticism in German and Global Culture | |
| GRMN 2502 | Representing the Holocaust | |
| GRMN 2503 | Fairy Tales of Germany | |
| GRMN 2504 | Gothic, Horror, and Fantasy | |
| GRMN 2601 | Kafka and the Kafkaesque | |
| GRMN 3141 | Topics in Modern German Culture and Society | |
| GRMN 3301 | Modern Art and Design at the Bauhaus | |
| GRMN 3401 | The German Experience in North America | |
| GRMN 3501 | The German-Jewish Experience: From the Enlightenment to the Present | |
| GRMN 3502 | The Creation of the Modern Individual in German Culture | |
| GRMN 3503 | German Film Through World War II | |
| GRMN 3504 | Topics in German Film | |
| GRMN 3505 | The Enlightenment: Tolerance and Emancipation | |
| GRMN 3506 | Tracing the Criminal: Crime in 19th C Society and Culture | |
| GRMN 3507 | Engineering and the Practice of Literature | |
| GRMN 3508 | Masters of Suspicion: Marx, Nietzsche, Freud | |
| GRMN 3513 | German Film and Society 1945-1989 | |
| GRMN 3514 | German Film & Society After 1989 | |
| GRMN 3601 | German Women Writers | |
| GRMN 3681 | Refugees in German Culture | |
| GRMN 3702 | Dada and Surrealist Literature | |
| GRMN 3802 | Politics and Culture in Berlin 1900-1939 | |
| GRMN 4051 | Critical Theory of the Frankfurt School | |
| GRMN 4231 | The Invention of Sexuality | |
| GRMN 4251 | Marxism | |
| GRMN 4301 | Gender, Race and Immigration in Germany and Europe | |
| GRMN 4501 | Seminar: Literature in Cultural Context | |
| GRMN 4502 | Nietzsche: Literature and Values | |
| GRMN 4503 | Issues in German Thought | |
| GRMN 4504 | Goethe's Faust | |
| **Total Credit Hours** | | **20** |

1 Students who take GRMN 2030 cannot also receive credit for GRMN 2010 and GRMN 2020, and must take one additional 3-credit GRMN course toward the minor, such that the total number of credits for the minor equals 20.

2 Students have the option of taking the exam *Goethe-Zertifikat B1* in GRMN 3020.

# Nordic Studies - Minor

Courses are offered in English on Nordic culture and civilization. Courses are also offered in Swedish language and may be offered in Danish. In addition, there is an exchange program with Uppsala University in Sweden and with the University of Copenhagen in Denmark (DIS).

The language courses satisfy College of Arts and Sciences language requirements for the BA, BS and BFA degrees.

# Russian, East European and Eurasian Studies - Minor

The Russian, East European and Eurasian Studies (REEES) minor introduces students to the culture, history and politics of Russian, East European and Eurasian countries. Students fulfilling requirements for the REEES minor must complete or test out of Russian language courses through RUSS 2020 and take a number of courses on cultural topics.

# Requirements

Declaration of a minor in Russian, East European and Eurasian Studies (REEES) is open to any student enrolled at CU Boulder, regardless of college or school.

A REEES minor requires the completion of 20 credit hours, 9 of which must be upper-division credit hours. All courses used to fulfill requirements for the minor must receive a grade of C- or better. The GPA for all coursework taken in the minor department must be equal to 2.00 (C) or higher. No courses applied to the minor may be taken pass/fail. Students may not apply more than 9 hours of transfer credit (including 6 upper-division credit hours) toward the minor. Transfer courses must be approved by the department.

## Required Courses and Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| RUSS 2010 | Second-Year Russian 1 [1] | 4 |
| RUSS 2020 | Second-Year Russian 2 [1] | 4 |
| **Culture Courses in English and Optional Russian Courses** | | **12** |
| Choose 12 hours from the following (include at least 3 hours from culture courses on the 19th century and earlier): | | |
| *Culture Courses in English (19th Century and Earlier):* | | |
| REES 2121 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 2211 | Russian Culture and Art Under Tsars Great and Terrible | |
| REES 2231 | Fairy Tales of Russia and Ukraine | |
| REES 2241 | Death and the Undead in Slavic and Nordic Cultures | |
| REES 2261 | Madness and Gambling: Russian Short Stories of Life on the Edge [3] | |
| REES 2471 | Women in Russian Culture: From Folklore to the Nineteenth Century | |
| REES 3121 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 3251 | Arctic Thrillers: Environment, Landscape and Literature of the Far North | |
| REES 3601 | Russian Culture Past and Present [3] | |
| REES 3705 | Crimes of Passion: Gender and Sexual Politics in Tolstoy's Russia | |
| REES 4210 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 4251 | Russian and Soviet Queer Culture [3] | |
| REES 4301 | American-Russian Cultural Relations [3] | |
| REES 4431 | Dostoevsky | |
| REES 4441 | Tolstoy | |
| REES 4451 | Chekhov | |
| REES 4481 | Rogues to Revolutionaries: Russian Rebels, Past and Present | |
| REES 4811 | Seeds of Revolt: 19th-Century Russian Literature | |
| REES 4861 | Absurd and Supernatural in Russian Literature [3] | |
| *Culture Courses in English (20th and 21st Centuries):* | | |
| REES 1112 | Astronauts and Astropolitics: Space Exploration from the Cold War to the Future of Innovation | |
| REES 2121 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 2221 | Introduction to Modern Russian and Soviet Culture | |
| REES 2222 | Sports and the Cold War | |
| REES 2261 | Madness and Gambling: Russian Short Stories of Life on the Edge [3] | |
| REES 2271 | Space, Invention, and Wonder in Fairy Tales, Literature and Film | |
| REES 2311 | Energy Cultures: Oil, Coal, and Atoms in Modern Literature and Film | |
| REES 2501 | Russia Beyond the Headlines: Media, Politics, Culture, and Environment | |
| REES 3221 | Space Race in Russian and American Culture | |
| REES 3231 | Laughter in Slavic Cultures | |
| REES 3241 | Red Star Trek: Russian Science Fiction Between Utopia and Dystopia | |
| REES 3301 | Russia, Eastern Europe and Eurasia Today through Film and TV | |
| REES 3333 | Spies Like Us: Espionage in the Culture of the Cold War and Beyond | |
| REES 3701 | Slavic Folk Culture: Ideals and Values in the Contemporary World | |
| REES 4120 | Russia after Communism: Post-Soviet Politics and Culture | |
| REES 4210 | Topics in Russian, East European and Eurasian Culture [2] | |
| REES 4211 | History of Russian and Soviet Cinema | |
| REES 4221 | Stalinism: Culture and Society | |
| REES 4251 | Russian and Soviet Queer Culture [3] | |
| REES 4301 | American-Russian Cultural Relations [3] | |
| REES 4321 | Mythological Russia and Ukraine | |
| REES 4471 | Women in 20th-21st Century Russian, East European and Eurasian Cultures | |
| REES 4481 | Rogues to Revolutionaries: Russian Rebels, Past and Present [3] | |
| REES 4821 | 20th-Century Russian Literature and Art | |
| REES 4831 | Contemporary Russian Literature | |
| REES 4851 | Critical Thinking: Russian Film and Society | |
| REES 4861 | Absurd and Supernatural in Russian Literature [3] | |
| **Total Credit Hours** | | **20** |

1 Heritage speakers should take RUSS 3060 and RUSS 4060 as well as any other 4000-level Russian language course in lieu of RUSS 2010 and RUSS 2020. In this case, 18 credit hours will be sufficient for the minor if other requirements are fulfilled.

2 Course counts for appropriate category depending on topic (Undergraduate Faculty Advisor determines category).

3 Course can only count for one category (student can choose).

# History

Historians study the past, in all of its complexity, to better understand our contemporary world and the forces that created it. Historians analyze change over time, and they use archival and other primary-source evidence to build interpretations that explain change and put it into context. In seeking to understand historical subjects on their own terms, and by appreciating the diverse perspectives of past actors, students of history develop empathy even as they rigorously engage with the ethical dimensions of past human decisions and actions. When students study the past on its own terms, they recognize their power to understand the present and shape the future.

History faculty conduct research and teach courses in a wide range of eras—from ancient to modern times—and across most major world areas including Africa and the Middle East, South and East Asia, Europe and the Americas. History faculty also pursue multiple methodologies and approaches, including cultural, diplomatic, demographic, economic, environmental, ethnic, gender, intellectual, legal, political, religious, social and transnational history.

Many students choose history as a major or minor because of their fascination with the rich imaginative terrain of the past, but the study of history is also practical. In the complex and contentious world in which we live, history provides the tools for thoughtful public citizenship. Historians are essential experts in helping us to navigate contemporary controversies, and the study of history cultivates the interpersonal skills and cultural awareness essential to heightening civic discourse and engagement. As importantly, students of history gain valuable skills that prepare them for careers in many fields. In this knowledge economy, employers increasingly want employees who can write and speak clearly and persuasively, who can read deeply and critically, who can think independently and ethically, who can do complex research and make cogent evidence-based arguments, who can locate relevant sources and discern good information from bad, who understand how and why change occurs, who are culturally literate and understand the complex world in which we live, and who can manage the diversity of the modern workplace in all of its forms. These are skills you will gain through the study of history and they are highly valued by today's employers.

We welcome students who wish to develop the knowledge, skills and habits of mind essential to the discipline of history. Studying history will hone your abilities in reasoning, research, analysis and expression, and it will prepare you to participate in, and adapt to, an increasingly complex and interconnected world of continual change over time.

## Bachelor's Degree

- History - Bachelor of Arts (BA) (p. 408)

## Minor

- History - Minor (p. 410)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Anderson, Fred W. (https://experts.colorado.edu/display/fisid_104273/)
Professor Emeritus; PhD, Harvard University

Anderson, Virginia D. (https://experts.colorado.edu/display/fisid_100365/)
Professor Emerita; PhD, Harvard University

Andrews, Thomas G. (https://experts.colorado.edu/display/fisid_149881/)
Professor; PhD, University of Wisconsin–Madison

Babicz, Martin Charles (https://experts.colorado.edu/display/fisid_147676/)
Teaching Associate Professor; PhD, University of Colorado Boulder

Buffington, Robert Marshall (https://experts.colorado.edu/display/fisid_144975/)
Professor Emeritus; PhD, University of Arizona

Carlos, Ann M. (https://experts.colorado.edu/display/fisid_105534/)
Professor Emerita

Catlos, Brian Aivars (https://experts.colorado.edu/display/fisid_147829/)
Professor; PhD, University of Toronto

Chambers, Lee Virginia (https://experts.colorado.edu/display/fisid_106130/)
Professor Emerita; PhD, University of Michigan Ann Arbor

Chester, Lucy P. (https://experts.colorado.edu/display/fisid_126541/)
Associate Professor; PhD, Yale University

Ciarlo, David Michael (https://experts.colorado.edu/display/fisid_149618/)
Associate Professor; PhD, University of Wisconsin–Madison

Dauverd, Celine (https://experts.colorado.edu/display/fisid_145804/)
Associate Professor; PhD, University of California, Los Angeles

Desautels-Stein, Justin Jacob (https://experts.colorado.edu/display/fisid_147370/)
Associate Professor; LLM, Harvard University; JD, University of North Carolina, Chapel Hill

Dike, Steven (https://experts.colorado.edu/display/fisid_149880/)
Instructor; PhD, University of Colorado Boulder

Engel, Barbara A. (https://experts.colorado.edu/display/fisid_100574/)
Distinguished Professor Emerita

Fenn, Elizabeth Anne (https://experts.colorado.edu/display/fisid_149896/)
Distinguished Professor Emerita; PhD, Yale University

Ferry, Robert J. (https://experts.colorado.edu/display/fisid_104214/)
Associate Professor Emeritus; PhD, University of Minnesota Twin Cities

Gautam, Sanjay Kumar (https://experts.colorado.edu/display/fisid_140614/)
Associate Professor; PhD, University of Chicago

Gerber, Matthew Dean (https://experts.colorado.edu/display/fisid_129799/)
Associate Professor; PhD, University of California, Berkeley

Gross, David L. (https://experts.colorado.edu/display/fisid_103329/)
Professor Emeritus; Ph.D., University of Wisconsin-Madison

Gutmann, Myron (https://experts.colorado.edu/display/fisid_154905/)
Professor Emeritus; PhD, Princeton University

Hammer, Paul E.J. (https://experts.colorado.edu/display/fisid_146581/)
Professor; PhD, University of Cambridge (England)

Hanna, Martha (https://experts.colorado.edu/display/fisid_104557/)
Professor Emerita; PhD, Georgetown University

Hohlfelder, Robert
Professor Emeritus

Hulden, Vilja Paivikki (https://experts.colorado.edu/display/fisid_154910/)
Assistant Teaching Professor; PhD, University of Arizona

Hunt, Peter (https://experts.colorado.edu/display/fisid_115394/)
Professor; PhD, Stanford University

Hutchinson, Erin M (https://experts.colorado.edu/individual/fisid_167154/)
Assistant Professor; PhD, Harvard University

Jankowski, James P.
Professor Emeritus

Jaworski, Taylor Allen (https://experts.colorado.edu/display/fisid_159798/)
Associate Professor; PhD, University of Arizona

Kadia, Miriam L. Kingsberg (https://experts.colorado.edu/display/fisid_147112/)
Professor; PhD, University of California, Berkeley

Kalisman, Hilary Falb (https://experts.colorado.edu/display/fisid_164096/)
Assistant Professor; PhD, University of California, Berkeley

Kent, Susan K. (https://experts.colorado.edu/display/fisid_100080/)
Professor Emerita; PhD, Brandeis University

Kim, Kwangmin (https://experts.colorado.edu/display/fisid_147160/)
Associate Professor; PhD, University of California, Berkeley

Lawrence-Sanders, Ashleigh (https://experts.colorado.edu/display/fisid_169099/)
Assistant Professor; PhD, Rutgers University

Lim, Sungyun A. (https://experts.colorado.edu/display/fisid_148726/)
Associate Professor, Associate Chair; PhD, University of California, Berkeley

Limerick, Patricia N. (https://experts.colorado.edu/display/fisid_105459/)
Professor; PhD, Yale University

Lindquist, Thea L. (https://experts.colorado.edu/display/fisid_122803/)
Professor; PhD, University of Wisconsin–Madison

Little, Katherine C. (https://experts.colorado.edu/display/fisid_149872/)
Professor; PhD, Duke University

Lovejoy, Henry Barrett (https://experts.colorado.edu/display/fisid_157679/)
Associate Professor; PhD, University of California-Los Angeles

Maeda, Daryl Joji (https://experts.colorado.edu/display/fisid_141460/)
Professor; PhD, University of Michigan Ann Arbor

Main, Gloria L.
Professor Emerita

Mann, Ralph
Professor Emeritus

McGranahan, Carole Ann (https://experts.colorado.edu/display/fisid_122673/)
Associate Professor; PhD, University of Michigan Ann Arbor

McIntosh, Marjorie K.
Distinguished Professor Emerita

Mendoza Gutierrez, Natalie (https://experts.colorado.edu/display/fisid_159677/)
Assistant Professor; PhD, University of California, Berkeley

Mukherjee, Mithi (https://experts.colorado.edu/display/fisid_123112/)
Associate Professor; PhD, University of Chicago

Ngo Nyeck, Sybille
Assistant Professor; PhD, University of California, Los Angelos

Ordaz, Jessica (https://experts.colorado.edu/display/fisid_159142/)
Assistant Professor; PhD, University of California, Davis

Osborne, Myles Gregory (https://experts.colorado.edu/display/fisid_145809/)
Associate Professor; PhD, Harvard University

Paradis, David (https://experts.colorado.edu/display/fisid_126959/)
Teaching Professor of Distinction, Associate Teaching Professor; PhD, Emory University

Pegelow Kaplan, Thomas (https://experts.colorado.edu/display/fisid_172194/)
Professor, Chair; Ph.D., University of North Carolina Chapel Hill

Phillips, George H.
Professor Emeritus

Pittenger, Mark A. (https://experts.colorado.edu/display/fisid_102007/)
Professor Emeritus; PhD, University of Michigan Ann Arbor

Ruestow, Edward G.
Professor Emeritus

Shell, Hanna Rose (https://experts.colorado.edu/display/fisid_163199/)
Associate Professor; PhD, Harvard University

Shiue, Carol Hua (https://experts.colorado.edu/display/fisid_141892/)
Professor; PhD, Yale University

Silleras-Fernández, Núria (https://experts.colorado.edu/display/fisid_147213/)
Associate Professor; PhD, Universitat Autònoma de Barcelona (Spain)

Sohi, Seema (https://experts.colorado.edu/display/fisid_144616/)
Associate Professor; PhD, University of Washington

Spires, David N.
Senior Instructor Emeritus

Stanford-McIntyre, Sarah (https://experts.colorado.edu/display/fisid_163315/)
Assistant Professor; PhD, University of Wyoming

Sutter, Paul Shriver (https://experts.colorado.edu/display/fisid_147513/)
Professor; PhD, University of Kansas

Wei, William (https://experts.colorado.edu/display/fisid_100864/)
Professor; PhD, University of Michigan Ann Arbor

Weston, Timothy B. (https://experts.colorado.edu/display/fisid_107605/)
Associate Professor; PhD, University of California, Berkeley

Willis, John Matthew (https://experts.colorado.edu/display/fisid_140095/)
Associate Professor; PhD, New York University

Wood, Peter H. (https://experts.colorado.edu/display/fisid_151977/)
Professor Adjunct

Wood, Tony (https://experts.colorado.edu/display/fisid_172396/)
Assistant Professor; Ph.D., New York University

Yonemoto, Marcia A. (https://experts.colorado.edu/display/fisid_107199/)
Professor, Chair; PhD, University of California, Berkeley

Young, Phoebe S.K. (https://experts.colorado.edu/display/fisid_147429/)
Professor; PhD, University of California, San Diego

Zeiler, Thomas W. (https://experts.colorado.edu/display/fisid_101692/)
Professor; PhD, University of Massachusetts at Amherst

# Courses

**HIST 1011 (3) Greeks, Romans, Kings & Crusaders: European History to 1600**
Examines the history and formation of Europe from its roots in the ancient Near East to Greece to the creation of Medieval states and kingdoms. Topics may include the rise of Christianity, Barbarian migrations, religious persecution, the role of gender and minority status, the growth of trade and European encounters, the Black Death, the European Renaissance the Protestant Reformation.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Ancient and Medieval
MAPS Course: Social Science
MAPS Course: Social Sci World Context

**HIST 1012 (3) Empire, Revolution and Global War: European History Since 1600**
Examines the history of modern Europe from 1600. Topics may include religious conflict, absolutism, the Scientific Revolution, the global impact of European colonialism and imperialism, the Enlightenment, the French and Industrial Revolutions, and the emergence of romanticism, nationalism, liberalism, socialism and modernism. Concludes by analyzing World War I and II, communist and fascist totalitarianisms, decolonization and the Cold War. Formerly HIST 1020
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Modern
MAPS Course: Social Science
MAPS Course: Social Sci World Context

**HIST 1015 (3) American History to 1865**
Examines American history from pre-Columbian times to the Civil War, including ancient cultures, exploration, colonization, Native American responses, the rise of race slavery, the American Revolution, political developments, Anglo-American expansion, slave life and culture, the market revolution, industrialization, reform and disunion. Introduces students to history as a dynamic discipline that shapes our understanding of the past and present. S. history.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods
MAPS Course: Social Science
MAPS Course: Social Science US Context

**HIST 1018 (3) Introduction to Early Latin American History to 1810**
Introduces students to the history of what is now called Latin America from about 1450 to the wars of independence in the nineteenth century. Examines pertinent aspects of the societies and cultures of indigenous people, the history of European conquest, and the most salient features of the Spanish and Portuguese colonial empires in America.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions

**HIST 1025 (3) American History since 1865**
Explores political, social and cultural changes in American life since Reconstruction. Focuses on shifting social and political relations as the U.S. changed from a nation of farmers and small-town dwellers to an urban, industrial society; the changing meaning of American identity in a society divided by ethnicity, race and class; and the emergence of the U.S. as a world power.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods
MAPS Course: Social Science
MAPS Course: Social Science US Context

**HIST 1028 (3) Latin American History since Independence**
Introduces students to Latin America¿s rich and complex history from independence in the early 1800s to the present. Explores major events shaping the region, from anti-colonial rebellions to the Cold War, and from revolutions to ¿drug wars.¿ Addresses longer-term themes such as national and racial identities, Black and indigenous resistance, migration, and economic and cultural shifts. While centering Latin American perspectives, the class analyzes the role played by the United States in the region¿s affairs.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Specific Regions

**HIST 1051 (3) The World of the Ancient Greeks**
Surveys the emergence, major accomplishments, failures and decline of the world of the ancient Greeks, from Bronze Age civilizations of the Minoans and Mycenaeans through the Hellenistic Age (2000-30 B.C.)
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 1051
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Ancient and Medieval

**HIST 1061 (3) The Rise and Fall of Ancient Rome**
Surveys the rise of ancient Rome in the eighth century B.C. to its fall in the fifth century A.D. Emphasizes political institutions, foreign policy, leading personalities, and unique cultural accomplishments.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 1061
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Ancient and Medieval

**HIST 1113 (3) Introduction to British History to 1660**
Deals with Roman, medieval and early modern periods. Covers the demographic, economic, social patterns, political and religious developments, and cultural changes that contributed to the formation of the English nation.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 1123 (3) Introduction to British History Since 1660**
Deals with the period from the 17th century to the present. Political, economic, social and imperial developments that contributed to creation of the modern industrial and democratic state are the major issues covered.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 1218 (3) Introduction to Sub-Saharan African History to 1850**
Provides an introduction to African history, beginning with early man and ending in 1850. Moves rapidly through civilizations as different as Ancient Egypt, Mali, Oyo and the Cape Colony, touching on important developments and highlighting themes relevant to the history of Africa as a whole. Including migration, technology, environment, trade, gender, religion, slavery and more.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Specific Regions

**HIST 1228 (3) Introduction to Sub-Saharan African History Since 1850**
Introduces students to the history of Sub-Saharan Africa from 1850 to the present. Major topics of study included the trans-Atlantic slave trade, African state-building, European colonialism, African responses to colonialism and issues facing independent African nations, ranging from debt to HIV/AIDS.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Specific Regions

**HIST 1308 (3) Introduction to Middle Eastern History**
Interdisciplinary course that focuses on medieval and modern history of the Middle East (A.D. 600 to the present). Introduces the Islamic civilization of the Middle East and the historical evolution of the region from the traditional into the modern eras. Covers social patterns, economic life, and intellectual trends, as well as political development.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 1438 (3) Episodes in Korean History**
Examines the history of Korea from the archaeological period to the 21st century. Topics may include: the origin of the early states, Kory¿ dynasty and Mongol rule, Confucian influence on Chos¿n society, Japanese colonial rule, WWII and the ¿Comfort Women,¿ the Korean War and the division, North Korea, rapid industrialization in South Korea under dictatorships, the democratization movement, evolving roles for women, and Korea as an emerging multi-ethnic society.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 1518 (3) The History of India from Aryans to Maratha Warriors, 2500 BCE-1757 CE**
Beginning with the origin of Indian civilization amongst a people who called themselves Aryans, the course introduces students to major milestones in Indian history and culture: The Indus valley civilization (2500-1900 BCE), the Buddha (563-483 BCE), Alexander¿s invasion (326 BCE), the first Pan-Indian polity, the Mauryan Empire (321-185 BCE), the epic, Mahabharata, the Mughal empire (1526-1707), and finally the rise of Hindu nationalism under the Marathas (1650-1757).
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 1528 (3) Introduction to South Asian History since 1757**
Introduces the history of modern South Asia from 1757 to the present. Examines themes such as the nature of British colonial state formation in South Asia, social transformation under British rule, modes of anticolonial resistance movements, particularly Mahatma Gandhi's nonviolent civil disobedience movement, Muslim nationalism and the formation of Pakistan, and current political conflicts involving India, Pakistan and Afghanistan.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 1618 (3) Great Wall Exchange: China and the Nomadic Conquerors, 500 BC ¿ 1500 AD**
This course surveys the intertwined history of China and the Inner Asian nomads. Major themes include but are not limited to 1) the origins of Chinese and Inner Asian civilizations, 2) the Great Wall and nomadic conquests of China, 3) the Silk Road and trans-Eurasian trades, 4) Chinggis Khan and the Mongol empire, 5) Buddhism, Islam, and Confucianism, 6) the tribute system and Asia, and 7) China and the Indian Ocean.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 1623 (3) Introduction to Central and East European History since 1770**
Examines major themes and events in the history of East-Central Europe from the late 1700s to the present. Themes include the impacts of nationalism, fascism, liberal democracy and communism in shaping the history of the region. Topics include World War I, World War II and the Holocaust, the Cold War, the fall of Communism, the Ukrainian revolution and more.
**Equivalent - Duplicate Degree Credit Not Granted:** CEES 1623
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 1628 (3) Introduction to Chinese History since 1644**
Introduces students to modern Chinese history and culture, from the 17th century to the present. Considers the pertinent aspects of modern China, focusing on its social patterns, economic structure, intellectual trends and political developments.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 1708 (3) Japan from Clay Pots to Robots**
Surveys the history of Japan from earliest times through the 21st century. Topics may include: the origins of civilization in the Japanese archipelago, the development of religions such as Shinto and Buddhism, the writing of the world¿s first novel, the rise of the samurai, the persecution of Christians, empire-building in Asia, World War II, occupation by the United States and its allies, J-pop, and contemporary headline news.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 1800 (3) Introduction to Global History**
The first cornerstone course for history majors applies a broad perspective to the global past in order to illuminate how common historical patterns and processes, as well as unique elements, shaped the human experience. Using a thematic approach, all topical variations of this course highlight cross-cultural interactions among societies, and, when relevant, how historical processes that began centuries ago still impact the contemporary world. Topics will vary by section. Department enforced prerequisite: 3 hours of any history coursework.
**Requisites:** Restricted to students with 27-180 credits (Sophomore, Junior, or Senior) History (HIST) majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Methodological, Comparative, and Global
Departmental Category: Asia Content

**HIST 1818 (3) Jewish History to 1492**
Focus on Jewish history from the Biblical period to the Spanish Expulsion in 1492. Study the origins of a group of people who call themselves, and whom others call, Jews. Focus on place, movement, power/powerlessness, gender, and the question of how to define Jews over time and place. Introduces Jews as a group of people bound together by a particular set of laws; looks at their dispersion and diversity; explores Jews' interactions with surrounding cultures and societies; introduces the basic library of Jews; sees how Jews relate to political power.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 1818 and RLST 1818
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 1828 (3) Jewish History Since 1492**
Surveys the major historical developments encountered by Jewish communities beginning with the Spanish Expulsion in 1492 up until the present day. Studies the various ways in which Jews across the modern world engaged with the emerging notions of nationality, equality and citizenship, as well as with new ideologies such as liberalism, socialism, nationalism, imperialism and antisemitism.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 1828 and RLST 1828
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Specific Regions

**HIST 1830 (3) Global History of Holocaust and Genocide**
Examines the interplay of politics, culture, psychology and sociology to try to understand why the great philosopher Isaiah Berlin called the 20th century, "The most terrible century in Western history." Our focus will be on the Holocaust as the event that defined the concept of genocide, but we will locate this event that has come to define the 20th century within ideas such as racism, imperialism, violence, and most important, the dehumanization of individuals in the modern world.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 1830 and RLST 1830
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Methodological, Comparative, and Global

**HIST 2015 (3) US Revolutionary Origins**
Examines major themes in the development of colonial societies in North America from the 15th to the early 19th centuries. Explores intercultural relations, economic development, labor systems, religion and society, and family life. Specific course focus may vary.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods

**HIST 2100 (3) Revolution in History**
Examines the causes, character, and significance of political revolution in world history. Concentrating on one of the major revolutions of modern history, it examines why revolutions occur, who participates in revolution, and to what effect. Specific course focus varies.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Methodological, Comparative, and Global

**HIST 2110 (3) Topics in Early Modern History**
Between the Black Death (c. 1350) and the French Revolution (1789), Europeans experienced transformative changes¿print, science, industrialism, overseas empires, religious and civil wars, and political revolutions¿that altered their relationship with the rest of the world. Examines topics in early modern history (e.g., intellectual developments, religion, culture, social history, economic/political changes, and warfare) in a specific region or nation (i.e. Europe, Latin America, the Atlantic World, Spain, Russia, China, Japan, etc.). Topics vary.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Methodological, Comparative, and Global
Departmental Category: Asia Content

**HIST 2126 (3) Issues in Modern U.S. Politics and Foreign Relations**
Traces the historical development of modern U.S. politics and foreign relations. Analyzes subjects such as the Cold War, the Vietnam War, the War on Terror, and the relationship between foreign and domestic politics, and the developing meaning of political conservatism, liberalism, and radicalism in the U.S. Explains the impact of race, gender, class, and immigration. Topics vary in any given semester.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 2166 (3) The Vietnam Wars**
Traces the causes, course, and outcome of the wars in Vietnam from 1940 until 1975. Explains the successes of the revolutionaries and the failures of the French and Americans. Analyzes the development of Vietnamese nationalism, French colonialism, and U.S. intervention.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: United States: Topical Courses 1
Departmental Category: Asia Content

**HIST 2170 (3) History of Christianity 1: To the Reformation**
General introduction to the history of Christianity from its beginnings through the first period of the Protestant Reformation. Examines religious life and the church in relation to its social and cultural setting.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Methodological, Comparative, and Global

**HIST 2220 (3) History of War and Society**
Focuses on war and society in a variety of global contexts. Explores the character, origins, and social, political, and intellectual impacts of war in contexts ranging from several centuries of international conflict to the experience of individual nations in specific wars. Topic varies in any given semester; contact Department of History for details.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Methodological, Comparative, and Global
Departmental Category: Asia Content

**HIST 2316 (3) History of American Popular Culture**
Traces changes in American popular culture from the Revolution to the present. Focuses on the increasing levels of mediation represented by print, spectacular performance, radio, television, and recorded music. The study of popular culture offers clues to decipher shifting patterns of consumption, globalization, race, gender, politics, technology, and media.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4546
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 2326 (3) Issues in the History of U.S. Society and Culture**
Examines the origins, development, and impacts (social, political, cultural, economic, etc.) of significant issues and themes in the cultural,intellectual, and/or social history of the United States from independence to the present day. Explains the impact of race, gender, ethnicity, and class on these issues. Topics vary in any given semester.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 2437 (3) African American History**
Surveys African American history. Studies, interprets and analyzes major problems, issues and trends affecting African Americans from about 1600 to the present.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 2432
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: United States: Topical Courses 2

**HIST 2476 (3) United States Legal History**
Surveys U.S. legal history from the founding era to today. It covers legal ideas that shaped the drafting of the Constitution and examines the pressures that tested that founding document through the present. It addresses legal debates in contexts of territorial expansion, industrial development, financial crisis, shifting demographics, and both civil and world war. It considers how slavery, civil rights, race, regulation, economic expansion, privacy, and equality contributed to various understandings of citizenship.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 2500 (3) Fact and Fiction in History**
Examines history and historical sources through the alternating lenses of ¿fact¿ and ¿fiction¿ in order to think not only about what happened, but how we acquire information and knowledge, and how we use sources and evidence to construct our own understandings of the past and to write history. Considers how narratives found in novels, myths, movies, television, music, visual material, monuments, or public memories, represent the past and relate to historical accounts.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**HIST 2516 (3) America Through Baseball**
Baseball could not have existed without America. Explains how the game fit into the larger context of social, cultural, economic and political history from the 19th century to the present. Studies the events and people who made baseball the national pastime.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4556
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1
Departmental Category: Asia Content

**HIST 2566 (3) Made in America: Work and Workers in American History**
Puts the working lives of Americans, and the meaning of work in American life, in historical perspective. What "counts" as work and how has that changed over time? How do people's expectations of their working lives today compare to how people thought about work trajectories in the past? Whose work has been valued and whose has not? The course focuses mainly on the nineteenth and twentieth centuries while drawing parallels to the present.

**HIST 2616 (3) History of Gender in America**
Introduces the social and cultural construction of femininity and masculinity in America from 1500 to the present. Explores gender as a status acquired and performed through tasks, clothing, adornment and bodily movement. Examines gender ideals, expression and practices such as gender crossing, gender bending and gender plan.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: United States: Topical Courses 1

**HIST 2629 (3) China in World History**
Examines the multiple connections between Chinese history and other parts of the world over the course of China's long history. Specific course focus may vary by instructor/term.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 2718 (3) History of Japan Through Cinema**
Japan¿s incredibly rich cinematic tradition, from early 20th-century dramatic masterpieces to 21st-century anime, reveals much about its culture and history. We will use Japanese films to study key issues in the history of Japan, roughly between the years 1500-2000, including the changing role of the samurai, women and the `floating world¿ of pleasure, modernization, the devastation of war, economic recovery, the downside of prosperity, and nostalgia for the past.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 2728 (3) Japan: From Samurai to Kamikaze**
Death-defying warriors prepared to cut their bellies and die over the slightest insult to their honor. Conscripted soldiers who charged uphill directly into the line of fire while shouting their loyalty to the emperor. Pilots who took off knowing they wouldn't return, blowing up military targets and themselves. This course peeks beneath stereotypes in the military history of Japan from the first evidence of armed conflict through World War II and beyond.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**HIST 2810 (3) Antisemitism: Histories, Concepts, Practices**
This class explores the main histories, concepts, and practices of antisemitism. It analyzes how and why they emerged and what accounts for their persistence. Why are Jews targeted? Is there a ¿new antisemitism¿¿ since the 1970s¿ that differs significantly from older manifestations? How is antisemitism related to anti-Zionism? What is its relationship with racism? And how have political, social, and religious groups and organizations responded to these threats and what challenges have they faced?
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 2810
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 2830 (3) Disease and Public Health in Global History**
Examines the global history of health and disease from the Paleolithic to the present. Themes and topics vary by semester but may include the co-evolution of humans, microbes, and vectors; food, famine, and nutrition; mental health; contagions such as plague, smallpox, cholera, yellow fever, influenza, HIV, and coronaviruses; cultural, social, medical, and institutional developments; gender, race, and sexuality; and connections between public health and environment, climate, water supply, colonization, globalization, imperialism, migration, and transportation.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 3012 (3) Seminar in Modern European History**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on modern European history, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Modern

**HIST 3018 (3) Seminar in Latin American History**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on Latin American history, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions

**HIST 3020 (3) Historical Thinking & Writing**
The second cornerstone course for history majors centers on the essential skills all historians use. Students will advance their reading, sourcing, and research techniques, hone critical, analytical, and synthetic skills, navigate scholarly discourse, and practice historical writing. As this simultaneously satisfies the College's upper-division writing requirement, all sections involve substantial, regular, and varied writing assignments as well as instruction in methods and the revision process. All topical variations of this course are limited to a maximum of 18 students in order to focus on supporting students as they learn to write - and think - like an historian. Topics will vary by section. Recommended for sophomores or juniors, HIST 3020 may be taken concurrently with, but not prior to, HIST 1800.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prereq courses of ARSC 1080 or 1150 or CLAS 1020 or ENGL 1001 or PHIL 1500 or WRTG 1100 or 1150 or 1250 and prereq/coreq of HIST 1800 or HIST 1830 (all min grade C-). Restrctd to students with 27-180 credits (Soph, Jr, or Sr) HIST majors only.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Upper
Departmental Category: Methodological, Comparative, and Global

**HIST 3109 (3) Seminar in Asian History**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on Asian history, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources. Previously offered as a special topics course.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 3110 (3) Honors Seminar**
Practical historiography for students who wish to write a senior honors thesis. Emphasizes choice of topic, critical methods, research, organization, argumentation, and writing.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 3.5 or higher.
**Additional Information:** Arts Sciences Honors Course
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Methodological, Comparative, and Global

**HIST 3112 (3) Seminar in Renaissance and Reformation**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on the history of the Renaissance and Reformation, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Modern

**HIST 3113 (3) Seminar in Medieval and Early Modern English History**
The third, and final, cornerstone course for history majors is a capstone seminar. Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous classes towards producing historical knowledge about a particular area of interest. This seminar focuses on medieval and early modern English history, and will include readings and discussions in a small seminar setting. These and other class activities and assignments will support the central goal: for each student to develop an individual research project on a topic of their own choosing in relation to medieval and early modern English history. Students will then write a substantial and original research paper based on primary sources. Completion of HIST 3020 is required for history majors to enroll in a senior seminar.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 3115 (3) Seminar in Early American History**
The third, and final, cornerstone course for history majors is a capstone seminar. Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous classes towards producing historical knowledge about a particular area of interest. This seminar focuses on early American history, and will include readings and discussions in a small seminar setting. These and other class activities and assignments will support the central goal: for each student to develop an individual research project on a topic of their own choosing in relation to early American history. Students will then write a substantial and original research paper based on primary sources. Completion of HIST 3020 is required for history majors to enroll in a senior seminar.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods

**HIST 3120 (3) Honors Thesis**
Intended for students writing an Honors Thesis in History. Department enforced prerequisite: HIST 3110 and instructor consent.
**Requisites:** Requires prerequisite course HIST 3110 (minimum grade C-).
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Methodological, Comparative, and Global

**HIST 3212 (3) Seminar in Early Modern Europe**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on early modern European history, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Modern

**HIST 3218 (3) Seminar in African History**
Deals with the history and anthropology of selected west African societies in the period before the imposition of European colonial rule.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions

**HIST 3328 (3) Seminar in Middle Eastern History**
Examines selected issues in modern Middle Eastern history. Check with the department concerning the specific subject of the seminar.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 3414 (3) Seminar in Modern European Thought and Culture**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on the history of modern European thought and culture, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Topical

**HIST 3415 (3) Seminar in Recent American History**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on recent American history, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods

**HIST 3416 (3) Seminar in American Society and Thought**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on the history of American society and thought, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 3417 (3) Seminar in African American History**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on African American history, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 2

**HIST 3628 (3) Seminar in Recent Chinese History**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on recent Chinese history, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 3713 (3) Seminar in Russian History**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on Russian history, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 3718 (3) Seminar in Japanese History**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on Japanese history, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 3800 (3) Seminar in Global History**
Organized around themes that change year to year, this seminar allows students to explore and research processes, phenomena, and events of global significance in historical context. Stress will be upon subjects that span multiple world areas. Possible topics include: the international arms trade; slavery; health and disease; youth culture; women's rights; genocide. See department for current theme.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Methodological, Comparative, and Global

**HIST 3840 (1-3) Independent Study**
Course content determined by faculty and student
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

**HIST 3841 (1-3) Independent Study**
Course content determined by faculty and student
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Europe: Ancient and Medieval

**HIST 3842 (1-3) Independent Study**
Course content determined by faculty and student
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Europe: Modern

**HIST 3843 (1-3) Independent Study**
Course content determined by faculty and student
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Europe: Specific Countries

**HIST 3844 (1-3) Independent Study**
Course content determined by faculty and student
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Europe: Topical

**HIST 3845 (1-3) Independent Study**
Course content determined by faculty and student
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: United States: Chronological Periods

**HIST 3846 (1-3) Independent Study**
Course content determined by faculty and student
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 3847 (1-3) Independent Study**
Course content determined by faculty and student
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: United States: Topical Courses 2

**HIST 3848 (1-3) Independent Study**
Course content determined by faculty and student
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: World Areas: Specific Regions

**HIST 3849 (1-3) Independent Study**
Course content determined by faculty and student
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: World Areas: Comparable and General

**HIST 4018 (3) Aztecs, Incas, and the Spanish Conquest of the Americas**
Building upon contemporary texts and modern histories of both famous and ordinary people, this course examines the indigenous empires known as the Aztecs and the Incas. It also examines the encounter of Europeans and native people, following the history of exploration and conquest from the time of Columbus to about 1550. Equal consideration is given to the course's three components: Aztec, Inca and the Spanish conquest.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1018 or HIST 3020.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions

**HIST 4020 (3) Topics in Comparative History**
Explores historical themes from a comparative perspective. Encourages students to think more analytically about historical change. Consult current online schedule for specific topics. Often team-taught by more than one faculty.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite two 4000-level History courses in differing content areas.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Methodological, Comparative, and Global

**HIST 4021 (3) Athens and Greek Democracy**
Studies Greek history from 800 B.C. (the rise of the city-state) to 323 B.C. (the death of Alexander the Great). Emphasizes the development of democracy in Athens. Readings are in the primary sources.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4021 and CLAS 5021
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Europe: Ancient and Medieval

**HIST 4031 (3) Alexander the Great and the Rise of Macedonia**
Covers Macedonia's rise to dominance in Greece under Philip II and the reign and conquests of Alexander the Great.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5031 and CLAS 4031
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite CLAS 1051 or CLAS 1509 or CLAS 2039 or CLAS 4139 or CLAS 4149 or CLAS 2041 or CLAS 4021 or CLAS 4041 or HIST 1051 or GREK 3113.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Europe: Ancient and Medieval

**HIST 4041 (3) Classical Greek Political Thought**
Studies main representatives of political philosophy in antiquity (Plato, Aristotle, Cicero) and of the most important concepts and values of ancient political thought. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4041 and CLAS 5041 and PHIL 4210
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Europe: Ancient and Medieval

**HIST 4048 (3) Latin American Revolutions**
Examines the origins, development and continuing influence of 20th-Century Latin American revolutionary movements, with a focus on placing these struggles in comparative historical context. Explores various approaches to revolution and the general role of left political formations in Latin America. Specific focus can vary by semester with examples drawn from various Latin American countries, including Mexico, Guatemala, Cuba, Chile and Nicaragua.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5048
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1018 or HIST 1028 or HIST 3020.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: World Areas: Specific Regions

**HIST 4061 (3) Twilight of Antiquity**
Explores the reasons for the fall of the Roman Empire in the western Mediterranean and its survival in the east as Byzantium. Emphasizes Christianity; barbarians; social, economic and cultural differences; contemporary views of Rome; and modern scholarship. No Greek or Latin is required.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5061 and CLAS 4061 and CLAS 5061
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Europe: Ancient and Medieval

**HIST 4071 (3) Seminar in Ancient Social History**
Considers topics ranging from demography, disease, family structure, and the organization of daily life to ancient slavery, economics, and law. Focuses either on Persia, Greece, or Rome and includes a particular emphasis on the methodology required to reconstruct an ancient society, especially the interpretation of problematic literary and material evidence and the selective use of comparisons with better known societies. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4071 and CLAS 5071
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Europe: Ancient and Medieval

**HIST 4081 (3) The Roman Republic**
Studies the Roman Republic from its foundation in 753 B.C. to its conclusion with the career of Augustus. Emphasizes the development of Roman Republic government. Readings are in the primary sources. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4081 and CLAS 5081
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Europe: Ancient and Medieval

**HIST 4083 (3) Trials and Triumphs on the Emerald Isle: The Irish People and Their Histories, 1641-1998**
Covers the history of Ireland during modern times, beginning with the rebellion of 1641 and ending with the Good Friday Agreement in 1998. Students will learn about some of the most tumultuous, triumphant, and creative periods in Irish history, all the while considering the blending of cultures, ideas, and artistic accomplishments that created Modern Ireland.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1012 or HIST 1123.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Europe: Specific Countries

**HIST 4091 (3) The Roman Empire**
Studies Imperial Roman history beginning with the Roman Revolution and ending with examination of the passing of centralized political authority in the western Mediterranean. Emphasizes life, letters and personalities of the Empire.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4091 and CLAS 5091
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Europe: Ancient and Medieval

**HIST 4101 (3) Greek and Roman Slavery**
Surveys slavery in ancient Greece and Rome beginning with its growth, economics and political effects, moving to the life experiences of slaves, resistance and revolt, and finishing with the ideology of slavery. Focuses throughout on the challenge of understanding classical slavery on the basis of scattered and biased evidence and on the controversies that have surrounded this topic.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4101 and CLAS 5101
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**HIST 4103 (3) England from the Viking Age to the Tudors**
During the Middle Ages Germanic values of honor and retribution became deeply ingrained in the warrior culture of the English aristocracy. This course begins with an examination of the Scandinavian and Germanic roots of this warrior culture before exploring the residue of that culture in the centuries leading up to the Tudor period.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Recommended:** Prerequisite HIST 1011 or HIST 1113.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 4109 (3) World War II in Asia and the Pacific**
For Asia, World War II began with the Mukden Incident (1931), resulting in the Japanese domination of Manchuria and leading to a full-scale war between China and Japan in 1937. Only after the Japanese attacked the U.S. Pacific fleet at Pearl Harbor four years later did the United States enter the war. Discusses the various socioeconomic and political factors leading to the war in Asia, examines the nature of the conflict on the Asian mainland and in the Pacific, and assesses legacy of the war on all those involved.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 4116 (3) History of U.S. Foreign Relations, 1865-1940**
Traces the rise of the United States to world power. Explores the interactions of expansionist and isolationist impulses with politics, ideology, culture and economics, with a focus on the Spanish American War and the acquisition of empire, World War I and the coming of World War II.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5116
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 4117 (3) Colorado History**
Presents the story of the people, society, culture, and environment of Colorado from the earliest Native Americans, through the Spanish influx, the fur traders and mountain men, the gold rush, railroad builders, the cattlemen and farmers, the silver boom, the twentieth-century tourists, city-dwellers, workers and activists. Highlights the historical origins of twenty-first century institutions, problems, challenges, and opportunities.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1015 or HIST 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 2

**HIST 4118 (3) History of Mexico to 1821**
Studies Mexican history beginning with roots and evolution of pre-Columbian civilizations and concluding with the events of Mexican independence in 1821. Emphasizes society and culture of the Aztecs and Mayans, the Spanish conquest of Mexico, and the colonial regime of New Spain.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions

**HIST 4123 (3) Kings & Commoners in an Age of Crisis: English History 1327-1487**
England in the 14th and 15th centuries endured climate change, the Black Death, peasant revolts, foreign and civil war and the forcible removal of five kings; yet this period also saw renewed forms of religious devotion, famous military victories and the exaltation of kingship. Crucially, it also saw the growing importance of the common people in English politics and the notion that government should aspire to serve the common good of the whole realm.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011 or HIST 1113.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4125 (3) Early American History to 1763**
Explores the colonial era of American history from the pre-Columbian period to the end of the Seven Years' War. Topics include pre-contact Native societies, exploration, European settlement and Native American responses, labor system and the rise of slavery, imperial wars, and the developments in religion, society, politics and culture.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5125
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: United States: Chronological Periods

**HIST 4126 (3) History of U.S. Foreign Relations Since 1941**
Traces the development of the United States as a superpower. Details American power and diplomacy in World War II and the rise of the national security state in the Cold War. Explores the Korean, Vietnam and Persian Gulf Wars, and the era of modern-day globalization.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5126
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 4128 (3) The History of Modern Mexico Since 1821**
Centers on the Mexican search for political consolidation and stability through the 19th, 20th and 21st centuries. Focuses on the Mexican Revolution (1910-1940) and the post revolutionary rule of the Institutional Revolutionary Party. Examines the War on Drugs and the causes of Mexican migration to the United States.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5128
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1028 or HIST 3020.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions

**HIST 4129 (3) China, Japan, Thailand: Asia under Semicolonialism**
China, Japan, and Thailand were never formally colonized, but were nonetheless deeply impacted by imperialism. Beginning with the age of Euro-American empire-building in the nineteenth century, we trace the different ways in which China, Japan, and Siam/Thailand strategized to secure their status as independent, sovereign nations. We also investigate how these states interacted with and influenced each other, particularly during the early twentieth century when Japan itself became a colonial power in Asia.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**HIST 4131 (3) The Origins of Christianity**
Examines the history of Christianity from Jesus Christ to the eighth century, including the Roman Empire and the rise of the papacy. Topics include the religion¿s spread across Afro-Eurasia, the Latin West and Greek East, ¿micro-Christendoms,¿ monastic life, cults of relics, cities and frontiers, saints¿ lives, and Christianity's encounters with heresies, Greek philosophy, and the beliefs of Judaism and Islam.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011 or HIST 1061 or HIST 2170 or CLAS 1061.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Ancient and Medieval

**HIST 4133 (3) Tudor England, 1485-1603**
Includes topics such as the aftermath of the Wars of the Roses; Henry VIII's 'Great Matter' and his six wives; Reformation and Counter-Reformation; the courtships of Elizabeth I; how Elizabeth became the Virgin Queen; Mary Queen of Scots and the perils of a queen marrying badly; the Tudors and Ireland; English pirates of the Caribbean; the Gran Armada and war against Spain; and the conspiracy that marked the end of England's most famous royal dynasty.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011 or HIST 1113.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4143 (3) The Making of Great Britain: British History 1603-1714**
Covers the history of the British Isles from 1603 to 1714, the era of the English Civil War and the Glorious Revolution. Traces economic and social relationships, cultural change and religious and political conflict under the Stuart monarchs.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011 or HIST 1012 or HIST 1113 or HIST 1123.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4166 (3) The Vietnam War in US Politics and Culture**
Examines America's second-longest and most divisive war from the beginning of the U.S. involvement in the 1950s to the repercussions echoing into the 1980s. Considers the global context, motives, and evolution of U.S. involvement, support for and opposition to the war in the USA, the war's repercussions in international policy and US politics, and representations of the war in American popular culture.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1
Departmental Category: Asia Content

**HIST 4205 (3) The Colonial Wars and the Coming of American Independence, 1739-1776**
Investigates imperial warfare and its effects during the late colonial period, concentrating on the French and Indian War (1754-1763), the disruption of Anglo-American relations and the origins of the War of American Independence (1775-1783).
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5205
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods

**HIST 4212 (3) The Age of Religious Wars: Reformation Europe,1500-1648**
Traces the history of Europe from the end of the Hundred Years War through the Thirty Years War. During this period Europe experienced tremendous changes including emerging religious heresies, the advent of the Spanish Inquisition, violent civil wars, the witch craze, and the Thirty Years War, a precursor to the World Wars of the 20th century.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011 or HIST 1113.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Modern

**HIST 4215 (3) The Revolutionary War and the Making of the American Republic, 1775-1801**
Investigates the Revolutionary War and its impact on the creation of American political institutions, as well as its cultural, social and economic effects, from the Battles of Lexington and Concord through the inauguration of Thomas Jefferson.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5215
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods

**HIST 4217 (3) The American West in the 19th Century**
Explores cultural, social and political interaction in the American West during the 19th century. Themes include environmental change; conflict and syncretism across race, class, and gender lines; mythic images, and their relationship to the "Real" West.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1015 or HIST 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 2

**HIST 4218 (3) Lost Kingdoms & Caliphates: West Africa to 1900**
Investigates the formation and dissolution of West Africa's kingdoms, caliphates and stateless societies during the era of the trans-Atlantic and trans-Saharan slave trades. Through a survey of oral and written sources, this course examines West Africa's geopolitical transformation in warfare, jihad, trade and slavery, especially in relation to the African Diaspora to the Americas and Muslim world.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Specific Regions

**HIST 4222 (3) War and the European State, 1618-1793**
Studies the development of the European states in response to international power struggles in the 17th and 18th centuries (up to the French Revolution).
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5222
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Modern

**HIST 4223 (3) The French Revolution and Napoleon**
Traces the origins, course, and consequences of the most important modern revolution, the French Revolution of 1789. While seeking to explain how a liberal movement for progressive change soon degenerated into the factional bloodbath of the Terror, will also examine the revolution's global impact and how three decades or revolutionary warfare lead to the rise and fall of Napoleon Bonaparte.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5223
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4227 (3) The American West in the 20th Century**
Explores cultural, social, and political interaction in the American West during the 20th century. Themes include popular culture, state-federal relationships, environmental change, urbanization, immigration, and cultural formation.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 2

**HIST 4232 (3) From Revolt to Revolution: Europe in an Age of Global Enlightenment, 1648-1789**
Studies how colonial and imperial expansion transformed cultural, political, and socio-economic institutions in Europe from the end of the Thirty Years War through the outbreak of the French Revolution. Central themes include state centralization, popular resistance, bureaucratization, commercialization, and cultural developments such as scientific revolution and enlightenment.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Modern

**HIST 4235 (3) Jacksonian America**
Focuses on the social and cultural history of the Jacksonian Era. Issues include the transformation of the market economy, slavery, moral reform, Indian removal, changes in ideas about men's and women's natures and roles, western expansion, and political culture.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5235
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1015.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods

**HIST 4238 (3) History of Southern Africa**
Examines the history of southern Africa history from the earliest times to the present. Short background readings and lectures cover southern African's history and class discussions of novels are layered over these basics. Topics of study include Cecil Rhodes and the diamond/gold mines; Shaka and the Zulu "nation"; apartheid; Nelson Mandela and the antiapartheid movement; issues facing South Africa today.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisites HIST 1218 or 1228 or 3109 or 4258 or 4218 or ANTH 1150 or ANTH 3100 or ANTH 4630 or GEOG 3862 or PSCI 3082 or WGST 3712.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Specific Regions

**HIST 4258 (3) Africa under European Colonial Rule**
Looks at the British, French, Portuguese and German empires that undertook the "Scramble for Africa" in the late 19th century. Themes include slavery and the slave trade; colonization and "pacification"; African resistance to European rule; missionaries and converts; decolonization and anti-colonial uprisings; issues facing Africa today, including oil, war and the Rwandan genocide.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1218 or HIST 1228 or HIST 3020 or ANTH 1150 or ANTH 3100 or ANTH 4630 or GEOG 3862 or PSCI 3082.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Specific Regions

**HIST 4303 (3) Venice and Florence during the Renaissance**
Comparative urban study of Florence and Venice from 13th through 16th centuries. Principal subjects are the distinctive economies of the cities, political developments, Renaissance humanism, patronage of the arts, and foreign policy.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4303
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4304 (3) The Cosmos in Ancient Mediterranean Societies**
Through a chronological investigation of ideas about the cosmos in ancient Mediterranean societies, this course communicates how ancient and premodern people thought about, described, and made space part of their daily lives. It will expose students to primary sources such as hieroglyphs, paintings, poems, lyrics & maps. By doing so students will also develop knowledge about ancient societies. The course will include lectures, student skit presentations, learning cells & one class project.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisites HIST 1011 or CLAS 1051 or CLAS 1061.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 4313 (3) History of Modern Italy**
Examines the major historical, economic and social factors that have shaped the identity of modern Italy, from the enthusiasm of young patriots during Italy's unification in the 1860s to the discontent and domestic terrorism of the 1960s-1980s. Focuses on Mussolini, the Fascist movement and on World War II, as well as the changing role of women. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 4250
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4315 (3) Civil War and Reconstruction**
Describes the forces at work in the antebellum period that led to sectional warfare; social, economic, and political changes effected by the war; the American agony of reconstruction; and the long-range results of that difficult era.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1015.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods

**HIST 4320 (3) The History of the Mediterranean, 600 CE-1600 CE**
Familiarizes students with the Mediterranean ecumene covering concepts such as the Renaissance, the Crusades, traders and travelers, religions and cities. Explores both conflicts (military, confessional) and exchanges (commercial, artistic, scientific) thus helping students think cross culturally, comparatively and thematically. Emphasizes the Mediterranean contribution to historical developments of western Europe, the Middle East, and North Africa.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011 or HIST 1061 or HIST 1308 or HIST 4061 or HIST 4071 or HIST 4081 or HIST 4091 or HIST 4711.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Methodological, Comparative, and Global

**HIST 4323 (3) Mafia and Terrorism: Organized Violence in Italy**
Investigates the origins and development of the Sicilian Mafia and Political Terrorism in Italy. In the first part of the course, the context of Italian politics, economy and society in which the mafia was born and flourished in the 19th and 20th century will be explored. The ramification of the Mafia in the United States in the 20th c. will also be studied.
In the second part of the course, the political and social causes of Italian left and right wing Terrorism will be examined, starting from the Piazza Fontana slaughter (1969) until the murder of Professor Marco Biagi (2002). Particular attention will be devoted to the kidnapping and murder of Democratic Christian Party President Aldo Moro and to the Red Brigades terrorist movement. The role of women in both Mafia and Terrorism will be explored.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 4260
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 4326 (3) Epidemic Disease in US History**
Focuses on the impact of infectious epidemic disease on American history, from smallpox and cholera to influenza, AIDS and Ebola. Addresses early depopulation of the Americas; contagion and social upheaval; interpretations of pestilence; social construction of disease; urbanization; doctors and alternative practitioners; public health; prejudice and infection; the ethics of quarantine; public versus individual interests; and the paradox of prevention.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: United States: Topical Courses 1

**HIST 4328 (3) The Modern Middle East, 1600 to the Present**
Primarily from 1800 to the present. Attention divided equally between the region's political history and international relations and its patterns of economic, social and cultural modernization in the main countries.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5328
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1308.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4329 (3) Islam in the Modern World: Revivalism, Modernism, and Fundamentalism, 1800-2001**
Examines the more important movements of reform in Muslim world (including Africa, the Middle East and India) from the 18th century to the present, and their origins and intellectual import. Due to the trans-regional nature of this broad movement of reform, particular attention is paid to how these movements related to local political, economic and social contexts, and how they, in turn, moved across larger networks of oceanic commerce and trade. Concludes with extended case studies of Islamic reformism in modern Egypt and India, and their ultimate influence on the politics of contemporary Islamist movements, especially the intellectual position of Ussama B. Ladin.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1308.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 4336 (3) Nineteenth-Century American Thought and Culture**
Examines the emergence of intellectual traditions and cultural trends in their social and political contexts from the early republic to the beginning of the modern era. Addresses developing arguments about democracy, religion, transcendentalism, gender, race, union/disunion, the Darwinian revolution, utopia/dystopia realism and naturalism in literature and the arts.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 4338 (3) History of Modern Israel/Palestine**
How did we get to this point? What histories do we need to know to understand the situation of Israelis and Palestinians today? To answer these questions, this course traces the intertwined histories of Israel/Palestine, Israelis and Palestinians from the late Ottoman period to the present. Topics include: nationalism and colonialism, the development of Zionisms, Palestinian nationalism, the Jewish community (Yishuv) under British rule, the founding of the State of Israel, Arab-Israeli and Palestinian-Israeli relations, Israel's minorities, the role of religion in Israel today and changing relationships between the United States, Israel and Palestinians.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4338
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST/JWST 1818 or HIST/JWST 1828 or HIST 1308 or JWST 2350 or other course work in Middle Eastern or Jewish History.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4339 (3) Borderlands of the British Empire**
Examines the development of the borderlands of the British empire through imperial expansion, consolidation, and early decolonization. Focuses on the 19th and early 20th centuries. Topics include domination, resistance and negotiation in areas such as India, Afghanistan, the Palestine Mandate. Aims for students to acquire skills in comparative history and to develop a better understanding of the roots of contemporary conflicts.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5339
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1012 or HIST 1123 or HIST 1228 or HIST 1308 or HIST 1528.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 4343 (3) Medieval Spain: Tolerance, Conquest and Religion, 800-1600**
This course examines the culture and politics of the Iberian Peninsula focusing on the two themes of toleration and reconquest c.800-1600. We focus on how Spain¿s institutions and religious beliefs shaped European culture. We explore convivencia, the period of Muslim toleration that borrowed heavily from the medieval Mediterranean, when the interaction between Christians, Jews, and Muslims produced cultural vibrancy. We then analyze the Spanish monarchs¿ solidification of their nation through expulsions, persecution, and empire building. Formerly HIST 4064.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5343
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011 or HIST 1018.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Topical

**HIST 4348 (3) Topics in Jewish History**
Covers topics in Jewish history from biblical beginnings to present day. Topics vary each semester. Consult the online Schedule Planner for specific topics.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4348
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1818 or JWST 1818 or HIST 1828 or JWST 1828 or HIST 1308 or JWST 2350 or other course work in Middle Eastern or Jewish History.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions

**HIST 4349 (3) Decolonization of the British Empire**
Examines the end of the British Empire. Focuses on connections between imperial territories, such as networks of anticolonial activists and links between British decision makers. Students will acquire research skills and develop a better understanding of the roots of contemporary conflict. Prior coursework in British imperial history and excellent writing skills are required.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5349
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1123 or HIST 1228 or HIST 1308 or HIST 1528 or HIST 4053 or HIST 4238 or HIST 4258 or HIST 4328 or HIST 4329 or HIST 4338 or HIST 4339 or HIST 4538 or HIST 4548 or HIST 4558.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 4358 (3) Childhood in Modern Israel/Palestine**
Examines topics relating to History, Jewish Studies and Israel/Palestine studies. Analyzes the history of modern childhood in Israel and Palestine from the 19th century to the present. Themes include agency, work, life cycle and culpability. Topics range from collective parenting on Israeli Kibbutzim, growing up in Ottoman Palestine, to the legal status of stone-throwing Palestinian children. Sources include memoirs, literature, films, monographs and articles.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4358 and JWST 5358 and HIST 5358
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST/JWST 4338 History of Modern Israel/Palestine, this course would give students relevant background on the history of the region, but is not required.

**HIST 4359 (3) The Global History of Modern Arabia**
Examines the history, politics and society of the countries of the Arabian Peninsula (modern day Saudi Arabia, Oman, Yemen, Bahrain, Qatar and the UAE) in the period between 1800 and the present. The guiding assumption will be that the histories of Arabia cannot be studied in isolation from broader histories of capital formation, imperialism, religious reform, state formation and the discourses and practices which they informed. To that end, the focus will be on Arabia as part of the British, Ottoman and Omani Empires, a participant in Indian Ocean commerce, a source and destination for migrant scholars, students and laborers, the center of the petroleum economy and a domain of struggle for activists and intellectuals representing multiple political/ideological currents-not only Islamist, but also, liberal, socialist and communist.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Comparable and General

**HIST 4366 (3) Culture Wars: Modernism, Mass Culture, and the Modern U.S.**
Examines how U.S. public moralists, intellectuals, and artists from the end of the nineteenth century to World War II both celebrated and attacked the rise of two characteristic features of modernity: mass culture (amusement parks, popular music, radio, movies), and modernist literary and artistic expression. Addresses how Americans both constructed and violated the line between "popular" and "high" culture.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 4378 (3) Jews in and of the Middle East**
Examines the modern history and culture of Jewish communities under Islamic rule in the Middle East and North Africa; Jews' and Muslims' encounters with empire, westernization and nationalism; representations of Sephardi and Eastern Jews; Jewish-Muslim relations in Europe and the U.S.; and contact and conflict between Jews and Muslims in (and about) Israel/Palestine. Sources include memoirs, diaries, newspapers and films.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5378, JWST 5378, and JWST 4378
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4388 (3) History Today: Global Intensive in Israel/Palestine**
This global intensive analyzes history, memory and nationalism in one of the areas where the relationship between these three categories is the most fraught: Israel/Palestine. After learning the historical background to the Arab/Israeli and Palestinian conflict in Boulder, students will visit Israel and the West Bank/Occupied Territories/Judea and Samaria. Through this course, students will gain a nuanced, multi-sided perspective of Israel, Palestine and the uses of history and memory.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4388
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 4412 (3) Europe, 1890-1945**
Examines the origins, character and significance of the First and Second World Wars for the major nations of Europe during the first half of the 20th century.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Modern

**HIST 4416 (3) Environmental History of North America**
Examines how people of North America, from precolonial times to the present, interact with, altered, and thought about the natural world. Key themes include Native American land uses; colonization and ecological imperialism; environmental impacts of food and agriculture; industrialization, urbanization and pollution; energy transitions; cultures of environmental appreciation; the growth of the conservation and environmental movements.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 4423 (3) German History 1848-1989: Weimar Republic, Nazism, State Socialism**
Cultural, political and social history of Germany from the Revolutions of 1848 to the Fall of the Berlin Wall in 1989. Emphasizes German unification & Bismarck, the effects of World War I, Weimar politics, the rise of Nazism, World War II and the Holocaust, the post-war paths of West and East Germany, and reunification.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4425 (3) United States History, 1917-1945**
Examines U.S. history from World War I through World War II. Key themes include: warfare; the rise of the modern state; consumer culture; the shift from conservative politics to the New Deal liberalism; the women's movement; immigration restriction; segregation; the Great Migration, and civil rights; conflicts between secular modernism and religious fundamentalism; and new technologies such as the automobile.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods

**HIST 4426 (3) Animals in U.S. History**
This course explores interactions between people and other animals in the present day U.S. over the last six hundred years. Animals, as we will learn, have shaped American history in profound and surprising ways. Reading works and viewing films on wolves, horses, grizzly bears, dogs, elephants, pigs, humans, and other creatures, we will explore the historical origins and development of present-day human-animal relationships in the realms of economics, science, culture, ethics, and the law.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 4433 (3) Nazi Germany and the Holocaust**
Focuses on the political, social, and cultural origins of National Socialism, the nature of the Nazi regime, the origins and course of the Second World war, and the perpetration of the Holocaust.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Europe: Specific Countries

**HIST 4435 (3) From the Cold War to the Counterculture: U.S. History 1945-73**
Analyzes high politics, grassroots movements, and cultural change in the years of unprecedented economic prosperity and rapid change after WWII. Explores the foreign and domestic politics of the Cold War; labor unionism; the Vietnam War; the Civil Rights, antiwar, and women's rights movements; and technocultural changes like the rise of television and the growing dominance of the automobile.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: United States: Chronological Periods

**HIST 4437 (3) African American History, 1619--1865**
Explores the history of Africans in America from the first arrivals to emancipation, and their role in the social, cultural, economic, and political evolution of the United States.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1015.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: United States: Topical Courses 2

**HIST 4442 (3) Europe since 1945**
Explores Europe from the end of World War II through the present day. Topics include postwar reconstruction; the cold war; anticommunist opposition and new social movements; consumer culture and punk music; the fall of communism; the Yugoslav wars; European unity.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Europe: Modern

**HIST 4445 (3) United States History since 1973**
Traces political, diplomatic, economic, and social developments in the United States from 1973 to the present.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: United States: Chronological Periods

**HIST 4447 (3) African American History, 1865 - Present**
Explores the cultural, social and political history of African Americans after 1865. Focuses on African American social movements, the diversity of the African American communities, as well as a critical examination of the African Americans¿ relationship to the United States. Students in this course will study the advances made in the years following Emancipation as well as the continued challenges for Black freedom in the U.S.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Diversity-U.S. Perspective

**HIST 4448 (3) Wars of Liberation in Southeast Asia**
Uses the contemporary nations of Indonesia, Myanmar, and Singapore as case studies to examine the making and unmaking of European and Japanese colonialism in Southeast Asia in the years surrounding World War II. In what ways did diverse communities understand and narrate imperialism and independence? How can we understand wars of liberation as local, regional, and global experiences, with legacies for today?
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5448 and ASIA 4448
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Departmental Category: Asia Content

**HIST 4454 (3) Jewish Thought in Modern History**
Takes students on a journey from Medieval Spain to contemporary United States to explore how Jews, living in different societies, have attempted to reshape and interpret central Jewish values and beliefs in accordance with the prevailing ideas of their host societies. Focuses on the historical context of each Jewish society that produced the thinkers and ideas considered in this course.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4454
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Europe: Topical

**HIST 4511 (3) Europe in the Dark Ages (400-1000 A.D.)**
Examines the history of Europe from the fall of the Roman Empire to the turn of the first millennium. Treats social, political and religious transformations in the barbarian kingdoms, and considers the persistence of Roman institutions and culture and the impact of Christianity in northern Europe.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011 or HIST 2170.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Europe: Ancient and Medieval

**HIST 4521 (3) Europe in the High Middle Ages (1000-1400 A.D.)**
Examines the history of Europe from the emergence of feudal institutions to the rise of nation states, with specific attention to social, intellectual and religious change, the role of law and ritual, the crusades and European expansion, and urban growth and identity in the West.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011 or HIST 2170.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Europe: Ancient and Medieval

**HIST 4524 (3) Expulsions and Diasporas: The Jews of Spain and Portugal**
Considers the experience of Jews and converses during the Spanish Inquisition and the Iberian expulsions of the 1490s. Sephardic refugees faced social, economic, and political upheavals in the decades after their exile, leading to new communities in settings as diverse as North Africa, India, Turkey, the Caribbean, and the Americas. The study of texts and traditions from the Sephardic diaspora will explore themes including forced conversion, rabbinic authority, colonialism, and mercantile networks. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4524
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 4527 (3) Mexican-American History since 1848**
Examines Mexican-origins people in the United States from the 19th century through the present. Focuses on Mexican-American history as both an integral part of American history and as a unique subject of historical investigation. Using primary and secondary sources, students will examine how Mexicans and Mexican-Americans have negotiated, influenced, and responded to political, social, cultural, and economic circumstances in the U.S.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1015 or HIST 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: United States: Topical Courses 2

**HIST 4538 (3) History of Modern India**
Examines the history of India from the British conquest of India in the late 18th century to independence in 1947. Emphasizes the impact of British rule on the political, economic and social development of modern India.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5538
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of any history coursework.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4546 (3) Popular Culture in the Modern United States**
Traces the history of cultural expression in the United States since the late nineteenth century. From art, fiction, and music to the movies, amusement parks, shopping, and sports, popular culture offers clues to decipher shifting patterns of consumption, globalization, race, gender, politics, technology, and media. Includes instruction and practice interpreting cultural materials in historical context.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 2316
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 4548 (3) Women in Modern India**
Examines the history of women and gender in India from the late 18th century to the present. Explores topics such as the changing legal status of women in the colonial and postcolonial period, marriage, domesticity and patriarchy, and women's education and participation in anti-colonial and postcolonial politics, women, work and the environment, violence against women, and women and globalization.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5548
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1528.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4554 (3) Researching European Jewish Life**
This upper-level hybrid class is a research and learning initiative of CU Boulder¿s History Department with the Department of History, Philosophy, and Jewish Studies at the Open University of Israel and the Center for Research in Antisemitism at the Technical University of Berlin, Germany. It revolves around an in-person research seminar in Europe. Topics will vary, beginning with a focus on egodocuments in the study of twentieth-century German Jewish life.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4554 and HIST 5554
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) only. Restricted to students who have taken either HIST/JWST 1828, HIST/JWST/RLST 1830, HIST 4423, HIST 4433 or GRMN 2301 with a grade of C- or better; or with permission of instructor.

**HIST 4556 (3) The History of America through Baseball**
Baseball serves as a window to view the American experience. Covers U.S. history since 1830, addressing the major topics that reflect on American society, such as professionalization, labor management conflict, race, gender, culture, politics, economics and diplomacy.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 2516
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1015 or 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 4558 (3) Buddha to Gandhi: A History of Indian Nonviolence**
Focuses on the intellectual history of nonviolence in India from the time of the Buddha to Mahatma Gandhi who led India to national independence from the British Empire in 1947. Pursues this history in light of the encounter between Indian and western cultural traditions in modern India.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4618 (3) From Genghis Khan to the Opium War: Early Modern China**
Examines political, social, and cultural history of China from the Song Dynasty (960-1279) to the opium War (1839-1842). Topics covered include the development of imperial political institution and gentry society, Conquest Dynasties, Neo-Confucianism, China's "medieval economic revolution", Chinese world order in East Asia, Qing multiethnic empire, Chinese overseas migration, and the coming of the West.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5618
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1618 or HIST 1628 or CHIN 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4619 (3) Women in East Asian History**
Considers major issues in the history of women in East Asia (China, Korea, Japan) in the 17th through 20th centuries. Focuses on gender roles in Asian family, state, and cultural systems. Topic varies in any given semester.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4619 and HIST 5619
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 4623 (3) History of Eastern Europe Since 1914**
Examines the struggle of nations of eastern Europe to assert their independence, from break-up of the imperial system at the end of World War I, through the Soviet bloc that emerged after World War II, to the establishment of democratic governments after the1989 revolutions.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4628 (3) Modern China: Collapse of Imperial Brilliance, 1644-1949**
Examines the brilliance of the Qing dynasty, its collapse in 1911, and the bloody and chaotic several decades that followed, up to the 1949 Communist Revolution. Focuses on such topics a Qing imperialism in Central Asia, global capitalism and Western imperialism in China, the opium trade, domestic violence, nationalism, concepts of modernity, competing revolutionary movements, and WW II in Asia.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5628
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4636 (3) Lesbian and Gay History: Culture, Politics, and Social Change in the United States**
Considers current theoretical approaches to the history of sexuality and traces the changing meaning of same-sex sexuality in the United States through investigation of lesbian/gay identity formation, community development, politics, and queer cultural resistance.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5636 and WGST 4636
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1015 or HIST 1025 or LGBT 2000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 4638 (3) Contemporary China: Radicalism and Reform, 1949 to Present**
Examines the dramatic, often tragic, and globally transformative history of China under the Chinese Communist Party. Focuses on such topics as political, social, and cultural revolution, nationalism, Maoism, the Great Leap Forward, Red Guards and the Great Proletarian Cultural Revolution, the Deng Xiaoping era, relations with Taiwan, the 1989 Tiananmen Massacre, and China's rise as a world power.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5638
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4640 (3) Women, Gender and War**
Study of how women experience war, how the structure, practice and memory of war, and the rights and obligations of military service (masculinity and femininity) are structured by the gender system.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4640
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1015 or HIST 1012 or HIST 1025 or HIST 1123 or HIST 1628 or HIST 1708.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Methodological, Comparative, and Global

**HIST 4648 (3) Inventing Chinese Modernity, 1800 to Present**
Examines the long and painful transformation, during the modern period of native Chinese concepts about the meaning of life, the proper order of politics and society, the role of the individual, the nature and role of human emotions, the place of the gods, the definition of nation, the proper relations between the sexes, and China's place in the global order.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1618 or HIST 1628 or CHIN 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4653 (3) Ukraine: The History Behind the Headlines**
Explores major topics in the history of Ukraine, including the impact of Russian imperialism, Ukrainian nationalism, the legacy of Soviet rule, the Second World War, and Ukraine¿s struggle for sovereignty, with a particular emphasis on periods in Ukrainian history that remain relevant and debated today. Over the course of the semester, we will also discuss the question of historical and cultural memory, diving into questions about the uses (and abuses) of the past.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1012, HIST 2100, HIST 4723, or HIST 4733.

**HIST 4658 (3) Between Beijing and Baghdad: China and Islam**
Traces how "Muslims in China" transformed themselves into "Chinese Muslims" while at once accommodating and conflicting with Chinese states and people throughout history until the present time.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5658
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1618 or HIST 1628 or CHIN 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4688 (3) Window on Modern China**
Examines the relationship between China's recent history and its booming contemporary economy and society through on-location study in a Chinese city. The course makes use of a rich array of historical and other kinds of sites to teach students to think critically about themes and events that played a shaping role in the unfolding of modern Chinese history.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4710 (3) China and Russia, 1200-2000**
The course explores entangled history of China and Russia since the thirteenth century from comparative and transnational perspectives. Major topics covered in this class include but not limited to the rise and the evolution of autocratic rulership in both countries; their frontier interactions through Inner Asian border regions of Mongolia, Xinjiang and Manchuria; Russia and the communist revolution in China; political split between China and Soviet Union in 1960s and 1970s.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisites of HIST1618 and HIST1628.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 4711 (3) The Medieval Crusades: Holy War and Its History, 1095-1400**
Studies the innovation, impact and meaning of holy war and the expansion of Christendom during the High Middle Ages. Topics include the definition of crusade and crusaders, religious persecution and tolerance, the expansion of European modes of government, war memory, colonization and its aftermath, the meaning of the Holy Land and the home front.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011 or HIST 2170.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Ancient and Medieval

**HIST 4713 (3) History of Russia through the 17th Century**
Introduces the history and culture of Russia from the 9th to the 17th century. Emphasizes selected topics in social, economic, religious and cultural history, including the formation of the Russian state conversion to Orthodox Christianity, the Mongol invasion and the reign of Ivan the Terrible.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4723 (3) Imperial Russia**
Surveys major cultural, social, and economic changes from the reign of Peter the Great through World War I.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4726 (3) A Nation of Immigrants: Immigration in American History**
Examines the shifting kaleidoscope of immigration to the United Sates in the 19th and 20th centuries. Considers immigrant motives, cultures and experiences; changing cultural and political ideas about the value of immigration; the relationship of immigration and immigration policy to ideas about the American national project; the creation and consequences of immigration law.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: United States: Topical Courses 1

**HIST 4728 (3) Japan¿s Empire: Birth and Death**
Examines the origins of Japan¿s wartime military state in the age of the samurai and the subsequent dislocations of revolution, industrialization, Westernization, and nation-building. Topics may include: colonialism in Asia, evolving roles for women, the rise and fall of democracy, the origins of fascism, the home front, military atrocities, the atomic bombs, war memory, and the art and literature of the late nineteenth and early twentieth centuries.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5728
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4733 (3) The Russian Revolution and the Soviet Regime**
Covers in detail the significant social, economic and political events of Soviet Russia from the February Revolution of 1917 to the present.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4738 (3) Japan¿s Great Peace, 1590-1868**
When we think of early modern Japan we think of samurai: swords flashing, heads rolling. Such images circulate through popular culture via films, anime, and video games. But samurai were only one small part of a complex society, and early modern Japan was characterized by over 250 years of peace. This course spotlights factors that enabled Japan¿s ¿great peace¿: political stability, the growing economy, foreign relations, restructured gender and family roles, and popular culture.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4758 (3) Japan after World War II**
Explores political, economic, social, and cultural factors in postwar Japan. Although defeat in 1945 is often seen as a moment of breakage with the past, the outlines of Japan today emerged before and during World War II. This course traces the impact of occupation by the Allied powers, the development of a ¿special relationship¿ with the United States, high-speed economic growth, social change, globalization, war memory, and other themes in the late twentieth-century Japanese nation-state.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4761 (3) Roman Law**
Studies the constitutional and legal history of ancient Rome; emphasizes basic legal concepts and comparisons with American law. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5761 and CLAS 4761 and CLAS 5761
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Ancient and Medieval

**HIST 4776 (3) History and Genealogy in American Society**
Introduces students to the uses and cultural importance of family history in American society and to the techniques of doing genealogy. It examines the subject of genealogy through its relationship to nostalgia, ethnicity, regionalism, slavery, race, sexuality, immigration, and national identity between the colonial period and the present. The course also requires students to engage in primary research on their own family or a family of their choosing.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**HIST 4800 (3) Special Topics in Global History**
Organized around themes that change yearly, this class allows students to study and research processes, phenomena, and events of global significance in historical context. Will stress historical subjects that span multiple geographic regions of the globe. Topics could include the global history of: the arms trade; slavery; health and disease; youth culture; women's rights; genocide, the environment, migration, economic trade, warfare exploration etc...
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Methodological, Comparative, and Global

**HIST 4803 (3) Special Topics in European History**
Covers specialized topics in European history, usually focusing on a specific country or theme. Formerly offered as a general special topics course.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisites HIST 1011 or HIST 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4806 (3) Special Topics in American History**
Focuses on special topics in U.S. history to provide a novel thematic, comparative, or methodological focus that cuts across usual geographical and temporal ranges within American history. Topics vary each semester. Students will engage in focused historical learning and research that spans across geographical and temporal ranges within American history. Topics may include: the History Animals in the American West, Slavery along the Atlantic Rim, Presidential Power in the Twentieth Century, the History of American Football, Immigration and Migration in the American Past, etc...
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 4808 (3) Special Topics in World Areas History**
Covers specialized topics in the history of World Areas outside of Europe and/or North America, usually focusing on one country or region.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions

**HIST 4820 (3) Human Rights: Historical Perspectives**
Examines the history of modern ideas of human rights.Focuses on themes such as the universalism/cultural relativism debate, colonialism, nationalism, refugees and stateless peoples, the United Nations and humanitarianism, ethnic genocide in Rwanda, and human rights abuses by the Taliban regime in Afghanistan.
**Requisites:** Requires a prerequiste of 6 hours of credit in any History course. Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Methodological, Comparative, and Global
Departmental Category: Asia Content

**HIST 4830 (3) Human Trafficking in Global Perspective**
Surveys the global history of slavery, serfdom, chattel slavery, debt bondage, pawnship, domestic servants, bonded labor, child soldiers, forced marriage, sex trafficking, abolitionism, and meanings associated with ¿freedom¿ from the ancient world to the modern day.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Asia Content

**HIST 4837 (3) Jews in the American West**
Explores the history of Jewish migration and settlement in the American West. Jewish pioneers in the nineteenth century included explorers, businessmen, and cowgirls that established small communities in territories that had not yet achieved statehood. As westward expansion progressed, Jews continued to find opportunity in the West, balancing assimilation with unique expressions of religious identity. The history of communal institutions including synagogues, hospitals and summer camps offers new perspectives on this underrepresented segment of American Jewry.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4837
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 4930 (1-6) History Internship**
Matches selected students with supervised internships in professional archives research libraries, historical associations, and special projects. Interns apply their academic area specialty to their work in the field. Internships have a work and academic (reading and writing) component.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) History (HIST) majors and minors only.
**Recommended:** Prerequisite completion of lower-level history coursework (for example HIST 1015 or HIST 1025).
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

# History - Bachelor of Arts (BA)

Historians study the past, in all of its complexity, to better understand our contemporary world and the forces that created it. Historians analyze change over time, and they use archival and other primary-source evidence to build interpretations that explain change and put it into context. In seeking to understand historical subjects on their own terms, and by appreciating the diverse perspectives of past actors, students of history develop empathy even as they rigorously engage with the ethical dimensions of past human decisions and actions. When students study the past on its own terms, they recognize their power to understand the present and shape the future.

History faculty conduct research and teach courses in a wide range of eras—from ancient to modern times—and across most major world areas including Africa and the Middle East, South and East Asia, Europe and the Americas. History faculty also pursue multiple methodologies and approaches, including cultural, diplomatic, demographic, economic, environmental, ethnic, gender, intellectual, legal, political, religious, social and transnational history.

The undergraduate degree in history balances the broad study of various world regions, exposure to multiple discipline-specific methods, and the freedom to pursue individual areas of interest. At the lower-division level, you are required to take one introductory course on the history of the United States, one on the history of Europe and one on the history of other areas of the world. Methods courses will provide an Introduction to Global History and more intensive practice in Historical Thinking and Writing (a sophomore-level seminar course that also serves as your upper-division writing requirement). At the upper-division level, you have greater flexibility because you take more courses, so long as you take at least one class in U.S. history, one in European history and two in the history of other areas of the world or in comparative/global history. In addition, when choosing courses to fulfill your major requirements, you will need to take at least two pre-modern history courses and two modern history courses.

While the major requires both geographical and chronological breadth, the requirements are flexible enough that you can concentrate your studies in a specific geographic area (for example Britain, China, Latin America or the U.S.), historical period (for example the Ancient world, the Medieval period or the twentieth century), or central theme (for example, environmental or diplomatic history, the history of revolution and war, imperialism and colonialism, borderlands and migration, cultural and intellectual history, or religious history). Within these areas, you are free to plan your program around a diverse set of rotating course offerings.

As you gain expertise in historical skills, knowledge of multiple regions and familiarity with diverse methodologies, you will apply that training to a capstone project. During a one-semester capstone senior seminar or a two-semester honors sequence, you will engage in your own original research, producing either a substantial research paper or an Honors thesis. History majors also have other undergraduate research opportunities and access to history-related internships.

Many history majors and minors combine their study in fruitful ways with other humanities fields or related programs such as international affairs, Jewish studies, women and gender studies, or Asian languages and civilizations. Moreover, many of our students combine a major or minor in history with studies in other social or natural science disciplines, or even as a complement to training in CU's professional schools such as Business or Engineering and Applied Sciences.

**Course code for this program is HIST.**

# Requirements

## Total Credit Hours

Students must complete 42 credit hours in history courses with grades of C- or better. Of those 42 credit hours, 24 must be at the upper division. Students should complete the required 1000-level survey courses, HIST 1800 or HIST 1830 and HIST 3020 before they enroll in any 4000-level history courses.

## Required Courses and Credits

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

| Code | Title | Credit Hours |
|---|---|---|
| **Lower-division Requirements** | | |
| One 1000-level United States history course | | 3 |
| One 1000-level Europe history course | | 3 |
| One 1000-level world areas history course | | 3 |
| One 1000-level global history course: HIST 1800 or HIST 1830 | | 3 |
| **Upper-division Requirements** | | |
| HIST 3020 | Historical Thinking & Writing [1] | 3 |
| One 4000-level United States history course | | 3 |
| One 4000-level Europe history course | | 3 |
| Two 4000-level World Areas or Comparative/Global history courses | | 6 |
| Two 4000-level HIST electives | | 6 |
| One 3000-level Capstone Senior Seminar or HIST 3110 Honors Seminar [2] | | 3 |
| **Lower- or Upper-division Elective Requirement** | | |
| 6 credit hours in any other HIST courses | | 6 |
| **Historical Period Requirement [3]** | | |
| 6 credit hours in courses whose focus falls primarily before 1800 | | |
| 6 credit hours in courses whose focus falls primarily after 1800 | | |
| **Total Credit Hours** | | **42** |

[1] Students are highly encouraged to take HIST 1800 prior to HIST 3020, but HIST 1800 and HIST 3020 may be taken concurrently when necessary. However, HIST 3020 may not be taken prior to HIST 1800. Students must fulfill the Gen Ed lower-division writing requirement before enrolling in HIST 3020.

[2] HIST 1800 and HIST 3020 must be completed prior to enrolling in a Capstone Senior Seminar. Concurrent enrollment is not permitted. Any additional 3000-level seminars can fulfill requirements that normally are fulfilled by 4000-level courses.

[3] 2000-level HIST courses cannot be used to fulfill this requirement. (A list of courses broken down by geographic areas and historical periods is available on the History Department website.)

**Note:** Under normal circumstances, no more than 45 credit hours in history may be used toward a student's total University of Colorado Boulder graduation requirements. Students must have a GPA of at least 2.00 in the major in order to graduate. Students may receive credit for HIST 1012 and/or HIST 1025 and/or 3 lower-division elective HIST credit hours by obtaining a score of 4 or better on the high school Advanced Placement history test(s). Some types of International Baccalaureate credit are acceptable; consult one of the major advisors to determine individual applicability. Credit from a CLEP History test cannot be applied to the major.

All students majoring in history must complete at least 12 credit hours of upper-division history in courses taught by the CU Boulder faculty. In addition, HIST 3020 and the 3000-level Senior Seminar must be successfully completed on the CU Boulder campus with a C- or better.

## Graduating in Four Years

Students should consult the Four-Year Guarantee Requirements for further information on eligibility for the four-year guarantee. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in history, students must consult a history advisor each semester but the following plan of study provides a rough outline of acceptable progress.

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will fulfill all 12 credits of the Arts & Humanities area of the Gen Ed Distribution Requirement and the Upper-Division component of the Written Communication Gen Ed Skills Requirement. Depending on the courses selected within the major, students can also potentially complete some of the Social Sciences area of the Gen Ed Distribution Requirement and both the US and Global Perspective categories of the Gen Ed Diversity Requirement.

**Year One**

| **Fall Semester** | **Credit Hours** |
|---|---|
| Any of the required 1000-level HIST geographic survey courses | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | 4 |
| Elective | 3 |
| Elective | 3 |
| **Credit Hours** | **16** |
| **Spring Semester** | |
| Any of the required 1000-level HIST geographic survey courses | 3 |
| Gen. Ed. Skills course (example: QRMS) | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | 3 |
| Elective | 3 |
| Elective | 3 |
| **Credit Hours** | **15** |

**Year Two**

| | | |
|---|---|---|
| **Fall Semester** | | |
| Third required 1000-level HIST geographic survey course | | 3 |
| 1000-level Global History (usually HIST 1800) | | 3 |
| Gen Ed Distribution/Diversity (example: Social Science/Global Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences ) | | 3 |
| Elective | | 3 |
| **Credit Hours** | | **15** |
| **Spring Semester** | | |
| HIST 3020 | Historical Thinking & Writing (fulfills Gen Ed upper division written communication) | 3 |
| Either a 2000 or 4000-level HIST elective (4000-level preferred) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| **Credit Hours** | | **15** |

**Year Three**

| | |
|---|---|
| **Fall Semester** | |
| Two 4000-level HIST geographic area requirements | 6 |
| Gen. Ed. Distribution course (example: Social Sciences) | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | 3 |
| Elective | 3 |
| **Credit Hours** | **15** |
| **Spring Semester** | |
| Two 4000-level HIST geographic area requirements | 6 |
| Gen. Ed. Distribution course (example: Social Science) | 3 |
| Elective (Upper Division) | 3 |
| Elective | 3 |
| **Credit Hours** | **15** |

**Year Four**

| | |
|---|---|
| **Fall Semester** | |
| HIST 3000-level Senior Seminar | 3 |
| HIST 4000-level elective | 3 |
| Elective (Upper Division) | 3 |
| Elective (Upper Division) | 3 |
| Elective | 3 |
| **Credit Hours** | **15** |
| **Spring Semester** | |
| HIST upper or lower division level electives | 6 |
| Elective (Upper Division) | 3 |
| Elective (Upper Division) | 3 |
| Elective (Upper Division) | 3 |
| **Credit Hours** | **15** |
| **Total Credit Hours** | **121** |

# Learning Outcomes

To study history is to develop a disciplined way of making sense of the world by inquiring about the past. The History Department has identified a common set of learning objectives that are crucial components of historical thinking. No single course will attend to all of the objectives listed below. Instructors identify learning goals specific to the course they are teaching, and so each course will reflect a unique combination of these broader objectives. However, taking multiple courses at increasing levels of difficulty during your time at CU Boulder will allow students to develop proficiency in *historical literacy*—the substantive knowledge, skills, concepts, methods and habits of mind specific to the discipline of history. These skills build upon and add to critical thinking skills shared across multiple disciplines, such as attentive reading, engaged discussion, recognition of multiple perspectives and effective writing. Mastering each cluster of historical elements will allow students to develop a portfolio of analytical and communication skills that will serve them in and beyond the discipline.

## 1. Substantive Essentials

What do we know about the past? How do we interpret it?

1. **Facts**: Call upon substantial factual knowledge about the past.
2. **Evidence**: Understand that history is an evidence-based discipline that requires identifying reliable sources of information.
3. **Questions**: Ask rigorous and open-ended questions of historical evidence in order to interpret what happened in the past.
4. **Context**: Establish relevant context to relate historical facts and/or evidence to the time and place of their original existence.

## 2. Conceptual Foundations

What foundational concepts frame how we think about the past? How do we analyze historical change?

1. **Change** over time: Understand how change over time, and continuity, shape narratives of the past.
2. **Causation**: Account for causation in explanations of historical change.
3. **Contingency**: Consider historical change as never preordained but dependent upon a set of prior conditions, actions, and events in human societies and the non-human world.
4. **Complexity**: Treat historical change as complex and not easily reduced to simple explanations or single variables.

## 3. Analysis of Historical Narrative

How do we assess accounts of history? How do we engage in scholarly conversation about the past?

1. **Argument**: Recognize historical narrative as a form of argument, built from evidence and interpretation and open to rigorous questioning and critique.
2. **Sources**: Assess authors' interpretations of sources (primary and secondary) as evidence in their historical narratives and arguments.
3. **Methods**: Identify how historians have used various sources and methodological traditions, including those drawn from other disciplines where relevant, to build their interpretations.
4. **Historiography**: Evaluate historical argument as part of a larger historiographical conversation among scholars who offer multiple and changing interpretations.

## 4. Production of Historical Knowledge

How do we develop arguments about the past? How do we share historical narratives?

1. **Research**: Conduct historical research, which includes: navigating libraries, databases, and archives; identifying, locating, and managing sources; and summarizing significant amounts of information.
2. **Explain**: Build historical explanations by evaluating, interpreting, and synthesizing historical evidence, and applying relevant theory and methods.
3. **Express**: Share historical knowledge and argument through written, oral, digital, and/or other forms of expression.

## 5. History and Perspective

Why do multiple perspectives matter to interpreting history? How can history help us to understand the present world?

1. **Global literacy**: Develop in-depth knowledge of multiple regions, countries, cultures, and communities across the world, and the factors that have shaped their historical interactions and interconnections, sometimes at a global scale.
2. **Diversity**: Identify relevant categories of analysis to frame and explore questions that aim to deepen our understanding of the complexity, richness, diversity, and power dynamics within human experience in the past and present.
3. **Public application**: Apply historical knowledge, skills, and habits of mind to the problems of the present world.

# History - Minor

Historians study the past, in all of its complexity, to better understand our contemporary world and the forces that created it. Historians analyze change over time, and they use archival and other primary-source evidence to build interpretations that explain change and put it into context. In seeking to understand historical subjects on their own terms, and by appreciating the diverse perspectives of past actors, students of history develop empathy even as they rigorously engage with the ethical dimensions of past human decisions and actions. When students study the past on its own terms, they recognize their power to understand the present and shape the future.

History faculty conduct research and teach courses in a wide range of eras—from ancient to modern times—and across most major world areas including Africa and the Middle East, South and East Asia, Europe and the Americas. History faculty also pursue multiple methodologies and approaches, including cultural, diplomatic, demographic, economic, environmental, ethnic, gender, intellectual, legal, political, religious, social and transnational history.

Students who enjoy taking history courses may want to consider becoming either a history major or minor. In general, the major requires a more in-depth commitment from students, whereas the minor offers students an opportunity for some specialization in history without all the obligations of the major.

For those students already pursuing a major in another field, a history minor might be the more viable option, because the minor requires the completion of fewer overall history courses.

## Program Requirements

All coursework applied to the minor must be completed with a grade of C- or better. No pass/fail work may be applied. The GPA for all minor coursework must equal 2.00 or higher. At least 12 of the 21 total credits and 6 of the 12 upper-division credits in History must be in courses taught by CU Boulder faculty.

All history courses taken at any CU campus, even ones not applied to minor requirements, are figured into the minor GPA.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| One United States history course | | 3 |
| One Europe history course | | 3 |
| Two World Areas or Global/Comparative history courses | | 6 |
| Three elective history courses | | 9 |
| **Total Credit Hours** | | **21** |

At least 12 credits must be taken at the 4000-level.

1000- 2000- and 4000-level HIST courses *are* applicable to the minor. 4000-level courses may be used to fulfill both upper-division credit hours and geographic area credit hours.

HIST 3020 and all 3000-level Senior Seminars are ordinarily restricted to history majors. 3000-level courses may occasionally be taken by minors if the course is not full as of the second week of drop-add and/or you have written permission from the instructor.

# Honors Program

## Arts & Sciences Honors Program

The Arts & Sciences Honors Program provides a community for highly motivated and academically engaged undergraduate students. It offers opportunities for intellectual engagement through Honors courses, academic-inspired events and Honors thesis research and creative work (through which student earn Latin Honors).

CU Boulder incoming honors-qualified first-year and transfer students, and continuing undergraduates who have a cumulative GPA of 3.3 or higher, are eligible to take one Honors Program course per semester. Students are not required to be enrolled full time; part-time students are also eligible to enroll in our courses. There is no extra cost to take an honors version of a course. Students are not required to take Honors courses, which means that students who take Honors Program courses are choosing to work at an honors level.

Admission for first-year and transfer students is done automatically through their application to CU Boulder's College of Arts & Sciences. Generally, students in the top 10 percent of the incoming class receive an invitation. This is based on numerous factors including high school GPA and application essays. Applicants to the College of Arts & Sciences are reviewed as the admissions process progresses and honors-eligible students will receive an invitation to the Honors Program after they have been admitted. Continuing students in the College of Arts & Sciences (those who have been at CU past their first year) who maintain a GPA of 3.3 or higher are automatically eligible to participate in the Honors Program. There is no Honors Program application; in all cases, eligibility is determined automatically.

Latin honors (http://www.colorado.edu/honors/graduation/) in the College of Arts & Sciences are conferred by the Honors Program. To graduate *cum laude*, *magna cum laude* or *summa cum laude*, honors-qualified students must successfully write and defend an Honors thesis. Most students pursue Latin honors in their major (based on departmental requirements), but students may also pursue General Honors (http://www.colorado.edu/honors/generalhonors/) via the Honors Program, providing students the opportunity to write an interdisciplinary thesis.

The Honors Residential Academic Program (Honors RAP (http://www.colorado.edu/hrap/)) is the optional residential component of the program. Honors RAP is open to a limited number of qualified incoming and continuing students. Students engage in small classes and co-curricular activities, forming an academic community in their residence hall. (See the Communities tab for more information about the Honors RAP.)

The Honors Program offers the certificate in Interdisciplinary Honors Studies (p. 414), which allows undergraduate students to develop skills in interdisciplinary theory and practice that they can draw on to address social problems. The certificate is founded on the principles of diversity: intellectual, social and experiential.

## Faculty

Chadwick, Jeffrey
Instructor; PhD, Purdue University

Feldman, Andrea (https://experts.colorado.edu/display/fisid_101230/)
Senior Instructor; PhD, University of Colorado Boulder

Fischer, Kate (https://experts.colorado.edu/display/fisid_155474/)
Instructor; PhD, University of Colorado Boulder

Hickcox, Abby Lynn (https://experts.colorado.edu/display/fisid_151860/)
Senior Instructor, Associate Faculty Director; PhD, University of Colorado Boulder

Jacobs, Janet L. (https://experts.colorado.edu/display/fisid_100744/)
Director; PhD, University of Colorado Boulder

Mishev, Ilia Dimitrov
Instructor

## Courses

**HONR 1001 (1) Honors Coseminar**
Honors coseminars are designed to combine an honors seminar experience with the shared experience of an organized lecture course. Designed typically for 15 students, coseminars are taken for an additional 1 credit hour. Coseminars provide honors students with an opportunity to extend their common experience in the course lecture into an enriched interactive, critical thinking opportunity.
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Enrollment allowed for first-year AS students invited into the Honors Program for the current academic year (not including Honors RAP students) and continuing AS students with a minimum cumulative GPA of 3.300.
**Additional Information:** Arts Sciences Honors Course

**HONR 1125 (3) Heroines and Heroic Traditions**
Reevaluating global heroic traditions is critical to understanding power structures. In this course we will interrogate the concept of the monomyth and redefine what it means to be a hero/ine. The course will explore comparative mythology, folklore, literature, film and television in order to reinterpret and investigate heroic traditions in diverse communities.
**Equivalent - Duplicate Degree Credit Not Granted:** HONR 4025
**Requisites:** Enrollment allowed for first-year AS students invited into the Honors Program for the current academic year (not including Honors RAP students) and continuing AS students with a minimum cumulative GPA of 3.300.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sciences Honors Course
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**HONR 1810 (3) Honors Diversity Seminar**
Students will develop an appreciation for, and experience with, diverse perspectives. In particular this includes: racial/ethnic, gender, sexual orientation, and class perspectives, for constructing knowledge as they proceed through their undergraduate studies. Three themes provide the framework for the course: education for the next century, the 21st century citizen, and the modern individual in a diverse society. Topics explored include privilege, stigmatization, targeted and nontargeted grouping, and oppression. Engaging in independent research and experiential, empathetic experiences is required.
**Requisites:** Enrollment allowed for first-year AS students invited into the Honors Program for the current academic year (not including Honors RAP students) and continuing AS students with a minimum cumulative GPA of 3.300.
**Additional Information:** Arts Sciences Honors Course
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**HONR 2250 (3) Ethics of Ambition**
Through selected readings in classical literature on ethics and through more contemporary readings and films, examines critical ethical issues relating to the competition of ambitions and the alternative styles of choosing between courses of action in a dangerous world. Uses biographies of those whose lives illustrate both the complexities of the struggles and the profundity of possibilities. Considers the unconscious metaphors of national visions and ambitions, the competing ethics of ends and means, the conflicting ambitions in a pluralistic society, and the transcendent ambitions of visionaries.
**Equivalent - Duplicate Degree Credit Not Granted:** FARR 2660
**Requisites:** Enrollment allowed for first-year AS students invited into the Honors Program for the current academic year (not including Honors RAP students) and continuing AS students with a minimum cumulative GPA of 3.300.
**Additional Information:** Arts Sciences Honors Course
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**HONR 2251 (3) Introduction to the Bible**
Studies the major works, figures, and genres of the Bible and attempts to understand what they meant to their own time and why they became so important to Western civilization and contemporary America.
**Requisites:** Enrollment allowed for first-year AS students invited into the Honors Program for the current academic year (not including Honors RAP students) and continuing AS students with a minimum cumulative GPA of 3.300.
**Additional Information:** Arts Sciences Honors Course
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**HONR 2500 (3) Open Topics**
Variety of new courses at the 2000 level. See honors program announcements for specific contents.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Enrollment allowed for first-year AS students invited into the Honors Program for the current academic year (not including Honors RAP students) and continuing AS students with a minimum cumulative GPA of 3.300.
**Additional Information:** Arts Sciences Honors Course

**HONR 2820 (3) Future of the Spaceship Earth**
Examines major ecological, political, economic, cultural, legal, and ethical issues that will shape the future. Students consider how their decisions influence the future, and reflect on fundamental values and ideals underlying the search for solutions to these complex problems.
**Equivalent - Duplicate Degree Credit Not Granted:** FARR 2820
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**HONR 2860 (3) The Figure of Socrates**
Investigates why Socrates intrigued great writers like Aristophanes, Plato, Xenophon, and Aristotle and why, through his life and execution by the Athenian democracy, he still influences Western ethics, politics, and education and is central to cultural literacy.
**Additional Information:** Arts Sciences Honors Course
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HONR 3004 (3) Women in Education**
Honors women in education and their legacy. Introduces women educators, beginning in the late 19th century, whose significant theories of education and work in teaching have had an impact on all of our lives, in history and in society. Explores the educational theories and methods of several representative women educators and analyzes them through an investigation of their professional and personal lives.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3004
**Additional Information:** Arts Sciences Honors Course
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**HONR 3220 (3) Advanced Honors Writing Workshop**
Intensive practice of expository writing skills, particularly argumentation in longer forms. Course includes extensive practice in researching secondary sources, synthesizing large bodies of information, structuring cogent arguments for diverse sources, etc.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sciences Honors Course
Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**HONR 3270 (3) Journey Motif in Women's Literature**
Investigates literature thematically centered on forced migration, diaspora, and marginalized communities through novels, graphic novels, and short essays by women. Themes explored: feminism, identity, intersectionality, diaspora, issues of gender and borders, exile, ethnicity, and literary theory among others.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sciences Honors Course
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**HONR 3550 (1-6) Open Topics**
Investigates special topics in humanities, social sciences, and natural sciences. Topics vary from semester to semester and from course to course. See Honors program announcements for specific contents. Open to Honors-qualified students beyond the freshman year. May be repeated for up to six credit hours for different topics.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sciences Honors Course

**HONR 3810 (3) Privilege and Modern Social Construction**
Examines social constructions that lead to productive interactions between and among American social communities. Using case studies and humanistic accounts, students analyze the lived experiences of a unique group or successful citizens who routinely evidence productive practices of multicultural engagement. Through interactions with policy makers and community practitioners, students design and enact activities that allow them to reconstruct their personal patterns of privilege practices of their peer groups in various settings.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sciences Honors Course

**HONR 3900 (3) Honors Internship Course**
Engages students in hands-on work in the community imparting practical knowledge and real-world experience. The course is designed to help students combine professional experiences with an academic component that involves critical thinking and interdisciplinary approaches to problem-solving. Benefits of the course include acquiring professional skills and knowledge, building a network of connections, developing insights on possible career options, and applying classroom material to real-world experiences.
**Grading Basis:** Letter Grade

**HONR 4000 (3) Open Topics**
Variety of new courses at the 4000 level, see Honors Program announcements for specific contents.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sciences Honors Course

**HONR 4025 (3) Heroines and Heroic Tradition**
Given recent controversies about the roles of women in power, this course re-evaluates heroic traditions as the stories that ground our sense of public endeavor. What do we mean by heroic? What is a heroine? Are heroines different from heroes?
**Equivalent - Duplicate Degree Credit Not Granted:** HONR 1125
**Requisites:** Enrollment allowed for first-year AS students invited into the Honors Program for the current academic year (not including Honors RAP students) and continuing AS students with a minimum cumulative GPA of 3.300.
**Additional Information:** Arts Sciences Honors Course
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**HONR 4055 (3) Discourse Analysis and Cultural Criticism**
Discourse analysis critically investigates the founding assumptions by which systems of meaning operate. Its practice is aimed at a rigorous, systematic analysis of both specific cultural issues and the dynamics by which structures of meaning may be maintained or transformed.
**Requisites:** Requires a corequisite course of HONR 4056. Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sciences Honors Course

**HONR 4056 (1-3) Service Practicum: Discourse Analysis and Cultural Criticism**
Help communities in need, with credit hours varying according to time commitment. The practicum provides experiential and intellectual understanding of the discourses and dynamics that maintain major cultural hierarchies of values and of resource distribution.
**Requisites:** Requires a corequisite course of HONR 4055. Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sciences Honors Course

**HONR 4075 (3) Environmental Justice**
Examines the experiences of people who face disproportionate environmental harms related to historical marginalization correlating with race, class, and gender. Covers the history, principles, and contemporary state of the environmental justice movement in its opposition to environmental inequalities.
**Requisites:** Enrollment allowed for first-year AS students invited into the Honors Program for the current academic year (not including Honors RAP students) and continuing AS students with a minimum cumulative GPA of 3.300.
**Recommended:** Junior or Seniors with 57-180 credits completed.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**HONR 4490 (3) Capstone in Interdisciplinary Honors Studies**
Explores the value of interdisciplinarity for conceptualizing, investigating, and solving problems. Critical analysis of interdisciplinarity across different fields will hone creative thinking, research, writing, and communication skills. Students will create a research project that encompasses multiple disciplines, informed by an appreciation of diverse points of view. Students will also examine how an interdisciplinary perspective is vital to being an engaged citizen.
**Requisites:** Requires prerequisite course of HONR 1810 (minimum grade C-).

**HONR 4900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sciences Honors Course

**HONR 4959 (3-6) Honors Thesis**
Requires approval of Honors Program.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sciences Honors Course

# Interdisciplinary Honors Studies - Certificate

The Interdisciplinary Honors Studies certificate allows undergraduate students to develop skills in interdisciplinary theory and practice that they can draw on to address social problems. The certificate is founded on the principles of diversity: intellectual, social and experiential.

Students who pursue the certificate will cultivate the ability to engage in meaningful dialogue across disciplinary divides and across social differences. Completing the certificate will help students develop the ability to look at a problem from multiple perspectives and the skills to help them work with people in society from all backgrounds and identities.

Housed in the Arts & Sciences Honors Program, the certificate draws from the curriculum across the College of Arts & Sciences, complementing a student's specialization in their major field.

Participation in the certificate program allows students to engage in interdisciplinary scholarship, cultivate critical thinking skills and become engaged campus and community citizens.

## Requirements

The interdisciplinary honors studies certificate requires 18 credits - 9 credits in 3 required HONR courses and 9 credits in elective honors courses. Students must complete 9 of the 18 credit hours at the upper-division level.

The certificate is available to degree-seeking undergraduate students who have at least a 3.3 cumulative GPA.

To earn the certificate, students are required to take 18 Honors credits, nine of which would be upper-division credits.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| HONR 1810 | Honors Diversity Seminar | 3 |
| HONR 3900 | Honors Internship Course | 3 |
| HONR 4490 | Capstone in Interdisciplinary Honors Studies | 3 |
| **Electives** | | |
| An additional 2 lower- or upper-division elective courses offered by the Honors Program | | 6 |
| An additional upper-division elective course offered by the Honors Program | | 3 |
| **Total Credit Hours** | | **18** |

### Electives

Electives can be drawn from courses offered by the Honors Program (course sections 880-889, classified as Arts & Sciences Honors courses in the registration system). At least one elective must be an upper-division course.

See lists of courses that fulfill this requirement from future, current and past semesters: Fall 2023 (https://www.colorado.edu/honors/fall-2023-honors-program-course-information/), Spring 2023 (https://www.colorado.edu/honors/spring-2023-courses/), Fall 2022 (https://www.colorado.edu/honors/fall-2022-honors-program-course-information/), Spring 2022 (https://www.colorado.edu/honors/spring-2022-honors-program-course-information/), Fall 2021 (https://www.colorado.edu/honors/fall-2021-honors-program-course-information/), Spring 2021 (https://www.colorado.edu/honors/spring-2021-honors-program-course-information/), Fall 2020 (https://www.colorado.edu/honors/fall-2020-honors-program-courses/) and Spring 2020 (https://www.colorado.edu/honors/spring-2020-honors-program-courses/).

## Learning Outcomes

The training in interdisciplinary and cross-divisional thinking central to the Certificate in Interdisciplinary Honors Studies will prepare students to learn about, ask questions about and make connections with topics and areas unknown to them when they are in the workforce and/or in graduate studies. Similar to students' training in interdisciplinarity, their coursework addressing diversity, privilege and social marginalization will prepare them for conversations and collaborations across difference in work and graduate studies and in their communities. The Arts & Sciences Honors Program is inherently interdisciplinary and coursework offered by the program spans the three divisions of the College of Arts & Sciences. Drawing on the program's strengths, the certificate will teach students how to think, engage and converse across disciplines, divisions and differences.

By the completion of the program, students will be able to:

- Become fluent in cross-disciplinary dialogue through core certificate courses and through elective courses distributed across at least 2 divisions (Arts Humanities, Social Sciences and Natural Sciences).
- Understand and engage with the challenges and advantages of interdisciplinary work in the introductory and capstone courses.
- Reflect on the internship experience from multiple disciplines and across divisions in the internship course.
- Develop a framework within which to understand interdisciplinary work, as well as communication across academic departments as well as across axes of social difference in the introductory and capstone courses, which will explicitly address interdisciplinarity and dialogue across social differences.

# Humanities

Humanities is an interdisciplinary program that allows students to combine different fields of study from all the disciplines of the humanities as well as from the social sciences (in particular, anthropology, ethnic studies, political science, psychology, sociology, women and gender studies) and beyond. This major especially encourages students to develop their interdisciplinary interests in fields of cultural and humanistic expression such as literature, art, music, film, philosophy, history, modern media, religion and contemporary critical practice and theory, and we encourage them to think outside of these fields as well.

The undergraduate degree in humanities emphasizes knowledge and awareness of:

- The ways cultures and traditions define both themselves and each other;
- The formal, rhetorical and ideological properties of cultural texts in a variety of forms and media (literature, history, philosophy, film, music, visual arts, architecture, dance, theatre, performance);
- The dynamic relationships between texts and their social and historical contexts;
- The genres and modes of texts and their production, transformation and reception; and
- The theoretical and ideological underpinnings and implications of one's own and others' interpretive approaches and assumptions.

In addition, students completing the degree in humanities are expected to acquire the ability and skills to:

- Analyze and interpret texts in a variety of forms and media;
- Articulate such analyses and interpretations at a sophisticated level in both written and oral forms;
- Discern similarities and differences among individual works, artistic media, historical periods and cultural traditions;
- Reason critically; and
- Explore the connections between contemporary issues and academic work.

**Course code for this program is HUMN.**

# Bachelor's Degree

- Humanities - Bachelor of Arts (BA) (p. 422)

# Minor

- Humanities - Minor (p. 424)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Burba, Audrey (https://experts.colorado.edu/display/fisid_158272/)
Teaching Assistant Professor; PhD, Emory University

Catlos, Brian Aivars (https://experts.colorado.edu/display/fisid_147829/)
Professor; PhD, University of Toronto

Cox, Jeffrey N. (https://experts.colorado.edu/display/fisid_113253/)
Distinguished Professor; PhD, University of Virginia

Ferris, David S. (https://experts.colorado.edu/display/fisid_116817/)
Professor; PhD, SUNY at Buffalo

Gerland, Oliver W. (https://experts.colorado.edu/display/fisid_101092/)
Associate Professor; PhD, Stanford University

Gilbert, Andrew
Teaching Assistant Professor; PhD, University of Colorado

Greaney, Patrick F. (https://experts.colorado.edu/display/fisid_122807/)
Professor; PhD, Johns Hopkins University

Ho, Jennifer (https://experts.colorado.edu/display/fisid_165744/)
Professor; PhD, Boston University

Krauel, Javier (https://experts.colorado.edu/display/fisid_143248/)
Associate Professor; PhD, Duke University

Murphy, Kieran Marcellin (https://experts.colorado.edu/display/fisid_152976/)
Associate Professor; PhD, University of California, Santa Barbara

Oddie, Graham (https://experts.colorado.edu/display/fisid_104741/)
Professor; PhD, University of London (England)

Peattie, Matthew
Associate Professor, Chair; PhD, Harvard University

Rabaka, Reiland (https://experts.colorado.edu/display/fisid_141463/)
Professor; PhD, Temple University

Rivera, John-Michael (https://experts.colorado.edu/display/fisid_118393/)
Professor; PhD, University of Texas at Austin

Silleras-Fernández, Núria (https://experts.colorado.edu/display/fisid_147213/)
Professor; PhD, Universitat Autònoma de Barcelona (Spain)

Wiese, Annjeanette Michelle (https://experts.colorado.edu/display/fisid_146485/)
Teaching Associate Professor, Associate Chair; PhD, University of Colorado Boulder

# Courses

**HUMN 1001 (3) Forms of Narrative: An Introduction to Humanities**
Introduces students to forms of narrative from different historical, geographical, and cultural contexts in different media in order to explore how narrative, as cognitive tool and form of representation, functions as a means of understanding human experience. Students learn to analyze and interpret narratives and improve critical thinking, the practice of close reading, and written and verbal communication. Serves to introduce students to the types of questions and methods of interpretation encountered in Humanities.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 1002 (3) Visualizing Culture: An Introduction to Humanities**
How do we see, what do we consider worth looking at, how does this shape culture? What do visual media do to/for us and how do we endow them with meaning? This class probes such questions using a range of visual media including visual art, film, music videos, and social media. With the help of theoretical, scholarly, and popular sources, students analyze examples of visual culture and articulate their responses to the issues raised.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 1003 (3) Conflicts in History: Civilization and Culture: An Introduction to Humanities**
Introduces students to concepts of culture, history, and civilization as sites of conflict across different historical times and geographical locations. Course materials address political and artistic questions that intersect across different ages through their different histories and guiding concepts. Students will learn to read and understand critical, historical, political, and artistic works. Emphasis will be placed on developing critical thinking, close reading, and the ability to articulate and develop issues in writing and verbally.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 1004 (3) Sound and Meaning**
This course examines how music creates meaning. Topics include: How ancient and modern writers conceive of the effects of music on its listeners; how the meanings of canonic texts are transformed in contemporary digital culture; how musical works are established though music writing and sound recording; and how music is used to voice identity. Musical examples are drawn primarily from historical repertories of western art music with comparative perspectives from more recent popular and recorded music.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 1110 (3) Introduction to Humanities: Literature 1**
Introduces students to works from the major Western literary periods (Classical, Medieval, Renaissance, Baroque) from the 8th c. BC to the early 17th c. AD comparatively, i.e., outside their national literary boundaries. Theorizes interdisciplinary, genre studies, periodization, comparativism, thematology, hermeneutics, criticism, etc. May be taken separately from HUMN 1120.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 1120 (3) Introduction to Humanities: Literature 2**
Introduces students to works from the major Western literary periods (Baroque, Enlightenment, Romanticism, Realism, Modernism) from the 17th- through the 20th-centuries comparatively, i.e., outside their national literary boundaries. Theorizes interdisciplinarity, genre studies, periodization, comparativism, thematology, hermeneutics, criticism.May be taken separately from HUMN 1110.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 1210 (3) Introduction to Humanities: Art and Music 1**
Examines the major artistic and musical works in the Western tradition from ancient Greece through the 16th century in their larger historical, interdisciplinary, and theoretical ("aesthetic") contexts. May be taken separately from HUMN 1220.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 1220 (3) Introduction to Humanities: Art and Music 2**
Examines the major artistic and musical works in the Western tradition from the 17th century to 21st-century post-modernism in their larger historical, interdisciplinary, and theoretical ("aesthetic") contexts. May be taken separately from HUMN 1210.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 1400 (3) Mediterranean Foundations**
Examines the pre-Modern Mediterranean as the foundational zone of Western Humanism and culture, beginning with Classical Antiquity and through to the dawn of Modernity. Through history, art, literature and thought, it studies the region's role as the crucible of Helleno-Persian culture, Roman society, of Judaism, Christianity and Islam, the intersection of Europe, Africa and Asia in the development of Modernity.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 1701 (3) Nature, Climate and Environment in German Culture**
Critically examines cultural products from German-speaking contexts that thematize climate and environment. Depictions of nature, climate and environment are examined in relationship to understandings of race, nation, sexuality, gender, labor, and rural versus urban spaces. Discussions span Romantic conceptions of nature and nation, to colonial resource extraction, to fascist understandings of home and nature, to contemporary political debates around contemporary Germany's environmental policies. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 1701
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 2000 (3) Methods and Approaches to the Humanities**
Provides a transition from the introductory courses to the upper-division courses. Introduces the various technical methods and topics encountered in the department's comparative, interdisciplinary upper-division courses, including cultural studies, rhetoric, translation, hermeneutics, word/image studies.
**Requisites:** Restricted to HUMN majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 2100 (3) Arts, Culture and Media**
Promotes a better understanding of fundamental aesthetic and cultural issues by exploring competing definitions of art and culture. Sharpens critical and analytical abilities by asking students to read and compare different theories about arts, culture, media, and identity, and then to apply and assess those theories in relation to a selection of visual and verbal texts from a range of cultural and linguistic traditions.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 2145 (3) African America in the Arts**
Introduces interrelationships in the arts of African Americans and the African American contribution to American culture as a whole.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Diversity-U.S. Perspective
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 2311 (3) Energy Cultures: Oil, Coal, and Atoms in Modern Literature and Film**
Explores the concept of energy and its influence in world culture from the 19th century to the present, paying particular attention to how writers and filmmakers from the United States, Russia, and elsewhere have responded to the accelerating production and consumption of fossil fuels and nuclear power. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 2311 and REES 2311
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 2601 (3) Kafka and the Kafkaesque**
Exposes the students to a wide selection of Kafka's literary output and aims to define the meaning of the Kafkaesque by looking not only for traces of Kafka's influence in the verbal and visual arts, but also for traces left in Kafka's own work by his precursors in the literary tradition.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 2601
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3092 (3) Studies in Humanities**
Students should check with the department for specific semester offerings.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3093 (3) Topics in Humanities**
Students should check with the department for specific semester offerings.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3104 (3) Film Criticism and Theory**
Surveys the range and function of film criticism, introduces major positions and concepts of film theory and focuses on students' abilities to write about film.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 3104
**Requisites:** Requires prerequisite course of FILM 1502 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3200 (3) Fictions of Illness: Modern Medicine and the Literary Imagination**
Examines the ways in which the rise of modern medicine fueled the literary imagination with a new focus, new patterns of perception and potent metaphors. Through a study of various works of fiction, critical theory and medical history, the course traces how medical discoveries and the increasing professionalization of medicine manifested itself in modern literature.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3210 (3) Narrative**
Explores the nature of narrative in literature, film, and the visual arts.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3211 (3) The Craft of Mystery**
Explores examples of and theories about the formation and growth of the genre of detective fiction, especially in the late 19th and early 20th centuries. Explores the social conditions of the times in which the texts were written and the possible resulting influences on style. Compares the texts and theories to examples from other genres and time periods.
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3212 (3) Shipwrecks, Mutinies, and Other Catastrophes at Sea**
Explores the theatrical analogy that frames our understanding of catastrophes at sea and their literary and visual representation, paying particular attention to issues of gender, race, and sexuality, which are intentionally banned from such representations, but turn out to be their secret focus.
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3240 (3) Tragedy**
Studies some of the great tragic works of art, music,and literature from the Greeks to the 20th century. Tragic theory is invoked as an aid to interpretation.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3280 (3) Social Justice and the Humanities**
Provides a historical foundation for the study of cultural and political movements that aim to remedy racial, gender, economic, and environmental inequalities in order to create more egalitarian societies. Examines depictions of struggles against inequality in the Spanish-speaking world, including slave revolts in nineteenth-century Cuba, anarchist revolutionary efforts during the Spanish Civil War in 1936-39, student protests in late 1960s Mexico, and the fight for environmental rights in contemporary Spain. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective

**HUMN 3290 (3) Foundations of Disability Studies**
Introduces students to the interdisciplinary field of disability studies by investigating key concepts in disability theory, disability history and culture, media representations of people with disabilities, and pertinent bioethical issues.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**HUMN 3310 (3) The Bible as Literature**
No single book has been as influential to the English-speaking world as the Bible. We¿ll read the Hebrew Bible and the New Testament for stories, poetry, and wisdom traditions. We¿ll approach the Bible as literature by analyzing its plots, characters, and meanings. Students study its textual history, how there came to be a ¿Bible,¿ and the many writers, conflicts, and cultures from which it emerged. We¿ll consider the Bible¿s powerful influence on ethics and philosophy. Formerly ENGL 3312.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 3310 and JWST 3310
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3321 (3) Political Thought in Ancient China**
Focuses on the political, religious, philosophical and literary aspects of ancient Chinese civilization (1500 B.C.-A.D. 200). Special attention is paid to foundational works that influenced later developments in Chinese culture. All readings are in English and taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** CHIN 3321
**Recommended:** Prerequisite CHIN 1012 or CHIN 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**HUMN 3341 (3) Literature and Popular Culture in Modern China**
Surveys 20th century Chinese literature and popular culture against the historical background of rebellion, revolution and reform. Emphasizes close and critical reading skills and an understanding of how aesthetic texts reflect and critically engage with historical and cultural experiences. Assignments include novels, essays, short stories, poems, plays, songs, films and scholarly articles. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** CHIN 3341
**Recommended:** Prerequisite CHIN 1012 or CHIN 1051.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**HUMN 3500 (3) Literatures of Consciousness**
Facilitates a complex and productive understanding of consciousness by analyzing and synthesizing interdisciplinary works (including literature, film and theoretical and scientific texts). This interdisciplinary approach enables students to think deeply about the following questions: what is consciousness? How do we think and perceive? What does it mean to be "neurotypical"? What does all of this have to do with who we are?
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3505 (3) The Enlightenment: Tolerance and Emancipation**
Examines Enlightenment notions of reason, humanity and social progress. Topics include 18th century views on government, science, education, religion, slavery and gender roles.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 3505
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3600 (3) Avatars: Studies in Contemporary Posthumanism**
Seeks to introduce students to the analysis of posthuman thought via the concept of the avatar within our digital cultures. Through an interdisciplinary approach to theory, art, and culture, students will become familiar with the discourse of both humanism and posthumanism as it relates to games, virtual spaces, and digital embodiments. Formerly offered as a special topics course.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3640 (3) Modernisms: Art and Theory from 1900 to 1960**
Offers an introduction to Modernism in various media, emphasizing in particular the historical development of the visual arts from German Expressionism and Cubism to Neo-Dada and Pop Art. Readings in literature will include Proust, Beckett, Blanchot and poets associated with various art movements. Theoretical readings range from Saussure and Freud to Adorno and Jameson. Recommend prerequisite: HUMN 2000.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3660 (3) The Postmodern**
Analyzes the cultural and critical practices as well as the thought that defines the postmodern period at the end of 20th century.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3666 (3) Critical Futures: Theorizing Climate Change**
This course takes an interdisciplinary approach to understanding environmental humanities and explores the insights that arts and humanities can provide in the face of climate change, environmental injustice, and our uncertain futures. By looking at diverse representations/theories about the Anthropocene, this course considers how we account for humans¿ relationship to nature and what the consequences of this are. It also discusses how art and fiction might harness individual and group will to sustain our world.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3702 (3) Dada and Surrealist Literature**
Surveys the major theoretical concepts and literary genres of the Dada and Surrealist movements. Topics include Dada performance and cabaret, the manifesto, montage, the ready made, the Surrealist novel, colonialism and the avant-garde, and literary and philosophical precursors to the avant-garde.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 3702
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3800 (3) Paris, Modernity, and the Avant-garde (1848-1914)**
Investigates the development of the concept of the 'avant-garde' in late-nineteenth and early twentieth-century Paris against a backdrop of political and social revolution. Analyzes the innovative nature of certain works of art, theater, photography, music and literature as well as the influence of the city. Probes and problematizes the concept of the artist as social outsider and cultural critic.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3801 (3) Muslims, Christians, Jews and the Mediterranean Origins of the West**
Provides a historical foundation for the study of western Modernity, including the Anglo-European and Islamic worlds. It focuses on the Mediterranean region in the long Middle Ages (650-1650), emphasizing the role of Christian, Muslim and Jewish peoples and cultures, in Europe, Africa and West Asia. The approach is interdisciplinary incorporating social, economic, cultural, literary and art history, combining lectures with discussions based around readings of contemporary documents and the analysis of contemporary artifacts.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 3801
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**HUMN 3802 (3) Politics and Culture in Berlin 1900-1939**
Examines early 20th century German culture, with emphasis on the Weimar Republic (1918-1933) in light of contemporaneous political discussions. The course presents modern art and literature (Expressionism, Dada, Brecht's epic theater) and architecture and design (Bauhaus, Werkbund) as well as political movements of women, sexual minorities, and Berlin's Jewish communities. Taught in English. Offered through CU Study Abroad Program.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 3802
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3811 (3) The World of the Shining Prince: The Tale of Genji and Heian Literature**
An exploration of the literary landscape of Classical Japan focusing on The Tale of Genji (early 11th century), a brilliantly provocative work of fiction sometimes called ¿the world¿s first novel.¿ Covers the extensive world drawn within Genji and provides context for understanding its origins and reception through readings of other important works of Heian-era (794-1185) literature. Taught in English; no prior knowledge of Japanese language, culture, or history is necessary or expected.
**Equivalent - Duplicate Degree Credit Not Granted:** JPNS 3811
**Recommended:** Prerequisite JPNS 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**HUMN 3841 (3) Transforming Worlds: Japanese Literature in Modernity**
Explores works of modern Japanese literature from the late 1800s to 1970s, placing novels, short stories, and poetry in their historical and cultural contexts. Topics covered include literary responses to Japan¿s modernisation and encounters with the West, the individual in society, mass culture and popular literature, the rise of fascism and colonialism, and visual media, including film. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** JPNS 3841
**Recommended:** Prerequisite JPNS 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**HUMN 3850 (3) The Mediterranean: Religion Before Modernity**
Offers an innovative approach to the multifaceted history of Christian-Muslim-Jewish interaction in the Mediterranean. It eschews established paradigms (e.g., Europe, Islamic world) that distort our understanding of these and pushes students to reconsider the accepted paradigms of Western history. Students will reappraise assumptions regarding the nature of ethnic, religious, national and cultural identity, and their role in human history.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 3850
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**HUMN 3860 (3) Politics and the Arts in the Information Age**
Examines the political aspects of the art and literature of the information age, with a focus on conceptual practices since 1965. The course investigates political theories of art along side sculpture, performance, installation, poetry, and graphic design.
**Recommended:** Requisite HUMN 2000 or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3930 (1-6) Humanities Internship**
Students gain academic credit and professional experience working in fields such as museums, galleries, arts administration, publishing, nonprofits, and cultural organizations. They work 3-18 hours per week under the guidance of a professional supervisor and meet regularly with a faculty advisor, who oversees the academic requirements, including reading and writing assignments. An interview with the faculty advisor is required.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**HUMN 3935 (1-3) Humanities Internship: Literature and Social Violence**
See HUMN 4835.
**Requisites:** Requires enrollment in corequisite course of HUMN 4835.

**HUMN 4000 (3) The Question of Romanticism**
Interdisciplinary study of literature, art, and music from 1780 to 1830 in France, England, and Germany.
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4004 (3) Topics in Film Theory**
Provides topic-centered analyses of controversial areas in film theory. Students read extensive materials in the topic area, analyze and summarize arguments as presented in the literature, write "position" papers and make oral presentations in which they elaborate their own arguments about specific assigned topic, establishing critical dialogue with the primary materials.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4004 and ARTF 5004
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of CINE 3051 (minimum grade D-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Cinema Studies or Humanities (HUMN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4006 (3) Introduction to Game Studies**
Seeks to introduce students to the analysis, history, cultural impact, and critique of games both digital and analogue - the largest and fastest growing Media throughout the world. Through an interdisciplinary approach to theory, art, and culture, students will become familiar with the discourse of contemporary game studies and its cultural manifestations. Formerly offered as a special topics course.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4010 (3) Hitchcock and Freud**
Applies Freudian psychoanalysis to the films of Alfred Hitchcock. Students will familiarize themselves with the Freudian methodology by reading a number of books and essays and then apply both Freud's general ideas as well as specific texts to particular aspects, both formal and contentual, of his films. Particular attention will be given to the important field of "feminism and psychoanalysis" as it relates to the study of the role of women in Hitchcock's films.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4011 (3) The Criminal-Hero**
Studies various theories of literary transgression by Aristotle, Nietzsche, Freud, Bataille and others to understand the many works, beginning with Genesis and the Iliad and including contemporary works such as Norman Mailer's The Executioners Song and the films of Herzog (Aguirre, Nosferatu) and Scorsese (Taxi Driver, Cape Fear) which feature this paradoxical figure.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4020 (3) Reading, Chance, and Guessing**
Considers the method of the humanities as opposed to those of the natural and social sciences, especially in view of their respective ability or claim to predict the future and to master chance.
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4030 (3) The Art of Travel**
Examines the art of travel: not where to go and what to do, but rather philosophical concepts about why people travel. Areas of discussion will include exploration, discovery, escape, pilgrimage, the grand tour, expatriotism, exile, nomadism, armchair travel, and the sense of home. Materials will include books by travel writers, novels, films, essays, short stories, art, music, and historical documents.
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4050 (3) Representations of People with Disabilities**
Examines the representation of people with disabilities in canonical and contemporary literature and drama, and introduces students to disability theory and the history of people with disabilities.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**HUMN 4060 (3) Modern Critical Theory**
Explores, through guided discussions, the concept of theory itself and how a theory is constructed. Emphasizes the close reading of theory in order to learn to analyze critically, considering theory as something to be thought about rather than simply applied.
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4070 (3) Making Meaning: Language, Myths, Dreams**
Introduces students to theories concerned with signification, communication, and meaning. The course will focus on the legacy of Ferdinand de Saussure¿s study of the sign and examine how Saussure¿s insights have been put to work in a variety of intellectual contexts from literary analysis to cultural anthropology, and psychoanalysis. Formerly offered as a special topics course.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**HUMN 4082 (3) 19th Century Art and Literature**
Interdisciplinary study of English fiction and poetry together with related movements in visual arts.
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4092 (3) Advanced Studies in the Humanities**
Students should check with the department for specific semester offerings.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4093 (3) Advanced Topics in the Humanities**
Students should check with the department for specific semester offerings.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4100 (3) Writing the World in Traditional China**
Examines the history and implications of the central role played by writing in pre-modern China, especially with regard to traditional constructions of the world, including relations with aesthetics, the non-human, and the spiritual. Key works of Chinese literature and thought from different periods are studied, with the aim of determining a particular type of Chinese humanism. All readings in English.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**HUMN 4110 (3) Greek and Roman Epic**
Students read in English translation the major epics of Greco-Roman antiquity such as the Iliad, Odyssey, Argonautica, Aeneid, and Metamorphoses. Topics discussed may include the nature of classical epic, its relation to the novel, and its legacy. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4110 and CLAS 5110
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4111 (3) Modern and Contemporary Culture**
Examines the legacy of the historical avant-garde (1910-1930) in postwar and contemporary culture: 1945 to the present. We will study the construction of a "neo-avant-garde" in diverse fields (art, film, philosophy) as well as the methodology of "social art history" which, like the artistic neo-avant-garde, critically analyzes the relation between aesthetic production and global capitalism.
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4120 (3) Greek and Roman Tragedy**
Intensive study of selected tragedies of Aeschylus, Sophocles, Euripides and Seneca in English translation. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4120 and CLAS 5120
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4130 (3) Greek and Roman Comedy**
Studies Aristophanes, Plautus, and Terence in English translation. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4130 and CLAS 5130
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4131 (3) The Greek and Roman Novel**
Studies a number of complete Greek and Roman novels from Classical Antiquity and their predecessors and contemporary neighbors in the genres of Greek prose fiction. Ancient texts in English translation.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4140 and CLAS 5140
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4135 (3) Art and Psychoanalysis**
Explores psychoanalytic theory as it relates to our understanding of literature, film and other arts. After becoming familiar with some essential Freudian notions (repression, narcissism, ego/libido, dreamwork, etc.), students apply these ideas to works by several artists (e.g., Flaubert, James, Kafka, Hoffmann and Hitchcock).
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4140 (3) What the Hell?: Dante¿s Divine Comedy and the Meaning of Life**
Focuses on close reading of Dante's poetry with emphasis on the intellectual, religious, political, and scientific background of the medieval world. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 4140 ITAL 4145 or ITAL 4147
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4150 (3) Boccaccio's Decameron: Tales of Sex and Death in the Middle Ages**
Studies Boccaccio's masterpiece, the Decameron, as emblematic of the post-Black Plague era in the late Middle Ages. Focuses on the art of storytelling through gendered perspectives to portray the complexity of the Middle Ages. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 4150
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**HUMN 4155 (3) Philosophy, Art, and the Sublime**
Explores philosophies of art, theories of the sublime, and the relation between art and morality through philosophy, literature, and the visual arts. Includes works by Plato, Longinus, Burke, Rousseau, Kant, Mary Shelley, Melville, Friedrich, Turner, and Pollock.
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4170 (3) Fiction and Reality: Literature, Science, and Culture**
Explores the significance of how one defines "fiction" and "reality". Begins by defining the core concepts and compares them with related terms. Lectures and discussions analyze the implications of these concepts from the perspective of a variety of disciplines and in the context of diverse issues in order to develop a critical awareness of them.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4502 (3) Nietzsche: Literature and Values**
Emphasis is placed on Nietzsche's major writings spanning the years 1872-1888, with particular attention to the critique of Western values. A systematic exploration of doctrines, concepts and ideas leading to the values of creativity.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 4502
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4504 (3) Goethe's Faust**
Systematic study of the Faust motif in Western literature, with major emphasis on Faust I and II by Goethe and Thomas Mann's Doctor Faustus.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 4504 and GRMN 5504
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4552 (3) The Harlem Renaissance: Fr Black Wmn's Club Mvmnt to Hip Hop**
Offers an interdisciplinary and intersectional overview of the origins and evolution of the Harlem Renaissance. Explores classic texts, music and works of art emerging from the Harlem Renaissance and related events and movements of its epoch: the Black Women's Club Movement, New Negro Movement, Pan-African Movement, Lost Generation, Jazz Age, World War I and World War II.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4552 and ETHN 5552
**Requisites:** Requires prerequisite course of ETHN 1022 or ETHN 2001 or ETHN 3212 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**HUMN 4555 (3) Interpreting Art**
Introduces various methods of interpretation (New Criticism; Reader Response; structuralism, post-structuralism, psychoanalysis, art history, etc.) with which to examine how one determines the meaning of the work of art. Methodologies are studied in close conjunction with particular poems, paintings, stories and films.
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4650 (3) Religion, Power, Modernity**
Examines the representation of religion in relationship to the claims made by modern narratives of power in fables, literature, graphic novels, visual materials and critical writings.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4720 (3) Architecture and the Feminine: Women on Space and Creativity**
Examines women¿s depictions of space, confinement, and liberation in literature, art, and film. Women¿s artistic productions have sought to conceptualize, expose, and subvert the ways that gender and power relations are inscribed into the spaces they inhabit. Students will trace the history of these visions of spaces (physical, geographical, psychological, imagined) and explore their relationship to subjectivity, power, and creativity.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4730 (3) Italian Feminisms: Culture, Theory, and Narratives of Difference**
Studies Italian women writers, artists and filmmakers. Literary and visual texts are analyzed in dialogue with readings of leading Italian gender theorists. Italian history and culture is reread by following the development of a discourse about women. Taught in English; readings in Italian for Italian majors.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 4730
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**HUMN 4811 (3) 19th Century Russian Literature**
Surveys background of Russian literature from 1800 to 1900. Russian writers and literary problems in the 19th century emphasizing major authors: Pushkin, Lermontov, Gogol, Dostoevsky, Turgenev, Tolstoy, and Chekhov.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4821 (3) 20th-Century Russian Literature and Art**
Interdisciplinary course emphasizing the influence of literature and art in 20th century Russian literature. Follows the changing cultural landscape from the time when Russia was in the vanguard of modern European literature to the period of Stalinism. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4821 and REES 5821
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4835 (3) Literature and Social Violence**
Provides a theoretical understanding of heightened awareness arising from literary and sociological investigations of contemporary sources of social violence (gang culture, racism, domestic violence), combined with the concrete knowledge offered by an internship in a social service agency. Optional internship credit is available.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4840 (1-3) Independent Study**
May be repeated for a maximum of 6 total credit hours.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**HUMN 4845 (3) Reading Culture: The Meanings We Make**
Analyzes a range of literary and cultural texts through the lens of critical theory in order to come to more understanding of how we are making meaning, how those meanings make us and how we might use that awareness to open new fields of possibility, both in our readings of texts and in our reactions to cultural contexts and conventions.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4950 (1-6) Honors Thesis**
Supervised project on a topic of the student's own choosing. It should demonstrate ability in interdisciplinary (such as literature and art, art and music, film and literature, literature and theory), extensive research, critical thinking, and excellent writing skills. The thesis is submitted to the Honors Program of the College of Arts and Sciences and is orally defended.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Humanities (HUMN) majors only.

# Humanities - Bachelor of Arts (BA)

The humanities major is an interdisciplinary program designed for students who wish to concentrate in more than one field or discipline. The major leads to a Bachelor of Arts (BA) degree and offers considerable flexibility, but students should choose courses in consultation with their primary advisor.

In addition to courses taken within Humanities (HUMN), an outside area of study is required and can be fulfilled by choosing one of the following: a major, minor or certificate in another discipline (additional courses may be necessary to meet the required 18 hours); 12 hours in one discipline plus 6 hours in a different discipline; 18 hours chosen according to a common theme (to be determined in consultation with and approved by the Director of Undergraduate Studies).

# Requirements

## Required Courses and Credits

A minimum of 54 credit hours is required for the major, including 21 upper-division HUMN credit hours. All required HUMN courses and all Outside Area of Study courses must be passed with a C- or better and cannot be taken pass/fail. No more than 45 credits in HUMN may be applied to overall graduation requirements. Students must have a GPA of at least 2.000 in the major in order to graduate.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| *Any three of the following introductory courses:* | | *9* |
| HUMN 1001 | Forms of Narrative: An Introduction to Humanities | |
| HUMN 1002 | Visualizing Culture: An Introduction to Humanities | |
| HUMN 1003 | Conflicts in History: Civilization and Culture: An Introduction to Humanities | |
| HUMN 1004 | Sound and Meaning | |
| HUMN 2000 | Methods and Approaches to the Humanities | 3 |
| One lower- or upper-division HUMN course | | 3 |
| Upper-division HUMN courses | | 21 |
| **Outside Area of Study** | | **18** |
| Choose one of the following courses of study outside of HUMN: | | |
| A major, minor or certificate another discipline (additional courses may be necessary to meet the required number of credit hours if the minor or certificate requires fewer than 18 credit hours.) | | |
| 12 credit hours in one discipline plus 6 credit hours in a different discipline | | |

| | |
|---|---|
| 18 credit hours chosen according to a common theme (to be determined in consultation with and approved by the Director of Undergraduate Studies) | |
| **Total Credit Hours** | **54** |

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. Because the humanities major is unique in requiring courses from a number of different departments in addition to its own courses, it is important that students wishing to graduate in four years declare the major early and meet regularly with a major advisor. The concept of "adequate progress" as it is used here refers only to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in humanities, students should meet the following requirements:

- Complete the lower-division courses, including three of the following four 1000-level introductory courses (HUMN 1001, HUMN 1002, HUMN 1003, HUMN 1004) and HUMN 2000 by the end of the fourth semester.
- Complete at least two courses in the outside area of study by the end of the fourth semester.
- Complete 15 of the remaining credit hours by the end of the sixth semester—at least three of these must be upper-division humanities courses.
- Complete all remaining required courses by the end of the eighth semester.

# Recommended Four-Year Plan of Study

Through the required HUMN coursework for the major, students will fulfill all 12 credits of the Arts & Humanities area of the Gen Ed Distribution Requirement.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| one 1000-level HUMN course | | 3 |
| one 1000-level HUMN course | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with lab) | | 4 |
| Gen. Ed. Skills course (example: lower-division Written Communication) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| one 1000-level HUMN course | | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 4 |
| Elective | | 3 |
| | **Credit Hours** | **13** |
| **Year Two** | | |
| **Fall Semester** | | |
| HUMN 2000 | Methods and Approaches to the Humanities | 3 |
| Outside Area of Study | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 4 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| HUMN upper-division course | | 3 |
| Outside Area of Study | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| HUMN upper-division course | | 3 |
| Outside Area of Study | | 3 |
| Gen. Ed. Skills course (example: upper-division Written Communication) | | 3 |
| Upper-division Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| HUMN upper-division course | | 3 |
| Outside Area of Study (Upper Division) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-division Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| HUMN upper-division course | | 3 |
| HUMN upper-division course | | 3 |
| Outside Area of Study (Upper Division) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| HUMN upper-division course | | 3 |
| HUMN upper-division course | | 3 |
| Outside Area of Study (Upper Division) | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **120** |

# Learning Outcomes

Students with a major in Humanities will be able to:

- Understand, interpret and compare works of human expression and cultural practice (visual arts, literature, film, music, etc.) in a variety of historical and geographical contexts.
- Understand, interpret and apply critical theories about culture and cultural products.

- Demonstrate and refine important skills in critical thinking and close analysis.
- Evaluate, apply and articulate complex ideas and interpretations through both written and verbal communication.
- Demonstrate creative and flexible thinking and problem solving skills, formulate original interpretations and integrate different interpretative approaches and disciplines into a focused program of study.

# Humanities - Minor

The depth of critical analysis as well as the breadth of knowledge covered by the Humanities Program's courses can be a great benefit to students pursuing a variety of other majors in the College of Arts and Sciences, in the Professional Schools and particularly students pursuing a pre-medical or pre-law school program of study. This minor provides students with the kinds of skills and interests that enhance employment opportunities as well as applications to graduate school.

Humanities Program courses are designed to train students to understand and analyze critical, historical, cultural, social and political issues from different perspectives and to teach students to draw independent conclusions. Our courses also help develop excellent written and verbal communication skills—recognized by the business and scientific worlds as indicators of future innovators as well as indicators of high quality practitioners and researchers across many different fields (media, communications, arts, creative design, marketing, etc.).

# Requirements

The minor in humanities offers students the opportunity to take a range of interdisciplinary courses offered by the humanities program faculty. Total: 18 credit hours (at least 12 of which must be upper-division). All coursework applied to the minor must be completed with a grade of C- or better. No pass/fail work may be applied. The GPA for all minor coursework must equal 2.00 or higher. Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor.

## Required Courses and Credits

Students must take 18 credit hours in humanities courses (HUMN). Of these 18 credit hours, 12 must be upper-division.

There are no specific course requirements for a minor in humanities. Any six 3-credit-hour humanities (HUMN) courses will do, as long as at least four are upper division. However, for a well-rounded course of study, the humanities program recommends the courses below.

| Code | Title | Credit Hours |
|---|---|---|
| **Recommended Courses** | | |
| *Introductory Courses* | | |
| Choose one of the following: | | 3 |
| HUMN 1001 | Forms of Narrative: An Introduction to Humanities | |
| HUMN 1002 | Visualizing Culture: An Introduction to Humanities | |
| HUMN 1003 | Conflicts in History: Civilization and Culture: An Introduction to Humanities | |
| Consider the following course to prepare for upper-division courses: | | 3 |
| HUMN 2000 | Methods and Approaches to the Humanities | |
| *Additional Coursework* | | |
| Choose any four 3-credit-hour upper-division HUMN courses | | 12 |

# Integrative Physiology

Physiology is the branch of biology concerned with the function in living organisms. The department's academic framework is built on an understanding of how humans and animals operate at the genetic, cellular, organ and systemic levels. Our multidisciplinary curriculum requires that students enroll in foundational courses covering anatomy, mathematics, physics, physiology and statistics. With this fundamental knowledge, students pursue additional coursework in biomechanics, cell physiology, endocrinology, immunology, exercise physiology, neurophysiology and sleep physiology.

Graduates of our integrative physiology program are expected to:

- Demonstrate a mastery of core anatomical and physiological concepts.
- Apply knowledge of the human body to novel, real-world contexts.
- Extract meaning from visual representations of data, such as graphs, tables and images.
- Synthesize ideas and concepts from multiple sources to develop a more comprehensive understanding of integrative physiology.
- Apply the scientific method to address questions related to integrative physiology.
- Demonstrate effective communication and collaboration skills.

These objectives are accomplished through a curriculum that includes both required courses and elective experiences. The required courses form the foundational knowledge base, while the elective courses offer opportunities to delve into specific topics. Elective options include seminars, internships, independent study, teaching opportunities, Latin honors and research projects covering a broad spectrum of physiological disciplines.

For more information, visit the Integrative Physiology website (http://www.colorado.edu/iphy/).

**Course code for this program is IPHY**.

# Bachelor's Degree

- Integrative Physiology - Bachelor of Science (BA) (p. 431)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Angiolillo, Albert
Assistant Teaching Professor; MS, University of Colorado Boulder

Bekoff, Anne (https://experts.colorado.edu/display/fisid_100613/)
Professor Emeritus; PhD, Washington University

Boyko, Marie (https://experts.colorado.edu/display/fisid_100073/)
Senior Instructor Emeritus; MA, University of Colorado Boulder

Broussard, Josiane
Associate Professor Adjunct

Brunt, Vienna E (https://experts.colorado.edu/display/fisid_158297/)
Assistant Professor Adjunct; PhD, University of Oregon

Bustamante, Heidi Margarita (https://experts.colorado.edu/display/fisid_146491/)
Associate Teaching Professor; MS, University of Colorado Boulder

Byrnes, William (https://experts.colorado.edu/display/fisid_100643/)
Associate Professor Emeritus; PhD, University of Wisconsin–Madison

Carey, Cynthia
Professor Emerita

Casagrand, Janet L. (https://experts.colorado.edu/display/fisid_100934/)
Associate Teaching Professor; PhD, Case Western Reserve University

Chonchol, Michel
Professor Adjunct; MD, Universidad Central de Venezuela, Caracas

Clayton, S. Zachary
Assistant Professor Adjunct

Depner, Christopher
Assistant Professor Adjunct; PhD, Oregon State University

DeSouza, Christopher A. (https://experts.colorado.edu/display/fisid_107460/)
Distinguished Professor; PhD, University of Maryland, College Park

Eaton, Robert
Professor Emeritus

Ehringer, Marissa A. (https://experts.colorado.edu/display/fisid_126595/)
Professor, Chair; PhD, University of Colorado Denver

Enoka, Roger M. (https://experts.colorado.edu/display/fisid_110122/)
Professor; PhD, University of Washington

Fleshner, Monika R. (https://experts.colorado.edu/display/fisid_103304/)
Professor; PhD, University of Colorado Boulder

Floriano, Maureen (https://experts.colorado.edu/display/fisid_169506/)
Assistant Teaching Professor; PhD, Case Western Reserve University

Foley, Teresa E. (https://experts.colorado.edu/display/fisid_147351/)
Teaching Professor of Distinction; PhD, University of Colorado Boulder

Fowler, John S.
Professor Emeritus

Gleeson, Todd T. (https://experts.colorado.edu/display/fisid_105480/)
Professor Emeritus; PhD, University of California, Irvine

Grabowski, Alena Marie (https://experts.colorado.edu/display/fisid_149727/)
Associate Professor; PhD, University of Colorado Boulder

Harsh, John R. (https://experts.colorado.edu/display/fisid_155406/)
Professor Adjunct

Heisler, Ruth E. (https://experts.colorado.edu/display/fisid_103195/)
Teaching Professor of Distinction; MA, University of Colorado Boulder

Hobbs, Steven L. (https://experts.colorado.edu/display/fisid_143724/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Hoeffer, Charles Albert (https://experts.colorado.edu/display/fisid_153384/)
Associate Professor; PhD, University of Arizona

Johnson, Thomas E. (https://experts.colorado.edu/display/fisid_104242/)
Professor Emeritus; PhD, University of Washington

Kim, Sewan (https://experts.colorado.edu/display/fisid_174402/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Kram, Rodger (https://experts.colorado.edu/display/fisid_118476/)
Associate Professor Emeritus; Ph.D. , Harvard University

Link, Christopher D. (https://experts.colorado.edu/display/fisid_109073/)
Associate Professor; PhD, University of Massachusetts at Amherst

Lowry, Christopher (https://experts.colorado.edu/display/fisid_143371/)
Professor; PhD, Oregon State University

Lynch, G. Robert
Professor Emeritus

Maldonado, Tammy A. (https://experts.colorado.edu/individual/fisid_104105/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Mazzeo, Robert (https://experts.colorado.edu/display/fisid_101031/)
Associate Professor Emeritus; PhD, University of California, Berkeley

McQueen, Matthew B. (https://experts.colorado.edu/display/fisid_143785/)
Professor Adjoint; DSc, Harvard University

Moore, Russell (https://experts.colorado.edu/display/fisid_105756/)
Professor; PhD, Washington State University

Norris, David O.
Professor Emeritus

Nowak, Kristen
Associate Professor Adjoint

Olm, Matthew R. (https://experts.colorado.edu/display/fisid_174400/)
Assistant Professor; PhD, University of California, Berkeley

Opp, Mark R. (https://experts.colorado.edu/display/fisid_158898/)
Professor; PhD, Washington State University

Robichaux, Waldean
Professor Emeritus

Rossman, J. Matthew (https://experts.colorado.edu/display/fisid_156619/)
Assistant Research Professor; PhD, University of Utah

Rowe, K. Rachel (https://experts.colorado.edu/display/fisid_168365/)
Assistant Professor; PhD, University of Kentucky

Saul, Leif J. (https://experts.colorado.edu/display/fisid_116130/)
Associate Teaching Professor; PhD, University of California, Berkeley

Schaetzel, Amanda E. (https://experts.colorado.edu/display/fisid_154385/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Seals, Douglas R. (https://experts.colorado.edu/display/fisid_103375/)
Distinguished Professor; PhD, University of Wisconsin–Madison

Shearston, Jenni
Assistant Professor; PhD, Oregon State University

Sherwood, David
Associate Professor Emeritus

Shi, Jia (https://experts.colorado.edu/display/fisid_143673/)
Associate Teaching Professor; PhD, Boston University

Stitzel, Jerry A. (https://experts.colorado.edu/display/fisid_102954/)
Professor; PhD, Johns Hopkins University

Stob, Nicole R. (https://experts.colorado.edu/individual/fisid_134529/)
Assistant Teaching Professor; PhD, Colorado State University

Tan, Andrew Q. (https://experts.colorado.edu/display/fisid_167426/)
Assistant Teaching Professor; PhD, Northwestern University

Tsai, Pei-San (https://experts.colorado.edu/display/fisid_115292/)
Professor; PhD, University of California, Berkeley

Wright Jr., Kenneth P. (https://experts.colorado.edu/display/fisid_125586/)
Distinguished Professor; PhD, Bowling Green State University

# Courses

**IPHY 1020 (1) Introduction to Integrative Physiology**
Introduces students to Integrative Physiology. Provides an overview of the major and how it differs from other biology programs; how to get involved in clubs, research, and/or internship opportunities; strategies for succeeding in IPHY courses; and career options. This is a first-year colloquium course specifically designed for freshman and other students exploring their educational and career opportunities.

**IPHY 1030 (1-2) Introduction to the Health Professions**
Introduces students to careers in healthcare. This exploratory course is designed to expose students to the wide spectrum of healthcare occupations available and the knowledge of basic requirements and personal attributes needed to enter such career fields. Students will discover potential careers that match their skills and interests. Other topics include locations and areas healthcare professionals practice, including the lesser-known areas, as well as cultural and economic factors impacting health equity and access. This course is designed for first-year and second-year students.

**IPHY 1040 (1) Medical Professional Speaker Series**
Fall semester only, meets one time per week. For students enrolled in Health Professions Residential Academic Program (HPRAP). Introduction to careers by working professionals from a variety of medical fields.
**Grading Basis:** Pass/Fail

**IPHY 1111 (2) Analysis of Human Movement with Smart-Phone Technology**
Learn how to measure and analyze human movement using a smart-phone application. After being provided with some background information on human physiology, students will learn how to acquire, process, and analyze signals detected by the app. Students will be required to participate in a group project that they present in poster format to their peers.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab

**IPHY 1131 (2) Using model organisms to study human disease: hands-on research**
Provides a hands-on laboratory research experience, including undertaking science scholarship, designing and performing experiments, and analysis of quantitative data. Students will also be exposed to basic concepts in genetics and molecular biology, as well as the rationale for current experimental approaches for understanding human disease.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 1181 (2) Biological Probiotic/Drug Discovery Through Hands-on Screens**
Provides introduction to research and laboratory experience. Students will work in teams to screen novel mycobacterial strains for use as probiotics or immunoregulatory/anti-inflammatory drugs using THP-1 cells, a human monocytic cell line. Topics covered include the hygiene or "Old Friends" hypothesis, the human microbiome, approaches to screening for new probiotics of therapeutics and statistical analysis of the data.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 1181
**Grading Basis:** Letter Grade

**IPHY 1211 (2)**
**Using Sensor Technology to Study the Effects of Light on Human Health**
Introduces you the basics of photobiology, measurement of light (including a discussion of humancentric vs. radiometric units for quantifying light exposure), and light effects on human physiology and longterm health. You will also be taught how to program light sensors, extract raw data, process, analyze and visualize it (incl. basic statistics in R).
**Grading Basis:** Letter Grade

**IPHY 1600 (3) Basic Human Anatomy and Physiology For Non-Majors**
Focuses on basic knowledge of human body structures and functions. Topics include an orientation to the human body, basic chemistry and cell structure, the integumentary, skeletal, muscular, nervous, endocrine, cardiovascular, lymphatic, immune, respiratory, digestive, urinary, and reproductive systems. Integrative Physiology (IPHY) majors should take IPHY 3410 and 3430 to fulfill the anatomy and physiology degree requirements.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 1950 (3) Introduction to Scientific Writing in Integrative Physiology**
Gives students practical tools that they will need as majors in Integrative Physiology or other sciences: skills in finding, reading, and using professional scientific publications; understanding of the formats required by various scientific documents; practice in writing about science for different purposes and audiences; and tools for analyzing and developing their own writing processes.
**Requisites:** Restricted to students with 0-86 credits (Freshmen, Sophomore or Juniors) only.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Lower
MAPS Course: English

**IPHY 2010 (1-3) Seminar in Integrative Physiology**
Introduces a small group of lower-division students to current research topics in integrative physiology. Emphasizes relevant applications to real-world situations.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 2030 (2) Preparing for a Career in the Health Professions**
This course is designed to help students learn the basic requirements and personal attributes needed to enter the healthcare professions, while building the primary elements of their application to health professional schools. Students will explore the ways in which they can gain shadowing, volunteering, and other clinical experiences that both fit their career path and reflect their personal goals and values. Students will also spend time working on one of the biggest components of their application - their personal statement. This course is specifically designed for sophomores, juniors, and seniors who are new to navigating admissions processes.
**Recommended:** Prerequisite IPHY 1030.

**IPHY 2400 (2) Introduction to Medical Terminology for Future Health Professionals**
Introduces medical terminology used within the health professions. Word roots, prefixes and suffixes used in medical records for major body systems will be examined and explained. The structure and functions of the major systems will be defined and described.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 2420 (3) Introduction to Nutrition**
Focuses on the basic anatomy, physiology, and chemistry of nutrition. Topics include weight management, the role of diet and lifestyle in disease prevention, specific nutrient deficiencies and toxicities, nutrition standards and guidelines, sports nutrition recommendations, agricultural practices, and food policy issues.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 3400
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 2692 (3) Foundations in Public Health**
Get a comprehensive overview of public health as well as an in-depth introduction to specific public health-related topics. Beginning with a historical overview, students will explore major public health concepts such as the basic principles of epidemiology, the biomedical basis of disease, social and behavioral determinants of health, and systems thinking. Learn about the concepts of measuring and evaluating the health of populations, principles of communicable and non-communicable diseases, environmental and occupational health, the economics of health, and the role of public health workers in society.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 2692 and PBHL 2692
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**IPHY 2910 (1-6) Practicum in Integrative Physiology**
Offers lower-division students practical experience in laboratory, clinical, or field settings with direct supervision. Students can earn 1 credit for every 45 hours of intern work.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.

**IPHY 3010 (1-2) Teaching in Integrative Physiology**
Provides an opportunity for students to assist in specific lecture, recitation, or laboratory sections under direct faculty supervision. Students can earn 1 credit for 30-49 hours of class contact time or 2 credits for 50+ hours.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite Students must have earned B- or higher in the course they are assisting.

**IPHY 3020 (1) Next Steps: Preparing for Life After Graduation**
Helps upper-division students prepare for what comes after graduation. Topics include exploring careers; how to write a resume or CV; interviewing tips; how to build your portfolio; asking for letters of recommendations. This course is specifically designed for juniors starting to prepare for the next stage post-graduation.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 3020 and MCDB 3020
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Pass/Fail

**IPHY 3280 (4) Intro to Data Science and Biostatistics**
Builds a foundation for modern data analysis and experimental design in the context of human physiology, health and disease. An intuitive understanding of probability, statistical methods, test outcomes and data relationships are emphasized over rigorous mathematical proofs. Foundational analytical skills using R and R Studio are developed using real and simulated data.
**Additional Information:** Arts Sci Gen Ed: Quantitative Reasoning Math

**IPHY 3410 (3) Human Anatomy**
Explores the cells, tissues, and organs that compose the different anatomical systems including integumentary, skeletal, muscular, digestive, respiratory, cardiovascular, lymphatic, nervous, urinary and reproductive. All registration restrictions will be strictly enforced by the department.
**Requisites:** Requires prerequisite 1-semester biology lecture of EBIO 1210 or MCDB 1150 or CHEN 2810 (minimum grade C-).
**Recommended:** Prerequisite EBIO 1220.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 3415 (2) Human Anatomy Laboratory**
Introduces structures of the human anatomical systems using human cadavers and animal tissue. This laboratory is meant to complement IPHY 3410. All registration restrictions will be strictly enforced by the department.
**Requisites:** Requires prerequisite or corequisite of IPHY 3410 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 3430 (4) Human Physiology**
Introduces the physiology of the endocrine, nervous, muscular, cardiovascular, respiratory, urinary, digestive, reproductive and immune systems. Each system will be integrated into the larger contexts of homeostasis and adaptation during pathology and challenges. Students must enroll in lecture and recitation sections. All registration restrictions will be strictly enforced by the department. Students can be co-enrolled in CHEM 1133/1134 or IPHY 3435.
**Requisites:** Requires prerequisite courses of IPHY 3410 and prerequisite or corequisite of CHEM 1133 and 1134 (all minimum grade C-).
**Recommended:** Prerequisite IPHY 3415.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 3435 (2) Physiology Lab**
Introduces laboratory experience in selected aspects of human physiology with a focus on applying the scientific method in experimentation. This laboratory is meant to complement IPHY 3430. Students should take IPHY 3435 or IPHY 3437 to fulfill degree requirements. All registration restrictions will be strictly enforced by the department.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 3437
**Requisites:** Requires prerequisite course of IPHY 3280 or EBIO 1010 or MATH 2510 or PSYC 2111 or SOCY 2061, and prerequisite or corequisite course of IPHY 3430 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 3437 (2) Virtual Human Physiology Laboratory**
Introduces online laboratory experiences for select aspects of human physiology using laboratory simulations. This online laboratory is meant to complement IPHY 3430. As an online course, this lab may not fulfill prerequisites for post-baccalaureate, graduate, or other allied health programs. Please consult with your Biology advisor before enrollment. Students should take IPHY 3435 or IPHY 3437 to fulfill degree requirements. All registration restrictions will be strictly enforced by the department.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 3435
**Requisites:** Prerequisite or corequisite of IPHY 3430 and prerequisite statistics course of IPHY 3280 or EBIO 1010 or MATH 2510 or PSYC 2111 or SOCY 2061 (all minimum grade C-). All registration restrictions will strictly enforced by the department.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 3440 (3) Clinical Nutrition**
Exploration of clinical nutrition concepts from a health care provider perspective. Examines how and why diseases develop and what nutritional therapy and intervention is appropriate for disease resolution. All registration restrictions will be strictly enforced by the department.
**Requisites:** Requires prerequisite of IPHY 2420 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Integrative Physiology (IPHY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 3490 (3) Introduction to Epidemiology**
Examines the history and uses of epidemiology, measures of disease frequency and occurrence, association and causality, analytic epidemiology, evidence-based screening and outbreak investigations.
**Recommended:** Prerequisite Statistics course (IPHY 3280 or EBIO 1010 or MATH 2510 or PSYC 2111 or SOCY 2061).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 3590 (3) Health and Function over the Adult Lifespan**
Examines topics in the field of biomedical aging in the context of public health including lifespan, changing demographics of aging, health span, genetics of aging; physiology of aging (changes in function with age; biological mechanisms of aging); clinical disorders of aging (aging and chronic diseases; clinical syndromes in geriatric medicine); lifestyle and pharmacological strategies for preserving health and function with aging.
**Requisites:** Requires prerequisite courses of Human Physiology (IPHY 3430) and a statistics course (IPHY 3280, EBIO 1010, MATH 2510, PSYC 2111, or SOCY 2061).

**IPHY 3700 (3) Scientific Writing in Integrative Physiology**
Takes a process-based approach to writing. Assignments and classroom experiences emphasize critical thinking, using scientific evidence and reasoning to construct original arguments, and applying conventions and problem-solving skills to craft successful documents.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Integrative Physiology (IPHY) or Neuroscience (NRSC) majors only.
**Recommended:** Prerequisite Statistics course (IPHY 3280 or EBIO 1010 or MATH 2510 or PSYC 2111 or SOCY 2061).
**Additional Information:** Arts Sci Core Curr: Written Communication Arts Sci Gen Ed: Written Communication-Upper

**IPHY 4010 (1-3) Seminar in Integrative Physiology**
Introduces a small group of students to current research topics in integrative physiology, evaluation of current research and discussion of critical issues.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite Statistics course (IPHY 3280 or EBIO 1010 or MATH 2510 or PSYC 2111 or SOCY 2061).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4040 (3) History of Medicine**
Explores the history of western European medicine from the Middle Ages to the 19th century with a focus on the influence of social events and how these shaped the process and evolution of medicine. Projects explore topics of student interest that might include pharmacology, pathology, mental illness, optometry, dentistry, women in medicine, and the influence of war on medical practices. This is a three-week Education Abroad Global Seminar.
**Requisites:** Prerequisite IPHY 3410 (minimum grade C-)

**IPHY 4041 (3) Global Health and Disease**
This course will provide a comprehensive study of community health and common diseases with a specific geographical case study that will vary. Students will have the opportunity to learn about these topics through observations, discussions, visiting local clinics, and hospitals, and interaction with local communities. This is a three-week Education Abroad Global Seminar.
**Requisites:** Requires prerequisite course of IPHY 3410 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4060 (4) Cell Physiology**
Focuses on the molecular machines and cellular sub-compartments that allow cells to renew, replicate, and function in the context of multicellular organisms. Students in lecture section 010 must also enroll in a lab section. The online section of the course may not fulfill prerequisites for post-baccalaureate, graduate, or other allied health programs. Please consult with your Biology advisor before enrollment.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 5060
**Requisites:** Requires prerequisite course of IPHY 3430 and IPHY 3435 or IPHY 3437 (all minimum grade C-). Restricted to Integrative Physiology (IPHY) or Neuroscience (NRSC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4200 (3) Physiological Genetics and Genomics**
Covers fundamental concepts in molecular genetics/genomics with physiological applications. Topics include structure and function of nucleic acids, genome structure, genetic and genomic research tools, methods for identifying disease-causing mutations, regulation of gene expression, pharmacogenetics, gene therapy and ethical issues in modern genomics. First course of a 3-course series recommended for IBG students. Includes a recitation section.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 5200
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4300 (3) Pathophysiology of Disease**
Uses case studies to explore various disease states of the organ systems within the body and the underlying mechanisms that contribute to the manifestations of these diseases. Additionally, students will examine the importance of epidemiology in the understanding of disease as well as discuss infectious disease, and the role of genetics in congenital defects and cancer. All registration restrictions will be strictly enforced by the department.
**Requisites:** Prerequisite of IPHY 3410 and IPHY 3430 (minimum grade C-).
**Grading Basis:** Letter Grade

**IPHY 4420 (3) Nutrition and Human Performance**
Examines nutrient use during exercise and the nutrient needs of athletes and active individuals, including strategies to improve physical performance and recovery through dietary manipulations and dietary supplements. All registration restrictions will be strictly enforced by the department.
**Requisites:** Prerequisite of IPHY 2420 (minimum grade C-). Restricted to Integrative Physiology (IPHY) majors only.

**IPHY 4440 (4) Endocrinology**
Introduces mammalian endocrine system. Provides a thorough analysis of chemical communication by hormones and related bioregulators with emphasis on the major endocrine systems such as the thyroid, gonad, pituitary and the brain. All registration restrictions will be strictly enforced by the department.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 5440
**Requisites:** Requires prerequisite courses of IPHY 3430 and IPHY 3435 or IPHY 3437 (minimum grade C-). Restricted to Integrative Physiology (IPHY) or Neuroscience (NRSC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4470 (3) Biology of Human Reproduction**
Anatomy and physiology of human reproduction, including gender determination, embryology, puberty, menstrual cycle, pregnancy, lactation, menopause, sexual behavior, sexual abnormalities and contraception. Open to all majors.
**Requisites:** Prerequisite of general biology (lecture + lab).
**Recommended:** Prerequisite IPHY 3430 and IPHY 4440.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4480 (3) Comparative Reproduction**
Focuses on comparative anatomy and physiology of reproductive system and the evolution of reproductive behavior in vertebrates and invertebrates. Topics include courtship, mating, fertilization, estrous and menstrual cycles and environmental control of seasonal reproduction.
**Requisites:** Prerequisite of general biology (lecture + lab).
**Recommended:** Prerequisite IPHY 3430.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4490 (3) Case Studies in Public Health**
Explores case studies in public health in how they have influenced our approach to disease outbreaks and disease resolution. Examines famous case studies in infectious disease, zoonoses and non-infectious diseases, including environmental and occupational exposure to see how they have changed our understanding of disease and responses by health and medical personnel. Examines special populations within public health, as well as discuss modern public health challenges.
**Requisites:** Prerequisite of IPHY 3490 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4540 (5) Biomechanics**
Applies the principles of physics and physiology to analyze the movement of humans and other animals. Assesses the mechanical properties of muscles, tendons, ligaments and bones. Quantitatively analyzes forces, torque, mechanical energy, power impulses and momentum associated with human movement. Students enroll in a lab, and the enrolled lab will have a designated recitation and lecture attached. All registration restrictions will be strictly enforced by the department.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 5540
**Requisites:** Requires prerequisite courses of IPHY 3430 and physics (PHYS 1110 or PHYS 2010) (all minimum grade C-). Restricted to Integrative Physiology (IPHY), Neuroscience (NRSC), or College of Engineering majors only.
**Recommended:** Prerequisites IPHY 3415 and calculus (MATH 1300 or MATH 1310 or APPM 1350) and statistics (IPHY 3280 or EBIO 1010 or MATH 2510 or PSYC 2111 or SOCY 2061).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4580 (3) Sleep Physiology**
Describes the physiology, neurobiology, and functions of sleep and circadian rhythms; explains the impact of sleep and circadian rhythms, as well as sleep and circadian disruptions and disorders on immune, endocrine, thermoregulatory, cardiovascular, respiratory, and neural systems; examines changes in sleep and circadian rhythms across the life span. The integrative nature of sleep and circadian rhythms in normal physiological and cognitive functions and their importance in health and disease processes will be emphasized. All registration restrictions will be strictly enforced by the department.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 5580
**Requisites:** Requires prerequisite course of IPHY 3430 (minimum grade C-). Restricted to Integrative Physiology (IPHY) or Neuroscience (NRSC) majors only.
**Recommended:** Prerequisites Statistics course (IPHY 3280 or EBIO 1010 or MATH 2510 or PSYC 2111 or SOCY 2061).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4600 (3) Immunology**
Studies the immune system, a multi-cellular system that functions to protect us from disease. Introduces concepts associated with the development and function of individual cells of the immune system (T-cells, B-cells, neutrophils, dendritic cells, macrophages), as well as their integrative roles in physiology and host defense. This course requires a conceptual understanding of the material and emphasizes problem-solving skills through case studies. All registration restrictions will be strictly enforced by the department.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 5600
**Requisites:** Requires prerequisite course of IPHY 3430 (minimum grade C-). Restricted to Integrative Physiology (IPHY) or Neuroscience (NRSC) majors only.
**Recommended:** Prerequisite or corequisite IPHY 4060.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4650 (5) Exercise Physiology**
Examines physiological and biochemical adjustments that occur in the body with acute and chronic exercise. Topics center on physiological mechanisms pertaining to metabolic, cardiovascular, and hormonal alterations, the role of exercise in health and disease, soreness and fatigue, immune function, as well as exercise during varied environmental conditions. All registration restrictions will be strictly enforced by the department.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 5650
**Requisites:** Requires prerequisite course of IPHY 3430 and IPHY 3435 or IPHY 3437 (all minimum grade C-). Restricted to Integrative Physiology (IPHY) or Neuroscience (NRSC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4720 (4) Neurophysiology**
Explores the function of the nervous system, including how the properties of neurons influence nervous system activity, how the nervous system controls the activity of muscles and how the sensory effects of muscle activity influence the function of the nervous system. All registration restrictions will be strictly enforced by the department.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 5720
**Requisites:** Requires prerequisite courses of IPHY 3430 and IPHY 3435 or IPHY 3437 (all minimum grade C-). Restricted to Integrative Physiology (IPHY) or Neuroscience (NRSC) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4780 (3) Sleep, Circadian Rhythms, and Health**
Examines the history of the fields of sleep and circadian rhythms; lifespan development of sleep and rhythms; observational, physiological, and clinical measures of sleep; screening for sleep and circadian disorders; associations between poor sleep and circadian misalignment and health; and evidenced-based sleep and circadian interventions/preventions in healthy and clinical samples. Dept. enforced requisite: one year of biology (lecture and lab).
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 5780

**IPHY 4800 (3) Molecular Evolution: How Natural Selection has Shaped the Molecules of Life**
This course explores how Darwin¿s idea has shaped the structures of DNA, RNA and proteins across the long history of life on earth. Natural selection driving the evolution these macromolecules and subsequent developmental pathways will be fully appreciated as the process that ultimately produced the amazing variety of species on this planet. Looking ahead, our recent efforts to harness the power of evolution in the test tube to develop new therapies will be covered.
**Requisites:** Requires prerequisite courses of MCDB 3135 and MCDB 3145 (minimum grade C-).

**IPHY 4850 (1) Honors Thesis Seminar**
The course is specifically designed for students who are enrolled in the IPHY Honors program and have a faculty mentor. The course follows a workshop-based approach and aims to guide students through the various stages of writing and defending a thesis. It also provides an opportunity to share and receive feedback on works in progress. Throughout the course, students will have the chance to explore the scientific writing format, improve their writing process, and effectively communicate about science. Additionally, student will have the opportunity to practice a thesis defense talk.
**Recommended:** Prerequisite IPHY 3700; and IPHY 4870 (taken concurrently).

**IPHY 4860 (1-8) Independent Study: Undergraduate**
An opportunity for upper-division students to earn academic credit for working under the individual direction of a faculty member. Consult with faculty mentor and undergraduate coordinator for approval. Department enforced prerequisites: Cumulative GPA of 2.0 and completion of at least one upper-division IPHY course. Students can earn 1 credit for every 25 hours worked.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**IPHY 4870 (1-6) Honors Thesis**
An opportunity for students enrolled in the IPHY Honors program to earn academic credit for working on their thesis. Students can earn 1 credit for every 25 hours worked.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisites IPHY 3700; and IPHY 4850 (taken concurrently).
**Additional Information:** Arts Sciences Honors Course

**IPHY 4880 (3) Advanced Data Analysis in Biomedical Research**
Provides advanced training on statistics and scientific reasoning in laboratory and clinical research. Conceptual foundations of classical and modern statistical techniques is reviewed. Multiple class projects consist of written reports on statistical analysis of data representative of the student's field of interest. The use of statistical packages, primarily R, is required.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 5880
**Requisites:** Prerequisite: Statistics course (IPHY 3280 or EB10 1010 or MATH 2510 or PSYC 2111 or SOCY 2061 (minimum grade C).
**Grading Basis:** Letter Grade

**IPHY 4900 (1-6) Public Health Practicum**
Offers practical experience in Public Health with direct supervision.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4900 and MCDB 4900
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**IPHY 4930 (1-6) Internship**
Offers upper-division students practical experience in laboratory, clinical, and field settings with direct supervision Students can earn 1 credit for every 45 hours of intern work. Consult with departmental internship coordinator for approval. Department enforced prerequisite: Cumulative GPA of 2.0 and completion of two upper-division IPHY courses.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**IPHY 4940 (1-6) Application for Clinical Internship**
Provides upper-division students an opportunity for internship experience in a clinic and hospital setting with an established Affiliation Agreement with CU Boulder. Students can earn 1 credit for every 45 hours of intern work. Consult with departmental internship coordinator for approval. Department enforced prerequisite: Cumulative GPA of 2.0 and completion of two upper-division courses.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**IPHY 4950 (1-6) Global Study Abroad Internship**
Provides an opportunity for students to combine international experiential learning and academic theory as a means to gain professional experience and to develop a new perspective on a career field. Contact the Study Abroad office (abroad@colorado.edu) for information on available opportunities and to find out how to enroll in this course.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

# Integrative Physiology - Bachelor of Arts (BA)

The Department of Integrative Physiology, housed within the College of Arts and Sciences, offers a Bachelor of Arts (BA) degree. Our undergraduate courses integrate knowledge from various life-science disciplines, enabling students to explore organisms as dynamic systems composed of molecules, cells, tissues and organs. The curriculum places specific emphasis on understanding whole-body function and its relevance to human health and disease.

We actively encourage students to engage in a variety of enriching experiences, including research, internships, independent study, teaching opportunities, honors programs and extracurricular activities. By participating in these diverse activities, students can broaden their perspectives and enhance their overall learning experience.

Upon successful completion of the BA degree in integrative physiology, students will possess the knowledge, skills and expertise necessary for advanced training and diverse career paths. Our graduates are well-prepared for pursuits in allied health, industry, government, science education and research.

## Requirements

Students must complete the general requirements of the College of Arts and Sciences and the required courses below. Students must complete a minimum of 38 credit hours, 30 credit hours in courses with the IPHY subject code, including a minimum of 18 upper-division credit hours, and 8 credit hours in a biology sequence including requisite labs.

All required major courses and all required ancillary courses must be passed with a C- or better and cannot be taken pass/fail. Students must have a grade point average of at least 2.000 in the major in order to graduate.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Biology Sequence** | | |
| Select one of the following biology sequences of lectures and lab(s): | | |
| *Lecture* | | *6* |
| EBIO 1210 & EBIO 1220 | General Biology 1 and General Biology 2 | |
| MCDB 1150 & MCDB 2150 | Introduction to Cellular and Molecular Biology and Principles of Genetics | |
| *Lab* | | *2* |
| EBIO 1230 & EBIO 1240 | General Biology Laboratory 1 and General Biology Laboratory 2 | |
| MCDB 1161 | From Dirt to DNA: Phage Genomics Laboratory I | |
| or IPHY 1111 | Analysis of Human Movement with Smart-Phone Technology | |
| or IPHY 1181 | Biological Probiotic/Drug Discovery Through Hands-on Screens | |
| or MCDB 1171 | Antibiotics Discovery Through Hands-on Screens I | |
| or MCDB 2161 | From DNA to Genes, Phage Genomics Laboratory II | |
| or MCDB 2171 | Chemotherapeutic Discovery Through Hands-On Screens 2 | |
| **Required IPHY Coursework** | | |
| IPHY 3410 | Human Anatomy | 3 |
| IPHY 3430 | Human Physiology | 3 |
| IPHY 3435 | Physiology Lab | 2 |
| or IPHY 3437 | Virtual Human Physiology Laboratory | |
| **Advanced IPHY Coursework** | | |
| Select at least 15 credits (three courses must be taken at CU Boulder--including Main Campus, Continuing Education, and Study Abroad): | | 15-17 |
| IPHY 4060 | Cell Physiology | |

| | | |
|---|---|---|
| IPHY 4440 | Endocrinology | |
| IPHY 4540 | Biomechanics | |
| IPHY 4580 | Sleep Physiology | |
| IPHY 4600 | Immunology | |
| IPHY 4650 | Exercise Physiology | |
| IPHY 4720 | Neurophysiology | |
| **IPHY Major Electives** [1] | | **4-6** |

[1]The number of IPHY major elective credit hours needed to reach the requirement for 30 credit hours in IPHY coursework and 38 total major credit hours will vary based on what major courses are taken and could be unnecessary.

| Code | Title | Credit Hours |
|---|---|---|
| **IPHY Recommended Coursework** | | |
| Coursework recommended for allied health careers. May be used to reach IPHY 30-credit total. | | |
| IPHY 1020 | Introduction to Integrative Physiology | 1 |
| IPHY 2400 | Introduction to Medical Terminology for Future Health Professionals | 2 |
| IPHY 3415 | Human Anatomy Laboratory | 2 |
| **Total Credit Hours** | | **5** |

Students apply no more than 45 major credit hours toward the degree. Contact department for current elective choices.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Ancillary Coursework** | | |
| One of the following Statistics courses | | 3-4 |
| IPHY 3280 | Intro to Data Science and Biostatistics<br>IPHY 3280 would count towards IPHY elective credits. | |
| or EBIO 1010 | Introduction to Statistics and Quantitative Thinking for Biologists | |
| or MATH 2510 | Introduction to Statistics | |
| or PSYC 2111 | Psychological Science I: Statistics | |
| or SOCY 2061 | Introduction to Social Statistics | |
| CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 | 5 |
| CHEM 1133 & CHEM 1134 | General Chemistry 2 and Laboratory in General Chemistry 2 | 5 |
| PHYS 2010 | General Physics 1 | 5 |
| **Total Credit Hours** | | **18-19** |

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in integrative physiology, students should meet the following requirements:

- By the first semester, declare the major.
- Before the beginning of the fifth semester, complete the biology and chemistry requirements.
- By the end of the sixth semester, complete the anatomy and physiology requirements.

Students must consult with a major advisor to determine adequate progress toward completion of major requirements.

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will fulfill all 12 credits of the Natural Sciences area of the Gen Ed Distribution Requirement, including the lab component, and the QRMS area of the Gen Ed Skills Requirement.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| EBIO 1210 & EBIO 1230 | General Biology 1 and General Biology Laboratory 1 | 4 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| Elective - IPHY 1020 | | 1 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| EBIO 1220 & EBIO 1240 | General Biology 2 and General Biology Laboratory 2 | 4 |
| CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 | 5 |
| Gen. Ed. Distribution (example: Arts & Humanities) | | 3 |
| Elective - IPHY 2400 | | 2 |
| | **Credit Hours** | **14** |
| **Year Two** | | |
| **Fall Semester** | | |
| CHEM 1133 & CHEM 1134 | General Chemistry 2 and Laboratory in General Chemistry 2 | 5 |
| IPHY 3280 or MATH 2510 or PSYC 2111 or EBIO 1010 or SOCY 2061 | Intro to Data Science and Biostatistics or Introduction to Statistics or Psychological Science I: Statistics or Introduction to Statistics and Quantitative Thinking for Biologists or Introduction to Social Statistics | 3-4 |
| IPHY 3410 | Human Anatomy | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| | **Credit Hours** | **14-15** |
| **Spring Semester** | | |
| PHYS 2010 | General Physics 1 | 5 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| IPHY 3430 | Human Physiology | 4 |
| Gen. Ed. Distribution (example: Arts & Humanities) | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| IPHY 3435 or IPHY 3437 | Physiology Lab or Virtual Human Physiology Laboratory | |

| | | |
|---|---|---|
| Elective | | 3 |
| IPHY Major Core Course #1 | | 3-5 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-division Elective | | 3 |
| **Credit Hours** | | **12-14** |
| **Spring Semester** | | |
| IPHY Major Core Course #2 | | 3-5 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Elective | | 3 |
| **Credit Hours** | | **15-17** |
| **Year Four** | | |
| **Fall Semester** | | |
| IPHY 3415 | Human Anatomy Laboratory | 2 |
| IPHY Major Core Course #3 | | 4-5 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/US Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-division Elective | | 3 |
| **Credit Hours** | | **15-16** |
| **Spring Semester** | | |
| IPHY Major Core Course #4 | | 3-5 |
| IPHY Major Core Course If Needed | | 3-5 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| **Credit Hours** | | **15-19** |
| **Total Credit Hours** | | **114-124** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate a mastery of the core concepts defined by the *2011 Vision and Change in Undergraduate Biology Education: A Call to Action,* including structure and function; information flow, exchange and storage; pathways and transformations of energy and matter; and systems.
- Apply knowledge of the human body to new and real-world contexts.
- Extract meaning from visual representations of data (e.g., graphs, tables, images), and discern relevant from irrelevant information in various contexts.
- Synthesize ideas and concepts from multiple sources to create a more comprehensive understanding of integrative physiology.
- Apply the scientific method to research questions related to integrative physiology, including designing experiments, collecting and analyzing experimental data, forming evidence-based conclusions and placing results in the larger scientific context.
- Search, critically evaluate and analyze the scientific literature related to integrative physiology, and apply this knowledge to critique claims in the popular media.
- Possess effective collaborative, teamwork, and oral and written communication skills, including the ability to work with others towards shared goals and successfully communicate an understanding of integrative physiology to a wide audience.
- Recognize the limit of one's knowledge or ability and determine how to expand that knowledge or extend the ability.
- Gain experience in disciplinary settings (e.g., research, teaching, internships, leadership, outreach, volunteering) and awareness of careers suitable for those with expertise in integrative physiology.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BA and MS in Integrative Physiology

The Department of Integrative Physiology has developed a curriculum that allows both degrees to be completed in five years. The program has been designed to provide qualified undergraduate students with an opportunity to enhance their knowledge base in the discipline, engage in research, increase their opportunities for employment and make their applications to medical/allied health professional schools more competitive.

### Admissions Requirements

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.3 or higher
- Have completed a minimum of 24 credit hours of coursework
- Transfer students must have completed a minimum of 24 credit hours at CU Boulder
- Students must have completed one year of general biology and one year of general chemistry prerequisite courses (all with minimum grades of C-)

Candidates for the program are recruited from the undergraduate population of declared integrative physiology majors during the beginning of their junior year. All interested candidates must apply by the second semester of their junior year. To apply, students must also provide one letter of recommendation and have a faculty mentor. Approximately 3–5 of the applicants will be selected on a competitive basis to begin the program.

### Program Requirements

Students may take up to and including 12 hours of graduate credits while in the undergraduate program which can later be used toward the master's degree. In addition, 6 graduate credits may be double counted toward the bachelor's degree and 6 undergraduate credits may be double counted toward the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's

degree, early in the semester in which the undergraduate requirements will be completed.

Once accepted into the program, a student must maintain a GPA of 3.00 in all coursework undertaken. After transitioning to the MS degree, students must register for at least 5 graduate course credit hours per semester. Students deciding to discontinue the program may do so at any time during their course of study. All credit hours completed toward the concurrent degree program will be counted toward the completion of the requirements for a BA degree in integrative physiology.

Please contact the Integrative Physiology graduate program (iphygrad@colorado.edu) or visit the website Integrative Physiology - Master of Science (MS) (p. 1319) for more information on the BAM degree.

# International Affairs

With the increasing importance of world issues to the United States, employment opportunities in government, international organizations and business continue to expand. Today there is an urgent need for college graduates with a strong background in international affairs. To meet this need, the University of Colorado Boulder offers a comprehensive and flexible interdisciplinary program in international affairs leading to the BA degree.

**Course code for this program is IAFS.**

## Bachelor's Degree

- International Affairs - Bachelor of Arts (BA) (p. 437)

## Minor

- International Affairs - Minor (p. 442)

## Certificates

- European Union Studies - Certificate (p. 444)
- Global Environmental Affairs - Certificate (p. 444)
- International Media - Certificate (p. 1099)
- International Affairs - Graduate Certificate (p. 1777)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Beard, Steven (https://experts.colorado.edu/display/fisid_168279/)
Teaching Assistant Professor

Chester, Lucy P. (https://experts.colorado.edu/display/fisid_126541/)
Associate Professor; PhD, Yale University

Fluri, Jennifer L. (https://experts.colorado.edu/display/fisid_154033/)
Professor; PhD, Pennsylvania State University

Teitelbaum, Benjamin Raphael (https://experts.colorado.edu/display/fisid_151338/)
Assistant Professor; PhD, Brown University

Truelove, Yaffa Elane (https://experts.colorado.edu/display/fisid_159271/)
Assistant Professor; PhD, University of Cambridge (England)

Wyrod, Robert (https://experts.colorado.edu/display/fisid_156319/)
Associate Professor; PhD, University of Chicago

Zeiler, Thomas W. (https://experts.colorado.edu/display/fisid_101692/)
Professor; PhD, University of Massachusetts at Amherst

## Courses

**IAFS 1000 (4) Global Issues and International Affairs**
Introduces the student to the international affairs program. The course examines political and economic development in several countries in many different world regions. Examines historical trends and development as well as current political and economic issues.
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**IAFS 3000 (3) Special Topics in International Affairs**
Junior or senior level umbrella seminar spanning a variety of topics relevant to the study of international affairs. Subjects addressed under this heading vary according to student interest and faculty availability.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Political Science (PSCI) majors or International Affairs (IAFS) majors or minors with 57-180 credits (Junior or Senior) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**IAFS 3010 (3) Islam, Geopolitics and Society: Gender, Identity and Place**
Examines Islam, geopolitics and society in various locations throughout the globe, such as Afghanistan, Egypt, France, Germany, India, Indonesia, Iran, Iraq, Ireland, Israel/Palestine, Morocco, Pakistan, Saudi Arabia, Turkey, Yemen, the UK and the US. Addresses issues of gender, identity and place to illustrate the complexity and diversity of social experiences within the milieu of Islam and geopolitics.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**IAFS 3500 (3) French Connections: Contemporary France and America in Historical Context**
Faculty-led Global Seminar, based in Bordeaux, France provides an opportunity to compare French history and contemporary culture, economy, and culture to that of the United States. Lectures in Boulder and Bordeaux are supplemented by interactions with officials, scholars, business leaders, interest groups, and organizations in France. Offered through Study Abroad.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4190
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**IAFS 3520 (6) Global Seminar: Justice, Human Rights and Democracy in Israel**
Explore the challenges and complexities of justice, democracy and human rights in Israel and the West Bank through field trips, course work and service learning projects with Jerusalem based non-profit organizations. Acquire new knowledge and lived experience on critical issues facing Israelis and Palestinians with the wider scope of Middle East politics.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4302
**Recommended:** Prerequisites ANTH 4050 or JWST 4050 and IAFS 3600 or JWST 3600.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**IAFS 3530 (3) Global Seminar: Jews and Muslims - The Multiethnic History of Istanbul**
Spend two weeks in Istanbul and examine Jewish-Muslim relations in a place that was for 500 years the crossroads of civilization. The only Muslim city in the 21st century with a large, thriving Jewish community, Istanbul models how people from different social classes, ethnicities and religious backgrounds can coexist.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3530 and RLST 3530
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**IAFS 3540 (3) Migration, Human Rights, and Conflict in the Mediterranean**
Faculty-led Global Seminar, based in Malta, provides the opportunity to study social, political, and economic issues surrounding international migration, Focuses on causes and consequences of recent migration flows from nations in the Middle East and Sub-Saharan Africa to European nations located in the Eastern Mediterranean. Students will interact with representatives of state governments, NGOs, and activist groups, and learn about the rich culture and history of Malta as a pivotal state promoting international diplomacy and regional security.
**Equivalent - Duplicate Degree Credit Not Granted:** PACS 3540
**Requisites:** Requires prerequisite course of PACS 2500 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective

**IAFS 3600 (3) Contemporary Jewish Societies**
Uses transnational lens to explore contemporary debates about Jewish people, places and practices of identity and community; places that Jews have called 'home', and what has made, or continues to make those places 'Jewish'; issues of Jewish homelands and diasporars; gender, sexuality, food and the Jewish body; religious practices in contemporary contexts. Readings drawn primarily from contemporary journalism and scholarship.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3600 and GSLL 3600
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**IAFS 3610 (3) Topics in International Affairs and Jewish Studies**
Explores topics in international affairs as it relates to Jewish culture and society. Subjects addressed under this heading vary according to student interest and faculty availability.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3610
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**IAFS 3621 (3) Rogues to Revolutionaries: Russian Rebels, Past and Present**
Explores the tradition of dissent and opposition in Russian culture, from the medieval period to present, approaching forms of rebellion (religious, political, social, aesthetic) in historical context. This survey in intellectual history will trace this phenomenon across historical documents, literary texts, film, and the fine and performing arts, pairing these primary materials with readings in Russian history. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4481 and RUSS 5481
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**IAFS 3622 (3) Understanding Ukraine: Culture, Diversity, Conflict**
Introduces students to Ukraine¿s cultural diversity and orients them in the history of the country at the heart of contemporary world politics. This course will provide students with a necessary historical frame for understanding current and war-time cultural debates about Ukraine¿s contested heritage and future. Taught in English. Degree credit not granted for REES 4871 and REES 5871.

**IAFS 3630 (3) Radical Nationalism in Contemporary Northern Europe**
Examines the current rise of National Socialists, white supremacists, ethnic separatists, anti-Islam activists and social and cultural ultraconservatives in northern Europe. Treats extremist nationalism as a social, cultural, aesthetic, intellectual and political movement. Consults scholarship from sociology, criminology and political science, as well as music, literature, art and film.
**Equivalent - Duplicate Degree Credit Not Granted:** SCAN 3301
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences

**IAFS 3631 (3) Arctic Society and Culture**
Investigates representations of the Arctic in literature, art, cinema, media and scientific, and geographical writing over the past century and a half, spanning material from North America, Britain, continental Europe and the Nordic region. Interpretive approaches include ecocriticism; post-colonialism; literary studies; indigenous studies; visual, film and media theory; Cold War studies.
**Equivalent - Duplicate Degree Credit Not Granted:** SCAN 3631
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**IAFS 3632 (3) Scandinavia and the European Union**
Examining the role that the EU plays in the Nordic region, this course is an introduction to the complex relationship between the Nordic nation states and the European project. We explore how the EU is perceived in the Nordic countries and investigate why the Nordic region is reluctant in its relation to the European Union.
**Equivalent - Duplicate Degree Credit Not Granted:** SCAN 3632

**IAFS 3640 (3) Data Analysis for Global Environmental Affairs**
Develops data analysis techniques for global environmental data including demographic, economic, agricultural, fisheries and energy sectors. Designed to support the development of basic and intermediate data analysis skills for students in the Global Environmental Affairs certificate program. Includes hands-on exploration of up-to-date global data sets from a variety of sources. Fulfills the application requirement for the ENVS major.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3640
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IAFS 3650 (3) History of Arab-Israeli Conflict**
Explores the origins and development of the Arab-Israeli conflict. Traces Arab-Jewish/Israeli relations from the 19th century through the Palestine Mandate, the evolution of Arab and Jewish nationalism and the creation of Israel to the present day.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3650
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) International Affairs (IAFS) majors only.
**Recommended:** Prerequisite HIST 1308 or HIST 1828 or JWST 1828.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**IAFS 3670 (3) Cities of the Global South**
Examines the geographies, processes, structural forces and everyday forms of urban life that are at the core of rapid urban transformation in the global South. Through using interdisciplinary scholarship, empirical case studies and key theoretical work, the course covers themes such as migration and urbanization, informality and governance, infrastructures of everyday life and urban environmental politics.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 3622

**IAFS 3681 (3) Refugees in German Culture**
Introduces the diversity of refugee migration in German culture through artistic and cultural "texts," including those created by or in collaboration with refugees (film, comic journalism, literature, blogs, hashtag campaigns, music, etc). These texts are discussed in relationship to theories of racism, precarity, and biopolitics together and contextualized by work from other disciplines. This interdisciplinary course is methodologically informed by the theory and practice of cultural studies. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 3681, JWST 3681 and AHUM 3681
**Recommended:** for students with sophomore standing or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**IAFS 3850 (3) International Conflict Resolution and Peacebuilding**
Provides an introduction to the interdisciplinary field of international conflict resolution and peacebuilding. Provides tools for analyzing and intervening in contemporary manifestations of violent social conflict. Argues for an approach to international affairs rooted in more nuanced understandings of the nature of violent conflict and its dynamics. Bases the quest to build sustainable peace not on military supremacy or coercive diplomacy, but rather the ability of states and peoples to work collaboratively to develop mutually beneficial solutions aimed at the satisfaction of basic needs, collective security, political representation, and respect for human dignity. Explores how international conflicts are mitigated, contained, and resolved through processes such as DDR (disarmament, demobilization, and reintegration), citizen diplomacy, and reconciliation.
**Equivalent - Duplicate Degree Credit Not Granted:** PACS 3850
**Recommended:** Prerequisite PACS 2500.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective

**IAFS 4500 (3) The Post-Cold War World**
Capstone course for international affairs majors. Examines the ways in which the end of the Cold War, the collapse of failed states, and the rise of global terrorism changed the world. Studies how peoples, governments and nongovernmental organizations face new social, political, economic and security challenges in an era of globalization. Includes discussion, oral reports, critical book reviews, and research papers.
**Requisites:** Restricted to students with 87-180 credits (Senior) International Affairs (IAFS) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**IAFS 4800 (3) Honors Seminar in International Affairs**
Directed research course tailored to the particular research interests of the students enrolled. Devoted to research methodology and the development of students' research. Department enforced prerequisite: overall 3.30 GPA and IAFS 3.40 GPA.
**Additional Information:** Arts Sciences Honors Course

**IAFS 4810 (3) Honors in International Affairs**
Continuation of IAFS 4800. Students complete original research begun in the fall and write, defend their honors thesis and meet regularly with the instructor.
**Requisites:** Requires prerequisite course of IAFS 4800 (minimum grade C-).
**Additional Information:** Arts Sciences Honors Course

**IAFS 4900 (1-6) Independent Study in International Affairs**
Provides an opportunity to earn academic credit for learning outside the formal class structure. Students interested in doing in-depth research propose a research project to a faculty sponsor and then work closely with that person to produce a piece of original research. Department enforced prerequisite: restricted to students with 57-180 credits (Juniors or Seniors), GPA of 3.00 or better, grade of C or better in all lower-division courses, and at least 6 upper-division courses.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**IAFS 4930 (3-6) Internship in International Affairs**
Working individually under the guidance of a public or private organization, students are assigned to projects selected for their academic suitability. Written assignments occur throughout the semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) International Affairs (IAFS) majors only.

# International Affairs - Bachelor of Arts (BA)

With the increasing importance of world issues to the United States, employment opportunities in government, international organizations and business continue to expand. Today there is an urgent need for college graduates with a strong background in international affairs. To meet this need, the University of Colorado offers a comprehensive and flexible interdisciplinary program in international affairs leading to the BA degree.

## Requirements

### Required Courses and Credits

Students must complete the general requirements of the College of Arts and Sciences and a minimum of 49–51 credit hours of specified courses with a grade of C- or better (none may be taken pass/fail).

#### Introductory Courses (10 credit hours)

| Code | Title | Credit Hours |
|---|---|---|
| IAFS 1000 | Global Issues and International Affairs | 4 |
| PSCI 2012 | Introduction to Comparative Politics | 3 |
| PSCI 2223 | Introduction to International Relations | 3 |
| **Total Credit Hours** | | **10** |

In addition to introductory courses, complete the requirements listed below for:

- Functional area
- Geographic concentration
- Economics/methods
- Off-campus experience
- Foreign language
- Senior seminar

IAFS 3000 Special Topics in International Affairs can be repeated up to 9 credit hours for different topics.

#### Functional Area (18 credit hours)

Students are required to complete one upper division class in each of the four functional areas and complete two additional upper division classes in any functional area. Students cannot apply more than four functional area classes from any one department.

| Code | Title | Credit Hours |
|---|---|---|
| **Development and Culture (Functional Area I)** | | |
| ANTH 4020 | Explorations in Anthropology (approved topics only) | 3-6 |
| ANTH 4500 | Cross-Cultural Aspects of Socioeconomic Development | 3 |
| COMM 3410 | Intercultural Communication | 3 |
| ECON 3784 | Economic Development and Policy | 3 |
| ECON/GEOG 4292 | Migration, Immigrant Adaptation, and Development | 3 |
| ECON 4774 | Topics in Economic Development, History and Political Economy | 3 |
| ECON 4784 | Economic Development | 3 |
| ECON 4794 | Economic Growth | 3 |
| GEOG/WGST 3672 | Who Runs the World? Sex, Power, and Gender in Geography | 3 |
| GEOG 3682 | International Development: Economics, Power, and Place | 3 |
| GEOG 3692 | Introduction to Global Public Health | 4 |
| GEOG 4632 | Development Geography | 3 |
| GEOG 4852 | Health and Medical Geography | 3 |
| IAFS/JWST 3600 | Contemporary Jewish Societies | 3 |
| IAFS/SCAN 3631 | Arctic Society and Culture | 3 |
| IAFS/ENVS 3640 | Data Analysis for Global Environmental Affairs | 3 |
| IAFS 3670/ GEOG 3622 | Cities of the Global South | 3 |
| LING 3545 | World Language Policies | 3 |
| MDST 3201 | Media, Culture and Globalization (International Media Certificate students only) | 3 |
| MUEL 3862 | Music and Global Health | 3 |
| PACS 3860 | Environmental Conflict and Conflict Resolution | 3 |
| PSCI 4012 | Global Development | 3 |
| PSCI 4283 | International Migration and Policy | 3 |
| PSCI 4732 | Critical Thinking in Development | 3 |
| SOCY 3002 | Population and Society | 3 |
| SOCY/WGST 3012 | Gender and Development | 3 |
| SOCY 4007 | Global Human Ecology | 3 |
| SOCY 4052 | Social Inequalities in Health | 3 |
| WGST 3500 | Global Gender Issues | 3 |
| WGST 4300 | Sex, Power, Politics: International Perspectives | 3 |
| **International Economics, Business, Political Economy (Functional Area II)** | | |
| ECON 3403 | International Economics and Policy | 3 |
| ECON 3545 | Environmental Economics | 3 |
| ECON 4413 | International Trade | 3 |
| ECON 4423 | International Finance | 3 |
| ECON 4504 | The New Institutional Economics: Institutions, Contracts and Economic Outcomes | 3 |
| ECON 4545 | Environmental Economics | 3 |
| FNCE 4060 | Special Topics in Finance | 1-6 |
| INBU 3300 | International Business and Management | 3 |
| INBU 3450 | International Business and Marketing | 3 |
| INBU 4200 | International Financial Management | 3 |
| PSCI 3092 | Comparative Political Economy | 3 |
| PSCI 3213 | International Political Economy | 3 |
| **Political Geography, International Security, Foreign Policy (Functional Area III)** | | |
| ANTH/JWST 4580 | The Holocaust: An Anthropological Perspective | 3 |
| GEOG 3742 | Place, Power, and Contemporary Culture | 3 |
| GEOG 4712 | Political Geography | 3 |
| GEOG 4742 | Topics in Environment and Society (approved topics only) | 3 |

| | | |
|---|---|---|
| GEOG 4762 | Geographies of Political Islam | 3 |
| HIST 4126 | History of U.S. Foreign Relations Since 1941 | 3 |
| HIST 4166 | The Vietnam War in US Politics and Culture | 3 |
| IAFS 3010 | Islam, Geopolitics and Society: Gender, Identity and Place | 3 |
| IAFS 3500/ HIST 4190 | French Connections: Contemporary France and America in Historical Context (Global Seminar) | 3 |
| IAFS/JWST 3650 | History of Arab-Israeli Conflict | 3 |
| PACS 3800 | Security Studies | 3 |
| PHIL 3190 | War and Morality | 3 |
| PSCI 3123 | War, Peace, and Strategic Defense | 3 |
| PSCI 3143 | Current Affairs in International Relations | 3 |
| PSCI 3163 | American Foreign Policy | 3 |
| PSCI 3193 | International Behavior | 3 |
| PSCI 4243 | Modern Warfare: Terrorism, Ideology, Identity | 3 |
| **International Institutions, Rights and Norms (Functional Area IV)** | | |
| ANTH 4525 | Global Islams | 3 |
| HIST 4820 | Human Rights: Historical Perspectives | 3 |
| IAFS 3630/ SCAN 3301 | Radical Nationalism in Contemporary Northern Europe | 3 |
| INVS 4402 | Nonviolent Social Movements | 3 |
| JRNL 4411 | International Media and Global Crises (International Media Certificate students only) | 3 |
| MUEL 3882 | Music and Violence | 3 |
| PACS 3850 | International Conflict Resolution and Peacebuilding | 3 |
| PACS 3870 | Nonviolent Civil Resistance: Movements and Strategies | 3 |
| PHIL 3260 | Philosophy and the International Order | 3 |
| PRLC 3810 | Global Issues in Leadership | 3 |
| PSCI 3062 | Revolution and Political Violence | 3 |
| PSCI 3183 | International Law | 3 |
| PSCI 4173 | International Organizations | 3 |
| PSCI 4252 | Politics of Ethnicity and Nationalism | 3 |
| PSCI 4783 | Global Issues | 3 |
| SOCY/ENVS 4027 | Inequality, Democracy, and the Environment | 3 |
| SOCY 4121 | Sociology of Religion | 3 |
| WGST 3220 | Women in Islam | 3 |
| WGST 3712 | Topics in Global Gender and Sexuality Studies (SS) | 3 |
| WGST 4010/ SOCY 4000 | Gender, Genocide and Mass Trauma | 3 |
| WGST 4500/ PSCI 4391 | Gender Politics and Global Activism | 3 |

## Geographic Concentration (9 credit hours)

Students are required to complete three upper-division classes concentrating on one of the four following global regions: Africa/Middle East, Asia, Europe/Eurasia or Latin America. Students should choose a geographic concentration and a language appropriate to that geographic concentration no later than the beginning of their junior year.

Geographic concentration coursework should be mainly in the social sciences, must include one course in contemporary history and can include a maximum of three credit hours of regional literature and arts (taught in the foreign language whenever possible).

| Code | Title | Credit Hours |
|---|---|---|
| **Africa/Middle East Geographic Concentration** | | |
| ANTH 3100 | Africa: Peoples and Societies in Change (fulfills Contemporary History) | 3 |
| ANTH 4630 | Nomadic Peoples of East Africa | 3 |
| ARAB/WGST 3410 | Gender, Sexuality and Culture in the Modern Middle East | 3 |
| ARAB 3340 | Representing Islam | 3 |
| FREN 3800 | France and the Muslim World | 3 |
| GEOG 4762 | Geographies of Political Islam | 3 |
| GEOG 3862 | Global Africa: Environment, Development, and Culture | 3 |
| HIST 4218 | Lost Kingdoms & Caliphates: West Africa to 1900 (fulfills Contemporary History) | 3 |
| HIST 4238 | History of Southern Africa (fulfills Contemporary History) | 3 |
| HIST 4258 | Africa under European Colonial Rule (fulfills Contemporary History) | 3 |
| HIST 4328 | The Modern Middle East, 1600 to the Present (fulfills Contemporary History) | 3 |
| HIST 4329 | Islam in the Modern World: Revivalism, Modernism, and Fundamentalism, 1800-2001 (fulfills Contemporary History) | 3 |
| HIST 4338 | History of Modern Israel/Palestine (fulfills Contemporary History) | 3 |
| HIST 4339 | Borderlands of the British Empire (fulfills Contemporary History) | 3 |
| HIST 4349 | Decolonization of the British Empire (fulfills Contemporary History) | 3 |
| HIST 4359 | The Global History of Modern Arabia (fulfills Contemporary History) | 3 |
| IAFS 3010 | Islam, Geopolitics and Society: Gender, Identity and Place | 3 |
| IAFS 3520/ JWST 4302 | Global Seminar: Justice, Human Rights and Democracy in Israel | 6 |
| IAFS/RLST 3530 | Global Seminar: Jews and Muslims - The Multiethnic History of Istanbul | 3 |
| IAFS/JWST 3650 | History of Arab-Israeli Conflict (fulfills Contemporary History) | 3 |
| PHIL 3040 | African Philosophy: Personhood and Morality | 3 |
| PSCI 3082 | Political Systems of Sub-Saharan Africa (fulfills Contemporary History) | 3 |
| PSCI 4242 | Middle Eastern Politics | 3 |
| RLST 3060 | Fundamentalism and Islam | 3 |
| RLST 3100 | Judaism | 3 |
| WGST 3520 | Gender and Sexuality in Africa | 3 |

| | | |
|---|---|---|
| *Africa/Middle East Regional Literature and Arts* | | |
| ARAB 3231 | In the Footsteps of Travelers: Travel Writing in Arabic Lit | 3 |
| ARAB 3330 | The Arabic Novel | 3 |
| FREN 4170 | Francophone Literature | 3 |
| **Asia Geographic Concentration** | | |
| ANTH 3160 | Peoples of the South Pacific (fulfills Contemporary History) | 3 |
| ANTH 4750 | Culture and Society in South Asia | 3 |
| ANTH 4760 | Ethnography of Southeast Asia and Indonesia | 3 |
| GEOG 3822 | China's Diverse Geographies: Environment, Society, Politics | 3 |
| HIST 4109 | World War II in Asia and the Pacific (fulfills Contemporary History) | 3 |
| HIST 4339 | Borderlands of the British Empire (fulfills Contemporary History) | 3 |
| HIST 4349 | Decolonization of the British Empire (fulfills Contemporary History) | 3 |
| HIST 4538 | History of Modern India (fulfills Contemporary History) | 3 |
| HIST 4548 | Women in Modern India (fulfills Contemporary History) | 3 |
| HIST 4558 | Buddha to Gandhi: A History of Indian Nonviolence (fulfills Contemporary History) | 3 |
| HIST 4628 | Modern China: Collapse of Imperial Brilliance, 1644-1949 (fulfills Contemporary History) | 3 |
| HIST 4638 | Contemporary China: Radicalism and Reform, 1949 to Present (fulfills Contemporary History) | 3 |
| HIST 4648 | Inventing Chinese Modernity, 1800 to Present (fulfills Contemporary History) | 3 |
| HIST 4658 | Between Beijing and Baghdad: China and Islam (fulfills Contemporary History) | 3 |
| HIST 4728 | Japan's Empire: Birth and Death (fulfills Contemporary History) | 3 |
| HIST 4758 | Japan after World War II (fulfills Contemporary History ) | 3 |
| PSCI 3072 | Government and Politics in Southeast Asia (fulfills Contemporary History) | 3 |
| PSCI 3102 | South Asian Politics | 3 |
| PSCI 4022 | Chinese Foreign Policy (fulfills Contemporary History) | 3 |
| PSCI 4052 | Chinese Politics (fulfills Contemporary History) | 3 |
| RLST 3060 | Fundamentalism and Islam | 3 |
| RLST 3200 | Yoga, Castes and Magic: Hindu Society and Spirituality | 3 |
| RLST 3300 | Foundations of Buddhism | 3 |
| RLST 3800 | Chinese Religions | 3 |
| WGST/HIST 4619 | Women in East Asian History (fulfills Contemporary History) | 3 |
| *Asia Regional Literature and Arts* | | |
| CHIN 4110 | Advanced Readings in Modern Chinese 1 | 3 |
| CHIN 4120 | Advanced Readings in Modern Chinese 2 | 3 |
| JPNS 3881 | Environment, Nature and Disaster in Japanese Literature and Culture | 3 |
| JPNS 4110 | Advanced Readings in Modern Japanese 1 | 3 |
| JPNS 4120 | Advanced Readings in Modern Japanese 2 | 3 |
| **Europe/Eurasia Geographic Concentration** | | |
| ECON 4514 | Economic History of Europe (fulfills Contemporary History) | 3 |
| FREN 3500 | French Current Events: Conversation and Composition | 3 |
| FREN 3800 | France and the Muslim World | 3 |
| GEOG 3882 | Geography of the Former Soviet Union | 3 |
| GRMN 3150 | Issues in German Politics, Literature and Media | 3 |
| GRMN/WGST 4301 | Gender, Race and Immigration in Germany and Europe | 3 |
| HIST 4412 | Europe, 1890-1945 (fulfills Contemporary History) | 3 |
| HIST 4423 | German History 1848-1989: Weimar Republic, Nazism, State Socialism (fulfills Contemporary History) | 3 |
| HIST 4433 | Nazi Germany and the Holocaust (fulfills Contemporary History) | 3 |
| HIST 4442 | Europe since 1945 (fulfills Contemporary History) | 3 |
| HIST 4623 | History of Eastern Europe Since 1914 (fulfills Contemporary History) | 3 |
| HIST 4723 | Imperial Russia (fulfills Contemporary History) | 3 |
| HIST 4733 | The Russian Revolution and the Soviet Regime (fulfills Contemporary History) | 3 |
| IAFS 3500/ HIST 4190 | French Connections: Contemporary France and America in Historical Context (fulfills Contemporary History, Global Seminar) | 3 |
| IAFS 3621/ REES 4481 | Rogues to Revolutionaries: Russian Rebels, Past and Present | 3 |
| IAFS 3622/ REES 4871 | Understanding Ukraine: Culture, Diversity, Conflict | 3 |
| IAFS 3630/ SCAN 3301 | Radical Nationalism in Contemporary Northern Europe | 3 |
| IAFS/SCAN 3631 | Arctic Society and Culture | 3 |
| IAFS/GRMN 3681 | Refugees in German Culture | 3 |
| ITAL 4250/HIST 4313 | History of Modern Italy (fulfills Contemporary History) | 3 |
| ITAL 4730 | Italian Feminisms: Culture, Theory, and Narratives of Difference | 3 |
| PSCI 3022 | Russian Politics (fulfills Contemporary History) | 3 |
| PSCI 3172 | Democracy and Its Citizens in the US and EU | 3 |
| PSCI 4002 | Western European Politics (fulfills Contemporary History) | 3 |

| | | |
|---|---|---|
| PSCI 4062 | East European Politics (fulfills Contemporary History) | 3 |
| PSCI 4213 | Europe and the International System | 3 |
| PSCI 4302 | European Union Politics | 3 |
| REES 3601 | Russian Culture Past and Present (Global Seminar) | 3 |
| REES 4221 | Stalinism: Culture and Society | 3 |
| REES 4301 | American-Russian Cultural Relations | 3 |
| REES/WGST 4471 | Women in 20th-21st Century Russian, East European and Eurasian Cultures | 3 |
| SPAN 3200 | Spanish Culture | 3 |
| *Europe/Eurasia Regional Literature and Arts* | | |
| FREN 3120 | Main Currents of French Literature 2 | 3 |
| FREN 4480 | 20th Century French Novel | 3 |
| ITAL 3140 | Main Current of Italian Culture and Literature 3 | 3 |
| REES 4210 | Topics in Russian, East European and Eurasian Culture | 3 |
| RUSS 4230 | Russian Cultural Idioms | 3 |
| SPAN 3310 | 20th Century Spanish Literature | 3 |
| **Latin America Geographic Concentration** | | |
| ANTH 3110 | Ethnography of Mexico and Central America (fulfills Contemporary History) | 3 |
| ANTH 4735 | Contemporary Cuban Culture: Race, Gender and Power | 3 |
| GEOG 3812 | Mexico, Central America, and the Caribbean (fulfills Contemporary History) | 3 |
| GEOG 4812 | Political Ecology & Latin America | 3 |
| HIST 4048 | Latin American Revolutions (fulfills Contemporary History) | 3 |
| HIST 4118 | History of Mexico to 1821 (fulfills Contemporary History) | 3 |
| HIST 4128 | The History of Modern Mexico Since 1821 (fulfills Contemporary History) | 3 |
| PSCI 3032 | Democracy, Inequality and Violence in Latin America (fulfills Contemporary History) | 3 |
| PSCI 3052/ WGST 3650 | Gender and Politics in Latin America (fulfills Contemporary History) | 3 |
| PSCI 4012 | Global Development | 3 |
| PSCI 4792 | Issues in Latin American Politics (fulfills Contemporary History) | 3 |
| SOCY 3161 | Global Perspectives on Race and Ethnicity | 3 |
| SPAN/PORT 3220 | Latin American Culture: Spanish America and Brazil | 3 |
| *Latin America Regional Literature and Arts* | | |
| ANTH 4730 | Latin American Politics and Culture through Film and Text | 3 |
| SPAN 3340 | 20th Century Spanish American Literature | 3 |
| SPAN 4180 | Major Works and Trends in Literature and Culture in Latin America: 1900-Present | 3 |

### Economics/Methods (6–8 credit hours)

Students are required to complete 6–8 credit hours in economics/methods. Choose two courses from the following list. Some of the courses listed may have required or recommended prerequisites.

| Code | Title | Credit Hours |
|---|---|---|
| ANTH 4000 | Quantitative Methods in Anthropology | 3 |
| ECON 2010 | Principles of Microeconomics | 4 |
| ECON 2020 | Principles of Macroeconomics | 4 |
| GEOG 3023 | Statistics and Geographic Data | 4 |
| GEOG 4023 | Advanced Quantitative Methods for Spatial Data | 4 |
| IAFS/ENVS 3640 | Data Analysis for Global Environmental Affairs | 3 |
| PSCI 2075 | Quantitative Research Methods | 3 |
| PSCI 3035 | Introduction to Qualitative Research Methods | 3 |
| PSCI 3075 | Applied Political Science Research | 3 |
| SOCY 2061 | Introduction to Social Statistics | 3 |
| WGST 3020 | Feminist Methods of Inquiry and Praxis | 3 |

### Off-Campus Experience (3 credit hours)

Complete 3 upper-division credit hours to fulfill the off-campus experience requirement from one of the following: IAFS 4930 Internship in International Affairs; a CU Boulder study abroad course; a CU in DC course; or other credit-bearing off-campus experience approved by the program. The 3 credits that fulfill the off-campus experience requirement cannot be applied to any other International Affairs major requirement. Fulfillment of the off-campus experience requirement through study abroad is subject to the student's final transcript from the Office of Education Abroad. Students should contact their advisor (https://www.colorado.edu/iafs/student-resources/advising/) with questions.

### Language Requirement

A third year, university-level proficiency in a foreign language appropriate to the geographic concentration is required. This requirement may be met by completion of one or two semester-long, third year, university-level grammar courses (depending on the language) with a grade of C- or better, while also satisfying language department requirements for advancement through the sequence. See the International Affairs Program (http://www.colorado.edu/iafs/) website for more information.

### Senior Seminar (3 credit hours)

| Code | Title | Credit Hours |
|---|---|---|
| Choose one of the following: | | 3 |
| IAFS 4500 | The Post-Cold War World | |
| IAFS 4800 | Honors Seminar in International Affairs | |
| PACS 4500 | Senior Seminar: Research in Conflict Contexts (for IAFS majors in PACS only) | |
| **Total Credit Hours** | | **3** |

## Recommendations

- All international affairs majors should have a good command of the English language.
- Students should choose electives with a view to their relevance to this program or usefulness as prerequisites for upper-division work.

- Students in international affairs are encouraged to consider the possibility of participating in one of the Study Abroad programs affiliated with the University of Colorado. Students wishing to participate in such a program should contact their advisor to work out an appropriate program.
- Internships are a useful experience for students seeking a career in international affairs. The (Internship in International Affairs (IAFS 4930)) provides the opportunity to earn academic credit for appropriate internships in the field. This course is generally offered during the spring and fall semesters and during summer sessions. Interested sophomores, juniors or seniors should consult with the director of the Internship Program. An application is required for admission to the Internship Program; see the International Affairs Program (http://www.colorado.edu/iafs/) website for more details. IAFS 4930 could count for the off-campus experience with approval from the internship director.
- The IAFS Honors Program offers the opportunity to learn and apply research skills for a select number of IAFS majors. Entry into the IAFS Honors Program is limited to seniors with a 3.40 major GPA and a 3.30 overall GPA. The Honors Seminar in International Affairs (IAFS 4800—offered each fall semester) provides instruction in research methods and facilitates the development of a sound research project. Research continues into the spring semester under the guidance of individual faculty members and through the continuation course, Honors in International Affairs (IAFS 4810). Interested and eligible students should consult with their academic advisor and the director of the Honors Program before spring break of their junior year. An application is required for admission to the Honors Program; see the International Affairs Program (http://www.colorado.edu/iafs/) website for more details. IAFS 4810 could count for either an upper-division functional area and/or a geographic concentration class with approval from the honors director.
- Students interested in international affairs may want to consider the Global Studies Residential Academic Program offered through the residence halls. See Residential Academic Programs for information.
- International affairs majors who wish to minor in political science must apply the following additional rules:
  - No more than 9 credit hours toward the PSCI minor can come from courses that count toward another major
  - International affairs majors must take at least one upper-division course in American politics and one course (lower- or upper-division) in political theory, in addition to the regular minor requirements.

The specific courses that may be counted to meet the requirements in this program are determined by the committee on international affairs and the dean of the College of Arts and Sciences.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in international affairs, students should meet the following requirements:

- Declare the major by the beginning of the second semester
- Begin language study by the third semester
- Complete the introductory requirements and any lower-division economics/methods requirements by the end of the sophomore year
- Begin geographic concentration and any upper-division economic/methods courses by the first semester of the junior year
- Begin upper-division general international affairs requirements by the first semester of the junior year
- Successfully complete any remaining major requirements by the end of the eighth semester
- See your IAFS advisor by the end of sophomore year to plan study abroad, the off-campus experience, and language requirements

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will fulfill all 12 credits of the Social Sciences area of the Gen Ed Distribution Requirement. Depending on the courses selected within the major, students can also potentially complete some or all credits toward the Arts & Humanities area of the Gen Ed Distribution Requirement and both categories in the Gen Ed Diversity Requirement. The off-campus experience should be completed in the third or fourth year through an Education Abroad program, IAFS 4930 with an approved internship or other off-campus experience course approved by IAFS.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| IAFS 1000 | Global Issues and International Affairs | 4 |
| PSCI 2223 | Introduction to International Relations | 3 |
| Beginning Foreign Language 1 (if needed, does not fulfill IAFS major course requirements) | | 4-5 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| | **Credit Hours** | **14-15** |
| **Spring Semester** | | |
| Lower-division Economics/Methods course (if needed; see IAFS website for options) | | 3-4 |
| Beginning Foreign Language 2 (if needed, does not fulfill IAFS major course requirements) | | 4-5 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| | **Credit Hours** | **14-16** |
| **Year Two** | | |
| **Fall Semester** | | |
| Lower-division Economics/Methods course (if needed; see IAFS website for options) | | 3-4 |
| Intermediate Foreign Language 1 (If needed; does not fulfill IAFS major course requirements) | | 3-5 |
| Gen. Ed Distribution/Diversity course (example: Arts & Humanities/US Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15-18** |
| **Spring Semester** | | |
| PSCI 2012 | Introduction to Comparative Politics | 3 |
| Intermediate Foreign Language 2 (If needed; does not fulfill IAFS major course requirements) | | 3-5 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |

| | |
|---|---|
| Elective | 3 |
| **Credit Hours** | **15-17** |
| **Year Three** | |
| **Fall Semester** | |
| Upper-Division Foreign Language (if needed; see IAFS website for options) | 3-5 |
| Upper-Division Economics/Methods course (if needed; see IAFS website for options) | 3-4 |
| IAFS Functional Area 1 - Development & Culture, e.g. (see IAFS website for options) | 3 |
| IAFS Geographic Concentration - Contemporary History (see IAFS website for options) | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | 3 |
| **Credit Hours** | **15-18** |
| **Spring Semester** | |
| Upper-Division Foreign Language (if needed; see IAFS website for options) | 3-5 |
| Upper-Division Economics/Methods course (if needed; see IAFS website for options) | 3-4 |
| IAFS Functional Area 2 - International Economics, e.g. (see IAFS website for options) | 3 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/Global Perspective) | 3 |
| IAFS Geographic Concentration - Africa/Middle East, Asia, Europe/Eurasia, or Latin America (see IAFS website for options) | 3 |
| **Credit Hours** | **15-18** |
| **Year Four** | |
| **Fall Semester** | |
| IAFS 4500 or IAFS 4800 Senior Seminar | 3 |
| IAFS Functional Area 3 - Political Geography, e.g. (see IAFS website for options) | 3 |
| IAFS Functional Area 4 - International Institutions, e.g. (see IAFS website for options) | 3 |
| IAFS Geographic Concentration - Africa/Middle East, Asia, Europe/Eurasia, or Latin America (see IAFS website for options) | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | 3 |
| Elective or Upper-division Elective (if needed) | 3 |
| **Credit Hours** | **18** |
| **Spring Semester** | |
| IAFS 4930 Internship in International Affairs (or other approved course to fulfill off-campus experience if not studying abroad) | 3 |
| IAFS Additional Functional Area (1 of 2 required; see IAFS website for options) | 3 |
| IAFS Additional Functional Area (2 of 2 required; see IAFS website for options) | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) - Upper-division (if needed) | 3 |
| Elective or Upper-division Elective (if needed) | 3 |
| Elective if needed to reach 120 total credits | 0-3 |
| **Credit Hours** | **15-18** |
| **Total Credit Hours** | **121-138** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Understand and examine fundamental issues, interdisciplinary theories and approaches to the study of international affairs.
- Analyze international challenges from a political, economic, historical and cultural perspective.
- Consider issues related to a specific geographic region of the world, including historical factors that give rise to regional institutions and processes.
- Communicate, orally and in writing, about international affairs to scholars in the field and to a broader audience, including in other cultural contexts.
- Develop grammar-based proficiency in a foreign language.

# International Affairs - Minor

With the increasing importance of world issues to the United States, employment opportunities in government, international organizations and business continue to expand. Today there is an urgent need for college graduates with a background in international affairs. To meet this need, the University of Colorado Boulder offers a minor in international affairs, giving students in various programs an interdisciplinary perspective on the world today.

# Requirements

## Required Courses and Credits

Complete the lower-division, upper-division and capstone requirements below for a total of 19 credits.

- All coursework applied to the minor must be completed with a grade of C- or better (no pass/fail work may be applied).
- The grade point average for all minor degree coursework must equal 2.00 (a grade of C) or higher.
- Students may apply no more than 9 credit hours of transfer work towards the minor.

| Code | Title | Credit Hours |
|---|---|---|
| **Lower-Division Requirement** | | |
| IAFS 1000 | Global Issues and International Affairs | 4 |
| **Upper-Division Electives** | | |
| Complete 12 credits of upper-division electives from the IAFS functional areas. Electives must be chosen from at least three of the four IAFS functional areas. Students cannot apply more than two IAFS Functional Area classes from any one discipline/department (e.g., PSCI, ECON). | | 12 |
| *Development and Culture (Functional Area I)* | | |
| ANTH 4020 | Explorations in Anthropology (approved topics only) | |
| ANTH 4500 | Cross-Cultural Aspects of Socioeconomic Development | |
| COMM 3410 | Intercultural Communication | |
| ECON 3784 | Economic Development and Policy | |
| ECON/GEOG 4292 | Migration, Immigrant Adaptation, and Development | |
| ECON 4774 | Topics in Economic Development, History and Political Economy | |

| | |
|---|---|
| ECON 4784 | Economic Development |
| ECON 4794 | Economic Growth |
| GEOG/WGST 3672 | Who Runs the World? Sex, Power, and Gender in Geography |
| GEOG 3682 | International Development: Economics, Power, and Place |
| GEOG 3692 | Introduction to Global Public Health |
| GEOG 4632 | Development Geography |
| GEOG 4852 | Health and Medical Geography |
| IAFS/JWST 3600 | Contemporary Jewish Societies |
| IAFS/SCAN 3631 | Arctic Society and Culture |
| IAFS/ENVS 3640 | Data Analysis for Global Environmental Affairs |
| IAFS 3670/ GEOG 3622 | Cities of the Global South |
| LING 3545 | World Language Policies |
| MUEL 3862 | Music and Global Health |
| PACS 3860 | Environmental Conflict and Conflict Resolution |
| PSCI 4012 | Global Development |
| PSCI 4732 | Critical Thinking in Development |
| PSCI 4283 | International Migration and Policy |
| SOCY 3002 | Population and Society |
| SOCY/WGST 3012 | Gender and Development |
| SOCY 4007 | Global Human Ecology |
| SOCY 4052 | Social Inequalities in Health |
| WGST 3500 | Global Gender Issues |
| WGST 4300 | Sex, Power, Politics: International Perspectives |
| *International Economics, Business, Political Economy (Functional Area II)* | |
| ECON 3403 | International Economics and Policy |
| ECON 3545 | Environmental Economics |
| ECON 4413 | International Trade |
| ECON 4423 | International Finance |
| ECON 4504 | The New Institutional Economics: Institutions, Contracts and Economic Outcomes |
| ECON 4545 | Environmental Economics |
| FNCE 4060 | Special Topics in Finance |
| INBU 3300 | International Business and Management |
| INBU 3450 | International Business and Marketing |
| INBU 4200 | International Financial Management |
| PSCI 3092 | Comparative Political Economy |
| PSCI 3213 | International Political Economy |
| *Political Geography, International Security, Foreign Policy (Functional Area III)* | |
| ANTH/JWST 4580 | The Holocaust: An Anthropological Perspective |
| GEOG 3742 | Place, Power, and Contemporary Culture |
| GEOG 4712 | Political Geography |
| GEOG 4742 | Topics in Environment and Society (approved topics only) |
| GEOG 4762 | Geographies of Political Islam |
| HIST 4050 | |
| HIST 4126 | History of U.S. Foreign Relations Since 1941 |
| HIST 4146 | |
| HIST 4166 | The Vietnam War in US Politics and Culture |
| IAFS 3010 | Islam, Geopolitics and Society: Gender, Identity and Place |
| IAFS 3500/ HIST 4190 | French Connections: Contemporary France and America in Historical Context |
| IAFS/JWST 3650 | History of Arab-Israeli Conflict |
| PACS 3800 | Security Studies |
| PHIL 3190 | War and Morality |
| PSCI 3123 | War, Peace, and Strategic Defense |
| PSCI 3143 | Current Affairs in International Relations |
| PSCI 3163 | American Foreign Policy |
| PSCI 3193 | International Behavior |
| PSCI 4243 | Modern Warfare: Terrorism, Ideology, Identity |
| *International Institutions, Rights and Norms (Functional Area IV)* | |
| ANTH 4525 | Global Islams |
| HIST 4820 | Human Rights: Historical Perspectives |
| IAFS 3630/ SCAN 3631 | Radical Nationalism in Contemporary Northern Europe |
| INVS 4402 | Nonviolent Social Movements |
| MUEL 3882 | Music and Violence |
| PACS 3850 | International Conflict Resolution and Peacebuilding |
| PACS 3870 | Nonviolent Civil Resistance: Movements and Strategies |
| PHIL 3260 | Philosophy and the International Order |
| PRLC 3810 | Global Issues in Leadership |
| PSCI 3062 | Revolution and Political Violence |
| PSCI 3183 | International Law |
| PSCI 4173 | International Organizations |
| PSCI 4252 | Politics of Ethnicity and Nationalism |
| PSCI 4783 | Global Issues |
| SOCY/ENVS 4027 | Inequality, Democracy, and the Environment |
| SOCY 4121 | Sociology of Religion |
| WGST 3220 | Women in Islam |
| WGST 3712 | Topics in Global Gender and Sexuality Studies (SS) |
| WGST 4010/ SOCY 4000 | Gender, Genocide and Mass Trauma |
| WGST 4500/ PSCI 4391 | Gender Politics and Global Activism |
| **Capstone** | |
| IAFS 3000 | Special Topics in International Affairs 3 |
| **Total Credit Hours** | **19** |

# European Union Studies - Certificate

The certificate in European Union studies (CEUS) allows CU Boulder undergraduates in a range of social science and humanities programs to gain skills and understanding around the European Union (EU). The certificate documents a student's expertise in European Union studies, opening opportunities for further study, internships and careers in public, private or nonprofit sectors.

CEUS is housed in the International Affairs Program (IAFS) in the College of Arts and Sciences, and the certificate curriculum is intentionally interdisciplinary. Students admitted into the program will complete coursework with EU content going beyond what they can obtain merely by completing any single major. They will also participate in cocurricular activities to augment their understanding of the development, focus, functioning and future of the EU.

Upon completion of this program, students will have a demonstrated understanding of the European Union; its politics, history, institutions, economics, policies, member states, relations with the US, role in the world and much more.

For more information, visit the program's European Union Studies (https://www.colorado.edu/iafs/academics/certificates/european-union-studies/) webpage.

## Requirements

### Application and Admission

For more information and to apply, contact iafs@colorado.edu (GEAcertificate@colorado.edu). The application includes an essay describing the applicant's interests and background in EU studies and reasons or motivations for pursuing this certificate.

### Program Requirements

A total of 19 credit hours of coursework is required to complete the certificate. All credit hours must be completed with grades of C- or better and an overall GPA of 3.000. None of the required hours may be taken pass/fail.

In addition to their coursework, CEUS students will attend at least four EU-related lectures and events during their semesters of residency at CU and will submit a brief write-up of the main themes or discussion points of the events to iafs@colorado.edu.

| Code | Title | Credit Hours |
|---|---|---|
| **Lower-Division Core Requirements** | | **7** |
| It is essential that all students in the EU Studies Certificate program begin with a common framework for the analysis of international institutions and relations as a background for the upper-division coursework in EU studies. All students must therefore complete the following lower-division requirements: | | |
| PSCI 2012 | Introduction to Comparative Politics | |
| IAFS 1000 | Global Issues and International Affairs | |
| **Upper-Division Core Requirements** | | **3** |
| PSCI 4302 | European Union Politics | |
| **Upper-Division Electives** | | **9** |
| Students must complete at least 9 hours of relevant upper-division coursework, including at least 6 credit hours from outside their major or minor, selected from the list below. Courses not listed here but with a focus on EU issues may be applied to this elective requirement with approval from IAFS. This includes, in particular, courses taken on authorized study abroad program in EU countries. | | |
| ECON 4514 | Economic History of Europe | |
| FNCE 4060 | Special Topics in Finance (certain topics) | |
| GEOG 4892 | Geography of Western Europe | |
| GRMN 3150 | Issues in German Politics, Literature and Media | |
| GRMN/WGST 4301 | Gender, Race and Immigration in Germany and Europe | |
| HIST 4212 | The Age of Religious Wars: Reformation Europe,1500-1648 | |
| HIST 4053 | | |
| HIST 4233 | | |
| HIST 4423 | German History 1848-1989: Weimar Republic, Nazism, State Socialism | |
| HIST 4424 | | |
| HIST 4442 | Europe since 1945 | |
| IAFS 3500 | French Connections: Contemporary France and America in Historical Context | |
| ITAL 4250 | History of Modern Italy | |
| PSCI 3143 | Current Affairs in International Relations | |
| PSCI 3172 | Democracy and Its Citizens in the US and EU | |
| PSCI 3183 | International Law | |
| PSCI 4002 | Western European Politics | |
| PSCI 4062 | East European Politics | |
| PSCI 4173 | International Organizations | |
| PSCI 4213 | Europe and the International System | |
| SPAN 3200 | Spanish Culture | |
| SPAN 3240 | Catalan Culture 1: Nation and Art | |
| SPAN 3250 | Catalan Culture 2: Contemporary Trends and Barcelona | |
| SPAN 3230 | Discovering Barcelona: Culture and Heritage | |
| SPAN 3270 | Barcelona: Understanding Local and Immigrant Cultures | |
| **Total Credit Hours** | | **19** |

Students earn the certificate in European Union studies upon verification by IAFS that they have completed a series of curricular and co-curricular requirements.

# Global Environmental Affairs - Certificate

The certificate in Global Environmental Affairs provides students with opportunities to personalize undergraduate learning across disciplinary lines and to deepen student engagement with world problems. The certificate includes both formal coursework and a 3-credit off-campus experiential component. This experiential learning component may be completed through internship, study abroad or CU in DC. This requirement

not only enriches the students' educational experience through applied learning and fieldwork, but it also helps students demonstrate their skills and experience as they prepare for graduation and the job market.

The certificate in global environmental affairs is offered jointly by the Program in International Affairs (IAFS) and the Department of Environmental Studies (ENVS). This certificate is open to all majors at CU Boulder, and it draws upon courses and interdisciplinary expertise in both IAFS and ENVS to link and develop knowledge of global environmental policies and practices. For IAFS and ENVS students, it will provide additional value for the two interdisciplinary majors.

For more information and to apply, contact GEAcertificate@colorado.edu.

# Requirements

## Program Requirements

The certificate requires 19–20 credits, depending on the courses chosen. All credit hours must be completed with grades of C- or better and an overall GPA of 2.50. None of the required hours may be taken pass/fail.For more details and application information, see the International Affairs Program (http://www.colorado.edu/iafs/) website.

## Program Tracks

### Track 1: ENVS Majors

| Code | Title | Credit Hours |
|---|---|---|
| **Introductory Course** | | |
| IAFS 1000 | Global Issues and International Affairs | 4 |
| **Data Analysis Requirement** | | |
| Choose one of the following: | | 3 |
| ENVS/IAFS 3640 | Data Analysis for Global Environmental Affairs | |
| EBIO 4155 | Ecosystem Ecology | |
| PSCI 2075 | Quantitative Research Methods | |
| **Experiential Requirement** | | |
| Choose one of the following (courses and internships must have clear environmental content): | | 3 |
| ENVS 3930 | Internship | |
| Study abroad class | | |
| The Washington Center class | | |
| **Electives** | | |
| Choose 9 credits from the following: | | 9 |
| ENVS 4100 | Special Topics in Environmental Studies (approved sections for the certificate) | |
| ENVS 4800 | Capstone: Critical Thinking in Environmental Studies (approved sections for the certificate) | |
| ECON 3403 | International Economics and Policy | |
| ECON 3784 | Economic Development and Policy | |
| IAFS 3000 | Special Topics in International Affairs (approved sections for certificate) | |
| PSCI 4012 | Global Development | |
| PSCI 4732 | Critical Thinking in Development | |
| **Total Credit Hours** | | **19** |

### Track 2: IAFS Majors

| Code | Title | Credit Hours |
|---|---|---|
| **Introductory Course** | | |
| ENVS 1000 | Introduction to Environmental Studies | 4 |
| **Data Analysis Requirement** | | |
| Choose one of the following: | | 3 |
| ENVS/IAFS 3640 | Data Analysis for Global Environmental Affairs | |
| EBIO 4155 | Ecosystem Ecology | |
| PSCI 2075 | Quantitative Research Methods | |
| **Experiential Requirement** | | |
| Choose one of the following (courses and internships must have clear environmental content): | | 3 |
| IAFS 4930 | Internship in International Affairs | |
| Study abroad class | | |
| The Washington Center class | | |
| **Electives** | | |
| Choose 9 credits from the following: | | 9 |
| ENVS 4100 | Special Topics in Environmental Studies (approved sections for the certificate) | |
| ENVS 3070 | Energy and the Environment | |
| ENVS/GEOL 3520 | Energy and Climate Change: An Interdisciplinary Approach | |
| ENVS 3525 | Intermediate Environmental Problem Analysis: Topical Cornerstones | |
| ENVS 3621 | Energy Policy and Society | |
| **Total Credit Hours** | | **19** |

### Track 3: All Other Majors

| Code | Title | Credit Hours |
|---|---|---|
| **Introductory Courses** | | |
| IAFS 1000 | Global Issues and International Affairs | 4 |
| ENVS 1000 | Introduction to Environmental Studies | 4 |
| **Data Analysis Requirement** | | |
| Choose one of the following: | | 3 |
| ENVS/IAFS 3640 | Data Analysis for Global Environmental Affairs | |
| EBIO 4155 | Ecosystem Ecology | |
| PSCI 2075 | Quantitative Research Methods | |
| **Experiential Requirement** | | |
| Choose one of the following (courses and internships must have clear environmental content): | | 3 |
| ENVS 3930 | Internship (or other internship class) | |
| Study abroad class | | |
| The Washington Center class | | |
| **Electives** | | |
| Choose 6 credits from the elective list of Track 1 or Track 2. | | 6 |
| **Total Credit Hours** | | **20** |

# Jewish Studies

The program in Jewish Studies, which is open to all students of all backgrounds, Jewish and non-Jewish, explores Jewish culture, history,

society, and thought from a broad, interdisciplinary perspective. The program reflects the core goals of Colorado's flagship university: to provide an outstanding liberal arts education, to foster critical thought, and to instill a keen appreciation of humankind's interrelatedness and diversity. At its core, the major trains students to be global citizens and to engage in and enact social justice in the world.

Jewish Studies is home to internationally acclaimed faculty engaged in cutting-edge research and provides opportunities for students to study with leading artists, scholars and professionals working in the field of Jewish Studies. The program offers an innovative and contemporary curriculum designed to provide a strong foundation in cultural education and to connect Jewish thought and text to action and people's lives.

The program offers a Bachelor of Arts in Jewish Studies (students can pursue either a culture intensive concentration or a foreign language intensive concentration), a minor in Jewish Studies and a minor in Hebrew and Israel Studies.

An undergraduate degree in Jewish Studies emphasizes knowledge and awareness of:

- The history of global Jewish communities over time, including the history of Israel and Palestine, biblical and medieval Jewish history, history of Jewish communities in the Mediterranean, the history of the Holocaust and post-Holocaust American Judaism;
- Dimensions of Jewish culture across variant Jewish communities, including differences in Jewish cultural practices, Jewish music and film, and Jewish philosophies, religious practices, mysticisms and thought;
- Jewish literature from the biblical period to the present, including Israeli literature, the Hebrew origins of western civilization, and contemporary Jewish literature; and
- Global languages of the Jewish people, including Hebrew, Arabic, Spanish, French, Italian, Russian, German, Ladino and others (for students pursuing the foreign language intensive concentration).

In addition, it is expected that students completing the degree in Jewish Studies will develop:

- Fundamental skills in critical thinking, comparative analysis, oral and written expression;
- A well-rounded perspective of the diversity of the Jewish experience;
- An ability to engage in dialogues with people who have different opinions;
- Professional skills intended to aid them in their career ambitions.

Jewish Studies alumni have gone on to careers in politics, international policy, criminal justice, nonprofit, business, education, law, public relations, administration, marketing, real estate and journalism. Many have pursued additional education in graduate programs and professional schools.

The study of Jewish culture, society, history and religion is, by its nature, comparative and interdisciplinary. Our program offers many cross-listed classes with other departments on campus to facilitate a well-rounded learning experience. Many of our courses also satisfy core and general education requirements.

The program also offers many professional development opportunities to help students find employment after graduation in a field that fits their interests. The Internship in Jewish Studies (JWST 3930) pairs students with local organizations based on the student's long-term career goals.

Majors are also required to complete a Capstone in Jewish Studies (JWST 4000) in which they design an artistic project or research paper under the supervision of a faculty mentor that serves as a summation of their work in Jewish Studies. Majors and minors are eligible to join the Jewish Studies Undergraduate Student Advisory Board. Jewish Studies also highly encourages students to study abroad and has instituted two Global Seminars, one to Istanbul and the other to Israel.

The program in Jewish Studies also offers undergraduate and graduate students an opportunity to apply for fellowships in our archival collections so they can learn how to conduct primary research first-hand.

The program in Jewish Studies is growing and new courses are continually being added. Visit the Jewish Studies (https://www.colorado.edu/jewishstudies/) website for the most current course information.

**Course codes for this program are JWST and HEBR.**

# Bachelor's Degree

- Jewish Studies - Bachelor of Arts (BA) (p. 452)

# Minors

- Hebrew and Israel Studies - Minor (p. 457)
- Jewish Studies - Minor (p. 457)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Boyd, Samuel L. (https://experts.colorado.edu/display/fisid_155484/)
Associate Professor; PhD, University of Chicago

Goodman, Nan (https://experts.colorado.edu/display/fisid_100633/)
Professor; PhD, Harvard University

Kalisman, Hilary Falb (https://experts.colorado.edu/display/fisid_164096/)
Endowed/Named Professor; PhD, University of California, Berkeley

Malin, Jonathan (https://experts.colorado.edu/display/fisid_151714/)
Associate Professor; PhD, University of Chicago

Mehta, Samira (https://experts.colorado.edu/display/fisid_165972/)
Assistant Professor, Director, Associate Faculty Director; PhD, Emory University; MDiv, Harvard University

Rivlin, Eyal Ofer (https://experts.colorado.edu/display/fisid_151100/)
Teaching Associate Professor, Endowed/Named Professor; MA, Naropa Institute

Wartell, Rebecca (https://experts.colorado.edu/display/fisid_164288/)
Teaching Assistant Professor; PhD, Monash University

Weber, Beverly Marie (https://experts.colorado.edu/display/fisid_144523/)
Professor; PhD, University of Massachusetts Amherst

# Courses

**JWST 1234 (3) Mysticism and the Jewish American Literary Tradition**
Explores the mystical tradition within Judaism from ancient times to the present. With roots in the Hebrew Bible, Jewish mysticism is one of the oldest forms of mysticism and has had an influence on some of the greatest philosophical traditions of western civilization.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 1340
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 1818 (3) Jewish History to 1492**
Focus on Jewish history from the Biblical period to the Spanish Expulsion in 1492. Study the origins of a group of people who call themselves, and whom others call, Jews. Focus on place, movement, power/powerlessness, gender, and the question of how to define Jews over time and place. Introduces Jews as a group of people bound together by a particular set of laws; looks at their dispersion and diversity; explores Jews' interactions with surrounding cultures and societies; introduces the basic library of Jews; sees how Jews relate to political power.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 1818 and RLST 1818
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Asia Content

**JWST 1828 (3) Jewish History Since 1492**
Surveys the major historical developments encountered by Jewish communities beginning with the Spanish Expulsion in 1492 up until the present day. Studies the various ways in which Jews across the modern world engaged with the emerging notions of nationality, equality and citizenship, as well as with new ideologies such as liberalism, socialism, nationalism, imperialism and antisemitism.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 1828 and RLST 1828
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**JWST 1830 (3) Global History of Holocaust and Genocide**
Examines the interplay of politics, culture, psychology and sociology to try to understand why the great philosopher Isaiah Berlin called the 20th century, "The most terrible century in Western history." Our focus will be on the Holocaust as the event that defined the concept of genocide, but we will locate this event that has come to define the 20th century within ideas such as racism, imperialism, violence, and most important, the dehumanization of individuals in the modern world.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 1830 and RLST 1830
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**JWST 1900 (3) Introduction to the Hebrew Bible/Old Testament**
Examine the content of the Hebrew Bible and critical theories regarding its development. Explore the development of these texts, as well as their foundational role for rabbinic literature and the New Testament. Assess the enduring influence of the Hebrew Bible/Old Testament in world literature and culture (such as in art and music).
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 1900
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**JWST 1910 (3) Introduction to the New Testament**
Examine the background, content and influence of the New Testament books. Studies the diverse perspectives contained in the various books, as well as the process of canonization. Assess the influence of the New Testament on the development of Christianity as well as world (eastern and western) culture.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 1910
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 2350 (3) Introduction to Jewish Culture**
Explores the development and expressions of Jewish cultures across the chronological and geographical map of the Jewish people, with an emphasis on the variety of Jewish ethnicities and their cultural productions, cultural syncretism, and changes, including such issues as sexuality and foodways. Sets the discussion in relevant contexts and looks at cultural representations that include literary, religious and visual texts.
**Equivalent - Duplicate Degree Credit Not Granted:** GSLL 2350
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Diversity-U.S. Perspective

**JWST 2502 (3) Representing the Holocaust**
Examines representations of the Holocaust in film, memoirs, poetry, novels, graphic novels, memorials. Considers questions such as: How to depict an event that resists representation? How does the memory of the Holocaust transform over generations? How do representations of the Holocaust inform our understanding of other experiences of racism and genocide? What ethical issues are at stake?
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 2502
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 2551 (3) Modern Jewish Literature**
Examines Jewish experience through the study of literary texts from around the world, mainly from the 20th and 21st centuries. Discusses issues pertaining to secularism and tradition; diasporas and homelands; modernity and questions of identity raised by the intellectual transitions brought about by political and social emancipation; sexualities; enormous changes wrought by population redistributions, world wars and rapid cultural transformations.
**Equivalent - Duplicate Degree Credit Not Granted:** GSLL 2551
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hebrew

**JWST 2600 (3) Judaism, Christianity, and Islam: Abrahamic Religions**
In Judaism, Christianity, and Islam, Abraham is described as a founding figure. In recent times, the label ¿Abrahamic Religions¿ has become increasingly important both as a way to describe the origins and beliefs of Judaism, Christianity, and Islam and as a means for finding common ground in political and religious discourse. Yet in each religion Abraham is also used in strikingly different ways and for distinct purposes. In this course, we will look at these three religious traditions and how each one imagines Abraham. In particular, the focus will be on how each religion uses Abraham to construct foundational stories of a special relationship to God, stories that ultimately serve to promote religious identity over time.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 2600
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**JWST 2810 (3) Antisemitism: Histories, Concepts, Practices**
This class explores the main histories, concepts, and practices of antisemitism. It analyzes how and why they emerged and what accounts for their persistence. Why are Jews targeted? Is there a ¿new antisemitism¿¿ since the 1970s¿ that differs significantly from older manifestations? How is antisemitism related to anti-Zionism? What is its relationship with racism? And how have political, social, and religious groups and organizations responded to these threats and what challenges have they faced?
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 2810
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 2850 (3) Sex, Religion, and Politics in US Healthcare**
Examines the roles of religion, gender, and sexuality in the politics of healthcare in the United States. Topics may include sexual health and education; debates over health and sexuality during the HIV/AIDS crisis; the expansion and contraction of access to birth control; public debates over abortion; debates over religion, politics, and healthcare for transgender people; and histories of religion, health, and race.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 2850
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 3100 (3) Judaism**
Explores Jewish religious experience and its expression in thought, ritual, ethics, and social institutions.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 3100
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**JWST 3110 (3) Of Jewish Legends, Folktales and the Supernatural**
Explores Jewish traditional legends, folktales and stories of the supernatural. Starts with Aggadic Talmud tales and Midrashic texts and focuses on later rabbinic and mystical texts and folktales ca 500-1900 C.E. from around the Jewish world with subjects ranging from didactic narratives extolling the virtues of the simple pure soul, to the horrors of a blood sucking vampiric outside world.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 3110
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 3120 (3) Radical Jews**
Explores major Jewish figures, and their cultural productions, who were radical in the challenges they posed and transformative in the effects they had on society. The figures we examine range from the Rabbis of the Talmud who revolutionized a sacrificial cult religion, to Western secularist Baruch Spinoza and American icons such as Allen Ginsberg, Gloria Steinem and Bob Dylan.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 3120
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 3150 (3) Jerusalem: The Holy City in History, Legend, and Religious Thought**
The history of Jerusalem and the stories that have given it prominence in the religious imagination continue to shape much of the world in which we live. In this class, we will survey approximately three millennia of the history of the city. We will ask methodological question, such as: What does it mean for a place to be conceived of as holy? How does this perceived holiness come about? What happens when holy places are destroyed and rebuilt? We will examine the biblical stories about Jerusalem not only as important sources themselves, but also for how they shape later religious traditions, specifically Judaism, Christianity, and Islam. As such, we will address what it means for the same place to be perceived as ¿holy¿ by differing, and often competing, groups. These contestations regarding Jerusalem will, then, allow us to engage issues of religious diversity and conflict both historically and in the present.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 3150
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 3200 (3) Religion and Feminist Thought**
Examines the origin of patriarchal culture in the theology and practices of Judaism and Christianity. Explores attitudes and beliefs concerning women as Judeo-Christian culture impacts gender roles and gender stratification through reading and discussion. Women's religious experience is studied from the perspective of feminist interpretations of religiosity.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3200
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 3202 (3) Women, Gender & Sexuality in Jewish Texts & Traditions**
Reads some of the ways Jewish texts and traditions look at women, gender and sexuality from biblical times to the present. Starts with an analysis of the positioning of the body, matter and gender in creation stories, moves on to the gendered aspects of tales of rescue and sacrifice, biblical tales of sexual subversion and power, taboo-breaking and ethnos building, to rabbinic attitudes towards women, sexuality and gender and contemporary renderings and rereadings of the earlier texts and traditions.
**Equivalent - Duplicate Degree Credit Not Granted:** HEBR 3202 and RLST 3202 and WGST 3201
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**JWST 3310 (3) The Bible as Literature**
No single book has been as influential to the English-speaking world as the Bible. We¿ll read the Hebrew Bible and the New Testament for stories, poetry, and wisdom traditions. We¿ll approach the Bible as literature by analyzing its plots, characters, and meanings. Students study its textual history, how there came to be a ¿Bible,¿ and the many writers, conflicts, and cultures from which it emerged. We¿ll consider the Bible¿s powerful influence on ethics and philosophy. Formerly ENGL 3312.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3310 and ENGL 3310
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 3401 (3) The Heart of Europe: Filmmakers and Writers in 20th Century Central Europe**
Surveys the major works of 20th century central and central east European film and literature. Examines cultural production in the non-imperial countries and non-national languages of the region including Yiddish, Belarusian, Czech, Hungarian, Polish and Romanian, among others. Traces the rise of nationalism over the course of the century from the age of empires through the Cold War.
**Equivalent - Duplicate Degree Credit Not Granted:** GSLL 3401
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 3501 (3) The German-Jewish Experience: From the Enlightenment to the Present**
Provides insight into the German-Jewish identity through essays, autobiographies, fiction and journalism from the Enlightenment to the post-Holocaust period. Examines the religious and social conflicts that typify the history of Jewish existence in German-speaking lands during the modern epoch.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 3501
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**JWST 3530 (3) Global Seminar: Jews and Muslims - The Multiethnic History of Istanbul**
Spend two weeks in Istanbul and examine Jewish-Muslim relations in a place that was for 500 years the crossroads of civilization. The only Muslim city in the 21st century with a large, thriving Jewish community, Istanbul models how people from different social classes, ethnicities and religious backgrounds can coexist.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3530 and RLST 3530
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**JWST 3600 (3) Contemporary Jewish Societies**
Uses transnational lens to explore contemporary debates about Jewish people, places and practices of identity and community; places that Jews have called 'home', and what has made, or continues to make those places 'Jewish'; issues of Jewish homelands and diasporars; gender, sexuality, food and the Jewish body; religious practices in contemporary contexts. Readings drawn primarily from contemporary journalism and scholarship.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3600 and GSLL 3600
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**JWST 3610 (3) Topics in International Affairs and Jewish Studies**
Explores topics in international affairs as it relates to Jewish culture and society. Subjects addressed under this heading vary according to student interest and faculty availability.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3610
**Repeatable:** Repeatable for up to 9.00 total credit hours.

**JWST 3650 (3) History of Arab-Israeli Conflict**
Explores the origins and development of the Arab-Israeli conflict. Traces Arab-Jewish/Israeli relations from the 19tj century through the Palestine Mandate, the evolution of Arab and Jewish nationalism and the creation of Israel to the present day.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3650
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**JWST 3681 (3) Refugees in German Culture**
Introduces the diversity of refugee migration in German culture through artistic and cultural "texts," including those created by or in collaboration with refugees (film, comic journalism, literature, blogs, hashtag campaigns, music, etc). These texts are discussed in relationship to theories of racism, precarity, and biopolitics together and contextualized by work from other disciplines. This interdisciplinary course is methodologically informed by the theory and practice of cultural studies. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3681, GRMN 3681 and AHUM 3681
**Recommended:** for students with sophomore standing or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 3820 (3) Topics in Jewish Studies**
Intensive study of a selected area or problem in Jewish Studies.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 3930 (3) Internship in Jewish Studies**
Learn beyond the classroom by interning in a local non-profit organization that connects with the Program in Jewish Studies through its mission and/or program. Interns will attend class to learn about work place ethics, professional development and leadership skills through a Jewish Studies lens. Interns will be supervised by the faculty member of record as well as the employer housing the intern.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisites HEBR 2350 or JWST 2350 or HIST 1818 or JWST 1818 or HIST 1828 or JWST 1828.

**JWST 4000 (1-3) Capstone in Jewish Studies**
Serves as the final product for students completing the major in Jewish Studies. Students will design a project under the supervision of a mentor that serves as the summation of their past work in Jewish Studies. Capstone projects can take the form of a thesis, film or another media. Instructor consent required for JWST minors.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Jewish Studies (JWST) BA majors only. Excludes JWST minors.

**JWST 4050 (3) Anthropology of Jews and Judaism**
Explores topics in Jewish anthropology. Uses the lens of anthropological inquiry to explore, discover and analyze different concepts within Jewish culture. Topics explored will include customs, religious practices, languages, ethnic and regional subdivisions, occupations, social composition, and folklore. Explores fundamental questions about the definition of Jewish identity, practices and communities.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4050
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4101 (3) Topics in Hebrew Studies**
Explores topics in Hebrew and Jewish literature and cultures. These may include topics such as diasporic literatures, Jewish artists and thinkers, courses on specific authors, figures or communities. Topics change each semester. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HEBR 4101
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4122 (3) Music in Jewish Culture**
Introduces students to a wide range of musical styles, traditions, genres, performers, composers, events and works that are part of Jewish culture, focusing on the twentieth and twenty-first centuries. Provides tools for understanding music on its own and in connection with issues of identity, diaspora, memory and liturgy. Includes opportunities for creative and critical engagement with Jewish music.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4122
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4170 (3) God and Politics**
Explores the relationship between religion and politics. Examining traditions such as Judaism and Christianity, this course considers diverse ways in which ancient, medieval and modern sources have imagined the role of religion in civic life. Some topics include the status of religious minorities, the nature of religious freedom and contemporary debates surrounding issues such as torture, sexuality and climate change.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4170 and RLST 5170
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4180 (3) Is God Dead?**
Explores debates about the following questions: does it make sense to believe in God? Should believing or not believing in God make a difference for how individuals behave? Examining ancient and modern views on the existence and nature of a higher power, this course considers topics including evil and suffering, religion and science and religion's role in politics.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4180 and RLST 5180
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4190 (3) Love and Desire**
Explores debates about the following questions: what and whom should humans and gods love, and what role should passions play in religion? Examining traditions such as Judaism and Christianity, this course considers diverse views on topics including religion and sexuality, the promise and perils of loving gods and humans, and the relationship between love, politics, and violence.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4190 and RLST 5190
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4200 (3) Religion and Reproductive Politics in the United States**
Focuses primarily on how Protestant, Catholic, and Jewish conversations about sexuality and reproduction have shaped access and attitudes towards reproductive health in the US over the course of the twentieth and twenty-first centuries.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4200, WGST 5200 and JWST 5200
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Diversity-U.S. Perspective

**JWST 4203 (3) Israeli Literature: Exile, Nation, Home**
Examines the creation and development of Israeli literature from its pre-State beginnings to the present day, from the writings of immigrants for whom Hebrew was not their mother tongue to a literature written by native Hebrew speakers. Considers texts written by Israeli Jewish and Arab writers and explores how ideas of exile, nation, and home play into the Israeli experience.
**Equivalent - Duplicate Degree Credit Not Granted:** HEBR 4203
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisites ENGL 4677 or JWST 4677 or GRMN 2502 or JWST 2502 or JWST 2551 or WRTG 3020.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4260 (3) Topics in Judaism**
Examines in depth central themes, schools of thought, and movements in Judaism, along with other traditions, across a range of historical periods.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4260 and RLST 5260
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4301 (3) Venice: The Cradle of European Jewish Culture**
Explores the development of European Jewish culture from the late Middle Ages to the present by focusing on Jewish life in the city of Venice, Italy. Emphasis is on the development of Venetian print culture and emergence of Italy as a center of Jewish publishing in both the religious and secular world. Examines a variety of cultural and historical material including early printings of the Talmud, the creation of Yiddish popular literature, Hebrew rabbinic literature, responses to political turmoil, and the aftermath of the Nazi genocide. Taught in English. Department enforced prerequisite: HEBR 2350 or JWST 2350 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** HEBR 4301
**Additional Information:** Arts Sci Core Curr: Literature and the Arts Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4302 (6) Global Seminar: Justice, Human Rights and Democracy in Israel**
Explore the challenges and complexities of justice, democracy and human rights in Israel and the West Bank through field trips, course work and service learning projects with Jerusalem based non-profit organizations. Acquire new knowledge and lived experience on critical issues facing Israelis and Palestinians with the wider scope of Middle East politics.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3520
**Recommended:** Prerequisites ANTH 4050 or JWST 4050 and IAFS 3600 or JWST 3600.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**JWST 4338 (3) History of Modern Israel/Palestine**
How did we get to this point? What histories do we need to know to understand the situation of Israelis and Palestinians today? To answer these questions, this course traces the intertwined histories of Israel/Palestine, Israelis and Palestinians from the late Ottoman period to the present. Topics include: nationalism and colonialism, the development of Zionisms, Palestinian nationalism, the Jewish community (Yishuv) under British rule, the founding of the State of Israel, Arab-Israeli and Palestinian-Israeli relations, Israel's minorities, the role of religion in Israel today and changing relationships between the United States, Israel and Palestinians.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4338
**Recommended:** Prerequisite HIST 1818 or JWST 1818 or HIST 1828 or JWST 1828 or HIST 1308 or JWST 2350 or other course work in Middle Eastern or Jewish History.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4348 (3) Topics in Jewish History**
Covers topics in Jewish history from biblical beginnings to present day. Topics vary each semester. Consult the online Schedule Planner for specific topics.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4348
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4358 (3) Childhood in Modern Israel/Palestine**
Examines topics relating to History, Jewish Studies and Israel/Palestine studies. Analyzes the history of modern childhood in Israel and Palestine from the 19th century to the present. Themes include agency, work, life cycle and culpability. Topics range from collective parenting on Israeli Kibbutzim, growing up in Ottoman Palestine, to the legal status of stone-throwing Palestinian children. Sources include memoirs, literature, films, monographs and articles.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4358 and JWST 5358 and HIST 5358
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST/JWST 4338 History of Modern Israel/Palestine, this course would give students relevant background on the history of the region, but is not required.

**JWST 4378 (3) Jews in and of the Middle East**
Examines the modern history and culture of Jewish communities under Islamic rule in the Middle East and North Africa; Jews' and Muslims' encounters with empire, westernization and nationalism; representations of Sephardi and Eastern Jews; Jewish-Muslim relations in Europe and the U.S.; and contact and conflict between Jews and Muslims in (and about) Israel/Palestine. Sources include memoirs, diaries, newspapers and films.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5378, JWST 5378, and HIST 4378
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**JWST 4388 (3) History Today: Global Intensive in Israel/Palestine**
This global intensive analyzes history, memory and nationalism in one of the areas where the relationship between these three categories is the most fraught: Israel/Palestine. After learning the historical background to the Arab/Israeli and Palestinian conflict in Boulder, students will visit Israel and the West Bank/Occupied Territories/Judea and Samaria. Through this course, students will gain a nuanced, multi-sided perspective of Israel, Palestine and the uses of history and memory.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4388
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4454 (3) Jewish Thought in Modern History**
Takes students on a journey from Medieval Spain to contemporary United States to explore how Jews, living in different societies, have attempted to reshape and interpret central Jewish values and beliefs in accordance with the prevailing ideas of their host societies. Focuses on the historical context of each Jewish society that produced the thinkers and ideas considered in this course.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4454
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4524 (3) Expulsions and Diasporas: The Jews of Spain and Portugal**
Considers the experience of Jews and converses during the Spanish Inquisition and the Iberian expulsions of the 1490s. Sephardic refugees faced social, economic, and political upheavals in the decades after their exile, leading to new communities in settings as diverse as North Africa, India, Turkey, the Caribbean, and the Americas. The study of texts and traditions from the Sephardic diaspora will explore themes including forced conversion, rabbinic authority, colonialism, and mercantile networks. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4524
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4554 (3) Researching European Jewish Life**
This upper-level hybrid class is a research and learning initiative of CU Boulder¿s History Department with the Department of History, Philosophy, and Jewish Studies at the Open University of Israel and the Center for Research in Antisemitism at the Technical University of Berlin, Germany. It revolves around an in-person research seminar in Europe. Topics will vary, beginning with a focus on egodocuments in the study of twentieth-century German Jewish life.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4554 and HIST 5554
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only. Restricted to students who have taken either HIST/JWST 1828, HIST/JWST/RLST 1830, HIST 4423, HIST 4433 or GRMN 2301; or by permission of instructor.

**JWST 4580 (3) The Holocaust: An Anthropological Perspective**
Focuses on the Holocaust during the Third Reich, which involved the murder of millions of people, including six million Jews. Reviews the Holocaust's history, dynamics and consequences as well as other genocides of the 20th century, using an anthropological approach.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4580
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4677 (3) Jewish-American Literature**
This course explores a variety of Jewish-American literary works from the late-nineteenth century to the present, from Abraham Cahan to Philip Roth to Cynthia Ozick. We examine a number of issues, including what a Jewish-American writer is or is not, what role the immigrant experience plays in Jewish writing, how assimilation is represented, how this literature changes over time, what the significance is of gender roles, and how it draws from spiritual and mystical traditions. Formerly ENGL 3677.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 4677
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**JWST 4800 (3) Ethics, Medicine and the Holocaust: Legacies in Health and Society**
Engages the disturbing fact that German health care professionals actively participated in the architecture and machinery of the Third Reich; explores the implications of these facts for contemporary health care ethics; expands beyond the Holocaust to consider the ramifications for our understanding of the problem of evil in general.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 5800
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4837 (3) Jews in the American West**
Explores the history of Jewish migration and settlement in the American West. Jewish pioneers in the nineteenth century included explorers, businessmen, and cowgirls that established small communities in territories that had not yet achieved statehood. As westward expansion progressed, Jews continued to find opportunity in the West, balancing assimilation with unique expressions of religious identity. The history of communal institutions including synagogues, hospitals and summer camps offers new perspectives on this underrepresented segment of American Jewry.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4837
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4900 (1-6) Independent Study in Jewish Studies**
Working with a faculty member in Jewish Studies on an independent study research project provides students with an opportunity to learn outside the formal classroom structure, with individual direction from Jewish Studies faculty on a topic of mutual interest not offered in regularly scheduled classes. (Independent study may not be used to substitute for a regular course not being offered in a given term.)
**Repeatable:** Repeatable for up to 6.00 total credit hours.

# Jewish Studies - Bachelor of Arts (BA)

The Bachelor of Arts in Jewish Studies is designed to help students develop the professional skills they need to become engaged global citizens, preparing them to obtain a job after graduation, pursue graduate studies and engage in dialogues about social justice around the world. By studying the world through the lens of Jewish culture, history, literature, society, and thought from a broad, interdisciplinary perspective, our students gain fundamental critical thinking, problem solving and communication skills.

Students pursuing a BA in Jewish studies may choose one of the following two concentrations:

- Culture intensive concentration, in which students will pursue an in-depth study of Jewish culture.
- Foreign language intensive concentration, in which students will obtain advanced language skills in addition to considerable knowledge of Jewish culture.

The major in Jewish studies is open to all students of all backgrounds, Jewish and non-Jewish.

## Requirements

### General Requirements

In addition to the general requirements of the College of Arts and Sciences, students must complete 36 credit hours of Jewish studies requirements, of which 18 credit hours must be in upper-division (3000- or 4000-level) courses. Of the 18 upper-division credit hours, 12 must be completed on the CU Boulder campus.

A grade of C- or better must be received in all courses used to satisfy the major requirements, with an overall average of 2.00 in the major.

No more than 6 credit hours may be taken in independent study. No pass/fail graded courses may satisfy the 36-credit-hour minimum requirement. No more than 45 credits in JWST may be applied to overall graduation requirements.

For the specific major course requirements, see the Concentration Areas tab.

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major.

Please speak with your advisor for specific recommendations; the following is intended to be a general outline only and there may be flexibility to this plan. To maintain adequate progress in Jewish studies, students should meet the following requirements:

- Declare the major by the beginning of the second semester of freshman year.
- Chose to pursue either the culture intensive concentration or the foreign language intensive concentration.
- For students pursuing the foreign language intensive concentration, have language study approved by Jewish Studies' Director of Undergraduate Studies by the beginning of the first semester of freshman year. Enroll in beginning language course (or language level applicable) during the first semester of freshman year.
- Enroll in JWST 2350/GSLL 2350 the second semester of freshman year.
- Each semester, complete two Jewish studies courses.
- The last spring semester in residence, complete the Capstone in Jewish Studies (JWST 4000).

# Concentration Areas

Students pursuing a BA in Jewish studies may choose one of the following two concentrations: culture intensive or foreign language intensive.

## Culture Intensive Concentration

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | **6** |
| JWST/GSLL 2350 | Introduction to Jewish Culture | |
| JWST 4000 | Capstone in Jewish Studies (Senior Capstone) | |
| **Fundamental Jewish Studies Requirements** [1] | | |
| Select at least two of the following courses, all courses are highly recommended: | | 6 |
| JWST/HIST/RLST 1818 | Jewish History to 1492 | |
| JWST/HIST/RLST 1828 | Jewish History Since 1492 | |
| JWST/GSLL 2551 | Modern Jewish Literature | |
| JWST/RLST 3100 | Judaism | |
| JWST/IAFS/GSLL 3600 | Contemporary Jewish Societies | |
| **Literature, Culture, and the Arts** [2] | | |
| Select at least two of the following courses | | 6 |
| JWST/GSLL 2551 | Modern Jewish Literature | |
| JWST/RLST 3110 | Of Jewish Legends, Folktales and the Supernatural | |
| JWST 3120 | Radical Jews | |
| JWST/ENGL 3310 | The Bible as Literature | |
| JWST/GSLL 3401 | The Heart of Europe: Filmmakers and Writers in 20th Century Central Europe | |
| JWST/GRMN 3501 | The German-Jewish Experience: From the Enlightenment to the Present | |
| JWST 3820 | Topics in Jewish Studies | |
| JWST 4101 | Topics in Hebrew Studies | |
| JWST/MUSC 4122 | Music in Jewish Culture | |
| JWST 4203 | Israeli Literature: Exile, Nation, Home | |
| JWST/HIST 4544 | | |
| JWST/ENGL 4677 | Jewish-American Literature | |
| JWST 4900 | Independent Study in Jewish Studies (On topic relevant to Literature, Culture, and the Arts) | |
| HUMN/GRMN 2601 | Kafka and the Kafkaesque [3] | |
| **History, Politics, and Religion** | | |
| Select at least two of the following courses | | 6 |
| FYSM 1000 | First Year Seminar (God) [4] | |
| JWST 1234/ ENGL 1340 | Mysticism and the Jewish American Literary Tradition | |
| JWST/HIST/RLST 1818 | Jewish History to 1492 | |
| JWST/HIST/RLST 1828 | Jewish History Since 1492 | |
| JWST/HIST/RLST 1830 | Global History of Holocaust and Genocide | |
| JWST/RLST 1900 | Introduction to the Hebrew Bible/Old Testament | |
| JWST/RLST 1910 | Introduction to the New Testament | |
| JWST/GRMN 2502 | Representing the Holocaust | |
| JWST/RLST 2600 | Judaism, Christianity, and Islam: Abrahamic Religions | |
| JWST/RLST 3100 | Judaism | |
| JWST/RLST 3150 | Jerusalem: The Holy City in History, Legend, and Religious Thought | |
| JWST/WGST 3200 | Religion and Feminist Thought | |
| JWST/RLST 3202/ WGST 3201 | Women, Gender & Sexuality in Jewish Texts & Traditions | |
| JWST/IAFS/RLST 3530 | Global Seminar: Jews and Muslims - The Multiethnic History of Istanbul | |
| JWST/IAFS/GSLL 3600 | Contemporary Jewish Societies | |
| JWST/IAFS 3610 | Topics in International Affairs and Jewish Studies | |
| JWST/IAFS 3650 | History of Arab-Israeli Conflict | |
| JWST 3681 | Refugees in German Culture | |
| JWST 3930 | Internship in Jewish Studies | |
| JWST/ANTH 4050 | Anthropology of Jews and Judaism | |
| JWST/RLST 4170 | God and Politics | |
| JWST/RLST 4180 | Is God Dead? | |
| JWST/RLST 4190 | Love and Desire | |
| JWST 4200 | Religion and Reproductive Politics in the United States | |
| JWST/RLST 4260 | Topics in Judaism | |
| JWST 4301 | Venice: The Cradle of European Jewish Culture | |
| JWST 4302/ IAFS 3520 | Global Seminar: Justice, Human Rights and Democracy in Israel | |
| JWST/HIST 4338 | History of Modern Israel/Palestine | |
| JWST/HIST 4348 | Topics in Jewish History | |
| JWST 4388 | History Today: Global Intensive in Israel/ Palestine | |
| JWST/HIST 4378 | Jews in and of the Middle East | |
| JWST/HIST 4454 | Jewish Thought in Modern History | |
| JWST 4524 | Expulsions and Diasporas: The Jews of Spain and Portugal | |
| JWST/HIST 4534 | | |
| JWST/ANTH 4580 | The Holocaust: An Anthropological Perspective | |
| JWST 4800 | Ethics, Medicine and the Holocaust: Legacies in Health and Society | |
| JWST/HIST 4827 | | |
| JWST/HIST 4837 | Jews in the American West | |
| JWST 4900 | Independent Study in Jewish Studies (On topic relevant to History, Religion, and Politics) | |
| WRTG 3020 | Topics in Writing (After the Holocaust) [4] | |

| | |
|---|---|
| **Electives (12 credit hours from the courses listed above not used to fulfill a requirement listed above)** [3] | **12** |
| *Auxiliary Courses (Optional) (maximum of 6 credit hours)* | |
| Auxiliary courses are courses from outside the Program in Jewish Studies which may count toward a Jewish Studies major. For all auxiliary courses, all final projects must be approved for the Jewish Studies major by the Director of Undergraduate Studies for the Program in Jewish Studies. A current list of auxiliary courses eligible to be counted towards the Jewish Studies major can be found on the Program in Jewish Studies website. | |
| **Total Credit Hours** | **36** |

## Foreign Language Intensive Concentration

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | **6** |
| JWST/GSLL 2350 | Introduction to Jewish Culture | |
| JWST 4000 | Capstone in Jewish Studies (Senior Capstone) | |
| **Language Requirement** | | |
| Three years of university level language training or demonstrated equivalent proficiency in Hebrew (modern or Biblical) or another language that is to be used in the Jewish Studies capstone project (JWST 4000). Examples include Russian, French, German, Arabic or Spanish. Language must be approved by the Director of Undergraduate Studies for the Program in Jewish Studies. | | 0-12 |
| **Fundamental Jewish Studies Requirements** [1] | | |
| Select at least two of the following courses, all courses are highly recommended: | | 6 |
| JWST/HIST/RLST 1818 | Jewish History to 1492 | |
| JWST/HIST/RLST 1828 | Jewish History Since 1492 | |
| JWST/GSLL 2551 | Modern Jewish Literature | |
| JWST/RLST 3100 | Judaism | |
| JWST/IAFS/GSLL 3600 | Contemporary Jewish Societies | |
| *Optional but highly recommended:* | | |
| JWST 3930 | Internship in Jewish Studies | |
| **Additional Requirements** | | |
| 12–24 remaining credit hours, of which at least eight must be upper division (3000-4000 level), taken from among the following list or other courses by approval of major advisor: | | 12-24 |
| *Lower Division:* [2] | | |
| FYSM 1000 | First Year Seminar (God) [4] | |
| JWST 1234/ ENGL 1340 | Mysticism and the Jewish American Literary Tradition | |
| JWST/HIST/RLST 1830 | Global History of Holocaust and Genocide | |
| JWST/RLST 1900 | Introduction to the Hebrew Bible/Old Testament | |
| JWST/RLST 1910 | Introduction to the New Testament | |
| JWST/GRMN 2502 | Representing the Holocaust | |
| JWST/RLST 2600 | Judaism, Christianity, and Islam: Abrahamic Religions | |
| HEBR 1030 | Beginning Biblical Hebrew, First Semester | |
| HEBR 2040 | Intermediate Biblical Hebrew, Second Semester | |
| HEBR 2120 | Intermediate Modern Hebrew, Second Semester | |
| HUMN/GRMN 2601 | Kafka and the Kafkaesque [4] | |
| *Upper Division:* | | |
| JWST/RLST 3110 | Of Jewish Legends, Folktales and the Supernatural | |
| JWST/RLST 3120 | Radical Jews | |
| JWST/RLST 3150 | Jerusalem: The Holy City in History, Legend, and Religious Thought | |
| JWST/WGST 3200 | Religion and Feminist Thought | |
| JWST/RLST 3202/ WGST 3201 | Women, Gender & Sexuality in Jewish Texts & Traditions | |
| JWST/ENGL 3310 | The Bible as Literature | |
| JWST/GSLL 3401 | The Heart of Europe: Filmmakers and Writers in 20th Century Central Europe | |
| JWST/GRMN 3501 | The German-Jewish Experience: From the Enlightenment to the Present | |
| JWST/IAFS/RLST 3530 | Global Seminar: Jews and Muslims - The Multiethnic History of Istanbul | |
| JWST/IAFS 3610 | Topics in International Affairs and Jewish Studies | |
| JWST/IAFS 3650 | History of Arab-Israeli Conflict | |
| JWST 3681 | Refugees in German Culture | |
| JWST 3820 | Topics in Jewish Studies | |
| JWST/ANTH 4050 | Anthropology of Jews and Judaism | |
| JWST/HEBR 4101 | Topics in Hebrew Studies | |
| JWST/MUSC 4122 | Music in Jewish Culture | |
| JWST/RLST 4170 | God and Politics | |
| JWST/RLST 4180 | Is God Dead? | |
| JWST/RLST 4190 | Love and Desire | |
| JWST 4200 | Religion and Reproductive Politics in the United States | |
| JWST 4203 | Israeli Literature: Exile, Nation, Home | |
| JWST/RLST 4260 | Topics in Judaism | |
| JWST 4301 | Venice: The Cradle of European Jewish Culture | |
| JWST 4302/ IAFS 3520 | Global Seminar: Justice, Human Rights and Democracy in Israel | |
| JWST/HIST 4338 | History of Modern Israel/Palestine | |
| JWST/HIST 4348 | Topics in Jewish History | |
| JWST/HIST 4378 | Jews in and of the Middle East | |
| JWST/HIST 4454 | Jewish Thought in Modern History | |
| JWST 4524 | Expulsions and Diasporas: The Jews of Spain and Portugal | |
| JWST/HIST 4534 | | |
| JWST/HIST 4544 | | |
| JWST/ANTH 4580 | The Holocaust: An Anthropological Perspective | |

| | |
|---|---|
| JWST/ENGL 4677 | Jewish-American Literature |
| JWST 4800 | Ethics, Medicine and the Holocaust: Legacies in Health and Society |
| JWST/HIST 4827 | |
| JWST/HIST 4837 | Jews in the American West |
| JWST 4900 | Independent Study in Jewish Studies |
| HEBR 3010 | Third Year Modern Hebrew, First Semester |
| HEBR 3020 | Third Year Modern Hebrew, Second Semester |
| HEBR 3030 | Advanced Biblical Hebrew, Third Year, First Semester |
| WRTG 3020 | Topics in Writing (After the Holocaust) [4] |

*Auxiliary Courses (Optional) (maximum of 6 credit hours)*

Auxiliary courses are courses from outside the Program in Jewish Studies which may count toward a Jewish Studies major. For all auxiliary courses, all final projects must be approved for the Jewish Studies major by the Director of Undergraduate Studies for the Program in Jewish Studies. A current list of auxiliary courses eligible to be counted towards the Jewish Studies major can be found on the Program in Jewish Studies website.

**Total Credit Hours** **36**

1 Additional Fundamental Jewish Studies Requirement courses can be taken to fulfill another major requirement where allowed.

2 For students pursuing the Culture Intensive Concentration, language courses may count as electives, but they do not count for Literature, Culture, and the Arts.

3 Not subject to the 6 credit hours limit on Auxiliary courses from outside Jewish Studies.

4 Electives can come from JWST, HEBR, or a range of other departments.

5 For student pursuing the Language Intensive Concentration, the first three semesters of modern Hebrew (or any equivalent language being used in the required capstone course JWST 4000) do not count as credit hours toward the major.

# Recommended Four-Year Plan of Study

## Culture Intensive Concentration

Through the required coursework for this track of the major, students will complete all 12 credits of the Arts & Humanities area of the Gen Ed Distribution Requirement as well as one component of the Gen Ed Diversity Requirement and may complete some of the Social Sciences area of the Gen Ed Distribution Requirement.

**Year One**

| **Fall Semester** | **Credit Hours** |
|---|---|
| JWST Fundamental Jewish Studies course | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | 3 |
| Elective or MAPS | 3 |
| Elective or MAPS | 3 |
| **Credit Hours** | **15** |

**Spring Semester**

| | | |
|---|---|---|
| JWST 2350 | Introduction to Jewish Culture | 3 |
| JWST Fundamental Jewish Studies course | | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Elective or MAPS (If needed) | | 3 |
| **Credit Hours** | | **16** |

**Year Two**

**Fall Semester**

| | |
|---|---|
| JWST History, Politics, and Religion course | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | 3 |
| Gen. Ed. Distributioncourse (example: Social Sciences) | 3 |
| Free Elective | 2 |
| Free Elective | 3 |
| **Credit Hours** | **14** |

**Spring Semester**

| | |
|---|---|
| JWST Literature, Culture, and the Arts course | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | 1 |
| Free Elective | 2 |
| Free Elective | 3 |
| Free Elective | 3 |
| **Credit Hours** | **15** |

**Year Three**

**Fall Semester**

| | |
|---|---|
| JWST Upper-division Elective | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | 3 |
| Upper-Division Elective | 3 |
| Upper-Division Elective | 3 |
| **Credit Hours** | **15** |

**Spring Semester**

| | | |
|---|---|---|
| JWST 3930 | Internship in Jewish Studies (optional but encouraged) | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| Free Elective | | 3 |
| **Credit Hours** | | **15** |

**Year Four**

**Fall Semester**

| | |
|---|---|
| JWST Upper-Division Elective | 3 |
| Upper-Division Elective | 3 |
| Upper-Division Elective | 3 |
| Upper-Division Elective | 3 |
| Elective | 3 |
| **Credit Hours** | **15** |

**Spring Semester**

| | | |
|---|---|---|
| JWST 4000 | Capstone in Jewish Studies | 3 |
| JWST Upper-Division Elective | | 3 |

| | |
|---|---|
| Upper-Division Elective | 3 |
| Upper-Division Elective | 3 |
| Upper-Division Elective | 3 |
| **Credit Hours** | **15** |
| **Total Credit Hours** | **120** |

## Foreign Language Intensive Concentration

Through the required coursework for this track of the major, students will complete all 12 credit hours of the Arts & Humanities area of the Gen Ed Distribution Requirement as well as one category of the Gen Ed Diversity Requirement and may complete some of the Social Sciences area of the Gen Ed Distribution Requirement.

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| Fundamental Jewish Studies course | | 3 |
| Beginning Foreign Language 1 (If needed; does not count toward JWST language required. Choices are Hebrew, Russian, German, French, Arabic, or Spanish) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective or MAPS | | 3 |
| **Credit Hours** | | **15** |
| **Spring Semester** | | |
| JWST 2350 | Introduction to Jewish Culture | 3 |
| Beginning Foreign Language 2 (If needed; does not count towards JWST language requirement. Choices are: Hebrew, Russian, German, French, Arabic, or Spanish) | | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Elective or MAPS (If needed) | | 3 |
| **Credit Hours** | | **16** |

**Year Two**

| **Fall Semester** | |
|---|---|
| Fundamental Jewish Studies course | 3 |
| Intermediate Foreign Language 1 (If needed; does not count toards JWST language requirement. Choices are: Herew, Russian, German, French, Arabic, or Spanish) | 3-5 |
| Gen. Ed. Distribution course (example: Natural Sciences) | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | 3 |
| Free Elective | 2 |
| **Credit Hours** | **14-16** |
| **Spring Semester** | |
| JWST Literature, Culture, and the Arts course | 3 |
| Intermediate Foreign Language 2 | 3-5 |
| Gen. Ed. Distribution course (example: Natural Sciences) | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | 1 |
| Free Elective | 2 |
| Free Elective | 3 |
| **Credit Hours** | **15-17** |

**Year Three**

| **Fall Semester** | |
|---|---|
| JWST Elective Upper Division | 3 |
| Advanced Foreign Language 1 | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | 3 |
| Upper-Division Elective | 3 |
| **Credit Hours** | **15** |
| **Spring Semester** | |
| JWST 3930 Internship in Jewish Studies (optional but encouraged) | 3 |
| Advanced Foreign Language 2 | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | 3 |
| Upper-Division Elective | 3 |
| Elective or Upper-division Elective (if needed) | 3 |
| **Credit Hours** | **15** |

**Year Four**

| **Fall Semester** | |
|---|---|
| JWST Upper-Division Elective | 3 |
| Upper-Division Elective | 3 |
| Upper-Division Elective | 3 |
| Upper-Division Elective | 3 |
| Elective | 3 |
| **Credit Hours** | **15** |
| **Spring Semester** | |
| JWST 4000 Capstone in Jewish Studies | 3 |
| JWST Upper-Division Elective | 3 |
| Upper-Division Elective | 3 |
| Upper-Division Elective | 3 |
| Elective | 3 |
| **Credit Hours** | **15** |
| **Total Credit Hours** | **120-124** |

# Learning Outcomes

An undergraduate degree in Jewish Studies emphasizes knowledge and awareness of:

- The history of global Jewish communities over time, including the history of Israel and Palestine, biblical and medieval Jewish history, history of Jewish communities in the Mediterranean, the history of the Holocaust and post-Holocaust American Judaism.
- Dimensions of Jewish culture across variant Jewish communities, including differences in Jewish cultural practices, Jewish music and film, and Jewish philosophies, religious practices, mysticisms and thought.
- Jewish literature from the biblical period to the present, including Israeli literature, the Hebrew origins of western civilization and contemporary Jewish literature.
- Global languages of the Jewish people, including Hebrew, Arabic, Spanish, French, Italian, Russian, German, Ladino and others (for students pursuing the foreign language intensive concentration).

In addition, it is expected that through a degree in Jewish Studies:

- History Diversity: Demonstrate the ability to think critically about the historical and global diversity of Jewish cultures, religion, practice and thought.
- Interdisciplinary Perspectives: Demonstrate the ability to analyze a wide range of contemporary and historical events, structures and movements using perspectives drawn from fields including (among others) history, women and gender studies, religious studies, literary studies and the arts.
- Critical Analysis: Demonstrate the ability to analyze how power and privilege function in Jewish history, cultures, religion, practice, language, music, and thought, exploring the intersection of gender, sexuality, race, class, ability, nationality and colonialism.
- Synthesis Presentation Skills: Communicate, both orally and in written assignments, complex ideas from the field of Jewish Studies to academic and general audiences through capstone projects, research opportunities, archives and an internship.
- Colloquium Scholarly Discourse: Work collaboratively to implement, and organize around, a range of theoretical and methodological perspectives used in Jewish studies.

# Hebrew and Israel Studies - Minor

A minor is offered in Hebrew and Israel studies. Any student enrolled at CU Boulder, regardless of college or school, may declare a minor in Hebrew and Israel studies.

The minor in Hebrew and Israel studies focuses on developing a student's Hebrew language skills while exploring a variety of courses on issues related to Israel and the Middle East. This minor is ideal for students who are interested in pursuing an international career or study in the Middle East.

The minor in Hebrew & Israel studies is open to all students of all backgrounds, Jewish and non-Jewish.

For more information, visit the Minor in Hebrew and Israel Studies (http://www.colorado.edu/jewishstudies/academics/majors-minors-jewish-studies/minor-hebrew-israel-studies/) website.

## Requirements

Students must complete 19 credit hours of Hebrew language courses and content courses focusing on Israeli and/or the Middle East. Of these 19 credit hours, 9 must be in upper-division courses. All coursework applied to the minor must be completed with a grade of C- or better. No pass/fail work may be applied. The GPA for all minor coursework must equal 2.00 or higher. Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Language Requirement** | | |
| Modern Hebrew Language (10 credit hours minimum above the 2010 Intermediate Hebrew level): | | 10 |
| HEBR 2120 | Intermediate Modern Hebrew, Second Semester | |
| HEBR 3010 | Third Year Modern Hebrew, First Semester | |
| HEBR 3020 | Third Year Modern Hebrew, Second Semester | |
| **Required Course** | | **3** |
| JWST/GSLL 2350 | Introduction to Jewish Culture | |
| **Additional Requirements** | | |
| Select two of the following Hebrew/Israel Studies courses (one of which must be upper-division): [1] | | 6 |
| JWST 2600 | Judaism, Christianity, and Islam: Abrahamic Religions | |
| JWST 3150 | Jerusalem: The Holy City in History, Legend, and Religious Thought | |
| JWST/IAFS 3650 | History of Arab-Israeli Conflict | |
| JWST/ANTH 4050 | Anthropology of Jews and Judaism (Cultures of Israel and Palestine) | |
| JWST/HEBR 4101 | Topics in Hebrew Studies | |
| JWST 4203 | Israeli Literature: Exile, Nation, Home | |
| JWST 4302/ IAFS 3520 | Global Seminar: Justice, Human Rights and Democracy in Israel | |
| JWST/HIST 4338 | History of Modern Israel/Palestine | |
| JWST/HIST 4348 | Topics in Jewish History (Childhood in Modern Israel/Palestine) | |
| JWST/HIST 4348 | Topics in Jewish History (Tel Aviv: Urban History and Culture) | |
| JWST 4388 | History Today: Nationalism & Collective Memory in Israel/Palestine | |
| **Total Credit Hours** | | **19** |

[1] Or a course approved by the faculty advisor.

# Jewish Studies - Minor

The minor in Jewish studies is designed to help students develop a unique, interdisciplinary perspective and build their critical thinking skills by exploring the world through the lens of Jewish studies. Because the program in Jewish studies is inherently interdisciplinary, many students are easily able to fulfill Jewish studies minor requirements while simultaneously completing requirements for their major.

**The minor in Jewish studies is open to all students of all backgrounds, Jewish and non-Jewish.**

## Requirements

Declaration of a minor is open to any student enrolled at CU Boulder, regardless of college or school. Students must complete 18 credit hours in Jewish studies courses, of which 12 credit hours must be upper division (3000/4000). All coursework applied to the minor must be completed with a grade of C- or better (no pass/fail work may be applied). The GPA for all coursework taken in the minor department must be equal to 2.00 (C) or higher. Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor.

For more information, visit the program's Minor in Jewish Studies (http://www.colorado.edu/jewishstudies/undergraduates/major-minors-jewish-studies/minor-jewish-studies/) webpage.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Course** | | **3** |
| JWST/GSLL 2350 | Introduction to Jewish Culture | |
| **Additional Requirements** | | |
| Select one of the following: | | 3 |
| JWST/HIST 1818 | Jewish History to 1492 | |
| JWST/HIST 1828 | Jewish History Since 1492 | |
| JWST 1234/ ENGL 1340 | Mysticism and the Jewish American Literary Tradition | |
| JWST/HIST/RLST 1830 | Global History of Holocaust and Genocide | |
| JWST/RLST 1900 | Introduction to the Hebrew Bible/Old Testament | |
| JWST/RLST 1910 | Introduction to the New Testament | |
| JWST/GRMN 2502 | Representing the Holocaust | |
| JWST/GSLL 2551 | Modern Jewish Literature | |
| JWST/RLST 2600 | Judaism, Christianity, and Islam: Abrahamic Religions | |
| Select four upper-division (3000-4000 level) Jewish Studies courses from the following list or by approval of advisor: | | 12 |
| JWST/RLST 3100 | Judaism | |
| JWST/RLST 3110 | Of Jewish Legends, Folktales and the Supernatural | |
| JWST/RLST 3120 | Radical Jews | |
| JWST 3150 | Jerusalem: The Holy City in History, Legend, and Religious Thought | |
| JWST/WGST 3200 | Religion and Feminist Thought | |
| JWST/RLST 3202/ WGST 3201 | Women, Gender & Sexuality in Jewish Texts & Traditions | |
| JWST/ENGL 3310 | The Bible as Literature | |
| JWST 3401 | The Heart of Europe: Filmmakers and Writers in 20th Century Central Europe | |
| JWST/GRMN 3501 | The German-Jewish Experience: From the Enlightenment to the Present | |
| JWST/IAFS/RLST 3530 | Global Seminar: Jews and Muslims - The Multiethnic History of Istanbul | |
| JWST/IAFS/GSLL 3600 | Contemporary Jewish Societies | |
| JWST/IAFS 3610 | Topics in International Affairs and Jewish Studies | |
| JWST/IAFS 3650 | History of Arab-Israeli Conflict | |
| JWST 3681 | Refugees in German Culture | |
| JWST 3820 | Topics in Jewish Studies (Sephardic Diasporas: Migration and Culture After the Spanish Expulsion) | |
| JWST 3930 | Internship in Jewish Studies (not repeatable for minor, except by permission of AD of Undergraduate Studies) | |
| JWST 4000 | Capstone in Jewish Studies (Minors in Jewish Studies may take the Capstone in Jewish Studies (JWST 4000) and count it as one of their required upper division courses with approval from the Director of Undergraduate Studies for Jewish Studies.) | |
| JWST/ANTH 4050 | Anthropology of Jews and Judaism | |
| JWST 4101 | Topics in Hebrew Studies (The Hebrew Origins of Western Civilization) | |
| JWST/MUSC 4122 | Music in Jewish Culture | |
| JWST/RLST 4170 | God and Politics | |
| JWST/RLST 4180 | Is God Dead? | |
| JWST/RLST 4190 | Love and Desire | |
| JWST 4200 | Religion and Reproductive Politics in the United States | |
| JWST 4203 | Israeli Literature: Exile, Nation, Home | |
| JWST/RLST 4260 | Topics in Judaism (The Bible in Judaism and Christianity) | |
| JWST/RLST 4260 | Topics in Judaism (Post-Holocaust American Judaism) | |
| JWST/RLST 4260 | Topics in Judaism (Hebrew Bible) | |
| JWST/RLST 4260 | Topics in Judaism (Meaning After the Holocaust) | |
| JWST 4302/ IAFS 3520 | Global Seminar: Justice, Human Rights and Democracy in Israel | |
| JWST/HIST 4338 | History of Modern Israel/Palestine | |
| JWST/HIST 4348 | Topics in Jewish History (Modern Childhood in Israel/Palestine) | |
| JWST/HIST 4348 | Topics in Jewish History (Tel Aviv: Urban History and Culture) | |
| JWST/HIST 4378 | Jews in and of the Middle East | |
| JWST/RUSS 4401 | | |
| JWST/HIST 4454 | | |
| JWST 4524 | Expulsions and Diasporas: The Jews of Spain and Portugal | |
| JWST/HIST 4534 | | |
| JWST/HIST 4544 | | |
| JWST/ANTH 4580 | The Holocaust: An Anthropological Perspective | |
| JWST/ENGL 4677 | Jewish-American Literature | |
| JWST 4800 | Ethics, Medicine and the Holocaust: Legacies in Health and Society | |
| JWST/HIST 4827 | | |
| JWST 4837 | Jews in the American West | |
| JWST 4900 | Independent Study in Jewish Studies | |
| WRTG 3020 | Topics in Writing (After the Holocaust) | |
| **Total Credit Hours** | | **18** |

# Latin American and Latinx Studies

The Latin American and Latinx Studies Center provides an institutional space to support and advance research, teaching and discussion on Latin American and Latinx issues at the University of Colorado Boulder. The center brings together CU faculty, graduate and undergraduate students, and visiting scholars interested in Latin American and Latinx issues

and recognizes the diversity of their interests and approaches. Center courses provide support for research and teaching in these areas and strengthens connections with Latin America and Latinx communities in the United States. The Latin American and Latinx Studies Center offers an undergraduate certificate program in Latin American and Latinx Studies.

For more information, visit the department's undergraduate certificate program (https://www.colorado.edu/lasc/undergraduate-certificate-latin-american-and-latinx-studies/) webpage.

**Course code for this program is LAMS.**

# Certificate

- Latin American and Latinx Studies - Certificate (p. 459)

# Courses

**LAMS 1000 (3) Introduction to Latin American and Latinx Studies**
Focuses on the main topics of Latin American and Latinx Studies, exploring them through interdisciplinary approaches. Core course of the Latin American and Latinx Studies Certificate.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective Arts Sci Gen Ed: Distribution-Social Sciences

**LAMS 3100 (3) Travel, Science and Adventure**
Focuses on the expeditions of the most important scientific travelers in Ecuador during the 18th and 19th centuries: French mathematician Charles-Marie La Condamine, German naturalist Alexander von Humboldt and English naturalist Charles Darwin. In Ecuador, La Condamine proved the shape of the Earth, Humboldt designed the theory of ecosystems and their interconnections, and Darwin found evidence of evolution in the Galapagos. These travelers made important observations about Ecuador¿s nature, society, and history.
**Grading Basis:** Letter Grade

**LAMS 3930 (3) Internship in Latin American and Latinx Studies**
Provides an academically supervised opportunity for student to work in public and private organizations on projects related to Latin American and Latinx Studies. Students must relate their academic experience to their field work experience though a portfolio and a final paper. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** it is recommended for students to be enrolled in LALSC certificate, but it is not a requirement.

**LAMS 4854 (1-3) Independent Study**
Work with an approved faculty sponsor to explore a topic in greater depth. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisite LAMS 1000 (minimum grade D-).

**QUEC 1010 (4) Beginning Quechua 1**
The course focuses on the development of written and oral communicative abilities in the Southern variety of Quechua through an interactive activity-based approach. Course includes an introduction to Andean Culture, and foundations on the sociocultural history of Quechua. Quechua is the most widely spoken indigenous language in South America, with an estimated 8-10 million speakers in Peru, Bolivia and Ecuador, Chile, Colombia, and Argentina. But decades of migration have brought Quechua to coastal cities and abroad, like New York, New Jersey and Chicago. Formerly LAMS 1010.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**QUEC 1020 (4) Beginning Quechua 2**
This course continues the study of the Southern variety of Quechua in Beginning Quechua 1. Quechua is the most widely spoken indigenous language in South America, with an estimated 8-10 million speakers in Peru, Bolivia and Ecuador, Chile, Colombia, and Argentina. Quechua is associated with people living in the Andes. But decades of migration have brought Quechua to coastal cities and abroad, like New York, New Jersey and Chicago. Quechua is more than a spoken language. Studying Quechua also provides a window into a rich indigenous culture, and alternative perspectives about space and time, family, relationships, society, and the natural world. Formerly LAMS 1020.
**Recommended:** Prerequisite QUEC 1010 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**QUEC 2010 (4) Intermediate Quechua 1**
This course continues the study of the Southern variety of Quechua in Beginning Quechua 2. Quechua is the most widely spoken indigenous language in South America, with an estimated 8-10 million speakers in Peru, Bolivia and Ecuador, Chile, Colombia, and Argentina. Quechua is associated with people living in the Andes. But decades of migration have brought Quechua to coastal cities and abroad, like New York, New Jersey and Chicago. Quechua is more than a spoken language. Studying Quechua also provides a window into a rich indigenous culture, and alternative perspectives about space and time, family, relationships, society, and the natural world.
**Recommended:** Prerequisite QUEC 1020 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

# Latin American and Latinx Studies - Certificate

The certificate in Latin American and Latinx[1] Studies trains future professionals to better serve the growing Latinx population of the country and the state.

It enhances the knowledge on the region to work in and with relation to Latin America in a wide range of disciplines and professions by:

- Understanding the historical, economic and political relation of Latin America and the US.
- Having familiarity with social, cultural, political and economic developments in a historical context.
- Learning about the commonalities and differences inside Latin America and between Latin American and Latinx cultures.
- Understanding changing and contested constructions of identities among the diverse peoples of the region.
- Learning about Latinx history and culture.
- Understanding migrations in the Americas, not only to the US but also inside Latin American countries and to other countries in the world.

[1] The term *Latinx* is used to connote a commitment to be inclusive of gender non-conforming identities, to challenge the gender binaries inherent in the Spanish language and to reflect the cutting edge of the fields traditionally called Chicano Studies and U.S. Latino studies.

# Requirements

Students are required to complete 18 credit of approved coursework, including a core course and electives as noted in the course list below.

Students must complete 9 credit hours at the upper-division level and a minimum of 12 credit hours must be taken on the CU Boulder campus. No more than 9 credits may be in the student's major or minor.

Although not mandatory, students are strongly encouraged to acquire an intermediate level of language proficiency in Quechua, Spanish or Portuguese.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Course** | | |
| LAMS 1000 | Introduction to Latin American and Latinx Studies | 3 |
| **Electives (filling the following categories)** | | |
| *Arts and Humanities (2 courses)* | | *6* |
| Art and Art History | | |
| ARTH 3729 | Foundations in Latin American Art | |
| ARTH 4419 | The Arts of Colonial Mexico and Peru | |
| ARTH 4919 | Capstone Seminar: Topics in Art History | |
| ARTH 4929 | Special Topics in Art History | |
| English | | |
| ENGL 4697 | Special Topics in Ethnic US Literatures [1] | |
| ENGL 2747/ ETHN 2746 | Introduction to Chicana/o/x Literature | |
| Ethnic Studies | | |
| ETHN 2536 | Survey of Chicana/o History and Culture | |
| ETHN 2546 | Chicana and Chicano Fine Arts and Humanities | |
| ETHN 2746/ ENGL 2747 | Introduction to Chicana/o/x Literature | |
| ETHN 3136 | Chicana Feminisms and Knowledges | |
| ETHN 4001 | Screening Race, Class & Gender in the U.S. and the Global Borderland | |
| ETHN 4006 | Chicana/Chicano Native American Cultures of the U.S. | |
| ETHN 4116 | Spoken Word Latinx Poetics and Poetry | |
| History | | |
| HIST 1018 | Introduction to Early Latin American History to 1810 | |
| HIST 1028 | Latin American History since Independence | |
| HIST 4018 | Aztecs, Incas, and the Spanish Conquest of the Americas | |
| HIST 4118 | History of Mexico to 1821 | |
| HIST 4128 | The History of Modern Mexico Since 1821 | |
| HIST 4527 | Mexican-American History since 1848 | |
| Latin American and Latinx Studies | | |
| LAMS 3930 | Internship in Latin American and Latinx Studies (Internship credits can count towards the certificate with approval by the LALSC Director.) | |
| Portuguese | | |
| PORT 2800 | Brazil: Past and Present | |
| PORT 3220 | Latin American Culture: Spanish America and Brazil | |
| PORT 3270 | Socio-Environmental Dynamics in Brazil | |
| PORT 4110 | Brazilian Literature | |
| Quechua | | |
| QUEC 1010 | Beginning Quechua 1 | |
| QUEC 1020 | Beginning Quechua 2 | |
| QUEC 2010 | Intermediate Quechua 1 | |
| Spanish | | |
| SPAN 1000 | Cultural Difference through Hispanic Literature | |
| SPAN 3215 | Urban History and Culture in the Spanish-Speaking World | |
| SPAN 3800 | Selected Readings: Latin American Literature in Translation | |
| SPAN 4120 | Literature and Cinema in Spain and Latin America | |
| SPAN 4170 | Major Works/Trends in Literature and Culture in Latin America Up to the 19th Century | |
| SPAN 4180 | Major Works and Trends in Literature and Culture in Latin America: 1900-Present | |
| SPAN 4220 | Special Topics in Spanish and/or Spanish American Literature | |
| Theatre | | |
| THTR 2021 | Global Theatre 2: Contemp Relevance and Resonance Forms of Pre-Colonial Modern Theatre and Performan | |
| *Social Sciences (2 courses)* | | *6* |
| Anthopology | | |
| ANTH 3110 | Ethnography of Mexico and Central America | |
| ANTH 4730 | Latin American Politics and Culture through Film and Text | |
| ANTH 4735 | Contemporary Cuban Culture: Race, Gender and Power | |
| ANTH 4740 | Peoples and Cultures of Brazil | |
| Ethnic Studies | | |
| ETHN 3026 | Women of Color: Chicanas in U.S. Society | |
| ETHN 3106 | Selected Topics in Chicana and Chicano Studies | |
| ETHN 3136 | Chicana Feminisms and Knowledges | |
| ETHN 4006 | Chicana/Chicano Native American Cultures of the U.S. | |
| ETHN 4106 | Special Topics in Chicana and Chicano Studies | |
| ETHN 4306 | The Chicana and Chicano and U.S. Social Systems | |
| Geography | | |
| GEOG 3812 | Mexico, Central America, and the Caribbean | |
| GEOG 4812 | Political Ecology & Latin America | |
| Political Science | | |
| PSCI 3032 | Democracy, Inequality and Violence in Latin America | |
| PSCI 3052 | Gender and Politics in Latin America | |
| PSCI 4131 | Latinos and the U.S. Political System | |

| | |
|---|---|
| PSCI 4792 | Issues in Latin American Politics |
| Sociology | |
| SOCY 3161 | Global Perspectives on Race and Ethnicity |
| SOCY 2091 | Topics in Sociology |
| Women and Gender Studies | |
| WGST 3510 | Gender, Sexuality and Global Health |
| WGST 3650 | Gender and Politics in Latin America |
| WGST 3600 | Latina/x Studies |
| *Latinx Studies (1 course)* [2] | *3* |
| English | |
| ENGL 4697 | Special Topics in Ethnic US Literatures [1] |
| ENGL 2747/ ETHN 2746 | Introduction to Chicana/o/x Literature |
| Ethnic Studies | |
| ETHN 2536 | Survey of Chicana/o History and Culture |
| ETHN 2546 | Chicana and Chicano Fine Arts and Humanities |
| ETHN 2746/ ENGL 2747 | Introduction to Chicana/o/x Literature |
| ETHN 3026 | Women of Color: Chicanas in U.S. Society |
| ETHN 3106 | Selected Topics in Chicana and Chicano Studies |
| ETHN 3136 | Chicana Feminisms and Knowledges |
| ETHN 4001 | Screening Race, Class & Gender in the U.S. and the Global Borderland |
| ETHN 4006 | Chicana/Chicano Native American Cultures of the U.S. |
| ETHN 4116 | Spoken Word Latinx Poetics and Poetry |
| ETHN 4106 | Special Topics in Chicana and Chicano Studies |
| ETHN 4306 | The Chicana and Chicano and U.S. Social Systems |
| History | |
| HIST 4527 | Mexican-American History since 1848 |
| Political Science | |
| PSCI 4131 | Latinos and the U.S. Political System |
| Sociology | |
| SOCY 2091 | Topics in Sociology |
| Women and Gender Studies | |
| WGST 3600 | Latina/x Studies |
| **Total Credit Hours** | **18** |

1 Only when taught with emphasis in Latinx or Chicana/o studies.

2 One course can be used both to fill the Latinx requirement and to count as 3 credits in either the Arts and Humanities or Social Sciences requirement. In that case a student would have to take an additional approved Certificate Elective course from any of the above categories to bring their total credits in the certificate to 18.

# Lesbian, Gay, Bisexual, Transgender and Queer Studies

The Lesbian, Gay, Bisexual, Transgender and Queer Studies certificate program is designed to help students develop a social, historical and cross-cultural understanding of gender and sexuality. By exploring the historical and contemporary experiences of lesbians, gay men, bisexuals and transgender people, the courses in the program encourage students to think critically about the function of sexuality and gender in the world around them. In doing so, students will be able to analyze the relationships between queer and normative sexualities and gender identities.

By developing an understanding of diverse sexual and gender identities, certificate program students are able to analyze gender and sexuality in a broad range of historical and contemporary institutions and societies.

Open to degree-seeking undergraduate students enrolled at the university, this interdisciplinary program consists of two required courses and elective courses offered by different departments.

For more information, visit the LGBTQ Studies Certificate (https://www.colorado.edu/lgbtq/certificate/) webpage.

**Course code for this program is LGBT.**

## Certificate

- LGBTQ Studies - Certificate (p. 462)

## Courses

**LGBT 2000 (3) Introduction to Lesbian, Gay, Bisexual, and Transgender Studies**
Investigates the social and historical meanings of racial, gender, and sexual identities and their relationship to contemporary lesbian, bisexual, gay, and transgender communities.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 2030
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**LGBT 2707 (3) Introduction to Queer Literature**
How is literature shaped by cultural understandings of queer and non-normative genders and sexualities? How does it, in turn, shape those understandings? This class explores how genders, sexualities, and writing intersect with issues of race, class, nation, ability, and empire. Readings may include novels, short stories, poetry, graphic novels, films, essays, blogs, and more.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 2707
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**LGBT 3710 (3) Topics in LGBT Studies**
Content varies by semester and reflects contemporary issues in the field of LGBT Studies.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**LGBT 3796 (3) Queer Theory**
Surveys theoretical, critical, and historical writings in the context of lesbian, bisexual, transgender and gay literature. Examines relationships among aesthetic, cultural and political agendas, and literary and visual texts of the 20th century.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 3796
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**LGBT 3930 (1-6) Lesbian, Gay, Bisexual, Transgender, and Queer Studies Internship**
Matches selected students with supervised internships in university programs and advocacy groups, local businesses, human service or government agencies. Internships will focus on lesbian, gay, bisexual, transgender or queer issues, such as anti-violence programs, educational outreach, and civil rights initiatives.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisite LGBT 2000.

**LGBT 4287 (3) Special Topics in Queer Literature**
This course will focus on a special topic in queer literature and non-normative genders and sexualities. Students will consider how literature reflects and represents understandings of sexuality, gender, desire, and more; the course may engage a variety of genres. Topics vary by semester. Check department description for details.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 4287 and WGST 4287
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**LGBT 4400 (3) Critical Inquiries in Transgender Studies**
Examines theories, methods and debates in the emerging field of transgender studies. Drawing on interdisciplinary perspectives, this course examines transgender identities, communities and political movements in different historical and cultural contexts. Focuses on crosscutting issues that shape transgender subjectivities, with special attention given to how transgender movements negotiate race, class, sexuality, labor, culture and nation.
**Equivalent - Duplicate Degree Credit Not Granted:** LGBT 5400 and WGST 4400 and WGST 5400
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Distribution-Social Sciences

**LGBT 4840 (1-6) Independent Study in LGBTQ Studies**
Self-directed research project in LGBTQ studies supervised by a faculty member and approved by one of the Co-Directors of the LGBT Studies Certificate Program.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

# LGBTQ Studies - Certificate

Lesbian, Gay, Bisexual, Transgender and Queer (LGBTQ) studies at CU Boulder is an undergraduate interdisciplinary program encompassing more than 30 courses in a dozen departments. The program offers coursework, programming and internship opportunities for students looking to explore queer and trans issues through an intersectional lens.

LGBTQ studies involves the academic investigation of sexuality in established fields such as literature, history, theatre, law, medicine, economics, sociology, anthropology, political science and the arts. With its interdisciplinary approach, LGBTQ studies interweaves complex theories and analysis into the study of sexuality and gender.

Through the certificate program and the guidance of faculty advisors, students are given an opportunity to integrate a wide variety of courses, internships, and programming in order to deepen their understanding of sexuality and gender in their academic, professional and personal lives.

For more details including application instructions, visit the LGBTQ Studies Certificate (http://www.colorado.edu/lgbtq/certificate/) webpage or email lgbt@colorado.edu.

***Note:*** This program is closed to new students as of Fall 2026. Prospective students may also wish to consider the Queer and Trans Studies minor (p. 645).

## Requirements

Completion of the certificate in LGBTQ studies requires the completion of 18 credit hours (9 upper-division) of approved courses with grades of C- or better.

### Required Courses and Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| LGBT 2000 | Introduction to Lesbian, Gay, Bisexual, and Transgender Studies | 3 |
| LGBT 3796 | Queer Theory | 3 |
| **Electives** | | |
| Twelve credit hours of approved elective courses, with at least 6 credit hours of upper-division electives [1] | | 12 |
| **Total Credit Hours** | | **18** |

[1] Up to six credit hours of independent study may be applied toward the certificate program.

Credits earned at other institutions may be transferred in partial fulfillment of the requirements upon approval of the program director. No more than 6 credit hours of transferred coursework may be applied to the certificate.

Students are encouraged to meet with the program directors early in their course of study and again in the semester prior to the semester of graduation, to ensure that program requirements are met.

Available elective courses are listed each semester under the "Courses" tab of the program (http://www.colorado.edu/lgbtq/) website.

# Linguistics

Linguistics is the study of all aspects of human language: how languages make it possible to express ideas and feelings; how and why languages are similar and different; how we develop different styles and dialects; what will be required for computers to understand and produce spoken language; and how languages are used in everyday communication as well as in formal settings. Linguists try to figure out what it is that speakers know and do by observing the structure of languages, the way children learn language, slips of the tongue, conversations, storytelling, the acoustics of sound waves and the way people's brains react when they hear speech or read. Linguists also reconstruct prehistoric

languages, and try to deduce the principles behind their evolution into the thousands of languages of the world today.

The major in linguistics is useful for careers involving cognitive science, computer science, psychology, international business, language teaching, advertising, publishing, law, technical writing and social media analytics. Double majors and minors are encouraged to take coursework on specific languages, computer science, psychology, communication, sociology, anthropology, international affairs, philosophy, education, and speech, language and hearing sciences.

The core of the major is a set of courses, taught in the Department of Linguistics, on the nature of language. In addition, the major requires language courses offered by other departments (fluent speakers of languages other than English are excepted from this requirement).

The undergraduate degree in linguistics emphasizes knowledge and awareness of:

- The fundamental architecture of language in the domains of phonetics and phonology, morphology and syntax, and semantics and pragmatics;
- The diversity of language structures and how languages change over historic time;
- The major interactions among language, culture and society, including the role of language in the promulgation of cultural values and social categories, the relationship between language and ideology, and the social functions of language variation;
- The relationship between language and cognition.

In addition, students completing the degree in linguistics are expected to acquire the ability and skills to:

- Demonstrate proficiency in a second language equivalent to the third-year university level
- Infer language structures from the analysis of data from unfamiliar languages.
- Give coherent general interpretations of common language phenomena in terms of language structure and language use.

**Course code for this program is LING.**

# Study Abroad

Language study and some courses in the major may be completed in university or university-affiliated study abroad programs, and such study is recommended. Students interested in doing part of their major work in a study abroad program should discuss the matter with their advisor before going abroad. For information on study abroad programs, consult the Education Abroad office.

# Graduation with Honors

The Honors program in linguistics offers the opportunity for highly motivated undergraduates to undertake a deeper and more individualized study of linguistics than is provided by the regular BA curriculum. Linguistics majors with an overall grade point average of 3.30 or higher are eligible to participate in the program. Honors that may be earned are *cum laude* (with honors), *magna cum laude* (with high honors), and *summa cum laude* (with highest honors).

Students interested in pursuing departmental honors are encouraged to consult with the departmental honors advisor by the beginning of their junior year to ensure that they will be able to meet the requirements for departmental honors before graduation.

# Bachelor's Degree

- Linguistics - Bachelor of Arts (BA) (p. 468)

# Minors

- Linguistics - Minor (p. 473)
- Teaching English to Speakers of Other Languages - Minor (https://catalog.colorado.edu/undergraduate/colleges-schools/arts-sciences/programs-study/linguistics/teaching-english-speakers-other-languages-certificate/)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Bell, Alan
Professor Emeritus

Brown, Susan Windisch
Assistant Professor Adjunct; PhD, University of Colorado Boulder

Calder, Jeremy (https://experts.colorado.edu/display/fisid_159936/)
Assistant Professor; PhD, Stanford University

Cowell, James Andrew (https://experts.colorado.edu/display/fisid_107090/)
Professor; PhD, University of California, Berkeley

Farrelly, Raichle (https://experts.colorado.edu/display/fisid_166033/)
Senior Instructor, Lecturer; PhD, University of Utah

Fox, Barbara (https://experts.colorado.edu/display/fisid_106066/)
Professor; PhD, University of California, Los Angeles

Frajzyngier, Zygmunt (https://experts.colorado.edu/display/fisid_104000/)
Professor; PhD, University of Warsaw (Poland)

Gutiérrez Lorenzo, Ambrocio (https://experts.colorado.edu/display/fisid_168627/)
Assistant Professor; PhD, University of Texas, Austin

Hall, Kira (https://experts.colorado.edu/display/fisid_123111/)
Professor, Associate Chair; PhD, University of California, Berkeley

Haynie, Hannah (https://experts.colorado.edu/display/fisid_166099/)
Assistant Professor; PhD, University of California, Berkeley

Hodges, Adam
Assistant Professor Adjunct; PhD, University of Colorado

Hulden, Mans (https://experts.colorado.edu/display/fisid_154602/)
Associate Professor; PhD, University of Arizona

Menn, Lise
Professor Emerita

Michaelis-Cummings, Laura A. (https://experts.colorado.edu/display/fisid_105599/)
Professor, Chair; PhD, University of California, Berkeley

Narasimhan, Bhuvaneswari (https://experts.colorado.edu/display/fisid_144863/)
Associate Professor; PhD, Boston University

Palmer, Martha
Professor; PhD, University of Edinburgh (Scotland)

Raymond, Chase Wesley (https://experts.colorado.edu/display/fisid_158278/)
Associate Professor; PhD, University of California, Los Angeles

Rood, David
Professor Emeritus

Scarborough, Rebecca (https://experts.colorado.edu/display/fisid_143741/)
Associate Professor, Associate Chair; PhD, University of California, Los Angeles

Shay, Erin J.
Assistant Professor Adjunct; PhD, University of Colorado

Taylor, Allan R.
Professor Emeritus

Thomas-Ruzic, Maria L.
Senior Instructor Emerita

# Courses

## English as a Second Language

**ESLG 1130 (2) Pronunciation for International Graduate Students**
Designed for international graduate students who want to polish and refine their spoken English skills. The course emphasizes producing increasingly accurate English stress, rhythm and intonation, and vowels and consonants. Students participate in listening and speaking activities targeting specific pronunciation features, prepare recordings, and deliver short presentations related to their field. Students receive weekly individualized feedback.
**Requisites:** Restricted to International Graduate students.

**ESLG 1140 (2) Public Speaking for International Students**
Designed for international graduate students to improve oral communication skills for effective academic, professional, and social interactions. Specific attention is given to presenting, explaining and clarifying ideas, negotiating, interrupting, hedging, and responding to questions. Students deliver short formal presentations and impromptu speeches, and lead and participate in group discussions. Students improve active listening skills, non-verbal communication and English pronunciation.
**Requisites:** Restricted to International Graduate students.

**ESLG 1210 (2) Academic Writing for International Graduate Students**
Designed for international graduate students who would benefit from academic and professional writing instruction and practice. This course addresses development of paragraphs and full-length papers, reports and proposals. Focus areas include organization and style, grammar and vocabulary, and using source material effectively. Assignments are customized to students' disciplines with extensive instructor feedback to improve fluency, clarity, and accuracy in writing.
**Requisites:** Restricted to International Graduate students.

**ESLG 1222 (2) Advanced Written Composition for Foreign Students**
Continued practice in academic writing, including incorporating the ideas of others and citing sources appropriately. Extensive instructor feedback provided. Preparation, writing, and revising of a full-length academic term/research paper or work on chapters for a master's thesis or doctoral dissertation. Does not fulfill humanities or major requirements.
**Recommended:** Prerequisite ESLG 1210.

**ESLG 1410 (3) Integrated Academic English Skills for Undergraduate International Students**
Designed for international undergraduate students who want to improve oral and written English communication skills. Students build confidence and accuracy through interactive reading, writing, listening and speaking activities. Students gain insight on U.S. academic culture and conventions by giving short presentations, collaborating on team projects, and writing academic papers using source materials. Course also emphasizes organization, grammar, and vocabulary.
**Requisites:** Restricted to International Undergraduate students.

## Linguistics

**LING 1000 (3) Language in U.S. Society**
Nontechnical exploration of the ways that language is used in America. Emphasizes language as a social institution and how values and goals of both public institutions and private groups shape and are shaped by language and its use.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
MAPS Course: Social Science

**LING 1010 (3) The Study of Words**
Study of English words of Latin and Greek origin, focusing on etymological meaning by analysis of component parts (prefixes, bases, suffixes) and on the ways in which words have changed and developed semantically.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 1010
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**LING 1020 (3) Languages of the World**
Explores the issue of human diversity by examining how languages vary around the world. Outlines historical, geographic, and typological classifications of languages across human societies, and the criteria used by linguists for grouping them into language families. Theorizes the relationship between linguistic and cognitive diversity, and considers the impact of language death on humanity. No formal training in linguistics is required.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**LING 1200 (3) Introduction to Python Programming**
Presents techniques for computer programming in high level programming languages such as Python to address a range of problems with a specific focus on language processing and linguistics. The class is suitable for students with little to no prior experience in computing or programming.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 1200 or INFO 1701
**Recommended:** Prerequisite LING 2000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 1500 (3) Understanding Grammar**
Presents fundamentals of grammar in the Western tradition. Emphasizes making concepts and uses of grammar (as exemplified in English and closely related foreign languages) understandable to the nonspecialist.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 1900 (1) Community-Based Learning Practicum: Literacy and Language Learning**
Student volunteers act as mentors to literacy and language learners in the Boulder community for 1-2 hours per week. Specific meeting times will be arranged at the beginning of the semester.
**Repeatable:** Repeatable for up to 3.00 total credit hours.

**LING 2000 (3) Introduction to Linguistics**
Introduces the study of languages as structural systems. Describes principles of sound patterns, word formation, meaning, and sentence structure. Gives attention to language acquisition, psycholinguistics, language families, dialects, historical change in languages, and different language types.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
MAPS Course: Social Science

**LING 2030 (3) The Ancient Roots of Modern Medicine**
Students learn the meaning and use of the Greek and Latin roots in modern medical terminology; they gain an appreciation of ancient Roman and Greek medicine history and culture in their relation to the modern practice of Western medicine and the sciences; they become familiar with common ancient bioethical principles that govern the ancient practice of medicine and the sciences and learn to appreciate how these principles inform and influence modern medicine and the sciences.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 2030 and CLAS 2030
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**LING 2400 (3) Language, Gender and Sexuality**
Familiarizes students with the effects of gender and sexuality on language use; discusses popular beliefs and scholarly theories about language and communication. Provides students with tools for exploring the role of language and gender.
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**LING 2500 (3) Race, Ethnicity, and Language**
Explores the relationship between race, ethnicity, and language and how they are co-constructed. How do speakers of different racial and ethnic groups use language differently, and what are the social implications of these different language varieties? Discusses the implications of ethnolinguistic variation on racial stereotypes, education, and the law.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 2500
**Recommended:** Prerequisite LING 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**LING 3005 (3) Cognitive Science**
Introduces cognitive science, drawing from psychology, philosophy, artificial intelligence, neuroscience, and linguistics. Studies the linguistic relativity hypothesis, consciousness, categorization, linguistic rules, the mind-body problem, nature versus nurture, conceptual structure and metaphor, logic/problem solving and judgment. Emphasizes the nature, implications and limitations of the computational model of mind.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3702 and CSCI 3702 and PHIL 3310 and PSYC 3005 and SLHS 3003 and CSPB 3702
**Recommended:** Prerequisites two of the following CSCI 1300 or LING 2000 or PHIL 2440 or PSYC 2145.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Distribution-Social Sciences

**LING 3100 (3) Language Sound Structures**
Introduces the sounds of languages and their organization into phonological structures.
**Requisites:** Requires prerequisite of LING 2000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 3185 (3) Figurative Language**
Introduces a framework for analyzing the metaphorical systems used to reason about abstract phenomena like emotion, conflict, purpose, relationships, power, causation, time, life and ideation. Explores how new word meanings develop and how meaning is grounded in embodied experience. Investigates how metaphor is distinguished from other common types of figurative language, including irony.
**Requisites:** Requires prerequisite of LING 2000 (minimum grade C-).
**Recommended:** Prerequisite or corequisite LING 3430 and junior or senior class standing.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 3200 (3) Academic Oral Communication in English**
Designed for undergraduate students who speak English as an additional language, this course improves students' oral communication skills for effective academic interactions in the classroom and within their academic discipline. Specific attention is given to presentation skills; developing, explaining and clarifying ideas; and discussion skills such as interrupting, hedging, and responding to questions. Students deliver formal presentations and impromptu speeches, and lead and participate in group discussions. Students improve active listening skills, non-verbal communication and English pronunciation. This course does not count toward the Linguistics major or minor.
**Recommended:** this course is restricted to course is restricted to speakers of English as an additional language.
**Grading Basis:** Letter Grade

**LING 3210 (3) English for Academic Purposes**
Designed for undergraduate students for whom English is an additional language, this course develops academic English skills for university-level work. Students sharpen English accuracy through academic reading, writing, speaking, and listening practice. They learn to express ideas more clearly, both orally and in writing, while engaging critically in class discussions, and giving presentations, including on a researched topic related to their major. Students improve grammatical accuracy, develop academic vocabulary, and expand critical thinking skills and metacognitive strategies. This course does not count toward the Linguistics major or minor.
**Recommended:** this course is restricted to students who use English as their additional language.
**Grading Basis:** Letter Grade

**LING 3220 (3) American Indigenous Languages in their Social and Cultural Context**
A sampling of the many indigenous languages and cultures found in America. Emphasizes the United States, but also gives attention to the languages of Canada and Latin America.
**Recommended:** students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**LING 3251 (3) Language in Arab Society**
This course introduces the multilingual situation of Arab societies and presents fundamental concepts in sociolinguistics. Students study the major theories and frameworks of language variation and change and the influence of variables such as gender, social class, religion, and colonization on language choice. Students will understand the relationship between language, identity and ideology revealing power dynamics in Arab communities. The course is taught in English and no prior knowledge of Arabic language is required.
**Equivalent - Duplicate Degree Credit Not Granted:** ARAB 3251
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**LING 3430 (3) Semantics**
Theoretical and practical study of meaning in natural language. Considers both semantic theories and semantic phenomena from diverse languages.
**Requisites:** Requires prerequisite LING 2000 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Linguistic major or minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 3545 (3) World Language Policies**
Examines the economic and sociopolitical impact of choosing English vs. other languages in the U.S. Introduces the study of language policies, rights, and planning in other countries, including the worldwide use of English in social, business, and legal contexts.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-Global Perspective

**LING 3550 (3) Talk at Work: Language Use in Institutional Contexts**
Provides an overview of language use in various workplace settings, with an emphasis on hands-on data analysis. Possible contexts include 911 emergency calls, doctor-patient consultations, news interviews, customer-service encounters, classroom discourse, and courtroom interaction. The course also discusses language-based inequalities in such contexts, as well as some of the laws and policies that govern language in the workplace.
**Recommended:** Prerequisite LING 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 3800 (3) Special Topics in Linguistics**
Intensive study of a selected area or problem in linguistics.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite of LING 2000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 3832 (3) Computational Linguistics**
Surveys the fundamental problems, models, and algorithms found and used in the processing of natural language. Computational linguistics is a large field and we will only be able to cover a selection of the vast range of methods employed to solve tasks involving natural language. However, arguably there exists a "core vocabulary" of techniques shared by most practitioners and researchers in the field, which we will focus on.
**Requisites:** Requires Prerequisite of LING 1200 or CSCI 1200 or CSCI 1300 or INFO 2201 (all minimum grade C-).
**Recommended:** Prerequisite or corequisite LING 2000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4050 (3) Japanese Sociolinguistics**
Explores issues related to contemporary Japanese language and society, such as language and identity, language and ideology, and language variation and change in Japan. More specifically, we will reconsider topics such as diversity in gender language, honorifics, dialects, and use of English in Japanese society that have been unidirectionally taught in Japanese language classrooms. The course aims to provide students opportunities to incorporate critical perspectives of sociolinguistics into analyses of Japanese literature and Japanese language education.
**Equivalent - Duplicate Degree Credit Not Granted:** JPNS 4050
**Requisites:** Requires prerequisite course of JPNS 3110 (minimum grade C).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**LING 4100 (3) Perspectives on Language**
Provides extended critical examination of a few selected issues, chosen each term for their general interest and relevance, e.g., the relation between language and thought, or human language vs. animal languages, and computer languages.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite LING 2000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4200 (3) Introduction to Computational Corpus Linguistics**
This course is an Includes extensive introduction (with lab) to the use of Python programming language, UNIX corpus tools, concordance programs, syntactic treebanks, propbanks, and corpora for linguistic analysis and natural language processing. discourse and phonology research. A major focus is the development of computational skills, preparing the student for CSCI 5832 (Natural Language Processing). Previous completion of LING 1200 or CSCI 1300 highly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5200
**Recommended:** Prerequisite LING 1200.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4220 (3) Language and Mind**
Studies topics such a speech perception, word recognition, sentence comprehension, language acquisition, bilingualism, reading and writing. Examines the role of language as a product and producer of the mind, studying interactions between language and cognition from an interdisciplinary perspective. Students will become familiar with the methods of psycholinguistics and design and conduct a psycholinguistic experiment on their own.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 4220
**Recommended:** Prerequisites PSYC 1001 and LING 2000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4225 (4) Interdisciplinary Research Methods in Child Language Acquisition**
Explores fundamental issues in language acquisition cross-culturally, combining methods from Linguistics, Anthropology, Psychology and Computer Science. Students will explore theoretical issue using a hands-on approach that involves acquiring skills such as designing and conducting experiments, investigating corpus data, and computational modeling.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 4225
**Recommended:** Prerequisites PSYC 1001 and LING 2000.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4420 (3) Morphology and Syntax**
Introduces principles of word formation and sentence structure. Covers major morphological and syntactic structures found in the world's languages, and methods for describing grammatical structures, and includes practice in analyzing data from a variety of languages.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5420
**Requisites:** Requires prerequisite course of LING 2000 (minimum grade C-). Restricted to Linguistic (LING) majors or minors with 57-180 credits (Junior or Senior) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4450 (3) Introduction to Formal Syntax**
Introduces formal generative grammar, including determining constituent structure, drawing trees, writing rules, understanding the properties of the lexicon and their interaction with syntax, X-bar theory and its modifications and movement analysis. Recommend pre-req: LING 4420
**Requisites:** Requires prerequisite of LING 2000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4560 (3) Language Development**
Covers the development of language in childhood and into adult life, emphasizing the role of environment and biological endowment in learning to communicate with words, sentences, and narratives.
**Equivalent - Duplicate Degree Credit Not Granted:** SLHS 4560 and PSYC 4560
**Requisites:** Restricted to Linguistics (LING) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4610 (3) Pedagogical Grammar for Teachers of English to Speakers of Other Languages**
Provides an introduction to the study of English grammar from the perspective of the nonnative learner and user of English. The focus is on understanding the form, meaning, and use of grammatical constructions and on how to teach these constructions in an ESL/EFL context.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5610
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4620 (3) Teaching Second Language (L2) Oral Skills and Communication**
This course explores pedagogical approaches for developing nonnative speakers' oral English proficiency and communication skills. We explore the practical and theoretical aspects of teaching the macroskills - listening and speaking - as well as related microskills, including pronunciation, fluency, vocabulary, and comprehension. Pedagogical concepts are considered through the lens of various teaching contexts for learners of all ages and backgrounds. Praxis occurs through lesson development and analysis and interactions with language learners in the community. Recommended prerequisite: LING 3100.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5620
**Recommended:** Prerequisite or corequisite LING 4630.

**LING 4622 (3) Statistical Analysis for Linguistics**
Aims to acquaint students with the fundamentals of quantitative analysis in linguistics and provide a practical introduction to the R statistical computing environment. Topics that will be covered include examining and manipulating data, tests for independence, regression modeling, mixed models, measures of association, and data visualization. It is suitable for students with no prior experience with statistics or statistical software packages.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5622
**Requisites:** Requires prerequisite of LING 2000 (minimum grade C-).
**Recommended:** recommended to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Quantitative Reasoning Math
Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4630 (3) TESOL and Second Language Acquisition: Principles and Practices**
Provides an overview of methods and materials for teaching English as an additional language, along with opportunities for students to observe, discuss and analyze these in relation to language teaching principles, second language acquisition, linguistic considerations, and global and local contexts. Aimed primarily at the teaching of English to non-native speaking adults, the course also addresses second and foreign language teaching.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4632 (3) Machine Learning and Linguistics**
Is an introduction to machine learning, with a focus on linguistic applications. It is oriented toward students who want to understand the basics of machine learning and apply well-known techniques to address problems related to language and linguistics. The main goal is to achieve a practical grasp of the fundamental and most successful concepts in machine learning and to be equipped with techniques to apply this knowledge in linguistic domains. The course is also intended to provide a perspective on natural language acquisition and learning, namely, insight into what types of language acquisition problems are truly difficult, and what types of learning problems can be solved by fairly straightforward pattern recognition techniques. Formerly offered as a special topics course.
**Requisites:** Requires prerequisite course of LING 1200 (minimum grade C-) or CSCI 1200 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4640 (3) Teaching Language Skills: Focus on Social Justice**
Introduces the underlying theories and classroom practices for teaching second language reading, writing, listening and speaking. The course highlights the nature of literacy and oral language development, beginning language skills (phonemic awareness, phonics, pronunciation), and meaning-focused language instruction. This unique iteration of the course, designed for CU Boulder¿s Global Seminar program takes a theme-based and project-based approach, contextualizing the study of language teaching around an exploration of social justice issues that are pressing both in Armenia and globally.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5640
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4650 (3) Language Teaching Materials Design**
This course introduces the role of English as an international language and its impact on languages, cultures, and communities around the world. Students evaluate approaches to teaching English against the backdrop of sociopolitical and historical factors. This course utilizes a project-based approach to study language teaching in a Zapotec speech community. The project involves co-creating language teaching materials for use by Zapotec speakers in efforts to maintain and revitalize the Zapotec language among young learners.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5650

**LING 4700 (3) Conversation Analysis and Interactional Linguistics**
Provides an introduction to the theories and methods of Conversation Analysis (CA) and Interactional Linguistics (IL), which aim to uncover the procedural infrastructure of language use in social interaction. The course emphasizes hands-on experience in analyzing naturally-occurring interactional data. Topics may include: turn-taking, sequence and preference organization, repair, reference, epistemics, and identity.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5700
**Requisites:** Requires prerequisite of LING 2000 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4800 (3) Language and Culture**
Principles of language structure and how language and culture interrelate, how language and language use are affected by culture and how culture may be affected by use of, or contact with, particular languages.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4800
**Recommended:** Prerequisite LING 1000 or LING 2400 or ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4830 (1-3) Honors Thesis**
Required for students who elect departmental honors. Students write an honors thesis based on independent research under the direction of a faculty member.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sciences Honors Course

**LING 4900 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.

**LING 4910 (3) TESOL Practicum**
Provides the field-based component and practical experience in English language teaching for the TESOL Certificate. Work on site includes class observations and supervised teaching in community-based programs/ESL providers. Weekly meetings provide opportunities to debrief/discuss teaching practice and connect theory, methods and practice. Supports professional development, completion of a teaching resume and portfolio and the job search process.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5910
**Requisites:** Requires prerequisite course of LING 3630 or LING 4630 (minimum grade C).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4920 (3) Speakers and the Structure of their Languages**
This is a summer intensive course that introduces various areas of Linguistics (specifically phonology, morphology, and syntax) at the same time that highlights the importance of language documentation, description and revitalization. The target language for Summer 2024 is Zapotec. 50% of this course is designed so that students can get a basic knowledge of this language as a second language and be able to interact with the community of speakers.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5920
**Repeatable:** Repeatable for up to 6.00 total credit hours.

# Linguistics - Bachelor of Arts (BA)

The CU Department of Linguistics has a strong commitment to excellence in teaching at both the graduate and undergraduate levels. The linguistics faculty offers a wide range of research strengths—including syntactic theory, sociocultural linguistics, computational and psycholinguistics, phonetics/phonology and language documentation—ensuring that students gain both versatility and expertise in an array of subfields.

Our educational mission is to provide students with insight into the fundamental design features of language—its sound patterns, its word- and sentence-formation devices, its semantic structure—and to create awareness of language varieties: the diversity of human languages, the role of language as an index of social identity and the ontogenetic and historical development of language.

# Requirements

## Program Requirements

Majors in linguistics must complete a total of 32 credit hours of study in general linguistics, including 5 credits at the intermediate to advanced level of a natural language (for exceptions, see below). Language study is taken in other departments.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. All courses must be completed with a grade of C- or better and cannot be taken pass/fail. Students must have a grade point average of at least 2.000 in the major in order to graduate.

In additional to the general Linguistics major the Linguistics department offers four specialized major tracks for undergraduates: Computational Linguistics; Language and Cognition; Sociocultural, Anthropological, and Interactional Linguistics (SAIL); and Teaching English to Speakers of Other Languages (TESOL). More information about these new tracks can be found on the t (https://www.colorado.edu/linguistics/undergraduate-program/major-detail/)he Program Tracks tab.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Foundational Linguistics Courses** | | |
| LING 2000 | Introduction to Linguistics | 3 |
| LING 3100 | Language Sound Structures | 3 |
| LING 3430 | Semantics | 3 |
| LING 4420 | Morphology and Syntax | 3 |
| **Natural Language** | | |
| Complete a minimum of 5 credit hours at the intermediate to advanced level of a natural language other than English (see details below) with a grade of C- or better. | | 5 |

| Electives | | |
|---|---|---|
| Select a minimum of 15 elective credit hours from the following with a grade of C- or better: | | 15 |
| ENGL 4003 | Old English 1: Introduction to Old English | |
| FREN 3020 | French Phonetics Through Musical Performance | |
| FREN 3010 | French Phonetics and Pronunciation | |
| JPNS 4030 | Japanese Syntax | |
| JPNS 4080 | Kanji in Japanese Orthography | |
| JPNS 4070 | | |
| SPAN 3050 | Spanish Phonology and Phonetics | |
| SPAN 3150 | Linguistic Analysis of Spanish | |
| SPAN 4430 | Special Topics in Hispanic Linguistics | |
| SPAN 4450 | Introduction to Hispanic Linguistics | |
| LING 1000 | Language in U.S. Society | |
| LING 1010 | The Study of Words | |
| LING 1020 | Languages of the World | |
| LING 1200 | Introduction to Python Programming | |
| LING 2400 | Language, Gender and Sexuality | |
| LING 2500 | Race, Ethnicity, and Language | |
| LING 3005 | Cognitive Science | |
| LING 3185 | Figurative Language | |
| LING 3220 | American Indigenous Languages in their Social and Cultural Context | |
| LING 3545 | World Language Policies | |
| LING 3550 | Talk at Work: Language Use in Institutional Contexts | |
| LING 3800 | Special Topics in Linguistics | |
| LING 3832 | Computational Linguistics | |
| LING 4050 | Japanese Sociolinguistics | |
| LING 4100 | Perspectives on Language | |
| LING 4220 | Language and Mind | |
| LING 4225 | Interdisciplinary Research Methods in Child Language Acquisition | |
| LING 4450 | Introduction to Formal Syntax | |
| LING 4560 | Language Development | |
| LING 4610 | Pedagogical Grammar for Teachers of English to Speakers of Other Languages | |
| LING 4620 | Teaching Second Language (L2) Oral Skills and Communication | |
| LING 4630 | TESOL and Second Language Acquisition: Principles and Practices | |
| LING 4632 | Machine Learning and Linguistics | |
| LING 4640 | Teaching Language Skills: Focus on Social Justice | |
| LING 4700 | Conversation Analysis and Interactional Linguistics | |
| LING 4800 | Language and Culture | |
| LING 4830 | Honors Thesis | |
| LING 4910 | TESOL Practicum | |
| Other upper-division linguistics courses may also be chosen if available; graduate courses may be taken with permission of the department. | | |

### Natural Language

Students must complete, with a grade of C- or better, a minimum of 5 credit hours of study of a natural language other than English (including signed languages used by deaf communities). The 5 credit hours offered in satisfaction of this requirement must be at the 3000 level or above for widely-taught languages (French, German, Greek, Latin, Spanish), or at the 2000 level or above for less-widely-taught languages (Arabic, American Sign Language, Chinese, Farsi, Hebrew, Hindi, Indonesian, Italian, Japanese, Korean, Norwegian, Portuguese, Russian, Swedish).

Only courses taught in the language in question, and focused specifically on language learning, may be used for this requirement. A list of all the approved courses is available from the Department of Linguistics or the departmental undergraduate advisor.

The natural language requirement may be satisfied by examination or waived for foreign students whose native language is not English; in these cases, students must still meet the college minimum major requirement of 18 credit hours of upper-division coursework and 30 credit hours overall in the major by taking an additional 3-credit elective from the list above. Students who wish to have their language requirement waived must obtain the consent of an undergraduate advisor before registering for the fall term of the junior year.

### Additional Information

The department recommends that prospective majors complete LING 2000 and at least two 1000-level foreign language courses (in the same language) by the end of the sophomore year, unless the student's foreign language proficiency is already advanced.

The fall semester of the junior year should include LING 3430, a 2000-level foreign language course, and a linguistics elective or LING 4420. It must also include LING 2000 if that was not taken earlier. The spring semester of the junior year should include LING 3100, a linguistics elective and a further 2000-level foreign language course (if needed to prepare the student for the required upper-division foreign language credit hours).

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here refers only to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in linguistics, students should meet the following requirements:

- By the beginning of the spring semester of the freshman year (second semester), declare linguistics as a major.
- During the freshman or sophomore years (first through fourth semesters), take LING 2000 (required) and LING 1000 or LING 2400 (electives)
- By the end of the sophomore year (fourth semester) at the latest, complete two semesters of study of a natural (spoken or signed) language other than English.*
- During the junior year (fifth and sixth semesters) at the latest, continue natural language study at the 2000 level.
- During the fall of the junior year (fifth semester), take one or both of LING 3430 or LING 4420.
- During the junior or senior year (fifth through eighth semesters), take the remaining courses as needed.
- During the spring of the junior year (sixth semester), take LING 3100 and an upper-division linguistics elective.

- During the senior year (seventh and eighth semesters) at the latest, take 5 credit hours of natural language study at the 3000 level. The language requirement is waived for native speakers of a language other than English, but if it is waived, 3 additional credit hours in linguistics must be taken.

*Note*: A Linguistics major who has been excluded from any upper-division linguistics course due to enrollment limitations will be given first preference for a seat in that course the following year if the exclusion is made known to the department staff within two weeks after it occurs. No declared linguistics major who still needs LING 2000 for fall of the junior year and attempts to register for it during the regular registration period for continuing students (spring of the sophomore year) will be excluded from the course.

# Program Tracks

In addition to the general linguistics major, the Linguistics Department offers four specialized major tracks for undergraduates. These tracks allow students to tailor their major coursework to better reflect their specific interest(s) within the field of linguistics. Concentrated training within a specific subfield of the discipline provides students with the in-depth knowledge and skills needed to pursue specific careers within the field of linguistics. In addition, it provides a foundation for pursuing a focused area of study for those who continue onto graduate school.

Students declaring any track will need to complete the following courses:

| Code | Title | Credit Hours |
|---|---|---|
| **Foundational Linguistics Courses** | | |
| LING 2000 | Introduction to Linguistics | 3 |
| LING 3100 | Language Sound Structures | 3 |
| LING 3430 | Semantics | 3 |
| LING 4420 | Morphology and Syntax | 3 |
| **Natural Language** | | |
| Complete a minimum of 5 credit hours at the intermediate to advanced level of a natural language other than English (see details on the Requirements Tab) with a grade of C- or better. | | 5 |
| **Total Credit Hours** | | **17** |

## Computational Linguistics

Students declaring the Computational Linguistics sub-plan will also complete 15 credit hours of LING electives (at least 9 at the upper division level); however, they must take 12 of these credits as the following 4 core courses listed below. For the remaining 3 elective credit hours, students can choose an elective from the list of electives, also below, some from CSCI or INFO.

| Code | Title | Credit Hours |
|---|---|---|
| **Computational Linguistics Core Courses** | | |
| LING 1200 | Introduction to Python Programming | 3 |
| LING 3832 | Computational Linguistics | 3 |
| LING 4200 | Introduction to Computational Corpus Linguistics | 3 |
| LING 4632 | Machine Learning and Linguistics | 3 |
| **Electives** | | |
| Select one course from the following: | | 3-4 |
| LING 4700 | Conversation Analysis and Interactional Linguistics | |
| CSCI 2270 | Computer Science 2: Data Structures | |
| CSCI 3832 | Natural Language Processing | |
| INFO 2201 | Programming for Information Science 2 | |
| **Total Credit Hours** | | **15-16** |

## Language and Cognition

Students declaring the Language and Cognition track will also complete 15 credits of LING electives (at least 9 at the upper division level); however, they must select 12 of these credits from the set of Language and Cognition-related courses below. For the remaining 3 elective credit hours, students can choose any LING course.

| Code | Title | Credit Hours |
|---|---|---|
| **Language and Cognition Core Courses** | | |
| Complete 12 credit hours from the following: | | 12 |
| LING 1010 | The Study of Words | |
| LING 3005 | Cognitive Science | |
| LING 3185 | Figurative Language | |
| LING 4220 | Language and Mind | |
| LING 4100 | Perspectives on Language (Language and Embodiment) | |
| LING 4225 | Interdisciplinary Research Methods in Child Language Acquisition | |
| LING 4560 | Language Development | |
| LING 4622 | Statistical Analysis for Linguistics | |
| LING 4632 | Machine Learning and Linguistics | |
| **Electives** | | |
| Select any LING course. | | 3 |
| **Total Credit Hours** | | **15** |

## Sociocultural, Anthropological & Interactional Linguistics (SAIL)

Students declaring the SAIL track will also complete 15 credit hours of LING electives (9 at the upper division level); however, they must select 12 of these credits from the set of SAIL-related courses below. For the remaining 3 elective credit hours, students can choose any LING course.

| Code | Title | Credit Hours |
|---|---|---|
| **Sociocultural, Anthropological & Interactional Linguistics Core Courses** | | |
| Complete 12 credit hours from the following: | | 12 |
| LING 1000 | Language in U.S. Society | |
| LING 1900 | Community-Based Learning Practicum: Literacy and Language Learning | |
| LING 2400 | Language, Gender and Sexuality | |
| LING/ETHN 2500 | Race, Ethnicity, and Language | |
| LING 3220 | American Indigenous Languages in their Social and Cultural Context | |
| LING 3545 | World Language Policies | |
| LING 3550 | Talk at Work: Language Use in Institutional Contexts | |

| | | |
|---|---|---|
| LING 3800 | Special Topics in Linguistics (Language in Digital Media) | |
| LING 3800 | Special Topics in Linguistics (Language and Politics) | |
| LING/JPNS 4050 | Japanese Sociolinguistics | |
| LING 4700 | Conversation Analysis and Interactional Linguistics | |
| LING/ANTH 4800 | Language and Culture | |
| **Electives** | | |
| Select any LING course. | | 3 |
| **Total Credit Hours** | | **15** |

## Teaching English to Speakers of Other Languages (TESOL)

Students declaring the TESOL sub-plan will be required to take four foundational TESOL-focused courses in Linguistics for a total of 12 credit hours. In addition to these four courses, students must complete at least 3 credit hours from a limited set of TESOL-related courses.

| Code | Title | Credit Hours |
|---|---|---|
| **Teaching English to Speakers of Other Languages Core Courses** | | |
| LING 4610 | Pedagogical Grammar for Teachers of English to Speakers of Other Languages | 3 |
| LING 4620 | Teaching Second Language (L2) Oral Skills and Communication | 3 |
| LING 4630 | TESOL and Second Language Acquisition: Principles and Practices | 3 |
| LING 4910 | TESOL Practicum | 3 |
| **Electives** | | |
| Select one course from the following: | | 3-4 |
| LING 3545 | World Language Policies | |
| LING/SLHS 4560 | Language Development | |
| LING/ANTH 4800 | Language and Culture | |
| COMM 3410 | Intercultural Communication | |
| EDUC 2411 | Educational Psychology for Elementary Schools | |
| EDUC 2425 | Foundations of Bilingual/Multicultural Education | |
| EDUC 2625 | Teaching English Language Development | |
| EDUC 4125 | Secondary World Language Methods | |
| EDUC 4425 | Introduction to Bilingual/Multicultural Education | |
| EDUC 4455 | Methods of Biliteracy Instruction | |
| EDUC 4615 | Language Acquisition for Bilingual Learners | |
| **Total Credit Hours** | | **15-16** |

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will complete all 12 credits of the Social Sciences area of the Gen Ed Distribution Requirement. Depending on the courses selected as a major electives, students can potentially complete some credits in the Arts & Humanities area of the Distribution and both the U.S. Perspective and the Global Perspective components of the Gen Ed Diversity Requirement.

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| LING 2000 | Introduction to Linguistics | 3 |
| Beginning Level Foreign Language 1 (If needed, does not count toward langage requirement) | | 4-5 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Diversity course (example: Diversity: US Perspective) | | 3 |
| | **Credit Hours** | **16-17** |
| **Spring Semester** | | |
| Beginning Level Foreign Language 2 (If needed, does not count toward language requirement) | | 4-5 |
| LING Lower-Division or Upper-Division elective | | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences and Lab) | | 4 |
| | **Credit Hours** | **14-15** |

**Year Two**

| **Fall Semester** | | |
|---|---|---|
| Second Year Foreign Language 1 (If needed) | | 3-5 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Gen. Ed. Diversity course (example: Diversity: Global Perspective) | | 3 |
| LING Lower-Division or Upper-Division elective | | 3 |
| | **Credit Hours** | **15-17** |
| **Spring Semester** | | |
| LING Foreign Language Requirement (if needed) | | 3-5 |
| LING 3100 | Language Sound Structures | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution (example: Arts & Humanities) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15-17** |

**Year Three**

| **Fall Semester** | | |
|---|---|---|
| LING 3430 | Semantics | 3 |
| LING Foreign Language Requirement UD (if needed) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| LING Upper-Division elective | | 3 |
| LING Foreign Language Requirement UD (if needed) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| LING 4420 | Morphology and Syntax | 3 |
| Upper-Division Elective | | 3 |
| | **Credit Hours** | **15** |

| | |
|---|---|
| **Year Four** | |
| **Fall Semester** | |
| LING Upper-Division elective | 3 |
| Elective | 3 |
| Upper-Division Elective | 3 |
| Upper-Division Elective | 3 |
| Upper-Division Elective | 3 |
| **Credit Hours** | **15** |
| **Spring Semester** | |
| LING Upper-Division Elective | 3 |
| Elective | 3 |
| Upper-Division Elective | 3 |
| Upper-Division Elective | 3 |
| Upper-Division Elective | 3 |
| **Credit Hours** | **15** |
| **Total Credit Hours** | **120-126** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Students can identify multiple levels of linguistic structure and their interactions: sound segments, sound categories, word structure, sentence structure and semantic structure.
- Students are aware of the range of speech sounds found in languages of the world, including how they are transcribed, and have the ability to transcribe those sounds that are frequently encountered.
- Students can use transcribed data to infer the contrastive relationships among sounds in a given language.
- Students can describe the ways in which languages and language families differ with regard to word- and sentence-formation devices.
- Students can infer language structures from the analysis of data from unfamiliar languages.
- Students can describe the relationship between conceptual structure and linguistic structure at both the word and sentence level, and identify differences between conventional and calculable linguistic meaning.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BA and MA in Linguistics

### Admissions Requirements

In order to apply for admission to the BAM program in linguistics, a student must meet the following criteria:

- Have a cumulative GPA of 3.0 or higher.
- Transfer students must have completed a minimum of 24 credit hours at CU Boulder.
- Have completed at least one upper division linguistics elective.
- Must take a graduate-level "qualifying course" in the semester they apply for admission to the BAM program.

The BAM degree program is recommended only for the most serious and able undergraduate students. For further information, see the graduate advisor in the spring of the sophomore year or during the first week of the fall semester of the junior year.

### Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. These 12 credits may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

If you are interested in the BAM degree program, please contact the Linguistics graduate advisor for more information. Students should discuss possible BAM plans with the graduate advisor by spring of the sophomore year or during the first week of the fall semester of the junior year.

## BA in Linguistics, MS in Computational Linguistics, Analytics, Search and Informatics

### Admission Requirements

In order to apply for admission to the BAM program, a student must meet the following criteria:

- Complete all prerequisite courses with a minimum grade of B or higher.

| Code | Title | Credit Hours |
|---|---|---|
| LING 1200 | Introduction to Python Programming | 3 |
| or CSCI 1300 | Computer Science 1: Starting Computing | |
| LING 4632/6632 | Machine Learning and Linguistics | 3 |
| LING 3832/5832 | Computational Linguistics | 3 |
| or CSCI 3832/5832 | Natural Language Processing | |
| LING 4200/5200 | Introduction to Computational Corpus Linguistics | 3 |
| One of the following courses in Computer Science as an elective | | |
| CSCI 3104 | Algorithms | |
| CSCI 3022 | Introduction to Data Science with Probability and Statistics | |
| One of the following courses (in the semester the student applies) | | |
| LING 5420 | Morphology and Syntax | |

| | |
|---|---|
| LING 5030 | Linguistic Phonetics |
| LING 5430 | Semantics and Pragmatics |

- Have a cumulative GPA of 3.5 or higher.
- Have at least junior class standing.
- Provide two letters of reference, one written by the course instructor of the LING 5XXX course they are taking during the semester they apply, the other by the instructor from an upper division course in Computer Science. Letters should be sent directly to the CLASIC Program Coordinator.

### Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only 6 credits may be double counted toward the bachelor's degree and the master's degree.

Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

# Linguistics - Minor

Students can profitably combine the linguistics minor with a major in one of the modern languages, classics, anthropology, psychology or speech, language and hearing sciences, to name just a few possibilities.

One good reason to take the linguistics minor is that by learning to analyze language and evaluate claims about language, students can improve the quality of their writing and argumentation in their major discipline.

## Requirements

Declaration of a minor in linguistics is open to any student enrolled at CU Boulder, regardless of college or school.

Students minoring in linguistics must complete a total of 18 credit hours in linguistics, 9 of which must be at the upper-division level. Students must maintain an overall and linguistics GPA of at least 2.00 (C), and complete all LING courses with a C- or better.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| LING 2000 | Introduction to Linguistics | 3 |
| **Electives** | | |
| Select two of the following: | | 6 |
| LING 3100 | Language Sound Structures | |
| LING 3430 | Semantics | |
| LING 4420 | Morphology and Syntax | |
| Take the remaining one of the three courses listed above and/or select from the following electives to bring the total credit hours to 18: [1] | | 9 |
| LING 1000 | Language in U.S. Society | |
| LING 1010 | The Study of Words | |
| LING 1020 | Languages of the World | |
| LING 1200 | Introduction to Python Programming | |
| LING 2400 | Language, Gender and Sexuality | |
| LING 2500 | Race, Ethnicity, and Language | |
| LING 3005 | Cognitive Science | |
| LING 3185 | Figurative Language | |
| LING 3220 | American Indigenous Languages in their Social and Cultural Context | |
| LING 3545 | World Language Policies | |
| LING 3550 | Talk at Work: Language Use in Institutional Contexts | |
| LING 3800 | Special Topics in Linguistics | |
| LING 4050 | Japanese Sociolinguistics | |
| LING 4100 | Perspectives on Language | |
| LING 4220 | Language and Mind | |
| LING 4225 | Interdisciplinary Research Methods in Child Language Acquisition | |
| LING 4450 | Introduction to Formal Syntax | |
| LING 4560 | Language Development | |
| LING 4610 | Pedagogical Grammar for Teachers of English to Speakers of Other Languages | |
| LING 4620 | Teaching Second Language (L2) Oral Skills and Communication | |
| LING 4630 | TESOL and Second Language Acquisition: Principles and Practices | |
| LING 4632 | Machine Learning and Linguistics | |
| LING 4640 | Teaching Language Skills: Focus on Social Justice | |
| LING 4700 | Conversation Analysis and Interactional Linguistics | |
| LING 4800 | Language and Culture | |
| LING 4830 | Honors Thesis | |
| LING 4910 | TESOL Practicum | |
| **Total Credit Hours** | | **18** |

[1] At least 3 credit hours of the electives must be in an upper-division course.

# Teaching English to Speakers of Other Languages - Minor

The undergraduate minor in TESOL provides CU Boulder students with foundational knowledge and skills for English teaching while also incorporating the broader perspectives of culture, language use and language learning. Housed in the linguistics department, the 18-credit minor is open to all interested students, and may be of particular relevance to students from social science, humanities, speech/language, foreign language, international affairs and communication programs or backgrounds.

The widespread role of English as an international lingua franca opens up many opportunities for trained English teachers globally. Increasingly, EFL (English as a foreign language) providers want to hire individuals with relevant training—not just those who are native or near-native speakers. Minor earners, in conjunction with their bachelor's degrees, will have the credentials to be able to tap into professional opportunities in the dynamic world of English language teaching—globally and in the U.S.

The program is focused on the teaching of English to young adults and adults while also incorporating the broader perspectives of language

use and language learning from education, communication, culture and society. A one-semester practicum experience involves teaching or tutoring with a community ESL provider.

# Requirements

Students must complete a total of 18 credit hours of TESOL linguistic courses and TESOL related coursework, 9 of which must be at the upper-division level. Students must maintain a GPA of at least 2.00 (C) in all courses that can count toward the minor and complete all courses counting toward the minor with a grade of C- or better.

Students cannot declare both the major in linguistics and the minor in TESOL.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| LING 4610 | Pedagogical Grammar for Teachers of English to Speakers of Other Languages | 3 |
| LING 4620 | Teaching Second Language (L2) Oral Skills and Communication | 3 |
| LING 4630 | TESOL and Second Language Acquisition: Principles and Practices | 3 |
| LING 4910 | TESOL Practicum | 3 |
| **Electives** | | |
| Choose two of the following courses: | | 6 |
| COMM 3410 | Intercultural Communication | |
| EDUC 2411 | Educational Psychology for Elementary Schools | |
| EDUC 2425 | Foundations of Bilingual/Multicultural Education | |
| EDUC 2625 | Teaching English Language Development | |
| EDUC 4125 | Secondary World Language Methods | |
| EDUC 4425 | Introduction to Bilingual/Multicultural Education | |
| EDUC 4455 | Methods of Biliteracy Instruction | |
| EDUC 4615 | Language Acquisition for Bilingual Learners | |
| LING 3545 | World Language Policies | |
| LING/ANTH 4800 | Language and Culture | |
| LING/SLHS 4560 | Language Development | |
| **Total Credit Hours** | | **18** |

# Mathematics

The Department of Mathematics offers courses leading to either a Bachelor of Arts (BA) degree in mathematics or a minor in mathematics. Students who choose to major in mathematics choose from one of five tracks for the major:

- **Comprehensive track:** The comprehensive track emphasizes theoretical mathematics and is aimed at students seeking a general background in mathematics or intending to pursue graduate work in mathematics.
- **Applicable track:** The applicable track is aimed at students seeking a background in applied and/or applicable mathematics.
- **Secondary education track:** The secondary education track is designed to align with the Colorado licensure requirements for mathematics secondary education and the university does offer a program for obtaining secondary education mathematics teaching licensure.
- **Computational track:** The computational track is designed for students with an interest in the intersection of mathematics and computer science.
- **Statistics track:** The statistics track is designed for students seeking a background in statistics and/or data science.

**Course code for this program is MATH.**

# Bachelor's Degree

- Mathematics - Bachelor of Arts (BA) (p. 480)

# Minor

- Mathematics - Minor (p. 484)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Baggett, Lawrence W.
Professor Emeritus; PhD, University of Washington Seattle

Beaudry, Agnès (https://experts.colorado.edu/display/fisid_157677/)
Associate Professor; PhD, Northwestern University

Black, John (https://experts.colorado.edu/display/fisid_126540/)
Associate Professor; PhD, University of California, Davis

Bronstein, Albert (https://experts.colorado.edu/display/fisid_154916/)
Teaching Assistant Professor; PhD, University of Kentucky

Brown, Gordon E.
Professor Emeritus

Casalaina-Martin, Sebastian Ben (https://experts.colorado.edu/display/fisid_145845/)
Professor, Chair; PhD, Columbia University

Clelland, Jeanne Nielsen (https://experts.colorado.edu/display/fisid_113103/)
Professor; PhD, Duke University

Czubak, Magdalena (https://experts.colorado.edu/display/fisid_157955/)
Associate Professor; PhD, University of Texas at Austin

Deeley, Robin J. (https://www.colorado.edu/math/robin-deeley/)
Associate Professor; PhD, University of Victoria (Canada)

Elliott, Peter D. (https://experts.colorado.edu/display/fisid_105048/)
Professor Emeritus; PhD, University of Cambridge (England)

Englander, Janos (https://experts.colorado.edu/display/fisid_147333/)
Professor; PhD, Technion – Israel Institute of Technology

Farsi, Carla Emilia (https://experts.colorado.edu/display/fisid_101437/)
Professor; PhD, University of Maryland, College Park

Fox, Jeffrey S. (https://experts.colorado.edu/display/fisid_105586/)
Professor; PhD, University of California, Berkeley

Goodrich, Robert K.
Professor Emeritus

Gorokhovsky, Alexander (https://experts.colorado.edu/display/fisid_126279/)
Professor; PhD, The Ohio State University

Grant, David R. (https://experts.colorado.edu/display/fisid_100868/)
Professor; PhD, Massachusetts Institute of Technology

Green, Richard Mutegeki (https://experts.colorado.edu/display/fisid_129800/)
Professor; MA, Oxford University (England)

Grochow, Joshua A. (https://experts.colorado.edu/display/fisid_158240/)
Assistant Professor; PhD, University of Chicago

Grulke, Boo (https://experts.colorado.edu/display/fisid_144824/)
Teaching Assistant Professor; DEd, University of Florida

Gustafson, Karl E. (https://experts.colorado.edu/display/fisid_104877/)
Professor Emeritus; PhD, University of Maryland, College Park

Holley, Richard A.
Professor Emeritus

Ih, Su-Ion (https://experts.colorado.edu/display/fisid_141091/)
Associate Professor; PhD, Brown University

Jesudason, Judith Packer (https://experts.colorado.edu/display/fisid_100338/)
Professor; PhD, Harvard University

Kearnes, Keith (https://experts.colorado.edu/display/fisid_118457/)
Professor; PhD, University of California, Berkeley

Kuznetsov, Sergei Eugenievitch (https://experts.colorado.edu/display/fisid_113246/)
Associate Professor, Associate Chair; DSc, Vilnius State University (Lithuania)

Luh, Kyle (https://experts.colorado.edu/display/fisid_166949/)
Assistant Professor; PhD, Yale University

Lundell, Albert T.
Professor Emeritus

Macrae, Robert Eugene
Professor Emeritus

Malitz, Jerome I.
Professor Emeritus

Manley, Kevin W. (https://experts.colorado.edu/display/fisid_142342/)
Teaching Associate Professor; PhD, University of Colorado Boulder

Mayr, Peter (https://experts.colorado.edu/display/fisid_155858/)
Associate Professor; PhD, Johannes Kepler Universität Linz (Austria)

Monk, James Donald
Professor Emeritus

Mycielski, Jan
Professor Emeritus

O'Rourke, Sean Daniel (https://experts.colorado.edu/display/fisid_154418/)
Associate Professor; PhD, University of California, Davis

Orosz Hunziker, Flor (https://experts.colorado.edu/display/fisid_167648/)
Assistant Professor; PhD, Yale University

Pflaum, Markus Josef (https://experts.colorado.edu/display/fisid_144979/)
Professor; Dr habil, Humboldt University of Berlin (Germany)

Ramsay, Arlan
Professor Emeritus

Rearick, David F.
Professor Emeritus

Roberson, Lee Forrest (https://experts.colorado.edu/display/fisid_158380/)
Teaching Assistant Professor; PhD, University of Northern Colorado

Schmidt, Wolfgang
Professor Emeritus

Stade, Eric (https://experts.colorado.edu/display/fisid_100456/)
Professor; PhD, Columbia University

Stalvey, Harrison Edward (https://experts.colorado.edu/display/fisid_158325/)
Teaching Assistant Professor; PhD, Georgia State University

Stange, Katherine E. (https://experts.colorado.edu/display/fisid_151508/)
Associate Professor; PhD, Brown University

Szendrei, Agnes Erzsebet (https://experts.colorado.edu/display/fisid_130160/)
Professor Emerita; DSc, Hungarian Academy of Sciences (Hungary)

Thiem, Franz Nathaniel (https://experts.colorado.edu/display/fisid_144618/)
Professor, Associate Chair; PhD, University of Wisconsin–Madison

Timmer, Joseph (https://experts.colorado.edu/display/fisid_156565/)
Teaching Associate Professor; PhD, University of Southern California

Varanasi, Mahesh K. (https://experts.colorado.edu/display/fisid_103090/)
Professor; PhD, Rice University

Walter, Martin E. (https://experts.colorado.edu/display/fisid_105263/)
Professor Emeritus; PhD, University of California, Irvine

Webb, David C. (https://experts.colorado.edu/display/fisid_141204/)
Associate Professor; PhD, University of Wisconsin–Madison

Wise, Jonathan (https://experts.colorado.edu/display/fisid_151516/)
Associate Professor; PhD, Brown University

Wolkowisky, Jay H.
Professor Emeritus

# Courses

**MATH 1005 (3) Introduction to College Mathematics**
Introductory level mathematics course which presents a college level introduction to algebraic functions and their applications. Only offered through the Student Academic Service Center.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 1011
**Additional Information:** MAPS Course: Mathematics

**MATH 1011 (3) College Algebra**
Covers simplifying algebraic expressions, factoring, linear and quadratic equations, inequalities, exponentials, logarithms, functions, graphs and systems of equations. Department enforced prerequisite: one year high school algebra.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 1005
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
MAPS Course: Mathematics

**MATH 1012 (3) Quantitative Reasoning and Mathematical Skills**
Promotes mathematical literacy among liberal arts students. Teaches basic mathematics, logic, and problem-solving skills in the context of higher level mathematics, science, technology, and/or society. This is not a traditional math class, but is designed to stimulate interest in and appreciation of mathematics and quantitative reasoning as valuable tools for comprehending the world in which we live.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 1112
**Additional Information:** GT Pathways: GT-MA1 - Mathematics
Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
MAPS Course: Mathematics

**MATH 1021 (3) College Trigonometry**
Covers trigonometric functions, identities, solutions of triangles, addition and multiple angle formulas, inverse and trigonometric functions and laws of sines and cosines. Department enforced prerequisite: MATH 1011 (minimum grade C-) or 1 1/2 years of high school algebra and 1 year of high school geometry.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1235 or MATH 1150

**MATH 1071 (3) Finite Mathematics for Social Science and Business**
Discusses systems of linear equations and introduces matrices, linear programming, and probability.
**Requisites:** Requires prerequisite course of MATH 1011 (minimum grade C-) or a score of 46% or greater on an ALEKS math exam taken in 2016 or earlier.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**MATH 1081 (3) Calculus for Social Science and Business**
Covers differential and integral calculus of algebraic, logarithmic and exponential functions. For more information about the math placement referred to in the "Enrollment Requirements", contact your academic advisor.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1345 or APPM 1350 or ECON 1088 or MATH 1300 or MATH 1310 or MATH 1330
**Requisites:** Requires prerequisite course of ECON 1078 or MATH 1011 or MATH 1071 or MATH 1150 or MATH 1160 (minimum grade C-) or an ALEKS math exam taken in 2016 or earlier, or placement into pre-calculus based on your admission data and/or CU Boulder coursework.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**MATH 1110 (3) Mathematics for Elementary Educators 1**
Includes a study of problem solving techniques in mathematics and the structure of number systems. Department enforced prereq., one year of high school algebra and one year of geometry. Department enforced restriction: restricted to prospective elementary teachers.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**MATH 1112 (4) Mathematical Analysis in Business**
Gives students experience with mathematical problem solving in real business contexts. Students will work with data and spreadsheets to build and analyze mathematical models. Themes of the course include applying logical operators to model business rules, interpreting data and using tables and graphs, finding break-even and optimal points, and addressing uncertainty and forecasting
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 1012
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
MAPS Course: Mathematics

**MATH 1120 (3) Mathematics for Elementary Educators 2**
Topics include geometry, measurement, probability, and statistics. Department enforced restriction: restricted to prospective elementary teachers.
**Requisites:** Requires prerequisite course of MATH 1110 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**MATH 1130 (3) Mathematics from the Visual Arts**
Introduces mathematical concepts through the study of visual arts.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**MATH 1150 (4) Precalculus Mathematics**
Develops techniques and concepts prerequisite to calculus through the study of trigonometric, exponential, logarithmic, polynomial and other functions. For more information about the math placement referred to in the "Enrollment Requirements", please contact your academic advisor.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1235 or MATH 1021
**Requisites:** Requires prerequisite course of MATH 1011 (minimum grade C-) or an ALEKS math exam taken in 2016 or earlier, or placement into pre-calculus based on your admissions data and/or CU Boulder coursework. Requires enrollment in corequisite course MATH 1151.
**Additional Information:** GT Pathways: GT-MA1 - Mathematics
Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
MAPS Course: Mathematics

**MATH 1151 (1) Precalculus Supplemental Lab**
Provides students concurrently enrolled in MATH 1150 with supplemental instruction.
**Requisites:** Requires enrollment in corequisite course of MATH 1150.
**Grading Basis:** Letter Grade

**MATH 1160 (3) Transition to Calculus (IBL): The Theory, Applications and Analysis of Functions**
Examines the functions of calculus and how they can be used to model concrete problems and/or change. This is an intensive study of these functions through Inquiry-Based Learning. Each class will be designed so students will be actively engaged in learning the material in small groups. For more information about the math placement referred to in the "Enrollment Requirements", please contact your academic advisor.
**Requisites:** Requires an ALEKS math exam taken in 2016 or earlier, or placement into pre-calculus based on your admissions data and/or CU Boulder coursework.

**MATH 1212 (3) Data and Models**
Engages students in statistical and algebraic problem solving through modeling data and real world questions taken from the social and life sciences. The course will emphasize these skills and the mathematical background needed for a university level statistics course.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 1011
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
MAPS Course: Mathematics

**MATH 1300 (5) Calculus 1**
Topics include limits, derivatives of algebraic and transcendental functions, applications of the derivative, integration and applications of the definite integral. Students who have already earned college credit for calculus 1 are eligible to enroll in this course if they want to solidify their knowledge base in calculus 1. For more information about the math placement referred to in the "Enrollment Requirements", contact your academic advisor.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1345 or APPM 1350 or ECON 1088 MATH 1081 or MATH 1310 or MATH 1330
**Requisites:** Requires prerequisite course of MATH 1011 and MATH 1021 or MATH 1150 or MATH 1160 or APPM 1235 (minimum grade C-) or an ALEKS math exam taken in 2016 or earlier, or placement into calculus based on your admissions data and/or CU Boulder coursework.
**Additional Information:** GT Pathways: GT-MA1 - Mathematics
Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**MATH 1301 (1) Calculus 1 Supplemental Lab**
Provides students concurrently enrolled in MATH 1300 with supplemental instruction.
**Requisites:** Requires corequisite course of MATH 1300.
**Grading Basis:** Letter Grade

**MATH 1310 (5) Calculus for Life Sciences**
Calculus concepts are developed through the analysis and modeling of complex systems, ranging from gene networks and cells to populations and ecosystems. Fundamental concepts of probability and statistics are also developed through the lens of calculus. MATH 1300 is similar, but a greater emphasis is placed on relevance and applications in biology and other life sciences. Students who have already earned college credit for calculus 1 are eligible to enroll in this course if they want to solidify their knowledge base in calculus 1. For more information about the math placement referred to in the "Enrollment Requirements", contact your academic advisor.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1345 or APPM 1350 or ECON 1088 or MATH 1081 or MATH 1300 or MATH 1330
**Requisites:** Requires prerequisite course of APPM 1235 or MATH 1021 or MATH 1150 or MATH 1160 or MATH 1300 (minimum grade C-) or an ALEKS math exam taken in 2016 or earlier, or placement into calculus based on your admissions data and/r CU Boulder coursework.
**Additional Information:** GT Pathways: GT-MA1 - Mathematics
Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**MATH 1330 (4) Calculus for Economics and the Social Sciences**
A calculus course intended to meet the needs of social science and economics majors, including applications. Covers differential and integral calculus of algebraic, logarithmic and exponential functions and modeling. For more information about the math placement referred to in the "Enrollment Requirements", contact your academic advisor.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1345 or APPM 1350 or ECON 1088 or MATH 1081 or MATH 1300 or MATH 1310
**Requisites:** Requires a prerequisite course of ECON 1078 or MATH 1011 or MATH 1071 or MATH 1150 or MATH 1160 (minimum grade C-) or an ALEKS math exam taken in 2016 or earlier, or placement into calculus based on your admissions data and/r CU Boulder coursework.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**MATH 2001 (3) Introduction to Discrete Mathematics**
Introduces the ideas of rigor and proof through an examination of basic set theory, existential and universal quantifiers, elementary counting, discrete probability, and additional topics.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 2002
**Requisites:** Requires prerequisite course of MATH 1300 or MATH 1310 or APPM 1345 or APPM 1350 (all minimum grade C-).

**MATH 2002 (3) Number Systems: An Introduction to Higher Mathematics**
Introduces the concepts of mathematical proofs using the construction of the real numbers from set theory. Topics include basic logic and set theory, equivalence relations and functions, Peano's axioms, construction of the integers, the rational numbers and axiomatic treatment of the real numbers.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 2001
**Requisites:** Requires prerequisite of MATH 1300 or MATH 1310 or APPM 1345 or APPM 1350 (all minimum grade C-).

**MATH 2130 (3) Introduction to Linear Algebra for Non-Mathematics Majors**
Examines basic properties of systems of linear equations, vector spaces, inner products, linear independence, dimension, linear transformations, matrices, determinants, eigenvalues, eigenvectors and diagonalization. Intended for students who do not plan to major in Mathematics. Formerly MATH 3130.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 2135 or APPM 3310
**Requisites:** Requires prerequisite course of MATH 2300 or APPM 1360 (minimum grade C-).

**MATH 2135 (3) Introduction to Linear Algebra for Mathematics Majors**
Examines basic properties of systems of linear equations, vector spaces, inner products, linear independence, dimension, linear transformations, matrices, determinants, eigenvalues, eigenvectors and diagonalization. Intended for students who plan to major in Mathematics. Formerly MATH 3135.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 2130 or APPM 3310
**Requisites:** Requires a prerequisite course of (MATH 2300 or APPM 1360) and (MATH 2001 or MATH 2002) (all minimum grade C-).

**MATH 2300 (5) Calculus 2**
Continuation of MATH 1300. Topics include transcendental functions, methods of integration, polar coordinates, differential equations, improper integrals, infinite sequences and series, Taylor polynomials and Taylor series. Department enforced prerequisite: MATH 1300 or MATH 1310 or APPM 1345 or APPM 1350 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1360
**Requisites:** Requires prerequisite course of MATH 1300 or MATH 1310 or APPM 1345 or APPM 1350 (minimum grade C-).

**MATH 2380 (3) Mathematics for the Environment**
An interdisciplinary course where environmental issues, such as climate change, global epidemics, pollution, population models and kinship relations of Australian Aborigines are studied with elementary mathematics (such as fuzzy logic). Similar techniques are applied to analyze other current events, such as surveillance, economic meltdowns, identity theft and media literacy. Department enforced prerequisite: proficiency in high school mathematics.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**MATH 2400 (5) Calculus 3**
Continuation of MATH 2300. Topics include vectors, three-dimensional analytic geometry, partial differentiation and multiple integrals, and vector analysis. Department enforced prerequisite: MATH 2300 or APPM 1360 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 2350
**Requisites:** Requires prerequisite course of MATH 2300 or APPM 1360 (minimum grade C-).

**MATH 2510 (3) Introduction to Statistics**
Elementary statistical measures. Introduces statistical distributions, statistical inference, hypothesis testing and linear regression. Department enforced prerequisite: two years of high school algebra.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
MAPS Course: Mathematics

**MATH 3001 (3) Analysis 1**
Provides a rigorous treatment of the basic results from elementary Calculus. Topics include the topology of the real line, sequences of numbers, continuous functions, differentiable functions and the Riemann integral.
**Requisites:** Requires prerequisite courses of (MATH 2001 or MATH 2002) and (MATH 2130 or MATH 3130 or MATH 2135 or MATH 3135) (all minimum grade C-).

**MATH 3110 (3) Introduction to Theory of Numbers**
Studies the set of integers, focusing on divisibility, congruences, arithmetic functions, sums of squares, quadratic residues and reciprocity, and elementary results on distributions of primes.
**Requisites:** Requires prerequisite of MATH 2001 or MATH 2002 (both minimum grade C-).

**MATH 3120 (3) Functions and Modeling**
Engages the students in daily projects and occasional in-class labs designed to strengthen and expand knowledge of the topics in secondary mathematics, focusing especially on topics from algebra, precalculus and calculus. Projects and labs involve the use of multiple representations, transformations, data analysis techniques and interconnections among ideas from geometry, algebra, probability and calculus.
**Requisites:** Requires prerequisite of MATH 2001 or MATH 2002 (both minimum grade C-).

**MATH 3130 (3) Introduction to Linear Algebra**
Examines basic properties of systems of linear equations, vector spaces, inner products, linear independence, dimension, linear transformations, matrices, determinants, eigenvalues, eigenvectors and diagonalization.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 3135 or APPM 3310
**Requisites:** Requires prerequisite course of MATH 2300 or APPM 1360 (minimum grade C-).

**MATH 3135 (3) Honors Introduction to Linear Algebra**
Examines basic properties of systems of linear equations, vector spaces, inner products, linear independence, dimension, linear transformations, matrices, determinants, eigenvalues, eigenvectors and diagonalization.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 3130 or APPM 3310
**Requisites:** Requires a prerequisite course of MATH 2300 or APPM 1360 and MATH 2001 (all minimum grade C-).

**MATH 3140 (3) Abstract Algebra 1**
Studies basic properties of algebraic structures with a heavy emphasis on groups. Other topics, time permitting, may include rings and fields.
**Requisites:** Requires prerequisite courses of (MATH 2001 or MATH 2002) and (MATH 2130 or MATH 3130 or MATH 2135 or MATH 3135) (all minimum grade C-).

**MATH 3170 (3) Combinatorics 1**
Covers basic methods and results in combinatorial theory. Includes enumeration methods, elementary properties of functions and relations, and graph theory. Emphasizes applications.
**Requisites:** Requires prerequisite of MATH 2001 or MATH 2002 (both minimum grade C-).

**MATH 3210 (3) Euclidean and Non-Euclidean Geometry**
Axiomatic systems; Euclid's presentation of the elements of geometry; Hilbert's axioms; neutral, Euclidean and non-Euclidean geometries and their models.
**Requisites:** Requires prerequisite courses of (MATH 2001 or MATH 2002) and (MATH 2130 or MATH 3130 or MATH 2135 or MATH 3135) (all minimum grade C-).

**MATH 3430 (3) Ordinary Differential Equations**
Involves an elementary systematic introduction to first-order scalar differential equations, nth order linear differential equations, and n-dimensional linear systems of first-order differential equations. Additional topics are chosen from equations with regular singular points, Laplace transforms, phase plane techniques, basic existence and uniqueness and numerical solutions. Formerly MATH 4430.
**Requisites:** Requires prerequisite courses of (MATH 2400 or APPM 2350) and (MATH 2130 or 3130 or MATH 2135 or 3135 or APPM 3310) (all minimum grade C-).

**MATH 3450 (3) Introduction to Complex Variables**
Theory of functions of one complex variable, including integrals, power series, residues, conformal mapping, and special functions. Formerly MATH 4450.
**Requisites:** Requires prerequisite courses of MATH 2400 or APPM 2350 (minimum grade C-).

**MATH 3510 (3) Introduction to Probability and Statistics**
Introduces the basic notions of Probability: random variables, expectation, conditioning, and the standard distributions (Binomial, Poisson, Exponential, Normal). This course also covers the Law of Large Numbers and Central Limit Theorem as they apply to statistical questions: sampling from a random distribution, estimation, and hypothesis testing.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 2510 or MATH 4510
**Requisites:** Requires a prerequisite course of (MATH 2300 or APPM 1360) and (MATH 2001 or MATH 2002) (all minimum grade C-).

**MATH 3850 (1) Seminar in Guided Mathematics Instruction**
Provides learning assistants with an opportunity to analyze assessment data for formative purposes and develop instructional plans as a result of these analyses. These formative assessment analyses will build on the literature in the learning sciences. Students gain direct experiences interacting with the tools of the trade, especially with actual assessment data and models of instruction. Restricted to learning assistants in Math.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires a corequisite course of EDUC 4610.

**MATH 4000 (3) Foundations of Mathematics**
Focuses on a complete deductive framework for mathematics and applies it to various areas. Presents Goedel's famous incompleteness theorem about the inherent limitations of mathematical systems. Uses idealized computers to investigate the capabilities and limitations of human and machine computation.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5000
**Requisites:** Requires prerequisite courses of MATH 3001 or MATH 3140 or MATH 4730 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**MATH 4001 (3) Analysis 2**
Provides a rigorous treatment of infinite series, sequences of functions and an additional topic chosen by the instructor (for example, multivariable analysis, the Lebesgue integral or Fourier analysis).
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5001
**Requisites:** Requires prerequisite course of MATH 3001 (minimum grade C-).

**MATH 4120 (3) Introduction to Operations Research**
Studies linear and nonlinear programming, the simplex method, duality, sensitivity, transportation and network flow problems, some constrained and unconstrained optimization theory, and the Kuhn-Tucker conditions, as time permits.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5120 and APPM 4120 and MATH 5120
**Requisites:** Requires prerequisite course of MATH 2130 or 3130 or MATH 2135 or 3135 or APPM 3310 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MATH 4140 (3) Abstract Algebra 2**
Explores some topic that builds on material in MATH 3140. Possible topics include (but are not limited to) Galois theory, representation theory, advanced linear algebra or commutative algebra.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5140
**Requisites:** Requires prerequisite course of MATH 3140 (minimum grade C-).

**MATH 4200 (3) Introduction to Topology**
Introduces the basic concepts of point set topology. Includes topological spaces, metric spaces, homeomorphisms, connectedness and compactness.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5200
**Requisites:** Requires prerequisite course of MATH 3001 (minimum grade C-).

**MATH 4230 (3) Differential Geometry of Curves and Surfaces**
Introduces the modern differential geometry of plane curves, space curves, and surfaces in 3-dimensional space. Topics include the Frenet frame, curvature and torsion for space curves; Gauss and mean curvature for surfaces; Gauss and Codazzi equations, and the Gauss-Bonnet theorem.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5230
**Requisites:** Requires prerequisite courses of (MATH 2400 or APPM 2350) and (MATH 2001 or 2002) and (MATH 2130 or MATH 3130 or MATH 2135 or MATH 3135) (all minimum grade C-).

**MATH 4240 (3) Hilbert Spaces and the Mathematics of Quantum Mechanics**
Provides an introduction to Hilbert spaces and their application in quantum mechanics. The primary goal is to prove and understand the so-called spectral theorem, which is crucial for the formulation of quantum mechanics. In addition, some examples from physics will be discussed, such as the quantum harmonic oscillator and the spectrum of the hydrogen atom.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5240
**Requisites:** Requires prerequisite course of MATH 3001 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MATH 4330 (3) Fourier Analysis**
The notion of Fourier analysis, via series and integrals, of periodic and nonperiodic phenomena is central to many areas of mathematics. Develops the Fourier theory in depth and considers such special topics and applications as wavelets, Fast Fourier Transforms, seismology, digital signal processing, differential equations, and Fourier optics.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5330
**Requisites:** Requires prerequisite course of MATH 3001 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MATH 4440 (3) Mathematics of Coding and Cryptography**
Gives an introduction, with proofs, to the algebra and number theory used in coding and cryptography. Basic problems of coding and cryptography are discussed.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5440
**Requisites:** Requires prerequisite course of MATH 2130 or 3130 or MATH 2135 or 3135 (minimum grade C-).

**MATH 4470 (3) Partial Differential Equations**
Studies initial, boundary, and eigenvalue problems for the wave, heat, and potential equations. Solution by separation of variables, Green's function, and variational methods.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5470
**Requisites:** Requires prerequisite courses of MATH 3430 (minimum grade C-).

**MATH 4510 (3) Introduction to Probability Theory**
Studies axioms, combinatorial analysis, independence and conditional probability, discrete and absolutely continuous distributions, expectation and distribution of functions of random variables, laws of large numbers, central limit theorems, and simple Markov chains if time permits.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 3570 or ECEN 3810 or MATH 3510 MATH 5510
**Requisites:** Requires prerequisite courses of (MATH 2400 or APPM 2350) and (MATH 2130 or 3130 or MATH 2135 or 3135) (all minimum grade C-).

**MATH 4520 (3) Introduction to Mathematical Statistics**
Examines point and confidence interval estimation. Principles of maximum likelihood, sufficiency, and completeness: tests of simple and composite hypotheses, linear models, and multiple regression analysis if time permits. Analyzes various distribution-free methods.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5520 and STAT 4520 and STAT 5520
**Requisites:** Requires prerequisite course of MATH 4510 or APPM 3570 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MATH 4530 (3) Theoretical Foundations of Data Science**
Introduces theoretical concepts from mathematics, statistics, and computer science required to understand and analyze data. Topics include randomized algorithms, machine learning, streaming, sketching, clustering, random matrices and graphs, graphical models and compressed sensing.
**Requisites:** Requires prerequisite courses of (MATH 2130 or MATH 2135) and MATH 4510 (minimum grade C-).

**MATH 4540 (3) Introduction to Time Series**
Studies basic properties, trend-based models, seasonal models, modeling and forecasting with ARIMA models, spectral analysis and frequency filtration.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5540 and STAT 4540 and STAT 5540
**Requisites:** Requires prerequisite course of MATH 4520 or APPM 4520 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MATH 4650 (3) Intermediate Numerical Analysis 1**
Focuses on numerical solution of nonlinear equations, interpolation, methods in numerical integration, numerical solution of linear systems, and matrix eigenvalue problems. Stresses significant computer applications and software. Department enforced prerequisite: knowledge of a programming language.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4650
**Requisites:** Requires a prerequisite course of MATH 3430 or APPM 2360 and APPM 3310 (minimum grade C-).

**MATH 4730 (3) Set Theory**
Studies in detail the theory of cardinal and ordinal numbers, definition by recursion, the statement of the continuum hypothesis, simple cardinal arithmetic and other topics chosen by the instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5730
**Requisites:** Requires prerequisite courses of MATH 3001 or MATH 3110 or MATH 3140 or MATH 3170 or MATH 3210 or MATH 3510 or MATH 4230 (all minimum grade C-).

**MATH 4805 (1) Mathematical Teacher Training: Inclusive Pedagogy**
Designed to train students to teach mathematics in an inclusive, multicultural environment. Students teach a math course within the McNeill Academic Program (Student Academic Services Center) meeting weekly with faculty and colleagues to learn to re-design curriculum, fine-tune pedagogical practices, create assessments, mentor undergraduate instructor assistants and create an inclusive classroom environment. Department enforced restriction: experience with college-level instruction.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to students with 87-180 credits (Seniors) or graduate students only.

**MATH 4810 (1-3) Special Topics in Mathematics**
Covers various topics not normally covered in the curriculum. Offered intermittently depending on student demand and availability of instructors.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5810
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**MATH 4820 (3) History of Mathematical Ideas**
Examines the evolution of a few mathematical concepts (e.g., number, geometric continuum, or proof), with an emphasis on the controversies surrounding these concepts. Begins with Ancient Greek mathematics and traces the development of mathematical concepts through the middle ages into the present.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5820
**Requisites:** Prerequisite courses of MATH 2001 or MATH 2002 and one of the following: MATH 3001, 3110, 3120, 3140, 3170, 3210, 3430, 3450, 3510, 3850, 4000, 4001, 4120, 4140, 4200, 4230, 4330, 4440, 4510, 4520, 4540, 4650, or 4660 (all min grade C-).
**Recommended:** completion of upper division Written Communication requirement.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**MATH 4890 (1-3) Honors Independent Study**
Offered for students doing a thesis for departmental honors.
**Additional Information:** Arts Sciences Honors Course

**MATH 4900 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours.

# Mathematics - Bachelor of Arts (BA)

The undergraduate degree in mathematics emphasizes knowledge and awareness of:

- Calculus of several variables and vector analysis.
- The structure of mathematical proofs and definitions.
- Basic linear algebra and the theory of vector spaces.
- Basic real analysis of one variable.
- At least one additional specialized area of mathematics.

In addition, students completing a degree in mathematics are expected to acquire the ability and skills to:

- Move from concrete to abstract thinking and back with facility.
- Recognize patterns and connections between areas of mathematics and between mathematics and other subjects.
- Organize and construct a logical argument, provide evidence to support arguments and articulate arguments clearly and succinctly, both verbally and in writing.

# Program Tracks

The mathematics program offers five tracks that lead to the BA degree. All five tracks require Calculus 1, Calculus 2, Calculus 3, MATH 2001, MATH 2135 and MATH 3001.

## Comprehensive Track

The comprehensive track emphasizes theoretical mathematics, and is aimed at students seeking a general background in mathematics or intending to pursue graduate work in mathematics.

## Applicable Track

The applicable track is aimed at students seeking a background in applied and/or applicable mathematics.

## Secondary Education Track

The secondary education track is designed to align with the Colorado licensure requirements for mathematics secondary education, and the university does offer a program for obtaining secondary education mathematics teaching licensure.

## Computational Track

The computational track is designed for students with an interest in the intersection of mathematics and computer science.

## Statistics Track

The statistics track is designed for students seeking a background in statistics and/or data science.

# Requirements

## Program Requirements

To earn a BA in mathematics, a student must complete the general requirements of the College of Arts and Sciences, as well as the six mathematics core courses and the five additional courses for one of the five tracks (described on the Program Tracks tab).

Students must earn a grade of C- or better in each of the mathematics core courses and the five additional courses, and have at least a C average for all attempted work in mathematics.

### Required Core Courses

The following courses are required of all mathematics majors, regardless of track.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MATH 1300 | Calculus 1 | 4-5 |
| or MATH 1310 | Calculus for Life Sciences | |
| or APPM 1350 | Calculus 1 for Engineers | |
| MATH 2300 | Calculus 2 | 4-5 |
| or APPM 1360 | Calculus 2 for Engineers | |
| MATH 2400 | Calculus 3 | 4-5 |
| or APPM 2350 | Calculus 3 for Engineers | |
| MATH 2001 | Introduction to Discrete Mathematics | 3 |
| or MATH 2002 | Number Systems: An Introduction to Higher Mathematics | |
| MATH 2135 | Introduction to Linear Algebra for Mathematics Majors | 3 |
| MATH 3001 | Analysis 1 | 3 |
| **Program Track Coursework** | | **15-16** |
| **Total Credit Hours** | | **36-40** |

# Program Tracks

## Comprehensive Track

Aimed at students seeking a general background in mathematics or intending to pursue graduate work in mathematics, in addition to the coursework required of all mathematics majors, the comprehensive track requires the following courses.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MATH 3140 | Abstract Algebra 1 | 3 |
| MATH 4140 | Abstract Algebra 2 | 3 |
| or MATH 4001 | Analysis 2 | |
| **Electives** | | |
| Three upper-division MATH or approved APPM courses (at least one at the 4000-level) | | 9 |
| **Total Credit Hours** | | **15** |

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress," as it is used here, refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in mathematics, students should meet the following requirements.

- By the beginning of the second semester, declare the major.
- By the end of the fourth semester, complete Calculus 1, Calculus 2, Calculus 3, MATH 2001 or MATH 2002, MATH 2135, and MATH 3001.
- By the end of the sixth semester, complete MATH 3140, MATH 4140 or MATH 4001, and one additional approved MATH or APPM course.
- By the end of the eighth semester, complete the major.

## Applicable Track

Aimed at students seeking a background in applied and/or applicable mathematics, in addition to the coursework required of all mathematics majors, the applicable track requires the following courses.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MATH 4510 | Introduction to Probability Theory | 3 |
| MATH 3430 | Ordinary Differential Equations | 3 |
| MATH 4520 | Introduction to Mathematical Statistics | 3 |
| or MATH 4470 | Partial Differential Equations | |

| | |
|---|---|
| **Electives** | |
| Two upper-division MATH or approved APPM courses | 6 |
| **Total Credit Hours** | **15** |

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress," as it is used here, refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in mathematics, students should meet the following requirements.

- By the beginning of the second semester, declare the major.
- By the end of the fourth semester, complete Calculus 1, Calculus 2, Calculus 3, MATH 2001 or MATH 2002, MATH 2135, and MATH 3001.
- By the end of the sixth semester, complete MATH 4510 ,MATH 3430 ,and either MATH 4520 or MATH 4470.
- By the end of the eighth semester, complete the major.

## Secondary Education Track

Aimed at students intending to teach mathematics at the secondary level, in addition to the coursework required of all mathematics majors, the secondary education track requires the following courses.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MATH 3110 | Introduction to Theory of Numbers | 3 |
| or MATH 3140 | Abstract Algebra 1 | |
| MATH 3120 | Functions and Modeling | 3 |
| MATH 3210 | Euclidean and Non-Euclidean Geometry | 3 |
| MATH 3510 | Introduction to Probability and Statistics | 3 |
| MATH 4820 | History of Mathematical Ideas | 3 |
| **Total Credit Hours** | | **15** |

*Note*: Completion of the secondary education track does not provide the student a teaching license.

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress," as it is used here, refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in mathematics, students should meet the following requirements.

- By the beginning of the second semester, declare the major.
- By the end of the fourth semester, complete Calculus 1, Calculus 2, Calculus 3, MATH 2001 or MATH 2002, MATH 2135, MATH 3001, and MATH 3120 .
- By the end of the sixth semester, complete MATH 3510, MATH 3210, and either MATH 3110 or MATH 3140.
- By the end of the eighth semester, complete the major.

## Computational Track

Aimed at students interested in both mathematics and computation, in addition to the coursework required of all mathematics majors, the computational track requires the following courses.

### Ancillary Courses

| Code | Title | Credit Hours |
|---|---|---|
| **Ancillary Courses** [1] | | |
| CSCI 1300 | Computer Science 1: Starting Computing | 4 |
| CSCI 2270 | Computer Science 2: Data Structures | 4 |
| **Total Credit Hours** | | **8** |

1 CSCI 1300 and CSCI 2270 do not count toward hours in the major and are not part of the major GPA.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CSCI 3104 | Algorithms | 4 |
| MATH 3430 | Ordinary Differential Equations | 3 |
| MATH/APPM 4650 | Intermediate Numerical Analysis 1 | 3 |
| **Electives** | | |
| Two MATH or approved APPM or approved CSCI courses, at least one of which must be at the 4000-level. | | 6 |
| **Total Credit Hours** | | **16** |

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress," as it is used here, refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in mathematics, students should meet the following requirements.

- By the beginning of the second semester, declare the major.
- By the end of the fourth semester, complete Computer Science 1, Computer Science 2, Calculus 1, Calculus 2, Calculus 3, MATH 2001 or MATH 2002, MATH 2135, and MATH 3001 .
- By the end of the sixth semester, complete CSCI 3104, MATH 3430, MATH 4650/APPM 4650 and one of the additionally required upper-division MATH classes.
- By the end of the eighth semester, complete the major.

## Statistics Track

Aimed at students seeking a background in statistics and/or data science, in addition to the coursework required of all mathematics majors, the statistics track requires the following courses.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MATH 4510 | Introduction to Probability Theory | 3 |
| MATH 4520 | Introduction to Mathematical Statistics | 3 |
| MATH 4540 | Introduction to Time Series | 3 |
| **Electives** | | |
| Two of the following courses: | | 6 |
| APPM 4560 | Markov Processes, Queues, and Monte Carlo Simulations | |
| APPM 4590 | | |
| MATH 6550 | Introduction to Stochastic Processes | |
| STAT 4000 | Statistical Methods and Application I | |

| | | |
|---|---|---|
| STAT 4010 | Statistical Methods and Applications II | |
| STAT 4610 | Statistical Learning | |
| **Total Credit Hours** | | **15** |

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress," as it is used here, refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in mathematics, students should meet the following requirements.

- By the beginning of the second semester, declare the major.
- By the end of the fourth semester, complete Calculus 1, Calculus 2, Calculus 3, MATH 2001 or MATH 2002, MATH 2135, and MATH 4510.
- By the end of the sixth semester, complete MATH 3001, MATH 4520, and MATH 4540.
- By the end of the eighth semester, complete the major.

## Recommended Four-Year Plan of Study

Through the required coursework for the major, students will complete the QRMS component of the Gen Ed Skills Requirement and, depending on the track of study, potentially some credit hours in the Natural Sciences and Arts & Humanities areas of the Gen Ed Distribution Requirement.

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| MATH 1300 | Calculus 1 | 5 |
| Gen. Ed. Distribution/diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| MATH 2300 | Calculus 2 | 5 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/US Perspective) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |

**Year Two**

| **Fall Semester** | | |
|---|---|---|
| MATH 2400 | Calculus 3 | 5 |
| MATH 2001 or MATH 2002 | Introduction to Discrete Mathematics or Number Systems: An Introduction to Higher Mathematics | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| MATH 2135 | Introduction to Linear Algebra for Mathematics Majors | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |

**Year Three**

| **Fall Semester** | | |
|---|---|---|
| MATH Upper Division Elective | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) - Upper-division | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| MATH 3001 | Analysis 1 | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **15** |

**Year Four**

| **Fall Semester** | | |
|---|---|---|
| MATH Upper Division Elective | | 3 |
| MATH Upper Division Elective | | 3 |
| Gen. Ed. Distribution course (Natural Sciences) | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| MATH Upper Division Elective | | 3 |
| MATH Upper Division Elective | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **121** |

## Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated

master's program enables students to continue working with their established faculty mentors.

### BA in Mathematics, MA in Mathematics or MS in Applied Mathematics

Each of the BAM degree programs offered by the Department of Mathematics allows highly motivated and successful students to experience graduate-level coursework earlier in their education than would otherwise be possible, and also allows them to obtain a master's degree in a reduced time period. Students are allowed to count 6 hours of graduate-level mathematics department coursework towards both their undergraduate and graduate degree requirements.

#### Admissions Requirements

In order to gain admission to the BAM programs named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.0 or higher.
- Have completed a minimum of 45 credit hours of coursework.
- If a transfer student, have completed a minimum of 24 credit hours at CU Boulder.
- Have completed a minimum of two upper-division courses from the Department of Mathematics.

The earliest admission to the program is after the successful completion of at least total 45 credit hours and a minimum of two upper-division courses from the Department of Mathematics. Students must have at least one year of coursework remaining towards the completion of their undergraduate degree in order to be admitted to the program. Students admitted to the program may not pursue a double degree or a double major; however, outside minors are allowed.

#### Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only 6 credits may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

If you are interested in the BAM degree program, please contact the mathematics graduate program for more information.

# Mathematics - Minor

The undergraduate minor in mathematics emphasizes knowledge and awareness of:

- Calculus of several variables and vector analysis.
- The structure of mathematical proofs and definitions.
- Basic linear algebra and the theory of vector spaces.
- At least one additional specialized area of mathematics.

## Requirements

Declaration of a minor in mathematics is open to any student enrolled at CU Boulder, regardless of college or school.

To earn a minor in mathematics, students must complete the following courses with a grade of C- or better in each course (no pass/fail work may be applied), and they must have at least a C (2.00) average for all attempted work in mathematics. Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor.

### Required Courses and Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MATH 1300 | Calculus 1 | 4-5 |
| or APPM 1350 | Calculus 1 for Engineers | |
| MATH 2300 | Calculus 2 | 4-5 |
| or APPM 1360 | Calculus 2 for Engineers | |
| MATH 2400 | Calculus 3 | 4-5 |
| or APPM 2350 | Calculus 3 for Engineers | |
| MATH 2001 | Introduction to Discrete Mathematics | 3 |
| or MATH 2002 | Number Systems: An Introduction to Higher Mathematics | |
| MATH 2130 | Introduction to Linear Algebra for Non-Mathematics Majors | 3 |
| or MATH 2135 | Introduction to Linear Algebra for Mathematics Majors | |
| **Electives** | | |
| Three upper-division MATH courses (at least one at the 4000-level) | | 9 |
| **Total Credit Hours** | | **27-30** |

# Medieval and Early Modern Studies

To the Middle Ages the modern world owes the preservation and transmission of Latin and Greek; the development of a host of vernaculars; the evolution of Judaism and Christianity, and the rise of Islam; the renewed study of Roman law; the growth of a mercantile class; the creation of musical notation; the erection of ecclesiastical monuments; the foundations of constitutional government; and the institution of universities. The early modern period inherited and elaborated all these institutions and inventions, adapting them to fit new conceptions of man (and woman), church and state.

The Center for Medieval and Early Modern Studies is founded on the convictions that the period from c. 400 to c. 1800, conceived in a global context, is a dynamic cultural continuum and ever-evolving system; that study of both periods in tandem sheds new light on each; and that the unity and diversity of the premodern world can be understood and appreciated only from an interdisciplinary perspective. Medieval and Early Modern Studies therefore crosses boundaries of period, nation, language and discipline, and the center's prime function is to facilitate and encourage interdepartmental study and teaching.

Courses throughout the curriculum are available to students whose area of specialization within a given department is the medieval and/or early modern period(s) and who wish to broaden their knowledge of the cultures of the period. With the approval of the major department, a coherent group of these courses may be accepted as a related program of study and as part of the requirements for an undergraduate degree. For additional details concerning these courses, see departmental listings.

For more information, visit the Center for Medieval and Early Modern Studies (https://www.colorado.edu/cmems/) website.

**Course code for this program is MEMS.**

## Certificate

- Medieval and Early Modern Studies - Certificate (p. 485)

## Courses

**MEMS 2020 (3) Introduction to Medieval and Renaissance Studies**
Introduces students to the literature, history, culture and art of Europe and the Mediterranean basin from late antiquity through the renaissance. The course is interdisciplinary and focuces on topics which reveal the dynamism and diversity of pre-modern culture.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**MEMS 4020 (3) Medieval and Early Modern Studies: Texts and Contexts**
Focuses on communities in the Mediterranean basin and Europe (i.e., cloister, court and city), discussing major literary texts and visual monuments associated with them and their historical context. Emphasizes tensions between tradition and innovation, Latin and vernacular, East and West, Christian and non-Christian (Jewish and Islam), sacred and secular, authority and freedom and male and female.
**Equivalent - Duplicate Degree Credit Not Granted:** MEMS 5020
**Requisites:** Requires a prerequisite course of CLAS 1110 and CLAS 1120 and ENGL 2503 or HIST 1011 and HIST 1012 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**MEMS 4030 (3) Medieval and Early Modern Studies: Special Topics**
Different topics offered by the faculty of the Medieval and Early Modern Studies Program in alternate semesters. Topics may include the literature of pilgrimage and travel, women and minorities, theatre, music, epic, medieval and early modern views of the classics, the Bible, and medieval and early modern theories of education.
**Equivalent - Duplicate Degree Credit Not Granted:** MEMS 5030
**Requisites:** Requires a prerequisite course of CLAS 1110 and CLAS 1120 and ENGL 2503 or HIST 1011 and HIST 1012 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

# Medieval and Early Modern Studies - Certificate

Students who pursue the medieval and early modern studies (MEMS) certificate are free to take a variety of courses offered in numerous departments across the CU Boulder campus. In consultation with the CMEMS director, each student can tailor the certificate to meet their intellectual interests in the study of premodern Europe and its global influence. Students usually earn the certificate in tandem with a BA degree in history, classics or English, and find the analytical and linguistic skills particularly useful for graduate work in history and law.

## Requirements

Students must complete at least 24 credits of approved coursework, as follows.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| Select one of the following lower-division introductory survey courses: | | 3 |
| ARTH 1300 | | |
| ARTH 1400 | | |
| HIST 1011 | Greeks, Romans, Kings & Crusaders: European History to 1600 | |
| HUMN 1110 | Introduction to Humanities: Literature 1 | |
| HUMN 1120 | Introduction to Humanities: Literature 2 | |
| HUMN 1210 | Introduction to Humanities: Art and Music 1 | |
| HUMN 1220 | Introduction to Humanities: Art and Music 2 | |
| Senior-level seminar: | | 3 |
| MEMS 4030 | Medieval and Early Modern Studies: Special Topics (or equivalent) [1] | |
| Capstone Seminar: | | 3 |
| MEMS 4020 | Medieval and Early Modern Studies: Texts and Contexts (or equivalent) (with a minimum grade of B) [1] | |
| Five electives, at least four of which must be upper-division and two of which must be in disciplines other than the student's major | | 15 |
| **Total Credit Hours** | | **24** |

[1] Substitutions for MEMS 4020 and MEMS 4030 may be made the discretion of the MEMS advisor or faculty chair.

# Molecular, Cellular and Developmental Biology

The undergraduate program in molecular, cellular and developmental biology (MCDB) is directed toward understanding the molecular and cellular mechanisms that provide the basis for biological structure, growth, evolution, embryonic development and genetic inheritance. Undergraduate majors learn about the scientific method, experimental approaches and groundbreaking discoveries that have made modern molecular and cellular biology such an important force in medicine, agriculture and the growing biotechnology industry. They also learn about the diverse tools of modern biology, including recombinant DNA, genomic mapping, transgenic organisms, gene targeting, analysis of mutants, biochemical purification, antibody probes, laser manipulation of living cells, light and electron microscopy, and computer modeling. In addition to academic and laboratory classes, MCDB majors have many opportunities to participate in ongoing research in the department.

Learn how living systems operate at the cellular and molecular levels of organization, their assembly and structure, with heavy emphasis on genetic information and regulation, including embryonic development.

**Course code for this program is MCDB.**

## Animal Use Policy

Biology is the science of life, and a major in it must include some hands-on experience with living organisms to be complete. Exercises involving the use of living animals or animal tissues are included, therefore, in MCDB laboratory courses. Majors with objections on moral grounds may arrange to limit their participation in these exercises, although their educational experience is compromised by doing so.

Nonmajors may take MCD biology lecture courses without the accompanying laboratories. Laboratory courses in which living vertebrate animals or tissues are used are identified in the course description section of this catalog. For additional information, please contact the department.

## Bachelor's Degree

- Molecular, Cellular and Developmental Biology - Bachelor of Arts (BA) (p. 495)

## Minor

- Molecular, Cellular and Developmental Biology - Minor (p. 498)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Abbott, Lois A.
Senior Instructor Emerita

Anseth, Kristi S. (https://experts.colorado.edu/display/fisid_103471/)
Distinguished Professor; PhD, University of Colorado Boulder

Arnoult, Nausica Christine (https://experts.colorado.edu/display/fisid_164094/)
Assistant Professor; PhD, Pierre and Marie Curie University (France)

Betterton, Meredith D. (https://experts.colorado.edu/display/fisid_125396/)
Professor; PhD, Harvard University

Blumenthal, Thomas (https://experts.colorado.edu/display/fisid_143346/)
Professor, Visiting Professor; PhD, Johns Hopkins University

Boswell, Robert E. (https://experts.colorado.edu/display/fisid_100196/)
Professor; PhD, University of Colorado Boulder

Brumbaugh, Justin J. (https://experts.colorado.edu/display/fisid_164025/)
Assistant Professor; PhD, University of Wisconsin-Madison

Cech, Thomas R. (https://experts.colorado.edu/display/fisid_103252/)
Distinguished Professor; PhD, University of California, Berkeley

Chen, Zhe
Assistant Research Professor; PhD, University of Colorado Boulder

Copley, Shelley (https://experts.colorado.edu/display/fisid_104067/)
Professor; PhD, Harvard University

DeDecker, Brian S. (https://experts.colorado.edu/display/fisid_143934/)
Senior Instructor; PhD, Yale University

Detweiler, Corrella Scott (https://experts.colorado.edu/display/fisid_128240/)
Professor; PhD, University of California, San Francisco

Donaldson, Zoe (https://experts.colorado.edu/display/fisid_157087/)
Assistant Professor; PhD, Emory University

Dowell, Robin D. (https://experts.colorado.edu/display/fisid_147779/)
Associate Professor; DSc, Washington University

Dubin, Mark W.
Professor Emeritus

Espinosa, Joaquin Maximiliano (https://experts.colorado.edu/display/fisid_134378/)
Visiting Associate Professor; PhD, Univ of Buenos Aires (Argentina)

Fillman, Christy L. (https://experts.colorado.edu/display/fisid_145115/)
Senior Instructor; PhD, University of Colorado Boulder

Garcea, Robert L. (https://experts.colorado.edu/display/fisid_146103/)
Professor; MD, University of California, San Francisco

Gold, Lawrence (https://experts.colorado.edu/display/fisid_100581/)
Professor; PhD, University of Connecticut

Guild, Nancy Ann (https://experts.colorado.edu/individual/fisid_111361/)
Professor Attendant Rank; PhD, University of Colorado

Han, Min (https://experts.colorado.edu/display/fisid_105512/)
Distinguished Professor; PhD, University of California, Los Angeles

Harvey, Pamela Ann (https://experts.colorado.edu/display/fisid_148012/)
Senior Instructor; PhD, Tufts University

Hoenger, Andreas (https://experts.colorado.edu/display/fisid_142883/)
Professor; PhD, Universität Basel (Switzerland)

Jones, Kevin Robert (https://experts.colorado.edu/display/fisid_102094/)
Associate Professor; PhD, University of California, Berkeley

Junge, Harald Jobst
Assistant Professor; PhD, Philipps-Universität Marburg (Germany)

Klymkowsky, Michael W. (https://experts.colorado.edu/display/fisid_101226/)
Professor; PhD, California Institute of Technology

Knight, Jennifer Kirsten (https://experts.colorado.edu/display/fisid_101933/)
Associate Professor; PhD, University of Michigan Ann Arbor

Kralj, Joel M.
Assistant Professor; PhD, Boston University

Krauter, Kenneth S. (https://experts.colorado.edu/display/fisid_107978/)
Professor, Associate Chair; PhD, Yeshiva University

Kuempel, Peter L.
Professor Emeritus

Leinwand, Leslie Anne (https://experts.colorado.edu/display/fisid_107104/)
Distinguished Professor, Faculty Director; PhD, Yale University

Martin, Jennifer Mary (https://experts.colorado.edu/display/fisid_110125/)
Senior Instructor; PhD, University of Washington

Mastronarde, David N.
Professor Attendant Rank; PhD, University of Colorado

McConkey, Edwin H.
Professor Emeritus

McIntosh, J. Richard
Distinguished Professor Emeritus

Niswander, Lee (https://experts.colorado.edu/display/fisid_160024/)
Chair, Professor; PhD, Case Western Reserve University

Odorizzi, Charles Gregory (https://experts.colorado.edu/display/fisid_118429/)
Professor; PhD, University of California, San Diego

Old, William (https://experts.colorado.edu/display/fisid_103039/)
Assistant Professor; PhD, University of Colorado Boulder

Olwin, Bradley Bruce (https://experts.colorado.edu/display/fisid_109888/)
Professor, Associate Chair; PhD, University of Washington

Orth, James D. (https://experts.colorado.edu/display/fisid_152017/)
Assistant Research Professor, Instructor; PhD, Mayo Graduate School of Medicine

Pace, Norman R.
Distinguished Professor Emeritus

Park, Soyeon (https://experts.colorado.edu/display/fisid_151944/)
Assistant Professor; PhD, Mayo Graduate School of Medicine

Parker, Roy Robert (https://experts.colorado.edu/display/fisid_151440/)
Distinguished Professor; PhD, University of California, San Francisco

Perkins, Thomas T. (https://experts.colorado.edu/display/fisid_124578/)
Professor Adjoint; PhD, Stanford University

Runner, Meredith
Professor Emeritus

Sawyer, Sara Lea (https://experts.colorado.edu/display/fisid_155218/)
Professor; PhD, Cornell University

Shen, Jingshi (https://experts.colorado.edu/display/fisid_146414/)
Professor; PhD, Columbia University

Singh, Ravinder (https://experts.colorado.edu/display/fisid_112067/)
Associate Professor; PhD, Baylor College of Medicine

Staehelin, L. Andrew
Professor Emeritus

Stowell, Michael (https://experts.colorado.edu/display/fisid_124136/)
Associate Professor; PhD, California Institute of Technology

Su, Tin Tin (https://experts.colorado.edu/display/fisid_113847/)
Professor, Chair; PhD, Carnegie Mellon University

Sueoka, Noboru
Professor Emeritus

Van Blerkom, Jonathan (https://experts.colorado.edu/display/fisid_100545/)
Research Professor; PhD, University of Colorado Boulder

Vigers, Alison Jane
Instructor; PhD, University of Colorado Denver

Voeltz, Gia Kaarina (https://experts.colorado.edu/display/fisid_143587/)
Professor; PhD, Yale University

Weaver, Benjamin
Assistant Professor; PhD, University of Kansas

Wood, William B. III
Distinguished Professor Emeritus

Xue, Ding (https://experts.colorado.edu/display/fisid_112336/)
Professor; PhD, Columbia University

Yarus, Michael J.
Professor Emeritus

# Courses

**MCDB 1020 (1) Introduction to Molecular, Cellular and Developmental Biology Major**
Introduces students to the Molecular and Cellular Biology major. Provides an overview of the major and how it differs from other CU biology programs; how to get involved in clubs, research, and/or internship opportunities; strategies for succeeding in MCDB courses; and career options. This is a first-year colloquium course specifically designed for freshman and other students exploring their educational and career opportunities in our department.
**Recommended:** New MCDB majors.

**MCDB 1043 (1) Exploring Genetics Laboratory**
Provides hands-on experience with fundamental genetic principles. Topics include scientific method, experimental design, mitosis, meiosis, classical genetics, molecular genetics, mutagenesis, DNA analysis, and transgenic organisms. Wherever possible, the focus of the lab will be on integrating science process skills with human-relevant experiments to encourage students to learn and apply science skills while seeing the application to humans.
**Requisites:** Restricted to Biological Sciences (MCDB) non-majors only.
**Recommended:** Corequisite MCDB 1041.
**Additional Information:** Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science Lab or Lab/Lec

**MCDB 1150 (3) Introduction to Cellular and Molecular Biology**
Covers biologically important macromolecules and biological processes, together with an introduction to cell structure, function, and physiology. Provides the foundation for advanced MCDB courses to majors, and a rigorous overview of modern biology to non-majors.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 1111
**Recommended:** Prerequisite high school chemistry and algebra, and recommended corequisite of MCDB 1152.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science Lab or Lab/Lec

**MCDB 1152 (1) Problem Solving Co-Seminar for Introduction to Molecular and Cellular Biology**
Uses problem solving and other interactive group work to aid student learning in a corequisite course, MCDB 1150. Students will work in small groups on learning and practicing how to solve difficult conceptual problems, as well as using hands-on activities and concept mapping to help learn content.
**Recommended:** Corequisite MCDB 1150.

**MCDB 1161 (2) From Dirt to DNA: Phage Genomics Laboratory I**
Provides laboratory experience working on a bacteriophage genomics research project. Students will study novel bacteriophage they isolate from the environment. Topics covered include phage biology, bacteria and phage culturing and amplification, DNA isolation, restriction digest analysis, agarose gel electrophoresis, and electron microscopy.
**Recommended:** Prerequisites or corequisites: MCDB 1150 or EBIO 1210.
**Additional Information:** Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science Lab or Lab/Lec

**MCDB 1171 (2) Antibiotics Discovery Through Hands-on Screens I**
Provides introductory research and laboratory experience. Students will work in teams to screen small molecule libraries for novel antibiotics using the bacterium Salmonella as a model system. Topics covered include the basic biology of the model system, genetics, approaches to screening for new therapeutics, statistical analysis of the data, compound verification and lead compound development.
**Recommended:** Prerequisite or corequisite MCBD 1150 or EBIO 1210.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science Lab or Lab/Lec

**MCDB 1181 (2) Biological Probiotic/Drug Discovery Through Hands-on Screens**
Provides introduction to research and laboratory experience. Students will work in teams to screen novel mycobacterial strains for use as probiotics or immunoregulatory/anti-inflammatory drugs using THP-1 cells, a human monocytic cell line. Topics covered include the hygiene or "Old Friends" hypothesis, the human microbiome, approaches to screening for new probiotics of therapeutics and statistical analysis of the data.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 1181
**Grading Basis:** Letter Grade

**MCDB 1234 (1-9) Skills Center: Modular Laboratory of Modern Molecular Biology Skills**
Dedicated to teaching students fundamental laboratory skills in modern molecular biology. The skills are updated on a rolling basis in consultation with MCDB faculty and local Pharma/Biotech companies in an effort to provide students with real world skills that can help them transition from a traditional lab course environment to a more independent research environment. Students can mix and match various skills to receive one or more university credit hours and students who successfully complete a module are given a certificate recognizing their competency. Available skills modules and in more course information can be found at https://skillscenter.colorado.edu/
**Repeatable:** Repeatable for up to 15.00 total credit hours.
**Grading Basis:** Letter Grade

**MCDB 2150 (3) Principles of Genetics**
Introduces the behavior of genes and chromosomes in eukaryotic and prokaryotic organisms. Covers three areas: transmission genetics, molecular genetics, and population genetics. Attention is given to genetic mapping, recombinant DNA procedures, and gene expression.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 2222
**Recommended:** Prerequisite MCDB 1150 or EBIO 1210 or CHEN 2810 (minimum grade C-) and recommended corequisite of MCDB 2152.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 2152 (1) Problem Solving Co-Seminars for Genetics**
Uses problem solving and other interactive group work to aid student learning in MCDB 2150. Students will work in small groups on learning and practicing how to solve difficult conceptual problems, as well as using hands-on activities and concept mapping to help learn content.
**Recommended:** Corequisite MCDB 2150.

**MCDB 2161 (2) From DNA to Genes, Phage Genomics Laboratory II**
Provides laboratory experience working on a bacteriophage isolated during the previous semester. Topics include bioinformatics, genome annotation, open reading frame and RNA identification, BLAST analysis, phylogenetics and submission to a genomic database.
**Requisites:** Requires prerequisite course of MCDB 1161 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 2171 (2) Chemotherapeutic Discovery Through Hands-On Screens 2**
Provides introductory research and laboratory experience. Students will work in teams to screen molecule libraries using fruit flies as a model system. Topics covered include the basic biology of the model system, genetics, approaches to screening for new therapeutics, statistical analysis of the data, compound verification and lead compound development.
**Recommended:** Prerequisite or corequisite MCBD 1150 or EBIO 1210.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 2350 (3) Understanding Cancer: Introduction to the disease¿s biology, medicine, and societal implications**
A course for students who want to learn about cancer but have little or no background in biology. It is based on a text that presents relevant science and medicine in a readable and comprehensible way. Classes will be discussion of material from the text with weekly quizzes for feedback. The ethics and economics of cancer treatments will be discussed, along with ways to minimize one¿s own cancer risk and live with cancer if necessary.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 2840 (1-3) Lower-Division Independent Study**
Students with adequate prerequisites should take MCDB 4840.
**Repeatable:** Repeatable for up to 8.00 total credit hours.

**MCDB 3000 (3) Synthetic Biology: Engineering Biomolecular Systems in the Laboratory**
Hands-on research experience in engineering biological systems. Students will design biological systems to address relevant medical and environmental problems facing our society. They will learn how to build their molecular designs in the lab using current synthetic biology techniques. Students will also learn how to critically evaluate current research in the field and effectively communicate their own research. Formerly offered as a special topics course. Students can take MCDB 3001 as a continuing course for advanced research.
**Requisites:** Requires prerequisite courses of (MCDB 1150 and MCDB 2150) or CHEN 2810 (all minimum grade C).
**Recommended:** BCHM, ENGR and BCHM majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab

**MCDB 3001 (3) Advanced Synthetic Biology: Engineering Biomolecular Systems in the Laboratory**
This course in engineering biological systems is an extension of the hands-on research experience gained from MCDB 3000 and meant to take following completion of MCDB 3000. Students designed biological systems to address relevant medical and environmental problems facing our society in MCDB 3000. Engineering biological system in the lab often takes longer than one semester. MCDB 3001 teaches students new laboratory techniques that will allow them to take more involved projects to the next step and gain more confidence in the laboratory.
**Requisites:** Requires prerequisite course of MCDB 3000 (minimum grade C-).
**Recommended:** BCHM, ENGR and BCHM majors only.

**MCDB 3010 (2) Undergraduate Teaching in Course-Based Undergraduate Research Experiences**
To address the need for more advanced and continued participation in course-based research, MCDB 3010 is designed to train students who have taken MCDB 1171 or MCDB 2171 or MCDB 4202 as teaching assistants. The aim is to enhance the students' experience and responsibilities in course-based research and to prepare them for research and mentorship in a departmental or graduate laboratory.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Requires prerequisite course of MCDB 1171 or MCDB 2171 or MCDB 1161 or MCDB 4202 (minimum grade B).
**Grading Basis:** Letter Grade

**MCDB 3020 (1) Next Steps: Preparing for Life After Graduation**
Helps upper-division students prepare for what comes after graduation. Topics include exploring careers; how to write a resume or CV; interviewing tips; how to build your portfolio; asking for letters of recommendations. This course is specifically designed for juniors starting to prepare for the next stage post-graduation.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 3020 and IPHY 3020
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Pass/Fail

**MCDB 3030 (3) Artificial Intelligence in Biology**
Delves into the intersection of Artificial Intelligence and Biology by exploring the rich history of human and machine intelligence. We will uncover the significant implications of advances in AI within the biological sciences, including brain-machine interfaces, molecular structure predictions, biomedical diagnostics, drug discovery, and therapeutics. This course is designed to equip you with a comprehensive understanding of AI's role in advancing biological research and applications, preparing you for the rapidly evolving career opportunities in the field. Enhanced by guest lectures, this course offers both theoretical knowledge and a real-world perspective. Join us to navigate and contribute to the ethical and innovative applications of AI in biology, shaping the future of healthcare and environmental solutions.
**Requisites:** Prerequisites of MCDB 2150 or EBIO 2070 with a minimum of a C- or instructor consent.
**Grading Basis:** Letter Grade

**MCDB 3105 (3) Antibiotics: Functions and Failures**
Learn about treatments for infectious diseases, how the first antibiotics were discovered, where they come from, how and why they work, and how resistance develops. Understand how antibiotics make modern medicine possible. Explore ways clinicians minimize the spread of resistance to antibiotics. Examine how new antibiotics and other approaches to treating infection are being developed.
**Requisites:** Requires prerequisite course of MCDB 2150 (minimum grade C).
**Grading Basis:** Letter Grade

**MCDB 3135 (3) Molecular Biology**
Examines the central dogma of biology by discussing the most important molecules in cells (DNA, RNA and protein) and how their synthesis (DNA replication, transcription, RNA processing and translation) is regulated. Incorporated into the discussion is how recombinant DNA techniques are used to discover and dissect cellular processes, how to design and interpret experiments, and understanding the limits of experiments to draw conclusions.
**Requisites:** Requires prerequisite courses of MCDB 2150 or EBIO 2070 and CHEM 1113 or CHEM 1400 or CHEN 1201 or CHEN 1211 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3140 (2) Cell Biology Laboratory**
Provides laboratory experience using microscopy, bioinformatics, DNA isolation, PCR and gel electrophoresis to study cell biology and gene expression in a model organism. Students will learn research skills such as interpreting data and planning experiments.
**Recommended:** Corequisite MCDB 3135 or MCDB 3145.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3145 (3) Cell Biology**
Examines intracellular mechanisms, including transport of ions and small molecules across membranes; protein targeting to organelles; membrane trafficking between organelles; signal transduction; the cytoskeleton; and the cell cycle.
**Requisites:** Requires prerequisite courses of (MCDB 2150 or EBIO 2070) and (CHEM 1113 or CHEM 1400 or CHEN 1211) (all minimum grade C-).
**Recommended:** Prerequisite or corequisite MCDB 3140 concurrent with either this class or MCDB 3135.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3150 (3) Biology of the Cancer Cell**
Highlights dimensions of the cancer problem; cancer as a genetic/cellular disease; chemicals, viruses, and radiation as causes of cancer; cancer and diet; cancer epidemiology; cancer risk factors; proto-oncogenes, oncogenes, and cancer suppressor genes; and prevention of cancer.
**Recommended:** Prerequisite MCDB 2150 or EBIO 2070 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3160 (3) Infectious Disease**
Illustrate how cutting edge tools in genomics can be used to study, monitor and cure disease caused by new and re-emerging human pathogens such as SARS/MERS, Ebola virus, Neisseria meningitides, influenza virus and malaria parasites. Technologies covered will include genome sequencing, annotation, transcriptomics, phylogenetics and genotyping of microbial populations. An integrated approach to this topic will be presented, with these concepts threaded throughout: natural history and evolution of pathogens, molecular biology, immunology, epidemiology, public health and clinical diagnosis. There may be some overlap with material covered in MCDB 1030 and MCDB 4750.
**Requisites:** Requires prerequisite course of MCDB 2150 or EBIO 2070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3161 (2) From DNA to Genes, Phage Genomics Laboratory II**
Provides in-silico laboratory experience annotating bacteriophage genomes from bacteriophages that were isolated in MCDB 1161. Topics include genome annotation, predicting gene functions using BLAST and HHPred, independent research, scientific writing, and preparation of an annotation file that will be submitted to a public genome database.
**Requisites:** Requires prerequisite course of MCDB 1161 (minimum grade C-).

**MCDB 3171 (2) Advanced Discovery Based Lab - Antibiotics**
Provides students an opportunity to expand upon the research they performed in the introductory level course, Drug Discovery Through Hands on Screens I (MCDB 1171). Students will work in teams to validate potential antibiotics against human pathogens. Topics include hit validation, dose response, mechanism of action, applied statistical analysis, and an introduction to the primary literature.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Requires prerequisite course of MCDB 1171 (minimum grade C-).
**Grading Basis:** Letter Grade

**MCDB 3181 (4) Microbial Planet Laboratory**
Provides beginner friendly lab & research experience working on a microbiology project. The course teaches how to conduct original scientific research from hypothesis to experimentation, evaluation and reporting. Students study non-pathogenic microorganisms they isolate themselves from nature as part of the course. Hands-on topics covered in class include how to isolate & culture new microbes; how to observe, describe and classify them; and how to examine their metabolic capabilities such as the production of antibiotics.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 3181
**Requisites:** Requires prerequisite courses of CHEM 1113 and CHEM 1114 or CHEM 1400 and CHEM 1401 (all minimum grade C-).
**Recommended:** Prerequisite GEOL 1180 or MCDB 1150 or EBIO 1210.

**MCDB 3300 (3) Personalized Medicine - Recent Advances in Diagnostics and Therapeutics**
Time for personalized medicine is now. Attempts to learn from and put the patient/person back into the equation because personalized medicine, at its worst, does nothing personal at all. Discusses historical perspective, recent advances in molecular biology and medicine (including OMICS) in regards to diagnostics and therapeutics for selected human diseases, and what the future holds for personalized medicine. Guest lectures (medical experts, patients, family members) will further enrich the course.
**Recommended:** Prerequisites MCDB 2150 or EBIO 2070.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3330 (3) Evolution and Creationism**
Intensive lecture/discussion course on the interrelationships among science, religion, and social policy. Includes historical and scientific development of evolution theory, social Darwinism/sociobiology, and the public perception of science.
**Recommended:** Prerequisite MCDB 1150 or EBIO 1210 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3333 (3) Biomedical Innovations and Discoveries**
Discusses how biological inventions and discoveries fuel biomedical innovations, how important techniques in molecular biology have advanced our understanding of cellular processes and contributed to biotechnology revolution and biomedical sciences to benefit our society. Guest lectures from experts in industry and site visits will enhance the course by providing a non-academic perspective, networking opportunities, and unexpected avenues for career paths for our graduates. Department enforced prerequisite: MCDB 2150 or EBIO 2070 or instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3350 (3) Fertility, Sterility, and Early Mammalian Development**
Describes the production of germ cells, ovulation, fertilization, reproductive cycles, controls of reproduction, early development of the embryo, methods of contraception, and causes and treatments of sterility. Recommended for students planning careers in the health sciences.
**Recommended:** Prerequisite MCDB 1150 or EBIO 1210 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3450 (3) Biological Data Science**
The central function of data science is to extract information from complex datasets. Biology is an increasingly large-data endeavor with health care records, genomics datasets, and extensive imaging. This course will develop core data science skills, including statistical analysis, visualization, data management, machine learning, and modeling.
**Recommended:** Prerequisite MCDB 2150 or EBIO 2070 (minimum grade C-), or exposure to probability theory.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3456 (1-9) Skills Center: Modular Laboratory of Advanced Modern Molecular Biology Skills**
Dedicated to teaching students fundamental laboratory skills in modern molecular biology. The skills are updated on a rolling basis in consultation with MCDB faculty and local Pharma/Biotech companies in an effort to provide students with real world skills that can help them transition from a traditional lab course environment to a more independent research environment. Students can mix and match various skills to receive one or more university credit hours and students who successfully complete a module are given a certificate recognizing their competency. Available skills modules can be viewed at https://skillscenter.colorado.edu/
**Repeatable:** Repeatable for up to 15.00 total credit hours.
**Recommended:** Prerequisite MCDB 1234, MCDB 1150, MCDB 1111 or EBIO 1220.
**Grading Basis:** Letter Grade

**MCDB 3501 (3) Structural Methods for Biological Macromolecules**
Newest developments in cryo-electron microscopy opened new avenues to study cellular and molecular processes with high structural detail. The class will explore the most recent strategies in Structural Biology to study protein structure and function with a special focus on viral host-pathogen interactions and cell infection and its implications to cell function and architecture. The class will be composed of lectures, scientific paper discussions and hands-on problem solving and demonstrations on microscopes and software.
**Recommended:** Prerequisite MCDB 2150 or EBIO 2070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3650 (3) The Brain - From Molecules to Behavior**
Examines the molecular basis of the brain's role in thought, action, and consciousness by exploring issues such as relationship of cognition and localized brain function, sensory systems and their role in cognition, learning and memory, and behavioral neurochemistry.
**Recommended:** Prerequisite MCDB 2150 or EBIO 2070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3651 (3) The Brain: Dysfunction to Disease**
Misregulation of synaptic function results in abnormal brain function and behavior that is manifested in numerous neurological and psychiatric diseases. Explores the molecular mechanisms responsible for altered synaptic plasticity in neurological diseases such as frontotemporal dementia (FTD), Parkinson's disease, Huntington's disease, Creutzfeldt-Jakob disease, Down syndrome, epilepsy, autism, and Alzheimer's disease.
**Recommended:** Prerequisites MCDB 3650 or NRSC 2100 (minimum grade C-) or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3700 (3) Poisons in Cell Biology and Society**
Investigate the inner workings of our cells by studying how poisons disrupt these processes. We will learn how selected poisons affect critical processes inside the cell to cause death or destruction. The scientific aspects of the poison will be discussed in the context of its historical significance or impact on society and popular culture.
**Requisites:** Requires prerequisite course of MCDB 2150 or EBIO 2070 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3990 (3) Introduction to Systems Biololgy for Biologists**
Introduces majors with relatively little mathematical experience to the major concepts in systems biology, in the context of key processes (cell growth, division, adaptation, development, and disease). Designed to help students master the necessary mathematical tools involved.
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 and MATH 1310 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4001 (3) The What, The Why, and The How of Neural Tube Defects**
Neural tube defects (NTDs) involve incomplete neural tube closure in embryos, resulting in embryonic death or lifelong health complications. Students will select a gene from a list of candidate human NTD genes and investigate whether its loss leads to an NTD in chick embryos. This course will train students in CRISPR, cloning, embryology, and "softer" research skills such as publication formatting, with the ultimate goal of supporting students' development as researchers.
**Requisites:** Requires prerequisite course of MCDB 3140 (minimum grade C-).
**Recommended:** Junior or Senior standing.

**MCDB 4100 (1-6) Special Topics**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4105 (3) Function of Cellular and Nuclear, Assemblies, and Machines**
Maintaining cellular functions requires a coordinated interaction of all kinds of organelles, assemblies and machines. This course will explore the structure, function, regulation and interactions of cellular organelles, supramolecular assemblies, and molecular machines (motors, ribosomes, polymerases, channels, etc.). Students will be exposed to a set of lectures and prepare specific papers that will be discussed in the group.
**Grading Basis:** Letter Grade

**MCDB 4150 (3) Biology of Aging and Longevity**
Through lectures and reading assignments, this capstone course will introduce fascinating cellular and molecular mechanisms underlying aging and longevity based on historical and recent research achievements. We will discuss major aging theories and multiple cellular regulatory systems that prominently affect lifespan. The course will integrate basic concepts from multiple other courses by addressing specific physiological problems in the aging field and present students with the opportunity to learn the reasoning process in cutting-edge biomedical research.
**Requisites:** Requires prerequisite courses of (MCDB 1150 or EBIO 1210) AND (MCDB 2150 or EBIO 2070) (minimum grade of C-).
**Recommended:** Prerequisite MCDB 3135 or MCDB 3145 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4185 (3) Geomicrobiology**
Examines how microbial and chemical processes interact on the Earth¿s surface today and have shaped the planet throughout its history. Emphasis will be placed on how the life styles and chemical ingenuity of microorganisms drive key biogeochemical processes including weathering and transformations of carbon, oxygen, sulfur, iron and nitrogen. Towards this goal, major geologic and evolutionary events will be examined through the lens of microbial diversity, metabolic energetics, microbe-mineral interactions, and molecular biomarkers.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5185, ENVS 4185, and GEOL 4185
**Requisites:** Requires prerequisite courses of CHEM 1113 and CHEM 1114 or CHEM 1400 and CHEM 1401 (minimum grade C-).
**Recommended:** Prerequisites GEOL 1180 or MCDB 1150 or GEOL 3320 or EBIO 3400 or ENVS 4160 or EVEN 4484.
**Grading Basis:** Letter Grade

**MCDB 4201 (3) From Bench to Bedside: The Role of Science in Medicine**
Demonstrates the breadth of research in the life sciences and how such research (not just in medical schools) can lead to medical applications. Lecturers from life sciences, the medical school and biotechnology, discuss drug development and the transfer of research into the clinical arena. Students also prepare a paper and presentation on the development of a commercial drug.
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4202 (3) The Python Project**
Studies how python hearts grow after they consume a meal. Understanding the molecular processes of growth and regression in the python heart could lead to development of therapeutics for heart disease. Students work in groups in the laboratory and generate novel data by using modern molecular biology and bioinformatic techniques to clone and sequence candidate molecules of the python genome. May be repeated once.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4234 (3) Research Methods**
Presents a rigorous and pedagogically coherent introduction into the experimental process used to collect data, formulate hypotheses, and answer scientific questions in general, and biological questions in particular. Includes a detailed consideration of the elements of experimental design, data collection and analysis, and the interpretation of results in the context of effective science teaching. Part of the CU Teach course sequence for teacher certification in science and mathematics.
**Requisites:** Restricted to Biological Sciences (MCDB) majors or School of Education (EDUC) undergraduate students only.
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4300 (3-4) Immunology**
Emphasizes cellular and molecular mechanisms by which organisms protect themselves from pathogens and the experimental basis for our understanding of these processes. Discusses development, function, and misfunction of t-cells, b-cells and other components of the immune system, focusing on the human immune system.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5301
**Requisites:** Requires prerequisite courses of MCDB 3135 and MCDB 3145 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4310 (3) Microbial Genetics and Physiology**
Examines the physiology and genetics of bacteria, Archaea and viruses. Particular emphasis will be on metabolism, regulation of gene expression and protein function, mechanisms of interactions with and manipulation of the environment, and evolution in response to environmental pressures.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5310
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 (minimum grade C-) and recommended corequisite of CHEM 4611.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4312 (3) Quantitative Optical Imaging**
Explores the fundamentals of optical imaging in biology, especially molecular and cellular biology. Covered topics include an introduction to optics and microscopes, fluorescence microscopy and image analysis, and biological applications. MATLAB will be taught at the beginning of the course and used throughout for image processing. Prior experience with MATLAB (or Python) is highly recommended but not required.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 4312, MCDB 5312 and BCHM 5312
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4350 (3) Microbial Diversity and the Biosphere**
Provides a molecular phylogeny-based perspective on microbial diversity and the interactions between organisms that result in the biosphere. Provides overview of recent methods and findings in microbial ecology, as well as computer-based workshop in molecular phylogeny. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5350
**Recommended:** Prerequisites MCDB 1150 or EBIO 1210 and CHEM 1133 and EBIO 3400 and/or CHEM 3311 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4410 (3) Human Molecular Genetics**
Studies the human organism as a genetic system, including effect of mutation on protein structure and function, biochemical basis of human genetic disease, polymorphic gene loci, gene mapping and identification, gene cloning and characterization, and impact of human genetics on medicine and society. Fulfills MCDB scientific reasoning requirement.
**Recommended:** Prerequisite MCDB 3135 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4420 (3) Genetics of Brain and Behavior**
Examines the genetic underpinnings of animal behavior, including an examination of behavioral evolution and the use of genes as tools to examine neural architecture. We will cover topics including foraging, social behavior, personality, parental care and fear. We will explore these behaviors at multiple levels, including genomics, population genetics, molecular genetics, epigenetics, endocrinology and neurobiology. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 4420
**Requisites:** Requires NRSC 2100 or (NRSC 2125 and NRSC 2150) and (EBIO 2070 or MCDB 2150). All minimum grade C-.
**Grading Basis:** Letter Grade

**MCDB 4422 (3) Molecular Biology of Free Radicals: Role(s) in Oxidative Stress, Signaling, Disease, Aging**
Examines how free radicals are formed in biological systems and their roles in oxidative stress, cell signalling, aging, and disease. Emphasis will be placed on the recent literature. Fulfills MCDB scientific reasoning requirement.
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 and CHEM 3311 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4425 (3) Topics in Membrane Biology: Cell Biology, Physiology and Disease**
Students will apply their knowledge of basic biology to exploring several of the most exciting topics in biomedicine including protein folding and stress responses, nutrient sensing and balance and signal transduction across membranes. Emphasis will be placed upon human physiology and associated human diseases including Alzheimer's disease, diabetes and cardiovascular disease. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5425
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 or instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4426 (3) Cell Signaling and Developmental Regulation**
Introduces several cell signaling processes and their biological functions. Students read and analyze original research articles to learn the thinking processes of scientific research. Writing assignments and oral presentations are required. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5426
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 and CHEM 4700 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4428 (3) Regulation of Lifespan**
Lectures and literature reading/discussion will introduce students to historical, fascinating and cutting-edge research achievements, as well as the basic genetic/biochemical approaches, towards understanding cellular signaling systems and mechanisms that regulate the aging process and lifespan of animals and humans. Through the combination of presentation, discussion, homework and two exams, students will learn the reasoning process of scientific research in the aging field, become familiar with typical experimental approaches and improve their communication ability.
**Requisites:** Requires prerequisite course of MCDB 3135 (minimum grade C-).
**Grading Basis:** Letter Grade

**MCDB 4441 (4) Animal Developmental Diversity**
Surveys development in a range of vertebrate and invertebrate systems to reconstruct the common bilatorian ancestor, and elucidate the developmental genetic changes underlying animal diversification. Lab focuses on vertebrate embryos and explores key methods in evolutionary developmental biology including in situ hybridization, embryo microinjection, and transgenesis.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5441 and EBIO 4440 and EBIO 5440
**Recommended:** Prerequisites MCDB 1150 or EBIO 1210 and MCDB 2150 or EBIO 2070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4444 (3) Cellular Basis of Disease**
Explores the cellular basis of disease. Discusses diseases arising from defects in intracellular targeting, cytoskeletal function, intracellular signaling, genomic instability, gene regulation, cell proliferation, and cell death. Involves student-organized presentations and classroom discussion. Fulfills MCDB scientific reasoning requirement.
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4471 (3) Mechanisms of Gene Regulation in Eukaryotes**
Focuses on manifestations of regulated gene expression. Studies gene regulation at multiple steps, including transcription, RNA processing and translation. Is based on critical analysis of primary research papers. Written assignments and oral presentations are required. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5471
**Recommended:** Prerequisite MCDB 3135 (minimum grade C-) or instructor consent required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4520 (3) Bioinformatics and Genomics**
Computational and experimental methods in bioinformatics and genomics, and how these methods provide insights into protein structure and function, molecular evolution, biological diversity, cell biology and human disease. Topics include database searching, multiple sequence alignment, molecular phylogeny, microarrays, proteomics and pharmacogenomics.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5520
**Recommended:** Prerequisites MCDB 3135 or CHEM 4700 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4521 (1) Bioinformatics and Genomics Laboratory**
Provides experience with, and exposure to, computational and experimental methods in bioinformatics and genomics. Meets once a week. Students are expected to read original research papers, discuss findings, plan and execute data analysis in selected areas.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5521
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4550 (3) Cells, Molecules and Tissues: A Biophysical Approach**
Focuses on the biophysics governing the structure/function of enzymes, cells, extracellular matrix and tissue. Synthesizes ideas from molecular biology, physics, and biochemistry, emphasizing how low Reynolds number physics, not Newtonian physics, is relevant to life inside a cell. Fulfills MCDB scientific reasoning requirement. Recommended restrictions: Cannot be repeated if taken as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5550 and PHYS 4550 and PHYS 5550
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 and PHYS 2010 and PHYS 2020 and CHEM 1133 and MATH 1300 and/or CHEM 3311 (minimum grade C-) or instructor consent required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4560 (3) Introduction to Biophysics**
Covers an introduction to the physics of living systems. Focuses on how living systems are able to generate order, with both physical principles and biological examples. Covers the development of quantitative models for biological systems, including estimates. Taught from a physics perspective, with biology background introduced as needed.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5560 and PHYS 4560 and PHYS 5560
**Requisites:** Requires a prerequisites course of PHYS 2210 (minimum grade C-).
**Recommended:** Prerequisite PHYS 4230.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4567 (3) Skills Center Linked Lab Research Project**
This course is a Skills Center Linked Lab independent project. Students who have sucessfully completed linked lab ( https://skillscenter.colorado.edu/labs.html) skills through MCDB 1234/3456 are eligible to take MCDB 4567. Student work with a linked lab advisor and the Skills Center proctors to develop a research project and the student completes the project in the Skills Center or in the Linked Lab and learn research skills such as interpreting data and planning and executing experiments, data interpretation, statistical analysis and presentation.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of MCDB 3456 (minimum grade C-).
**Grading Basis:** Letter Grade

**MCDB 4615 (3) Biology of Stem Cells**
Stem cells have received considerable notice in both the scientific and social arena. Examines the stem cell concept by a critical examination of the primary scientific literature. Topics will include pluripotency and plasticity, environment, technology, self-renewal, transdifferentiation, molecular signature, epigenetic programming and stem cell versus cancer cell. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5615
**Recommended:** Prerequisite MCDB 3135 or MCDB 3145 or instructor consent required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4650 (3) Developmental Biology**
Explores the development of invertebrate and vertebrate organisms, emphasizing cellular, molecular and genetic mechanisms. Focuses on conceptual understanding and experimental approaches to topics such as embryology, developmental control of gene expression in eukaryotic cells, mechanisms of differentiation and morphogenesis and developmental genetics.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5651
**Requisites:** Requires prerequisite courses of MCDB 3135 and MCDB 3145 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4680 (3) Mechanisms of Aging**
Studies aging as a developmental process emphasizing genetic, cellular and molecular mechanisms. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5680
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4750 (3) Animal Virology**
Encompasses the structure and replication of both lytic and transforming animal viruses. Emphasizes diversity of naturally occurring genomic structures and the resulting strategies of infection as well as the impact of viral epidemics on society. Includes critical analysis of primary research papers. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5750
**Recommended:** Prerequisite MCDB 3135 (minimum grade C-) or instructor consent required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4777 (3) Molecular Neurobiology**
Introduces the functional anatomy of the nervous system and explores current knowledge regarding the molecular and genetic basis of the development and function of the nervous system. Studies recent insights into the molecular basis of neurodegenerative diseases, in the last portion of the course.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5777
**Requisites:** Requires prerequisite courses of MCDB 3135 and MCDB 3145 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4790 (3) Oocytes, Stem Cells, Organisms: Experiments to Discoveries**
Develop critical thinking, scientific reasoning and communication skills by reading and presenting primary research articles and Nobel Prize winning research on patterning, stem cells, cell death, genetic and epigenetic mechanisms that regulate embryonic development. Learn about experimental approaches from a historical and present view, while discussing their ethical implications.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4800 (3) Molecular Evolution: How Natural Selection has Shaped the Molecules of Life**
This course explores how Darwin¿s idea has shaped the structures of DNA, RNA and proteins across the long history of life on earth. Natural selection driving the evolution these macromolecules and subsequent developmental pathways will be fully appreciated as the process that ultimately produced the amazing variety of species on this planet. Looking ahead, our recent efforts to harness the power of evolution in the test tube to develop new therapies will be covered.
**Requisites:** Requires prerequisite courses of MCDB 3135 and MCDB 3145 (minimum grade C-).

**MCDB 4810 (3) Insane in the Membrane: The Biology and Biophysics of the Membrane**
Studies the biology and physics of the biomembrane. Topics include structure and mechanism of membrane proteins; membrane biogenesis; membrane protein folding and stability; membrane homeostasis; mechanisms of membrane fusion and fission; lipid trafficking. Fulfills MCDB scientific reasoning requirement.
**Recommended:** Prerequisite CHEM 4700 (minimum grade C-) or instructor consent required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4811 (3) Teaching and Learning Biology**
Provides an introduction to recent research into student learning on the conceptual foundations of modern biology, together with pedagogical methods associated with effective instruction and its evaluation. Students will be involved in active research into conceptual and practical issues involved in biology education, methods to discover student preconceptions, and the design, testing and evaluation of various instructional interventions.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 6811 and EDUC 4811 and MCDB 5811 and EBIO 4811
**Recommended:** Prerequisites MCDB 1150 or EBIO 1210 and MCDB 2150 and MCDB 3145.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4840 (1-6) Upper-Division Independent Study**
An independent study contract is required.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Recommended:** Prerequisite MCDB 2150.

**MCDB 4900 (1-6) Public Health Practicum**
Offers practical experience in Public Health with direct supervision.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4900 and IPHY 4900
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**MCDB 4960 (1) Research Communication: Analyzing Data and Effectively Communicating Science for Honors Students**
This course is intended for MCDB honors students and to be taken the same semester as their undergraduate thesis defense. The course will teach honors students how to analyze their research data with proper statistics and effectively write their undergraduate honors thesis. Students will also gain experience in presenting their research to an audience with constructive feedback given.
**Requisites:** Requires prerequisite courses of MCDB 3135 and MCDB 3145 (minimum grade C-).

**MCDB 4980 (3) Honors Research**
Provides faculty-supervised research for students who have been approved by the departmental honors committee. Normally taken during the semester before completion of the honors thesis.
**Recommended:** Prerequisite MCDB 4840 or comparable research experience, and minimum GPA of 3.20.
**Additional Information:** Arts Sciences Honors Course

**MCDB 4990 (3) Honors Thesis**
Involves the preparation and defense of an honors thesis, based on faculty-supervised original research, including final phases of the research project.
**Recommended:** Prerequisites MCDB 4840 or MCDB 4980 or comparable research experience, and minimum GPA of 3.3 and approval by the MCDB Honors Committee.
**Additional Information:** Arts Sciences Honors Course

# Molecular, Cellular and Developmental Biology - Bachelor of Arts (BA)

The undergraduate degree in molecular, cellular and developmental biology emphasizes knowledge and awareness of:

- The biological sciences in general and a detailed understanding of currently important aspects of cellular biology, molecular biology, biochemistry, genetics and developmental biology; and
- The relationship of the specialty area to broader areas of science and to society in general, including ethical issues raised by current biological research and by the rapid growth of biotechnology as an important shaping force for the future.

In addition, students completing the degree in molecular, cellular and developmental biology are expected to acquire the ability and skills to:

- Learn detailed laboratory procedures rapidly when the need arises;
- Demonstrate a scientific vocabulary and an understanding of research methods that permits the comprehension of current journal articles, extraction of pertinent information and judgment of the quality of the work described;
- Evaluate a biological problem, determine which aspects are understood and apply basic research methods and techniques to the unknown aspects; and
- Communicate scientific concepts and analytical arguments clearly and concisely, both orally and in writing.

## Prerequisites

It is MCDB policy to enforce the course prerequisites listed in the course catalog. If you have not either taken and passed (C- or better) the prerequisites for a course, or obtained permission from the instructor or a departmental advisor to take the course based on equivalent preparatory coursework or experience here or elsewhere, you may be administratively dropped from the course.

## Course Requirements

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. All required major courses and all required ancillary courses must be passed with a C- or better and cannot be taken pass/fail. Students must have a grade point average of at least 2.000 in the major in order to graduate.

It is strongly recommended that MCDB majors consult with a departmental advisor before applying AP, IB or CLEP credit. Students majoring in MCDB who transfer biology credit from other institutions also must consult a departmental advisor.

Students who plan to double major with biochemistry or chemistry are encouraged to meet with an academic advisor to understand how their chemistry courses will apply to the MCDB major.

Students who plan to also pursue a degree in engineering are encouraged to meet with an academic advisor to understand how their chemistry and calculus courses will apply to the MCDB major.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Major Courses** | | |
| *Introductory Coursework* | | |
| Select one: | | 3 |
| MCDB 1150 | Introduction to Cellular and Molecular Biology (MCDB 1152 is a recommended coseminar for MCDB 1150) [1] | |
| MCDB 1111 | (MCDB 1152 is not a recommended coseminar for MCDB 1111) | |
| *Genetics* | | |
| Select one: | | 3 |
| MCDB 2150 | Principles of Genetics (MCDB 2152 is a recommended coseminar for MCDB 2150) [2] | |
| MCDB 2222 | (MCDB 2152 is not a recommended coseminar for MCDB 2222) | |
| *Research-Based Introductory Labs* | | |
| Select one: | | 2 |
| MCDB 1161 | From Dirt to DNA: Phage Genomics Laboratory I | |
| MCDB 1171 | Antibiotics Discovery Through Hands-on Screens I | |
| MCDB 1181 | Biological Probiotic/Drug Discovery Through Hands-on Screens | |
| MCDB 2171 | Chemotherapeutic Discovery Through Hands-On Screens 2 | |
| *Cell Biology* | | *8* |
| MCDB 3135 | Molecular Biology | |
| MCDB 3140 | Cell Biology Laboratory | |
| MCDB 3145 | Cell Biology | |
| *Development Biology* | | *3* |
| MCDB 4650 | Developmental Biology | |
| **Upper-division capstone and scientific reasoning requirements** | | |
| *Capstone* | | *3* |
| Select one: | | |
| MCDB 4300 | Immunology | |
| MCDB 4777 | Molecular Neurobiology | |
| MCDB 4150 | Biology of Aging and Longevity | |
| *Scientific Reasoning* | | |
| Select one (see department for full list of approved courses) | | 3 |
| MCDB 4350 | Microbial Diversity and the Biosphere | |
| MCDB 4361 | | |
| MCDB 4410 | Human Molecular Genetics | |
| MCDB 4420 | Genetics of Brain and Behavior | |
| MCDB 4422 | Molecular Biology of Free Radicals: Role(s) in Oxidative Stress, Signaling, Disease, Aging | |
| MCDB 4425 | Topics in Membrane Biology: Cell Biology, Physiology and Disease | |
| MCDB 4426 | Cell Signaling and Developmental Regulation | |
| MCDB 4427 | | |
| MCDB 4444 | Cellular Basis of Disease | |
| MCDB 4471 | Mechanisms of Gene Regulation in Eukaryotes | |
| MCDB 4550 | Cells, Molecules and Tissues: A Biophysical Approach | |
| MCDB 4615 | Biology of Stem Cells | |
| MCDB 4680 | Mechanisms of Aging | |
| MCDB 4750 | Animal Virology | |
| MCDB 4810 | Insane in the Membrane: The Biology and Biophysics of the Membrane | |
| MCDB 4811 | Teaching and Learning Biology | |
| **Electives** | | |
| An additional 6 credit hours of upper-division electives (any MCDB 3000 or MCDB 4000 level) [3] | | 6 |
| **Total Credit Hours** | | **31** |

| Code | Title | Credit Hours |
|---|---|---|
| **Required Ancillary Courses:** | | |
| Complete the following chemistry and biochemistry courses: | | 18 |
| CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 | |
| CHEM 1133 & CHEM 1134 | General Chemistry 2 and Laboratory in General Chemistry 2 | |
| CHEM 3311 & CHEM 3321 | Organic Chemistry 1 and Laboratory in Organic Chemistry 1 | |
| BCHM 4611 | Principles of Biochemistry | |
| Select one of the following calculus or statistics courses: [4] | | 3-5 |
| Calculus: | | |
| MATH 1300 | Calculus 1 | |
| MATH 1310 | Calculus for Life Sciences | |
| APPM 1350 | Calculus 1 for Engineers | |
| Statistics: | | |
| MATH 2510 | Introduction to Statistics | |
| EBIO 1010 | Introduction to Statistics and Quantitative Thinking for Biologists | |
| EBIO 4410 | Biological Statistics | |
| IPHY 3280 | Intro to Data Science and Biostatistics | |
| PSYC 2111 | Psychological Science I: Statistics | |
| **Total Credit Hours** | | **21-23** |

1. EBIO 1210 is an acceptable alternative to MCDB 1150.
2. EBIO 2070 is accepted in place of MCDB 2150.
3. Up to 6 hours of MCDB 4840 Upper-Division Independent Study, MCDB 4980 Honors Research, MCDB 4990 Honors Thesis, or select courses from outside MCDB may be used. A minimum of 3 credit hours of MCDB upper-division electives must be taken on the Boulder campus. See department for details.
4. Not all the courses in this category will also meet the QRMS component of the Gen Ed Skills Requirement.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in molecular,

cellular and developmental biology, students should meet the following requirements:

- In the first semester, declare the MCDB major. (If the major is not started in the first year, the student must meet with an MCDB academic advisor to ensure that it is still possible to complete the major in four years.)
- During the first and second semesters, complete either general chemistry or the introductory MCDB sequence.
- By the end of the fourth semester, complete general chemistry and the introductory MCDB sequence with a C- or better.
- By the end of the eighth semester, complete the major.

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will fulfill all 12 credits of the Natural Sciences area of the Gen Ed Distribution Requirement, including the Lab requirement, and, potentially, the QRMS component of the Gen Ed Skills Requirement.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| MCDB 1150<br>or MCDB 1111 | Introduction to Cellular and Molecular Biology<br>or | 3 |
| MCDB 2 Credit Hour Lab | | 2 |
| MCDB 1152 | Problem Solving Co-Seminar for Introduction to Molecular and Cellular Biology (strongly recommended in conjunction with MCDB 1150, not required) | 1 |
| CHEM 1113<br>& CHEM 1114 | General Chemistry 1<br>and Laboratory in General Chemistry 1 | 5 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| MCDB 2150<br>or MCDB 2222 | Principles of Genetics<br>or | 3 |
| MCDB 2152 | Problem Solving Co-Seminars for Genetics (strongly recommended in conjunction with MCDB 2150, not required) | 1 |
| CHEM 1133<br>& CHEM 1134 | General Chemistry 2<br>and Laboratory in General Chemistry 2 | 5 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Skills course (example: QRMS) or Elective if QRMS is fulfilled by major requirement. | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| MCDB 3135<br>or MCDB 3145 | Molecular Biology<br>or Cell Biology | 3 |
| MCDB 3140<br>or MCDB 3145 | Cell Biology Laboratory (MCDB 3140 may be taken at the same time as MCDB 3135 or MCDB3145)<br>or Cell Biology | |
| CHEM 3311<br>& CHEM 3321 | Organic Chemistry 1<br>and Laboratory in Organic Chemistry 1 | 5 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| MCDB 3145 | Cell Biology | 3 |
| MATH 1300 OR Statistics: Calculus 1 or Statistics OR (some students may decide to take Organic Chemistry 2 as an approved out of department, upper division MCDB elective, in that case, taking stats or calc is advised for later semesters) | | 3-5 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective (only if taking Statistics) | | 3 |
| | **Credit Hours** | **15-17** |
| **Year Three** | | |
| **Fall Semester** | | |
| MCDB 4650 | Developmental Biology | 3 |
| BCHM 4611 | Principles of Biochemistry | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| Free elective | | 3 |
| MCDB Science Reasoning | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| MCDB Capstone | | 3 |
| MCDB upper division elective | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/US Perspective) | | 3 |
| Free Elective | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| MCDB Upper-division Elective | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Upper-Division Elective | | 3 |
| Free elective | | 3 |
| Free elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **118-120** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Connect the principles of evolution to the cellular, molecular and genetic properties of organisms, including how genomes and allele frequencies change over time.
- Describe the assembly and properties of macromolecular complexes and membranes, the movement of molecules and macromolecules, and the chemical properties that underlie these functions.
- Describe how the genetic information in a cell is stored, replicated, transcribed and translated, and compare the different mechanisms and consequences of gene expression regulation.
- Describe the basic features of inter- and intra-cellular signaling systems and interpret the ways that they can influence, directly and indirectly, gene expression, cellular behaviors, and organismic phenotypes.
- Describe the mechanisms of inheritance, including deducing information about genes, alleles, mutations and gene functions from analyses of genetic crosses and patterns of inheritance.
- Distinguish between different experimental techniques, justify their use to test specific hypotheses and interpret conclusions from experimental data.
- Carry out basic research using standard cell and molecular biology techniques and communicate that research through both written and oral presentations.

# Molecular, Cellular and Developmental Biology - Minor

The department offers a minor in molecular, cellular and developmental biology. Declaration of the minor is open to any student enrolled at CU Boulder, regardless of college or school.

## Requirements

Students must complete a total of 20 credit hours of molecular, celular and developmental biology coursework, 12 of which must be at the upper-division level. Students must maintain an overall and minor GPA of at least 2.00 (C), and complete all MCDB courses with a C- or better.

Students may apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward the minor.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MCDB 1150 | Introduction to Cellular and Molecular Biology | 3 |
| or MCDB 1111 | | |
| or EBIO 1210 | General Biology 1 | |
| or CHEN 2810 | | |
| MCDB 2150 | Principles of Genetics | 3 |
| or MCDB 2222 | | |
| or EBIO 2070 | Genetics: Molecules to Populations | |
| MCDB 1161 | From Dirt to DNA: Phage Genomics Laboratory I | 2 |
| or MCDB 1171 | Antibiotics Discovery Through Hands-on Screens I | |
| or MCDB 2171 | Chemotherapeutic Discovery Through Hands-On Screens 2 | |
| or MCDB 1181 | Biological Probiotic/Drug Discovery Through Hands-on Screens | |
| MCDB 3135 | Molecular Biology | 3 |
| MCDB 3145 | Cell Biology | 3 |
| **Electives** | | |
| Upper-division MCDB coursework (3000-level or higher) | | 6 |
| **Total Credit Hours** | | **20** |

# Peace, Conflict and Security Studies

The Certificate in Peace, Conflict and Security Studies (PACS) is designed to help students explore why conflict and violence occur, and to develop practical, nonviolent skills to analyze, intervene and resolve conflicts in their personal life, in their communities and between countries. The certificate is granted by the College of Arts and Sciences. All enrolled CU Boulder undergraduate students, regardless of school or major, may apply for and earn the PACS Certificate.

The program utilizes an interdisciplinary perspective on the study of conflict, cooperation, violence, war and peacemaking. Coursework focuses on theorizing and analyzing various levels of conflict, from the interpersonal to international and related possibilities for personal and social change. Coursework also emphasizes the development of transferable skills and experiential learning in conflict resolution and civic activism. The program encourages hands-on, "in the field" engagement through volunteer service, enrollment in study-abroad programs and internship placement with related agencies and programs.

For more information or an application, visit the Peace, Conflict and Security Studies Program (http://www.colorado.edu/pacs/) website.

**Course code for this program is PACS.**

## Certificate

- Peace, Conflict and Security - Certificate (p. 500)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

English, Michael D. (https://experts.colorado.edu/display/fisid_164260/)
Instructor, Associate Faculty Director; PhD, George Mason University

## Courses

**PACS 2500 (3) Introduction to Peace, Conflict and Security Studies**
Introduces the related fields of peace, conflict and security studies. Examines causes and dynamics of conflict and violence (interpersonal to global). Examines theory and research concerning peace movements, conflict resolution and security institutions. Explores career options in related fields.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective Arts Sci Gen Ed: Distribution-Social Sciences

**PACS 3540 (3) Migration, Human Rights, and Conflict in the Mediterranean**
Faculty-led Global Seminar, based in Malta, provides the opportunity to study social, political, and economic issues surrounding international migration, Focuses on causes and consequences of recent migration flows from nations in the Middle East and Sub-Saharan Africa to European nations located in the Eastern Mediterranean. Students will interact with representatives of state governments, NGOs, and activist groups, and learn about the rich culture and history of Malta as a pivotal state promoting international diplomacy and regional security.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3540
**Requisites:** Requires prerequisite course of PACS 2500 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective

**PACS 3700 (3) Communication and Conflict Management**
Examines interdisciplinary concepts and theories enabling students to better understand different types of conflict, sources of conflict, and communication patterns that serve to create, maintain and transform conflict. Teaches practical skills in conflict management areas such as bargaining, facilitation, mediation and negotiation.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite PACS 2500.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PACS 3800 (3) Security Studies**
Provides an introduction to the academic field of "Security Studies". Focuses on motives, institutions and processes associated with societal defense against threats posed to cherished possessions and the pursuit of stable, autonomous and prosperous existence. Reviews related theoretical traditions associated with militarism, war and conflict. Covers key concerns of (in-)security in post 9/11 global society, including surveillance, terrorism, genocide and insurgency.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PACS 3850 (3) International Conflict Resolution and Peacebuilding**
Provides an introduction to the interdisciplinary field of international conflict resolution and peacebuilding. Provides tools for analyzing and intervening in contemporary manifestations of violent social conflict. Argues for an approach to international affairs rooted in more nuanced understandings of the nature of violent conflict and its dynamics. Bases the quest to build sustainable peace not on military supremacy or coercive diplomacy, but rather the ability of states and peoples to work collaboratively to develop mutually beneficial solutions aimed at the satisfaction of basic needs, collective security, political representation, and respect for human dignity. Explores how international conflicts are mitigated, contained, and resolved through processes such as DDR (disarmament, demobilization, and reintegration), citizen diplomacy, and reconciliation.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3850
**Recommended:** Prerequisite PACS 2500.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective

**PACS 3860 (3) Environmental Conflict and Conflict Resolution**
This course focuses on the environment as a source of conflict in international and intranational contexts. Considers natural resource scarcity and extraction as causes of conflict and violence, the growing phenomenon of climate-change-induced migration, as well as the effects of war on the environment. Prospects for conflict intervention involving multiparty stakeholders, international cooperation, and environmentally sustainable development practices are explored as methods for resolving these situations.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PACS 3870 (3) Nonviolent Civil Resistance: Movements and Strategies**
Explores the development of nonviolent practices for creating social change. Examines cases from around the globe, both historical and contemporary, to understand the reasons actors form social movements, as well choices in tactics and strategies associated with nonviolent civil resistance to achieve their aims. Special attention is paid to the relationship between community organizing, social movement activism, and nonviolent revolution.
**Recommended:** Prerequisite PACS 2500.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PACS 4000 (3) Special Topics in Peace, Conflict and Security Studies**
Upper division umbrella seminar spanning a variety of topics relevant to the study of peace, conflict and security related issues. Subjects addressed under this heading vary according to student interest and faculty availability.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Recommended:** Prerequisite PACS 2500, PACS 3700 or PACS 3850.
**Grading Basis:** Letter Grade

**PACS 4100 (3) Managing Organizational Conflict**
This course introduces students to organizational conflict from a leadership perspective, the facilitative role leaders play in conflict intervention, and how leadership styles can affect organizational dynamics. Engaging with conflict productively requires leaders to recognize relational and structural factors that generate conflict. Leaders must guide difficult conversations and manage a range of situations. This includes challenges such as working in teams, remote/hybrid formats, cultural dimensions, and those related to gender discrimination and racial harassment.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite PACS 3700 or PACS 3860.
**Grading Basis:** Letter Grade

**PACS 4150 (3) Mediation Skills**
This 3-credit seminar trains students in facilitative mediation. The essential skills learned in this course are for anyone interested in helping people navigate, manage, and resolve conflicts in personal and professional settings. Students will engage in hands-on, experiential learning, participating in role plays and other exercises designed to teach them the basics of mediation as well as how to strengthen their communication and listening skills while working with those experiencing conflict. Formerly offered as a special topics course.
**Recommended:** Prerequisite PACS 3700.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PACS 4500 (3) Senior Seminar: Research in Conflict Contexts**
Course prepares students interested in working in the field of peace, conflict, and security studies with necessary research skills to navigate conflict contexts and collaborate with conflict-affected populations. Students conduct in-depth research projects, and develop data collection and analysis skills, specifically focusing on interviews, surveys, and secondary sources. Emphasizes use of critical thinking skills in writing, presentations, and class discussion, as well as explores ethical considerations faced in conflict zones.
**Recommended:** Prerequisite course of PACS 2500, PACS 3700, PACS 3850, or PACS 3860 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PACS 4900 (3) Undergraduate Independent Study**
Provides opportunities for independent study at the upper-division undergraduate level. Students work on research or a creative project guided by PACS faculty. May only be taken once for 3 credit hours. Department consent required prior to registration.
**Requisites:** Requires prerequisite courses of PACS 2500 and PACS 3700 or PACS 3850 (minimum grade C). Restricted to students with 57-180 credits (Junior or Seniors).
**Recommended:** Prerequisite C average or higher in all PACS coursework and enrollment in the PACS Certificate Program.
**Grading Basis:** Letter Grade

# Peace, Conflict and Security - Certificate

The Certificate in Peace, Conflict and Security Studies (PACS) is designed to help students explore why conflict and violence occur, and to develop practical, nonviolent skills to analyze, intervene and resolve conflicts in their personal life, in their communities and between countries. The certificate is granted by the College of Arts and Sciences. All enrolled CU Boulder undergraduate students, regardless of school or major, may apply for and earn the PACS Certificate.

The program utilizes an interdisciplinary perspective on the study of conflict, cooperation, violence, war and peacemaking. Coursework focuses on theorizing and analyzing various levels of conflict, from the interpersonal to international, and related possibilities for personal and social change. Coursework also emphasizes the development of transferable skills and experiential learning in conflict resolution and civic activism. The program encourages hands-on, "in the field" engagement through volunteer service, enrollment in study-abroad programs and internship placement with related agencies and programs.

For more information or an application, visit the Peace, Conflict and Security Studies Program (http://www.colorado.edu/pacs/) website.

**Course code for this program is PACS.**

## Requirements

Completion of the certification requires 18 credit hours (9 upper-division) of study, up to six (6) of these credit hours may completed through approved transfer credit. Each of these courses must be completed with a grade of C- or better. These courses must also include:

### Required Courses and Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| *Introductory Course* | | |
| PACS 2500 | Introduction to Peace, Conflict and Security Studies | 3 |
| *Conflict Resolution Course* | | *3* |
| PACS 3700 | Communication and Conflict Management | |
| PACS 3850 | International Conflict Resolution and Peacebuilding | |
| PACS 3860 | Environmental Conflict and Conflict Resolution | |
| *Senior Capstone Course* | | *3* |
| PACS 4000 | Special Topics in Peace, Conflict and Security Studies | |
| PACS 4100 | Managing Organizational Conflict | |
| PACS 4150 | Mediation Skills | |
| PACS 4500 | Senior Seminar: Research in Conflict Contexts | |
| PACS 4900 | Undergraduate Independent Study | |
| *PACS Elective* [1] | | *3* |
| Choose one of the following courses or one of the courses listed in Conflict Resolution or Senior Capstone that were not used to fill those specific requirements | | |
| PACS 3800 | Security Studies | |
| PACS 3870 | Nonviolent Civil Resistance: Movements and Strategies | |
| PSCI 3123 | War, Peace, and Strategic Defense | |
| **Outside PACS Electives** [2] | | |
| 6 credit hours of relevant course work related to PACS from non-PACS courses | | 6 |
| **Total Credit Hours** | | **18** |

1. Students may select a PACS Elective of their choice as long as the course differs from the PACS Conflict Resolution and Senior Capstone courses. For instance, a student may take PACS 3700 to fill the Conflict Resolution requirement and then PACS 3850 as their PACS elective.
2. The PACS website contains a list of approved courses (https://www.colorado.edu/pacs/approved-courses-category/) that students may complete to fulfill the outside course requirements. The PACS director may allow for substitutions of approved outside courses on a case by case basis.

# Philosophy

Philosophy provides an essential component in any sound general education: that form of education designed not to prepare one for a specific career, but to give one a broad and general understanding of the world, the place of human beings in the world and human values, as well as general intellectual skills that can be brought to bear on diverse subject matters.

**Course code for this program is PHIL.**

# Bachelor's Degree

- Philosophy - Bachelor of Arts (BA) (p. 509)

# Minor

- Philosophy - Minor (p. 513)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Bailey, Dominic (https://experts.colorado.edu/display/fisid_145110/)
Associate Professor; PhD, University of Cambridge

Boonin, David (https://experts.colorado.edu/display/fisid_113100/)
Professor; PhD, University of Pittsburgh

Bredeson, Garrett (https://experts.colorado.edu/display/fisid_154933/)
Assistant Teaching Professor, Associate Chair; PhD, Vanderbilt University

Cleland, Carol (https://experts.colorado.edu/display/fisid_105674/)
Professor; PhD, Brown University

Demarest, Heather (https://experts.colorado.edu/display/fisid_159052/)
Assistant Professor; PhD, Rutgers University

Fileva, Iskra (https://experts.colorado.edu/display/fisid_154600/)
Associate Professor, Associate Chair; PhD, Boston University

Heathwood, Chris (https://experts.colorado.edu/display/fisid_141144/)
Professor; PhD, University of Massachusetts at Amherst

Huemer, Michael (https://experts.colorado.edu/display/fisid_113081/)
Professor; PhD, Rutgers University–Newark

Jacobson, Daniel (https://experts.colorado.edu/individual/fisid_167068/)
Professor; PhD, University of Michigan

Kaufman, Dan (https://experts.colorado.edu/display/fisid_134174/)
Associate Professor; PhD, University of Massachusetts at Amherst

Kopeikin, Zak (https://experts.colorado.edu/display/fisid_167727/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Lee, Mi-Kyoung (https://experts.colorado.edu/display/fisid_141821/)
Associate Professor; PhD, Harvard University

Norcross, Alastair (https://experts.colorado.edu/display/fisid_144850/)
Professor; PhD, Syracuse University

Pasnau, Robert (https://experts.colorado.edu/display/fisid_115293/)
Professor; PhD, Cornell University

Potter, Jason (https://experts.colorado.edu/display/fisid_103972/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Rupert, Robert (https://experts.colorado.edu/display/fisid_139802/)
Professor, Chair; PhD, University of Illinois at Chicago

Saucedo, Raul (https://experts.colorado.edu/display/fisid_153759/)
Assistant Professor; PhD, Cornell University

Shear, Ted (https://experts.colorado.edu/display/fisid_166781/)
Assistant Teaching Professor; PhD, University of California-Davis

Sridharan, Vishnu
Assistant Professor; PhD, University of Southern California

Staffel, Julia (https://experts.colorado.edu/display/fisid_163744/)
Associate Professor; PhD, University of Southern California

Steup, Matthias (https://experts.colorado.edu/display/fisid_157766/)
Professor; PhD, Brown University

Talbot, Brian (https://experts.colorado.edu/display/fisid_147617/)
Associate Professor; PhD, University of Southern California

Wingo, Ajume (https://experts.colorado.edu/display/fisid_144391/)
Associate Professor; PhD, University of Wisconsin–Madison

Youkey, David (https://experts.colorado.edu/display/fisid_105211/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

# Courses

**PHIL 1000 (3) Introduction to Philosophy**
Discusses fundamental questions concerning human existence and the nature of reality. Questions may include: Does God exist? Am I the same person I was when I was born? Will I survive the death of my body? Do I have free will? How do I know whether the world around me really exists? What is knowledge? What is truth? What is morality, and how do I know what¿s right to do?
**Additional Information:** GT Pathways: GT-AH3 - Arts Hum: Ways of Thinking
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1010 (3) Introduction to Western Philosophy: Ancient**
Introduces major philosophical ideas originating in ancient Greece, including the concepts of eudaimonia (happiness), sophia (knowledge), philosophia, psychê (soul), aretê (virtue), erôs (love), and democracy, placing these in historical context and relating them to subsequent philosophical developments. Topics may include the nature of happiness; why philosophy and democracy flourished in ancient Greece; the ancient Greek origins of science; whether being a virtuous person makes you happier; and ancient Greek thinking about life, love, and death.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 1030
**Additional Information:** GT Pathways: GT-AH3 - Arts Hum: Ways of Thinking
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1020 (3) Introduction to Western Philosophy: Modern**
Introduces philosophy through core ideas of the seventeenth and eighteenth centuries, examining Enlightenment-era controversies such as: What are the foundations of scientific thinking? How does sense perception contribute to knowledge? How do we explain the movement of bodies in the natural world? What, if anything, is God¿s role in nature? How do societies form, and how should they be governed? Are human beings free? If so, how is human freedom compatible with political authority?
**Additional Information:** GT Pathways: GT-AH3 - Arts Hum: Ways of Thinking
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1030 (3) Introduction to Global Philosophy**
Examines and compares different approaches to philosophy from across the globe, including Indian, Chinese, African, Islamic, Judaic, and European traditions. Topics may include: the nature of the self and reality, the foundations and limits of human knowledge, the role of the individual in the political community, the basic principles of ethics, and the meaning of life as a whole.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1040 (3) Introduction to African Philosophy**
Introduces the philosophical ideas of several African ethnic groups and contemporary African philosophers, also exploring cross-cultural comparisons between African philosophy and the Western tradition, with special attention to historical context and the post-colonial condition. Topics may include both methodological differences between African and Western philosophy and fundamental philosophical questions concerning human existence, such as the nature and value of persons, knowledge, custom and morality, human rights, and meaning.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1100 (3) Ethics**
Introduces students to moral philosophy by having them study and evaluate prominent moral theories and their application to a selection of real-world moral problems. Theories studied may include utilitarianism, rights theory, virtue ethics, social contract theory, divine command theory, cultural relativism, and natural law theory. Social problems covered may include abortion, world poverty, animal rights, reparations for slavery, gun rights, or similar such controversies.
**Additional Information:** GT Pathways: GT-AH3 - Arts Hum: Ways of Thinking
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1160 (3) Introduction to Medical Ethics**
Introduces students to moral dilemmas in medical practice, biomedical research, and health policy, placing them in the context of comprehensive ethical theories and core principles of bioethics. Topics may include: euthanasia; abortion; organ procurement; moral status; research on nonhuman animals; navigating cultural differences between patients and health professionals; and the fair distribution of healthcare resources; as well as the bioethical issues arising from technological advances in medicine, including genetic engineering, cloning, and assistive reproductive technologies.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1200 (3) Contemporary Social Problems**
Examines competing positions in debates over a wide variety of controversial moral, social and political issues. Topics may include: abortion, world poverty, animal rights, immigration, physician-assisted suicide, freedom of religion, hate speech, cloning, income inequality, pornography, gun rights, racial profiling, capital punishment, overpopulation, prostitution, drug legalization, torture. Formerly titled 'Philosophy and Society.'
**Additional Information:** GT Pathways: GT-AH3 - Arts Hum: Ways of Thinking
Arts Sci Core Curr: Ideals and Values
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
MAPS Course: Social Science

**PHIL 1250 (3) Poverty, Power, and Patriotism: Issues of Global Justice**
Explores justice (and injustice) in global and local contexts, introducing students to major traditions in political philosophy and core concepts like equality, liberty, reciprocity, and distributive justice. Specific topics may include: racism; sexism; reparations; colonialism; famine; immigration; patriotism; exploitation; labor justice; climate change; terrorism; and war. Relates political topics in U.S. society to their global context, challenging students to consider marginalization along axes of race, gender, and class across cultural boundaries.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**PHIL 1350 (3) Knowledge, Mind, and Reality**
Introduces philosophy by exploring fundamental questions concerning the nature of reality and our knowledge. Possible questions include: Does God exist? Are you the same person you were when you were born? Does the past exist? Are we free to choose our actions? Is the mind something distinct from the body? Can a computer think? How can we know anything at all?
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1400 (3) Philosophy and the Sciences**
Considers philosophical topics and concepts related to the natural sciences, such as the following: science and pseudo-science; scientific method; the nature of explanation, theory, confirmation, and falsification; the effect of science on basic concepts like mind, freedom, time, and causality; ethics of experimentation; and the relation of science to society.
**Additional Information:** GT Pathways: GT-AH3 - Arts Hum: Ways of Thinking
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHIL 1440 (3) Critical Thinking**
Develops students' skills in evaluating arguments and other aspects of critical thinking, focusing on the ways people reason and attempt to justify their beliefs. Activities may include modeling arguments, detecting common fallacies, examining the use (and misuse) of scientific evidence, and learning the basics of symbolic logic. Formerly titled "Introductory Logic.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1500 (3) Reading, Writing and Reasoning**
Teaches students how to write argumentative papers. Each seminar will focus narrowly on some controversial topic. For example, one seminar might focus on the existence of God, whereas another might question whether we have free will. In all cases, a significant portion of the course will be devoted to learning how to write cogent argumentative papers about controversial topics.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Lower

**PHIL 1600 (3) Philosophy and Religion**
Philosophical introduction to some of the central concepts and beliefs of religious traditions, focusing particularly on the question of the existence of God and on the relation between religious beliefs and moral beliefs.
**Additional Information:** GT Pathways: GT-AH3 - Arts Hum: Ways of Thinking
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**PHIL 1700 (3) Philosophy and the Arts**
Explores controversial questions in aesthetics (philosophy of art), such as: What counts as art? What makes art, music, or even the natural world beautiful? What¿s the proper way to appreciate beauty? Do some people have better taste in music or art than others? If so, what does ¿good taste¿ mean? Is pop music bad? What about cultural appropriation? Is it wrong when, e.g., white people perform music traditionally associated with black culture?
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1750 (3) Philosophy through Literature**
Introduces philosophy through literature. Selected novels, plays, and short stories that exemplify traditional problems in philosophy are read and discussed.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1800 (3) Open Topics/Philosophy**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2140 (3) Environmental Justice**
Studies the intersection of environmental health and social justice, examining how political and economic institutions affect our planet and considering environmental problems in light of social problems that produce them. Topics may include sustainable development, climate justice, responsibility to future generations, global poverty, environmental racism, and the relation between economic systems (e.g., capitalism) and environmental concerns. Part philosophy, part policy, this class weaves together moral and factual issues, addressing fairness, rights, equality, and responsibility.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2150 (3) Ethics and Sex**
Explores a variety of moral questions relating to sex and procreation. Topics may include arguments for and against the wrongness of masturbation, incest, pedophilia, bestiality, necrophilia, voyeurism, pornography, sadomasochism, prostitution, abortion, commercial surrogacy and cloning, as well as arguments addressing such additional subjects as what constitutes rape and whether procreation is morally obligatory, optional, or forbidden.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2160 (3) Ethics and Information Technology**
Examines contemporary ethical issues concerning the use, misuse, and development of information technologies, with particular focus on the consequences such changes may have on the lives of individuals and on the shape of societies. Topics may include hacking and cyber crime; artificial intelligence; robotics and automation technologies, such as drones and self-driving cars; mass surveillance; use of personal information by corporate, law enforcement, and media interests; as well as gaming and virtual reality.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**PHIL 2170 (3) Ethics and Economics**
Examines a variety of perspectives on problems at the intersection of ethics and economics, using both empirical data and moral reasoning to evaluate arguments concerning topics such as: government regulation of private industry, protectionist economic policies, fair work compensation, retirement benefits, and access to health care.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2200 (3) Major Social and Political Theories**
Explores fundamental questions concerning the nature and legitimacy of major social and political institutions. Topics may include the nature of freedom; the meaning and value of democracy; competing conceptions of justice; the basis of political authority; civil disobedience; human dignity and individual rights; social conflict, tyranny, and war; just and unjust distributions of wealth; the relation between ethics and politics; the nature of political belief; and arguments for and against socialism, communism, libertarianism, and anarchism.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2220 (3) Philosophy and Law**
Considers controversies about the law in general and the U.S. system in particular. Questions may include: What is law? What should the law prohibit (e.g., abortion, drug use, prostitution, cloning)? Is there a moral obligation to obey the law? Can civil disobedience be justified? How do we justify punishing those who break the law? Is capital punishment morally justifiable?
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2240 (3) Philosophy and Sports**
Introduces students to philosophical issues surrounding sport. Topics may include: paying college athletes, sex testing in sports, the use of performance enhancing drugs, sports and gambling, the nature and value of sports and sportsmanship, gender equity and sports, the ethics of strategic fouling, sports fandom, the coach-athlete relationship, athletes as role models, and the risk of extreme bodily harm.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**PHIL 2250 (3) Philosophy and Video Games**
Introduces philosophical issues raised in and by video games. Students will discuss ethical, aesthetic, and/or metaphysical questions such as: Is it okay to engage in otherwise immoral behavior (like violence or murder) in video games? What do in-game choices say about you? What is the relationship between you and your avatar? Is gaming culture misogynistic? Are video games art? Is virtual reality ¿real¿? Is social media a kind of video game?
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2260 (3) Philosophy and Food**
Introduces students to topics and issues connected to the nature of food. Helps students investigate questions about our food choices, production and distribution, as well as connection food bears to culture and identity. No previous experience in philosophy required or presupposed.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2270 (3) Philosophy and Race**
Explores the historical relationship between western philosophy and race and investigates the ways in which philosophy can be used to address contemporary racial issues.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Diversity-U.S. Perspective

**PHIL 2290 (3) Philosophy and Gender**
Analyzes critically the concepts of sex, gender, and their intersection with other aspects of identity, exploring how these impact the extent to which people face injustice because of their gender.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 2290
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Diversity-U.S. Perspective

**PHIL 2380 (3) Philosophy and Psychiatry**
Introduces problems at the intersection of psychiatry and philosophy, combining philosophy¿s critical thinking tools with psychiatry¿s empirical grounding. Considers theoretical problems (What is mental disorder? Is there a boundary between normality and psychopathology at all? Is autism, e.g., a disorder?), as well as ethical problems (Is it permissible to administer psychiatric treatment against a patient¿s will? Is it permissible to amputate the limb of a patient with Body Integrity Dysphoria who strongly desires the amputation?).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2390 (3) Philosophy and Psychology**
Interdisciplinary course on issues where philosophy and psychology meet. For example, topics such as selfhood, motivation, psychotherapy, freedom, and human behavior are examined. Selected readings in philosophy and psychology are required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2440 (3) Symbolic Logic**
Introduces students to sentential logic, the logic of quantification and some of the basic concepts and results of metalogic (interpretations, validity and soundness).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2490 (3) The Power of Words**
Discusses philosophical problems about language and how our using it shapes the world. Topics may include: what language is, what we can do with words, how social norms affect meaning and communication, the relationship of language to features of the social world like race, gender, and ideology, the nature of speech acts, hate speech, propaganda, pejoratives, slurs, freedom of speech, humor, deception, translation, how language conveys thoughts, and how language shapes thought.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2710 (3) Philosophy and Film**
Introduces students to issues in philosophy through film, including consideration of film itself as an artistic medium. Students will watch films and wrestle with the philosophical problems they present. Topics will vary according to film selection and may include: the distinction (if any) between high and low art; aspects of film production that support or create aesthetic value; and how (if at all) film can and should be used to foment socio-political change.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2750 (3) Philosophy and Science Fiction**
Explores philosophical issues in science fiction literature and film. Topics may include time travel, artificial intelligence, free will, personal identity, and how scientific advances will change human life and society. Students may read science fiction stories and philosophical articles, and watch several movies.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2800 (3) Open Topics/Philosophy**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2840 (1-3) Independent Study**
Department-enforced prerequisite: 6 hours of philosophy course work (minimum grade D-).
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Philosophy (PHIL) majors or minors with 27-180 credits (Sophomores, Juniors, Seniors) only.

**PHIL 3000 (3) History of Ancient Philosophy**
Surveys developments in metaphysics, ethics, logic, and philosophy of mind from the Pre-Socratics through Hellenistic philosophy, focusing primarily on the arguments of the philosophers. Topics may include: Zeno¿s paradoxes of time and motion; Democritean atomism; Plato on knowledge, reality, ethics, and politics; Aristotle on logic and natural philosophy; Epicurus on pleasure and friendship; Epicurean atomism; the Stoics on materialism, determinism, and vagueness; and the coherence and practicality of global skepticism.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of philosophy coursework.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3010 (3) History of Modern Philosophy**
Introduces modern philosophy, focusing on the period from Descartes through Kant. In addition to careful analysis of philosophical arguments, attention is paid to the ways in which philosophers responded to and participated in major developments in the 17th and 18th century, such as the scientific revolution.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of philosophy coursework.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3030 (3) Asian Philosophies**
Explores various topics in Asian philosophy. Students will be exposed to and critically engage with a range of ethical, metaphysical, epistemological, and other philosophical issues in Chinese, Indian, and other Asian traditions, including discussion of how major Asian traditions relate to other approaches to philosophy. Specific topics and themes vary from term to term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3040 (3) African Philosophy: Personhood and Morality**
Examines conceptions of personhood, humanity, and morality among several African ethnic groups (including the Akan and Nso), employing a comparative approach that challenges traditional Western philosophical presuppositions and builds sensitivity to unfamiliar conceptions of morality and politics. Gives special attention to the effects of history, geography, and the environment on different societies¿ ways of conceptualizing ethical questions. Topics include human rights; free will and responsibility; custom and morality; and methodological questions concerning cross-cultural comparisons.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of Philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**PHIL 3050 (3) Continental Philosophy**
Considers texts, figures, and/or movements in Continental philosophy from the nineteenth century onwards. While diverse, Continental thought tends to involve radical reflection on the methodology of philosophy, challenging traditional conceptions of subjectivity and objectivity while contextualizing knowledge and rationality within the structures of human existence, history, and culture. Topics may be drawn from German idealism, phenomenology, psychoanalysis, existentialism, hermeneutics, poststructuralism, postmodernism, critical theory, Continental feminism, gender theory, queer theory, new materialism, and contemporary Marxist thought.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of philosophy coursework.

**PHIL 3100 (3) Ethical Theory**
Examines important doctrines and arguments in various areas of theoretical ethics, such as the normative ethics of behavior, axiology, virtue theory, and metaethics.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 6 hours of philosophy course work.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3110 (3) Feminist Practical Ethics**
Examines issues of public policy and personal ethics in light of the feminist commitment to gender justice. Readings for the course will present competing feminist points of view on topics such as: the environment, sex trafficking, immigration, abortion rights, the fashion and beauty industries, cosmetic surgery, food, and militarism. Contributes to an understanding of gender diversity from a U.S. perspective, fostering further insight into social, political, economic, and cross-cultural relations in America.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3110
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite PHIL 2290 or WGST 2000 or WGST 2290.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**PHIL 3120 (3) Applied Ethics**
Examines arguments about controversial social issues drawn from various areas of applied ethics including biomedical ethics, AI ethics, sexual ethics, criminal justice ethics, and environmental ethics. Multiple topics will be covered and may include abortion, physician-assisted suicide, obligations to the global poor, cloning, genetic engineering, algorithmic fairness, deepfake pornography, prostitution, animal rights, climate change, obligations to future generations, affirmative action, slave reparations, mass public surveillance, predictive policing, and criminal punishment.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of philosophy coursework.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3140 (3) Environmental Ethics**
Examines major traditions in moral philosophy to see what light they shed on value issues in environmental policy and the value presuppositions of the economic, ecological, and juridical approaches to the environment.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3140
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PHIL 1100 or PHIL 1200 or PHIL 2200 or PHIL 3100 or PHIL 3200.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3160 (3) Bioethics**
Analysis of ethical problems involved in such issues as abortion, euthanasia, organ transplants, eugenics, treatment of the patient as a person and the institutional nature of the health care delivery system.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of philosophy coursework.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3170 (3) Philosophy and Ethics of Artificial Intelligence**
Examines the philosophy and ethics of artificial intelligence (AI), exploring existing machine learning algorithms, autonomous AI systems of the near future (e.g., self-driving cars, autonomous weapons), and advanced AI of the distant future (e.g., superintelligence, robot rights), with applications to medicine, criminal justice, social media, and warfare. Questions may include: Are machine learning systems biased? Who deserves blame when autonomous systems make mistakes? Will AI systems ever be conscious or deserve rights?
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3190 (3) War and Morality**
Focuses on moral issues raised by war. When, if ever, can war be morally justified? Are rules of war globally applicable, or are they affected by local religious and cultural frameworks? Are colonized nations bound by the same rules of war as their colonizer states? Are states ever obligated to intervene to stop massacres or genocides in other states?
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of PHIL coursework.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3200 (3) Social and Political Philosophy**
Introduces students to an in-depth examination and analysis of central operational ideas in social and political philosophy, such as power, freedom, equality, democracy, justice, rights, community, individuality, civil disobedience, and law. A thorough treatment of any of these ideas may call for some cross-cultural and/or comparative political and social analysis.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of philosophy course work.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3260 (3) Philosophy and the International Order**
Considers philosophical topics concerning the international economic, political and legal systems. Topics that may be considered include the nature of international law, war and peace, humanitarian intervention, international justice, world hunger and human rights.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of philosophy coursework.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**PHIL 3290 (3) War and Morality and the Enduring Struggle for Freedom**
Explores normative theories of just war, political obligation, and collective self-determination, and select empirical studies of the causes and effects of violent revolutions. Designed primarily for PHIL, PSCI, IAFS, and PACS students, this interdisciplinary course involves an intensive two-week abroad study in Budapest, Hungary, where students will visit diverse historical sites that bear out normative and empirical lessons learned in the classroom about collective armed conflict and the enduring struggle for freedom.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite Three hours of PHIL coursework.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3310 (3) Cognitive Science**
Introduces cognitive science, drawing from psychology, philosophy, artificial intelligence, neuroscience, and linguistics. Studies the linguistic relativity hypothesis, consciousness, categorization, linguistic rules, the mind-body problem, nature versus nurture, conceptual structure and metaphor, logic/problem solving and judgment. Emphasizes the nature, implications and limitations of the computational model of mind.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3702 and LING 3005 and CSCI 3702 and PSYC 3005 and SLHS 3003 and CSPB 3702
**Recommended:** Prerequisites two of the following CSCI 1300 or LING 2000 or PHIL 2440 or PSYC 2145.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Distribution-Social Sciences

**PHIL 3410 (3) History of Science: Ancients to Newton**
Surveys the history of science up to Newton, tracing the emergence of scientific thinking from religious and philosophical roots in the Near East and Greece to its development in the Middle Ages and Renaissance, culminating with Newton and the seventeenth-century Scientific Revolution. Additional topics may include early discoveries concerning mathematics; technological advancement and its relation to the evolution of scientific theory; and cross-cultural comparisons of scientific and technological traditions (e.g., Chinese traditions).
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of philosophy coursework.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHIL 3430 (3) History of Science: Newton to Einstein**
Surveys the development of modern scientific thought, with an emphasis on the natural sciences, beginning with Newton and ending with the radical and controversial implications of relativity theory and quantum mechanics. Topics may include the rise of modern chemistry, Darwin¿s earth-shattering achievements in biology, the beginnings of the social sciences (and their relationship with the natural sciences), the rise of ecology and holistic science, and the philosophical interpretation of scientific method and explanation.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of philosophy coursework.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHIL 3480 (3) Critical Thinking/Writing in Philosophy**
Focuses upon the fundamental skills, methods, concepts and distinctions that are essential for the study of philosophy. Basic skills covered include the writing of philosophy papers, the reading of articles and the extraction and evaluation of arguments.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) Philosophy (PHIL) majors only (excluding minors).
**Recommended:** Prerequisites 6 hours of philosophy course work.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Upper

**PHIL 3600 (3) Philosophy of Religion**
Explores fundamental questions concerning major world religions, especially the Abrahamic religions. Possible topics include: the divine attributes (Is perfect goodness compatible with the existence of hell? Can God be truly omnipotent?), the problem of evil, divine hiddenness and evidence of the existence of God, religious experience, the legitimacy of faith, the dilemma of freedom and divine foreknowledge, God and morality, tensions between religion and science, conceptions of the self in Abrahamic religions and in Buddhism.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 6 hours of philosophy coursework.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3700 (3) Aesthetic Theory**
Introduces major theories of aesthetics and contemporary discussions of problems, such as the nature of art and the problem of evaluations in art.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of philosophy coursework.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3800 (3) Open Topics in Philosophy**
See current departmental announcements for specific content. Department enforced prerequisite: 6 hours of philosophy course work.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3840 (1-3) Independent Study**
Department enforced prerequisite: Minimum of 6 completed hours of philosophy course work (minimum grade D-).
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Philosophy (PHIL) majors only.

**PHIL 3930 (1-6) Internship in Applied Philosophy**
Provides an academically supervised opportunity for junior and senior Philosophy students to work in public or private organizations to gain practical knowledge and experience, allowing students to apply philosophical theory to real-world problems while enriching their understanding of philosophy itself through its application. Requires the student to pursue an academic research project and compose an original research paper. Department consent required, as well as a minimum 3.0 cumulative GPA.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 9 hours philosophy course work.

**PHIL 4010 (3) Single Philosopher**
Discusses the work of a single historical figure in philosophy with the aim of reaching a broad and deep understanding of the philosopher's thought.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5010
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4020 (3) Topics in the History of Philosophy**
Examines a specific philosophical problem over an extended historical period.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5020
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites 12 hours of philosophy course work including PHIL 3000 and PHIL 3010.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4030 (3) Medieval Philosophy**
Introduces philosophy from the late Roman era to the 14th century. Philosophers studied may include Augustine, Boethius, Aquinas, and Ockham. Topics range over religion, ethics, mind, and metaphysics.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4040 (3) Studies in 20th Century Philosophy**
Studies two or three major philosophies prominent during the last century.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4070 (3) Existentialist Philosophy**
Examines central figures and texts in the existential tradition, from Kierkegaard and Nietzsche to Heidegger and Sartre.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4110 (3) Contemporary Moral Theory**
Provides an in-depth look at some recent work in moral theory, usually organized around a single topic. Topics vary from year to year. Previous topics include: consequentialism and its critics, virtue theory, deontological ethics, moral psychology, well-being, and metaethics.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5110
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite or corequisite of PHIL 3100 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors). Restricted to PHIL majors or PHIL minors.
**Recommended:** Prerequisite 12 hours of PHIL coursework (all minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4120 (3) Philosophy and Animals**
Examines the moral status of nonhuman animals, and its implications for the common use of animals as food and experimental subjects for humans.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5120
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites PHIL 1100 or PHIL 1200 or PHIL 3100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4150 (3) Topics in Applied Ethics**
Discusses advanced work in applied normative philosophy. Topics vary from semester to semester and may focus on one or two specific areas (e.g., race, procreative ethics, military ethics, sports ethics) or take a broader approach that includes issues from across a wider range of subjects.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5150
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours of PHIL coursework.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4200 (3) Contemporary Political Philosophy**
Provides a survey of recent approaches to political philosophy: liberalism (Rawls, Dworkin); libertarianism (Nozick); communitarianism (Sandel, Macintyre); feminism (Jaggar). Topics and readings vary with the instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5200
**Requisites:** Requires prerequisite courses of PHIL 2200 or PHIL 3200 (all minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours of philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4210 (3) Classical Greek Political Thought**
Studies main representatives of political philosophy in antiquity (Plato, Aristotle, Cicero) and of the most important concepts and values of ancient political thought. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4041 and CLAS 5041 and HIST 4041
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4250 (3) Marxism**
Examines the economic, political, and philosophical thought of Karl Marx, placing it in the context of his predecessors in the classical German tradition and his successors (and critics) in the twentieth century. Themes may include the development of historical materialism; Marx¿s analysis of estranged labor; the critique of utopian socialism; the categories of Marxist economic analysis; the relation between politics, philosophy, and economics; theories of labor, surplus value, and exploitation; and the fate of communism.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 4251
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours of GRMN or PHIL course work or instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Distribution-Social Sciences

**PHIL 4260 (3) Philosophy of Law**
Considers philosophical topics concerning law and the U.S. legal system. Topics that may be considered include the nature of law, relations between law and morality, justifications of punishment, the moral duty to obey the law, and law and liberty.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5260
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4300 (3) Philosophy of Mind**
Discusses topics in the philosophy of mind, including the mind-body problem, consciousness, intentionality, rationality, mental causation and the nature of mental states.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5300
**Requisites:** Requires prerequisite courses PHIL 2440 and PHIL 3010 and PHIL 3480 and PHIL 4340 (all minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4340 (3) Epistemology**
Studies some of the main topics of theory of knowledge, such as evidence, justification, prediction, explanation, skepticism, and concept acquisition.
**Equivalent - Duplicate Degree Credit Not Granted:** 5340
**Repeatable:** Repeatable for up to 15.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Philosophy (PHIL) majors only.
**Recommended:** Prerequisites PHIL 3480 and 12 credit hours of philosophy including PHIL 2440 and PHIL 3010.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4360 (3) Metaphysics**
Examines philosophical questions and debates about the general nature of reality. Specific topics may include: existence; identity; change; particulars and universals; parts and wholes; space and time; possibility and necessity; freedom and determinism; laws of nature; causation; and the posits of mathematical and physical theories.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5360
**Requisites:** Requires prerequisite courses PHIL 2440 and PHIL 3010 and PHIL 3480 (all minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4370 (3) Free Will and Determinism**
Explores the full range of questions relating to the problem of free will and determinism. Topics may include; the scientific evidence for determinism, hard versus soft determinism, arguments for and against the compatibility of free will and determinism, moral responsibility and the principle of alternate possibilities, hierarchical motivation, the deep self, reactive attitudes, the intelligibility question for libertarianism, divine foreknowledge.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5370
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4400 (3) Philosophy of Science**
Advances students' knowledge of topics in philosophy of science and develops students' ability to think and write clearly about science. Topics may include scientific methodology; distinguishing science from pseudoscience; characterizing experimental and historical sciences; interpretations of special and general relativity; interpretations of quantum mechanics; the nature of biological species; approaches to defining life; criteria for identifying alien life; artificial intelligence; neuroscience and consciousness; fundamental physical properties and laws of nature; chance and probability; and causation.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5400
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours philosophy course work including PHIL 2440.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4440 (3) Topics in Logic**
Provides for offering courses in a variety of topics in logic, including, but not limited to, mathematical logic, philosophical issues in logic, probability theory, decision theory, and inductive logic.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5440
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours PHIL coursework, including PHIL 2440.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4450 (3) History and Philosophy of Physics**
Discusses the epistemic question of what characterizes good physics research as well as the metaphysical question of what our best physics research tells us about the world. Topics may include case studies of physics experiments, theory choice, and scientific methodology in physics, as well as foundational metaphysical questions in statistical mechanics, quantum mechanics, special and general relativity, chance and probability, and the laws of nature.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5450 and PHYS 4450 and PHYS 5450
**Requisites:** Requires prerequisite course PHYS 1020 or PHYS 1120 or PHYS 2020 or PHIL 1400 or PHIL 2440 or PHIL 3410 or PHIL 3430 or PHIL 4400 (all minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Distribution-Natural Sciences

**PHIL 4460 (3) Modal Logic**
Introduces the most philosophically relevant kind of logic that builds on PHIL 2440. Modal logic is the logic of the concepts of necessity, possibility and contingency. A variety of systems of sentential modal logic will be covered, along with the standard system of first-order modal logic.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5460
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite PHIL 2440.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4470 (3) Probability and Rational Choice**
Examines issues in four related areas: probability theory (e.g. the interpretation of probability, the raven paradox, and the principle of indifference), decision theory (e.g., the Newcomb problem, the toxin puzzle, and Pascal's wager), game theory (e.g., Prisoner's dilemma, tragedy of the commons, and Schelling points), and social choice theory (e.g., Arrow's theorem). Familiarity with symbolic logic is strongly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5470
**Recommended:** Prerequisite PHIL 2440 and 12 hours philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4480 (3) Formal Methods in Philosophy**
Introduces formal methods used in contemporary philosophy beyond classical first-order logic. Specific topics may vary. Examples: extensions of and alternatives to first-order logic (including propositional and quantified modal logic and higher-order and plural logic), alternatives to classical logic (including many-valued and intuitionistic systems), generalized and substitutional quantifiers, the lambda calculus, indicative and subjunctive conditionals, probability theory, inductive logic, and decision theory.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5480
**Requisites:** Requires prerequisite course of PHIL 2440 (minimum grade B). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4490 (3) Philosophy of Language**
Examines the nature of language through topics such as truth, reference, meaning, and use, as well as the general relationships between language and action, cognition, logic, and reality.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5490
**Requisites:** Requires prerequisite course PHIL 2440 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4800 (3) Open Topics in Philosophy**
See current departmental announcements for specific content.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4830 (3) Senior Seminar in Philosophy**
Critical in-depth examination of a selected philosophical topic.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Philosophy (PHIL) majors only.
**Recommended:** Prerequisite 15 hours philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4840 (1-3) Independent Study**
Department enforced prerequisite: Minimum of 6 completed hours of philosophy course work (minimum grade D-).
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Philosophy (PHIL) majors or minors with 87-180 credits (Seniors, Fifth Year Senior) only.

**PHIL 4950 (3) Honors Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours philosophy course work.
**Additional Information:** Arts Sciences Honors Course

# Philosophy - Bachelor of Arts (BA)

The undergraduate degree in philosophy emphasizes knowledge and awareness of:

- Some of the principal philosophical texts in the history of western philosophy, from its beginnings in Greece to the twentieth century.
- Some of the main currents in contemporary philosophy, including those in ethics, epistemology and metaphysics.
- Elementary formal logic.

In addition, students completing the major will develop the knowledge and skills to:

- Form reasoned opinions about the issues—moral, religious, political, etc.—that educated people debate.
- Understand, analyze and evaluate complex arguments and theories.
- Distinguish between the main thrust of an argument or position and what is ancillary to it.
- Discover and critically examine the underlying presuppositions of major systems of ideas or programs for action.
- See important connections between different systems of ideas or programs for action.
- Explain difficult ideas and concepts in an informed, effective and coherent manner.
- Develop a thesis and present a coherent argument for it.
- Write a clear and coherent argumentative essay.
- Engage in rational and productive discussion of issues and arguments.

In addition to the general philosophy major, the department offers two topically oriented major tracks that are interdisciplinary in nature: Law and Society; and Values and Social Policy.

# Requirements

## Program Requirements

For the undergraduate degree in philosophy, students must take 33 to 45 credit hours in philosophy, no fewer than 18 of which must be upper division, earning 33 credit hours with a grade of C- or better in each course in philosophy and a C (2.000) average for all work attempted in philosophy. No fewer than 12 of those credit hours must be completed on the Boulder campus. No more than 3 credit hours of independent study may count toward the minimum requirement. No more than 3 hours of internship credit (PHIL 3930) may count towards the elective requirement. A single course can count towards at most one area requirement.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **History** | | |
| PHIL 3000 | History of Ancient Philosophy | 3 |
| PHIL 3010 | History of Modern Philosophy | 3 |
| Select one of the following: | | 3 |
| PHIL 4010 | Single Philosopher | |
| PHIL 4020 | Topics in the History of Philosophy | |
| PHIL 4030 | Medieval Philosophy | |
| PHIL 4040 | Studies in 20th Century Philosophy | |
| PHIL 4070 | Existentialist Philosophy | |
| PHIL 4250 | Marxism | |
| **Logic** | | |
| Select one of the following: | | 3 |
| PHIL 2440 | Symbolic Logic | |
| PHIL 4440 | Topics in Logic (Mathematical Logic) | |
| PHIL 4460 | Modal Logic | |
| **Philosophical Writing** | | |
| PHIL 3480 | Critical Thinking/Writing in Philosophy | 3 |
| **Values** | | |
| PHIL 3100 | Ethical Theory | 3 |
| Select one of the following: | | 3 |
| PHIL 2140 | Environmental Justice | |
| PHIL 2150 | Ethics and Sex | |
| PHIL 2160 | Ethics and Information Technology | |
| PHIL 2170 | Ethics and Economics | |
| PHIL 2200 | Major Social and Political Theories | |
| PHIL 2220 | Philosophy and Law | |
| PHIL 2270 | Philosophy and Race | |
| PHIL 2290 | Philosophy and Gender | |
| PHIL 3040 | African Philosophy: Personhood and Morality | |
| PHIL 3110 | Feminist Practical Ethics | |
| PHIL 3140 | Environmental Ethics | |
| PHIL 3160 | Bioethics | |
| PHIL 3170 | Philosophy and Ethics of Artificial Intelligence | |
| PHIL 3190 | War and Morality | |
| PHIL 3200 | Social and Political Philosophy | |
| PHIL 3260 | Philosophy and the International Order | |
| PHIL 3700 | Aesthetic Theory | |
| PHIL 4110 | Contemporary Moral Theory | |
| PHIL 4120 | Philosophy and Animals | |
| PHIL 4150 | Topics in Applied Ethics | |
| PHIL 4200 | Contemporary Political Philosophy | |
| PHIL 4250 | Marxism | |
| PHIL 4260 | Philosophy of Law | |
| **Metaphysics and Epistemology** | | |
| PHIL 4340 | Epistemology | 3 |
| Select one of the following: | | 3 |
| PHIL 3600 | Philosophy of Religion | |
| PHIL 4040 | Studies in 20th Century Philosophy | |
| PHIL 4300 | Philosophy of Mind | |
| PHIL 4360 | Metaphysics | |
| PHIL 4370 | Free Will and Determinism | |
| PHIL 4400 | Philosophy of Science | |
| PHIL 4490 | Philosophy of Language | |
| **Electives** | | |
| Any two PHIL courses that are not taken to satisfy any of the above requirements | | 6 |
| **Total Credit Hours** | | **33** |

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in philosophy, students should meet the following requirements:

- By the beginning of the second semester, declare the major and meet with an undergraduate advisor at the time the major is declared.
- In each of the next five semesters, complete an average of 6.7 credit hours of required philosophy courses.
- By the end of the fifth semester of study, complete PHIL 2440, PHIL 3480, PHIL 3000 and PHIL 3010.

## Program Tracks

The department also offers two topically oriented tracks within the major that are interdisciplinary in nature: law and society and values and social policy. These tracks require two semesters in the history of philosophy, as well as a series of core courses that vary according to the track. A student intending to complete a topical track within the philosophy major should see the departmental undergraduate advisor as soon as possible.

### Values and Social Policy Track

Students must take 33 to 45 credit hours in philosophy, no fewer than 18 of which must be upper division, earning 33 credit hours with a grade of C- or better in each course in philosophy and a C (2.000) average for all work attempted in philosophy. No fewer than 12 of the upper-division credit hours must be completed on the Boulder campus. No more than 3

credit hours of independent study and no more than 3 hours of internship credit (PHIL 3930) may count toward the minimum credit requirements.

Students must complete the required philosophy courses listed below, 15 credit hours in allied fields, and the general requirements of the College of Arts and Sciences.

| Code | Title | Credit Hours |
|---|---|---|
| **Group I** | | |
| Required courses: | | |
| PHIL 1440 | Critical Thinking | 3 |
| or PHIL 2440 | Symbolic Logic | |
| PHIL 2200 | Major Social and Political Theories | 3 |
| PHIL 3000 | History of Ancient Philosophy | 3 |
| PHIL 3010 | History of Modern Philosophy | 3 |
| PHIL 3100 | Ethical Theory | 3 |
| PHIL 3200 | Social and Political Philosophy | 3 |
| **Group II** | | |
| Select four of the following courses: | | 12 |
| PHIL 2140 | Environmental Justice | |
| PHIL 2150 | Ethics and Sex | |
| PHIL 2160 | Ethics and Information Technology | |
| PHIL 2170 | Ethics and Economics | |
| PHIL 2220 | Philosophy and Law | |
| PHIL 2270 | Philosophy and Race | |
| PHIL 2290 | Philosophy and Gender | |
| PHIL 3040 | African Philosophy: Personhood and Morality | |
| PHIL 3110 | Feminist Practical Ethics | |
| PHIL 3140 | Environmental Ethics | |
| PHIL 3160 | Bioethics | |
| PHIL 3170 | Philosophy and Ethics of Artificial Intelligence | |
| PHIL 3190 | War and Morality | |
| PHIL 3260 | Philosophy and the International Order | |
| PHIL 3700 | Aesthetic Theory | |
| PHIL 3930 | Internship in Applied Philosophy | |
| PHIL 4110 | Contemporary Moral Theory | |
| PHIL 4120 | Philosophy and Animals | |
| PHIL 4150 | Topics in Applied Ethics | |
| PHIL 4200 | Contemporary Political Philosophy | |
| PHIL 4250 | Marxism | |
| PHIL 4260 | Philosophy of Law | |
| Other courses with advisor's approval | | |
| **Elective** | | **3** |
| Any PHIL course that is not taken to satisfy any of the above requirements | | |
| **Allied Fields** | | |
| 15 credit hours of approved courses in allied fields. For further information, contact the Track Advisor, Dave Youkey. | | 15 |
| **Total Credit Hours** | | **48** |

### Law and Society Track

| Code | Title | Credit Hours |
|---|---|---|
| **Group I** | | |
| Required courses: | | |
| PHIL 1440 | Critical Thinking | 3 |
| or PHIL 2440 | Symbolic Logic | |
| PHIL 2200 | Major Social and Political Theories | 3 |
| PHIL 2220 | Philosophy and Law | 3 |
| PHIL 3000 | History of Ancient Philosophy | 3 |
| PHIL 3010 | History of Modern Philosophy | 3 |
| PHIL 3100 | Ethical Theory | 3 |
| PHIL 3200 | Social and Political Philosophy | 3 |
| PHIL 3480 | Critical Thinking/Writing in Philosophy | 3 |
| PHIL 4260 | Philosophy of Law | 3 |
| **Group II** | | |
| Recommended courses: | | |
| PHIL 2140 | Environmental Justice | |
| PHIL 2150 | Ethics and Sex | |
| PHIL 2160 | Ethics and Information Technology | |
| PHIL 2170 | Ethics and Economics | |
| PHIL 2270 | Philosophy and Race | |
| PHIL 2290 | Philosophy and Gender | |
| PHIL 3040 | African Philosophy: Personhood and Morality | |
| PHIL 3110 | Feminist Practical Ethics | |
| PHIL 3140 | Environmental Ethics | |
| PHIL 3160 | Bioethics | |
| PHIL 3260 | Philosophy and the International Order | |
| PHIL 4110 | Contemporary Moral Theory | |
| PHIL 4150 | Topics in Applied Ethics | |
| PHIL 4200 | Contemporary Political Philosophy | |
| PHIL 4250 | Marxism | |
| **Group III** | | |
| Required Courses: | | |
| 12 credit hours of approved courses from other departments. For further information, contact the Track Advisor, Brian Talbot. | | 12 |
| **Total Credit Hours** | | **39** |

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will complete all 12 credits of the Arts & Humanities area of the Gen Ed Distribution Requirement and the Upper-division Written Communication component of the Gen Ed Skills Requirement. Depending on the courses selected in the major electives, students can potentially complete some credits in the Natural Sciences and Social Sciences areas of the Distribution and both the U.S. Perspective and the Global Perspective components of the Gen Ed Diversity Requirement.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| PHIL 1000 | Introduction to Philosophy | 3 |
| Gen. Ed. Distribution/Diveristy course (example: Social Sciences/US Perspective) | | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| PHIL required elective | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication–PHIL 1500, if possible) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Year Two** | | |
| **Fall Semester** | | |
| PHIL 3480 | Critical Thinking/Writing in Philosophy | 3 |
| PHIL 2440 | Symbolic Logic | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 4 |
| | **Credit Hours** | **13** |
| **Spring Semester** | | |
| PHIL 3000 | History of Ancient Philosophy | 3 |
| PHIL 3010 | History of Modern Philosophy | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| PHIL 3100 | Ethical Theory | 3 |
| PHIL Values Course (see Degree Audit for choices) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 4 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| PHIL 4340 | Epistemology | 3 |
| PHIL 4000-level History Course (see Degree Audit for choices) | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| PHIL Metaphysics (see Degree Audit for choices) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| PHIL Elective | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **120** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Understand the mechanics of critical thinking. Students on the general track will be competent in the basics of symbolic logic. Students on the values social policy and law society tracks will be able to model and evaluate arguments.
- Construct organized argumentative papers.
- Interpret and criticize texts and arguments from the history of philosophy.
- Engage with questions concerning human values and assess arguments for and against the ethical theories responding to them.
- Recognize the main theories in epistemology, assess arguments for and against them and apply them to analyze problems and cases. (General track)
- Apply philosophical reasoning to contemporary social, political and/or legal problems. (Values social policy and law society tracks)

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BA and MA in Philosophy

The Philosophy Department offers a five-year program that leads to both the BA and MA in philosophy. For complete details on the program, please see the Philosophy Department website (https://www.colorado.edu/philosophy/undergraduate/concurrent-ba-ma-program/).

### Admissions Requirements

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.0 or higher.
- Not have any MAPS deficiencies (students admitted to CU Boulder prior to Summer 2023 only).
- Transfer students must have completed a minimum of 24 credit hours at CU Boulder with degree-seeking status.
- Have completed the prerequisite course requirements as described below.

**Prerequisite Course Requirements**
The applicant must have taken all of the following courses and received a grade of A- or better in each of them:

- PHIL 2440 (or either PHIL 4440 or PHIL 4460)
- PHIL 3000 (or PHIL 3010)
- PHIL 3100
- PHIL 3480

Additionally, the applicant must either have
taken PHIL 4300, PHIL 4340, PHIL 4360, PHIL 4400 or PHIL 4490, earning a grade of A- or better, or be enrolled in one of those courses during the semester in which the student applies for admission to the BAM program. In the latter case, admission to the BAM program will not be decided until the student's midterm grade for the 4000-level course in question has been furnished to the Graduate Admissions Committee; the midterm grade must be an A- or better.

**Application Process**
To apply to the BAM program, submit the online application. Additional application requirements:

- *Letters of recommendation*: Please ask each of your letter-writers to submit a letter of recommendation to the Philosophy Department's Associate Chair for Graduate Studies.
- *GRE* scores need not be submitted.
- *Deadlines*: A student can apply to this program no earlier than the second semester of their junior year. Fall applications must be received before October 25. Spring applications must be received by the Friday before Spring Break.
- *Commitment*: Students who are admitted to the BAM program may not pursue a double-degree or double-major of any other kind.
- *Minimum cumulative GPA*: All students enrolled in the BAM program must maintain a cumulative GPA of 3.0 throughout their time in the program. The time limit for the program is 5 years.

### Program Requirements
To complete the BAM program, the student will fulfill separately all requirements for the BA and thesis-based MA, with the exception that two 4000-level courses can satisfy requirements for both the BA and the MA. In addition to these two overlapping 4000-level courses, the student must complete *all of the remaining requirements* for the general track (http://www.colorado.edu/philosophy/sites/default/files/attached-files/major_reqs.pdf) of the philosophy major, as well as all of the remaining requirements for the thesis-based MA in Philosophy (http://www.colorado.edu/philosophy/graduate/ma-program/). Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

In order to make it possible for the student to finish both degrees in five years, during the fourth year the student will be required to take two graduate-level courses (5000-level or above), which will *not* count toward the student's BA requirements. One of these two courses will be a three-credit version of PHIL 5840, to be taken in the second semester of the student's fourth year. In this Independent Study, the student will work individually with their projected thesis advisor to identify a topic for the student's MA thesis and will do research on that topic. This ensures that the student will enter their fifth year having done a significant amount of work on the master's thesis project. During each semester of the student's fifth year, they will typically take two 5000-level courses and three credits of master's thesis hours. As indicated above, the two graduate-level courses taken during the student's fourth year will *not* satisfy requirements for the BA. Thus, the student must be in a position (perhaps as a result of having entered with AP credits or having taken summer courses at CU) to fit two demanding courses into the fourth-year schedule, in addition to whatever courses are needed to satisfy remaining BA requirements.

Note that beyond the required Independent Study course referred to above, no independent study courses can be used to fulfill MA course requirements for students in the BAM program.

During the second semester of the fifth year, the student must successfully defend their master's thesis in an oral examination before a committee consisting of the student's thesis advisor and two other regular faculty members.

# Philosophy - Minor

A minor is offered in philosophy. Declaration of a philosophy minor is open to any student enrolled at CU Boulder, regardless of college or school.

## Requirements

For the minor in philosophy, students must take 18 credit hours in philosophy (PHIL), earning 18 credit hours with a grade of C- or better and a 2.00 (C) average for all work attempted in philosophy. Of these 18 credit hours in philosophy, 9 must be upper-division with grades of C- or better. Students may apply toward a minor no more than 9 hours of transfer credits, no more than 6 hours of which may be upper-division.

**There are no distribution requirements for a minor in philosophy**: any six 3-credit-hour philosophy courses will do, so long as at least three are upper-division. However, for a well-rounded course of study, the Philosophy Department *recommends* the courses below.

### Recommended Courses

| Code | Title | Credit Hours |
|---|---|---|
| **Logic** | | |
| At least one course in Logic, such as: | | |
| PHIL 1440 | Critical Thinking | |
| PHIL 2440 | Symbolic Logic | |
| **History of Philosophy** | | |
| At least one course in the History of Philosophy, such as: | | |
| PHIL 1010 | Introduction to Western Philosophy: Ancient | |
| PHIL 1020 | Introduction to Western Philosophy: Modern | |
| PHIL 3000 | History of Ancient Philosophy | |
| PHIL 3010 | History of Modern Philosophy | |

| | |
|---|---|
| **Values** | |
| At least one course in Values, such as: | |
| PHIL 1100 | Ethics |
| PHIL 1200 | Contemporary Social Problems |
| PHIL 1250 | Poverty, Power, and Patriotism: Issues of Global Justice |
| PHIL 2270 | Philosophy and Race |
| PHIL 2290 | Philosophy and Gender |
| PHIL 3100 | Ethical Theory |
| PHIL 3200 | Social and Political Philosophy |
| **Metaphysics/Epistemology** | |
| At least one course in Metaphysics/Epistemology, such as: | |
| PHIL 1350 | Knowledge, Mind, and Reality |
| PHIL 1400 | Philosophy and the Sciences |
| PHIL 1600 | Philosophy and Religion |
| PHIL 3600 | Philosophy of Religion |
| PHIL 4370 | Free Will and Determinism |
| PHIL 4400 | Philosophy of Science |

## Plan(s) of Study

The philosophy minor is entirely elective, though students should pay attention to required and recommended prerequisites when selecting their classes.

# Physics

The curriculum offered by the Department of Physics provides knowledge of the physical concepts that are basic to the laws of nature and the ability to use these fundamental concepts to answer questions and solve real problems. Students also gain an understanding of the relationship of physics to other fields such as astronomy, biology, engineering, chemistry and medicine.

**Course code for this program is PHYS.**

## Areas of Study

Students can choose from one of three plans leading to the Bachelor of Arts degree. Plan 1 is designed primarily for students who plan to pursue graduate study in physics or go directly into professional employment. Plan 2 is intended for students who wish to combine a physics major with an interdisciplinary focus. Interdisciplinary focuses include applied mathematics, biotechnology, biophysics, chemical physics, environmental science, electronic devices, history, optics and philosophy of science, or premedicine. Plan 3 is a program designed specifically for those who wish to become secondary school teachers. It includes a teaching licensure in cooperation with the School of Education. A bachelor's-accelerated master's degree (BAM) is also available.

The Department of Physics also offers a Bachelor of Science degree in Engineering Physics (p. 989) through the College of Engineering and Applied Science.

*Note:* Students may not earn a bachelor's degree in physics from the College of Arts & Sciences as well as a bachelor's degree in engineering physics from the College of Engineering & Applied Science. Furthermore, the physics minor may not be earned with either of these two baccalaureate programs.

## Research Opportunities

Physics majors are strongly encouraged to work in a research laboratory. Such experience is especially useful in pursuing a career in science or engineering. Involvement in laboratory experimentation provides knowledge of modern electronic equipment and computerized instrumentation. As contributing members of a research group, students also get a real sense of the creative processes that are part of modern physics research.

## Career Opportunities

Physics provides an excellent background for a wide variety of careers, as well as preparation for admission to graduate school in physics and related fields. Design and development work in industrial firms, government and academic laboratories, and nonprofit research centers present opportunities to apply theory to specific problems. In such settings, physics graduates often work closely with engineers, complementing specific disciplines with a broader physics perspective. Graduates can also go on to careers in business, law, finance or medicine after appropriate graduate work.

## Bachelor's Degree

- Physics - Bachelor of Arts (BA) (p. 523)

## Minor

- Physics - Minor (p. 527)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Anderson, Dana Z. (https://experts.colorado.edu/display/fisid_102371/)
Professor; PhD, University of Arizona

Ashby, Neil
Professor Emeritus; PhD, Harvard University

Aumentado, Jose
Lecturer; PhD, Northwestern University

Baker, Daniel N. (https://experts.colorado.edu/display/fisid_103264/)
Distinguished Professor; PhD, University of Iowa

Bartlett, David
Professor Emeritus; PhD, Columbia University

Beale, Paul D. (https://experts.colorado.edu/display/fisid_101602/)
Professor; PhD, Cornell University

Becker, Andreas (https://experts.colorado.edu/display/fisid_146675/)
Distinguished Professor; Dr habil, Universite Laval (Canada)

Berry, Joseph (https://experts.colorado.edu/display/fisid_131839/)
Associate Professor; PhD, Pennsylvania State University

Betterton, Meredith D. (https://experts.colorado.edu/display/fisid_125396/)
Professor; PhD, Harvard University

Bohn, John (https://experts.colorado.edu/display/fisid_111716/)
Research Professor; PhD, University of Chicago

Bolton, Daniel Ryan (https://experts.colorado.edu/display/fisid_155168/)
Associate Teaching Professor; PhD, University of Washington

Calkins, Michael Andrew (https://experts.colorado.edu/display/fisid_149720/)
Associate Professor; PhD, University of California, Los Angeles

Cao, Gang (https://experts.colorado.edu/display/fisid_157991/)
Professor; PhD, Temple University

Cary, John R. (https://experts.colorado.edu/display/fisid_105901/)
Professor; PhD, University of California, Berkeley

Chou, Chin-Wen
Lecturer; PhD, California Insitutute of Technology

Clark, Noel A. (https://experts.colorado.edu/display/fisid_101947/)
Professor; PhD, Massachusetts Institute of Technology

Coddington, Jan
Lecturer; PhD, University of Colorado Boulder

Cooper, John
Professor Emeritus; PhD, University of London

Cornell, Eric (https://experts.colorado.edu/display/fisid_100112/)
Professor Adjoint; PhD, Massachusetts Institute of Technology

Cumalat, John P. (https://experts.colorado.edu/display/fisid_105582/)
Professor; PhD, University of California, Santa Barbara

De Alwis, Senarath P. (https://experts.colorado.edu/display/fisid_103029/)
Professor Emeritus; PhD, University of Cambridge (England)

Deca, Jan (https://experts.colorado.edu/display/fisid_155664/)
Lecturer; PhD, KU Leuven (Belgium)

Degrand, Thomas A. (https://experts.colorado.edu/display/fisid_102740/)
Professor; PhD, Massachusetts Institute of Technology

Dennis, Tasshi
Lecturer; PhD, Rice University

Dessau, Daniel S. (https://experts.colorado.edu/display/fisid_107532/)
Professor; PhD, Stanford University

DeWolfe, Oliver M. (https://experts.colorado.edu/display/fisid_142992/)
Professor; PhD, Massachusetts Institute of Technology

Diddams, Scott A. (https://experts.colorado.edu/display/fisid_148274/)
Professor; PhD, University of New Mexico

Dincao, Jose Paulo (https://experts.colorado.edu/display/fisid_143731/)
Assistant Research Professor; PhD, Univ of Sao Paulo (Brazil)

Donley, Elizabeth
Lecturer; PhD, Swiss Federal Institute of Technology

Dreitlein, Joseph
Professor Emeritus; PhD, Washington University

Dubson, Michael A. (https://experts.colorado.edu/display/fisid_102266/)
Teaching Professor of Distinction, Associate Chair; PhD, Cornell University

Figueroa, Nuris (https://experts.colorado.edu/display/fisid_167396/)
Assistant Professor; PhD, Sorbonne University (France)

Finkelstein, Noah D. (https://experts.colorado.edu/display/fisid_129919/)
Professor; PhD, Princeton University

Ford, William T. (https://experts.colorado.edu/display/fisid_102175/)
Professor Emeritus; PhD, Princeton University

Franklin, Allan D. (https://experts.colorado.edu/display/fisid_100660/)
Professor Emeritus; PhD, Cornell University

Gallagher, Michael (https://experts.colorado.edu/display/fisid_151214/)
Lecturer; PhD, University of Colorado

Gao, Xun (https://experts.colorado.edu/display/fisid_174294/)
Assistant Professor; PhD, Tsinghua University (China)

Glancy, Scott
Lecturer; PhD, University of Notre Dame

Glaser, Matthew A.
Professor Attendant Rank; PhD, University of Colorado Boulder

Goldman, Martin V. (https://experts.colorado.edu/display/fisid_100567/)
Professor Emeritus; PhD, Harvard University

Gopinath, Juliet T. (https://experts.colorado.edu/display/fisid_147075/)
Professor; PhD, Massachusetts Institute of Technology

Gorokhovsky, Vladimir
Lecturer; PhD, Russian Academy of Sciences

Gurarie, Victor Vladimir (https://experts.colorado.edu/display/fisid_129918/)
Professor; PhD, Princeton University

Gyenis, Andras (https://experts.colorado.edu/display/fisid_167223/)
Assistant Professor; PhD, Princeton University

Hall, John L. (https://experts.colorado.edu/display/fisid_103891/)
Professor Adjoint; PhD, Carnegie Institute of Technology

Halverson, Nils W. (https://experts.colorado.edu/display/fisid_134252/)
Professor; PhD, California Institute of Technology

Hamilton, Andrew J.S. (https://experts.colorado.edu/display/fisid_101517/)
Professor; PhD, University of Virginia

Hasenfratz, Anna (https://experts.colorado.edu/display/fisid_102393/)
Professor; PhD, Lorand Eotvos University, Budapest (Hungary)

Hermann, Allen M.
Professor Emeritus; PhD, Texas AM University

Hermele, Michael Aaron (https://experts.colorado.edu/display/fisid_143370/)
Professor; PhD, University of California, Santa Barbara

Hodby, Eleanor R. (https://experts.colorado.edu/display/fisid_128058/)
Senior Instructor, Faculty Fellow, Associate Teaching Professor; PhD, Oxford University

Holland, Murray John (https://experts.colorado.edu/display/fisid_105126/)
Professor; PhD, Oxford University (England)

Horanyi, Mihaly (https://experts.colorado.edu/display/fisid_102420/)
Professor; PhD, Eötvös Loránd University (Hungary)

Hough, Loren Evan (https://experts.colorado.edu/display/fisid_144904/)
Associate Professor; PhD, University of Colorado Boulder

Hume, David
Lecturer; PhD, University of Colorado Boulder

Hussein, Mahmoud I. (https://experts.colorado.edu/display/fisid_144300/)
Professor; PhD, University of Michigan Ann Arbor

Kapteyn, Henry C. (https://experts.colorado.edu/display/fisid_115334/)
Professor; PhD, University of California, Berkeley

Kaufman, Adam Micah (https://experts.colorado.edu/display/fisid_159513/)
Associate Professor Adjoint; PhD, University of Colorado Boulder

Kempf, Sascha (https://experts.colorado.edu/display/fisid_149628/)
Associate Professor; Dr habil, Technische Universität Braunschweig (Germany)

Kinney, Edward R. (https://experts.colorado.edu/display/fisid_101717/)
Professor; PhD, Massachusetts Institute of Technology

Kitching, John
Lecturer; PhD, California Institute of Techology

Knill, Emanuel
Lecturer; PhD, University of Colorado Boulder

Kunz, P. Dale
Professor Emeritus; PhD, University of Washington

Lee, Minhyea (https://experts.colorado.edu/display/fisid_145209/)
Associate Professor; PhD, University of Chicago

Lehnert, Konrad W. (https://experts.colorado.edu/display/fisid_139785/)
Professor Adjoint; PhD, University of California at Santa Barbara

Leibfried, Dietrich
Lecturer; PhD, Max-Planck Institute for Quantum Optics (Germany)

Levine, Judah (https://experts.colorado.edu/display/fisid_100654/)
Professor Adjoint; PhD, New York University

Lewandowski, Heather Jean (https://experts.colorado.edu/display/fisid_111815/)
Professor, Associate Chair; PhD, University of Colorado Boulder

Litos, Michael (https://experts.colorado.edu/display/fisid_158137/)
Assistant Professor; PhD, Boston University

Lucas, Andrew James (https://experts.colorado.edu/display/fisid_164180/)
Assistant Professor; PhD, Harvard University

Ludlow, Andrew
Lecturer; PhD, University of Colorado Boulder

MacLennan, Joseph E. (https://experts.colorado.edu/display/fisid_104854/)
Professor Attendant Rank, Lecturer; PhD, University of Colorado Boulder

Marino, Alysia Diane (https://experts.colorado.edu/display/fisid_146427/)
Professor; PhD, University of California, Berkeley

Mascarenhas, Angelo
Lecturer; PhD, University of Pittsburgh

McGehee, Michael D. (https://experts.colorado.edu/display/fisid_163453/)
Professor; PhD, University of California, Santa Barbara

Miller, Stanley
Professor Emeritus; PhD, University of California, Berkeley

Munsat, Tobin Leo (https://experts.colorado.edu/display/fisid_134251/)
Professor, Chair; PhD, Princeton University

Murnane, Margaret (https://experts.colorado.edu/display/fisid_115333/)
Distinguished Professor; PhD, University of California, Berkeley

Nagle, James L. (https://experts.colorado.edu/display/fisid_126784/)
Professor; PhD, Yale University

Nam, SaeWoo
Lecturer; PhD, Stanford University

Nandkishore, Rahul Mahajan (https://experts.colorado.edu/display/fisid_156417/)
Associate Professor; PhD, Massachusetts Institute of Technology

Neil, Ethan (https://experts.colorado.edu/display/fisid_153411/)
Associate Professor; PhD, Yale University

Nesbitt, David J. (https://experts.colorado.edu/display/fisid_100333/)
Professor Adjoint; PhD, University of Colorado

Newbury, Nathan
Lecturer; PhD, Princeton University

Papp, Scott
Lecturer; PhD, University of Colorado Boulder

Parker, Scott E. (https://experts.colorado.edu/display/fisid_109685/)
Professor; PhD, University of California, Berkeley

Peleg, Orit (https://experts.colorado.edu/display/fisid_159998/)
Associate Professor; PhD, ETH Zürich (Switzerland)

Pereira Da Costa, Hugo
Lecturer; PhD, Service de Physique Nucleaire du CEA (France)

Perepelitsa, Dennis V. (https://experts.colorado.edu/display/fisid_158294/)
Associate Professor; PhD, Columbia University in the City of New York

Perkins, Katherine K. (https://experts.colorado.edu/display/fisid_124217/)
Professor Attendant Rank; PhD, Harvard University

Perkins, Thomas T. (https://experts.colorado.edu/display/fisid_124578/)
Professor Adjunct; PhD, Stanford University

Peterson, R. Jerome
Professor Emeritus; PhD, University of Washington

Piestun, Rafael (https://experts.colorado.edu/display/fisid_118538/)
Professor; PhD, Israel Instit of Tech (Israel)

Pollock, Steven J. (https://experts.colorado.edu/display/fisid_101392/)
Professor; PhD, Stanford University

Price, John C. (https://experts.colorado.edu/display/fisid_101129/)
Professor Emeritus; PhD, Stanford University

Radzihovsky, Leo (https://experts.colorado.edu/display/fisid_107484/)
Professor; PhD, Harvard University

Rankin, Patricia (https://experts.colorado.edu/display/fisid_105939/)
Professor Emerita; PhD, University of London (England)

Raschke, Markus B. (https://experts.colorado.edu/display/fisid_148716/)
Professor; PhD, Technische Universität München (Germany)

Regal, Cindy Anne (https://experts.colorado.edu/display/fisid_144184/)
Professor; PhD, University of Colorado Boulder

Rey, Ana Maria (https://experts.colorado.edu/display/fisid_146407/)
Professor Adjoint; PhD, University of Maryland College Park Campus

Reznik, Dmitry (https://experts.colorado.edu/display/fisid_147659/)
Professor; PhD, University of Illinois at Urbana–Champaign

Ritzwoller, Michael H. (https://experts.colorado.edu/display/fisid_102264/)
Professor; PhD, University of California, San Diego

Robertson, Scott H.
Professor Emeritus; PhD, Cornell University

Rogers, Charles (https://experts.colorado.edu/display/fisid_101331/)
Professor; PhD, Cornell University

Romatschke, Paul (https://experts.colorado.edu/display/fisid_149870/)
Professor; PhD, Technical Univ of Vienna (Austria)

Schibli, Thomas Richard (https://experts.colorado.edu/display/fisid_143464/)
Professor; PhD, Univ of Karlsruhe (Germany)

Shaheen, Sean Eric (https://experts.colorado.edu/display/fisid_153664/)
Professor; PhD, University of Arizona

Shalm, Lynden Krister (https://experts.colorado.edu/display/fisid_152367/)
Lecturer; PhD, University of Toronto

Shepard, James R.
Professor Emeritus; PhD, University of Colorado Boulder

Shi, Yuan (https://experts.colorado.edu/display/fisid_172193/)
Assistant Professor; PhD, Princeton University

Simmonds, Raymond
Lecturer; PhD, University of California, Berkeley

Slichter, Daniel
Lecturer; PhD, University of California, Berkeley

Smalyukh, Ivan (https://experts.colorado.edu/display/fisid_144757/)
Professor; PhD, Kent State University

Stenson, Kevin M. (https://experts.colorado.edu/display/fisid_128676/)
Professor, Associate Chair; PhD, University of Wisconsin–Madison

Sun, Shuo (https://experts.colorado.edu/display/fisid_165715/)
Assistant Professor; PhD, University of Maryland College Park Campus

Taylor, John
Professor Emeritus; PhD, University of California, Berkeley

Teufel, John D.
Lecturer; PhD, Yale University

Thompson, James Karl (https://experts.colorado.edu/display/fisid_144585/)
Professor Adjoint; PhD, Massachusetts Institute of Technology

Toney, Michael (https://experts.colorado.edu/individual/fisid_167235/)
Professor; PhD, University of Washington

Ullom, Joel
Lecturer; PhD, Harvard University

Ulmer, Keith A. (https://experts.colorado.edu/display/fisid_144871/)
Associate Professor; PhD, University of Colorado Boulder

Uzdensky, Dmitri Anatoljevich (https://experts.colorado.edu/display/fisid_147430/)
Professor; PhD, Princeton University

Van Schilfgaarde, Mark
Lecturer; PhD, Stanford University

Wagner, Stephen R. (https://experts.colorado.edu/display/fisid_139773/)
Professor Attendant Rank; PhD, Johns Hopkins University

Wang, Xu (https://experts.colorado.edu/display/fisid_141619/)
Lecturer; PhD, University of Wisconsin-Madison

Washburn, Brian R.
Lecturer; PhD, Georgia Institute of Technology

West, Colin G. (https://experts.colorado.edu/display/fisid_163336/)
Associate Teaching Professor; PhD, Stony Brook University

Wilcox, Bethany R. (https://experts.colorado.edu/display/fisid_156075/)
Assistant Professor; PhD, University of Colorado Boulder

Wilkerson, Donald (https://experts.colorado.edu/display/fisid_104406/)
Associate Teaching Professor; MA, University of Colorado Boulder

Wilson, Andrew
Lecturer; PhD, University of Otago (New Zealand)

Wineland, David J. (https://experts.colorado.edu/display/fisid_119931/)
Professor Adjoint; PhD, Harvard University

Ye, Jun (https://experts.colorado.edu/display/fisid_106154/)
Professor Adjoint; PhD, University of Colorado Boulder

Zabow, Gary
Lecturer; PhD, Harvard University

Zhong, Shijie (https://experts.colorado.edu/display/fisid_118396/)
Professor; PhD, University of Michigan Ann Arbor

Zimmerman, Eric (https://experts.colorado.edu/display/fisid_122809/)
Professor; PhD, University of Chicago

# Courses

**PHYS 1000 (3) Preparatory Physics**
Introduces basic physics, emphasizing an analytical approach to prepare for PHYS 1110 and PHYS 1120, the engineering majors sequence. Does not satisfy any MAPS deficiency in either the sciences or math. Department enforced prerequisite: 1 year high school algebra.
**Additional Information:** Arts Sci Core Curr: MAPS Course

**PHYS 1010 (3) Physics of Everyday Life 1**
Intended primarily for nonscientists, this course covers physics encountered in everyday life. Topics include balls, scales, balloons, stoves, insulation, light bulbs, clocks, nuclear weapons, basics of flashlights, and microwave ovens. Department enforced prereq., high school algebra or equivalent. This course should not be taken if the student has a MAPS deficiency in math.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Quantitative Reasoning Math
MAPS Course: Chemistry
MAPS Course: Physics

**PHYS 1110 (4) General Physics 1**
First semester of three-semester sequence for science and engineering students. Covers kinematics, dynamics, momentum of particles and rigid bodies, work and energy, gravitation, and simple harmonic motion.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 1115
**Requisites:** Requires prerequisite course of GEEN 3830 (minimum grade C-) or prerequisite or corequisite course of APPM 1345 or APPM 1350 or MATH 1300 or MATH 1310 (minimum grade C-).
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 1115 (4) General Physics 1 for Majors**
First semester of three semester sequence for physics, engineering physics and astronomy majors. Covers kinematics, dynamics momentum of particles and rigid bodies, work and energy, gravitation, and simple harmonic motion.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 1110
**Requisites:** Requires prerequisite course of GEEN 3830 or prerequisite or corequisite course of APPM 1345 or APPM 1350 or MATH 1300 or MATH 1310 (minimum grade C-). Restricted to Physics (PHYS-BA) or Engineering Physics (EPEN-BS) or Astronomy (ASTR-BA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 1120 (4) General Physics 2**
Three lect., one rec. per week, plus three evening exams in the fall and spring semesters. Second semester of three-semester introductory sequence for science and engineering students. Covers electricity and magnetism, wave motion and optics. Normally is taken concurrently with PHYS 1140.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 1125
**Requisites:** Requires prerequsite courses of PHYS 1110 or PHYS 1115 and a prerequisite or corequisite course of APPM 1360 or MATH 2300 (all minimum grade of C-).
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 1125 (4) General Physics 2 for Majors**
Three lect., one rec per week, plus three evening exams in the fall and spring semesters. Second semester of three semester introductory sequence for physics, engineering and astronomy majors. Covers electricity and magnetism, wave motion and optics. Normally is taken concurrently with PHYS 1140.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 1120
**Requisites:** Requires a prerequisite course of PHYS 1110 or PHYS 1115. Requires a prerequisite or corequisite course of APPM 1360 or MATH 2300 (all minimum grade C-). Restricted to Physics (BA), Engineering Physics (BS) and Astronomy (BA) students only.
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 1140 (1) Experimental Physics 1**
Introduces experimental physics through laboratory observation of a wide range of phenomena. Covers experiments on physical measurements, including mechanics, electricity & magnetism, and optics, with the mathematical analysis of physical errors associated with the experimental process.
**Requisites:** Requires a prerequisite or corequisite course of PHYS 1120 or PHYS 1125 (minimum grade C-).
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 1230 (3) Light and Color for Nonscientists**
Discusses light, color, vision, and perception. Covers reflection, refraction, lenses, and applications to photography and other methods of light sensing. Other topics include lasers and holography. Course is geared toward nonscience majors. Department enforced prereq., high school algebra or equivalent. Should not be taken by students with a math MAPS deficiency.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Chemistry
MAPS Course: Natural Science
MAPS Course: Physics

**PHYS 1240 (3) Sound and Music**
Explores the physical processes that underlie the diversity of sound and musical phenomena. Topics covered include the physical nature of sound, the perception of sound, the perception of pitch and harmony, musical instruments, synthesizers and samplers, and room acoustics. Geared toward nonscience majors. Department enforced prereq., high school algebra or equivalent. Should not be taken by students with a math MAPS deficiency.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Chemistry
MAPS Course: Natural Science
MAPS Course: Physics

**PHYS 1400 (1) Fundamentals of Scientific Inquiry**
Engages students in discussions and experimentation to uncover the aspects of physics that won't be found in a textbook, centered around how to do scientific research and be a part of the greater scientific community. Topics include model-building, metacognition, failure in science, and presentation skills. Students will have the opportunity to interact with real scientists through panels, lab tours, and direct mentorship as they engage in a hands-on group research project culminating in a poster presentation session. Geared toward first-year and transfer physics and engineering physics students. Does not count toward the PHYS-BA major requirements. For more information, please visit: http://www.cuprime.org/class.

**PHYS 1580 (3) Energy and Interactions**
Engages non-physics majors in hands-on, minds-on activities and labs to investigate the physical world, the nature of science, and how science knowledge is constructed. This introductory course is especially relevant for future elementary and middle school teachers although it will meet the needs of most non-physics and non-science majors. Physical content focuses on interactions and energy.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 1580
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Chemistry
MAPS Course: Natural Science
MAPS Course: Physics

**PHYS 2010 (5) General Physics 1**
Includes three lectures, one two-hour laboratory/recitation per week, plus three evening exams in the fall and spring semesters. Covers mechanics, heat and sound. Thorough presentation of fundamental facts and principles of physics using algebra and trigonometry. Designed for life science majors, including premed students. Natural science majors with a knowledge of calculus and others taking calculus are urged to take the calculus-based courses PHYS 1110, PHYS 1120, PHYS 1140 and PHYS 2130, rather than PHYS 2010 and PHYS 2020. Department enforced prerequisites: ability to use high school algebra and trigonometry.
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**PHYS 2020 (5) General Physics 2**
Includes three lectures, one two-hour laboratory/recitation per week, plus three evening exams in the fall and spring semesters. Covers electricity and magnetism, light and modern physics. Designed for life science majors, including premed students. Natural science majors with a knowledge of calculus and others taking calculus are urged to take the calculus-based courses PHYS 1110, PHYS 1120, PHYS 1140 and PHYS 2130, rather than PHYS 2010 and PHYS 2020.
**Requisites:** Requires a prerequisite course of PHYS 1110 or PHYS 2010 (minimum grade C-).
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 2130 (3) Introduction to Quantum Mechanics and Its Applications**
Learn about a leading edge of physics and engineering along with its applications to much of modern technology. Topics include quantum theory, atomic physics, solid state and nuclear physics. Applications discussed may include special relatively, lasers, diodes/transistors, nuclear energy, quantum computing and encryption. Third semester of introductory sequence for science and engineering students. Physics majors should take PHYS 2170 instead of this course. May be taken concurrently with PHYS 2150.
**Requisites:** Requires a prerequisite course of PHYS 1120 or PHYS 1125, and a prerequisite or corequisite course of MATH 2400 or APPM 2350 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 2150 (1) Experimental Physics 2**
One lect., one 2-hour lab per week. Includes many experiments of modern physics, including atomic physics, solid state physics, electron diffraction, radioactivity and quantum effects. Normally taken concurrently with PHYS 2130 or PHYS 2170, this course may be taken after PHYS 2130 or PHYS 2170.
**Requisites:** Requires a prerequisite course of PHYS 1140 and a prerequisite or corequisite course of PHYS 2130 or PHYS 2170 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 2170 (3) Foundations of Modern Physics**
Covers special relativity, quantum mechanics and atomic structure. Completes the three-semester sequence of general physics for physics and engineering physics majors. Normally taken with the laboratory PHYS 2150.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 2130
**Requisites:** Requires a prerequisite course of PHYS 1120 or PHYS 1125, and a prerequisite or corequisite course of MATH 2400 or APPM 2350 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 2210 (3) Classical Mechanics and Mathematical Methods 1**
Theoretical Newtonian mechanics, including position and velocity dependent forces, oscillation, stability, non-inertial frames and gravitation from extended bodies. Ordinary differential equations, vector algebra, curvilinear coordinates, complex numbers, and Fourier series will be introduced in the context of the mechanics.
**Requisites:** Requires a prerequisite course of PHYS 2130 or PHYS 2170 and a prerequisite or corequisite course of APPM 2350 or MATH 2400 and a prerequisite or corequisite course of APPM 2360 or MATH 3430 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 2600 (3) Introduction to Programming and Scientific Computing**
Covers basic concepts in programming and scientific computing, including numerical integration and simulation of physical systems. Students will learn the programming language Python and associated graphics libraries. Programming examples will be drawn from classical physical systems that can only be solved numerically, such as projectile motion with drag and N-body problems.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 2600
**Requisites:** Requires prerequisite course of PHYS 1120 (minimum grade C-). Requires prerequisite or corequisite course of PHYS 2170 or PHYS 2130 (minimum grade C-).

**PHYS 2840 (1-3) Independent Study**
Selected topics for undergraduate independent study. Subject matter to be arranged.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**PHYS 3000 (3) Science and Public Policy**
For nonscience majors. Reading, discussions, debates and lectures are used to study how science affects society economically, intellectually, and in terms of health and national security. Another focus is how government fosters and funds scientific activities. Department enforced prerequisite: completion of core science requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** ARSC 3200

**PHYS 3050 (3) Writing in Physics: Problem-Solving and Rhetoric**
Teaches strategies used in scientific writing with an emphasis on argument, reviews and reinforces essential writing skills, provides experience in writing both academic and professional communications in a style appropriate to the literature of physics. Department enforced prerequisite: lower-division core writing requirement. Does not count toward the PHYS-BA major requirements or major GPA.
**Requisites:** Requires a prerequisite course of PHYS 2130 or PHYS 2170 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**PHYS 3070 (3) Energy and the Environment**
Contemporary issues in energy consumption and its environmental impact, including fossil fuel use and depletion; nuclear energy and waste disposal; solar, wind, hydroelectric, and other renewable sources; home heating; energy storage; fuel cells; and alternative transportation vehicles. Included are some basic physical concepts and principles that often constrain choices. No background in physics is required.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3070
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 3090 (3) Introduction to Quantum Computing**
Covers the basics of quantum computation, including the basics of quantum information; axioms of quantum mechanics; quantum circuits and universality; the relationship between quantum and classical complexity classes; simple quantum algorithms such as the quantum Fourier transform; Shor factoring algorithm; Grover search algorithm; physical implementation of quantum computation; error correction and fault tolerance.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3090 and ECEN 3090
**Requisites:** Requires prerequisite course of APPM 2360 or APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135 (minimum grade C-).

**PHYS 3210 (3) Classical Mechanics and Mathematical Methods 2**
Lagrangian and Hamiltonian treatment of theoretical mechanics, including coupled oscillations, waves in continuous media, central force motion, rigid body motion and fluid dynamics. The calculus of variations, linear algebra, tensor algebra, vector calculus, and partial differential equations will be introduced in the context of the mechanics.
**Requisites:** Requires a prerequisite course of PHYS 2210 and a prerequisite course of APPM 2350 or MATH 2400 and a prerequisite course of MATH 3430 or APPM 2360 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 3220 (3) Quantum Mechanics 1**
Introduces quantum mechanics with wave, operator and matrix computational techniques. Investigates solutions for harmonic oscillator, potential well and systems with angular momentum. Develops a quantitative description of one-electron atoms in lowest order.
**Requisites:** Requires a prerequisite course of PHYS 3210 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 3221 (1) Tutorial Practicum for Quantum Mechanics 1**
Uses interactive group work to aid student learning in corequisite course PHYS 3220. In this tutorial, students will work in small groups to practice how to solve challenging problems and their underlying conceptual basis, as well as using hands-on activities, demonstrations, and other techniques to help learn content.
**Requisites:** Requires a corequisite course of PHYS 3220.

**PHYS 3310 (3) Principles of Electricity and Magnetism 1**
Covers mathematical theory of electricity and magnetism, including electrostatics, magnetostatics, and polarized media, and provides an introduction to electromagnetic fields, waves, and special relativity.
**Requisites:** Requires a prerequisite course of PHYS 2210 and a prerequisite course of APPM 2350 or MATH 2400 and a prerequisite course of MATH 3430 or APPM 2360 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 3311 (1) Tutorial Practicum for Electricity & Magnetism 1**
Uses interactive group work to aid student learning in corequisite course PHYS 3310. In this tutorial, students will work in small groups to practice how to solve challenging problems and their underlying conceptual basis, as well as using hands-on activities, demonstrations, and other techniques to help learn content.
**Requisites:** Requires a corequisite course of PHYS 3310.

**PHYS 3320 (3) Principles of Electricity and Magnetism 2**
Continuation of PHYS 3310. Electromagnetic induction; magnetic energy; microscopic theory of magnetic properties; Ac circuits; Maxwell's Equations; planewaves; waveguides and transmission lines; radiation from electric and magnetic dipoles and from an accelerated charge.
**Requisites:** Requires a prerequisite course of PHYS 3310 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 3330 (2) Electronics for the Physical Sciences**
Introduces laboratory electronics for physical science students. Includes basic electronic instruments, dc bridge circuits, operational amplifiers, bipolar transistors, field-effect transistors, photodiodes, noise in electronic circuits, digital logic and microcontrollers. Students gain hands-on experience in designing, building and debugging circuits. Two lectures and one three hour laboratory per week. Concludes with a three-week project in which students design and build an experiment of their choice and present a seminar on the results.
**Requisites:** Requires prerequisite courses of PHYS 2150 and PHYS 2130 or PHYS 2170 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4130 (3) Biological Electron Microscopy: Principles and Recent Advances**
Covers basic mechanisms for imaging and recent advances used in current biological research, elements of electron optics, image optimization, resolution, radiation damage, various imaging modes (TEM, HVEM, Sem, Stem, Stm), specimen quantitation and reconstruction (stereo and 3-D), microanalysis and electron diffraction. Specimen preparation treated only incidentally.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5130
**Requisites:** Requires a prerequisite course of EBIO 1220 or MCDB 1150 or MCDB 4550 or MCDB 5550 or PHYS 1120 or PHYS 2020 (minimum grade D-).

**PHYS 4150 (3) Plasma Physics**
Discusses the fundamentals of plasma physics, including particle motion in electromagnetic fields, wave propagation, collisions, diffusion, and resistivity. Presents examples from space plasmas, astrophysical plasmas, laboratory fusion plasmas, and plasmas in accelerators.
**Requisites:** Requires a prerequsite course of PHYS 3310 and a prerequisite or corequisite course of PHYS 3320 (all minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4230 (3) Thermodynamics and Statistical Mechanics**
Statistical mechanics applied to macroscopic physical systems; statistical thermodynamics, classical thermodynamics systems; applications to simple systems. Examines relationship of statistical to thermodynamic points of view.
**Requisites:** Requires a prerequisite course of PHYS 2210 and a prerequisite or corequisite course of PHYS 3220 (all minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4340 (3) Introduction to Solid State Physics**
Discusses crystal structure, lattice dynamics, band theory, semiconductors and ferromagnetism.
**Requisites:** Requires a prerequsite course of PHYS 3220 (minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4410 (3) Quantum Mechanics 2**
Extends quantum mechanics to include perturbation theory and its applications to atomic fine structure, multi-particle systems, interactions with external forces, the periodic table and dynamical processes including electromagnetic transition rates.
**Requisites:** Requires prerequisite courses of PHYS 3220 and PHYS 3310 (all minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4420 (3) Nuclear and Particle Physics**
Introduces structure of the atomic nucleus, spectroscopy of subnuclear particles, scattering, reactions, radioactive decay, fundamental interactions of quarks and leptons.
**Requisites:** Requires prerequsite courses of PHYS 3320 and PHYS 4410 (all minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4430 (3) Advanced Laboratory**
Two lectures, one lab per week. Experiments introduce students to realities of the experimental physics so they gain a better understanding of theory and an appreciation of the vast amount of experimental work done in the physical sciences today.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5430
**Requisites:** Requires a prerequsite course of PHYS 3330 (minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4450 (3) History and Philosophy of Physics**
Discusses the epistemic question of what characterizes good physics research as well as the metaphysical question of what our best physics research tells us about the world. Topics may include case studies of physics experiments, theory choice, and scientific methodology in physics, as well as foundational metaphysical questions in statistical mechanics, quantum mechanics, special and general relativity, chance and probability, and the laws of nature.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5450 and PHIL 4450 and PHYS 5450
**Requisites:** Requires a prerequisite course of PHYS 1020 or PHYS 1120 or PHYS 1125 or PHYS 2020 (minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4460 (3) Teaching and Learning Physics**
Learn how people understand key concepts in physics. Through examination of physics content, pedagogy and problems, through teaching, and through research in physics education, students will explore the meaning and means of teaching physics. Students will gain a deeper understanding of how education research is done and how people learn. Useful for all students, especially for those in interested in physics, teaching and education research.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5460 and EDUC 4460 and EDUC 5460
**Requisites:** Requires prerequisite courses of PHYS 3210 and PHYS 3310 (all minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4510 (3) Optics**
Basic electromagnetic theory of light, using Maxwell's equations. Examples in geometrical optics; extensive applications in physical optics including diffraction and polarization. Spectra, including Zeeman effect and fluorescence. Recent advances in experimental techniques: microwaves, lasers, image converters.
**Requisites:** Requires a prerequisite course of PHYS 3320 (minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4550 (3) Cells, Molecules and Tissues: A Biophysical Approach**
Focuses on the biophysics governing the structure/function of enzymes, cells, extracellular matrix and tissue. Synthesizes ideas from molecular biology, physics, and biochemistry, emphasizing how low Reynolds number physics, not Newtonian physics, is relevant to life inside a cell. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5550 and MCDB 4550 and PHYS 5550
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 and PHYS 2010 and PHYS 2020 and CHEM 1133 or MATH 1300 and/or CHEM 3311 (minimum grade C-) or instructor consent required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4560 (3) Introduction to Biophysics**
Covers an introduction to the physics of living systems. Focuses on how living systems are able to generate order, with both physical principles and biological examples. Covers the development of quantitative models for biological systems, including estimates. Taught from a physics perspective, with biology background introduced as needed.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5560 and MCDB 4560 and MCDB 5560
**Requisites:** Requires a prerequisites course of PHYS 2210 (minimum grade C-).
**Recommended:** Prerequisite PHYS 4230.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4610 (2) Physics Honors**
Students are matched with a faculty member and work independently on a research topic. Typically, the honors program lasts three semesters. A senior thesis and an oral presentation of the work are required. See also PHYS 4620 and PHYS 4630. Department enforced prerequisite: mininimum 3.00 GPA. Registration by special arrangement with the Department of Physics.
**Additional Information:** Arts Sciences Honors Course

**PHYS 4620 (2) Physics Honors**
Students are matched with a faculty member and work independently on a research topic. Typically, the honors program lasts three semesters. A senior thesis and an oral presentation of the work are required. See also PHYS 4610 and PHYS 4630. Department enforced prerequisite: mininimum 3.00 GPA. Registration by special arrangement with the Department of Physics.
**Additional Information:** Arts Sciences Honors Course

**PHYS 4630 (2) Physics Honors**
Students are matched with a faculty member and work independently on a research topic. Typically, the honors program lasts three semesters. A senior thesis and an oral presentation of the work are required. See also PHYS 4610 and PHYS 4620. Department enforced prerequisite: mininimum 3.00 GPA. Registration by special arrangement with the Department of Physics.
**Additional Information:** Arts Sciences Honors Course

**PHYS 4700 (3) Quantum Forge I**
Provides junior- and senior-level engineering and physical science students an opportunity to gain professional and technical quantum science skills and experience through participation in real-world projects in collaboration with industry leaders and academic investigators. Alongside project activity, students will engage in skill- and concept-focused modules to ensure proficiency in the skills necessary to participate in the quantum workforce. This capstone experience is intended for students who do not intend to continue on to graduate study in physics or engineering, but rather to enter the workforce directly.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4700
**Requisites:** Requires prerequisite course of PHYS 3330 (minimum grade C-).
**Recommended:** Prerequisite or corequisite PHYS 4410.

**PHYS 4710 (3) Quantum Forge II**
Continuation of PHYS 4700, Quantum Forge I. The Quantum Forge provides junior- and senior-level engineering and physical science students an opportunity to gain professional and technical quantum science skills and experience through participation in real-world projects in collaboration with industry leaders and academic investigators. In the second semester, students will expand upon the knowledge and skills gained through the first-semester to bring projects to a point of completion and readiness for deployment in the industry context. As with Quantum Forge I, this capstone experience is intended for students who do not intend to continue on to graduate study in physics or engineering, but rather to enter the workforce directly.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4710
**Requisites:** Requires prerequisite course of PHYS 4700 or MCEN 4700 (minimum grade C-).

**PHYS 4810 (1-3) Special Topics in Physics**
Various topics not normally covered in the curriculum. Offered intermittently depending on student demand and availability of instructors.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4840 (1-3) Independent Study**
Selected topics for undergraduate independent study. Subject matter to be arranged. See also PHYS 4850.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**PHYS 4850 (1-3) Independent Study**
Selected topics for undergraduate independent study. Subject matter to be arranged. See also PHYS 4840.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**PHYS 4970 (3) Seminar on Physical Methods in Biology**
Covers basic mechanisms and applications of physical methods used in current biological research, microprobe analysis, Eels, elementary electron and x-ray crystallography, biomedical imaging (NMR, MRI, Pet, Cat), Fourier analysis, synchrotron radiation, Exafs, neutron scattering and novel ultramicroscopy techniques. Includes lectures, student presentations, occasional demonstrations. Emphasis depends on student interest.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5970
**Requisites:** Requires a prerequisite course of PHYS 1120 or PHYS 2020 and MCDB 1150 or EBIO 1220 (all minimum grade D-).

# Physics - Bachelor of Arts (BA)

The undergraduate degree in physics emphasizes knowledge and awareness of:

- The basic subfields of physics (classical mechanics, electricity and magnetism, quantum mechanics, statistical mechanics and thermodynamics), as well as at least one specialty area of application (e.g., solid state physics or optics);
- The major principles of physics, their historical development and the roles they play in the various subfields of physics;
- The interrelations between theory and observation, the role of systematic and random experimental errors and methods used to analyze experimental uncertainty and compare experiment with theory;
- Physical phenomena and experience in the use of basic experimental apparatus and measuring instruments;
- Mathematics sufficient to facilitate the acquisition and application of physical principles; and
- The importance of physics in other fields such as chemistry, biology, engineering, medicine and in society at large.

In addition, students completing the degree in physics are expected to acquire the ability and skills to:

- Apply physical principles to new situations;
- Construct and assemble experimental apparatus, conduct and analyze measurements of physical phenomena, analyze experimental uncertainty and make meaningful comparisons between experiment and theory; and
- Communicate results of scientific inquiries verbally and in writing.

# Plans of Study

Three different plans are available to students in physics. Because there is some flexibility within each plan, the department encourages students to pursue their own interests in setting up their curriculum. The final responsibility for fulfilling the requirements for the degree rests with the student.

*Note:* Students may not earn a bachelor's degree in physics from the College of Arts & Sciences as well as a bachelor's degree in engineering physics from the College of Engineering & Applied Science. Furthermore, the physics minor may not be earned with either of these two baccalaureate programs.

## Plan I

This plan is primarily for students planning graduate work in physics.

## Plan II

This plan is for students desiring an interdisciplinary physics program.

The interdisciplinary program includes a combination of a physics major with a focus in another area such as astrophysics, atmospheric sciences, applied mathematics, biophysics, biotechnology, chemical physics, computer science, electronic devices, environmental sciences, geophysics, optics, philosophy and history of science, and pre-medicine.

## Plan III

This plan is for students intending to become secondary school teachers.

# Requirements

## Program Requirements

Students who have declared physics as a major are required to consult with a physics faculty mentor at least once per semester. First-year students considering physics as a major, are strongly encouraged to visit the physics academic advisor and discuss the situation. Because most of the advanced physics courses have various prerequisites, failure to settle on an appropriate plan of study early in the college career can result in delay and complications later. Students must receive a "C-" or better in all major courses, as well as in ancillary courses. These courses cannot be taken pass/fail. If a course is a pre-requisite for another course, the student may not register for the subsequent course until the grade in the pre-requisite is a "C-" or better. Students must have a grade point average of at least 2.000 in the major in order to graduate, and no more than 45 credits in PHYS may be applied to overall graduation requirements.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

## Plans of Study

### Plan I

This plan includes 45 credit hours of physics courses.

**Required Courses and Credits**

| Code | Title | Credit Hours |
|---|---|---|
| **Required Physics Courses** | | |
| PHYS 1115 | General Physics 1 for Majors | 4 |
| or PHYS 1110 | General Physics 1 | |
| PHYS 1125 | General Physics 2 for Majors | 4 |
| or PHYS 1120 | General Physics 2 | |
| PHYS 1140 | Experimental Physics 1 | 1 |
| PHYS 2150 | Experimental Physics 2 | 1 |
| PHYS 2170 | Foundations of Modern Physics | 3 |
| PHYS 2210 | Classical Mechanics and Mathematical Methods 1 | 3 |
| PHYS 3210 | Classical Mechanics and Mathematical Methods 2 | 3 |
| PHYS 3220 | Quantum Mechanics 1 | 3 |
| PHYS 3310 | Principles of Electricity and Magnetism 1 | 3 |
| PHYS 3320 | Principles of Electricity and Magnetism 2 | 3 |
| PHYS 3330 | Electronics for the Physical Sciences | 2 |
| PHYS 4230 | Thermodynamics and Statistical Mechanics | 3 |
| PHYS 4410 | Quantum Mechanics 2 | 3 |
| **Physics Electives** | | **9** |
| Select a research activity - see details below (3-6 credit hours): | | |
| PHYS 4430 | Advanced Laboratory | |
| PHYS 4610 | Physics Honors | |
| PHYS 4620 | Physics Honors | |
| PHYS 4630 | Physics Honors | |
| PHYS 4700 | Quantum Forge I | |
| PHYS 4710 | Quantum Forge II | |
| PHYS 4840 | Independent Study | |
| Select physics theory electives from the list below (3-6 credit hours): | | |

| | |
|---|---|
| PHYS 2600 | Introduction to Programming and Scientific Computing |
| PHYS 3090 | Introduction to Quantum Computing |
| PHYS 4150 | Plasma Physics |
| PHYS 4340 | Introduction to Solid State Physics |
| PHYS 4420 | Nuclear and Particle Physics |
| PHYS 4450 | History and Philosophy of Physics |
| PHYS 4460 | Teaching and Learning Physics |
| PHYS 4510 | Optics |
| PHYS 4550 | Cells, Molecules and Tissues: A Biophysical Approach |
| PHYS 4560 | Introduction to Biophysics |
| PHYS 4810 | Special Topics in Physics |
| PHYS 5030 | Intermediate Mathematical Physics 1 |
| PHYS 5040 | Intermediate Mathematical Physics 2 |
| PHYS 5770 | Gravitational Theory (Theory of General Relativity) |
| Other PHYS or ASTR upper-division courses as approved in advance by advisor. | |
| **Total Credit Hours** | **45** |

**Ancillary Mathematics & Chemistry Coursework**

| Code | Title | Credit Hours |
|---|---|---|
| **Ancillary Mathematics Courses** | | |
| MATH 1300 | Calculus 1 | 4-5 |
| or APPM 1350 | Calculus 1 for Engineers | |
| MATH 2300 | Calculus 2 | 4-5 |
| or APPM 1360 | Calculus 2 for Engineers | |
| MATH 2400 | Calculus 3 | 4-5 |
| or APPM 2350 | Calculus 3 for Engineers | |
| Select one of the following Linear Algebra and Differential Equations options: | | 4-6 |
| *Option 1* | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | |
| *Option 2* | | |
| MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |
| **Ancillary Chemistry Course** | | |
| CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 | 5 |
| **Total Credit Hours** | | **21-26** |

**Ancillary Programming Requirement**

The programming requirement may be completed in one of the following ways:

1. Complete PHYS 2600, ASTR 2600, CSCI 1300 or APPM 1650. (PHYS 2600 will count toward the 45 required PHYS credit hours while the other programming courses will not.)
2. By documentation of programming experience (i.e., a letter from a job or internship, or evidence of substantial contributions to an open-source code base). Approval by a physics department faculty mentor is required for this option and no academic credit is earned under this option.

**Research Activity Requirement**

The research activity may be completed in one of the following ways:

1. Between 3 and 6 credit hours may be earned from: PHYS 4430, PHYS 4610/PHYS 4620/PHYS 4630, PHYS 4700, PHYS 4710 or PHYS 4840.
2. By documentation of your accomplishments as an intern with a research activity within the physics department or a suitable cognate department, institute or external entity such as NCAR, NIST, NOAA, etc.
   - Approval by a physics department advisor is required for option (2) and should be obtained in advance.
   - No academic credit is earned under the internship option (2), so if an internship is taken, students must still earn 9 credit hours of physics electives.

## Plan II

For the interdisciplinary program, 33 credit hours of physics courses, plus 12 credit hours of interdisciplinary courses are required. Courses in the interdisciplinary subjects may not be double-counted with the required 33 credit hours of physics courses. Students may not double-major in Astrophysics (though the APS department) and Physics Plan 2 with an astrophysics concentration.

Interdisciplinary courses must be approved by the physics department, either by the pre-approved list of courses in each discipline or by a physics department mentor on a course-by-course basis. It is therefore imperative that students in Plan II be in close contact with the physics department advisor.

**Required Courses and Credits**

| Code | Title | Credit Hours |
|---|---|---|
| **Required Physics Courses** | | |
| PHYS 1115 | General Physics 1 for Majors | 4 |
| or PHYS 1110 | General Physics 1 | |
| PHYS 1125 | General Physics 2 for Majors | 4 |
| or PHYS 1120 | General Physics 2 | |
| PHYS 1140 | Experimental Physics 1 | 1 |
| PHYS 2150 | Experimental Physics 2 | 1 |
| PHYS 2170 | Foundations of Modern Physics | 3 |
| PHYS 2210 | Classical Mechanics and Mathematical Methods 1 | 3 |
| PHYS 3210 | Classical Mechanics and Mathematical Methods 2 | 3 |
| PHYS 3220 | Quantum Mechanics 1 | 3 |
| PHYS 3310 | Principles of Electricity and Magnetism 1 | 3 |
| PHYS 3320 | Principles of Electricity and Magnetism 2 | 3 |
| PHYS 3330 | Electronics for the Physical Sciences | 2 |
| PHYS 4230 | Thermodynamics and Statistical Mechanics | 3 |
| *Interdisciplinary Program* | | |
| Select 12 credit hours from an interdisciplinary focus. [1] | | 12 |
| **Total Credit Hours** | | **45** |

**Ancillary Mathematics & Chemistry Coursework**

| Code | Title | Credit Hours |
|---|---|---|
| **Ancillary Mathematics Courses** | | |
| MATH 1300 | Calculus 1 | 4-5 |
| or APPM 1350 | Calculus 1 for Engineers | |
| MATH 2300 | Calculus 2 | 4-5 |
| or APPM 1360 | Calculus 2 for Engineers | |
| MATH 2400 | Calculus 3 | 4-5 |
| or APPM 2350 | Calculus 3 for Engineers | |
| Select one of the following Linear Algebra and Differential Equations options: | | 4-6 |
| *Option 1* | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | |
| *Option 2* | | |
| MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |
| **Ancillary Chemistry Course** | | |
| CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 | 5 |
| **Total Credit Hours** | | **21-26** |

**Ancillary Programming Requirement**

The programming requirement may be completed in one of the following ways:

1. Complete PHYS 2600, ASTR 2600, CSCI 1300 or APPM 1650. (PHYS 2600 could count as the 3-credit PHYS elective in the interdisciplinary program.)
2. By documentation of programming experience (i.e., a letter from a job or internship, or evidence of substantial contributions to an open-source code base). Approval by a physics department faculty mentor is required for this option and no academic credit is earned under this option.

[1] Departmental lists of approved courses for the interdisciplinary plan are available in the advising guide on the Department of Physics website (http://www.colorado.edu/physics/).

## Plan III

This plan involves a minimum of 30 credit hours of physics and a minimum of 6–7 credit hours in education courses. To earn a Secondary Science teacher license from the School of Education, students must complete additional education courses as well as courses in biology and earth/space science. Students should check with an advisor in the School of Education for the most updated teacher licensure requirements.

**Required Courses and Credits**

| Code | Title | Credit Hours |
|---|---|---|
| **Required Physics Courses** | | |
| PHYS 1115 | General Physics 1 for Majors | 4 |
| or PHYS 1110 | General Physics 1 | |
| PHYS 1125 | General Physics 2 for Majors | 4 |
| or PHYS 1120 | General Physics 2 | |
| PHYS 1140 | Experimental Physics 1 | 1 |
| PHYS 2130 | Introduction to Quantum Mechanics and Its Applications | 3 |
| PHYS 2150 | Experimental Physics 2 | 1 |
| PHYS 2210 | Classical Mechanics and Mathematical Methods 1 | 3 |
| PHYS 3210 | Classical Mechanics and Mathematical Methods 2 | 3 |
| PHYS 3220 | Quantum Mechanics 1 | 3 |
| PHYS 3310 | Principles of Electricity and Magnetism 1 | 3 |
| PHYS 3330 | Electronics for the Physical Sciences | 2 |
| PHYS 4460 | Teaching and Learning Physics | 3 |
| or PHYS 4450 | History and Philosophy of Physics | |
| **Required Education courses** | | |
| EDUC 4050 | Knowing and Learning in Mathematics and Science | 3 |
| EDUC 5385 | Phenomenon-Based Science Instruction | 4 |
| **Total Credit Hours** | | **37** |

**Ancillary Astronomy, Mathematics, and Chemistry Coursework**

| Code | Title | Credit Hours |
|---|---|---|
| **Ancillary Astronomy Course** | | **4** |
| ASTR 1030 | Accelerated Introductory Astronomy 1 | |
| **Ancillary Chemistry Courses** | | |
| Select one of the following options: | | 7-10 |
| *Option 1* | | |
| CHEM 1011 & CHEM 1031 | Environmental Chemistry 1 and Environmental Chemistry 2 | |
| *Option 2* | | |
| CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 | |
| CHEM 1133 & CHEM 1134 | General Chemistry 2 and Laboratory in General Chemistry 2 | |
| **Ancillary Mathematics Courses** | | |
| MATH 1300 | Calculus 1 | 4-5 |
| or APPM 1350 | Calculus 1 for Engineers | |
| MATH 2300 | Calculus 2 | 4-5 |
| or APPM 1360 | Calculus 2 for Engineers | |
| MATH 2400 | Calculus 3 | 4-5 |
| or APPM 2350 | Calculus 3 for Engineers | |
| Select one of the following Linear Algebra and Differential Equations options: | | 4-6 |
| *Option 1* | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | |
| *Option 2* | | |
| MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |
| **Total Credit Hours** | | **27-35** |

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a

requirement for the major. To maintain adequate progress in physics plans I and II, students should meet the following requirements:

- In the first semester, declare the physics major.
- By the end of the second semester, complete the following courses: PHYS 1110 or PHYS 1115; PHYS 1120 or PHYS 1125; PHYS 1140, MATH 1300 or APPM 1350, and MATH 2300 or APPM 1360.
- By the end of the fourth semester, complete the following courses: PHYS 2150, PHYS 2170, PHYS 2210, CHEM 1113, MATH 2400 or APPM 2350; and APPM 2360. MATH 2130 and MATH 3430 can substitute for APPM 2360.
- Before the fifth semester, meet with the physics advisor to get approval for completion plan (FSACP). In addition to completing PHYS 4230 and PHYS 4410, Plan I students must get approval to complete 9 credit hours in physics electives, with a research participation component. In addition to completing PHYS 4230, interdisciplinary Plan II students must complete 12 credit hours of interdisciplinary courses.
- By the end of the sixth semester, complete PHYS 3210, PHYS 3220, PHYS 3310, PHYS 3320 and PHYS 3330.
- Early in the seventh semester, meet with the physics advisor to have the statement of major status filled in. This includes a plan for completing the requirements of the major during the senior year and must be signed by the student and the advisor. Further details concerning the execution of the guarantee can be obtained from the department.

# Sample Four-Year Plan of Study

Through the required coursework for the major, students will fulfill all 12 credits of the Natural Sciences area of the Gen Ed Distribution Requirement, including the Lab requirement, and the QRMS component of the Gen Ed Skills Requirement. See the department for Plan-specific Four-Year Plans of Study.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| PHYS 1115<br>or PHYS 1110 | General Physics 1 for Majors<br>or General Physics 1 | 4 |
| MATH 1300<br>or APPM 1350 | Calculus 1<br>or Calculus 1 for Engineers | 5 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/Global Perspective) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| PHYS 1125<br>or PHYS 1120 | General Physics 2 for Majors<br>or General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| MATH 2300<br>or APPM 1360 | Calculus 2<br>or Calculus 2 for Engineers | 5 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| | **Credit Hours** | **16** |
| **Year Two** | | |
| **Fall Semester** | | |
| PHYS 2170 | Foundations of Modern Physics | 3 |
| PHYS 2150 | Experimental Physics 2 | 1 |
| MATH 2400<br>or APPM 2350 | Calculus 3<br>or Calculus 3 for Engineers | 4-5 |
| MATH 2130 | Introduction to Linear Algebra for Non-Mathematics Majors (or elective if completing APPM track) | 3 |
| Programming Requirement | | 3-4 |
| | **Credit Hours** | **14-16** |
| **Spring Semester** | | |
| PHYS 2210 | Classical Mechanics and Mathematical Methods 1 | 3 |
| MATH 3430<br>or APPM 2360 | Ordinary Differential Equations<br>or Introduction to Differential Equations with Linear Algebra | 3 |
| CHEM 1113 | General Chemistry 1 | 4 |
| CHEM 1114 | Laboratory in General Chemistry 1 | 1 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| | **Credit Hours** | **14** |
| **Year Three** | | |
| **Fall Semester** | | |
| PHYS 3210 | Classical Mechanics and Mathematical Methods 2 | 3 |
| PHYS 3310 | Principles of Electricity and Magnetism 1 | 3 |
| PHYS 3330 | Electronics for the Physical Sciences | 2 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| PHYS 3220 | Quantum Mechanics 1 | 3 |
| PHYS 3320 | Principles of Electricity and Magnetism 2 | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Upper-division elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| PHYS 4230 | Thermodynamics and Statistical Mechanics | 3 |
| PHYS 4410 | Quantum Mechanics 2 | 3 |
| PHYS: Elective from approved list | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Upper-division elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| PHYS: Elective from approved list | | 3 |
| PHYS: Elective from approved list | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Upper-division elective | | 3 |
| Lower or Upper-division elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **118-120** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Knowledge of the basic subfields of physics (classical mechanics, electricity and magnetism, quantum mechanics, statistical mechanics and thermodynamics), as well as at least one specialty area of application (e.g., condensed matter physics or optics).
- The ability to apply major principles of physics towards solving problems in various subfields of physics, including the use of mathematical and computational tools as appropriate.
- Skills in assembling and using experimental apparatus to conduct and analyze measurements of physical phenomena.
- Knowledge of the role of systematic and random experimental errors, along with methods used to analyze experimental uncertainty and compare experiment with theory.
- Skills in collaborating effectively and communicating results of scientific inquiries verbally and in writing.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BA and MS in Physics

The BAM program in physics aims to provide new opportunities for undergraduate physics majors. The program is specifically addressed to the students in the Plan 1 Major Program of the Department of Physics. The Plan 1 physics major gives students a thorough grounding in theoretical physics so that they are well prepared either to proceed with graduate work or with professional employment. For students interested in graduate studies, this program in physics allows for participation in graduate coursework and research in a broad range of areas. For students interested in immediate professional employment, this program would serve as a terminal degree program that qualifies students for a higher level of employment.

### Admissions Requirements

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.30 or higher and a physics major GPA of 3.30 or higher.
- Have completed a minimum of 75 credit hours of coursework.
- Transfer students must have completed a minimum of 24 credit hours at CU Boulder.
- Have a letter of support from a faculty advisor to complete master's level research.

### Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only 6 credit hours may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

If you are interested in the BAM degree program, please see the Department of Physics website (http://www.colorado.edu/physics/academics/undergraduate-students/concurrent-bachelorsmasters-degree/).

# Physics - Minor

A minor is offered in physics. Declaration of a minor is open to any student enrolled at CU Boulder, regardless of college or school, except for students pursing the physics major, engineering physics major or the astrophysics/physics track of the astronomy major. For more information, see the Department of Physics Minoring in Physics (http://www.colorado.edu/physics/academics/undergraduate-students/minoring-physics/) webpage.

# Requirements

Declaration of a minor is open to any student enrolled at CU Boulder, regardless of college or school, except for students pursing the engineering physics major or the astrophysics/physics track of the astronomy major. The minimum number of credit hours for a student without advanced placement or transfer credit is 25 hours (16 lower-division and 9 upper-division). *All of the required physics classes listed below have co-requisite or prerequisite mathematics courses. Students should check to see if they meet these requisites.*

All coursework applied to the minor must be completed with a grade of C- or better (no pass/fail work may be applied). The GPA for all coursework taken in the minor department must be equal to 2.00 (C) or higher. Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor.

## Required Courses and Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **Required Physics Courses** | | **16** |
| PHYS 1110 | General Physics 1 | |
| PHYS 1120 | General Physics 2 | |
| PHYS 1140 | Experimental Physics 1 | |
| PHYS 2130 | Introduction to Quantum Mechanics and Its Applications | |
| or PHYS 2170 | Foundations of Modern Physics | |
| PHYS 2150 | Experimental Physics 2 | |
| PHYS 2210 | Classical Mechanics and Mathematical Methods 1 | |
| **Upper-Division Physics Electives** | | **9** |
| Select three of the following upper-division courses: | | |
| PHYS 3210 | Classical Mechanics and Mathematical Methods 2 | |
| PHYS 3220 | Quantum Mechanics 1 | |
| PHYS 3310 | Principles of Electricity and Magnetism 1 | |

| | | |
|---|---|---|
| PHYS 3320 | Principles of Electricity and Magnetism 2 | |
| PHYS 4230 | Thermodynamics and Statistical Mechanics | |
| **Total Credit Hours** | | **25** |

# Political Science

The political science major is a social science major. Students learn about political institutions, behavior, ideas and the methods used to study these phenomena. Work within the department is organized around six fields: American government and politics, comparative politics, international relations, public policy, political theory and empirical theory and methodology. The department's mission is to understand the political world and give students skills for a lifetime of inquiry, engagement and analysis.

In the undergraduate program, students develop skills in critical thinking, writing, analysis, research methods, and communication of social science findings. Political science majors go on to work in business, government, non-governmental organizations and many other fields. The major also prepares students for study at the graduate level in political science, public policy, law and other disciplines.

Our mission is to help students understand important political ideas, institutions (domestic and international), and actors. Students learn a number of broad concepts, including:

- The philosophical basis of justice, equality and representation.
- The meaning of diversity and its political consequences.
- The origins and function of the American political system.
- The political behavior of individuals and groups and why it matters.
- The political and social organization of other countries.
- The reasons that some countries cooperate while others engage in conflict.

**Course code for this program is PSCI.**

## Sample Courses

Below is a sample of current courses which represent areas of inquiry within our curriculum.

| Code | Title | Credit Hours |
|---|---|---|
| PSCI 2116 | Introduction to Environmental Policy and Policy Analysis | 3 |
| PSCI 3062 | Revolution and Political Violence | 3 |
| PSCI 3183 | International Law | 3 |
| PSCI 3021 | U.S. Campaigns and Elections | 3 |
| PSCI 3174 | Sex, Power, and Politics: U.S. Perspectives | 3 |
| PSCI 4012 | Global Development | 3 |
| PSCI 4221 | Political Psychology | 3 |
| PSCI 3075 | Applied Political Science Research | 3 |

## Learning Outcomes

The undergraduate political science curriculum produces the following learning outcomes:

- Students will communicate political science concepts clearly, both orally and in writing.
- Students will locate the evidence necessary to evaluate arguments in political science research and the current political world.
- Students will create well-designed arguments using relevant theories of political science.
- Students will answer research questions using logical inference from quantitative and qualitative evidence.
- Students will understand political dynamics at the subnational, national and international levels.
- Students will develop an appreciation for various ideological perspectives and for the complex political environment around them.
- Students will acquire a sense of efficacy for changing the political environment.

Students interested in political science may also want to consider the Global Studies Residential Academic Program (RAP) (p. 1096).

# Bachelor's Degree

- Political Science - Bachelor of Arts (BA) (p. 539)

# Minor

- Political Science - Minor (p. 541)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Adler, Edward Scott (https://experts.colorado.edu/display/fisid_108903/)
Professor; PhD, Columbia University

Aydin, Aysegul (https://experts.colorado.edu/display/fisid_143789/)
Associate Professor; PhD, SUNY at Binghamton

Baird, Vanessa Anne (https://experts.colorado.edu/display/fisid_115297/)
Associate Professor; PhD, University of Houston-University Park

Bateson, Regina
Assistant Professor; PhD, Yale University

Bayard de Volo, Lorraine M. (https://experts.colorado.edu/display/fisid_143611/)
Professor; PhD, University of Michigan Ann Arbor

Beard, Steven (https://experts.colorado.edu/display/fisid_168279/)
Teaching Assistant Professor

Beer, Francis A. (https://experts.colorado.edu/display/fisid_100703/)
Professor Emeritus; PhD, University of California Berkeley

Bickers, Kenneth Norman (https://experts.colorado.edu/display/fisid_130482/)
Chair, Professor; PhD, University of Wisconsin–Madison

Billica, Nancy (https://experts.colorado.edu/display/fisid_114455/)
Instructor; PhD, Harvard University

Boulding, Carew Elizabeth (https://experts.colorado.edu/display/fisid_144417/)
Professor; PhD, University of California, San Diego

Brown, Hank
Professor Emeritus

Brunner, Ronald D.
Professor Emeritus

Cohen, Grant
Lecturer; PhD, University of Miami

Costain, Anne N. (https://experts.colorado.edu/display/fisid_101427/)
Professor Emerita

Costain, Douglas
Senior Instructor Emeritus

Derderyan, Svet (https://experts.colorado.edu/display/fisid_158226/)
Instructor; PhD, University of North Carolina

Donavan, Janet Lynn (https://experts.colorado.edu/display/fisid_145270/)
Teaching Professor, Associate Chair; PhD, University of Wisconsin–Madison

Eckart, Dennis R.
Professor Emeritus

Ferguson, Michaele L. (https://experts.colorado.edu/display/fisid_129299/)
Associate Professor; PhD, Harvard University

Fitzgerald, Jennifer L. (https://experts.colorado.edu/display/fisid_140086/)
Professor, Chair, Faculty Fellow; PhD, Brown University

Greenberg, Edward S. (https://experts.colorado.edu/display/fisid_106090/)
Professor Emeritus; Ph.D., University of Wisconsin- Madison

Jorde, Christopher
Teaching Assistant Professor; PhD, University of Colorado Boulder

Jupille, Joseph H. (https://experts.colorado.edu/display/fisid_140088/)
Professor; PhD, University of Washington

Krutz, Glen
Professor; , Texas AM University

Landgrave, Michelangelo
Assistant Professor

Mapel, David Reed
Professor Emeritus

Martinez, Marayna
Assistant Professor; PhD, Duke University

McIver, John P.
Professor Emeritus

Palmer, Alexandra
Assistant Teaching Professor; PhD, University of Colorado Boulder

Parinandi, Srinivas C. (https://experts.colorado.edu/display/fisid_155589/)
Assistant Professor; PhD, University of Michigan Ann Arbor

Park, Clara (https://experts.colorado.edu/display/fisid_163545/)
Assistant Professor; PhD, University of California, Berkeley

Philips, Andrew Q. (https://experts.colorado.edu/display/fisid_159155/)
Associate Professor; PhD, Texas A&M University

Safran, William
Professor Emeritus

Scarritt, James R.
Professor Emeritus

Shannon, Megan L. (https://experts.colorado.edu/display/fisid_154265/)
Associate Professor; PhD, University of Iowa

Shepherd Macklin, JulieMarie Anjali (https://experts.colorado.edu/display/fisid_153034/)
Instructor; PhD, University of Colorado Boulder

Shin, Adrian (https://experts.colorado.edu/display/fisid_158138/)
Assistant Professor; PhD, University of Michigan Ann Arbor

Sokhey, Anand Edward (https://experts.colorado.edu/display/fisid_147113/)
Professor; PhD, The Ohio State University

Sokhey, Sarah Wilson (https://experts.colorado.edu/display/fisid_147614/)
Associate Professor; PhD, The Ohio State University

Strayhorn, Joshua Aaron (https://experts.colorado.edu/display/fisid_152584/)
Associate Professor; PhD, Emory University

Tir, Jaroslav (https://experts.colorado.edu/display/fisid_149842/)
Professor; PhD, University of Illinois at Urbana–Champaign

Vanderheiden, Steven Jon (https://experts.colorado.edu/display/fisid_144759/)
Professor; PhD, University of Wisconsin–Madison

# Courses

**PSCI 1101 (3) Introduction to American Politics**
Emphasizes interrelations among levels and branches of government, formal and informal institutions, processes, and behavior.
**Additional Information:** GT Pathways: GT-SS1 - Soc Behav Sci: Econ or Pol Systems
Arts Sci Core Curr: Contemporary Societies
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American
MAPS Course: Social Science
MAPS Course: Social Science US Context

**PSCI 2004 (3) Survey of Western Political Thought**
Studies main political philosophies and political issues of Western culture, from antiquity to 20th century.
**Additional Information:** GT Pathways: GT-SS1 - Soc Behav Sci: Econ or Pol Systems
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Theory

**PSCI 2012 (3) Introduction to Comparative Politics**
Most countries confront a variety of common political problems, including how to gain popular support, what kinds of political institutions are most appropriate, and how to distribute burdens and benefits to different segments of the population. Concentrates on learning how to compare different political systems and provides illustrative examples from several countries in both the industrialized and nonindustrialized world.
**Additional Information:** GT Pathways: GT-SS1 - Soc Behav Sci: Econ or Pol Systems
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 2028 (3) Special Topics**
Offers subjects not covered by existing courses. Offered when department approves a special topic.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General

**PSCI 2075 (3) Quantitative Research Methods**
Introduces quantitative research methods used in political science. Focuses on basic tools of analysis: data collection, processing, and evaluation, with special attention to survey techniques. Includes elite and case study analysis; aggregate, cluster, and content analysis; and the use of computers in political research.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Empirical Theory and Research Methdology
MAPS Course: Mathematics

**PSCI 2106 (3) Introduction to Public Policy Analysis**
Studies policymaking processes in American government, factors shaping public decision, and issues and questions relevant to political inquiry.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Public Policy

**PSCI 2116 (3) Introduction to Environmental Policy and Policy Analysis**
Teaches a systematic general framework for the analysis of environmental policy issues. Analyzes the interaction of environmental sciences, ethics, and policy across a range of environmental policy problems. Stresses critical thinking and practical applications.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Public Policy

**PSCI 2223 (3) Introduction to International Relations**
Introduces the field of international relations, with general survey of the theories, histories, and problems of historical and contemporary relations among state and nonstate actors.
**Additional Information:** GT Pathways: GT-SS1 - Soc Behav Sci: Econ or Pol Systems
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 2481 (3) Introduction to the Legal Process**
Covers basic legal concepts and processes emphasizing the American system. Gives special attention to political functions of law. Recommended as preparation for PSCI 4241.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3011 (3) The American Presidency and the Executive Branch**
Examines the constitutional, institutional and historical development of the presidency and the federal bureaucracy. Explores the changing role of the executive branch in the U.S. political system over time and competing views of executive power.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3021 (3) U.S. Campaigns and Elections**
Introduces students to the subjects, techniques, and findings of Political Science research on campaigns and elections. Particular emphasis is placed on the study of voting, campaign effects, partisan coalitions, electoral rules, campaign finance, and the policy impact of elections.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3022 (3) Russian Politics**
Covers the important and pressing issues in modern Russia politics since 1990. How and why did Communism end? How did Putin come to power, what are his goals, and how long will he stay in power? What is going on with the Russian-Ukrainian conflict? Does the Russian government interfere in the politics of other countries? Come learn about the politics of this major world power.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 3031 (3) Political Parties and Interest Groups**
Highlights the practice of party politics in the United States, including the nature, structure, organization, and functions of political parties and interest groups. Analyzes interest group politics and political behavior.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3032 (3) Democracy, Inequality and Violence in Latin America**
Stresses different perspectives on Latin American politics and understanding key political actors and processes. Country focus varies.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 3035 (3) Introduction to Qualitative Research Methods**
Enables students to create and critique qualitative research designs including comparative case studies, process tracing, interviews, archival research, and mixed methods. Includes lectures and in- or out-of-class exercises in which students use ideas discussed in the course to develop their own applied knowledge of these methods. Previously offered as a special topics course.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSCI 3041 (3) The American Congress**
Provides intensive examination of the role of Congress in American government, including congressional elections, representation, the organization of Congress, and congressional policy making. Examines larger context of congressional politics, including political parties, the president, and interest groups.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3051 (3) Public Opinion and Political Behavior**
Examines measurement of public opinion and evaluation of its impact on governmental policy formation, including survey research techniques.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3052 (3) Gender and Politics in Latin America**
Examines Latin American politics with particular focus on women's participation in social movements, war, revolution, and elections. Compares women's and men's politics and activism and examines changing gender and sexuality policies, gender relations, and the differential impact of political, economic, and social changes on men and women.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3650
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2600 or PSCI 3032.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 3054 (3) American Political Thought**
Highlights the development of American political theories and ideas from colonial period to present. Can also be taken for American field credit.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2004.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Theory

**PSCI 3061 (3) State Government and Politics**
Examines politics in the American states from a comparative and historical perspective. Considers major political actors---interest groups, citizens (direct democracy), and political parties, as well as central institutions, in the state political arena. Also focuses on major state public policy concerns.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3062 (3) Revolution and Political Violence**
Studies and evaluates alternative theoretical frameworks for the analysis of revolution and political violence. Theoretical material is firmly couched in case situations, such as ethnic, class, colonial, urban, racial, and religious conflicts.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101 or PSCI 2012 or IAFS 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 3064 (3) Environmental Political Theory**
Examines environmental discourses as conceptual means for theorizing environmental politics, and applies normative political theories to contemporary environmental policy issues. Considers the roles of political actors (individuals, groups, the state) in defining and addressing environmental problems on local, national, and global levels.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3064
**Recommended:** Prerequisite PSCI 2004.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Theory

**PSCI 3071 (3) Urban Politics**
Examines the structure of political, social, and economic influence in urban areas. Focuses on the relationship of the political system to governmental, social, and economic institutions and the contemporary policy processes in American cities.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3072 (3) Government and Politics in Southeast Asia**
Surveys historical and contemporary forces shaping politics in Southeast Asia. Gives special attention to comparative political economy, including development strategies and transitions to democracy.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2012 or IAFS 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative
Departmental Category: Asia Content

**PSCI 3075 (3) Applied Political Science Research**
Introduces the types of research design and quantitative methodology used in applied political science research. Directly builds on the data analysis performed in Quantitative Research Methods (PSCI 2075).
**Requisites:** Requires prerequisite course of PSCI 2075 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Empirical Theory and Research Methdology

**PSCI 3082 (3) Political Systems of Sub-Saharan Africa**
Analyzes post-independence and post-Cold War change in sub-Saharan Africa and provides intensive case studies of selected countries exemplifying each type with South Africa seen as a special case.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2012 or IAFS 1000.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 3084 (3) Diversity, Disagreement, and Democracy: an Introduction to the Theory and Practice of Democracy**
Examines the justification and limits for moral, political and religious pluralism. Students will be trained in the practice of dialogue and research the historical context of a subject that would be appropriate for a dialogue, and then interview members of the community who have different perspectives on the subject.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Theory

**PSCI 3091 (3) Politics of Social Movements**
Examines theoretical and empirical research on social movements from a U.S. perspective. Considers why social movements arise, who participates in them, the tactics they employ, obstacles they face, and their political impact.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3092 (3) Comparative Political Economy**
Presents theories on the interaction between policies and economics, economic models of politics, and familiarizes students with an approach that will prove useful in understanding current developments in both economics and politics. Explores relationships between financial markets, currency regimes and politics with some special consideration of the behavioral foundations of political and economic developments. Recommeded prerequisite: PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 3101 (3) Black Politics**
Examines structure of political, social, and economic influence in urban areas. Focuses on the relationship of political processes to governmental, social, and economic institutions and contemporary policy processes in American cities.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: American

**PSCI 3102 (3) South Asian Politics**
Examine the diverse political trajectories of four South Asian countries: India, Pakistan, Nepal, and Sri Lanka. Using a comparative lens, we will take into account historical, cultural, and economic, in addition to political, factors in deciphering this diversity of political paths.
**Recommended:** Prerequisite PSCI 2012 or IAFS 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative
Departmental Category: Asia Content

**PSCI 3105 (3) Designing Social Inquiry: An Introduction to Analyzing Political Phenomena**
Tackles conceptualization and measurement with a focus on reliability and validity of measures at the individual level. Explores how improper measurement and conceptualization can affect our inferences. Investigates how to use the tools of causal logic with statistical tools to differentiate linear, spurious, intervening and conditional relationships with a particular focus on what it means to "control for other factors".
**Requisites:** Requires prerequisite course of PSCI 2075 (minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Empirical Theory and Research Methdology

**PSCI 3122 (3) Authoritarianism in the Digital Age**
Introduces students to cutting edge research on how changes in information communication technologies (ICTs) have shaped politics in authoritarian regimes. Drawing on longstanding theories in the comparative politics literature, students will learn how governments, citizens, and non state actors use digital technologies to achieve their goals.
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSCI 3123 (3) War, Peace, and Strategic Defense**
Analyzes employment, or the threat of employing force, in securing American interests in the post-Cold War world. Gives special attention to utilities claimed for nuclear weapons, and alternatively, to weapons control and disarmament.
**Equivalent - Duplicate Degree Credit Not Granted:** PACS 3800
**Recommended:** Prerequisite PSCI 2223.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 3142 (3) Politics, History and Society of Cuba**
Provide students with general knowledge about Cuba, its history, government, and economy, with a particular emphasis on the Cuban Revolution and more current events such as changes to travel restrictions and US policy toward Cuba under Obama, Trump and Biden. As a global intensive, it also involves a 10-day travel/educational program in Cuba that will occur after the semester.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSCI 3143 (3) Current Affairs in International Relations**
Analyzes the various theoretical and policy challenges facing the post-Cold War world, with an emphasis on examining alternative conceptions of and approaches to such challenges.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2223.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 3155 (3) Survey Design and Analysis**
Provides the unique experience of involvement in ongoing survey research. Designed for students from different disciplines who will learn about what makes a good versus bad survey, how to write effective questions and how to put survey questions together into a cohesive questionnaire. Gain insight into the pitfalls of survey research and how to overcome them. Provides hands-on, real world experience on the design, implementation and analysis of the annual Colorado Political Climate survey.
**Requisites:** Requires prerequisite course ANTH 4000 or APPM 4570 or BCOR 1020 or ECON 3818 or GEOG 3023 or GEOL 3023 or MATH 2510 or PSCI 2075 or PSYC 2111 or SOCY 2061(minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Empirical Theory and Research Methdology

**PSCI 3163 (3) American Foreign Policy**
Examines foundations, assumptions, objectives, dynamics, and methods of U.S. foreign policy since WWII. Gives special attention to domestic and external problems of adapting U.S. policy to the changing world environment.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2223.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 3172 (3) Democracy and Its Citizens in the US and EU**
Explores the political institutions of the US and the EU and asks questions pertaining to the very citizenship experience in these two places; including policy, rights and liberties, quality of life, national identity, and immigration.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 3174 (3) Sex, Power, and Politics: U.S. Perspectives**
Explores how norms of sex, gender, race and sexuality find expression in institutions and policies in ways that legitimize only certain individuals as political actors, certain identities as politically relevant, and certain relationships as important. Critically examines how norms may be exposed, resisted, and changed by studying the politics of the women's, gay liberation, and men's movements in the U.S.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3174
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2004 or WGST 2000 or LGBT 2000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Theory

**PSCI 3183 (3) International Law**
Investigates the legal principles and landmark judicial cases that govern relations between countries and other international actors. Explores the development and effectiveness of law on issues such as human rights, war crimes, and the use of military force.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2223.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 3184 (3) Race, Power, and Politics**
Examines the fraught relationship between democracy and racial inequality in the US expressed in the founding contradiction between the Declaration of Independence and the recognition of slavery in the US Constitution. Explores these issues through study of the abolition movement, the Jim Crow era, Civil Rights and Black Power movements, immigrant activism, the American Indian movement, and Black Lives Matter.
**Recommended:** Prerequisite PSCI 2004.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**PSCI 3191 (3) National Security Organization and Policy Making**
Analyzes how the American governmental and political system is structured to define, select, and implement national security policies. Examines roles of the president, Congress, bureaucracy, interest groups,and other actors.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3193 (3) International Behavior**
Presents alternate theoretical frameworks for the explanation of international processes. Applies theories of conflict behavior and social organization to problems of war and peace.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2223.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 3205 (3) Undergraduate Research Experience**
Broadens and strengthens social science methodological skills and training by providing research collaboration between undergraduates and advanced graduate students and faculty. Promotes hands-on learning, immersion in the research process, and professional relationships. Students will collectively design and execute an original research project on a topic chosen with guidance by the instructor.
**Requisites:** Requires prerequisite course of PSCI 2075 (minimum grade C-). Restricted to students with 27-180 credits (Sophomore, Junior or Senior) Political Science (PSCI) majors or minors only. Restricted to students with a cumulative GPA of 3.0 or higher.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 3206 (3) The Environment and Public Policy**
Considers constitutional, political, and geographic factors in development of public policy affecting the use of natural resources and management of the environment; organization, procedures, and programs for use of natural resources; and administration of environmental policies.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101 or PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Public Policy

**PSCI 3211 (3) The Politics of Economic Inequality in the United States**
Explores empirical and normative origins and current state of economic inequality in the United States from a political science perspective. Evaluates how ideas about democracy and public policy address economic inequality, including the roles of gender, race and class in inequality. Examines the relationship between economic inequality and political inequality in both political behavior and political institutions.
**Requisites:** Requires a prerequisite course of PSCI 1101 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: American

**PSCI 3213 (3) International Political Economy**
Analyzes issues at the intersection of international politics and international economics. Utilizes theories and concepts from both economics and political science to understand issues in trade, finance, development and migration. Formerly PSCI 4193.
**Recommended:** Prerequisite PSCI 2223.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 3216 (3) Politics of Social Policy**
Examines theoretical assumptions, political processes, program content, and analytical methods used in development of US social policy. Current social policy issues are put in historic context and include assessment of social, economic, and political influences on policy choices and outcomes. Students have opportunity to compare policy approaches and gain practice in evaluating the politics and content of public policy alternatives.
**Recommended:** Prerequisite PSCI 1101, PSCI 2106 or PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSCI 3223 (3) International Human Rights**
Introduces the basic concepts behind international human rights. We define human rights and learn how human rights norms have developed. We explore why countries regularly violate the human rights of their own citizens. We learn how politics complicates the interactions between countries and other actors to protect human rights. Finally, we analyze the promise and limits of international cooperation and law in promoting human rights.
**Recommended:** Prerequisite PSCI 2223.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSCI 3225 (3) Strategy and Politics**
Focuses on the rational choice approach to understanding political decision making. Introduces students to the tools and methods of game-theoretic reasoning, and examines the strategic logic of many forms of political decision-making, including voting, lawmaking, and international conflict.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101 or PSCI 2012 or PSCI 2223.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Empirical Theory and Research Methdology

**PSCI 3271 (3) Law and Society: Legal Institutions and Human Behavior**
Examines relationship between human behavior and legal system, looking closely at the voluntary relationship between the citizen and the state, the use of law to balance economic liberty and equality, support for civil liberties, and procedural, distributive, and retributive justice.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3274 (3) Capitalism and its Critics**
Examines competing theoretical approaches to questions related to origins, development, and purposes of modern government in the United States; particular attention paid to impact of transformations in the underlying structure of the capitalist economy. Formerly PSCI 3171.
**Recommended:** Prerequisite PSCI 1101 or PSCI 2004.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Theory

**PSCI 3281 (3) Development of American Political Institutions**
Learn about the evolution of major American political institutions including the presidency, Congress, the judiciary, the party system and the right to vote.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3294 (3) Theories of Identity**
What is identity? How does it shape politics, and vice-versa? What are identity politics, and how do they shape the current political landscape? This course uses political theory, law, and case studies to give a three-part introduction to related core concepts: modern and contemporary theories of identity; the legal construction of identity in the United States; and the relationship between identity, policy, and activism in U.S. history and contemporary politics.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**PSCI 3301 (3) Gender, Sexuality and U.S. Law**
Contemporary and historic overview of U.S. courts' treatment of sex and gender. Using the case method, examines policy issues including, but not limited to: same sex marriage and civil unions; privacy; affirmative action; abortion; reproductive technologies; and discrimination based on sex and sexual orientation in education and in the workplace.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3300
**Recommended:** Prerequisite PSCI 1101 or WGST 2000.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: American

**PSCI 3311 (3) Gender and U.S. Politics: Protest, Polls and Policy**
Provides an overview and critical examination of women as political actors within the United States. Students will examine the gendered components of citizenship, election, political office and public policy. Furthermore, students will explore the ways in which gender intersects with class, race, ethnicity, sexual orientation and other identities in U.S. politics.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3311
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3774 (3) Free Speech and Dangerous Ideas**
Examines in depth various philosophical and legal justifications of First Amendment rights of speech, press, association and religion. Assesses these justifications in relation to broader normative theories of liberal democracy. Can also be taken for American field credit. Formerly PSCI 4774.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisites PSCI 2004 and PSCI 2481.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Theory

**PSCI 4002 (3) Western European Politics**
Comparatively analyzes development of the political systems and processes of European democracies. Emphasizes contemporary institutions, decision making patterns, and policy issues. Special attention to challenges of welfare systems.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 4012 (3) Global Development**
Analyzes development theory, case studies in development strategies, and the problems and promises of development: specifically issues of gender, environment, labor, corruption and poverty. The primary focus is on explanations for variation in level of development over time and across countries.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 4015 (3) Social Media & Politics Research Methods**
Introduces students to state-of-the-art methods for using data from Twitter, Facebook, Instagram, Youtube, and TikTok in quantitative political science research. In this hands-on course, students will conduct original research projects using social media data, while learning text analysis and machine learning techniques that can be applied to diverse types of data.
**Requisites:** Requires prerequisite course of PSCI 2075 (minimum grade B).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSCI 4016 (3) Inequality and Public Policy in the U.S. and Europe**
Provides an in-depth understanding of factors that change the level of inequality in the U.S. and in Europe and its economic, political, and social consequences across these states over time.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101 or PSCI 2012 or PSCI 2106.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Public Policy

**PSCI 4022 (3) Chinese Foreign Policy**
History of China's external relations and theories of foreign policy decision making. Explores two vital bilateral relations (Sino-U.S. and Sino-Japanese) and several key issues (like Taiwan) in China's 21st century foreign policy.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative
Departmental Category: Asia Content

**PSCI 4024 (3) Senior Seminar in Political Theory**
Intensively analyzes and discusses major theories and issues of both contemporary political thought and the history of political philosophy. The topic is announced by the instructor, but might include analysis of concepts (justice, human rights, democracy, etc.) or major theories. Emphasizes advanced discussion plus individual research.
**Recommended:** Prerequisite PSCI 2004.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Theory

**PSCI 4028 (3) Special Topics**
Offers subjects not covered by existing courses. Offered when the department approves a special topic.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General

**PSCI 4052 (3) Chinese Politics**
Explores the politics of 20th century China to speculate on China's future in the 21st century. Begins with an extensive look at the political history of the People's Republic, before turning to social, cultural, economic, and political issues today. Concludes with an examination of Chinese foreign policy, with a focus on Sino-American relations.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative
Departmental Category: Asia Content

**PSCI 4062 (3) East European Politics**
Studies developments in the former Soviet satellites and Yugoslavia, their governmental organizations, and their relation to the former Soviet Union and the West.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 4106 (3) Issues and Challenges in American Green Energy Policy**
Explores growth of contemporary American green energy industry. Explores different types of green energy policies and how government institutions and regularly arrangements affect the development of green energy policy.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Public Policy

**PSCI 4131 (3) Latinos and the U.S. Political System**
Examines the political status and activities of Mexican Americans and other Latino groups (Cuban Americans and Puerto Ricans) in the U.S. Also covers Latino political attitudes and behaviors; Latino efforts to influence the major national, state, and local institutions of the American government; and public policy concerns of Latinos.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: American

**PSCI 4173 (3) International Organizations**
Explores if and how countries cooperate under anarchy. Investigates cooperation over a number of international issues, including peace and security, trade and development, human rights, and justice for victims of war crimes. Gives special attention to organizations including the United Nations, European Union, International Monetary Fund, and World Trade Organization.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 4213 (3) Europe and the International System**
Covers the past, present and future of Europe's global role.
**Recommended:** Prerequisite PSCI 2223.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 4221 (3) Political Psychology**
Examines the psychological foundations of political decision-making among citizens and elites. Considers the role of political psychology in explaining political behavior and outcomes at the individual and collective level.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 4241 (3) Constitutional Law**
Focuses on the nature and scope of American constitutional principles as developed by the U.S. Supreme Court, including federalism, separation of powers, commerce, due process and equal protection.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 4242 (3) Middle Eastern Politics**
Explores the domestic politics of various Middle Eastern countries as well as the development and globalization of the region. Includes topics such as the ongoing prevalence of dictatorships, political Islamism, oil politics, economic growth and stagnation, and relations with the U.S.
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative
Departmental Category: Asia Content

**PSCI 4243 (3) Modern Warfare: Terrorism, Ideology, Identity**
Explores the evolution of warfare and origins of terrorism. Ideological and identity differences have come to the forefront of violent political conflicts while the emerging doctrine of warfare has placed civilians in the middle of modern conflicts. Tracks potential changes in the means of and reasons for fighting, roles of civilians and media, and rules of war.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisites PSCI 2223 and PSCI 3193.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 4252 (3) Politics of Ethnicity and Nationalism**
Analyzes ethnic identity as a factor in contemporary politics. Deals extensively with the role of ethnic groups in political mobilization, the development of national collective consciousness, nation building, and international relations. Explores the influence of religion, language, history, culture and class on ethnic group formation and behavior.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 4253 (3) Politics of Identity and Inter-Ethnic Violence**
Discusses politics of identity and why identity is such a potent source of violence. Is inter-ethnic conflict an end in itself, or are ethnic groups trying to achieve other goals through violence? What can be done to prevent or ameliorate inter-ethnic strife? Examines theoretical aspects of identity, inter-ethnic conflict, as well as specific examples of ethnic crises.
**Recommended:** Prerequisite PSCI 2223 or PSCI 2012.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 4283 (3) International Migration and Policy**
Explores the politics of international migration, including public attitudes toward immigration, special interests politics of immigration policy making and the dynamics between political institutions and international migrations. Students will learn about the politics of international migration across different receiving and sending states over the past two centuries with an emphasis on the current debates over immigration in the U.S. and Western Europe.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 4302 (3) European Union Politics**
Explores the development, functioning, focus and future of the European Union. Examines history, institutions, policies and politics as well as governance theories that have been developed to explain origins and evolution of the EU.
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 4322 (3) Indigenous People's Politics**
Explore critical concepts, conversations, and issues surrounding Indigenous peoples' politics and politics around the globe. Analyze the ways in which Indigenous peoples have been impacted by colonization and look at how Indigenous peoples continue to respond to forces such as colonialism and capitalism in different geographical regions with a focus on the Americas. We will also draw on the experiences of indigenous peoples in Australia and New Zealand.
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSCI 4341 (3) Media and Politics**
Examines aspects of political communication as it applies to citizens, political decision makers, and specific public policies.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 4374 (3) Global Seminar: Revolutions in Paris**
Study the French Revolution (1789-1799) and the Paris Commune (1871) through immersive role-playing games, while learning about the ideas, history, and impact of these events through visits to important sites in and around the city of Paris. Learn about conservatism, republicanism, proto-socialism, slavery abolition, and anti-colonialism in the French Revolution; and socialism, Marxism, anarchism, and feminism in the Paris Commune.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSCI 4391 (3) Gender Politics and Global Activism**
Addresses the problems and challenges women face around the world and the ways in which women have mobilized to address them. Explores political activism at the local, national, regional and global levels. Focuses on different forms of activism, including strategies aimed at working with and within governmental institutions, as well as outside and against them.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4500
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 4701 (3) Symbolic Politics**
Introduces uses and abuses of symbols as instruments and indicators of political change.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 4703 (3) Technology, Society and the Future**
Explores some of the remarkable technological advances made in recent years such as Artificial Intelligence, Robotics, Social Media, "Big Data," Internet-Interconnectivity, etc. in order to better understand how they are reshaping the world around us. Looks at the implications of these technological advances for a variety of social and political issues including education, communication, medicine, international development, international relations, work, social life, politics, elections and democracy. Recommended Prerequistes: PSCI 2012 and/or IAFS 1000.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 4714 (3) Liberalism and Its Critics**
Examines contemporary arguments for and against liberalism. Focuses on the analysis, evaluation, and understanding of the philosophical contributions to this debate. Gives special attention to the concepts of justice, freedom, equality, and individualism.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2004.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Theory

**PSCI 4715 (3) Honors Political Science Seminar**
Involves writing and discussion of selected topics in political science. Critically reviews the major methodological and conceptual features of the discipline. Students begin their honors papers in the seminar. Department enforced prerequisite: minimum 3.3 GPA. Generally offered in fall term only.
**Additional Information:** Arts Sciences Honors Course
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Empirical Theory and Research Methdology

**PSCI 4716 (3) Selected Policy Problems**
Integrates general principles of policy inquiry with documents and other literature on specific problems in public policy, in order to evaluate courses of action.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Public Policy

**PSCI 4725 (3) Political Science Honors Thesis**
Involves writing an honors thesis. Formerly PSCI 4008.
**Requisites:** Requires prerequisite course of PSCI 4715 (minimum grade B-).
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Empirical Theory and Research Methdology

**PSCI 4731 (3) Civic Engagement in America**
Closely examines the various understandings of democracy, the arguments for and against democracy, and the progress of and prospects for democratic politics in the United States. Particular attention is paid to economic, social, and political developments in the United States that affect popular sovereignty, political equality, and liberty.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 4732 (3) Critical Thinking in Development**
Exposes students to current issues in the political economy of development. Subjects range from globalization, democratization and economic development. Specifically explores the international and domestic determinants of economic development with special reference to currency markets, foreign direct investment, trade and democratization.
**Equivalent - Duplicate Degree Credit Not Granted:** INVS 4302
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 4734 (3) Politics and Literature**
Broadly examines political topics as they are presented in important literary works and analyzes the possibilities involved in using the literary mode to present political teachings.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2004.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Theory

**PSCI 4751 (3) The Politics of Ideas**
Examines theoretical arguments and case studies of interactions of ideas, interests, and institutions in policymaking. Analyzes processes through which ideas come to the public agenda, how institutional settings shape those ideas, and why some ideas and interests are more successful.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 4771 (3) Civil Rights and Liberties in America**
Implementation of rights and liberties in America. Examines fundamental issues of free speech, press, association, and religion along with rights to due process and equal protection under the law.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 4783 (3) Global Issues**
Studies the principal issues confronting humanity that affect stability and survivability and their economic, social, and political implications.
**Requisites:** Restricted to Political Science (PSCI), International Affairs (IAFS) or Environmental Studies (ENVS) majors only.
**Recommended:** Prerequisite PSCI 2012 or PSCI 2223.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 4792 (3) Issues in Latin American Politics**
Studies several Latin American countries in some depth including history and contemporary politics. Teaches students to listen to and evaluate different sides of political controversies, and critically evaluate arguments.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 4841 (1-3) Independent Study in American Politics**
Subjects are chosen and arrangements are made to suit the needs of each student. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall GPA of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. A special independent study approval agreement form must be obtained from the department.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Departmental Category: American

**PSCI 4842 (1-3) Independent Study in Comparative Politics**
Subjects chosen and arrangements made to suit needs of each student. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall GPA of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. Special independent study approval agreement form must be obtained from the department.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite PSCI 2012 or IAFS 1000.
**Additional Information:** Departmental Category: Comparative

**PSCI 4843 (1-3) Independent Study in International Relations**
Subjects chosen and arrangements made to suit needs of each student. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall average of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. Special independent study approval agreement form must be obtained from the department.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite PSCI 2223.
**Additional Information:** Departmental Category: International Relations

**PSCI 4844 (1-3) Independent Study in Political Theory**
Subjects and arrangements suit individual student needs. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall GPA of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. Special independent study approval agreement form must be obtained from the department.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite PSCI 2004.
**Additional Information:** Departmental Category: Political Theory

**PSCI 4846 (1-3) Independent Study in Public Policy**
Subjects chosen and arrangements made to suit needs of each student. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall average GPA of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. Special independent study approval agreement form must be obtained from the department.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Public Policy

**PSCI 4848 (1-3) Independent Study**
Subjects chosen and arrangements made to suit needs of each student. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall average of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. Special independent study approval agreement form must be obtained from the department.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General

**PSCI 4938 (3-6) Internship in Government**
With instructor's assistance, students secure an internship with a political or governmental organization. In addition to the internship, the class consists of regular seminars, course readings and assignments, and individual conferences with the instructor. Student pursues an academic research project and writes an original research paper. Instructor approval required in semester preceding internship. Contact instructor prior to early registration.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Departmental Category: General

# Political Science - Bachelor of Arts (BA)

A degree in political science provides students with the ability to think critically about challenges facing the world today. Students develop research, writing and analytical skills to prepare them for careers in fields such as:

- Government
- Civil service
- Journalism
- Business management
- Legislative analysis
- Criminology
- City planning
- Population studies

Students can combine the major with credentials to teach government, political science and civics in secondary schools. If a student plans to go on to the graduate level, the political science minor is an excellent complement to fields such as law, economics and a number of other social science disciplines.

Career Services (http://www.colorado.edu/career/) offers a number of programs and services designed to help political science students plan their career, including workshops, internships and placement services after graduation.

# Requirements

## Program Requirements

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. Total credit hours required in Political Science courses: 42 credit hours, including 24 upper-division credit hours.

No courses for the PSCI major may be taken pass/fail, and a student must have a grade of C- or better in all 42 required credit hours in political science, and a cumulative GPA of 2.0 or better in political science courses.

No more than 45 credit hours in political science credit will count toward the Arts and Sciences graduation requirement of 120 credit hours. This may be exceeded by 6 credit hours (for a total of 51 credit hours), provided that the excess credit hours are taken in PSCI 4715 and PSCI 4725 (honors thesis credit).

### Required Courses and Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **PSCI Lower-division Distribution** | | |
| PSCI 1101 | Introduction to American Politics | 3 |
| PSCI 2012 | Introduction to Comparative Politics | 3 |
| PSCI 2223 | Introduction to International Relations | 3 |
| PSCI 2004 | Survey of Western Political Thought | 3 |
| **Empirical Theory and Research Methodology** | | |
| PSCI 2075 | Quantitative Research Methods | 3 |
| Choose one of the following: | | 3 |
| PSCI 3075 | Applied Political Science Research | |
| PSCI 3105 | Designing Social Inquiry: An Introduction to Analyzing Political Phenomena | |
| PSCI 3155 | Survey Design and Analysis | |
| PSCI 3205 | Undergraduate Research Experience | |
| PSCI 3225 | Strategy and Politics | |
| **PSCI Upper-division Distribution** | | |
| Select one course in four of the following six primary fields: | | 12 |
| American | | |
| Comparative | | |
| International Relations | | |
| Political Theory | | |
| Empirical Theory and Research Methodology [1] | | |
| Public Policy | | |
| **Political Science Electives** | | |
| Three upper-division PSCI elective courses | | 9 |
| One lower or upper-division PSCI elective course | | 3 |
| **Total Credit Hours** | | **42** |

[1] Note that the second Empirical Theory and Research Methodology course taken in sequence, PSCI 3075, PSCI 3105, PSCI 3155, PSCI 3205 or PSCI 3225, will not count toward the upper-division distribution requirement for the Empirical Theory/Research Methodology field.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in political science, students should meet the following requirements:

- By the end of the second semester, declare the major.
- By the end of the third semester, complete PSCI 1101 and two of the following required courses: PSCI 2012, PSCI 2223, PSCI 2004 or PSCI 2075.
- By the end of the fourth semester, complete the remaining lower-division political science courses.
- By the end of the sixth semester, complete 12 upper-division credit hours of political science courses, including at least one course in three of the following fields: American, comparative, international relations, methodology, policy and theory. In addition, complete three upper-division or lower-division political science elective credit hours.
- During the seventh and eighth semesters, complete 12 credit hours of political science courses, including at least 9 upper-division political science elective credit hours and all remaining upper-division field distribution requirements.

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will complete all 12 credits of the the Social Sciences area of the Gen Ed Distribution Requirement, as well as the QRMS component of the Gen Ed Skills Requirement. Depending on the courses selected in the major, students can also potentially complete the U.S. Perspective component of the Gen Ed Diversity Requirement.

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| PSCI 1101 | Introduction to American Politics | 3 |
| PSCI 2012<br>or PSCI 2223 | Introduction to Comparative Politics<br>or Introduction to International Relations | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Elective or MAPS (If needed) | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| PSCI 2223<br>or PSCI 2012 | Introduction to International Relations<br>or Introduction to Comparative Politics | 3 |
| PSCI 2004 | Survey of Western Political Thought | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective or MAPS | | 3 |
| Elective or MAPS | | 3 |
| | **Credit Hours** | **15** |

**Year Two**

| **Fall Semester** | | |
|---|---|---|
| PSCI 2075 | Quantitative Research Methods | 3 |
| PSCI Required Upper-Division course (Four Area courses required) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/US Perspective) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| PSCI 3105<br>or PSCI 3075<br>or PSCI 3225<br>or PSCI 3155<br>or PSCI 3205 | Designing Social Inquiry: An Introduction to Analyzing Political Phenomena<br>or Applied Political Science Research<br>or Strategy and Politics<br>or Survey Design and Analysis<br>or Undergraduate Research Experience | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/Global Perspective) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |

**Year Three**

| **Fall Semester** | | |
|---|---|---|
| PSCI Required Upper-Division course (Four Area courses required) | | 3 |
| PSCI Required Upper-Division course (Four Area courses required) | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Elective (Upper-Division) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| PSCI Required Upper-Division course (Four Area courses required) | | 3 |
| PSCI Required Upper-Division Elective (Twelve elective credits required) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective (Upper-Division) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |

**Year Four**

| **Fall Semester** | | |
|---|---|---|
| PSCI Upper-Division Elective (Twelve elective credits required) | | 3 |
| PSCI Upper-Division Elective (Twelve elective credits required) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective (Upper-Division) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| PSCI Elective Lower or Upper-division (Twelve elective credits required) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective (Upper-Division) | | 3 |
| Elective (Upper-Division) | | 3 |
| Elective (Upper-Division, if needed) | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **121** |

## Learning Outcomes

By the completion of the program, students will be able to:

- Communicate political science concepts clearly, both orally and in writing.
- Locate the evidence necessary to evaluate arguments in political science research and the current political world.
- Create well-designed arguments using relevant theories of political science.
- Answer research questions using logical inference from quantitative and qualitative evidence.
- Understand political dynamics at the subnational, national and international levels.
- Develop an appreciation for various ideological perspectives and for the complex political environment around them.
- Acquire a sense of efficacy for changing the political environment.

# Political Science - Minor

A minor in political science provides students with the ability to think critically about challenges facing the world today. Students develop research, writing and analytical skills to prepare them for careers in fields such as:

- Government
- Civil service
- Journalism
- Business management
- Legislative analysis
- Criminology
- City planning
- Population studies

Students can combine the minor with teaching credentials and study in an affiliated field to teach government, political science and civics in secondary schools. If a student plans to go on to the graduate level, the political science minor is an excellent complement to fields such as law, economics and a number of other social science disciplines.

Career Services (http://www.colorado.edu/career/) offers a number of programs and services designed to help political science students plan their career, including workshops, internships and placement services after graduation.

## Requirements

Declaration of a minor in political science is open to any student enrolled at CU Boulder, regardless of college or school.

Students must complete 21 credit hours of political science to complete the political science minor, of which 9 credit hours must be in upper-division coursework. All 21 credit hours must be completed with grades of C- or better and an overall GPA of 2.00. None of the required credit hours may be taken pass/fail.

### Required Courses and Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **Lower-Division Courses** | | |
| PSCI 1101 | Introduction to American Politics | 3 |
| Select two of the following: | | 6 |
| PSCI 2012 | Introduction to Comparative Politics | |
| PSCI 2223 | Introduction to International Relations | |
| PSCI 2004 | Survey of Western Political Thought | |
| PSCI 2075 | Quantitative Research Methods | |
| **Upper-Division Courses** | | |
| 9 credit hours in a minimum of two of the following primary fields: [1] | | 9 |
| American | | |
| Comparative | | |
| International Relations | | |
| Political Theory | | |
| Empirical Theory and Research Methodology | | |
| Public Policy | | |
| **Lower- or Upper-Division Political Science** | | |
| 3 credit hours of lower- or upper-division political science | | 3 |
| **Total Credit Hours** | | **21** |

[1] PSCI 4938 will not fulfill a primary field area in the minor.

### International Affairs Majors

International affairs majors who wish to minor in political science must apply the following additional rules:

- No more than 9 credit hours toward the PSCI minor can come from courses that count toward another major.
- International affairs majors must take at least one upper-division course in American politics and one course (lower- or upper-division) in political theory, in addition to the regular minor requirements.

# Psychology and Neuroscience

At the undergraduate level, this department offers a major in psychology and a major and a certificate in neuroscience.

Psychology includes a set of interconnected disciplines that, together, seek to understand human cognition, emotion and behavior. Psychology also encompasses applied disciplines that seek to advance and apply psychological science to better understand mental health and improve lives and benefit society.

Neuroscience is the study of the mechanisms of nervous system—the brain, the spinal cord and networks of sensory nerve cells, or neurons. Neuroscientists work to describe how neural circuits transmit signals and process different types of information. The principles of neuroscience are derived from the application of methods from many scientific disciplines, including molecular and cellular biology, biochemistry, physiology, structure and computational modeling.

Students contemplating postgraduate education, either in professional or in graduate school, are encouraged to participate in the departmental honors program, which provides special opportunities for individualized attention.

CU Boulder's Department of Psychology and Neuroscience has been ranked by the National Academy of Sciences as one of the best in the country with respect to the quality of the faculty and their scholarly productivity. Moreover, the department offers undergraduates a wide range of opportunities for involvement in research.

**Course codes for this program are PSYC and NRSC.**

# Bachelor's Degrees

- Neuroscience - Bachelor of Science (BA) (p. 551)
- Psychology - Bachelor of Arts (BA) (p. 553)

# Certificate

- Neurosciences and Behavior - Certificate (p. 556)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Allen, David (https://experts.colorado.edu/display/fisid_114466/)
Teaching Associate Professor; PhD, University of California, Los Angeles

Alpern, Herbert P.
Professor Emeritus

Arch, Joanna (https://experts.colorado.edu/display/fisid_147415/)
Professor; PhD, University of California, Los Angeles

Bachtell, Ryan (https://experts.colorado.edu/display/fisid_146084/)
Associate Professor; PhD, Oregon Health Science University

Banich, Marie (https://experts.colorado.edu/display/fisid_120646/)
Professor; PhD, University of Chicago

Baratta, Michael V. (https://experts.colorado.edu/display/fisid_149599/)
Assistant Professor; PhD, University of Colorado Boulder

Barth, Daniel
Professor Emeritus

Benoit, Roland
Associate Professor; PhD, University College London

Bidwell, Cinnamon (https://experts.colorado.edu/display/fisid_155117/)
Associate Professor; PhD, University of Colorado Boulder

Blair, Irene (https://experts.colorado.edu/display/fisid_107261/)
Professor; PhD, Yale University

Blechman, Elaine A.
Professor Emerita

Bourne, Lyle E. Jr.
Professor Emeritus

Bryan, Angela (https://experts.colorado.edu/display/fisid_115216/)
Professor; PhD, Arizona State University

Campeau, Serge (https://experts.colorado.edu/display/fisid_115395/)
Professor; PhD, Yale University

Cartwright, Desmond S.
Professor Emeritus

Collins, Allan C.
Professor Emeritus

Colunga, Eliana (https://experts.colorado.edu/display/fisid_129477/)
Associate Professor; PhD, Indiana University Bloomington

Correll, Joshua (https://experts.colorado.edu/display/fisid_151728/)
Professor; PhD, University of Colorado Boulder

Cowell, Rosie
Associate Professor; PhD, University of Oxford

Cummings, Andrew (https://experts.colorado.edu/display/fisid_174362/)
Teaching Assistant Professor; PhD, University of Nevada Las Vegas

Curran, Timothy (https://experts.colorado.edu/display/fisid_118454/)
Professor Emeritus; PhD, University of Oregon

Curtis, Ryan (https://experts.colorado.edu/display/fisid_164483/)
Teaching Associate Professor; PhD, University of Maryland College Park Campus

Day, Heidi E.W. (https://experts.colorado.edu/display/fisid_116632/)
Teaching Professor of Distinction; PhD, University of Cambridge

Derricks, Veronica
Assistant Professor; PhD, University of Michigan

Dimidjian, Sona (https://experts.colorado.edu/display/fisid_140084/)
Professor; PhD, University of Washington

Donaldson, Zoe (https://experts.colorado.edu/display/fisid_157087/)
Associate Professor; PhD, Emory University

Friedman, Naomi P. (https://experts.colorado.edu/display/fisid_109519/)
Associate Professor; PhD, University of Colorado Boulder

Grotzinger, Andrew (https://experts.colorado.edu/display/fisid_167222/)
Assistant Professor; PhD, University of Texas at Austin

Gruber, June L. (https://experts.colorado.edu/display/fisid_153634/)
Professor; PhD, University of California, Berkeley

Harvey, Lewis Orvis (https://experts.colorado.edu/display/fisid_101173/)
Professor Emeritus

Healy, Alice F. (https://experts.colorado.edu/display/fisid_100418/)
Distinguished Professor Emeritus; PhD, The Rockefeller University

Hernandez, Theresa D. (https://experts.colorado.edu/display/fisid_102953/)
Professor; PhD, University of Texas at Austin

Hewitt, John K. (https://experts.colorado.edu/display/fisid_101035/)
Professor; PhD, University of London

Hill, Karl G. (https://experts.colorado.edu/individual/fisid_159803/)
Professor; PhD, Brandeis University

Hiura, Lisa (https://experts.colorado.edu/display/fisid_167644/)
Assistant Professor; PhD, Cornell University

Huber, David
Professor; PhD, University of Indiana

Huibregtse Ketels, Brooke (https://experts.colorado.edu/display/fisid_159929/)
Teaching Assistant Professor; PhD, University of Colorado Boulder

Ito, Tiffany (https://experts.colorado.edu/display/fisid_113066/)
Professor; PhD, University of Southern California

Jessor, Richard
Professor Emeritus

Jones, Matthew (https://experts.colorado.edu/display/fisid_144611/)
Professor; PhD, University of Michigan Ann Arbor

Judd, Charles M.
Distinguished Professor Emeritus

Kaiser, Roselinde H. (https://experts.colorado.edu/display/fisid_164070/)
Associate Professor; PhD, University of Colorado Boulder

Kandra Hughes, Kelly
Teaching Assistant Professor; PhD, University of North Carolina at Chapel Hill

Kaufmann, Vyga G. (https://experts.colorado.edu/display/fisid_151089/)
Teaching Assistant Professor; PhD, University of Colorado Boulder

Keller, Matthew C. (https://experts.colorado.edu/display/fisid_144507/)
Professor; PhD, University of Michigan Ann Arbor

Kilimnik, Chelsea (https://experts.colorado.edu/display/fisid_169111/)
Assistant Professor; PhD, University of Texas at Austin

Kim, Albert E. (https://experts.colorado.edu/display/fisid_143740/)
Associate Professor; PhD, University of Pennsylvania

King, D. Brett (https://experts.colorado.edu/display/fisid_103815/)
Teaching Professor of Distinction; PhD, Colorado State University

Kintsch, Walter
Professor Emeritus

Knight, Erik (https://experts.colorado.edu/individual/fisid_167412/)
Assistant Professor; PhD, University of Oregon

Kodish, Tamar
Assistant Professor; PhD, University of California Los Angeles

Maier, Steven F.
Distinguished Professor; PhD, University of Pennsylvania

McClelland, Gary H.
Professor Emeritus

Miyake, Akira (https://experts.colorado.edu/display/fisid_107321/)
Professor; PhD, Carnegie Mellon University

Molas, Susanna
Assistant Professor; PhD, Pompeu Fabra University

Olson, Richard
Professor Emeritus

Park, Bernadette (https://experts.colorado.edu/display/fisid_103732/)
Professor Emeritus; PhD, Northwestern University

Pedersen, Eric (https://experts.colorado.edu/display/fisid_159278/)
Assistant Professor; PhD, University of Miami

Pierotti, Chelsea (https://experts.colorado.edu/individual/fisid_155551/)
Teaching Assistant Professor; PhD, University of Northern Colorado

Pietri, Evava
Associate Professor; PhD, Ohio State University

Pittman Wagers, Tina (https://experts.colorado.edu/display/fisid_117148/)
Emerita Teaching Professor of Distinction; PsyD, University of Denver

Polson, Peter G.
Professor Emeritus

Ramirez, Albert
Associate Professor Emeritus

Reynolds, Chandra
Professor; PhD, University of Southern California

Rhee, Soo H. (https://experts.colorado.edu/display/fisid_123401/)
Associate Professor; PhD, Emory University

Richardson, Emily (https://experts.colorado.edu/display/fisid_115007/)
Clinical Associate Professor; PhD, University of Iowa

Root, David H. (https://experts.colorado.edu/display/fisid_159444/)
Assistant Professor; PhD, Rutgers University

Rudy, Jerry W.
Professor Emeritus; PhD, University of Virginia

Saddoris, Michael Paul (https://experts.colorado.edu/display/fisid_152979/)
Associate Professor; PhD, Johns Hopkins University

Schell, Emily
Teaching Assistant Professor; PhD, Stanford University

Smutzler, Natalie (https://experts.colorado.edu/individual/fisid_113933/)
Teaching Associate Professor; PhD, Indiana University Bloomington

Spencer, Robert L. (https://experts.colorado.edu/display/fisid_104362/)
Professor; PhD, University of Arizona

Stallings, Michael C. (https://experts.colorado.edu/display/fisid_108745/)
Professor; PhD, University of Southern California

Stratford, Jennifer M. (https://experts.colorado.edu/display/fisid_157880/)
Teaching Associate Professor; PhD, Florida State University

Stubblefield, Elizabeth
Teaching Assistant Professor; PhD, University of Colorado Anschutz Medical Campus

Taylor, Ronald G.
Professor Emeritus

Van Boven, Leaf D. (https://experts.colorado.edu/display/fisid_126291/)
Professor; PhD, Cornell University

Watkins, Linda R. (https://experts.colorado.edu/display/fisid_101513/)
Distinguished Professor; PhD, Virginia Commonwealth University

Wehner, Jeanne M.
Professor Emerita

Wertheimer, Michael
Professor Emeritus

Whisman, Mark (https://experts.colorado.edu/display/fisid_113391/)
Professor; PhD, University of Washington

Willcutt, Erik G. (https://experts.colorado.edu/display/fisid_113861/)
Professor; PhD, University of Denver

Wilson, James R.
Professor Emeritus

Yuan, Lei (https://experts.colorado.edu/individual/fisid_167699/)
Assistant Professor; PhD, Northwestern University

# Courses

## Neuroscience

**NRSC 1020 (1) Exploring the Neuroscience Major**
This course familiarizes students to the neuroscience major at CU Boulder, and helps students develop key skills needed for academic success. Students will learn about department and campus resources, and how to get involved in the wider neuroscience community, including clubs and research. An overview of select neuroscience-related topics, and possible career paths, helps students determine goodness of fit. This elective course is designed for first-year and other students exploring educational and career opportunities in this exciting field.

**NRSC 2100 (4) Introduction to Neuroscience**
Provides an introduction to fundamental concepts in neuroscience. The goal of this first course is to provide a strong foundation in neurobiology-cell biology, physiology of the neuronal membrane, interneuronal communication, neurotransmission, gross anatomy, and how the brain develops. Students will also learn principles of sensory systems functions. Recitation will reinforce lecture concepts through discussion of current research.
**Requisites:** Requires prerequisite courses of MCDB 1111 or MCDB 1150 or EBIO 1210 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 2101 (1-4) Topics in Neuroscience**
Provides students with the opportunity to focus on a specific area of Neuroscience in depth.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 2125 (4) Introduction to Neuroscience I: Foundations**
Provides an introduction to fundamental knowledge and principles in neuroscience. The goal of this first semester of an Introduction to Neuroscience two semester sequence is to provide a strong foundation in neurobiology-cell biology, physiology of the neuronal membrane, synaptic neurotransmission, neurochemistry, gross anatomy and introduction to sensory perception. Recitation will reinforce lecture concepts.
**Requisites:** Requires prerequisite course of MCDB 1150 or EBIO 1210 (minimum grade C-).

**NRSC 2150 (4) Introduction to Neuroscience II: Systems**
Extends understanding of fundamental knowledge in neuroscience with a focus on systems function. The goal of this second semester of an Introduction to Neuroscience two semester sequence is to develop deeper understanding of neurobiological systems function. Featured is the neurophysiology, neuroanatomy and function of human sensory systems, motor systems, sensorimotor integration and higher level neurosystem function.
**Requisites:** Requires prerequisite course of NRSC 2100 or NRSC 2125 (minimum grade C-).

**NRSC 2200 (2) Laboratory Techniques in Neuroscience**
Introduces students to many basic and essential laboratory skills in neuroscience research. Students will learn experimental methods and perform experiments depicting principles in neurophysiology, neuroanatomy, neurochemistry, and the fundamentals of neuroimaging techniques.
**Requisites:** Requires a prerequisite course of NRSC 2100 or NRSC 2125 (minimum grade C-). Restricted to Neuroscience (NRSC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4011 (1-3) Senior Thesis**
Senior Thesis credits are available for students during the semester that they write and defend a departmental Honors Thesis. A neuroscience honors thesis must be based on an empirical research project that the student directs/participates in under guidance from a faculty member. Contact the neuroscience director for further information.

**NRSC 4015 (3) Affective Neuroscience**
Experiencing and learning from affect--emotional value--is a fundamental part of the human experience. When people started thinking of brains as computers, research on emotion fell by the wayside. Recently however, this has changed, and there is an explosion of work on the brain mechanisms of affective value. Covers recent advances in understanding the emotional brain.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 5015
**Requisites:** Requires a prerequisite course of PSYC 2012 or (NRSC 2100 or (NRSC 2125 and NRSC 2150)) (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4032 (3) Neurobiology of Learning and Memory**
Provides a comprehensive treatment of how the brain acquires, stores, and retrieves memories. To do this we will consider (a) the methods used to address these issues, (b) what we know about how brain systems are organized to support memories of different types,and (c) the synaptic mechanisms that are involved.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 5032
**Requisites:** Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4042 (3) Systems Neuroscience**
Explores the neurophysiology, neuroanatomy and function of human sensory systems, motor systems, sensorimotor integration and higher level neurosystem function.
**Requisites:** Requires prerequisite of (PSYC 2012 or NRSC 2100 or (NRSC 2125 and 2150)) and one of the following (EBIO 1210 or MCDB 1111 or MCDB 1150) all require minimum grade of C-.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4062 (3) The Neurobiology of Stress**
Provides an introduction to the concept of stress and the physiological systems involved. Factors modulating stress vulnerability versus resilience, and stress interactions with other systems with health relevance will be explored. Emphasis will be placed on current research on brain mechanisms. Formerly PSYC 4062.
**Requisites:** Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4072 (3) Clinical Neuroscience: A Clinical and Pathological Perspective**
Provides a review of the anatomy and physiology of the nervous system and then explores how alterations in these systems can result in neurologic or psychiatric disorders. Emphasizes pathological neuroanatomy, neurophysiology and neuropharmacology, which is essential for understanding problems related to health and disease.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 5072
**Requisites:** Requires a prerequisite course of (NRSC 2100 or (NRSC 2125 and NRSC 2150)) and (EBIO 2070 or MCDB 2150), (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4082 (3) Neural Circuits of Learning and Decision Making**
Provides an in-depth survey of the neural mechanisms of learning, motivated behavior and decision making. Analysis will focus on the interaction of neural circuits underlying these processes with particular attention to the cellular, molecular and information-processing aspects of identified pathways and considered into the context learning-based and neuroeconomic models of choice.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 5082
**Requisites:** Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4092 (3) Behavioral Neuroendocrinology**
Provides an introduction to neuroendocrinology with a focus on the interaction between hormones on brain development and behaviorally relevant brain function, including reproductive behaviors, stress, biological rhythms and mood.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 5092
**Requisites:** Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4132 (3) Neuropharmacology**
Study of drug action within the central nervous system. This course is designed to provide a fundamental understanding of the neurobiological and neurochemical mechanisms of drug action. Topics covered include the following: 1) principles of pharmacology; 2) brain neurotransmitter systems; 3) biochemical basis of psychiatric disorders and their pharmacological treatment.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 5132
**Requisites:** Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4155 (4) Cognitive Neuroscience/Neuropsychology**
Introduction to cognitive neuroscience and neuropsychology. Provides a survey of the neuropsychological underpinnings for a wide range of cognitive functions: vision, object recognition, attention, language, memory and executive function. One lab per week.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 4155
**Requisites:** Requires a prerequisite course of PSYC 2111 and PSYC 3111 and (PSYC 2012 or NRSC 2100 or (NRSC 2125 and NRSC 2150)) (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4420 (3) Genetics of Brain and Behavior**
Examines the genetic underpinnings of animal behavior, including an examination of behavioral evolution and the use of genes as tools to examine neural architecture. We will cover topics including foraging, social behavior, personality, parental care and fear. We will explore these behaviors at multiple levels, including genomics, population genetics, molecular genetics, epigenetics, endocrinology and neurobiology. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4420
**Requisites:** Requires NRSC 2100 or (NRSC 2125 and NRSC 2150) and (EBIO 2070 or MCDB 2150). All minimum grade C-.
**Grading Basis:** Letter Grade

**NRSC 4542 (3) The Neurobiology of Mental Illness**
Provides in depth study of what is known concerning the neurobiology of mental illnesses, with a focus on depression and anxiety. Consideration will be given to both animal models and human work, with neurochemical, circuitry level, and neuroinflammatory processes to be highlighted. There will be discussion of the intricacies of determining the effectiveness of pharmacological treatments, and what the implications of such treatments might be.
**Requisites:** Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4545 (3) Neurobiology of Addiction**
Covers an intensive survey and synthesis of recent findings contributing to our understanding of the neurobiological basis of addiction. Analysis of both drug and behavioral addictions will be made at the molecular, cellular and neurocircuitry levels and synthesized into models utilizing common themes between various addictions and contributing pathologies.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 5545
**Requisites:** Requires prerequisite courses of (NRSC 2100 or (NRSC 2125 and NRSC 2150)) and NRSC 4132 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4561 (1-3) Special Topics in Neuroscience**
Presents and analyzes special interest topics from the broad and interdisciplinary field of neuroscience. The instructor determines the content of a particular section. Repeatable for up to 6 total credit hours.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4572 (3) Developmental Neurobiology**
Examines the molecular and cellular processes that generate a functional nervous system. Topics covered include cell fate determination, neurogenesis and gliogenesis, cell migration, axon pathfinding, synapse formation and synapse refinement. Also explores how alterations in development can result in neurologic or psychiatric disorders. Formerly offered as a special topics course.
**Requisites:** Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
**Recommended:** Prerequisite or corequisite MCDB 3135.

**NRSC 4841 (1-3) Independent Study in Neuroscience**
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Neuroscience (NRSC) majors only.

## Psychology

**PSYC 1001 (3) General Psychology**
Provides a foundation for engaging with scientific research on human behavior, and surveys the basic principles and theories of psychology. Topics include biological and hereditary influences on behavior; human perception, attention, learning, and memory; social influences; personality; psychiatric disorders and treatments.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Social Science

**PSYC 2012 (3) Biological Psychology**
Surveys biological bases of learning, motivation, emotion, sensory processes and perception, movement,comparative animal behavior, sexual and reproductive activity, instinctual behavior, neurobiology of language and thought, and neurophysiology and neuroanatomy in relation to behavior.
**Requisites:** Requires prerequisite PSYC 1001 (minimum grade C-).
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 2111 (4) Psychological Science I: Statistics**
Three hours of lecture and one two-hour lab per week. Introduces descriptive and inferential statistics and their roles in psychological research. Topics include correlation, regression, T-test, analysis of variance and selected nonparametric statistics.
**Requisites:** Requires prerequisite course of MATH 1011 or MATH 1150 or MATH 1212 or MATH 1300 or ECON 1078 or ECON 1088 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 2145 (3) Introductory Cognitive Psychology**
Introduces the study of human cognitive processes and covers perception, attention, memory, language, problem solving, reasoning, and decision making. Focuses on basic research and theory in cognitive psychology but also considers their implications for everyday applications such as effective learning and retention, multitasking, and eyewitness testimony.
**Requisites:** Requires a prerequisite course of PSYC 1001 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 2606 (3) Social Psychology**
Covers general psychological principles underlying social behavior. Analyzes major social psychological theories, methods, and topics, including attitudes, conformity, aggression, attraction, social perception, helping behavior, and group relations.
**Requisites:** Requires a prerequisite course of PSYC 1001 (minimum grade C-).
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 2700 (3) Psychology of Gender and Sexuality**
Examines psychological research on gender and sexuality as they intersect with race, class and other social categories. Points of emphasis include differences in cognition, attitudes, personality and social behavior. Conceptual themes include research methodologies, implicit and explicit attitudes, stigma and stereotypes. These elucidate such areas as close relationships, leadership, career success and mental health and happiness.
**Requisites:** Requires a prerequisite course of PSYC 1001 or WGST 2000 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**PSYC 3001 (4) Honors Research Methods Seminar**
Focuses on research design. Each student prepares an original, detailed research proposal, which can become the honors thesis. Open only to students who have been accepted into the psychology departmental honors program. Instructor consent required.
**Additional Information:** Arts Sciences Honors Course

**PSYC 3005 (3) Cognitive Science**
Introduces cognitive science, drawing from psychology, philosophy, artificial intelligence, neuroscience, and linguistics. Studies the linguistic relativity hypothesis, consciousness, categorization, linguistic rules, the mind-body problem, nature versus nurture, conceptual structure and metaphor, logic/problem solving and judgment. Emphasizes the nature, implications and limitations of the computational model of mind.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3702 and LING 3005 and PHIL 3310 and CSCI 3702 and SLHS 3003 and CSPB 3702
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 3102 (3) Behavioral Genetics**
This course introduces the basic principles of behavior genetics, the field of study that is interested in evaluating the different forces that shape individual differences. More specifically, the course will survey the evidence for genetic and environmental influences on a broad range of human behaviors, including psychopathology, personality, cognition, and substance use. This course also covers the different methods for evaluating these genetic and environmental contributions, including family-based designs that compare similarities across siblings, twins, and parents and their children, animal models of human behavior, and more recent genomic methods that measure our DNA. Lectures are largely about conceptually understanding findings from this field and the corresponding methods used to produce these findings. This course does not require a strong statistical or biological background to be successful or understand the material.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 3111 (4) Psychological Science 2: Research Methods in Psychology**
Provides a foundation in research methodology to give students the ability to design, conduct, analyze, and present (both verbally and in writing) an empirical study in psychology. Allows students to be effective producers and consumers of research.
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2111 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 3131 (3) Human Emotion**
Introduces students to a diverse array of theoretical and empirical issues related to the study of human emotion. Evolutionary theories of anger, love and disgust; emotion and morality; cultural and gender differences; emotion and the brain; relation between emotion and thinking; development of emotion; and abnormal emotions in mental illness.
**Requisites:** Requires a prerequisite course of PSYC 1001 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 3303 (3) Clinical Psychology: Psychological Disorders**
Examines etiological, theoretical, clinical,diagnostic, and experimental perspectives of major mental health disorders, with an emphasis on the main symptoms and diagnostic criteria associated with these disorders.
**Requisites:** Requires a prerequisite course of PSYC 1001 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 3456 (3) Psychology of Personality**
Offers a psychological study of structure, organization and development of the person as a whole. Analysis of major theories, methods and research, including topics such as emotion, motivation, temperament, inner experience, identity and the self, personality change and the influence of sociocultural context.
**Requisites:** Requires a prerequisite course of PSYC 1001 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 3511 (3) History of Psychology**
Includes outline of development of psychological theories since the Greek philosophers, the story of experimental psychology and its problems, and schools of psychological thinking. Students read original sources in English and English translations. Formerly PSYC 4511.
**Requisites:** Requires a prerequisite course of PSYC 1001 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PSYC 3684 (3) Developmental Psychology**
In-depth consideration of human developmental processes across the life span. Includes coverage of the major topics in human development, such as physical, cognitive, social, emotional, and moral development.
**Requisites:** Requires prerequisite of PSYC 1001 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites PSYC 2111 and PSYC 3111 (Both require minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Developmental

**PSYC 4001 (3) Honors Seminar 2**
Surveys contemporary issues, explores current controversies, and examines in detail selected topics in psychology. Open to juniors and seniors pursuing departmental honors.
**Additional Information:** Arts Sciences Honors Course

**PSYC 4011 (1-3) Senior Thesis**
Critically reviews some aspect of psychological literature, scholarly analysis of a major psychological issue, and/or empirical research project. See the psychology honors director for further information.
**Additional Information:** Departmental Category: General

**PSYC 4021 (3) Psychology and Neuroscience of Exercise**
Explores social, cognitive, psychobiological and behavioral aspects of exercise and other forms of physical activity. Examines how psychological and neuroscience research have been used to study how participation in regular physical activity affects mental health and how psychological and other variables influence participation in, adherence to, enjoyment of, and consequences of exercise and physical activity.
**Requisites:** Requires a prerequisite course of PSYC 2012 or NRSC 2100 or NRSC 2125 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 4031 (3) Sport Psychology**
Explores the role psychological factors play in the participation in, performance in, and enjoyment of sport. Topics include the role of motivation, attention, arousal, psychological skills training, leadership, and teamwork in sport performance; the psychological variables influencing exercise addiction, overtraining, burnout, body image, and susceptibility to, and recovery from, athletic injuries; and competition, cooperation aggression, and moral behavior in sport.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: General

**PSYC 4101 (3) Honors Thesis 1**
Completing an Honors Thesis under the direction of the course instructor will be the focus of this course. Students will each conduct an original, empirical research project, including developing the research idea, collecting and analyzing data, and writing their thesis, as well as practice their oral defense. Students will additionally acquire applied experience in research methods, statistics, and data analysis.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of PSYC 2111 and PSYC 3111 (minimum grade C-). Restricted to students with 3.3 GPA or higher.
**Grading Basis:** Letter Grade

**PSYC 4114 (3) Adolescent Development and Learning for Teachers**
Examines current theory and research about adolescent learning and development and explore implications for secondary teaching. Topics include human diversity as a resource for learning, adversity and agency, connecting instruction to students' everyday lives, and the role of belonging and relationships in positive youth development. This course is appropriate for masters degree students.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4136 (4) Judgment and Decision Making**
Introduces the study of judgment and decision making processes (estimation, prediction and diagnosis, choice under certainty, and risky decision making) and the methods that have been developed to improve these processes (statistical modeling, decision analysis, and expert systems).
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2606 and PSYC 2111 and PSYC 3111 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Psychology (PSYC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4142 (3) Brain Injury, Plasticity and Recovery: From Neuron to Behavior**
Traumatic brain injury is prevalent in all aspects of society, with incidence rates varying according to age, gender, military affiliation and participation in certain sports. Delves into the full spectrum of consequences following injury, beginning with the individual neural cells in the brain through to the behaving individual. Covers strategies to improve functional recovery.
**Requisites:** Requires a prerequisite course of PSYC 2012 or NRSC 2100 or NRSC 2125 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) majors only.
**Recommended:** Prerequisite NRSC 4132.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 4145 (4) Advanced Cognitive Psychology**
Advanced course in human cognitive processes. Covers key aspects of cognition, such as perception, attention, learning, memory, language and thinking. Discusses major theories and ideas in terms of the research they have inspired. Emphasis varies with instructor. One lab per week and a research project is required.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 5145
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2145 and PSYC 2111 and PSYC 3111 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 4152 (4) Research Methods in Behavioral Genetics**
Analyze your own genome in this advanced course in behavioral genetics! Students will learn modern genomic analytic techniques by analyzing millions of single nucleotide polymorphisms across their own or a test genome (students' choice) and interpret results as they apply to complex traits, health conditions, ancestry, and relatedness. Students will also review primary-source research and reviews. Students learn and apply their analytic skills in laboratory practicals and demonstrate applied and theoretical knowledge in a cumulative paper.
**Requisites:** Requires prerequisite courses of PSYC 3111 and (EBIO 2070 or MCDB 2150 or PSYC 3102) (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 4155 (4) Cognitive Neuroscience/Neuropsychology**
Introduction to cognitive neuroscience and neuropsychology. Provides a survey of the neuropsychological underpinnings for a wide range of cognitive functions: vision, object recognition, attention, language, memory and executive function. One lab per week.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 4155
**Requisites:** Requires a prerequisite course of PSYC 2111 and PSYC 3111 and (PSYC 2012 or NRSC 2100 or (NRSC 2125 and NRSC 2150)) (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 4165 (4) Psychology of Perception**
One lab, three lect. per week. Analyzes peripheral and central mechanisms involved in the transduction and interpretation of experience. Gives special attention to vision and audition; major theories in these areas are discussed in terms of research they have inspired.
**Requisites:** Requires a prerequisite course of PSYC 1001 and PSYC 2111 and PSYC 3111 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 4175 (4) Computational Cognitive Neuroscience**
Introduction to cognitive neuroscience (how the brain gives rise to thought) using computer simulations based on the neural networks of the brain. Covers a full range of cognitive phenomena including perception and attention, learning and memory, language, and higher-level cognition based on both large-scale cortical neuroanatomy and detailed properties of cortical neural networks. One lab per week.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 5175
**Requisites:** Requires prereq of PSYC 1001 and (PSYC 2012 or NRSC 2100 or NRSC 2125) and PSYC 2111 and PSYC 3111 (minimum grade of C-). Restricted to PSYC or NRSC majors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 4201 (3) Honors Thesis 2**
Completing an Honors Thesis under the direction of the instructor will be the focus of this course. Students will each conduct an original, empirical research project, including developing the research idea, collecting and analyzing data, and writing their thesis, as well as practice their oral defense. Students will additionally acquire applied experience in research methods, statistics and data analysis.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of PSYC 2111 and PSYC 3111 (minimum grade C-). Restricted to students with GPA of 3.3 or higher.
**Grading Basis:** Letter Grade

**PSYC 4220 (3) Language and Mind**
Studies topics such a speech perception, word recognition, sentence comprehension, language acquisition, bilingualism, reading and writing. Examines the role of language as a product and producer of the mind, studying interactions between language and cognition from an interdisciplinary perspective. Students will become familiar with the methods of psycholinguistics and design and conduct a psycholinguistic experiment on their own.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4220
**Recommended:** Prerequisites PSYC 1001 and LING 2000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4225 (4) Interdisciplinary Research Methods in Child Language Acquisition**
Explores fundamental issues in language acquisition cross-culturally, combining methods from Linguistics, Anthropology, Psychology and Computer Science. Students will explore theoretical issue using a hands-on approach that involves acquiring skills such as designing and conducting experiments, investigating corpus data, and computational modeling.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4225
**Requisites:** Requires a prerequisite course of PSYC 1001 or LING 2000 (minimum grade C).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4263 (3) Psychological Treatment: An Evidence-Based Approach**
Provides an intensive introduction to behavioral interventions for common mental health problems and the framework of evidence-based practice in psychology, including helping students to acquire, critically evaluate and communicate about clinical psychological science intervention research and become familiar with applied skills that are relevant to a broad range of clinical settings.
**Requisites:** Requires prerequisite courses of PSYC 2111 and PSYC 3111 and PSYC 3303 (all minimum grade C-)
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4332 (1) Found in Translation: TBI From Bench to Bedside to Community**
Traumatic Brain Injury (TBI) is prevalent in all aspects of society. Delves into all aspects of TBI, with particular emphasis on translational clinical neuroscience. That is, the movement of knowledge from bench, to bedside, to community. All of this knowledge resulting in better treatment of and outcome for those with TBI.
**Requisites:** Requires prerequisite courses of PSYC 2012 or NRSC 2100 or NRSC 2125 (minimum grade C-). Restricted to students with 57-180 units (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 4376 (4) Research Methods in Social Psychology**
Introduces the study of social psychological processes, emphasizing the social cognition perspective (e.g., stereotyping, person perception, theory of planned behavior) and the methods utilized in studying these processes. Students will complete research projects as part of the course.
**Requisites:** Requires prerequisite courses of PSYC 2606 and PSYC 2111 and PSYC 3111 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Psychology (PSYC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4377 (4) Research Methods in Positive Psychology**
This research methods course will examine the science of human flourishing from the viewpoint of experimental positive psychology. Empirical research methods will be examined in the context of nine factors related to human flourishing: signature strengths, savoring, gratitude, kindness, social connection, exercise, sleep, mindfulness, and nature. Students will apply course material in a class experiment with individual research reports and presentations as a cumulative course experience.
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2111 and PSYC 3111 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4378 (4) Research Methods in Conservation Psychology**
This course will examine the science behind how psychological processes influence behaviors that help or hurt the environment and how psychology can help encourage environmental conservation. Empirical research methods will be examined in the context of nine factors related to the human-nature connection: Environmental Attitudes & Values, Pro-environmental Behaviors, Social Influence & Environmental Action, Environmental Education & Communication, Human-Nature Relationships, Environmental Justice & Ethics, Psychological Impacts, Policy & Governance.
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2111 and PSYC 3111 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4399 (4) Qualitative Research Methods in Psychology**
In this Lab and Methods course, we will take a deeper dive into different types of qualitative research approaches, such as observation, interviewing, and multimodal (e.g., text, media) analysis, to learn how each method can help us investigate elements of the human experience that we might otherwise not be able to study. We will cover basic theoretical principles of qualitative inquiry and acquire a general understanding of how different qualitative methods work. Through discussions, critique, a student-created ¿mini study,¿ and lots of hands-on practice, you will explore different ways of investigating our world in a scientific, but non-statistical, way that accurately and ethically uplifts the voices of your study participants. The goal of this course is to help you develop skills in qualitative research that will serve you well as a researcher or practitioner in psychology.
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2111 and PSYC 3111 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4443 (4) Research Methods in Clinical Psychology**
Learn to evaluate research methods as they relate to etiology, assessment, and intervention of psychological disorders. Emphasizes the importance of using sound methodological strategies in both research and clinical settings.
**Requisites:** Requires prerequisite courses of PSYC 2111 and PSYC 3111 and PSYC 3303 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4526 (3) Social Neuroscience**
Develops greater knowledge of the general psychological principles underlying social behavior by using methods and theories from neuroscience. Students learn about common methods in human neuroscience and how they can be applied to better understand social behavior.
**Requisites:** Requires prerequisite courses of (PSYC 2012 or NRSC 2100 or NRSC 2125) and PSYC 2111 and PSYC 2606 and PSYC 3111 (all minimum grade C-). Restricted to students with 57-180 credits (junior or senior) Psychology (PSYC) or Neuroscience (NRSC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4541 (3) Special Topics in Psychology - Social Science**
Examines individual or social dimensions of human behavior. Students will develop expertise in basic theories, as well as in measurement techniques and data interpretation regarding issues of societal significance. Students will consider applications of that knowledge, ranging from the development of new theory to solving problems. Particular section content is determined by instructor. PSYC 4541 and/or PSYC 4551 may be taken 3 times with different topics, for a total of 9 credits
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2111 and PSYC 3111 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Psychology (PSYC) majors only.

**PSYC 4542 (3) Public Health Capstone Research Methods: Environmental Interventions to the Mental Health Epidemic**
This course will introduce students to interdisciplinary research methods in public health, with a focus on environmental interventions to address mental health. Robust data shows that spending time in nature can positively impact mental health. This course will teach students about the many phases of the scientific research process through doing; students will work in small groups to do their own research project throughout the semester on a pre-picked topic that can change from year to year.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4542 and PBHL 4542
**Requisites:** Prerequisites: Restricted to Public Health majors or those pursuing the Public Health certificate. Also, must have taken one of the following: ANTH 4000, ECON 3818, GEOG 3023, IPHY 3280, MATH 2510, PSCI 2075, PSYC 2111, SOCY 2061, STAT 2600.
**Recommended:** Prerequisite Students who are interested in taking this course but do not meet these requirements must have instructor approval.

**PSYC 4543 (3) Clinical Neuropsychological Disorders**
Neuropsychological disorders are behavioral and cognitive expressions of underlying brain diseases or injury. The course will provide in-depth coverage from clinical perspectives of wide range of disorders caused by stroke, traumatic brain injury, degenerative diseases, and inflammatory diseases. Students will learn the various neurologic, neuroimaging and neuropsychological methods for assessing and diagnosing these disorders and will review specific illustrative cases.
**Requisites:** Requires prerequisite PSYC 1001 and (PSYC 2012 or NRSC 2100 or NRSC 2125) (all minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 4553 (3) Women's Mental Health: A Biopsychosocial Approach**
Provides a broad overview of current research and theory related to women's mental health, emphasizing topics and problems that are prevalent among or particularly relevant to women. Teaches students to develop a critical and integrative understanding women's mental health, including historical, social, cultural, biolotgical, behavioral, cognitive and emotional factors.
**Requisites:** Requires a prerequisite course of PSYC 3303 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Psychology (PSYC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4560 (3) Language Development**
Covers the development of language in childhood and into adult life, emphasizing the role of environment and biological endowment in learning to communicate with words, sentences, and narratives.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4560 and SLHS 4560
**Requisites:** Restricted to Psychology (PSYC) or Neuroscience (NRSC) majors only.
**Recommended:** Prerequisite PSYC 1001 and LING 2000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4606 (3) Advanced Topics in Social Psychology**
In-depth study of selected topics in social psychology. Particular section content each semester is determined by the instructor. May be repeated for a maximum of 6 credit hours, provided the topics vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2606 and PSYC 2111 and PSYC 3111 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Psychology (PSYC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4655 (4) Community-based Research and Design**
There is a growing recognition that in designing products, interventions, and systems, it is critical to involve the people who will be using those products, experiencing those interventions, and participating in those systems. The field of developmental psychology studies how people grow, change, and adapt over time. The fields of participatory and design research combine methods from different disciplines to guide design and implementation. In this course, you will collaborate with local community partners to design, prototype, implement, and refine a learning experience for young children. By the end of this class you will be able to combine theory- and evidence-based principles from cognitive development with methods and tools from community-based and participatory research to create and evaluate a design product.
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2111 and PSYC 2145 and PSYC 3111 (all minimum grade C-).
**Recommended:** Prerequisite PSYC 3684.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 4713 (3) Survey of Clinical Psychology**
Covers theories and practices relating to problems of ability and maladjustment. Diagnostic procedures and treatment methods with children and adults.
**Requisites:** Requires a prerequisite course of PSYC 3303 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Psychology (PSYC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4733 (4) Psychological Testing and Assessment**
Provides an overview of issues central to testing and assessment of psychological constructs, including types of evaluation instruments currently in use inthe field, their applications and design.
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2111 and 3111 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4744 (4) Methods in Developmental Psychology**
Learn to critically read and form hypotheses from studies in the developmental literature, gain hands-on experience in testing children and in the design of methods to test children, evaluate experimental data and relate them to hypotheses, previous results and theory, and write so others can understand.
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2111 and PSYC 3111 and PSYC 3684 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Psychology (PSYC) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4841 (1-6) Independent Study (Upper Division)**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Psychology (PSYC) majors only.

**PSYC 4911 (3) Teaching of Psychology**
Students receive concrete experience in teaching general psychology under supervision of a psychology faculty member. Alternative pedagogical strategies are discussed. Students must submit an application to the undergraduate advising center.
**Additional Information:** Departmental Category: General

**PSYC 4931 (1-6) Field Placement Internship**
Offers valuable volunteer experience through a supervised field placement. Provides hands-on insight into the decisions and issues that confront professionals in psychology and related fields.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Psychology (PSYC) majors only.
**Recommended:** Prerequisite completion of 15 or more hours of psychology course work.
**Additional Information:** Departmental Category: General

# Neuroscience - Bachelor of Arts (BA)

Our neuroscience major provides a fundamental understanding of brain function that emerges from knowledge of the interplay of the molecular, cellular and systems—level operation of the nervous system. Our distinguished faculty also teach excellent upper division courses in areas of expertise that include, but are not limited to, learning and memory, addiction, mental illness, stress, neuroendocrinology, neurogenetics and neurocircuits of motivated behavior.

# Requirements

## Prerequisites

It is policy to enforce the course prerequisites listed in the course descriptions. If a student has not either taken and passed (C- or better) the prerequisites for a course, or obtained permission from the instructor or a departmental advisor to take the course based on equivalent preparatory coursework or experience here or elsewhere, the student may be administratively dropped from the course.

## Degree Requirements

The neuroscience major requires a minimum of 37 credit hours in neuroscience coursework, including a minimum of 21 upper-division credit hours, and additional ancillary foundation coursework in biology and chemistry. The ancillary courses provide an important foundation for the overall curriculum and should be started early in the major. The ancillary biology lecture requirement must be completed (with a grade of C- or better) to begin any NRSC coursework.

The department recommends taking the ancillary biology and genetics requirements in the first year. The department also recommends completing the ancillary general chemistry sequence, NRSC 2125, NRSC 2150 and NRSC 2200, and statistics requirements within the first 2.5 years (5 semesters) of study.

Students must complete the general requirements of the College of Arts and Sciences (General Education, graduation, and credit requirements) and the requirements listed below. Students must fulfill all the following requirements with a grade of C- or better. None of the courses taken to fill these requirements may be taken pass/fail; courses must be taken for a letter grade. The cumulative GPA in courses that can count toward the major must be at least 2.000.

### Required Major Courses

| Code | Title | Credit Hours |
|---|---|---|
| **Required Major Courses** | | |
| NRSC 2125 | Introduction to Neuroscience I: Foundations | 4 |
| NRSC 2150 | Introduction to Neuroscience II: Systems | 4 |
| NRSC 2200 | Laboratory Techniques in Neuroscience | 2 |
| Select one of the following genetics courses: [1] | | 3-4 |
| MCDB 2150 | Principles of Genetics (preferred) | |
| EBIO 2070 | Genetics: Molecules to Populations | |
| Select one of the following statistics/computation courses: | | 3-4 |
| PSYC 2111 | Psychological Science I: Statistics (preferred) | |
| EBIO 1010 | Introduction to Statistics and Quantitative Thinking for Biologists | |
| ECON 3818 | Introduction to Statistics with Computer Applications | |
| IPHY 3280 | Intro to Data Science and Biostatistics | |
| MATH 2510 | Introduction to Statistics | |
| BCOR 1025 | Statistical Analysis in Business | |
| CSCI 3022 | Introduction to Data Science with Probability and Statistics | |
| SOCY 2061 | Introduction to Social Statistics | |
| **Upper-division Neuroscience Requirements** | | |
| MCDB 3135 | Molecular Biology (one will count as an UD elective if both are taken) | 3 |
| or MCDB 3145 | Cell Biology | |
| Select at least four of the following Neuroscience courses: | | 12 |
| NRSC 4032 | Neurobiology of Learning and Memory | |
| NRSC 4062 | The Neurobiology of Stress | |
| NRSC 4545 | Neurobiology of Addiction | |
| NRSC 4572 | Developmental Neurobiology | |
| NRSC 4072 | Clinical Neuroscience: A Clinical and Pathological Perspective | |
| NRSC 4082 | Neural Circuits of Learning and Decision Making | |
| NRSC 4092 | Behavioral Neuroendocrinology | |
| NRSC 4132 | Neuropharmacology | |
| NRSC/MCDB 4420 | Genetics of Brain and Behavior | |
| *Upper-division major electives* | | |
| Select 6 credit hours of upper-division elective coursework by taking additional courses from the upper-division requirements above or from the following neuroscience and general science electives. [1] | | 6 |
| BCHM 3300 | Genetic Engineering: Science, Technology, and Society | |
| BCHM 3450 | Principles of Pharmacology and Toxicology | |
| BCHM 4312 | Quantitative Optical Imaging | |
| BCHM 4720 | Metabolic Pathways and Human Disease | |
| BCHM 4611 | Principles of Biochemistry | |
| BCHM 4631 | Computational Genomics Lab | |
| EBIO 3240 | Animal Behavior | |

| | |
|---|---|
| EBIO 4420 | Computational Biology |
| IPHY 3410 | Human Anatomy |
| IPHY 3430 | Human Physiology |
| IPHY 3590 | Health and Function over the Adult Lifespan |
| IPHY 4200 | Physiological Genetics and Genomics |
| IPHY 4580 | Sleep Physiology |
| IPHY 4720 | Neurophysiology |
| IPHY 4780 | Sleep, Circadian Rhythms, and Health |
| IPHY 4880 | Advanced Data Analysis in Biomedical Research |
| MCDB 3450 | Biological Data Science |
| MCDB 4312 | Quantitative Optical Imaging |
| or BCHM 4312 | Quantitative Optical Imaging |
| MCDB 4426 | Cell Signaling and Developmental Regulation |
| MCDB 4444 | Cellular Basis of Disease |
| MCDB 4680 | Mechanisms of Aging |
| MCDB 4777 | Molecular Neurobiology |
| NRSC 4011 | Senior Thesis |
| NRSC 4015 | Affective Neuroscience |
| NRSC 4042 | Systems Neuroscience |
| NRSC/PSYC 4155 | Cognitive Neuroscience/ Neuropsychology |
| NRSC 4561 | Special Topics in Neuroscience |
| PSYC 4152 | Research Methods in Behavioral Genetics |
| PSYC 4165 | Psychology of Perception |
| PSYC 4526 | Social Neuroscience |
| PSYC 4543 | Clinical Neuropsychological Disorders |
| SLHS 4576 | Communication Neuroscience |
| **Total Credit Hours** | **37-39** |

### Required Ancillary Foundation Courses

| Code | Title | Credit Hours |
|---|---|---|
| **Ancillary Introductory Biology and Laboratory Requirement** | | **4-5** |
| Select one of the two following: | | |
| MCDB 1150 | Introduction to Cellular and Molecular Biology (with 2 credit lab MCDB 1161, MCDB 1171, MCDB 1181/IPHY 1181, MCDB 2161, MCDB 2171) | |
| EBIO 1210 & EBIO 1230 | General Biology 1 and General Biology Laboratory 1 | |
| **Ancillary General Chemistry Sequence Requirement** | | **10** |
| Select one of the following options: | | |
| Option 1: | | |
| CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 | |
| CHEM 1133 & CHEM 1134 | General Chemistry 2 and Laboratory in General Chemistry 2 | |
| Option 2: | | |
| | Biochemistry/Chemistry double majors and Engineering double degree students: Please check with your NRSC advisor for approved alternative options, including the "for-majors" CHEM courses. | |
| **Total Credit Hours** | | **14-15** |

1 Please check all prerequisites and corequisites before enrolling in courses.

2 Students planning graduate/medical school or work in the biotechnology industry should also take CHEM 3311 and CHEM 3331. Students should verify program requirements for any additional chemistry prerequisites.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major.

To maintain adequate progress in neuroscience, students should meet the following requirements:

- The neuroscience major ideally should be started in the first semester. Adequate progress is defined as cumulative completion of at least one fourth of the required coursework for the major during each academic year, including the following specific requirements: a) The ancillary introduction to biology requirement and the genetics requirement ideally should be completed during the first year; b) All ancillary requirements and Introduction to Neuroscience I and II ideally should be completed by the end of the second year.
- The neuroscience major requires at least 51 hours of required coursework.
- The four-year guarantee also requires completion of 30 hours of General Education courses by the end of the sophomore year.

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will complete all 12 credits of the Natural Sciences area of the Gen Ed Distribution Requirement, including the lab component, and possibly the QRMS component of the Gen Ed Skills Requirement.

| **Year One** | | |
|---|---|---|
| **Fall Semester** | | **Credit Hours** |
| MCDB 1150 | Introduction to Cellular and Molecular Biology | 3 |
| MCDB 1161 or MCDB 1171 | From Dirt to DNA: Phage Genomics Laboratory I or Antibiotics Discovery Through Hands-on Screens I | 2 |
| MCDB 1152 | Problem Solving Co-Seminar for Introduction to Molecular and Cellular Biology | 1 |
| NRSC 1020 | Exploring the Neuroscience Major (OPTIONAL) | 1 |
| General Education Requirement (example: Lower-division Written Communication) | | 3 |
| General Education Requirement (example: Arts & Humanities, Social Science) | | 3 |

| | | |
|---|---|---|
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| Genetics (MCDB 2150 or EBIO 2070) | | 3-4 |
| MCDB 2152 | Problem Solving Co-Seminars for Genetics | 1 |
| CHEM 1021 | Introductory Chemistry | 4 |
| General Education Requirement (example: Arts & Humanities, Social Science) | | 3 |
| General Education Requirement (example: Arts & Humanities, Social Science) | | 3 |
| | **Credit Hours** | **14-15** |
| **Year Two** | | |
| **Fall Semester** | | |
| CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 | 5 |
| NRSC 2125 | Introduction to Neuroscience I: Foundations | 4 |
| General Education Requirement (example: Arts & Humanities, Social Science) | | 3 |
| General Education Requirement (example: Diversity) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| CHEM 1133 & CHEM 1134 | General Chemistry 2 and Laboratory in General Chemistry 2 | 5 |
| NRSC 2150 | Introduction to Neuroscience II: Systems | 4 |
| General Education Requirement (example: Diversity) | | 3 |
| General Education Requirement (example: Arts & Humanities, Social Science) | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| NRSC 2200 | Laboratory Techniques in Neuroscience | 2 |
| MATH 2510 | Introduction to Statistics | 3 |
| MCDB 3135 or MCDB 3145 | Molecular Biology or Cell Biology | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Elective (lower-division or upper-division) | | 1-3 |
| | **Credit Hours** | **15-17** |
| **Spring Semester** | | |
| Upper-division NRSC Core course | | 3 |
| Upper-division NRSC Core course | | 3 |
| General Education Requirement (example: Upper-division Written Communication) | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| Upper-division NRSC Core course | | 3 |
| Upper-division NRSC Core course | | 3 |
| Upper-division Elective | | 3 |
| Upper division Elective | | 3 |
| General Education Requirement (example: Arts & Humanities, Social Science) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| Upper-division NRSC Elective | | 3 |
| Upper-division NRSC Elective | | 3 |
| Upper-division Elective | | 3 |
| Elective (lower-division or upper-division) | | 3 |
| Elective (lower-division or upper-division) | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **120-123** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate knowledge of the structural organization and functional components of the nervous system, including intracellular and intercellular signaling.
- Demonstrate understanding of the systems and circuits of the brain and nervous system that control specific functions.
- Demonstrate understanding of the important mechanistic relationship between nervous system function and health (physiological, neurological and psychological health).
- Read, evaluate and interpret primary literature in the neuroscience field.
- Design experiments, critically evaluate experimental design and analyze experimental data related to the neuroscience field.
- Effectively communicate information in the neuroscience field.

# Psychology - Bachelor of Arts (BA)

The psychology major provides a fundamental understanding of the principles of human cognition, emotion, behavior, social interactions and mind-brain relationships. Our distinguished faculty also teach specialized upper-division courses in behavioral genetics, neuroscience, cognitive psychology, clinical psychology, child development, social psychology, and judgment and decision making.

# Requirements

## Prerequisites

It is policy to enforce the course prerequisites listed in the course descriptions. If you have not either taken and passed (C- or better) the prerequisites for a course or obtained permission from the instructor to take the course based on equivalent preparatory coursework, you may be administratively dropped from the course.

## Degree Requirements

Students must complete the general requirements of the College of Arts and Sciences and the requirements for the major, listed below.

A major in psychology requires a minimum of 36 credit hours in psychology courses. At least 20 of these credit hours must be in upper-division PSYC or NRSC coursework that includes a minimum of 10 credit hours at the 4000 level. Students must complete a minimum of 12 upper-division credit hours of psychology coursework on the Boulder campus

with a C- or better. Of those 12 credit hours, one laboratory and methods course must be included.

All required major courses and all required ancillary courses must be passed with a C- or better and cannot be taken pass/fail. Students must have a GPA of at least 2.000 in the major in order to graduate, and no more than 45 credits in PSYC may be applied to overall graduation requirements.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Psychology Core** | | |
| PSYC 1001 | General Psychology | 3 |
| PSYC 2111 | Psychological Science I: Statistics | 4 |
| PSYC 3111 | Psychological Science 2: Research Methods in Psychology | 4 |
| **Required Courses** | | |
| Select 4 out of 5 from the following options: | | 12 |
| PSYC 2012 | Biological Psychology | |
| PSYC 2145 | Introductory Cognitive Psychology | |
| PSYC 2606 | Social Psychology | |
| PSYC 3102 | Behavioral Genetics | |
| PSYC 3303 | Clinical Psychology: Psychological Disorders | |
| **Laboratory and Methods Course** | | |
| Select at least one upper-division course from the following: | | 4 |
| PSYC 4136 | Judgment and Decision Making | |
| PSYC 4145 | Advanced Cognitive Psychology | |
| PSYC 4152 | Research Methods in Behavioral Genetics | |
| PSYC/NRSC 4155 | Cognitive Neuroscience/ Neuropsychology | |
| PSYC 4165 | Psychology of Perception | |
| PSYC 4376 | Research Methods in Social Psychology | |
| PSYC 4377 | Research Methods in Positive Psychology | |
| PSYC 4378 | Research Methods in Conservation Psychology | |
| PSYC 4399 | Qualitative Research Methods in Psychology | |
| PSYC 4443 | Research Methods in Clinical Psychology | |
| PSYC 4655 | Community-based Research and Design | |
| **Upper-Division Major Electives** | | |
| Complete 9 credits of applicable electives, including: | | 9 |
| 3 credits of upper-division elective in PSYC or NRSC (3000 or 4000-level) | | |
| 3 credits of 4000-level elective in PSYC or NRSC | | |
| 3 credits of 4000-level elective either in PSYC/NRSC or from an approved list of external elective courses, including SOCY 4014, SOCY 4031, SOCY 4024, SOCY 4086, SOCY 4063. A maximum of one (3 credit) external elective can be counted toward the PSYC major requirements and hours. | | |
| **Total Credit Hours** | | **36** |

| Code | Title | Credit Hours |
|---|---|---|
| **Ancillary Natural Science sequence (some courses may have required labs):** | | |
| Select one of the following natural science sequences: [1] | | 6-10 |
| CHEM 1011 & CHEM 1031 | Environmental Chemistry 1 and Environmental Chemistry 2 | |
| CHEM 1113 & CHEM 1133 | General Chemistry 1 and General Chemistry 2 | |
| CHEM 1400 & CHEM 2100 | Foundations of Chemistry and Foundations of Chemistry 2 | |
| EBIO 1210 & EBIO 1220 | General Biology 1 and General Biology 2 | |
| MCDB 1150 & MCDB 2150 | Introduction to Cellular and Molecular Biology and Principles of Genetics | |
| MCDB 1150 & EBIO 1220 | Introduction to Cellular and Molecular Biology and General Biology 2 | |
| PHYS 1110 & PHYS 1120 | General Physics 1 and General Physics 2 (calculus based) | |
| PHYS 2010 & PHYS 2020 | General Physics 1 and General Physics 2 (algebra based) | |
| **Ancillary Math requirement:** | | |
| Select one of the following courses: [1] | | 3-5 |
| MATH 1011 | College Algebra | |
| MATH 1150 | Precalculus Mathematics | |
| MATH 1212 | Data and Models | |
| MATH 1300 | Calculus 1 | |

[1] The student is required to pass with a grade of C- or better.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The department recommends taking PSYC 1001, PSYC 2111 and three of the four required courses (select from PSYC 2012, PSYC 2145, PSYC 2606, PSYC 3102 and PSYC 3303) by the end of the sophomore year. It is recommend that the math prerequisite for PSYC 2111 be taken by the end of the first year. It is also recommended that the two-part sequence, PSYC 2111 and PSYC 3111 , be taken in consecutive semesters if possible, although completing the two classes over three semesters is also acceptable. It is recommended that PSYC 3111 be completed by the end of the fifth semester.

# Recommended Four-Year Plan of Study

This is a *sample* four-year plan that provides one option to complete the BA in Psychology. There are other possible pathways, depending on the timing of the Psychological Science 1 and 2 sequence (PSYC 2111 and PSYC 3111). Meeting routinely with a departmental advisor is recommended to develop a four-year plan most applicable to students' individual circumstances and goals.

*Note:* Wherever "elective" is listed, students may take coursework that applies to a second major, minor or certificate program instead. Work with an advisor to help plan for additional academic credentials.

Through the required coursework for the major, students will complete at least 7 credits in the social sciences area and all 12 credits of the natural

sciences area of the Gen Ed Distribution Requirement. This may include the lab component (PSYC 2111 meets the Gen Ed Natural Science lab requirement) as well as the quantitative reasoning and mathematical skills (QRMS) component of the Gen Ed Skills Requirement.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| PSYC 1001 | General Psychology | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Psychology approved Ancillary Natural Science sequence part 1 (example: EBIO 1210; also partially fulfills Gen. Ed.: Natural Sciences) [1] | | 3 |
| Gen. Ed. Skills or Distribution course (example: Foreign Language or Arts & Humanities) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| Required Psychology Course 1 of 4 (e.g. PSYC 2012, PSYC 2145, or PSYC 2606) | | 3 |
| MATH Ancillary course (MATH 1212, MATH 1011, MATH 1150, or MATH 1300, also fulfills Gen. Ed. Skills: QRMS) | | 3 |
| Psychology approved Ancillary Natural Science sequence part 2 (example: EBIO 1220; also partially fulfills Gen. Ed.: Natural Sciences) [1] | | 3 |
| Gen. Ed. Skills or Distribution course (example: Arts & Humanities or lower-division Written Communication) | | 3-5 |
| Elective | | 3 |
| | **Credit Hours** | **15-17** |
| **Year Two** | | |
| **Fall Semester** | | |
| PSYC 2111 | Psychological Science I: Statistics | 4 |
| Required Psychology Course 2 of 4 (e.g. PSYC 2012, PSYC 2145, or PSYC 2606) | | 3 |
| Gen Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **13** |
| **Spring Semester** | | |
| PSYC 3111 | Psychological Science 2: Research Methods in Psychology [2] | 4 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/Global Perspective) | | 3 |
| Required Psychology Course 3 of 4 (PSYC 2012, PSYC 2145, PSYC 2606, PSYC 3102, or PSYC 3303) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Year Three** | | |
| **Fall Semester** | | |
| Required Psychology Course 4 of 4 (PSYC 2012, PSYC 2145, PSYC 2606, PSYC 3102, or PSYC 3303) | | 3 |
| PSYC Elective: 3000 level | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| PSYC Elective: 4000 level (or external elective from approved list) | | 3 |
| Upper-division Elective | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| PSYC Approved Laboratory and Methods course (or PSYC Elective: 4000 level) | | 4 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| PSYC Elective: 4000 level (or PSYC Approved Laboratory and Methods course if not taken in 7th semester) | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **120-122** |

1 Other choices for PSYC approved Ancillary Natural Science sequence can be found on the Requirements page, but EBIO 1210 (https://catalog.colorado.edu/search/?P=EBIO%201210) and EBIO 1220 (https://catalog.colorado.edu/search/?P=EBIO%201220) are the most common. Recommended to be completed by the end of the sophomore year.

2 It is recommended that the two-part sequence, PSYC 2111 and PSYC 3111, be taken in consecutive semesters if possible, although completing the two classes over three semesters is also acceptable. It is recommended that PSYC 3111 be completed by the end of the 5th semester.

# Learning Outcomes

By the completion of the program, students will be able to:

- Achieve a fundamental understanding of the principles of human cognition, emotion, behavior, social interactions and mind-brain relationships; including the scientific basis for this knowledge and methods by which this knowledge is obtained.
- Learn the principles and application of psychological statistical analysis including how to analyze and report experimental results.
- Learn the principles and application of psychological research design.
- Learn how to evaluate and interpret relevant primary literatures.
- Learn how to apply knowledge of psychological principles and the study of human behavior.

# Neurosciences and Behavior - Certificate

The neurosciences certificate program encourages undergraduate students interested in how the brain controls behavior to take courses in the basic sciences while providing the means to specialize in neuroscience.

Since this subdiscipline of the biological sciences spans a number of departments at the university (e.g., integrative physiology, psychology & neuroscience and MCD biology), students are encouraged to obtain greater academic breadth through interdepartmental course selection.

For more information, visit the Undergraduate Certificate in Neuroscience (https://www.colorado.edu/neuroscience/undergraduate-education/) website.

## Requirements

To obtain the certificate, a student must satisfy the requirements of a major other than the NRSC major and the requirements of the neuroscience certificate and maintain an overall grade point average of 3.20 or better. All courses must be taken for a letter grade (no pass/fail).

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| *General Chemistry sequence with lab (or equivalent sequence)* | | |
| CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 | 5 |
| CHEM 1133 & CHEM 1134 | General Chemistry 2 and Laboratory in General Chemistry 2 | 5 |
| *General Physics sequence with lab (or equivalent sequence)* | | |
| PHYS 2010 & PHYS 2020 | General Physics 1 and General Physics 2 | 10 |
| *Biology with lab* | | *6* |
| Select one of the two options (or approved equivalent biology courses): | | |
| MCDB 1150 & MCDB 1152 | Introduction to Cellular and Molecular Biology and Problem Solving Co-Seminar for Introduction to Molecular and Cellular Biology | |
| or MCDB 1161 | From Dirt to DNA: Phage Genomics Laboratory I | |
| or MCDB 1171 | Antibiotics Discovery Through Hands-on Screens I | |
| or MCDB 1181 | Biological Probiotic/Drug Discovery Through Hands-on Screens | |
| EBIO 1210 & EBIO 1230 | General Biology 1 and General Biology Laboratory 1 | |
| *Introduction to Neuroscience:* | | *8* |
| NRSC 2125 & NRSC 2150 | Introduction to Neuroscience I: Foundations and Introduction to Neuroscience II: Systems | |
| *General Genetics* | | *3* |
| Select one of the following: | | |
| EBIO 2070 | Genetics: Molecules to Populations | |
| MCDB 2150 | Principles of Genetics | |
| IPHY 4200 | Physiological Genetics and Genomics | |
| Or an approved equivalent general genetics course | | |
| *Statistics* | | *3-4* |
| Select one of the following: | | |
| PSYC 2111 | Psychological Science I: Statistics | |
| IPHY 3280 | Intro to Data Science and Biostatistics | |
| EBIO 1010 | Introduction to Statistics and Quantitative Thinking for Biologists | |
| EBIO 4410 | Biological Statistics | |
| MATH 2510 | Introduction to Statistics | |
| Or an approved equivalent statistics course | | |
| *Electives* | | *3* |
| At least one additional upper - division Neuroscience/Behavior courses in IPHY, MCDB, PSYC or another department. | | |
| **Total Credit Hours** | | **43-44** |

For more information on this certificate and answers to frequently asked questions, see the Neuroscience Undergraduate Certificate (https://www.colorado.edu/neuroscience/undergraduate-education/) website or email Professor Serge Campeau (Serge.Campeau@Colorado.EDU), director of the program.

# Public Health

As the world becomes more interconnected, our communities and populations face increasingly complex health challenges emerging through the interaction of individual vulnerability and behavior, cultural and social factors, environmental and geographic influences, as well as economic and political dynamics. Addressing these public health challenges requires innovative approaches arising from multiple disciplines.

According to the Association of Schools & Programs of Public Health (ASPPH) (http://aspph.org/discover/), public health is the science and art of protecting and improving the health of communities through education, promotion of healthy lifestyles, and research for disease and injury prevention. Public health helps improve the health and well being of people in local communities and around the globe. Public health works to prevent health problems before they occur.

## Core Areas of Public Health

While public health is defined in many different ways, the following is a list of core areas that are often associated with public health. For more information, visit the What is Public Health? (http://aspph.org/study/) website.

- Biostatistics: Statistical science applied to health and biomedical data.
- Environmental health: The impact of air, water and the built environment on health.
- Epidemiology: The study of the frequency, distribution and determinants of disease.
- Health administration and management: Managing human and fiscal resources to deliver public health services.
- Global health: Addressing health challenges across the world.
- Maternal and child health: Improving the health of women, children and their families.
- Nutrition: How food and nutrients impact the health of populations.

- Public health laboratory practice: Diagnose, prevent, treat and control infectious disease.
- Public health policy: The role of policy and policy decisions on public health.
- Public health practice: Incorporating public health principles into clinical practice.
- Social and behavioral science: The study of social and behavioral determinants of health.

## Bachelor's Degree

- Public Health - Bachelor of Arts (BA) (p. 557)

## Minor

- Public Health - Minor (p. 560)

# Public Health - Bachelor of Arts (BA)

The Public Health Program at the University of Colorado Boulder is pleased to be offering a Bachelor of Arts degree in Public Health. According to the Association of Schools & Programs of Public Health (ASPPH), public health is the science and art of protecting and improving the health of communities through education, promotion of healthy lifestyles and research for disease and injury prevention. Public health helps improve the health and well-being of people in local communities and around the globe. Public health works to prevent health problems before they occur.

As the world becomes more interconnected, our communities and populations face increasingly complex health challenges emerging through the interaction of individual vulnerability and behavior, cultural and social factors, environmental and geographic influences, as well as economic and political dynamics. Addressing these public health challenges requires innovative approaches arising from multiple disciplines.

## Core Areas of Public Health

While public health is defined in many ways, the following is a list of core areas that are often associated with public health.

- Biostatistics: Statistical science applied to health and biomedical data.
- Environmental health: The impact of air, water and the built environment on health.
- Epidemiology: The study of the frequency, distribution and determinants of disease.
- Health administration and management: Managing human and fiscal resources to deliver public health services.
- Global health: Addressing health challenges across the world.
- Maternal and child health: Improving the health of women, children and their families.
- Nutrition: How food and nutrients impact the health of populations.
- Public health laboratory practice: Diagnose, prevent, treat and control infectious disease.
- Public health policy: The role of policy and policy decisions on public health.
- Public health practice: Incorporating public health principles into clinical practice.
- Social and behavioral science: The study of social and behavioral determinants of health.

## Requirements

Graduating with a BA in Public Health will require meeting the Arts & Sciences requirements (p. 75) as well as the curriculum presented below, consisting of at least 40 credit hours, with a minimum of 22 at the upper division level, passed with a cumulative GPA of 2.000 or higher. Grades of C- or better will be required in all courses a student is using to satisfy the requirements for the major. Additionally, students must meet the requirements for graduation from their other school or college, if doing a double degree. Students should take note of when and if courses have prerequisites that are not part of the public health major.

| Code | Title | Credit Hours |
|---|---|---|
| **Fundamentals of Public Health** | | |
| GEOG/IPHY/PBHL 2692 | Foundations in Public Health | 3 |
| GEOG 3692 | Introduction to Global Public Health | 4 |
| IPHY 3490 | Introduction to Epidemiology | 3 |
| **Bioethics** | | |
| Choose one of the following: | | 3 |
| PHIL 1160 | Introduction to Medical Ethics | |
| PHIL 3160 | Bioethics | |
| **Introduction to Biology** | | |
| Choose one of the following: | | 3 |
| EBIO 1100 | Biology and Society | |
| EBIO 1210 | General Biology 1 | |
| MCDB 1150 | Introduction to Cellular and Molecular Biology | |
| **Introductory Statistics** | | |
| Choose one of the following courses in statistics: | | 3-4 |
| ANTH 4000 | Quantitative Methods in Anthropology | |
| ECON 3818 | Introduction to Statistics with Computer Applications | |
| GEOG 3023 | Statistics and Geographic Data | |
| IPHY 3280 | Intro to Data Science and Biostatistics | |
| MATH 2510 | Introduction to Statistics | |
| PSCI 2075 | Quantitative Research Methods | |
| PSYC 2111 | Psychological Science I: Statistics | |
| SOCY 2061 | Introduction to Social Statistics | |
| STAT 2600 | Introduction to Data Science | |
| **Capstone Course** | | |
| Choose one of the following courses | | 3 |
| PBHL 4142 | Public Health Capstone in Public Health Practice: Internships | |
| PBHL 4242 | Capstone in Public Health: Career Exploration in Public Health | |
| PBHL 4342 | Public Health Capstone: Honors Thesis | |
| PBHL 4542 | Public Health Capstone Research Methods: Environmental Interventions to the Mental Health Epidemic | |
| **Electives in Public Health** | | |

| | | |
|---|---|---|
| Students must complete an additional minimum of 6 courses (4 of which must be at the 3000 or 4000 level). One elective must be from Social and Behavioral Health and one from Environmental Health. The other 4 electives can come from either of those lists or from the list of Other Public Health Courses. | | |
| *Social and Behavioral Health Courses* | | *3* |
| ANTH 4605 | Anthropology of Neuroscience | |
| ANTH 4610 | Medical Anthropology | |
| ECON 4646 | Topics in Health Economics (only certain topics ) | |
| PSYC 4021 | Psychology and Neuroscience of Exercise | |
| PSYC 4541 | Special Topics in Psychology - Social Science (only certain topics ) | |
| PSYC 4606 | Advanced Topics in Social Psychology (only certain topics ) | |
| SOCY 1022 | Ethics and Social Issues in U.S. Health and Medicine | |
| SOCY 3032 | Social Epidemiology | |
| SOCY 3045 | Sociology of Death and Dying | |
| SOCY 3052 | Medical Sociology | |
| SOCY 4052 | Social Inequalities in Health | |
| SOCY 4062 | Suffering and Care in Society | |
| *Environmental Health Courses* | | *3* |
| EBIO 3400 | Microbiology | |
| ECON 4646 | Topics in Health Economics (only certain topics ) | |
| ENVS 3034 | Foundations of Environmental Justice | |
| or HONR 4075 | Environmental Justice | |
| or PHIL 2140 | Environmental Justice | |
| or GEOG 3782 | Environmentalism, Race, and Justice | |
| ENVS 3525 | Intermediate Environmental Problem Analysis: Topical Cornerstones (only certain topics ) | |
| GEOG 4692 | Climate Change and Health | |
| GEOG 4772 | Food and Power | |
| GEOG 4852 | Health and Medical Geography | |
| HIST 2830 | Disease and Public Health in Global History | |
| SOCY 4007 | Global Human Ecology | |
| *Other Public Health Courses* | | *12* |
| ANTH 4060 | Nutrition and Anthropology | |
| EBIO 3630 | Parasitology | |
| HUMN 3200 | Fictions of Illness: Modern Medicine and the Literary Imagination | |
| IPHY 2420 | Introduction to Nutrition | |
| or IPHY 3440 | Clinical Nutrition | |
| IPHY 4420 | Nutrition and Human Performance | |
| IPHY 4780 | Sleep, Circadian Rhythms, and Health | |
| NRSC 4420 | Genetics of Brain and Behavior | |
| PSYC 2012 | Biological Psychology | |
| SLHS 1010 | Disabilities in Contemporary American Society | |
| SLHS 3014 | Hearing Loss Epidemiology | |
| SPAN 3080 | Spanish Health Professions | |
| WGST/JWST 4200 | Religion and Reproductive Politics in the United States | |
| **Total Credit Hours** | | **40-41** |

# Plan(s) of Study

Through the required coursework for the major, students will complete at least 3 credit hours in the Arts & Humanities area, 6 credit hours in the Social Sciences area and a minimum of 6 credit hours in the Natural Sciences area of the Gen Ed Distribution Requirement, the Global Perspective category of the Gen Ed Diversity Requirement and the Quantitative Reasoning and Mathematical Skills category of the Gen Ed Skills requirement. Depending on elective courses selected within the major, students can complete most of the Natural Sciences area and Social Sciences area in the Gen Ed Distribution Requirement and the US Perspective component of the Gen Ed Diversity Requirement.

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| GEOG 2692 | Foundations in Public Health | 3 |
| EBIO 1210 | General Biology 1 (Biology major requirement) | 3 |
| EBIO 1230 | General Biology Laboratory 1 | 1 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| PHIL 1160 | Introduction to Medical Ethics (Bioethics major requirement) | 3 |
| Gen. Ed. Skills course (example: QRMS, if needed) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |

**Year Two**

| **Fall Semester** | | |
|---|---|---|
| SOCY 2061 | Introduction to Social Statistics (Or another course that fulfills the statistics major requirement) | 3 |
| GEOG 3692 | Introduction to Global Public Health | 4 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences, if necessary) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| IPHY 3490 | Introduction to Epidemiology | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |

| | |
|---|---|
| **Year Three** | |
| **Fall Semester** | |
| Upper-Division Public Health major Elective | 3 |
| Public Health major Elective | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | 3 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/Diversity: US Perspective) | 3 |
| Elective | 3 |
| **Credit Hours** | **15** |
| **Spring Semester** | |
| Upper-Division Public Health major Elective | 3 |
| Gen. Ed. Distribution/Diversity course (example: Natural Sciences) | 3 |
| Upper-Division Elective | 3 |
| Upper-Division Elective | 3 |
| Elective | 3 |
| **Credit Hours** | **15** |
| **Year Four** | |
| **Fall Semester** | |
| Public Health major Elective | 3 |
| Upper-Division Public Health major Elective | 3 |
| Upper-Division Elective | 3 |
| Upper-Division Elective | 3 |
| Elective | 3 |
| **Credit Hours** | **15** |
| **Spring Semester** | |
| PBHL Capstone Course | |
| Upper-Division Public Health major Elective | 3 |
| Upper-Division Elective | 3 |
| Upper-Division Elective | 3 |
| Elective | 3 |
| **Credit Hours** | **12** |
| **Total Credit Hours** | **119** |

## Learning Outcomes

By the completion of the program, students will be able to:

- Describe and apply the public health approach to understanding the natural history of communicable and noncommunicable diseases.
- Examine the biological, behavioral, social, cultural and environmental factors that contribute to the distribution of disease and health indicators in different geographic contexts and across the life course.
- Articulate the importance of data, data literacy and statistics in public health research and practice.
- Describe analytic methodologies, research strategies and study designs used in public health to study the distribution, underlying causes and impact of communicable and noncommunicable disease.
- Identify and examine multidisciplinary public health strategies for the prevention, treatment and control of communicable and noncommunicable diseases.
- Identify and recognize different ethical features and considerations in relation to public health.

# Public Health - Certificate

The undergraduate certificate in public health encourages students to extend the breadth of their undergraduate education to include elements of public health. Students are encouraged to take courses from a variety of participating departments to develop an appreciation of the interdisciplinary nature of public health.

For more information, visit the Public Health Certificate Program (http://www.colorado.edu/certificate/publichealth/) website.

## Requirements

The certificate requirements include a minimum of 22 credit hours of coursework, including at least 9 upper-division credit hours. A maximum of 6 semester credit hours from other institutions will be accepted.

### Required Courses and Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | **10** |
| GEOG/IPHY 2692 | Foundations in Public Health | |
| GEOG 3692 | Introduction to Global Public Health | |
| IPHY 3490 | Introduction to Epidemiology | |
| *Required biology course:* | | *3* |
| EBIO 1100 | Biology and Society | |
| or EBIO 1210 | General Biology 1 | |
| or MCDB 1030 | | |
| or MCDB 1150 | Introduction to Cellular and Molecular Biology | |
| *At least one of the following courses in statistics:* | | *3-4* |
| ANTH 4000 | Quantitative Methods in Anthropology | |
| or BCOR 1025 | Statistical Analysis in Business | |
| or CHEN 3010 | Applied Data Analysis | |
| or EBIO 1010 | Introduction to Statistics and Quantitative Thinking for Biologists | |
| or EBIO 4410 | Biological Statistics | |
| or ECON 3818 | Introduction to Statistics with Computer Applications | |
| or GEOG 3023 | Statistics and Geographic Data | |
| or MATH 2510 | Introduction to Statistics | |
| or PSCI 2075 | Quantitative Research Methods | |
| or PSYC 2111 | Psychological Science I: Statistics | |
| or SOCY 2061 | Introduction to Social Statistics | |
| or STAT 2600 | Introduction to Data Science | |
| **Electives** | | |
| Six credit hours of public health electives. At least one course (at least 3 credits) must be at the upper-division level, and at least one course (at least 3 credits) must be from outside of the student's major. | | 6 |
| *Biomedicine and Health* | | |
| EBIO 3400 | Microbiology | |
| EBIO 3630 | Parasitology | |
| IPHY 2420 | Introduction to Nutrition | |
| IPHY 3440 | Clinical Nutrition | |
| MCDB 3160 | Infectious Disease | |

| | |
|---|---|
| MCDB 4201 | From Bench to Bedside: The Role of Science in Medicine |
| SLHS 3014 | Hearing Loss Epidemiology |
| *Global, Population and Environmental Health* | |
| ECON 4646 | Topics in Health Economics |
| ENVS 3525 | Intermediate Environmental Problem Analysis: Topical Cornerstones |
| ENVS 4800 | Capstone: Critical Thinking in Environmental Studies |
| GEOG 3682 | International Development: Economics, Power, and Place |
| GEOG 4732 | Population Geography |
| GEOG 4852 | Health and Medical Geography |
| IAFS 3000 | Special Topics in International Affairs |
| PSCI 4012 | Global Development |
| SLHS 1010 | Disabilities in Contemporary American Society |
| SOCY 4007 | Global Human Ecology |
| *Medical Humanities* | |
| HIST 4326 | Epidemic Disease in US History |
| MUEL 3862 | Music and Global Health |
| PHIL 1160 | Introduction to Medical Ethics |
| PHIL 3160 | Bioethics |
| SPAN 3080 | Spanish Health Professions |
| WGST 3510 | Gender, Sexuality and Global Health |
| WRTG 3020 | Topics in Writing |
| *Social, Cultural and Behavioral Health* | |
| ANTH 4060 | Nutrition and Anthropology |
| ANTH 4610 | Medical Anthropology |
| PSYC 3102 | Behavioral Genetics |
| PSYC 4263 | Psychological Treatment: An Evidence-Based Approach |
| PSYC 4443 | Research Methods in Clinical Psychology |
| PSYC 4606 | Advanced Topics in Social Psychology |
| SOCY 1022 | Ethics and Social Issues in U.S. Health and Medicine |
| SOCY 3032 | Social Epidemiology |
| SOCY 3042 | Topics in Population and Health |
| SOCY 3045 | Sociology of Death and Dying |
| SOCY 3052 | Medical Sociology |
| SOCY 4052 | Social Inequalities in Health |
| SOCY 4062 | Suffering and Care in Society |
| **Total Credit Hours** | **22-23** |

Global Public Health is an unofficial track of the Public Health Certificate designed specifically for IAFS students. Students interested in pursuing the Global Public Health track of the Public Health Certificate can find additional information on the International Affairs Program (http://www.colorado.edu/iafs/academics/certificates/global-public-health/) website.

# Public Health - Minor

As the world becomes more interconnected, our communities and populations face increasingly complex health challenges emerging through the interaction of individual vulnerability and behavior, cultural and social factors, environmental and geographic influences, as well as economic and political dynamics. Addressing these public health challenges requires innovative approaches arising from multiple disciplines.

According to the Association of Schools & Programs of Public Health (ASPPH), public health is the science and art of protecting and improving the health of communities through education, promotion of healthy lifestyles, and research for disease and injury prevention. Public health helps improve the health and well-being of people in local communities and around the globe. Public health works to prevent health problems before they occur.

## Core Areas of Public Health

While public health is defined in many ways, the following is a list of core areas that are often associated with public health.

- Biostatistics: Statistical science applied to health and biomedical data.
- Environmental health: The impact of air, water, and the built environment on health.
- Epidemiology: The study of the frequency, distribution, and determinants of disease.
- Health administration and management: Managing human and fiscal resources to deliver public health services.
- Global health: Addressing health challenges across the world.
- Maternal and child health: Improving the health of women, children, and their families.
- Nutrition: How food and nutrients impact the health of populations.
- Public health laboratory practice: Diagnose, prevent, treat, and control infectious disease.
- Public health policy: The role of policy and policy decisions on public health.
- Public health practice: Incorporating public health principles into clinical practice.
- Social and behavioral science: The study of social and behavioral determinants of health.

## Requirements

A minimum of 22 credit hours in public health coursework, including a minimum of 9 upper-division credit hours, are required for the minor. All coursework applied to the minor must be completed with a grade of C- or better; no pass/fail work may be applied. The grade point average for all public health coursework must equal 2.00 (C) or higher.

Students will be allowed to apply no more than 9 credit hours, including 6 upper-division credit hours of transfer work towards a minor in public health

Students must take courses in the following areas:

- **Fundamentals of Public Health**: Collectively, the core courses in public health will provide a foundational knowledge on the burden and distribution of disease and mortality around the world, the determinants of global health disparities, the development of global health policies, and the outcomes of global health interventions. Students will examine the history and uses of epidemiology, measures of disease frequency and occurrence, association and

causality, analytic epidemiology, evidence-based screening, and infectious disease outbreak investigations.

- **Introductory Statistics**: Public health students must possess basic skills in quantitative reasoning to critically evaluate primary literature and understand how data are used to measure population health and disease burden, monitor intervention and screening programs, and inform policy decisions.
- **Introductory Biology**: Students majoring in public health must have a foundation of biological knowledge in order to understand and appreciate the concepts of health and disease.
- **Elective Courses**: To round out the public health major, students are required to take two courses (at least 6 credits) in the various domains of public health. Students must note when and if courses have prerequisites that are not part of the public health major.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Fundamentals of Public Health** | | |
| PBHL/GEOG/IPHY 2692 | Foundations in Public Health | 3 |
| GEOG 3692 | Introduction to Global Public Health | 4 |
| IPHY 3490 | Introduction to Epidemiology | 3 |
| **Introductory Statistics** | | |
| Students must take at least one of the following courses in statistics: | | 3-4 |
| ANTH 4000 | Quantitative Methods in Anthropology | |
| ECON 3818 | Introduction to Statistics with Computer Applications | |
| GEOG 3023 | Statistics and Geographic Data | |
| IPHY 3280 | Intro to Data Science and Biostatistics | |
| MATH 2510 | Introduction to Statistics | |
| PSCI 2075 | Quantitative Research Methods | |
| PSYC 2111 | Psychological Science I: Statistics | |
| SOCY 2061 | Introduction to Social Statistics | |
| STAT 2600 | Introduction to Data Science | |
| **Introductory Biology** | | |
| Students must take at least one of the following courses: | | 3 |
| EBIO 1100 | Biology and Society | |
| EBIO 1210 | General Biology 1 | |
| MCDB 1150 | Introduction to Cellular and Molecular Biology | |
| **Elective Courses** | | |
| Six credit hours of public health electives. At least one course (at least 3 credits) must be at the upper-division level, and at least one course (at least 3 credits) must be from outside of the student's major. | | 6 |
| *Social and Behavioral Health Electives* | | |
| ANTH 4610 | Medical Anthropology | |
| ANTH 4605 | Anthropology of Neuroscience | |
| SOCY 1022 | Ethics and Social Issues in U.S. Health and Medicine | |
| SOCY 3032 | Social Epidemiology | |
| SOCY 3045 | Sociology of Death and Dying | |
| SOCY 3052 | Medical Sociology | |
| SOCY 4052 | Social Inequalities in Health | |
| SOCY 4062 | Suffering and Care in Society | |
| ECON 4646 | Topics in Health Economics (depends on topic) | |
| PSYC 4606 | Advanced Topics in Social Psychology (Social Psychology of Health Promotion; Discrimination and Health) | |
| PSYC 4021 | Psychology and Neuroscience of Exercise | |
| PSYC 4541 | Special Topics in Psychology - Social Science (Prevention Science: Promoting Positive Youth and Adult Development; Science of Happiness; Sports Psychology) | |
| *Environment and Health Electives* | | |
| ENVS 3034 | Foundations of Environmental Justice | |
| or HONR 4075 | Environmental Justice | |
| or PHIL 2140 | Environmental Justice | |
| or GEOG 3782 | Environmentalism, Race, and Justice | |
| GEOG 4852 | Health and Medical Geography (taught every other year) | |
| EBIO 3400 | Microbiology | |
| SOCY 4007 | Global Human Ecology | |
| GEOG 4772 | Food and Power (taught every year) | |
| GEOG 4692 | Climate Change and Health | |
| HIST 2830 | Disease and Public Health in Global History (online course) | |
| ECON 4646 | Topics in Health Economics (depends on topic) | |
| *Nutrition and Health Electives* | | |
| IPHY 2420 | Introduction to Nutrition [1] | |
| or IPHY 3440 | Clinical Nutrition | |
| ANTH 4060 | Nutrition and Anthropology | |
| IPHY 4420 | Nutrition and Human Performance (offered every other year) | |
| GEOG 4772 | Food and Power | |
| EBIO 3590 | Plants and Society | |
| PHIL 2260 | Philosophy and Food | |
| ENVS 3525 | Intermediate Environmental Problem Analysis: Topical Cornerstones (Food and Environment; Water-Energy-Food Nexus) | |
| HIST 2830 | Disease and Public Health in Global History (online course) | |
| SOCY 4117 | Food and Society (online course) | |
| *Other Electives Related to Public Health* | | |
| EBIO 3630 | Parasitology | |
| IPHY 4780 | Sleep, Circadian Rhythms, and Health | |
| SLHS 3014 | Hearing Loss Epidemiology | |
| SLHS 1010 | Disabilities in Contemporary American Society | |
| SPAN 3080 | Spanish Health Professions | |
| APRD 4010 | Strategic Health Communication | |
| HUMN 3200 | Fictions of Illness: Modern Medicine and the Literary Imagination | |

| | | |
|---|---|---|
| NRSC 4420 | Genetics of Brain and Behavior | |
| PSYC 2012 | Biological Psychology | |
| WGST/JWST 4200 | Religion and Reproductive Politics in the United States | |
| **Total Credit Hours** | | **22-23** |

[1] IPHY 2420 is offered every year; IPHY 3440 is offered every other year.

# Plan(s) of Study

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| EBIO 1210 | General Biology 1 | 3 |
| | **Credit Hours** | **3** |
| **Spring Semester** | | |
| PBHL 2692<br>or GEOG 2692<br>or IPHY 2692 | Foundations in Public Health<br>or Foundations in Public Health<br>or Foundations in Public Health | 3 |
| | **Credit Hours** | **3** |
| **Year Two** | | |
| **Fall Semester** | | |
| SOCY 2061 | Introduction to Social Statistics | 3 |
| | **Credit Hours** | **3** |
| **Spring Semester** | | |
| IPHY 3490 | Introduction to Epidemiology | 3 |
| | **Credit Hours** | **3** |
| **Year Three** | | |
| **Fall Semester** | | |
| GEOG 3692 | Introduction to Global Public Health | 4 |
| | **Credit Hours** | **4** |
| **Spring Semester** | | |
| SOCY 4052 | Social Inequalities in Health | 3 |
| | **Credit Hours** | **3** |
| **Year Four** | | |
| **Fall Semester** | | |
| PSYC 4606 | Advanced Topics in Social Psychology (Social Psychology of Health Promotion) | 3 |
| | **Credit Hours** | **3** |
| | **Total Credit Hours** | **22** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Describe and apply the modern public health approach to understanding the natural history of communicable and noncommunicable diseases
- Examine the biological, behavioral, social, cultural and environmental origins of communicable and noncommunicable diseases
- Identify and examine the biological, behavioral, social, cultural and environmental factors that contribute to the distribution of disease and health indicators over the life course
- Define the role of data, data literacy and statistics in guiding evidence-based risk assessment and health policy
- Apply analytic methodologies, research strategies and study designs used in public health to study the distribution, underlying causes and impact of communicable and noncommunicable disease
- Articulate multi-disciplinary public health strategies for the prevention, treatment and control of communicable and noncommunicable diseases

# Religious Studies

The curriculum in the Department of Religious Studies at CU Boulder trains students in the scholarly understanding and interpretation of the complex phenomenon we call religion through careful study of history, texts, rituals, narrative, art and media. The program offers the skills to approach the comparative study of religion with the option of gaining deeper knowledge in Islam, Hinduism, Buddhism, Judaism, Christianity, religions in America, religions in the Mediterranean, religions in Asia and several indigenous traditions. We also allow students to develop expertise in thematic areas such as religion and the body; ritual studies; religion and the environment; ethics, politics and law; religion, gender and sexuality; and ancient and medieval religions.

The undergraduate degree in religious studies emphasizes the application of various theoretical and methodological approaches to the study of religion; the understanding of religious practices and traditions with attention to historical context and present-day impact; and the development of media literacy, critical thinking, effective oral and written communication, and research skills in our increasingly globalized and religiously diverse world.

In addition, students with a degree in religious studies are expected to achieve basic religious literacy: the ability to communicate and analyze practical information regarding religious diversity as educated citizens of a pluralistic society and thereby to effectively understand and participate in public debates and discussions about religion.

**Course codes for this program are RLST and SNSK.**

# Bachelor's Degree

- Religious Studies - Bachelor of Arts (BA) (p. 569)

# Minor

- Religious Studies - Minor (p. 571)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ali, Aun Hasan (https://experts.colorado.edu/display/fisid_155948/)
Assistant Professor; PhD, McGill University

Biernacki, Loriliai (https://experts.colorado.edu/display/fisid_115294/)
Professor; PhD, University of Pennsylvania

Boyd, Samuel L. (https://experts.colorado.edu/display/fisid_155484/)
Associate Professor, Associate Chair; PhD, University of Chicago

Catlos, Brian Aivars (https://experts.colorado.edu/display/fisid_147829/)
Professor; PhD, University of Toronto

Chernus, Ira R. (https://experts.colorado.edu/display/fisid_101043/)
Professor Emeritus; Ph.D, Temple University

Denny, Frederick M.
Professor Emeritus

Gayley, Antonia Hollis (https://experts.colorado.edu/display/fisid_144505/)
Associate Professor, Associate Chair; PhD, Harvard University

Gill, Sam D. (https://experts.colorado.edu/display/fisid_103595/)
Professor Emeritus; PhD, University of Chicago

Kleeman, Terry F. (https://experts.colorado.edu/display/fisid_114181/)
Professor; PhD, University of California, Berkeley

Ross-Bryant, Lynn
Professor Emerita

Sacks, Elias R. (https://experts.colorado.edu/display/fisid_151425/)
Associate Professor; PhD, Princeton University

Taylor, Rodney L.
Professor Emeritus

Whitehead, Deborah Faith (https://experts.colorado.edu/display/fisid_144239/)
Associate Professor, Chair; ThD, Harvard University

# Courses

## Religious Studies

**RLST 1620 (3) Religious Dimensions of Human Experience**
Surveys different approaches to the study of religion. Students will grow familiar with key thinkers, texts, and movements that shape how we understand religious phenomena. Students will also examine critiques of how religion is studied. In the end, students will have gained insight into significant aspects of religious life, belief, and practice that will empower them to navigate a world in which religion is increasingly relevant.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 1818 (3) Jewish History to 1492**
Focus on Jewish history from the Biblical period to the Spanish Expulsion in 1492. Study the origins of a group of people who call themselves, and whom others call, Jews. Focus on place, movement, power/powerlessness, gender, and the question of how to define Jews over time and place. Introduces Jews as a group of people bound together by a particular set of laws; looks at their dispersion and diversity; explores Jews' interactions with surrounding cultures and societies; introduces the basic library of Jews; sees how Jews relate to political power.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 1818 and JWST 1818
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**RLST 1820 (3) Religion and Politics in Ancient Egypt**
Studies the literature, politics, religions and other traditions of Ancient Egypt.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 1828 (3) Jewish History Since 1492**
Surveys the major historical developments encountered by Jewish communities beginning with the Spanish Expulsion in 1492 up until the present day. Studies the various ways in which Jews across the modern world engaged with the emerging notions of nationality, equality and citizenship, as well as with new ideologies such as liberalism, socialism, nationalism, imperialism and antisemitism.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 1828 and JWST 1828
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**RLST 1830 (3) Global History of Holocaust and Genocide**
Examines the interplay of politics, culture, psychology and sociology to try to understand why the great philosopher Isaiah Berlin called the 20th century, "The most terrible century in Western history." Our focus will be on the Holocaust as the event that defined the concept of genocide, but we will locate this event that has come to define the 20th century within ideas such as racism, imperialism, violence, and most important, the dehumanization of individuals in the modern world.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 1830 and JWST 1830
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**RLST 1850 (3) Ritual and Media**
Ritual continues to play an important role in contemporary societies in both religious and secular contexts. This course examines the elements and genres of ritual activity from African rites of passage to the Beijing Olympics, paying close attention to how the media documents, appropriates and transforms aspects of ritual.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 1900 (3) Introduction to the Hebrew Bible/Old Testament**
Examine the content of the Hebrew Bible and critical theories regarding its development. Explore the development of these texts, as well as their foundational role for rabbinic literature and the New Testament. Assess the enduring influence of the Hebrew Bible/Old Testament in world literature and culture (such as in art and music).
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 1900
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**RLST 1910 (3) Introduction to the New Testament**
Examine the background, content and influence of the New Testament books. Studies the diverse perspectives contained in the various books, as well as the process of canonization. Assess the influence of the New Testament on the development of Christianity as well as world (eastern and western) culture.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 1910
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 2100 (3) American Beliefs and Values**
An in-depth analysis of beliefs and values that have dominated American life in modern and postmodern eras, and of diverse belief and value systems that offer alternatives for the future. The analysis will be based on influential theories from the academic study of religion, and the course will give special attention to the influence of religious factors on secular American life.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 2200 (3) Religion and Dance**
Connecting dancing to religions across the globe demonstrates the near synonymy of the two in most cultures, the remarkable potential for dancing to articulate cultural identity, and finally that dancing is strongly connected to what distinguishes being human. Provides an enriched appreciation of dancing and the introduction to dancing in many cultures.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 2202 (3) Islam**
Introduces students to foundational Islamic concepts, texts, core practices, historical narratives and intellectual, spiritual and literary traditions. Topics covered include: the figure of Muhammad; the Quran; the emergence of distinct Muslim identities; Hadith; Sharia; Islamic theology; Islamic philosophy; science in Islamic civilization; Islamic mysticism; the impact of colonialism and modernity on the Muslim world; gender and sexuality; political Islam.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Diversity-U.S. Perspective

**RLST 2320 (3) The Muslim World, 600-1250**
Focusing on the history of the Muslim World in the age of the caliphates, this course takes an interdisciplinary, comparative approach to the development of Islamicate society, focusing on social structure, politics, economics and religion. Students will use primary and secondary sources to write a research paper, and make in-class presentations to cultivate critical thinking, research and writing skills.
**Equivalent - Duplicate Degree Credit Not Granted:** ARAB 2320
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Asia Content

**RLST 2400 (3) Religion, Ethics and Politics**
Explores the role of religion in today's world, focusing on debates around religion, ethics and politics. Examining diverse voices from Christianity, Judaism and other traditions, this course considers religion's role in debates about issues such as same-sex marriage, race, climate change, war, criminal justice, torture, sexual ethics, abortion and economic justice.
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 2500 (3) Religions in the United States**
Explores the development of various religions within the shaping influences of American culture, including separation of church and state, the frontier experience, civil religion, and the interaction of religions of indigenous peoples, immigrants, and African Americans.
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Ideals and Values
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**RLST 2600 (3) Judaism, Christianity, and Islam: Abrahamic Religions**
In Judaism, Christianity, and Islam, Abraham is described as a founding figure. In recent times, the label ¿Abrahamic Religions¿ has become increasingly important both as a way to describe the origins and beliefs of Judaism, Christianity, and Islam and as a means for finding common ground in political and religious discourse. Yet in each religion Abraham is also used in strikingly different ways and for distinct purposes. In this course, we will look at these three religious traditions and how each one imagines Abraham. In particular, the focus will be on how each religion uses Abraham to construct foundational stories of a special relationship to God, stories that ultimately serve to promote religious identity over time.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 2600
**Additional Information:** GT Pathways: GT-AH3 - Arts Hum: Ways of Thinking
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 2610 (3) Happiness and Nirvana: Enlightenment in Indian Religions**
Addresses religious and spiritual practices geared towards ideals of enlightenment across various religious traditions in India, including Buddhism, Hinduism, Jainism and Sikhism, in relation to different social groups historically. Examines the concept of happiness (sukh¿) and its connections to spiritual enlightenment.
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 2612 (3) Yoga: Ancient and Modern**
Addresses the history and philosophy of yoga, beginning from its earliest articulations in Vedic India 1200 BCE up to contemporary understandings of yoga. Examines yoga's historical evolution from a primarily mental practice to a bodily centered practice. Looks at the shifts yoga undergoes as it becomes popular in the modern West.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**RLST 2614 (3) Paganism to Christianity**
Offers a cultural history of Greek and Roman religion. Students read ancient texts in translation and use evidence from archaeology to reconstruct the shift from paganism to Christianity in antiquity. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 2610
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 2619 (3) Religion, Psychedelics, and Shamanism**
From ancient India¿s tradition of using the hallucinogenic plant Soma to Patañjali¿s early yoga tradition proposing herbs (o¿adhi) as a means to enlightenment to 21st century mestizo shamans in Peru offering ayahuasca medicine retreats¿the use of mind-altering hallucinogenic substances has played an expansive role in the generation of religious and mystical experience and the subsequent structure of religious praxis. This class focuses on tracing out the religious elements of this history.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 2620 (3) Religions of East Asia**
Introduces literature, beliefs, practices, and institutions of Taoism, Confucianism, Buddhism, and Shintoism in historical perspective.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 2650 (3) Meditation: Ancient and Modern**
Explores the roots of today's mindfulness movement in ancient forms of Buddhist meditation. Topics covered include the array of meditation techniques in Buddhism, colonial-period origins of lay meditation in Asia, Buddhism's transmission to North America and Europe in the 20th century, the emergence of secular forms of mindfulness, and scientific studies on mindfulness and compassion.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 2700 (3) Native American and Indigenous Religious Traditions**
Studies the religious lifeways of diverse Indigenous peoples in North America. The course considers how these religious lifeways facilitate healing, movements of social protest, and efforts for self-determination in response to ongoing forms of colonialism. Students will critically explore the impact of colonial structures on Native American religious traditions, such as missionization, and evaluate the meaning of decolonization as both a pathway and goal supporting Native liberation.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 2703
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**RLST 2800 (3) Women and Religion**
Examines roles of women in a variety of religious traditions including Judaism, Christianity, Hinduism, Buddhism, and goddess traditions.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 2800
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**RLST 2840 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.

**RLST 3000 (3) Christian Traditions**
Serves as an introduction to the academic study of Christianity, understood in its historical context, beginning with its most remote Mesopotamian origins and through to beginnings of the Protestant Reformation. Coverage is global, but "Western" Christian tradition are emphasized, as is the evolution of doctrine, ritual and institutions in relation to social, cultural and political factors.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3001 (3) Modern Christianity: Culture, Politics, Religion**
Studies development of various aspects of global Christian traditions from the Reformation to the present day, as expressed through scripture, theology, ritual, media, politics, ethics, popular culture, and the arts. Includes topics such as colonialism, modernism and liberalism, secularism, pluralism, ecumensim, globalization, and the impact of new technologies. Recommended perquisite: RLST 3000
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3010 (3) Religion and the Senses**
Expanding the five common senses so they are grounded on a more fundamental kinesthetic sense, that is, sense of movement, this course focuses on the study of religion and culture on all those marvelous richly and sensuously textured aspects of religious behavior: movement, experience, feeling, action, sensation, gesture, art, music, dancing, architecture, costume, food, and ritual.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3020 (3) Advanced Writing in Religious Studies**
Seminar for religious studies majors that emphasizes the development of writing skills for use inside as well as outside the academy. Writing assignments are focused on one or more core topics in religious studies.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Religious Studies (RLST) majors only.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Upper

**RLST 3040 (3) The Quran**
Examines how Christian constructions of religion and scripture have shaped Muslim understandings of the Quran and marginalized other views with a much longer history. Helps students appreciate how this process of marginalization is negotiated and explores the Quran from other perspectives including sound, performance, embodiment, and occultism. By highlighting marginalized approaches to the Quran, it promotes a better understanding of how social and religious differences are shaped by different political legacies. Previously offered as a special topics course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Asia Content

**RLST 3050 (3) Religion and Literature in America**
Studies religious dimensions of American culture through representative literature, beginning with the Puritans and focusing on diversity in the 19th and 20th centuries.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3060 (3) Fundamentalism and Islam**
Explores the global rise of fundamentalism, particularly Islamic fundamentalism. Students will analyze fundamentalism as a function of modernity, and in metaphysical rather than geostrategic or cultural terms. Students will examine the arguments of Muslim fundamentalists, and the counterarguments of their critics.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 3070 (3) Islamic Mysticism: Ibn Arabi, Rumi, and the Sufi Tradition**
Introduces students to the philosophical, literary, and musical traditions of Islamic Mysticism or Sufism. Figures covered include: Rumi, Hallaj, Ibn Arabi, Mulla Sadra, Ghazali, Hafez, Ibn al-Farid, Ghalib, and Nusrat Fateh Ali Khan. Students will learn how Islamic Mysticism differs across cultural contexts and how it compares to other mystical traditions.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3100 (3) Judaism**
Explores Jewish religious experience and its expression in thought, ritual, ethics, and social institutions.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3100
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 3110 (3) Of Jewish Legends, Folktales and the Supernatural**
Explores Jewish traditional legends, folktales and stories of the supernatural. Starts with Aggadic Talmud tales and Midrashic texts and focuses on later rabbinic and mystical texts and folktales ca 500-1900 C.E. from around the Jewish world with subjects ranging from didactic narratives extolling the virtues of the simple pure soul, to the horrors of a blood sucking vampiric outside world.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3110
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3120 (3) Radical Jews**
Explores major Jewish figures, and their cultural productions, who were radical in the challenges they posed and transformative in the effects they had on society. The figures we examine range from the Rabbis of the Talmud who revolutionized a sacrificial cult religion, to Western secularist Baruch Spinoza and American icons such as Allen Ginsberg, Gloria Steinem and Bob Dylan.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3120
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3150 (3) Jerusalem: The Holy City in History, Legend, and Religious Thought**
The history of Jerusalem and the stories that have given it prominence in the religious imagination continue to shape much of the world in which we live. In this class, we will survey approximately three millennia of the history of the city. We will ask methodological question, such as: What does it mean for a place to be conceived of as holy? How does this perceived holiness come about? What happens when holy places are destroyed and rebuilt? We will examine the biblical stories about Jerusalem not only as important sources themselves, but also for how they shape later religious traditions, specifically Judaism, Christianity, and Islam. As such, we will address what it means for the same place to be perceived as ¿holy¿ by differing, and often competing, groups. These contestations regarding Jerusalem will, then, allow us to engage issues of religious diversity and conflict both historically and in the present.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3150
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3200 (3) Yoga, Castes and Magic: Hindu Society and Spirituality**
Addresses yoga, religious asceticism and practices of magic in Hinduism from ancient India up to the modern period. Gives an overview of the variety of traditions in Hinduism, focusing on how spiritual practices affect social roles. Looks at how spritual practices approach happiness and social change, from ancient India¿s secret Upanisads through medieval mystic poets like Mirabai, through Gandhi in the 20th century, focusing on figures using mystical experience to overturn social and political powers.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 3202 (3) Women, Gender & Sexuality in Jewish Texts & Traditions**
Reads some of the ways Jewish texts and traditions look at women, gender and sexuality from biblical times to the present. Starts with an analysis of the positioning of the body, matter and gender in creation stories, moves on to the gendered aspects of tales of rescue and sacrifice, biblical tales of sexual subversion and power, taboo-breaking and ethnos building, to rabbinic attitudes towards women, sexuality and gender and contemporary renderings and rereadings of the earlier texts and traditions.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3201 and JWST 3202 and HEBR 3202
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**RLST 3300 (3) Foundations of Buddhism**
Introduction to Buddhist thought and practice in the variety of its historical and cultural contexts. The course begins with an exploration of narrative, cosmology, doctrine and ritual in early Buddhism and the Theravada of South and Southeast Asia. Through case studies, we then trace diverse conceptions of the Buddhist path in Tibet and East Asia where the Mahayana spread.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 3530 (3) Global Seminar: Jews and Muslims - The Multiethnic History of Istanbul**
Spend two weeks in Istanbul and examine Jewish-Muslim relations in a place that was for 500 years the crossroads of civilization. The only Muslim city in the 21st century with a large, thriving Jewish community, Istanbul models how people from different social classes, ethnicities and religious backgrounds can coexist.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3530 and JWST 3530
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**RLST 3550 (3) Tibetan Buddhism**
Explores Tibetan Buddhism through literature and film, including sacred biographies, treatises on the Buddhist path and films providing a visual window into Tibetan life worlds. We examine different kinds of Tibetan journeys: moving through the life cycle, treading the path of self-cultivation, embarking on solitary retreat, traversing from death to rebirth and traveling on pilgrimage and into exile.
**Equivalent - Duplicate Degree Credit Not Granted:** ASIA 3550
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3750 (3) Women in Buddhism**
Explores diverse representations of the female in Buddhist literature and the social realities of actual women in Asian historical contexts. Through case studies that traverse Buddhist Asia, we delve into monastic views of the female body, philosophical analyses of the emptiness of gender, idealized images of the feminine in Buddhist tantra, and contemporary issues such as the nun's revival moment.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3750
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 3800 (3) Chinese Religions**
Studies classical Confucianism, Taoism, Buddhism, and Neo-Confucianism within the historical context of Chinese culture.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 3801 (3) Muslims, Christians, Jews and the Mediterranean Origins of the West**
Provides a historical foundation for the study of western Modernity, including the Anglo-European and Islamic worlds. It focuses on the Mediterranean region in the long Middle Ages (650-1650), emphasizing the role of Christian, Muslim and Jewish peoples and cultures, in Europe, Africa and West Asia. The approach is interdisciplinary incorporating social, economic, cultural, literary and art history, combining lectures with discussions based around readings of contemporary documents and the analysis of contemporary artifacts.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3801
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3820 (3) Topics in Religious Studies**
Intensive study of a selected area or problem in religious studies.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3850 (3) The Mediterranean: Religion Before Modernity**
Offers an innovative approach to the multifaceted history of Christian-Muslim-Jewish interaction in the Mediterranean. It eschews established paradigms (e.g., Europe, Islamic world) that distort our understanding of these and pushes students to reconsider the accepted paradigms of Western history. Students will reappraise assumptions regarding the nature of ethnic, religious, national and cultural identity, and their role in human history.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3850
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**RLST 4030 (3) Religions in America**
Studies various religious movements in the U.S. and other parts of the Americas. Includes American religion and religions, religion and nationalism, revitalization and religion and Asian religions in America.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5030
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4050 (3) Topics in Christian Studies**
Studies a particular topic in Christian theology and culture such as early Christianity, medieval Christianity, Christianity in the United States, women and Christianity, liberation theologies, Christianity and literature, and modern Christian thought.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5050
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite 6 hours of RLST courses at any level or instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4170 (3) God and Politics**
Explores the relationship between religion and politics. Examining traditions such as Judaism and Christianity, this course considers diverse ways in which ancient, medieval and modern sources have imagined the role of religion in civic life. Some topics include the status of religious minorities, the nature of religious freedom and contemporary debates surrounding issues such as torture, sexuality and climate change.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5170 and JWST 4170
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4180 (3) Is God Dead?**
Explores debates about the following questions: does it make sense to believe in God? Should believing or not believing in God make a difference for how individuals behave? Examining ancient and modern views on the existence and nature of a higher power, this course considers topics including evil and suffering, religion and science and religion's role in politics.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5180 and JWST 4180
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4190 (3) Love and Desire**
Explores debates about the following questions: what and whom should humans and gods love, and what role should passions play in religion? Examining traditions such as Judaism and Christianity, this course considers diverse views on topics including religion and sexuality, the promise and perils of loving gods and humans, and the relationship between love, politics, and violence.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5190 and JWST 4190
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4200 (3) Topics in Hinduism**
Examines in depth central themes, schools of thought and movements in Hinduism, such as myth and ritual, renunciation, Vedanta, Tantra and Yoga.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5200
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of RLST courses at any level or instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 4250 (3) Topics in Buddhism**
Examines in depth central themes, schools of thought and movements in Buddhism, such as Theravada in Southeast Asia, Mahayana and Tantrayana thought, Zen and Buddhism in America. Department enforced prerequisite: RLST 2610 or RLST 2620 or RLST 3300 or instructor consent.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5250
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 4260 (3) Topics in Judaism**
Examines in depth central themes, schools of thought, and movements in Judaism, along with other traditions, across a range of historical periods.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5260 and JWST 4260
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4280 (3) Body and Magic in India**
Addresses ideas of the body and its use and functions within magic, particularly in Tantric traditions. Uses classical Hinduism and Tantra as a point of departure, focusing on subtle bodies and Tantric bodies and will also supplement this with writing about the body and its connection to mind in contemporary Western thought addressing the mind-body problem.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5280
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4300 (3) Topics in Native American Religions**
Examines a topic (varies at different offerings) focusing on religions of peoples indigenous to the Americas. May consider mythology; shamanism and medicine; trickster, clown and fool; crisis cult movements.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5300
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of RLST 2700 (minimum grade C-).
**Recommended:** Prerequisite 3 additional credit hours of RLST course work or instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4353 (3) Indigenous Traditions and Law: A Global Perspective**
Explores intersections of indigenous religions and law through historical and contemporary case studies. American Indian and Hawaiian contexts will be featured, as well as the study of the United Nations Declaration on the Rights of Indigenous Peoples and its recent implementation in places as diverse as Bolivia, Norway and Nagaland. Theoretical issues in the academic study of religion and ethnic studies will be emphasized.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5353 and ETHN 4353 and ETHN 5353
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**RLST 4450 (3) Religion and Nonviolence**
Studies theories of nonviolence developed by major thinkers and movements, especially in the U.S., in the context of their religious commitments and beliefs and their historical circumstances.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4610 (3) Topics in Islam**
A detailed exploration of diverse intellectual approaches to central questions in Islamic traditions. Department consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5610
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4650 (3) Islam in the Modern World**
Globally surveys Islam, covering religion and politics; Islam and the West; the Islamic revival and its varied forms in Iran, Indonesia, Libya and Pakistan; development and change; the status of women; media and academic stereotyping.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5650
**Recommended:** Prerequisite 6 credit hours of religious studies at any level or instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Asia Content

**RLST 4780 (3) New Religions of East Asia**
Explores the new religious movements of modern China, Japan and Korea, which have arisen over the last century due to the influence of the West and in response to the pressures of modernization. Previous coursework in religious studies or Asian languages and civilizations is recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5780
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4800 (3) Critical Studies in Religion**
Focuses on a current issue or area of research in the study of religion. Students analyze the way theories develop and learn to develop their own critical analysis. Topics vary, e.g., comparative kingship, colonialism, ritual theories, feminist analysis.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Religious Studies (RLST) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4810 (3) Honors Thesis**
Students write an honors thesis based on independent research under the direction of a faculty member. Required for students who elect departmental honors.
**Additional Information:** Arts Sciences Honors Course

**RLST 4820 (3) Interdisciplinary Seminar on Religion**
Variable topics in religion, drawing from a variety of disciplines and methodologies as they shed light on specific traditions and issues.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5820
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Requisite 6 credit hours of religious studies at any level or instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4830 (3) Senior Majors Seminar**
Topics and instructors vary. Brings advanced majors together in order to focus their major experience onsignificant topics and issues of common interest.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4840 (1-6) Senior Independent Study**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.

**RLST 4850 (3) Gender in Hagiography**
Explores gendered ideals of sainthood in medieval hagiographic literature. We draw primarily from the lives of female mystics in Buddhist and Christian sources and also examine the construction of mendicant masculinities. Reading from an array of primary sources, we query the category of mysticism and ask why visionary experience has so often been gendered female.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5850 and WGST 4850
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

## Sanskrit

**SNSK 1010 (3-4) Introductory Sanskrit 1**
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Additional Information:** Departmental Category: Sanskrit

**SNSK 1020 (3-4) Introductory Sanskrit 2**
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Requires prerequisite course of SNSK 1020 (minimum grade C-).
**Additional Information:** Departmental Category: Sanskrit

**SNSK 2110 (3-4) Intermediate Sanskrit 1**
Continued study of the grammar of classical Sanskrit and translation of selected readings from the literature.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Requires prerequisite course of SNSK 1020 (minimum grade C-).
**Additional Information:** Departmental Category: Sanskrit

**SNSK 2120 (3-4) Intermediate Sanskrit 2**
Continuation of SNSK 2110.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Requires prerequisite course of SNSK 2110 (minimum grade C-).
**Additional Information:** Departmental Category: Sanskrit

# Religious Studies - Bachelor of Arts (BA)

The curriculum in the Department of Religious Studies at CU Boulder trains students in the scholarly understanding and interpretation of the complex phenomenon we call religion through careful study of history, texts, rituals, narrative, art and media. The program offers the skills to approach the comparative study of religion with the option of gaining deeper knowledge in Islam, Hinduism, Buddhism, Judaism, Christianity, religions in America, religions in the Mediterranean, religions in Asia and several indigenous traditions. The program also allows students to develop expertise in thematic areas such as religion and the body; ritual studies; religion and the environment; ethics, politics and law; religion, gender, and sexuality; and ancient and medieval religions.

The undergraduate degree in religious studies emphasizes the application of various theoretical and methodological approaches to the study of religion; the understanding of religious practices and traditions with attention to historical context and present-day impact; and the development of media literacy, critical thinking, effective oral and written communication, and research skills in our increasingly globalized and religiously diverse world.

In addition, students with a degree in religious studies are expected to achieve basic religious literacy: the ability to communicate and analyze practical information regarding religious diversity as educated citizens of a pluralistic society and thereby to effectively understand and participate in public debates and discussions about religion.

# Graduation with Honors

The Honors Program in religious studies offers the opportunity for highly motivated undergraduates to undertake a deeper and more individualized study than is provided by the regular BA curriculum and to earn an honors designation on their diploma. Religious studies majors with at least a 3.30 overall GPA and 3.50 in the major are eligible to participate in the program. Honors that may be earned are cum laude (with honors), magna cum laude (with high honors) and summa cum laude (with highest honors).

Students interested in pursuing departmental honors are encouraged to consult with the departmental undergraduate advisor by the beginning of their junior year.

# Requirements

## Program Requirements

Students must complete the general requirements of the College of Arts and Sciences and, in addition:

- Complete a minimum of 36 credit hours in the major, of which at least 27 credits hours must be in RLST designated courses.
- More than half of the credit hours (19 or greater) counted toward the major need to be in upper-division courses.
- All courses counted towards the major must be completed with a grade of C- or better and none of the courses may be taken for a Pass/Fail grade.
- The cumulative Grade Point Average (GPA) in courses counted toward the major must be at least 2.0.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Academic Study of Religion Requirement** | | |
| RLST 1620 | Religious Dimensions of Human Experience | 3 |
| RLST 4830 | Senior Majors Seminar | 3 |
| **Cluster Requirement** | | |
| *Select three courses in either of the following:* | | *9* |
| | A single religious tradition (i.e. Buddhism, Christianity, East Asian Religions, Hinduism, Islam, Judaism, Native American and Indigenous Religions) | |
| | A particular theme (i.e. ancient and medieval religions, gender and sexuality, interreligioius interactions, law and politics, media, culture, and contemporary society, philosophy and ethics, religion and violence, ritual, performance, and the body) | |
| **Electives** | | **21** |
| **Total Credit Hours** | | **36** |

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in religious studies, students should meet the following requirements:

- At the beginning of the second semester of study, declare the major.
- Each semester, complete two religious studies courses.
- The last spring semester in residence, take the senior seminar.

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will fulfill all 12 credits of the Arts & Humanities area of the Gen Ed Distribution Requirement and possibly could fill one or both of the categories of the Gen Ed Diversity Requirement (U.S. and/or Global Perspective.)

| **Year One** | | |
|---|---|---|
| **Fall Semester** | | **Credit Hours** |
| RLST 1620 | Religious Dimensions of Human Experience | 3 |

| | |
|---|---|
| Gen. Ed. Skills course (example: Lower-division Written Communication) | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | 4 |
| Elective | 3 |
| Elective | 3 |
| **Credit Hours** | **16** |
| **Spring Semester** | |
| RLST Major Elective | 3 |
| Gen. Ed. Skills course (example: QRMS) | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | 3 |
| Elective | 3 |
| Elective | 3 |
| **Credit Hours** | **15** |
| **Year Two** | |
| **Fall Semester** | |
| RLST Major Elective Lower or Upper-division | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | 3 |
| Elective | 3 |
| Elective | 3 |
| **Credit Hours** | **15** |
| **Spring Semester** | |
| RLST Major Elective Lower or Upper-division | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | 3 |
| Elective | 3 |
| Elective | 3 |
| Elective | 3 |
| **Credit Hours** | **15** |
| **Year Three** | |
| **Fall Semester** | |
| RLST Upper-division Major Elective | 3 |
| RLST Cluster course Lower or Upper-division | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | 3 |
| Gen. Ed. Distribution/ Diversity course (example: Social Sciences/Global Perspective) | 3 |
| Elective or Upper-division Elective (if needed) | 3 |
| **Credit Hours** | **15** |
| **Spring Semester** | |
| RLST Upper-Division Major Elective | 3 |
| RLST Cluster course - Upper-Division | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | 3 |
| Upper-division Elective | 3 |
| Upper-division Elective | 3 |
| **Credit Hours** | **15** |
| **Year Four** | |
| **Fall Semester** | |
| RLST Upper-Division Major Elective | 3 |
| RLST Cluster course - Upper-Division | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | 3 |
| Upper-division Elective | 3 |
| Upper-division Elective | 3 |
| **Credit Hours** | **15** |
| **Spring Semester** | |
| RLST 4830 Senior Majors Seminar | 3 |
| RLST Upper-Division Major Elective | 3 |
| Upper-division Elective | 3 |
| Upper-division Elective | 3 |
| Upper-division Elective | 3 |
| **Credit Hours** | **15** |
| **Total Credit Hours** | **121** |

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BA and MA in Religious Studies

### Admissions Requirements

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.0 or higher.
- Transfer students must have completed a minimum of 24 credit hours at CU Boulder.
- Students must have completed 24 RLST credit hours with a GPA of 3.5 or higher.

### Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only 6 credits may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

If you are interested in the BAM degree program, please contact the graduate program assistant for more information.

# Learning Outcomes

By the completion of the program, students will be able to:

- Develop competency of knowledge about the historical and global diversity of religious ideas, practices, movements and dimensions of cultures.
- Identify, analyze and apply major concepts and theories in the academic study of religion to historical and contemporary issues.

- Communicate knowledge about the historical and global diversity of religious ideas, practices, movements and dimensions of cultures through effective writing.

# Religious Studies - Minor

The Department of Religious Studies offers a minor in religious studies in addition to the BA. The minor in religious studies allows students to learn about many of the world's longstanding religious traditions, including Buddhism, Christianity, Islam, Hinduism, Judaism, Native and Indigenous traditions, while working toward a BA in another major at CU Boulder. Minors will also gain familiarity with theoretical, comparative and interdisciplinary approaches to the academic study of religion through topics such as gender and sexuality, interreligious interactions, law, politics, ethics, sacred texts and decolonization. Students are subject to the College of Arts and Sciences minor requirements.

## Requirements

Students must complete at least 18 credit hours in religious studies coursework, including at least 6 hours of lower division and 9 hours of upper division coursework. Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor.

All coursework applied to the minor must be completed with a grade of C- or better. No pass/fail work may be applied. The GPA for all RLST coursework must equal 2.00 or higher.

| Code | Title | Credit Hours |
|---|---|---|
| RLST lower-division coursework | | 6 |
| RLST lower- or upper-division coursework | | 3 |
| RLST upper-division coursework | | 9 |
| **Total Credit Hours** | | **18** |

# Sociology

Sociology is the study of society. Students who major in sociology have the opportunity to learn in-depth about social structures and processes, and to gain skills in critical thinking, writing and data analysis. Sociology graduates go into many different fields, as described by a recent study by the American Sociological Association.

**Course code for this program is SOCY.**

## Bachelor's Degree

- Sociology - Bachelor of Arts (BA) (p. 579)

## Minor

- Sociology - Minor (p. 581)

## Certificates

- Animals & Society - Certificate (p. 581)
- Care, Health and Resilience - Certificate (p. 582)
- Social Innovation - Certificate (p. 583)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Adler, Patricia A.
Professor Emerita

Bailey Mollborn, Stefanie Faun (https://experts.colorado.edu/display/fisid_142921/)
Professor; PhD, Stanford University

Bartos, Otomar J.
Professor Emeritus

Boardman, Jason D. (https://experts.colorado.edu/display/fisid_125577/)
Professor; PhD, University of Texas at Austin

Brown, Matthew C.
Instructor; PhD, University of Colorado Boulder

Cook-Martin, David (https://experts.colorado.edu/display/fisid_165342/)
Professor; PhD, University of California-Los Angeles

Desan, Mathieu (https://experts.colorado.edu/display/fisid_157678/)
Assistant Professor; PhD, University of Michigan

Downey, Liam C. (https://experts.colorado.edu/display/fisid_129297/)
Assistant Professor; PhD, University of Arizona

Downton, James V.
Professor Emeritus

Elliott, Delbert S.
Professor Emeritus

Gimenez, Martha E.
Professor Emerita

Grant, Don Sherman II (https://experts.colorado.edu/display/fisid_154039/)
Professor; PhD, Ohio State University

Hubbard, Eleanor
Professor Emerita

Hunter, Lori Mae (https://experts.colorado.edu/display/fisid_118372/)
Professor; PhD, Brown University

Irvine, Leslie Jane (https://experts.colorado.edu/display/fisid_113150/)
Professor; PhD, SUNY at Stony Brook

Jacobs, Janet L. (https://experts.colorado.edu/display/fisid_100744/)
Professor; PhD, University of Colorado Boulder

Kjolseth, J. Rolf
Professor Emeritus

Masters, Ryan Kelly (https://experts.colorado.edu/display/fisid_152730/)
Associate Professor; PhD, University of Texas at Austin

Mayer, Thomas
Professor Emeritus

Menken, Jane A. (https://experts.colorado.edu/display/fisid_112411/)
Distinguished Professor; PhD, Princeton University

Mileti, Dennis S.
Professor Emeritus

Pampel, Fred
Professor Emeritus

Patterson, Laura R. (https://experts.colorado.edu/display/fisid_146606/)
Instructor; PhD, University of Colorado Boulder

Pedersen-Gallegos, Liane G.
Instructor; PhD, University of Colorado Boulder

Peek, Lori (https://experts.colorado.edu/display/fisid_158492/)
Professor; PhD, University of Colorado Boulder

Pinto, Leonard J.
Professor Emeritus

Platter, Adele
Professor Emerita

Pyrooz, David C. (https://experts.colorado.edu/display/fisid_155784/)
Associate Professor; PhD, Arizona State University

Radelet, Michael L. (https://experts.colorado.edu/display/fisid_121802/)
Professor; PhD, Purdue University

Regoli, Robert M.
Professor Emeritus

Rinaldo, Rachel Ann (https://experts.colorado.edu/display/fisid_156309/)
Associate Professor; PhD, University of Chicago

Riosmena, Fernando (https://experts.colorado.edu/display/fisid_144419/)
Associate Professor; PhD, University of Pennsylvania

Rogers, Richard G. (https://experts.colorado.edu/display/fisid_106129/)
Professor; PhD, University of Texas at Austin

Steen, Sara
Associate Professor; PhD, University of Washington

Stevenson, Amanda Jean (https://experts.colorado.edu/display/fisid_157687/)
Assistant Professor; PhD, University of Texas at Austin

Stewart, Amanda (https://experts.colorado.edu/display/fisid_167417/)
Instructor; PhD, University of Illinois at Chicago

Sue, Christina Alicia
Associate Professor, Associate Chair; PhD, University of California, Los Angeles

Thomas, Kyle (https://experts.colorado.edu/display/fisid_165253/)
Assistant Professor; PhD, University of Maryland College Park Campus

Tierney, Kathleen Jane (https://experts.colorado.edu/individual/fisid_125978/)
Professor Emerita; PhD, Ohio State University

Wadsworth, Thomas Pearson (https://experts.colorado.edu/display/fisid_144382/)
Associate Professor, Chair; PhD, University of Washington

Walden, Glenda D. (https://experts.colorado.edu/display/fisid_105898/)
Senior Instructor; PhD, University of Colorado Boulder

Wanderer, Jules J.
Professor Emeritus

## Courses

**SOCY 1001 (3) Introduction to Sociology**
Examines basic sociological ideas including social relations, social interaction, social structure, and social change. Examples are drawn from societies around the world.
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology
MAPS Course: Social Science

**SOCY 1004 (3) Deviance in U.S. Society**
Examines the social construction of deviance in the U.S., the process of acquiring a deviant identity and managing deviant stigma, and the social organization of deviant act, lifestyles, relationships and careers.
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Deviance and Criminology

**SOCY 1006 (3) The Social Construction of Sexuality**
Discusses the social determinants of sexuality. Analyzes the economic, psychological, and cultural influences on human sexuality. Interactional perspective of human sexuality is presented.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 1006
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Sex and Gender

**SOCY 1016 (3) Sex, Gender, and Society 1**
Examines status and power differences between the sexes at individual and societal levels. Emphasizes historical context of gender roles and status, reviews major theories of gender stratification.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 1016
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Sex and Gender

**SOCY 1021 (3) United States Race and Ethnic Relations I**
Examines how concepts of race and ethnicity have manifested historically and manifest currently in U.S. society. Covers foundational concepts such as prejudice, discrimination, and privilege. Also addresses the structural causes and consequences of race and ethnicity in various aspects of U.S. society, such as the housing market, the criminal justice system, and education.
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: General Sociology

**SOCY 1022 (3) Ethics and Social Issues in U.S. Health and Medicine**
Explores current ethical and policy issues in U.S. health and medical practices. Includes such issues as alcohol and drug abuse, organ transplants and substitutes, genetic engineering, contraception, abortion, occupational safety and health, and euthanasia.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Population and Health Issue

**SOCY 1841 (1-6) Independent Study in Sociology**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: General Sociology

**SOCY 2011 (3) Contemporary Social Issues and Human Values**
Explores contemporary societies on a global scale. Focuses on such issues as capitalism, socialism, race and ethnic problems, sex discrimination, poverty and the concentration of wealth, crime and deviance, human rights and human values, peace and war.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 2022 (3) Happiness in Society**
Examines the measurement, meaning, and causes of happiness and its relationship to social life in the contemporary United States as well as in other countries. Students will also learn about and critically evaluate existing strategies for enhancing happiness in their lives. Formerly offered as a special topics course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**SOCY 2031 (3) Social Problems**
Examines various social problems in the U.S. through a traditional sociological framework focused on race, class, and gender. Considers such problems as economic, racial, and gender inequality as manifestations of broader structural dynamics rooted in unequal relations of power. Addresses topics such as mass incarceration, poverty, segregation, drug use, immigration, and war and terrorism.
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 2034 (3) Drugs in United States Society**
Examines the relationship between drugs and social contexts. Lends insight into why people find consciousness alteration meaningful, what kinds of experiences and problems arise, and what types of social policies emerge to control drug use.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Deviance and Criminology

**SOCY 2044 (3) Crime and Society**
Explores issues related to crime, the criminal justice system, and crime-related public policy. It addresses what we know about crime and how we know it, how our society responds to crime, how the institutions designed to address crime (police, courts, corrections) function, and diversity in experiences with the criminal justice system.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 2044
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Deviance and Criminology

**SOCY 2061 (3) Introduction to Social Statistics**
Introduces students to quantitative analysis of social phenomena. Emphasizes understanding and proper interpretation of graphs; measures of central tendency, dispersion, and association; and the concept of statistical significance. Assumes students have only limited mathematical background.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology
MAPS Course: Mathematics

**SOCY 2077 (3) Environment and Society**
Examines interactions between societies and their natural and built environments through the lens of inequality. Describes how environmental problems vary along, are shaped by, and exacerbate disparities along lines of race, socioeconomic status, and other forms of social status. Also examines collective efforts to address social and environmental problems.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment and Society

**SOCY 2080 (3) Sociology of the Helping Professions**
Investigates how today's helping professionals are trained and socialized to care for clients, the challenges they face in working within modern bureaucracies and with advanced technologies and the importance of inter-professional care.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 2091 (3) Topics in Sociology**
Variety of courses taught by visiting and regular faculty. See current departmental announcements for specific content. Students may receive credit for this course up to three times for different topics.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 2092 (3) Sex, Power and Reproduction**
Examines fertility, contraception and abortion with an emphasis on demographic trends, social stratification and policy impacts. Sociological, demographic and public health perspectives will be presented.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**SOCY 2150 (3) Gender, Race, and Chainsaws**
Practice fundamental skills of visual literacy with an emphasis on understanding the sociological importance of popular media¿s representation of different groups of people and the implications of these representations for social justice. We will analyze how historical and current social conditions influence the creation, distribution, and interpretation of visual media in our culture, focusing on films in the horror genre. Formerly offered as a special topics course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**SOCY 3001 (3) Classical Theory**
In-depth study of classical sociological theorists, particularly Marx, Durkheim, and Weber. Examines their roles in defining the discipline of sociology.
**Requisites:** Requires a prerequisite course of SOCY 1001 (minimum grade C-). Restricted to students with 27-180 credits (Sophomore, Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 3002 (3) Population and Society**
Examines population, its structure and processes, and its relationships to selected areas of the social structure. Examines Malthusian, neo-Malthusian, and Marxist perspectives.
**Requisites:** Restricted to Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Population and Health Issue

**SOCY 3011 (3) Contemporary Theory**
Continuation of SOCY 3001. In-depth study of modern and post-modern theories of the 20th century, including structural-functionalist, conflict, symbolic interactionist, feminist, and world system theories.
**Requisites:** Requires a prerequisite course of SOCY 3001 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 3012 (3) Gender and Development**
Provides a sociological perspective on gender, globalization, and economic development in the Global South. Examines a variety of topics, including feminist theories of development; poverty and inequality; women¿s work in the context of globalization; and women¿s activism and feminism(s).
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3012
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 3001.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Population and Health Issue
Departmental Category: Asia Content

**SOCY 3016 (3) Marriage and the Family in the United States**
Comparative and historical examination of marriage and the family within the U.S. Emphasizes changing family roles and family structures. Also considers alternatives to the nuclear family and traditional marriage exploring new definitions of family.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3016
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sex and Gender

**SOCY 3032 (3) Social Epidemiology**
Introduces students to social epidemiology. Identifies how social structures, institutions, norms, relationships, and neighborhood context affect health. Particular attention is paid to ways in which economic inequality, racism, and gender discrimination increase groups¿ risk of exposure to factors that undermine health.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 3041 (3) Self and Consciousness**
Explores human development from a psychosocial perspective, focusing on the interplay between psychological patterns and social forms. Issues such as self-image and social consciousness are studied within the larger context of individual and collective forces leading to transformation.
**Equivalent - Duplicate Degree Credit Not Granted:** INVS 3041
**Requisites:** Requires a prerequisite course of SOCY 3001 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 3042 (3) Topics in Population and Health**
A variety of courses in population and/or health will be taught, usually by visiting lecturers. See current departmental announcements for specific content.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of SOCY 1001 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Population and Health Issue

**SOCY 3044 (3) Race, Class, Gender, and Crime**
Overview of race, class, gender and ethnicity issues in offending, victimization and processing by the justice system. Examines women and people of color employed in the justice system.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 3044 and WGST 3044
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 1001 or SOCY 1004 or SOCY 1021 or SOCY 2044.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Deviance and Criminology

**SOCY 3045 (3) Sociology of Death and Dying**
Addresses sociological aspects of thanatology (the study of death and dying). Includes study of the social meaning of death and its normative treatment in western civilization, with a focus on the contemporary United States.
**Requisites:** Requires a prerequisite course of SOCY 1001 or SOCY 3001 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Population and Health Issue

**SOCY 3046 (3) Topics in Sex and Gender**
Faculty present courses based on their area of expertise and specialization in the field of sex and gender. Students should check current sociology department notices of course offerings for specific topics.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3046
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sex and Gender

**SOCY 3052 (3) Medical Sociology**
Explores the role of medicine and medical systems in society. How does society shape health, how does health shape social position, and how do societies make sense of health and illness? Topics may include epidemiology, social demography of health, social stress, health behavior, experiences of illness and recovery, health care provision, and health care delivery systems.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Population and Health Issue

**SOCY 3141 (3) Social Movements and the Politics of Protest**
Considers theory and research about social movements and other forms of protest within and beyond the United States. Examines their impacts as well as factors shaping their success and failure, including leadership, ideology, recruitment, strategy, organizational dynamics, and broader social context.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 3151 (3) Self in Modern Society**
Explores how modern social institutions and culture shape our personal experiences, how personal experiences can affect the nature of those, institutions and culture, and how strategies can be developed for achieving balance between the individual and society.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 3001.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 3161 (3) Global Perspectives on Race and Ethnicity**
Explores various manifestations of race and ethnicity in different parts of the world. Includes in-depth coverage of various subtopics, such as racial and ethnic stratification, identity formation, social movements, politics, citizenship, and migration.
**Recommended:** Prerequisite SOCY 1021.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: General Sociology

**SOCY 3171 (3) Whiteness Studies**
Uses the conceptual framework of the sociology of race and ethnic relations to explore whiteness as a racial category that is centered and privileged in American society. Investigates the development of whiteness from past white supremacy, current colorblindness, to possible future multiculturalism. Analyzes the consequences of whiteness as a racial identity and a social structure.
**Requisites:** Requires a prerequisite course of SOCY 1001 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 3201 (3) Sociological Research Methods**
Introduces students to the logics and methods of sociological research. This requirement for majors teaches ways to answer sociological questions by collecting and analyzing different types of data. Students are trained in research ethics and learn how to collect their own data and conduct original sociological research. Collection and analysis of both qualitative and quantitative data are included.
**Requisites:** Requires prerequisite course of SOCY 2061 or ANTH 4000 or EBIO 4410 or ECON 3818 or GEOG 3023 or IPHY 2800 or IPHY 3280 or MATH 2510 or PSCI 2075 or PSYC 2111 or EDUC 4716 (minimum grade C-). Restricted to Sociology (SOCY) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 3301 (3) Survey Methods**
Teaches quantitative research methods and, particularly, methods of survey research. Topics include sampling, interviewing, schedule construction, data analysis, computer methods, index construction, and statistical analysis. Students participate in a survey project, design, collect data, and prepare a research paper on the basis of collected data.
**Requisites:** Requires prerequisite courses of SOCY 2061 and SOCY 3001 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 3314 (3) Violence Against Women and Girls**
Focuses on aspects of the victimization of women and girls that are "Gendered" - namely, sexual abuse and intimate partner abuse. Also explores the importance of race, class, and sexuality in gendered violence.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 3314 and WGST 3314
**Recommended:** Prerequisite SOCY 1016 or WGST 1016.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Deviance and Criminology

**SOCY 3401 (3) Field Methods**
Skill development prepares students to conduct qualitative sociological research. Emphasizes ethnographic techniques, including intensive interviewing, direct observation, coding, participant observation, and report writing. Students conceive and execute a field research project with data collection, analysis, and a report.
**Requisites:** Requires a prerequisite course of SOCY 3001 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 4000 (3) Gender, Genocide and Mass Trauma**
Studies the persistence of genocide and the effects of mass trauma on women and girls. Within the framework of political and social catastrophe, examines cataclysmic world events and the traumatic consequences for women of religious persecution, colonialism, slavery and the genocides of the 20th and 21st centuries.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4010
**Recommended:** Prerequisite SOCY 1016 or WGST 1016 or WGST 2000 or SOCY 3314 or WGST 3314.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sex and Gender

**SOCY 4002 (3) Sociology of Aging**
Studies present and future roles of the aged in the family, the community, and the larger society. Considers economic, political, and health consequences of various retirement systems.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Recommended:** Prerequisite SOCY 3001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Population and Health Issue

**SOCY 4004 (3) Advanced Topics in Criminology**
Variety of courses in criminology. See current departmental announcements for specific content.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 1001 or SOCY 1004 or SOCY 2044.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Deviance and Criminology

**SOCY 4007 (3) Global Human Ecology**
Examines global environmental issues using sociological perspectives. A variety of critical contemporary challenges are explored that link social and ecological processes. These include the social dimensions of climate change, inequitable distribution of pollution, the environmental aspects of population growth, and resource shortages. Policies and strategies for change are explored.
**Equivalent - Duplicate Degree Credit Not Granted:** SEWL 2000
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment and Society

**SOCY 4014 (3) Criminology**
Examines the scientific study of types of criminal behavior and explanations for criminal behavior, with special attention to social factors affecting criminal behavior.
**Requisites:** Requires a prerequisite course of SOCY 1001 or SOCY 1004 or SOCY 2044 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Deviance and Criminology

**SOCY 4016 (3) Sex, Gender and Society 2**
Studies status and power differences between the sexes at individual, group, and societal levels. Examines empirically established sex differences, and reviews biological, psychological, and sociological explanations for gender differences.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4016
**Requisites:** Requires a prerequisite course of SOCY 1016 or WGST 1016 or WGST 2000 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sex and Gender

**SOCY 4017 (3) Animals and Society**
Examines the role of non-human animals in human society. Investigates the social construction of the human/animal boundary. Challenges ideas that animals are neither thinking nor feeling. Examines the many ways humans rely on animals. Considers the link between animal cruelty and other violence. Explores the moral status of animals.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment and Society

**SOCY 4018 (3) Sport in Society**
Investigates the world of sport via the social structures and processes that underlie this ubiquitous and much-pursued area of social life. Elucidates social dimensions of sport by highlighting and debating different theoretical and methodological dimensions of sociology of sport research. Examines demographics of sport, including gender, race, and sexual orientation, as well as inequalities within sport, along with the politics, economics, globalization, and commodification of sport.
**Recommended:** Prerequisites SOCY 1001 and SOCY 3001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**SOCY 4024 (3) Juvenile Justice and Delinquency**
Examines the history, incidence and prevalence of delinquent behavior among youth.
**Requisites:** Requires a prerequisite course of SOCY 1001 or SOCY 1004 or SOCY 2044 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Deviance and Criminology

**SOCY 4027 (3) Inequality, Democracy, and the Environment**
Focuses on the structural forces affecting environmental degradation and environmental behavior by examining the relationships between (a) inequality and democratic decision making and (b) undemocratic decision making; U.S. and corporate food and energy policy; and global environmental degradation. Focuses on the role that global inequality plays in fostering environmental degradation.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 4027
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment and Society

**SOCY 4030 (3) Sociology of Climate Change**
Examines the human drivers and causes of climate change, the health and security risks it creates and the efforts of societies to mitigate and adapt to its effects.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 4030
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment and Society

**SOCY 4031 (3) Social Psychology**
Studies individuals in social context. Reviews philosophical and sociological treatments of the relation between the individual and society. More specific topics include the socialization process,theories of human development and personality formation, language acquisition, conformity, aggression, sex differences in personality and gender identity, and the relation between attitudes and overt behavior.
**Requisites:** Requires a prerequisite course of SOCY 3001 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 4037 (3) Hazards, Disasters and Society**
Explores the societal dimensions of hazards and disasters, emphasizing disaster theory and research, and key issues in the sociological study of disasters, social vulnerability, and the impacts of disasters in the U.S. and worldwide.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 5037
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment and Society

**SOCY 4042 (3) Economic Sociology**
Defines relationship between economy and society; sociological approach to study of economic activity and organization; difference from the theoretical and methodological assumptions orienting the discipline of economics; tackles these questions in two ways: studies foundations as established in works of Smith, Marx, Weber, Polanyi, and Schumpeter, and considers current research in economic sociology, focusing on concepts of markets, networks, and embeddedness.
**Requisites:** Requires a prerequisite course of SOCY 1001 (minimum grade D-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Population and Health Issue

**SOCY 4047 (3) Topics in Environment and Society**
Variety of courses taught by visiting and regular faculty. See current departmental announcements for specific content.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment and Society

**SOCY 4052 (3) Social Inequalities in Health**
Focuses on social inequalities in health in both U.S. and international contexts. Reviews the link between health status and various types of social statuses, including but not limited to socioeconomic status, gender, race and ethnicity. Explanations for the relationships between these factors and various health outcomes are discussed. Focuses on multiple levels of analysis, from the physician-patient interactions to health care systems and social policies. Students have the opportunity to develop their own specific research interests in this field.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Population and Health Issue

**SOCY 4060 (2) Caring for Others**
Enables teachers to earn credit for the MOOC Caring for Society. This 2 credit course is an abbreviated version of the 3 credit course SOCY 4062 Suffering and Care in Society.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4062
**Grading Basis:** Letter Grade

**SOCY 4062 (3) Suffering and Care in Society**
Examines how modern societies understand and respond to the reality of human suffering, how care systems are organized, and the experiences of professional caregivers.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4060
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Population and Health Issue

**SOCY 4063 (3) Risk and Resilience in Society**
Explores the growing dangers of modern life and the ability of society and its members to recover from epidemics, terrorism, financial disasters, natural catastrophes and other harmful events. Special attention is given to the social (as opposed to the individual) sources of risk and resilience and their implications for the helping professions.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 4071 (3) Social Inequalities and Social Change**
Provides a sociological perspective on social inequalities in the United States, such as those pertaining to social class, race, ethnicity, sex, gender, sexuality, and age. Examines current data of patterns and trends of such inequalities, reviews scholarship on their roots, and critically evaluates social change efforts to redress them.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 5071
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 4081 (1-3) Sociology of Education**
Analyzes the school as a social organization. Among topics considered are power and control in the school; classroom interaction and its relation to learning and personality development in students; roles of educators; and reciprocal relations of school and community.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 4084 (3) Punishment, Law and Society**
Places the current state of punishment in the U.S. in historical and cross national context. Examines key features of penal systems and key sociological theories about the relationship between punishment and society.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4084
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 1001 or SOCY 1004 or SOCY 2044.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Deviance and Criminology

**SOCY 4086 (3) Family and Society**
Studies the changing relationship between family and social structure. Examines variations in family organization and considers political, social, ideological, demographic, and economic determinants of family formation.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4086
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 3001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sex and Gender

**SOCY 4104 (3) The Death Penalty in America**
Examines the historical and international use of capital punishment, and then focuses on its use and status in the United States in this century, with a special look at Colorado. Critically examines the arguments for and against capital punishment. The inmates on death row and their families will be examined, as well as the needs of families of homicide victims.
**Requisites:** Requires a prerequisite course of SOCY 4014 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Deviance and Criminology

**SOCY 4117 (3) Food and Society**
Examines the food system along the lines of social justice and environmental sustainability. Investigates the institutional and cultural supports of major food system problems and contemporary efforts to address those problems, including the realms of food production, processing, distribution, marketing, policy, regulation, consumption, and activism.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment and Society

**SOCY 4121 (3) Sociology of Religion**
Examines complex interactions between religious and other social structures, such as the economy, government, and the family, and how globalization is affecting religious traditions across the globe. Includes discussion of how various religions are used or misused to justify terrorism and other acts of violence.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 3001.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 4131 (1-3) Advanced Topics in Sociology**
Variety of advanced specialty courses taught by visiting and regular faculty designed for upper division sociology majors. See current departmental announcement for specific content.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of SOCY 1001 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 4132 (3) Gender, Islam and Modernity**
Examines gender in contemporary Muslim societies, with emphasis on Asia and the Middle East. Explores issues such as veiling, feminism, sexuality, family, women's participation in politics and social movements.
**Requisites:** Requires prerequisite course of SOCY 1001 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**SOCY 4141 (3) The Social Psychology of Friendships**
Studies friendships between individuals and groups, applying social psychological theories of interaction and group processes. Examines the effects of hierarchies of status and power and of norms and social pressure on friendships. Attempts to answer questions like how social categories like gender, race, and class affect friendships, what are the unwritten rules of behavior among friends in different situations, and what happens when we violate them.
**Requisites:** Requires a prerequisite course of SOCY 1001 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 4160 (3) Designing Social Innovations**
One of the goals of higher education is to nurture innovative thinking and prepare professionals to solve society¿s most complex and pressing problems. Towards that end, this course reviews academic and practitioner literatures on the processes involved in designing social innovations.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 5160
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**SOCY 4161 (3) Executing Social Innovations**
Introduces students to the skills and strategies involved in developing a business plan for a social business or an organization wanting to increase its social impact.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**SOCY 4441 (3) Senior Honors Seminar 1**
Helps students design and initiate an honors thesis based on original sociological research.
**Requisites:** Requires prerequisite courses of SOCY 3001 and SOCY 3301 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sciences Honors Course
Departmental Category: General Sociology

**SOCY 4451 (3) Senior Honors Seminar 2**
Helps students complete an honors thesis based on original sociological research. Emphasizes analyzing data, writing research reports, and presenting results.
**Requisites:** Requires prerequisite courses of SOCY 3001 and SOCY 3201 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sciences Honors Course
Departmental Category: General Sociology

**SOCY 4841 (1-8) Independent Study in Sociology**
Upper-division variable credit. Instructor consent required.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of SOCY 3001 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 4911 (1-3) Teaching Sociology**
Students participate in a teaching seminar under the supervision of a faculty member. Includes pedagogical strategies for implementing concrete educational goals and encouraging higher levels of creativity and analysis in a large, lower-division class. Emphasizes mentorship and personal development. Instructor consent required.
**Requisites:** Requires a prerequisite course of SOCY 1001 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 4923 (3-6) Animals and Society Certificate Internship**
Offers students applied learning opportunities to explore interests and clarify career goals associated with animal welfare. Students apply theory, acquire new skills, gain experience, and network with professionals. Internships integrate theory, knowledge, and practice through planned, supervised work experience.
**Recommended:** Prerequisite SOCY 4017 Animals and Society.
**Grading Basis:** Letter Grade

**SOCY 4931 (1-6) Internship in Sociology**
Provides an academically supervised opportunity for junior and senior sociology majors to work in public or private organizations to gain practical knowledge and experience, and allows students to make a connection between sociological theory and the "real world". Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires a prerequisite course of SOCY 3001 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 4932 (3) Internship in Care, Health and Resilience**
Provides an academically supervised opportunity for juniors and seniors interested in the helping professions to work in a job that provides them valuable hands-on experience, allows them to apply insights learned in their formal coursework and helps them make informed career choices upon graduation. This course cannot be applied to the SOCY major or minor requirements.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Population and Health Issue

**SOCY 4935 (3) Internship in Social Innovation**
Provides an academically supervised opportunity for juniors and seniors interested in social innovation to work in a job that provides them valuable hands-on experience, allows them to apply insights learned in their formal coursework and helps them make informed career choices upon graduation. This course cannot be applied to the SOCY major or minor requirements.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors) with a minimum GPA of 2.0.

# Sociology - Bachelor of Arts (BA)

Sociology is the scientific study of human social behavior. It considers how society influences individuals and how individuals influence society. Sociologists describe and explain the actions of persons, groups, organizations, classes and entire societies. They also design and evaluate social programs and public policy.

The study of sociology includes social theory, research methods, social stratification, race relations, social change, criminology, demography, gender roles, religion, social psychology and the environment.

# Requirements

## General Requirements

Students must complete the graduation requirements of the College of Arts and Sciences and the required courses listed below. A minimum of 36 credit hours (but not more than 45) in sociology is required for the degree. Of the 36 credit hours, 21 must be upper division with a minimum of 15 upper-division credit hours of coursework in the major taken on the Boulder campus.

All required major courses must be completed with a grade of C- or better. The cumulative GPA required in sociology courses is 2.00.

In addition to formal coursework, the degree offers opportunities for internships with various organizations, including social service agencies, the criminal justice system and nonprofit organizations. There is also the opportunity to design and complete an honors thesis based on the student's original research, as well as to work closely with a faculty member through the UROP program.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| SOCY 1001 | Introduction to Sociology | 3 |
| SOCY 2061 | Introduction to Social Statistics [1] | 3 |
| SOCY 3001 | Classical Theory | 3 |
| SOCY 3201 | Sociological Research Methods | 3 |
| **Electives** | | |
| SOCY Lower or Upper-division electives | | 9 |
| SOCY Upper-division electives [2] | | 15 |
| **Total Credit Hours** | | **36** |

1. A non-SOCY statistics course (*C-* grade or higher) can be used to substitute for SOCY 2061, but then an additional 3 credit SOCY elective would need to be taken to reach the 36 required SOCY credits.
2. SOCY 4932 cannot be applied to the SOCY major or minor requirements.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility (p. 75). The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in sociology, students should meet the following requirements:

- By the beginning of the second semester, declare the major.
- By the end of the fourth semester, complete SOCY 1001 and SOCY 3001 and 6 credit hours of sociology electives.
- By the end of the sixth semester, complete SOCY 2061 and SOCY 3201 and 15 credit hours of sociology electives (with a minimum of 9 of the 15 being upper-division credit hours).
- By the end of the eighth semester, complete 36 credit hours (but not more than 45), in sociology with at least 21 of those credit hours in upper-division courses.

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will fulfill all 12 credits of the Social Sciences area of the Gen Ed Distribution Requirement and one, or potentially, both categories of the Gen Ed Diversity Requirement, as well as the QRMS component of the Gen Ed Skills Requirement.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| SOCY 1001 | Introduction to Sociology | 3 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/US Perspective) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Elective/MAPS | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| SOCY Elective Lower or Upper-division | | 3 |
| SOCY Elective Lower or Upper-division | | 3 |
| Gen. Ed. Distribution (example: Arts and Humanities) | | 3 |
| Elective/MAPS | | 3 |
| Elective/MAPS | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| SOCY 2061 | Introduction to Social Statistics | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/Global Perspective) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| SOCY 3001 | Classical Theory | 3 |
| SOCY Elective Lower or Upper-division | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| SOCY Elective Upper-Division | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| SOCY 3201 | Sociological Research Methods | 3 |
| SOCY Elective Upper-Division | | 3 |
| Gen. Ed. Distribution course (example: Upper-division Arts & Humanities) | | 3 |
| Upper-Division Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| SOCY Elective Upper-Division | | 3 |
| SOCY Elective Upper-Division | | 3 |
| Upper-Division Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| SOCY Elective Upper-Division | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Divisoin Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **121** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Use sociological theories and evidence to understand, analyze and explain the causes and consequences of social stratification; ethnic, racial, religious, gender and other forms of differentiation and inequality; and variations in the composition and form of basic social institutions.
- Learn to use a variety of research methods to help describe and explain social phenomena.
- Employ critical thinking skills to evaluate data, sociological writings and other work.
- Locate and consult works relevant to a sociological investigation and write a sociological paper that makes an argument that is coherent, cogent and grounded in a review of relevant scholarship.
- Understand processes of social change and the opportunities for and barriers to them.

# Sociology - Minor

Sociology is the scientific study of human social behavior. It considers how society influences individuals and how individuals influence society. Sociologists describe and explain the actions of persons, groups, organizations, classes and entire societies. They also design and evaluate social programs and public policy. The study of sociology includes social theory, research methods, social stratification, race relations, social change, criminology, demography, gender roles, religion, social psychology and the environment.

To declare a minor in sociology, students can visit Buff Portal and fill out a declaration form. For information on the sociology minor (or major), students can email michael.lynn@colorado.edu (Michael.Lynn@colorado.edu) from their CU email account.

Students must complete minimum of 18 credit hours in sociology courses, including at least 9 hours of upper-division coursework, and the required course listed below. Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor. All courses applied to the minor must be completed with a grade of C- or better. The GPA for all SOCY coursework must equal 2.00 or higher.

## Required Courses and Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| SOCY 1001 | Introduction to Sociology | 3 |
| SOCY Lower or Upper-division electives | | 6 |
| SOCY Upper-division electives | | 9 |
| **Total Credit Hours** | | **18** |

*Note*: SOCY 4932 cannot be applied to the SOCY major or minor requirements.

# Animals and Society - Certificate

The animals and society certificate builds on a rapidly growing interdisciplinary field devoted to the critical examination and evaluation of the relationships between humans and nonhuman animals, whether historical or contemporary, factual, fictional or symbolic, beneficial or detrimental. The program requirements emphasize scholarship from the social sciences and humanities, but include elective options in the natural sciences. The interdisciplinary approach helps students explore the complexities of animals' lives, human-animal relationships, ethical and moral concerns about animals, representations of animals and humans, and the significance of animals in human evolution, history and civilization.

This certificate has an especially practical use for students in the social sciences and humanities who would like to pursue careers or interests related to wild or domesticated animals, but do not wish to become biologists, zoologists or veterinarians. Examples of career options include:

- development, management, policy work, research, outreach, marketing, lobbying or other work in animal protection or environmental organizations;
- administrative, fundraising, marketing or outreach jobs at animal shelters;
- humane or environmental education;
- jobs with government agencies, such as the U.S. Department of Agriculture, the Fisheries and Wildlife Service or others;
- animal-assisted therapy (with a master's degree in social work);
- wildlife rehabilitation;
- humane law enforcement.

Students might also consider pursuing graduate degrees in human–animal studies, anthrozoology or related fields.

For more information or to apply to the certificate in animals and society, contact Dr. Laurent Cilia ( laurent.cilia@colorado.edu).

# Requirements

The animals and society certificate requires 18 credits through three main areas. Students must complete 9 of the 18 credit hours at the upper-division level; a minimum of 12 credit hours must be taken on campus. If applicable, a maximum of 6 transfer credit hours from other institutions will be accepted. No more than 3 courses (or 9 credits), not including the internship, may be taken in one department.

- *Core Courses*: Students must take Animals and Society (SOCY 4017) and two of the classes listed, all of which examine the research in relevant areas of human–animal studies. Courses not taken to fulfill the core requirement may be taken as electives.
- *Electives*: Students must take either two or three classes (depending on whether they will complete an internship) from the list of those offered in the College of Arts and Sciences that provide essential perspectives on human–animal interactions and relationships.
- *Internship (or third elective course):* In either the second semester of the junior year or the senior year, students may opt to take a semester-long, 3-credit internship. Alternatively, students may enroll in an additional 3-credit course. The internships allow students to apply knowledge gained in courses to practical experience. The internship is not applicable to the sociology major or minor.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| SOCY 4017 | Animals and Society | 3 |
| Select two of the following: [1] | | 6 |
| ANTH 3010 | The Human Animal | |
| PHIL 4120 | Philosophy and Animals | |
| FREN 4700 | Encountering Animals: Contemporary Discourse and the Dialog of Species | |
| ENVS 4100 | Special Topics in Environmental Studies (Dogs, Wolves and Human Evolution) [2] | |
| or ENVS 4135 | Dogs, Wolves, and Humans | |
| ENVS 3007 | Animal Ethics and Policy | |
| **Electives** [3] | | **6** |
| Select at least 6 credits of elective course work; labs may result in 7 credits. | | |
| ANTH 3000 | Primate Behavior | |
| ANTH 4110 | Human Evolutionary Biology | |
| EBIO 2040 | Principles of Ecology | |
| EBIO 3040 | Conservation Biology | |
| EBIO 3240 | Animal Behavior | |
| HIST 4117 | Colorado History | |

| | | |
|---|---|---|
| HIST 4326 | Epidemic Disease in US History | |
| HIST 4416 | Environmental History of North America | |
| MCDB 1030 | | |
| MCDB 1041 | | |
| SOCY 4117 | Food and Society | |
| **Internship** | | **3** |
| **Total Credit Hours** | | **18** |

1 Courses not taken to fulfill core requirements may be taken as electives.

2 ENVS 4135 (Dogs, Wolves and Humans) was taught as a topic under ENVS 4100 before the 2021-2022 academic year.

3 No more than 3 courses (or 9 credits), not including the internship, may be taken in one department.

### Internship

Students can choose from the several animal welfare-related Boulder County internship sites. Students can also locate their own internship sites, with the director's approval. Students taking internships must work a minimum of 40 hours for each hour of academic credit. For 3 credits, this means 90 hours on site (i.e., 6 hours per week), 10 hours of classroom time and 20 hours of reading and writing assignments.

In collaboration with the program director and site supervisors, students will outline tasks and responsibilities that support their learning goals. Consequently, students who achieve their learning goals acquire experience and a set of transferable skills that prepare them for professional positions or further academic study.

# Care, Health and Resilience - Certificate

The certificate in care, health and resilience prepares undergraduates for working in today's helping professions: nursing, medicine, counseling, teaching, community services, ministry, emergency management and related fields. It emphasizes the skills and practices expected of paid care providers, ranging from the ability to nurture clients' physical, emotional and social well-being to helping people thrive despite life-altering circumstances.

The program's curriculum:

- Provides students an opportunity to explore a variety of care-related occupations.
- Addresses the needs of suffering people and at-risk populations.
- Examines the ethical dilemmas posed by medical technologies and bureaucracies.
- Links students to Colorado's only academic health sciences center, the University of Colorado Anschutz Medical Campus and other local hospitals through its internship program.

# Requirements

The certificate is open to degree seeking CU Boulder undergraduates in good standing from any declared major and non-degree seeking students. There is no GPA requirement for admission into the program. Completion of the certificate requires the completion of 18 credit hours (9 upper-division) of approved courses with grades of C- or better. No more than 6 credit hours from other institutions will be accepted.

## Required Courses and Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | **9** |
| Choose two of the following: | | |
| SOCY 1022 | Ethics and Social Issues in U.S. Health and Medicine | |
| SOCY 2080 | Sociology of the Helping Professions | |
| SOCY 3045 | Sociology of Death and Dying | |
| SOCY 3052 | Medical Sociology | |
| SOCY 4052 | Social Inequalities in Health | |
| SOCY 4062 | Suffering and Care in Society | |
| SOCY 4063 | Risk and Resilience in Society | |
| **Required Internship** [1] | | **3** |
| SOCY 4932 | Internship in Care, Health and Resilience [2] | |
| **Electives** | | **6** |
| Choose three of the following: | | |
| ANTH 4110 | Human Evolutionary Biology | |
| ANTH 4610 | Medical Anthropology | |
| ECON 4242 | Urban Economics: The Economics of Cities | |
| ECON 4646 | Topics in Health Economics | |
| ENGL 1001 | Writing, Reading, Culture (Epidemics & Literature) | |
| ENVS 3525 | Intermediate Environmental Problem Analysis: Topical Cornerstones | |
| ETHN 3201 | Social Justice, Leadership and Community Engagement Internships | |
| GEOG 3692 | Introduction to Global Public Health | |
| GEOG 3742 | Place, Power, and Contemporary Culture | |
| GEOG 4852 | Health and Medical Geography | |
| IPHY 3490 | Introduction to Epidemiology | |
| INVS 3302 | Facilitating Peaceful Community Change | |
| PHIL 1160 | Introduction to Medical Ethics | |
| PHIL 3160 | Bioethics | |
| PHIL 4110 | Contemporary Moral Theory | |
| PSCI 3084 | Diversity, Disagreement, and Democracy: an Introduction to the Theory and Practice of Democracy | |
| PSYC 2606 | Social Psychology | |
| PSYC 3131 | Human Emotion | |
| PSYC 3456 | Psychology of Personality | |
| SLHS 1010 | Disabilities in Contemporary American Society | |
| SLHS 3014 | Hearing Loss Epidemiology | |
| WGST 3400 | Gender, Personality, and Culture | |
| **Total Credit Hours** | | **18** |

1 Given the difficulties of securing internships caused by the coronavirus, students are allowed to substitute one of the remaining core courses for the internship until further notice.

[2] SOCY 4932 cannot be applied to the SOCY major or minor requirements. For more information about the internship program, contact Dr. Glenda Walden (glenda.walden@colorado.edu).

# Social Innovation - Certificate

The certificate in social innovation prepares students for working in fields whose primary mission is to improve the lives of society's most vulnerable and disadvantaged people. The program will teach students how to design and execute evidence-based strategies for advancing human welfare.

The program's curriculum will provide students with:

- A substantive understanding of social problems;
- A methodology for conceiving solutions to such complex problems;
- A broad set of skills needed to implement solutions in new or existing organizations; and
- The tools for critically evaluating the effectiveness and sustainability of solutions.

# Requirements

## Admission Requirements

Degree seeking and non-degree seeking CU Boulder undergraduate students in good standing from any discipline will be eligible to participate in the social innovation certificate program. There will not be a grade point average requirement to enroll in the program; however, students will be required to achieve a C- or better in all coursework that applies toward the certificate.

## Required Courses and Credits

The certificate requires the completion a minimum of 18 credits, of which 9 credits must be at the upper-division level. A maximum of 6 semester credit hours from other institutions will be accepted.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| SOCY 4160 | Designing Social Innovations | 3 |
| SOCY 4161 | Executing Social Innovations [1] | 3 |
| **Electives** | | **12** |
| Students will complete four of the following courses (only one of which can be from SOCY and no more than three of which may be from the any one other department) and, depending on their career goals, can choose all from the same area or from multiple areas. | | |
| *Care, Health and Resilience* | | |
| GEOG 3692 | Introduction to Global Public Health | |
| IPHY 3490 | Introduction to Epidemiology | |
| PHIL 3160 | Bioethics | |
| PSYC 2606 | Social Psychology | |
| SLHS 1010 | Disabilities in Contemporary American Society | |
| *Economy* | | |
| ANTH 4020 | Explorations in Anthropology | |
| GEOG 3862 | Global Africa: Environment, Development, and Culture | |
| GEOG 3672 | Who Runs the World? Sex, Power, and Gender in Geography | |
| ECON 4242 | Urban Economics: The Economics of Cities | |
| ECON 4717 | Economics of Entrepreneurship | |
| SOCY 4071 | Social Inequalities and Social Change | |
| *Environment/Population* | | |
| BAKR 1600 | Creating a Sustainable Future | |
| ECON 3535 | Natural Resource Economics | |
| ECON 3545 | Environmental Economics | |
| ECON 3784 | Economic Development and Policy | |
| ENVS 3030 | Topics in Environmental Social Sciences | |
| ENVS 3031 | Environmental Psychology | |
| ENVS 3032 | Environment, Media and Society | |
| GEOG 1962 | Geographies of Global Change | |
| SOCY 2077 | Environment and Society | |
| SOCY 3002 | Population and Society | |
| SOCY 4007 | Global Human Ecology | |
| SSIR 1010 | Social Entrepreneurship & Sustainability | |
| *Government* | | |
| ECON 4211 | Public Economics: the Economics of the Government Sector | |
| PSCI 2106 | Introduction to Public Policy Analysis | |
| PSCI 3031 | Political Parties and Interest Groups | |
| PSCI 3274 | Capitalism and its Critics | |
| PSCI 4714 | Liberalism and Its Critics | |
| *International Affairs* | | |
| ANTH 4500 | Cross-Cultural Aspects of Socioeconomic Development | |
| GEOG 3682 | International Development: Economics, Power, and Place | |
| IAFS 1000 | Global Issues and International Affairs | |
| PHIL 3260 | Philosophy and the International Order | |
| PSCI 3143 | Current Affairs in International Relations | |
| PSCI 4012 | Global Development | |
| *Society* | | |
| ANTH 3170 | America: An Anthropological Perspective | |
| ANTH 4500 | Cross-Cultural Aspects of Socioeconomic Development | |
| ARSC 3001 | | |
| ETHN 2001 | Foundations of Comparative Ethnic Studies: Race, Gender and Culture(s) | |
| ETHN 2013 | Critical Issues in Native North America | |
| ETHN 2432 | African American History | |
| ETHN 2536 | Survey of Chicana/o History and Culture | |
| ETHN 3201 | Social Justice, Leadership and Community Engagement Internships | |
| GEOG 3742 | Place, Power, and Contemporary Culture | |
| IAFS 3000 | Special Topics in International Affairs (Humanitarianism) | |
| INVS 3302 | Facilitating Peaceful Community Change | |
| PACS 2500 | Introduction to Peace, Conflict and Security Studies | |

| | |
|---|---|
| PACS 3700 | Communication and Conflict Management |
| SLHS 2000 | Introduction to Communication Disorders |
| SOCY 2011 | Contemporary Social Issues and Human Values |
| SOCY 2031 | Social Problems |
| SOCY 2044 | Crime and Society |
| SOCY 3141 | Social Movements and the Politics of Protest |
| SOCY 4081 | Sociology of Education |
| WGST 2000 | Introduction to US Gender, Race and Sexuality Studies |
| WGST 3500 | Global Gender Issues |
| *Technology* | |
| ATLS 4519 | Advanced Special Topics (Design for Change) |
| EMEN 4200 | Engineering and Entrepreneurship for the Developing World |
| EMEN 4825 | New Venture Creation |
| ENES 1850 | Engineering in History: The Social Impact of Technology |
| ENES 2130 | History of Modern Technology from 1750 to the Atomic Bomb |
| ENES 2210 | Modern Science and Technological Society |
| MCEN 4045 | Mechanical Engineering Design Project 1 |
| MCEN 4085 | Mechanical Engineering Senior Design Project 2 |
| MCEN 4228 | Special Topics in Mechanical Engineering (Cookstove Assessment; Project-based Learning in Rural Schools) |
| **Total Credit Hours** | **18** |

[1] Students may substitute SOCY 4935, subject to director approval.

# Spanish and Portuguese

The Department of Spanish and Portuguese offers three major tracks and two minors. Language courses at the elementary and intermediate levels are also offered in Spanish, Portuguese and Catalan.

The department has identified the following as educational outcomes for the three tracks within the Spanish major.

The undergraduate degree in Spanish language and literature emphasizes knowledge and awareness of:

- The fundamental outlines of the history of literary and cultural expressions of the Spanish-speaking world.
- Major creative writers in both Spanish and Spanish American literature.
- Basic critical methodologies in the study of different genres ranging from fiction to poetry in a variety of textual forms, and from the written word to cinema, media and other visual arts.
- The cultural and historical contexts in which Spanish-speaking societies developed and continue to develop.

In addition, students completing the degree in Spanish language and literature are expected to acquire the ability and skills to:

- Read sophisticated Spanish texts at a level at which literary and cultural analyses can be performed.
- Write and speak Spanish sufficiently to participate in critical discussions and write critical essays.
- Analyze and interpret texts in terms of themes, characters, structure, style and overall textual strategies.
- Relate analysis and interpretations of different texts to one another.
- Communicate such interpretations competently in written form in Spanish.

The undergraduate degree in Spanish and Portuguese language and culture emphasizes knowledge and awareness of the same topics listed in the degree in Spanish language and literature, in addition specifies electives to focus on:

- The culture of the Portuguese-speaking world.
- Knowledge of the Portuguese language.

The undergraduate degree in Spanish for the professions emphasizes knowledge and awareness of:

- Several professional practices including business, health, media and sustainable development practices as applied to the Spanish-speaking world.
- Fundamental Professional Spanish terminology related to these areas.
- The cultural environment in which these professions are conducted in the Spanish-speaking world.
- Basic disciplinary practices according to the canons of each discipline.
- Best practices in cross-cultural communication.
- Best practices in the field of translation, interpretation and language services in the targeted professional areas.

In addition, students completing the degree in Spanish for the professions are expected to acquire the ability and skills to:

- Read and interpret in cultural and professional-related terms sophisticated Spanish texts concerning business, health, media and sustainable development practices.
- Write and speak Spanish sufficiently to communicate effectively on professional-related issues, be involved in critical discussions and write critical essays on the subject.
- Analyze a particular professional problem in order to place it in a relevant context and formulate an appropriate response.
- Adequately translate professional-related documents.

**Course codes for these programs are SPAN and PORT.**

## Bachelor's Degree

- Spanish - Bachelor of Arts (BA) (p. 592)

## Minors

- Portuguese - Minor (p. 595)
- Spanish - Minor (p. 596)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Abdala-Mesa, Yohainna
Assistant Teaching Professor; PhD, Université de Toulouse II Le Mirail (France)

Becher, Anne Helen (https://experts.colorado.edu/display/fisid_110035/)
Associate Teaching Professor; MA, University of Colorado Boulder

Brown, Esther Lynn (https://experts.colorado.edu/display/fisid_129298/)
Professor, Chair; PhD, University of New Mexico

Dabove, Juan Pablo (https://experts.colorado.edu/display/fisid_125397/)
Professor; PhD, University of Pittsburgh

Elmore, Peter Michael (https://experts.colorado.edu/display/fisid_103089/)
Professor; PhD, University of Texas at Austin

Elmore, Vivian
Assistant Teaching Professor; BA, Pontificia Universidad Católica (Perú)

Hallstead, Susan Rita (https://experts.colorado.edu/display/fisid_125579/)
Associate Teaching Professor; PhD, University of Pittsburgh

Herland, Emmy (https://experts.colorado.edu/display/fisid_168686/)
Assistant Teaching Professor; PhD, University of Washington

Herrero-Senés, Juan (https://experts.colorado.edu/display/fisid_147159/)
Associate Professor, Associate Chair; PhD, Universitat Pompeu Fabra (Spain)

Kennedy, John
Assistant Professor; PhD, Cornell University

Krauel, Javier (https://experts.colorado.edu/display/fisid_143248/)
Associate Professor; PhD, Duke University

Long, Mary K. (https://experts.colorado.edu/display/fisid_109994/)
Teaching Professor; PhD, Princeton University

Malcolm, Karen L. (https://experts.colorado.edu/display/fisid_108575/)
Assistant Teaching Professor; MA, University of Nebraska-Lincoln

Martuscelli, Tania A. (https://experts.colorado.edu/display/fisid_148379/)
Associate Professor; PhD, University of Massachusetts at Amherst

Ortega Guzmán, Élika (https://experts.colorado.edu/display/fisid_165171/)
Assistant Professor; PhD, University of Western Ontario

Piras, Maria Cristina
Assistant Teaching Professor; M.A, University of Colorado Boulder

Prieto, Andrés Ignacio (https://experts.colorado.edu/display/fisid_143948/)
Professor; PhD, University of Connecticut

Quan, Tracy (https://experts.colorado.edu/display/fisid_167169/)
Assistant Professor; PhD, University of California-Davis

Rivas Rodríguez, José Javier (https://experts.colorado.edu/display/fisid_144516/)
Professor, Associate Chair; PhD, Universidade de Santiago De Compostela (Spain)

Schincariol, Marcelo Tadeu (https://experts.colorado.edu/display/fisid_148724/)
Associate Teaching Professor; PhD, Universidade Estadual de Campinas (Brazil)

Silleras-Fernández, Núria (https://experts.colorado.edu/display/fisid_147213/)
Professor; PhD, Universitat Autònoma de Barcelona (Spain)

Vargas, Edgar (https://experts.colorado.edu/display/fisid_174781/)
Assistant Teaching Professor; PhD, University of Houston

# Courses

## Portuguese

**PORT 1010 (5) Beginning Portuguese 1**
Provides students with basic vocabulary and fundamentals of grammar through practice in speaking, listening comprehension, reading and writing, based on the Communicative Approach. Introduces the cultures of the Portuguese speaking world, with a focus on Brazil.
**Additional Information:** Departmental Category: Portuguese

**PORT 1020 (5) Beginning Portuguese 2**
Provides students with basic vocabulary and fundamentals of grammar through practice in speaking, listening comprehension, reading and writing, based on the Communicative Approach. Introduces the cultures of the Portuguese speaking work, with a focus on Brazil. Continuation of PORT 1010. Department enforced prerequisite: PORT 1010 (minimum grade C-).
**Additional Information:** Departmental Category: Portuguese

**PORT 2110 (3) Second-Year Portuguese 1**
Involves practice in speaking, listening comprehension, reading and writing at an intermediate level. Explores relevant topics of the Brazilian culture through different media. Besides introducing grammar topics corresponding to the intermediate level of the Portuguese languages, it includes grammar review (PORT 1010 and PORT 1020) and extra work on vocabulary acquisition. Department enforced prerequisite: PORT 1020 (minimum grade C-).
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Portuguese

**PORT 2120 (3) Second-Year Portuguese 2**
Includes practice in speaking, listening comprehension, reading and writing at intermediate level, based on the Communicative Approach. Includes grammar and extra work on vocabulary acquisition, both explored through literary texts by renowned authors of the Portuguese speaking world, with a focus on Brazilian literature.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Portuguese

**PORT 2350 (3) Portuguese for Romance Language Speakers**
Focusing on Brazilian Portuguese, this course constitutes an intensive introduction to Portuguese language for those who speak a Romance language. Comprehends basic vocabulary and fundamentals of grammar through practice in speaking, listening comprehension, reading and writing, based on the Communicative Approach. Uses different media to explore cultural aspects of the Portuguese speaking world.
**Recommended:** Requisite three semesters of college equivalent in any Romance language.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Portuguese

**PORT 2800 (3) Brazil: Past and Present**
Discusses contemporary Brazil through the lenses of its literary, as well as socio-political movements. Students acquire a broader perspective of the country's current dynamics based on the formation of its national identity from 1500 to today. History serves as background to analyze literature and arts and critically understand Brazilian culture. Taught in English. Does not count toward Portuguese minor or Spanish and Portuguese major.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 2800
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Portuguese

**PORT 3003 (3) Advanced Portuguese Language Skills**
Consists of an advanced language course focused on current socio-environmental issues in Brazil. Involves reading academic texts in different areas of study, writing essays, watching documentaries, conducting class presentations and discussions, and studying grammar and vocabulary in the context of a more sophisticated written Portuguese.
**Requisites:** Requires prerequisite course of PORT 2120 or PORT 2350 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Portuguese

**PORT 3170 (3) Lisbon as a Global City: Cosmopolitanism, Diversity, and Innovation**
Experience the city of Lisbon, Portugal, one of the oldest cities in the world. Known for its cosmopolitanism and cultural diversity since the Age of Discovery, Lisbon will be the center of our exploration of how multicultural heritage has created new social, economic and cultural dynamics that have molded the city as a singular destination to visit and to invest.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**PORT 3220 (3) Latin American Culture: Spanish America and Brazil**
Examines literary, artistic, and philosophical currents in Spanish America and Portuguese America (Brazil), from pre-Columbian times to the present. Taught in Spanish.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 3220
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Recommended:** Prerequisites PORT 2110 and PORT 2120.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Portuguese

**PORT 3230 (3) Transatlantic Relations in the Portuguese Speaking World**
Examines cultural movements in Brazil, Portugal and Portuguese-speaking Africa, from the 15th century period of Portuguese expansion to the postcolonial present. Includes articles on culture as seen through literary, artistic, historical and sociological lenses. Taught in Portuguese.
**Requisites:** Requires prerequisite courses of PORT 2110 and PORT 2120 and PORT 2350 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Portuguese

**PORT 3270 (3) Socio-Environmental Dynamics in Brazil**
Gives students the opportunity to immerse themselves in the language, culture and contemporary realities of rural Maranhao, Brazil. Explores some of the most pressing issues in Brazil today with a focus on sustainable development, environmental governance and social entrepreneurship.
**Requisites:** Requires a prerequisite course of PORT 2110 or PORT 2350 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Portuguese

**PORT 3800 (3) Indigenous Thought: Art, Literature and Political Engagement in Brazil**
Discusses art, literature, and political engagement of Indigenous populations in contemporary Brazil. With a Decolonial viewpoint, this course analyses a series of works by Indigenous authors that underscores their culture, identity, and political expression. By focusing on the significance of the first-person testimonies, students will become more familiar with the diversity of languages and traditions that are otherwise homogenized by the ideological frameworks of those (non-indigenous) occupying a place and space of power. Taught in English.

**PORT 4110 (3) Brazilian Literature**
Focuses on Brazilian literature through the lenses of literary and cultural studies. May address fiction, poetry and/or the relationship between literature and film. In addition to reading literary texts, students read academic essays.
**Equivalent - Duplicate Degree Credit Not Granted:** PORT 5110
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires a prerequisite course of PORT 2120 or PORT 2350 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Portuguese

**PORT 4150 (3) Literature of the Portuguese Speaking World**
Examines major works of Portuguese literature and/or Portuguese-speaking African literature through the lenses of cultural and literary studies. May address fiction, poetry, and/or the relationship between literature and cinema.
**Equivalent - Duplicate Degree Credit Not Granted:** PORT 5150
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of PORT 2120 or PORT 2350 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Portuguese

**PORT 4230 (3) Special Topics in Luso-Brazilian and/or African Literature**
Designed to examine intensively particular topics or issues concerning the literatures of Portugal, Brazil and/or the African countries of Portuguese colonization. Taught in Spanish.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 4230
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of PORT 3230 and SPAN 3100 (all minimum grade C-).
**Recommended:** Prerequisites SPAN 3120 and an additional course above SPAN 3000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Portuguese

**PORT 4840 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Portuguese

## Spanish

**SPAN 1000 (3) Cultural Difference through Hispanic Literature**
For freshmen only. Organized around the general topic of cultural differences. Focuses on a related issue such as gender or history articulated in the literature of Spain, Latin America, and the Hispanic United States. Taught in English; students read selected literary texts in English from the various traditions. Does not count towards the Spanish major.
**Requisites:** Restricted to students with 0-26 credits (Freshmen) only.
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 1010 (5) Beginning Spanish 1**
A beginning course that assumes no prior knowledge or experience with Spanish. A variety of language-teaching approaches are used to help students develop all four basic language skills: listening, speaking, reading and writing.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 1150
**Additional Information:** Departmental Category: Spanish

**SPAN 1020 (5) Beginning Spanish 2**
Continuation of SPAN 1010. Department enforced prerequisite: SPAN 1010 (min. grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 1150
**Additional Information:** Departmental Category: Spanish

**SPAN 1150 (5) Intensive First Year Spanish**
An intensive beginning course covering the same material as SPAN 1010 and 1020.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 1010 or SPAN 1020
**Additional Information:** Departmental Category: Spanish

**SPAN 2110 (3) Second-Year Spanish 1**
Grammar review. Emphasizes reading, writing, and speaking skills. Department enforced prerequisite: SPAN 1020 (min. grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 2150
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Foreign Language
Departmental Category: Spanish

**SPAN 2120 (3) Second-Year Spanish 2**
Grammar review. Emphasizes reading, writing and speaking skills. Department enforced prerequisite: SPAN 2110 (min. grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 2150
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 2130 (3) Spanish for Heritage Speakers in the United States I**
Designed to further the linguistic skills and repertoires of students who grew up hearing and/or speaking Spanish at home and/or in their communities. This course aims to support students¿ bilingual and biliteracy development, build students¿ confidence in using their language skills across personal and professional Spanish-speaking settings in the United States and beyond, and recognize the value of their linguistic and cultural backgrounds. This is the first of a two-course sequence.
**Requisites:** Requires prerequisite of SPAN 1020.
**Recommended:** Prerequisites Students must have experience in a Spanish-speaking or bilingual household, community, or environment (Spanish-speaking family members, dual immersion, extended stay in a Spanish-speaking country); and Students must score between 23-27 on the Placement Exam in Canvas.

**SPAN 2140 (3) Spanish for Heritage Speakers in the United States II**
Designed to further the linguistic skills and repertoires of students who grew up hearing and/or speaking Spanish at home and/or in their communities. This course aims to further students¿ bilingual and biliteracy skills developed in SPAN 2130 so that they may meet the demands of personal and professional Spanish-speaking settings locally and beyond, and recognize the value of their linguistic and cultural backgrounds. This is the second of a two-course sequence.
**Requisites:** Requires prerequisite of SPAN 1020.
**Recommended:** Prerequisites Students must have experience in a Spanish-speaking or bilingual household, community, or environment (Spanish-speaking family members, dual immersion, extended stay in a Spanish-speaking country); and Students must score at least a 28 on the Placement Exam in Canvas.

**SPAN 2150 (5) Intensive Second-Year Spanish**
Intensive review of grammar and other subjects covered in SPAN 2110 and SPAN 2120.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 2110 or SPAN 2120
**Requisites:** Requires prerequisite course of SPAN 1020 (minimum grade C-).
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Spanish

**SPAN 2450 (3) Catalan for Spanish Speakers**
Offers an intensive introduction to the Catalan language for those able to speak Spanish. By the end of the course students should be able to communicate well in all language-skills areas: listening comprehension, speaking, reading and writing. Students will also have gained a better understanding and appreciation of the singularity of Catalan.
**Recommended:** Prerequisite SPAN 3000 or placement or five semesters of college Spanish or department consent required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3000 (5) Advanced Spanish Language Skills**
Moves students beyond the intermediate level toward an advanced command of Spanish with a focus on communication appropriate for academic research and professional interactions. Course activities focus on solidifying and deepening interpretive, interpersonal and presentational communication skills through close exploration of authentic texts and media and creation of both formal and informal writing and oral presentations. The course prepares students for continued study of literature, art, history, linguistics, culture, business, medical and other professional topics in Spanish. SPAN 3000 is one of the prerequisites for all upper-division Spanish courses except SPAN 3001.
**Requisites:** Requires prerequisite course of SPAN 2120 or SPAN 2150 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3001 (3) Spanish Conversation**
Emphasizes vocabulary acquisition and speaking fluency. This is an intermediate-level course intended for those who are learning Spanish as a second-language. Native speakers of Spanish who have pursued formal education in a Spanish speaking country will not be admitted to the course. Heritage speakers of Spanish (native speakers who have pursued formal education in a non-Spanish speaking setting) as well as students from bi-lingual K-12 programs must meet with the coordinator to determine appropriate class level. This is a 5th semester course offered at the same level as SPAN 3000. It is not part of a sequence and it does not serve as a prerequisite for any other course. This course does not count toward the Spanish major or minor.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 3002
**Requisites:** Requires prerequisite course of SPAN 2120 or SPAN 2150 (minimum grade C-).
**Additional Information:** Departmental Category: Spanish

**SPAN 3002 (3) Advanced Spanish Conversation**
Focuses on refining fluency in both informal and formal discourse through group discussions, class work and individual and group presentations in order to prepare students for communication in professional settings. To that end, the materials used in the course will emphasize themes and problems relevant to the contemporary Hispanic world. This course is designed for Spanish majors, minors and students seeking state certification as instructors of Spanish.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 3001
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3010 (3) Advanced Rhetoric and Composition**
Designed to refine expository and argumentative writing in Spanish, this course will center around four main areas of study: culture, linguistics, sociopolitical and economic reality, and literature and criticism. A multi-draft process-based approach will guide the writing and revision of essays. Additionally, there will be a focus on grammar and lexical issues that are the most challenging for students at the third-year level.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Upper
Departmental Category: Spanish

**SPAN 3030 (3) Professional Spanish for Business 1**
Develops advanced Spanish-language skills, trans-cultural knowledge, and regional, historical, and sociocultural understanding in order to expand the critical apparatus necessary for pursuing business-related professions in the Spanish-speaking world. Includes the study of essential business terminology and documents.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3040 (3) Professional Spanish for Business 2**
Complements SPAN 3030 with a focus on different business topics and countries. Emphasizes interpreting and elementary translation. Attention is given to the writing of resumes and application letters, as well s the entire job search process.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3050 (3) Spanish Phonology and Phonetics**
Designed to teach some of the methods, techniques, and tools of descriptive linguistics as they apply to articulatory phonetics. Students analyze important contrasts between sounds of Spanish and English bymeans of phonetic transcription.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Spanish

**SPAN 3060 (3) Spanish for Careers in Environmental Studies and Sustainable Development**
Provides advanced Spanish language competency and transcultural knowledge of issues pertaining to the environment, energy and sustainable development in the Spanish-speaking world. Students will develop a critical apparatus for analyzing, reading, listening, speaking and writing about the social, cultural and economic parameters of these countries and the U.S.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3070 (3) Spanish 21st Century Media Professions**
Develops advanced Spanish language skills, trans-cultural knowledge and regional and historical understanding necessary for using Spanish in media related professions. Examines the production, representations and cultural meaning of Hispanic and Latino media within the United States and globally, drawing on films, videos and readings in political economy, cultural studies, history and sociology. Students create five media products in Spanish.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3080 (3) Spanish Health Professions**
Develops advanced Spanish language competency and trans-cultural knowledge and skills for health related contexts both in the United States and abroad in order to develop a critical apparatus for analyzing, reading, listening, speaking and writing about health and understanding health fields in historical and sociocultural contexts of the Spanish speaking world.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3100 (3) Literary and Cultural Analysis in Spanish**
Fosters critical thinking and the ability to discuss texts from a historical, sociological, ideological and formalistic viewpoint. Analyzes literary and cultural expressions from Latin America, Spain and the US Latino traditions in different genres, ranging from fiction to poetry, and media from the written word to cinema and other visual arts.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3120 (3) Advanced Spanish Grammar**
Develops a deeper understanding of grammatical features of Spanish. Advancement of Spanish language skills and development of metalinguistic awareness is achieved through examination of grammar usage in both texts and spontaneous speech productions within communities.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3150 (3) Linguistic Analysis of Spanish**
Introduces students to fundamental areas of linguistic analysis with special attention paid to Spanish (and Portuguese). The structural systems of language will be introduced (principles of sound patterns, word formation, meaning, and sentence structure). Different types of language variation will be discussed (historical, social, regional).
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Spanish

**SPAN 3200 (3) Spanish Culture**
Examines historical bases of modern Spain's cultural and political currents. Department enforced prerequisite: SPAN 3000.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3215 (3) Urban History and Culture in the Spanish-Speaking World**
Understanding the complex history, social fabric, material life and cultural diversity of Latin American and Iberian cities is the goal of this course, which in its iterations will be devoted to analyzing and discussing different urban centers on either side of the Atlantic Ocean. Materials from a wide variety of media and genres such as literature, visual arts, historiography, and film, will be used. Taught in Spanish.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3220 (3) Latin American Culture: Spanish America and Brazil**
Examines literary, artistic, and philosophical currents in Spanish America and Portuguese America (Brazil), from pre-Columbian times to the present.
**Equivalent - Duplicate Degree Credit Not Granted:** PORT 3220
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3230 (3) Discovering Barcelona: Culture and Heritage**
Presents more than 2,000 years of Barcelona's cultural heritage in the city of Barcelona from the Romans to the present. Students read works by locals and foreign authors to understand how the city has been a hub of the European and Mediterranean cultures for centuries. A faculty sponsored Global Seminar to Barcelona, Spain, offered through the Study Abroad Program.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3240 (3) Catalan Culture 1: Nation and Art**
Introduces students to the literary, artistic and historical currents of Catalonia, an economically vibrant area of the Iberian Peninsula with 10 million people, its capital Barcelona, and a distinct culture and language. Examines national identity and major works from renowned Catalan artists, spanning architecture, painting and literature, like Dali, Gaudi, or Miro. Department enforced prerequisite: SPAN 3000.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3250 (3) Catalan Culture 2: Contemporary Trends and Barcelona**
Introduces students to the contemporary social and cultural trends of Catalonia, primarily in its capital of Barcelona. Examines current developments in fields such as theatre, art, fashion, cooking, urban design and/or architecture.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3260 (3) Late 19th and 20th Century Argentine Narrative**
Considers a series of late 19th and 20th century canonical works from several genres (poetry, short story, essay, and the novel). Students will acquire a specific knowledge of late 19th and 20th century Argentine literature, and its relationship to specific social actors and specific historical processes. A faculty-sponsored Global Seminar to Rosario, Argentina, offered through the Study Abroad Program.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3270 (3) Barcelona: Understanding Local and Immigrant Cultures**
Explores the history of Barcelona from an interdisciplinary, European perspective that emphasizes the city's cultural diversity and pluralism. A range of historical, literary, artistic, and sociological texts will be examined. Taught in Spanish. Offered through the Study Abroad Program.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Spanish

**SPAN 3280 (3) Introduction to Catalan Literature & Film**
Introduces students to the rich and diverse literary and film traditions of Catalonia, an economically vibrant area of the Iberian Peninsula with 10 million people and a distinct culture and language. Taught in Spanish.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3290 (3) Argentine Culture and History in a Latin American Context**
This course examines the historical trends in Latin America from 1880 to the present and compares and contrasts Argentina's unique cultural identity to the larger Latin American context. The course then considers how said history plays a role in the literary, artistic, philosophical and social currents (including identity issues related to race, ethnicity and gender) that shape contemporary Argentine culture.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**SPAN 3310 (3) 20th Century Spanish Literature**
Surveys leading writers of Spain from 1898 until the present.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3340 (3) 20th Century Spanish American Literature**
Introduces contemporary Spanish American literature.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3700 (3) Selected Readings: Spanish Literature in Translation**
Introduces selected Spanish literature masterpieces. Taught in English. Does not count toward requirements for Spanish major or minor.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3800 (3) Selected Readings: Latin American Literature in Translation**
Introduces selected Latin American (Spanish and Portuguese) literature masterpieces. Taught in English. Does not count toward requirements for the Spanish major or minor.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3900 (3) Cosmos Latinos: Hispanic Science Fiction and New Worlds**
Examines how Hispanic science fiction (from both Spain and Latin America) in literature and film portrays and addresses topics such as technological development, the exploration (and exploitation) of space, life in on other planets, alternative paradigms of modernity, and the cultural and social landscape of technologically saturated societies. Course taught in English. Does not count towards the requirements for the Spanish major or minor.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**SPAN 4060 (3) Problems of Translation for Professions in Spanish 1**
Develops skills in English-Spanish and Spanish-English translation and interpretation.
**Requisites:** Requires a prerequisite course of SPAN 3000 and SPAN 3010 or SPAN 3030 or SPAN 3040 or SPAN 3060 or SPAN 3070 or SPAN 3080 or SPAN 3120 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4070 (3) Problems of Translation for Professions in Spanish 2**
Presents documents from different professional areas (business, health, media and environmental studies and sustainable development) which are studied, prepared, translated and discussed in context in order to enable students to perform successfully in real translation situations.
**Requisites:** Requires a prerequisite course of SPAN 3000 and SPAN 3010 or SPAN 3030 or SPAN 3040 or SPAN 3060 or SPAN 3070 or SPAN 3080 or SPAN 3120 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4110 (3) Hispanic Women Writers**
Discusses the image of women in Spanish literature through the centuries using works by representative female writers.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4120 (3) Literature and Cinema in Spain and Latin America**
Studies film and fiction in different periods and about main topics of the Hispanic world. It will provide a historical and cultural overview, introduce students to film theory, narrative theory and the vocabulary associated with both, and integrate critical texts about all the material studied. Topics may vary each semester. This course will be taught entirely in Spanish.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4130 (3) The Power of Storytelling: Oral, Textual and Digital Narratives**
Examines the ways in which oral, textual and digital narratives have shaped, and continue to shape, our lives and the different communities we inhabit. Students consider stories from the Hispanic tradition produced in a variety of historical settings and across different media.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4150 (3) Major Works and Trends in Literature and Culture in Spain Up to 1700**
Examines major works and trends in literature, visual arts and/or other cultural expressions of Spain from its origins to the end of the Baroque period,
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4160 (3) Major Works and Trends in Literature and Culture in Spain: 1700-Present**
Examines major works and trends in literature, visual arts and/or other cultural expressions of Spain from 1700 to the present day.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4170 (3) Major Works/Trends in Literature and Culture in Latin America Up to the 19th Century**
Examines major works and trends in literature, visual arts and/or other cultural expressions of Latin America from the colonial period to the end of the 19th century.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4180 (3) Major Works and Trends in Literature and Culture in Latin America: 1900-Present**
Examines major works of literature, visual arts and/or other cultural expressions of Latin America from the beginning of the 20th century to the present day.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4215 (3) Spanish in the United States**
Describes the linguistic characteristics of U.S. Spanish, Spanish-English bilingualism and direct contact, including the study of borrowing, code switching, phonological and grammatical convergence, leveling, accommodation and attrition, among other linguistic phenomena. Discusses the relationships between language and identity, as well as the role of Spanish in U.S. education, media and social institutions.
**Requisites:** Requires a prerequisite course of SPAN 3000 or SPAN 3010 or SPAN 3050 or SPAN 3120 or SPAN 3150 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4220 (3) Special Topics in Spanish and/or Spanish American Literature**
Examines intensively particular topics or issues concerning Spanish and/or Spanish American literature selected by the instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4230 (3) Special Topics in Luso-Brazilian and/or African Literature**
Designed to examine intensively particular topics or issues concerning the literatures of Portugal, Brazil and/or the African countries of Portuguese colonization. Taught in Spanish.
**Equivalent - Duplicate Degree Credit Not Granted:** PORT 4230
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of PORT 3230 and SPAN 3100 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4430 (3) Special Topics in Hispanic Linguistics**
Examines intensively particular topics or issues concerning Hispanic linguistics selected by the instructor.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires a prerequisite course of SPAN 3000 or SPAN 3010 or SPAN 3050 or SPAN 3120 or SPAN 3150 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Spanish

**SPAN 4450 (3) Introduction to Hispanic Linguistics**
Introduces students to the main areas of inquiry within the field of Hispanic linguistics. Topics to be covered include speech and language, phonetics and phonology, morphology and syntax, semantics, linguistic change and variation and Spanish spoken in the United States.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5450
**Requisites:** Requires a prerequisite course of SPAN 3000 or SPAN 3010 or SPAN 3050 or SPAN 3120 or SPAN 3150 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Spanish

**SPAN 4620 (3) Cervantes**
Works of Cervantes.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4650 (3) Methods of Teaching Spanish**
Familiarizes students with second-language acquisition theories and current methodology and techniques in foreign-language teaching. The opportunities to observe Spanish classes, teach mini-lessons and perform volunteer work 2 hours a week in a local school or language program provide students with real-world teaching experience.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5650
**Requisites:** Requires a prerequisite course of SPAN 3000 and SPAN 3010 and SPAN 3002 or SPAN 3030 or SPAN 3040 or SPAN 3050 or SPAN 3150 or SPAN 3200 or SPAN 3220 or SPAN 3240 or SPAN 3250 or SPAN 3280 or SPAN 3310 or SPAN 3340 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4660 (6) High School Spanish Teaching**
Part of supervised secondary school teaching required for state certification to teach Spanish. These hours do not count toward student hours in the major nor in the total departmental hours allowed.
**Requisites:** Requires prerequisite course of SPAN 4650 or SPAN 5650 (minimum grade D-).
**Additional Information:** Departmental Category: Spanish

**SPAN 4840 (1-3) Independent Study**
Departmental approval required.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Spanish

**SPAN 4930 (1-4) Languages Internship for Professions**
Participants interested in public service or management-oriented careers in government or business are able to work as interns in public sector agencies or in private industry, on campus, or abroad.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Recommended:** Prerequisites SPAN 3200 and an additional course above SPAN 3000.
**Additional Information:** Departmental Category: Spanish

**SPAN 4980 (1) Methods Language Learn/Pedagogy**
Required, intensive mini-course for Teaching Assistants in Spanish and Portuguese. Provides teachers with the opportunity to learn about language-learning theory and pedagogy.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 4990 (3) Spanish Honors Thesis**
Recommended restriction: 18 hours of upper-division Spanish, 3.00 GPA overall, and 3.50 GPA in Spanish.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite 18 hours of upper-division Spanish, 3.00 GPA overall, and 3.50 GPA in Spanish.
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Spanish

# Spanish - Bachelor of Arts (BA)

## Program Tracks

The Department of Spanish and Portuguese offers a Bachelor of Arts in Spanish with three program tracks.

### Spanish Language and Literature Track

This track emphasizes knowledge and awareness of:

- The fundamental outlines of the history of Peninsular literature and of Latin American literature.
- The major creative writers in both Peninsular and Latin American literature.
- Basic critical methodologies in the study of poetry, drama, narrative fiction, nonfiction and cinema.
- The cultural and historical contexts in which particular traditions develop.

The program focuses on critical thinking and communication skills (written and oral) and their application in today's real-world global setting. Our internationally recognized professors and instructors integrate their research with their teaching in a fruitful manner. The degree supports an active secondary teaching certification program, which prepares future Spanish instructors for the growing demand for secondary Spanish teachers. Catalan language courses are also offered to broaden students' linguistic spectrum. Advanced students, particularly honor's program students, are invited to begin their MA work in our program by taking graduate seminars during their senior year.

### Spanish and Portuguese Language and Culture Track

This track focuses on the literature and culture of Spanish-speaking and Lusophone countries, guiding students through readings on the history of Spain, Portugal, Brazil and Latin America. Along with major authors and literary movements of the Spanish and Portuguese-speaking worlds, students read a variety of complex texts across academic disciplines.

The linguistic and cultural mastery of Spanish and Portuguese is key in opening endless possibilities to the European Union (Portugal and Spain), as well as Brazil and the whole of Latin America. Through this bilingual combination, students will gain the tools needed to conduct business in the Western Hemisphere in today's competitive global market.

### Spanish for the Professions Track

This interdisciplinary track offers exciting career possibilities, both in government and private industry, at home and abroad. Languages and cultural understanding are essential in business, engineering, commerce, civil service, law, library science, media, science, economics, health and social sciences.

The degree emphasizes knowledge and awareness of the cultural environment in which professions are practiced in the Spanish-speaking world. Students develop an advanced level of language proficiency and trans-cultural competence in addition to taking courses in a professional field of their choice.

## Education Abroad

The department strongly recommends that all majors include a period of study in a Spanish or Portuguese-speaking country in the course of their undergraduate education. Please visit Education Abroad (https://abroad.colorado.edu/) for more information.

Although the 4-year graduation guarantee does not apply to those who study abroad, it is still entirely possible to go abroad for a semester or a year and graduate in 4 years. The Department of Spanish and Portuguese sponsors Summer Global Seminars in Argentina (https://abroad.colorado.edu/?FuseAction=Programs.ViewProgramAngular&id=740), Portugal (https://abroad.colorado.edu/?FuseAction=Programs.ViewProgramAngular&id=10349) and Spain (https://abroad.colorado.edu/?FuseAction=Programs.ViewProgramAngular&id=766).

## Concurrent Degree Program

### BA/MSIB in Spanish

This program is designed for students who wish to combine their BA in Spanish for the Professions with a one-year MS in international business (MSIB) from the University of Colorado Denver. Students seeking this option should complete the Leeds Business Minor.

Students apply for the MSIB program during their third year by declaring their intention to the Spanish for the Professions faculty director, submitting the standard MSIB application forms, and completing admissions requirements, which include the GMAT (Graduate Management Admissions Test). Students are notified of acceptance to the program before the start of their fourth year. Students must have at least a 3.00 GPA to be considered for admission.

# Requirements

## General Requirements

The following requirements apply to all program tracks.

The College of Arts and Sciences does not allow more than 45 credit hours in any one discipline to be counted toward the 120 credit hours required for a BA degree. This rule does not mean that a student may not take more than 45 credit hours in Spanish, but rather that one must have at least 75 credit hours in courses other than Spanish. PORT 2120 will be accepted as partially fulfilling upper-division courses in other foreign languages.

To fulfill the requirements for any major track, students must complete at least 12 upper-division credits at CU Boulder. For the Spanish Language and Literature track and the Spanish and Portuguese Language and Culture track, 9 of the 12 credits must be from the major works/trends courses listed (SPAN 4150 or SPAN 4160, and SPAN 4170 or SPAN 4180) and SPAN 3100. For the Spanish for the Professions track, students must take at least two of the 3000-level profession courses and SPAN 4070 and SPAN 3100 on the Boulder campus.

No more than 3 independent study credit hours may count toward the major. No grade lower than a C- will be counted in the major requirements. The ancillary GPA (made up of the combined grades from area courses) must be at least 2.00.

Please note that students seeking Colorado State Teaching Certification should complete the Spanish Language and Literature Track. Students seeking teaching certification in Spanish must take certain classes. For full requirements, please contact the advisor for the Secondary Spanish Teaching Certificate program in the department.

Students must complete the general requirements of the College of Arts and Sciences and the required courses. All Spanish majors are encouraged to consult with the Spanish and Portuguese Department professional advisor (http://www.colorado.edu/mycuhub/) before they register each semester.

Transfer credit must be approved by the Associate Chair for Undergraduate Studies. Study Abroad courses must be approved; contact the Spanish and Portuguese Department Professional Advisor (http://www.colorado.edu/mycuhub/) to begin the process.

## Program Track Requirements

### Spanish Language and Literatures Track

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| SPAN 3000 | Advanced Spanish Language Skills | 5 |
| SPAN 3100 | Literary and Cultural Analysis in Spanish | 3 |
| SPAN 3010 | Advanced Rhetoric and Composition | 3 |
| or SPAN 3120 | Advanced Spanish Grammar | |
| **Hispanic Linguistics Requirement** | | **3** |
| SPAN 3050 | Spanish Phonology and Phonetics | |
| or SPAN 3150 | Linguistic Analysis of Spanish | |
| or SPAN 4430 | Special Topics in Hispanic Linguistics | |
| or SPAN 4450 | Introduction to Hispanic Linguistics | |
| **4000-level Spanish Language and Literature courses** | | **9** |
| *Spanish Literature and Culture* | | |
| SPAN 4150 | Major Works and Trends in Literature and Culture in Spain Up to 1700 | |
| or SPAN 4160 | Major Works and Trends in Literature and Culture in Spain: 1700-Present | |
| *Latin American Literature and Culture* | | |
| SPAN 4170 | Major Works/Trends in Literature and Culture in Latin America Up to the 19th Century | |
| or SPAN 4180 | Major Works and Trends in Literature and Culture in Latin America: 1900-Present | |
| *Additional 4000-level Spanish Literature course* | | |
| Choose one of the following courses not used to fulfill a requirement above: | | |
| SPAN 4110 | Hispanic Women Writers | |
| or SPAN 4150 | Major Works and Trends in Literature and Culture in Spain Up to 1700 | |
| or SPAN 4160 | Major Works and Trends in Literature and Culture in Spain: 1700-Present | |
| or SPAN 4170 | Major Works/Trends in Literature and Culture in Latin America Up to the 19th Century | |
| or SPAN 4180 | Major Works and Trends in Literature and Culture in Latin America: 1900-Present | |
| or SPAN 4220 | Special Topics in Spanish and/or Spanish American Literature | |
| or SPAN 4620 | Cervantes | |
| **Upper-Division Spanish Electives** | | **9** |
| 9 credit hours of upper-division SPAN electives. 3 credit hours must be 4000-level. Can include courses not used to fulfill an above requirement. | | |
| **Total Credit Hours** | | **32** |

### Spanish and Portuguese Languages and Culture Track

Note that prerequisites for the program include sufficient Spanish knowledge to be admitted to 3000-level courses and sufficient knowledge of Portuguese to be admitted to 2000-level courses.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| PORT 2110 | Second-Year Portuguese 1 | 3 |
| or PORT 2350 | Portuguese for Romance Language Speakers | |
| PORT 2120 | Second-Year Portuguese 2 (or SPAN/PORT upper-division) [1] | 3 |
| or PORT 2800 | Brazil: Past and Present | |
| PORT 3003 | Advanced Portuguese Language Skills [2] | 3 |
| or PORT 3170 | Lisbon as a Global City: Cosmopolitanism, Diversity, and Innovation | |
| or PORT 3220 | Latin American Culture: Spanish America and Brazil | |
| or PORT 3230 | Transatlantic Relations in the Portuguese Speaking World | |
| 4000-level PORT course [2] | | 3 |
| **Required Spanish Language and Literature Courses** | | |
| SPAN 3000 | Advanced Spanish Language Skills | 5 |
| SPAN 3100 | Literary and Cultural Analysis in Spanish | 3 |
| SPAN 3010 | Advanced Rhetoric and Composition | 3 |

| | | |
|---|---|---|
| or SPAN 3120 | Advanced Spanish Grammar | |
| **Hispanic Linguistic Requirement** | | **3** |
| Choose one of the following: | | |
| SPAN 3050 | Spanish Phonology and Phonetics | |
| or SPAN 3150 | Linguistic Analysis of Spanish | |
| or SPAN 4430 | Special Topics in Hispanic Linguistics | |
| or SPAN 4450 | Introduction to Hispanic Linguistics | |
| **Spanish Literature and Culture Course** | | **3** |
| SPAN 4150 | Major Works and Trends in Literature and Culture in Spain Up to 1700 | |
| or SPAN 4160 | Major Works and Trends in Literature and Culture in Spain: 1700-Present | |
| **Latin American Literature and Culture Course** | | **3** |
| SPAN 4170 | Major Works/Trends in Literature and Culture in Latin America Up to the 19th Century | |
| or SPAN 4180 | Major Works and Trends in Literature and Culture in Latin America: 1900-Present | |
| **SPAN or PORT Elective** | | **3** |
| Upper division (3000/4000 level) SPAN or PORT literature, culture and/or language. | | |
| **Total Credit Hours** | | **35** |

1 Native speakers of Portuguese, and in general, all students whose Portuguese skills are beyond the PORT 2120 level, are not required to take Portuguese lower-division courses. However, students have to make up these credit hours by taking 6 hours of upper-division SPAN or PORT courses or any related courses outside the department. Related courses must be approved by the department.

2 Some 3000-level and 4000-level Portuguese (PORT) courses are repeatable for up to 6 credits each.

### Spanish for the Professions Track

The department offers an interdisciplinary major in Spanish for the Professions, which includes the completion of 12 credits in a professional field, in a second major or in a second degree. It offers students numerous career possibilities, both in government and private industry at home and abroad. Those choosing this major are not able to enter the CU Boulder graduate program in Spanish without fulfilling the requirements in the language and literature major.

Prerequisites for the program include sufficient Spanish to be admitted to 3000-level courses and any pertinent prerequisites for the 12 credits in the professional field. SPAN 4070 must be taken at CU Boulder.

| Code | Title | Credit Hours |
|---|---|---|
| **Professional Spanish Courses** [1] | | **9** |
| Choose three of the following: | | |
| SPAN 3030 | Professional Spanish for Business 1 | |
| SPAN 3060 | Spanish for Careers in Environmental Studies and Sustainable Development | |
| SPAN 3070 | Spanish 21st Century Media Professions | |
| SPAN 3080 | Spanish Health Professions | |
| **Required Courses** | | |
| SPAN 4060 | Problems of Translation for Professions in Spanish 1 | 3 |
| SPAN 4070 | Problems of Translation for Professions in Spanish 2 | 3 |
| **Spanish Language Courses** | | |
| SPAN 3000 | Advanced Spanish Language Skills | 5 |
| SPAN 3100 | Literary and Cultural Analysis in Spanish | 3 |
| SPAN 3010 | Advanced Rhetoric and Composition | 3 |
| or SPAN 3120 | Advanced Spanish Grammar | |
| **Upper-Division SPAN Elective** | | |
| One Upper Division course (SPAN 3000 or 4000 level) | | 3 |
| One SPAN 4000-level course. SPAN 4930 is an option. | | 3 |
| **Non-SPAN Electives** | | **12** |
| Students are required to take 12 credit hours outside of Spanish in a certificate program, minor, second major or degree related to their professional interests. Students must fulfill the prerequisites for the relevant program. The Business Minor, or the Public Health Certificate, or the Technology, Arts and Media Certificate are recommended. Courses meeting this requirement must be approved by the faculty director of the major. | | |
| **Total Credit Hours** | | **44** |

1 No substitutions permitted.

## Recommended Four-Year Plan of Study

Through the required coursework for the major, students can complete all 12 credits of the Arts & Humanities area of the Gen Ed Distribution Requirement and potentially the Upper-division Written Communication component of the Gen Ed Skills Requirement.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| SPAN 1010 | Beginning Spanish 1 (If needed, does not fulfill Spanish major course requirements) | 5 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| SPAN 1020 | Beginning Spanish 2 (If needed, does not fulfill Spanish major course requirements) | 5 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 4 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| SPAN 2110 | Second-Year Spanish 1 (If needed, does not fulfill Spanish major course requirements) | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |

| | | |
|---|---|---|
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| SPAN 2120 | Second-Year Spanish 2 (If needed, does not fulfill Spanish major course requirements) | 3 |
| Related Fields course outside of Spanish (see degree audit for details and instructions) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| SPAN 3000 | Advanced Spanish Language Skills | 5 |
| Related Fields course outside of Spanish (See Degree Audit for details and instructions) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| SPAN 3100 | Literary and Cultural Analysis in Spanish | 3 |
| SPAN 3120 | Advanced Spanish Grammar | 3 |
| SPAN 3010 | Advanced Rhetoric and Composition (Also fulfills Gen. Ed. Skills course: Upper-division Written Communication) | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) - Upper-Division | | 3 |
| Upper-Division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| SPAN 3050<br>or SPAN 3150<br>or SPAN 4430<br>or SPAN 4450<br>or SPAN 4215 | Spanish Phonology and Phonetics<br>or Linguistic Analysis of Spanish<br>or Special Topics in Hispanic Linguistics<br>or Introduction to Hispanic Linguistics<br>or Spanish in the United States | 3 |
| SPAN 4150<br>or SPAN 4160 | Major Works and Trends in Literature and Culture in Spain Up to 1700<br>or Major Works and Trends in Literature and Culture in Spain: 1700-Present | 3 |
| SPAN Literature course | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) - Upper-Division | | 3 |
| Upper-Division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| SPAN 4170<br>or SPAN 4180 | Major Works/Trends in Literature and Culture in Latin America Up to the 19th Century<br>or Major Works and Trends in Literature and Culture in Latin America: 1900-Present | 3 |
| SPAN 4000 level elective | | 3 |
| SPAN Upper-Division elective | | 3 |
| Upper-Division Elective | | 3 |
| Upper-Division Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **122** |

## Learning Outcomes

By the completion of the program, students will be able to:

- Communicate effectively and accurately in the target language, in all four skills (listening, speaking, reading and writing), using a range of informal and formal registers.
- Demonstrate proficiency in professional communication within the Spanish- and Portuguese-speaking worlds by applying cross-cultural understanding, critical thinking skills and accuracy in oral and written communication.
- Critically analyze literary and cultural productions from the Spanish- and Portuguese-speaking world by considering their historical and socio-political contexts.
- Apply critical thinking, problem-solving and interpersonal abilities, as well as other soft skills to academic, professional and real-world questions/challenges.
- Integrate research protocols, expectations and standards related to cultural studies, intercultural competency, linguistics and literary theory.

# Portuguese - Minor

The Portuguese minor focuses on Brazilian Portuguese and provides the students with knowledge of the Portuguese-speaking world and the relations between the different national contexts in which the language is spoken. The courses are designed to cover a variety of topics that are relevant to Brazil and other Portuguese-speaking countries. Students acquire a wider comprehension of Portuguese in a multi-cultural context.

The topics of the courses range from language to literature; from academic writing to performing arts; from sixteenth century letters on colonial issues to contemporary issues of biodiversity; from documentary films to soap operas; from nineteenth century Brazilian opera to twenty-first century *funk ostentação*.

The faculty in the Portuguese program incorporate their international research into their teaching. Their innovative pedagogical approaches aim to contribute to students' cultural intelligence, in addition to language fluency.

## Requirements

Declaration of a minor in Portuguese is open to any student enrolled at CU Boulder, regardless of college or school. To declare the Portuguese minor, make an appointment with the Spanish and Portuguese Department Professional Advisor (http://www.colorado.edu/mycuhub/).

The minor in Portuguese consists of 18 credit hours, at least twelve of which must be upper-division credit hours. A grade of C- or better is required for a course to apply to the requirements of the minor, and a cumulative GPA in all Portuguese courses of at least 2.0 is required for completion of the minor.

Transfer credit must be approved by the Associate Chair of Undergraduate Studies. A maximum of two courses may be taken abroad; this may be in addition to transfer credits. Study Abroad courses must be approved; contact the Spanish and Portuguese Department Professional Advisor (http://www.colorado.edu/mycuhub/) to begin the process.

### Required Courses and Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| **2000-level Portuguese courses** | | |
| Choose two of the following: | | 6 |
| PORT 2110 | Second-Year Portuguese 1 | |
| or PORT 2350 | Portuguese for Romance Language Speakers | |
| PORT 2120 | Second-Year Portuguese 2 | |
| PORT 2800 | Brazil: Past and Present | |
| **3000-level Portuguese courses** | | |
| Choose two of the following: | | 6 |
| PORT 3003 | Advanced Portuguese Language Skills | |
| PORT 3170 | Lisbon as a Global City: Cosmopolitanism, Diversity, and Innovation | |
| PORT 3230 | Transatlantic Relations in the Portuguese Speaking World | |
| PORT 3270 | Socio-Environmental Dynamics in Brazil | |
| **4000-level Portuguese courses** | | |
| Choose two of the following: | | 6 |
| PORT 4110 | Brazilian Literature | |
| PORT 4150 | Literature of the Portuguese Speaking World | |
| PORT 4230 | Special Topics in Luso-Brazilian and/or African Literature | |
| **Total Credit Hours** | | **18** |

# Spanish - Minor

The minor in Spanish offered through the Department of Spanish and Portuguese will help students gain an understanding of the Spanish language, as well as a grasp of primary cultural concepts and practices, and current literary and cultural trends.

In a global economy and a competitive market environment, a Spanish minor adds value to an existing CU degree. Cultural and linguistic competence broaden a student's understanding of the nuances and complexities of today's world. Spanish, Portuguese and English are the most spoken languages in the Western Hemisphere.

## Requirements

The minor in Spanish consists of 20 credit hours, including a total of 17 upper-division credit hours. A maximum of 9 credits, with no more than 6 upper-divsion credits, can be transferred from other U.S. institutions toward the minor. A maximum of 6 credits can be taken abroad; this may be in addition to transfer credits.

All coursework applied to the minor must be completed with a grade of C- or better (no pass/fail work may be applied). The GPA for all coursework taken in the minor department must be equal to 2.00 (C) or higher.

Transfer credit must be approved by the Associate Chair for Undergraduate Studies. A maximum of two courses may be taken abroad; this may be in addition to transfer credits. Study Abroad courses must be approved; contact the Spanish and Portuguese Department Professional Advisor (http://www.colorado.edu/mycuhub/) to begin the process.

### Required Courses and Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| SPAN 2120 | Second-Year Spanish 2 [1] | 3 |
| or SPAN 2140 | Spanish for Heritage Speakers in the United States II | |
| or SPAN 2150 | Intensive Second-Year Spanish | |
| SPAN 3000 | Advanced Spanish Language Skills [2] | 5 |
| **Electives** | | |
| Twelve upper-division credits from any course offered by the department and taught in Spanish [3] | | 12 |
| **Total Credit Hours** | | **20** |

1. If students take SPAN 2150 instead of SPAN 2120, only 3 out of the 5 credits from SPAN 2150 will be counted toward the minor.
2. Students who test into SPAN 3000 (i.e., who do not need to take SPAN 2120) must take 15 upper-division elective credits instead of 12.
3. Courses below SPAN 2120 do not count toward the minor, nor does SPAN 3001. SPAN 3100 is not required for the minor, but it is a prerequisite for all 4000-level literature courses.

# Speech, Language and Hearing Sciences

The undergraduate program in speech, language and hearing sciences (SLHS) introduces concepts basic to human communication and provides opportunities for students to acquire an understanding of normal and disordered speech, language and hearing processes. The curriculum for the undergraduate degree in SLHS provides a strong academic foundation for students interested in a wide variety of careers related to the fields of disabilities, healthcare and education. Additionally, it provides the appropriate undergraduate background for students interested in continuing onto graduate school in speech pathology, audiology and/or special education.

The undergraduate degree in speech, language and hearing sciences emphasizes knowledge of:

- The anatomy of the speech and hearing mechanisms, as well as the processes of speech production, transmission and reception.
- The development of language.

- Scientific methods used in investigating speech/language/learning and hearing processes.
- The etiologies, characteristics and treatments of speech, language, learning and hearing disorders.
- The role of the professional speech-language pathologist and audiologist, including the scientific traditions of the discipline and the ethical issues in providing service to individuals with communication disorders.

In addition, students completing the degree in speech, language and hearing sciences are expected to acquire the ability and skills to:

- Express themselves effectively both orally and in written scientific and clinical discipline-specific reports.
- Critically evaluate literature in the discipline.
- Analyze the acoustic output of the speech production process auditorily and/or instrumentally.

**Course code for this program is SLHS.**

# Bachelor's Degree

- Speech, Language and Hearing Sciences - Bachelor of Arts (BA) (p. 599)
- Speech, Language and Hearing Sciences - Minor (p. 601)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Arehart, Kathryn H. (https://experts.colorado.edu/display/fisid_105561/)
Professor; PhD, University of Washington

Baiduc, Rachael (https://experts.colorado.edu/display/fisid_157676/)
Associate Professor; PhD, University of Washington

Brennan, Christine (https://experts.colorado.edu/display/fisid_155861/)
Assistant Professor; PhD, Northwestern University

Fredrickson, Tammy L. (https://experts.colorado.edu/display/fisid_148888/)
Clinical Associate Professor; PhD, University of Colorado Boulder

Hawkins, Paige
Assistant Teaching Professor; MA, Gallaudet University

Hilger, Allison (https://experts.colorado.edu/individual/fisid_167224/)
Assistant Professor; PhD, Northwestern University

Kan, Pui Fong (https://experts.colorado.edu/display/fisid_145806/)
Professor; PhD, University of Minnesota Twin Cities

Kleiber, Holly (https://experts.colorado.edu/display/fisid_164035/)
Clinical Assistant Professor; MS, University of Washington

Lewon, Jennifer (https://experts.colorado.edu/display/fisid_147362/)
Clinical Associate Professor; MA, Northern Arizona University

Macias, Pamela
Assistant Teaching Professor; MA,

McCorkle-Geng, Audra
Assistant Teaching Professor; MA, University of Northern Colorado

Meyers-Denman, Christina Nicole (https://experts.colorado.edu/display/fisid_155857/)
Assistant Professor; PhD, University of Arizona

Pontis, Lauren
Clinical Assistant Professor; AuD, University of Colorado Boulder

Ramsberger, Gail (https://experts.colorado.edu/display/fisid_100943/)
Associate Professor; ScD, Boston University

Riseman, Christina (https://experts.colorado.edu/display/fisid_164336/)
Clinical Assistant Professor; MA, University of Colorado Boulder

Sharma, Anu (https://experts.colorado.edu/display/fisid_143814/)
Professor, Associate Chair; PhD, Northwestern University

Tennant, Sherri
Clinical Assistant Professor; MS, University of Wisconsin Madison

Tucker, Kathryn
Clinical Assistant Professor; MA, University of Colorado Boulder

Werner, LJ (https://experts.colorado.edu/display/fisid_154952/)
Scholar in Residence; MA, University of Colorado Denver

Yun, Donghyeon
Assistant Professor; PhD, Indiana University

# Courses

**SLHS 1010 (3) Disabilities in Contemporary American Society**
Addresses the issue that 50 percent of all individuals experience disability in their lifetime. Introduces students to the social, cultural, psychological, economic, political, legal, and health-care issues related to society and individuals with disabilities.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Didactic: All-Department

**SLHS 2000 (3) Introduction to Communication Disorders**
Surveys communication disorders, including hearing impairments, learning disabilities, and speech-language disorders, as well as an introduction to basic speech and hearing science.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Didactic: All-Department

**SLHS 2010 (3) Science of Human Communication**
Discusses how human communication (the process by which a thought is transmitted from the brain of a speaker to the brain of a listener) involves a complex interaction of acoustics, anatomy, physiology, neurobiology, and psychology.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Didactic: All-Department

**SLHS 2305 (4) American Sign Language 1**
Introduces basic sign vocabulary, grammatical structures of ASL, and the culture of deaf people. Classes are taught using ASL without the use of spoken English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: American Sign Language

**SLHS 2315 (4) American Sign Language 2**
Develops more complex vocabulary and grammatical structures, and an understanding of deaf culture. Classes are taught using ASL without the use of spoken English.
**Requisites:** Requires a prerequisite course of SLHS 2305 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: American Sign Language

**SLHS 2325 (4) American Sign Language 3**
Continuation of SLHS 2315. Covers ASL literature, advanced grammatical structures, idiomatic expressions, and deaf culture.
**Requisites:** Requires a prerequisite course of SLHS 2315 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: American Sign Language

**SLHS 2335 (4) American Sign Language 4**
Builds intermediate-level production and comprehension skills in American Sign Language (ASL). Students will expand ASL vocabulary and will learn complex grammatical structures through conversation, narration, and ASL literature. Instruction will include the history and culture of Deaf communities as well as culturally appropriate behaviors.
**Requisites:** Requires a prerequisite course of SLHS 2325 (minimum grade C-).

**SLHS 3000 (3) Deaf Studies**
This course explores perspectives on human rights and social justice of Deaf people as a cultural and linguistic minority. It examines the humanity, cultural identity and historical factors that have impacted Deaf people¿s lives, both positively and negatively. Topics include the history of American Sign Language, multi-identities, technology, educational institutions, medical perspectives, art, media, and literature created by and/or related to Deaf individuals.

**SLHS 3003 (3) Cognitive Science**
Introduces cognitive science, drawing from psychology, philosophy, artificial intelligence, neuroscience, and linguistics. Studies the linguistic relativity hypothesis, consciousness, categorization, linguistic rules, the mind-body problem, nature versus nurture, conceptual structure and metaphor, logic/problem solving and judgment. Emphasizes the nature, implications and limitations of the computational model of mind.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3702 and LING 3005 and PHIL 3310 and PSYC 3005 and CSCI 3702 and CSPB 3702
**Recommended:** Prerequisites two of the following CSCI 1300 or LING 2000 or PHIL 2440 or PSYC 2145.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Distribution-Social Sciences

**SLHS 3006 (3) Phonetics**
Focuses on production of speech sounds, transcribing speech using the International Phonetic Alphabet, analyzing the acoustic properties of speech sounds, understanding how speech sounds vary depending on the context. Provides a foundation for understanding normal and atypical speech development, atypical speech problems and patterns, regional and foreign accents, and speech recognition by computers.
**Requisites:** Requires a prerequisite course of LING 2000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Didactic: Speech-Hearing Science

**SLHS 3014 (3) Hearing Loss Epidemiology**
Introduces students to basic epidemiological concepts related to hearing loss. Provides an overview of the hearing mechanism, assessment and identification of hearing loss, prevalence of hearing disorders, treatment and intervention. Noise pollution, aging and toxic agents are discussed. Focuses on risk factors for hearing impairment and comorbidities.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Didactic: Audiology

**SLHS 3106 (3) Hearing Science**
Focuses on the three main aspects of the hearing process: sounds in the environment (physical acoustics), sounds encoded within the auditory system (physiological acoustics) and perception of sound (psychological acoustics).
**Requisites:** Requires a prerequisite course of SLHS 2010 (minimum grade C-). Restricted to Speech, Language and Hearing Sciences (SLHS) undergraduate majors minors with a minimum of 27 credits (Sophomore), or SLHS master's students, or Audiology (AUDD) majors only
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Didactic: Speech-Hearing Science

**SLHS 3116 (3) Anatomy, Physiology, and Science of Speech**
Provides a basic understanding of the structural organization (anatomy), function (physiology), and neural controls of the structures used to produce speech, swallowing, respiration, and related behaviors in humans.
**Requisites:** Requires a prerequisite course of SLHS 2010 (minimum grade C-).
**Recommended:** Prerequisite SLHS 3106.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Didactic: Speech-Hearing Science

**SLHS 4000 (3) Multicultural Aspects of Communication Differences and Disorders**
Examines perceptions and attitudes regarding differences in communication as a function of cultural-linguistic diversity. Discusses implications of differing verbal and nonverbal communication styles of various cultural groups in terms of professional responsibilities.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 4100 (1-3) Special Topics in Speech, Language, and Hearing Sciences**
Studies selected topics in speech, language, hearing sciences, communication disorders, and other professional issues.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 4502 (3) Language Disorders Across the Lifespan**
Provides students with an introductory understanding of the causes, characteristics, assessment and treatment of developmental and acquired language disorders in children and adults. Examines a variety of disorders including specific language impairment, learning disabilities, and language and cognitive disorders due to brain damage. Considers the challenge of identifying language disorders in children and adults from culturally and linguistically diverse backgrounds.
**Requisites:** Requires a prerequisite or corequisite course of SLHS 4560 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Didactic: Speech-Language Pathology

**SLHS 4512 (3) Speech Disorders Across the Lifespan**
Provides students with an introductory understanding of the causes, characteristics, assessment and treatment of speech disorders including those involving articulation, voice, resonance, and fluency. Examines a variety of disorders including stuttering, speech sound disorders, cleft lip and palate, vocal pathology, as well as dysarthria and apraxia due to stroke, trauma, and progressive neurological diseases.
**Requisites:** Requires a prerequisite course of SLHS 2010 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Didactic: Speech-Language Pathology

**SLHS 4560 (3) Language Development**
Covers the development of language in childhood and into adult life, emphasizing the role of environment and biological endowment in learning to communicate with words, sentences, and narratives.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4560 and PSYC 4560
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) undergraduate majors and minors, or SLHS master's students, or Audiology (AUDD) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Didactic: All-Department

**SLHS 4576 (3) Communication Neuroscience**
Provides an introduction to neuroscience with an emphasis on the systems that support human communication including speech perception and production, language, memory and cognition. Topic areas will include auditory processing, language, memory and motor systems. Development of brain systems and structures will be explored, as well as neurologically based disorders. Neuroscientific methods surveyed will include MRI, fMRI, EEG, MEG, NIRS, lesion studies and electrophysiology.
**Requisites:** Requires a prerequisite course of SLHS 2010 or NRSC 2100 (both minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**SLHS 4704 (3) Audiological Evaluation**
Studies basic principles and techniques of hearing evaluation, including pure-tone, speech, immittance, and advanced audiometry; hearing conservation in hospital, school, and industrial settings; and identification and evaluation of auditory pathologies. Required projects in screening and pure-tone audiometry.
**Requisites:** Requires a prerequisite course of SLHS 3106 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Departmental Category: Didactic: Audiology

**SLHS 4714 (3) Audiological Rehabilitation**
Covers basic principles and techniques related to the habilitation and rehabilitation of individuals who are deaf or hard of hearing: amplification, speech, language, auditory, speech reading, and educational issues.
**Requisites:** Requires prerequisite courses of LING 3100 or SLHS 3006. Requires a prerequisite or corequisite course of SLHS 4704 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Didactic: Audiology

**SLHS 4849 (1-6) Independent Study for Undergraduates**
Instructor consent required.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Independent Study

**SLHS 4918 (2) Introduction to Clinical Practice**
Introduces students to the clinical processes and key components of assessment and interventions. Explores the applications of theoretical and scientific information to clinical settings. Students complete supervised observation of assessment and intervention with individuals with communication challenges.
**Requisites:** Requires a prerequisite course of SLHS 2000 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Speech, Language and Hearing Sciences (SLHS) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Practica

**SLHS 4938 (1-6) Internship: Speech-Language Intervention**
Provides a supervised clinical experience with children or adults who have communication challenges. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Practica

# Speech, Language and Hearing Sciences - Bachelor of Arts (BA)

The undergraduate major in speech, language and hearing sciences (SLHS) at CU Boulder includes coursework in three general areas:

- Characteristics, causes and treatment of disorders that impact speech, language and/or hearing (e.g., stuttering, head injury, deafness, autism, learning disabilities, etc.).
- The science behind human communication (e.g., the anatomy and physiology of the speech and hearing mechanisms, acoustics of sound, etc.).
- Linguistics, specifically the normal development of language in children, phonetic transcription and the various component parts of language.

The program leads to a Bachelor of Arts (BA) degree. In addition to learning in the classroom about normal and disordered communication, students will observe graduate students and professionals engaged in clinical work with individuals exhibiting speech, language, learning and hearing problems. Internships are optional but are encouraged throughout a student's program.

# Requirements

## Program Requirements

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. The major includes 35 credit hours of required coursework plus a 3-credit course in general psychology.

All required major courses and the required general psychology course must be passed with a C- or better and cannot be taken pass/fail. No more than 45 credits in SLHS may be applied to overall graduation requirements. Students must have a grade point average of at least 2.000 in the major in order to graduate.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| LING 2000 | Introduction to Linguistics | 3 |
| LING 3100 | Language Sound Structures | 3 |

| | | |
|---|---|---|
| SLHS 2000 | Introduction to Communication Disorders | 3 |
| SLHS 2010 | Science of Human Communication | 3 |
| SLHS 3106 | Hearing Science | 3 |
| SLHS 3116 | Anatomy, Physiology, and Science of Speech | 3 |
| SLHS 4502 | Language Disorders Across the Lifespan | 3 |
| SLHS 4512 | Speech Disorders Across the Lifespan | 3 |
| SLHS 4560 | Language Development | 3 |
| SLHS 4704 | Audiological Evaluation | 3 |
| SLHS 4714 | Audiological Rehabilitation | 3 |
| SLHS 4918 | Introduction to Clinical Practice | 2 |
| **Total Credit Hours** | | **35** |

### Required Ancillary Course

| Code | Title | Credit Hours |
|---|---|---|
| PSYC 1001 | General Psychology | 3 |

### Recommended Electives

| Code | Title | Credit Hours |
|---|---|---|

The following courses are recommended, but not required:

| | |
|---|---|
| SLHS 1010 | Disabilities in Contemporary American Society |
| SLHS 2305 | American Sign Language 1 |
| SLHS 3014 | Hearing Loss Epidemiology |
| SLHS 4576 | Communication Neuroscience |
| Speech-Language Assistant Certificate Program | |

If planning to attend graduate school for SLHS, students should take one course from each of the following categories (graduate school prerequisite courses):

| | |
|---|---|
| *Statistics* | |
| EDUC 4716/5716 | Basic Statistical Methods |
| SOCY 2061 | Introduction to Social Statistics |
| MATH 2510 | Introduction to Statistics |
| *Biological Science* | |
| EBIO 1100 | Biology and Society |
| EBIO 1210 | General Biology 1 |
| EBIO 1220 | General Biology 2 |
| PSYC 2012 | Biological Psychology |
| *Physics or Chemistry* | |
| CHEM 1011 | Environmental Chemistry 1 |
| CHEM 1021 | Introductory Chemistry |
| PHYS 1010 | Physics of Everyday Life 1 |
| PHYS 1020 | |
| PHYS 1230 | Light and Color for Nonscientists |
| PHYS 1240 | Sound and Music |
| PHYS 1580 | Energy and Interactions |

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in the Department of Speech, Language and Hearing Sciences students should meet the following requirements:

- Declare the major by the beginning of the sophomore year
- Complete prerequisite courses—LING 2000, SLHS 2010 and PSYC 1001—by the end of spring semester of sophomore year.

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will complete all 12 credits of the Social Sciences area and all 12 credits of the Natural Sciences area of the Gen Ed Distribution Requirement.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| SLHS 2000 | Introduction to Communication Disorders | 3 |
| LING 2000 | Introduction to Linguistics | 3 |
| Gen. Ed. Diversity course (example: Diversity: US Perspective) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Elective/MAPS course | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| PSYC 1001 | General Psychology | 3 |
| SLHS 2010 | Science of Human Communication | 3 |
| Gen. Ed. Skills course (example: QRMS - if going onto SLHS grad school, take statistics) | | 3 |
| Gen. Ed. Diversity course (example: Diversity: Global Perspective) | | 3 |
| Elective/MAPS course | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| LING 3100 | Language Sound Structures | 3 |
| SLHS 4560 | Language Development | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective | | 3 |
| Biological Science course with lab | | 4 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| SLHS 3106 | Hearing Science | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Gen Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| SLHS 3116 | Anatomy, Physiology, and Science of Speech | 3 |
| SLHS 4502 | Language Disorders Across the Lifespan | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective | | 3 |

| | | |
|---|---|---|
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| SLHS 4704 | Audiological Evaluation | 3 |
| SLHS 4918 | Introduction to Clinical Practice | 2 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Elective: upper-division | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **14** |
| **Year Four** | | |
| **Fall Semester** | | |
| SLHS 4512 | Speech Disorders Across the Lifespan | 3 |
| Elective: upper-division | | 3 |
| Elective: upper-division | | 3 |
| Elective: upper-division | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| SLHS 4714 | Audiological Rehabilitation | 3 |
| Elective: upper-division | | 3 |
| Elective: upper-division | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **120** |

## Learning Outcomes

By the completion of the program, students will be able to:

- An understanding of foundational knowledge of human communication sciences and its disorders.
- An understanding of how diversity impacts human communication disorders.
- The ability to critically analyze and communicate research in speech, language and hearing sciences.
- An ability to apply scientific evidence in the field of speech-language-hearing sciences to the analysis of real-world problems.
- A knowledge of the professional pathways available to graduates in the field of communication sciences and disorders.

# Speech, Language and Hearing Sciences - Minor

The undergraduate minor in speech, language and hearing sciences (SLHS) introduces concepts basic to human communication and provides opportunities for students to acquire an understanding of normal and disordered speech, language and hearing processes. The minor in SLHS provides a basic academic foundation for students interested in a wide variety of careers related to the fields of disabilities, healthcare, education, integrated physiology, linguistics, psychology and communication.

## Requirements

Students must complete a minimum of 18 credit hours in SLHS courses, including at least 9 hours of upper-division coursework, and the required courses listed below. Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor. All minor courses must be completed with a grade of C- or better, no pass/fail work may be applied. The GPA for all minor coursework must equal 2.00 or higher.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| SLHS 2000 | Introduction to Communication Disorders | 3 |
| SLHS 2010 | Science of Human Communication | 3 |
| Additional lower- or upper-division SLHS coursework | | 3 |
| Additional upper-division SLHS coursework | | 9 |
| **Total Credit Hours** | | **18** |

# Theatre & Dance

The Department of Theatre and Dance offers undergraduate and graduate degrees in both theatre and dance, a graduate and undergraduate certificate in hip-hop studies (p. 625) and a graduate certificate in applied Shakespeare (http://www.colorado.edu/connect/certificate-programs/applied-shakespeare/). These programs combine traditional studies with practical training. Ambitious seasons of theatre productions and dance concerts feature student performers, designers, directors, choreographers and guest artists of national and international fame whom often participate in curricular and extracurricular activities.

Previous guests have included Uri Shafir, Claudia La Vista, Sidra Bell, Faye Driscoll, Lux Boreal, Jonathan Becker, Diane J. Rayor, Ralph Lemon, Ana Prada, Asia One, Teena Marie Custer, Nina Flagg, Nina Martin, Millicent Johnnie, Ananya Chatterjea, Maria Bauman, Jane Hawley, Tim O'Donnel, Ms. Prissy, April Rose, Chris Aiken and Angie Hauser, Art Bridgman/ Myrna Packer, Rennie Harris, Heidi Henderson, Kathleen Hermesdorf, Deborah Jowitt, Darrell Jones, Susan Marshall & Co., Bebe Miller, David Dorfman, Joe Goode, Kevin Wynn, John Scott and Shelley Senter; Lisa Wolpe, Jennifer Hubbard, Geoffrey Kent, Eric Van Baars, Silvia Gregory, Gary John LaRosa and Ami Dayan.

Students interested in theatre and dance are urged to consult with an advisor in the appropriate field to obtain both advice and the most current information concerning program opportunities and expectations.

**Course codes for this department are THTR, DNCE, and THDN.**

## Bachelor's Degrees

- Dance - Bachelor of Arts (BA) (p. 614)
- Dance - Bachelor of Fine Arts (BFA) (p. 617)
- Theatre - Bachelor of Arts (BA) (p. 619)
- Theatre - Bachelor of Fine Arts (BFA) (p. 621)

## Minors

- Dance - Minor (p. 625)
- Theatre - Minor (p. 625)

# Certificate

- Hip-Hop Studies - Certificate (p. 625)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Bashore, Kate (https://experts.colorado.edu/display/fisid_168644/)
Assistant Teaching Professor; MFA, University of Tennessee - Knoxville

Bergner, Bruce Alan (https://experts.colorado.edu/display/fisid_113315/)
Associate Professor; MFA, University of Illinois at Chicago

Cloud, Anya (https://experts.colorado.edu/individual/fisid_167400/)
Assistant Professor; MFA, University of California San Diego

Cobin, Martin T.
Professor Emeritus

Devin, Richard
Professor Emeritus

Ellsworth, Michelle (https://experts.colorado.edu/display/fisid_112060/)
Distinguished Professor, Chair, Endowed Chair; MFA, University of Colorado Boulder

Feeler, Jordan (https://experts.colorado.edu/display/fisid_166032/)
Instructor; BFA, Webster University

Gerland, Oliver W. (https://experts.colorado.edu/display/fisid_101092/)
Associate Professor; PhD, Stanford University

Haig, Robin
Senior Instructor Emerita

Harris, Lorenzo R. (https://experts.colorado.edu/display/fisid_147634/)
Artist in Residence

Henry, Markas (https://experts.colorado.edu/display/fisid_134379/)
Associate Professor; MFA, University of Connecticut

Irey, Charlotte York
Professor Emerita

Lessley, Merrill J.
Professor Emeritus

Manno, Jesse J. (https://experts.colorado.edu/display/fisid_120813/)
Senior Instructor; BA, University of Colorado Boulder

Meneghini-Stalker, Tamara L. (https://experts.colorado.edu/display/fisid_146090/)
Associate Professor; MFA, Northern Illinois University

Nichols, Lynn (https://experts.colorado.edu/display/fisid_103654/)
Senior Instructor Emeritus; PhD, University of Colorado Boulder

Osnes, Mary Beth (https://experts.colorado.edu/display/fisid_102607/)
Professor; PhD, University of Colorado Boulder

Pang, Cecilia J. (https://experts.colorado.edu/display/fisid_129479/)
Professor; PhD, University of California, Berkeley

Persons, Charles Howard (https://experts.colorado.edu/display/fisid_145012/)
Associate Professor; MFA, Columbia University

Potts, Margaret Lee
Associate Professor Emerita

Randall, Erika Anne (https://experts.colorado.edu/display/fisid_144755/)
Professor; MFA, The Ohio State University

Rich, Kevin M. (https://experts.colorado.edu/display/fisid_157950/)
Associate Professor; MFA, Yale School of Drama

Shannon, Robert J.
Senior Instructor Emeritus

Southall, Lawrence (https://experts.colorado.edu/display/fisid_143027/)
Instructor; MFA, University of Colorado Boulder

Sowah, Nii Armah (https://experts.colorado.edu/display/fisid_115125/)
Senior Instructor; MA, Lesley College

Spanier, Nancy L.
Professor Emerita

Spencer, Jonathan (https://experts.colorado.edu/display/fisid_164209/)
Teaching Professor; MFA, Ohio University

Stark, Theodore (https://experts.colorado.edu/display/fisid_118462/)
Teaching Professor; MFA, Boston University

Symons, James M.
Professor Emeritus

Wilkins, Helanius J. (https://experts.colorado.edu/display/fisid_155486/)
Assistant Professor, Associate Chair; MFA, George Washington University

Williams, Letitia S.
Senior Instructor Emerita

Yang, Daniel
Professor Emeritus

# Courses

## Dance

**DNCE 1000 (2) Beginning Contemporary Dance Technique**
Introduces students to the dynamic capabilities of the body as an articulate means of expression. Presents basic concepts and skills from contemporary dance forms that may include Afro-modern, floor work, inversion, classical modern and improvisation. Classwork develops efficient alignment, strength, flexibility, coordination, rhythm, dynamics and spatial awareness. No experience necessary.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nonmajor Technique

**DNCE 1012 (2) Dance Production**
Provides the dancer with an introduction to the types of performance venues available today, and their technical systems and equipment. It will also establish an awareness of how technical theatre design arts may be utilized by a choreographer.
**Requisites:** Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**DNCE 1013 (2) Dance Improvisation**
An opportunity for students to develop skills of dance improvisation through the exploration of structured movement problems. Students study selected contemporary dance artists whose work stresses improvisation in performance and/or as a training vehicle. Department consent required for dance minors.
**Requisites:** Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Creative Process

**DNCE 1017 (3) Dance in Popular Culture and Media**
Explores and contextualizes contemporary popular culture and dance. Introduces methods of critical analysis that reveal the rich heritage hidden within and around the dances students commonly encounter at the club, on the street, on television, on the big screen and elsewhere in everyday life. Through watching, reading, and discussion, students discover new meaning in their lived cultural experience.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Dance and Cultural Studies

**DNCE 1020 (1) Beginning Contemporary Dance with Experience**
Invites students to deepen their somatic awareness, efficient athleticism, and creative voice through the medium of contemporary dance. Continues the investigation of contemporary dance forms that may include Afro-modern, floor work, inversions, classical modern, and improvisation. Classwork will deepen students' alignment, strength, flexibility, coordination, rhythm, dynamics and spatial awareness.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Recommended:** Prerequisite DNCE 1000 or previous dance experience.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nonmajor Technique

**DNCE 1027 (3) Dance in Cultural Perception and Expression**
Explores how the practice of dance can reflect, disrupt, subvert, support, and reinforce cultural expectations, norms and practices. Introduces international and domestic dance traditions and provides context for an interdisciplinary examination. Comparative readings from sociology, anthropology, gender studies, history, post-colonial studies, and political science provide a foundation to understand how cultural identities are negotiated and represented through movement.
**Additional Information:** GT Pathways: GT-AH1 - Arts Hum: Arts Expression
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Dance and Cultural Studies
Departmental Category: Asia Content

**DNCE 1091 (1) Modern 1**
Introduces basic skills of modern dance. In-class technique work increases muscle strength, flexibility, and coordination.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Major Technique

**DNCE 1100 (1) Beginning Ballet**
Introduces beginning students to fundamental aspects of classical ballet technique; no previous experience required. Basic principles of alignment, rotation, and movement quality are introduced as the building blocks for success in advanced material. Foundational movements and ballet vocabulary are learned and refined. Students work toward mastery of simple combinations and rhythmic patterns.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nonmajor Technique

**DNCE 1120 (1) Beginning Ballet with Experience**
Relies on a demonstrated comprehension of kinesthetic and conceptual principles mastered at the beginning level. New movements from the classical ballet vocabulary are introduced with continued emphasis on alignment, rotation, and movement quality. Ballet sequences are longer and more complex.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Recommended:** Prerequisite DNCE 1100 or previous ballet experience.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nonmajor Technique

**DNCE 1190 (1) Ballet 1**
Beginning ballet covering the basic vocabulary of classical ballet technique.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nonmajor Technique

**DNCE 1200 (1) Beginning Jazz Dance**
Introduces various styles of movement unique to jazz dance including improvisation, isolations, and African-influenced polyrhythms. Working within a range of dynamic performance styles, students will learn fundamental dance skills and jazz vocabulary, from which more advanced skills can be developed. Designed for students will little or no dance experience.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nonmajor Technique

**DNCE 1220 (1) Beginning Jazz with Experience**
Digs deeper into syncopated movement style of the jazz vernacular by continuing the embodied investigation of the Africanist influence on the form. Demands a rigorous awareness of efficient alignment while engaging with complex movement and challenging rhythmic structures.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Recommended:** Prerequisite DNCE 1200 or previous dance experience.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nonmajor Technique

**DNCE 1290 (1) Jazz 1**
Introduces jazz dance, consisting of a technique warm-up, locomotion across the floor, and a series of dance phrases developed into a short dance combination.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nonmajor Technique

**DNCE 1301 (2) Hip-Hop Dance Technique 1**
Introduces students to Hip-Hop dance as a culturally significant form. Students learn history, the social and political forces at work, and the fundamental techniques (Campbell Locking, Popping, Breaking etiquette/ movements, Hip-Hop Party Dance and House). Intellectual challenge is offered through the lens of critical race theory and historical context. Training addresses flexibility, sequencing, coordination, and performance skills.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Technique

**DNCE 1401 (1) Transnational Fusion Dance: USA and Middle East/North Africa**
Introduces a fusion form popularized in 2000: secular dance traditions of the Middle East/North African (MENA) communities in dialog with popular dances of the hip-hop and underground electronic dance music communities. Stretching, hip work, spinal undulations and poly-rhythmic orientations are covered. Educational highlights include discourse regarding cultural appropriation and gender coding in human movement.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**DNCE 1411 (2) Aerial Dance Technique**
Study of basic technique skills in aerial dance on single point, low-flying trapeze. Additional skills include choreographic techniques, improvisation, and a historical overview of aerial dance. Through theoretical readings and discussions, this course defines the place of aerial dance in the lineage of modern dance and addresses aesthetics, philosophical approaches to teaching, and safety issues.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**DNCE 1501 (1) Tap Technique**
Introduces students to the basic steps and timing of tap technique to develop rhythm, style and clear tap sounds. Exercises focus on building flexibility of the knee and ankles, coordination and speed of movement. A variety of tap styles from Broadway to Rhythm tap will be taught.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Technique

**DNCE 1849 (1-3) Independent Study**
Involves creative or scholarly investigation of an area of interest to the student not addressed in the curriculum. Work must be arranged with and advised by a faculty member. Freshman level course.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Independent Study

**DNCE 1901 (1-3) Technique Practicum**
Broadens students' exposure to a range of diverse movement material. Topical course in dance technique, see subtopic for specific form.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Technique

**DNCE 1908 (1) First Year Dance Seminar**
Designed for new dance majors as an introduction to the place of dance within academia and the professional/public spheres. Through the practice of descriptive dance writing, theoretical and physical exploration of discrete pedagogical and choreographic procedures, and interactions with in-class guest artists of different disciplines, students will engage in independent research and physical experimentation, culminating in a final personal presentation and group performance.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Performance

**DNCE 2021 (2) Major Technique**
Designed for Dance majors. Enrollment by audition only.
**Repeatable:** Repeatable for up to 16.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Major Technique

**DNCE 2091 (1) Modern 2**
Continuation of Modern 1. a developmental sequence of modern dance technique designed to refine the technical/expressive skills required of the professional dancer.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Major Technique

**DNCE 2098 (1) Performance/Repertory**
Students learn and perform dances from the repertory of guest artists. Offered summers only.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Performance

**DNCE 2141 (1) Low Intermediate Ballet**
Builds on an existing understanding of alignment, rotation, and movement quality to introduce more mentally and physically difficult movements and enchainements of the classical ballet vocabulary. Students must be able to demonstrate an embodied familiarity with all traditional barre exercises on the first day of class.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Recommended:** Prerequisite DNCE 1120 or previous ballet experience.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Technique

**DNCE 2191 (1) Ballet 2**
Intermediate ballet, covering the complete vocabulary of classical ballet technique. Enchainements are of complex structure.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Major Technique

**DNCE 2290 (1) Jazz 2**
Continuation of Jazz 1. Studies coordination, rhythm, style, and advanced body part isolation in depth.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Nonmajor Technique

**DNCE 2501 (2) African Dance**
Explores the technique, styles, and rhythms of regional and national cultures of Africa. Areas of concentration may vary each semester (e.g. Ghana, Mali, Guinea, etc.). Introduces signature attributes common to different countries' dance traditions and features discussions of the musical traditions, histories, cosmologies, philosophies and aesthetics to contextualize and increase familiarity.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Technique

**DNCE 2701 (2) Contact Improvisation 1**
Investigates movement vocabulary and kinesthetic understanding through physical contact and weight-sharing between two or more dancers. Fundamental skills of contact will be introduced and employed in duets and larger group improvisations: rolling, falling, giving and receiving weight, and the use of momentum and gravity.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Major Technique

**DNCE 2849 (1-3) Independent Study**
Involves creative or scholarly investigation of an area of interest to the student not addressed in the curriculum. Work must be arranged with and advised by a faculty member. Sophomore level course.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Independent Study

**DNCE 2901 (1-3) Technique Practicum 2**
Topical course (second level) in dance technique, see subtopic for specific form. May require an audition.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Major Technique

**DNCE 2909 (1-4) Special Topics**
Explores topics and research in relation to areas such as technology, environment, teaching methods, performance, world dance, arts in society, and/or criticism that the normal sequence of offerings may not allow.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 4909 and DNCE 5909
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Independent Study

**DNCE 3001 (2) Intermediate/Advanced Contemporary Dance Technique**
Challenges intermediate and advanced students to refine their understanding and personal approach to the study of international contemporary dance. Demands a deep sense of somatic awareness, efficient athleticism, and creative voice. Floor work, inversions, and improvisation may be included. No audition required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisite DNCE 1000 or DNCE 1020 or any major technique course ending in "1" or previous dance experience.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Technique

**DNCE 3005 (3) Movement Awareness and Injury Prevention for the Dancer**
Advances safe and effective dance practices supporting longevity and wellness. Areas explored include experiential anatomy, conditioning, alignment, nutrition, injury prevention, care of common dance injuries, and experience with various somatic practices. Instructor approval required to enroll if outside dance major or minor. Formerly DNCE 2005.
**Requisites:** Restricted to Dance (DNCE or DBFA) majors or minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Somatic Awareness

**DNCE 3014 (2) Inside the Groove: Developing Rhythmic Skills**
Enhances rhythmic acuity through intensive rhythmic drills, analytical listening, drumming, notating and creating rhythm-based performance work. Course material explores non-Western rhythmic paradigms, irregular meters, mixed meters, polyrhythms, etc., and how to communicate clearly with a live accompanist in technique class.
**Requisites:** Restricted to Dance (DNCE or DBFA) majors or minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Music

**DNCE 3024 (2) SOUND Choices: Enhancing the Music/Dance Relationship**
Examines how musical choices can profoundly affect audiences, dancers and the creative process. Surveys historic and contemporary music styles and influential artists through guided listening and experimentation. Deepens understanding of music, including vocabulary, technology, collaboration skills, ethics, and copyright issues.
**Requisites:** Restricted to Dance (DNCE or DBFA) majors or minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Music

**DNCE 3033 (3) Choreographic Resources**
Explores movement invention and strategies of choreographic manipulation of body, space and time. Students add to their toolbox of compositional resources through solo and duet studies. Class interrogates and supports the students' developing language for addressing, critiquing and comprehending compositional choices and structures through verbal and written feedback practice. Can be taken out of sequence with DNCE 3043. Formerly DNCE 2033.
**Requisites:** Requires a prerequisite course of DNCE 1013 and DNCE 2021 or DNCE 3041 or DNCE 4061 (minimum grade C-). Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Creative Process

**DNCE 3035 (1) Production Practicum**
Practical production activities and projects within a designated area of dance design, stage technology, or stage management, normally related to the department's season. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Production

**DNCE 3041 (2) Major Technique**
Designed for dance majors. Enrollment by audition only.
**Repeatable:** Repeatable for up to 16.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Major Technique

**DNCE 3043 (3) Choreographic Process**
Examines physical and spatial relationships via group and site specific work. New methods of creative problem solving unearth and mine one's imagination and inspiration, cultivating the individual's unique process of dance-making. Class interrogates and supports students' developing language for addressing, critiquing and comprehending compositional choices and structures through verbal and written feedback practice. Can be taken out of sequence with DNCE 3033.
**Requisites:** Requires prerequisite courses of DNCE 1013 and DNCE 2021 or DNCE 3041 or DNCE 4061 (all minimum grade C-). Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Creative Process

**DNCE 3101 (1-3) Ballet Practicum**
Practical studio training in ballet at the advanced/professional level with a professional company. Designed for dance majors. Enrollment by audition only.
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of DNCE 2141 or DNCE 3161 or DNCE 4181 (minimum grade C-).
**Additional Information:** Departmental Category: Major Technique

**DNCE 3161 (1) Intermediate Ballet**
Surveys a wide range of the intermediate-level classical ballet vocabulary, focusing on an anatomically sound approach to the material. Students must work efficiently to execute the technique with rhythmic accuracy, clarity of line, propriety of style, and fluency in translating names of steps. Enrollment by audition only.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Technique

**DNCE 3241 (1) Intermediate Jazz**
Expands student's performance of the syncopated movement style of the jazz vernacular. Designed for the experienced jazz dancer. Includes dance techniques that further improves alignment, strength, flexibility, and coordination within the jazz idiom through an emphasis on style, rhythm, and more challenging dance combinations.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Recommended:** Prerequisite DNCE 1220 or previous dance experience.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Technique

**DNCE 3301 (2) Hip-Hop Dance Technique 2**
Builds on fundamentals established in Hip-Hop Dance Technique 1. Students deepen their understanding of Hip-Hop history through fundamental movement techniques, specifically, House, and study the social/political forces at work. The course focuses on increasing dancers' capacity for variation, sequencing, musicality and free-styling in Hip-Hop dance. Enrollment by audition only. Meets with DNCE 5331.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Technique

**DNCE 3601 (2) Alexander Technique for Actors and Dancers**
Studies how human reaction, coordination, and movement play a role in all activities. Through in-depth class discussions, movement, exploration, and individualized hands-on lessons, actors and dancers gain an understanding of the technique and its benefits to performance. Meets with DNCE 5601.
**Requisites:** Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) or Theatre (THTR or TBFA, excludes THTR-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Technique

**DNCE 3849 (1-3) Independent Study**
Involves creative or scholarly investigation of an area of interest to the student not addressed in the curriculum. Work must be arranged with and advised by a faculty member. Junior level course.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Independent Study

**DNCE 3901 (1-3) Technique Practicum**
Topical course (intermediate level) in dance technique. See subtopic for specific form. May require an audition.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Technique

**DNCE 3909 (1-4) Special Topics**
Explores topics and research in relation to areas such as technology, environment, teaching methods, performance, world dance, arts in society, and/or criticism that the normal sequence of offerings may not allow.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**DNCE 4012 (1) Concert Production**
Provides practical experience in producing formal and informal dance concerts. Introduces basic familiarity with production and promotional responsibilities, backstage and front-of-house duties and procedures. Meets with DNCE 5012.
**Requisites:** Requires a prerequisite course of DNCE 1012 (minimum grade C-). Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Major Technique

**DNCE 4015 (3) Movement Analysis**
Introduces Rudolf Laban's theories of movement and exposes several body therapies to heighten students' awareness of movement as a multifaceted (neuromuscular/spatial/dynamic) event. Emphasizes refinement of movement, observation skills, and improvement of performance. Meets with DNCE 5015.
**Requisites:** Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Movement Awareness Injury Prevent for the Dancer

**DNCE 4016 (3) Creative Dance for Children**
Methods course for prospective teachers of creative dance for children. Lectures, readings and laboratory experiences are followed by observation and teaching in primary grades.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 5016
**Requisites:** Requires a prerequisite course of DNCE 2033 (minimum grade C-). Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Pedagogy

**DNCE 4017 (3) Dancing Histories: Sex, Gender and Race in U.S. Concert Dance**
Traces the evolution of American concert dance through roots in select dance forms, including dances of the African Diaspora, Ballet, Social Dance, Jazz, Modern, and Folklorico. Studies specific dance artists against the backdrop of social, political, economic, and environmental issues.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 5017
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Dance and Cultural Studies

**DNCE 4023 (2) Performance Improvisation Techniques**
Explores movement and vocal improvisational techniques to enhance creative, interdisciplinary, collaborative and performance skills. Helps individuals expand their definition of performance, discover and access the diversity of the human instrument and employ improvisation to create personal and social commentary.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 5023
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Creative Process

**DNCE 4036 (2) Dance Teaching Practices: Inclusive Approaches to Instruction**
Examines legal, practical, pedagogical and philosophical issues in current dance education. Goals and content of professional and recreational dance training are considered and strategies for effective teaching practice are discussed. All genres of dance may be utilized depending on the specialities of participants.
**Requisites:** Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Pedagogy

**DNCE 4037 (3) Contemporary Concert Dance: Shifting Perspectives in Performance**
Focuses on the development of perceptual, descriptive, and analytical skills as well as the ability to apply cultural and critical theory to 20th and 21st century concert dance. Specific pieces of choreography are looked at from a broad range of perspectives.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite or corequisite a Human Diversity core requirement course.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Dance and Cultural Studies

**DNCE 4038 (1-3) Dance Repertory**
Learning and performing dances from the repertory of current faculty members, artists-in-residence and upon occasion from the repertory of historic modern dancers. Dance majors may repeat up to 9 total credit hours with different instructors. Enrollment by audition only.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 5038
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**DNCE 4046 (1) Teaching Practicum**
Designed to give students supervised practical teaching skills through practice teaching, discussion, observation (in-person and video), reflection and feedback. Students will develop age appropriate lesson plans, define and refine principles of classroom management and understand the needs of diverse groups of students in a community, academic (K-12) and/or studio setting. All genres of dance are topic relevant.
**Requisites:** Requires a prerequisite course of DNCE 4036 (minimum grade C-). Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Departmental Category: Pedagogy

**DNCE 4047 (3) Hip-Hop Dance History**
Addresses the origin and evolution of American Hip-Hop dance rooted in a theoretical structure that springs from the elemental nature of the African Diaspora. Emphasis placed on the social, political, and economic environment in which it was fashioned. Pioneers, innovators, terminology, and styles will be identified. Course includes lectures, readings, audio/video analysis and discussion. Meets with DNCE 5047.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Dance and Cultural Studies

**DNCE 4053 (3) Advanced Dance Composition**
Focuses on deepening the artistic voice and engaging with other art forms. Students explore the integration of technology and collaboration in creative projects and continue to engage in an objective critical process of their own work and the work of others. Meets with DNCE 5053.
**Requisites:** Requires a prerequisite course of DNCE 3043 (minimum grade C-). Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Creative Process

**DNCE 4061 (2) Major Technique**
Designed for dance majors. Enrollment by audition only.
**Repeatable:** Repeatable for up to 16.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Major Technique

**DNCE 4128 (1) Ballet Repertory**
Develops understanding of the ballet canon through practice of major solos from Romantic, Classical, and New-Classical ballets. For the advanced classical ballet student. Enrollment by audition only. Meets with DNCE 5128.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**DNCE 4181 (1) Advanced Ballet**
Investigates the full range of the advanced-level classical ballet vocabulary, focusing on an anatomically sound approach to the material. Exercises require strength and a deeply subtle understanding of principles of alignment, rotation, epaulement, and movement quality. Class moves quickly through enchainements of complex structure. Enrollment by audition only.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Technique

**DNCE 4261 (1) Advanced Jazz Dance Technique**
Refines advanced students' approach to the nuances and virtuosity of jazz idiom. Emphasis is placed on efficient use of alignment, complex polyrhythmic explorations and improvisations, and dynamic performance style. Class moves quickly through material and demands a high level of proficiency. Enrollment by audition only. Meets with DNCE 5261.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Technique

**DNCE 4701 (2) Contact Improvisation 2**
Builds upon skills introduced in DNCE 2701 and moves into more rigorous exploration of weight sharing principles. Emphasis will be placed on ease and efficiency in partnering, and integrating this work into choreography and performance. Meets with DNCE 5701.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Requires a prerequisite course of DNCE 2701 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Major Technique

**DNCE 4849 (1-3) Independent Study**
Involves creative or scholarly investigation of an area of interest to the student not addressed in the curriculum. Work must be arranged with and advised by a faculty member. Senior level course.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Independent Study

**DNCE 4909 (1-4) Special Topics**
Explores topics and research in relation to areas such as technology, environment, teaching methods, performance, world dance, arts in society, and/or criticism that the normal sequence of offerings may not allow.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 2909 and DNCE 5909
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Independent Study

**DNCE 4919 (1-3) Dance Practicum**
Project in dance under supervision of senior faculty.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 5919
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Independent Study

**DNCE 4939 (1-3) Dance Internship**
Provides an opportunity for upper-division dance majors to serve apprenticeships in the community in work areas related to their major interests and career goals. Internships are available in areas such as arts administration, dance therapy, and technical production. Instructor consent rquired.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Independent Study

## Theatre

**THTR 1003 (3) Acting 1**
Introductory course designed to explore creativity, collaboration and communication in the craft of acting. Focuses on basic terms and concepts of psychological realism fundamental to the actors' process through solo work and ensemble exercises. Open to majors and non-majors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**THTR 1009 (3) Theatre and Society**
Explores the importance of telling (and listening) to stories from the stages of the world; in theatre we learn what people value in their time and place. Investigates the range of genres of theatre in today's society and how theatrical artwork is devised and presented. Ideal for non-majors.
**Additional Information:** GT Pathways: GT-AH1 - Arts Hum: Arts Expression
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Special Courses in Theatre

**THTR 1011 (3) Global Theatre 1: Live Performance to Shakespeare**
Travels across four continents exploring live performance from the beginning of recorded history to Shakespeare through various forms of theatrical storytelling including masked dramas, shadow puppets, kabuki, passion plays and commedia.
**Additional Information:** GT Pathways: GT-AH1 - Arts Hum: Arts Expression
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: History/Dramaturgy/Directing

**THTR 1019 (3) Script Laboratory: Text Analysis and Practice for the Theatre**
Introduces fundamental methods of text analysis for performance. Equips theatre makers with common vocabulary and concepts to more effectively communicate when collaborating with other artists. Provides tools for analyzing any narrative art form.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) Theatre (THTR or TBFA) majors only (excluding minors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Special Courses in Theatre

**THTR 1050 (3) Introduction to Stagecraft and Design**
Hands on project-based learning introducing the craft, principles, and practices of stagecraft and design. Students execute varied projects in topics including scenic, lighting, sound, and costume design as well as stage management, scenic construction, painting, props, sewing, hair and wigs, dyeing, and makeup. This course is ideal for those interested in theatre, film, dance, fine art, architecture, cosplay, fashion, engineering, and game design.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**THTR 1105 (3) Stage Technologies**
Introduces technical production elements and procedures, including materials, organizations, methods and equipment to realize theatrical scenery, properties, lighting and sound.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre Design and Technology

**THTR 1115 (3) Costume Technologies**
Introduces technical production elements and procedures including materials, organizations, methods and equipment to realize theatrical costuming and make-up.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre Design and Technology

**THTR 1117 (2) Musical Theatre Studio I**
Explores creativity, collaboration, and communication in the craft of acting both in musical theatre and stage acting, specifically directed to the Musical Theatre degree student. Focuses on terms and concepts of psychological realism fundamental to the actors' process through solo work and ensemble exercises. Emphasis on developing a character through analysis and scene study. Various acting modalities will be introduced.
**Equivalent - Duplicate Degree Credit Not Granted:** PMUS 1117
**Grading Basis:** Letter Grade

**THTR 1217 (2) Musical Theatre Lab 2**
Focus on building terms and concepts introduced in THTR 1117. A more thorough emphasis is placed on developing character, utilizing analysis tools, and scene study of musical theatre works. Both lecture and performance-based class. Includes advanced repertoire and further song/monologue study in terms of crafting a character and building an arc for the character in a song and/or an identified specific moment.
**Requisites:** Restricted to BFA Musical Theatre and BM Musical Theatre students only.
**Grading Basis:** Letter Grade

**THTR 2021 (3) Global Theatre 2: Contemp Relevance and Resonance Forms of Pre-Colonial Modern Theatre and Performan**
This course explores world performance and theatre before and after European imperialism and settler colonialism, until 1850. By studying examples from Africa, Greece, Asia, India, Europe, and the Americas we will better understand the roots of theatre and performance today, and gain insight into epistemologies that might spur how to imagine into being a more equitable and sustainable world.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: History/Dramaturgy/Directing

**THTR 2035 (3) Design Fundamentals**
Introduces principles and techniques relevant to the expression of dramatic mood and idea through visual elements of the theatre, giving practice in conceptdevelopment, style selection, and rendering techniques in scenery and costume design.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre Design and Technology

**THTR 2043 (3) Voice and Movement for the Stage**
Natural resources of the human voice and body are studied as artistic resources for the performing artist. Designed to examine both the process and products of vocal and physical craft work. Please consult professor if you are interested in taking this class but do not fill the prerequisites.
**Requisites:** Restricted to Theatre (THTR, TBFA) or Dance (DNCE or DBFA) majors only (excluding minors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**THTR 2050 (2) Technical Theatre for Performance**
Hands on learning in an immersive environment, students are embedded into the Theatre and Dance department workshops and crews. Students gain direct experience in scenic construction, painting, props, costumes, stage lighting, media and projections, sound, and performance design as determined by the production season. This course is ideal for students interested in theatre, film, dance, performance art, design, and technical theater.

**THTR 2059 (3) Open Topics in Theatre and Drama**
Covers topics not otherwise listed in the curriculum. Topics for each semester are specified in the online schedule planner.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Special Courses in Theatre

**THTR 2105 (3) Introduction to Performance Design**
Introduces the creative/collaborative process of design for theatre and dance, including scenery, costume, lighting, and sound. Students create design projects and evaluate them with regard to artistic and practical concerns. Much of the course work is hands-on, experiential, and team-oriented.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre Design and Technology

**THTR 2117 (2) Musical Theatre Studio Class III**
Explores the creation of extended musical theatre performance using acting, movement and vocal techniques, with an emphasis on the ensemble. Topics: finding the arc of a role, staging techniques for small and large ensembles, rehearsal and performance skills for a range of contexts from summer stock to Broadway.
**Equivalent - Duplicate Degree Credit Not Granted:** PMUS 2117
**Requisites:** Restricted to College of Music undergraduates (MUSCU) and BFA Musical Theatre (TBFA-BFA) students only.
**Grading Basis:** Letter Grade

**THTR 2849 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 3005 (3) Costume Design 1**
Hands on studio course for students interested in theatre, dance, film, media studies, clothing, design, watercolor painting, psychology, sociology, history, art, art history, period styles, literature and cosplay. Students will learn, explore and practice literary analysis, character profiling, figure drawing, painting, fashion and clothing history and fabric selection to research, conceive, design and paint costume plates for several performance pieces over the course of the semester.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre Design and Technology

**THTR 3011 (3) American Musical Theatre History**
This course investigates diversity in American musical theatre through the disciplinary frameworks of critical race theory, intersectional feminism, the American Myth, Jewish and LGBTQIA+ theories, and music and performance theory. In addition to increasing students¿ knowledge, understanding, and appreciation of this uniquely American art form, this course encourages students to examine larger historical and/or political events and movements through the lens of the reception and development of musicals in a given time period.
**Recommended:** Prerequisite 3 credits in THTR, DNCE or MUSC.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: History/Dramaturgy/Directing

**THTR 3013 (3) Studio 1: Building a Character**
Students learn to deepen and develop their proficiency with specific acting techniques. Explores the craft elements of acting, as well as text analysis.
**Requisites:** Requires prerequisite course of THTR 1003 (minimum grad C-). Restricted to Theatre (TBFA) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Performance

**THTR 3015 (3) Scene Design 1**
Engages students in the creative process of creating spatial worlds for dramatic texts. Students learn to read and analyze scripts and scores, conceptualize and envision environments, express design ideas, draw, draft and build scale 3D models of stage sets.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Theatre Design and Technology

**THTR 3020 (3) Filmmaking Abroad: Acting & Directing Internationally**
Offers an intensive three-week production seminar to realize a short narrative film. Students immerse themselves in a city abroad, in collaboration with fellow CU students and the host population, as they scout locations and film their projects. Requires production responsibilities on both sides of the camera. A Global Seminar offered during Maymester through CU International Education.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 3020
**Requisites:** Requires prerequisite course of CINE 3400 or THTR 1003 (minimum grade C-).

**THTR 3023 (3) Studio 2: Creating a Role**
Continued development of acting technique and tools for play analysis, with particular emphasis on scene study. Special attention will be given to the Master Teachers of Acting and their pedagogies.
**Requisites:** Requires prerequisite course of (THTR 1003 or PMUS 1117 or PMUS 1217) and THTR 3053 (all minimum grade C-) or Theatre (TBFA) majors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Performance

**THTR 3031 (3) Development of Theatre 3: 20th Century International Drama**
Introduces 20th century international drama. Discusses selected plays by major African, Asian, and European authors and explores different dramatic traditions and their increasing interactions throughout the 20th century.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: History/Dramaturgy/Directing

**THTR 3033 (1-3) Production Research and Practicum: Acting**
Allows students to undertake an acting project, either within the major season or approved departmental production. Requires detailed preparational research, rehearsal commitments, and public presentation of theories and concepts in practice. Following the performance, students present written reports and evaluations.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Performance

**THTR 3035 (1-2) Production Practicum**
Practical production projects within a designated area of technical theatre, design, stage management, normally related to the department's season.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Theatre Design and Technology

**THTR 3037 (2-3) Shakespeare Practicum**
Students are assigned to work with production artisans of the Colorado Shakespeare Festival. While there are many possible areas, production designs for each season determine the number of available positions. May substitute for two credits of THTR 3035.
**Requisites:** Requires prerequisite courses of THTR 1105 and THTR 1115 (all minimum grade C-).
**Additional Information:** Departmental Category: Shakespearean Production

**THTR 3043 (3) Advanced Voice for the Stage**
Continues the work begun in THTR 2043. Studies advanced vocal techniques with the goal of integrating these skills into the working process of the performing artist.
**Requisites:** Requires prerequisite course of THTR 1003 or PMUS 1117 or PMUS 1217 and THTR 2043 (all minimum grade C-). Restricted to Theatre (THTR or TBFA) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Performance

**THTR 3045 (3) Stage Management**
Covers stage management from the inception of a production concept through the process of mounting aproduction, focusing on the interrelationships of the various artists involved, management and scheduling of time, and the psychology of handling a wide range of personalities.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Theatre Design and Technology

**THTR 3053 (3) Acting 2**
Continuation of the techniques introduced in Acting 1 (THTR 1003). Emphasis is placed on monologues and scene study of contemporary plays. Basic technique in developing a character are explored.
**Requisites:** Requires prerequisite course of THTR 1003 or PMUS 1117 or PMUS 1217 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Performance

**THTR 3055 (3) Stage Lighting Design 1**
Hands on learning in a creative lab-based environment exploring introductory practices of performance lighting design. Ideal for students excited by storytelling, technology, creating moods, the science of the human eye, human perception, and for students studying theatre, film, dance, art, design, architecture, architectural lighting, and game design.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Theatre Design and Technology

**THTR 3075 (3) Sound Design**
Hands on practical and creative exploration of the theatrical sound design process. Students will expand their understanding of sound design in the theatre through explorations in audio tools and technologies, sound system design and application, live mixing and troubleshooting skills, and enhancing theatrical performances using sound as an artistic medium.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Theatre Design and Technology

**THTR 3085 (3) Fashion, Society and Decor**
Hands on survey course for students interested in history, art history, decorative arts, sociology, psychology, politics, fashion, costume design, theatre, film, dance, media studies and cosplay. Students will create research projects based in numerous historical eras stanning from Ancient Egypt, Roman and Greek civilizations to the palaces and opulence of the Baroque and Rococo eras. Students will explore the social and technological advances in fashion creation and manufacture during the Industrial Revolution and Victorian era to the technological advances of modern Haute Couture fashion and important fashion designers.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Theatre Design and Technology

**THTR 3117 (2) Musical Theatre Studio Class IV**
Explores the development of solo performance sets of songs in cabaret and small theatre venues incorporating a range of musical styles. Topics include: How to create an audition video, Commercial auditions, Conceive, construct and perform a cabaret and/or small theatrical event, and how to collaborate with a musical production team.
**Equivalent - Duplicate Degree Credit Not Granted:** PMUS 3117
**Requisites:** Restricted to College of Music undergraduates (MUSCU) and BFA Musical Theatre (TBFA-BFA) students only.
**Grading Basis:** Letter Grade

**THTR 3149 (1) Professional Orientation: Exploring Professional Potentials for THTR and DNCE Majors**
Explores and identifies a wide range of professional opportunities connected to personal strengths and interests in theatre and dance by studying current professional practices, trends and cross-disciplinary connections. Instructor will: provide information/learning needed from representative professionals; open avenues to find/create employment opportunities towards internship consideration/post-graduation; and mentor structured self-assessment/professional development.
**Requisites:** Restricted to Theatre (THTR or TBFA) or Dance (DNCE or DBFA) majors (excluding minors).
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 3213 (3) Improvisation I: Thinking On Your Feet**
Provides students with an introduction to several forms of improvisation, including short form, long-form, playback theatre and clown. A useful course for anyone interested in improving confidence with public speaking, communication and/or performance. Attendance and participation are mandatory.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Performance

**THTR 3849 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 4003 (3) Acting 3**
Continuation of the techniques explored in Acting 1 (THTR 1003) and Acting 2 (THTR 3053). Emphasis is placed on monologues and scene study of Shakespeare and other classical plays.
**Requisites:** Requires prerequisite course of THTR 1003 or PMUS 1117 or PMUS 1217 (minimum grade C-).

**THTR 4005 (3) Costume Design 2**
Advanced studio course building on experiences and techniques studied in THTR 3005, with additional emphases on portfolio quality painting/ rendering techniques, fabrics/ fabric manipulation and costume production technology as it affects and is affected by the designer and the creative impulse.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of THTR 3005 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Theatre Design and Technology

**THTR 4013 (3) Studio 3: Acting Shakespeare**
In-depth study of Shakespearean texts from the perspective of their demands on the actor, including the conventions and performance styles of Elizabethan theatre.
**Requisites:** Requires prerequisite courses of (THTR 1003 or PMUS 1117 or PMUS 1217) or Theater BFA (TBFA) majors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Performance

**THTR 4015 (3) Scene Design 2**
Advanced projects in theatrical scene design. Provides intensive practice in sketching, rendering, drafting and model-building. Emphasizes portfolio development and preparing the student designer for graduate training or professional work.
**Requisites:** Requires prerequisite course of THTR 3015 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Theatre Design and Technology

**THTR 4021 (3) Global Theatre and Performance 2: Contesting the Status Quo**
This course views theater and performance as social, political, or artistic critique, with emphasis on examples from the Americas after 1850. Students will learn how theater and performance has either challenged or reinscribed social, political, or artistic conventions by studying works of dramatists, the historical avant-garde, theorist-practitioners, and contemporary performance artists with marginalized identities from around the world.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: History/Dramaturgy/Directing

**THTR 4023 (3) Studio 4: Playing with Styles**
Studies selected styles of theatre performance such as Greek Drama, Comedy of Manners, Commedia dell'arte, Modern Realism, Theatre of the Absurd, and Non-Western Theatre, including vocal and physical style elements.
**Requisites:** Requires prerequisite courses of THTR 3013, THTR 3023 and THTR 4013 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Performance

**THTR 4025 (3) Costume Patterning and Construction**
Learn to pattern and make your own clothing and costumes. The course focuses on basic hand and machine sewing skills, flat patterning and draping techniques, all culminating in the production of a final project. This course is ideal for those interested in theatre, film, dance, fine art, architecture, cosplay, fashion, engineering, and game design.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 5025
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite THTR 1050.

**THTR 4029 (3) Performance and Community Engagement**
Engages students in the power of performance for effecting positive social change. Students research collaboratively to create performances and workshop experiences to intentionally author the future they want. Readings provide theoretical foundations that serve as the basis for creative work. Students engage in creative explorations. Open to all forms of performance.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Special Courses in Theatre

**THTR 4033 (3) Advanced Movement for the Stage**
Continues the work begun in THTR 2043 and explores a wide range of physical actor training methods and practices that support the fundamentals of mask training and mask performance for the actor. Students will experience each mask by gaining an understanding of its historical and performative relevance and directly bring into play the authentic life required of the specific mask. Department consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 5033
**Requisites:** Requires prerequisite course of THTR 2043 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Performance

**THTR 4035 (3) Scene Painting**
Exposes students to the crafts involved in painting large and colorful backgrounds for stage productions through hands-on projects. Introduces students to scenic art techniques such as layout, representational painting, trompe l¿oeil, faux finishing and related skills. Students are taught about proper tool use and care, paint products, and the profession.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Theatre Design and Technology

**THTR 4039 (3) Musical Theatre Repertory**
Developed around the learning of complete scenes, songs and dances that are representative of the major periods and styles within musical comedy from the 1920s to the present. Emphasizes in-class performance. Admission by audition.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 5039
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Theatre (THTR, TBFA) or Dance (DNCE or DBFA) or Music (MUSA-BAMUS, MUSC-BMUS or MUSE-BMUE) majors only (excluding minors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Special Courses in Theatre

**THTR 4040 (3) Theatrical Tailoring -- Menswear**
Learn to pattern and make your own clothing and costumes. The course focuses on tailoring of menswear (trousers, vest/waistcoats and coats) using hand and machine sewing skills, flat patterning and draping techniques, all culminating in the production of a final project. Period of exploration will vary by semester. This course is ideal for those interested in theatre, film, dance, fine art, architecture, cosplay, fashion, engineering, and game design.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite THTR 1050.
**Grading Basis:** Letter Grade

**THTR 4046 (3) Costume Crafts**
Covers basic and advanced techniques in casting/molding, mask making, dyeing, painting, jewelry making, ventilating and wig style and millinery via a series of projects. Culminates in a final project encompassing all techniques. Instruction consent required. This course is ideal for those interested in theatre, film, dance, fine art, architecture, cosplay, fashion, engineering, and game design.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 5046
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite THTR 1050.

**THTR 4049 (1-4) Special Topics in Theatre**
Opportunity for students to explore, upon consultation with the instructor, areas in theatre that the normal sequence of offerings may not allow.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Special Courses in Theatre

**THTR 4051 (3) Playwriting**
Introductory course in craft of playwriting; primary focus on technique of developing short plays.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: History/Dramaturgy/Directing

**THTR 4055 (3) Stage Lighting Design 2**
Hands on learning in a creative lab-based environment exploring advanced practices of performance lighting design. Ideal for students excited by technology, working with computers, and complex systems. This course is excellent for students interested in design, lighting design, concert, festival, dance, and nightclub lighting design, all styles of kinetic art, music, storytelling, themed environments, and architecture.
**Requisites:** Requires prerequisite course of THTR 3055 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Theatre Design and Technology

**THTR 4059 (3) Open Topics in Theatre and Drama**
Covers topics not otherwise listed in the curriculum. Topics for each semester are specified in the online Schedule Planner.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Special Courses in Theatre

**THTR 4061 (3) Directing**
Theory and practice of directing for the stage.
**Requisites:** Requires prerequisite courses of THTR 1003 or PMUS 1117 or PMUS 1217 or THTR 3053 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: History/Dramaturgy/Directing

**THTR 4063 (3) Audition Techniques**
Prepares students for the demands of the acting profession. Trains students in various audition techniques including general auditions, prepared auditions, cold readings, on-camera auditions, andcommercial auditions. Shows how to prepare and perfect audition material in a professional and exemplary way. Discusses agents, casting directors, and the process of becoming a professional actor.
**Requisites:** Requires prerequisite course of THTR 1003 or PMUS 1117 or PMUS 1217 (minimum grade C-). Restricted to students with 27-180 credits (Sophomore, Junior or Senior) Theatre (THTR or TBFA) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**THTR 4065 (1-3) Advanced Design Projects.**
Practical course in the application of design theory.Students design major costume, lighting, or scenic elements in a season production. Design concept and process must be explained and defended.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**THTR 4073 (3) Performing Voices of Women**
Explores theories underlying the "feminine voice," varied perspectives in prose and poetry, ways of embodying these voices and perspectives in performance forms and ultimately the students' own voices through creation of autobiographical performance pieces (some to be presented for student audiences). Open to both men and women.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4073
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**THTR 4075 (1-3) Advanced Technical Projects**
Students assume responsibility, under faculty supervision, for planning and executing specific technical responses to a design concept in the department's season productions.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade

**THTR 4081 (3) Senior Seminar**
Intellectual and conceptual capstone course for departmental majors with separate sections for theatre and dance students. Course promotes integration of ideas regarding history, criticism, and theory in performance and production. All inquiry throughout the semester relates to the theme of creative process.
**Requisites:** Restricted to Theatre (THTR, TBFA) or Dance (DNCE or DBFA) majors only (excluding minors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: History/Dramaturgy/Directing

**THTR 4085 (3) Theatre Management**
Students will learn how arts companies are run and managed, how non profit boards function and more. We will discuss budgeting, season planning, grant writing, unions, marketing and development. The class will include a wide range of guest speaker experts in the industry.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre Design and Technology

**THTR 4095 (1-3) Special Topics in Theatre Design and Technology**
Intensive study of specialized topics in theatre technology and design. Topics and credits specified in the online Schedule Planner.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre Design and Technology

**THTR 4103 (3) Acting and Directing for the Camera**
Offers an intensive production workshop to prepare actors and directors to work collaboratively and effectively for the medium of the camera. Directing vocabulary, script interpretation, film terminology and acting techniques are applied. Explores situations in which actors and directors interact, from auditions to rehearsals to filming. Requires attendance, textbook readings, research and production responsibilities on both sides of the camera.
**Requisites:** Requires prerequisite course of THTR 1003 or PMUS 1117 or PMUS 1217 (minimum grade C-). Restricted to students with 27-180 credits (Sophomore, Junior or Senior) Theatre (THTR or TBFA) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**THTR 4105 (3) Theatre Make-Up Design**
Hands on studio course for students interested in theatre, film, television, entertainment, cosplay and fashion make-up styles and applications. Students will research and create various make-up designs and learn various make-up application techniques and products to conceive and create characters ranging from clowns to 17th, 18th and 19th period and historical styles and stages of old age and special effect make-up. Techniques include ombre blending, removing eyebrows, changes facial features, 3D prosthetics and latex, silicone and foam appliances in the creation of wounds, stages of healing and zombies.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Special Courses in Theatre

**THTR 4113 (3) Comedy Matters**
Examines the role of comedy in performance within various cultures through readings, viewings and a participatory exploration. We will analyze comedy within various societies to understand the underlying ideals and values. Throughout this investigation we will seek to understand what makes something comedic, why, for whom, for what purpose, when and under what circumstances.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 5113
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**THTR 4117 (1-3) Musical Theatre Lab 5: Senior Showcase Experience**
Research and identify material from a variety of mediums (theatre, film, television, web-based work, commercial) that best fit preferred performance type and style. Emphasis placed on topically/timely relevant material so that the student becomes most knowledgeable of current trends and practices. Prepared work will be presented at an organized showcase featuring agents, casting professionals and directors providing feedback for continued growth, learning and a new network of industry colleagues.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Recommended:** Prerequisites TBFA Acting students ¿ completion of Studios 1-4, for PMUS, BMMT and TBFA Musical Theatre students, completion of Labs 1-4, PMUS 1117, 1217, 2117, 3117.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**THTR 4125 (3) Watercolor Illustration and Rendering Techniques**
Hands on studio course for the student interested in theatre, film, art and art history, scenic art, illustration, drawing, and painting. This course explores watercolor, gouache, pen and ink, chalk pastels, color pencils and multi-media painting techniques and approaches. Students will gain fluency in exploring, analyzing, and copying various paintings and illustration styles and approaches by famous Illustrators and artists to expand their skillset and painting techniques. Painting supplies must be supplied by the student.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 5125
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre Design and Technology

**THTR 4135 (3) Technical Production**
Examines the process of and technology for producing theatrical scenery on a limited production timeline.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Theatre Design and Technology

**THTR 4143 (3) Shakespeare in Community**
Surveys a growing field of arts practitioners who are intersecting Applied Theatre, Shakespeare and community in meaningful ways, including Shakespeare in Prisons, Shakespeare with Veterans and Shakespeare for Inclusive Audiences. Students will explore a variety of methodologies for teaching and practicing Shakespeare and create original work using Shakespeare as a lens for examining a particular theme, topic or social issue.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 5143

**THTR 4149 (1-3) Theatre Internship**
Provides opportunities for theatre majors to explore career opportunities in theatre fields other than, or in addition to, those with performance emphasis. Students apply knowledge and skills developed in their major studies to a practical work experience.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Requisite 30 credit hours in THTR.
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 4173 (3) Creative Climate Communication**
We generate multimodal compositions on the subject of climate change and engage with various dimensions of issues associated with sustainability. We work to deepen our understanding of how issues associated with climate change are or can be communicated, by analyzing previously created expressions from a variety of media (interactive theatre, film, fine art, television programming, blogs, performance art, for example) and then be creating our own work.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3173 and ATLS 3173
**Recommended:** Prerequisite ENVS 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Performance

**THTR 4175 (3) Conceptualization**
Fosters creativity and collaboration through a variety of diverse projects where students conceive of live, performative productions, events and experiences. Offers both individual and team exercises that stimulate visualization, expression, documentation and communication of creative ideas, including their overall scope, aesthetic, style, audience relationship and mode of presentation.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 5175
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Special Courses in Theatre

**THTR 4193 (1-3) Studio 5: Senior Project**
Students engage in a project or projects of their own undertaking that takes a broader experience to apply the craft utilizing self-initiative, collaborative approaches and public exhibition. Instructor consent required for non-BFA THTR performance majors.
**Equivalent - Duplicate Degree Credit Not Granted:** PMUS 4117
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of THTR 3013 and THTR 3023 and THTR 4013 and THTR 4023 (all minimum grade C-).
**Additional Information:** Departmental Category: Performance

**THTR 4213 (3) Improvisation II: Advanced Improvisation**
Continues the student's study of improvisation as a collaborative art form. Whereas Improvisation I introduces students to a variety of techniques, forms and applications of improvisation, this course focuses specifically on long-form improvisation in performance. Previous experience with long-form improvisation is necessary to enroll in this course.
**Recommended:** Prerequisite course of THTR 3213 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**THTR 4555 (1-2) Production Studio**
Requires participation in a Theatre Department production assignment in the areas of design, technology, or management, as well as participation in a semester portfolio review. May be repeated upto 6 total credit hours.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Theatre (TBFA) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre Design and Technology

**THTR 4849 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Special Courses in Theatre

# Dance - Bachelor of Arts (BA)

The University of Colorado Boulder offers a well-established, nationally recognized dance program that encourages the pursuit of one's artistic voice, embodied scholarship and pedagogical exploration.

CU Boulder has an exciting and diversified dance program. Our curriculum is designed to use dance and the body to challenge assumptions about practices, values, technology and sustainability. Our program scaffolds entrepreneurial approaches to art-making based in personal initiative, curiosity and versatility.

We support the vital cultivation of self-awareness alongside a nuanced appreciation of one's positionality within the global conversation.

Somatic studies serve as the integrative tissue in our highly diverse and forward-thinking program.

We are a contemporary program—one that values and provides study in a range of styles and fusion of forms that influence and reflect the multifaceted nature of dance performance today. Our curriculum is designed to develop concrete skills in performance and choreography and to instill an appreciation of the role that dance plays in human culture around the world.

# Requirements

## Required Courses and Credits

The Bachelor of Arts provides a well-rounded dance education in both technique and theory courses. Students must receive a C- or better in all required courses. No more than 45 credits in DNCE may be applied to overall graduation requirements. Students must have a grade point average of at least 2.000 in the major in order to graduate. Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

Students are expected to take a variety of technique styles. A minimum of three different styles, as well as African dance, are required. Students who have not placed in the major technique class (DNCE 2021, DNCE 3041 or DNCE 4061) by their second semester in dance program are strongly advised not to continue in the major program in dance. Placement into and successful completion of major technique is a prerequisite for enrollment in other required dance courses.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Lower-Division Courses** | | |
| DNCE 1012 | Dance Production | 2 |
| DNCE 1013 | Dance Improvisation | 2 |
| DNCE 1027 | Dance in Cultural Perception and Expression | 3 |
| DNCE 1908 | First Year Dance Seminar | 1 |
| DNCE 2501 | African Dance | 2 |
| **Required Major Technique Courses** | | |
| Take 6 credit hours from the following courses: [1] | | 6 |
| DNCE 2021 | Major Technique | |
| DNCE 3041 | Major Technique | |
| DNCE 4061 | Major Technique | |
| **Upper-Division Music Course** | | |
| Choose one of the following courses: | | 2 |
| DNCE 3014 | Inside the Groove: Developing Rhythmic Skills | |
| DNCE 3024 | SOUND Choices: Enhancing the Music/ Dance Relationship | |
| **Upper-Division Creative Process Course** | | |
| Choose one of the following courses: | | 3 |
| DNCE 3033 | Choreographic Resources | |
| DNCE 3043 | Choreographic Process | |
| **Required Production Practicum Courses** | | |
| Take 2 credit hours of production practicum, including 1 credit of Run Crew. | | 2 |
| DNCE 3035 | Production Practicum | |
| **Required Upper-Division Courses** | | |
| DNCE 3005 | Movement Awareness and Injury Prevention for the Dancer | 3 |
| DNCE 4017 | Dancing Histories: Sex, Gender and Race in U.S. Concert Dance | 3 |
| or DNCE 4037 | Contemporary Concert Dance: Shifting Perspectives in Performance | |
| or DNCE 4047 | Hip-Hop Dance History | |
| DNCE 4036 | Dance Teaching Practices: Inclusive Approaches to Instruction | 3 |
| DNCE 4939 | Dance Internship | 1 |
| THTR 4029 | Performance and Community Engagement | 3 |
| THTR 4081 | Senior Seminar | 3 |
| **Electives in Dance Technique** | | |
| Take 6 credit hours of DNCE courses with course numbers that end in 1. | | 6 |
| **Required Theatre Production Course** | | |
| Choose one of the following courses: | | 2-3 |
| THTR 2105 | Introduction to Performance Design | |
| THTR 3005 | Costume Design 1 | |
| THTR 3015 | Scene Design 1 | |
| THTR 3045 | Stage Management | |
| THTR 3055 | Stage Lighting Design 1 | |
| THTR 3075 | Sound Design | |
| THTR 4035 | Scene Painting | |
| THTR 4055 | Stage Lighting Design 2 | |
| THTR 4095 | Special Topics in Theatre Design and Technology (Some sections including Tailoring or Product Design) | |
| THTR 4105 | Theatre Make-Up Design | |
| THTR 4175 | Conceptualization | |
| THTR 5025 | Costume Patterning and Construction | |
| **Total Credit Hours** | | **47-48** |

[1] Students are placed at the appropriate level based on audition. Students without sufficient training will be asked to take nonmajor technique classes to make up the deficiency. These classes will not count toward the major requirement.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for more information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BA in dance, students should meet the requirements in the Four-Year Plan section.

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will fulfill all 12 credits of the Arts & Humanities area of the Gen Ed Distribution Requirement and will fulfill the Global Perspective category in the Gen Ed Diversity Requirement.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| DNCE 1012 | Dance Production | 2 |
| DNCE 1027 | Dance in Cultural Perception and Expression | 3 |
| DNCE 1908 | First Year Dance Seminar | 1 |
| DNCE 2021 | Major Technique | 2 |
| Gen. Ed. Distribution course (example: Natural Science and Lab) | | 4 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| DNCE 1013 | Dance Improvisation | 2 |
| DNCE 3035 | Production Practicum | 1 |
| DNCE 3041 | Major Technique | 2 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **14** |
| **Year Two** | | |
| **Fall Semester** | | |
| DNCE 2501 | African Dance | 2 |
| THTR 4029 | Performance and Community Engagement | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Elective | | 4 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| DNCE 3005 | Movement Awareness and Injury Prevention for the Dancer | 3 |
| DNCE 3035 | Production Practicum | 1 |
| Additional DNCE Technique | | 2 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| DNCE 3014<br>or DNCE 3024 | Inside the Groove: Developing Rhythmic Skills<br>or SOUND Choices: Enhancing the Music/Dance Relationship | 2 |
| DNCE 4036 | Dance Teaching Practices: Inclusive Approaches to Instruction | 3 |
| Additional DNCE Technique | | 1 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences) | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| DNCE 3033<br>or DNCE 3043 | Choreographic Resources<br>or Choreographic Process | 3 |
| DNCE 4061 | Major Technique | 2 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Required Theatre Production Course | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **14** |
| **Year Four** | | |
| **Fall Semester** | | |
| DNCE 4017 | Dancing Histories: Sex, Gender and Race in U.S. Concert Dance | 3 |
| DNCE 4939 | Dance Internship | 1 |
| Additional DNCE Technique | | 2 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| THTR 4081 | Senior Seminar | 3 |
| Additional DNCE Technique | | 2 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective or Upper-division Elective (if needed) | | 3 |
| Upper-division Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **17** |
| | **Total Credit Hours** | **120** |

# Learning Outcomes

The following areas of knowledge and experience are central to all the undergraduate degrees in dance:

- Physical accomplishment in a range of dance styles and within fusions of various forms, including contemporary, ballet, jazz, hip-hop, transnational fusion, African dance, performance improvisation and other dance traditions from around the world.
- Experience with the process and underlying aesthetics of dance creation, composition and collaboration.
- Basic familiarity with cultural, sociological and aesthetic issues important to the contemporary realities of the field of dance, including a working knowledge of major world dance styles, works of dance literature, theoretical lenses and the history of dance.
- Knowledge of the various means, such as stagecraft, costuming, lighting, make-up, production and projections, through which a public presentation of dance is realized.
- Study and practical experience in dance pedagogy, identifying our purpose, goals and objectives as future educators.
- Basic knowledge of tactics for sustaining wellness, including various somatic approaches to dance training, injury prevention and rehabilitation from injury.
- Experiential study of the relationship between dance and music, including concrete practice of skills in playing and hearing music.

- Opportunities to explore the power of performance for effecting positive social change.

In addition, students completing a degree in dance are expected to acquire the ability and skills to:

- Define their positionality as a maker and thinker of art with responsibility and awareness within their local setting and global conversations.
- Create and perform through dance, theatre, design, technology, research, scholarship and writing.
- Make art that is relevant to their medium of expression, that generates resistance to and expands developed techniques towards contemporary relevance, and aesthetic and artistic excellence.
- Apply diverse theories to critically analyze various performance practices, approaches, compositions, forms, histories, events and scripts.
- Engage with the histories of their art form and the impact of these histories on contemporary performance challenges and opportunities.
- Build communities of greater equity and inclusion within the cultures of theatre and dance, and the broader world.
- Cultivate their responsibility as artist-citizens to have a positive impact on the world and the future.

# Dance - Bachelor of Fine Arts (BFA)

The University of Colorado Boulder offers a well-established, nationally recognized dance program that encourages the pursuit of one's artistic voice, embodied scholarship and pedagogical exploration.

Our BFA program is designed to meet the needs of highly curious and motivated students interested in preparing for a professional dance career in performance and/or choreography while in an academic setting. Our curriculum is designed to use dance and the body to challenge assumptions about practices, values, technology and sustainability. Our program scaffolds entrepreneurial approaches to art-making based in personal initiative, curiosity and versatility.

We support the vital cultivation of self-awareness alongside a nuanced appreciation of one's positionality within the global conversation. Somatic studies serve as the integrative tissue in our highly diverse and forward-thinking program.

We are a contemporary program—one that values and provides study in a range of styles and fusion of forms that influence and reflect the multifaceted nature of dance performance today. Our curriculum is designed to develop concrete skills in performance and choreography and to instill an appreciation of the role that dance plays in human culture around the world.

# Requirements

## Admission Requirements

Students who did not pre-audition into the BFA program and who wish to pursue the BFA can audition during the fall semester of their freshman or sophomore year. If the student is a sophomore auditioning for the BFA, they must be enrolled in or have taken DNCE 3033 or DNCE 3043 in order to be on track to graduate in four years.

Application guidelines for the BFA track are posted each fall semester. The undergraduate director will notify students of faculty decisions regarding their audition. If a student is admitted to the program, they should talk to their primary advisor to have their degree status officially changed from BA to BFA.

The characteristics that the faculty looks for in BFA students are:

- Exceptional technical/expressive ability as demonstrated in class work and performance.
- Choreographic skill or potential as demonstrated through movement invention and appropriate clarity of structure
- Willingness and drive necessary to pursue a professional career in dance.
- Exceptional musicality and rhythmic precision.
- Maturity, organization and a positive attitude.

## Required Courses and Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| DNCE 1012 | Dance Production | 2 |
| DNCE 1013 | Dance Improvisation | 2 |
| DNCE 1027 | Dance in Cultural Perception and Expression | 3 |
| DNCE 1908 | First Year Dance Seminar | 1 |
| DNCE 2501 | African Dance | 2 |
| DNCE 3005 | Movement Awareness and Injury Prevention for the Dancer | 3 |
| DNCE 3014 | Inside the Groove: Developing Rhythmic Skills | 2 |
| DNCE 3024 | SOUND Choices: Enhancing the Music/ Dance Relationship | 2 |
| DNCE 3033 | Choreographic Resources | 3 |
| DNCE 3035 | Production Practicum | 1 |
| DNCE 3043 | Choreographic Process | 3 |
| DNCE 3901 | Technique Practicum | 1-3 |
| DNCE 4012 | Concert Production | 1 |
| DNCE 4036 | Dance Teaching Practices: Inclusive Approaches to Instruction | 3 |
| DNCE 4017 | Dancing Histories: Sex, Gender and Race in U.S. Concert Dance | 3 |
| DNCE 4037 | Contemporary Concert Dance: Shifting Perspectives in Performance | 3 |
| or DNCE 4047 | Hip-Hop Dance History | |
| DNCE 4053 | Advanced Dance Composition | 3 |
| DNCE 5052 | Studio Concert | 3 |
| THTR 4029 | Performance and Community Engagement | 3 |
| THTR 4081 | Senior Seminar | 3 |
| **Electives** | | |
| Take 12 credit hours of one of the following: [1] | | 12 |
| DNCE 2021 | Major Technique | |
| DNCE 3041 | Major Technique | |
| DNCE 4061 | Major Technique | |
| Select one of the following: | | 2-3 |
| THTR 1003 | Acting 1 | |
| DNCE 4023 | Performance Improvisation Techniques | |

| | | |
|---|---|---|
| THTR 4073 | Performing Voices of Women | |
| Take 9 credit hours of electives in dance technique with course numbers that end in 1. | | 9 |
| Select one of the following THTR Production courses: | | 2-3 |
| THTR 2105 | Introduction to Performance Design | |
| THTR 3005 | Costume Design 1 | |
| THTR 3015 | Scene Design 1 | |
| THTR 3045 | Stage Management | |
| THTR 3055 | Stage Lighting Design 1 | |
| THTR 3075 | Sound Design | |
| THTR 4035 | Scene Painting | |
| THTR 4055 | Stage Lighting Design 2 | |
| THTR 4105 | Theatre Make-Up Design | |
| THTR 4175 | Conceptualization | |
| THTR 5025 | Costume Patterning and Construction | |
| Some sections of the following including Tailoring or Projection Design: | | |
| THTR 4095 | Special Topics in Theatre Design and Technology | |
| **Total Credit Hours** | | **72-76** |

[1] Students are placed at the appropriate level based on audition. Students without sufficient training will be asked to take nonmajor technique classes to make up the deficiency. These classes will not count toward the major requirement.

## Additional Requirements

In addition to specified coursework, the BFA student must meet the following requirements:

- Show original choreographic work each semester in Open Space, FRESH or Dance Class Showings.
- Present a concert in conjunction with other senior BFA's in the spring of their senior year.
- By December of their junior year, the student must have formed a committee of two faculty members who will evaluate their concert. The student and First Reader (lead faculty member) of the committee will complete a BFA Concert Form that is given to the Director of Dance Production by January 31 junior year. The Director of Dance Production will help you plan and oversee the production aspects of the show.
- Maintain a 3.2 GPA in required dance and theatre courses. If a student drops below the required GPA by the time of their concert proposal submission (January 31), they will be removed from the BFA and their concert proposal will no longer be considered.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for more information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BFA in dance, students should meet the requirements in the Four-Year Plan section.

# Four-Year Plan of Study

Through the required coursework for the major, students will fulfill all 12 credits of the Arts & Humanities area of the Gen Ed Distribution Requirement and will fulfill the Global Perspective category of the Gen Ed Diversity Requirement.

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| DNCE 1012 | Dance Production | 2 |
| DNCE 1027 | Dance in Cultural Perception and Expression | 3 |
| DNCE 1908 | First Year Dance Seminar | 1 |
| DNCE 2021 | Major Technique | 2 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| DNCE 1013 | Dance Improvisation | 2 |
| DNCE 3041 | Major Technique | 2 |
| DNCE 3035 | Production Practicum | 1 |
| Additional technique as needed | | 2 |
| Gen. Ed. Skills course (example: QRMS) | | 3-5 |
| Gen. Ed. Distribution course (example: Natural Science) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16-18** |

**Year Two**

| **Fall Semester** | | |
|---|---|---|
| DNCE 2501 | African Dance | 2 |
| DNCE 3014 | Inside the Groove: Developing Rhythmic Skills | 2 |
| THTR 4029 | Performance and Community Engagement | 3 |
| THTR 2050 | Technical Theatre for Performance | 2 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Natural Science) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| DNCE 3005 | Movement Awareness and Injury Prevention for the Dancer | 3 |
| DNCE 3041 or DNCE 4061 | Major Technique or Major Technique | 2 |
| DNCE 3033 | Choreographic Resources | 3 |
| DNCE 3024 | SOUND Choices: Enhancing the Music/ Dance Relationship | 2 |
| Additional technique as needed | | 2 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| | **Credit Hours** | **15** |

**Year Three**

| **Fall Semester** | | |
|---|---|---|
| DNCE 3041 or DNCE 4061 | Major Technique or Major Technique | 2 |
| DNCE 3901 | Technique Practicum | 1-3 |
| DNCE 4036 | Dance Teaching Practices: Inclusive Approaches to Instruction | 3 |

| | | |
|---|---|---|
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15-17** |
| **Spring Semester** | | |
| DNCE 3041<br>or DNCE 4061 | Major Technique<br>or Major Technique | 2 |
| DNCE 3043 | Choreographic Process | 3 |
| DNCE 4012 | Concert Production | 1 |
| THTR 1003<br>or DNCE 4023<br>or THTR 4073 | Acting 1<br>or Performance Improvisation Techniques<br>or Performing Voices of Women | 2-3 |
| Additional technique as needed | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| | **Credit Hours** | **14-15** |
| **Year Four** | | |
| **Fall Semester** | | |
| DNCE 3041<br>or DNCE 4061 | Major Technique<br>or Major Technique | 2 |
| DNCE 4017 | Dancing Histories: Sex, Gender and Race in U.S. Concert Dance | 3 |
| DNCE 4053 | Advanced Dance Composition | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| DNCE 4037<br>or DNCE 4047 | Contemporary Concert Dance: Shifting Perspectives in Performance<br>or Hip-Hop Dance History | 3 |
| DNCE 5052 | Studio Concert | 3 |
| THTR 4081 | Senior Seminar | 3 |
| Additional technique as needed | | 2 |
| Elective | | 3 |
| | **Credit Hours** | **14** |
| | **Total Credit Hours** | **118-123** |

# Theatre - Bachelor of Arts (BA)

The BA program in theatre is a broad-based program of theatre practice and study embracing creativity, research and diversity. Through performance and practice, process and research, the BA student will investigate the role of creativity within a liberal arts education. The BA in theatre investigates theatre and performance via historical context, forward-looking practice and a multiplicity of ways of knowing and making.

The BA in theatre also serves as the core of studies for a student who wishes to pursue further theatre training in one of the BFA areas of concentration.

# Requirements

## Program Requirements

The BA degree program in theatre requires 35 credit hours in theatre and 3 in dance. A grade of C- or better is needed in each required course toward the BA degree, as well as an overall theatre GPA of 2.00. No more than 45 credits in THTR may be applied to overall graduation requirements. Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| THTR 1003 | Acting 1 | 3 |
| THTR 1019 | Script Laboratory: Text Analysis and Practice for the Theatre | 3 |
| THTR 1050 | Introduction to Stagecraft and Design | 3 |
| THTR 2021 | Global Theatre 2: Contemp Relevance and Resonance Forms of Pre-Colonial Modern Theatre and Performan | 3 |
| THTR 2050 | Technical Theatre for Performance | 2 |
| THTR 2105 | Introduction to Performance Design | 3 |
| THTR 3035 | Production Practicum (Run Crew) | 1 |
| THTR 3149 | Professional Orientation: Exploring Professional Potentials for THTR and DNCE Majors | 1 |
| THTR 4021 | Global Theatre and Performance 2: Contesting the Status Quo | 3 |
| THTR 4149 | Theatre Internship | 1 |
| **Upper-Division Performance Course** | | |
| Select one of the following: | | 3 |
| THTR 3043 | Advanced Voice for the Stage | |
| THTR 3053 | Acting 2 | |
| THTR 3213 | Improvisation I: Thinking On Your Feet | |
| THTR 4003 | Acting 3 | |
| THTR 4029 | Performance and Community Engagement | |
| THTR 4039 | Musical Theatre Repertory | |
| THTR 4059 | Open Topics in Theatre and Drama (certain topics) | |
| THTR 4063 | Audition Techniques | |
| THTR 4073 | Performing Voices of Women | |
| THTR 4103 | Acting and Directing for the Camera | |
| THTR 4113 | Comedy Matters | |
| THTR 4173 | Creative Climate Communication | |
| THTR 4213 | Improvisation II: Advanced Improvisation | |
| **Electives** | | |
| Electives in Theatre (9 credit hours must be upper-division) | | 9 |
| **Total Credit Hours** | | **35** |

[1] THTR 1050and THTR 2050 cannot be taken in the same semester.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Course Work Outside THTR** | | |
| Electives in Dance | | 3 |
| **Total Credit Hours** | | **3** |

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BA in theatre, students should meet the requirements in the Four-Year Plan of Study.

# Recommended Four-Year Plan of Study

Through the required coursework for the major, students will fulfill all 12 credits of the Arts & Humanities area of the Gen Ed Distribution Requirement.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| THTR 1019 | Script Laboratory: Text Analysis and Practice for the Theatre | 3 |
| THTR 1050 | Introduction to Stagecraft and Design | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| THTR 1003 | Acting 1 | 3 |
| THTR 2050 | Technical Theatre for Performance | 2 |
| THTR 3035 | Production Practicum | 1 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| THTR 2021 | Global Theatre 2: Contemp Relevance and Resonance Forms of Pre-Colonial Modern Theatre and Performan | 3 |
| DNCE Electives | | 1 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab ) | | 4 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| THTR Elective (Upper Division) | | 3 |
| THTR 3149 | Professional Orientation: Exploring Professional Potentials for THTR and DNCE Majors | 1 |
| THTR 2105 | Introduction to Performance Design | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Year Three** | | |
| **Fall Semester** | | |
| DNCE Elective | | 2 |
| THTR 4149 | Theatre Internship | 1 |
| Elective | | 3 |
| Elective | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) - Upper-division | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| THTR Elective (Upper Division) | | 3 |
| THTR (choose one Upper Division Performance course) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| THTR Elective (Upper Division) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| THTR 4021 | Global Theatre and Performance 2: Contesting the Status Quo | 3 |
| Upper-division Elective | | 3 |
| Upper-division Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **120** |

# Learning Outcomes

The undergraduate degrees in theatre emphasize knowledge and awareness of:

- The major works of dramatic literature that are representative of the most important eras in the development of theatre and drama.
- The history of theatrical production—its styles, conventions and socially related mores—from ancient civilizations to the present time.
- The various means through which a theatrical concept is realized.

- The aesthetic and intellectual relationship between theatre in its various 21st century modes and contemporary society.

In addition, by the completion of the program, students will be able to:

- Define their positionality as a maker and thinker of art with responsibility and awareness within their local setting and global conversations.
- Create and perform through dance, theatre, design, technology, research, scholarship and writing.
- Make art that is relevant to their medium of expression, that generates resistance to and expands developed techniques towards contemporary relevance, and aesthetic and artistic excellence.
- Apply diverse theories to critically analyze various performance practices, approaches, compositions, forms, histories, events and scripts.
- Engage with the histories of their art form and the impact of these histories on contemporary performance challenges and opportunities.
- Build communities of greater equity and inclusion within the cultures of theatre and dance, and the broader world.
- Cultivate their responsibility as artist-citizens to have a positive impact on the world and the future.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BA and MA in Theatre

### Admissions Requirements

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.0 or higher.
- Have completed a minimum of 60 credit hours of coursework.
- Transfer students must have completed a minimum of 24 credit hours at CU Boulder.
- Complete all MAPS deficiencies (students admitted to CU Boulder prior to Summer 2023 only).

The typical student will be a student writing an honors thesis who will use that project as the basis for developing the MA thesis, though this is not mandatory. This new degree program is open only to students enrolled in the BA in theatre degree program at CU Boulder.

Interested students should apply for admission to the BAM by December 15 of their junior year.

### Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only 6 credits may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

If you are interested in the BAM degree program, please contact the theatre graduate program for more information.

### Course Requirements

Students must complete the following in addition to the BA requirements.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| THDN 5010 | Introduction to Performance Studies | 3 |
| or THTR 5011 | Seminar: Theory and Criticism | |
| THDN 6009 | Research and Teaching in Theatre, Dance and Performance Studies | 2 |
| **Electives** | | **6** |
| THTR 6011 | Theatre and Performance Histories 1 | |
| THTR 6041 | Theatre and Performance Histories 2 | |
| **Master's Thesis** [1] | | |
| THTR 6959 | Master's Thesis | 4 |
| **Graduate Electives** [2] | | **6** |
| **Total Credit Hours** | | **21** |

1. The master's thesis is optional. Students choosing the thesis plan complete 4–6 thesis hours. Students choosing the non-thesis plan take additional electives.
2. Thirty credit hours are required to complete the Master of Arts degree. BAM students transfer six undergraduate credits toward their graduate degree.

For more information, visit the department's BAM in Theatre and Performance Studies (https://www.colorado.edu/theatredance/theatre/undergraduates/bam-theatre/) webpage.

# Theatre - Bachelor of Fine Arts (BFA)

The BFA degree concentrations in theatre offer pre-professional training to highly-motivated students aiming at professional careers in certain disciplines. The BFA student will pursue one of three concentration areas: acting, design/technology/management or musical theatre. Students may elect to further focus within one of these degree tracks.

# Requirements

## Admission Requirements

Admission is based on talent, academic record, motivation, auditions and/or interviews. Enrollment is limited to ensure individual attention necessary for effective training. Interested students should identify themselves as early as possible. Contact the department for information regarding how to apply to the BFA degree concentrations.

Formal application to the:

- musical theatre concentration should be made concurrently with an application to the university. Auditions and interviews will be held at the regular spring auditions for the College of Music.
- acting concentration should be made at the beginning of the spring semester.
- design/technology/management concentrations should be made at the beginning of the spring semester.

Students are subject to the requirements in place at the time of admission to the BFA.

## General Degree Requirements

The College of Arts & Sciences counts a maximum of 67 credit hours of THTR credits toward the total credit hours required for graduation. A grade of C- or higher is needed in all required courses to fulfill the requirements of the BFA degree, as well as an overall Theatre GPA of 2.00.

In addition to the specific course requirements listed for completing a BFA degree in Acting and Design/Technology/Management concentrations, students must fulfill all requirements for the BA degree in Theatre.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BFA in theatre students should meet the following requirements:

- By Dec. 1 of the year before the first semester, declare in writing the intention to audition for the BFA in Musical Theatre.
- During the second semester (acting concentration) or third semester (design/technology/management concentrations), complete the audition and interview.
- Immediately upon acceptance into a BFA concentration declare the major.
- Once accepted into a BFA concentration, meet with a departmental advisor to confirm in writing specific courses to be completed within the remaining semesters of study.

## Concentrations

### Acting Concentration

The BFA in acting begins as early as the sophomore year. Interested students will begin on the CU Boulder campus as BA students taking a series of preparatory courses. This allows students to begin their training without blindly committing to an intensive curricular path.

As students are eligible to audition for all CU performance opportunities when they arrive on campus, this timeline also gives students and faculty the chance to work together before making a major commitment.

Auditions to transition from BA to BFA in acting generally take place around spring break. The BFA in acting curriculum is designed to be completed in 6 semesters, allowing a student to graduate in 4 years. For students on an alternate timeline (such as transfer students) the curriculum can be completed in as few as 4 semesters.

Visit the Theatre & Dance website (https://www.colorado.edu/theatredance/theatre/undergraduates/theatre-ba-bfa/bfa-acting/) for more information on the BFA in acting.

### Design/Technology/Management Concentrations

In addition to the College of Arts and Sciences core requirements, students pursuing a BFA in design, technology or management must complete up to 67 credits in theatre and an additional 15 credits in other disciplines. Students who choose this concentration must elect one primary emphasis (design, technology or management) but may have opportunities to explore other emphases.

The BFA in design/technology/management begins as early as the sophomore year. Interested students will begin on the CU Boulder campus as BA students taking a series of preparatory courses. This allows students to begin their training without blindly committing to an intensive curricular path.

As students are eligible to be involved in all CU performance opportunities when they arrive on campus, this timeline also gives students and faculty the chance to work together before making a major commitment.

Interviews to transition from BA to BFA in design/technology/management generally take place around spring break. The BFA in design/technology/management curriculum is designed to be completed in 6 semesters, allowing a student to graduate in 4 years. For students on an alternate timeline (such as transfer students) the curriculum can be completed in as few as 4 semesters.

For more information on the BFA design/technology/management program, visit the Theatre & Dance (https://www.colorado.edu/theatredance/theatre/undergraduates/theatre-ba-bfa/bfa-design-technology-management/) website.

### Musical Theatre Concentration

The BFA in musical theatre begins in the freshman year. Interested students will submit pre-screen audition materials during the fall of their high school senior year. A selection of students from the pre-screen will be invited to audition in person during the winter of their high school senior year (generally late January, early February). Invitations to the program will be made around spring break.

For application timeline, required materials and submission information for the BFA in Musical Theatre, visit the Theatre & Dance (https://www.colorado.edu/theatredance/theatre/undergraduates/theatre-ba-bfa/bfa-musical-theatre/) website.

In addition to coursework, all students are eligible to be involved in all CU performance opportunities when they arrive on campus.

# Four-Year Plans of Study

Through the required coursework for all concentrations in the BFA in Theatre, students will fulfill all 12 credits of the Arts & Humanities area of the Gen Ed Distribution Requirement.

## Acting Concentration

| Year One | | |
|---|---|---|
| **Fall Semester** | | **Credit Hours** |
| THTR 1003 | Acting 1 | 3 |
| THTR 1019 | Script Laboratory: Text Analysis and Practice for the Theatre | 3 |
| THTR 1050 | Introduction to Stagecraft and Design | 2 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |

| | | |
|---|---|---|
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| THTR 2021 | Global Theatre 2: Contemp Relevance and Resonance Forms of Pre-Colonial Modern Theatre and Performan | 3 |
| THTR 3035 | Production Practicum (Run Crew) | 1 |
| Dance Electives | | 2 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| | **Credit Hours** | **12** |
| **Year Two** | | |
| **Fall Semester** | | |
| THTR 1011 | Global Theatre 1: Live Performance to Shakespeare | 3 |
| THTR 2043 | Voice and Movement for the Stage | 3 |
| THTR 2050 | Technical Theatre for Performance | 2 |
| THTR 3013 | Studio 1: Building a Character | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| | **Credit Hours** | **18** |
| **Spring Semester** | | |
| THTR 3023 | Studio 2: Creating a Role | 3 |
| THTR 3033 | Production Research and Practicum: Acting | 1 |
| THTR 3043 | Advanced Voice for the Stage | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Year Three** | | |
| **Fall Semester** | | |
| THTR 3033 | Production Research and Practicum: Acting | 1-3 |
| THTR 4033 | Advanced Movement for the Stage | 3 |
| THTR 4013 | Studio 3: Acting Shakespeare | 3 |
| THTR 4061 | Directing | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| | **Credit Hours** | **13-15** |
| **Spring Semester** | | |
| THTR 3149 | Professional Orientation: Exploring Professional Potentials for THTR and DNCE Majors | 2 |
| THTR 4023 | Studio 4: Playing with Styles | 3 |
| THTR 4063 | Audition Techniques | 3 |
| ENGL 3563 | Shakespeare in Dialogue (Or another Shakespeare Course in ENGL) | 3 |
| Dance Elective | | 1 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **18** |
| **Year Four** | | |
| **Fall Semester** | | |
| THTR 4149 | Theatre Internship | 1 |
| THTR 4193 | Studio 5: Senior Project [1] | 3 |
| THTR Elective | | 3 |
| Dramatic Literature/Global Arts & Literature | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| THTR 4021 | Global Theatre and Performance 2: Contesting the Status Quo | 3 |
| THTR Electives | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **122-124** |

[1] Students may take 1-3 credits of THTR 4117 as credit for THTR 4193.

## Design/Technology/Management Concentration

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| THTR 1019 | Script Laboratory: Text Analysis and Practice for the Theatre | 3 |
| THTR 1050 | Introduction to Stagecraft and Design | 3 |
| THTR 3035 | Production Practicum | 1 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| THTR 1003 | Acting 1 | 3 |
| THTR 2050 | Technical Theatre for Performance | 2 |
| THTR 2105 | Introduction to Performance Design | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **14** |
| **Year Two** | | |
| **Fall Semester** | | |
| THTR 2021 | Global Theatre 2: Contemp Relevance and Resonance Forms of Pre-Colonial Modern Theatre and Performan | 3 |
| THTR Design 1 | | 3 |
| THTR 3035 | Production Practicum | 1 |
| THTR 4555 | Production Studio | 1 |
| THTR 4175 or THTR 4061 | Conceptualization or Directing | 3 |

| | | |
|---|---|---|
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| THTR Electives in Tech/Graphics/Design | | 3 |
| THTR 3149 | Professional Orientation: Exploring Professional Potentials for THTR and DNCE Majors | 1 |
| THTR 4075 | Advanced Technical Projects | 1 |
| THTR 4555 | Production Studio | 1 |
| Gen. Ed. Distribution course (example: Social Sciences/Global Perspective) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences) | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| THTR Electives in Tech/Graphics/Design | | 3 |
| THTR 4555 | Production Studio | 1 |
| THTR 4075 | Advanced Technical Projects | 1 |
| THTR 3085 | Fashion, Society and Decor | 3 |
| THTR 4149 | Theatre Internship | 1 |
| Gen Ed Distribution/Diversity Course (eg Natural Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| THTR Electives in Tech/Graphics/Design | | 3 |
| THTR 4075 | Advanced Technical Projects | 1 |
| THTR 4021 or THTR 3011 | Global Theatre and Performance 2: Contesting the Status Quo or American Musical Theatre History | 3 |
| Gen. Ed. Distribution course (example: Social Sciences)- Upper Division | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Upper Division Elective | | 3 |
| | **Credit Hours** | **16** |
| **Year Four** | | |
| **Fall Semester** | | |
| THTR 4085 | Theatre Management | 3 |
| THTR 4075 | Advanced Technical Projects | 1 |
| THTR Second Design 1 | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Upper Division Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| THTR Electives in Tech/Graphics/Design | | 3 |
| THTR 4075 | Advanced Technical Projects | 1 |
| DNCE Electives | | 3 |
| Gen Ed Distribution Course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **13** |
| | **Total Credit Hours** | **120** |

## Musical Theatre Concentration

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| THTR 1117 | Musical Theatre Studio I | 2 |
| MUSC 1101 | Semester 1 Theory | 2 |
| MUSC 1121 | Aural Skills Lab, Semester 1 | 1 |
| PMUS 1105 or MUEL 1115 | Keyboard Musicianship 1 or Piano Class 1 | 1 |
| PMUS 1726 | Voice | 2 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/US Perspective) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| MUEL 1081 | Basic Music Theory (if needed) | 3 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| THTR 1217 | Musical Theatre Lab 2 | 2 |
| THTR 3035 | Production Practicum (Run Crew) | 1 |
| MUSC 1111 | Semester 2 Theory | 2 |
| MUSC 1131 | Aural Skills Lab, Semester 2 | 1 |
| PMUS 1205 or MUEL 1125 | Keyboard-Musicianship 2 or Piano Class II | 1 |
| PMUS 1726 | Voice | 2 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| | **Credit Hours** | **12** |
| **Year Two** | | |
| **Fall Semester** | | |
| THTR 1050 | Introduction to Stagecraft and Design | 2 |
| THTR 2043 | Voice and Movement for the Stage | 3 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 2726 | Voice | 2 |
| Dance Elective | | 2 |
| Gen. Ed. Distribution course (Natural Sciences and Lab) | | 4 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| PMUS 2117 | Musical Theatre Studio Class III | 2 |
| PMUS 2726 | Voice | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **14** |
| **Year Three** | | |
| **Fall Semester** | | |
| THTR 2050 | Technical Theatre for Performance | 2 |
| THTR 3033 | Production Research and Practicum: Acting | 1-3 |
| Music History | | 3 |

| | | |
|---|---|---|
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Elective/MAPS | | 3 |
| | **Credit Hours** | **15-17** |
| **Spring Semester** | | |
| PMUS 3117 | Musical Theatre Studio Class IV | 2 |
| THTR 3011 | American Musical Theatre History | 3 |
| THTR 3149 | Professional Orientation: Exploring Professional Potentials for THTR and DNCE Majors | 2 |
| THTR 4039 | Musical Theatre Repertory | 3 |
| Dance Elective | | 2 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **18** |
| **Year Four** | | |
| **Fall Semester** | | |
| PMUS 4137 | Opera Theatre 1 | 1 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **13** |
| **Spring Semester** | | |
| PMUS 4147 | Opera Theatre 2 | 1 |
| THTR 4117 | Musical Theatre Lab 5: Senior Showcase Experience | 1-3 |
| THTR 4149 | Theatre Internship | 1 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15-17** |
| | **Total Credit Hours** | **120-124** |

# Dance - Minor

The minor in dance is designed to provide the student with a broad overview of dance as an art form.

Our curriculum is designed to use dance and the body to challenge assumptions about practices, values, technology, sustainability and personal and global positionality. Our program scaffolds entrepreneurial approaches to art-making based in personal initiative, curiosity and versatility. Required courses introduce students to basic elements of dance while the remaining plan is created by the student in conjunction with their primary advisor. If you have specific dance questions, please contact the director of dance or the undergraduate director of dance.

The rules of the College of Arts and Sciences apply in designing each student's program.

## Requirements

Declaration of a dance minor is open to any undergraduate student enrolled at CU Boulder, regardless of college or school affiliation.

- A minimum of 18 credit hours must be taken in DNCE courses,[1] including a minimum of 9 upper-division credit hours.[2]
- All coursework applied to the dance minor must be completed with a grade of C- or better. No pass/fail work may be applied. The GPA in all minor coursework must equal 2.00 (C) or greater.
- Students will be allowed to apply no more than 9 credit hours (including 6 upper-division) of transfer work toward a minor.
- Coursework applied toward minor requirements may also be applied toward Gen Ed requirements.

As long as they meet the above requirements, students are free to choose DNCE courses that suit their interests.

1 Up to six credits from the following THTR courses may be used in place of the required DNCE courses: THTR 1003 Acting 1, THTR 3055 Stage Lighting Design 1, THTR 3075 Sound Design, THTR 4039 Musical Theatre Repertory, THTR 4073 Performing Voices of Women, or THTR 4555 Production Studio.

2 Some upper-division DNCE courses may require prerequisites. DNCE classes with 800–900 sections are controlled enrollment sections and require an audition or instructor consent for enrollment.

# Theatre - Minor

The minor in theatre is designed to provide students with a broad overview of theatre. Students may declare a theatre minor by contacting their advisor through the Academic Advising Center (https://www.colorado.edu/advising/).

## Requirements

Requirements include a minimum of 18 credit hours or THTR or THDN courses, 9 credit hours of which must be upper-division. Students select courses from the theatre curriculum based on their interests and course availability.

All coursework applied to the minor must be completed with a grade of C- or better (no pass/fail work may be applied). The GPA for all coursework taken in the minor department must be equal to 2.00 (C) or higher.

Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward the theatre minor.

Students may also count up to 4 credit hours of DNCE courses to apply toward the theatre minor.

# Hip-Hop Studies - Certificate

The certificate in hip-hop studies is is designed to emphasize both the theory and practice of hip-hop. Classes immerse students in the culture of hip-hop, as well as develop the critical thinking skills and theoretical context required for understanding hip-hop's socio-historical development and political efficacy.

Hip-hop, which arose in youth communities of color in the 1970s amid political abandonment and economic devastation, has become the most important cultural movement of the last half-century. Practiced in nearly every corner of the globe, it is now one of the most important

through-lines in human culture. To understand hip-hop is to understand the world in which we live. Inclusive excellence is the bedrock of Hip-hop; membership in its community is not defined by subscription to a particular place or race but rather to its unique ethos, which privileges virtuosic innovation as much as historic and self knowledge.

Hip-hop is fundamentally an interdisciplinary form. It does not live in one field alone. Rather, it is a dialogue that occurs across dance, music, visual and verbal arts, as well as history and theory. While the Hip-hop Studies Undergraduate Certificate is housed in the Department of Theatre & Dance, courses are available in other departments, such as History, English, Sociology and Ethnic Studies. Organized in this way, with offerings from several campus departments, the consolidated certificate program is the best way to give students a sense of the richness, complexity, and vitality of Hip-hop.

The certificate in Hip-hop Studies is designed to be an enriching, interdisciplinary supplement to other areas of study. It provides a broad base, which can serve as an entry point to more focused study and practice. While offering rich and rewarding experiences, the undergraduate certificate is not a professional endorsement from Rennie Harris or Larry Southall of the student's skills. Rather, it develops students' appreciation and respect for one of the most important American cultural forms to have emerged in the last half-century.

# Requirements

## Prerequisites

All currently matriculated undergraduate students at CU Boulder are eligible for admission to the certificate program. Students must submit a Statement of Interest form, found on the Hip-Hop Studies Certificate Website (https://www.colorado.edu/theatredance/theatre/hip-hop-studies-certificate/), to request enrollment in the certificate.

## Program Requirements

To earn this certificate, students must complete a total of 18 undergraduate credit hours comprised of both practice-based movement courses and writing/research-based theory courses.

Students must complete a total of 8 credit hours in both the required core theory courses as well as a movement course option as listed below. Students select the remaining 10 credits from an array of pre-approved courses offered on a regular basis in the departments of Theatre & Dance, History, Sociology, Ethnic Studies and English. Additionally, nine of the certificate's 18 credits must be awarded in upper-division courses and no more than nine can come from any one department. Students may petition to have special topics courses in these and other departments approved by their hip-hop studies advisor.

To earn the certificate, students must earn above a grade of C- in each course and meet the undergraduate school's overall GPA requirement.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| DNCE 4047 | Hip-Hop Dance History | 3 |
| ETHN 3212 | Introduction to Hip Hop Studies | 3 |
| *Movement Credits* [1] | | *2* |
| Choose one: | | |
| DNCE 1301 | Hip-Hop Dance Technique 1 | |
| DNCE 3301 | Hip-Hop Dance Technique 2 | |
| DNCE 3041 | Major Technique (Hip-hop section) | |
| DNCE 4038 | Dance Repertory (Hip-hop section) | |
| **Elective Courses** | | **10** |
| DNCE 1027 | Dance in Cultural Perception and Expression | |
| ENGL 1800 | American Ethnic Literatures | |
| ENGL 2021 | Introductory Poetry Workshop | |
| ENGL 2102 | Literary Analysis | |
| ENGL 2112 | Introduction to Literary Theory | |
| ENGL 4039 | Capstone in Literary Studies (Certain sub-topics) | |
| ETHN 1022 | Introduction to Africana Studies | |
| ETHN 2001 | Foundations of Comparative Ethnic Studies: Race, Gender and Culture(s) | |
| ETHN 2232 | Contemporary African American Social Movements | |
| ETHN 2304 | Introduction to Social Justice | |
| ETHN 2432/ HIST 2437 | African American History | |
| ETHN 3692 | African Am Music: Fr Spirituals and the Blues to Rap/Hip Hop Soul | |
| ETHN 4102 | Special Topics in Africana Studies (Certain sub-topics) | |
| ETHN 4552 | The Harlem Renaissance: Fr Black Wmn's Club Mvmnt to Hip Hop | |
| HIST 4437 | African American History, 1619--1865 | |
| HIST 4546 | Popular Culture in the Modern United States | |
| SOCY 3161 | Global Perspectives on Race and Ethnicity | |
| SOCY 3171 | Whiteness Studies | |
| SOCY 4071 | Social Inequalities and Social Change | |
| THTR 4029 | Performance and Community Engagement | |
| **Total Credit Hours** | | **18** |

[1] Any additional courses taken in this category can count toward the credits required to complete the certificate.

# Western American Studies

The Center of the American West offers an 18-credit undergraduate certificate program in Western American studies for students who have an intellectual commitment to any of a broad range of issues and aspects of the American West, including history and literature, culture and society and economic and environmental challenges facing western communities. Courses involve students in an exploration of the past, an appreciation for traditional and contemporary stories and art in the region and an understanding of western landscapes, ecosystems and the factors that affect them. For more information, visit the department's undergraduate certificate program (https://www.colorado.edu/center/west/academics/undergraduate-certificate-program/) webpage.

**Course code for this program is CAMW.**

## Certificate

- Western American Studies - Certificate (p. 627)

## Courses

**CAMW 2001 (3) The American West**
Students tour the cultural, social, and natural features of the American West, based on readings and presentations by guest speakers from the CU faculty and from important professions and positions in the West. Designed as the foundation course in the Western American Studies certificate program.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomores).
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**CAMW 3939 (1-3) Center of the American West Internship**
Work for public and private organizations on projects that enhance the understanding of various Western American topics and issues (environmental, cultural, public policy, etc.), and which foster students' development as community leaders working for a sustainable West.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite CAMW 2001.

**CAMW 4840 (1-4) Independent Study: The American West**
Independent Study for Western American Studies certificate program
**Requisites:** Requires prerequisite course of CAMW 2001 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior).

# Western American Studies - Certificate

The certificate in Western American studies offers students at CU Boulder a unique regional studies curriculum. The interdisciplinary format allows an exploration of the region's characteristic and evolving issues: from its flora and fauna to its history and literature; and from the political, social, cultural, economic and environmental concerns facing Westerners to the landscapes and ecosystems that they inhabit.

The Center of the American West believes in community and in helping students feel more at home within the larger university. As such, the center hosts gatherings each semester where students and faculty can get to know each other as well as various noteworthy featured guests in a more social, off–campus environment. Students enrolled in the program are also eligible to apply for the Beardsley Family Scholarship.

## Requirements

The certificate requires 18 credit hours (9 of which must be at the upper-division level and 9 of which must be outside the student's major). It includes an introductory course and a capstone course, and it allows students to choose the remaining four classes from a variety of academic areas. In this way, students are able to piece together a survey of the American West that aligns with their own unique interests. No more than 6 credits transferred from another institution may apply to the certificate.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CAMW 2001 | The American West | 3 |
| CAMW 4840 | Independent Study: The American West | 3 |
| **Electives** | | |
| Choose one course from each of three academic areas: Arts & Humanities, Natural Sciences and Social Sciences, as approved by the center. | | 9 |
| Choose one course from a variety of academic areas, as approved by the center. | | 3 |
| **Total Credit Hours** | | **18** |

# Western Civilization Studies

The Benson Center for the Study of Western Civilization offers an undergraduate certificate program, Foundations of Western Civilization, for students interested in a rigorous grounding in Western culture. The certificate promotes critical reflection and academic research on the traditions and issues that characterize Western civilization through the study of Western culture, science and government in their ancient, medieval and modern forms. It helps students understand their role as citizens in a nation founded on the ancient ideals of consensual rule and republican government.

**Course code for this program is CWCV.**

## Certificate

- Foundations of Western Civilization - Certificate (p. 628)

## Courses

**CWCV 2000 (3) The Western Tradition**
Encourages a historical and critical investigation into the formative influences on what is often called Western culture, including religious, political, social and economic factors, and contemporary interpretations and critiques of these developments and concepts. Designed as the foundation course for the Center for Western Civilization.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arts Sciences Special Courses

**CWCV 2010 (3) Topics in Western Civilization**
Offers in-depth consideration of one or more foundational traditions in Western civilization.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.

**CWCV 2840 (1-3) Independent Study**
Requires sophomore standing.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).

**CWCV 3840 (1-3) Independent Study**
Requires junior standing.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-86 credits (Junior).

**CWCV 4000 (3) Foundations of Western Civilization**
Offers in-depth consideration of one or more foundational traditions in Western civilization.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Arts Sciences Special Courses

**CWCV 4840 (1-3) Independent Study**
Requires senior standing.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior).

# Foundations of Western Civilization - Certificate

Our undergraduate certificate program is for students interested in a rigorous grounding in Western culture, reflecting on its traditions and values, and the certificate itself is the equivalent of an inter-disciplinary minor. The program allows students to study Western culture, science and government in their ancient, medieval and modern forms. The curriculum embraces over 30 courses taught by faculty in departments that include art history, classics, English, German, history, humanities, Italian, philosophy, political science and religious studies.

For more information on the program, requirements and current course offerings, visit the Benson Center's Certificate in Western Civilization webpage or contact the Director.

## Requirements

The interdisciplinary curriculum of over 30 courses is taught by faculty in departments that include: classics, English, history, philosophy, religious studies, and Germanic languages and literatures.

The certificate requires the completion with a grade of C- or better of eight courses (24 credit hours), of which 12 credit hours must be at the upper-division level. Up to three courses (or 9 credit hours) may come from the student's major.

In addition, students must fulfill the requirements for a BA in a major in a school or college at the University of Colorado Boulder.

### Required Courses and Credits

The required courses are offered each year. Students will enroll in one course from each cluster (9 hours total): literature, history and science.

The elective courses are offered regularly, but not each semester. Students are advised to check with the offering department regarding availability. Some courses may have prerequisites. Additional courses may be petitioned for inclusion in meeting certificate requirements through the center director.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| *History* | | *3* |
| Select one course from the following: | | |
| HUMN 1120 | Introduction to Humanities: Literature 2 | |
| HIST 1011 | Greeks, Romans, Kings & Crusaders: European History to 1600 | |
| HIST 1012 | Empire, Revolution and Global War: European History Since 1600 | |
| HIST/CLAS 1051 | The World of the Ancient Greeks | |
| HIST/CLAS 1061 | The Rise and Fall of Ancient Rome | |
| CWCV 2000 | The Western Tradition | |
| *Science* | | *3* |
| Select one course from the following: | | |
| PHIL 1400 | Philosophy and the Sciences | |
| PHIL 3410 | History of Science: Ancients to Newton | |
| PHIL 3430 | History of Science: Newton to Einstein | |
| CLAS 2020 | Science in the Ancient World | |
| *Literature* | | *3* |
| Select one course from the following: | | |
| HUMN 1110 | Introduction to Humanities: Literature 1 | |
| ENGL 2503 | Medieval and Renaissance | |
| ENGL 3000 | Shakespeare for Nonmajors | |
| ENGL 3563 | Shakespeare in Dialogue | |
| ENGL 3573 | Shakespeare in Performance | |
| CLAS 1100 | Greek and Roman Mythology | |
| CLAS 1120 | Power and Passion in Ancient Rome | |
| **Electives** | | **15** |
| *Art* | | |
| ARTH 3019 | Pompeii and the Cities of Vesuvius | |
| ARTH 3079 | Medieval Art Survey | |
| *Literature* | | |
| SPAN 4150 | Major Works and Trends in Literature and Culture in Spain Up to 1700 | |
| SPAN 4620 | Cervantes | |
| ITAL 3160 | Main Currents of Italian Culture and Literature 1 | |
| HUMN 3310 | The Bible as Literature | |
| HUMN 3505 | The Enlightenment: Tolerance and Emancipation | |
| HUMN 3240 | Tragedy | |
| HUMN 4000 | The Question of Romanticism | |
| HUMN 4110 | Greek and Roman Epic | |
| HUMN 4120 | Greek and Roman Tragedy | |
| HUMN 4130 | Greek and Roman Comedy | |
| HUMN 4140 | What the Hell?: Dante's Divine Comedy and the Meaning of Life | |
| HUMN 4150 | Boccaccio's Decameron: Tales of Sex and Death in the Middle Ages | |
| GRMN 3502 | The Creation of the Modern Individual in German Culture | |
| FREN 3110 | Main Currents of French Literature 1 | |
| FREN 4350 | French Enlightenment | |
| ENGL 3553 | Chaucer and the Invention of English Literature | |
| ENGL 3583 | Milton's Worlds | |
| ENGL 4113 | Medieval Worlds | |
| *History* | | |
| HIST 4021 | Athens and Greek Democracy | |
| HIST 4031 | Alexander the Great and the Rise of Macedonia | |

| | |
|---|---|
| HIST 4061 | Twilight of Antiquity |
| HIST 4081 | The Roman Republic |
| HIST 4091 | The Roman Empire |
| HIST 4122 | |
| HIST 4212 | The Age of Religious Wars: Reformation Europe,1500-1648 |
| HIST 4232 | From Revolt to Revolution: Europe in an Age of Global Enlightenment, 1648-1789 |
| HIST 4320 | The History of the Mediterranean, 600 CE-1600 CE |
| HIST 4454 | |
| HIST 4511 | Worlds Transformed: Late Antiquity and the Early Middle Ages in Europe and the Mediterranean |
| HIST 4521 | Europe in the High Middle Ages (1000-1400 A.D.) |
| *Ideas* | |
| RLST 3000 | Christian Traditions |
| RLST 3100 | Judaism |
| PHIL 3000 | History of Ancient Philosophy |
| PHIL 3010 | History of Modern Philosophy |
| PHIL 4030 | Medieval Philosophy |
| GRMN 3505 | The Enlightenment: Tolerance and Emancipation |
| GRMN 4502 | Nietzsche: Literature and Values |
| CWCV 4000 | Foundations of Western Civilization |
| *Politics* | |
| PSCI 2004 | Survey of Western Political Thought |
| HIST/CLAS 4041/ PHIL 4210 | Classical Greek Political Thought |
| **Total Credit Hours** | **24** |

# Women and Gender Studies

The Department of Women and Gender Studies offers a Bachelor of Arts degree, a minor, an undergraduate certificate in global gender and sexuality studies, a#graduate certificate#for students enrolled in another disciplinary master's or doctoral degree program and a new graduate Master of Arts degree in Gender and Sexuality Studies. The interdisciplinary field of women and gender studies offers students rigorous and flexible programs of study that examine women, gender and sexuality at the intersections of race, class, ability, nation and empire, among other variables. Students will gain foundational knowledge and skills in feminist, queer and trans theory and methods, while developing critical understanding of the varying relationships between feminist, queer and trans movements and other movements for social justice across the globe. Areas of inquiry include but are not limited to:#gender/sex systems across cultures, historical periods and epistemological traditions; gender and sexuality in literature, the arts and popular culture; legal and public policy issues around gender and sexuality; women's participation in social and cultural production; transnational and anticolonial feminisms; feminist, queer and transgender theories; and LGBTQI politics and histories.

The department is home to one of the university's most diverse faculty, known for their groundbreaking contributions to feminist theories, social justice, and intersectional research and creative work. The department houses a reading library and organizes talks, workshops, and other cultural and educational events.

Many students combine their women and gender studies degree with other departmental offerings across campus as a second major, minor or certificate. Students have coupled the critical thinking skills they learn in women and gender studies with additional fields of study from the College of Arts and Sciences or from other colleges or schools at CU Boulder. For example, a graduate of the department who also completes studies in biology may attend medical school to specialize in women's health; by combining a women and gender studies degree with a focus in business, a graduate could better understand how gender affects the workplace. Students have gone on to careers in fields such as law, medicine, government, public health, social work, teaching, public policy, counseling, advocacy, media, public relations, academia, politics, fundraising, small business development, librarianship and arts administration, among others.

For more information, visit theDepartment of Women and Gender Studies#website.

**Course code for this program is WGST.**

## Bachelor's Degree

- Women and Gender Studies - Bachelor of Arts (BA) (p. 638)

## Minors

- Queer and Trans Studies - Minor (p. 645)
- Women and Gender Studies - Minor (p. 647)

## Certificate

- Global Gender and Sexuality Studies - Certificate (p. 649)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Bayard de Volo, Lorraine M. (https://experts.colorado.edu/display/fisid_143611/)
Professor; PhD, University of Michigan Ann Arbor

Buffington, Robert Marshall (https://experts.colorado.edu/display/fisid_144975/)
Professor Emeritus; PhD, University of Arizona

David, Emmanuel A. (https://experts.colorado.edu/display/fisid_146542/)
Associate Professor, Associate Chair; PhD, University of Colorado Boulder

Gómez, Leila Gabriela (https://experts.colorado.edu/display/fisid_133563/)
Professor; PhD, Johns Hopkins University

Jacobs, Janet L. (https://experts.colorado.edu/display/fisid_100744/)
Professor; PhD, University of Colorado Boulder

Mehta, Samira (https://experts.colorado.edu/display/fisid_165972/)
Associate Professor; PhD, Emory University; MDiv, Harvard University

Misri, Deepti (https://experts.colorado.edu/display/fisid_146428/)
Associate Professor; PhD, University of Illinois at Urbana–Champaign

Montoya, Celeste (https://experts.colorado.edu/display/fisid_144862/)
Associate Professor; PhD, Washington University

Moore, A. Nathan (https://experts.colorado.edu/display/fisid_171850/)
Assistant Professor; Ph.D., University of Texas at Austin

Pois, Anne Marie
Senior Instructor Emerita

Potter, Hillary A. (https://experts.colorado.edu/display/fisid_124938/)
Associate Professor; PhD, University of Colorado Boulder

Ranjbar, A. Marie (https://experts.colorado.edu/display/fisid_165964/)
Assistant Professor; PhD, Pennsylvania State University

Soares, Kristie (https://experts.colorado.edu/display/fisid_147081/)
Assistant Professor; PhD, University of California, Santa Barbara

Wyrod, Robert (https://experts.colorado.edu/display/fisid_156319/)
Associate Professor; PhD, University of Chicago

# Courses

**WGST 1006 (3) The Social Construction of Sexuality**
Discusses the social determinants of sexuality. Analyzes the economic, psychological and cultural influences on human sexuality. Interactional perspective of human sexuality is presented.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 1006
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Sociology

**WGST 1016 (3) Sex, Gender, and Society 1**
Examines status and power differences between the sexes at individual and societal levels. Emphasizes historical context of gender roles and status, reviews major theories of gender stratification.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 1016
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Sociology

**WGST 1250 (3) Introduction to World Literature by Women**
This course considers how literature represents gendered experiences across multiple countries and continents. Students will read fiction and poetry by women from South Asia, East Asia, Africa, Europe, and the Americas, that address questions of sexuality, marriage, and family, politics, labor, and justice at the intersections of gender, race, and nation.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 1250
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: English

**WGST 1270 (3) Introduction to American Literature by Women**
This course investigates how literature by women has shaped the United States over time, from Indigenous authors, to abolitionists, to suffragists, to feminists of various waves. With attention to intersections between class, race, and sexual orientation, students will consider what it has meant and still means to be a woman writer in the United States and will explore how women have engaged, subverted, and resisted ideas about gender.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 1270
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: English

**WGST 2000 (3) Introduction to US Gender, Race and Sexuality Studies**
Introduces students to the field of Women and Gender Studies. Examines gender issues in the United States from interdisciplinary, intersectional and transnational feminist perspectives across a range of US cultural contexts. Covers such topics as gender identity and performance, sexuality, reproductive justice, gendered violence, work and labor, imperialism and war, and the environment.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
MAPS Course: Social Science

**WGST 2020 (3) Femininities, Masculinities, Alternatives**
Examines the construction of gender and sexual identities in the modern world. Focuses on the role of social attitudes and material circumstances in shaping how individuals understand themselves and are understood by others, as well as the actions they take to accept, negotiate and resist these pressures.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**WGST 2030 (3) Introduction to Lesbian, Gay, Bisexual, and Transgender Studies**
Investigates the social and historical meanings of racial, gender, and sexual identities and their relationship to contemporary lesbian, bisexual, gay and transgender communities.
**Equivalent - Duplicate Degree Credit Not Granted:** LGBT 2000
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: LGBT Studies

**WGST 2050 (3) Gender, Sexuality, and Popular Culture**
Explores diverse cultural forms such as film, popular fiction and non-fiction, music videos, public art, websites, blogs and zines which are shaped by, and in turn shape, popular understandings of gender at the intersections of race, class, ability, religion, nation and imperialism.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**WGST 2100 (3) Gender and Sexuality in Ancient Greece**
Examines evidence of art, archaeology and literature of Greek antiquity from a contemporary feminist point of view. Focuses on women's roles in art, literature and daily life. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 2100
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Classics

**WGST 2110 (3) Gender and Sexuality in Ancient Rome**
Uses art, archaeology, and literature to study, from a contemporary feminist point of view, the status of women in works of Roman art and literature, the development of attitudes expressed toward them, and their daily life. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 2110
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Classics

**WGST 2200 (3) Women, Gender, Literature, and the Arts**
Introduces the contributions of women to literature and the performing arts from a historical and cross-cultural perspective. Emphasizes representations of gender and sexuality, as well as the cultural contexts in which artworks are created. Stresses issues of structure, content, and style, along with the acquisition of basic techniques of literary and arts criticism.
**Recommended:** Prerequisite WGST 2000.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**WGST 2290 (3) Philosophy and Gender**
Analyzes critically the concepts of sex, gender, and their intersection with other aspects of identity, exploring how these impact the extent to which people face injustice because of their gender.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 2290
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Philosophy

**WGST 2500 (3) Gender, Race, Sex and the Body**
Studies the body as a site for the production of social difference, meaning and inequality. Focuses on the body as a conduit for political, social, and ethical dilemmas and conflicts. Examines a selection of these issues to help students understand what a body is, how bodily difference is constructed, and what this constructed difference signifies.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 2600 (3) Introduction to Global Gender, Race and Sexuality Studies**
Introduces students to the field of Women and Gender Studies. Examines gender issues globally from interdisciplinary, intersectional and transnational feminist perspectives across a range of global cultural contexts. Covers such topics as transnational feminism, colonialism and imperialism, indigenous feminisms, religion and politics, immigration and asylum, and climate change.
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**WGST 2700 (3) Psychology of Gender and Sexuality**
Examines psychological research on gender and sexuality as they intersect with race, class and other social categories. Points of emphasis include differences in cognition, attitudes, personality and social behavior. Conceptual themes include research methodologies, implicit and explicit attitudes, stigma and stereotypes. These elucidate such areas as close relationships, leadership, career success and mental health and happiness.
**Recommended:** Prerequisite WGST 2000 or PSYC 1001.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**WGST 2800 (3) Women and Religion**
Examines roles of women in a variety of religious traditions including Judaism, Christianity, Hinduism, Buddhism and goddess traditions.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 2800
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Religioius Studies

**WGST 2850 (3) Sex, Religion, and Politics in US Healthcare**
Examines the roles of religion, gender, and sexuality in the politics of healthcare in the United States. Topics may include sexual health and education; debates over health and sexuality during the HIV/AIDS crisis; the expansion and contraction of access to birth control; public debates over abortion; debates over religion, politics, and healthcare for transgender people; and histories of religion, health, and race.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 2850
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WGST 3012 (3) Gender and Development**
Provides a sociological perspective on gender, globalization, and economic development in the Global South. Examines a variety of topics, including feminist theories of development; poverty and inequality; women¿s work in the context of globalization; and women¿s activism and feminism(s).
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 3012
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 3001.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sociology
Departmental Category: Asia Content

**WGST 3016 (3) Marriage and the Family in the United States**
Comparative and historical examination of marriage and the family within the U.S. Emphasizes changing family roles and family structures. Also considers alternatives to the nuclear family and traditional marriage exploring new definitions of family.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 3016
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 3001.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sociology

**WGST 3020 (3) Feminist Methods of Inquiry and Praxis**
Examines various research methods and approaches in the field of feminist studies. Students will gain practical experience to be able to write a proposal for a significant research project, informed by course readings and discussions.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3044 (3) Race, Class, Gender, and Crime**
Overview of race, class, gender and ethnicity issues in offending, victimization and processing by the justice system. Examines women and people of color employed in the justice system.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 3044 and SOCY 3044
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 1001 or SOCY 1004 or SOCY 1021 or SOCY 2044.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sociology

**WGST 3046 (3) Topics in Sex and Gender**
Faculty present courses based on their area of expertise and specialization in the field of sex and gender. Students should check current sociology department notices of course offerings for specific topics.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 3046
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sociology

**WGST 3100 (3) Feminist Theories**
Explores a variety of alternative systematic accounts of, and explanations for, gender inequities. Social norms of both masculinity and femininity are analyzed in relation to other axes of inequality such as class, sexuality, race/ethnicity, neocolonialism and the domination of nonhuman nature.
**Requisites:** Requires a prerequisite course of WGST 2000 or WGST 2020 or WGST 2050 or WGST 2600 (minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3110 (3) Feminist Practical Ethics**
Examines issues of public policy and personal ethics in light of the feminist commitment to gender justice. Readings for the course will present competing feminist points of view on topics such as: the environment, sex trafficking, immigration, abortion rights, the fashion and beauty industries, cosmetic surgery, food, and militarism. Contributes to an understanding of gender diversity from a U.S. perspective, fostering further insight into social, political, economic, and cross-cultural relations in America.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 3110
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite WGST 2000 or WGST 2290 or PHIL 2290.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**WGST 3135 (3) Chicana Feminisms and Knowledges**
Provides insight into the present socioeconomic condition of Chicanas and the concept of feminismo through interdisciplinary study of history, sociology, literary images and film portrayals.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 3136
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite ETHN 2001 or ETHN 2536.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Chicano Studies

**WGST 3174 (3) Sex, Power, and Politics: U.S. Perspectives**
Explores how norms of sex, gender, race and sexuality find expression in institutions and policies in ways that legitimize only certain individuals as political actors, certain identities as politically relevant, and certain relationships as important. Critically examines how norms may be exposed, resisted and changed by studying the politics of the women's, gay liberation and men's movements in the U.S.
**Equivalent - Duplicate Degree Credit Not Granted:** PSCI 3174
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2004 or WGST 2000 or LGBT 2000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Science

**WGST 3200 (3) Religion and Feminist Thought**
Examines the origin of patriarchal culture in the theology and practices of Judaism and Christianity. Explores attitudes and beliefs concerning women as Judeo-Christian culture impacts gender roles and gender stratification through reading and discussion. Women's religious experience is studied from the perspective of feminist interpretations of religiosity.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3200
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WGST 3201 (3) Women, Gender & Sexuality in Jewish Texts & Traditions**
Reads some of the ways Jewish texts and traditions look at women, gender and sexuality from biblical times to the present. Starts with an analysis of the positioning of the body, matter and gender in creation stories, moves on to the gendered aspects of tales of rescue and sacrifice, biblical tales of sexual subversion and power, taboo-breaking and ethnos building, to rabbinic attitudes towards women, sexuality and gender and contemporary renderings and rereadings of the earlier texts and traditions.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3202 and HEBR 3202 and RLST 3202
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**WGST 3208 (3) Women in Nordic Society: Modern States of Welfare**
Examines the role and status of women and marginalized social classes in the Nordic countries, whose societies have been heralded as egalitarian models since the twentieth century. Texts include a variety of media, from literature to sociological works to artifacts of political and popular culture.
**Equivalent - Duplicate Degree Credit Not Granted:** SCAN 3208
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Nordic (Formerly Scandinavian)

**WGST 3210 (3) American Indian Women**
Explores the experiences, perspectives and status of American Indian women in historical and contemporary contexts. Examines representations of Indigenous women in mainstream culture. Emphasizes the agency of American Indian women-their persistence, creativity and activism, especially in maintaining Indigenous traditions.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 3213
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2000 or WGST 2600 or ETHN 2001 or ETHN 1023.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**WGST 3220 (3) Women in Islam**
Examines the historical and contemporary relation between women, gender and Islamic cultures in different parts of the world. We will consider the role and rights of women in Islam, historical and literary representations of Muslim women, and the historically changing constructions of gender and sexuality in Muslim societies. In addition, we will critically explore the construction of Muslim women in western discourses, including liberal feminist discourse, and ask whether the representation of Muslim women in these discourses achieves or undermines ends that we might consider "Feminist". In attending to the wide range of Muslim women's lived experiences in Islamic communities and cultures, as well as the self-representations of Muslim women themselves, our readings will urge us to reexamine our presumptions about piety, secularism, modernity and feminism.
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**WGST 3250 (3) Disney's Women and Girls**
Examines the construction of gender, race, class, sexual orientation and disability in a selection of Disney's animated films. Cultivates skills of media literacy, exploring how mass media acts to enforce and maintain conventional gendered understandings of power, privilege and difference. Analyzes the political economy of the Disney phenomenon through a feminist lens.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3267 (3) Women Writers**
This course explores how women write about a range of issues, some explicitly gendered, such as desire, sexuality, marriage, and family, and others perhaps less so, such as politics, justice, race, and class. We¿ll consider how women think about their craft, how they approach questions of art and beauty, and whether we should consider writing by women a separate category. Students will examine a range of literature by women, aiming to be inclusive and intersectional.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 3267
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: English

**WGST 3300 (3) Gender, Sexuality and U.S. Law**
Contemporary and historic overview of U.S. courts' treatment of sex and gender. Using the case method, examines policy issues including, but not limited to: same sex marriage and civil unions; privacy; affirmative action; abortion; reproductive technologies; discrimination based on sex and sexual orientation in education and in the workplace.
**Equivalent - Duplicate Degree Credit Not Granted:** PSCI 3301
**Recommended:** Prerequisite WGST 2000 or PSCI 1101.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Political Science

**WGST 3302 (3) Facilitating Peaceful Community Change**
Students gain knowledge and skills that enable them to become effective agents of community change. Focuses on understanding the processes of community building with a multicultural emphasis. Students are encouraged to apply their own life experiences and to examine themselves as potential change agents.
**Equivalent - Duplicate Degree Credit Not Granted:** INVS 3302
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3311 (3) Gender and U.S. Politics: Protest, Polls and Policy**
Provides an overview and critical examination of women as political actors within the United States. Students will examine the gendered components of citizenship, election, political office and public policy. Furthermore, students will explore the ways in which gender intersects with class, race, ethnicity, sexual orientation and other identities in U.S. politics.
**Equivalent - Duplicate Degree Credit Not Granted:** PSCI 3311
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3314 (3) Violence Against Women and Girls**
Focuses on aspects of the victimization of women and girls that are "Gendered" - namely, sexual abuse and intimate partner abuse. Also explores the importance of race, class and sexuality in gendered violence.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 3314 and SOCY 3314
**Recommended:** Prerequisite SOCY 1016 or WGST 1016.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3400 (3) Gender, Personality, and Culture**
Explores the relationship among gender, culture and personality. Brings together the disciplines of psychology and sociology in the study of gender and personality formation through investigation of psychoanalytic theory and the social environment.
**Recommended:** Prerequisite WGST 2000 or WGST 2700.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3410 (3) Gender, Sexuality and Culture in the Modern Middle East**
Examines the issues of gender and sexuality in the modern Middle East and North Africa from the colonial period to the present, focusing on how feminist movements, Arab women's writing, and constructions of gender and sexuality have been shaped by local, national and international factors. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** ARAB 3410
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Arabic

**WGST 3500 (3) Global Gender Issues**
Introduces global gender issues, such as the gendered division of labor in the global economy, migration, women's human rights, environmental issues, gender violence in war, women in the military, nationalism and feminism and the representation of the Third World in the United States. Offers students the opportunity to broaden their perspectives beyond the borders of the United States.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2000 or WGST 2050 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**WGST 3505 (3) Historical and Contemporary Issues of African American Women**
Explores the social, economic, political, historical and cultural role of African American women from an interdisciplinary perspective. Special emphasis is placed on African American women's rich oral and literary tradition.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2000 or ETHN 1022 or ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3510 (3) Gender, Sexuality and Global Health**
Examines the intersections of gender, sexuality and health in global perspective. Explores how men's and women's health are shaped by gender and sexual relations in a wide range of social contexts, including South and Southeast Asia, Latin America, sub-Saharan Africa and the United States.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sociology

**WGST 3520 (3) Gender and Sexuality in Africa**
Examines the dramatic changes occurring across the continent of Africa that are currently reworking gender and sexuality. Foregrounds African conceptions of feminism, and explores a range contemporary issues, including gender & health, modern womanhood, new African masculinities, LGBTQ rights, and the gendered implications of environmental change.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Requisites WGST or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3600 (3) Latina/x Studies**
Drawing from work produced by and about Latinas/xs, discusses the social and cultural construction of race and ethnicity alongside gender and sexuality, the function of nationalism, the politics of migration and citizenship, Latina/x literary production and theory, historiographical trends, Latina feminist theory, activism and the academy, and Latina/x political organizing.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2000 or WGST 2050 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3601 (3) German Women Writers**
Explores writing by German/Austrian women from 1945 to the present, with special attention to the representation of the Holocaust, the continuation of avant-garde traditions, innovations in literary form and feminism. Visual arts, film and feminist theory will also be considered in their relation to literature. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 3601
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: German

**WGST 3610 (3) Gender, Race, Science and Technology**
Examines the role of science and technology in forming conceptions of race, gender and class, and vice-versa. Considers how some populations benefit from scientific knowledge-production while others are excluded or come to be its subjects. Students will explore this knowledge production through historical, anthropological, literary, and philosophical investigations of technology and scientific inquiry.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Requisites WGST 2000 or WGST 2050 or WGST 2500 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**WGST 3620 (3) Women of Color and Activism**
Surveys the history of social activism in the United States by Women of Color with an emphasis on modes of social activism, issues that have organized specific communities of color, and issues that have crossed ethnic/racial boundaries. In order to offer students a historical understanding of how Women of Color have been marginalized, as well as how they have fought back against this marginalization, this course relies upon historical, sociological, and theoretical readings.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2000 or WGST 2020 or WGST 2050 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3640 (3) Black Feminist and Womanist Theories**
Examines theoretical and activist approaches concerning the oppression, agency, and liberation of Black girls, women, and femmes. Traces the development of Black feminisms and womanisms created, co-constructed, and advanced by Black women and femmes, including Black feminist thought, Africana womanism, intersectionality, Black trans feminism, hip hop feminism, pan-African feminism, and transnational Black feminism. Explores themes, assumptions, interventions, and variants of Black feminist and womanist theories and praxes.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2000 or WGST 2020 or WGST 2050 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3650 (3) Gender and Politics in Latin America**
Examines Latin American politics with particular focus on women's participation in social movements, war, revolution and elections. Compares women's and men's politics and activism and examines changing gender and sexuality policies, gender relations and the differential impact of political, economic, and social changes on men and women.
**Equivalent - Duplicate Degree Credit Not Granted:** PSCI 3052
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite WGST 2600 or PSCI 2012 or PSCI 3032.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Science

**WGST 3670 (3) Gender, Race, Sexuality and Global Migration**
Engages in an interdisciplinary study of the intersections of gender, race and sexuality that have created a multicultural, multiethnic and multiracial world. Focuses on the effects of political, economic, social and cultural forces on gender, race and sexuality in migrant communities.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Ethnic Studies

**WGST 3672 (3) Who Runs the World? Sex, Power, and Gender in Geography**
This course will examine how gender and sexuality is constructed locally, nationally, and globally, drawing on conversations about feminist pasts, presents, and futures. We will focus on how gender intersects with race, class, sexuality, ability, religion, ethnicity, and geopolitical location to structure the lived experiences of women across the globe. We will apply critical geographic perspectives to gender inequality, exploring the overlaps and differences in women¿s and LGBTQ+ struggles as they are shaped by ongoing socio-cultural, political, and economic conditions globally.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 3672
**Recommended:** Prerequisite GEOG 1982 or GEOG 1992 or GEOG 2002 or GEOG 2412 or WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Geography

**WGST 3701 (3) Topics in U.S. Gender and Sexuality Studies (AH)**
Examines selected topics in women, gender and sexuality in the arts and humanities, from a U.S. perspective.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WGST 3702 (3) Topics in U.S. Gender and Sexuality Studies (SS)**
Examines selected topics in women, gender and sexuality in the social sciences, from a U.S. perspective.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3711 (3) Topics in Global Gender and Sexuality Studies (AH)**
Examines selected topics in women, gender and sexuality in the arts and humanities, from a global perspective.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WGST 3712 (3) Topics in Global Gender and Sexuality Studies (SS)**
Examines selected topics in women, gender and sexuality in the social sciences, from a global perspective.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3750 (3) Women in Buddhism**
Explores diverse representations of the female in Buddhist literature and the social realities of actual women in Asian historical contexts. Through case studies that traverse Buddhist Asia, we delve into monastic views of the female body, philosophical analyses of the emptiness of gender, idealized images of the feminine in Buddhist tantra and contemporary issues such as the nun's revival moment.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 3750
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Religioius Studies
Departmental Category: Asia Content

**WGST 3767 (3) Feminist Fictions**
Examines a series of literary texts to consider how writers across the world have used fiction to creatively stage and reimagine gender and sexuality. Attends to the formal and narrative techniques by which these texts call attention to the fictionality, and thereby the creative malleability, of gender itself. Some cinematic and performance texts will also be included.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 3767
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: English

**WGST 3800 (3) Advanced Writing in Feminist Studies**
Offers expository writing and training in analytical and descriptive skills, structures or argument, critical thinking, the rhetoric of persuasion, and the development of a personal voice. Readings and papers focus on basic issues in gender studies.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Upper

**WGST 3930 (1-6) Women and Gender Studies Internship**
Provides field experience in local and national government and non-governmental agencies focusing on women and gender-related issues. Supervision by approved field instructors. Students must relate their academic experience to their field work experience though a portfolio and a final paper. Department enforced prerequisite: 6 hours of course work in Women and Gender Studies and 30 cumulative credit hours.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**WGST 3940 (1) Practicum in Women and Gender Studies**
Enriches the academic experience of majors and minors within Women and Gender Studies. Usually will combine readings from books with lectures and discussions, community outreach and in-house publications spanning the interdisciplinary focus of the department.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to Womens Studies (WGST) majors or minors only.

**WGST 4001 (3) Advanced Topics in Gender and Sexuality Studies (AH)**
Provides an advanced interdisciplinary course organized around a specific issue in the arts and humanities relating to gender and sexuality.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 5001
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WGST 4002 (3) Advanced Topics in Gender and Sexuality Studies (SS)**
Provides an advanced interdisciplinary course organized around a specific issue in the social sciences relating to gender and sexuality.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 5002
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 4010 (3) Gender, Genocide and Mass Trauma**
Studies the persistence of genocide and the effects of mass trauma on women and girls. Within the framework of political and social catastrophe, examines cataclysmic world events and the traumatic consequences for women of religious persecution, colonialism, slavery and the genocides of the 20th and 21st centuries.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4000
**Recommended:** Prerequisite SOCY 1016 or WGST 1016 or WGST 2000 or SOCY 3314 or WGST 3314.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sociology

**WGST 4016 (3) Sex, Gender and Society 2**
Studies status and power differences between the sexes at individual, group and societal levels. Examines empirically established sex differences and reviews biological, psychological and sociological explanations for gender differences.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4016
**Requisites:** Requires a prerequisite course of SOCY 1016 or WGST 1016 or WGST 2000 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sociology

**WGST 4073 (3) Performing Voices of Women**
Explores theories underlying the "feminine voice," varied perspectives in prose and poetry, ways of embodying these voices and perspectives in performance forms and ultimately the students' own voices through creation of autobiographical performance pieces (some to be presented for student audiences). Open to both men and women.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4073
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre

**WGST 4086 (3) Family and Society**
Studies the changing relationship between family and social structure. Examines variations in family organization and considers political, social, ideological, demographic and economic determinants of family formation.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4086
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 3001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sociology

**WGST 4100 (3) Indigenizing Feminism: Literature, Art, Film**
Through analysis of literature and films by Indigenous and non-Indigenous writers and filmmakers, this course explores issues of gender in Indigenous communities in the Americas, gender and power distribution within Indigenous communities, related national and global politics, legal and economic systems, migration, and environmental issues, among other topics. This course also studies how colonization and the imposition of patriarchy has transformed Indigenous societies by diminishing the power, status, and material circumstances of Indigenous women.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WGST 4200 (3) Religion and Reproductive Politics in the United States**
Focuses primarily on how Protestant, Catholic, and Jewish conversations about sexuality and reproduction have shaped access and attitudes towards reproductive health in the US over the course of the twentieth and twenty-first centuries.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4200, WGST 5200 and JWST 5200
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**WGST 4277 (3) Special Topics in Women Writers**
This course focuses on a special topic or issue in works written by women. Topics vary by semester, and may focus on a particular historical period or literary genre. Students may consider writing by women as itself a genre, asking what unites these works in terms of both subject and style. Check department description for details.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 4277
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WGST 4287 (3) Special Topics in Queer Literature**
This course will focus on a special topic in queer literature and non-normative genders and sexualities. Students will consider how literature reflects and represents understandings of sexuality, gender, desire, and more; the course may engage a variety of genres. Topics vary by semester. Check department description for details.
**Equivalent - Duplicate Degree Credit Not Granted:** LGBT 4287 and ENGL 4287
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WGST 4300 (3) Sex, Power, Politics: International Perspectives**
Studies the commercial trade of sexual labor in the global economy, examining theories and assumptions about sexual-economic exchanges and gendered and racialized relations of power in the sex trade. Emphasizes prostitution.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite WGST 2600 or WGST 3100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 4301 (3) Gender, Race and Immigration in Germany and Europe**
Introduces students to debates surrounding migration and race in contemporary Germany with comparisons to other European contexts. Emphasis on reading texts in context using tools of cultural studies, integrating analyses of gender, race, nation, and sexuality. Texts may include film, literature, television, social media, news media, political posters, etc. Topics include: race and racisms, Black and women of color feminisms, Roma feminisms, Muslim feminisms, notions of integration and citizenship, and more. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 4301 and AHUM 4301 and GRMN 5301
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: German

**WGST 4331 (3) Gender, Race, Class, and Sexuality in Popular Culture**
Studies the construction, interconnections, and replications of gender, race, class and sexuality in popular culture and how these constructs become cultural norms and mores. Uses critical methods with a focus on producing responsible viewers and readers.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WGST 4400 (3) Critical Inquiries in Transgender Studies**
Examines theories, methods and debates in the emerging field of transgender studies. Drawing on interdisciplinary perspectives, this course examines transgender identities, communities and political movements in different historical and cultural contexts. Focuses on crosscutting issues that shape transgender subjectivities, with special attention given to how transgender movements negotiate race, class, sexuality, labor, culture and nation.
**Equivalent - Duplicate Degree Credit Not Granted:** LGBT 5400 and LGBT 4400 and WGST 5400
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: LGBT Studies

**WGST 4471 (3) Women in 20th-21st Century Russian, East European and Eurasian Cultures**
Examines issues facing women in 20th-21st century Russia, East Europe, Caucasus and Central Asia, based on study of current events, history, literature, posters and film. Studies images of women as Amazons and rebels, salon hostesses and poets, New Soviet Women and women in combat, prostitutes and mothers. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4471 and REES 5471
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite lower level literature or culture course.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Russian

**WGST 4500 (3) Gender Politics and Global Activism**
Addresses the problems and challenges women face around the world and the ways in which women have mobilized to address them. Explores political activism at the local, national, regional and global levels. Focuses on different forms of activism, including strategies aimed at working with and within governmental institutions, as well as outside and against them.
**Equivalent - Duplicate Degree Credit Not Granted:** PSCI 4391
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 4619 (3) Women in East Asian History**
Considers major issues in the history of women in East Asia (China, Korea, Japan) in the 17th through 20th centuries. Focuses on gender roles in Asian family, state and cultural systems. Topic varies in any given semester.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4619 and HIST 5619
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: History
Departmental Category: Asia Content

**WGST 4636 (3) Lesbian and Gay History: Culture, Politics, and Social Change in the U.S.**
Considers current theoretical approaches to the history of sexuality and traces the changing meaning of same-sex sexuality in the U.S. through investigation of lesbian and gay identity formation, community development, politics, and queer cultural resistance.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4636 and HIST 5636
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite HIST 1015 or HIST 1025 or LGBT 2000 or WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WGST 4640 (3) Women, Gender and War**
Study of how women experience war, how the structure, practice and memory of war, and the rights and obligations of military service (masculinity and femininity) are structured by the gender system.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4640
**Recommended:** Prerequisite HIST 1015 or HIST 1020 or HIST 1025 or HIST 1123 or HIST 1628 or HIST 1708.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: History

**WGST 4800 (3) Senior Colloquium in Feminist Studies**
Provides students with the opportunity to actively reflect on their education and to complete a research project that incorporates an interdisciplinary and feminist approach to the study of gender, class, race, ethnicity and sexuality. Offered each spring.
**Requisites:** Requires prerequisite courses of (WGST 2000 or WGST 2600) and (WGST 3020 or WGST 3100) (all minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Womens Studies (WGST) majors or minors only.

**WGST 4840 (1-6) Independent Study**
Department enforced prerequisite: over minimum GPA of 3.3.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**WGST 4850 (3) Gender in Hagiography**
Explores gendered ideals of sainthood in medieval hagiographic literature. We draw primarily from the lives of female mystics in Buddhist and Christian sources and also examine the construction of mendicant masculinities. Reading from an array of primary sources, we query the category of mysticism and ask why visionary experience has so often been gendered female.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4850 and RLST 5850
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Religioius Studies

**WGST 4950 (3) Honors Research**
For qualified Women and Gender Studies majors working on the research phase of departmental honors. Department enforced prerequisite: overall GPA of 3.3.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sciences Honors Course

**WGST 4999 (1-3) Senior Honors Thesis**
Qualified Women and Gender Studies majors may write an honors thesis, an in-depth research paper, on a topic of choice. Thesis hours available to majors only after successfully completing the research phase.
**Requisites:** Restricted to Womens Studies (WGST) majors only.
**Additional Information:** Arts Sciences Honors Course

# Women and Gender Studies - Bachelor of Arts (BA)

The interdisciplinary women and gender studies undergraduate major and minor offer students a rigorous and flexible program of study that examines women, gender and sexuality in relation to race, class, ability, nation and empire, among other variables. Students explore how gender and sexuality intersect with structures of power in a range of cultural, historical and geopolitical contexts. Drawing from approximately 50 courses, many cross-listed with other academic units, students fulfill the requirements of the major or minor and can design an emphasis relevant to their interests by focusing on one of three cognate areas: 1) gender/sexuality, 2) race/ethnicity and 3) global/transnational.

# Requirements

## General Requirements

In addition to the general requirements of the College of Arts and Sciences, students must complete a minimum of 33 credit hours with grades of C- or better in approved women and gender studies courses, a minimum of 24 credit hours of which must be upper-division (3000- or 4000-level). No more than 45 credits in WGST may be applied to overall graduation requirements. Students must have a grade point average of at least 2.000 in the major in order to graduate.

The Department of Women and Gender Studies offers two undergraduate major concentration areas culminating in the Bachelor of Arts (BA) in Women and Gender Studies. Students choose to pursue either the women and gender studies concentration or the queer and trans studies concentration. For the specific major course requirements, see the Concentration Areas tab.

# Concentration Areas

## Women and Gender Studies Concentration

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| WGST 2000 | Introduction to US Gender, Race and Sexuality Studies | 3 |
| or WGST 2600 | Introduction to Global Gender, Race and Sexuality Studies | |
| WGST 3020 | Feminist Methods of Inquiry and Praxis | 3 |
| WGST 3100 | Feminist Theories | 3 |
| WGST 4800 | Senior Colloquium in Feminist Studies | 3 |
| **Cognate Areas** | | |
| At least three courses, one from each of the three cognate areas (see below) | | 9 |
| **Electives** [1] | | |
| Two upper-division approved WGST elective courses (those listed under upper-division electives or cognate areas below) | | 6 |
| Two additional lower- or upper-division approved WGST elective courses (see below) | | 6 |
| **Total Credit Hours** | | **33** |

[1] Internships and independent study credit hours may apply, as well as special topics courses (WGST 3701, WGST 3702, WGST 3711, WGST 3712, WGST 4001 and WGST 4002); see advisor or department for more information.

## Cognate Areas

Students must take three courses (for a total of 9 credit hours), one each from the three following cognate areas. Select topics offerings of special topics courses may apply to cognate areas; see advisor or department for more information.

### Queer and Trans Studies Cognate Area

| Code | Title | Credit Hours |
|---|---|---|
| At least one course (3 credit hours) from the queer and trans studies cognate area | | 3 |
| LGBT 3710 | Topics in LGBT Studies | |
| LGBT/ENGL 3796 | Queer Theory | |
| WGST 3600 | Latina/x Studies (may count for queer and trans studies or race/ethnicity, but not both) | |
| WGST/ENGL 3767 | Feminist Fictions (may count for global/transnational or queer and trans studies, but not both) | |
| WGST/LGBT/ENGL 4287 | Special Topics in Queer Literature | |
| WGST 4300 | Sex, Power, Politics: International Perspectives (may count for global/transnational or queer and trans studies, but not both) | |
| WGST/LGBT 4400 | Critical Inquiries in Transgender Studies | |
| WGST/HIST 4620 | (may count for global/transnational or queer and trans studies, but not both) | |
| WGST/HIST 4636 | Lesbian and Gay History: Culture and Politics and Social Change in the U.S. | |

### Race/Ethnicity Cognate Area

| Code | Title | Credit Hours |
|---|---|---|
| At least one course (3 credit hours) from the race/ethnicity cognate area | | 3 |
| DNCE 4017 | Dancing Histories: Sex, Gender and Race in U.S. Concert Dance | |
| ETHN 3026 | Women of Color: Chicanas in U.S. Society | |
| WGST/ETHN/SOCY 3044 | Race, Class, Gender, and Crime | |
| WGST 3135/ETHN 3136 | Chicana Feminisms and Knowledges | |
| WGST 3210/ETHN 3213 | American Indian Women | |
| WGST/PSCI 3311 | Gender and U.S. Politics: Protest, Polls and Policy | |
| WGST 3505 | Historical and Contemporary Issues of African American Women | |
| WGST 3600 | Latina/x Studies (may count for queer and trans studies or race/ethnicity, but not both) | |
| WGST 3610 | Gender, Race, Science and Technology | |
| WGST 3620 | Women of Color and Activism | |
| WGST 3640 | Black Feminist and Womanist Theories | |
| WGST 3650/PSCI 3052 | Gender and Politics in Latin America (may count for global/transnational or race/ethnicity, but not both) | |
| WGST 4100 | Indigenizing Feminism: Literature, Art, Film (may count for global/transnational or race/ethnicity, but not both) | |
| WGST/GRMN 4301 | Gender, Race and Immigration in Germany and Europe (may count for global/transnational or race/ethnicity, but not both) | |
| WGST/MDST 4331 | Gender, Race, Class, and Sexuality in Popular Culture | |
| WGST/HIST 4619 | Women in East Asian History | |

### Global/Transnational Cognate Area

| Code | Title | Credit Hours |
|---|---|---|
| At least one course (3 credit hours) from the race/ethnicity cognate area | | 3 |
| DNCE 4017 | Dancing Histories: Sex, Gender and Race in U.S. Concert Dance | |
| ETHN 3026 | Women of Color: Chicanas in U.S. Society | |
| WGST/ETHN/SOCY 3044 | Race, Class, Gender, and Crime | |
| WGST 3135/ETHN 3136 | Chicana Feminisms and Knowledges | |
| WGST 3210/ETHN 3213 | American Indian Women | |
| WGST/PSCI 3311 | Gender and U.S. Politics: Protest, Polls and Policy | |
| WGST 3505 | Historical and Contemporary Issues of African American Women | |
| WGST 3600 | Latina/x Studies (may count for queer and trans studies or race/ethnicity, but not both) | |
| WGST 3610 | Gender, Race, Science and Technology | |
| WGST 3620 | Women of Color and Activism | |
| WGST 3640 | Black Feminist and Womanist Theories | |
| WGST 3650/PSCI 3052 | Gender and Politics in Latin America (may count for global/transnational or race/ethnicity, but not both) | |
| WGST 4100 | Indigenizing Feminism: Literature, Art, Film (may count for global/transnational or race/ethnicity, but not both) | |
| WGST/GRMN 4301 | Gender, Race and Immigration in Germany and Europe (may count for global/transnational or race/ethnicity, but not both) | |
| WGST/MDST 4331 | Gender, Race, Class, and Sexuality in Popular Culture | |
| WGST/HIST 4619 | Women in East Asian History | |

## Lower-Division Electives

| Code | Title | Credit Hours |
|---|---|---|
| No more than 6 credit hours of lower-division electives | | 0-6 |
| LGBT 2000/ WGST 2030 | Introduction to Lesbian, Gay, Bisexual, and Transgender Studies | |
| LGBT/ENGL 2707 | Introduction to Queer Literature | |
| LING 2400 | Language, Gender and Sexuality | |
| WGST/SOCY 1006 | The Social Construction of Sexuality | |
| or WGST 1016 | Sex, Gender, and Society 1 | |
| or SOCY 1016 | Sex, Gender, and Society 1 | |
| WGST/ENGL 1250 | Introduction to World Literature by Women | |
| or WGST 1270 | Introduction to American Literature by Women | |
| or ENGL 1270 | Introduction to American Literature by Women | |
| WGST 2020 | Femininities, Masculinities, Alternatives | |
| WGST 2050 | Gender, Sexuality, and Popular Culture | |
| WGST/CLAS 2100 | Gender and Sexuality in Ancient Greece | |
| WGST/CLAS 2110 | Gender and Sexuality in Ancient Rome | |
| WGST 2200 | Women, Gender, Literature, and the Arts | |
| WGST/PHIL 2290 | Philosophy and Gender | |
| WGST 2500 | Gender, Race, Sex and the Body | |
| WGST/PSYC 2700 | Psychology of Gender and Sexuality | |
| WGST/RLST 2800 | Women and Religion | |

## Upper-Division Electives

| Code | Title | Credit Hours |
|---|---|---|
| Select additional courses from the three cognate areas above or from the following upper-division electives below, total credits toward the degree must equal 33 credit hours | | 6-12 |
| CINE 3013 | Women and Film | |
| COMM 3420 | Gender and Communication | |
| ENGL 3217 | Topics in Gender and Sexuality | |
| ITAL 4730 | Italian Feminisms: Culture, Theory, and Narratives of Difference | |
| PSYC 4553 | Women's Mental Health: A Biopsychosocial Approach | |
| WGST/SOCY 3016 | Marriage and the Family in the United States | |
| WGST/PHIL 3110 | Feminist Practical Ethics | |
| WGST/PSCI 3174 | Sex, Power, and Politics: U.S. Perspectives | |
| WGST/JWST 3200 | Religion and Feminist Thought | |
| WGST 3201/ JWST 3202/RLST 3202 | Women, Gender & Sexuality in Jewish Texts & Traditions | |
| WGST/ENGL 3267 | Women Writers | |
| WGST/INVS 3302 | Facilitating Peaceful Community Change | |
| WGST 3400 | Gender, Personality, and Culture | |
| WGST/GRMN 3601 | German Women Writers | |
| WGST/RLST 3750 | Women in Buddhism | |
| WGST 3800 | Advanced Writing in Feminist Studies | |
| WGST/THTR 4073 | Performing Voices of Women | |
| WGST/SOCY 4086 | Family and Society | |
| WGST/JWST 4200 | Religion and Reproductive Politics in the United States | |
| WGST/ENGL 4277 | Special Topics in Women Writers | |
| WGST/REES 4471 | Women in 20th-21st Century Russian, East European and Eurasian Cultures | |
| WGST/HIST 4616 | | |
| WGST/HIST 4626 | | |
| WGST/HIST 4640 | Women, Gender and War | |
| WGST/RLST 4850 | Gender in Hagiography | |

## Honors

Students may take up to 6 credit hours of honors in women and gender studies; credit hours apply to upper-division electives in the major.

For more information about pursuing departmental honors, visit the department honors (http://www.colorado.edu/wgst/students/undergraduates/wgst-honors-program/) webpage and the main Honors Program (http://www.colorado.edu/honors/graduation/) webpage describing qualifications, requirements and deadlines.

| Code | Title | Credit Hours |
|---|---|---|
| WGST 4950 | Honors Research | 3 |
| WGST 4999 | Senior Honors Thesis | 1-3 |

## Internship

Students may take up to 6 credit hours of internship in women and gender studies; credit hours apply to upper-division electives in the major. See advisor or department for more information.

| Code | Title | Credit Hours |
|---|---|---|
| WGST 3930 | Women and Gender Studies Internship | 1-6 |

## Special Topics

Students may take up to 6 credit hours in WGST topics courses; course topics vary each semester. Ask the women and gender studies advisor or department about how each course applies to major cognate area requirements, if applicable.

| Code | Title | Credit Hours |
|---|---|---|
| WGST 3701 | Topics in U.S. Gender and Sexuality Studies (AH) | 3 |
| WGST 3702 | Topics in U.S. Gender and Sexuality Studies (SS) | 3 |
| WGST 3711 | Topics in Global Gender and Sexuality Studies (AH) | 3 |
| WGST 3712 | Topics in Global Gender and Sexuality Studies (SS) | 3 |
| WGST 4001 | Advanced Topics in Gender and Sexuality Studies (AH) | 3 |
| WGST 4002 | Advanced Topics in Gender and Sexuality Studies (SS) | 3 |

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for more information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a

requirement for the major. To maintain adequate progress in women and gender studies, students should meet the following requirements:

- By the beginning of the second semester, declare the major.
- By the end of the fourth semester, complete WGST 2000 or WGST 2600, and 9 additional credit hours of major requirements.
- By the end of the sixth semester, complete WGST 3100 and 6 additional credit hours of major requirements (24 credit hours total of the major requirements completed).
- During the seventh and eighth semester, complete WGST 4800 and 6 additional credit hours of the major requirements.

Students should consult with their advisor for specific recommendations. The following sample plan will outline the major requirements, but the order of some classes can vary greatly. It is important for students to check the degree audit and work with the major advisor each semester to make sure of the requirements and graduation timeline.

## Queer and Trans Studies Concentration

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| LGBT 2000/ WGST 2030 | Introduction to Lesbian, Gay, Bisexual, and Transgender Studies | 3 |
| LGBT 3796 | Queer Theory | 3 |
| LGBT/WGST 4400 | Critical Inquiries in Transgender Studies | 3 |
| WGST 4800 | Senior Colloquium in Feminist Studies | 3 |
| **Cognate Areas** | | |
| At least three courses, one from each of the three cognate areas (see below) | | 9 |
| **Electives** [1] | | |
| Two upper-division approved LGBT or WGST elective courses (those listed under upper-division electives or cognate areas below) | | 6 |
| Two additional lower- or upper-division approved LGBT or WGST elective courses (see below) | | 6 |
| **Total Credit Hours** | | **33** |

[1] Internships and independent study credit hours may apply, as well as special topics courses (LGBT 3710, WGST 3701, WGST 3702, WGST 3711, WGST 3712, WGST 4001 and WGST 4002); see advisor or department for more information.

### Cognate Areas

Students must take three courses (for a total of 9 credit hours), one each from the three following cognate areas. Select topics offerings of special topics courses may apply to cognate areas; see advisor or department for more information.

#### Feminist Studies Cognate Area

| Code | Title | Credit Hours |
|---|---|---|
| At least one course (3 credit hours) from the gender/sexuality cognate area | | 3 |
| ETHN 4001 | Screening Race, Class & Gender in the U.S. and the Global Borderland (may count for feminist studies or global/ transnational, but not both) | |
| WGST 3020 | Feminist Methods of Inquiry and Praxis | |
| WGST/SOCY 3046 | Topics in Sex and Gender | |
| WGST 3100 | Feminist Theories | |
| WGST 3250 | Disney's Women and Girls | |
| WGST 3300/ PSCI 3301 | Gender, Sexuality and U.S. Law | |
| WGST/ETHN/ SOCY 3314 | Violence Against Women and Girls | |
| WGST 3510 | Gender, Sexuality and Global Health (may count for feminist studies or global/ transnational, but not both) | |
| WGST 3520 | Gender and Sexuality in Africa (may count for feminist studies or global/ transnational, but not both) | |
| WGST 4010/ SOCY 4000 | Gender, Genocide and Mass Trauma (may count for feminist studies or global/transnational, but not both) | |
| WGST/SOCY 4016 | Sex, Gender and Society 2 | |

#### Race/Ethnicity Cognate Area

| Code | Title | Credit Hours |
|---|---|---|
| At least one course (3 credit hours) from the race/ethnicity cognate area | | 3 |
| DNCE 4017 | Dancing Histories: Sex, Gender and Race in U.S. Concert Dance | |
| ETHN 3026 | Women of Color: Chicanas in U.S. Society | |
| WGST/ETHN/ SOCY 3044 | Race, Class, Gender, and Crime | |
| WGST 3135/ ETHN 3136 | Chicana Feminisms and Knowledges | |
| WGST 3210/ ETHN 3213 | American Indian Women | |
| WGST/PSCI 3311 | Gender and U.S. Politics: Protest, Polls and Policy | |
| WGST 3505 | Historical and Contemporary Issues of African American Women | |
| WGST 3600 | Latina/x Studies | |
| WGST 3610 | Gender, Race, Science and Technology | |
| WGST 3620 | Women of Color and Activism | |
| WGST 3640 | Black Feminist and Womanist Theories | |
| WGST 3650/ PSCI 3052 | Gender and Politics in Latin America (may count for global/transnational or race/ethnicity, but not both) | |
| WGST 4100 | Indigenizing Feminism: Literature, Art, Film (may count for global/transnational or race/ethnicity, but not both) | |
| WGST/GRMN 4301 | Gender, Race and Immigration in Germany and Europe (may count for global/transnational or race/ethnicity, but not both) | |
| WGST/MDST 4331 | Gender, Race, Class, and Sexuality in Popular Culture | |
| WGST/HIST 4619 | Women in East Asian History | |

### Global/Transnational Cognate Area

| Code | Title | Credit Hours |
|---|---|---|
| At least one course (3 credit hours) from the global/transnational cognate area | | 3 |
| ANTH 3180 | Gender, Culture, and Sexuality | |
| ETHN 4001 | Screening Race, Class & Gender in the U.S. and the Global Borderland (may count for feminist studies or global/transnational, but not both) | |
| SOCY 4132 | Gender, Islam and Modernity | |
| WGST/SOCY 3012 | Gender and Development | |
| WGST 3220 | Women in Islam | |
| WGST/ARAB 3410 | Gender, Sexuality and Culture in the Modern Middle East | |
| WGST 3500 | Global Gender Issues | |
| WGST 3510 | Gender, Sexuality and Global Health (may count for feminist studies or global/transnational, but not both) | |
| WGST 3520 | Gender and Sexuality in Africa (may count for feminist studies or global/transnational, but not both) | |
| WGST 3650/PSCI 3052 | Gender and Politics in Latin America | |
| WGST 3670 | Gender, Race, Sexuality and Global Migration | |
| WGST/GEOG 3672 | Who Runs the World? Sex, Power, and Gender in Geography | |
| WGST/ENGL 3767 | Feminist Fictions | |
| WGST 4010/SOCY 4000 | Gender, Genocide and Mass Trauma (may count for feminist studies or global/transnational, but not both) | |
| WGST 4100 | Indigenizing Feminism: Literature, Art, Film (may count for global/transnational or race/ethnicity, but not both) | |
| WGST 4300 | Sex, Power, Politics: International Perspectives | |
| WGST/GRMN 4301 | Gender, Race and Immigration in Germany and Europe (may count for global/transnational or race/ethnicity, but not both) | |
| WGST 4500/PSCI 4391 | Gender Politics and Global Activism | |
| WGST/HIST 4620 | | |

### Lower-Division Electives

| Code | Title | Credit Hours |
|---|---|---|
| No more than 6 credit hours of lower-division electives | | 0-6 |
| LING 2400 | Language, Gender and Sexuality | |
| LGBT/ENGL 2707 | Introduction to Queer Literature | |
| WGST/SOCY 1006 | The Social Construction of Sexuality | |
| or WGST 1016 | Sex, Gender, and Society 1 | |
| or SOCY 1016 | Sex, Gender, and Society 1 | |
| WGST/ENGL 1250 | Introduction to World Literature by Women | |
| or WGST 1270 | Introduction to American Literature by Women | |
| or ENGL 1270 | Introduction to American Literature by Women | |
| WGST 2020 | Femininities, Masculinities, Alternatives | |
| WGST 2050 | Gender, Sexuality, and Popular Culture | |
| WGST/CLAS 2100 | Gender and Sexuality in Ancient Greece | |
| WGST/CLAS 2110 | Gender and Sexuality in Ancient Rome | |
| WGST 2200 | Women, Gender, Literature, and the Arts | |
| WGST/PHIL 2290 | Philosophy and Gender | |
| WGST 2500 | Gender, Race, Sex and the Body | |
| WGST/PSYC 2700 | Psychology of Gender and Sexuality | |
| WGST/RLST 2800 | Women and Religion | |

### Upper-Division Electives

| Code | Title | Credit Hours |
|---|---|---|
| Select additional courses from the three cognate areas above or from the following upper-division electives below, total credits toward the degree must equal 33 credit hours | | 6-12 |
| CINE 3013 | Women and Film | |
| COMM 3420 | Gender and Communication | |
| ENGL 3217 | Topics in Gender and Sexuality | |
| ENGL/LGBT 4287 | Special Topics in Queer Literature | |
| ITAL 4730 | Italian Feminisms: Culture, Theory, and Narratives of Difference | |
| PSYC 4553 | Women's Mental Health: A Biopsychosocial Approach | |
| WGST/SOCY 3016 | Marriage and the Family in the United States | |
| WGST/PHIL 3110 | Feminist Practical Ethics | |
| WGST/PSCI 3174 | Sex, Power, and Politics: U.S. Perspectives | |
| WGST/JWST 3200 | Religion and Feminist Thought | |
| WGST 3201/JWST 3202/RLST 3202 | Women, Gender & Sexuality in Jewish Texts & Traditions | |
| WGST/ENGL 3267 | Women Writers | |
| WGST/INVS 3302 | Facilitating Peaceful Community Change | |
| WGST 3400 | Gender, Personality, and Culture | |
| WGST/GRMN 3601 | German Women Writers | |
| WGST/RLST 3750 | Women in Buddhism | |
| WGST 3800 | Advanced Writing in Feminist Studies | |
| WGST/THTR 4073 | Performing Voices of Women | |
| WGST/SOCY 4086 | Family and Society | |
| WGST/JWST 4200 | Religion and Reproductive Politics in the United States | |
| WGST/ENGL 4277 | Special Topics in Women Writers | |
| WGST/REES 4471 | Women in 20th-21st Century Russian, East European and Eurasian Cultures | |
| WGST/HIST 4616 | | |
| WGST/HIST 4626 | | |
| WGST/HIST 4636 | Lesbian and Gay History: Culture and Politics and Social Change in the U.S. | |
| WGST/HIST 4640 | Women, Gender and War | |
| WGST/RLST 4850 | Gender in Hagiography | |

### Honors

Students may take up to 6 credit hours of honors in women and gender studies; credit hours apply to upper-division electives in the major.

For more information about pursuing departmental honors, visit the department honors (http://www.colorado.edu/wgst/students/undergraduates/wgst-honors-program/) webpage and the main Honors Program (http://www.colorado.edu/honors/graduation/) webpage describing qualifications, requirements and deadlines.

| Code | Title | Credit Hours |
|---|---|---|
| WGST 4950 | Honors Research | 3 |
| WGST 4999 | Senior Honors Thesis | 1-3 |

### Internship

Students may take up to 6 credit hours of internship in queer and trans studies or in women and gender studies; credit hours apply to upper-division electives in the major. See advisor or department for more information.

| Code | Title | Credit Hours |
|---|---|---|
| LGBT 3930 | Lesbian, Gay, Bisexual, Transgender, and Queer Studies Internship | 1-6 |
| WGST 3930 | Women and Gender Studies Internship | 1-6 |

### Special Topics

Students may take up to 6 credit hours in LGBT or WGST topics courses; course topics vary each semester. Ask the women and gender studies advisor or department about how each course applies to major cognate area requirements, if applicable.

| Code | Title | Credit Hours |
|---|---|---|
| LGBT 3710 | Topics in LGBT Studies | 3 |
| WGST 3701 | Topics in U.S. Gender and Sexuality Studies (AH) | 3 |
| WGST 3702 | Topics in U.S. Gender and Sexuality Studies (SS) | 3 |
| WGST 3711 | Topics in Global Gender and Sexuality Studies (AH) | 3 |
| WGST 3712 | Topics in Global Gender and Sexuality Studies (SS) | 3 |
| WGST 4001 | Advanced Topics in Gender and Sexuality Studies (AH) | 3 |
| WGST 4002 | Advanced Topics in Gender and Sexuality Studies (SS) | 3 |

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for more information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in women and gender studies, students should meet the following requirements:

- By the beginning of the second semester, declare the major.
- By the end of the fourth semester, complete LGBT 2000 and LGBT 3796 and 9 additional credit hours of major requirements.
- By the end of the sixth semester, complete LGBT 4400 and 6 additional credit hours of major requirements (24 credit hours total of the major requirements completed).
- During the seventh and eighth semester, complete WGST 4800 and 6 additional credit hours of the major requirements.

Students should consult with their advisor for specific recommendations. The following sample plan will outline the major requirements, but the order of some classes can vary greatly. It is important for students to check the degree audit and work with the major advisor each semester to make sure of the requirements and graduation timeline.

## Four-Year Plan(s) of Study

Through the required coursework for the major, students will complete 9 credit hours of the Social Sciences area of the Gen Ed Distribution Requirement and both the US Perspective and Global Perspective categories of the Gen Ed Diversity Requirement. Depending on other courses taken for the major, students could easily complete the remaining 3 credit hours in the Social Sciences area and much of the Arts and Humanities area of the Gen Ed Distribution Requirement.

| Year One | | |
|---|---|---|
| **Fall Semester** | | **Credit Hours** |
| WGST 2000<br>or WGST 2600 | Introduction to US Gender, Race and Sexuality Studies<br>or Introduction to Global Gender, Race and Sexuality Studies | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Elective/MAPS | | 3 |
| Elective/MAPS | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| WGST Lower-division elective | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/Global Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective/MAPS | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| WGST 3020 | Feminist Methods of Inquiry and Praxis | 3 |
| WGST Lower- or upper- division elective | | 3 |
| Gen. Ed. Skills course (QRMS) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| WGST Cognate area requirement or upper-division elective (one course from each of three cognate areas required) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |

| | | |
|---|---|---|
| **Year Three** | | |
| **Fall Semester** | | |
| WGST Cognate area requirement or upper-division elective (one course from each of three cognate areas required) | | 3 |
| WGST 3800 | Advanced Writing in Feminist Studies (not required, but fulfills Gen. Ed. Skills: Upper-division Written Communication and WGST Elective) | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| WGST 3100 | Feminist Theories | 3 |
| WGST Cognate area requirement or upper-division elective (one course from each of three cognate areas required) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective (Upper Division) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| WGST Cognate area requirement or upper-division elective (one course from each of three cognate areas required) | | 3 |
| Elective or Gen. Ed. Distribution course (example: Arts & Humanities, if needed) | | 3 |
| Elective (Upper Division) | | 3 |
| Elective (Upper Division) | | 3 |
| Elective or Upper-division Elective (if needed) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| WGST 4800 | Senior Colloquium in Feminist Studies | 3 |
| WGST Cognate area requirement or upper-division elective (one course from each of three cognate areas required) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences, if needed) | | 3 |
| Elective (Upper Division) | | 3 |
| Elective (Upper Division) | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **121** |

## Queer and Trans Studies Concentration

Through the required coursework for the major, students will complete 9 credit hours of the Social Sciences area of the Gen Ed Distribution Requirement and both the US Perspective and Global Perspective categories of the Gen Ed Diversity Requirement. Depending on other courses taken for the major, students could easily complete the remaining 3 credit hours in the Social Sciences area and much of the Arts and Humanities area of the Gen Ed Distribution Requirement.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| LGBT 2000 | Introduction to Lesbian, Gay, Bisexual, and Transgender Studies | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Elective/MAPS | | 3 |
| Elective/MAPS | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| WGST Lower-division elective | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/Global Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective/MAPS | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| LGBT 3796 | Queer Theory | 3 |
| WGST Lower- or upper- division elective | | 3 |
| Gen. Ed. Skills course (QRMS) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| WGST Cognate area requirement or upper-division elective (one course from each of three cognate areas required) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| WGST Cognate area requirement or upper-division elective (one course from each of three cognate areas required) | | 3 |
| WGST 3800 | Advanced Writing in Feminist Studies (not required, but fulfills Gen. Ed. Skills: Upper-division Written Communication and WGST Elective) | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| LGBT 4400 | Critical Inquiries in Transgender Studies | 3 |
| WGST Cognate area requirement or upper-division elective (one course from each of three cognate areas required) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective (Upper Division) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |

| | | |
|---|---|---|
| **Year Four** | | |
| **Fall Semester** | | |
| WGST Cognate area requirement or upper-division elective (one course from each of three cognate areas required) | | 3 |
| Elective or Gen. Ed. Distribution course (example: Arts & Humanities, if needed) | | 3 |
| Elective (Upper Division) | | 3 |
| Elective (Upper Division) | | 3 |
| Elective or Upper-division Elective (if needed) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| WGST 4800 | Senior Colloquium in Feminist Studies | 3 |
| WGST Cognate area requirement or upper-division elective (one course from each of three cognate areas required) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences, if needed) | | 3 |
| Elective (Upper Division) | | 3 |
| Elective (Upper Division) | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **121** |

# Knowledge

Students will be able to:

- Analyze how power and privilege function at the intersection of gender, sexuality, race, class, ability, nationality and colonialism.
- Think critically about the historical and global variability of social norms of gender and sexuality.
- Identify the varying forms of feminism across the globe, and the relationships between feminism and other movements for social justice.

# Practical Skills

Students completing their degree with the Department of Women and Gender Studies are expected to acquire the ability and skills to:

- Analyze a range of social events, structures and movements using intersectional and decolonial feminist theories.
- Communicate complex ideas from the field of women and gender studies to academic and general audiences.
- Work collaboratively to implement and organize around a range of theoretical and methodological perspectives used in women, gender, and sexuality studies.

# Queer and Trans Studies - Minor

The minor in queer and trans studies provides students the opportunity to critically examine non-normative sexual and gender identities in a range of social and historical contexts. Queer and trans studies interweaves complex theories and analysis into the study of sexuality and gender, with particular focus on intersections with race, ethnicity, class and ability. Students can engage with a wide variety of courses, internships and programming in order to deepen their understanding of queer and trans issues in their academic, professional and personal lives. Students fulfilling the requirements of the minor can designate an emphasis relevant to their interests by focusing on one of three cognate areas: 1) feminist studies, 2) race/ethnicity and 3) global/transnational.

Declaration of a minor is open to any student enrolled at CU Boulder, regardless of college or school.

# Requirements

## Required Courses and Credits

Students must complete a minimum of 18 credit hours with grades of C- or better in approved women and gender studies courses, 12 credit hours of which must be upper division (3000 or 4000 level). Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| LGBT 2000/ WGST 2030 | Introduction to Lesbian, Gay, Bisexual, and Transgender Studies | 3 |
| LGBT 3796 | Queer Theory | 3 |
| LGBT/WGST 4400 | Critical Inquiries in Transgender Studies | 3 |
| **Cognate Areas** | | |
| One course each from two of the three cognate areas (see below) | | 6 |
| **Electives** [1] | | |
| Any lower- or upper-division course listed below that has not been used to fulfill any other minor requirements | | 3 |
| **Total Credit Hours** | | **18** |

[1] Internships and independent study credit hours may apply, as well as special topics courses (LGBT 3710, WGST 3701, WGST 3702, WGST 3711, WGST 3712, WGST 4001 and WGST 4002); see advisor or department for more information.

## Cognate Areas

Students must take one course each from two different cognate areas for a total of 6 credit hours. Select topics offerings of special topics courses may apply to cognate areas; see advisor or department for more information.

### Feminist Studies Cognate Area

| Code | Title | Credit Hours |
|---|---|---|
| Feminist Studies | | 0-3 |
| ETHN 4001 | Screening Race, Class & Gender in the U.S. and the Global Borderland (may count for feminist studies or global/ transnational, but not both) | |
| WGST 3020 | Feminist Methods of Inquiry and Praxis | |
| WGST/SOCY 3046 | Topics in Sex and Gender | |
| WGST 3100 | Feminist Theories | |
| WGST 3250 | Disney's Women and Girls | |
| WGST 3300/ PSCI 3301 | Gender, Sexuality and U.S. Law | |
| WGST/ETHN/ SOCY 3314 | Violence Against Women and Girls | |
| WGST 3510 | Gender, Sexuality and Global Health (may count for feminist studies or global/ transnational, but not both) | |

| | |
|---|---|
| WGST 3520 | Gender and Sexuality in Africa (may count for feminist studies or global/transnational, but not both) |
| WGST 4010/ SOCY 4000 | Gender, Genocide and Mass Trauma (may count for feminist studies or global/transnational, but not both) |
| WGST/SOCY 4016 | Sex, Gender and Society 2 |

### Race/Ethnicity Cognate Area

| Code | Title | Credit Hours |
|---|---|---|
| Race/Ethnicity | | 0-3 |
| DNCE 4017 | Dancing Histories: Sex, Gender and Race in U.S. Concert Dance | |
| ETHN 3026 | Women of Color: Chicanas in U.S. Society | |
| WGST/ETHN/ SOCY 3044 | Race, Class, Gender, and Crime | |
| WGST 3135/ ETHN 3136 | Chicana Feminisms and Knowledges | |
| WGST 3210/ ETHN 3213 | American Indian Women | |
| WGST/PSCI 3311 | Gender and U.S. Politics: Protest, Polls and Policy | |
| WGST 3505 | Historical and Contemporary Issues of African American Women | |
| WGST 3600 | Latina/x Studies | |
| WGST 3610 | Gender, Race, Science and Technology | |
| WGST 3620 | Women of Color and Activism | |
| WGST 3640 | Black Feminist and Womanist Theories | |
| WGST 3650/ PSCI 3052 | Gender and Politics in Latin America (may count for global/transnational or race/ethnicity, but not both) | |
| WGST 4100 | Indigenizing Feminism: Literature, Art, Film (may count for global/transnational or race/ethnicity, but not both) | |
| WGST/GRMN 4301 | Gender, Race and Immigration in Germany and Europe (may count for global/transnational or race/ethnicity, but not both) | |
| WGST/MDST 4331 | Gender, Race, Class, and Sexuality in Popular Culture | |
| WGST/HIST 4619 | Women in East Asian History | |

### Global/Transnational Cognate Area

| Code | Title | Credit Hours |
|---|---|---|
| Global/Transnational | | 0-3 |
| ANTH 3180 | Gender, Culture, and Sexuality | |
| ETHN 4001 | Screening Race, Class & Gender in the U.S. and the Global Borderland (may count for feminist studies or global/transnational, but not both) | |
| SOCY 4132 | Gender, Islam and Modernity | |
| WGST/SOCY 3012 | Gender and Development | |
| WGST 3220 | Women in Islam | |
| WGST/ARAB 3410 | Gender, Sexuality and Culture in the Modern Middle East | |
| WGST 3500 | Global Gender Issues | |
| WGST 3510 | Gender, Sexuality and Global Health (may count for feminist studies or global/transnational, but not both) | |
| WGST 3520 | Gender and Sexuality in Africa (may count for feminist studies or global/transnational, but not both) | |
| WGST 3650/ PSCI 3052 | Gender and Politics in Latin America | |
| WGST 3670 | Gender, Race, Sexuality and Global Migration | |
| WGST/GEOG 3672 | Who Runs the World? Sex, Power, and Gender in Geography | |
| WGST/ENGL 3767 | Feminist Fictions | |
| WGST 4010/ SOCY 4000 | Gender, Genocide and Mass Trauma (may count for feminist studies or global/transnational, but not both) | |
| WGST 4100 | Indigenizing Feminism: Literature, Art, Film (may count for feminist studies or global/transnational, but not both) | |
| WGST 4300 | Sex, Power, Politics: International Perspectives | |
| WGST/GRMN 4301 | Gender, Race and Immigration in Germany and Europe (may count for global/transnational or race/ethnicity, but not both) | |
| WGST 4500/ PSCI 4391 | Gender Politics and Global Activism | |
| WGST/HIST 4620 | | |

## Lower-Division Electives

Students may take no more than 3 credit hours of lower-division electives.

| Code | Title | Credit Hours |
|---|---|---|
| Lower-division electives | | 0-3 |
| LING 2400 | Language, Gender and Sexuality | |
| LGBT/ENGL 2707 | Introduction to Queer Literature | |
| WGST/SOCY 1006 | The Social Construction of Sexuality | |
| or WGST 1016 | Sex, Gender, and Society 1 | |
| or SOCY 1016 | Sex, Gender, and Society 1 | |
| WGST/ENGL 1250 | Introduction to World Literature by Women | |
| or WGST 1270 | Introduction to American Literature by Women | |
| or ENGL 1270 | Introduction to American Literature by Women | |
| WGST 2000 | Introduction to US Gender, Race and Sexuality Studies | |
| WGST 2020 | Femininities, Masculinities, Alternatives | |
| WGST 2050 | Gender, Sexuality, and Popular Culture | |
| WGST/CLAS 2100 | Gender and Sexuality in Ancient Greece | |
| WGST/CLAS 2110 | Gender and Sexuality in Ancient Rome | |
| WGST 2200 | Women, Gender, Literature, and the Arts | |
| WGST/PHIL 2290 | Philosophy and Gender | |
| WGST 2500 | Gender, Race, Sex and the Body | |

| | |
|---|---|
| WGST 2600 | Introduction to Global Gender, Race and Sexuality Studies |
| WGST 2700 | Psychology of Gender and Sexuality |
| WGST/RLST 2800 | Women and Religion |
| WGST/JWST 2850 | Sex, Religion, and Politics in US Healthcare |

### Upper-Division Electives

Select an additional course or courses from the three cognate areas above or from the following upper-division electives listed below to bring the total credit hours in the minor to 18 and the total upper-division credit hours in the minor to 12.

| Code | Title | Credit Hours |
|---|---|---|
| Upper-division electives | | 0-3 |
| CINE 3013 | Women and Film | |
| COMM 3420 | Gender and Communication | |
| ENGL 3217 | Topics in Gender and Sexuality | |
| ENGL/LGBT 4287 | Special Topics in Queer Literature | |
| ITAL 4730 | Italian Feminisms: Culture, Theory, and Narratives of Difference | |
| PSYC 4553 | Women's Mental Health: A Biopsychosocial Approach | |
| WGST/SOCY 3016 | Marriage and the Family in the United States | |
| WGST/PHIL 3110 | Feminist Practical Ethics | |
| WGST/PSCI 3174 | Sex, Power, and Politics: U.S. Perspectives | |
| WGST/JWST 3200 | Religion and Feminist Thought | |
| WGST 3201/ JWST 3202/RLST 3202 | Women, Gender & Sexuality in Jewish Texts & Traditions | |
| WGST/ENGL 3267 | Women Writers | |
| WGST/INVS 3302 | Facilitating Peaceful Community Change | |
| WGST 3400 | Gender, Personality, and Culture | |
| WGST/GRMN 3601 | German Women Writers | |
| WGST/RLST 3750 | Women in Buddhism | |
| WGST 3800 | Advanced Writing in Feminist Studies | |
| WGST/THTR 4073 | Performing Voices of Women | |
| WGST/SOCY 4086 | Family and Society | |
| WGST/JWST 4200 | Religion and Reproductive Politics in the United States | |
| WGST/ENGL 4277 | Special Topics in Women Writers | |
| WGST/REES 4471 | Women in 20th-21st Century Russian, East European and Eurasian Cultures | |
| WGST/HIST 4616 | | |
| WGST/HIST 4626 | | |
| WGST/HIST 4636 | Lesbian and Gay History: Culture and Politics and Social Change in the U.S. | |
| WGST/HIST 4640 | Women, Gender and War | |
| WGST/RLST 4850 | Gender in Hagiography | |

# Women and Gender Studies - Minor

The interdisciplinary women and gender studies minor offer students a rigorous and flexible program of study that examines women, gender and sexuality in relation to race, class, ability, nation and empire, among other variables. Students explore how gender and sexuality intersect with structures of power in a range of cultural, historical and geopolitical contexts. Drawing from approximately 50 courses, many cross-listed with other academic units, students fulfill the requirements of the minor and can design an emphasis relevant to their interests by focusing on one of three cognate areas: 1) gender/sexuality, 2) race/ethnicity and 3) global/ transnational.

Declaration of a minor is open to any student enrolled at CU Boulder, regardless of college or school.

# Requirements

## Required Courses and Credits

Students must complete a minimum of 18 credit hours with grades of C- or better in approved women and gender studies courses, 12 credit hours of which must be upper division (3000 or 4000 level). Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| WGST 2000 | Introduction to US Gender, Race and Sexuality Studies | 3 |
| or WGST 2600 | Introduction to Global Gender, Race and Sexuality Studies | |
| WGST 3020 | Feminist Methods of Inquiry and Praxis | 3 |
| WGST 3100 | Feminist Theories | 3 |
| **Cognate Areas** | | |
| One course each from two of the three cognate areas (see below) | | 6 |
| **Electives** [1] | | |
| Any lower- or upper-division course listed below that has not been used to fulfill any other minor requirements. | | 3 |
| **Total Credit Hours** | | **18** |

[1] Internships and independent study credit hours may apply, as well as special topics courses (WGST 3701, WGST 3702, WGST 3711, WGST 3712, WGST 4001 and WGST 4002); see advisor or department for more information.

## Cognate Areas

Students must take one course each from two different cognate areas for a total of 6 credit hours. Select topics offerings of special topics courses may apply to cognate areas; see advisor or department for more information.

### Queer and Trans Studies Cognate Area

| Code | Title | Credit Hours |
|---|---|---|
| Gender/Sexuality | | 0-3 |
| LGBT 3710 | Topics in LGBT Studies | |
| LGBT/ENGL 3796 | Queer Theory | |

| | |
|---|---|
| WGST 3600 | Latina/x Studies (may count for queer and trans studies or race/ethnicity, but not both) |
| WGST/ENGL 3767 | Feminist Fictions (may count for global/transnational or queer and trans studies, but not both) |
| WGST/LGBT/ ENGL 4287 | Special Topics in Queer Literature |
| WGST 4300 | Sex, Power, Politics: International Perspectives (may count for global/transnational or queer and trans studies, but not both) |
| WGST/LGBT 4400 | Critical Inquiries in Transgender Studies |
| WGST/HIST 4620 | (may count for global/transnational or queer and trans studies, but not both) |
| WGST/HIST 4636 | Lesbian and Gay History: Culture and Politics and Social Change in the U.S. |

### Race/Ethnicity Cognate Area

| Code | Title | Credit Hours |
|---|---|---|
| Race/Ethnicity | | 0-3 |
| DNCE 4017 | Dancing Histories: Sex, Gender and Race in U.S. Concert Dance | |
| ETHN 3026 | Women of Color: Chicanas in U.S. Society | |
| WGST/ETHN/ SOCY 3044 | Race, Class, Gender, and Crime | |
| WGST 3135/ ETHN 3136 | Chicana Feminisms and Knowledges | |
| WGST 3210/ ETHN 3213 | American Indian Women | |
| WGST/PSCI 3311 | Gender and U.S. Politics: Protest, Polls and Policy | |
| WGST 3505 | Historical and Contemporary Issues of African American Women | |
| WGST 3600 | Latina/x Studies (may count for queer and trans studies or race/ethnicity, but not both) | |
| WGST 3610 | Gender, Race, Science and Technology | |
| WGST 3620 | Women of Color and Activism | |
| WGST 3640 | Black Feminist and Womanist Theories | |
| WGST 3650/ PSCI 3052 | Gender and Politics in Latin America (may count for global/transnational or race/ethnicity, but not both) | |
| WGST 4100 | Indigenizing Feminism: Literature, Art, Film (may count for global/transnational or race/ethnicity, but not both) | |
| WGST/GRMN 4301 | Gender, Race and Immigration in Germany and Europe (may count for global/transnational or race/ethnicity, but not both) | |
| WGST/MDST 4331 | Gender, Race, Class, and Sexuality in Popular Culture | |
| WGST/HIST 4619 | Women in East Asian History | |

### Global/Transnational Cognate Area

| Code | Title | Credit Hours |
|---|---|---|
| Global/Transnational | | 0-3 |
| ANTH 3180 | Gender, Culture, and Sexuality | |
| ETHN 4001 | Screening Race, Class & Gender in the U.S. and the Global Borderland | |
| SOCY 4132 | Gender, Islam and Modernity | |
| WGST/SOCY 3012 | Gender and Development | |
| WGST 3220 | Women in Islam | |
| WGST/ARAB 3410 | Gender, Sexuality and Culture in the Modern Middle East | |
| WGST 3500 | Global Gender Issues | |
| WGST 3510 | Gender, Sexuality and Global Health | |
| WGST 3520 | Gender and Sexuality in Africa | |
| WGST 3650/ PSCI 3052 | Gender and Politics in Latin America (may count for global/transnational or race/ethnicity, but not both) | |
| WGST 3670 | Gender, Race, Sexuality and Global Migration | |
| WGST/GEOG 3672 | Who Runs the World? Sex, Power, and Gender in Geography | |
| WGST/ENGL 3767 | Feminist Fictions (may count for global/transnational or queer and trans studies, but not both) | |
| WGST 4010/ SOCY 4000 | Gender, Genocide and Mass Trauma | |
| WGST 4100 | Indigenizing Feminism: Literature, Art, Film (may count for global/transnational or race/ethnicity, but not both) | |
| WGST 4300 | Sex, Power, Politics: International Perspectives (may count for global/transnational or queer and trans studies, but not both) | |
| WGST/GRMN 4301 | Gender, Race and Immigration in Germany and Europe (may count for global/transnational or race/ethnicity, but not both) | |
| WGST 4500/ PSCI 4391 | Gender Politics and Global Activism | |
| WGST/HIST 4620 | (may count for global/transnational or queer and trans studies, but not both) | |

## Lower-Division Electives

Students may take no more than 3 credit hours of lower-division electives.

| Code | Title | Credit Hours |
|---|---|---|
| Lower-division electives | | 0-3 |
| LGBT 2000/ WGST 2030 | Introduction to Lesbian, Gay, Bisexual, and Transgender Studies | |
| LGBT/ENGL 2707 | Introduction to Queer Literature | |
| LING 2400 | Language, Gender and Sexuality | |
| WGST/SOCY 1006 | The Social Construction of Sexuality | |
| or WGST 1016 | Sex, Gender, and Society 1 | |
| or SOCY 1016 | Sex, Gender, and Society 1 | |

| | |
|---|---|
| WGST/ENGL 1250 | Introduction to World Literature by Women |
| or WGST 1270 | Introduction to American Literature by Women |
| or ENGL 1270 | Introduction to American Literature by Women |
| WGST 2020 | Femininities, Masculinities, Alternatives |
| WGST 2050 | Gender, Sexuality, and Popular Culture |
| WGST/CLAS 2100 | Gender and Sexuality in Ancient Greece |
| WGST/CLAS 2110 | Gender and Sexuality in Ancient Rome |
| WGST 2200 | Women, Gender, Literature, and the Arts |
| WGST/PHIL 2290 | Philosophy and Gender |
| WGST 2500 | Gender, Race, Sex and the Body |
| WGST/PSYC 2700 | Psychology of Gender and Sexuality |
| WGST/RLST 2800 | Women and Religion |

### Upper-Division Electives

Select an additional course or courses from the three cognate areas above or from the following upper-division electives listed below to bring the total credit hours in the minor to 18 and the total upper-division credit hours in the minor to 12.

| Code | Title | Credit Hours |
|---|---|---|
| Upper-Division Electives | | 0-3 |
| CINE 3013 | Women and Film | |
| COMM 3420 | Gender and Communication | |
| ENGL 3217 | Topics in Gender and Sexuality | |
| ITAL 4730 | Italian Feminisms: Culture, Theory, and Narratives of Difference | |
| PSYC 4553 | Women's Mental Health: A Biopsychosocial Approach | |
| WGST/SOCY 3016 | Marriage and the Family in the United States | |
| WGST/PHIL 3110 | Feminist Practical Ethics | |
| WGST/PSCI 3174 | Sex, Power, and Politics: U.S. Perspectives | |
| WGST/JWST 3200 | Religion and Feminist Thought | |
| WGST 3201/ JWST 3202/RLST 3202 | Women, Gender & Sexuality in Jewish Texts & Traditions | |
| WGST/ENGL 3267 | Women Writers | |
| WGST/INVS 3302 | Facilitating Peaceful Community Change | |
| WGST 3400 | Gender, Personality, and Culture | |
| WGST/GRMN 3601 | German Women Writers | |
| WGST/RLST 3750 | Women in Buddhism | |
| WGST 3800 | Advanced Writing in Feminist Studies | |
| WGST/THTR 4073 | Performing Voices of Women | |
| WGST/SOCY 4086 | Family and Society | |
| WGST/JWST 4200 | Religion and Reproductive Politics in the United States | |
| WGST/ENGL 4277 | Special Topics in Women Writers | |
| WGST/REES 4471 | Women in 20th-21st Century Russian, East European and Eurasian Cultures | |
| WGST/HIST 4616 | | |
| WGST/HIST 4626 | | |
| WGST/HIST 4640 | Women, Gender and War | |
| WGST/RLST 4850 | Gender in Hagiography | |

# Global Gender and Sexuality Studies - Certificate

The Department of Women and Gender Studies offers an undergraduate certificate in global gender and sexuality studies. The ever-increasing movement of people, commodities, politics and culture that define "globalization" affects all of us in different ways.

The certificate in global gender and sexuality studies provides students with an opportunity to study how individuals and groups from diverse gender, racial, ethnic, national, class and sexual backgrounds engage with the world and how processes of global change shape gender relations locally, nationally and internationally. The certificate is designed for students who wish to understand, analyze and respond to these dramatic global transformations and their impact on women and gender relations. The certificate complements students' majors and interests and prepares them for graduate studies and employment.

This interdisciplinary undergraduate certificate program takes advantage of the research strengths of the department's core and associate faculty and enhances the experience of undergraduate students in any major, including international affairs, political science, history, ethnic studies, geography, English, anthropology, sociology, integrative physiology, environmental studies and many others. Career specialization in international gender and sexuality has grown in both the private and public sectors, including fields such as international development, finance, public health, public policy and education.

For more details including application instructions, visit the Undergraduate Certificate in Global Gender & Sexuality Studies (http://www.colorado.edu/wgst/ggss/) webpage or email wgst@colorado.edu.

# Requirements

## Required Courses and Credits

Certificate requirements include 18 credit hours of specified coursework, including 12 credit hours at the upper-division level. A maximum of 6 credit hours transferred from other institutions will be accepted

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| *Lower-Division Required Course* | | *3* |
| WGST 2600 | Introduction to Global Gender, Race and Sexuality Studies | |
| *Upper-Division Required Courses* | | *6* |
| Choose two: | | |
| WGST 3500 | Global Gender Issues | |
| WGST 3510 | Gender, Sexuality and Global Health | |
| WGST 3520 | Gender and Sexuality in Africa | |
| WGST 3650/ PSCI 3052 | Gender and Politics in Latin America | |
| WGST 3711 | Topics in Global Gender and Sexuality Studies (AH) | |
| or WGST 3712 | Topics in Global Gender and Sexuality Studies (SS) | |
| WGST/ENGL 3767 | Feminist Fictions | |

| | | |
|---|---|---|
| WGST 4010/ SOCY 4000 | Gender, Genocide and Mass Trauma | |
| WGST 4100 | Indigenizing Feminism: Literature, Art, Film | |
| WGST 4300 | Sex, Power, Politics: International Perspectives | |
| WGST 4500/ PSCI 4391 | Gender Politics and Global Activism | |
| WGST/HIST 4620 | | |
| **Elective Courses** | | **9** |
| *Lower-Division Electives* | | |
| No more than 3 credit hours | | |
| WGST 2050 | Gender, Sexuality, and Popular Culture | |
| ANTH 1170 | Exploring Culture and Gender through Film | |
| LING 2400 | Language, Gender and Sexuality | |
| *Upper-Division Electives* | | |
| Choose from the upper-division requirements listed above as well as the following courses, 6-9 credit hours | | |
| WGST/SOCY 3012 | Gender and Development | |
| WGST 3201/ JWST 3202/RLST 3202 | Women, Gender & Sexuality in Jewish Texts & Traditions | |
| WGST/SCAN 3208 | Women in Nordic Society: Modern States of Welfare | |
| WGST 3210/ ETHN 3213 | American Indian Women | |
| WGST 3220 | Women in Islam | |
| WGST/ARAB 3410 | Gender, Sexuality and Culture in the Modern Middle East | |
| WGST 3670 | Gender, Race, Sexuality and Global Migration | |
| WGST/GEOG 3672 | Who Runs the World? Sex, Power, and Gender in Geography | |
| WGST/GRMN 4301 | Gender, Race and Immigration in Germany and Europe | |
| WGST/HIST 4619 | Women in East Asian History | |
| WGST/HIST 4640 | Women, Gender and War | |
| ETHN/CINE 4001 | Screening Race, Class & Gender in the U.S. and the Global Borderland | |
| ANTH 4505 | Globalization and Transnational Culture | |
| **Total Credit Hours** | | **18** |

Appropriate topics courses offered by other departments and programs—those that deal centrally with issues of gender and/or sexuality in global context—may count for upper division elective credit with the permission of the department's director of undergraduate studies. Students must get the director's approval beforehand, or credit toward the certificate is not guaranteed.

## Education Abroad and CU Global Seminars

Appropriate education abroad courses and CU Global Seminars that deal centrally with issues of gender and/or sexuality in global context may count for lower- or upper-division elective credit with the permission of the department's director of undergraduate studies. Only CU-sponsored education abroad programs and Global Seminars will count as CU credit. Appropriate education abroad courses taken through other accredited study abroad programs may count for elective transfer credit with the permission of the director of undergraduate studies. In all of these cases, students must get the director's approval beforehand, or credit toward the certificate is not guaranteed.

# Writing and Rhetoric, Program for

The Program for Writing and Rhetoric (PWR) is an award-winning, independent writing program that partners with multiple entities on and off campus to train students in the critical, creative and persuasive arts of applied public writing in order to prepare them for active participation in personal, civic and professional life.

While PWR's primary disciplinary domain is rhetoric and composition/ writing studies, our faculty engage in interdisciplinary research and/or have teaching expertise in ten main areas:

- Cultural rhetorics
- Content generation and new media
- Creative nonfiction
- Public rhetorics and advocacy
- Technical, professional and community writing
- Applied public humanities
- Digital information and critical data literacies
- Rhetorics of image, sound and the body
- Science writing and environmental rhetorics
- Writing studies and pedagogy

Through our wide range of lower and upper division course offerings, students learn how to be critical consumers and creative producers of knowledge, information and media. Students learn specifically how to research diverse perspectives, make well-reasoned arguments and hone their information literacies by exploring what counts as truth, fact and credible evidence. In addition to learning how to critique public discourse as well as systems and technologies of power, students also learn how to generate creative and persuasive content in multiple genres, media and modes for diverse audiences and aims. Whether students are interested in working toward social change, shaping public opinion, generating creative content or writing in a disciplinary or professional domain, our courses prepare students for communicative success in their everyday lives, communities and careers.

Students enrolled in PWR courses benefit from intimate learning environments in which students have opportunities to work closely with both their instructors and peers and receive extensive feedback on their work. Classes are generally conducted as intensive writing workshops, placing a premium on thoughtful, substantive revision. Many courses also offer direct experience in researching contemporary issues, engaging public audiences, working toward publication and working with local communities and organizations.

In taking our diverse courses, students cannot only fulfill lower and upper division written communication requirements but may also work toward accreditations such as a minor in writing for public engagement or certificate in interdisciplinary writing.

For information about specific classes and accreditations, students should visit www.colorado.edu/pwr (http://www.colorado.edu/pwr/) . Students should always check with their advisors to be sure that they are taking the right course to fulfill their requirements.

## Minor

- Writing and Public Engagement - Minor (p. 284)

## Certificate

- Writing - Certificate (p. 654)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Abiragi, Anthony A. (https://experts.colorado.edu/display/fisid_147611/)
Assistant Teaching Professor; PhD, New York University

Ackerman, John Martin (https://experts.colorado.edu/display/fisid_144951/)
Associate Professor; PhD, Carnegie Mellon University

Albert, Michelle A. (https://experts.colorado.edu/display/fisid_134708/)
Associate Teaching Professor; MFA, Naropa Institute

Barkin, Sarah (https://experts.colorado.edu/display/fisid_156490/)
Assistant Teaching Professor; PhD, Syracuse University

Bliss, Anne
Senior Instructor Emerita; PhD, University of Colorado Boulder

Burger, Eric B. (https://experts.colorado.edu/display/fisid_143577/)
Associate Teaching Professor; PhD, University of Utah

Byrd, Sigman M. (https://experts.colorado.edu/display/fisid_127494/)
Associate Teaching Professor; PhD, University of Utah

Colley, Dawn (https://experts.colorado.edu/individual/fisid_149567/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Couey, Stephanie
Assistant Teaching Professor; PhD, University of Colorado Boulder

Dickson, Rebecca (https://experts.colorado.edu/display/fisid_105043/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Doyle, Damian P. (https://experts.colorado.edu/display/fisid_100290/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Ellis, Jay (https://experts.colorado.edu/display/fisid_122674/)
Associate Teaching Professor; PhD, New York University

Feldman, Andrea (https://experts.colorado.edu/display/fisid_101230/)
Teaching Professor of Distinction Emerita; PhD, University of Colorado Boulder

Ferrell, Tracy L. (https://experts.colorado.edu/display/fisid_101540/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Fobes, Alexander S. (https://experts.colorado.edu/display/fisid_152512/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Green, Sally Edith (https://experts.colorado.edu/display/fisid_122076/)
Associate Teaching Professor Emerita; MA, University of Colorado Boulder

Gries, Laurie Ellen (https://experts.colorado.edu/display/fisid_155951/)
Associate Professor, Faculty Director; PhD, Syracuse University

Henningsen, Matthew Scott (https://experts.colorado.edu/display/fisid_156802/)
Assistant Teaching Professor; PhD, Marquette University

Hersh, Orly M. (https://experts.colorado.edu/display/fisid_143580/)
Associate Teaching Professor; MA, Northern Arizona University

Hessel, Kurtis (https://experts.colorado.edu/individual/fisid_159325/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Knowlton, Ginger (https://experts.colorado.edu/display/fisid_112458/)
Associate Teaching Professor; PhD, University of Denver

Kratzke, Peter J. (https://experts.colorado.edu/display/fisid_126546/)
Associate Teaching Professor Emeritus; PhD, University of Kentucky

Krywicki, Jarad (https://experts.colorado.edu/display/fisid_164243/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Kunce, Catherine (https://experts.colorado.edu/display/fisid_120631/)
Associate Teaching Professor; PhD, University of Denver

Lamos, Steven Joseph (https://experts.colorado.edu/display/fisid_141169/)
Associate Professor, Faculty Director; PhD, University of Illinois at Urbana–Champaign

Long, Daniel R. (https://experts.colorado.edu/display/fisid_149910/)
Associate Teaching Professor; MA, University of Colorado Boulder

Macdonald, Christine (https://experts.colorado.edu/display/fisid_105513/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Massey-Warren, Sarah (https://experts.colorado.edu/display/fisid_145057/)
Assistant Teaching Professor Emerita; PhD, University of Colorado Boulder

Min, Young Kyung (https://experts.colorado.edu/display/fisid_156466/)
Assistant Teaching Professor; PhD, University of Illinois at Urbana–Champaign

Myers, Seth G. (https://experts.colorado.edu/display/fisid_153207/)
Associate Teaching Professor; PhD, New Mexico State University

Newsom, Elia (https://experts.colorado.edu/display/fisid_172312/)
Assistant Teaching Professor; PhD, Wayne State University

Norgaard, Rolf P. (https://experts.colorado.edu/display/fisid_102502/)
Teaching Professor of Distinction Emeritus, Associate Faculty Director; PhD, Stanford University

Padgett, Adam
Assistant Teaching Professor; PhD, University of South Carolina

Pearce, Lonni Dee (https://experts.colorado.edu/display/fisid_134710/)
Associate Teaching Professor, Associate Faculty Director; PhD, University of Arizona

Pieplow, Kathryn
Senior Instructor Emerita; JD, University of South Dakota

Pieplow, Nathan D. (https://experts.colorado.edu/display/fisid_131512/)
Associate Teaching Professor; MEd, University of Oregon

Reilly, Kerry Anne (https://experts.colorado.edu/display/fisid_131502/)
Associate Teaching Professor; MFA, University of Iowa

Rios, Gabriela (https://experts.colorado.edu/individual/fisid_167679/)
Assistant Professor; PhD, Texas AM University

Rivera, John-Michael (https://experts.colorado.edu/display/fisid_118393/)
Professor, Endowed Chair; PhD, University of Texas at Austin

Schaberg, Petger J. (https://experts.colorado.edu/display/fisid_103135/)
Associate Teaching Professor; MA, University of Colorado Boulder

Shade-Johnson, Jaquetta
Assistant Professor; PhD, Michigan State University

Shanmugaraj, Nisha (https://experts.colorado.edu/display/fisid_173859/)
Assistant Professor; PhD, Carnegie Mellon University

Stewart, Jennifer
Assistant Teaching Professor; MA, Colorado State University

Strauch, Bret
Assistant Teaching Professor; PhD, Bowling Green University

Swan, Elizabeth
Assistant Teaching Professor; PhD, University of South Carolina

von der Nuell, Tobin D. (https://experts.colorado.edu/display/fisid_113896/)
Associate Teaching Professor; MA, University of Colorado Boulder

Wenger, Paula (https://experts.colorado.edu/display/fisid_113621/)
Associate Teaching Professor; MA, Miami University–Oxford

Wilson, Andrew (https://experts.colorado.edu/individual/fisid_159824/)
Associate Teaching Professor; PhD, University of Florida

# Courses

**WRTG 1100 (4) Extended First-Year Writing and Rhetoric**
Extended version of WRTG 1150 intended for students desiring more preparation and practice in college writing. Meets the same goals and fulfills the same requirements as WRTG 1150. Includes one-hour recitation for small group work. Focuses on rhetorical analysis, argument, inquiry and information literacy. Taught as a writing workshop, the course emphasizes practicing strategies for all phases of the writing process. For placement criteria, see the arts and sciences advising office.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Additional Information:** GT Pathways: GT-CO2 - Communication
Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Lower
MAPS Course: English

**WRTG 1150 (3) First-Year Writing and Rhetoric**
Rhetorically informed introduction to college writing. Focuses on rhetorical analysis, argument, inquiry and information literacy. Taught as a writing workshop, the course emphasizes practicing writing strategies for all phases of the writing process. For placement criteria, see the arts and sciences advising office.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** GT Pathways: GT-CO2 - Communication
Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Lower
MAPS Course: English

**WRTG 1160 (3) CMCI First-Year Writing and Rhetoric**
Rhetorically informed introduction to college writing for CMCI students enrolled in CMCI 1040. Focuses on rhetorical analysis, argument, inquiry, and information literacy. Taught as a writing workshop, the course emphasizes practicing writing strategies for all phases of the writing process.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Communication, Media, Design and Information (CMDI) undergraduate students only.
**Additional Information:** GT Pathways: GT-CO2 - Communication
Arts Sci Gen Ed: Written Communication-Lower

**WRTG 1250 (3) Advanced First-Year Writing and Rhetoric**
Advanced version of WRTG 1150 intended for more experienced writers, this course meets the same goals and fulflls the same requirements as WRTG 1150 but at a more challenging level. Focuses on rhetorical analysis, argument, inquiry, and information literacy. Taught as a writing workshop, the course emphasizes practicing writing strategies for all phases of the writing process. For placement criteria, see the arts and sciences advising office.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** GT Pathways: GT-CO2 - Communication
Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Lower
MAPS Course: English

**WRTG 1840 (1-3) Independent Study in Writing**
**Repeatable:** Repeatable for up to 8.00 total credit hours.

**WRTG 2000 (3) Information and Society**
In an information economy, few skill sets are as fundamental to our civic, economic, and environmental well-being as information literacy. This writing course will train students to produce, categorize, and analyze information in academic and real-world contexts. In addition to information literary, we will examine the writing thresholds and habits of mind conducive to the effective uses of information. Through extensive use of digital technologies, students will equally cultivate the skills of digital literacy.
**Recommended:** Prerequisite WRTG 1150 or equivalent.

**WRTG 2020 (3) Introduction to Creative Nonfiction**
Explores from both the reader's and writer's perspectives the forms of creative nonfiction, including personal essay and memoir. Students will read and write extensively within this genre, develop skill in revision and peer critique and learn how to submit work for publication. Does not fulfill core requirements. Department enforced prerequisite: WRTG 1150 or equivalent (completion of lower-division writing requirement).

**WRTG 2090 (3) Electives in Writing**
Explores a variety of academic and professional writing genres, ranging from research to technical writing, in intensive workshops. Students read and write extensively across genres. Check with program for semester offerings. Designed for self-motivated students in all majors. Does not fulfill core requirements. Department enforced prereq., WRTG 1150 or equivalent (completion of lower-division writing requirement)
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**WRTG 2095 (3) Ideas for Social Change**
Introduces key concepts and practices central to understanding historical and contemporary social movements in the U.S. Grounded in theories about discourse, bodies, culture, and power, the course is taught through various frameworks such as intersectionality, rhetoric, critical race theory, feminism, queer studies, decolonial studies, and/or LGTBQ+ studies. Students will discover, identify, and analyze social issues of significance to them; practice developing their own visions for social change; and present their visions in public-facing multi-modal genres. Formerly offered as a special topics course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WRTG 2930 (1-6) Internship in Writing and Rhetoric**
Provides academically supervised opportunity for undergraduate students to engage in writing and rhetoric as a practical and productive art. Students may work in a variety of organizations (public/government/civic/private) on writing-intensive projects related to their career goals, and thereby connect classroom theory to real-world practice. Prior approval of PWR internship coordinator required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** This course is restricted to students with 30 credits (Sophomores) with a 3.0 cumulative GPA.

**WRTG 3007 (3) Writing in the Visual Arts**
Enables students in the arts to improve their writing skills through organization, presentation, critique and revision. Writing assignments include formal writing (analysis and argument), informal writing and grant proposals. Department enforced prerequisite: WRTG 1150 or equivalent (completion of lower-division writing requirement).
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) AAAH or FILM/FMST or AASA or AASF or THTR or TBFA or DNCE or DBFA or AMST or ARCH or ATLS or BASA or CLAS or DSGN or ETHN or JADV or MDST or RLST or TMEN or EDUC majors only.
**Additional Information:** GT Pathways: GT-CO3 - Communication: Advanced Writing Course
Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**WRTG 3010 (3) Technology, Rhetoric and the Self in Contemporary Life**
Weaves theories of rhetoric with theories of information, data, and technology to investigate how digital information systems mediate contemporary ways of knowing and being in everyday life. Through seminar discussions and a suite of public facing assignments, students will have opportunities to question their own roles in information networks, critique systems of power, and enter into contemporary debates about the overlaps of data, media, and ethics.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WRTG 3020 (3) Topics in Writing**
Through sustained inquiry into a selected topic or issue, students will practice advanced forms of academic writing. Emphasizes analysis, criticism and argument. Taught as a writing seminar, places a premium on substantive, thoughtful revision. Department enforced prerequisite: WRTG 1150 or equivalent (completion of lower-division writing requirement).
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students w/ 57-180 credits (Jr or Sr) in AS (ARSCU), College of Media, Comm Info (CMCIU) or School of Ed (EDUCU) or Business (BUSNU) or Comp Sci Bachelor of Arts (CSEN-BA) or Prog in Env Design (ARPLU) or College of Music (MUSC) only.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**WRTG 3030 (3) Writing on Science and Society**
Through selected reading and writing assignments, students consider ethical and social ramifications of science policy and practice. Focuses on critical thinking, revision, analytical writing, and oral presentation. Taught as a writing seminar, the course addresses communication with professional and non-technical audiences.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits in Engineering, MCDB, EBIO, GEOL, ASTR, IPHY, PHYS, MATH, ECON, BCHM, CHEM, PSYC, NRSC, EDUC, ATOC, GEOG, CSCI or Program in Env Des (ARPLU) majors only.
**Additional Information:** GT Pathways: GT-CO3 - Communication: Advanced Writing Course
Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**WRTG 3035 (3) Technical Communication and Design**
Rhetorically informed introduction to technical writing that hones communication skills in the context of technical design activities. Treats design as a collaborative, user-oriented, problem-based activity, and technical communication as a rhetorically informed and persuasive design art. Taught as a writing seminar emphasizing critical thinking, revision, and oral presentation skills. Focuses on client-driven design projects and effective communication with multiple stakeholders.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** GT Pathways: GT-CO3 - Communication: Advanced Writing Course
Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**WRTG 3040 (3) Writing on Business and Society**
Through selected reading and writing assignments, students examine ethical and social issues in the context of business decision-making processes. Focuses on critical thinking, revision, analytical writing and oral presentation. Taught as a writing seminar, the course emphasizes effective communication with professional and non-technical audiences. Department enforced prerequisite: WRTG 1150 or equivalent (completion of lower-division writing requirement).
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**WRTG 3045 (3) Writing for Emerging Workplaces**
A rhetorically-informed professional writing course addressing key competencies needed in emerging workplaces. Intended for juniors and seniors from a wide range of majors who anticipate working in communication-intensive capacities. Taught as a writing seminar inspired by design thinking, with a focus on prototyping, revision, critical thinking, and collaborative engagement. Key topics: the future of work, rapid prototyping of career options, proposal writing, writing for policy debates, data analysis and visualization, report writing, and advanced oral presentation and multimedia skills. Satisfies A&S Upper-Division Written Communication requirement.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Written Communication-Upper

**WRTG 3070 (3) Advocating with Data**
Teaches how to use data and data-driven arguments to advocate for change on issues of concern. Via rhetorical and other critical frameworks, explores definitions of data and its relations to power, publics, and justice. Students will produce persuasive texts, including multimodal texts and data visualizations, intended for real-world advocacy and publication in a variety of media and genres. Taught as a writing workshop, with a focus on revision, critical thinking, and collaborative engagement.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Written Communication-Upper Arts Sci Gen Ed: Distribution-Arts Humanities

**WRTG 3090 (1-3) Open Topics in Writing: Advanced**
Advanced topics course providing intensive, specialized writing instruction in selected topics. Check with the program for semester offerings. Does not fulfill core requirements. Department enforced prerequisite: WRTG 3007 or WRTG 3020 WRTG 3030 or WRTG 3035 or WRTG 3040 or instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**WRTG 3095 (3) Journal Publishing**
Offers hands-on publishing experience that enable students to hone multiple skills related to but not limited to writing, editing, and production. Students work on staff of two annual journals of creative nonfiction sponsored by the Program for Writing and Rhetoric, currently Hindsight and Changing Skies. Students collaborate with other staff members to bring a print issue from acquisitions through editing, into digital compositing and final proofreading, to print production and ¿launch¿ with public readings from both students and global writers. Students also gain experience publishing online-only features for both journals, videos, podcasts, and creative nonfiction in all its forms. This course may be repeated up to 6 total credit hours.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**WRTG 3400 (3) Race and Epistemic Justice**
This course will study the visual construction of race in the United States from the slavery era to the digital age. Through analyses of diverse media (photography, cinema, television, and digital platforms), we will interrogate testimony, witnessing, and visual self-creation as long-standing forms of political agency in the United States. Finally, we will test the hypothesis that epistemic justice ¿ equal treatment of one another as knowers and documenters ¿ is an inseparable component of racial justice.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 3400

**WRTG 3840 (1-3) Independent Study**
Department enforced prerequisite: WRTG 3007 or WRTG 3020 or WRTG 3030 or WRTG 3035 or WRTG 3040 or instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**WRTG 3930 (1-6) Internship in Writing and Rhetoric**
Provides academically supervised opportunity for undergraduate students to engage in writing and rhetoric as a practical and productive art. Students may work in a variety of organizations (public/government/civic/private) on writing-intensive projects related to their career goals, and thereby connect classroom theory to real-world practice. Prior approval of PWR internship coordinator required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** This course is restricted to students with 57 credits (Juniorss) with a 3.0 cumulative GPA.

**WRTG 4910 (1-3) Portfolio Curation in Writing and Rhetoric**
Provides academically supervised opportunity for undergraduate students to curate, reflect on and synthesize their learning over a range of courses through the production of an electronic portfolio. One credit hour required of students seeking the Interdisciplinary Writing Certificate. Approval of PWR Certificate coordinator required prior to registration.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors). Requires cumulative GPA of 3.0 or higher.

# Writing - Certificate

The interdisciplinary certificate in writing is designed to help CU Boulder undergraduates sharpen their written and communication abilities through an interdisciplinary learning experience. The certificate complements students' academic majors by helping students gain extensive experience writing for diverse audiences and aims that are applicable in civic and professional spheres.

The certificate is housed in the Program for Writing and Rhetoric (PWR), yet to fulfill its interdisciplinary mission, students can take courses not only in PWR but also English, linguistics, communication, journalism, media studies and education to fulfill certificate requirements. The certificate includes a practicum and culminates in a curated electronic portfolio that showcases student work and can be used to pursue graduate education or other professional interests.

# Requirements

Students must complete at least 18 credit hours, 9 of which must be upper-division, and adhere to the following:

- At least 6 credit hours: WRTG courses within the PWR (not including 1000-level courses).
- At least 6 credit hours: courses from outside of the PWR.
- At least 1 credit hour: required portfolio curation pass/fail course, and practicum course(s) focusing on applied professional work.

No more than two courses (6 credit hours) can be counted from a student's major and no more than 6 credit hours of transfer work from another institution may be applied to the certificate.

## Overview of Required Courses

| Code | Title | Credit Hours |
|---|---|---|
| **Writing and Rhetoric Courses** | | |
| Select at least two courses (6 credits) from the following: | | 6 |
| WRTG 2000 | Information and Society | |
| WRTG 2020 | Introduction to Creative Nonfiction | |
| WRTG 2090 | Electives in Writing | |
| WRTG 2095 | Ideas for Social Change | |

| | | |
|---|---|---|
| WRTG 2930 | Internship in Writing and Rhetoric | |
| WRTG 3007 | Writing in the Visual Arts | |
| WRTG 3010 | Technology, Rhetoric and the Self in Contemporary Life | |
| WRTG 3020 | Topics in Writing | |
| WRTG 3030 | Writing on Science and Society | |
| WRTG 3035 | Technical Communication and Design | |
| WRTG 3040 | Writing on Business and Society | |
| WRTG 3045 | Writing for Emerging Workplaces | |
| WRTG 3070 | Advocating with Data | |
| WRTG 3090 | Open Topics in Writing: Advanced | |
| WRTG 3095 | Journal Publishing | |
| WRTG 3400 | Race and Epistemic Justice | |
| WRTG 3840 | Independent Study | |
| WRTG 3930 | Internship in Writing and Rhetoric | |
| **Courses Outside Writing & Rhetoric** | | |
| Select at least two courses (6 credits) outside of the PWR. See details below. | | 6 |
| **Portfolio Curation & Practicum Course(s)** | | **1** |
| WRTG 4910 | Portfolio Curation in Writing and Rhetoric | |
| **Electives** | | **5** |
| **Total Credit Hours** | | **18** |

## About the Requirements

### Courses from Outside the Program for Writing and Rhetoric

Select at least two courses (6 credits) outside the program from the following two categories, in any combination.

#### Courses that Fulfill the A&S Upper-Division Written Communication Requirement

| Code | Title | Credit Hours |
|---|---|---|
| ARSC 3100 | Multicultural Perspective and Academic Discourse | 3 |
| CHIN 3200 | Adv Wrtg Topics on Chinese & Japanese Literature and Civilization | 3 |
| EBIO 3940 | Written Communication in the Sciences | 3 |
| ENVS 3020 | Advanced Writing in Environmental Studies | 3 |
| GEOL 3090 | Developing Scientific Writing Skills | 3 |
| HIST 3020 | Historical Thinking & Writing | 3 |
| HONR 3220 | Advanced Honors Writing Workshop | 3 |
| IPHY 3700 | Scientific Writing in Integrative Physiology | 3 |
| ITAL 3025 | Advanced Composition 2: Introduction to Literary Writing | 3 |
| JPNS 3200 | Adv Wrtg Topics on Chinese & Japanese Literature and Civilization | 3 |
| PHIL 3480 | Critical Thinking/Writing in Philosophy | 3 |
| RLST 3020 | Advanced Writing in Religious Studies | 3 |
| ARTS 4050 | Writing Across the Arts: Culture Writing in the 21st c | 3 |
| ENGL 3026 | Syntax, Citation, Analysis: Writing About Literature | 3 |
| ENGL 3830 | Topics in Advanced Writing and Research | 3 |
| ENGL 4026 | Special Topics in Genre, Media, and Advanced Writing | 3 |
| FREN 3050 | French Composition | 3 |
| PHYS 3050 | Writing in Physics: Problem-Solving and Rhetoric | 3 |
| SPAN 3010 | Advanced Rhetoric and Composition | 3 |
| WGST 3800 | Advanced Writing in Feminist Studies | 3 |

#### Courses that Treat Theories and Contexts Pertaining to Writing

Students in the following programs may count up to two of the listed courses in their major (6 credits) toward the certificate.

| Code | Title | Credit Hours |
|---|---|---|
| **Communication Majors** | | |
| COMM 1210 | Perspectives on Human Communication | 3 |
| COMM 1300 | Public Speaking | 3 |
| COMM 2400 | Discourse, Culture and Identities | 3 |
| COMM 3300 | Rhetorical Thinking | 3 |
| COMM 3320 | Persuasion in Society | 3 |
| COMM 3340 | Political Communication | 3 |
| COMM 3410 | Intercultural Communication | 3 |
| COMM 3420 | Gender and Communication | 3 |
| COMM 3610 | Communication, Technology, and Society | 3 |
| COMM 3630 | Organizational Communication | 3 |
| COMM 4100 | Seminar in Honors Thesis Writing and Research | 3 |
| **Education Licensure Students** [1] | | |
| EDUC 3013 | School and Society | 3 |
| EDUC 4135 | Story and Memoir | 3 |
| **English Majors** [2] | | |
| ENGL 1191 | Introduction to Creative Writing | 3 |
| ENGL 2036 | Introduction to Media Studies in the Humanities | 3 |
| ENGL 4026 | Special Topics in Genre, Media, and Advanced Writing | 3 |
| ENGL 4116 | Advanced Topics in Media Studies | 3 |
| ENGL 4830 | Honors Thesis | 3 |
| **Journalism Majors** | | |
| JRNL 2401 | Media Coverage of Diverse Populations | 3 |
| JRNL 3112 | Concepts in Visual Culture | 3 |
| JRNL 3201 | Critical Perspectives on Journalism | 3 |
| JRNL 3202 | Covering Political Campaigns | 3 |
| JRNL 3401 | Sociology of News | 3 |
| JRNL 4311 | Literary Journalism | 3 |
| JRNL 4401 | News and Public Perception | 3 |
| JRNL 4411 | International Media and Global Crises | 3 |
| **Linguistics Majors** | | |
| LING 1000 | Language in U.S. Society | 3 |
| LING 1010 | The Study of Words | 3 |
| LING 2400 | Language, Gender and Sexuality | 3 |
| LING 3220 | American Indigenous Languages in their Social and Cultural Context | 3 |
| LING 3545 | World Language Policies | 3 |
| LING 4800 | Language and Culture | 3 |

| | | |
|---|---|---|
| LING 4830 | Honors Thesis | 3 |
| **Media Studies Majors** | | |
| MDST 3002 | Digital Culture and Politics | 3 |
| MDST 3201 | Media, Culture and Globalization | 3 |
| MDST 3321 | Media Industries and Economics | 3 |
| MDST 3401 | Media, Food and Culture | 3 |
| MDST 3711 | Media and Popular Culture | 3 |
| MDST 3791 | Media and the Public | 3 |
| MDST 4111 | Crime, Media and Contemporary Culture | 3 |
| MDST 4211 | Asian Media and Culture | 3 |
| MDST 4331 | Gender, Race, Class, and Sexuality in Popular Culture | 3 |
| MDST 4371 | Media and Religion | 3 |

[1] Upper-division EDUC courses in Literacy Studies count toward the certificate. Consult the School of Education for offerings in any given semester.

[2] Just as 1000-level PWR expository writing courses do not count toward the certificate, neither is ENGL 1001 eligible.

### Practicum Course(s)

Students must complete a 1-credit, pass/fail course for portfolio curation (WRTG 4910). In addition, they may also select the options below as electives. Students may select the option that best suits their interest and career goals.

#### Internship

Of interest to students intending to work in business, industry or nonprofits:

- Complete an internship, either with the PWR (WRTG 2930 or WRTG 3930) or with the major department (e.g., ENGL 3930 or JRNL 4931), that has a significant writing component. For an internship to count toward the certificate, it must be pre-approved by the certificate coordinator. Following the internship, the student must submit a brief (2–3 page) report describing the writing activities and how the internship contributed to learning outcomes.

#### Writing Center Consultancy or School-Based Literacy Practicum

Of interest to students intending to work in education and related fields:

- WRTG 2090 Electives in Writing (3) (Writing Center Theory and Practice)
- EDUC 4321 Writing Instruction for Elementary Schools (3) (for students already accepted into the teacher licensure program)
- EDUC 4345 Secondary English Methods I (3) (for students already accepted into the teacher licensure program)

#### Graduate Study in Writing Pedagogy

Of interest to students intending to conduct graduate work in rhetoric and composition:

- WRTG 5050 Graduate Studies in Writing and Rhetoric (3) (various topics, with permission).

## Learning Outcomes

The certificate in writing has at its core a set of *aspirational learning outcomes*, which are met over the course of the certificate:

- Compose effectively in a variety of genres, ranging from academic genres to professional workplace genres and civic genres.
- Address a range of audiences effectively and to understand how to accommodate secondary or multiple audiences.
- Analyze and/or argue effectively, and to call on available means of persuasion and apply appropriately a range of rhetorical strategies.
- Draw on a range of styles as appropriate to the purpose, audience and rhetorical situation, and to meet professional standards of correctness.
- Apply disciplinary expertise to engage a range of readers, in a variety of rhetorical contexts.
- Compose with digital and multi-modal tools in evolving, hybrid genres.
- Understand and practice writing as an act of composing in the broader media landscape.
- Seek, access, evaluate and apply a range of information literacy resources and to appreciate the complex, evolving role of information in disciplinary and social contexts.
- Use composition skills effectively in broader contexts of communication, including public speaking.
- Apply compositional skills in professional contexts and organizations, ranging from advanced academic work to business settings, and in genres ranging from PowerPoint presentations to scientific posters.
- Ability to appreciate and use composing tools in civic contexts and in life-long learning.

The student will have the opportunity to demonstrate how these aspirational learning goals have been met by creating and curating an *electronic portfolio* of work completed during the certificate experience. This portfolio asks students to synthesize their learning and articulate how it advances their academic and professional goals.

# Writing and Public Engagement - Minor

The writing and public engagement (WPE) minor is designed to help students hone the arts of persuasive writing and storytelling in diverse public-facing genres and media. Through a unique curriculum offered by the Program for Writing and Rhetoric and the English Department, students learn how to leverage a wide variety of technologies to design, produce and distribute multi-modal compositions; write in professional settings and with community partners; and write individually and collaboratively for social change. From forwarding public arguments to designing social media content to composing for nonprofits, this minor enables students to learn valuable skills, practices and tools that are crucial for communication, work and civic engagement in the 21st century.

## Requirements

Requirements for the minor in writing and public engagement include:

1. Earn 18 credits in ENGL and WRTG courses with grades of C- or better. At least 12 credits must be in upper division, and at least 9 credits must be ENGL designated courses.
2. Students may apply no more than 9 credit hours of transfer work, including no more than 6 upper division credit hours, towards a minor. This is a college residency rule for an 18-credit minor.
3. Students may apply one lower- or upper-division Creative Writing or Literature ENGL course of their choice to count towards the minor.

4. Students must maintain at least a 2.00 (C) GPA in all courses counting toward the minor.
5. All courses applied to the writing and public engagement minor must be from the Department of English (ENGL) or the Program in Writing and Rhetoric (WRTG).
6. English majors (Creative Writing or Literature and Cultural Studies) are not eligible to declare/earn this minor.
7. Must have completed the 3-credit lower-division Written Communication requirement as required by all schools and colleges at CU Boulder prior to declaring the minor

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Theory** | | **3** |
| Choose one: | | |
| WRTG 2095 | Ideas for Social Change | |
| WRTG 3010 | Technology, Rhetoric and the Self in Contemporary Life | |
| ENGL 3377 | Literatures of Race, Multiculturalism, Ethnicity (Select topics only) | |
| **Practice** | | **3** |
| Choose one: | | |
| ENGL 3026 | Syntax, Citation, Analysis: Writing About Literature | |
| ENGL 3830 | Topics in Advanced Writing and Research (Select topics only) | |
| WRTG 2020 | Introduction to Creative Nonfiction | |
| WRTG 3020 | Topics in Writing (Select topics only) | |
| WRTG 3045 | Writing for Emerging Workplaces | |
| **Action** | | **3** |
| Choose one: | | |
| ENGL 3940 | Service Learning Practicum (Select topics only) | |
| ENGL 4116 | Advanced Topics in Media Studies (Select topics only) | |
| ENGL 4206 | Writing for the Real World (Select topics only) | |
| WRTG 2090 | Electives in Writing | |
| WRTG 2930 | Internship in Writing and Rhetoric | |
| WRTG 3035 | Technical Communication and Design | |
| WRTG 3070 | Advocating with Data | |
| WRTG 3095 | Journal Publishing | |
| WRTG 3930 | Internship in Writing and Rhetoric | |
| **Electives** | | **9** |
| Choose one of the following: | | |
| Choose 9 credits from any of the courses listed above not being used to fill the Theory, Practice or Action requirements. | | |
| Choose 6 credits from any of the courses listed above not being used to fill the Theory, Practice or Action requirements and 3 credits of any other ENGL course. | | |
| **Total Credit Hours** | | **18** |

## Learning Outcomes

Upon completing the program, students will be able to:

- Synthesize and apply theories of writing, rhetoric and publics with critical race, decolonial, queer and other critical theories to a variety of rhetorical situations central to public life.
- Use a wide range of research methods#including but not limited to rhetorical criticism, genre analysis, archival research, action#oriented research, iconographic tracking, case studies, ethnography, oral story telling to investigate and address a variety of complex contemporary cultural, political and environmental issues on local, national and transnational scales.
- Design, create and deliver persuasive compositions in a variety of genres, modes and media for diverse public audiences and rhetorical goals such as argument, advocacy, activism, policy change, community organizing, productive dialogue, networking and awareness raising.
- Put writing into practice with a variety of other strategic tactics to engage effectively in political and nonpolitical actions central to public life.
- Analyze, organize, create and circulate documents and artifacts that contribute to identity construction, institutional and cultural memory, organizational structures, public assemblage and policy making.
- Understand and manipulate how writing and information circulates and gets taken up in an era of misinformation, data overload, intense political division, racial intensity and algorithmic injustice.
- Design and manage an online presence for both self and community organizations through digital content and social media writing.

# Business

The new innovation economy requires—and rewards—richer knowledge, sharper skills and a global mindset. Ultimately, the edge belongs to those who are principled leaders who bring inspiration and purpose to their work and in this way drive value for society.

Within this climate, the Leeds School of Business offers an innovative agenda designed to leverage our unique assets: the intellectual capital of Leeds faculty, our innovative and best-in-class curriculum, our focus on the "whole student" experience, our strong network of alumni and industry partners and our firm commitment to student support.

Accredited by the Association to Advance Collegiate Schools of Business (AACSB-International), Leeds awards four types of degrees: Bachelor of Science (BS), Master of Science (MS), Master of Business Administration (MBA) and Doctor of Philosophy (PhD). Undergraduate students can specialize in accounting, finance, management and entrepreneurship, business analytics, marketing, and real estate. Leeds further offers certificates in a variety of areas to provide opportunities for students to explore additional areas of interest and distinction.

World-class faculty provide the foundation for breakthrough thinking—creating knowledge from research, disseminating knowledge through teaching and applying knowledge in collaboration with the business community. Faculty discoveries are frequently published in prestigious academic journals and discussed in media outlets such as the *The Wall Street Journal*, *The New York Times*, CNBC and more. The cutting-edge research we produce enhances the school's reputation for innovation.

From orientation to graduation, Leeds faculty and staff guide students to discover and optimize their potential. Through an array of targeted

services, students create an individualized journey that maximizes the impact of their experience and leads to future opportunities. Ethics and social responsibility are hallmarks of a Leeds education, and the school's commitment to professional development is unrivaled.

Leeds alumni and industry partners collaborate to offer a meaningful level of engagement with students and faculty. Alumni provide the support and resources that ensure graduates are poised for maximum impact. Corporate partners infuse relevance to Leeds' curriculum innovation, supporting new programs and providing the school access to professional talent. Both communities are the backbone of one of the largest mentoring programs in the world.

Leeds joins the University of Colorado and the Boulder community to generate extraordinary opportunities for students. Cross-campus collaborations with fields like engineering and science link Leeds faculty and students with more resources to put innovation into action. Our location in Boulder provides inspiration with its physical beauty as well as the intellectual energy of a thriving start-up community and high concentrations of advanced technology and socially responsible industries.

Together, these assets make Leeds uniquely qualified to deliver on our mission of educating principled, innovative leaders who drive value.

### Graduation Recognition Ceremony

Every May, the Office of the Dean and the Leeds Business Student Government sponsor a recognition ceremony honoring the graduating class, in addition to the university-wide commencement. Graduates and their families are invited to attend.

## Facilities & Research

The Leeds School of Business houses resources for the specific needs of business students:

- Burridge Center for Finance
- Business Research Division
- Career Development
- Center for Education on Social Responsibility
- Center for Research on Consumer Financial Decision Making
- Michael A. Klump Center for Real Estate
- Office of Diversity Affairs
- Robert H. and Beverly A. Deming Center for Entrepreneurship
- Smart classrooms
- Student lounges
- Undergraduate Student Services
- Graduate Student Services
- William M. White Business Library and Information Commons

### The William M. White Business Library and Information Commons

The White Business Library (http://www.colorado.edu/libraries/libraries/william-m-white-business-library/) and Information Commons provide students with a wealth of information pertaining to the business world. Students have access to the business and other libraries via the university libraries online catalog. Many databases are accessible through the wireless network and off campus. These databases contain a myriad of full-text magazines and journals; business periodical indexes; corporate annual, 10-K and proxy reports of all the public companies in the United States; short profiles of both American and international companies; demographic and business statistics; industry and market information; and investment reports written by Wall Street analysts. Over 50 computers provide access to the databases and the internet, and technology-outfitted team rooms are available for group study. Knowledgeable librarians are always available to help navigate the search for information. The Information Commons is open 24 hours, seven days per week and contains 30 of the 50 computers with a full suite of software. These are accessible to students, faculty and staff of the university. In addition, Leeds has 25 technology equipped team rooms. These rooms support group study and project work, and are available for reservation through University of Colorado Scheduling (https://vems1.colorado.edu/).

The White Business Library is part of the University of Colorado library system, which includes more than two million volumes, more than five million microforms and more than 24,000 periodicals and serials. The system is also a full depository for United States government, international and state documents.

All classrooms in the Leeds School of Business are equipped up to campus "smart" classroom technology standards. Technologies in a typical Leeds classroom include: a desktop computer loaded with Microsoft Office Suite applications, video projection system, ceiling speakers for audio, DVD/VCR, iClicker base station, campus cable and both wired and wireless Internet connections. All classrooms have the flexibility to support a personal laptop with connectivity in place to integrate with the video projection and sound system.

### Business Research Division

Established in 1915, the Business Research Division is one of the earliest organized state service-oriented bureaus in the country.

The Business Research Division conducts business, economic and market research that contributes to the efficient use of Colorado's resources and increases interest in and awareness of the Leeds School of Business. It also is the umbrella organization for the Rocky Mountain Trade Adjustment Assistance (TAA) Center (RMTAAC). Through its annual Colorado Business Economic Outlook Forum, held in December, the division has established a base of knowledge that adds value to its work in other areas. In addition to providing businesses, government and nonprofits with information to help them make better-informed business and policy decisions, the division specializes in economic and fiscal analysis, market research and custom research projects. It also prepares a Colorado leading economic indicator series, the *Leeds Business Confidence Index*. Research results are distributed through presentations and reports; a quarterly newsletter, the *Colorado Business Review*; and the division's website.

Funding for center activities comes from the Leeds School of Business, the university, state agencies, the federal government, state and local business firms and from the sale of research products and services.

RMTAAC is one of 11 centers across the nation funded by the U.S. Department of Commerce to manage the Trade Adjustment Assistance for Firms Program, which helps import-impacted U.S. firms develop and implement business recovery strategies to strengthen their competitiveness in the global marketplace. The TAA for Firms Program is a cost-sharing federal grant program that pays a portion of professional consultant expenses or industry-specific expert services for projects that improve a firm's competitiveness, thereby increasing sales and creating U.S. jobs. Benefits of the program include up to $75,000 in grant funds and 50/50 cost sharing for strategic projects.

# Academic Centers

In addition to the Business Research Division, the school has five centers linking academic programs and the business community—the endowed Robert H. and Beverly A. Deming Center for Entrepreneurship, the Michael A. Klump Center for Real Estate, the Burridge Center for Finance, the Center for Education on Social Responsibility (CESR) and the Center for Business Integration.

## The Robert H. and Beverly A. Deming Center for Entrepreneurship

As part of the Leeds School of Business, the Deming Center for Entrepreneurship's mission is to inspire and empower students, community, alumni, faculty and staff through entrepreneurship education and partnership with the community. The Deming Center does this in part by educating, engaging and partnering and focusing on student experience.

### Cutting-Edge Curriculum

Our progressive curriculum and interdisciplinary programs include:

- courses in entrepreneurial finance, marketing and business planning,
- interdisciplinary programs in engineering, business, law and environmental studies,
- undergraduate business minor (p. 680) with a certificate of entrepreneurship for students across campus,
- undergraduate certificate of entrepreneurship (p. 682) for Leeds students,
- High Growth Ventures Pathway, and
- world-renowned PhD program (p. 1493) in entrepreneurship.

The Deming Center supports the entrepreneurial curriculum and advances the Leeds School's leadership agenda through our collaborative initiatives across campus and in the business community in these key areas:

- **Education**. Our entrepreneurship students have access to a world class entrepreneurship faculty. The faculty are involved in collecting, curating and making available the latest research and thinking on entrepreneurship in the world. These faculty are inspiring and directing new research and thought leadership in entrepreneurship and constantly working with thought leaders to develop and stay ahead of the latest trends and tools for entrepreneurship education.
- **Real-world experience**. Our entrepreneurship students are challenged to turn accepted thinking on its head—in the classroom, in real-world industry projects, and by the business innovators serving as student mentors and advisors. The center helps connect students with projects, advisors and internships that challenge them to use their new skills creatively.
- **Student experience**. Staff and faculty at Deming are focused on delivering an outstanding student experience. Deming promotes the development of entrepreneurial thinkers and doers. Entrepreneurial thinkers and doers are optimistic, resilient, resourceful, persistent, calculated risk-takers, efficient, creative problem solvers and effective workers. These are teachable skills any student is capable of learning.
- **The community**. Boulder is consistently named one of the best places in the country to launch a startup. The center connects students to industry leaders via the Deming Network—an active group of world-class entrepreneurs and innovators who are accessible and hands-on. CU Boulder is also a top research university. Across campus, the Deming Center helps students access opportunities in technology transfer and the engineering, law, biofrontiers and environmental science programs

## Michael A. Klump Center for Real Estate

The Michael A. Klump Center for Real Estate, founded in 1995, is supported by an industry council with the goal of advancing academic excellence in real estate education and scholarship. The center oversees the school's real estate teaching programs and advises the faculty in designing an integrated curriculum at both the graduate and undergraduate levels. Coursework is drawn from the law school, the colleges of architecture and engineering, construction management and others.

The center creates real-world experiences for students by providing project coursework and being a resource for securing internships, mentors and jobs. It also provides support for faculty teaching and research activities in real estate and, through the Real Estate Foundation, assists the university with its real estate portfolio.

## Burridge Center for Finance

The Burridge Center for Finance is dedicated to encouraging and supporting the creation and dissemination of new knowledge about the world financial markets with an emphasis on the U.S. financial markets by:

- facilitating the exchange of ideas and knowledge between professional investment managers, finance scholars, policy makers and the investing public,
- identifying critical research issues in the theory and practice of security analysis and valuation, and
- encouraging and supporting rigorous qualitative and quantitative research on topics relevant and useful to money managers, valuation experts and finance academics.

## Center for Ethics and Social Responsibility (CESR)

CESR's goal is to help students become outstanding business leaders of tomorrow by preparing them to meet the ethical challenges posed by a highly competitive, globally-connected business world. Accordingly, CESR oversees the infusion of values and social responsibility discussions throughout the undergraduate and graduate curricula at the Leeds School of Business. As part of the central mission at Leeds, CESR creates pedagogies that are national models and plays a leadership role carrying out the school's commitment to developing leaders of conscience. Although the Center's primary focus is on excellence in curriculum development and delivery, CESR also undertakes a broad spectrum of initiatives including a certificate program, student organizations, conferences and other extracurricular offerings as well as providing funding and administrative support for faculty research.

### Courses

CESR is directly responsible for course development, staffing and coordination of the Business requisite introduction course World of Business, and collaborates on the design and delivery of the requisite business core courses; Business Law and Business Ethics & Social Responsibility. CESR also offers leading edge electives such as CESR 4000, CESR 4005, CESR 4850, and CESR 4828.

### Certificate and Graduate Pathways

CESR offers specialized recognition for students at the undergraduate and graduate levels. Undergraduates wishing to focus on CESR-related topics may earn the certificate in social responsibility and ethics

(p. 686) (SRE). At the MBA level, MBAs can participate in CESR-designed co-curricular pathways in Natural & Organics, Clean Energy, and ESG Integration and Sustainability.

### CESR Co-Curricular Activities

ESR routinely hosts events aimed at our students, our local business community and educators and industry leaders throughout the academic year. Guest speakers change each semester, but recurring events are included here:

- **CESR Business Ethics Case Competition (BECC).** The CESR BECC is an interactive way to deepen the Leeds undergraduate students' understanding of the importance of creating ethical as well as profitable business cultures. Teams are provided with a business case in the weeks leading up to the competition which they will have to analyze, create recommendations for course of action and present their solutions to a panel of professional judges. Cash prizes are awarded to the top three teams.
- **Student Center for Social Entrepreneurship**. CESR provides faculty sponsorship for SCSE, the student branch of Social Entrepreneurship for Equitable Development, an interdisciplinary, inter-generational campus group that is involved in researching, teaching and generating student involvement in the areas of social entrepreneurship and sustainable community development.
- **Net Impact Club**. CESR is home to a graduate chapter of Net Impact, an international nonprofit organization whose mission is to use the power of business to create a more socially and environmentally sustainable world.
- **New Venture Challenge Social Impact Track**. CESR developed and continues to support the Social Impact Track of the **CU New Venture Challenge**, a campus-wide initiative connecting students and faculty with teammates in a broad range of disciplines and with mentors from the business community. The goal is to provide knowledge and experience making entrepreneurship accessible to anyone on the CU Boulder campus with the enthusiasm and creativity required to start a new business.

## Career Opportunities

Leeds School of Business graduates are prepared for positions in the following fields:

- Accounting—public, private, nonprofit and governmental
- Banking and other financial institutions
- Consulting
- Corporate financial management
- Entrepreneurship and small business management
- Financial analysis
- Human resources management
- Information systems
- International business
- Investment management
- Management consulting and organization management
- Marketing and sales management
- Nonprofit management
- Operations management
- Real estate
- Retailing
- Taxation
- Technology management
- Transportation
- Venture capital

Other graduates hold positions in fields as diverse as business journalism, public relations, city planning, chamber of commerce and trade association management, college administration and government. The entrepreneurial area of application prepares students to start their own business ventures to take positions in emerging growth companies and the venture capital industry.

# Programs & Leadership

## Professional Mentorship Program

The Professional Mentorship Program (PMP) is a unique program that offers one-on-one professional mentoring to current undergraduate students. The program's mission is to enhance business education at the Leeds School by offering hands-on learning, professional skills development, leadership opportunities and a sense of connection and community among current students, Leeds alumni and corporate partners. PMP mentors prepare and inspire our students to become the next generation of strong business leaders.

This two-year program matches students with executives or high-level business professionals who align by industry, geographic location or functional area. To ensure a quality experience for both students and mentors, the PMP provides workshops, training and additional support for participants throughout the program.

### Program Benefits

Through this program, students gain an additional level of advising and career counseling from a business professional. Through the mentoring relationships, students can explore choice of majors, potential for graduate school, work-life balance and effective networking and job search strategies.

Other potential benefits of being involved in the PMP include:

- advice and assistance on academic questions, career options, life beyond college and more,
- access to the PMP network and networking opportunities and the opportunity to start building the student's own professional network,
- opportunities to practice and strengthen professional communication and presentation skills,
- help in defining personal and professional goals, and the strategies to achieve them,
- unique internship and job opportunities, and
- development of a life-long friend and connection in the business world.

### Contact Information

Website: leedsmentoring.colorado.edu/about (http://leedsmentoring.colorado.edu/about/)
Email: leedspmp@colorado.edu
Office: Koelbel 201
Phone: 303-492-5881

## Study Abroad

Study abroad programs are available for students interested in international business or in cultural experiences abroad. The college-sponsored London Seminar in International Finance and Business is a five-week-long program held each summer in the financial district of London and is open to juniors, seniors and graduate students.

## Student Organizations

Listed below are undergraduate organizations that promote professional interests and provide recognition of scholastic attainment:

- Alpha Kappa Psi
- Athletic Business Club
- CU Fashion Club
- Beta Alpha Psi
- Collegiate DECA
- CESR Fellows
- CU Energy Club
- CU Finance Club
- CU American Marketing Association
- CU Investment Club
- CU Society for Human Resources Management
- Delta Sigma Pi
- International Business Club
- Leeds Ambassadors
- Leeds Association of Information Systems
- Leeds Council (Undergraduate Student Government)
- Multicultural Business Student Alliance
- Music Industry Club
- Real Estate Club
- Women in Business Club

## Leeds School of Business Student Government

Leeds Council is the governing body of the Leeds School of Business that strives to serve, support and represent the student body. The council also works to make Leeds a better business school through social, academic and professional programming. The council is made up of five primary committees and an executive board that control a significant portion of the Leeds student fees.

Two members of Leeds Council also serve as representatives on University of Colorado Student Government (CUSG) to voice the interests of business students at the main campus.

# Career Development

The Office of Career Development's mission is to advance Leeds students' career competencies through co-curricular exploration and development.

From dedicated industry coaching and professional skills development to real-world experiences and employer and alumni connections, Leeds students are equipped with all the support and resources they need to successfully transition from academia to a rewarding career after graduation.

## Career Coaching and Career Readiness Programs

All Leeds students are assigned a career coach by their area of emphasis. Coaches work with each student to create a four-year career development plan that allows them to develop the professional competencies and business connections needed to pursue their goals. Key services that support career readiness include, but are not limited to:

- one-on-one industry coaching sessions
- skill development workshops
- personal and career assessments
- mock interviews

## Global Programs

The globalization of the marketplace demands employees who can compete in a multicultural business environment in the United States and around the world. To prepare students for this, Leeds offers immersive programs and experiences designed to deepen students' understanding of global cultures and international business. Through these opportunities abroad, students develop a heightened level of intercultural competence and other critical skills needed for a successful career in business.

- **First Year Global Experience (FGX)**: The First-Year Global Experience (FGX) program is a spring semester elective that includes a short-term global experience during Spring Break or May term.
- **Global Business Certificate**: Students can add to their Leeds academic journey with 3 global core courses, 2 approved international courses and a global experience.
- **Global Seminars**: With a Global Seminar, students can study various topics in international business though a three to five week course taught abroad by Leeds faculty.

## Experiential Learning

Students can develop their professional skills through signature events, shadow days, micro-internships and internships. At Leeds, students are encouraged to explore career opportunities in business through hands-on learning.

- **Professional Assignments**: The World of Business course and integrated sophomore year assignments provide all Leeds first- and second-year students with a strong foundation to pursue their career interests and goals.
- **Career Treks**: Visits focused on an industry, functional area or location with in-depth opportunities for job search and connections. Previous visits have included Boulder, Denver, Chicago, Austin, Los Angeles, New York, Seattle and San Francisco.
- **Micro-internships**: Micro-internships are short-term, paid, professional assignments that enable students to demonstrate skills, explore career paths and build their network as they explore interests and seek the right full-time role.
- **Internships**: Dedicated support includes an internship advisor, internship-focused workshops and networking events.
- **Leeds Professionalism Summit:** The Leeds Professionalism Summit is a one-day professional development training delivered as part of the academic curriculum for Leeds BASE students. Students will participate with mentors, alumni, and corporate partners in panels and interactive sessions oriented around professional and business etiquette skills.

## Mentoring Programs

Participate in Leeds' award-winning mentoring pipeline that spans the entire four-year experience, pairing students with peer, alumni and professional mentors for personalized support. More than 1,500 undergraduates and 1,050 professional mentors participate in mentoring through these programs:

- **Peer2Peer.** Connects new Leeds students with trained student mentors to help students build a strong foundation and sense of belonging at Leeds.

- **Young Alumni Mentors Program**: Partners sophomores with recent Leeds graduates to provide major and career exploration, academic preparation and professional skills development.
- **Professional Mentorship Program:** Pairs juniors and seniors with experienced business professionals providing opportunities to develop and practice critical professional skills and build their professional network.

### Employer Relations

The Leeds School has created strong partnerships with more than 2,000 companies from diverse industries and locations. Our office connects students of all interests with the resources, organizations and people necessary to facilitate career success, including:

- on-campus, instant, and virtual interviews
- employer panels and webinars by industry or topic
- employer information sessions and recruitment days
- Leeds-specific career fairs and treks

### Women's and Leadership Programs

Students can harness their strengths and develop leadership skills through special programs and a leadership certificate. By offering a unique approach to creating an inclusive business environment for all students, Leeds students enter the workforce prepared to shape and influence the future of business in every discipline.

- **Business & Engineering Women in Technology (BEWiT):** BEWiT is a two-year interdisciplinary program focused on inspiring accomplished and intellectually curious women to explore the technology industry.
- **Leadership, Excellence and Purpose (LEAP):** This one-year program for incoming first-year students will engage students in leadership development both inside and outside of the classroom while examining issues of gender equity in the field of business.
- **Business Leadership Certificate:** The Business Leadership Certificate provides students with the foundations of theory and research on leadership, but emphasizes professional experiences such as mentoring, internships, and engaging in leadership roles.

### Contact Information

Website: Career Development, Leeds School of Business (https://www.colorado.edu/business/career/)
Email: leedscareer@colorado.edu
Office: KOBL 201
Phone: 303-492-1808

# Policies & Requirements

## Academic Excellence

### Honors

In recognition of high scholastic achievement, upon recommendation of the faculty, the designation "With High Distinction" or "With Distinction" will be awarded at graduation. To qualify for the "With High Distinction" designation, the student's cumulative University of Colorado GPA must be at least 3.90. For the "With Distinction" designation, the student's cumulative GPA must be at least 3.75 but less than 3.90. In addition, for these designations, at least 60 credit hours must have been earned at CU Boulder.

### Dean's List

Students in the Leeds School of Business who have completed at least 12 credit hours of CU Boulder coursework for a letter grade in any single semester with a term GPA of 3.600 or better are included on the dean's list and receive a notation on their transcript.

### Beta Gamma Sigma

Membership in Beta Gamma Sigma is an honor that must be earned through outstanding scholastic achievement. Such membership is the highest scholastic honor that a student in a school of business or management can attain.

To be eligible for Beta Gamma Sigma membership, students must rank in the top 10 percent of their junior class, the top 10 percent of their senior class or be among the top 20 percent of those students receiving master's degrees. Also, students completing all requirements for the doctoral degree conferred by a business school are eligible for Beta Gamma Sigma. It should be noted that Beta Gamma Sigma chapters may be chartered only in those schools of business and management accredited by AACSB, the International Association for Management Education.

### Scholarships

Each year the college awards a number of divisional and general scholarships. Business scholarships are for students who have completed business coursework at the university. The amount and number of the awards vary each year.

## Academic Standards

### Academic Ethics

Students are expected to conduct themselves in accordance with the highest standards of honesty and integrity. Cheating, plagiarism, illegitimate possession and disposition of examinations, alteration, forgery or falsification of official records and similar acts or the attempt to engage in such acts are grounds for suspension or expulsion from the university. Reported acts of academic dishonesty must be referred to the Honor Council.

Students are advised that plagiarism consists of any act involving the offering of someone else's work as the student's own. It is recommended that students consult with instructors as to the proper preparation of reports, papers, etc., in order to avoid this and similar offenses. Official college procedures concerning academic ethics are maintained in the Office of Undergraduate Studies.

### Standards of Performance

Students are held to basic standards of performance with respect to attendance, active participation in coursework, promptness of assignments, correct English usage both in writing and in speech, accuracy in calculations and general quality of scholastic workmanship. In general, examinations are required in all courses and for all students, including seniors.

### Good Academic Standing

To be in good academic standing, students must have an overall grade point average of *C* (2.00) or better for all coursework taken. Students must earn a passing grade for all required courses. This requirement applies to work taken at all university campuses.

Any student earning all or nearly all failing grades, or no academic credit for a semester will not be permitted to register without the dean's approval.

Official double-degree students must maintain required academic standards for the Leeds School as well as their other college.

Students are responsible for being aware of their academic status at all times, and late grades and/or late notification do not waive this responsibility. See campus Academic Standing policies (p. 28) for details.

Suspended Leeds School students who transfer into another school or college of the university will not be eligible to register for business courses and will be subject to administrative drops.

# Credit and Enrollment

All students are responsible for knowing and following the provisions set forth below. Any questions concerning these provisions should be directed to the college. The college cannot assume responsibility for problems resulting from a student's failure to follow the policies stated here or from incorrect advice given by those outside the Office of Undergraduate Services. Similarly, students are responsible for all deadlines, rules and regulations stated in the General Information section of this catalog. All rules and regulations are subject to change. Any questions should be directed to the Leeds School of Business, Office of Undergraduate Services, KOBL 201, 303-492-6515.

## Admission to the Business Program

Prospective freshman students are encouraged to complete strong academic programs in high school. A minimum of four academic units should be completed each year with special emphasis given to writing, mathematics and science skills. For a detailed explanation of the high school preparation desired, see Undergraduate Admission in the General Information section.

Transfer students are expected to demonstrate proficiency in economics, writing and mathematics. Prospective transfer students should complete courses equivalent to those taken by University of Colorado business freshmen and sophomores.

## Residency Requirement

Complete a minimum of 45 credit hours in University of Colorado courses on the Boulder campus. Of these 45 credits, a minimum of 30 credits must be business courses completed as a matriculated student in Leeds.

## Intra-University Transfer

An undergraduate student who is enrolled on the Boulder campus and wishes to transfer to the Leeds School of Business may submit a completed application for the fall or spring semester. A cumulative university GPA of 3.2 is necessary to be considered for admission. In addition, students must have 24 completed credit hours, 12 of which must be graded work at CU Boulder, 4 credit hours of MATH 1112, statistics, microeconomics and macroeconomics. Students must earn a grade of B or better in ECON, MATH, and statistics to be considered for admission. Students who have earned 60 credits (including AP, IB, CU and transfer coursework) or more at the time of application will need to submit a Leeds graduation plan approved by the Leeds IUT team as part of the application process. Please refer to The Leeds IUT Guide for more information.

Intra-university transfer (IUT) students must take a minimum of 30 credit hours of business courses, including their area of emphasis, in residence after admission to the college.

Visit the campus IUT webpage (https://www.colorado.edu/advising/intra-university-transfer/) to learn more about the IUT process.

## Registration Stops

A service indicator stop will be placed on students' records when they have earned 45 credit hours, if they have not yet declared their area of emphasis. All first and second year students will also have a service indicator and be required to attend an advising meeting before registration for the next semester.

## Registration for Business Courses

Business students may register only for those courses for which they have the stated prerequisites.

### Administrative Drops

Instructors may recommend to the Office of Undergraduate Services that students who fail to meet expected course attendance or prerequisites be dropped from their courses at any time during the semester.

### Attendance Regulations

Classroom attendance is left to the discretion of the instructor. Students are responsible for understanding each instructor's policy on attendance.

Students who are unavoidably absent should make arrangements with instructors to make up the work missed. Failure to attend regularly may result in receipt of an F in a course. Students who, for illness or other legitimate reasons, miss a final examination must notify the instructor no later than the end of the day on which the examination is given. Failure to do so may result in receipt of an F in the course.

### Concurrent Registration

Concurrent registration is for graduating seniors who must be enrolled on two campuses of the University of Colorado at the same time in order to fulfill graduation requirements.

Students enrolled in the Leeds School of Business may exercise the concurrent registration option if they are in their graduating semester or are two semesters from graduating and cannot obtain a course necessary to complete a prerequisite sequence. The course must be required for graduation and must not be offered on the Boulder campus, or the course must conflict with another required course in which the student is enrolled. Students from other colleges and schools who wish to take business courses must have the approval of their own college or school before submitting the concurrent registration form.

### Scholastic Load

The normal scholastic load of an undergraduate student in the college is 15 credit hours, with a maximum of 21 credit hours during the fall and spring semesters. A maximum of 3 credit hours may be taken during Maymester. A maximum of 6 credit hours may be taken during a five-week summer term, with no more than 12 credit hours total during the 10-week summer session.

## Credit Policies

To receive credit, all courses must be listed on the student's official transcript by the Office of the Registrar. Credit is then evaluated by the Leeds School of Business to determine degree acceptability.

### Cooperative Education Credit
No credit is given for work experience or cooperative education programs.

### Correspondence Credit
All correspondence courses must have prior approval and be evaluated to determine their acceptability.

### Advanced Placement (College Board)
For students who earn scores of 3, 4 or 5 on Advanced Placement exams, college credit will be given where appropriate. See the Admissions section for a comprehensive AP credit chart (p. 37).

### College-Level Examination Program (CLEP)
College credit for approved CLEP subject examinations may be considered, providing the scores are at 54 or above. Specific information is available in the Office of Undergraduate Student Services.

CLEP credit is only appropriate for nonbusiness requirements and nonbusiness electives. A maximum of 6 hours of credit in any one course area is allowed. CLEP may not be used in course areas where credit has already been allowed. General examinations are not acceptable. CLEP credit is not transferable.

Before taking a CLEP examination, students should check in with their academic advisor to ensure the credit will apply.

### Special Sources of Credit
The college reserves the right to accept or reject all special sources of credit that do not have prior approval of the dean.

## Independent Study
A maximum of 6 credit hours of independent study will be accepted as degree credit. Prior approval is required if the work is to be applied as degree credit. A maximum of 3 credit hours may be taken in any one semester.

### Study Abroad Credit
Transfer credit from study abroad programs may be applied to the business degree. Students planning to attend study abroad programs must meet with an undergraduate advisor and have their course selections approved prior to leaving campus.

More specific information about these opportunities is available from the Office of International Education.

### Transfer Credit
The school reserves the right to disallow any credit that it deems inappropriate degree credit.

Credits in business subjects transferred from other institutions will be limited to the number of credit hours given for equivalent work in the regular offerings of the university. Only work from regionally accredited institutions will transfer to the college. A maximum of 60 credit hours of credit may be accepted from a two-year school.

Actual equivalent courses may be substituted for required courses. Students must submit a carefully checked catalog description and course syllabus for course equivalency determination.

Business students desiring to apply coursework from another institution or University of Colorado campus toward the BS degree in business administration must have prior approval of the Leeds School of Business. Only nonbusiness requirements or elective credit is acceptable in transfer from other institutions once the student has enrolled.

All courses in the area of emphasis must be taken at the University of Colorado Boulder unless written approval is given by the associate dean of undergraduate services. Transfer students must take a minimum of 30 credit hours of business courses, including the area of emphasis, in residence after admission to the college. For more information on transfer of credit policies, see Transfer of College-Level Credit (p. 48).

## Grading Policies
In addition to the campus wide grading system and pass/fail policy (p. 50), the Leeds School of Business enforces the following policies.

### Pass/Fail
Students in the Leeds School of Business may not use the pass/fail option for courses taken to fulfill General Education Core Requirements, business core requirements, business major requirements or business electives. A grade of F when earned in a course taken pass/fail will calculate into the GPA as a failing grade. Only non-business electives may be taken on a pass/fail basis. A maximum of 6 credit hours of pass/fail credit may be applied toward the BS degree in business administration. Pass/fail determination must be made by the deadline set through the Office of the Registrar. A maximum of 6 credit hours designated pass/fail may be taken in any one semester.

Failed courses may be repeated, but the F will be included in the GPA.

### Minimum Grades
A grade of C- or above is required for classes applied to the area of emphasis. A grade of D- is a passing grade for all other degree requirements.

### Incomplete Grades
The only incomplete grade in the college is given only when documented circumstances clearly beyond the student's control prevent the student from completing the course. Generally, students should make up the missing work and not retake the entire course. Students should not register for the class a second time, unless directed by the instructor. All I grades must be made up within one year or the I will be changed to a grade of F.

### Grade Changes
Final grades as reported by instructors are considered permanent and final. Grade changes will be considered only in cases of documented clerical errors, and must be approved by the associate dean.

### Grade Appeal Policy
The following shall be the official policy of the academic units of the Leeds School, unless an academic unit submits an alternative procedure to the Dean for approval. When a student believes that a grade has been improperly assigned, and discussions between the instructor and the student have not led to any resolution of the problem, then the student may pursue the following steps:

1. The student shall have the option of making a formal written appeal to the Division Chair for the instructor's unit. The appeal must detail the basis for the appeal, including relevant written documentation, specify the remedy desired by the student, and must be submitted within 30 days of the end of the academic term in which the course was taken. The instructor will be provided the opportunity to respond in writing to the student's appeal.
2. The Chair will meet (together or separately) with the student and with the instructor who taught the course. If the Chair is unable to secure a solution mutually acceptable to both student and instructor, then

3. The Chair shall appoint an ad hoc Grade Appeals Committee, which will review the dispute. This committee shall consist of at least three impartial faculty members competent in the subject matter of the course in question. Members of this committee need not be from the Chair's division. The Chair will provide the Committee with the student's appeal and a written response from the faculty member.
4. Within 30 days, the committee will submit a report and recommendation to the Chair, and Chair will recommend to the instructor either 1) that the originally assigned grade stands; or 2) that a revised final grade be assigned.
5. In cases where a change of grade is recommended and the instructor does not wish to accept the recommendation of the Chair, the Chair will forward the written materials associated with the appeal, together with the recommendation of the Chair, to the Dean (or a designee), who will make the final decision on the student's grade appeal.

### Withdrawal

Students may withdraw from the university any time before the beginning of the final examination period.

# Programs of Study
# Business Administration

The following areas of knowledge are central to the undergraduate degree in business administration:

- Knowledge of core business concepts that provides students with a comprehensive understanding of the basic functional areas of the discipline.
- Knowledge in one or more of the four areas of emphasis, in which students are exposed to in-depth study that provides them with the tools necessary to solve complex business problems.
- Awareness of the interrelations between academic theory and practice in order for students to be fully equipped to make effective decisions.
- Strong verbal and written communication skills, proficiency in business computer applications and knowledge of international business environments.
- Knowledge of mathematics sufficient to facilitate the application of quantitative principles.
- Awareness of the importance of academic fields in the area of arts and sciences, with special emphasis placed on the study of economics, political science and other related fields.

In addition, students completing a degree in business administration are expected to acquire:

- The ability to apply basic business principles to solve problems in new and recurring situations,
- The ability to conceptualize and analyze decision-making situations to facilitate solutions in an effective and timely manner, and
- The ability to effectively communicate the results of problem-solving situations, both verbally and in writing.

Having acquired these skills and knowledge, students are able to conceptualize and analyze the concept of business and problem solving as a system. They have the ability to present solutions to business problems in an understandable and useful form. Their education provides them with excellent working knowledge, not only in the field of business, but also in related academic disciplines.

The Leeds School of Business holds accreditation by the Association to Advance Collegiate Schools of Business (AACSB-International).

## Advising and Records

Undergraduate business students receive academic advising from a staff of professional advisors in the Office of Undergraduate Student Services. Advisors are available in KOBL 201, Monday–Friday, 8 a.m.–5 p.m., by appointment and during drop-in hours.

Students are expected to assume responsibility for planning their program in accordance with college rules and policies. Students are encouraged to discuss the various emphases available as well as career opportunities with the faculty of the college.

## Bachelor's Degree

- Business Administration - Bachelor of Science (BSBA) (https://catalog.colorado.edu/undergraduate/colleges-schools/business/programs-study/business-administration/business-administration-bachelor-science-bs/)

## Minor

- Business - Minor (p. 680)

## Certificates

- Entrepreneurial Studies - Certificate (p. 682)
- Global Business - Certificate (p. 682)
- Operations and Information Management - Certificate (p. 685)
- Quantitative Finance - Certificate (p. 90)
- Social Responsibility and Ethics - Certificate (p. 686)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Adams, Heather L. (https://experts.colorado.edu/display/fisid_143714/)
Associate Chair, Faculty Director, Senior Instructor; PhD, University of Maryland, College Park

Alston, Eric Christopher (https://experts.colorado.edu/display/fisid_158159/)
Scholar in Residence; JD, University of Chicago

André, Quentin (https://experts.colorado.edu/display/fisid_166737/)
Assistant Professor; PhD, INSEAD (France)

Appenzeller, William
Professor Emeritus

Auslander, Bonnie (https://experts.colorado.edu/display/fisid_158273/)
Instructor; MFA, University of Massachusetts

Balkin, David B. (https://experts.colorado.edu/display/fisid_105481/)
Professor; PhD, University of Minnesota Twin Cities

Ballantine, John T. Jr. (https://experts.colorado.edu/display/fisid_102703/)
Senior Instructor; JD, University of Colorado Boulder

Bangs, F. Kendrick
Professor Emeritus

Banks, Cynthia (https://experts.colorado.edu/display/fisid_158245/)
Instructor, Faculty Director; MS, University of Colorado Denver

Bei, Xiaoshu (https://experts.colorado.edu/display/fisid_165170/)
Assistant Professor; PhD, Duke University

Bennett, Douglas P. (https://experts.colorado.edu/display/fisid_149983/)
Instructor; JD, George Washington University

Bercovitz, Janet (https://experts.colorado.edu/display/fisid_159339/)
Professor; PhD, University of California, Berkeley

Bernstein, Asaf (https://experts.colorado.edu/display/fisid_157738/)
Assistant Professor; BS, Harvey Mudd College

Bernthal, Wilmar F.
Professor Emeritus

Bhagat, Sanjai (https://experts.colorado.edu/display/fisid_100789/)
Professor; PhD, University of Washington

Biegelsen, Casey (https://experts.colorado.edu/display/fisid_166072/)
Instructor; MBA, University of Colorado Boulder

Billings, Stephen B. (https://experts.colorado.edu/display/fisid_157918/)
Associate Professor, Faculty Director; PhD, University of Colorado Boulder

Bone, Jennifer Emerling (https://experts.colorado.edu/display/fisid_158206/)
Instructor, Associate Chair; PhD, University of Colorado Boulder

Boss, Russel Wayne (https://experts.colorado.edu/display/fisid_105260/)
Professor, Chair; PhD, University of Georgia

Brown, Daniel (https://experts.colorado.edu/display/fisid_152029/)
Senior Instructor; D.Phil, Oxford University

Buchman, Thomas A. (https://experts.colorado.edu/display/fisid_101677/)
Professor Emeritus; PhD, University of Illinois at Urbana-Champaign

Buffa, Andrea (https://experts.colorado.edu/display/fisid_167152/)
Assistant Professor; PhD, London Business School

Bumbaca, Frederico (https://experts.colorado.edu/display/fisid_163475/)
Assistant Professor; PhD, University of California, Irvine

Campbell, Kimberly D. (https://experts.colorado.edu/display/fisid_158160/)
Instructor; PhD, Howard University

Campbell, Margaret Catherine
Professor Emerita; PhD, Stanford University

Carbone, Christopher (https://experts.colorado.edu/display/fisid_158166/)
Instructor; MFA, University of Baltimore

Carson, Visda (https://experts.colorado.edu/display/fisid_158296/)
Instructor; MBA, University of Colorado, Leeds School of Business

Cateora, Phillip R.
Professor Emeritus

Chari, Mukund (https://experts.colorado.edu/display/fisid_159141/)
Assistant Professor; PhD, University of Washington

Christoff, Lorna Colleen (https://experts.colorado.edu/display/fisid_146614/)
Instructor; JD, University of Denver

Cookson, John Anthony (https://experts.colorado.edu/display/fisid_152874/)
Associate Professor, Faculty Director; PhD, University of Chicago

Correll, Mark R.
Professor Emeritus

Cropanzano, Russell Salvador (https://experts.colorado.edu/display/fisid_151710/)
Professor, Chair, Endowed/Named Professor; PhD, Purdue University

Cunningham, Cory (https://experts.colorado.edu/individual/fisid_158270/)
Instructor; PhD, University of Oklahoma

Darnell, Jerome C.
Professor Emeritus

Davies, Shaun William (https://experts.colorado.edu/display/fisid_152995/)
Assistant Professor; PhD, University of California, Los Angeles

Demaree, John D.
Professor Emeritus

Donchez, Robert M. (https://experts.colorado.edu/display/fisid_101267/)
Senior Instructor, Faculty Director; MBA, Fordham University

Donohew, Zachary (https://experts.colorado.edu/display/fisid_164033/)
Scholar in Residence

Drake, David Francis (https://experts.colorado.edu/display/fisid_163641/)
Assistant Professor; PhD, INSEAD (France)

Eargle, David (https://experts.colorado.edu/display/fisid_159053/)
Assistant Professor; PhD, University of Pittsburgh

Edwards, Emily (https://experts.colorado.edu/display/fisid_153378/)
Senior Instructor, Associate Chair; MBA, University of Colorado Denver

Engel, Steven
Professor Emeritus

Ertimur, Yonca (https://experts.colorado.edu/display/fisid_151585/)
Professor, Associate Dean; PhD, New York University

Fernbach, Philip M. (https://experts.colorado.edu/display/fisid_149786/)
Associate Professor, Faculty Director; PhD, Brown University

Fisher, Christina Marie (https://experts.colorado.edu/display/fisid_158798/)
Instructor; MS, University of Delaware

Frederick, David M.
Professor Emeritus: Leeds School of Business

Gallagher, Emily Anne (https://experts.colorado.edu/display/fisid_163544/)
Assistant Professor; PhD, Paris School of Economics

Garcia, Diego (https://experts.colorado.edu/display/fisid_156036/)
Professor, Endowed Chair; PhD, University of California, Berkeley

Garnand, John J.
Professor Emeritus

Gasta, Mark (https://experts.colorado.edu/display/fisid_165314/)
Instructor; PhD, Pepperdine University

Gladstone, Joe (https://experts.colorado.edu/display/fisid_166596/)
Assistant Professor; PhD, University of Cambridge (England)

Glover, Fred W.
Professor Emeritus

Goeldner, Charles R.
Professor Emeritus

Gordon, Kenneth R.
Professor Emeritus

Gross, David Michael (https://experts.colorado.edu/display/fisid_109026/)
Senior Instructor, Faculty Director, Associate Chair; PhD, University of Colorado Boulder

Gwozdz, Ronald Scott (https://experts.colorado.edu/display/fisid_144830/)
Instructor; MBA, University of Colorado Boulder

Hawk, Ashton Lewis (https://experts.colorado.edu/display/fisid_157915/)
Assistant Professor; PhD, New York University

He, Chuan (https://experts.colorado.edu/display/fisid_124857/)
Associate Professor; PhD, Washington University

Hekman, David R. (https://experts.colorado.edu/display/fisid_151359/)
Associate Professor; PhD, University of Washington

Higgins, Brian Edmund (https://experts.colorado.edu/display/fisid_156515/)
Instructor; JD, University of Denver

Ikenberry, David L. (https://experts.colorado.edu/display/fisid_149340/)
Professor; PhD, University of Illinois at Urbana-Champaign

Jackson, Betty R.
Professor Emerita

Jedamus, Paul E.
Professor Emeritus

Jennings, Tracy M. (https://experts.colorado.edu/display/fisid_128765/)
Senior Instructor, Faculty Director; PhD, University of Denver

Jensen, Howard G.
Professor Emeritus

Johnson, Stefanie Kathleen (https://experts.colorado.edu/display/fisid_153813/)
Associate Professor, Faculty Fellow; PhD, Rice University

Kennedy, Heather (https://experts.colorado.edu/display/fisid_157932/)
Instructor, Scholar in Residence; MA, University of Texas at Austin

Khoshsokhan, Sina (https://experts.colorado.edu/display/fisid_167155/)
Assistant Professor; PhD, Boston University

Koberg, Christine S.
Associate Professor Emerita

Koc, Ozlem (https://experts.colorado.edu/display/fisid_158324/)
Instructor; PhD, Georgia State University

Kolb, Burton A.
Professor Emeritus

Kornish, Laura Joyce (https://experts.colorado.edu/display/fisid_139966/)
Professor, Associate Dean; PhD, Stanford University

Kozar, Kenneth A.
Professor Emeritus

Kwaramba, Marcia (https://experts.colorado.edu/display/fisid_164299/)
Scholar in Residence; PhD, Monash University (Australia)

Lacerenza, Christina Noelle (https://experts.colorado.edu/display/fisid_159797/)
Assistant Professor; PhD, Rice University

Laguna, Manuel (https://experts.colorado.edu/display/fisid_102975/)
Professor, Faculty Director, Endowed/Named Professor; PhD, University of Texas at Austin

Larsen, Kai Rune (https://experts.colorado.edu/display/fisid_118160/)
Associate Professor, Faculty Director; PhD, SUNY at Albany

Laurion, Henry R. (https://experts.colorado.edu/display/fisid_163642/)
Assistant Professor; PhD, University of California, Berkeley

Lawrence, Stephen R. (https://experts.colorado.edu/display/fisid_102032/)
Associate Professor; PhD, Carnegie Mellon University

Leach, Chris (https://experts.colorado.edu/display/fisid_105152/)
Professor, Endowed/Named Professor; PhD, Cornell University

Lee, Jintae (https://experts.colorado.edu/display/fisid_115390/)
Associate Professor Emeritus; PhD, Massachusetts Institute of Technology

Lewis, Barry L.
Professor Emeritus

Lewis, Mary Beth (https://experts.colorado.edu/display/fisid_153829/)
Senior Instructor Emerita; MBA, University of Pittsburgh

Lewis, Ryan C. (https://experts.colorado.edu/display/fisid_157865/)
Assistant Professor; PhD, London Business School (England)

Lichtenstein, Donald (https://experts.colorado.edu/display/fisid_101701/)
Professor, Chair; PhD, University of South Carolina

Lionberger, Erin Leigh (https://experts.colorado.edu/display/fisid_167647/)
Instructor; MS, South Dakota State University

Liu, Liu (https://experts.colorado.edu/display/fisid_163568/)
Assistant Professor; PhD, New York University

Lord, Kimberly E.
Lecturer

Lynch, John G. (https://experts.colorado.edu/display/fisid_147448/)
Faculty Director, Professor, Associate Dean, Endowed/Named Professor, Distinguished Professor; PhD, University of Illinois at Chicago

Macaluso, Gregg Richard (https://experts.colorado.edu/display/fisid_123302/)
Instructor Emeritus; MS, University of California, Irvine

Macfee, Raymond D. Jr.
Professor Emeritus

Maciszewski, Michael (https://experts.colorado.edu/display/fisid_153223/)
Instructor; JD, University of Denver

Marshall, Nathan Thomas (https://experts.colorado.edu/display/fisid_156034/)
Assistant Professor; PhD, Indiana University Bloomington

Matusik, Sharon Marie Frances (https://experts.colorado.edu/display/fisid_133564/)
Professor, Dean; PhD, University of Washington

Maxwell, Christopher (https://experts.colorado.edu/display/fisid_164956/)
Instructor; BS, Colorado State University

McGraw, Albert Peter (https://experts.colorado.edu/display/fisid_133262/)
Professor; PhD, Ohio State University

McMahon, Kevin Christopher (https://experts.colorado.edu/display/fisid_143892/)
Senior Instructor; MBA, Indiana University

McNown, Robert F.
Professor Emeritus

Melicher, Ronald W. (https://experts.colorado.edu/individual/deptid_10255/)
Professor Emeritus: Leeds School of Business

Merrell, Jeffery C. (https://experts.colorado.edu/individual/fisid_156158/)
Senior Instructor; PhD, University of Colorado Boulder

Meyer, G. Dale
Professor Emeritus

Mohr, Pete J. (https://experts.colorado.edu/display/fisid_155498/)
Senior Instructor; MS, Colorado State University

Montealegre, Jose Ramiro (https://experts.colorado.edu/display/fisid_100072/)
Professor; DBA, Harvard University

Moon, Katie Seoyeon (https://experts.colorado.edu/display/fisid_157680/)
Assistant Professor; PhD, University of Maryland

Morley, Susan (https://experts.colorado.edu/display/fisid_116716/)
Senior Instructor; JD, University of Colorado Boulder

Moyen, Nathalie (https://experts.colorado.edu/display/fisid_113873/)
Professor, Chair; PhD, University of British Columbia (Canada)

Mueller, Erick Michael (https://experts.colorado.edu/display/fisid_140940/)
Senior Instructor, Faculty Director; MBA, University of Colorado Boulder

Neil, Josh (https://experts.colorado.edu/display/fisid_152068/)
Senior Instructor, Faculty Director; MS, Oklahoma State University

Nelson, James E.
Professor Emeritus

Nelson, Thomas Cavett (https://experts.colorado.edu/display/fisid_116011/)
Senior Instructor Emeritus; PhD, University of Colorado Boulder

Nunziato, Joshua (https://experts.colorado.edu/display/fisid_164373/)
Instructor; PhD, Villanova University

Oest, Donald G. (https://experts.colorado.edu/display/fisid_146623/)
Senior Instructor; MBA, Fairleigh Dickinson University

Palmer, Michael
Professor Emeritus

Papuzza, Antonio (https://experts.colorado.edu/display/fisid_145295/)
Senior Instructor; PhD, University of Florence (Italy)

Packer, Richard C. (https://experts.colorado.edu/display/fisid_166139/)
Lecturer

Parkin, Don
Professor Emeritus

Ravishankar, G. Ravi (https://experts.colorado.edu/display/fisid_144567/)
Scholar in Residence, Faculty Director; MBA, Massachusetts Institute of Technology

Reinholtz, Nicholas S. (https://experts.colorado.edu/display/fisid_155180/)
Assistant Professor; PhD, Columbia University

Reznicek, Birdie C. (https://experts.colorado.edu/display/fisid_149091/)
Instructor, Associate Chair; MBA, Northwestern University

Richey, Clyde W.
Professor Emeritus

Ringgenberg, Ralph G.
Professor Emeritus

Rock, Steven Karl (https://experts.colorado.edu/display/fisid_113689/)
Associate Professor, Chair; PhD, Pennsylvania State University

Rodgers, Timothy (https://experts.colorado.edu/display/fisid_155460/)
Instructor; PhD, University of California, Santa Cruz

Rogers, Jonathan Lawrence (https://experts.colorado.edu/display/fisid_153009/)
Professor, Endowed/Named Professor; PhD, University of Pennsylvania

Rosse, Joseph G.
Professor Emeritus: Leeds School of Business

Schattke, Rudolph
Professor Emeritus

Schaub, Kevin D. (https://experts.colorado.edu/display/fisid_144142/)
Senior Instructor, Faculty Director; MBA, University of Colorado Boulder

Schonberger, Bryce (https://experts.colorado.edu/display/fisid_167332/)
Assistant Professor; PhD, University of Southern California

Sears, Curtis R. (https://experts.colorado.edu/display/fisid_145482/)
Senior Instructor, Faculty Fellow, Endowed/Named Professor; JD, University of Colorado Boulder

Selto, Frank
Professor Emeritus

Seward, Lori Elizabeth (https://experts.colorado.edu/display/fisid_113934/)
Senior Instructor, Faculty Director; PhD, Virginia Polytechnic Institute and State University

Shriver, Scott Kennedy (https://experts.colorado.edu/display/fisid_158937/)
Assistant Professor; PhD, Stanford University

Shukri, Salma Tariq (https://experts.colorado.edu/display/fisid_158219/)
Instructor; PhD, University of Denver

Smith, Julie Scher (https://experts.colorado.edu/display/fisid_166064/)
Instructor; MBA, University of Chicago

Sorenson, Ralph Z.
Professor Emeritus

Spinetto, Richard D.
Professor Emeritus

Stanton, William J.
Professor Emeritus

Starn, Harry Mohr (https://experts.colorado.edu/display/fisid_160803/)
Senior Instructor, Faculty Director; MS, University of Colorado Boulder

Stephan, Andrew Perry (https://experts.colorado.edu/display/fisid_159297/)
Assistant Professor; PhD, Northwestern University

Stephenson, Craig A. (https://experts.colorado.edu/display/fisid_144851/)
Senior Instructor; PhD, University of Arizona

Stutzer, Michael J. (https://experts.colorado.edu/display/fisid_126711/)
Professor Emeritus; PhD, University of Minnesota Twin Cities

Taylor, Robert H.
Professor Emeritus

Thibodeau, Thomas G. (https://experts.colorado.edu/display/fisid_134750/)
Professor Emeritus; PhD, SUNY at Stony Brook

Tice, Frances M. (https://experts.colorado.edu/display/fisid_156018/)
Assistant Professor; PhD, Texas A&M University

Tong, Wenfeng (https://experts.colorado.edu/display/fisid_144520/)
Professor, Chair; PhD, The Ohio State University

Tracy, John A.
Professor Emeritus

Urrea, Gloria (https://experts.colorado.edu/display/fisid_165311/)
Assistant Professor; PhD, Università della Svizzera italiana, Switzerland

Van Wesep, Edward D. (https://experts.colorado.edu/display/fisid_154573/)
Associate Professor; PhD, Stanford University

Vargo, Christopher (https://experts.colorado.edu/display/fisid_158320/)
Associate Professor; PhD, University of North Carolina

Volpone, Sabrina D. (https://experts.colorado.edu/display/fisid_158941/)
Associate Professor; PhD, Temple University

Vossen, Thomas Wilhelmus (https://experts.colorado.edu/display/fisid_126642/)
Associate Professor; PhD, University of Maryland, College Park

Wang, Clare (https://experts.colorado.edu/display/fisid_165260/)
Associate Professor, Faculty Director; PhD, University of Pennsylvania, The Wharton School

Wang, Yanwen
Assistant Professor; PhD, Emory University

Wang, Zhiyi (https://experts.colorado.edu/display/fisid_167339/)
Assistant Professor; PhD, National University of Singapore (Singapore)

Waters, Brian Todd (https://experts.colorado.edu/display/fisid_155846/)
Assistant Professor; PhD, University of California, Los Angeles

Wenger, Paula (https://experts.colorado.edu/display/fisid_113621/)
Senior Instructor; MA, Miami University–Oxford

Werner, Walter Bradley (https://experts.colorado.edu/display/fisid_158225/)
Instructor, Faculty Director; MBA, University of Chicago

Williams, Lawrence Edwin Jr. (https://experts.colorado.edu/display/fisid_145743/)
Associate Professor; PhD, Yale University

Winn, Daryl
Professor Emeritus

Wobbekind, Richard (https://experts.colorado.edu/display/fisid_100997/)
Associate Dean, Lecturer; PhD, University of Colorado Boulder

Yao, Xin
Assistant Professor; PhD, University of Washington

Yilmaz, Ovunc (https://experts.colorado.edu/display/fisid_167064/)
Assistant Professor; PhD, University of South Carolina - Colombia

York, Jeffrey Glenn (https://experts.colorado.edu/display/fisid_148387/)
Associate Professor, Chair, Faculty Director; PhD, University of Virginia

Zechman, Sarah Louise Center (https://experts.colorado.edu/display/fisid_156016/)
Professor, Chair, Faculty Fellow; PhD, University of Pennsylvania

Zender, Jaime (https://experts.colorado.edu/display/fisid_122563/)
Professor, Endowed/Named Professor, Chair; PhD, Yale University

Zhang, Dan (https://experts.colorado.edu/display/fisid_149619/)
Professor, Faculty Director; PhD, University of Minnesota Twin Cities

Zhang, Huanan (https://experts.colorado.edu/display/fisid_167063/)
Assistant Professor; PhD, University of Michigan Ann Arbor

Zhang, Rui (https://experts.colorado.edu/display/fisid_157866/)
Assistant Professor; PhD, University of Maryland

Zhang, Xingtan (https://experts.colorado.edu/display/fisid_159295/)
Assistant Professor; PhD, University of Pennsylvania

Zikmund, Noah
Senior Instructor; MBA, University of Tulsa

# Courses

**BADM 1250 (1.5) Designing Your Leeds**
Designing Your Leeds is a class about customizing your college experience to get the most out of it. Using a process rooted in Design Thinking, the course equips students with tools to design and prototype a college experience that best aligns with who they are and what they hope to get from college. Students will explore the purpose of college, reflect on personal values and strengths, learn about educational and career opportunities, and create a prototype of their 4 year experience. Through in-class activities and out of class assignments, students will also learn and practice professional and self-leadership skills.
**Requisites:** Restricted to Business (BUSNU) majors only.

**BADM 1260 (2) First-Year Global Experience**
In today's world of increased mobility, globally aware students have more choices for employment upon graduation and are immediately ready to contribute in global environments. They are aware of global issues and cultural differences, and their global mindset allows them to recognize good ideas from whenever they might come and new market/product opportunities wherever they might exist. This course is the first step toward the development of a global mindset. It provides a meaningful global experience to first-year business students through an in-depth perspective of a specific country or region outside the United States and a short academic trip to the region.
**Requisites:** Restricted to Business (BUSNU) majors only.

**BADM 2010 (1) Excel in Business**
Teaches beginner to intermediate level Excel skills, emphasizing efficient use of Excel to make sense of substantial data sets. The course is designed to increase students' proficiency with Excel through a series of hands-on workshops. The workshops have a business problem solving orientation and use real data from Leeds' corporate partners. The workshops emphasize the most important skills that employers value.
**Requisites:** Restricted to Business (BUSNU) Majors or students with a Business Minor (BUSM-MIN)

**BADM 2020 (3) Fundamentals of Quantitative Analysis**
Focuses on the application of calculus and statistics in financial analysis with emphasis on theory and problem solving in excel. Calculus topics covered in the class will include: series, limits and continuity, calculating derivatives, graphing and optimization. Descriptive statistics will be reviewed in the context of financial data. Applications to finance will include portfolio optimization, calculation and graphing of historical stock returns, along with calculation of bond prices, returns, and duration.
**Requisites:** Restricted to students with the Business Minor (BUSM-MIN) plan.

**BADM 2050 (3) Honors/Special Topics**
Variable topics in business, drawing from a variety of disciplines.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** At least a 3.50 cumulative GPA is required.
**Additional Information:** Arts Sciences Honors Course

**BADM 2880 (1-3) Special Topics**
Explores historical developments, contemporary issues, industry trends and best practices pertinent to the business of sports. Designed to provide sufficient background for educated consumption of this literature and pursuit of further study if desired.
**Requisites:** Restricted to Business (BUSN) majors.

**BADM 2900 (1-3) Independent Study**
Department consent and departmental form required.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Business (BUSNU) majors only.

**BADM 3020 (3) Written Communication for Business Leaders**
This course focuses on business writing for professionals in an organizational setting, especially those in leadership roles. While the course focuses principally on writing, it builds on a number of skills addressed in BCOR 1030: Communication Strategy¿a prerequisite for this class emphasizing oral communication. In this course, students will revisit such topics as communication channels, storytelling, persuasion, and audience analysis, but specifically in the context of writing.
**Requisites:** Requires prerequisite course of BCOR 1030 (minimum grade D-). Restricted to Business (BUSN) majors with 52 units completed.

**BADM 3100 (1) Professional Development**
Designed to provide opportunities to understand and develop professional competencies for successful careers in business. Designed to increase knowledge of job search strategies and formulate a career management plan for transitioning to the worksplace. Topics such as resumes, cover letters, personal branding, job search strategies, internships, career choices, networking and social media will be covered. A Self-Marketing Plan will be developed to help focus on long-term career goals.
**Requisites:** Restricted to Leeds School of Business majors only.

**BADM 3200 (1.5) Internship Accelerator**
Seminar focused on developing competencies critical to a successful transition into the workplace. Apply what you have learned in the classroom to business problems. Practice problem framing, decision making, and synthesizing complex information. Reflect on which professional communication skills are the most essential complements to your classroom skills and knowledge. Craft ways to improve those most essential skills. Reflect on when to ask for help and when not to. Through hands-on projects, learn about adaptability in the workplace and deciphering professional expectations.
**Requisites:** Restricted to Business (BUSN) majors.

**BADM 3880 (3) Special Topics**
Introduces students to the many facets of the marketing of sport and marketing through sport. Theoretical and practical applications of marketing sport are examined. Provides students with an understanding of current marketing concepts and best business practices, related to sports enterprises and a foundation for pursuit of further study and work in sports and event marketing.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**BADM 3900 (1) Independent Study**
Department consent and departmental form required.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Business (BUSNU) majors only.

**BADM 3930 (1-6) Internship - London Seminar**
Student training and participation in government or industry environment under faculty supervision. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of BASE 2104 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).

**BADM 4030 (3) Crisis Communication**
In today¿s highly volatile, uncertain, complex, and ambiguous (VUCA; Johansen, 2012) world, successful business leaders understand that experiencing an organizational crisis is a matter of when, not if. Organizational leaders¿ communication and actions before, during, and after a crisis determine if the organization survives, is able to recover, and ultimately utilize the crisis as an opportunity for growth. This course takes a message-centered approach to the study of crisis communication. The purpose of this course is to explore the role of communication and strategic communication practices throughout the three stages of crisis management. Both theoretical and applied research areas are considered to provide an overview of the established and emerging perspectives on risk and crisis from the communication perspective.
**Requisites:** Restricted to Business (BUSN) majors with 52-180 units completed.

**BADM 4820 (1-6) Special Topics**
Variable topics in business drawing from a variety of business disciplines.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Business (BUSN) majors with 52-180 units completed.

**BADM 4830 (1-3) Special Topics**
Various topics in business and society drawing from a variety of business disciplines.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Business (BUSNU) majors only.

**BADM 4900 (1-3) Independent Study**
Intended only for exceptionally well qualified business seniors. Department form required.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Business (BUSNU) majors only.

**BADM 4910 (2) VITA-Volunteer Tax Assistance**
Offers students the opportunity to gain professional work experience in an accounting position while still in school. Provides academically relevant work experience that complements students' studies and enhances their career potential.
**Requisites:** Requires prerequsite courses of BCOR 2000 and ACCT 3440 or ACCT 5440 (all minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

# Business Administration - Bachelor of Science (BSBA)

All business students pursuing a bachelor's degree in business administration must complete the prescribed courses in at least one area of emphasis. The school offers programs in 10 areas of emphasis: accounting, business analytics, finance, management, management information systems, marketing, real estate, strategy & entrepreneurship, supply chain management and sustainable business. An area of emphasis consists of a minimum of 18 credit hours taken at CU Boulder.

# Areas of Emphasis

## Accounting Emphasis

The accounting area of emphasis prepares students for careers in which they will develop, analyze and interpret complex financial data. Accounting majors become experts in “the language of business.” This expertise prepares them for careers in CPA firms, business consulting, industry (from Fortune 500 companies to small entrepreneurial enterprises), not-for-profit enterprises or government. Accountants who pursue careers in public accounting might become partners in public accounting and consulting firms. Those who begin their careers in industry might have positions as a chief executive officer (CEO), chief financial officer (CFO), chief accounting officer (CAO) or controller, tax specialist, internal auditor, accounting systems analyst, financial analyst or managerial accountant. Many students begin their careers in public accounting firms and move to industry or government after several years of experience. Employers seek students with skills in communication, interpersonal interactions, analytical thinking, problem solving and integrity.

The major branches of study in the accounting area of emphasis are:

- Financial accounting / analysis and audit
- Tax planning and compliance

Basic coursework in accounting focuses on developing a comprehensive understanding of the theory and concepts underlying the presentation of financial and operating information about an enterprise to external and internal users. Additional coursework exposes the student to income taxation of business enterprises and individuals, the practice and principles of auditing and assurance services and cost management. Specialization is available through graduate work.

### Professional Certification as a CPA or CMA

Most accounting students from the University of Colorado earn professional credentials within a year or two of receiving their degrees. The two most widely-recognized professional certifications are the certified public accountant (CPA) and certified management accountant (CMA).

The CPA is a state-granted license, for which each state sets its own requirements. All states require 150 total credit hours of study to be licensed as a CPA, thus the bachelor's degree in business at CU, with only 120 credit hours, will not meet licensure requirements. Additionally, while the CPA requirements of most states have similar components and required courses, the specifics of those requirements differ greatly. Students interested in ultimately pursuing CPA licensure should contact the applicable state licensing board to determine any requirements they may need to fulfill in order to obtain licensure in a particular state. Most states set requirements for the following before a CPA license will be granted:

- Background checks
- Education
- CPA Exam passage
- Work experience

Not only do state requirements differ greatly from one state to another, those requirements frequently change. It is very important that the accounting student obtain the guidelines for the relevant state to ensure proper development of his or her degree plan (see NASBA.org (http://NASBA.org) or the website of the particular state's board of accountancy).

The CPA license is a legal requirement for someone to perform financial statement audits, but is not legally required to perform other kinds of accounting work. It is important to note, however, that many professional accounting positions set CPA licensure as a job requirement even where it is not legally required, thus a CPA license is a valuable credential for any accounting professional. As a result, most students completing an accounting emphasis at Leeds continue into the concurrent bachelor's and master's degree program (see Concurrent Degree Programs below) to seek their CPA license.

The CPA's expertise typically focuses on presentation and analysis of financial information for an external user. The CMA's primary focus is improving information for the internal user. Professional accountants' expertise in financial matters and their understanding of company operations through financial information prepare them to become key players and critical decision makers for all aspects of business creation, operation and transformation.

As is the case at most colleges and universities, simply meeting the requirements to receive a degree with an undergraduate emphasis in accounting at Leeds will not necessarily meet all of the specific requirements for CPA licensure of any particular state including Colorado. Prior to being licensed, a candidate must be granted permission by a state's board of accountancy to take the CPA Examination. As with the overall requirements for licensure, the specific requirements and timing when students can take the exam differ greatly for different states, all of which makes it crucial for the student to develop the degree plan in conjunction with applicable state requirements.

The CMA is a different type of certification because it not granted by a state, but rather by the Institute of Management Accountants, which is a professional organization. The requirements are the same regardless of where an applicant lives. The website for the Institute of Management Accountants provides information about becoming a certified management accountant (CMA). Though not legally required for any kinds of positions in any state, the CMA is also a valuable professional credential.

## Business Analytics Emphasis

The area of emphasis in business analytics focuses on the exciting and fast-growing field of big data. This interdisciplinary area of emphasis teaches students how to translate data into strategic business decisions. The coursework integrates marketing and customer analytics with operations research, information management and statistical methods. This technical, quantitative and statistically intensive curriculum prepares students to excel in the field of business analytics.

## Finance Emphasis

Finance is essential to business. Finance faculty boast expertise in foundational concepts like corporate finance and macroeconomics, as well as specialized areas like mergers and acquisitions, derivatives and foreign exchange markets. Students within the program benefit from access to the Burridge Center for Securities Analysis and Valuation and the CU Real Estate Center. Our curriculum prepares students to succeed in areas such as financial management, business economics and real estate. The finance program addresses issues in the financial services and securities area, including topics related to high technology firms, large corporations and entrepreneurial companies. The finance program is designed to provide students with in-depth exposure to the background necessary for entry-level positions in various areas of financial management. Students study financial management, money and capital markets, investments and derivative securities, and financial institutions. This program enables students to develop the ability to evaluate financial problems and formulate sound financial decisions and policies. Although emphasis is on financial management of profit-oriented organizations, the principles and concepts covered are applicable to nonprofit and governmental organizations.

## Management Emphasis

Advances in business knowledge and technology have radically changed business systems, organization structures and processes. As a result, critical to today's businesses is the ability to get the right information to the right people at the right time, so that both strategic and operational decisions are made properly and quickly. Students majoring in management will learn to recognize the pivotal role that information plays in the business world and to use their knowledge to increase business competitiveness. Students completing the management area of emphasis are viewed by potential employers as having the education required to successfully compete in the team-oriented, horizontally organized and globally competitive environments of the 21st century. The management area of emphasis prepares students for careers managing people, operations and information. Management students must choose a track in either talent management or leadership.

## Management Information Systems

The most significant enabler of quality decision making is the careful management of digital resources. Useful information must be captured and organized in a way that enables managers to understand how much value is being added by the organization's activities. Students graduating from the Management Information Systems emphasis know how to organize digital resources, solve business problems and develop cutting-edge technologies. Students are trained to solve deep problems using tools, methods and techniques for addressing issues related to the adoption of new technologies in organizations. These technologies are used to get the right information to the right people at the right time.

## Marketing Emphasis

The Marketing Division at the Leeds School of Business is distinguished by its scholarly impact on academic marketing thought and by

exceptional teaching. Research by our faculty is our strength. Research is published in prestigious publications such as the Journal of Consumer Research. Our faculty bring marketing theory and practical solutions to students and prepare them for careers in business and in academics. The increasingly global marketplace, coupled with new communication vehicles such as the Internet, have changed the traditional tactics used in marketing. Today's marketing practitioners must understand the unique challenges of serving foreign markets and how to effectively convey their messages to consumers throughout the world. The marketing program develops students' analytic and decision-making skills in such areas as advertising, market research, brand/product management, selling and sales management, distribution, relationship marketing, international marketing, marketing consumer products and services, and marketing nonprofit organizations. Key concepts focus on identifying customer needs and wants, developing products and services to meet those demands, establishing communications to promote products and services, and monitoring transactions and customer responses to guide future activities. Marketing concepts apply to tangible products, services and ideas, consumer and business markets, and domestic and global markets.

### Real Estate Emphasis

Real estate is an essential part of all our lives—it is where we live, work and play. The real estate area of emphasis educates students about the three fundamental building blocks of real estate: real estate property markets; real estate capital markets; and the legal environment where real estate is built, bought, sold, valued, used as security for mortgages, taxed, owned and rented. The real estate curriculum for the area of emphasis consists of required courses in principles of real estate, real estate finance and investments, real estate economics and a senior seminar in real estate. Elective courses to complete the 18-hour requirement allow students to take coursework in real estate law, real estate development, real estate technology or an academic internship.

In addition to the real estate curriculum, the 300+ member Michael A. Klump Center for Real Estate helps students network with industry professionals, obtain internships, part-time and full-time jobs. The Michael A. Klump Center for Real Estate also sponsors various treks to visit real estate firms in major markets, both domestic and international, to enhance students' education. Finally, the Michael A. Klump Center for Real Estate sponsors additional skills development with extracurricular courses in advanced Excel for real estate applications, ARGUS Enterprise software, LEEDS Green Building certification, and real estate case analysis and presentation (which is preparation for various real estate case competitions). The program graduates real estate professionals prepared to add value for their employer on the first day of their job.

### Strategy & Entrepreneurship

Entrepreneurs and strategists excel at the single most challenging problem in business - creating value by aligning internal strengths and weaknesses with external opportunities and threats. Sometimes that involves creating entirely new companies, even entirely new industries. Often it involves leading innovation or technology commercialization in existing businesses. Students in the Strategy and Entrepreneurship emphasis at the Leeds School of Business develop the skills to create and lead new ventures, to restructure business models and to build high-performing entrepreneurial teams.

### Supply Chain Management Emphasis

The principal function of any organization is the efficient creation and delivery of products and services to its customers (operations). The supply chain management emphasis focuses on this creative process and identifies how organizations use productivity, quality, flexibility, timeliness and technology to compete and prevail in their markets. Students graduating from the supply chain management emphasis will have a broad understanding of the importance of operations in the success of any organization and will be qualified to serve in entry-level line management positions and as general managers later in their careers.

### Sustainable Business

The Sustainable Business emphasis focuses on values-based practices of organizations. This emphasis identifies how business professionals can promote responsible corporate governance practices to create lasting positive social impact. The emphasis will introduce students to values-based decision making and business practices. Students will learn about sustainable business practices across different functions of a business organization and have the opportunity to apply their knowledge though projects, case studies, competitions and examination of current business practices. Course work in leadership and governance will provide students with skills and knowledge to create positive social impact in an organization. Students will be prepared to provide practical solutions for the social and environmental complexities of modern business.

## Requirements

### Total Credit Hours

Students must complete a minimum of 120 acceptable credit hours from the following categories:

- *Business core* (30 credit hours): Consists of integrated coursework through which students develop key skills such as communication, teamwork and leadership while learning fundamentals of business and working on live cases.
- *Business area of emphasis* (18 credit hours): Emphases are available in accounting, business analytics, finance, management, management information systems, marketing, real estate, strategy & entrepreneurship, supply chain management and sustainable business. They require a minimum of three semesters to complete.
- *Business electives* (16 credit hours).
- *General Education* (33 credit hours): Consists of coursework from the Business General Education requirements.
- *Non-business electives* (23 credit hours).

The school reserves the right to disallow any credit that it determines is not appropriate academic credit.

### Minimum Grade Point Average

- A cumulative GPA of 2.00 in the area of emphasis and all grades in the 18 credit hours must have a grade of C- or higher (no pass/fail credit hours can be applied to the area).
- A cumulative GPA of 2.00 is required for all courses attempted at the university.
- A cumulative 2.00 is required for all business coursework attempted at the university.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Business Core** | | |
| BCOR 1015 | The World of Business | 3 |

| | | |
|---|---|---|
| BCOR 1025 | Statistical Analysis in Business | 3 |
| BCOR 1030 | Communication Strategy | 3 |
| BCOR 2201 | Principles of Marketing | 1.5 |
| BCOR 2202 | Principles of Organizational Behavior | 1.5 |
| BCOR 2203 | Principles of Accounting I | 1.5 |
| BCOR 2204 | Principles of Financial Management | 1.5 |
| BCOR 2205 | Introduction to Information Management and Analytics | 1.5 |
| BCOR 2206 | Principles of Operations Management | 1.5 |
| BCOR 2301 | Business Law | 1.5 |
| BCOR 2302 | Business Ethics and Social Responsibility | 1.5 |
| BCOR 2303 | Principles of Accounting II | 1.5 |
| BCOR 2304 | Strategic and Entrepreneurial Thinking | 1.5 |
| BASE 2104 | BCOR Applied Semester Experience | 6 |
| **Area of Emphasis** | | |
| Students must choose an area of emphasis in accounting, business analytics, finance, management, management information systems, marketing, real estate, strategy & entrepreneurship, supply chain management and sustainable business. | | 18 |
| **Business Electives** | | |
| Business courses required by specific areas in excess of the 18 credit hours listed under areas of emphasis may count as business electives. | | 16 |
| **General Education Requirements** | | |
| Students in the Leeds School of Business are required to complete coursework from the Business General Education requirements, including classes from the following categories: [1] | | 33 |
| Mathematical Skills [2] | | |
| Social Sciences [2] | | |
| Written communication [2] | | |
| Arts & Humanities | | |
| Diversity - U.S. Perspective | | |
| Diversity - Global Perspective | | |
| Natural sciences | | |
| **Nonbusiness Electives** | | |
| Students are required to complete 23 credit hours of non-business electives. [3] | | 23 |
| **Total Credit Hours** | | **120** |

1 A list of courses that fulfill specific requirements for each area is available on the College of Arts and Sciences' General Education Requirements webpage. https://www.colorado.edu/artsandsciences/undergraduate/degree-requirements/general-education-requirements.

2 Leeds students are required to take microeconomics and macroeconomics, specific math and writing courses to fulfill these categories. Contact undergraduate student services for more information, or visit leeds.colorado.edu (https://leeds.colorado.edu).

3 Not all classes are accepted as elective credit hours. Generally, to be acceptable, electives must have a form of assessment such as a term paper and/or examinations and must be regular classroom-type courses. Course coverage must be college level, must not be repetitious of other work applied toward the degree, must be academic as opposed to vocational or technical and must be part of the regular university offerings. Contact Undergraduate Student Services or visit the school's Degree Requirements (http://www.colorado.edu/business/academic-programs/undergraduate-programs/undergraduate-degree/degree-requirements/) webpage for more information about the number of business elective credit hours required.

## Residency Requirement

Students must complete a minimum of 45 credit hours in University of Colorado courses on the Boulder campus. Of these 45 credits, a minimum of 30 credits must be business courses completed as a matriculated student in Leeds.

# Areas of Emphasis

## Accounting Emphasis

This emphasis may be earned by a student who takes 18 credit hours of accounting beyond the core. The 18-credit-hour requirement for the emphasis does not meet the educational requirements to be licensed as a CPA in any state. This option might be chosen by a student who does not want to become professionally certified, but who seeks a career involving accounting and financial analysis in industry, government or nonprofit enterprises. This also might be chosen by a student choosing a dual emphasis, such as accounting and finance or accounting and information management.

| Code | Title | Credit Hours |
|---|---|---|
| **Required** | | |
| ACCT 3220 | Corporate Financial Reporting 1 | 3 |
| ACCT 3230 | Corporate Financial Reporting 2 | 3 |
| ACCT 3320 | Cost Management | 3 |
| ACCT 3440 | Income Taxation of Individuals | 3 |
| ACCT 4850 | Senior Seminar - Accounting Ethics | 3 |
| **Electives** | | |
| Select one of the following: | | 3 |
| ACCT 4240 | Advanced Financial Accounting | |
| ACCT 4250 | Financial Statement Analysis | |
| ACCT 4540 | Accounting Information Systems | |
| ACCT 4620 | Auditing and Assurance Services | |
| ACCT 4828 | ESG Reporting: Accounting for a Changing World | |
| **Total Credit Hours** | | **18** |

### CPA Licensure Requirements

All states require 150 total credit hours for licensure as a CPA and most require additional accounting and other business courses. Most states do not require a master's degree. Thus, one route to licensure is obtain a BS with an accounting emphasis, but take additional coursework to meet the specific requirements of the state(s) where the student expects to practice. Students can generally find the current requirements for a particular state at the website for that state's board of accountancy, or at NASBA.org (http://nasba.org/). It is possible that one or more

courses that a state requires for CPA certification is not available to undergraduates at CU Boulder; in such a case the student could take those courses either in person or online at a different institution.

## Business Analytics Emphasis

The area of emphasis in business analytics focuses on the exciting and fast-growing field of big data. This interdisciplinary area of emphasis teaches students how to translate data into strategic business decisions. The coursework integrates marketing and customer analytics with operations research, information management and statistical methods. This technical, quantitative and statistically intensive curriculum prepares students to excel in the field of business analytics.

| Code | Title | Credit Hours |
|---|---|---|
| **Required** | | |
| BAIM 3200 | | 3 |
| BAIM 3205 | Business Data Management | 3 |
| MKTG 3050 | Customer Analytics | 3 |
| MGMT 4820 | Decision Analytics | 3 |
| BAIM 4065 | Leadership in a Digital Age | 3 |
| **Electives** | | |
| Select one of the following: | | 3 |
| BAIM 3220 | Introduction to Python Programming | |
| BAIM 4230 | Customer Success with CRM | |
| MKTG 3350 | Marketing Research and Analytics | |
| MKTG 3700 | Digital Marketing | |
| MGMT 4110 | Supply Chain Management | |
| MGMT 4120 | Managing Business Processes | |
| **Total Credit Hours** | | **18** |

## Finance Emphasis

Students with a finance emphasis must take 18 credit hours of finance courses beyond the BCOR sequence. Students interested in a finance area of emphasis should plan to take FNCE 2010 during their sophomore year.

| Code | Title | Credit Hours |
|---|---|---|
| FNCE 2010 | Quantitative Methods for Finance | 3 |
| FNCE 3010 | Corporate Finance | 3 |
| FNCE 3030 | Investment and Portfolio Management | 3 |
| ACCT 3220 | Corporate Financial Reporting 1 | 3 |
| FNCE 4040 | Derivative Securities | 3 |
| FNCE 4850 | Business Senior Seminar in Finance | 3 |
| **Total Credit Hours** | | **18** |

### Personal Financial Planning Track (PFP)

| Code | Title | Credit Hours |
|---|---|---|
| FNCE 2010 | Quantitative Methods for Finance | 3 |
| FNCE 3820 | Principles of Personal Financial Planning and Insurance | 3 |
| FNCE 3010 | Corporate Finance | 3 |
| FNCE 3030 | Investment and Portfolio Management | 3 |
| ACCT 3220 | Corporate Financial Reporting 1 | 3 |
| FNCE 3040 | Retirement Planning | 3 |
| ACCT 3440 | Income Taxation of Individuals | 3 |
| FNCE 3060 | Estate Planning | 3 |
| FNCE 4840 | Personal Financial Plan Development Capstone | 3 |
| **Total Credit Hours** | | **27** |

The required courses represent a minimum requirement for competence in financial analysis and decision-making. Combinations of the upper division elective finance courses allow students to structure their learning in preparation for specific career paths. Completion of the optional elective focus does not appear on a transcript.

### Optional Elective Focus: Investment Banking

In addition to the required courses, students interested in a career in investment banking should consider taking the following courses as business electives:

| Code | Title | Credit Hours |
|---|---|---|
| FNCE 4830 | Seminar in Investment Banking | 3 |
| ACCT 3230 | Corporate Financial Reporting 2 | 3 |
| FNCE 4050 | Capital Investment Analysis | 3 |
| **Total Credit Hours** | | **9** |

### Optional Elective Focus: Investment Management

In addition to the required courses, students interested in a career in investment management should consider taking the following courses:

| Code | Title | Credit Hours |
|---|---|---|
| FNCE 4050 | Capital Investment Analysis | 3 |
| FNCE 4831 | Seminar in Investment Management | 3 |
| FNCE 4835 | Fixed Income Securities | 3 |
| **Total Credit Hours** | | **9** |

### Optional Elective Focus: Commercial Banking

In addition to the required courses, students interested in a career in commercial banking should consider taking the following courses:

| Code | Title | Credit Hours |
|---|---|---|
| FNCE 4000 | Financial Institutions Management | 3 |
| FNCE 4070 | Financial Markets and Institutions | 3 |
| FNCE 4835 | Fixed Income Securities | 3 |
| **Total Credit Hours** | | **9** |

### Optional Elective Focus: Corporate Finance/Consulting

In addition to the required courses, students interested in a career in corporation finance should consider taking the following courses:

| Code | Title | Credit Hours |
|---|---|---|
| ESBM 4570 | Entrepreneurial Finance | 3 |
| ACCT 3230 | Corporate Financial Reporting 2 | 3 |
| FNCE 4050 | Capital Investment Analysis | 3 |
| **Total Credit Hours** | | **9** |

### Optional Elective Focus: Entrepreneurial Finance

In addition to the required courses, students interested in a career in entrepreneurial finance should consider taking the following courses:

| Code | Title | Credit Hours |
|---|---|---|
| ESBM 4570 | Entrepreneurial Finance | 3 |
| INBU 4200 | International Financial Management | 3 |
| FNCE 4826 | Experimental Seminar: Corporate Governance | 3 |
| **Total Credit Hours** | | **9** |

### Personal Financial Planning Track (PFP) + Finance

| Code | Title | Credit Hours |
|---|---|---|
| FNCE 2010 | Quantitative Methods for Finance | 3 |
| FNCE 3820 | Principles of Personal Financial Planning and Insurance | 3 |
| FNCE 3010 | Corporate Finance | 3 |
| FNCE 3030 | Investment and Portfolio Management | 3 |
| ACCT 3220 | Corporate Financial Reporting 1 | 3 |
| FNCE 3040 | Retirement Planning | 3 |
| ACCT 3440 | Income Taxation of Individuals | 3 |
| FNCE 3060 | Estate Planning | 3 |
| FNCE 4040 | Derivative Securities | 3 |
| FNCE 4840 | Personal Financial Plan Development Capstone | 3 |
| FNCE 4850 | Business Senior Seminar in Finance | 3 |
| **Total Credit Hours** | | **33** |

## Management Emphasis

All students declared in the management area of emphasis must choose one of the following tracks: Leadership or Human Resources Management.

### Leadership Track

The Leadership Track equips students with essential leadership skills and competencies. Students who complete this track acquire research-based knowledge and hands-on experiences that enable them to become principled, productive leaders who can energize, relate, and innovate. Students will be uniquely positioned to become great business leaders because they will possess the interpersonal and communications skills to help organizations succeed in an increasingly competitive marketplace.

| Code | Title | Credit Hours |
|---|---|---|
| **Required** | | |
| ORGN 3010 | Negotiation and Conflict Management | 3 |
| ORGN 3025 | How to Be the Boss | 3 |
| ORGN 3030 | Critical Leadership Skills | 3 |
| **Electives** | | |
| Select two of the following: | | 6 |
| ORGN 3040 | Fundamentals of Ethical Leadership | |
| ORGN 4300 | Leading Diverse and Inclusive Organizations | |
| ORGN 4040 | Individual, Team, and Organizational Development | |
| INBU 3300 | International Business and Management | |
| BADM 4030 | Crisis Leadership | |
| **Required Senior Capstone Course** | | |
| BAIM 4065 | Leadership in a Digital Age | 3 |
| **Total Credit Hours** | | **18** |

### Human Resources Management Track

The Human Resources Management track focuses on organizational excellence by hiring, training, rewarding and retaining an organization's people. Students will learn the knowledge and skills for entry-level human resource positions and will have a strong basis from which to take the Society for Human Resources Management (SHRM) Assurance of Learning exam. After completing the Human Resources Management Track, students find opportunities as human resources generalist, recruiter, training & development, management trainee and many other interesting and rewarding careers.

| Code | Title | Credit Hours |
|---|---|---|
| **Required** | | |
| ORGN 4010 | Redefining the Employee-Employer Relationship | 3 |
| ORGN 4020 | Hiring and Retaining Critical Human Resources | 3 |
| ORGN 4040 | Individual, Team, and Organizational Development | 3 |
| **Electives** | | |
| Select two of the following: | | 6 |
| ORGN 3010 | Negotiation and Conflict Management | |
| ORGN 3025 | How to Be the Boss | |
| ORGN 3030 | Critical Leadership Skills | |
| ORGN 4300 | Leading Diverse and Inclusive Organizations | |
| **Required Senior Capstone Course** | | |
| BAIM 4065 | Leadership in a Digital Age | 3 |
| **Total Credit Hours** | | **18** |

## Management Information Systems

Management Information Systems students inclined toward careers in technical information systems are encouraged to take programming courses as non-business electives (such as CSCI 1300 or ATLS 3519 ).

| Code | Title | Credit Hours |
|---|---|---|
| **Required** | | |
| BAIM 3205 | Business Data Management | 3 |
| **Electives** | | |
| Select four of the following: | | 12 |
| BAIM 3100 | Data Visualization | |
| BAIM 3210 | Low Code for Citizen Developers | |
| BAIM 4120 | Business Analytics | |
| BAIM 3220 | Introduction to Python Programming | |
| BAIM 4200 | Advanced Business Analytics | |
| BAIM 4220 | Enterprise Applications | |
| BAIM 4230 | Customer Success with CRM | |
| BAIM 4240 | Agile Project Management | |

| | | |
|---|---|---|
| BAIM 4250 | Information Security Management | |
| **Required Senior Capstone Course** | | |
| BAIM 4065 | Leadership in a Digital Age (Senior Capstone) | 3 |
| **Total Credit Hours** | | **18** |

## Marketing Emphasis

Students with a marketing emphasis must take 18 credit hours of marketing courses beyond BCOR 2201. Students pursuing a marketing emphasis will need three semesters to complete the required coursework after taking BCOR 2201.

| Code | Title | Credit Hours |
|---|---|---|
| MKTG 3250 | Buyer Behavior | 3 |
| MKTG 3350 | Marketing Research and Analytics | 3 |
| MKTG 4250 | Product Strategy | 3 |
| MKTG 4300 | Pricing and Channels of Distribution | 3 |
| MKTG 4550 | Advertising and Promotion Management | 3 |
| MKTG 4850 | Senior Seminar in Marketing | 3 |
| **Total Credit Hours** | | **18** |

## Real Estate Emphasis

Students with a real estate emphasis must follow the course requirements below.

| Code | Title | Credit Hours |
|---|---|---|
| **Required** | | |
| FNCE 3010 | Corporate Finance | 3 |
| REAL 3000 | Principles of Real Estate | 3 |
| REAL 4100 | Real Estate Finance and Investment Analysis | 3 |
| REAL 4400 | Real Estate Economics | 3 |
| **Electives** | | |
| Select one of the following: | | 3 |
| REAL 4000 | Real Estate Law (Transactions) | |
| REAL 4200 | Real Estate Technology | |
| REAL 4810 | Real Estate Applied Practice (only offered pass/fail) | |
| REAL 4820 | Topics: Real Estate Development | |
| **Required Senior Capstone Course** | | |
| REAL 4850 | Senior Seminar in Real Estate | 3 |
| **Total Credit Hours** | | **18** |

## Strategy & Entrepreneurship

| Code | Title | Credit Hours |
|---|---|---|
| **Required** | | |
| ESBM 3700 | Entrepreneurial Environments | 3 |
| ESBM 4830 | New Venture Creation | 3 |
| MGMT 4200 | Competitive Strategy | 3 |
| **Electives** | | |
| Select two of the following: [1] | | 6 |
| CESR 4430 | Corporate Boards in Action | |
| ESBM 4570 | Entrepreneurial Finance | |
| INBU 3300 | International Business and Management | |
| MGMT 3800 | Consulting Skills | |
| MGMT 4160 | Managing Growth: Entrepreneurship and High Growth Ventures | |
| ORGN 3030 | Critical Leadership Skills | |
| ORGN 4020 | Hiring and Retaining Critical Human Resources | |
| ORGN 4030 | Managing Employee Reward Systems | |
| ORGN 4040 | Individual, Team, and Organizational Development | |
| **Required Senior Capstone Course** | | |
| MGMT 4850 | Senior Seminar in Management | 3 |
| **Total Credit Hours** | | **18** |

## Supply Chain Management

| Code | Title | Credit Hours |
|---|---|---|
| **Required** | | |
| MGMT 3100 | Operations Management | 3 |
| or INBU 3101 | Operations Management Global Seminar | |
| MGMT 4110 | Supply Chain Management | 3 |
| **Electives** | | |
| Select three of the following: | | 9 |
| MGMT 4130 | Sustainable Operations | |
| MGMT 4140 | Project Management | |
| MGMT 4150 | International Operations Management | |
| or INBU 4151 | International Operations in Hong Kong | |
| MGMT/EMEN 4400 | Quality Management | |
| MGMT 4820 | Decision Analytics (Decision Modeling) | |
| **Required Senior Capstone Course** | | |
| MGMT 4850 | Senior Seminar in Management | 3 |
| **Total Credit Hours** | | **18** |

## Sustainable Business

| Code | Title | Credit Hours |
|---|---|---|
| **Required** | | |
| CESR/MGMT 4130 | Sustainable Operations | 3 |
| CESR/ORGN 3040 | Fundamentals of Socially Responsible Leadership | 3 |
| **Electives** | | |
| Select three of the following: | | 9 |
| ACCT 4828 | ESG Reporting: Accounting for a Changing World | |
| FNCE 2280 | Investing in Sustainability | |
| CESR 3050 | Sustainable Space Governance | |
| CESR 3060 | Our Sustainable Future CU-in-DC Seminar | |
| CESR 4000 | Leadership Challenges | |
| CESR 4005 | Business Solutions for Global Development | |
| CESR/ORGN 4430 | Corporate Boards in Action | |
| ESBM 4830 | New Venture Creation | |

| | | |
|---|---|---|
| ORGN 3030 | Critical Leadership Skills | |
| ORGN 4100 | Global Business Ethics | |
| ORGN 4300 | Leading Diverse and Inclusive Organizations | |
| **Required Senior Capstone Course** | | |
| CESR 4850 | The Sustainable Firm: Strategies and Practice | 3 |
| **Total Credit Hours** | | **18** |

# Integration Area

## Computer Science Integration

The computer science and business integration program allows Leeds students to complete a BS in Business Administration with a specialization in computer science. Students in this selective program take 28 hours of coursework in computer science in place of business and non-business electives and graduate with an in-depth knowledge in both computer science and business.

| Code | Title | Credit Hours |
|---|---|---|
| **Computer Science Requirements** | | |
| *Computer Science Foundations* | | *15* |
| CSCI 1300 | Computer Science 1: Starting Computing | |
| CSCI 2270 | Computer Science 2: Data Structures | |
| CSCI 2400 | Computer Systems | |
| CSCI 2824 | Discrete Structures | |
| or MATH 2001 | Introduction to Discrete Mathematics | |
| or APPM 3170 | Discrete Applied Mathematics | |
| *Computer Science Electives* | | *13* |
| **Mathematics** | | |
| MATH 1300 | Calculus 1 | 5 |
| BCOR 1025 | Statistical Analysis in Business | 3 |
| or APPM 4570 | | |
| **Integration Components: Hybrid IM/Integrated Technology** | | |
| BAIM 4120 | Business Analytics | 3 |
| BAIM 4220 | Enterprise Applications | 3 |
| MGMT 4140 | Project Management | 3 |
| **Total Credit Hours** | | **45** |

# Recommended Four-Year Plan of Study

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| BCOR 1015 or BCOR 1030 | The World of Business or Communication Strategy | 3 |
| ECON 2010 | Principles of Microeconomics | 4 |
| MATH 1112 | Mathematical Analysis in Business | 4 |
| BADM 1250 | Designing Your Leeds | 1.5 |
| General Education Course | | 3 |
| | **Credit Hours** | **15.5** |
| **Spring Semester** | | |
| BCOR 1025 | Statistical Analysis in Business | 3 |
| BCOR 1030 or BCOR 1015 | Communication Strategy or The World of Business | 3 |
| ECON 2020 | Principles of Macroeconomics | 4 |
| BADM 1260 | First-Year Global Experience | 2 |
| WRTG 1150 | First-Year Writing and Rhetoric | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| BCOR 2201 | Principles of Marketing | 1.5 |
| BCOR 2202 | Principles of Organizational Behavior | 1.5 |
| BCOR 2203 | Principles of Accounting I | 1.5 |
| BCOR 2204 | Principles of Financial Management | 1.5 |
| BCOR 2205 | Introduction to Information Management and Analytics | 1.5 |
| BCOR 2206 | Principles of Operations Management | 1.5 |
| General Education Course | | 3 |
| General Education Course | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| BCOR 2301 | Business Law | 1.5 |
| BCOR 2302 | Business Ethics and Social Responsibility | 1.5 |
| BCOR 2303 | Principles of Accounting II | 1.5 |
| BCOR 2304 | Strategic and Entrepreneurial Thinking | 1.5 |
| BASE 2104 | BCOR Applied Semester Experience | 6 |
| General Education Course | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| Area of Emphasis Course | | 3 |
| Area of Emphasis Course | | 3 |
| Business Elective Course | | 3 |
| Non-Business Elective Course | | 3 |
| Non-Business Elective Course | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| Area of Emphasis Course | | 3 |
| Area of Emphasis Course | | 3 |
| Business Elective Course | | 3 |
| Non-Business Elective Course | | 3 |
| General Education Course | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| Area of Emphasis Course | | 3 |
| Business Elective Course | | 3 |
| General Education Course | | 3 |
| Non-Business Elective Course | | 3 |
| Non-Business Elective Course | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| Area of Emphasis Course: Senior Seminar | | 3 |
| Business Elective Course | | 3 |
| Non-Business Elective Course | | 3 |

| | | |
|---|---|---|
| Non-Business Elective Course | | 3 |
| Non-Business Elective Course | | 2 |
| BADM 2010 | Excel in Business | 1 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **120.5** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Develop a basic knowledge of core concepts in the five major functional areas of business: accounting, finance, management, marketing and operations and information management.
- Develop a specialized knowledge of one or more of the ten areas of emphasis (accounting, business analytics, finance, management, management information systems, marketing, real estate, strategy entrepreneurship, supply chain management and sustainable business).
- Demonstrate that they have insight into the significance of the globalization of markets and its impact on modern business functions.
- Understand the connections between academic theory and practice.
- Recognize societal issues inherent in all business decisions, including the value of diversity and the role values play in business practices.
- Possess strong analytical and problem-solving skills, enabling them to identify and critically assess business problems.
- Develop a skillset appropriate for business professionals, including strong verbal and written communication skills, proficiency in business computer applications, the ability to work as part of a diverse team and the skills to act and present themselves in a professional manner.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BS in Business Administration, MS in Accounting or MS in Taxation

### Admissions Requirements

In order to gain admission to the bachelor's–accelerated master's program in accounting *or* taxation, a student must meet the following criteria:

- Have a cumulative GPA of 3.1 or higher
- Must have completed four **prerequisite** courses with a minimum GPA of 3.0 averaged over the following four courses:
  - ACCT 3220 Corporate Financial Reporting 1
  - ACCT 3230 Corporate Financial Reporting 2
  - ACCT 3320 Cost Management
  - ACCT 3440 Income Taxation of Individuals
- Transfer students must have completed a minimum of 24 credit hours at CU Boulder

### Program Requirements

BAM students will be allowed to take four classes (12 credit hours) of MS coursework while still in undergraduate status (i.e. the "BAM" courses). Of the four BAM courses, a maximum of three classes (9 credit hours) will be allowed to double count toward both the undergraduate and master's degrees. All BAM courses will be charged undergraduate tuition. After receiving the undergraduate degree, all remaining coursework will be assessed graduate tuition. To advance to the remaining MS coursework, BAM students must submit a graduate admission application early in the semester in which the undergraduate requirements will be completed.

Below is a recommended sequence of courses to complete in addition to other undergraduate requirements. The BAM in accounting or taxation is a 150 credit-hour program. Students earn a BS in business administration (120 credits) with an area of emphasis in accounting, finance, or accounting and finance, and an MS in Accounting (30 credits) or an MS in Taxation (31 credits).

#### Fourth Year - Undergraduate Status

- Required for all: ACCT 6350 (counts toward ACCT 4850 requirement)
- Choose up to three of the following:
  - ACCT 5450 (counts toward MS degree only)
  - ACCT 5620 (counts toward ACCT 4XXX elective requirement)
  - ACCT 5240 (counts toward ACCT 4XXX elective requirement)
  - ACCT 5250 (counts toward ACCT 4XXX elective requirement)
  - BSLW 5120 (counts toward business elective)

#### Fifth Year - Graduate Status

- Take remaining MS coursework over the summer, fall and spring semesters. Most courses are offered every semester but ACCT 6620 must be taken during final semester of the program. With precise planning, it is possible to complete the remaining graduate work over one summer session and one full semester

*Note*: The MS taxation path has less flexibility than the MS accounting path; please contact the department for taxation advising.

## BS in Business Administration, MS in Real Estate

### Admissions Requirements

In order to gain admission to the bachelor's–accelerated master's program in real estate, a student must meet the following criteria:

- Have a cumulative GPA of 3.0 or higher
- Must have completed all real estate **prerequisite** courses.
- Completion of BAM intent application

### Program Requirements

BAM students will be allowed to take four classes (12 credit hours) of MS coursework while still in undergraduate status (i.e. the "BAM" courses). Of the four BAM courses, a maximum of three classes (9 credit hours) will be allowed to double count toward both the undergraduate and master's degrees. All BAM courses will be charged undergraduate tuition. After receiving the undergraduate degree, all remaining coursework will be assessed graduate tuition. To advance to the remaining MS coursework,

BAM students must submit a graduate admission application early in the semester in which the undergraduate requirements will be completed.

### Additional Information

Students interested in the bachelor's–accelerated master's degrees listed above may contact the Leeds Graduate Program for more information at leedsmsa@colorado.edu.

# Business - Minor

In 2013, the Leeds School of Business launched a 12-credit business minor so all CU Boulder students could gain business fundamentals, increasing their immediate impact as new hires. The business minor is now the largest minor on campus, attracting nearly 2,000 students from each college across the university.

Visit the Business Minor (https://www.colorado.edu/business/academic-programs/minor-business/) webpage to learn more about the curriculum, eligibility requirements and application process.

# Requirements

## Application

The admissions process consists of an online application (https://www.colorado.edu/business/undergraduate/admissions/non-business%20major/business%20minor/) and resume upload. Leeds receives many more qualified applicants than spots available; apply early for favorable admission.

### Deadlines

Round 1 applicants (standard admission) receive admission decisions before registration opens, while Round 2 applicants (late admission) receive admission decisions after registration has begun.

- Spring deadlines: Oct. 5 (Round 1) & Dec. 5 (Round 2)
- Summer deadlines: Feb. 5 (Round 1) & April 5 (Round 2)
- Fall deadlines: March 5 (Round 1) & July 5 (Round 2)

### Eligibility

To be eligible for admission students must have a minimum 2.0 cumulative GPA and have earned at least a C- in a pre-approved math reasoning course. Students currently enrolled in a pre-approved math reasoning course may apply and be conditionally admitted pending final course grade. The complete list of pre-approved math reasoning courses can be found on the Business Minor Application (https://www.colorado.edu/business/undergraduate/admissions/non-business%20major/business%20minor/) webpage.

## Required Courses and Credits

The Business Minor takes a minimum of two semesters to complete. Foundation courses must first be completed before moving on to the track and capstone courses. Twelve credits of business minor coursework must be taken at CU Boulder.

| Code | Title | Credit Hours |
|---|---|---|
| **Foundation Courses** | | |
| BUSM 2010 & BUSM 2011 | Principles of Marketing and Principles of Management | 3 |
| BUSM 2020 & BUSM 2021 | Principles of Accounting and Principles of Finance | 3 |
| **Program Track** | | |
| Choose one 3-credit track. (View "Track Courses" section below.) | | 3 |
| **Capstone** | | |
| BUSM 4010 | Entrepreneurship and Innovation | 3 |
| **Total Credit Hours** | | **12** |

### Foundation Courses

Through our foundation courses students are introduced to the essential elements of marketing, management, accounting and finance. Foundation courses are available in the fall, spring and summer. Track and capstone courses are only available in the fall and spring. The global business track is the exception, as it occurs abroad during the summer months and is available to a select few.

Prospective Business Minor students interested in taking summer foundation courses should apply for the summer cohort and are expected to enroll in both BUSM 2010/BUSM 2011 and BUSM 2020/BUSM 2021 over Summer Sessions A and B.

*Note*: Business Minor course codes changed in Fall 2018: Marketing & Management was previously coded as BUSM 2001, Finance & Accounting was coded as BUSM 2002, Tracks were coded as BUSM 3001, 3002, 3003, 3004 and 3005 and the Capstone was listed as BUSM 4001.

### Track Courses

Students must complete one 3-credit track course, but may enroll in multiple tracks if desired.

| Code | Title | Credit Hours |
|---|---|---|
| **Track Courses** | | |
| *Innovation* | | |
| BUSM 3010 | Product Development I | 1.5 |
| BUSM 3011 | Product Development II | 1.5 |
| *Analytics* | | |
| BUSM 3020 | Business and Financial Analytics I | 1.5 |
| BUSM 3021 | Business and Financial Analytics II | 1.5 |
| *Entrepreneurship* | | |
| BUSM 3031 | Business Leadership | 3 |
| *Global Business* | | |
| BUSM 3040 | Doing Business in Europe | 3 |
| *Real Estate* | | |
| BUSM 3050 | Introduction to Real Estate | 3 |
| *Environmental Sustainability* | | |
| BUSM 3060 | Environmental Sustainability in a Globalized World | 3 |

### Capstone Course

Students complete the minor with an entrepreneurial capstone course that focuses on business strategy and development (BUSM 4010).

# Business Leadership - Certificate

The business leadership certificate provides students with the foundations of theory and research on leadership, but emphasizes professional experiences such as mentoring, internships and engaging in leader roles. By the time they graduate, students should be poised to embrace leadership challenges as they unfold, make sense of leadership

experiences, thrive in a dynamic business culture and lead with an ethical compass.

The business leadership certificate is recommended for students who:

- Are interested in learning about the art and science of leadership,
- Have an interest in developing their own leadership to take on exciting leadership roles,
- Want to accelerate their leadership development so they can best learn from their early career experiences, and
- Want to start their own companies or lead important projects for social change.

# Requirements

## Admissions Requirements

Complete the Business Leadership Certificate Application Form (https://www.colorado.edu/business/programs/leeds-certificate-programs/business-leadership-certificate/) or email Antonio Papuzza (antonio.papuzza@colorado.edu) for additional details.

## Required Courses and Credits

To teach students to be leaders, we must go beyond the traditional classroom, providing students with the opportunity to engage in leadership experiences and to make sense of those experiences to prepare them for future leader roles. As such we include both classroom and experiential requirements to the certificate.

There is a minimum grade requirement is a C- or better in order for upper-division courses to apply toward a certificate requirement. In addition, students are required to maintain an overall GPA of 2.0 for the selected courses.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Coursework** | | |
| BCOR 2202 | Principles of Organizational Behavior | 1.5 |
| BCOR 2302 | Business Ethics and Social Responsibility | 1.5 |
| ORGN 3030 | Critical Leadership Skills | 3 |
| **Electives** | | **6** |
| Choose two: | | |
| ORGN 3010 | Negotiation and Conflict Management | |
| ORGN 3040 | Fundamentals of Ethical Leadership | |
| INBU 3300 | International Business and Management | |
| or INBU 3301 | Doing Business in China | |
| ORGN 4300 | Leading Diverse and Inclusive Organizations | |
| **Experiential Requirements** [1] | | |
| Leadership retreat | | |
| Leadership impact project | | |
| **Total Credit Hours** | | **12** |

[1] Students must complete a retreat, workshop and project to fulfill their experiential learning requirement. For more information, visit the Business Leadership Certificate (https://www.colorado.edu/business/programs/leeds-certificate-programs/business-leadership-certificate/) webpage.

# Plan(s) of Study

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| BCOR 1015 | The World of Business | 3 |
| ECON 2010 | Principles of Microeconomics | 4 |
| MATH 1112 | Mathematical Analysis in Business | 4 |
| BADM 1250 | Designing Your Leeds | 1.5 |
| WRTG 1150 | First-Year Writing and Rhetoric | 3 |
| | **Credit Hours** | **15.5** |
| **Spring Semester** | | |
| BCOR 1025 | Statistical Analysis in Business | 3 |
| BCOR 1030 | Communication Strategy | 3 |
| ECON 2020 | Principles of Macroeconomics | 4 |
| BADM 1260 | First-Year Global Experience | 2 |
| General Education Course | | 3 |
| | **Credit Hours** | **15** |

**Year Two**

| **Fall Semester** | | |
|---|---|---|
| BCOR 2201 | Principles of Marketing | 1.5 |
| BCOR 2202 | Principles of Organizational Behavior | 1.5 |
| BCOR 2203 | Principles of Accounting I | 1.5 |
| BCOR 2204 | Principles of Financial Management | 1.5 |
| BCOR 2205 | Introduction to Information Management and Analytics | 1.5 |
| BCOR 2206 | Principles of Operations Management | 1.5 |
| General Education Course | | 3 |
| General Education Course | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| BCOR 2301 | Business Law | 1.5 |
| BCOR 2302 | Business Ethics and Social Responsibility | 1.5 |
| BCOR 2303 | Principles of Accounting II | 1.5 |
| BCOR 2304 | Strategic and Entrepreneurial Thinking | 1.5 |
| BASE 2104 | BCOR Applied Semester Experience | 6 |
| General Education Course | | 3 |
| | **Credit Hours** | **15** |

**Year Three**

| **Fall Semester** | | |
|---|---|---|
| Area of Emphasis Course | | 3 |
| Area of Emphasis Course | | 3 |
| ORGN 3030 | Critical Leadership Skills | 3 |
| Non-Business Elective Course | | 3 |
| Non-Business Elective Course | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| Area of Emphasis Course | | 3 |
| Area of Emphasis Course | | 3 |
| ORGN 4210 | Systems Thinking | 3 |
| Non-Business Elective Course | | 3 |

| | |
|---|---|
| General Education Course | 3 |
| **Credit Hours** | **15** |
| **Year Four** | |
| **Fall Semester** | |
| Area of Emphasis Course | 3 |
| Business Leadership Certificate Elective Course | 3 |
| General Education Course | 3 |
| Non-Business Elective Course | 3 |
| Non-Business Elective Course | 3 |
| **Credit Hours** | **15** |
| **Spring Semester** | |
| Area of Emphasis Course: Senior Seminar | 3 |
| Business Elective Course | 3 |
| Non-Business Elective Course | 3 |
| Non-Business Elective Course | 3 |
| Non-Business Elective Course | 3 |
| BADM 2010 | |
| **Credit Hours** | **15** |
| **Total Credit Hours** | **120.5** |

# Entrepreneurial Studies - Certificate

Whether working for a large global corporation or a small start-up venture, graduates will be valued for their ability to innovate, lead change, recognize emerging markets and launch new products. The entrepreneurial studies program is designed to develop an individual's abilities to create, discover and exploit opportunities in start-up ventures or existing organizations.

The entrepreneurial studies program at the Leeds School of Business is internationally recognized for the quality of its instruction and the capabilities of our students. Within the Leeds School, the Deming Center for Entrepreneurship has served as a rich resource for students with interests in entrepreneurship—coordinating the academic curriculum, providing help with internship and job placement, creating links with the business community and sponsoring networking opportunities and many special events.

The curriculum focuses on experiential learning. Courses are designed to give students hands-on experiences that develop the ability to act on opportunities. Students may begin the study of entrepreneurship in their junior year.

## Requirements

A certificate in entrepreneurial studies is granted to students who fulfill the following requirements:

1. Complete the 12 credits listed below.
2. Earn at least a 3.00 GPA in the three ESBM courses.
3. Complete an approved 60-hour entrepreneurship internship with a start-up company who's been in business for 5 years or less and has less than 200 employees and complete a 2-3 page write-up about it.
4. Engage in the entrepreneurship ecosystem (attend minimum of 8 events) and provide a short write-up on their experiences.
5. Pass a written exam in entrepreneurship at the conclusion of their studies.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| BCOR 2301 | Business Law | 1.5 |
| BCOR 2304 | Strategic and Entrepreneurial Thinking | 1.5 |
| ESBM 3700 | Entrepreneurial Environments | 3 |
| ESBM 4570 | Entrepreneurial Finance | 3 |
| ESBM 4830 | New Venture Creation | 3 |
| **Total Credit Hours** | | **12** |

Note: Students seeking internships should complete ESBM 3700 prior to their internship.

For more information, visit the Leeds School's Deming Center for Entrepreneurship (http://www.colorado.edu/business/deming/) webpage.

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate comprehensive knowledge and application of the entrepreneurial process.
- Develop and deliver a professional business pitch to a group of seasoned investors.
- Understand the importance of economic, social and political trends in the global entrepreneurial environment.
- Analyze industry and market data to identify entrepreneurial opportunities.

# Global Business - Certificate

The globalization of the marketplace demands employees who can successfully compete in a multicultural business environment in the United States and around the world. Understanding the significant cultural, economic and political differences between countries and regions is vital to success in international business.

To develop these competencies, the Leeds School of Business offers the Global Business Certificate to its students. The certificate provides diverse exposure to global business principles and opportunities to develop intercultural self-awareness and a global mindset.

## Requirements

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| Select three of the following: | | 9 |
| *Business Courses* | | |
| INBU 3300 | International Business and Management | |
| or INBU 3500 | Global Intensive: International Strategy and Entrepreneurship | |
| INBU 3450 | International Business and Marketing | |
| INBU 4200 | International Financial Management | |
| MGMT 4150 | International Operations Management | |
| CESR 4005 | Business Solutions for Global Development | |

| | |
|---|---|
| *Any Leeds Global Seminar* | |
| ESBM 4830 | New Venture Creation (Only if taken as a Global Seminar) |
| FNCE 4060 | Special Topics in Finance (London Finance Global Seminar) |
| INBU 3300 | International Business and Management (Only if taken as a Global Seminar) |
| INBU 3101 | Operations Management Global Seminar |
| INBU 3301 | Doing Business in China |
| INBU 3333 | Leading and Managing Across Cultures in Northern Europe |
| INBU 4151 | International Operations in Hong Kong |
| INBU 4925 | Entrepreneurship and Empowerment in South Africa |
| MGMT 4110 | Supply Chain Management (Only if taken as a Global Seminar) |
| MKTG 4250 | Product Strategy (Only if taken as a Global Seminar) |
| ORGN 4444 | Global Leadership |
| **International Elective Courses** | |
| Select two of the following: [1] | 5-6 |
| *Business Courses* | |
| BADM 1260 | First-Year Global Experience [2] |
| CESR 4850 | The Sustainable Firm: Strategies and Practice |
| INBU 4910 | Global Internship [1] |
| BADM 3930 | Internship - London Seminar [1] |
| ORGN 3010 | Negotiation and Conflict Management |
| ORGN 4100 | Global Business Ethics |
| *Language Courses (2000 level or higher only)* | |
| ARAB 2110 | Intermediate Arabic 1 |
| ARAB 2120 | Intermediate Arabic 2 |
| ARAB 3110 | Advanced Arabic 1 |
| ARAB 3120 | Advanced Arabic 2 |
| CHIN 2110 | Intermediate Chinese 1 |
| CHIN 2120 | Intermediate Chinese 2 |
| CHIN 3110 | Advanced Chinese 1 |
| CHIN 3120 | Advanced Chinese 2 |
| FREN 2110 | Second-Year French Grammar Review and Reading 1 |
| FREN 2120 | Second-Year French Grammar Review and Reading 2 |
| FREN 3010 | French Phonetics and Pronunciation |
| FREN 3050 | French Composition |
| FREN 3600 | Business French 1 |
| FRSI 3110 | |
| FRSI 3120 | |
| GRMN 2010 | Intermediate German 1 |
| GRMN 2020 | Intermediate German 2 |
| GRMN 3010 | Advanced German 1 |
| GRMN 3020 | Advanced German 2 |
| GRMN 3030 | Business German |
| GRMN 4010 | Advanced German III |
| HEBR 2110 | Intermediate Modern Hebrew, First Semester |
| HEBR 2120 | Intermediate Modern Hebrew, Second Semester |
| HEBR 3010 | Third Year Modern Hebrew, First Semester |
| HEBR 3020 | Third Year Modern Hebrew, Second Semester |
| HEBR 3030 | Advanced Biblical Hebrew, Third Year, First Semester |
| HIND 2110 | Intermediate Hindi 1 |
| HIND 2120 | Intermediate Hindi 2 |
| HIND 3110 | Advanced Hindi 1 |
| HIND 3120 | Advanced Hindi 2 |
| INDO 2110 | Intermediate Indonesian 1- DILS |
| INDO 2120 | Intermediate Indonesian 2- DILS |
| ITAL 2110 | Intermediate Italian Reading, Grammar, and Composition 1 |
| ITAL 2120 | Intermediate Italian Reading, Grammar, and Composition 2 |
| ITAL 3015 | Advanced Composition 1 |
| ITAL 3025 | Advanced Composition 2: Introduction to Literary Writing |
| ITAL 3030 | Italian Conversation Through Art History |
| JPNS 2110 | Intermediate Japanese 1 |
| JPNS 2120 | Intermediate Japanese 2 |
| JPNS 3110 | Advanced Japanese 1 |
| JPNS 3120 | Advanced Japanese 2 |
| JPNS 3311 | Japanese Minority and Transnational Literature |
| JPNS 3331 | Business Japanese |
| KREN 2110 | Intermediate Korean 1 |
| KREN 2120 | Intermediate Korean 2 |
| KREN 3110 | Advanced Korean 1 |
| KREN 3120 | Advanced Korean 2 |
| LATN 2004 | Accelerated Latin 1 |
| LATN 2044 | Accelerated Latin 2 |
| LATN 2114 | Intermediate Latin 1 |
| LATN 2124 | Intermediate Latin 2 |
| PORT 2110 | Second-Year Portuguese 1 |
| PORT 2120 | Second-Year Portuguese 2 |
| PORT 3003 | Advanced Portuguese Language Skills |
| QUEC 2010 | Intermediate Quechua 1 |
| RUSS 2010 | Second-Year Russian 1 |
| RUSS 2020 | Second-Year Russian 2 |
| RUSS 3000 | Advanced Conversation |
| RUSS 3010 | Third-Year Russian 1 |
| RUSS 3020 | Third-Year Russian 2 |
| RUSS 3060 | Advanced Russian for Heritage Speakers (Part 1) |
| RUSS 4010 | Advanced Conversation and Composition 1 |
| RUSS 4020 | Advanced Conversation and Composition 2 |

| | |
|---|---|
| RUSS 4060 | Advanced Russian for Heritage Speakers (Part 2) |
| SNSK 2110 | Intermediate Sanskrit 1 |
| SNSK 2120 | Intermediate Sanskrit 2 |
| SPAN 2110 | Second-Year Spanish 1 |
| SPAN 2120 | Second-Year Spanish 2 |
| SPAN 2150 | Intensive Second-Year Spanish |
| SPAN 3000 | Advanced Spanish Language Skills |
| SPAN 3001 | Spanish Conversation |
| SPAN 3002 | Advanced Spanish Conversation |
| SPAN 3010 | Advanced Rhetoric and Composition |
| SPAN 3030 | Professional Spanish for Business 1 |
| SPAN 3040 | Professional Spanish for Business 2 |
| SPAN 3120 | Advanced Spanish Grammar |
| SWED 2010 | Intermediate Swedish 1 -DILS |
| SWED 2020 | Intermediate Swedish 2 - DILS |
| SWED 2120 | Second-Year Swedish Reading and Conversation 2 |
| SWED 3010 | Advanced Swedish 1-DILS |
| SWED 3020 | Advanced Swedish 2 - DILS |
| TBTN 2010 | Intermediate Colloquial Tibetan 1 |
| TBTN 2020 | Intermediate Colloquial Tibetan 2 |
| TBTN 2120 | |
| TBTN 2220 | Intermediate Tibetan II DILS |
| YIDD 2010 | Intermediate Yiddish 1 |
| *Economics, Geography, or Political Science courses with international focus* | |
| ECON 3403 | International Economics and Policy |
| ECON 3784 | Economic Development and Policy |
| ECON 4292 | Migration, Immigrant Adaptation, and Development |
| ECON 4413 | International Trade |
| ECON 4423 | International Finance |
| ECON 4514 | Economic History of Europe |
| ECON 4774 | Topics in Economic Development, History and Political Economy |
| ECON 4784 | Economic Development |
| GEOG 3662 | Economic Geography |
| GEOG 3672 | Who Runs the World? Sex, Power, and Gender in Geography |
| GEOG 3682 | International Development: Economics, Power, and Place |
| GEOG 3692 | Introduction to Global Public Health |
| GEOG 3742 | Place, Power, and Contemporary Culture |
| GEOG 3812 | Mexico, Central America, and the Caribbean |
| GEOG 3822 | China's Diverse Geographies: Environment, Society, Politics |
| GEOG 3862 | Global Africa: Environment, Development, and Culture |
| GEOG 4292 | Migration, Immigrant Adaptation, and Development |
| GEOG 4712 | Political Geography |
| GEOG 4732 | Population Geography |
| GEOG 4812 | Political Ecology & Latin America |
| GEOG 4822 | Environment and Development in China |
| GEOG 4892 | Geography of Western Europe |
| PSCI 2012 | Introduction to Comparative Politics |
| PSCI 2028 | Special Topics (Social Entrepreneurship and Sustainability) |
| PSCI 2223 | Introduction to International Relations |
| PSCI 3032 | Democracy, Inequality and Violence in Latin America |
| PSCI 3072 | Government and Politics in Southeast Asia |
| PSCI 3082 | Political Systems of Sub-Saharan Africa |
| PSCI 3143 | Current Affairs in International Relations |
| PSCI 3163 | American Foreign Policy |
| PSCI 3193 | International Behavior |
| PSCI 4002 | Western European Politics |
| PSCI 4012 | Global Development |
| PSCI 4052 | Chinese Politics |
| PSCI 4062 | East European Politics |
| PSCI 4173 | International Organizations |
| PSCI 4213 | Europe and the International System |
| PSCI 4703 | Technology, Society and the Future |
| PSCI 4783 | Global Issues |
| PSCI 4792 | Issues in Latin American Politics |
| SEWL 2000 | America, the Environment, and the Global Economy |
| *Any of the Core Courses not applied toward the core course requirements* | |
| CESR 4005 | Business Solutions for Global Development |
| INBU 3300 | International Business and Management |
| or INBU 3500 | Global Intensive: International Strategy and Entrepreneurship |
| INBU 3450 | International Business and Marketing |
| INBU 4200 | International Financial Management |
| MGMT 4150 | International Operations Management |
| *Any Leeds Global Seminar* [2] | |
| **Global Experience** | |
| Select one experience | |
| BADM 1260 | First-Year Global Experience |
| INBU 4910 | Global Internship |
| BADM 3930 | Internship - London Seminar |
| Semester/Summer Abroad | |
| International Volunteer Experience | |
| *Any Leeds Global Seminar* | |
| ESBM 4830 | New Venture Creation (Only if taken as a Global Seminar) |
| FNCE 4060 | Special Topics in Finance (London Finance Global Seminar) |
| INBU 3300 | International Business and Management (Only if taken as a Global Seminar) |
| INBU 3101 | Operations Management Global Seminar |
| INBU 3301 | Doing Business in China |

| | |
|---|---|
| INBU 3333 | Leading and Managing Across Cultures in Northern Europe |
| INBU 4151 | International Operations in Hong Kong |
| INBU 4925 | Entrepreneurship and Empowerment in South Africa |
| MGMT 4110 | Supply Chain Management (Only if taken as a Global Seminar) |
| MKTG 4250 | Product Strategy (Only if taken as a Global Seminar) |
| ORGN 4444 | Global Leadership |
| **International Community Connection** | |
| (Attend two events) [3] | |
| **Total Credit Hours** | **14-15** |

1 Options for international electives include international business electives, language, geography, economics or political science. Only one foreign language course may be utilized for this requirement; the other class should be in another area.

2 Students are required to attend two campus events with a global focus. Options are available on the certificate website (https://www.colorado.edu/business/student-resources/global-initiatives/global-business-certificate/).

### Additional Requirements

In addition to the three core courses and two elective courses as described above, the certificate program requires that students complete an experiential learning component. Students must participate in a global experience. This requirement may be satisfied in a number of ways including participation in a Leeds First-Year Global Experience, Leeds Global Seminar, global internship or study abroad program. International volunteer experiences or service learning work that is pre-approved may also be accepted.

All courses taken for the certificate must be taken for a letter grade. The exception is coursework taken on study abroad, which automatically transfers as pass/fail credit.

For any questions about these requirements, students should contact leeds.global@colorado.edu.

## Learning Outcomes

By the completion of the program, students will be able to:

- Solve business problems that are distinct to global enterprises with an interdisciplinary approach.
- Effectively communicate about major global business trends in diverse environments.
- Resolve issues of ethics and social responsibility by considering appropriate cross-cultural elements.
- Adapt business decision-making to the technology, tools and data available in internationally diverse markets.

# Operations and Information Management - Certificate

Advances in business knowledge and technology have radically changed business systems and processes—for example, how organizations buy and sell goods and services, integrate their supply chain and logistic systems and reach or retain customers. As a result, critical to today's businesses is the ability to get the right information to the right people at the right time, so that both strategic and operational decisions are made properly and quickly. To help students develop this ability, the Leeds School of Business offers the OPIM certificate.

## Requirements

The Operations and Information Management (OPIM) Certificate requires 12 total credits. Students who are not pursuing the Business Analytics Emphasis, Operations Management or Information Management track in the Management and Entrepreneurship Division can take any three courses from the certificate course options listed below. Students pursuing Business Analytics, Operations Management or Information Management must take three certificate course options that do not already apply to their emphasis/track. Students cannot count courses toward both the OPIM Certificate and Business Analytics, Operations Management or Information Management.

To complete the OPIM certificate requirements, all students must also complete a faculty-supervised OPIM internship (MGMT 4910).

In addition, students are required to maintain an overall GPA of 3.00 or higher for the selected courses and receive a letter grade of B- or higher in each of the three certificate courses. Successful completion of the certificate program will appear on the student's transcript.

### Courses

| Code | Title | Credit Hours |
|---|---|---|
| **Required Business Core Classes** | | |
| BCOR 2205 | Introduction to Information Management and Analytics | 1.5 |
| BCOR 2206 | Principles of Operations Management | 1.5 |
| **Certificate Course Options** | | |
| Choose three of the following: | | 9 |
| ACCT 4540 | Accounting Information Systems | |
| BAIM 3100 | Data Visualization | |
| BAIM 3205 | Business Data Management | |
| BAIM 3210 | Low Code for Citizen Developers | |
| BAIM 3220 | Introduction to Python Programming | |
| BAIM 4065 | Leadership in a Digital Age | |
| BAIM 4090 | IT and Business Strategy | |
| BAIM 4120 | Business Analytics | |
| or MGMT 3201 | Business Analytics | |
| BAIM 4200 | Advanced Business Analytics | |
| BAIM 4220 | Enterprise Applications | |
| BAIM 4230 | Customer Success with CRM | |
| BAIM 4240 | Agile Project Management | |
| BAIM 4250 | Information Security Management | |
| MGMT 3100 | Operations Management | |
| MGMT 3800 | Consulting Skills | |
| MGMT 4110 | Supply Chain Management | |
| MGMT 4120 | Managing Business Processes | |
| MGMT 4130 | Sustainable Operations | |
| MGMT 4140 | Project Management | |
| MGMT 4150 | International Operations Management | |
| MGMT 4200 | Competitive Strategy | |

| | | |
|---|---|---|
| MGMT 4400 | Quality Management | |
| MGMT 4820 | Decision Analytics | |
| MKTG 3700 | Digital Marketing | |
| ORGN 4210 | Systems Thinking | |
| **Research Project or Internship** | | |
| Complete a faculty-supervised OPIM internship: | | |
| MGMT 4910 | OPIM Academic Internship | |
| **Total Credit Hours** | | **12** |

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate specialized expertise in operations management and supply chain management.
- Effectively communicate interdisciplinary trends that influence the global economy, and their impact on operations management and supply chain management.
- Understand ethical considerations and apply ethical decision-making frameworks in business operations.
- Learn and apply new technologies and quantitative analysis to solve business problems.

# Personal Financial Planning - Certificate

The Personal Financial Planning Certificate is available to undergraduate students who are not enrolled in the personal financial planning track. The certificate, which includes coursework requirements and an experiential component, is designed to differentiate students seeking to position themselves for potential career opportunities within the financial services industry and acquire personal skillsets for financial planning and wealth management.

## Requirements

In addition to completing the four courses as described below, students must complete a relevant experiential learning activity, a personal reflection and an exit interview.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| FNCE 2830 | Personal Investment Management | 3 |
| FNCE 3820 | Principles of Personal Financial Planning and Insurance | 3 |
| **Electives** | | |
| Complete two of the following: | | 6 |
| ACCT 3440 | Income Taxation of Individuals | |
| FNCE 3040 | Retirement Planning | |
| FNCE 3060 | Estate Planning | |
| **Total Credit Hours** | | **12** |

## Learning Outcomes

By the completion of the program, students will be able to:

- Upon completion of each course, students should be able to demonstrate the associated CFP Board learning objectives.
- The Certificate in Personal Financial Planning will help a student pursue job opportunities in wealth management and personal financial planning firms.

# Social Responsibility and Ethics - Certificate

CU Boulder's Leeds School of Business is one of the few undergraduate business schools in the nation that emphasizes socially responsible conduct in business throughout its curriculum. The Center for Ethics and Social Responsibility (CESR) helps undergraduate students become outstanding business leaders of tomorrow by preparing them to meet the ethical challenges posed by an increasingly competitive, globally connected business world.

CESR offers the certificate in social responsibility and ethics (SRE) to business students who seek to distinguish themselves in the field of socially responsible business, whether their unique interests lie in environmental sustainability, social entrepreneurship, corporate ethics or values-driven leadership. Students who complete the certificate will develop the practical knowledge and marketable experiences that will distinguish them as business professionals who strive to make a positive social impact.

## Requirements

The Social Responsibility and Ethics (SRE) Certificate is available to business students who seek to distinguish themselves in the field of socially responsible business, whether their unique interests lie in environmental sustainability, social entrepreneurship, or ethical leadership. Interested students need to register with the SRE office, then meet with CESR's Program Manager, and must graduate with a 3.00 GPA.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Business Core** | | |
| BCOR 2301 | Business Law | 1.5 |
| BCOR 2302 | Business Ethics and Social Responsibility | 1.5 |
| **Business Coursework** | | |
| Select three of the following courses. All courses have the minimum prerequisites of 52 credits completed and the completion of BASE 2104. Some courses have additional prerequisites. | | 9 |
| ORGN 3030 | Critical Leadership Skills | |
| CESR/ORGN 3040 | Fundamentals of Socially Responsible Leadership | |
| CESR 3050 | Sustainable Space Governance | |
| CESR 4000 | Leadership Challenges | |
| CESR 4005 | Business Solutions for Global Development | |
| CESR/MGMT 4130 | Sustainable Operations | |
| ORGN 4100 | Global Business Ethics | |
| ORGN 4300 | Leading Diverse and Inclusive Organizations | |
| CESR 4430 | Corporate Boards in Action | |
| ESBM 4830 | New Venture Creation | |

| | | |
|---|---|---|
| CESR 4850 | The Sustainable Firm: Strategies and Practice | |
| **Total Credit Hours** | | **12** |

*Note*: These courses are in addition to BCOR, the capstone course, as well as any other prerequisites. See course descriptions for prerequisite details.

## Experiential Learning

SRE students gain practical experience working in a field of their personal interest within sustainability and/or social responsibility. Examples include:

- **Internship (for-profit or nonprofit)**. Acceptable internships will be characterized by substantive work that adds value to the organization and contributes to the student's learning. Internships must be approved for SRE credit.
- **Service learning through the Education Abroad Office**. The Office of International Education offers study abroad programs focused on service learning, generally spanning one academic quarter or semester in the host country, during which the student will participate in, and gain credit for study in a school of higher education partnered with work for local institutions and non-governmental organizations on service projects that promote community development.
- **Related coursework**. CESR 4005, MGMT 4140 and advisor-approved courses may count toward the Experiential Learning requirement *or* toward the Business Coursework requirement, but not both.

For course descriptions and program details, visit the CESR Learning (http://www.colorado.edu/business/CESR/cesr-learning/) webpage.

| Code | Title | Credit Hours |
|---|---|---|
| MGMT 4140 | Project Management | 3 |
| CESR 4005 | Business Solutions for Global Development | 3 |
| ESBM 4830 | New Venture Creation | 3 |
| Advisor-approved independent study in a related topic; or an advisor-approved internship of an appropriate nature | | |

## Personal Reflection and Exit Interview

Before graduation, students synthesize their academic and experiential experiences and set goals for their future. Students write a short essay (2-3 pages), reflecting on their experience and setting out the values that will guide their conduct and their careers. Students then meet with a staff or faculty member associated with the certificate program for their exit interview.

# Learning Outcomes

By the completion of the program, students will be able to:

- Recognize and apply ethical principles and social responsibility in business decision-making.
- Understand the business case for sustainability including specialized knowledge of market trends and social/environmental risks and opportunities.
- Develop and demonstrate effective communication skills that provide strategic influence across multiple stakeholders.
- Learn and apply sustainable technologies to effectively solve problems in dynamic environments.

# Communication, Media, Design & Information

The College of Communication, Media, Design and Information (CMDI) prepares students for careers as engaged citizens and effective professionals endowed with deep understanding of the historical and contemporary context of human communication, design and expression. Mindful of the active role communication plays in shaping human relationships, CMDI trains graduates to study and practice constructive interaction among people, communities, industries and publics. The college equips students with the skills needed to produce, gather, archive, curate, design, analyze and evaluate the flood of information, messages, images, sounds and ideas that populate our complex and rapidly evolving global media landscape, as well as to design spaces and to find solutions to social problems.

The careers of the future, and the problems professionals will be called upon to solve, do not rest inside a single discipline. To these ends, CMDI resourcefully combines disciplines newly extended and empowered by digital media and the social and cultural transformations those media engender. These include established scholarly, creative and professional fields such as media studies, communication, journalism, advertising, public relations and design, architecture, sustainable plannings & urban design, environmental product design and landscape architecture. But the college also houses the fast-growing fields of information science, a discipline that tackles the problems and opportunities facing an increasingly networked society, and critical media practices, a discipline centered on media production across media arts and experiential forms.

In giving these activities a collaborative home, CMDI facilitates innovative interactions among them. Its academic structure accordingly stimulates cross-disciplinary cooperation at all levels of curriculum, research and creative work.

# Statement of Core Skills, Competencies and Scholarly and Creative Initiatives

CMDI attracts students, faculty and industry and creative professionals from across the closely related fields of media, communication and information. All of those either rostered in or affiliated with the new college accordingly share a set of skills, competencies and scholarly and creative interests that form a common core. This core is expressed at all levels of the college, from undergraduate curriculum and graduate training to the research and creative work of its faculty and both internal and external affiliates.

# The Undergraduate Experience

All undergraduates enrolled in CMDI complete a core curriculum[1] designed to provide the broad intellectual framework common to each of the individual disciplines in which students eventually major. In addition to conveying the conceptual tools and perspectives all students in the college need, the core curriculum supplies the shared body of knowledge, exemplars and ideas required to build a coherent intellectual and creative community. Each academic unit within the college offers a unique curriculum determined by its faculty and expressed as a set of major requirements. Completion of the major requirements within a discipline

provides students with depth of knowledge and expertise appropriate to earning a BA or BS as designated by their discipline.

Additionally, undergraduates enrolled in CMDI acquire the technical and computational skills needed to thrive in today's networked media environment. Training in these skills is provided through CMCI 1040 (required of all first-year students) and the core computing requirement and is integrated into each student's chosen field of study. Finally, students in CMDI complete a secondary area of study outside of their major in order to build the intellectual versatility necessary for successful study and work in the field of communication, media, design and information.

[1]ENVD majors follow their departmental core for 2025-2026 instead of the CMDI core.

# Graduate Study

Curricula leading to advanced degrees are offered by all of the departments in the College of Communication, Media, Design and Information. Students should consult the Graduate Catalog's Admissions (p. 1109) section for admission and degree requirements. Curricula for graduate programs are listed under each department.

# Special Programs & Leadership

## CMDI in DC, Washington D.C.

Working in partnership with the Washington Media Institute, the CMDI in DC Program is comprised of a four-day-a-week internship and project-based classes that will immerse students in a professional education and will prepare them for a media career. It's open to all CMDI majors and is designed for students in their junior or senior years.

## Student media

The college is home to multiple student-run news outlets that challenge students to put lessons in journalism, communication, media production and more to test. Student media organizations include Radio 1190, The Bold, CU Independent and Sko Buffs Sports.

## LA Entertainment Buffs, Los Angeles, CA

Working with alumni partners in the technology and entertainment industries, students can pursue a variety of west coast internship experience. Interested CMDI majors should contact their department for more information.

# Policies & Requirements

The College of Communication, Media, Design and Information provides students with a world-class education to succeed as professionals and citizens in the ever-changing communication, media, design and information environment. Undergraduate degree programs are available in communication, information science, journalism, media production, media studies, environmental design and strategic communication.

In addition to completion of requirements for their designated major and core requirements for the college, all students in CMDI develop knowledge in a secondary area of study, typically by completing a minor or certificate. This requirement supports breadth of learning and allows students to develop skills outside their chosen major.

# Academic Excellence

## Dean's List

Students in the College of Communication, Media, Design and Information who have completed at least 12 credit hours of CU Boulder coursework for a letter grade in any single semester with a term GPA of 3.75 or better are included on the dean's list and receive a notation on their transcript and a letter from the dean.

## Graduation with Honors

CMDI students may graduate with the honors designations of cum laude, magna cum laude or summa cum laude by completing the CMDI honors program, which involves completing a senior honors project within the major. Students interested in graduating with honors should contact the associate chair for their major department to learn more about the application process related to this opportunity.

## Graduation with Distinction

Students will graduate with CMDI Distinction if they have at least 60 credit hours completed at CU Boulder and have a GPA of 3.75 or higher at the time they apply to graduate, for all coursework completed at the University of Colorado. This distinction is not updated after final grades post or projected based on anticipated final grades—it is determined based on the GPA posted at the time of application. This aligns with campus policy.

## Program Awards and Scholarships

Alumni and friends of CMDI have made possible scholarships and awards to officially admitted students in CMDI. The application is open from November-March. Students must submit a completed application by the deadline, which is posted each year. For more information and application instructions, visit the university's Scholarships (http://www.colorado.edu/scholarships/) website. Incoming first-year students who have received a CU Boulder Esteemed Scholarship are automatically considered for a CMCI Merit Scholarship. For more information, visit CMDI's Financial Aid and Scholarships (http://www.colorado.edu/cmci/life-at-cmci/financial-aid-and-scholarships/) webpage.

# Academic Standards

## Good Academic Standing

Good academic standing in the college requires a cumulative GPA of 2.00 or above in University of Colorado work and a 2.00 GPA for all CMDI major coursework. Grades earned at another institution are not used in calculating the GPA at the University of Colorado. However, grades earned in another school or college within the University of Colorado system are used in determining a student's scholastic standing and progress toward the degree. Please refer to campus Academic Standing policies (p. 28) for further information about academic and registration processes for students earning below a 2.00 cumulative GPA.

## Academic Ethics

The College of Communication, Media, Design and Information maintains the highest standards of intellectual honesty. Cheating; plagiarism; illegal possession and distribution of examinations or answers to specific question; alterations, forgery, or falsification of official records; presenting someone else's work as one's own or performing work or taking an examination for another student are examples of acts that may lead to suspension or expulsion. Reported acts of academic dishonesty are referred to the Honor Council. For more information, see the Academic Integrity (p. 24) section.

## Policy on Grade Appeals

The following shall be the official policy of the College of Communication, Media, Design and Information regarding grade appeals.

Campus policy states that faculty members have primary authority in the area of grading and are charged with carrying out their responsibilities in a professional manner. The Dean's office has the authority and responsibility to deal with changes of grades in special and unusual cases such as those that might involve unprofessional faculty conduct in assigning the grade. Students should be aware, however, that neither Chairs nor Deans can require an instructor to change a properly assigned course grade.

Faculty are expected to assign grades in ways that are consistent, fair and conscientious. When a student believes a course grade has been improperly assigned, the student should first contact the course instructor to see if the issue can be resolved. If discussion between the student and faculty member has not led to a resolution, the student shall have the option of making a formal appeal utilizing the procedures outlined below:

1. The student shall have the option of making a formal written appeal to the chair/associate chair of the department in which the course was taken. The appeal must specify the inappropriate or unprofessional nature of the grade rendered and the remedy desired by the student, and it must be submitted within 45 days of the end of the academic term in which the course was taken.
2. The chair/associate chair will meet with the student and with the faculty member who taught the course. The instructor will be asked to submit a formal, written response to the student's written appeal. If the chair/associate chair is unable to broker a solution mutually acceptable to both student and instructor, then the chair shall appoint an ad hoc student ethics committee, which will review the dispute. The committee shall consist of two impartial faculty members competent in the subject matter of the course in question.
3. The department chair will convene the committee and provide the committee with the student's written appeal and the written response from the faculty member. Within 30 days, the committee will submit a report and recommendation to the chair, and the chair will recommend to the instructor either:
   a. that the originally assigned grade stand; or
   b. that a new grade be assigned.
4. In cases where a change of grade is recommended and the instructor does not wish to accept the recommendation, the materials will be submitted to the Dean of CMDI who will review the materials and make a final decision within 30 days of receipt. There is no appeal of the decision of the Dean.

This policy applies to the principal instructor in the course, whether that person is a faculty member or GPTI.

# Policy on Waiver of Degree Requirements

The College of Communication, Media, Design and Information does not waive degree requirements or excuse students from completing degree requirements. Petitions for exceptions to the academic policies stated here may be submitted to the ad hoc Committee on Academic Rules and Policies. Such petitions will be considered only if they meet all three of the following conditions:

- The student must document they have made every effort to fulfill the policy or requirement as defined and must demonstrate that no other options exist for fulfilling the requirement as defined in this catalog.
- The student must document they are prevented from fulfilling the policy or meeting the requirement as defined here for compelling reasons beyond the student's control.
- The student must demonstrate to the satisfaction of the faculty committee that they have fulfilled or will fulfill the intent of the policy or the requirement through an appropriate alternative.

Students who believe that their circumstances meet the conditions to submit a petition must *first* consult with their academic advisor. If the advisor offers options for meeting the requirement or policy as defined here, the student *must* pursue those options and should not submit a petition.

Students who believe that their circumstances meet the conditions to submit a petition, who meet with their academic advisor *and it is agreed* they meet the requirements for a petition, should then, and only then, submit a petition to the Assistant Dean of Student Experience. Upon review it will be a) sent back for more information b) denied if alternatives are available and need to be pursued by the student (as stated above) or c) forwarded to the ad hoc Committee on Academic Rules and Policies for review and decision if an exception will be granted. Please note, the timeline for petitions to be reviewed by the ad hoc Committee on Academic Rules and Policies may vary depending on time of year. Students should expect a minimum of 5 business days for a response.

# Credit and Enrollment

## Requirements for Admission

Students will apply to the College of Communication, Media, Design and Information in one of the seven undergraduate majors. Students who are not eligible for admission directly into the major may be admitted to the CU Program for Exploratory Studies.

## Transfer Students

Students applying to transfer into the College of Communication, Media, Design and Information from another institution must meet the following criteria: Students who enter with more than 36 credit hours must have a GPA of at least 3.0 from their transfer institution and must have completed an introductory course in the major they intend to pursue. Students who enter with 36 or fewer credit hours must have a GPA of at least 3.0 from their transfer institution but do NOT need to have completed the introductory course for the major they intend to pursue. For more information, see the undergraduate Transfer of College-Level Credit (p. 48) section.

## Attendance Regulations

Students are expected to attend classes regularly and to comply with the attendance policies specified by their instructors at the beginning of each semester. A student who does not attend the equivalent of the first week's sessions of a class during a term may be administratively dropped from the class.

## Credit Policies

### Major Requirements

All coursework taken for major requirements must have a grade of C- or better in order to be counted toward the major requirements. Additionally, a grade of C- or better must be earned in CMCI 1040, which is required of incoming first-year CMDI students, or in CMCI 2030, which is required of all transfer students from other universities. Students admitted through

the Intra-University Transfer (IUT) process to CMDI are not required to and will not receive credit for CMDI 1040/2030.

### Pass/Fail and Satisfactory/Unsatisfactory

In addition to the university's general policies, majors in the CMDI may not take any of the following courses pass/fail: CMDI core requirements, certificate or minor courses, business, secondary area of study or CMDI courses pass/fail or satisfactory/unsatisfactory.

The one exception to this policy is the APRD internship course (APRD 4931 (https://catalog.colorado.edu/search/?P=APRD%204931) Internship), which is a course designated only as S/U and for which 3 credits may be counted toward the major if appropriately approved for internship credit and registered in the course.

This is restricted up to six credit hours *outside* the CMDI major, CMDI core requirements, certification or minor courses, business or additional field of study may be taken pass/fail.

For transfer students, this is restricted to one credit hour for every eight credits attempted at the University of Colorado, up to the maximum of six credit hours.

### Transfer Credits

Credit in subjects transferred from other institutions to the University of Colorado is limited to the amount of credit given for similar work at the University of Colorado. All transfer credit is subject to approval of the associate dean of CMDI. Work from another accredited institution of higher education that has been completed with a grade of C- (1.70) or better may be transferred to the University of Colorado. Categories of transfer coursework not accepted by the university are described in the undergraduate Transfer of College-Level Credit (p. 48) section.
All courses transferred from junior and community colleges carry lower-division credit. Courses transferred from four-year institutions generally carry credits at the level at which they were taught at the previous institution but can be subject to review on a course-by-course basis.

### Residence Requirement

CMDI students must complete a minimum of 45 credit hours in University of Colorado Boulder courses. Of these 45 credit hours, a minimum of 30 credit hours must be in upper-division credit hours completed as a matriculated student in the College of Communication, Media, Design and Information at the University of Colorado Boulder and at least 15 of these upper-division credit hours must be in the major. A maximum of 6 credit hours taken at other University of Colorado campuses (CU Denver and UCCS) can be counted toward the minimum 45 credit hours required on the Boulder campus. Courses taken while on CU Boulder study abroad programs, through CU Boulder Continuing Education or CU Boulder correspondence courses are considered to be in residence.

## Graduating Senior Requirement

Graduating seniors in CMDI majors are expected to **apply to graduate *prior* to their final anticipated enrollment window at CU**. Students are expected to understand their degree audit and requirements to graduate. CMDI Advising partners with students to affirm they accurately enroll in what is needed to complete all degree requirements. Students need to apply prior to their last enrollment window to allow time to adjust schedules and for advising to communicate instances where the student is missing requirements. This also allows departments to project enrollment needs in required and/or senior level courses.

*Note:* Later campus deadlines ensure graduates are in the ceremony event program and in campus processing system so that a degree can be conferred. Students who apply late may not be recognized in campus and college event programs.

## Advising

Majors are encouraged to consult with their assigned CMDI academic advisor each registration period. Incoming first-year students are required to meet with their advisor in CMDI during the first four terms.

Advising is available throughout the academic year, and major degree planning tools are provided. However, the official tool of the university is the degree audit, students are ultimately responsible for fulfilling all degree requirements and understanding their degree audit. Appointments can be made with CMDI academic advisors in Buff Portal Advising.

Incoming first-year students are required to meet with their assigned primary advisor during the first four terms. This aligns with campus expectations around first year students to ensure proper connections to campus resources through advising and progress through their intended degree program.

## Double Degree/Double Major Programs

All double degrees shall consist of a degree within CMDI and a degree outside CMDI. Students may complete requirements in two fields and receive two degrees from the university. Such double-degree programs are available combining CMDI with business, engineering, music or disciplines in the College of Arts and Sciences. Students must apply to graduate for each degree—CMDI and the Leeds School of Business, the College of Arts and Sciences, the School of Engineering and Applied Sciences or the College of Music. Any other combined program must be arranged by consulting both programs.

Students may double major within CMDI. The primary major will determine whether the degree is a BA or BS. Students may not get a double degree within CMDI.

Dual degrees are combined programs such as BA/MA or BS/MS, where a student is earning two degrees such as a baccalaureate and a master's degree in a single integrated program of study.

## Enrollment Policies

CMDI departments determine and manage course enrollment. Enrollment capacities, course scheduling, faculty/instructor assignments, course requirements and waitlist structures are controlled at the department level.

Faculty do not make decisions about individual course enrollment. Students who seek enrollment into a CMDI course must engage in the campus registration process and adhere to policies related to enrollment windows, waitlists, adding, dropping, course reservation, etc. These policies and procedures can be found on the Office of the Registrar's website.

Enrollment concerns or questions should be directed to individual department administrative staff who will work with the Chairs of the department to determine course enrollment details as needed. Discretion is at the department level to modify or adjust any enrollment details for courses run through the department.

## Colorado Student Bill of Rights

In the interests of promoting timely graduation and facilitating the transfer of students among the institutions of higher education in the state of Colorado, the College of Communication, Media, Design and

Information and the University of Colorado Boulder adhere to the Student Bill of Rights as presented in Colorado Statute 23-1-125.

- 23-1-125. Commission directive - student bill of rights - degree requirements - implementation of core courses - competency test - prior learning
  a. Student bill of rights. The general assembly hereby finds that students enrolled in public institutions of higher education shall have the following rights:
     i. Students should be able to complete their Associate of Arts and Associate of Science degree programs in no more than 60 credit hours or their baccalaureate programs in no more than 120 credit hours unless there are additional degree requirements recognized by the commission;
     ii. A student can sign a two-year or four-year graduation agreement that formalizes a plan for that student to obtain a degree in two or four years, unless there are additional degree requirements recognized by the commission;
     iii. Students have a right to clear and concise information concerning which courses must be completed successfully to complete their degrees;
     iv. Students have a right to know which courses are transferable among the state public two-year and four-year institutions of higher education;
     v. Students, upon completion of core general education courses, regardless of the delivery method, should have those courses satisfy the core course requirements of all Colorado public institutions of higher education;
     vi. Students have a right to know if courses from one or more public higher education institutions satisfy the students' degree requirements;
     vii. A student's credit for the completion of the core requirements and core courses shall not expire for ten years from the date of initial enrollment and shall be transferable.

## Statewide Guaranteed Transfer of General Education Courses

As of fall 2003, the two-year and four-year transfer articulation agreements among Colorado institutions of higher education were replaced by a statewide guaranteed transfer of approved general education courses taken at any Colorado public institution of higher education. Under the statewide guaranteed transfer program, up to 31–33 credit hours of successfully (C- or better) completed coursework will automatically transfer and apply towards graduation requirements at the receiving institution. The coursework must be drawn from the list of approved guaranteed transfer courses and must meet the distribution requirements of the guaranteed transfer program. Further information about the statewide transfer program, including the list of approved courses and distribution requirements, can be found on the Colorado Department of Higher Education's Complete College Colorado! (http://highered.colorado.gov/Academics/Transfers/Students.html) webpage.

As of fall 2006, a student graduating with an Associate of Arts or an Associate of Science degree from a Colorado community college and entering the College of Media, Communication and Information is exempt from the written communication requirement and the lower-division component of the core curriculum, with the exception of CMCI 2030. Additional information on the evaluation of transfer credit of Colorado community college coursework and its application in select arts and sciences major programs can also be found on the College of Arts & Sciences' Student Resources (http://www.colorado.edu/artsandsciences/student-resources/) webpage.

Students are required to follow the graduation requirements listed in this catalog at the time of their initial entry onto the Boulder campus.

## Credit Policies

### Advanced Placement Program

See the undergraduate Credit by Examination (p. 37) section.

### International Baccalaureate

Any student admitted to a University of Colorado campus after June 30, 2003, who has graduated from high school having successfully completed an International Baccalaureate (IB) diploma, program will be granted 24 credit hours of college credit. No tuition will be charged for these credit hours. These credit hours will be granted, however, only if the student receives a score of 4 or better on an examination administered as part of the IB diploma program.

In addition, college credit is granted for International Baccalaureate examinations at the higher level with a score of 4 or better. For specific equivalencies, contact the Office of Admissions at 303-492-2458 or visit the International Baccalaureate (http://www.ibo.org/) website.

### Credit/No Credit

Credit/no credit changes must occur during the schedule adjustment periods each semester as outlined in the Registrar's academic calendar.

### Credit Taken as a Nondegree Student

Once a student has been admitted to a degree program, credits from the Division of Continuing Education such as ACCESS, Boulder evening credit courses and CU Boulder correspondence classes may be eligible to be applied toward the degree. Students will receive initial advising during orientation once they have been accepted to a degree program in the College of Communication, Media, Design and Information.

### Incomplete Grades

An I grade is given at the discretion of the course instructor only when a student has satisfactorily completed a substantial portion of a course and, for reasons beyond the student's control, is prevented from completing all work for the course within the term. Incomplete grades must be requested by the student and should not be awarded by the instructor for non-attendance. (In the case of nonattendance, the instructor should award the student the grade(s) earned.) If an incomplete grade is given, the instructor is required to document the reasons/grounds for awarding the incomplete grade, the specific work and conditions for completion of the course and the time frame within which the coursework must be completed. The maximum time the instructor can allow for the completion of the coursework and subsequent award of a course grade is one year from the end of the term the course was taken. After one year, if no final grade is awarded, the I will change to the grade of F. A copy of the Incomplete Agreement (https://www.colorado.edu/cmci/sites/default/files/attached-files/cmci_incomplete_grade_form_2.pdf) signed by the student and instructor and accompanied by documentation of the extenuating circumstances that resulted in the awarding of an incomplete should be filed with the CMDI Advising Office (email cmciadvising@colorado.edu) and a copy should be emailed to the student.

### Independent Learning

A maximum of 30 credit hours of correspondence/online learning work may count toward the degree. CMDI and Arts and Sciences courses

offered by the CU Boulder Division of Continuing Education carry resident credit.

### Independent Study

With departmental approval, students may register for independent study during the normal registration periods for each semester. Students may not register for more than 6 credit hours of independent study credit during any term. No more than 9 credit hours of independent study taken in a single department or program can be applied toward the total credit hours needed for graduation. A maximum of 16 credit hours of independent study may count toward the degree. The minimum expectation for each hour of credit is 25 hours of work. Independent study is rarely available during the summer term.

A student may not use independent study projects to fulfill the college's general education requirements. Some departments further restrict the use of independent study hours toward meeting major requirements.

### Repetition of Courses

If a student takes a course for credit more than once, all grades are calculated into the GPA. However, the course is only counted toward graduation once, unless a course description specifically states that it can be taken more than once for credit.

Students may also retake a course for grade replacement (p. 52) under the grade replacement policy. When a student retakes a course for grade replacement, the grade earned in the most recent prior attempt will still appear on the transcript, but their cumulative GPA and credit totals on the transcript will only include the grade from the latest attempt.

### ROTC Credit

The ROTC courses listed below have been certified as acceptable college-level coursework by the faculty of the College of Arts and Sciences or by other colleges and schools on the Boulder campus. These courses are counted as elective credit toward the degree. Courses not included on this list do not count toward any degree requirements. Transfer ROTC coursework must be evaluated as equivalent to coursework on this list to count toward degree requirements.

| Code | Title | Credit Hours |
|---|---|---|
| AIRR 3010 & AIRR 3020 | Leading People and Effective Communication 1 and Leading People and Effective Communication 2 | 6 |
| AIRR 4010 & AIRR 4020 | National Security, Leadership Responsibilities/Commissioning Preparation 1 and National Security/Leadership Responsibilities/Commissioning Preparation 2 | 6 |
| MILR 1011 & MILR 1021 | Adventures in Leadership 1 and Adventures in Leadership 2 | 4 |
| MILR 2031 & MILR 2041 | Methods of Leadership and Management 1 and Methods of Leadership and Management 2 (students may not receive credit for either course if they have credit in OPMG 3000) | 6 |
| MILR 4072 & MILR 4082 | Leadership 1: Adaptive Leadership and Leadership 2: Leadership in a Complex World | 6 |
| NAVR 2020 | Seapower and Maritime Affairs | 3 |
| NAVR 3030 | Naval Engineering Systems | 3 |
| NAVR 3040 | Weapons and Systems Analysis | 3 |
| NAVR 3101 | Evolution of Warfare | 3 |
| NAVR 4010 & NAVR 4020 | Leadership and Management and Leadership and Ethics | 6 |
| NAVR 4030 | Navigation | 3 |

## Withdrawal

See the Registration & Enrollment (p. 59) section for campuswide policies and withdrawal procedures.

Students in the College of Communication, Media, Design and Information who withdraw two semesters in a row will have a dean's hold placed on their registration. Summer session is not counted as a regular semester. They will not be permitted to return to CU Boulder before one full academic year has elapsed (not including their semester of withdrawal). CMDI students may withdraw from all classes for a term until the last day that classes are taught by requesting withdrawal through the Office of the Registrar. Students cannot withdraw after classes have ended for a term except through the retroactive withdrawal process outlined in the Registration & Enrollment (p. 59) section.

These policies also apply to CMDI students who are enrolled in Continuing Education courses.

Students are encouraged to apply for leave of absence benefits with the Office of the Registrar when their withdrawal from the university is temporary. For more information, see the Registration & Enrollment (p. 59) section.

## Readmission

CMDI students who request readmission to the college are always readmitted to their major of record at the time they last attended the university. Readmitted students who desire to pursue a major different from their major of record must follow the college's process for declaring a major after they have been readmitted. Students who request readmission from a discontinued program must work with CMDI advising to determine the current major degree pathway available to them based on their educational goals.

# Core Curriculum*

(*for the 2025-2026 academic year, BEnvD majors will follow the ENVD departmental core instead of the CMDI core curriculum).

## Mission Statement

The Core Curriculum blends liberal arts learning with skills necessary for success in careers involving communication, media, design and information. It aims to cultivate ways of thinking and doing that serves the educational, vocational and citizenship needs of CMDI students. To these ends, the curriculum promotes expression, collaboration and critical literacy across multiple forms of communication—from speech and writing to computing and visual media. Those skills underwrite learning across the humanities, the arts and the social and natural sciences, insuring educational breadth. The Core Curriculum matches that breadth with focus through a secondary area of study that students choose to supplement their major—a double degree, a double major, a

minor or academic certificate. Through designated history and diversity courses, the curriculum equips students to live in globalizing worlds, consider issues from multiple perspectives and engage in long-term thinking beyond the contemporary moment. Finally, the curriculum promotes both intellectual cohesion and independent learning through an introductory Common Experience course for all students and specialized Capstone Experiences tailored to particular majors and interests.

## Educational Goals

The Core Curriculum is designed to help CMDI students master ways of doing, thinking and investigating essential to studying and working in media, communication and information fields. These competencies may be studied and practiced in coursework either within or outside the college. Graduates of the college are expected to be able to demonstrate competence in the following:

- Multi-modal composition and expression: being able to use written, spoken, visual and digital media for effective expression, argumentation and communication of ideas and sentiments to audiences.
- Collaboration, design and creative problem solving: being able to work effectively and inventively with others in complex problem solving and design tasks.
- Communicative interaction: being able to look at phenomena from the perspective of symbolic and material interchanges among individuals, collectives and institutions.
- Media literacies: being able to interpret and critically analyze messages and formal conventions (genres, grammars, logics) in multiple modes and media of communication (visual, sonic, discursive) and to consider them from the perspectives of their audiences, political economies and histories.
- Quantitative and computational thinking: being able to approach and solve problems quantitatively and algorithmically, and to apply and utilize computing models and resources when advantageous.
- Institutional and organizational understanding: being able to consider problems, policies and collective action from the perspectives of different institutions and organizations—e.g., political, legal, economic and religious.
- Cultural understanding: being able to consider problems and social experiences comparatively, considering different global and domestic cultures, with attention to categories of race, class, ethnicity, religion, gender and sexuality.
- Historical understanding: being able to consider social, cultural, intellectual, technological and/or institutional phenomena in historical perspective.
- Ethical action: being able to recognize moral issues, deliberate intelligently about them and uphold the ethical standards of particular disciplines and practices.

## Design of the Core Curriculum

The Core Curriculum is designed to be both flexible and comprehensive. While promoting a shared mission and identity for CMDI students through a set of college requirements, the Core Curriculum also promotes breadth and porosity of learning across all the schools and colleges of the CU Boulder campus. Most of the core requirements may be taken either within or outside the college, and many are covered by a student's major. Students who wish to double degree in a CMDI discipline and a discipline outside CMDI will find that the CMDI Core Curriculum dovetails almost entirely with the core or breadth requirements of other CU Boulder colleges and schools.

## Core Curriculum at a Glance

| Code | Title | Credit Hours |
|---|---|---|
| **College Requirements** | | |
| Common Experience: 1 course | | 4 |
| Computing: 1 course | | 3 |
| Capstone Experience: 1 course | | 3-4 |
| Secondary Area of Study outside the major | | variable |
| **Breadth Requirements** | | |
| Composition and Expression: 2 courses: | | 6 |
| | Lower-division writing | |
| | Upper-division composition | |
| Quantitative Thinking: 1 course | | 3 |
| World Language: third-year high school or third-semester college proficiency | | 0-3 |
| The Natural World: 2 courses + a lab | | 7 |
| People and Society: 2 courses | | 6 |
| Humanities and the Arts: 2 courses | | 6 |
| **Point-of-View Requirements** | | |
| Historical Views: 2 "H" designated courses (0–6 additional credit hours) | | 0-6 |
| Diversity and Global Cultures: 2 “D” designated courses (0–6 additional credit hours) | | 0-6 |
| **Total Credit Hours** | | **38-54** |

## College Requirements

1. A **Common Experience** course: incoming first year students are required to take CMCI 1040 and students who transfer into CMDI from outside CU Boulder are required to take CMCI 2030. The common experience course introduces shared themes, values, ethical issues and competencies across the college and emphasizes the marriage of study and practice that will be the hallmark of CMDI as a whole. The course is four credits and is structured as a lecture plus a lab/studio in which students create projects putting the lecture's ideas into practice by means of writing, speaking, design, visual presentation and other modes of expression, and by means of collaborative and active learning. Students must receive a C- or better in each course in order for them to count toward completion of the requirement.
2. **Computational Thinking and Literacy** (1 course, 3 credit hours): This requirement is designed to cultivate an understanding of the basic principles of computational thinking and literacy in order to support students in becoming reflective consumers and producers of information and communication technologies in an increasingly digital world. Courses that fulfill this requirement may do so by introducing students to algorithmic thinking in ways that facilitate purposeful engagement with digital technology use and design; the basic principles and structures of digital computing systems; coding and scripting; information search, retrieval and organization techniques; and human-centered technology design. These topics are contextualized by the ways in which digital technologies shape and are shaped by their interactions with people, organizations and societies.
3. An upper-division **Capstone Experience**: scholarly, lab-based or studio-based (1 course, 3–4 credit hours). This course fosters students' research, creative work, service learning and/or invention, and may include teamwork as well as individual achievement. This course may

be taken within the major, or it may be offered as an interdisciplinary option.

4. An **Secondary Area of Study** outside the major (variable credit hours). Defined as a double degree, second major, a minor, or an academic certificate, this sequence of courses helps students develop the intellectual versatility necessary for successful study and work in communication, media, design and information fields.

## Breadth Requirements

Breadth requirements may be satisfied either within or outside the college. They may also overlap with requirements for individual majors.

1. **Composition and Expression** (2 courses, 6 credit hours):
   a. Lower-division writing (3 credit hours). This course develops the foundational skills in written expression expected of every CU Boulder graduate.
   b. Upper-division visual, digital, verbal, written and/or media composition (3 credit hours). This course requirement emphasizes the many alternative forms of composition and expression that CMDI students cultivate.
2. **Quantitative Thinking** (1 course, 3 credit hours): This course provides students with the ability to think at a certain level of abstraction, to manipulate symbols and to assess adequately the data that will confront them in their coursework and in their daily lives.
3. **World Language** (third-level proficiency): The goal of the language requirement is to encourage students to examine the formal and semantic structure of another language, significant and difficult works in that language, and one or more aspects of the culture lived in that language. This enables students to understand their own language and culture better, analyze texts more clearly and effectively, and appreciate more vividly the dangers and limitations of using a translated document. The language requirement concentrates on reading, although in some languages other abilities may be emphasized as well. Understanding what it means to read a significant text in its original language is essential for a liberal education according to the standards of this university.
   All students are required to demonstrate third-level proficiency in a single non-English modern or classical language. Students may meet this requirement by:
   a) Completing a Level III course (typically the third of three consecutive years) of a single non-English language while in high school;[1]
   b) Graduating from a high school that uses a non-English language as its principal mode of instruction, or receiving, in high school, a Colorado or other state-sponsored Seal of Biliteracy;
   c) Passing an appropriate third-semester college course that is part of a three-course sequence of at least 12 semester credit hours, or earning AP or IB credit equivalent to such a course; or
   d) Passing a CU Boulder approved proficiency examination.
   For a listing of courses at CU that fulfill the Level III requirement, please refer to the Arts & Science World Language listing.
4. **The Natural World** (2 courses + lab, 7 credit hours): These courses study the nature of matter, life and the universe. They enhance literacy and knowledge of one or more disciplines in the natural or physical sciences, and enhance the reasoning and observing skills necessary to evaluate issues with scientific content. A laboratory or field experience helps students gain hands-on experience with scientific research, develop observational skills of measurement and data interpretation and learn the relevance of these skills to the formation and testing of scientific hypotheses.
5. **People and Society** (2 courses, 6 credit hours): These courses introduce students to the study of social groups, including social institutions and processes and the forces that mold and shape social groups, including values, beliefs, communication processes and organizational principles. They prepare students to approach social phenomena of all kinds in an informed and critical way; to describe, analyze, compare and contrast social phenomena; and to analyze their own sociocultural assumptions and traditions.
6. **Humanities and the Arts** (2 courses, 6 credit hours): These courses foster students' understanding of fundamental aesthetic, cultural, literary, philosophical and theological issues. They sharpen critical and analytical abilities so that students may develop a deeper appreciation of works of art and literature and of philosophical, ethical and religious ideas and belief systems.

[1] A Level III course is defined as a high school course clearly designated as such (e.g., Spanish 3, Chinese 3 or German III) on the high school transcript or third-semester college course if the third-year course taken in high school is a concurrent/dual enrollment college course. Concurrent/dual enrollment college courses taken while in high school that are below the third semester level will not fulfill this requirement.

## Point-of-View Requirements

Point-of-view requirements may be satisfied either within or outside the college, but at a minimum three of the 12 credit hours must be within CMDI. They may also overlap with breadth requirements and/or major requirements. In addition, a single course may be designated both "H" and "D."

1. **Historical Views** (2 "H" designated courses, 0–6 additional credit hours). This requirement enables students to understand that every contemporary issue has a history, and that an understanding of historical context and change is essential to an understanding of the contemporary moment. "H" designated courses emphasize longitudinal thinking and the investigation of the processes and the meanings of change over time.
2. **Diversity and Global Cultures** (2 "D" designated courses, 0–6 additional credit hours). This requirement increases students' understanding of the world's diversity and pluralism. "D" designated courses study some aspect of two broad and interrelated areas:
   a. The nature and meaning of diversity and the experience of groups marginalized because of their race, ethnicity, gender, sexuality or other characteristics; and
   b. Cultures other than those of Europe and the United States.

# Academic Advising and Responsibilities

Students in the college are expected to assume responsibility for planning their academic program in conjunction with their academic advisor. Planning must be in accordance with college rules, policies and with departmental major requirements. Any questions concerning these provisions are to be directed to the student's primary academic advisor. The college cannot assume responsibility for problems resulting from students failing to follow the policies stated in the catalog, failing to understand their degree audit in consult with their academic advisor, failing to engage with or consult regularly with their assigned advisor throughout their degree progression, or from incorrect advice given by someone other than an appropriate staff member of the college. Students completing coursework for a secondary area of study outside of CMDI are expected to work with the advisor who oversees that area of study.

CMDI advisors are not responsible for knowing all the requirements for secondary area of studies offered outside of CMDI.

All new students are required to attend a special orientation, advising and registration program on campus before enrolling. All senior students are expected to review their progress through degree and timeline to graduate with their assigned advisor which results in a student log of their path to graduation. This ensures consistency in processes and progression along the student experience in CMDI.

### Advising

Academic advising is an integral part of undergraduate education. The goal of all academic advising is to help students make responsible decisions as they develop educational plans compatible with their potential and with their career and life goals. Advising is more than the sharing of information about academic courses and programs; it includes encouraging students to formulate important questions about the nature and direction of their education and working with them to find answers to those questions. Advisors confer with students about alternative course schedules and other educational experiences, but students themselves are responsible for selecting the content of their academic program and making progress toward an academic degree.

As students progress through their academic program, their questions and concerns change. CU Boulder offers a system of faculty, professional academic advisors and peer advisors to address these ongoing and multifaceted concerns.

Students are ultimately responsible for choosing appropriate courses, for registering accurately and for meeting all degree requirements. Academic advisors assist students in clarifying their interests, values and goals and help students relate these to academic programs and educational opportunities. As students work with their advisors, they help students develop a coherent and balanced program of study that fulfills graduation requirements and assist students in identifying educational experiences outside the classroom that enhance their personal, intellectual and professional development. Academic advisors also assist students in understanding academic policies, requirements, procedures and deadlines.

### Responsibilities of Students and Advisors

Within the advising system on the Boulder campus, both students and advisors have responsibilities.

Students are responsible for:

1. Knowing the requirements of their particular academic program, selecting courses that meet those requirements in an appropriate time frame, prioritizing courses that they need to register to progress toward graduation;
2. Consulting with their academic advisor several times every term; establishing a timeline to degree in consultation with their assigned advisor.
3. Scheduling and keeping academic advising appointments in a timely manner throughout their academic career, so as to avoid seeking advising only during busy registration periods;
4. Being prepared for advising sessions (for example, by bringing in a list of questions or concerns, having a tentative schedule in mind and/or being prepared to discuss interests and goals with their advisor);
5. Knowing and adhering to published academic deadlines;
6. Monitoring their position on registration waitlists; and
7. Reading their CU email on a weekly basis.

Advisors are responsible for:

1. Helping students clarify their values, goals and abilities;
2. Helping students understand the nature and purpose of a college education;
3. Providing accurate information about educational options, requirements, policies and procedures;
4. Helping students plan educational programs consistent with the requirements of their degree program and with their goals, interests and abilities;
5. Assisting students in the continual monitoring and evaluation of their educational progress; and
6. Helping students locate and integrate the many resources of the university to meet their unique educational needs and aspirations.

## General Graduation Requirements

CMDI students must fulfill the following requirements for graduation:

1. Pass a total of 120 credit hours.
2. Maintain a 2.00 overall GPA and a 2.00 GPA in CMDI major coursework.
3. All courses taken for the major requirements must be passed with a C- or better.
4. Pass 45 credit hours of upper-division work.
5. Complete a minimum of 45 credit hours in University of Colorado courses on the Boulder campus. Of these 45 credit hours, a minimum of 30 credit hours must be upper division credit hours completed as a matriculated student in CMDI. Six of the 45 credit hours may be taken at other University of Colorado campuses. Courses taken while on CU Boulder study abroad programs, through CU Boulder continuing education or CU Boulder correspondence courses are considered to be in residence.
6. Complete a major offered by the College of Communication, Media, Design and Information. Students are subject to the major requirements in force when they declare the major.
7. Complete the CMDI core and MAPS requirements (MAPS apply to students entering prior to Summer 2023).

# Programs of Study

# Advertising, Public Relations and Media Design

Advertising, public relations and design (APRD) strives to produce leaders in strategic communication who are grounded in analytical and strategic management thinking and who equally understand the tactical and creative requirements of running professional communication campaigns. We believe in amplifying our students' curiosity, increasing their tolerance for risk and encouraging them to look at life and a career with an entrepreneur's eye for opportunity. APRD is committed to providing students with the necessary skills and techniques to think strategically, critically, adapt, create and above all lead in a rapidly changing media world.

Our goal is to help students acquire the kind of in-depth expertise in at least one area of strategic communication and design that will enable

them to generate ideas and solve problems for a variety of organizations, including but not limited to advertising agencies, public relations consultancies, publishing and design firms, nonprofits, start-ups and personal ventures. We produce graduates who are forward-looking and have a deep interest in and knowledge of diverse cultures both within the United States and throughout the world.

The department of advertising, public relations and design actively encourages students to enroll in courses offered both within and outside CMDI.

**Course code for this program is APRD.**

# Bachelor's Degree

- Strategic Communication - Bachelor of Science (BS) (p. 701)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Barrett, Bridget (https://experts.colorado.edu/display/fisid_173429/)
Assistant Professor; PhD, University of North Carolina at Chapel Hill

Cheval, Melinda Kiger
Associate Teaching Professor Emerita

Doty, Dawn (https://experts.colorado.edu/display/fisid_158312/)
Associate Teaching Professor; MA, Johns Hopkins University

Duncan, Thomas R.
Professor Emeritus

Elliston, Diane
Assistant Teaching Professor; MFA, Claremont Graduate University

Fisher, Jolene (https://experts.colorado.edu/display/fisid_158335/)
Associate Chair, Associate Professor; PhD, University of Oregon

Gangadharbatla, Harsha (https://experts.colorado.edu/display/fisid_153279/)
Professor; PhD, University of Texas at Austin

Gillette, Jeff
Assistant Teaching Professor; MS, Virginia Commonwealth University

Greenan, LoriBeth
Assistant Teaching Professor; MS, New York University

Hopp, Toby (https://experts.colorado.edu/display/fisid_157745/)
Associate Professor; PhD, University of Oregon

Iyer, Pooja
Assistant Professor; PhD, University of Texas at Austin

Khedekar, Deepti (https://experts.colorado.edu/display/fisid_174027/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Kim, WooJim
Assistant Professor; PhD, University of Illinois at Urbana-Champaign

Labrecque, Joseph (https://experts.colorado.edu/display/fisid_165806/)
Assistant Teaching Professor; MA, University of Denver

Lee, Sangwook
Assistant Professor; PhD, Pennsylvania State University

Lee, Seow Ting (https://experts.colorado.edu/display/fisid_157994/)
Professor; PhD, University of Missouri–Columbia

Ligon, Dan (https://experts.colorado.edu/display/fisid_158313/)
Associate Teaching Professor; MFA, Brown University

Logan, Kelty Irene (https://experts.colorado.edu/display/fisid_147340/)
Associate Professor Emerita

Morehouse, Jordan (https://experts.colorado.edu/display/fisid_173434/)
Assistant Professor; PhD, University of North Carolina Chapel Hill

Moriarty, Sandra E.
Professor Emerita

Nottoli, David (https://experts.colorado.edu/display/fisid_164356/)
Assistant Teaching Professor; MBA, University of Illinois at Urbana-Champaign

Peterson, Loni
Assistant Teaching Professor; MA, University of Denver

Robbs, Brett
Professor Emeritus

Schauster, Erin E. (https://experts.colorado.edu/display/fisid_156310/)
Associate Chair, Associate Professor; PhD, University of Missouri–Columbia

Slayden, David Lee (https://experts.colorado.edu/display/fisid_113297/)
Associate Professor; PhD, Indiana University Bloomington

Sriramesh, Krishnamurthy (https://experts.colorado.edu/display/fisid_163947/)
Professor; PhD, University of Maryland College Park Campus

St. John, Burton (https://experts.colorado.edu/display/fisid_163948/#teaching)
Faculty Director, Professor; PhD, Saint Louis University

Tashakori, Parisa (https://experts.colorado.edu/display/fisid_166723/)
Faculty Director, Assistant Teaching Professor; MA, Islamic Azad University (Iran)

Vargo, Christopher (https://experts.colorado.edu/display/fisid_158320/)
Associate Professor; PhD, University of North Carolina

Wang, Mia (https://experts.colorado.edu/display/fisid_173497/)
Assistant Professor; PhD, University of Illinois at Urbana-Champaign

Weaver, Kay (https://experts.colorado.edu/display/fisid_167189/)
Chair, Professor; PhD, University of Stirling (Scotland)

Willis, Erin (https://experts.colorado.edu/display/fisid_156068/)
Associate Professor; PhD, University of Missouri–Columbia

Young, Morgan (https://experts.colorado.edu/display/fisid_159842/)
Assistant Teaching Professor; M.A., George Washington University

# Courses

**APRD 1003 (3) Principles of Strategic Communication**
Introduces the foundations, nature, and practices of advertising and public relations and the various industry functions - including account management, market research, account planning, media planning, creative strategy, creative execution, branding, image reputation and crisis management. This course offers historical, organizational, financial, creative and critical perspectives concerning strategic communication.
**Requisites:** Restricted to students with 65 units or less completed.
**Grading Basis:** Letter Grade

**APRD 1004 (1) Fundamentals of Grammar**
Teaches students the basic rules of grammar, punctuation, word choice and sentence structure so that they can write clear and concise messages that convey a desired meaning, apply punctuation in an accurate and effective manner, and differentiate between style conventions.
**Grading Basis:** Letter Grade

**APRD 2001 (3) Strategic Thinking in Advertising and Public Relations**
Reviews historical and contemporary views of critical and strategic thinking, as well as strategic practices utilized in advertising, branding, and public relations through the use of readings, exploration of case studies, lectures, individual and group exercises, and client projects.
**Requisites:** Requires a prerequisite course of APRD 1003 (minimum grade C-). Restricted to students with Strategic Communication (STCM) plan (Majors) or who are On-Track admitted to STCM.
**Grading Basis:** Letter Grade

**APRD 2004 (3) Introduction to Research Methods and Insights**
Provides students with the fundamental skills necessary to develop research-based strategies to address challenges faced by advertising, public relations, and marketing professionals in their efforts to address client communication needs.
**Requisites:** Requires a prerequisite course of APRD 1003 (minimum grade C-). Restricted to students with Strategic Communication (STCM) plan (Majors) or who are On-Track admitted to STCM.
**Grading Basis:** Letter Grade

**APRD 2005 (3) Strategic Communication Writing**
Introduces students to strategic writing across multiple media platforms and demonstrates the different forms of writing used in the strategic communication subfields. Students will learn strategies for crafting and delivering effective messages to target audiences.
**Requisites:** Requires prerequisite courses of APRD 1004 and APRD 2001 and APRD 2004 (all minimum grade C-). Restricted to Strategic Communication (STCM) majors only.
**Grading Basis:** Letter Grade

**APRD 2006 (3) Software and Design Applications**
Equips students with the practical knowledge and critical skills necessary to effectively employ visual design in advertising and public relations practice. Students will be introduced to both the fundamental principles of graphic design and the technical tools used to bring design ideas to life.
**Requisites:** Requires prerequisite courses of APRD 1004 and APRD 2001 and APRD 2004 (all minimum grade C-). Restricted to Strategic Communication (STCM) majors only.
**Grading Basis:** Letter Grade

**APRD 3001 (3) Visual Design 1**
Students are introduced to design elements and principles, research and visual storytelling. They are challenged to communicate intellectual, sensory and emotional concepts by learning a visual vocabulary of type, color, and form expressed in a variety of mediums and dimensions.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 3002 (3) Communication and Media Planning**
Concentrates on strategies and tactics advertisers and marketers use to communicate their brand stories to their desired audiences. These include traditional media planning and placement - TV, print, radio, and out-of-home - as well as new areas like digital, social, and experiential approaches to communications. Students will learn how to create, develop, and present communication plans and campaigns in an interactive and fast-paced environment.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Advertising (ADV) subplan only.
**Grading Basis:** Letter Grade

**APRD 3003 (3) Strategic Communication Research Methods**
Provides an opportunity to use and master quantitative and qualitative research methods. Students conduct research and analyze data to determine the target audience¿s relationship with specific product categories and identify the emotional and practical needs that create brand relationships.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Advertising (ADV) or Public Relations (PRL) subplans only.
**Grading Basis:** Letter Grade

**APRD 3004 (3) Account Management**
Examines managerial and decision making processes of advertising and related brand communication functions. Emphasis on determining opportunities, integrating with other elements of the promotion mix, setting objectives, establishing budgets, and measuring advertising and communication effectiveness.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Advertising (ADV) subplan only.
**Grading Basis:** Letter Grade

**APRD 3005 (3) Content Strategy and User Engagement**
Explore and understand the importance of content as a brand building tool. Students will gain the ability to use analytics to create strategy that allows the brand to have meaningful and cohesive conversation with its community.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Advertising (ADV) or Public Relations (PRL) subplans only.
**Grading Basis:** Letter Grade

**APRD 3006 (3) History of Advertising**
Explores the critical moments in advertising history from the start of the Industrial Revolution through the current post digital era.
**Grading Basis:** Letter Grade

**APRD 3009 (3) Brand Building**
Explains the value of a brand in a marketing and advertising environment: how to build, manage, and protect a brand. Specific areas covered include what a brand is and why it matters, how a brand creates value, ways to measure and understand the value of a brand, managing new and established brands, and the role of consumer insight in managing a brand.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all with minimum grade C-). Restricted to Strategic Communication (STCM) majors with Advertising (ADV) subplan only.
**Grading Basis:** Letter Grade

**APRD 3010 (3) Consumer Insights**
Students will learn how to leverage insights for the purposes of creative strategy and creative brief writing.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all with minimum grade C-). Restricted to Strategic Communication (STCM) majors with Advertising (ADV) subplan only.
**Grading Basis:** Letter Grade

**APRD 3011 (3) Visual Design 2**
This advanced-level course is a continuation of "Visual Design I". Through hands-on studio exercises, interactive lectures, and critiques, students will learn to utilize the fundamentals of design, creative thinking, and storytelling to create practical and advanced projects that can be added to their portfolio. They will also learn to articulate the qualities of a visual design system and the strategies behind them.
**Requisites:** Requires prerequisite of APRD 3001 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 3100 (3) UX and UI Design Workflows**
Explores how to create and produce effective and engaging designs for dynamic information across a variety of screens while maintaining brand identity. Extending the design principles learned in previous classes, the student will concept for user interfaces (UI) and navigational frameworks that optimize usability and accessibility.
**Requisites:** Requires prerequisite course of APRD 3001 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 3102 (3) Copywriting 1**
Explores the development of interactive concepts that meet a strategic brief's brand objectives. Emphasis is placed on developing strong digital ideals and mastering and applying the styles appropriate for different digital media.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all with minimum grade C-). Restricted to Strategic Communication (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 3103 (3) Public Relations Writing**
Emphasizes communication tactics: How to plan, write, and produce public relations tools; select audience and media; utilize print and electronic media. Focuses on Associated Press style and advanced writing techniques.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Public Relations (PRL) subplan only.
**Grading Basis:** Letter Grade

**APRD 3104 (3) Digital Storytelling for Public Relations**
Provides students a new skill set in digital storytelling ideas, production, and analysis. Students will develop the skills to produce creative online stories that will reach strategic audiences. We will look at the changing roles of the storyteller in news, promotion, and public relations while discussing and analyzing media consumption habits that encourage a seamless transition from consumer to creator. This course is designed for public relations students within the strategic communication major.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Public Relations (PRL) subplan only.
**Grading Basis:** Letter Grade

**APRD 3105 (3) Public Relations Strategy and Implementation**
Exposes students to concepts in strategic planning and implementation of public relations efforts. Students will come to understand the organization's internal and external communications and identify potential crises in the development of public relations strategy. This class provides an overview of the public relations process and its application to the development of strategy. Students will also understand implementation and evaluation of strategy.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Public Relations (PRL) subplan only.
**Grading Basis:** Letter Grade

**APRD 3112 (3) International Public Relations**
Introduces students to the cultural, social and economic issues relevant to strategic communication in the global arena. Provides students with the foundational tools necessary to both understand and effectively navigate the often complex world of strategic intercultural communication. Specific topics will include exploration of the contextual factors that influence public relations practice in different nations/regions, discussion of the various theoretical models that govern global PR practice and critical evaluation of international PR case studies/campaigns.
**Requisites:** Requires a prerequisite course of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Public Relations (PRL) subplan only.
**Grading Basis:** Letter Grade

**APRD 3300 (3) Crisis Communication in Public Relations**
Explores theories and research related to public relations communication before, during and after a crisis; examines the fundamentals of organizational communication, crisis management and strategic planning.
**Requisites:** Requires prerequisite course of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Public Relations (PRL) subplan only.
**Grading Basis:** Letter Grade

**APRD 3301 (3) Social Media Strategies**
Emphasis on how social media and internet marketing influence public relations; understand the fundamentals and best practices in social media management, visual communication and mobile applications.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all minimum grade C-). Restricted to Strategic Communication (STCM) majors with subplans of Advertising (ADV) or Public Relations (PRL) only.
**Grading Basis:** Letter Grade

**APRD 3302 (3) Case Studies in Public Relations**
Designed to help develop and refine critical thinking in selecting, creating and applying tools, techniques and principles of public relations to a variety of managerial cases and problem situations.
**Requisites:** Requires prerequisite course of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Public Relations (PRL) subplan only.
**Grading Basis:** Letter Grade

**APRD 3400 (3) Creative Concepting 1**
Introduces students to Design Thinking and the techniques for designing ideas into concepts. The course leads students through the design thinking process of 1) Empathize, 2) Define, 3) Ideate, 4) Concept, 5) Prototype, 6) Test. Most emphasis is placed on the first four steps.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all with minimum grade C-). Restricted to Strategic Communications (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 3401 (3) Creative Concepting 2**
Building on the fundamentals mastered in APRD 3400, this course takes design thinking for strategic communication purposes to the next level. Students tackle projects of greater complexity, designing concepts for, among others, mobile applications, social platforms, and interactive experiences. This class prepares the foundation for - and ladders into - APRD 4600.
**Requisites:** Requires prerequisite course of APRD 3400 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 3402 (3) Content Creation**
Focused on rapid content creation, this course will teach students how to develop and produce social content for strategic communication by combining message, concept and execution into consumer-facing touchpoints. Strategic Communication majors with the Creative (CTV) subplan have priority; others may enroll on a space-available basis.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all with minimum grade C-). Restricted to Strategic Communication (STCM) majors.
**Recommended:** Prerequisites APRD 3500 or APRD 3001.
**Grading Basis:** Letter Grade

**APRD 3500 (3) Copywriting 2**
Explores the uses of story and how the design of story must adapt to different platforms and genres, including both short and long-form narratives, visual narrative, film, personal essay and advertising copy writing.
**Requisites:** Requires prerequisite course of APRD 3102 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 3501 (1) Software Applications 2**
Equips students with the critical skills necessary to effectively employ intermediate design software skills in advertising and public relations practice. Students will expand upon existing creative software skills and explore concepts and techniques when working with visual design and media content, motion design, animated compositions, audio and video production, and additional intermediate level topics.
**Requisites:** Requires prerequisite of APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 3504 (1) Software Applications 3**
Equips students with the critical skills necessary to effectively employ advanced design software skills in advertising and public relations practice. Students will expand upon prior creative software skills and explore advanced concepts and techniques when working with general visual media design, 3D compositing, interactive motion design, user interface design, animation concepts, data-driven visuals, and will explore additional media platforms not covered in previous courses.
**Requisites:** Requires prerequisite of APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 4000 (3) Event Planning and Management**
Introduces students to the planning and management of experiential events. Specifically, the course will locate experiential and event planning within the broader context of organizational strategy and will introduce students to project management through proposal development, scheduling, budgeting, and evaluation components that underlie successful event production.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all with minimum grade C-). Restricted to Strategic Communication (STCM) majors with Public Relations (PRL) subplan only.
**Grading Basis:** Letter Grade

**APRD 4010 (3) Strategic Health Communication**
Introduces students to theory, research and contemporary concerns in health communication. Focuses on strategic communication for public service and public education campaigns related to health. Includes advertising and health promotion, community relations, public service programs, advocacy, online communities and social media management.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all with minimum grade C-). Restricted to Strategic Communication (STCM) majors with Public Relations (PRL) subplan only.
**Grading Basis:** Letter Grade

**APRD 4100 (3) Brands and Culture**
Explores the intersection between culture and marketing communication. Students will examine brand communities, brand and category culture as well as popular culture and the impact on and within marketing communication. The goal is for students to become more aware of the importance of culture in the ability of communication to disrupt the status quo within a market.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all minimum grade C-). Restricted to Strategic Communications (STCM) majors with Advertising (ADV) or Public Relations (PRL) subplans only and at least 70 credits.
**Grading Basis:** Letter Grade

**APRD 4102 (3) Sustainable Brand Practices: Ethics Cases in Advertising and PR**
Explore contemporary issues and ethics cases in advertising and public relations and how these practices impact the long-term success of a brand. Students will explore branding concepts and theories of ethics to examine some of the current controversies in which advertising and public relation campaigns are involved and how these issues can be dealt with in an ethical and socially responsible manner.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all minimum grade C-). Restricted to Strategic Communications (STCM) majors with Advertising (ADV) or Public Relations (PRL) subplans only and at least 70 credits.
**Grading Basis:** Letter Grade

**APRD 4300 (3) Strategic Communication Analytics and Metrics**
Provide students with a base knowledge of analytics and metrics used in strategic communication. Students will learn how to obtain and clean big data, how to analyze and turn it into insights and how to present and communicate insights into actionable recommendations.
**Requisites:** Requires a prerequisite course of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with a minimum of 70 hours and a subplan of Advertising (ADV) or Public Relations (PRL) only..
**Grading Basis:** Letter Grade

**APRD 4301 (3) Social Media Listening**
Provides the practical understanding and application of strategic social media listening from the brand perspective in advertising and public relations, focusing on critical thinking and the ethics of using social media data. Provides students with hands-on experience in industry leading listening tools including Brandwatch, Social Studio, Meltwater and Hootsuite. Equips students with the skills needed to find relevant conversations, uncover insights then apply their perspectives to management for business impact.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all with minimum grade C-). Restricted to Strategic Communications (STCM) majors with Advertising (ADV) or Public Relations (PRL) subplans only.
**Grading Basis:** Letter Grade

**APRD 4302 (3) Marketing Data Visualization**
Teaches students how to use data visualization to tell business stories based upon the analysis of marketing and business data. Students will learn basic data concepts, types, and uses. They will explore, summarize, and analyze the data using various techniques and best practices with Tableau Software.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communications (STCM) majors with Advertising (ADV) or Public Relations (PRL) subplans only.
**Grading Basis:** Letter Grade

**APRD 4303 (3) Search Advertising Strategies**
Build, manage and evaluate digital advertising campaigns for a non-profit organization. Teams of students are assigned a local non-profit and will evaluate, develop, and execute search advertising campaigns for their use. The course also provides a general overview of the search advertising landscape, "paid search." Course prepares students for careers in advertising agencies, media agencies, marketing departments and search consultancies.
**Requisites:** Requires prerequisite courses of APRD 2005, APRD 2006, and APRD 3002 (all with minimum grade C-). Restricted to Strategic Communication (STCM) majors with Advertising Strategy (ADV) subplan only.
**Recommended:** Prerequisite APRD 4300.
**Grading Basis:** Letter Grade

**APRD 4404 (3) Advanced Ad Campaigns NSAC**
Work and design an ad campaign for a real-world client through the National Student Advertising Competition (NSAC). Students in the course commit to both the fall and spring semesters in the same academic year for 6 total credit hours (4 hours of capstone credit plus 2 hours of upper-division elective credit). This two-semester course is equivalent to APRD 4405, and credit cannot be given for both. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires a prerequisite course of APRD 3001 or APRD 3010 or APRD 3105 (minimum grade C-). Restricted to Strategic Communication (STCM) majors only with a minimum of 80 hours completed.
**Grading Basis:** Letter Grade

**APRD 4405 (4) Strategic Communication Capstone**
Puts into practice knowledge from previous coursework to plan and execute a strategic communication campaign. Students work with others, operating as an agency. Students will develop one or more strategic communication campaigns. In addition, students will practice organizational and leadership skills; design and layout skills; produce a plans book; and pitch the proposed campaigns to the class and the client.
**Requisites:** Requires prerequisite courses of APRD 3001 or APRD 3010 or APRD 3105 or APRD 4506 (minimum grade C-). Restricted to Strategic Communications (STCM) majors with 85 or more credits.
**Grading Basis:** Letter Grade

**APRD 4406 (3) Advanced PR Campaigns BATEMAN COMPETITION**
Offers students the opportunity to develop and implement a PR campaign for a real-world client through the Bateman Competition, PRSSA's national case study competition for public relations students. Students in the course commit to both the fall and spring semesters in the same academic year for 6 total credit hours (4 hours of capstone credit plus 2 hours of upper-division elective credit). This two-semester course is equivalent to APRD 4405, and credit cannot be given for both. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of APRD 3103 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Public Relations (PRL) subplan only and who have completed at least 80 credit hours.
**Grading Basis:** Letter Grade

**APRD 4501 (3) Design for Social Innovation**
Provides an introduction to design thinking as a means to drive social change and solve real-world problems. This studio class is project based and asks students to experiment with new behaviors of work and learning, including: collaboration, iteration, prototyping, empathizing, craft and inference. Field work and collaboration with teammates are required.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all with minimum grade C-). Restricted to Strategic Communications (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 4543 (3) Strategic Brand Management**
Examines the theory of branding: what brands are, how brands are created and measured, as well as strategies for managing brands and brand communication.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Advertising (ADV) or Public Relations (PRL) subplans and a minimum of 85 credits only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Advertising Media Design

**APRD 4600 (3) Creative Portfolio 1**
Develop a variety of design concepts and execute them at a professional level. Students are assigned projects to demonstrate their ability in areas such as branding, product design, advertising creativity, and interaction design. Students will also design their own online portfolio. Creative work is presented in a juried show at the end of the semester.
**Requisites:** Requires a prerequisite course of APRD 3001 (minimum grade C-). Restricted to Strategic Communications (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 4601 (3) Creative Portfolio 2**
Drawing on creative skills and knowledge developed in previous courses, students produce a final creative portfolio ready for professional viewing. There will be an opportunity to enter work into the International One Show advertising and design awards competition.
**Requisites:** Requires a prerequisite course of APRD 4600 (minimum grade C-). Restricted to Strategic Communications (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 4800 (3) Seminar in Honors Writing and Research**
Supports seniors accepted into the APRD Honors Program in developing the research foundation for their projects, whether scholarly, creative, or hybrid. Topics include topic development, primary and secondary source research, and the writing of a scholarly literature review. Project and time management, planning for creative and scholarly field research, and peer support and editing are emphasized. In the spring, students take an independent study with their faculty advisor to complete their honors project.
**Grading Basis:** Letter Grade

**APRD 4841 (1-6) Undergraduate Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**APRD 4873 (1-4) Special Topics**
Special Topics.
**Repeatable:** Repeatable for up to 16.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Strategic Communication (STCM) majors only with 57-180 credits (Juniors or Seniors)
**Additional Information:** Departmental Category: Advertising Media Design

**APRD 4931 (1-6) Internship**
Internship course
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of APRD 3001 or APRD 3002 or APRD 3103 or APRD 3503 (all minimum grade C-).

# Strategic Communication - Bachelor of Science (BS)

In the Department of Advertising, Public Relations and Design, students learn how to generate ideas and solve problems for businesses, organizations, brands and issues through a strategic thinking process that is grounded in analytical and creative thought. With the explosion of digital and social media, there's never been a more exciting time to work in the rapidly growing field of strategic communication.

The department offers a bachelor's degree in strategic communication—an umbrella term that refers to the way in which organizations use advertising, public relations and design to accomplish their goals. Undergraduate students can choose to specialize in one of three track areas below.

# Program Tracks

## Advertising Strategy

The advertising strategy track prepares students for careers in account management, account planning, brand and campaign management or media management. These advertising careers require knowledge of brand-building, audience engagement across media platforms, data analysis and strategy development.

## Public Relations

The public relations track prepares students for a career in one of the nation's fastest-growing fields. Career opportunities within public relations include—but are not limited to—the roles of public relations director, media and communications manager, fundraising manager, director of communications, corporate communication manager, account manager, lobbyist, publicist, copywriter, event planner, social media manager and spokesperson.

## Creative

The creative track involves the application of design thinking and design practices to create the targeted touchpoints of strategic communication for modern media in a commercial context, such as social media strategies, packaging design, app development and user experience. The creative track provides the methods and processes to solve a strategic communication problem, the experience and understanding to design an original concept, and the skills and best practices to bring those concepts to life. Graduates are employed as digital producers, social media managers, app designers, graphic designers, art directors, copywriters, user experience strategists and interaction designers.

# Requirements

## General Requirements

Each degree track requires 41-43 credit hours, comprised of the 23-credit-hour departmental Core Curriculum and 18-20 credit hours of specialized coursework.

The courses of Core Curriculum include Strategic Communication Capstone (APRD 4405), a 4-credit-hour capstone course completed in the student's final year.

### Core Curriculum

Students must take the following courses to complete the department core requirement.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| APRD 1003 | Principles of Strategic Communication | 3 |
| APRD 1004 | Fundamentals of Grammar | 1 |
| APRD 2001 | Strategic Thinking in Advertising and Public Relations | 3 |
| APRD 2004 | Introduction to Research Methods and Insights | 3 |
| APRD 2005 | Strategic Communication Writing | 3 |
| APRD 2006 | Software and Design Applications | 3 |
| JRNL 3651 | Media Law and Ethics | 3 |
| APRD 4405 | Strategic Communication Capstone | 4 |
| **Total Credit Hours** | | **23** |

### Secondary Area of Study

In addition to the coursework required for the major, all students in STCM must complete a secondary area of study outside of STCM. This secondary area of study can be met by any of the following: a minor, a second major within CMDI, a double degree or any credit-based certificate program of at least 12 credit hours.

# Program Tracks

## Advertising Strategy Track

The advertising strategy track consists of three required courses and three electives totaling 18 credit hours. Up to six credit hours of elective requirements can be satisfied by an internship.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| APRD 3002 | Communication and Media Planning | 3 |
| APRD 3009 | Brand Building | 3 |
| APRD 3010 | Consumer Insights | 3 |
| **Electives** | | **9** |
| APRD 3003 | Strategic Communication Research Methods | |
| APRD 3004 | Account Management | |
| APRD 3005 | Content Strategy and User Engagement | |
| APRD 3006 | History of Advertising | |
| APRD 3301 | Social Media Strategies | |
| APRD 3402 | Content Creation | |
| APRD 4100 | Brands and Culture | |
| APRD 4102 | Sustainable Brand Practices: Ethics Cases in Advertising and PR | |
| APRD 4300 | Strategic Communication Analytics and Metrics | |
| APRD 4301 | Social Media Listening | |
| APRD 4302 | Marketing Data Visualization | |
| APRD 4303 | Search Advertising Strategies | |
| APRD 4404 | Advanced Ad Campaigns NSAC | |
| APRD 4406 | Advanced PR Campaigns BATEMAN COMPETITION | |
| APRD 4543 | Strategic Brand Management | |
| APRD 4800 | Seminar in Honors Writing and Research | |
| APRD 4873 | Special Topics (repeatable up to 6 credits) | |
| APRD 4931 | Internship | |
| **Total Credit Hours** | | **18** |

## Public Relations Track

The public relations track consists of three required courses and three electives totaling 18 credit hours. Up to six credit hours of elective requirements can be satisfied by an internship.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| APRD 3103 | Public Relations Writing | 3 |
| APRD 3105 | Public Relations Strategy and Implementation | 3 |
| APRD 3003 | Strategic Communication Research Methods | 3 |
| or APRD 3104 | Digital Storytelling for Public Relations | |
| or APRD 3112 | International Public Relations | |
| or APRD 3300 | Crisis Communication in Public Relations | |
| **Electives** | | **9** |
| APRD 3003 | Strategic Communication Research Methods | |
| APRD 3005 | Content Strategy and User Engagement | |
| APRD 3006 | History of Advertising | |
| APRD 3104 | Digital Storytelling for Public Relations | |
| APRD 3112 | International Public Relations | |
| APRD 3300 | Crisis Communication in Public Relations | |
| APRD 3301 | Social Media Strategies | |
| APRD 3302 | Case Studies in Public Relations | |
| APRD 3402 | Content Creation | |
| APRD 4000 | Event Planning and Management | |
| APRD 4010 | Strategic Health Communication | |
| APRD 4100 | Brands and Culture | |
| APRD 4102 | Sustainable Brand Practices: Ethics Cases in Advertising and PR | |
| APRD 4300 | Strategic Communication Analytics and Metrics | |
| APRD 4301 | Social Media Listening | |
| APRD 4302 | Marketing Data Visualization | |
| APRD 4404 | Advanced Ad Campaigns NSAC | |
| APRD 4406 | Advanced PR Campaigns BATEMAN COMPETITION | |
| APRD 4543 | Strategic Brand Management | |
| APRD 4800 | Seminar in Honors Writing and Research | |
| APRD 4873 | Special Topics (repeatable up to 6 credits) | |
| APRD 4931 | Internship | |
| **Total Credit Hours** | | **18** |

## Creative Track

The creative track consists of six required courses and two electives totaling 20 credit hours. Up to six credit hours of elective requirements can be satisfied by an internship.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| APRD 3001 | Visual Design 1 | 3 |
| APRD 3102 | Copywriting 1 | 3 |
| APRD 3400 | Creative Concepting 1 | 3 |
| APRD 3501 | Software Applications 2 | 1 |
| APRD 3504 | Software Applications 3 | 1 |
| APRD 4600 | Creative Portfolio 1 | 3 |
| **Electives** | | **6** |
| APRD 3006 | History of Advertising | |
| APRD 3011 | Visual Design 2 | |
| APRD 3100 | UX and UI Design Workflows | |
| APRD 3401 | Creative Concepting 2 | |
| APRD 3402 | Content Creation | |
| APRD 3500 | Copywriting 2 | |
| APRD 4404 | Advanced Ad Campaigns NSAC | |
| APRD 4406 | Advanced PR Campaigns BATEMAN COMPETITION | |
| APRD 4501 | Design for Social Innovation | |
| APRD 4601 | Creative Portfolio 2 | |
| APRD 4800 | Seminar in Honors Writing and Research | |
| APRD 4873 | Special Topics (repeatable up to 6 credits) | |
| APRD 4931 | Internship | |
| **Total Credit Hours** | | **20** |

# Sample Plan of Study

The following provides an example of how the core requirements for a BS in Strategic Communication could be fulfilled within four years. Please refer to the specific track requirements to determine the number of electives required for the advertising strategy, public relations and creative tracks. Specific details on the Core Curriculum requirements for the College of Communication, Media, Design and Information Policies & Requirements (https://catalog.colorado.edu/undergraduate/colleges-schools/media-communication-information/policies-requirements/#corecurriculumtext).

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| APRD 1003 | Principles of Strategic Communication | 3 |
| CMDI 1040 Foundational CMDI (4), or CMDI Core or Elective (3) | | 4 |
| Quantitative Thinking | | 3 |
| Lower Division Writing | | 3 |
| | **Credit Hours** | **13** |
| **Spring Semester** | | |
| APRD 1004 | Fundamentals of Grammar | 1 |
| APRD 2001 | Strategic Thinking in Advertising and Public Relations | 3 |
| APRD 2004 | Introduction to Research Methods and Insights | 3 |
| CMDI 1040 Foundational CMDI (4), or CMDI Core or Elective (3) | | 3 |
| CMDI Core (Natural World with Lab) | | 4 |
| | **Credit Hours** | **14** |
| **Year Two** | | |
| **Fall Semester** | | |
| APRD 2005 | Strategic Communication Writing | 3 |
| CMDI Core Computing | | 3 |
| CMDI Core or Elective (P/S; H & A; Hist V; Div & Global) | | 6 |
| Secondary Area | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| APRD 2006 | Software and Design Applications | 3 |
| CMDI Core (Natural World) | | 3 |
| CMDI Core or Elective (P/S; H & A; Hist V; Div & Global) | | 6 |
| Secondary Area | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| APRD Program Track Core or Elective | | 9 |
| CMDI Core or Elective (P/S; H & A; Hist V; Div & Global) | | 3 |
| Secondary Area | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| JRNL 3651 | Media Law and Ethics | 3 |
| APRD Program Track Core or Elective | | 3 |
| CMDI Core or Elective (P/S; H & A; Hist V; Div & Global) | | 7 |
| Upper Division Composition or Elective | | 3 |
| | **Credit Hours** | **16** |
| **Year Four** | | |
| **Fall Semester** | | |
| APRD Program Track Core or Elective | | 3 |
| CMDI Core or Elective (P/S; H & A; Hist V; Div & Global) | | 10 |
| Secondary Area | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| APRD 4405 | Strategic Communication Capstone | 4 |
| APRD Program Track Core or Elective | | 3 |
| Secondary Area | | 3 |
| Electives | | 6 |
| | **Credit Hours** | **16** |
| | **Total Credit Hours** | **120** |

# Learning Outcomes

The Advertising, Public Relations and Media Design Department has established that these are vital learning outcomes:

- Demonstrate the ability to conduct and apply research, strategic analysis and creative problem-solving to develop and execute solutions for real-world strategic communication challenges.
- Communicate clearly and effectively across various formats—written, verbal, digital and visual—to a range of audiences.

- Demonstrate an understanding of the structures, roles and key competencies within the strategic communication field.
- Work collaboratively across disciplines to achieve strategic communication goals.
- Critically analyze the role of strategic communication within broader social, cultural and global contexts, understanding its ethical implications and influence on diverse societies.
- Demonstrate proficiency with current and emerging tools, platforms and technologies essential for strategic communication.

# Communication

In the Department of Communication, students learn about communication practices that underlie all of our social interactions, both in face-to-face interaction and in new forums, such as social media. The department is a vibrant community of scholars who share a commitment to excellence and innovation in communication research and teaching.

Our undergraduate degree blends the best of a broad, liberal arts education with practical skills that contribute to career and life success. We also offer a minor in communication.

Students will acquire broad knowledge in communication, including:

- Communication contexts (e.g., interpersonal, group, organizational, public, intercultural and digital).
- Ethical issues and responsibilities of communication practice.
- Fostering and supporting inclusive and just communities.
- History of communication and rhetorical study.
- Implications for shifting communication technologies.
- Methods for investigating communication problems.

Students will also acquire the skills and abilities to:

- Design innovative and influential messages.
- Develop inclusive and responsible communication practices.
- Analyze and critique communication processes.
- Build quality relationships and interactions.

**Course code for this program is COMM.**

## Bachelor's Degree

- Communication - Bachelor of Arts (BA) (p. 708)

## Minor

- Communication - Minor (p. 710)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ackerman, John Martin (https://experts.colorado.edu/display/fisid_144951/)
Professor; PhD, Carnegie Mellon University

Ashcraft, Karen Lee (https://experts.colorado.edu/display/fisid_147453/)
Professor; PhD, University of Colorado Boulder

Boromisza-Habashi, David (https://experts.colorado.edu/display/fisid_145833/)
Associate Professor; PhD, University of Massachusetts at Amherst

Burns, Michael
Assistant Teaching Professor; PhD, North Dakota State University

Cruz, Joelle (https://experts.colorado.edu/display/fisid_157594/)
Associate Professor; PhD, Texas A&M University

Frey, Lawrence R. (https://experts.colorado.edu/display/fisid_125937/)
Professor Emeritus; PhD, University of Kansas

Hickerson Dominiski, Ruth (https://experts.colorado.edu/display/fisid_151159/)
Teaching Professor; PhD, University of Denver

Hodge, Danielle (https://experts.colorado.edu/display/fisid_167427/)
Assistant Professor; PhD, University of Colorado Boulder

Izaguirre, José G.
Assistant Professor; PhD, University of Illinois Urbana-Champaign

Jahn, Jody L. (https://experts.colorado.edu/display/fisid_153426/)
Associate Professor; PhD, University of California, Santa Barbara

Kelsie, Amber (https://experts.colorado.edu/display/fisid_171455/)
Assistant Professor; PhD, University of Pittsburgh

Koschmann, Matthew A. (https://experts.colorado.edu/display/fisid_145807/)
Associate Professor; PhD, University of Texas at Austin

Kuhn, Tim (https://experts.colorado.edu/display/fisid_118144/)
Professor; PhD, Arizona State University

Maurer, Christy (https://experts.colorado.edu/display/fisid_148831/)
Teaching Associate Professor; PhD, University of Colorado Boulder

Montiegel, Kristella (https://experts.colorado.edu/display/fisid_172738/)
Assistant Professor; PhD, University of California, Los Angeles

Ochieng, Omedi (https://experts.colorado.edu/display/fisid_170851/)
Associate Professor; PhD, Bowling Green State University

Pezzullo, Phaedra Carmen (https://experts.colorado.edu/display/fisid_156204/)
Professor; PhD, University of North Carolina Chapel Hill

Shrikant, Natasha (https://experts.colorado.edu/display/fisid_157954/)
Associate Professor; PhD, University of Massachusetts at Amherst

Simonson, Peter D.
Professor Emeritus; PhD, University of Iowa

Skerski, Jamie L. (https://experts.colorado.edu/display/fisid_149871/)
Teaching Professor; PhD, Indiana University Bloomington

Sprain, Leah M.H. (https://experts.colorado.edu/display/fisid_151292/)
Associate Professor, Faculty Director; PhD, University of Washington

Taylor, Bryan Copeland (https://experts.colorado.edu/display/fisid_107421/)
Professor; PhD, University of Utah

White, Cindy Hagemeier (https://experts.colorado.edu/display/fisid_107461/)
Associate Professor; PhD, University of Arizona

# Courses

**COMM 1210 (3) Perspectives on Human Communication**
Surveys communication in a variety of contexts and applications. Topics include basic concepts and general models of communication, ethics, language and nonverbal communication, personal relationships, group decision making, organizational communication, and impact of technological developments on communication. Required for COMN majors and minors.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
MAPS Course: Social Science

**COMM 1300 (3) Public Speaking**
Develops confidence and competence in writing and delivering presentations. Examines public speaking in a variety of personal, civic and professional settings. Required for COMM or COMN majors.

**COMM 1600 (3) Group Interaction**
Learn communication skills to be a better group member and enhance group effectiveness in a variety of professional and civic contexts. Practice group communication skills through an innovative group project and online simulation. Focuses on topics such as group development & socialization, decision making, conflict management, technology & virtual group work, difference & diversity, planning & coordination, leadership & management, and ethics. Required for COMM and COMN majors.
**Requisites:** Restricted to Communication (COMN) majors only.

**COMM 2000 (3) Topics in Communication**
Investigates select topics in communication. Does not count toward the 2000-level courses required for the major, unless explicitly stated in the course schedule.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisites COMM 1210 and COMM 1600.

**COMM 2320 (3) The Craft of Argument**
Focuses on the practice of argumentation in public life with attention to how the process of critical thinking leads to the invention of arguments. Students use argumentation theory to craft ethical and well-reasoned appeals and to critically evaluate the arguments of others. Formerly COMM 3310. Students who took this course previously as COMM 3310 cannot re-take it for credit.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**COMM 2400 (3) Discourse, Culture and Identities**
Considers how communication is central to constructing who people are and examines social controversies related to talk and identities. Students learn to analyze and understand discourse, defined as everyday talk and conversation, through the practice of discourse analysis.
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**COMM 2410 (3) The Practice of Intercultural Communication**
Prepares students to approach intercultural communication as interaction across cultural difference. Teaches the discovery of how culturally variable communication practices (e.g., word and language choice, speech acts, personal address, silence, nonverbal communication, etc.) can lead to the breakdown of coordinated interaction, and how coordination can be restored. Examines broader social, cultural, and political contexts in which intercultural interactions occur.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**COMM 2500 (3) Interpersonal Communication**
Examines how communication processes such as language and nonverbal behavior shape perceptions of self, influence identity, and impact interpersonal roles and relationships. Students learn theories of human interaction and consider how this can be used to improve relational communication.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisites COMM 1210 and COMM 1600.

**COMM 2650 (3) Business and Professional Communication**
Develops knowledge of concepts and skills required for successful participation in contemporary workplace communication. Focuses on communication processes associated with contexts such as sales, leadership, diversity, teamwork, customer service, and conflict. Facilitates students conduct of self-assessment, networking, interviewing, and other career-development strategies. Provides students training in informative and persuasive business presentations.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisites COMM 1300 and COMM 1600.
**Grading Basis:** Letter Grade

**COMM 3000 (3) Issues in Communication**
Explores select issues in communication.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites COMM 1210 and COMM 1600.

**COMM 3210 (3) Communication Theory**
Reviews multiple theories of communication and how they address a variety of personal, relational, group, organizational, and social problems. Develops new approaches to understanding and improving human communication.
**Requisites:** Requires prerequisite courses of COMM 1210 and COMM 1600 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Communication (COMM or COMN) majors/minors or On-Track IUT students admitted to COMN.

**COMM 3220 (3) The Art of Listening**
Investigates the entwined phenomena of listening and sound as fundamental but overlooked dimensions of embodied experience, communication, culture, and the living and material environments of the world. The course explores ways to understand, critically analyze, and practice listening as an embodied process of human responsiveness, social leadership, unequal power differentials, and creative possibility. It aims to retune how we listen to people, places, technologies, and the world at large.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites COMM 1210 and COMM 1600.
**Grading Basis:** Letter Grade

**COMM 3300 (3) Rhetorical Thinking**
Reviews the classical tradition of rhetoric and its relevance to current events and public issues. Students learn how rhetorical perspectives help us create new ways of thinking, speaking, and acting through practicing creative message design.
**Requisites:** Requires prerequisite courses of COMM 1210 and COMM 1600 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Communication (COMM or COMN) majors/minors or On-Track IUT students admitted to COMN.

**COMM 3320 (3) Persuasion in Society**
Learn personal and professional skills to become more persuasive in a variety of communication contexts, and develop a broader and more critical understanding of the culture of persuasion that pervades all aspects of society.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors). Requires prerequisite of COMM 1210 and COMM 1600 (all minimum grade C-).

**COMM 3330 (3) Social Movements**
Introduces concepts in rhetoric and argumentation that are used to explain significant social and political changes in our society. The goal is to show how social actors use rhetoric to promote some social goals and hinder others. Formerly COMM 2360.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites COMM 1210 and COMM 1600.

**COMM 3340 (3) Political Communication**
Explores the role of communication in politics, emphasizing how language drives policies and campaigns. Students learn communication strategies in order to craft innovative campaign messaging.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites COMM 1210 and COMM 1600.

**COMM 3370 (3) Environmental Communication**
Introduces the growing field of environmental communication, including historical events, key concepts, legal landmarks, technological developments and public controversies at the intersection of the environment, economics and social justice. Focuses on persuasive communication in the public sphere, as well as the constitutive power of communication to name and redefine what has been and might become possible in our environmental imaginations.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**COMM 3380 (3) Advanced Topics in Storytelling, Culture, & Climate Justice**
Examines how we communicate about the intersections of climate change and social justice within specific cultural contexts, as well as how we can change narratives about climate justice through a culture-centered framework. Will focus on storytelling topics, such as food justice or energy justice.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**COMM 3410 (3) Intercultural Communication**
Explores complex relationships between culture and communication processes from various conceptual perspectives. Considers the important role of context (e.g., social, historical, and cultural) in intercultural interactions. Recommended Prerequisites: COMM 1210 and COMM 1600.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**COMM 3420 (3) Gender and Communication**
Examines gender as a social practice that remains vital to identities, relationships, and institutions in contemporary society. Treats gender as something we do or enact through communication, rather than as something we are or have, and explores the implications of this shift in perspective. Investigates how gender interacts with sexuality, race, class, nation, age, ability, and other aspects of identity.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**COMM 3430 (3) Communication, Culture and Sport**
Examines the communicative, historical and cultural aspects of sport in contemporary American society including the intersections of power, gender/sexuality, race and class.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**COMM 3510 (3) Family Communication**
Explores communication in families from various theoretical perspectives, such as social constructionism, systems theory, and dialectical theory. Communication patterns and processes created and sustained by family members are examined, including rules, roles, stories, rituals, myths, metaphors, themes, and cycles.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites COMM 1210 and COMM 1600.

**COMM 3610 (3) Communication, Technology, and Society**
Examines how electronic media influence our communication in relationships and communities. Focuses on how we use technology to create shared meanings, express identities, and coordinate interaction, and why such efforts succeed and fail. Also focuses on political and ethical questions concerning the development of communication technology in a global society characterized by conflict and inequality.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites COMM 1210 and COMM 1600.

**COMM 3620 (3) Advanced Teamwork and Collaboration**
Explores communication and collaboration in complex situations (e.g., extreme environments e.g., space travel; cross-sector collaborations). Reviews and applies key processes of team/group communication and collaboration to the context of extreme teams to identify communication issues and interventions relevant in complex organizing or dangerous situations.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**COMM 3630 (3) Organizational Communication**
Learn to understand and critique organizations and organizing from a communication perspective. Addresses topics such as organizational theory, organizational culture, power, technology, decision making, teamwork, leadership, diversity, gender, socialization, and ethics.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites COMM 1210 and COMM 1600.
**Grading Basis:** Letter Grade

**COMM 3700 (3) Communication and Conflict Management**
Examines communication concepts and theories related to interpersonal and organization conflict. Enables students to better understand different types of conflict, sources of conflict, and communication patterns that serve to create, maintain and transform conflict by teaching conflict management and collaboration.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite COMM 1600 and COMM 2500 or COMM 2650.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**COMM 3740 (3) Qualitative Research Methods**
Learn to collect and analyze qualitative data (interviews, observations, focus groups) in order to answer research questions about communication and society. Focuses on research that investigates meaning, understanding, process, and interpretation in order to enhance our knowledge of human interaction.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Communication (COMM or COMN) majors or minors only.
**Recommended:** Prerequisites COMM 1210 and COMM 1600.

**COMM 3750 (3) Quantitative Research Methods**
Introduces empirical communication research. Students develop skills in collecting data and analyzing statistical research. Students conduct an original research project applying numerical analysis to communication behavior.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Communication (COMM or COMN) majors or minors only.
**Recommended:** Prerequisites COMM 1210 and COMM 1600.

**COMM 3760 (3) Rhetorical Research Methods**
Considers what it means to do rhetorical research. Explores various methods for analyzing all forms of public discourse, such as political speeches, advertising, activist campaigns, and popular entertainment, to better understand their effects and influence.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Communication (COMM or COMN) majors or minors only.
**Recommended:** Prerequisites COMM 1210 and COMM 1600 and COMM 3300.

**COMM 4000 (1-6) Advanced Topics in Communication**
Analyzes special interest areas of communication theory, research, and practice. Course format involves lecture, discussion, investigative analysis, and practical application.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites COMM 3210 and COMM 3300.

**COMM 4100 (3) Seminar in Honors Thesis Writing and Research**
Provides the opportunity for students writing an honors thesis to develop their understanding of the research process and to improve their research and writing skills.
**Requisites:** Restricted to students with 80-180 credits (Senior) Communication (COMM or COMN) majors only.
**Additional Information:** Arts Sciences Honors Course

**COMM 4220 (3) Senior Seminar: Functions of Communication**
Topical seminar on the functions of communication across interpersonal, group, organizational, and public contexts. Reviews current theory and research on topics such as communication and conflict, persuasion, and ethical dimensions of communication practices.
**Requisites:** Requires prerequisite course of COMM 3210 (minimum grade C-). Restricted to students with 80-180 credits (Senior) Communication (COMM or COMN) majors only.

**COMM 4300 (3) Senior Seminar: Rhetoric**
Reviews current theory and research on rhetoric and culture on topics such as environmental rhetoric, rhetoric of racism, and rhetoric of storytelling.
**Requisites:** Requires prerequisite course of COMM 3300 (minimum grade C-). Restricted to students with 80-180 credits (Senior) Communication (COMM or COMN) majors only.
**Grading Basis:** Letter Grade

**COMM 4510 (3) Senior Seminar: Interpersonal Communication**
Reviews current theory and research on topics such as communication in intimate relationships, the darkside of relationships, and online relationship management.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of COMM 3210 (minimum grade C-). Restricted to students with 80-120 credits (Senior) Communication (COMM or COMN) majors only.

**COMM 4600 (3) Senior Seminar: Organizational Communication**
Reviews current theory and research on topics such as communication and organizational decision making, organizational culture, gender relations, communication technology, and power and control in organizations.
**Equivalent - Duplicate Degree Credit Not Granted:** COMM 5600
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of COMM 3210 (minimum grade C-). Restricted to students with 80-120 credits (Senior) Communication (COMM or COMN) majors only.

**COMM 4610 (3) Senior Seminar: Communication Studies of Science and Technology**
Requires students to synthesize and demonstrate what they¿ve learned in the major. Please refer to the specific description listed for the current semester. Each seminar will vary greatly in format and content.
**Requisites:** Requires prerequisite course of COMM 3210 (minimum grade C-). Restricted to students with 80-180 credits (Senior) Communication (COMM or COMN) majors only.

**COMM 4840 (1-6) Undergraduate Independent Study**
Note that the 14-hour limit in the major applies to any combination of independent study and internship credit. This course does not count toward the 36 credit hours required for the major.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Communication (COMM or COMN) majors only.
**Recommended:** Prerequisites COMM 3210 and COMM 3300.

**COMM 4930 (1-6) Internship**
Studies are pursued in communication-related work experience projects that generally require 40 hours on the job per credit hour and evidence (e.g., journal, paper and employer evaluation) of significant learning. The 14-hour limit in the major applies to any combination of independent study and internship credit and does not count toward the 36 hours required for the major.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Communication (COMM or COMN) majors only. Requires 2.5 or higher cumulative GPA
**Recommended:** Prerequisite 57 hours of overall course work, 18 hours of communication course work completed, 2.50 overall GPA and a faculty sponsor.

**COMM 4950 (1-6) Senior Thesis: Honors**
For exceptional communication majors who wish to graduate with department honors and receive credit for writing an honors thesis. For students accepted into COMN Honors program and currently completing COMN Honors Thesis project.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sciences Honors Course

# Communication - Bachelor of Arts (BA)

The BA in communication provides a broad-based liberal arts degree designed to foster students' abilities to understand, analyze and effectively engage in a wide range of communication practices. It encourages critical thinking about the ways that symbols and interactions contribute to social problems and solutions.

The major provides instruction and practice in the skills of effective communication and collaborative problem-solving that employers are looking for—speaking, writing, reading, listening, asking good questions, utilizing media and working in groups. Students learn how to design innovative messages, build quality personal and professional relationships, elevate their critical thinking skills and are prepared to thrive in a variety of professions.

## Requirements

### Required Courses and Credits

Majors must complete a minimum of 36 credit hours of coursework in communication, at least 18 of which must be upper division (3000 level or higher). Only courses with grades of C- or better count toward the major, and the overall major GPA must be 2.000 (a C- is 1.700).

*Note*: In addition to major requirements, communication majors must complete CMDI Core Curriculum requirements. The Core Curriculum requirements for the College of Communication, Media, Design and Information can be found in Policies & Requirements (https://catalog.colorado.edu/undergraduate/colleges-schools/media-communication-information/policies-requirements/#corecurriculumtext).

Students who wish to major in communication should meet with a department advisor, where they will be advised of any changes to this list of requirements.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| COMM 1210 | Perspectives on Human Communication | 3 |
| COMM 1300 | Public Speaking | 3 |
| COMM 1600 | Group Interaction | 3 |
| COMM 3210 | Communication Theory | 3 |
| COMM 3300 | Rhetorical Thinking | 3 |
| **Lower-Division COMM Electives** | | |
| Select at least two of the following: | | 6 |
| COMM 2320 | The Craft of Argument | |
| COMM 2400 | Discourse, Culture and Identities | |
| COMM 2410 | The Practice of Intercultural Communication | |
| COMM 2500 | Interpersonal Communication | |
| COMM 2650 | Business and Professional Communication | |
| **Methods Course** | | |
| Select one of the following: | | 3 |
| COMM 3740 | Qualitative Research Methods | |
| COMM 3750 | Quantitative Research Methods | |
| COMM 3760 | Rhetorical Research Methods | |
| **Senior Seminar** | | |
| Select one of the following: | | 3 |
| COMM 4220 | Senior Seminar: Functions of Communication | |
| COMM 4300 | Senior Seminar: Rhetoric | |
| COMM 4510 | Senior Seminar: Interpersonal Communication | |
| COMM 4600 | Senior Seminar: Organizational Communication | |
| COMM 4610 | Senior Seminar: Communication Studies of Science and Technology | |
| **Upper-Division Electives** | | |
| Two additional upper-division electives (3000- or 4000-level courses); 4000-level courses may be taken twice (only twice) with different topics | | 6 |
| COMM 3000 | Issues in Communication | |
| COMM 3320 | Persuasion in Society | |
| COMM 3330 | Social Movements | |
| COMM 3340 | Political Communication | |
| COMM 3370 | Environmental Communication | |
| COMM 3380 | Advanced Topics in Storytelling, Culture, & Climate Justice | |
| COMM 3410 | Intercultural Communication | |
| COMM 3420 | Gender and Communication | |
| COMM 3430 | Communication, Culture and Sport | |
| COMM 3510 | Family Communication | |
| COMM 3610 | Communication, Technology, and Society | |
| COMM 3620 | Advanced Teamwork and Collaboration | |
| COMM 3630 | Organizational Communication | |
| COMM 4000 | Advanced Topics in Communication | |
| **COMM Elective** | | |
| One additional COMM elective, any level. | | 3 |

| | |
|---|---|
| **Independent Study/Internships** | |
| Up to 8 credit hours of independent study and 6 credit hours of internships may be taken. These are upper-division elective hours but do not count toward major requirements. Eligible students interested in graduating with department honors should contact the department's honors coordinator as soon as possible. | |
| **Total Credit Hours** | **36** |

## Secondary Area of Study

In addition to coursework required for the major, all students in COMM must complete a secondary area of study outside of COMM. This secondary area of study can be met by any of the following: a minor, a second major within CMDI, a double degree or any credit-based certificate program of at least 12 credit hours. Secondary areas of study typically require 15-21 credit hours.

## Additional Information

The department encourages its majors to take related courses in other departments in CMDI as well as anthropology, business, English, ethnic studies, history, linguistics, philosophy, political science, sociology, speech, language and hearing sciences, and theatre and dance.

The department also encourages participation in optional programs such as study abroad, internships and graduating with honors.

# Sample Four-Year Plan of Study

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| COMM 1210 | Perspectives on Human Communication | 3 |
| CMCI 1040:Foundational Concepts and Creativity in Media, Communication and Information (4) or CMDI Core or Elective (3) | | 4 |
| CMDI Core or elective (P & S; H & A; Hist V; Div & Global) | | 3 |
| Lower-division Writing Course | | 3 |
| | **Credit Hours** | **13** |
| **Spring Semester** | | |
| COMM 1300 | Public Speaking | 3 |
| CMCI 1040:Foundational Concepts and Creativity in Media, Communication and Information (4) or CMDI Core or Elective (3) | | 3 |
| COMM 1600 | Group Interaction | 3 |
| CMDI Core Computing Course | | 3 |
| Quantitative Thinking Course | | 3 |
| | **Credit Hours** | **15** |

**Year Two**

| **Fall Semester** | | |
|---|---|---|
| At least one of the following: | | 3 |
| COMM 2320<br>or COMM 2400<br>or COMM 2410<br>or COMM 2500<br>or COMM 2650 | The Craft of Argument<br>or Discourse, Culture and Identities<br>or The Practice of Intercultural Communication<br>or Interpersonal Communication<br>or Business and Professional Communication | |
| CMDI Core: Natural World | | 3 |
| CMDI CORE or elective (P & S; H & A; Hist V; Div & Global) | | 7 |
| Secondary Area of Study | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| At least one of the following: | | 3 |
| COMM 2320<br>or COMM 2400<br>or COMM 2410<br>or COMM 2500<br>or COMM 2650 | The Craft of Argument<br>or Discourse, Culture and Identities<br>or The Practice of Intercultural Communication<br>or Interpersonal Communication<br>or Business and Professional Communication | |
| CMDI Core: Natural World with Lab | | 4 |
| CMDI CORE or elective (P & S; H & A; Hist V; Div & Global) | | 3 |
| Secondary Area of Study | | 6 |
| | **Credit Hours** | **16** |

**Year Three**

| **Fall Semester** | | |
|---|---|---|
| COMM Elective, any level | | 3 |
| COMM 3210<br>or COMM 3300 | Communication Theory<br>or Rhetorical Thinking | 3 |
| (Students should not take COMM 3210 and COMM 3300 in the same semester) | | |
| CMDI CORE or elective (P & S; H & A; Hist V; Div & Global) | | 6 |
| Secondary Area of Study | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| COMM 3210<br>or COMM 3300 | Communication Theory<br>or Rhetorical Thinking | 3 |
| (Students should not take COMM 3210 and COMM 3300 in the same semester) | | |
| One of the following methods courses: | | 3 |
| COMM 3740<br>or COMM 3750<br>or COMM 3760 | Qualitative Research Methods<br>or Quantitative Research Methods<br>or Rhetorical Research Methods | |
| CMDI CORE or elective (P & S; H & A; Hist V; Div & Global) | | 6 |
| Secondary Area of Study | | 3 |
| | **Credit Hours** | **15** |

**Year Four**

| **Fall Semester** | | |
|---|---|---|
| One Senior Seminar: | | 3 |
| COMM 4220<br>or COMM 4300<br>or COMM 4510<br>or COMM 4600<br>or COMM 4610 | Senior Seminar: Functions of Communication<br>or Senior Seminar: Rhetoric<br>or Senior Seminar: Interpersonal Communication<br>or Senior Seminar: Organizational Communication<br>or Senior Seminar: Communication Studies of Science and Technology | |
| COMM Upper-division Elective [1] | | 3 |
| CMDI CORE or elective (P & S; H & A; Hist V; Div & Global) | | 3 |
| Composition and Expression Course : Upper-division composition | | 3 |

| | |
|---|---|
| Secondary Area of Study | 3 |
| **Credit Hours** | **15** |
| **Spring Semester** | |
| COMM Upper-division Elective [1] | 3 |
| CMDI CORE or elective (P & S; H & A; Hist V; Div & Global) | 9 |
| Secondary Area of Study | 3 |
| **Credit Hours** | **15** |
| **Total Credit Hours** | **120** |

[1] Detailed list available in major requirements section of catalog.

## Learning Outcomes

By the completion of the program, students will be able to:

- Develop creative and ethical messages to solve problems.
- Practice effective group communicaiton to work together toward a collective outcome.
- Understand communicative processes as constitutive.

# Communication - Minor

Employers consistently rank communication skills among the most important qualities they look for in potential employees. Communication specialists are uniquely able to analyze and understand the work of communication in the world and design the kinds of processes that generate satisfying, effective, just and sustainable futures in relationships, organizations and communities.

A minor in communication teaches students how to design innovative messages, build quality personal and professional relationships, foster critical thinking skills, and prepares students to thrive in a variety of professions.

## Requirements

Students pursuing the minor must complete a minimum of 18 credit hours of coursework in communication, at least 9 of which must be upper division (3000 level or higher). Only courses with grades of C- or better count toward the minor, and the overall minor GPA must be 2.000 (a C- is 1.700). They may apply no more than 6 credit hours of transfer work, including 3 credit hours of upper-division credit. Independent study and internship hours will not count toward the COMM minor requirements.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| COMM 1210 | Perspectives on Human Communication | 3 |
| COMM 1300 | Public Speaking | 3 |
| One 2000-level course | | 3 |
| Three upper-division courses (3000 level or higher) | | 9 |
| **Total Credit Hours** | | **18** |

Students who wish to minor in communication should meet with a department advisor, where they will be advised of any changes in this list of requirements.

# Critical Media Practices

Critical media practices addresses the changing landscape of electronic media making by developing student analytical and production skills across a wide range of platforms, practices and technologies. The department explores the creative potential of cross-platform media production, as well as time-based media arts practices, such as immersive media production, sound practices and performance media. Our convergent approach to media spans a variety of media tools including digital photography, audio/video editing and single camera video production, computational media, open source programming and emergent tools under development. Our students acquire the skills and perspective to critically understand and actively contribute to this new constellation of audio-visual media making possibilities. The Department of Critical Media practices aims to prepare students to pursue careers as media art creators and critical citizens for the 21st century.

Production coursework encourages the development of personal style as students explore the expressive potential of emergent media practices, with a particular emphasis on the documentary impulse and making the “invisible” visible. Our program explores media art from a critical perspective: its nature, its history and its place in the contemporary world. Students are required to analyze not only existing media but also their own work. In this way the program presents media art as a way of engaging and knowing the world. At the graduate level, our department features an MFA degree in Interdisciplinary Documentary Media Practices and a Graduate Certificate in Interdisciplinary Documentary Media Practices. The department also offers a practice-led PhD in Emergent Technologies and Media Art Practices. The Center for Documentary and Ethnographic Media is affiliated with our program. Our department collaborators include faculty and students from anthropology, art and art history, Center for the American West, Center for Asian Studies, cinema studies, dance, English, geography, music and programs within the College of Communication, Media, Design and Information.

**Course code for this program is CMDP.**

## Bachelor's Degree

- Media Production - Bachelor of Arts (BA) (p. 715)

## Minor

- Media Production - Minor (p. 720)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ambrose, Kirk T. (https://experts.colorado.edu/display/fisid_115914/)
Professor; PhD, University of Michigan Ann Arbor

Auguiste, Reece Luke (https://experts.colorado.edu/display/fisid_149596/)
Chair, Associate Professor, Faculty Director; PhD, University of Nottingham (England)

Biggs, Betsey (https://experts.colorado.edu/display/fisid_158344/)
Assistant Professor; PhD, Princeton University

Boord, Daniel Olin (https://experts.colorado.edu/display/fisid_134649/)
Professor Emeritus; MFA, University of California, San Diego

Clark, Patrick Ryan (https://experts.colorado.edu/display/fisid_156499/)
Assistant Professor, Associate Chair; MFA, San Diego State University

Coombs Esmail, Eric (https://experts.colorado.edu/display/fisid_158305/)
Assistant Professor, Faculty Director; MFA, State University of New York at Buffalo

Eggert, Katherine (https://experts.colorado.edu/display/fisid_103618/)
Professor; PhD, University of California, Berkeley

Ellsworth, Michelle (https://experts.colorado.edu/display/fisid_112060/)
Distinguished Professor; MFA, University of Colorado Boulder

Espelie, Erin Marie (https://experts.colorado.edu/display/fisid_148671/)
Associate Professor; MFA, Duke University

Hammons, Christian Stanford (https://experts.colorado.edu/display/fisid_152915/)
Teaching Associate Professor, Associate Chair, Associate Faculty Director; PhD, University of Southern California

Knight, Tara (https://experts.colorado.edu/display/fisid_158318/)
Associate Professor; MFA, University of California, San Diego

Laurenzo, Tomas (https://experts.colorado.edu/display/fisid_168230/)
Associate Professor; PhD, Universidad De La Republica (Uruguay)

Limerick, Patricia N. (https://experts.colorado.edu/display/fisid_105459/)
Professor; PhD, Yale University

Oakes, Tim (https://experts.colorado.edu/display/fisid_109269/)
Professor; PhD, University of Washington

Rivers, Ed (https://experts.colorado.edu/display/fisid_101652/)
Professor; PhD, University of Oregon

Rueb, Teri Susan (https://experts.colorado.edu/display/fisid_163944/)
Professor, Chair; PhD, Harvard University

Sanford, Jason Sidney (https://experts.colorado.edu/display/fisid_165067/)
Instructor

Saxton, Richard W. (https://experts.colorado.edu/display/fisid_144756/)
Associate Professor; MFA, Indiana University Bloomington

Sylvester, Roshanna (https://experts.colorado.edu/display/fisid_164037/)
Associate Professor; PhD, Yale University

Young, Andrew P. (https://experts.colorado.edu/display/fisid_153434/)
Assistant Professor; PhD, University of California, Los Angeles

# Courses

**CMDP 1400 (4) Introduction to Critical Media Practices**
Prepares students for critical practices in contemporary media cultures in a global context. Explores the diversity of media practices, including narrative and non-narrative forms, emphasizing aesthetics and visual studies. In lectures and recitations students will explore video, sound, the internet and other multi-media platforms of expression.

**CMDP 2010 (3) Information, Media and Technology**
Surveys the intertwined histories of information, media, and technology production and use through exploration of a shared topic. Examines the political, social, economic, and cultural contexts that underlie the movement toward a digital society. Enhances students¿ abilities to do research, write for multiple audiences, and create publicly-facing digital projects.

**CMDP 2100 (3) Approaches to Historical Media Practices**
Investigate historical and cultural discourses in the formation of media practices. Examines practices such as performance media; cinematic media, media art, and their aesthetic alignment to cognate movements throughout history.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**CMDP 2500 (3) Media Practices I**
Working in design groups, students will explore the expressive potential of media through the production of short projects, discussions, readings, formal analysis, and critique. Provide a basic introduction to media practices as an extension of "visual thinking" and through approaches to storytelling, and hybrid media forms.
**Requisites:** Requires a prerequisite course of CMDP 1400 (minimum grade C-). Restricted to CMDI majors and minors and IUT On-Track students.

**CMDP 2510 (1-3) Critical Media Practices Workshop I**
Training in narrow topics of media practices.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires a prerequisite course of CMDP 2500 (minimum grade C-).

**CMDP 3050 (3) Research/Remix**
This Composition and Expression seminar develops information literacy practices: self-motivated, reflective discovery; critical source evaluation; and responsible, ethical knowledge creation. Encourages the seeking of multiple perspectives and diverse viewpoints through critically informed research, reflection, and creative work. Provides hands-on training in advanced searching, fact-checking, citation, and licensing. Enhances understanding of creators¿ rights and responsibilities. Formerly CMDP 3550.
**Requisites:** Restricted to CMDI majors with 57 or more credit hours.

**CMDP 3110 (3) Electronic Arts Survey**
Explores the development of electronic media art through screenings, readings, lectures and discussions.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 3150 (3) Sonic Histories**
Introduces students to the history and theory of sound, through aesthetic, conceptual, and technological, developments. This course explores the physicality of sound, what sound can do inside and outside the artistic sphere, investigate sounding and listening as cultural and social acts, and study major developments in radio, electronic music, sound art, science and technology studies, and sound studies.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 3210 (3) Immersive and Emergent Media Histories**
Introduces students to the histories and theories of virtual and augmented reality and associated technologies. Examines how interactive media have changed the classical dynamics of human communication, allowing multidirectional, non-linear and multimedia practices. In this course, students will study the various aesthetic, narrative, emotional and cultural elements of VR, AR, and other emergent media.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 3250 (3) Histories of Animation**
This course provides an overview of animation by exploring this form through conceptual, historical, cross-cultural, and technical histories.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**CMDP 3310 (3) Performance Media Cultures**
Reflect on the cultural construction of old and new performance media through the lens of emerging practices and contemporary discourse. From ancient theatre to cinema, interactive television to YouTube, and multi-media dance performances to computer games, this course explores how media shape, and are shaped by, various historical and contemporary audiences and contexts.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 3350 (3) Modes of Documentary Media History**
Introduces students to the variety of practices by examining their emergence, evolution and cultural impact in the global sphere. Students discover the major themes and genres in documentary work from photography, cinema, audio, hypermedia and the public debates they have engendered. Through lectures, screenings and research, develop critical perspectives on the international and transcultural dimensions of documentary media history.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 3400 (3) Media Aesthetics**
Builds students' ability to watch, reflect on, and write about media images. The course will be grounded in the analysis of media practices with special focus on media style and storytelling techniques. Explores media aesthetics from formal, cultural, and theoretical perspectives. Formerly CMDP 2400.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**CMDP 3450 (3) Critical Perspectives in Media Practices**
Examines the contemporary landscape of media practices across platforms, such as film, social media, painting, video, and web art. This integrative exploration focuses on production contexts, circulation and reception through the lens of critical and interpretive frameworks. Drawing from key texts by major scholars and the works of media practitioners, students develop globally informed, critical perspectives for understanding.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 3510 (1-3) Critical Media Practices Workshop II**
Training in narrow topics of media practices. Open to CMDI students and by permission of the instructor.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 3600 (3) Media Practices II**
Focus on developing an understanding of the principles, forms and aesthetics of media production. Working in design groups on small-scale media preproduction and production exercises, screenings and critiques, students learn creative solutions to problems in realizing expressive media projects. Formerly CMDP 2600.
**Requisites:** Requires prerequisite of CMDP 2500 (minimum grade C-). Restricted to CMDI majors and minors and IUT On-Track students.

**CMDP 3610 (3) Intro to Digital Image Making Practices**
Intro to Digital Image Making Practices provides students the technical skills for in depth exploration of the evolving principles and strategies of digital image making. Students will create small-scale projects with the primary emphasis on cinematographic experimentation and innovative visual techniques.
**Requisites:** Requires prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 3620 (3) Images and Stories**
Learn and apply innovative non-traditional approaches to scripting and storytelling, including automatic thinking, idea sketches, visual notes, outlines and storyboards, serials, aleatoric methods, diagrams, locations, photographs and short stories. Focuses on methods of exploring scripting methods outside of the fixed and rule-bound traditional model of storytelling as a means of introducing students to discover their own scripting techniques.
**Requisites:** Requires prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 3700 (3) Digital Photographic Practices**
Explores the creative possibilities of photography; students work on projects that combine concepts and techniques with contemporary practice and current modalities of exhibition and social distribution. Emphasis is placed on the student's personal growth through aesthetic and intellectual development in relation to current technologies. Formerly CMDP 3500.
**Requisites:** Requires prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 3710 (3) Audio/Vision 360**
Introduces techniques, software and related concepts of digital design and image making through individual and group projects. Emphasizes digital animation, digital audio, digital video and website design and development as a means to formal and expressive ends. Introduces students to critical readings and theories related to digital media practice.
**Requisites:** Requires prerequisite course of CMDP 3750 (minimum grade C-).

**CMDP 3720 (3) Multimedia Composition**
Combine writing with media such as video, music, animation and podcasting on the computer. Includes a unit on web-site design and ends with each student creating their own website and positing on it the project they created for the course.
**Requisites:** Requires prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 3730 (3) Media Production Methods and Ideas**
Explores creative approaches to idea formation, conceptualization, and organization for the moving image employing critical thinking, improvisation and visual storytelling techniques. Includes forms of creative writing, storytelling and preproduction techniques and strategies. Previously CMDP 2710.
**Requisites:** Requires prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 3750 (3) Intro to Immersive and Emergent Media**
This course serves at the gateway to the Immersive & Emergent Media concentration. Introduces concepts and practices associated with immersive & emergent media production. Emphasizes hands-on experience such as basic 3D modeling, the fundamentals of coding and interactivity, creating fully immersive extended reality experiences, and experimental applications of microcontrollers.
**Requisites:** Requires CMDP 3600 as either a prerequisite (minimum grade C-) or a corequisite; or MUSC 2081.

**CMDP 3800 (3) Documentary Media Poetics**
This course serves as the gateway to the Documentary Media concentration. Investigates documentary cinema and media practices through class discussions, research papers, hands on exercises and screenings. Cross-references documentary photography and moving-image documentary in the production of short digital projects. Explores the distinctive contributions of digital technologies to documentary image making.
**Requisites:** Requires CMDP 3600 as either a prerequisite (minimum grade C-) or a corequisite; or MUSC 2081.

**CMDP 3820 (3) Performance Media Practices**
Develop a performance vocabulary within the context of various media platforms. Through creating individual and collaborative performance projects, students will explore performance design issues such as movement, blocking and staging with projection, sensors, sound and other media tools.
**Requisites:** Requires a prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 3830 (3) Advanced Performance Media Workshop**
Study practical, technical and theoretical strategies of performing with and through media. This is an in-depth course that investigates a narrow scope drawn from topics that may include dance/movement, the illustrated lecture, projection environments, digital sensing, responsive lighting or acoustic strategies for performance.
**Requisites:** Requires prerequisite course of CMDP 3820 (minimum grade C-).

**CMDP 3840 (3) Sound Practices**
This course serves as the gateway to the Sound Practices concentration. Explores the aesthetics of sound through the study of sound art and sound culture. Reading and discussion covers theories technologies, and histories that drive the medium. Students apply concepts by designing and building their own soundscapes, Class will be organized around hands-on activities, lectures, and discussion of readings.
**Requisites:** Requires CMDP 3600 as either a prerequisite (minimum grade C-) or a corequisite; or MUSC 2081.

**CMDP 3860 (3) Sonic Arts I**
Surveys the various tools and techniques in the field of music technology. Topics include an introduction to basic synthesis, digital signal processing, MIDI and audio sequencing, music notation and a historical perspective on electronic music.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 2061 and MUEL 2061
**Requisites:** Requires prerequisite course of CMDP 3840 (minimum grade C-).

**CMDP 3880 (3) Hearing Image, Seeing Sound**
Explores how artists, filmmakers, composers, and others have forged connections between sound and image, and how we might learn from them to create our own meaningful creative work. Readings and screenings will dig deep into the geneologies of film sound, and students will create their own imaginative combinations of sound and image throughout the semester.
**Requisites:** Requires prerequisite course of CMDP 3840 (minimum grade C-).

**CMDP 3890 (3) Sound Art**
This studio course provides an overview of contemporary sound art and installation, facilitates the development of sonic artwork, and encourages a critical approach to sound and audio practice. How can sound, uniquely powerful in triggering memory and connecting us to the present moment, be used to engage with or challenge specific sites and histories? Class projects might include audio collages, audiovisual works, headphone tours, interactive installations, and public interventions.
**Requisites:** Requires prerequisite course of CMDP 3840 (minimum grade C-).

**CMDP 3910 (3) Media Production Topics**
Rotating topics in media production techniques.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires a prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 3990 (3) Media Professional Seminar**
Learn aspects of professional development in media production. Through workshops, class trips and assignments students will learn of the many opportunities found within media production.
**Requisites:** Requires a prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 4110 (3) Cultures of Digital Sound**
Introduces students to a variety of critical scholarship and debates about our sonic environment through an examination of how sound interfaces with different facets of media production. Consisting of listening, analyzing and differentiating sound in different contexts, students will deepen their understanding of the relationship between sight and sound in cultural production.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 4220 (3) Digital Archives in Media Practices**
Examine the theories and methods underpinning the use of archival materials in non-fiction media production while simultaneously exploring questions of ethics, truth and representation that the use and manipulation of archives raises. Through weekly lectures, seminars, readings and screenings, students will discover the theories and interpretive approaches to understanding the archive and its uses.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 4310 (3) Screen Culture and Globalization**
Examine the formation of screen cultures (narrative, experimental, documentaries and multi-media video art) in the context of the cultural globalization of the moving image. Through lectures, seminars and research projects students explore the formation and evolution of screen cultures on various platforms such as digital cinema, web environments, video art, multi-channel installations and the moving image on mobile interfaces.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 4320 (3) Media Engagement in Digital Diasporas**
Offers students critical and interpretive frameworks for understanding the cultural and historical significance of digital diasporas and these communities' use of digital technologies for communication, community building and the creation of digital documents about migration and connectivity with the homeland.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 4410 (3) Topics in Contemporary Media Technologies**
Focus on the development and application of media technologies in moving image aesthetics and emergent media practices. Topics rotate according to faculty expertise, but may include new imaging technologies for small screen and mobile devices, web-specific media or emerging modes of production. Through lectures, screenings and seminars, students explore the work of contemporary thinkers and practitioners in the field.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 4610 (3) Small Screen Storytelling**
Shoot footage on or for mobile screens including narratives, microdocumentaries, music videos, short stories and collaborative exquisite corpse projects. Students will complete work and distribute through various outlets on the internet.
**Requisites:** Requires a prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 4620 (3) Media Environments**
Explore the design and implementation of multimedia environments. Students will develop strategies for creating media exhibitions and/or performance environments with projection and sounds activated by sensors. This course is ideal for performers, dancers and media artists as well as those desiring to present information in novel ways, such as working with archival or non-fiction materials.
**Requisites:** Requires prerequisite course of CMDP 3820 (minimum grade C-).

**CMDP 4630 (3) Introduction to Computational Media**
Develop the technical and conceptual skills for computational media practices. Through individual and collaborative projects, students will explore the creative use of electronics and microcontrollers (including wearable and other embedded systems) through relevant programming environments. Introduces visual programming with a focus on signal processing for image and sound.
**Requisites:** Requires a prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 4640 (3) Multimedia Sound**
Learn what sound is and where it comes from; how to create, analyze, alter, mix, and record it digitally in the studio and in the field; and how it can interact creatively with other media. In addition to analyzing how professionals use sound, students will create five sound-based projects of their own.
**Requisites:** Requires prerequisite course of CMDP 3840 (minimum grade C-).

**CMDP 4650 (3) Collaborative Performance Media Making**
Explores the potential of collaborative performance media making through interdisciplinary, collaborative, media-for-live-performance production. Students create their own original performative works, reflect on both their own and their peers' works, and revise and revisit their creative work.
**Requisites:** Requires prerequisite course of CMDP 3820 (minimum grade C-).

**CMDP 4660 (3) Dance for Camera**
Explores the practices and techniques of moving-image production course with an emphasis on capturing human movement. The class develops skills in the areas of camera usage, digital editing, choreography, sound, and visual composition.
**Requisites:** Requires prerequisite course of CMDP 3820 (minimum grade C-).

**CMDP 4710 (3) Projection Practices**
Design and implement projection-based media projects and explore projection practice as a distinct field. Through individual and collaborative projects, this course explores projection for live events, installation, moving images and site-specific or community-based projects. Students will be introduced to emergent software and hardware for projection design.
**Requisites:** Requires a prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 4730 (3) Digital Art and Emergent Technologies**
Explores digital artistic practices across contexts and disciplines in various contexts. Emphasizes web and networked media as it applies to digital practices in sound, image, language, spatial and time-based arts.
**Requisites:** Requires a prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 4740 (3) Augmented Reality**
Builds on concept and principles learned in CMDP 3750. Introduces more advanced AR technologies and modes of production. Hands-on work allows students to apply theoretical knowledge by designing interactive digital experiences that blend the virtual and physical worlds. Examines ethical and societal implications of AR technology via critical practice and challenges students to evaluate its impact on privacy, accessibility, and cultural norms. Students work independently or in small teams on one semester-long AR project.
**Requisites:** Requires prerequisite course of CMDP 3750 (minimum grade C-).

**CMDP 4750 (3) Virtual Reality**
This course provides technical training in the arena of virtual reality (VR), as well as an in-depth perspective on the history of VR, its practical and artistic applications as well as its societal implications. Throughout the semester students also engage in discussions centered around best practices for immersive storytelling and user experience.
**Requisites:** Requires prerequisite course of CMDP 3750 (minimum grade C-).

**CMDP 4760 (3) Topics in Immersive and Emergent Media**
Apply individual and collaborative skills developed in previous coursework to rotating special topics in immersive & emergent media practices. In this production course, students will investigate and employ specific theories, methods, and techniques to create I+E works. Some topics may prioritize hands-on engagement with new tools and technologies. Areas of focus may include virtual reality, augmented reality, creative coding, AI, and others.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of CMDP 3750 (minimum grade C-).

**CMDP 4810 (3) Advanced Documentary Practices**
Combine research and production to produce short documentary media projects, which explore the world we live in. Focusing on practice, this course explores stylistic options employed on documentaries that give voice to different perspectives on the world. Students will be able to identify the tactics and strategies of documentaries in a variety of media, and will include visits with professional documentary makers. Students will complete a final documentary project.
**Requisites:** Requires prerequisite course of CMDP 3800 (minimum grade C-).

**CMDP 4830 (3) Topics in Documentary Media Practices**
Apply individual and collaborative skills developed in previous coursework to rotating special topics in advanced documentary media arts practice. In this production course, students will investigate and employ specific theories, methods, and techniques for making documentaries. Areas of focus may include documentary cinematography, producing, and postproduction or themes such as engaged documentary, ethnographic media, environmental documentary, social documentary, archival documentary, etc.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of CMDP 3800 (minimum grade C-).

**CMDP 4841 (1-6) Undergraduate Independent Study**
Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**CMDP 4860 (3) Sonic Arts II**
Learn strategies and techniques for generating and manipulating sound with computer-specific tools. Students' projects will include compositions, soundscapes, ambient environments and soundtracks for multimedia and performance projects.
**Requisites:** Requires prerequisite course of CMDP 3860 (minimum grade C-). Restricted to Department of Critical Media Practices (DCMP) undergraduate majors and minors only.

**CMDP 4865 (3) Multimedia Performance and Installation**
Multimedia Performance and Installation is a hands-on introduction to creating live multimedia performances, media art installations, and more. Students will learn to use visual software environments such as Max to patch sounds, data, images, and other media together in exciting ways. These ideas will be synthesized in ongoing workshops, group discussions, and weekly projects, culminating in the creation of a media installation or live performance. No programming knowledge is required, but basic audio skills are recommended.
**Requisites:** Requires prerequisite course of CMDP 3840 (minimum grade C-).
**Recommended:** Prerequisite CMDP 3860 Sonic Arts I (minimum grade C-).

**CMDP 4870 (3) Sound and Technology**
Exploration of issues, techniques and tools of music and sound technology. Topics vary and may include: interactive systems for performance; music and mobile media; electronic music instrument design; digital synthesis and signal processing; music in multimedia; sound practices and analysis. Lecture during work sessions will support student projects.
**Requisites:** Requires prerequisite course of CMDP 3840 or MUEL 2061 (minimum grade C-).

**CMDP 4880 (3) Topics in Sound Practices**
Apply skills developed in previous coursework to rotating special topics in advanced sound practices. In this production course, students will investigate and employ specific theories, methods, and techniques for making sonic arts projects, alone or in conjunction with other media. Areas of focus may include sound installation, electronic music, film sound, podcasting, radio, or other advanced topics.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of CMDP 3840 (minimum grade C-).

**CMDP 4900 (3) Media Practices Capstone**
This Media Production capstone course explores the application of new media technologies in depth and engages students in an ongoing dialogue about the cultural context of new media technologies and their own work. Students will produce a major media project that synthesizes methods of media making into modes of communication and expression. Students are encouraged to take this course during their final semester.
**Requisites:** Requires prerequisite course of CMDP 3600 (minimum grade C-) and a minimum of 95 credit hours. Restricted to Media Production (DCMP) majors (not minors).

**CMDP 4931 (1-6) Internship**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite of CMDP 3600 (minimum grade C-). Restricted to MDPD majors.

# Media Production - Bachelor of Arts (BA)

The BA program in Media Production educates future media artists and creators by developing their professional production skills in a constructive and collaborative environment. Students learn to engage creativity as a way of knowing and a means through which to communicate complex ideas. Critical Studies courses help majors develop critical perspectives that place media practices within a broad cultural and historical continuum of innovation. Studio classes enable exploration of a diverse range of production topics, offering hands-on experience with a variety of media tools. Concentrations enable students to specialize in a particular practice area – documentary media, immersive media or sound – or create a blend through the integrative media option.

## Program Tracks

### Documentary Media Practices

The documentary media concentration provides students with the foundation to engage with their communities and find their voices as nonfiction artists and media producers. This concentration focuses on hands-on instruction and encourages collaboration, introducing students to the theories, practices and technologies associated with contemporary documentary media production. Students will learn how to implement techniques in the field to produce creative documentary projects and to develop an ethically informed, critically aware practice that harnesses the power of documentary media to build a better world.

### Immersive Media Practices

We see the future of immersive storytelling as an active, connected, social and presence-inducing experience. The immersive media concentration is designed to introduce students to technologies and mediums of the future while providing a foundation for creative thinking,

considerate design, aesthetic sensitivity and engaging storytelling. This concentration introduces students to new learning experiences through instruction and hands-on experience with the technologies and techniques necessary for producing meaningful and engaging immersive content. Students will learn to question and intervene in the designed spaces of immersive media with the goal of bringing critical awareness to their cultural, social and political impacts and significance.

### Sound Practices

Students in this concentration learn the tools, techniques and technologies of sonic practices ranging from sound art to electronic music to podcast production. A focus on creating a practice of deep and critical listening and exposure to a diversity of sound practitioners challenges students to think creatively and conceptually about sound in order to broaden both their technological and conceptual understandings of sound and to enable them to engage constructively and creatively with sonic worlds.

### Integrative Media Practices

This option allows students to build their own concentration blending aspects of multiple practice areas. This focus teaches students to engage an audience through visual storytelling using a variety of media tools, techniques and technologies.

## Requirements

### General Requirements

The entry point to the Media Production major is CMDP 1400 Introduction to Critical Media Practices, a foundational course in theory and practice. Students must earn a grade of C- or above in CMDP 1400 to move forward in the program.

CMDP 1400 is the prerequisite for all subsequent critical studies courses, including two additional required courses: CMDP 2100 and CMDP 3400.

CMDP 1400 is also the prerequisite for the first required studio course: CMDP 2500. Immediately after completing CMDP 2500 (with a grade of C- or above), majors are required to take the second Studio core course: CMDP 3600. Both courses are restricted to CMDI majors and minors.

CMDP 3600 is a corequisite for concentration gateway courses (CMDP 3750, CMDP 3800 and CMDP 3840) and the prerequisite for all upper-division studio courses, including the capstone.

Majors should declare their concentration no later than the end of the semester in which they take CMDP 3600.

Concentrations consist of three upper-division studio courses and one critical studies course. The documentary media, immersive media and sound concentrations begin with a required “gateway” course, which serves as the prerequisite for advanced studio courses in the concentration area. Students in the documentary media and sound concentrations must take a designated critical studies course. Students in immersive media and integrative media have an open critical studies elective.

Majors conclude the program by taking CMDP 4900 Media Practices Capstone. The Capstone course is restricted to majors only and should be taken in a student’s final semester.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Studio** | | |
| CMDP 2500 | Media Practices I | 3 |
| CMDP 3600 | Media Practices II | 3 |
| CMDP 4900 | Media Practices Capstone | 3 |
| **Studio Elective Courses (Rotating Electives)** | | |
| Select 3 credit hours of studio elective coursework (in addition to concentration requirements) | | 3 |
| CMDP 2510 | Critical Media Practices Workshop I | |
| CMDP 2820 | | |
| CMDP 3510 | Critical Media Practices Workshop II | |
| CMDP 3610 | Intro to Digital Image Making Practices | |
| CMDP 3620 | Images and Stories | |
| CMDP 3700 | Digital Photographic Practices | |
| CMDP 3710 | Audio/Vision 360 | |
| CMDP 3720/ ENGL 3856/ ATLS 3519 | Multimedia Composition | |
| CMDP 3730 | Media Production Methods and Ideas | |
| CMDP 3750 | Intro to Immersive and Emergent Media | |
| CMDP 3800 | Documentary Media Poetics | |
| CMDP 3820 | Performance Media Practices | |
| CMDP 3830 | Advanced Performance Media Workshop | |
| CMDP 3840 | Sound Practices | |
| CMDP 3860/ MUEL 2061 | Sonic Arts I | |
| CMDP 3880 | Hearing Image, Seeing Sound | |
| CMDP 3890 | Sound Art | |
| CMDP 3910 | Media Production Topics | |
| CMDP 3990 | Media Professional Seminar | |
| CMDP 4610 | Small Screen Storytelling | |
| CMDP 4620 | Media Environments | |
| CMDP 4630 | Introduction to Computational Media | |
| CMDP 4640/ ENGL 4116/ ATLS 4519 | Multimedia Sound | |
| CMDP 4650 | Collaborative Performance Media Making | |
| CMDP 4660 | Dance for Camera | |
| CMDP 4710 | Projection Practices | |
| CMDP 4720 | | |
| CMDP 4730 | Digital Art and Emergent Technologies | |
| CMDP 4740 | Augmented Reality | |
| CMDP 4750 | Virtual Reality | |
| CMDP 4760 | Topics in Immersive and Emergent Media | |
| CMDP 4810 | Advanced Documentary Practices | |
| CMDP 4830 | Topics in Documentary Media Practices | |
| CMDP 4841 | Undergraduate Independent Study | |
| CMDP 4860 | Sonic Arts II | |
| CMDP 4865 | Multimedia Performance and Installation | |
| CMDP 4870/ MUEL 4121 | Sound and Technology | |
| CMDP 4880 | Topics in Sound Practices | |

| | | |
|---|---|---|
| CMDP 4931 | Internship | |
| **Required Media Production Critical Studies Courses** | | |
| CMDP 1400 | Introduction to Critical Media Practices | 4 |
| CMDP 2100 | Approaches to Historical Media Practices | 3 |
| CMDP 3400 | Media Aesthetics | 3 |
| **Concentration Courses** | | |
| Select a 12 credit hour concentration (see concentration descriptions) | | 12 |
| **Open Elective** | | |
| Select a 3 credit hour Open Elective (any CMDP Critical Studies or Studio Course beyond those required) | | 3 |
| **Total Credit Hours** | | **37** |

## Secondary Area of Study

In addition to coursework required for the major, all students in MDPD must complete a secondary area of study outside of MDPD. This secondary area of study can be met by any of the following: a minor, a second major within CMDI, a double degree or any credit-based certificate program of at least 12 credit hours.

## Concentration Areas

### Documentary Media Practices Concentration

In addition to completing basic major requirements, students complete an additional 9 credit hours of advanced studio coursework focusing on documentary storytelling and a concentration designated critical studies course.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Studio** | | |
| CMDP 3800 | Documentary Media Poetics (required gateway) | 3 |
| CMDP 4810 | Advanced Documentary Practices | 3 |
| **Concentration-Designated Studio Elective** | | |
| CMDP 4830 | Topics in Documentary Media Practices | 3 |
| **Concentration-Designated Critical Studies Course** | | |
| CMDP 3350 | Modes of Documentary Media History | 3 |

### Immersive Media Practices Concentration

In addition to completing basic major requirements, students complete an additional 9 credit hours of advanced studio coursework focusing on immersive media practices and complete a 3 credit hour critical studies elective of their choice.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Studio** | | |
| CMDP 3750 | Intro to Immersive and Emergent Media (required gateway) | 3 |
| **Concentration-Designated Studio Electives** | | |
| CMDP 3710 | Audio/Vision 360 | 3 |
| CMDP 4740 | Augmented Reality | 3 |
| CMDP 4750 | Virtual Reality | 3 |
| CMDP 4760 | Topics in Immersive and Emergent Media | 3 |
| **Concentration-Designated Critical Studies Course Options** | | |
| CMDP 2010 | Information, Media and Technology | |
| CMDP 3050 | Research/Remix | |
| CMDP 3110 | Electronic Arts Survey | |
| CMDP 3150 | Sonic Histories | |
| CMDP 3210 | Immersive and Emergent Media Histories | |
| CMDP 3250 | Histories of Animation | |
| CMDP 3310 | Performance Media Cultures | |
| CMDP 3350 | Modes of Documentary Media History | |
| CMDP 3450 | Critical Perspectives in Media Practices | |
| CMDP 4110 | Cultures of Digital Sound | |
| CMDP 4220 | Digital Archives in Media Practices | |
| CMDP 4310 | Screen Culture and Globalization | |
| CMDP 4320 | Media Engagement in Digital Diasporas | |
| CMDP 4410 | Topics in Contemporary Media Technologies | |

### Sound Practices Concentration

In addition to completing basic major requirements, students complete an additional 9 credit hours of advanced studio coursework focusing on music technology and a concentration designated critical studies course.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Studio** | | |
| CMDP 3840 | Sound Practices (required gateway) | 3 |
| **Concentration-Designated Studio Electives** | | |
| CMDP 3860 | Sonic Arts I | 3 |
| CMDP 3880 | Hearing Image, Seeing Sound | 3 |
| CMDP 3890 | Sound Art | 3 |
| CMDP 4640 | Multimedia Sound | 3 |
| CMDP 4860 | Sonic Arts II | 3 |
| CMDP 4865 | Multimedia Performance and Installation | 3 |
| CMDP 4870 | Sound and Technology | 3 |
| CMDP 4880 | Topics in Sound Practices | 3 |
| **Concentration-Designated Critical Studies Course** | | |
| CMDP 3150 | Sonic Histories | 3 |

### Integrative Media Concentration

Students follow the basic major requirements, but also select 9 credit hours of studio elective courses and an additional 3 credit hours of critical studies coursework.

| Code | Title | Credit Hours |
|---|---|---|
| **Concentration-Designated Studio Electives** | | **9** |
| CMDP 2510 | Critical Media Practices Workshop I | |
| CMDP 2820 | | |
| CMDP 3510 | Critical Media Practices Workshop II | |
| CMDP 3610 | Intro to Digital Image Making Practices | |
| CMDP 3620 | Images and Stories | |
| CMDP 3700 | Digital Photographic Practices | |
| CMDP 3710 | Audio/Vision 360 | |
| CMDP 3720 | Multimedia Composition | |
| CMDP 3730 | Media Production Methods and Ideas | |
| CMDP 3750 | Intro to Immersive and Emergent Media | |
| CMDP 3800 | Documentary Media Poetics | |

| | | |
|---|---|---|
| CMDP 3830 | Advanced Performance Media Workshop | |
| CMDP 3820 | Performance Media Practices | |
| CMDP 3840 | Sound Practices | |
| CMDP 3860 | Sonic Arts I | |
| CMDP 3880 | Hearing Image, Seeing Sound | |
| CMDP 3910 | Media Production Topics | |
| CMDP 4610 | Small Screen Storytelling | |
| CMDP 4620 | Media Environments | |
| CMDP 4630 | Introduction to Computational Media | |
| CMDP 4640 | Multimedia Sound | |
| CMDP 4650 | Collaborative Performance Media Making | |
| CMDP 4660 | Dance for Camera | |
| CMDP 4710 | Projection Practices | |
| CMDP 4720 | | |
| CMDP 4730 | Digital Art and Emergent Technologies | |
| CMDP 4750 | Virtual Reality | |
| CMDP 4760 | Topics in Immersive and Emergent Media | |
| CMDP 4810 | Advanced Documentary Practices | |
| CMDP 4841 | Undergraduate Independent Study | |
| CMDP 4860 | Sonic Arts II | |
| CMDP 4870 | Sound and Technology | |
| CMDP 4931 | Internship | |
| **Concentration-Designated Critical Studies Course Options** | | **3** |
| CMDP 2010 | Information, Media and Technology | |
| CMDP 3050 | Research/Remix | |
| CMDP 3110 | Electronic Arts Survey | |
| CMDP 3150 | Sonic Histories | |
| CMDP 3210 | Immersive and Emergent Media Histories | |
| CMDP 3250 | Histories of Animation | |
| CMDP 3310 | Performance Media Cultures | |
| CMDP 3350 | Modes of Documentary Media History | |
| CMDP 3450 | Critical Perspectives in Media Practices | |
| CMDP 4110 | Cultures of Digital Sound | |
| CMDP 4220 | Digital Archives in Media Practices | |
| CMDP 4310 | Screen Culture and Globalization | |
| CMDP 4320 | Media Engagement in Digital Diasporas | |
| CMDP 4410 | Topics in Contemporary Media Technologies | |

# Sample Four-Year Plans of Study

## Documentary Concentration

Students follow the basic major requirements and complete the 3 credit-hour Documentary Concentration Gateway course CMDP 3800, 6 credit hours of Documentary Concentration Studio courses, and 3 credit hours of Documentary Concentration-designated Critical Studies CMDP 3350.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| CMCI 1040: Foundational Concepts and Creativity in Media, Communication, and Information (4) or CMDI Core or Elective (3) | | 4 |
| CMDP 1400 | Introduction to Critical Media Practices | 4 |
| Quantitative Thinking | | 3 |
| Lower Division Writing | | 3 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| CMCI 1040: Foundational Concepts and Creativity in Media, Communication, and Information (4) or CMDI Core or Elective (3) | | 3 |
| CMDP 2100 | Approaches to Historical Media Practices | 3 |
| CMDP 2500 | Media Practices I | 3 |
| CMDI Core Computing | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| CMDP 3400 | Media Aesthetics | 3 |
| CMDP 3600 | Media Practices II | 3 |
| CMDI Core (Natural World) | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 3 |
| Secondary Area | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| (CMDP3800) Documentary Concentration Gateway | | 3 |
| (CMDP3350) Critical Studies Elective | | 3 |
| CMDI Core (Natural World w/Lab) | | 4 |
| CDCI Core or elective (P/S; H & A; Hist V; Div & Global) | | 3 |
| Secondary Area | | 3 |
| | **Credit Hours** | **16** |
| **Year Three** | | |
| **Fall Semester** | | |
| (CMDP4810) Documentary Concentration Required Studio | | 3 |
| CMDP Studio Elective | | 3 |
| CMDI Core or electives (P/S; H & A; Hist V; Div & Global) | | 7 |
| Secondary Area | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| (CMDP4830) Documentary Concentration Studio Elective | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 9 |
| Secondary Area | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| CMDP Studio Elective | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 6 |
| Secondary Area | | 6 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| CMDP 4900 | Media Practices Capstone | 3 |
| CMDI Core and elective (P/S; H & A; Hist V; Div & Global) | | 8 |
| Secondary Area | | 3 |
| | **Credit Hours** | **14** |
| | **Total Credit Hours** | **120** |

## Immersive Media Concentration

Students follow the basic major requirements and take 9 credit hours of CMDP coursework focusing on immersive media practices such as virtual and augmented reality. Students take CMDP 3750 Intro to Immersive and Emergent Media and 6 credit hours of concentration electives.

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| CMCI 1040: Foundational Concepts and Creativity in Media, Communication, and Information (4) or CMCI Core or Elective (3) | | 4 |
| CMDP 1400 | Introduction to Critical Media Practices | 4 |
| Quantitative Thinking | | 3 |
| Lower Division Writing | | 3 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| CMDP 2100 | Approaches to Historical Media Practices | 3 |
| CMDP 2500 | Media Practices I | 3 |
| CMCI 1040: Foundational Concepts and Creativity in Media, Communication, and Information (4) or CMCI Core or Elective (3) | | 3 |
| CMCI Core Computing | | 3 |
| CMCI Core or electives (P/S; H & A; Hist V; Div & Global) | | 3 |
| | **Credit Hours** | **15** |

**Year Two**

| **Fall Semester** | | |
|---|---|---|
| CMDP 3400 | Media Aesthetics | 3 |
| CMDP 3600 | Media Practices II | 3 |
| CMCI Core (Natural World) | | 3 |
| CMCI Core or elective (P/S; H & A; Hist V; Div & Global) | | 3 |
| Secondary Area | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| (CMDP3750) Immersive Concentration Gateway | | 3 |
| CMDP Critical Studies Elective | | 3 |
| CMCI Core (Natural World w/Lab) | | 4 |
| CMCI Core or elective (P/S; H & A; Hist V; Div & Global) | | 3 |
| Secondary Area | | 3 |
| | **Credit Hours** | **16** |

**Year Three**

| **Fall Semester** | | |
|---|---|---|
| CMDP Immersive Concentration Studio Elective | | 3 |
| CMDP Studio Elective | | 3 |
| CMCI Core or elective (P/S; H & A; Hist V; Div & Global) | | 7 |
| Secondary Area | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| CMDP Immersive Concentration Studio Elective | | 3 |
| CMCI Core or elective (P/S; H & A; Hist V; Div & Global) | | 9 |
| Secondary Area | | 3 |
| | **Credit Hours** | **15** |

**Year Four**

| **Fall Semester** | | |
|---|---|---|
| CMDP Studio Elective | | 3 |
| CMCI Core or elective (P/S; H & A; Hist V; Div & Global) | | 6 |
| Secondary Area | | 6 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| CMDP 4900 | Media Practices Capstone | 3 |
| CMCI Core or elective (P/S; H & A; Hist V; Div & Global) | | 8 |
| Secondary Area | | 3 |
| | **Credit Hours** | **14** |
| | **Total Credit Hours** | **120** |

## Sound Practices Concentration

Students follow the basic major requirements and complete the 3 credit hour Sound Concentration Gateway CMDP 3840, 6 credit hours of Sound Concentration Studio courses, and 3 credit hours of Sound-designated Critical Studies CMDP 3150.

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| CMCI 1040: Foundational Concepts and Creativity in Media, Communication, and Information (4) or CMDI Core or Elective (3) | | 4 |
| CMDP 1400 | Introduction to Critical Media Practices | 4 |
| Quantitative Thinking | | 3 |
| Lower Division Writing | | 3 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| CMDP 2100 | Approaches to Historical Media Practices | 3 |
| CMDP 2500 | Media Practices I | 3 |
| CMCI 1040: Foundational Concepts and Creativity in Media, Communication, and Information (4) or CMDI Core or Elective (3) | | 3 |
| CMDI Core Computing | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 3 |
| | **Credit Hours** | **15** |

**Year Two**

| **Fall Semester** | | |
|---|---|---|
| CMDP 3400 | Media Aesthetics | 3 |
| CMDP 3600 | Media Practices II | 3 |
| CMDI Core (Natural World) | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 3 |
| Secondary Area | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| (CMDP3840) Sound Concentration Gateway | | 3 |
| (CMDP3150) CMDP Critical Studies Elective | | 3 |
| CMDI Core (Natural World w/Lab) | | 4 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 3 |
| Secondary Area | | 3 |
| | **Credit Hours** | **16** |

| | | |
|---|---|---|
| **Year Three** | | |
| **Fall Semester** | | |
| CMDP Sound Practices Concentration Studio Elective | | 3 |
| CMDP Studio Elective | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 7 |
| Secondary Area | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| CMDP Sound Practices Concentration Studio Elective | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 9 |
| Secondary Area | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| CMDP Studio Elective | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 6 |
| Secondary Area | | 6 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| CMDP 4900 | Media Practices Capstone | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 8 |
| Secondary Area | | 3 |
| | **Credit Hours** | **14** |
| | **Total Credit Hours** | **120** |

## Integrative Media Practices Concentration

Students follow the basic major requirements and select an additional 9 credit hours of studio electives that are approved for their Integrative Media Practices Concentration individualized plan of study.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| CMCI 1040: Foundational Concepts and Creativity in Media, Communication, and Information (4) or CMDI Core or Elective (3) | | 4 |
| CMDP 1400 | Introduction to Critical Media Practices | 4 |
| Quantitative Thinking | | 3 |
| Lower Division Writing | | 3 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| CMDP 2100 | Approaches to Historical Media Practices | 3 |
| CMDP 2500 | Media Practices I | 3 |
| CMCI 1040: Foundational Concepts and Creativity in Media, Communication, and Information (4) or CMDI Elective (3) | | 3 |
| CMDI Core Computing | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| CMDP 3400 | Media Aesthetics | 3 |
| CMDP 3600 | Media Practices II | 3 |
| CMDI Core (Natural World) | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 3 |
| Secondary Area | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| CMDP Integetative Concentration Approved Studio Elective | | 3 |
| CMDP Critical Studies Elective | | 3 |
| CMDI Core (Natural World w/Lab) | | 4 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 3 |
| Secondary Area | | 3 |
| | **Credit Hours** | **16** |
| **Year Three** | | |
| **Fall Semester** | | |
| CMDP Integrative Concentration Approved Studio Elective | | 3 |
| CMDP Studio Elective | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 7 |
| Secondary Area | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| CMDP Integrative Concentration Approved Studio Elective | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 9 |
| Secondary Area | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| CMDP Studio Elective | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 6 |
| Secondary Area | | 6 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| CMDP 4900 | Media Practices Capstone | 3 |
| CMDI Core or electives (P/S; H & A; Hist V; Div & Global) | | 8 |
| Secondary Area | | 3 |
| | **Credit Hours** | **14** |
| | **Total Credit Hours** | **120** |

# Learning Outcomes

Upon completing the program, students will be able to:

- Understand and use the creative process as a way of knowing.
- Collaborate on the conception and production of innovative works.
- Critically engage media making as experience, inquiry and world-making.
- Understand the histories and theories of media art and how they shape and are shaped by society and culture.

# Media Production - Minor

The minor in media production is designed to give students majoring in any discipline foundational skills in media making, while also allowing students to pursue a range of elective courses in their particular areas of creative interest.

# Requirements

The minor consists of a total of 19 credit hours, with three required media production courses that combine theory with technical skill in order to prepare students for upper division study.

Students must complete all classes for the minor with a grade of C- or better and an overall GPA in the minor of 2.0.

Students may apply no more than six credit hours of transfer work, including three hours of upper-division credit.

## Required Courses and Semester Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **Required Foundation Courses** | | |
| CMDP 1400 | Introduction to Critical Media Practices | 4 |
| CMDP 2500 | Media Practices I | 3 |
| CMDP 3600 | Media Practices II | 3 |
| **Studio Electives** | | |
| Choose one upper-division studio course | | 3 |
| CMDP 3510 | Critical Media Practices Workshop II | |
| CMDP 3610 | Intro to Digital Image Making Practices | |
| CMDP 3620 | Images and Stories | |
| CMDP 3700 | Digital Photographic Practices | |
| CMDP 3710 | Audio/Vision 360 | |
| CMDP 3720 | Multimedia Composition | |
| CMDP 3730 | Media Production Methods and Ideas | |
| CMDP 3750 | Intro to Immersive and Emergent Media | |
| CMDP 3800 | Documentary Media Poetics | |
| CMDP 3820 | Performance Media Practices | |
| CMDP 3830 | Advanced Performance Media Workshop | |
| CMDP 3840 | Sound Practices | |
| CMDP 3860 | Sonic Arts I | |
| CMDP 3880 | Hearing Image, Seeing Sound | |
| CMDP 3890 | Sound Art | |
| CMDP 3910 | Media Production Topics | |
| CMDP 3990 | Media Professional Seminar | |
| CMDP 4610 | Small Screen Storytelling | |
| CMDP 4620 | Media Environments | |
| CMDP 4630 | Introduction to Computational Media | |
| CMDP 4640 | Multimedia Sound | |
| CMDP 4650 | Collaborative Performance Media Making | |
| CMDP 4660 | Dance for Camera | |
| CMDP 4710 | Projection Practices | |
| CMDP 4720 | | |
| CMDP 4730 | Digital Art and Emergent Technologies | |
| CMDP 4740 | Augmented Reality | |
| CMDP 4750 | Virtual Reality | |
| CMDP 4760 | Topics in Immersive and Emergent Media | |
| CMDP 4810 | Advanced Documentary Practices | |
| CMDP 4830 | Topics in Documentary Media Practices | |
| CMDP 4841 | Undergraduate Independent Study | |
| CMDP 4860 | Sonic Arts II | |
| CMDP 4870 | Sound and Technology | |
| CMDP 4865 | Multimedia Performance and Installation | |
| CMDP 4880 | Topics in Sound Practices | |
| **Open Electives** | | **6** |
| Choose any two addtional media production courses | | |
| **Total Credit Hours** | | **19** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Understand, and be able to use, the creative process as a way of knowing.
- Understand how to critically engage media making as experience, inquiry and world-making.

# Environmental Design

Built on strong traditions within the design fields, the Department in Environmental Design (ENVD) offers an integrative approach to education and research. The department offers the Bachelor of Environmental Design (BEnvD)—a four-year, preprofessional degree that prepares students for careers in design and graduate study in design fields. ENVD offers four majors: architecture, environmental products of design, landscape architecture and sustainable planning & urban design. With a diverse faculty committed to excellence in teaching, research, scholarship and creative and professional work, ENVD provides students with a range of learning opportunities. Course content ranges from environmental products and prefabricated building systems to open space issues, political systems and institutional arrangements.

Building on an underlying philosophy of environmental awareness, students in ENVD work within their majors to:

- Design solution-based approaches that blend technical, ecological, economic, social, cultural, aesthetic and ethical concerns.
- Employ evidence-based knowledge to help inform design and planning decisions.
- Participate in interdisciplinary dialogues that integrate core design disciplines with the sciences, humanities, arts and other professions.
- Obtain a disciplinary foundation that prepares students for careers in both traditional and emerging design fields.

Graduates from the Department in Environmental Design are uniquely qualified to confront significant environmental challenges. Becoming adept at complex problem solving, analytical thinking and leadership through coursework in theory, history, ecological impact, materials and methods and systems thinking. Students enroll in studios, lectures and seminars taught by faculty with both academic and professional expertise. Students employ state-of-the-art educational technology, including computing tools, fabrication equipment and advanced media.

Sharing in the varied resources of Boulder campus—from natural sciences, social sciences, humanities, arts and technology fields—ENVD offers an educational opportunity like no other. The cross-disciplinary collaborations with colleagues in affiliated CU programs enhance the curriculum and research within ENVD.

# Structure of the Undergraduate Curriculum

The Bachelor of Environmental Design curriculum is comprised of a shared core (lasting three semesters) followed by five semesters of coursework focused on one of four majors: architecture, environmental products of design, landscape architecture and sustainable planning and urban design.

The shared core provides an intensive and balanced introduction to the traditional professions contained within the broad field of environmental design. The core provides students the information and flexibility to hone their major area and career direction. Allowing opportunities for hands-on problem solving that features eight-week design studios as the primary teaching pedagogy. Anchored through a combination of lecture courses and studio instruction, the core curriculum builds upon studios where students solve design problems at four scales of the built environment: urban systems, landscapes, buildings and environmental products. Students may declare their major in architecture, environmental products of design, landscape architecture or sustainable planning and urban design at any time, and should no later than after completing the core program.

The major coursework in the final five semesters allows students to pursue in-depth projects and gain more specialized skills necessary for entering the design fields or further graduate study. Students can also pursue approved education abroad options as part of the curriculum as well. The final academic year culminates into capstone requirements for the chosen major.

# Educational Advantages of the BEnvD

The Department in Environmental Design provides a balanced introduction to environmental design. ENVD's emphasis on both the breadth and depth of design allows students to gain the appreciation, information, skills and experiences needed to make an informed decision about their career direction.

For the past 50 years, ENVD has retained a focus on studio instruction in small class sizes. From a student's first semester, they learn to work both in small groups and individually to solve design problems. By the end of a student's first year, the small classes and unique teaching style builds relationships with several faculty and a cohort of their peers.

ENVD's curriculum stresses both critical thinking and applied project work. Experiential learning is a core component of design education with students engaging in hands-on activities. Student satisfaction within higher education has been directly linked to teaching that incorporates projects where small student groups work together to solve real-world problems that they know are important.

ENVD pedagogy celebrates an interdisciplinary culture for both students and faculty. Mirroring emerging workplace trends in industry, students work within teams. Sometimes students work within multi-disciplinary teams where each profession shares its expertise and coordinates with others and sometimes within inter-disciplinary teams where the separate expertise is not as important as the ability to mutually and collaboratively define and solve a problem.

# Education Abroad

The Department in Environmental Design has, in partnership with the office of Education Abroad, developed an exciting selection of study abroad options. Studying abroad gives students an array of unique experiences, and it can often make students more competitive for employment and for graduate study. Summer programs and faculty-led programs (global seminars and global intensives) are available to students at various stages of their academic coursework. Full-semester programs are available to students starting in their third year. The study abroad program provides an academically challenging experience with extensive local support.

Education Abroad course offerings are open to students of all ENVD majors—architecture, environmental products of design, landscape architecture and sustainable planning and urban design. Students may pursue studio courses as well as electives. These courses offer students an opportunity to study in another culture and to examine their own perceptions and attitudes toward design. Environmental design programs, of varying lengths, are currently offered in Auckland, Berlin, Barcelona, Copenhagen, Dublin, Medellin, Rome, Sydney and Wellington.

Students can find out more about these options through the Ed Abroad ENVD major guide (https://abroad.colorado.edu/?FuseAction=Abroad.ViewDocument&File_ID=06057B7472713F72750D71760473051
The Office of Education Abroad offers additional programs with courses appropriate to design students. Programs outside of the pre-approved listing may be considered for approval. Please meet with an ENVD academic advisor for details.

For more information about the study abroad programs, contact Education (https://abroad.colorado.edu/) Abroad (located in C4C S355). Advisors available via walk-in or appointment.

# Dual Degrees, Minors & Certificates

## Dual Degrees

In addition to the BEnvD degree, students may pursue a dual degree at CU Boulder. Students may receive the BEnvD degree concurrently with undergraduate degrees in any CU Boulder college. Typically, specific course requirements do not change in either program of a dual degree. Additional credit hours (varying by college) may be required.

All undergraduate students must complete the general education requirements and the requirements for their specific major within the Department in Environmental Design in addition to the other degree requirements. Students considering a dual degree are encouraged to speak with advisors in both units to determine requirements and procedures for application.

## Certificates and Minors

Environmental design encourages students to expand their education opportunities and explore certificates and minors available on campus. Students interested in certificate options or minors offered at CU should contact their academic advisor to have a plan set in place prior to their junior year.

To filter through all the minors and certificates offered at CU Boulder, see the undergraduate Programs A-Z (https://catalog.colorado.edu/programs-a-z/#filter=filter_20&filter_21) section.

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Anderson, Brandon (https://experts.colorado.edu/individual/fisid_148082/)
Teaching Assistant Professor; MArch, Texas Tech University

Arias, Ernesto G.
Professor Emeritus

Arp, Jared (https://experts.colorado.edu/display/fisid_168314/)
Teaching Assistant Professor; BS, Metropolitan State University

Bacalzo, Dean (https://experts.colorado.edu/display/fisid_172805/)
Teaching Associate Professor; MSD, Arizona State University

Charlet, Caitlin (https://experts.colorado.edu/display/fisid_174564/)
Teaching Associate Professor; MArch, Parson's School of Constructed Environments

Chawla, Louise (https://experts.colorado.edu/display/fisid_143894/)
Professor Emerita; PhD, CUNY System Office

Crichlow, Gregory (https://experts.colorado.edu/display/fisid_142184/)
Teaching Professor; M. Arch., University of Illinois at Chicago

de Lange, Marcel (https://experts.colorado.edu/display/fisid_140404/)
Teaching Professor; MS, Delft University of Technology (Netherlands)

Ehly, Jeremy G. (https://experts.colorado.edu/display/fisid_149190/)
Teaching Associate Professor; MArch, Illinois Institute of Technology

Evers, Neal (https://experts.colorado.edu/display/fisid_157360/)
Associate Director, Teaching Associate Professor; MBA, University of Colorado Boulder

Fantalis, Maryanne (https://experts.colorado.edu/display/fisid_156467/)
Teaching Associate Professor; JD, Rutgers University

Felderman, Melissa (https://experts.colorado.edu/individual/fisid_163478/)
Teaching Associate Professor; MPS, New York University

Goldstein, Bruce (https://experts.colorado.edu/display/fisid_147755/)
Professor Emeritus; PhD, University of California, Berkeley

Greenwood, Emily (https://experts.colorado.edu/display/fisid_157375/)
Teaching Associate Professor; MLA, University of Colorado Denver

Grisales, Juan
Teaching Assistant Professor; MLA, Harvard University

Henao Cano, Valeria (https://experts.colorado.edu/display/fisid_173407/)
Teaching Assistant Professor; MURP, University of Colorado Denver

Hersey, John K. (https://experts.colorado.edu/display/fisid_170139/)
Teaching Assistant Professor; M.A., University of Massachusetts--Amherst; M.A., University of Maryland College Park Campus

Holbert, Marianne Bellino (https://experts.colorado.edu/display/fisid_146986/)
Teaching Professor; MArch, Washington University

Juhasz, Joseph
Professor Emeritus

Kamal, Azza (https://experts.colorado.edu/display/fisid_174957/)
Teaching Associate Professor; PhD, Cairo University (Egypt)

Krizek, Kevin J. (https://experts.colorado.edu/display/fisid_145292/)
Professor; PhD, University of Washington

Lee, Rachel (https://experts.colorado.edu/display/fisid_142183/)
Teaching Associate Professor; MArch, Tulane University

Lindberg, Case (https://experts.colorado.edu/display/fisid_154137/)
Teaching Professor; PhD, Stanford University

Mansour, Nesrine
Assistant Professor; PhD, Texas AM University

Paddack, Martin
Teaching Associate Professor; MArch, The Catholic University of America

Massey, Susan
Teaching Associate Professor; MA, University of Michigan

Matson, Zannah (https://experts.colorado.edu/display/fisid_173968/)
Assistant Professor; MLA, Harvard Graduate School of Design

McCall, Raymond Jr.
Professor Emeritus

Muller, Brian H.F. (https://experts.colorado.edu/display/fisid_140230/)
Professor Emeritus; PhD, University of California-Berkeley

Polizzi, Jade Venus (https://experts.colorado.edu/display/fisid_140368/)
Teaching Professor; MArch, University of Colorado Denver

Roudbari, Shawhin (https://experts.colorado.edu/display/fisid_153645/)
Associate Professor; PhD, University of California, Berkeley

Rukamathu, Mark (https://experts.colorado.edu/display/fisid_174660/)
Teaching Associate Professor; MArch, Harvard Graduate School of Design

Sabinson, Elena (https://experts.colorado.edu/display/fisid_173948/)
Assistant Professor; PhD, Cornell University

Samper, Jota (https://experts.colorado.edu/display/fisid_157949/)
Associate Professor; PhD, MIT-DUSP

Sancar, Fahriye Hazer
Professor Emeritus

Schulte, Stacey (https://experts.colorado.edu/display/fisid_146819/)
Teaching Professor; MURP, University of Colorado Denver

Tabatabaie, Sara (https://experts.colorado.edu/display/fisid_164969/)
Teaching Assistant Professor; Ph.D., University of Colorado Boulder

Van Vliet, Willem K.T.
Professor Emeritus

Xu, Ping (https://experts.colorado.edu/display/fisid_101140/)
Professor; PhD, Harvard University

# Courses

**ARCH 2100 (6) Studio 1: Foundations of Architecture**
Provides a framework for students to learn the basic strategies and techniques of architectural design. This project-based studio focuses on concepts of medium-scale building design, site, and climate. Through multiple design exercises, students learn how these factors assist in shaping our buildings.
**Requisites:** Requires prerequisite course of ENVD 1120 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite ARCH 2115.
**Grading Basis:** Letter Grade

**ARCH 2115 (3) Architecture Materials and Methods**
Exposes students to the elements and processes used in constructing buildings. Through lectures, technical drawing, material research and exposure to practicing professionals, students build a foundation of knowledge necessary to approach the specification and design of materials and to foster a curiosity in the innovative frontiers of assembly, aesthetics and sustainable life-cycle considerations.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite ARCH 2100.
**Grading Basis:** Letter Grade

**ARCH 3100 (6) Studio 2: Intermediate Architecture**
Emphasizes the interaction of form, programmatic use, human behavior and context in creating structure. May include a client-based community engaged project, real world applications, and result in a physical product. Students work across analog and digital platforms to produce designs that provide solutions to contemporary challenges.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite course of ARCH 2100 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite ARCH 3114.
**Grading Basis:** Letter Grade

**ARCH 3114 (3) History and Theory of Architecture 1**
Focusing on buildings, surveys the built environment starting with some of the first structures built by humans and moving through time to the Industrial Revolution. The course focuses on the development of major styles, influential people, and the drivers of building form.
**Requisites:** Requires prerequisite course of ENVD 1024 (minimum grade C-) and restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) or Architectural Engineering (AREN) majors only with 57-180 credits (Junior or Senior).
**Recommended:** Corequisite ARCH 3100.
**Grading Basis:** Letter Grade

**ARCH 3214 (3) History and Theory of Architecture 2**
Picking up after the Industrial Revolution and continuing through to today¿s Contemporary Architecture, history is taught thematically to cover important structures, key figures, and movements that have shaped our modern world.
**Requisites:** Requires prerequisite course of ENVD 1024 (minimum grade C-) and restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) or Architectural Engineering (AREN) majors only with 57-180 credits (Junior or Senior).
**Recommended:** Prerequisite ARCH 3114 with a C- or better.
**Grading Basis:** Letter Grade

**ARCH 4100 (6) Studio 3: Capstone in Architecture**
Engages students in complex design challenges such as integrating building technology, structural systems, user experiences, and environmental sustainability. Students will focus on contemporary architectural issues within the profession and produce design proposals that address key topics such as climate-resilient, human-centric, and systematically responsive design solutions.
**Requisites:** Requires prerequisite course of ARCH 3100 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite ARCH 4115.
**Grading Basis:** Letter Grade

**ARCH 4115 (3) Architecture Building Technology**
Presents the fundamentals of building physics and climate science through experimentation and testing. Students learn the concepts related to structural and mechanical systems necessary for proper building function by first studying and then implementing the key systems through hypothetical building assignments. This class covers active and passive green building systems that are necessary when designing structures for an evolving climate.
**Requisites:** Requires prerequisite course of ARCH 2115 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 1001 (1) ENVD First-Year Seminar**
Transitions first-year ENVD students into college through the process of discovering their path to educational success. Provides opportunities to facilitate learning through peer support groups and curricular integration with the ENVD core classes.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Social Factors

**ENVD 1002 (2) Technology 1: Applications for Environmental Design**
Introduces technological competencies to support studio work including design representation and presentation. Students develop fundamental competencies in sketching, graphic design, file management and 3D modeling. Course is part of a co-requisite sequence: ENVD 1002, Technology 1: Applications for Environmental Design is a 16-week class that is taught alongside the following two 8-week studios. ENVD 1010, Studio 1: Introduction to Environmental Products of Design, taken the first half of the semester, followed by ENVD 1020, Studio 1: Introduction to Architecture, taken in the second half of the semester.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and to IUT On Track students.
**Grading Basis:** Letter Grade

**ENVD 1004 (3) Introduction to Environmental Design**
Introduces methods, principles and philosophies that guide environmental design. Explores ways of thinking about, and accomplishing, the act of design. Students contemplate the processes and motivations behind design decisions including discussions of environmental sustainability and social responsibility.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: History and Theory

**ENVD 1010 (3) Studio 1: Introduction to Environmental Products of Design**
Introduces students to concepts and techniques related to the design of products at a human scale. In an immersive project-based studio environment students develop the foundation of design communication and thinking through a series of hands-on projects with physical outcomes. Course is part of a co-requisite sequence: ENVD 1010, Studio 1: Introduction to Environmental Products of Design is taken the first 7-weeks of the semester, followed by ENVD 1020, Studio 1: Introduction to Architecture, taken in the second 7-weeks of the semester, along with ENVD 1002, Technology 1: Applications for Environmental Design, a 14-week class that is taught alongside the two 7-week studios.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and to IUT On Track students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: History and Theory

**ENVD 1012 (2) Technology 2: Visual Communications**
Explores the basic visual communication skills necessary for environmental design through image manipulation, vector and raster graphics, and composite renderings. Students will explore concepts in visual hierarchy, composition, and color theory to inform graphics within each environmental design major. Course is part of a co-requisite sequence: ENVD 1012, Technology 2: Visual Communications is a 16-week class that is taught alongside the following two 8-week studios. ENVD 1030, Studio 1: Introduction to Landscape Architecture, taken the first half of the semester, followed by ENVD 1040, Studio 1: Introduction to Sustainable Planning and Urban Design, taken in the second half of the semester.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and to IUT On Track students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 1020 (3) Studio 1: Introduction to Architecture**
Introduces students to strategies and techniques of architectural design and communication in a hands-on studio environment. Students explore architectural form-making and design opportunities through an iterative design process culminating with a small-scale architectural project that responds to environmental, contextual and programmatic needs. Course is part of a co-requisite sequence: ENVD 1020, Studio 1: Introduction to Architecture, an 7-week class which is taken in the second half of the first semester. ENVD 1010, Studio 1: Introduction to Environmental Products of Design, taken during the first 7-weeks of the semester, and ENVD 1002, Technology 1: Applications for Environmental Design is a 14-week class that is taught alongside the two 7-week studios.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and to IUT On Track students.
**Grading Basis:** Letter Grade

**ENVD 1022 (2) Technology 3: Intermediate Applications for Environmental Design**
Explores more advanced competencies in graphic design, diagramming, 3D modeling, and digital fabrication.
**Requisites:** Requires prerequisite course of ENVD 1012 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 1024 (3) History of the Built Environment**
Fosters an appreciation for the designed environment by exploring historical contexts that have shaped our built environment. Students gain insight into how design themes have emerged in response to significant historical movements. Covering a diverse range of topics, this course examines everything from small objects to iconic buildings, significant landscapes, gardens, and urban spaces. Through this exploration, students develop an understanding of how the built environment influences and reflects societal values throughout history.
**Requisites:** Requires prerequisite course of ENVD 1004 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and to IUT On Track students.
**Grading Basis:** Letter Grade

**ENVD 1030 (3) Studio 1: Introduction to Landscape Architecture**
Exposes students to concepts and strategies inherent to the practice of landscape architecture. Students design for biodiversity, climate resilience and human and beyond human physical and mental health within an urban context. Course is part of a co-requisite sequence: ENVD 1030, Studio 1: Introduction to Landscape Architecture, taken the first 8-weeks of the semester, followed by ENVD 1040, Studio 1: Introduction to Sustainable Planning and Urban Design, taken in the second 8-weeks of the semester, along with ENVD 1012, Technology 2: Visual Communications, a 16-week class that is taught alongside the two 8-week studios.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and to IUT On Track students.
**Grading Basis:** Letter Grade

**ENVD 1040 (3) Studio 1: Introduction to Sustainable Planning and Urban Design**
Explores concepts and strategies related to urban planning and design. Students collaboratively develop a design solution to a small-scale problem within an urban fabric using basic skills of analysis and design iteration. Course is part of a co-requisite sequence: ENVD 1040, Studio 1: Introduction to Sustainable Planning and Urban Design, an 8-week class which is taken in the second half of the first semester. ENVD 1030, Studio 1: Introduction to Landscape Architecture, taken during the first 8-weeks of the semester, and ENVD 1012, Technology 2: Visual Communications, a 16-week class that is taught alongside the two 8-week studios.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and to IUT On Track students.
**Grading Basis:** Letter Grade

**ENVD 1110 (3) Studio 2: Fundamentals of Environmental Design 1**
Explores the core principles shared across environmental design disciplines, including Architecture, Landscape Architecture, Environmental Product Design, and Sustainable Planning and Urban Design. Through a multidisciplinary studio approach, students engage in spatial problem-solving, sustainable design strategies, peer-to-peer collaboration, and design thinking. Hands-on projects challenge students to apply foundational tools and methods to real-world challenges, considering social, environmental, and cultural impacts in both built and natural environments.¿Course is part of a co-requisite sequence: ENVD 1110, Studio 2: Fundamentals of Environmental Design 1, taken the first 7-weeks of the semester, followed by ENVD 1120, Studio 2: Fundamentals of Design 2, taken in the second 7-weeks of the semester, along with ENVD 1022, Technology 3: Intermediate Applications for Environmental Design, a 14-week class that is taught alongside the two 7-week studios.
**Requisites:** Requires prerequisite courses of ENVD 1040 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 1120 (3) Studio 2: Fundamentals of Design 2**
Explores the core principles shared across environmental design disciplines, including Architecture, Landscape Architecture, Environmental Product Design, and Sustainable Planning and Urban Design. Through a multidisciplinary studio approach, students engage in spatial problem-solving, sustainable design strategies, peer-to-peer collaboration, and design thinking. Hands-on projects challenge students to apply foundational tools and methods to real-world challenges, considering social, environmental, and cultural impacts in both built and natural environments. The course is part of a co-requisite sequence: ENVD 1120, Studio 2: Fundamentals of Design 2, a 7-week class which is taken in the second half of the first semester. ENVD 1110, Studio 2: Fundamentals of Environmental Design 1, taken during the first 7-weeks of the semester, and ENVD 1022, Technology 3: Intermediate Applications for Environmental Design, a 14-week class that is taught alongside the two 7-week studios.
**Requisites:** Requires prerequisite courses of ENVD 1040 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 1130 (3) Studio 2: Fundamentals of Design 3**
Explores the core principles shared across environmental design disciplines, including Architecture, Landscape Architecture, Environmental Product Design, and Sustainable Planning and Urban Design. Through a multidisciplinary studio approach, students engage in spatial problem-solving, sustainable design strategies, peer-to-peer collaboration, and design thinking. Hands-on projects challenge students to apply foundational tools and methods to real-world challenges, considering social, environmental, and cultural impacts in both built and natural environments.
**Requisites:** Requires prerequisite courses of ENVD 1040 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 1140 (3) Studio 2: Fundamentals of Environmental Design 4**
Explores the core principles shared across environmental design disciplines, including Architecture, Landscape Architecture, Environmental Product Design, and Sustainable Planning and Urban Design. Through a multidisciplinary studio approach, students engage in spatial problem-solving, sustainable design strategies, peer-to-peer collaboration, and design thinking. Hands-on projects challenge students to apply foundational tools and methods to real-world challenges, considering social, environmental, and cultural impacts in both built and natural environments.¿
**Requisites:** Requires prerequisite course of ENVD 1040 (all minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 1150 (3) First Year Writing for Environmental Design**
Introduces students to the fundamentals of effective academic and professional communication within Environmental Design. Students develop strong written and oral communication skills and build knowledge of research techniques. Classroom activities and discussions challenge students to become critical and flexible thinkers.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 1976 (1) Colloquium - Exploring Careers, Research and Practice**
Develops an understanding of the breath of environmental design careers, research and practice, through a series of faculty and professional lectures.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 2001 (3) Human Behavior and Design**
Examines reciprocal relationships between people and the built and natural environments and the ways that human well-being is impacted by the built environment. Traces major issues and approaches in design research to understand how people are influenced by the environment and how they can create healthy, just, and livable places.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and to IUT On Track students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Social Factors

**ENVD 2003 (3) Ecological Systems in Design**
Introduces the essential principles and concepts of ecology as they relate to the design and understanding of the built environment. Students explore interactions between people and nature, the design of resilient ecological systems and ways that the built world is influenced by its environment.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Physical Factors

**ENVD 2011 (1-6) Special Topics: Social Factors in Environmental Design for non-majors**
Addresses variable topics in the relationship of human experience and behavior to the built environment.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to non-Environmental Design majors with 0-56 credits (Freshmen or Sophomores).

**ENVD 2012 (1-6) Special Topics: Computer Methods and Graphic Applications for non-majors**
Addresses variable topics in design communications, animation and environmental simulation, and computational methods of technical evaluation and optimization.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to non-Environmental Design majors with 0-56 credits (Freshmen or Sophomores).

**ENVD 2013 (1-6) Special Topics: Physical Factors in Environmental Design for non-majors**
Addresses variable topics in appropriate technology, public policy and natural hazards, organization of the designing and building process, and physical elements of urban development.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to non-Environmental Design majors (not ARCH, EPOD, LAND, PLAN or open option ENVD)with 0-56 credits (Freshmen or Sophomores).

**ENVD 2014 (1-6) Special Topics: Theory, History and Historiography of Environmental Design for non-majors**
Addresses variable topics in theory and criticism, history and historiography of environmental design.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to non-Environmental Design majors with 0-56 credits (Freshmen or Sophomores).

**ENVD 2015 (1-6) Special Topics: Technology and Practice for non-majors**
Addresses variable topics in the new technologies and issues of professional practice in the environmental design professions.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to non-Environmental Design majors with 0-56 credits (Freshmen or Sophomores).

**ENVD 2101 (3) Context of Design: Planning and Implementation**
Explores the regulatory and procedural context in which design decisions are made and implemented. Includes an examination of finance, policy, and development procedures necessary in bringing conceptual designs to life.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 2352 (1-6) Special Topics: Beginning Digital Applications**
Foundation level computing skills for design analytics and representation.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 3002 (3) Revit I: Introduction to Building Information Modeling (BIM)**
Introduces students to BIM modeling through the Revit platform. Fundamental skills will be taught to help students understand technical and practical aspects of this software to support academic projects and gain early exposure to expectations in professional practice.
**Requisites:** Requires prerequisite course of ENVD 1022 (minimum grade C-) and 30+ credits. Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 3003 (3) Site Planning**
Introduces the site planning process including: site analysis and its relationship to building program and site concept, and preparation of site plans. Emphasis is placed on the planning of the physical site through a thorough understanding of process, land use, site constraints and synthesis of ecological, functional and aesthetic considerations in the site planning process.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite ENVD 2130.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Physical Factors

**ENVD 3009 (1-6) Special Topics in Environmental Design**
Seminar or design lab on special issues in environmental design, including study abroad. Variable topic class.
**Repeatable:** Repeatable for up to 21.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 3011 (1-6) Special Topics: Social Factors in Environmental Design for non-majors and ENVD students**
Addresses variable topics in the relationship of human experience and behavior to the built environment.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) are required to take class for grade.

**ENVD 3012 (1-6) Special Topics: Computer Methods and Graphic Applications for non-majors and ENVD students**
Addresses variable topics in design communications, animation and environmental simulation, and computational methods of technical evaluation and optimization.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ENVD 3002 (minimum grade C-). Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) are required to take class for grade.

**ENVD 3014 (1-6) Special Topics: Theory, History and Historiography of ENVD for non-majors and ENVD students**
Addresses variable topics in theory and criticism, history and historiography of environmental design.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) are required to take class for grade.

**ENVD 3023 (1-6) Special Topics: Physical Factors in Environmental Design for non-majors and ENVD students**
Addresses variable topics in appropriate technology, public policy and natural hazards, organization of the designing and building process, and physical elements of urban development.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) are required to take class for grade.

**ENVD 3035 (1-6) Special Topics: Technology and Practice for non-majors and ENVD students**
Addresses variable topics in the new technologies and issues of professional practice in the environmental design professions.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) are required to take class for grade.

**ENVD 3052 (3) Digital Tools for LAND/PLAN**
Weave together digital tools used in the landscape architecture and sustainable planning professions. Emphasizing the exploration of design, 3D modeling, analysis, and how to use and present data. Tools covered include software for mapping, data analysis and 3D modeling.
**Requisites:** Requires prerequisite course of ENVD 1022 (minimum grade C-). Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD) and Environmental Planning Minor students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 3100 (6) ENVD Interdisciplinary Design Studio**
Explores a sequence of investigations that lead to the development of design concepts for critical evaluation and discussion. Students analyze intermediate to advanced design practices that are common to the disciplines of architecture, planning, urban design, landscape architecture, and product design through an interdisciplinary design project.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and Environmental Planning Minor students with 40+ credits and ENVD 2003 or ENVD 2001 prerequisites.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Studios

**ENVD 3102 (3) Revit II**
Provides students a learning and practice environment to deepen and expand their skills within the Revit software. The experiential nature of this software benefits from repetitive use and expansion of skills, which this course provides. More attention will be given to presentation techniques, family building and templates which support project advancement and production. This course may also integrate plug-ins and other software compatible within and alongside Revit.
**Requisites:** Requires prerequisite course of ENVD 3002 (minimum grade C-). Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 3150 (3) Professional Communication for Design Students**
Prepares students for the projects they will undertake as design professionals. Enriches students' awareness of writing as a life-long tool and communicates the importance of writing well, while emphasizing effective written and oral communication skills.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 3152 (3) ArcGIS: Geographic Information Systems (GIS)**
Focuses on construction and use of computer-based information systems to represent and manipulate geographic data. Emphasizes the recording, mapping, and transforming of data for analysis and use by environmental designers.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 3212 (3) Color Theory**
Develops visual awareness and technical knowledge while exploring the significance of color in the design world. Color plays a crucial psychological role, evoking emotions and influencing behavior, making it essential for designers to use color intentionally and thoughtfully. Through hands-on activities, we examine contemporary uses of color and patterns, learning how to achieve color harmony in design.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 3252 (3) RHINO: Intro to 3-D Modeling**
Teaches beginning to intermediate skills and design practices of 3D modeling using Rhino-Rhinoceros 3D software. Learn strategies around representing your design in 3D models and how to use these techniques.
**Requisites:** Requires prerequisite course of ENVD 1022 (minimum grade C-) and 30+ credits. Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 3314 (1-6) Special Topics: History of Design**
Provides a lecture exploring various topics of design history of the built environment. The focus of this course is directed to all majors.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) students with 27-180 credits (Sophomores, Juniors or Seniors).
**Grading Basis:** Letter Grade

**ENVD 3352 (1-6) Special Topics: Intermediate Digital Applications**
Intermediate level computing skills for design analytics and representation.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of ENVD 3252 or in progress. Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 3909 (1-6) Independent Study**
By special arrangement with instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 3919 (1-6) Teaching Assistant**
By special arrangement with instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Program in Environmental Design (ARPLU) students with 87 -180 credits (Seniors).
**Recommended:** Prerequisite three point zero GPA.
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 3929 (1) Peer Leadership and Mentorship and Transitioning Students**
Explores the student transition to university life and engage students in active leadership and mentoring capacity-building activities. Examines the role peers play in leading students through transitional development. Students will learn the theoretical basis for understanding student transition and develop their mentoring capacities as well as examine personal identity and values and its intersection with leadership and mentorship.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) students with 27-180 credits (Sophomores, Juniors or Seniors).
**Recommended:** 3.00 GPA.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 3939 (1-3) Exploratory Internship**
Offers professional experiences allowing students to discover a variety of design-related environments. In addition to the internship experience, students attend classroom sessions providing professional development exercises.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) students with 27-180 credits (Sophomores, Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 3972 (3) Advanced Writing in Environmental Design**
Prepares students for researching, planning, and writing a Senior Honors thesis and for professional life. Enriches students' awareness of writing as a life-long tool and communicates the importance of writing well. Emphasizes clear, persuasive, and effective written and oral communication skills. Projects explore the many ways in which writing is a powerful tool in the world of design.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) students with 57 credit hours and a cumulative GPA of 3.0 or higher.
**Grading Basis:** Letter Grade

**ENVD 4009 (1-6) Special Topics in Environmental Design**
Variable topic seminar or design lab on special issues in environmental design.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 4023 (3) Environmental Impact Assessment**
Provides a field-oriented seminar in current environmental impact controversies. Gives attention to history, theory, and application of impact analysis at state levels for designers, land-use planners, and others involved in resource decision making. By instructor consent, open to nonmajors on a space available basis.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Physical Factors

**ENVD 4052 (3) Portfolio Design: Graphic Communication for Designers**
Explores topics related to graphic design and visual communication aimed at constructing your professional identity. Topics include layout, composition, fonts, color theory, printing, publication and web-based presence. Comprehend the fundamentals of graphic design and their application in visual communication through the use of Adobe Creative Suite.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD), with 60+ credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 4055 (3) Professional Practice of Environmental Design**
Explores how projects are conceived, designed, documented, and built. Students will examine the complexities of the design and construction process, including industry standards, project delivery methods, and practice management. Emphasizing problem-solving and real-world applications, the course prepares students to navigate the challenges of translating ideas into built environments.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 4100 (3-6) Advanced Design Lab 1**
Design lab exploring new and emerging themes in design.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Studios

**ENVD 4112 (3) Advanced Graphics for Designers**
Illustrates techniques of graphics communication and presentation for environmental design, including advanced illustration and color studies.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 4122 (3) Digital Photo for Designers**
Explores digital photographic workflow from capture to exhibition. Students gain the ability to document their projects and utilize photography as a means of creative expression. Topics include: using DSLRs, Adobe Lightroom, retouching with Adobe Photoshop, time-lapse photography, Adobe Premier, professional printing, landscape and architectural photography, sharing work through blogs and social media, and submitting work for publication and exhibition.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 4152 (3) Digital Design and Fabrication**
Teaches beginning to intermediate concepts, strategies, and techniques in digital design and fabrication. Students will use 3D modeling (Rhino) and parametric plugins (Grasshopper) to investigate new ways of making using 3D printing, CNC machining, laser cutting and other processes.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 4252 (3) Advanced Digital Design and Fabrication**
Teaches intermediate to advanced concepts, strategies, technologies and joinery around ways to make objects and systems using computer software, analytical software and machines such as 3d printers, laser cutters, CNC machines and robot arms, etc. Explores more personal driven object typologies around furniture, building skins and small structures/folies tailored around performance and optimizations around materiality, manufacturing tolerances, embodied energies and sustainability.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD) and Environmental Planning Minor students.
**Grading Basis:** Letter Grade

**ENVD 4311 (3) Housing Policies and Practices**
Provides students with a descriptive knowledge and analytical understanding of the use and development of residential settings in global and political economies of high-, low-, and middle-income countries.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Social Factors

**ENVD 4322 (1-6) Special Topics: Graphics**
Provides an advanced seminar on special issues in design communications.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 4352 (1-6) Special Topics: Computer Methods**
Topics include animation and environmental simulation, computational methods of technical evaluation and optimization, and computational mapping and analysis.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 4361 (1-6) Special Topics: Social Factors in Design**
Addresses variable topics in the relationship of human experience and behavior to the built environment, e.g., social research methods in environmental design.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Social Factors

**ENVD 4363 (1-6) Special Topics: Physical Factors in Environmental Design**
Includes such topics as appropriate technology, public policy and natural hazards, organization of the designing and building process, and physical elements of urban development.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Physical Factors

**ENVD 4364 (1-6) Special Topics: History and Historiography of Environmental Design**
Provides an advanced seminar on history and historiography of environmental design, e.g., American dwellings.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: History and Theory

**ENVD 4365 (1-6) Special Topics: Technology and Practice**
Provides an advanced seminar on new technologies and issues of professional practice in the environmental design professions.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Technology and Practice

**ENVD 4420 (3) Senior Capstone Seminar**
Focuses on theoretical concerns and practical issues inherent in environmental design and planning. Views concerns and issues in terms of setting, processes, and planning and design outcomes. Provides a critical synthesis of the inherently interdisciplinary nature of planning and design education.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Studios

**ENVD 4764 (1-6) Special Topics: Theory and Criticism in Environmental Design**
Provides an advanced seminar on theory and criticism in environmental design.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: History and Theory

**ENVD 4909 (1-6) Independent Study**
By special arrangement with instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite Students should have a minimum three point zero GPA.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 4919 (1-6) Teaching Assistant**
By special arrangement with instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Prerequisite 3.00 GPA.
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 4929 (1-6) Research Assistant**
By special arrangement with instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Prerequisite Students should have a minimum three point zero GPA.
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 4939 (3) Professional Design Internship**
Students develop design and professional skills outside of the curriculum while working for an organization in the field of Environmental Design. Students also attend classroom sessions providing professional development exercises.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite Students should have a minimum three point zero GPA.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 4972 (1-3) Honors Research Methods and Thesis Preparation**
Prepares students for undertaking a research based honors thesis project in Environmental Design. Students engage with existing literature in the field to understand how research and design projects are conducted, and how their contribution fits within a long tradition of scholarship.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 4979 (1-3) Honors Thesis**
Working with an advisor, students prepare, complete, and defend a research-based honors thesis project, in an area of Environmental Design.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**EPOD 2004 (3) History and Theory of Environmental Products of Design**
Explores the chronology of product design and how it has shaped our engagement with the everyday context. The course will explore impactful precedents and the design thoughts behind them. Surveys advances in production and material technologies that have propelled key product designs from regional exclusivity to global access. Investigate product design¿s influence on cultural adaptations. Class discussions will give space to think critically about product design intent and perceived successes.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite EPOD 2100.
**Grading Basis:** Letter Grade

**EPOD 2100 (6) Studio 1: Foundations of Environmental Products of Design**
Project-based studio in which students focus on the design of products at a human scale with an emphasis on visualization, both graphic and 3D modeling, digital fabrication file production, and translation to physical form to design and build solutions for real users.
**Requisites:** Requires prerequisite course of ENVD 1120 (minimum grade C-). Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite EPOD 2004.
**Grading Basis:** Letter Grade

**EPOD 3100 (6) Studio 2: Intermediate Environmental Products of Design**
Introduces students to emerging technologies and techniques in digital fabrication and design through a project-based studio environment. Students will be asked to develop design solutions that benefit humanity through material investigations, cradle-to-cradle methodology, and more advanced methods in design optimization.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite course of EPOD 2100 (minimum grade C-). Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite EPOD 3101.
**Grading Basis:** Letter Grade

**EPOD 3101 (3) Theory and Ethics in Design**
Engages with key theories and provocative ideas at the intersection of design, sustainability, and ethics. Students will explore contemporary challenges designers face, critically analyzing readings and discussions to develop their own principled foundations. The course emphasizes the ethical impact of design outcomes on society, the environment, and individuals. By the end, students will articulate personal values and ethical guidelines, gaining tools to address complex moral issues in their future design work.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite EPOD 3100.
**Grading Basis:** Letter Grade

**EPOD 3105 (3) Human Centered Design and Entrepreneurship Strategies**
Exposes students to innovation and entrepreneurial practices around the topic of Environmental Products of Design through human/user centered design strategies.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**EPOD 4100 (6) Studio 3: Capstone in Environmental Products of Design**
Draws on design research processes such as design thinking, human-centered design, and speculative/critical design to create a comprehensive proposal. In this capstone experience, students identify a specific need, opportunity, or problem and then develop a design solution that addresses the challenge. This proposal is brought to life through the creation of a full-scale physical prototype.
**Requisites:** Requires prerequisite courses of EPOD 3100 and 4115 (minimum grade C-). Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**EPOD 4115 (3) Materials and Manufacturing Processes in Product Design**
Explores the creation of products through an environmental lens as they relate to Material Science, Manufacturing Methods and Production Systems. Students have the opportunity to investigate innovative alternative materials and industry production approaches that improve upon pre-existing materials and paradigms; including sustainable materials, advanced production techniques at a variety of scales and a thorough understanding of the environmental cost incurred in the creation of products.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) students with 30-180 credits.
**Grading Basis:** Letter Grade

**LAND 2004 (3) History of Landscape Architecture**
Through an examination of distinct historical periods, this course explores the human narrative of reshaping nature through the practice of what is now Landscape Architecture. This course introduces major histories, theories, and sites guiding Landscape Architecture while questioning the Eurocentric perspective that has framed history¿s curation. Students will survey humanity¿s redesign of natural surroundings such as fields, groves, avenues, gardens, terraces, coastal restorations, riparian ecological systems, national parks, and urban greenways.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD), and Environmental Planning Minor students only.
**Recommended:** Corequisite LAND 2100.
**Grading Basis:** Letter Grade

**LAND 2100 (6) Studio 1: Foundations of Landscape Architecture**
Introduces essential landscape architecture skills through a project-based studio. Building on design literacy, students incorporate varied ecological processes, explore landscape as a medium for connecting the natural and cultural, develop analog and digital communication tools and focus on the importance of place-making.
**Requisites:** Requires prerequisite course of ENVD 1120 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD), students with 40+ credits.
**Recommended:** Corequisite LAND 2004.
**Grading Basis:** Letter Grade

**LAND 3003 (3) Site Planning, Materials, and Technologies**
Presents the fundamental skills in site planning and decision-making. Students will perform analysis, concept generation, and programming through biophysical and socio-economic parameters, while reflecting on the subjective experiences, and historical, cultural, and infrastructural factors influencing design. Additional emphasis on the practice of site grading, surveying methods and infrastructure detailing in the context of watersheds and landscape restoration. Students will gain insights into materiality and design technologies.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite LAND 3100.
**Grading Basis:** Letter Grade

**LAND 3100 (6) Studio 2: Intermediate Landscape Architecture**
Advances the understanding of the practice of landscape architecture. Focusing on concepts such as community engagement and client-based projects and covering topics such as health-focused spaces, ecological adaptability, green equity and gentrification. This studio builds on digital technologies, drawing, and graphic communication skills.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite course of LAND 2100 (minimum grade C-). Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**LAND 3103 (3) Ecological Planting Design**
Introduces species identification, planting design concepts, and design tools and methods. By framing the course in local ecological systems, the course eclipses the mere fundamentals of planting design resulting in students building a robust plant palette applicable to Colorado and the American West and the knowledge needed to deploy an ecologically responsive design intervention. Students are exposed to planting design methods of placemaking, embracing senescence, planting habitats, and designing for changing climates.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite LAND 3100.
**Grading Basis:** Letter Grade

**LAND 4100 (6) Capstone in Landscape Architecture**
Emphasizes individual project development and well-defined design concepts. Capstone experience introduces critical strategies, advanced design techniques, and representation skills to address pressing issues in landscape architecture.
**Requisites:** Requires prerequisite course of LAND 3100 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**LAND 4114 (3) Landscape Architecture Theory**
Students research and interrogate the boundaries of landscape architecture theory and practice. Analyzing the values and concepts that have shaped landscape architecture throughout its history into the present. The course further focuses on connecting central theories to lived experiences, studio practices and contemporary design that exemplifies these theoretical approaches.
**Requisites:** Requires prerequisite course of LAND 2004 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and Environmental Planning Minor students.
**Grading Basis:** Letter Grade

**PLAN 2004 (3) History and Theory of Sustainable Planning and Urban Design**
Surveys the key urban theories that shape sustainable planning and urban design. Covers the evolution of city form, policy approaches, history of planning, and evolution of sustainability and its approaches globally.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD), and Environmental Planning Minor students only.
**Recommended:** Corequisite PLAN 2100.
**Grading Basis:** Letter Grade

**PLAN 2100 (6) Studio 1: Foundations of Sustainable Planning and Urban Design**
Expands on introductory sustainable planning and urban design concepts and methods to address social and ecological challenges in communities. Exploration skills include spatial analysis, basic community engagement techniques, legal and regulatory framework, and policy alternatives. The resultant project addresses challenges at the intersection of social and environmental systems.
**Requisites:** Requires prerequisite course of ENVD 1120 (minimum grade C-). Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD), students with 40+ credits.
**Recommended:** Corequisite PLAN 2004.
**Grading Basis:** Letter Grade

**PLAN 3005 (3) Process and Practice**
Introduces the regulatory and legal structures surrounding sustainable planning, design, and development. Covers issues of environmental policy, property rights, zoning, and building codes and laws. Includes work on professional development in the field of planning and design.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**PLAN 3100 (6) Studio 2: Intermediate Sustainable Planning and Urban Design**
Utilizes intermediate-level planning concepts and practices to create solutions to specific challenges in a collaborative process. Through a sequence of planning, policy, and design investigations students explore issues such as equity, housing, transportation, community engagement and land use.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite course of PLAN 2100 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**PLAN 3102 (3) Strategies and Techniques for Sustainable Planning and Urban Design**
Explores analytical strategies and techniques in applied research and professional skills needed in sustainable planning and design. Includes quantitative and qualitative methods used by planners and designers to make informed decisions.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**PLAN 4100 (6) Capstone in Sustainable Planning and Urban Design**
Applies advanced concepts in comprehensive planning, plan-making, and plan implementation for communities. Capstone experience provides an opportunity for students to engage with real-world challenges, working closely with communities to address complex issues. The project integrates both qualitative and quantitative skills, focusing on solving social, environmental, and ecological problems while emphasizing sustainable, impactful planning solutions for community development and resilience.
**Requisites:** Requires prerequisite course of PLAN 3100 (minimum grade C-). Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and Environmental Planning Minor students.
**Grading Basis:** Letter Grade

**PLAN 4101 (3) Sustainable Futures Planning**
Surveys innovative ways that planners and designers are addressing the great social and ecological challenges of the present and future. Includes issues such as population growth and climate change.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

# Design Careers

## Preparing for a Professional Design Career

Environmental design prepares undergraduate students for entry directly into the design professions or to enter graduate study in the design professions. The BEnvD degree prepares students for study in master degree programs: Master of Architecture (MArch), Master of Landscape Architecture (MLA), Master of Urban Design (MUD), Master of Urban and Regional Planning (MURP), Master of Fine Arts (MFA) in design or Master of Industrial Design (MID).

It is common for Bachelor of Environmental Design graduates to receive advanced standing for the work they have completed, which allows them to complete a graduate degree at other design schools in a shorter time. Advanced standing for graduate study is evaluated on a case-by-case basis, according to the standards of each graduate program as demonstrated by and in accordance with a student's prior academic accomplishments in the application, portfolio and the transcript.

## Preparation for a Career in Architecture

A BEnvD prepares undergraduate students to practice as an architectural designer in the professional field or attend graduate study in architecture. A Bachelor in Environmental Design equates to other preprofessional architectural design degrees such as the Bachelor of Science or Bachelor of Arts in Architecture. In the United States, architecture licensure is granted by each state's regulatory agency. The National Architecture Accreditation Board (NAAB) recognizes a Master of Architecture (MArch), five-year Bachelor of Architecture (BArch), and Doctorate of Architecture (DArch) as accredited degrees that are then typically identified by state regulatory agencies as a traditional path to architecture licensure. Most regulatory agencies also recognize alternative paths to licensure that include non-accredited degrees like the Bachelor in Environmental Design, Bachelor of Science or Bachelor of Arts in Architecture. Colorado is one such state that has charted a licensure pathway for the BEnvD, specifically.

## Preparation for a Career in Sustainable Planning and Urban Design

A BEnvD prepares undergraduate students to enter the professional field as a designer or for graduate study in planning. The practice of planning

is currently not licensed in most states. Professional membership and certification are overseen by the American Planning Association (APA) and the American Institute of Certified Planners (AICP).

Although students interested in entry-level positions in planning may find the BEnvD degree sufficient, an advanced degree (MURP, PhD or other graduate planning focus) is often desirable. Students primarily interested in professional practice often obtain a graduate degree in urban planning, in urban and regional planning, in urban planning and community development or in urban design. Students interested in teaching or research in planning should complete a PhD.

### Preparation for a Career in Landscape Architecture

A BEnvD prepares undergraduate students to enter the professional field as a designer or for graduate study in landscape architecture. In the United States, licensing is overseen both at the state level and nationally by the Council of Landscape Architectural Registration Boards (CLARB). Accreditation of educational programs is voluntary. The Landscape Architectural Accreditation Board (LAAB) evaluates programs and provides an assessment.

Although students interested in entry-level positions in landscape architecture may find the BEnvD degree sufficient, an advanced degree (MLA, PhD or other graduate landscape architecture focus) is often desirable.

### Preparation for a Career in Environmental Products of Design

A BEnvD prepares undergraduate students to enter the professional field as a designer or for graduate study in industrial design, architecture, or other product design programs. The practice of product design does not require licensure in the United States, and professional membership is overseen by the Industrial Designers Society of America (IDSA). Degrees in the field are accredited by the National Association of Schools of Art and Design (NASAD).

Most students interested in working as a product designer will find the BEnvD degree sufficient; an advanced degree Master of Industrial Design (MID) may be desirable in relation to design management and is considered the terminal industrial design degree. Students with a BEnvD will find themselves prepared to work for a company, attend graduate school in a variety of disciplines or start their own businesses.

## Facilities and Design Centers

Facilities for the department are provided in the Environmental Design Building and at the Center for Innovation and Creativity (CINC) facility.

### Environmental Design Building

Located in the heart of campus, the ENVD building (http://www.colorado.edu/campusmap/map.html?bldg=ENVD) houses administrative and faculty offices, studio spaces, conference rooms, lecture rooms and exhibit spaces, as well as an academic research center, high-end computing lab classroom and an academic support center specializing in digital outcomes.

ENVD is a studio-based design program, where students participate in no less than 42 credits of lab setting instruction. Studio instructional spaces provide large open areas with individualized worktables available to students 24 hours a day during their course. Studios are located on the third floor and sublevel of the ENVD building.

### Digital Media Center

The Digital Media Center (https://www.colorado.edu/envd/facilities-centers/digital-media-center/) (DMC), an ENVD Academic Support Center housed in the ENVD Building, offers students digital imaging computer workstations, a printing and production lab with state-of-the-art large format printers for professional-style presentation boards, a photographic studio for portfolio creation and in-house 3D printing. The DMC also includes a 24-person active learning classroom where students can engage with imaging-based software and other programs or meet with the DMC Peer Tutors for one-on-one tutoring sessions. ENVD students can walk in to ask questions or use the flexible creative space to work on projects.

### Creative Lab Center (CLC)

The CLC is located in the university's Center for Innovation and Creativity (CINC), located on East campus. The CLC is an approximately 15,000 square-foot facility that houses makers spaces, classrooms, studio spaces, fabrication shops and a high-end computing lab.

The Creative Lab Center (https://www.colorado.edu/envd/facilities-labs/creative-labs-center/) provides students access to studio spaces along with specialized fabrication facilities where students learn technological design skills and fabricate components for their projects. In addition to teaching, learning, and assembly spaces, students have access to various design and fabrication resources at the CLC supported by a state-of-the-art wood lab, metal lab, laser cutting machines, 3D printers and CNC milling machines.

A mandatory basic safety orientation is conducted for all students before access to the shops is granted. This course offers an introduction to ENVD's safety policies as well as the proper use of personal safety equipment and safety practices with the fabrication equipment. Specific trainings are offered and some may be required within the individual labs depending on the need of the user.

The CLC also offers a virtual reality (VR) lab where students can test their designs and ideas in the digital world before building them. These labs enhance the ENVD curriculum by providing students with the technological resources for design visualization, scale modeling and full-scale prototyping, turning ideas into tangible objects.

## Living and Learning Communities

The Environmental Design (ENVD) Living Learning Community (LLC) is a unique community where students accepted into environmental design are housed together in Willard Hall and participate in First-Year Experience (FYE) programming. Students in the LLC create meaningful connections with their cohort, engage in social and academic events and gain the tools to continue their design education in confidence beyond the first year.

### People

The ENVD LLC is run by architecturally licensed teaching professors with the intention of supporting students both academically and socially as they journey through their first year of a design education. Additionally, a team of friendly and highly skilled upper-level mentors are matched with first year students to create peer-to-peer partnerships assisting students in navigating their first year.

### Location

Willard Hall is home to ENVD's Living Learning Community. Built in 1955, Willard Hall is a four-story dorm just south of Farrand Field on CU's

central campus. Willard Hall houses 450 students and the environmental design first-year class lives on the top floor.

## First-Year Experience Structure

Designed to engage all incoming students in establishing a formative connection to the profession while addressing skill variables, our First-Year Experience events target competencies that expose students to the design world. Programming includes field trips, social activities, site visits and hands-on experiences all aimed at building proficiencies in our first-year students.

## Analytics

- Environmental design student retention from year one to year two is ten percent higher than CU Boulder campus average.
- Four-minute walk from the Willard Residence Hall to the Environmental Design Building.
- Fifteen $500 first-year engagement scholarships awarded at the end of the academic year.
- Ten first-year mentors available for one-on-one mentoring alongside first-year activities.
- Over thirty events and activities throughout the year that explore design, target skills and make connections.

For more information, visit Living and Learning Communities (https://catalog.colorado.edu/undergraduate/colleges-schools/academic-enrichment-programs/undergraduate-residential-programs/#livingandlearningcommunitiestext).

# Departmental Policies & Requirements

The following Policies and Requirements are for students who entered the Department of Environmental Design in the academic year 2025-2026, or were previously ENVD students.

## Academic Excellence

### Recognition of Academic Achievement

Environmental design provides an atmosphere for study and creative investigation. ENVD holds academic rigor and quality in the highest esteem. In recognition of high academic achievement and professional attainment, the Department grants scholarly honors at graduation.

#### Thesis Honors in Environmental Design

Environmental design students may graduate with Latin Honors (summa cum laude, magna cum laude or cum laude). Students with a GPA of a 3.3 or above may apply and propose an honors thesis project to work on under the guidance of a primary faculty advisor. Students defend their thesis to a committee of faculty in their senior year.

Latin Honors candidates present work that is student initiated and student-directed well beyond the requirements for required class work. Department in Environmental Design Latin Honors projects fall into two major categories: research and design.

- Research projects present a heretofore-unanswered question then seek to answer it, relying on a variety of data or types of evidence. The product is a paper, which is determined by the topic in conversation with the faculty advisor.
- Design projects present a problem and propose a solution to that problem. The product is a design or object, presented with a critical introduction. Design theses go beyond designing a product, building, landscape, urban district or planning problem that responds to conventional programmatic assumptions, to propose a new response to a problem identified by the student. The scope of the project and the design presentation are determined in conversation with the faculty advisor.

#### Honors Distinction

Students achieving a grade point average of 3.50 to 3.749 (distinction) and 3.75 to 4.00 (high distinction) are recognized at commencement. Honors distinction is based on coursework completed at the University of Colorado. A minimum of 70 credit hours of coursework must be completed at CU to be eligible for honors distinction.

### Scholarships and Awards

A wide range of scholarships (https://www.colorado.edu/envd/current-students/environmental-design-scholarships/) and awards are available to environmental design (ENVD) students. The awards are sponsored by the department, the campus, the professions and other foundations and donors.

In addition to these scholarships, interested students may participate in faculty-student research projects funded by the Undergraduate Research Opportunities Program (UROP (http://www.colorado.edu/suep/about-urop/)), in other research opportunities provided by the campus or in cooperation with ENVD faculty.

## Academic Standards

### Student Rights and Responsibilities

Environmental design is part of an academic community whose mission requires an open learning and working environment for students, faculty, staff and administrators. An open learning and working environment values and protects individual dignity and the integrity of human relationships and is based upon mutual trust, freedom of inquiry, freedom of expression and the absence of intimidation and exploitation. Any infringement upon these freedoms and rights may cause review by ENVD and/or by other university offices for retention in the Department. Students are subject to the policies and procedures governing student rights and responsibilities. See the campus-wide Student Conduct & Colorado Creed (p. 61) section.

### GPA Requirements and Academic Standing

Good academic standing in ENVD requires a cumulative GPA of 2.00 or above in University of Colorado work. Students who fail to meet the minimum cumulative grade point requirement of 2.00 may apply to be permitted to continue their studies on a provisional basis.

### Withdrawal

Students in environmental design who withdraw from all their registered courses two semesters in a row will have a hold placed on their account prohibiting them from further registration except for registration in Summer Session classes, which are not counted in the regular academic year. Students will not be readmitted to CU Boulder before one full academic year has elapsed (not including the semesters of withdrawal).

### Attendance

Students are expected to subscribe to attendance and participation guidelines specified by instructors for individual courses in a manner that complies with university protocol. Given that a considerable portion of the ENVD curriculum is offered via studio courses, students are fully expected to comply with guidelines that may be different and more

onerous than traditional lecture or seminar courses (e.g., attending skill sessions, lectures, juries and presentations).

## Credit and Enrollment

### Requirements for Admission

#### High School Students

Candidates interested in admission into environmental design should see CU Admissions for specific requirements. Students applying to undergraduate programs are strongly encouraged to meet the following Higher Education Admission Recommendations (HEAR) when applying to any Colorado four-year public college or university. Students with enrollments prior to Summer 2023 will be held to the previous CU Boulder MAPS requirements. Students should consult the catalog of their first enrollment term for the MAPS requirements of the college, school or program in which they are earning their degree.

#### Transfer Students

Transfer students entering environmental design are admitted through CU Boulder's admission process directly into the Department. A college-level GPA of 3.0 or higher is required. Preference is given to students who have taken college-level courses in the areas of architecture, landscape architecture, planning, or product design. Completion of courses in related fields of social science, natural science, fine arts or humanities is also considered in admission review. All coursework except the last term, if in progress, must be completed and must be listed on the official transcript sent for admission consideration.

Students are encouraged to transfer as early as possible in their undergraduate career due to the required sequence of design courses in the first two years of the curriculum. While transfer students are admitted for the fall and spring terms each year, it is important to note that the core curriculum sequence begins in the fall semester with only limited opportunities to begin study out of sequence. Students who start the sequence in the spring semester will be required to complete summer classes in order to stay on track in the curriculum. All transfer students are required to take a minimum of 30 credit hours in the Department in Environmental Design.

A maximum of 60 credit hours taken at a two-year college may be applied toward the baccalaureate degree. In general, credit hours in vocational-technical courses are not accepted for transfer. Transfer agreements between the University of Colorado and all Colorado community colleges outline approximately one year of prescribed general education courses that may be completed as preparation for transfer into the Department in Environmental Design. As noted above, students should plan to transfer to the University of Colorado as soon as possible to start the sequential curriculum. See Transfer of College-Level Credit for admission standards for transfer.

#### Transfer Students from Other University Design Programs

Transfer students from other universities offering preprofessional or accredited professional degree programs in one of ENVD's majors who enter CU Boulder may apply for equivalency and advanced standing. A portfolio review will be required for these students, including work from each design course completed. For transfer credit to meet core degree requirements, a grade of B or better is required in the transferring class. For more information, visit the ENVD Transfer webpage.

#### Intra-University Transfer (IUT)

University of Colorado students in good standing who are interested in pursuing a degree in environmental design may apply for intra-university transfer into the department. Students should visit the Intra-University Transfer webpage for application requirements, informational tours and application deadlines for specific semesters.

ENVD has become increasingly competitive, and acceptance is not guaranteed. Due to limited space and a high volume of applications, a limited number of applicants will be admitted.

### Credit Policies

#### Incomplete Grades

ENVD accepts incomplete agreements between faculty and students who have satisfactorily completed a substantial amount of coursework but are unable to complete the course requirements due to extenuating circumstances. In all cases, students must present evidence of circumstances beyond their control that prevent them from completing the class. The student and faculty member must submit an Incomplete Agreement outlining the terms of the unfinished course requirements.

#### Independent Study

Students at 3000 or 4000 studio level and who hold at least a 3.00 GPA are permitted to register for Independent Study (ENVD 3909) or Independent Study (ENVD 4909) . Independent study credit is supervised by a faculty member and may not be used to substitute for any required core education or design studio courses.

Additional requirements may be established depending on the proposed topic. No more than 3 credit hours of independent study credit during one semester and no more than a total of 6 are given for the entire time the student is enrolled in ENVD, unless an exception is granted by the department.

A complete description of the scope of the independent work, a summary of how it will be carried out and a definition of the intended outcomes must be submitted to the supervising faculty member no later than five days after the official beginning of a semester. Approval of the description must be by the faculty member and by ENVD administration before permission is granted for enrollment in an independent study course. Students should make arrangements for the independent study course details during registration or well before the semester begins.

#### Other Credits

Credits for Teaching Assistant (ENVD 3919) , Research Assistant (ENVD 4929) , Professional Design Internship (ENVD 4939) , Exploratory Internship (ENVD 3939) and Independent Study (ENVD 3909) or Independent Study (ENVD 4909) are all guided by the same standards. Credits earned are subject to a 3 credit-hour limitation per course, Independent Study and Internships are graded while teaching assistantships and research assistantships are offered on a satisfactory/unsatisfactory (S/U) grading basis.

#### Pass/Fail Credits

A student may elect to take up to 6 credit hours toward the BEnvD degree on a pass/fail (P+/P/F) or satisfactory/unsatisfactory (S/U) grading basis but these credit hours must fall in the category of general electives and may not include coursework taught within the Department in Environmental Design. Courses within the Department in Environmental Design that are only offered as pass/fail are not subject to this policy.

#### ROTC Credit

Students matriculating into environmental design are eligible to participate in the ROTC programs on the Boulder campus.

Students interested in such programs should contact the professor in charge of the ROTC program of their choice (Air Force, Army, Navy) and also their ENVD academic advisor for information on residence and

curriculum requirements for graduation. No more than 8 credit hours of ROTC courses may be applied to the BEnvD degree.

### Transfer Credit

Credits transferred from other institutions are limited to the number of credit hours given for similar work in regular offerings at the University of Colorado and must meet the quality level expected at the University of Colorado Boulder. The faculty, in conjunction with the ENVD Undergraduate Education & Student Success unit, may make exceptions to this policy.

ENVD does not accept vocational/technical coursework in design, graphics or construction as meeting specific course requirements; nor does it consider such coursework as acceptable in fulfilling elective requirements. Only in exceptional circumstances may a student petition to request a transfer of such credits.

A grade of C- or better is required in any course for which credit is granted in transfer from another institution to the university. However, in order for transfer credit to meet specific core degree requirements, a grade of B or better is required in the transferring class. Grades earned in other institutions (excluding other campuses of the University of Colorado system) are not factored in the CU grade point average.

For more information on transfer credit policies, see the Transfer of College-Level Credit section.

### Residency Requirement

To graduate from the University of Colorado with a Bachelor of Environmental Design, all students must complete a minimum of 30 credit hours within the Department in Environmental Design as well as complete their last semester in residence as a full-time student.

### Academic Advising and Academic Coaching

Academic advising is an essential part of your undergraduate experience. Students enrolled in ENVD receive academic advising and coaching from professional staff in the ENVD Undergraduate Education and Student Success unit (https://www.colorado.edu/envd/current-students/academic-advising/) through both appointments and open drop-in office hours.

### New Student Welcome

Incoming first-year and transfer students are required to attend New Student Welcome programming during the summer prior to the start of the fall semester. Visit the New Student & Family Programs website to learn more.

All students are required to attend ENVD welcome sessions during New Student Welcome Week in August to receive an overview of educational opportunities and the philosophy of the Department, and to meet other new students and the ENVD faculty and staff. Students starting their educational career in the spring semester are required to attend ENVD welcome sessions during New Student Welcome Week in January to receive an overview of educational opportunities and the philosophy of the Department, and to meet other new students and the ENVD faculty and staff.

### Retention of Student Work

The Department in Environmental Design may retain student work submitted in fulfillment of class requirements. This retained work may be used to provide outside agencies with tangible evidence of performance, to serve as additional visual aid material in presentations to other students, and to contribute to possible educational exhibits and publications requested by the university community and the general public. The Department does not claim any copyright and intellectual ownership of the material but does retain rights to display student work for marketing and promotion, or for academic purposes.

Students are responsible for recording their work for future use in their portfolios. When the Department retains students' materials for displays or presentations, the Department will ensure that students have the opportunity to reclaim and record their work for portfolio use.

### Computing

Environmental design requires that all incoming undergraduate students have and use their own computers and software applications in their studies. Suggested computer specifications and standards are posted on the Office of Information Technology (OIT)'s Recommended Software and Hardware List webpage.

Neither the Boulder campus nor the Department in Environmental Design endorse nor require students to buy a computer from a particular manufacturer. The configurations suggested by OIT establish high performance requirements that can be found in many different computers. Specialized software requirements for different classes in the Department in Environmental Design appear on the syllabi for those classes, and that software is generally available at discounted student rates.

## Bachelor's Degrees

- Architecture - Bachelor of Environmental Design (BEnvD) (p. 737)
- Environmental Products of Design - Bachelor of Environmental Design (BEnvD) (p. 739)
- Landscape Architecture - Bachelor of Environmental Design (BEnvD) (p. 742)
- Sustainable Planning and Urban Design - Bachelor of Environmental Design (BEnvD) (p. 744)

## Minor

- Environmental Planning - Minor (p. 746)

# Architecture - Bachelor of Environmental Design (BEnvD)

The architecture major focuses on the design and development of the built environment. At ENVD, we encompass broad topics of sites, program, materiality, structural systems, modern technologies, human interconnectedness and social interaction. This major endeavors to teach our students to be responsible citizens and stewards of aesthetic, ethical, social, economic and environmental concerns.

## Required Courses and Credits

The curriculum for the Bachelor of Environmental Design (BEnvD) is subdivided into two parts:

1. The first part consists of a core lasting one-and-a-half years which provides a balanced introduction to each of the majors offered. By the end of the core studies, students select or confirm their intended major.

2. The second part is focused on a selected major. Studies lead to the degree Bachelor of Environmental Design (BEnvD) with a major in either environmental products of design, architecture, landscape

architecture and sustainable planning and urban design. Each area has specific requirements for completing the major.

## Credit Hours

Students must complete a minimum of 120 credit hours subject to the maximum outlined in this catalog, meet all specified university general education requirements, all major core requirements and maintain a GPA of 2.00 or better. Students must complete courses with a grade of C- or better to fulfill university and degree requirements.

Students in the Department in Environmental Design are required to complete coursework meeting General Education requirements; each major may have differing totals. Students who take approved CU Boulder coursework to fulfill their General Education requirements must take those courses for a letter grade and receive a grade of C- or higher. Students may not use thesis hours, independent study, internship or practicum courses to fill any of the General Education requirements. All courses approved to fulfill specific General Education requirements are identified as such in this catalog and are searchable in CU Boulder Class Search.

| Code | Title | Credit Hours |
|---|---|---|
| **Environmental Design core** | | **37** |
| Consists of a sequential core lasting one-and-a-half years which provides a balanced introduction to each of the majors offered. By the end of the core semesters, students select or confirm their intended major. | | |
| **Environmental Design major** | | **54** |
| The second part of the sequential Environmental Design core is focused on a selected major, which leads to the degree Bachelor of Environmental Design (BEnvD) with a major in either environmental products of design, architecture, landscape architecture, or sustainable planning and urban design. Each major has specific requirements and culminates into capstone requirements to complete the major. | | |
| **Environmental Design electives (9 credits)** | | |
| **General Education Requirements** | | |
| *Lower-Division Writing requirement* | | *3* |
| Choose one: | | |
| ARSC 1150 | Writing in Arts and Sciences | |
| ENVD 1150 | First Year Writing for Environmental Design | |
| ENVS 1150 | First-Year Writing in Energy, Environment and Sustainability | |
| WRTG 1100 | Extended First-Year Writing and Rhetoric | |
| WRTG 1150 | First-Year Writing and Rhetoric | |
| *Upper-Division Writing requirement* [1] | | *3* |
| *Lower-Division Social Science requirement* [2] | | *3* |
| *Lower-Division Arts & Humanities requirement* [3] | | *3* |
| *Upper-Division Art and Humanities or Social Science requirement* [4] | | *3* |
| *Math requirement* | | *3* |
| Meet with Academic Advisor to determine requirement for specific major. Choose one: | | |
| MATH 1150 & MATH 1151 | Precalculus Mathematics and Precalculus Supplemental Lab | |
| MATH 1300 | Calculus 1 | |
| MATH 2510 | Introduction to Statistics | |
| GEOG 3023 | Statistics and Geographic Data | |
| SOCY 2061 | Introduction to Social Statistics | |
| *Natural Science requirement* | | *3* |
| Meet with an Academic Advisor to determine requirements for specific major. Choose from the following: | | |
| PHYS 1110 | General Physics 1 | |
| PHYS 2010 | General Physics 1 | |
| EBIO 1210 & EBIO 1230 | General Biology 1 and General Biology Laboratory 1 | |
| EBIO 1220 & EBIO 1240 | General Biology 2 and General Biology Laboratory 2 | |
| EBIO 3590 | Plants and Society | |
| CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 | |
| GEOG 1001 | Our Changing Planet: Climate and Vegetation | |
| GEOG 1011 | Our Changing Planet: Landscapes and Water | |
| GEOL 1060 & GEOL 1030 | Global Change: An Earth Science Perspective and Introduction to Geology Laboratory 1 | |
| **Non-Environmental Design electives (6-9 credits) to meet 120 graduation credits.** | | **9** |
| **Total Credit Hours** | | **121** |

1. May be fulfilled by courses in Upper-Division Writing requirement list or ENVD 3150.
2. May be fulfilled by courses in Lower-Division Social Science requirement list.
3. May be fulfilled by courses in Lower-Division Arts & Humanities requirement list.
4. May be fulfilled by 3000/4000-level courses in Upper-Division Art and Humanities or Social Science requirement lists.

# Plan(s) of Study

## Sample Four-Year Plans of Study

The first three semesters of the BEnvD curriculum are the core curriculum, which is prerequisite for each of the majors: Environmental Products of Design, Architecture, Landscape Architecture, and Sustainable Planning and Urban Design. There are corequisite ENVD core courses each semester and the core courses are typically sequential from semester to semester.

### ENVD Core

| First Year Fall Semester | | Credit Hours |
|---|---|---|
| ENVD 1010 | Studio 1: Introduction to Environmental Products of Design | 3 |
| ENVD 1020 | Studio 1: Introduction to Architecture | 3 |
| ENVD 1002 | Technology 1: Applications for Environmental Design | 2 |
| ENVD 1004 | Introduction to Environmental Design | 3 |
| ENVD 1976 | Colloquium - Exploring Careers, Research and Practice | 1 |

| | | |
|---|---|---|
| Lower-Division Writing requirement (choose one: ARSC 1150, ENVD 1150, ENVS 1150, WRTG 1100 or WRTG 1150) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ENVD 1030 | Studio 1: Introduction to Landscape Architecture | 3 |
| ENVD 1040 | Studio 1: Introduction to Sustainable Planning and Urban Design | 3 |
| ENVD 1012 | Technology 2: Visual Communications | 2 |
| ENVD 1024 | History of the Built Environment | 3 |
| Lower-Division Arts & Humanities requirement [1] | | 3 |
| | **Credit Hours** | **14** |
| **Second Year** | | |
| **Fall Semester** | | |
| ENVD 1110 | Studio 2: Fundamentals of Environmental Design 1 | 3 |
| ENVD 1120 | Studio 2: Fundamentals of Design 2 | 3 |
| ENVD 1022 | Technology 3: Intermediate Applications for Environmental Design | 2 |
| ENVD 2003 | Ecological Systems in Design | 3 |
| ENVD 2101 | Context of Design: Planning and Implementation | 3 |
| Lower-Division Social Science requirement [2] | | 3 |
| | **Credit Hours** | **17** |
| | **Total Credit Hours** | **46** |

| **Second Year** | | |
|---|---|---|
| **Spring Semester** | | **Credit Hours** |
| ARCH 2100 | Studio 1: Foundations of Architecture | 6 |
| ARCH 2115 | Architecture Materials and Methods | 3 |
| ENVD 2001 | Human Behavior and Design | 3 |
| Math requirement (choose one: MATH 1150 & 1151 or MATH 1300) | | 5 |
| | **Credit Hours** | **17** |
| **Third Year** | | |
| **Fall Semester** | | |
| ARCH 3100 | Studio 2: Intermediate Architecture | 6 |
| ARCH 3114 | History and Theory of Architecture 1 | 3 |
| PHYS 2010 | General Physics 1 | 5 |
| Design Elective [5] | | 3 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| Professional development requirement (complete application for advisor approval) [4] | | 6 |
| ARCH 3214 | History and Theory of Architecture 2 | 3 |
| Upper-Division Writing or ENVD 3150 [2] | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Fourth Year** | | |
| **Fall Semester** | | |
| Elective Studio (choose one: ENVD 3100, ARCH 3100 or an approved Design study abroad) [6] | | 6 |
| ARCH 4115 | Architecture Building Technology | 3 |
| Upper-Division Art and Humanities or Social Science requirement [3] | | 3 |
| Design elective [5] | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ARCH 4100 | Studio 3: Capstone in Architecture | 6 |
| Design elective [5] | | 3 |
| Electives | | 6 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **79** |

2 Upper-Division Writing (p. 79) or ENVD 3150

4 Application (https://cuboulder.qualtrics.com/jfe/form/SV_3myQkpi3QMKLwqN/) for professional development requirement

5 Design Electives list

6 Students can enroll in an **additional** 3100 studio in their major to fulfill the elective studio requirement. Please meet with your advisor to address course options.

## Learning Outcomes

By the completion of the program, students will be able to:

- Use creative, critical and convergent thinking to address social and environmental issues, analyzing the need for and impact of design solutions by examining precedents, applying theoretical knowledge, conducting research and using problem-defining techniques.
- Develop conceptual or material solutions to socio-environmental issues through iterative design processes, synthesizing critical feedback and collaborative findings with peers and communities they engage with.
- Employ graphic, verbal, written, spatial and other communication strategies to organize, demonstrate and effectively argue for their design concepts and proposals.
- Apply principles of social and environmental justice in their work, prioritizing design stewardship and sustainability to ensure the health, safety and welfare of all project constituents.
- Demonstrate foundational technical skills and the ability to apply methodologies essential for entering academic and professional disciplines in environmental design.

# Environmental Products of Design - Bachelor of Environmental Design (BEnvD)

The Environmental Products of Design (EPOD) major creates design leaders prepared to take on challenges facing humanity and our environment(s) through the rigorous development of design solutions. Students will implement a critical and hands-on design process that leverages design thinking, ethical consideration and speculative design in conjunction with rapid prototyping, experimentation, fabrication techniques and product development. EPOD majors graduate with creative confidence and a diverse problem-solving skillset poised to make innovative solutions towards improving our human, natural and built environments.

# Required Courses and Credits

The curriculum for the Bachelor of Environmental Design (BEnvD) is subdivided into two parts:

1. The first part consists of a core lasting one-and-a-half years which provides a balanced introduction to each of the majors offered. By the end of the core studies, students select or confirm their intended major.
2. The second part is focused on a selected major. Studies lead to the degree Bachelor of Environmental Design (BEnvD) with a major in either environmental products of design, architecture, landscape architecture and sustainable planning and urban design. Each area has specific requirements for completing the major.

## Credit Hours

Students must complete a minimum of 120 credit hours subject to the maximum outlined in this catalog, meet all specified university general education requirements, all major core requirements and maintain a GPA of 2.00 or better. Students must complete courses with a grade of C- or better to fulfill university and degree requirements.

Students in the Department in Environmental Design are required to complete coursework meeting General Education requirements; each major may have differing totals. Students who take approved CU Boulder coursework to fulfill their General Education requirements must take those courses for a letter grade and receive a grade of C- or higher. Students may not use thesis hours, independent study, internship or practicum courses to fill any of the General Education requirements. All courses approved to fulfill specific General Education requirements are identified as such in this catalog and are searchable in CU Boulder Class Search.

| Code | Title | Credit Hours |
|---|---|---|
| **Environmental Design core** | | **37** |
| Consists of a sequential core lasting one-and-a-half years which provides a balanced introduction to each of the majors offered. By the end of the core semesters, students select or confirm their intended major. | | |
| **Environmental Design major** | | **54** |
| The second part of the sequential Environmental Design core is focused on a selected major, which leads to the degree Bachelor of Environmental Design (BEnvD) with a major in either environmental products of design, architecture, landscape architecture, or sustainable planning and urban design. Each major has specific requirements and culminates into capstone requirements to complete the major. | | |
| **Environmental Design electives (9 credits)** | | |
| **General Education Requirements** | | |
| *Lower-Division Writing requirement* | | *3* |
| Choose one: | | |
| ARSC 1150 | Writing in Arts and Sciences | |
| ENVD 1150 | First Year Writing for Environmental Design | |
| ENVS 1150 | First-Year Writing in Energy, Environment and Sustainability | |
| WRTG 1100 | Extended First-Year Writing and Rhetoric | |
| WRTG 1150 | First-Year Writing and Rhetoric | |
| *Upper-Division Writing requirement* [1] | | *3* |
| *Lower-Division Social Science requirement* [2] | | *3* |
| *Lower-Division Arts & Humanities requirement* [3] | | *3* |
| *Upper-Division Art and Humanities or Social Science requirement* [4] | | *3* |
| *Math requirement* | | *3* |
| Meet with Academic Advisor to determine requirement for specific major. Choose one: | | |
| MATH 1150 & MATH 1151 | Precalculus Mathematics and Precalculus Supplemental Lab | |
| MATH 1300 | Calculus 1 | |
| MATH 2510 | Introduction to Statistics | |
| GEOG 3023 | Statistics and Geographic Data | |
| SOCY 2061 | Introduction to Social Statistics | |
| *Natural Science requirement* | | *3* |
| Meet with an Academic Advisor to determine requirements for specific major. Choose from the following: | | |
| PHYS 1110 | General Physics 1 | |
| PHYS 2010 | General Physics 1 | |
| EBIO 1210 & EBIO 1230 | General Biology 1 and General Biology Laboratory 1 | |
| EBIO 1220 & EBIO 1240 | General Biology 2 and General Biology Laboratory 2 | |
| EBIO 3590 | Plants and Society | |
| CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 | |
| GEOG 1001 | Our Changing Planet: Climate and Vegetation | |
| GEOG 1011 | Our Changing Planet: Landscapes and Water | |
| GEOL 1060 & GEOL 1030 | Global Change: An Earth Science Perspective and Introduction to Geology Laboratory 1 | |
| **Non-Environmental Design electives (6-9 credits) to meet 120 graduation credits.** | | **9** |
| **Total Credit Hours** | | **121** |

1. May be fulfilled by courses in Upper-Division Writing requirement list or ENVD 3150.
2. May be fulfilled by courses in Lower-Division Social Science requirement list.
3. May be fulfilled by courses in Lower-Division Arts & Humanities requirement list.
4. May be fulfilled by 3000/4000-level courses in Upper-Division Art and Humanities or Social Science requirement lists.

# Sample Four-Year Plans of Study

The first three semesters of the BEnvD curriculum are the core curriculum, which is prerequisite for each of the majors: Environmental Products of Design, Architecture, Landscape Architecture, and Sustainable Planning and Urban Design. There are corequisite ENVD core courses each semester and the core courses are typically sequential from semester to semester.

## ENVD Core

**First Year**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| ENVD 1010 | Studio 1: Introduction to Environmental Products of Design | 3 |
| ENVD 1020 | Studio 1: Introduction to Architecture | 3 |
| ENVD 1002 | Technology 1: Applications for Environmental Design | 2 |
| ENVD 1004 | Introduction to Environmental Design | 3 |
| ENVD 1976 | Colloquium - Exploring Careers, Research and Practice | 1 |
| Lower-Division Writing requirement (choose one: ARSC 1150, ENVD 1150, ENVS 1150, WRTG 1100 or WRTG 1150) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ENVD 1030 | Studio 1: Introduction to Landscape Architecture | 3 |
| ENVD 1040 | Studio 1: Introduction to Sustainable Planning and Urban Design | 3 |
| ENVD 1012 | Technology 2: Visual Communications | 2 |
| ENVD 1024 | History of the Built Environment | 3 |
| Lower-Division Arts & Humanities requirement [1] | | 3 |
| | **Credit Hours** | **14** |

**Second Year**

| **Fall Semester** | | |
|---|---|---|
| | | |
| ENVD 1110 | Studio 2: Fundamentals of Environmental Design 1 | 3 |
| ENVD 1120 | Studio 2: Fundamentals of Design 2 | 3 |
| ENVD 1022 | Technology 3: Intermediate Applications for Environmental Design | 2 |
| ENVD 2003 | Ecological Systems in Design | 3 |
| ENVD 2101 | Context of Design: Planning and Implementation | 3 |
| Lower-Division Social Science requirement [2] | | 3 |
| | **Credit Hours** | **17** |
| | **Total Credit Hours** | **46** |

**Second Year**

| **Spring Semester** | | **Credit Hours** |
|---|---|---|
| EPOD 2100 | Studio 1: Foundations of Environmental Products of Design | 6 |
| EPOD 2004 | History and Theory of Environmental Products of Design | 3 |
| ENVD 2001 | Human Behavior and Design | 3 |
| Math requirement (choose one: MATH 1150 & 1151 or MATH 1300, MATH 2510, SOCY 2061) Meet with an Academic Advisor suggested | | 4 |
| | **Credit Hours** | **16** |

**Third Year**

| **Fall Semester** | | |
|---|---|---|
| EPOD 3100 | Studio 2: Intermediate Environmental Products of Design | 6 |
| EPOD 3101 | Theory and Ethics in Design | 3 |
| Natural Science requirement (choose one pair: PHYS 1110, PHYS 2010, EBIO 1210 & EBIO 1230, or CHEM 1113 & CHEM 1114) | | 4 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| Professional development requirement (complete application for advisor approval) [4] | | 6 |
| EPOD 3105 | Human Centered Design and Entrepreneurship Strategies | 3 |
| Upper-Division Writing requirement or ENVD 3150 [2] | | 3 |
| Design Elective [5] | | 3 |
| | **Credit Hours** | **15** |

**Fourth Year**

| **Fall Semester** | | |
|---|---|---|
| Elective Studio (choose one: ENVD 3100, EPOD 3100 or an approved Design study abroad) [6] | | 6 |
| EPOD 4115 | Materials and Manufacturing Processes in Product Design | 3 |
| Upper-Division Art and Humanities or Social Science requirement [3] | | 3 |
| Design Elective [5] | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| EPOD 4100 | Studio 3: Capstone in Environmental Products of Design | 6 |
| Design Electives [5] | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **12** |
| | **Total Credit Hours** | **74** |

2 Upper-Division Writing or ENVD 3150

3 Upper-Division Humanities (3000/4000-level courses); Upper-Division Social Science (3000/4000-level courses)

4 Application (https://cuboulder.qualtrics.com/jfe/form/SV_3myQkpi3QMKLwqN/) for professional development requirement

5 ENVD Elective list

6 Students can enroll in an additional 3100 studio in their major to fulfill the elective studio requirement. Please meet with your advisor to address course options.

# Learning Outcomes

By the completion of the program, students will be able to:

- Use creative, critical and convergent thinking to address social and environmental issues, analyzing the need for and impact of design solutions by examining precedents, applying theoretical knowledge, conducting research and using problem-defining techniques.
- Develop conceptual or material solutions to socio-environmental issues through iterative design processes, synthesizing critical feedback and collaborative findings with peers and communities they engage with.
- Employ graphic, verbal, written, spatial and other communication strategies to organize, demonstrate and effectively argue for their design concepts and proposals.

- Apply principles of social and environmental justice in their work. They will prioritize design stewardship and sustainability to ensure the health, safety and welfare of all project constituents.
- Demonstrate foundational technical skills and apply methodologies essential for entering academic and professional disciplines in environmental design.

# Landscape Architecture - Bachelor of Environmental Design (BEnvD)

The landscape architecture major teaches students to design environments in urban, rural and agricultural contexts at all scales. Students learn strategies to repair and strengthen ecological systems, create and restore habitats, manage storm water, express cultural values, and support human health and well-being. This major encourages students to explore the cultural value of landscapes, to redefine how landscape architects can transform the urban fabric, and to design resilient, climate-responsive projects.

## Required Courses and Credits

The curriculum for the Bachelor of Environmental Design (BEnvD) is subdivided into two parts:

1. The first part consists of a core lasting one-and-a-half years which provides a balanced introduction to each of the majors offered. By the end of the core studies, students select or confirm their intended major.

2. The second part is focused on a selected major. Studies lead to the degree Bachelor of Environmental Design (BEnvD) with a major in either environmental products of design, architecture, landscape architecture and sustainable planning and urban design. Each area has specific requirements for completing the major.

### Credit Hours

Students must complete a minimum of 120 credit hours subject to the maximum outlined in this catalog, meet all specified university general education requirements, all major core requirements and maintain a GPA of 2.00 or better. Students must complete courses with a grade of C- or better to fulfill university and degree requirements.

Students in the Department in Environmental Design are required to complete coursework meeting General Education requirements; each major may have differing totals. Students who take approved CU Boulder coursework to fulfill their General Education requirements must take those courses for a letter grade and receive a grade of C- or higher. Students may not use thesis hours, independent study, internship or practicum courses to fill any of the General Education requirements. All courses approved to fulfill specific General Education requirements are identified as such in this catalog and are searchable in CU Boulder Class Search.

| Code | Title | Credit Hours |
|---|---|---|
| **Environmental Design core** | | **37** |
| Consists of a sequential core lasting one-and-a-half years which provides a balanced introduction to each of the majors offered. By the end of the core semesters, students select or confirm their intended major. | | |
| **Environmental Design major** | | **54** |
| The second part of the sequential Environmental Design core is focused on a selected major, which leads to the degree Bachelor of Environmental Design (BEnvD) with a major in either environmental products of design, architecture, landscape architecture, or sustainable planning and urban design. Each major has specific requirements and culminates into capstone requirements to complete the major. | | |
| **Environmental Design electives (9 credits)** | | |
| **General Education Requirements** | | |
| *Lower-Division Writing requirement* | | *3* |
| Choose one: | | |
| ARSC 1150 | Writing in Arts and Sciences | |
| ENVD 1150 | First Year Writing for Environmental Design | |
| ENVS 1150 | First-Year Writing in Energy, Environment and Sustainability | |
| WRTG 1100 | Extended First-Year Writing and Rhetoric | |
| WRTG 1150 | First-Year Writing and Rhetoric | |
| *Upper-Division Writing requirement* [1] | | *3* |
| *Lower-Division Social Science requirement* [2] | | *3* |
| *Lower-Division Arts & Humanities requirement* [3] | | *3* |
| *Upper-Division Art and Humanities or Social Science requirement* [4] | | *3* |
| *Math requirement* | | *3* |
| Meet with Academic Advisor to determine requirement for specific major. Choose one: | | |
| MATH 1150 & MATH 1151 | Precalculus Mathematics and Precalculus Supplemental Lab | |
| MATH 1300 | Calculus 1 | |
| MATH 2510 | Introduction to Statistics | |
| GEOG 3023 | Statistics and Geographic Data | |
| SOCY 2061 | Introduction to Social Statistics | |
| *Natural Science requirement* | | *3* |
| Meet with an Academic Advisor to determine requirements for specific major. Choose from the following: | | |
| PHYS 1110 | General Physics 1 | |
| PHYS 2010 | General Physics 1 | |
| EBIO 1210 & EBIO 1230 | General Biology 1 and General Biology Laboratory 1 | |
| EBIO 1220 & EBIO 1240 | General Biology 2 and General Biology Laboratory 2 | |
| EBIO 3590 | Plants and Society | |
| CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 | |
| GEOG 1001 | Our Changing Planet: Climate and Vegetation | |
| GEOG 1011 | Our Changing Planet: Landscapes and Water | |
| GEOL 1060 & GEOL 1030 | Global Change: An Earth Science Perspective and Introduction to Geology Laboratory 1 | |
| **Non-Environmental Design electives (6-9 credits) to meet 120 graduation credits.** | | **9** |
| **Total Credit Hours** | | **121** |

1 May be fulfilled by courses in Upper-Division Writing requirement list or ENVD 3150.
2 May be fulfilled by courses in Lower-Division Social Science requirement list.
3 May be fulfilled by courses in Lower-Division Arts & Humanities requirement list.
4 May be fulfilled by 3000/4000-level courses in Upper-Division Art and Humanities or Social Science requirement lists.

# Sample Four-Year Plans of Study

The first three semesters of the BEnvD curriculum are the core curriculum, which is prerequisite for each of the majors: Environmental Products of Design, Architecture, Landscape Architecture, and Sustainable Planning and Urban Design. There are corequisite ENVD core courses each semester and the core courses are typically sequential from semester to semester.

## ENVD Core

**First Year**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| ENVD 1010 | Studio 1: Introduction to Environmental Products of Design | 3 |
| ENVD 1020 | Studio 1: Introduction to Architecture | 3 |
| ENVD 1002 | Technology 1: Applications for Environmental Design | 2 |
| ENVD 1004 | Introduction to Environmental Design | 3 |
| ENVD 1976 | Colloquium - Exploring Careers, Research and Practice | 1 |
| Lower-Division Writing requirement (choose one: ARSC 1150, ENVD 1150, ENVS 1150, WRTG 1100 or WRTG 1150) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ENVD 1030 | Studio 1: Introduction to Landscape Architecture | 3 |
| ENVD 1040 | Studio 1: Introduction to Sustainable Planning and Urban Design | 3 |
| ENVD 1012 | Technology 2: Visual Communications | 2 |
| ENVD 1024 | History of the Built Environment | 3 |
| Lower-Division Arts & Humanities requirement [1] | | 3 |
| | **Credit Hours** | **14** |

**Second Year**

| **Fall Semester** | | |
|---|---|---|
| | | |
| ENVD 1110 | Studio 2: Fundamentals of Environmental Design 1 | 3 |
| ENVD 1120 | Studio 2: Fundamentals of Design 2 | 3 |
| ENVD 1022 | Technology 3: Intermediate Applications for Environmental Design | 2 |
| ENVD 2003 | Ecological Systems in Design | 3 |
| ENVD 2101 | Context of Design: Planning and Implementation | 3 |
| Lower-Division Social Science requirement [2] | | 3 |
| | **Credit Hours** | **17** |
| | **Total Credit Hours** | **46** |

**Second Year**

| **Spring Semester** | | **Credit Hours** |
|---|---|---|
| LAND 2100 | Studio 1: Foundations of Landscape Architecture | 6 |
| LAND 2004 | History of Landscape Architecture | 3 |
| ENVD 2001 | Human Behavior and Design | 3 |
| MATH 1150 & 1151 or MATH 1300, MATH 2510, SOCY 2061) Meet with Academic Advisor suggested | | 3 |
| | **Credit Hours** | **15** |

**Third Year**

| **Fall Semester** | | |
|---|---|---|
| LAND 3100 | Studio 2: Intermediate Landscape Architecture | 6 |
| LAND 3003 | Site Planning, Materials, and Technologies | 3 |
| LAND 3103 | Ecological Planting Design | 3 |
| Natural Science requirement (choose one or one pair: ATOC 3600, CHEM 1011, CHEM 1113 & CHEM 1114, EBIO 1210 & EBIO 1230, EBIO 1220 & EBIO 1240, EBIO 3590, EBIO 4060, GEOG 1001, GEOG 1011, GEOL 1060, PHYS 1110 or PHYS 2010) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| Professional development requirement (complete application for advisor approval) [3] | | 6 |
| Upper-Division Writing or ENVD 3150 [1] | | 3 |
| Design Elective [4] | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |

**Fourth Year**

| **Fall Semester** | | |
|---|---|---|
| Elective Studio (choose one: ENVD 3100, LAND 3100 or an approved Design study abroad) [5] | | 6 |
| LAND 4114 | Landscape Architecture Theory | 3 |
| Upper-Division Arts & Humanities or Social Science [2] | | 3 |
| Design Elective [4] | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| LAND 4100 | Capstone in Landscape Architecture | 6 |
| Design Elective [4] | | 3 |
| Electives | | 6 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **75** |

1 Upper-Division Writing or ENVD 3150
2 Upper-Division Humanities (3000/4000-level courses); Upper-Division Social Science (3000/4000-level courses)
3 Application (https://cuboulder.qualtrics.com/jfe/form/SV_3myQkpi3QMKLwqN/) for professional development requirement
4 ENVD Elective List

[5] Students can enroll in an **additional** 3100 studio in their major to fulfill the elective studio requirement. Please meet with your advisor to address course options.

## Learning Outcomes

By the completion of the program, students will be able to:

- Use creative, critical and convergent thinking to address social and environmental issues, analyzing the need for and impact of design solutions by examining precedents, applying theoretical knowledge, conducting research and using problem-defining techniques.
- Develop conceptual or material solutions to socio-environmental issues through iterative design processes, synthesizing critical feedback and collaborative findings with peers and communities they engage with.
- Employ graphic, verbal, written, spatial and other communication strategies to organize, demonstrate and effectively argue for their design concepts and proposals.
- Apply principles of social and environmental justice in their work. They will prioritize design stewardship and sustainability to ensure the health, safety and welfare of all project constituents.
- Demonstrate foundational technical skills and apply methodologies essential for entering academic and professional disciplines in environmental design.

# Sustainable Planning and Urban Design - Bachelor of Environmental Design (BEnvD)

The sustainable planning and urban design major examines issues of sustainability and social justice in communities, cities and regions around the world. Heavily centered around community engagement, this major allows students to focus on a variety of topics, such as housing, environmental planning, transportation planning and urban design. Students examine these topics through a combination of design, policy and management perspectives.

## Required Courses and Credits

The curriculum for the Bachelor of Environmental Design (BEnvD) is subdivided into two parts:

1. The first part consists of a core lasting one-and-a-half years which provides a balanced introduction to each of the majors offered. By the end of the core studies, students select or confirm their intended major.

2. The second part is focused on a selected major. Studies lead to the degree Bachelor of Environmental Design (BEnvD) with a major in either environmental products of design, architecture, landscape architecture and sustainable planning and urban design. Each area has specific requirements for completing the major.

### Credit Hours

Students must complete a minimum of 120 credit hours subject to the maximum outlined in this catalog, meet all specified university general education requirements, all major core requirements and maintain a GPA of 2.00 or better. Students must complete courses with a grade of C- or better to fulfill university and degree requirements.

Students in the Department in Environmental Design are required to complete coursework meeting General Education requirements; each major may have differing totals. Students who take approved CU Boulder coursework to fulfill their General Education requirements must take those courses for a letter grade and receive a grade of C- or higher. Students may not use thesis hours, independent study, internship or practicum courses to fill any of the General Education requirements. All courses approved to fulfill specific General Education requirements are identified as such in this catalog and are searchable in CU Boulder Class Search.

| Code | Title | Credit Hours |
|---|---|---|
| **Environmental Design core** | | **37** |
| Consists of a sequential core lasting one-and-a-half years which provides a balanced introduction to each of the majors offered. By the end of the core semesters, students select or confirm their intended major. | | |
| **Environmental Design major** | | **54** |
| The second part of the sequential Environmental Design core is focused on a selected major, which leads to the degree Bachelor of Environmental Design (BEnvD) with a major in either environmental products of design, architecture, landscape architecture, or sustainable planning and urban design. Each major has specific requirements and culminates into capstone requirements to complete the major. | | |
| **Environmental Design electives (9 credits)** | | |
| **General Education Requirements** | | |
| *Lower-Division Writing requirement* | | *3* |
| Choose one: | | |
| ARSC 1150 | Writing in Arts and Sciences | |
| ENVD 1150 | First Year Writing for Environmental Design | |
| ENVS 1150 | First-Year Writing in Energy, Environment and Sustainability | |
| WRTG 1100 | Extended First-Year Writing and Rhetoric | |
| WRTG 1150 | First-Year Writing and Rhetoric | |
| *Upper-Division Writing requirement* [1] | | *3* |
| *Lower-Division Social Science requirement* [2] | | *3* |
| *Lower-Division Arts & Humanities requirement* [3] | | *3* |
| *Upper-Division Art and Humanities or Social Science requirement* [4] | | *3* |
| *Math requirement* | | *3* |
| Meet with Academic Advisor to determine requirement for specific major. Choose one: | | |
| MATH 1150 & MATH 1151 | Precalculus Mathematics and Precalculus Supplemental Lab | |
| MATH 1300 | Calculus 1 | |
| MATH 2510 | Introduction to Statistics | |
| GEOG 3023 | Statistics and Geographic Data | |
| SOCY 2061 | Introduction to Social Statistics | |
| *Natural Science requirement* | | *3* |
| Meet with an Academic Advisor to determine requirements for specific major. Choose from the following: | | |
| PHYS 1110 | General Physics 1 | |
| PHYS 2010 | General Physics 1 | |
| EBIO 1210 & EBIO 1230 | General Biology 1 and General Biology Laboratory 1 | |

| | | |
|---|---|---|
| EBIO 1220 & EBIO 1240 | General Biology 2 and General Biology Laboratory 2 | |
| EBIO 3590 | Plants and Society | |
| CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 | |
| GEOG 1001 | Our Changing Planet: Climate and Vegetation | |
| GEOG 1011 | Our Changing Planet: Landscapes and Water | |
| GEOL 1060 & GEOL 1030 | Global Change: An Earth Science Perspective and Introduction to Geology Laboratory 1 | |
| **Non-Environmental Design electives (6-9 credits) to meet 120 graduation credits.** | | **9** |
| **Total Credit Hours** | | **121** |

1 May be fulfilled by courses in Upper-Division Writing requirement list or ENVD 3150.

2 May be fulfilled by courses in Lower-Division Social Science requirement list.

3 May be fulfilled by courses in Lower-Division Arts & Humanities requirement list.

4 May be fulfilled by 3000/4000-level courses in Upper-Division Art and Humanities or Social Science requirement lists.

# Sample Four-Year Plans of Study

The first three semesters of the BEnvD curriculum are the core curriculum, which is prerequisite for each of the majors: Environmental Products of Design, Architecture, Landscape Architecture, and Sustainable Planning and Urban Design. There are corequisite ENVD core courses each semester and the core courses are typically sequential from semester to semester.

## ENVD Core

**First Year**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| ENVD 1010 | Studio 1: Introduction to Environmental Products of Design | 3 |
| ENVD 1020 | Studio 1: Introduction to Architecture | 3 |
| ENVD 1002 | Technology 1: Applications for Environmental Design | 2 |
| ENVD 1004 | Introduction to Environmental Design | 3 |
| ENVD 1976 | Colloquium - Exploring Careers, Research and Practice | 1 |
| Lower-Division Writing requirement (choose one: ARSC 1150, ENVD 1150, ENVS 1150, WRTG 1100 or WRTG 1150) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ENVD 1030 | Studio 1: Introduction to Landscape Architecture | 3 |
| ENVD 1040 | Studio 1: Introduction to Sustainable Planning and Urban Design | 3 |
| ENVD 1012 | Technology 2: Visual Communications | 2 |
| ENVD 1024 | History of the Built Environment | 3 |
| Lower-Division Arts & Humanities requirement [1] | | 3 |
| | **Credit Hours** | **14** |

**Second Year**

| **Fall Semester** | | |
|---|---|---|
| ENVD 1110 | Studio 2: Fundamentals of Environmental Design 1 | 3 |
| ENVD 1120 | Studio 2: Fundamentals of Design 2 | 3 |
| ENVD 1022 | Technology 3: Intermediate Applications for Environmental Design | 2 |
| ENVD 2003 | Ecological Systems in Design | 3 |
| ENVD 2101 | Context of Design: Planning and Implementation | 3 |
| Lower-Division Social Science requirement [2] | | 3 |
| | **Credit Hours** | **17** |
| | **Total Credit Hours** | **46** |

**Second Year**

| **Spring Semester** | | **Credit Hours** |
|---|---|---|
| PLAN 2100 | Studio 1: Foundations of Sustainable Planning and Urban Design | 6 |
| PLAN 2004 | History and Theory of Sustainable Planning and Urban Design | 3 |
| ENVD 2001 | Human Behavior and Design | 3 |
| Math requirement (choose one: MATH 1150 & 1151 or MATH 1300, MATH 2510, SOCY 2061) Meet with an Academic Advisor suggested | | 3 |
| | **Credit Hours** | **15** |

**Third Year**

| **Fall Semester** | | |
|---|---|---|
| PLAN 3100 | Studio 2: Intermediate Sustainable Planning and Urban Design | 6 |
| PLAN 3005 | Process and Practice | 3 |
| Natural Science requirement (choose one or one pair: ATOC 3600, CHEM 1011, CHEM 1113 & CHEM 1114, EBIO 1210 & EBIO 1230, EBIO 1220 & EBIO 1240, EBIO 3590, EBIO 4060, GEOG 1001, GEOG 1011, GEOL 1060, PHYS 1110 or PHYS 2010) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| Professional development requirement (complete application for advisor approval) [4] | | 6 |
| PLAN 3102 | Strategies and Techniques for Sustainable Planning and Urban Design | 3 |
| Upper Division Writing requirement or ENVD 3150 [3] | | 3 |
| Design Elective [1] | | 3 |
| | **Credit Hours** | **15** |

**Fourth Year**

| **Fall Semester** | | |
|---|---|---|
| Elective Studio (choose one: ENVD 3100*, PLAN 3100 or an approved Design study abroad) [2] | | 6 |
| PLAN 4101 | Sustainable Futures Planning | 3 |
| Upper-Division Arts and Humanities or Social Science requirement [5] | | 3 |

| | | |
|---|---|---|
| Design Elective [1] | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| PLAN 4100 | Capstone in Sustainable Planning and Urban Design | 6 |
| Design Electives [1] | | 3 |
| Elective | | 6 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **75** |

1. Design electives.
2. Students can enroll in an **additional** 3100 studio in their major to fulfill the elective studio requirement. Students should meet with their advisor to address course options.
3. Upper-Division Writing or ENVD 3150.
4. Application (https://cuboulder.qualtrics.com/jfe/form/SV_3myQkpi3QMKLwqN/) for professional development requirement.
5. Upper-Division Humanities (3000/4000-level courses); Upper-Division Social Science (3000/4000-level courses).

# Learning Outcomes

By the completion of the program, students will be able to:

- Use creative, critical and convergent thinking to address social and environmental issues, analyzing the need for and impact of design solutions by examining precedents, applying theoretical knowledge, conducting research and using problem-defining techniques.
- Develop conceptual or material solutions to socio-environmental issues through iterative design processes, synthesizing critical feedback and collaborative findings with peers and communities they engage with.
- Employ graphic, verbal, written, spatial and other communication strategies to organize, demonstrate and effectively argue for their design concepts and proposals.
- Apply principles of social and environmental justice in their work. They will prioritize design stewardship and sustainability to ensure the health, safety and welfare of all project constituents.
- Demonstrate foundational technical skills and apply methodologies essential for entering academic and professional disciplines in environmental design.

# Environmental Planning - Minor

Environmental planning represents interdisciplinary practices that direct decision making for urban planning, urban design, land development and natural resource conservation challenges. Implicit in environmental planning concepts and techniques that professionals in these fields employ are considerations of environmental, social, political and economic factors. Hence, environmental planning applies natural and social sciences to promote environmentally sound growth, effective management of natural resources, and strategies of urban development to offer frameworks for achieving sustainability. To address these goals, environmental planning might enlist the traditional skills of landscape architects and urban planners, such as physical planning and site design, to inspire more creative and ecologically informed plans and help mitigate the detrimental effects of development.

The Environmental Planning Minor provides non-ENVD students experiences with the process, technical skills and professional practice of planning. Students learn to use planning-based software applications, the theoretical and conceptual dimensions of planning and take a six-credit planning studio as a capstone of the experience. The minor is directed at students seeking to employ interdisciplinarity into their major using the tools of planning and landscape architecture. The program may also contribute to the education of students considering graduate study in planning, urban design, architecture and landscape architecture. The curriculum of the minor requires courses in history and theory, technology, a capstone studio and two electives that may include any ENVD course not otherwise applied to the program requirements.

# Requirements

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Theory and History Requirement** | | **3** |
| Choose one: | | |
| PLAN 2004 | History and Theory of Sustainable Planning and Urban Design | |
| LAND 2004 | History of Landscape Architecture | |
| LAND 4114 | Landscape Architecture Theory | |
| ARCH 3114 | History and Theory of Architecture 1 | |
| **Technology Requirement** | | **3-4** |
| Choose one: | | |
| GEOG 3053 | Geographic Information Science: Mapping | |
| GEOG 4603 | GIS in the Social and Natural Sciences | |
| ENVD 3052 | Digital Tools for LAND/PLAN | |
| **Electives** | | **6** |
| Choose two ENVD courses that are not contributing to a program requirement. | | |
| **Planning Capstone Studio** | | **6** |
| Choose one: | | |
| PLAN 4100 | Capstone in Sustainable Planning and Urban Design | |
| **Total Credit Hours** | | **18-19** |

# Information Science

Undergraduate students majoring in information science will explore the intersection of human values and the information technologies that influence everyday life. Students will synthesize knowledge and skills integrating design, computation and data analysis. Students will investigate, understand and engage contemporary issues around our increasingly digitized life. Topics include communicating with data, design, quantitative and qualitative data collection, and analysis, how culture and history shape technology, ethics, and technology for social good. This project-centered major prepares students with a professional portfolio and project experience for in-demand careers.

**Course code for this program is INFO.**

# Bachelor's Degree

- Information Science - Bachelor of Science (BS) (p. 752)

# Minors

- Data Science - Minor (p. 754)
- Information Science - Minor (p. 755)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Barker, Lecia Jane (https://experts.colorado.edu/display/fisid_101367/)
Associate Professor; PhD, University of Colorado Boulder

Brubaker, Jed Richards (https://experts.colorado.edu/display/fisid_156193/)
Assistant Professor; PhD, University of California, Irvine

Burke, Robin D. (https://experts.colorado.edu/display/fisid_165005/)
Chair, Professor; PhD, Northwestern University

Carruth, Christopher (https://experts.colorado.edu/display/fisid_153706/)
Instructor; MS, University of Colorado Boulder

Devendorf, Laura (https://experts.colorado.edu/display/fisid_158564/)
Assistant Professor; PhD, University of California, Berkeley

Fiesler, Casey Lynn (https://experts.colorado.edu/display/fisid_155950/)
Assistant Professor, Associate Chair; PhD, Georgia Institute of Technology

Iyasele, Abel
Teaching Assistant Professor; MBA, University of Dundee (UK)

Keegan, Brian (https://experts.colorado.edu/display/fisid_158122/)
Assistant Professor; PhD, Northwestern University

Palen, Leysia A. (https://experts.colorado.edu/display/fisid_114604/)
Professor; PhD, University of California, Irvine

Roque, Ricarose (https://experts.colorado.edu/display/fisid_158315/)
Assistant Professor; PhD, Massachusetts Institute of Technology

Voida, Amy Kathryn Mitchell (https://experts.colorado.edu/display/fisid_155855/)
Associate Professor; PhD, Georgia Institute of Technology

Voida, Stephen A. (https://experts.colorado.edu/display/fisid_155856/)
Assistant Professor; PhD, Georgia Institute of Technology

# Courses

**INFO 1101 (3) Computation in Society**
Introduces students to modern information and communication technology, the basic principles of software and programming, the fundamental role of algorithms in modern society, computational reasoning, the major organizations in the information sector and fundamental interactions between humans and information technology. Appropriate for students with limited prior experience with computing. Fulfills the CMDI computing requirement.
**Grading Basis:** Letter Grade

**INFO 1111 (4) Introduction to Information Science: Understanding the World Through Data**
Provides a hands-on survey of key concepts and theories in Information Science, including the nature of information, everyday experience of data, technologies that generate data, and how data are conveyed and represented. Students will critically examine texts, systems, and interpretations of data from multidisciplinary perspectives. Through design explorations, activities, and group projects, students will develop facility representing and transforming information.
**Grading Basis:** Letter Grade

**INFO 1121 (4) Designing Interactions**
Provides an introduction to human-centered design and the universal requirements of interactions with data, information and technologies. Studio experiences challenge students to consider the impact that information and computing technology design choices have on a) enabling diverse audiences to access, manipulate and experience information, and b) how differences get encoded by data and technology, ultimately reflecting biases.
**Grading Basis:** Letter Grade

**INFO 1201 (4) Computational Reasoning**
Introduces principles of computational thinking through the manipulation, transformation, and creation of media artifacts, such as images, sounds, and web pages. Students will be exposed to a high-level overview of algorithms, functions, data structures, recursion, and object-oriented computer programming through a series of assignments that emphasize the use of computation as a means of creative expression.

**INFO 1301 (3) Statistics for Information Science**
Introduces concepts and techniques for characterizing and quantifying data. Students will learn to summarize, visualize, and interpret data with descriptive statistics and will learn the foundations of statistical inference and modeling. Topics include statistical distributions and the normal distribution, hypothesis testing and statistical significance, and linear regression.
**Grading Basis:** Letter Grade

**INFO 1701 (4) Programming for Information Science 1**
Introduces principles of programming for information and data science using the Python programming language. Students will learn to understand, modify and create Python programs and will learn about programmatic techniques for exploring, discovering, and communicating information contained within various data sources.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 1200 or CSCI 1200

**INFO 2001 (1) Information Science Portfolio and Professional Development**
Facilitates career development through the disciplined reflection about and presentation of one's work using a variety of modalities across a variety of media. Students will be introduced to individuals and organizations representing a diversity of career paths in information science.
**Requisites:** Restricted to Information Science (INFO) majors and minors.
**Grading Basis:** Letter Grade

**INFO 2131 (3) Information Ecosystems**
Introduces students to techniques for working with communities, organizations, and institutions in the transformative use of information. Develops students' ability to listen for (and mediate among) diverse, discordant voices and values. Employs qualitative research, design explorations, activities, and small group projects as students examine, navigate, and design for complex interactions across ecosystems.
**Grading Basis:** Letter Grade

**INFO 2201 (4) Programming for Information Science 2**
Surveys techniques for accessing, exploring, and analyzing real-world data in various formats. Students will acquire, process, and visualize this data in order to communicate their findings to a general audience. Requires demonstrated proficiency with introductory computer programming.
**Requisites:** Requires prerequisite course of INFO 1701 or CSCI 1300 or CSCI 1200 or LING 1200 or ATLS 1300 or APPM 1650 (minimum grade C-).

**INFO 2301 (3) Quantitative Reasoning for Information Science**
Introduces methods for quantifying and analyzing different types of data, covering foundational concepts in discrete mathematics, probability, and predictive modeling, along with complementary computational skills to apply these concepts to real problems. Covers counting and combinatorics, logic, set theory, introductory probability, common probability distributions, regression, and model validation. Requires demonstrated proficiency with introductory computer programming.
**Requisites:** Requires prerequisite course of INFO 1701 or CSCI 1200 or CSCI 1300 or LING 1200 or ATLS 1300 (all minimum grade C-).
**Grading Basis:** Letter Grade

**INFO 3101 (3) History of Computing and Information**
Focusing on two topics: the changing role of information in everyday life over time and the increasing role of information in disciplinary studies such as social science, engineering, computer science, mathematics, digital humanities. Examines information related academic disciplines, businesses, industries and technologies from multiple perspectives from the 17th century to the present.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 3101

**INFO 3401 (3) Information Exploration**
Teaches students how to use information to identify interesting real world problems and to generate insight. Students will learn to find, collect, assemble and organize data to inspire new questions, make predictions, generate deliverables, and work towards solutions. They will learn to appropriately apply different methods (including computational, statistical and qualitative) for exploratory data analysis in a variety of domains.
**Requisites:** Requires prerequisite course of INFO 2201 and any one of INFO 2301, GEOG 4023, PSCI 3075, PSYC 3111 or SOCY 3201 (all minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 3402 (3) Information Exposition**
Teaches students to communicate information to a wider audience and construct stories with data across a variety of domains. Students will learn to use data for rhetorical purposes, applying visual, statistical and interpretative methods. Students will learn to think critically about ethical and social implications of using data in expository media, including identification of bias.
**Requisites:** Requires prerequisite course of INFO 2201 and any one of INFO 2301, GEOG 4023, PSCI 3075, PSYC 3111 or SOCY 3201 (all minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).

**INFO 3501 (3) Open Collaboration**
Analyzes the mechanisms of peer production and crowdsourcing systems like Wikipedia and OpenStreetMap. Students will investigate how these crowdsourced platforms work socially and technically, develop skills using tools for their analysis and critically evaluate platform and community limitations.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5501
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 3502 (3) Online Communities**
Explores practical and theoretical topics in online communities through inquiry into one or more particular online communities. Student projects will explore online communities as social and technical systems, including their alignment with conceptualizations of community, expressed and apparent interests, nature of membership and participation, history, participants' motivations for involvement, and explicit, implicit, and infrastructural features that enable and constrain behaviors.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5502
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 3503 (3) Everyday Information Behavior**
Familiarizes students with practical and theoretical topics in the discipline of information behavior and its application to everyday events, activities and environments. Explores the information dimension of various everyday activities such as buying a car, playing a game or looking up health information online. Students learn to analyze the informational dimensions that occur in their everyday lives.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5503
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 3504 (3) Digital Identity**
Explores and analyzes identity in a digital era. Through applied research, students investigate both social and technical aspects of how identity is captured, represented and experienced through technology using theoretical, empirical and design-based inquiry. Methods and platforms studied vary by semester.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5504
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 3505 (3) Designing for Creative Learning**
Analyzes learning technologies, discusses learning theories and develops prototypes to investigate strategies for engaging people in creative and inclusive learning experiences. Students explore design, learning and technology by examining sociotechnical systems like construction kits, online communities and makerspaces with a critical lens on equity and inclusion. Studio format enables students to apply constructionist ideas into the design of technology-enabled environments.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5505
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 3506 (3) Online Fandom**
Explores and analyzes fan communities in a digital context. Through applied research, students will investigate online spaces devoted to participatory and remix culture, media fandom, and fan creation. This class will draw concepts and methods from fan studies, social computing, ethnography, data science, and sociology to drive project-based inquiry.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5506
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 3507 (3) Foundations and Futures in Digital Humanities**
Explore foundational methods and major movements in digital humanities. This course discusses the impact of digitization on humanist inquiry and introduces students to techniques for analyzing digital data across literature, history, and art. Emphasizes key methodologies, technical practices, and the creation of media artifacts. Familiarity with foundational programming concepts is recommended. Degree credit not granted for both this course and INFO 5507.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 3508 (3) Personal Information Management**
Explores and analyzes personal information management: the organization of our digital "stuff", including course assignments, internship documents, files shared with others via the cloud, social media posts, step counts captured by smartwatches, and location traces collected by phones. In this course, students will participate in a semester-long design research project exploring ways to re-imagine how technology handles our digital stuff.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 3509 (3) Personal Health Informatics**
Surveys the theoretical and practical foundations for the design of patient-centered health and wellness technologies. Students will conduct an in-depth exploration of the multidisciplinary research literature informing the design of these systems, participate in discussions about the practical information management and interaction design challenges that must be addressed in their implementation, and demonstrate their learning through a variety of research study- and system-design activities. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5509
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 3510 (3) Music as Information**
Music is universal throughout all of society. This class will utilize the Python programming language to explore information that is inherent in and generated by music. Topics will cover various types of information related to music itself as well as the production of music which may include topics such as consumer-related music data, music recommender systems, sonification, and brain-music interfaces.
**Requisites:** Requires prerequisite course of INFO 2201 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) only.

**INFO 3702 (3) Cognitive Science**
Introduces cognitive science, drawing from psychology, philosophy, artificial intelligence, neuroscience, and linguistics. Studies the linguistic relativity hypothesis, consciousness, categorization, linguistic rules, the mind-body problem, nature versus nurture, conceptual structure and metaphor, logic/problem solving and judgment. Emphasizes the nature, implications and limitations of the computational model of mind.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3702 and LING 3005 and PHIL 3310 and PSYC 3005 and SLHS 3003 and CSPB 3702
**Requisites:** Restricted to INFO majors with 57-180 credits.

**INFO 3901 (3) Digital Legacy Clinic**
Gain hands-on experience running CU¿s Digital Legacy Clinic, supporting end-of-life planning and digital affairs management. Students will learn to establish a startup, collaborate effectively, and solve common startup challenges. Through team-based work, students will gain practical skills in service design, collaboration, technical research, and client support.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with minimum of 90 credit hours taken (Seniors) and Information Science (INFO) majors.
**Grading Basis:** Letter Grade

**INFO 4001 (1) Information Science Portfolio and Professional Development**
Facilitates career development through the disciplined reflection about and presentation of one's work using a variety of modalities across a variety of media. Students will be introduced to individuals and organizations representing a diversity of career paths in information science.
**Requisites:** Requires prerequisite course of INFO 2001 (minimum grade C-). Restricted to Information Science (INFO) majors and minors.
**Grading Basis:** Letter Grade

**INFO 4601 (3) Information Ethics and Policy**
Explores ethical and legal complexities of information and communication technology. By combining real-world inquiry with creative speculation, students will probe everyday ethical dilemmas they face as digital consumers, creators and coders, as well as relevant policy. Explores themes such as privacy, intellectual property, social justice, free speech, artificial intelligence, social media and ethical lessons from science fiction.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5601
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 4602 (3) Information Visualization**
Explores the design, development and evaluation of information visualizations. Covers visual representations of data and provides hands-on experience with using and building exploratory tools and data narratives. Students create visualizations for a variety of domains and applications, working with stakeholders and their data. Covers interactive systems, user-centered and graphic design, perception, data storytelling and analysis, and insight generation. Programming knowledge is strongly encouraged.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5602
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 4603 (3) Survey Research Design**
Familiarizes students with practical and theoretical topics in using survey methods for conducting information science research. Through discussion and real world assignments, students will learn when and why to use surveys for collecting data; effective, efficient and ethical approaches to maximizing response; sampling issues; development of valid items and scales; and how to implement, analyze and report on survey data collection.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5603
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 4604 (3) Applied Machine Learning**
Introduces algorithms and tools for building intelligent computational systems. Methods will be surveyed for classification, regression and clustering in the context of applications such as document filtering and image recognition. Students will learn the theoretical underpinnings of common algorithms (drawing from mathematical disciplines including statistics and optimization) as well as the skills to apply machine learning in practice.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5604
**Requisites:** Requires prerequisite courses of INFO 2201 or INFO 2301 or CSCI 2270 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior).
**Grading Basis:** Letter Grade

**INFO 4605 (3) Ethnographic Research in Applied Settings**
Demonstrates the power of ethnography as an investigative approach that is useful in design, evaluation and question formation for information scientists across all workforce sectors. Teaches students how to be keen observers of the unusual as well as the everyday to reveal meaningful insights that elaborate information science projects.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5605
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 4606 (3) Critical Technical Practice**
Surveys design theory and methods that can be used to question relationships between technology, culture, and the environment. Students will discuss readings and synthesize those readings through design exercises. The course will equip students with resources for thinking more critically and creatively about design and possible future human-technology relationships.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5606, ATLS 4606, and ATLS 5606
**Grading Basis:** Letter Grade

**INFO 4607 (3) Software Engineering for Data-Centered Systems**
Explores design and engineering of systems for data storage and analysis. Introduces fundamental development concepts used in real-world data systems. By combining software engineering with knowledge from data science and human-centered computing, prepares students to develop systems, interpret and modify codebases, understand modern concepts for managing data at scale, and work in teams to create cutting-edge applications for consumer use.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5607
**Requisites:** Requires prerequisites of INFO 2201 or CSCI 2270 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior)
**Grading Basis:** Letter Grade

**INFO 4608 (3) Community-Based Design**
Surveys techniques in cooperative design with community members as collaborators rather than subjects. Students will explore approaches such as participatory design and co-design. Students will work in teams in partnership with community stakeholders to create tools, experiences, or systems that meet the needs of communities, contribute to social change, and/or lead to advancing academic knowledge.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5608
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 4609 (3) User-Centered Design**
Surveys the theoretical and practical foundations of human-computer interaction and user-centered design. Students learn theories of interaction (including cognitive, organizational, collaborative, and task-based approaches), user interface design techniques, design guidelines, and usability testing in the context of developing technology. Course content is explored through a variety of interfaces (desktop, mobile, touch, vision, audio, etc.) and contexts (personal, organizational, cross-cultural, etc.).
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5609
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 4611 (3) Ubiquitous Computing Experience Design**
Introduces the field of ubiquitous computing, including sensors, ambient displays, tangibles, mobility, location awareness and context awareness. These topics are explored from a user-centered design perspectives, focusing on how a situated models of computing affect requirements gathering, interaction design, prototyping and evaluation. Students gain mastery with contemporary "UbiComp" technologies and learn to incorporate them into a user-centered design process.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5611
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 4613 (3) Network Science**
Introduces theories and methods for analyzing relational data in social, information, and other complex networks. Students will understand the processes and theories explaining network structure and dynamics as well as develop skills analyzing and visualizing real-world network data. No math or statistics training required, but course will assume familiarity with Python.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5613
**Requisites:** Requires prerequisite course of INFO 3402 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 4614 (3) Information and Data Retrieval Systems**
Examines techniques for managing and accessing information and data of a variety of types for a range of applications. Students will study retrieval models for text and for structured and unstructured data, covering creation, management and querying techniques for each, and how to apply each model in data-intensive applications. Students will also consider ethical aspects of data management including data protection, data rights and user privacy.
**Requisites:** Requires prerequisite course of INFO 2201 (minimum grade C-).

**INFO 4615 (3) Fair Machine Learning**
Equips students with the foundational knowledge needed to understand fairness in machine learning from an interdisciplinary perspective and the essential skills necessary to address fairness challenges in practice. Provides an overview of core concepts concerning fair machine learning, from defining fairness to the measurement and mitigation of fairness-related harms. Proficiency in Python programming and prior coursework in machine learning required.
**Grading Basis:** Letter Grade

**INFO 4617 (3) Web Data Science**
The internet makes many kinds of information easy to access. The ability to retrieve, parse, and analyze this information is a valuable skill for data scientists. This course will provide an overview of computational tools and practices for transforming web documents and APIs into data for common research designs.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 4620 (3) Race and Technology**
This course is designed with the understanding that race and racial inequality have been central to how societies and societal systems of power have been shaped and reshaped over time. Students will critically examine how race is created by and through sociotechnical systems. Students will explore how the design, implementation, and use of digital platforms and their data continue to perpetuate and embody white, cisgender, heteronormative systems of power. This course will cover a wide range of foundational and emergent scholarship¿giving voice to Scholars of Color¿providing students with a foundation through which they can continue to critique and explore sociotechnical and other societal arrangements more broadly.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5620
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**INFO 4651 (3) Fundamental Concepts in Data Science**
This intensive course provides a general understanding of the mathematical concepts required for success in data science. This course will cover a wide range of mathematical tools in data science including an overview of calculus and linear algebra along with selected topics from numerical analysis. The course will also explore computational implementations of these ideas. This course provides a bridge for students without these advanced math concepts to learn to apply them within a data science career or within a graduate program in data science.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5651
**Requisites:** Requires prerequisite course of INFO 1301 or ANTH 4000 or GEOG 3023 or PSCI 2075 or PSYC 2111 or SOCY 2061 (minimum grade C-). Restricted to juniors and seniors.

**INFO 4652 (3) Statistical Programming in R**
This intensive course covers foundational data science tools and techniques in the R programming language, including acquiring, cleaning, exploring, and analyzing data, programming, and conducting reproducible research. The course will emphasize the use of data management best practices such as the tidyverse toolkit in R.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5652
**Requisites:** Requires prerequisite course of INFO 1301 or ANTH 4000 or GEOG 3023 or PSCI 2075 or PSYC 2111 or SOCY 2061 (minimum grade C-). Restricted to juniors and seniors.

**INFO 4700 (3) Senior Capstone**
Provides senior level INFO students an opportunity to demonstrate the culmination of their learning in the major by designing and implementing a significant information system or developing a research question, typically in response to a problem of personal interest related to or informed by their secondary area of specialization. Reinforces project planning, public presentation and ethic skills.
**Requisites:** Restricted to Information Science (INFO) majors only with a minimum of 90 hours.
**Grading Basis:** Letter Grade

**INFO 4747 (4) Defamiliarizing Data: The Ethnography and Design of Making Data Strange**
Introduces students to the design and use of data in an unfamiliar, international context. Develops students¿ ethnographic and design skills for defamiliarizing data¿seeing, characterizing, and designing for data in ways that render it as unfamiliar and strange in order to gain new perspectives and insights about those data and the contexts in which they are produced and consumed. This course includes international travel.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5747

**INFO 4800 (1-3) Leadership Practicum in Information Science**
Equips students for taking on leadership roles in the interdisciplinary context of information science. Students will learn to facilitate learning among students with diverse backgrounds and expertise, developing communication and mentoring skills and gaining exposure to a variety of learner-centered design strategies and pedagogical approaches. Enrollment is by invitation and at the discretion of the instructor.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Information Science (INFO) majors only.
**Grading Basis:** Letter Grade

**INFO 4841 (1-6) Undergraduate Independent Study**
Involves in-depth independent research and/or project work completed under the direction of a faculty member that demonstrates learning at the upper-division level within the discipline. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Information Science (INFO) majors only.
**Grading Basis:** Letter Grade

**INFO 4871 (1-4) Special Topics**
Special topics.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 4900 (1-6) Research Experience in Information Science**
Provides research experience in information science. Students will contribute to the construction of new knowledge, helping to answer current research questions or to solve contemporary problems in the domain. Enrollment is by invitation and discretion of the advising faculty member.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Grading Basis:** Letter Grade

**INFO 4950 (1-6) Honors Thesis**
Involves the preparation and oral defense of an honors thesis, based on faculty-supervised original research, including final phases of the research project. Students receive guidance on research, the process of thesis writing, presentation of research results, and thesis defense. Thesis requirements and the role of the CMDI Honors Council will be discussed. Honors students share written, visual, and oral drafts for peer and faculty feedback and offer feedback to their peers.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 55-180 credits (Juniors or Seniors) and Information Science majors only.
**Grading Basis:** Letter Grade

# Information Science - Bachelor of Science (BS)

Undergraduate students majoring in information science will explore the intersection of human values and the information technologies that influence everyday life. Students will synthesize knowledge and skills integrating design, computation and data analysis. Students will investigate, understand and engage contemporary issues around our increasingly digitized life. Topics include communicating with data, design, quantitative and qualitative data collection and analysis, how culture and history shape technology, ethics and technology for social good. This project-centered major prepares students with a professional portfolio and project experience for in-demand careers.

# Requirements

## Program Requirements

The BS in information science requires 51 credit hours within the major. Students will also complete the CMDI Core as part of their general education. A secondary area of study, which is also part of the CMDI Core, will be used to synthesize knowledge of information science with an application domain.

### Foundations

| Code | Title | Credit Hours |
|---|---|---|
| INFO 1111 | Introduction to Information Science: Understanding the World Through Data | 4 |
| INFO 1121 | Designing Interactions | 4 |
| INFO 1301 | Statistics for Information Science | 3 |
| INFO 1701 | Programming for Information Science 1 | 4 |
| INFO 2131 | Information Ecosystems | 3 |
| INFO 2201 | Programming for Information Science 2 | 4 |
| INFO 2301 | Quantitative Reasoning for Information Science | 3 |
| **Total Credit Hours** | | **25** |

### Information Exploration & Exposition Series

Information science students will take both Information Exploration and Information Exposition.

| Code | Title | Credit Hours |
|---|---|---|
| INFO 3401 | Information Exploration | 3 |
| INFO 3402 | Information Exposition | 3 |
| **Total Credit Hours** | | **6** |

### Portfolio & Professional Development and Capstone Series

The Department of Information Science values project-based learning, team-based learning, the development of good professional practice and the development of specializations at the undergraduate level. The Portfolio & Professional Development as well as the Capstone courses are a critical part of cohort-building in the major, and are designed to create a community of learners who are prepared to tackle ambitious projects together, individually and in preparation for internship and post-baccalaureate opportunities.

| Code | Title | Credit Hours |
|---|---|---|
| INFO 2001 | Information Science Portfolio and Professional Development | 1 |
| INFO 4001 | Information Science Portfolio and Professional Development | 1 |
| **Total Credit Hours** | | **2** |

Facilitates development of careers in Information Science through the disciplined reflection about and presentation of one's work using a variety of modalities across a variety of media. Students will be introduced to individuals and organizations representing a diversity of career paths in Information Science.

### Senior Capstone

The Senior Capstone (INFO 4700) provides senior-level information science students an opportunity to demonstrate the culmination of their learning in the major by designing and implementing a significant information system or developing a research question, typically in response to a problem of personal interest related to or informed by their secondary area of study. The course reinforces project planning, public presentation, collaboration and professional ethics skills.

**Total Credit Hours: 3**

### Upper-division Electives in Information Science

Information science students will take a total of 5 upper division elective courses numbered from 3500 to 4999. These courses fall into two general categories, investigations and mastery.

In investigations courses, students deeply engage in specific domains, applying the skills they have learned in the foundation courses through instructor-guided projects. Examples of investigations courses include: Digital Identity, Designing for Creativity and Learning, Data and the Humanities and Online Community.

Mastery courses offer deep dives into theory and methods in different areas of information science. Examples of mastery topics include: Applied Machine Learning, Ethnography, Survey Research Design, Information Visualization, Ubiquitous Computer Experience Design, and Ethical and Policy Dimensions of Information.

Elective courses offered in any given semester will vary. These may include:

| Code | Title | Credit Hours |
|---|---|---|
| INFO 3502 | Online Communities | 3 |
| INFO 3501 | Open Collaboration | 3 |
| INFO 3504 | Digital Identity | 3 |
| INFO 3505 | Designing for Creative Learning | 3 |
| INFO 3506 | Online Fandom | 3 |

| | | |
|---|---|---|
| INFO 3507 | Foundations and Futures in Digital Humanities | 3 |
| INFO 3508 | Personal Information Management | 3 |
| INFO 3509 | Personal Health Informatics | 3 |
| INFO 3510 | Music as Information | 3 |
| INFO 3702 | Cognitive Science | 3 |
| INFO 4601 | Information Ethics and Policy | 3 |
| INFO 4602 | Information Visualization | 3 |
| INFO 4603 | Survey Research Design | 3 |
| INFO 4604 | Applied Machine Learning | 3 |
| INFO 4605 | Ethnographic Research in Applied Settings | 3 |
| INFO 4606 | Critical Technical Practice | 3 |
| INFO 4608 | Community-Based Design | 3 |
| INFO 4609 | User-Centered Design | 3 |
| INFO 4611 | Ubiquitous Computing Experience Design | 3 |
| INFO 4612 | Recommender Systems | 3 |
| INFO 4613 | Network Science | 3 |
| INFO 4614 | Information and Data Retrieval Systems | 3 |
| INFO 4620 | Race and Technology | 3 |
| INFO 4651 | Fundamental Concepts in Data Science | 3 |
| INFO 4652 | Statistical Programming in R | 3 |
| INFO 4747 | Defamiliarizing Data: The Ethnography and Design of Making Data Strange | 4 |
| INFO 4871 | Special Topics | 3 |

Students in the Honor's Program may use 2–3 credit hours of Honor's Independent Study as an upper division elective.

**Total Credit Hours: 15**

## Secondary Area of Study

In addition to the coursework required for the major, all students in INFO must complete a secondary area of study outside of INFO. This can be met by any of the following: a minor, a second major within CMDI, a double degree or a credit-based certificate program of at least 12 credit hours offered by a department in any school or college at CU. Information science majors may not receive an information science minor nor a data science minor.

Students are encouraged to select one of the programs of study described above, since these have been officially approved by experts who can either provide a formal certificate or list the minor on a student's official transcript upon graduation. In exceptional circumstances, however, students may apply to complete an individualized secondary area of study equal to or greater than 18 credit hours. Application for an individualized secondary area of study must be submitted and approved before the student has earned 50 credit hours.

# Sample Four-Year Plan of Study

| **Year One** | | |
|---|---|---|
| **Fall Semester** | | **Credit Hours** |
| CMCI 1040 Foundational Concepts and Creativity in Media, Communication and Information (4) or CMDI Core or Elective (3) | | 4 |
| INFO 1111 | Introduction to Information Science: Understanding the World Through Data | 4 |
| INFO 1701 | Programming for Information Science 1 | 4 |
| WRTG 1160 or other first year writing course | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| CMDI Core or Elective | | 3 |
| INFO 1121 | Designing Interactions | 4 |
| INFO 2201 | Programming for Information Science 2 | 4 |
| INFO 1301 | Statistics for Information Science | 3 |
| | **Credit Hours** | **14** |
| **Year Two** | | |
| **Fall Semester** | | |
| INFO 2131 | Information Ecosystems | 3 |
| INFO 2001 | Information Science Portfolio and Professional Development | 1 |
| CMDI Core [2] | | 3 |
| CMDI Core or Elective [1] | | 6 |
| Secondary Area | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| INFO 2301 | Quantitative Reasoning for Information Science | 3 |
| CMDI Core [3] | | 4 |
| CMDI Core or Elective [1] | | 3 |
| Secondary Area | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Year Three** | | |
| **Fall Semester** | | |
| INFO 3401 | Information Exploration | 3 |
| INFO Upper Division Electives | | 6 |
| CMDI Core [1] | | 3 |
| Secondary Area | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| INFO 3402 | Information Exposition | 3 |
| INFO 3101 | History of Computing and Information | 3 |
| Secondary Area | | 3 |
| Electives | | 3 |
| | **Credit Hours** | **12** |
| **Year Four** | | |
| **Fall Semester** | | |
| INFO 4001 | Information Science Portfolio and Professional Development | 1 |
| INFO Upper Division Electives | | 6 |
| CMDI Core [1] | | 3 |
| Secondary Area | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| INFO 4700 | Senior Capstone | 3 |

| | |
|---|---|
| INFO Upper Division Elective | 3 |
| Secondary Area | 3 |
| Electives | 4 |
| **Credit Hours** | **13** |
| **Total Credit Hours** | **117** |

1 P/S; H & A; Hist V; Div & Global
2 Natural World
3 Natural World with Lab

# Learning Outcomes

By the completion of the program, students will be able to:

- Design, prototype and analyze information artifacts.
- Identify and implement multiple methods for data collection and analysis, from small data to big data, from quantitative to qualitative.
- Write computer programs to answer questions and generate interactive artifacts.
- Understand and be able to apply methods for generating insights from data.
- Accurately and persuasively communicate information to different audiences.
- Understand and evaluate social contexts and ethical implications of information technologies.
- Identify biases in technologies and understand their ethical ramifications.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BS and MS in Information Science

The BAM program in information science has been created in recognition of the increasing demand for master's-level training and research skills.

### Admissions Requirements

In order to gain admission to the BAM program named above, a student must:

- Fill out the intent form, around the junior year, for admission to the program.
- Have a cumulative GPA of 3.5 or better.
- Have completed MAPS requirements (students admitted to CU Boulder prior to Summer 2023 only).
- Submit a resume or CV.
- Provide two letters of recommendation.

### Program Requirements

Students may take up to and including 12 credit hours while in the undergraduate program which can later be used toward master's degree requirements. Six credits may be double counted toward both the bachelor's degree and master's degree, effectively shortening the expected time to completion for the master's degree from three semesters to two. Graduate courses will not be counted as satisfying program requirements unless a grade of B or higher is earned. Double-counted courses may not be used toward a subsequent doctoral program (or additional master's program) at CU Boulder.

- Students must maintain a 3.0 cumulative GPA at all times in the program.
- Students must apply to graduate at the beginning of the semester in which they will complete the bachelor's degree requirements.
- Students must apply to continue with the master's degree program.
- Students will be matriculated into the master's program without further program review.
- Students must maintain a cumulative 3.0 GPA while in the master's program, including in the courses being used toward the master's degree.

# Data Science - Minor

Data science is a multidisciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from structured and unstructured data.

This minor provides students with an introduction to the core concepts and skills of data science in computing, statistics and information science to complement existing majors in CMDI fields, in the social sciences and in the arts and humanities.

The program is specifically designed as an add-on to existing quantitative methods courses and sequences in the social sciences. Students in such degree programs who wish to add data science experience and credentials to their course of study can complete the minor without additional course prerequisites. For this reason, some aspects of the curriculum (particularly the quantitative methods area) are quite flexible, allowing students to acquire this background through subject-specific study in a variety of disciplines.

# Required Courses and Credits

The minor is divided into three areas: computing, quantitative methods, and electives. Computing courses cover basic programming and data structures with an emphasis on the Python programming language. Because of the variation in credit hours associated with quantitative methods courses, the total hours for the minor vary between 19–22. Students may apply no more than six credit hours of transfer work, including three hours of upper-division credit.

Information Science majors may not receive an Information Science minor nor a Data Science minor. Students may not receive both the Information Science minor and the Data Science minor.

All coursework applied to the minor must be completed with a grade of C- or better (no pass/fail work may be applied). The GPA for all coursework attempted in the minor department must be equal to 2.00 (C) or higher.

Aside from course prerequisites for the courses listed below, there are no other prerequisites for the minor.

| Code | Title | Credit Hours |
|---|---|---|
| **Computing** | | |
| *Computing 1:* | | *3-4* |
| Choose one from the following list: | | |
| ATLS 1300 | Computational Foundations 1 | |
| CSCI 1200 | Introduction to Computational Thinking | |
| CSCI 1300 | Computer Science 1: Starting Computing | |
| GEOG 4303 | Geographic Information Science: Spatial Programming | |
| INFO 1701 | Programming for Information Science 1 | |
| LING 1200 | Introduction to Python Programming | |
| *Computing 2:* | | *4* |
| INFO 2201 | Programming for Information Science 2 | |
| **Quantitative Reasoning** | | **6-8** |
| Choose a two-course sequence from the following options: | | |
| INFO 1301 & INFO 2301 | Statistics for Information Science and Quantitative Reasoning for Information Science | |
| ANTH 4000 & INFO 2301 | Quantitative Methods in Anthropology and Quantitative Reasoning for Information Science | |
| CSCI 3022 & INFO 2301 | Introduction to Data Science with Probability and Statistics and Quantitative Reasoning for Information Science | |
| BCOR 1025 & INFO 2301 | Statistical Analysis in Business and Quantitative Reasoning for Information Science | |
| GEOG 3023 & GEOG 4023 | Statistics and Geographic Data and Advanced Quantitative Methods for Spatial Data | |
| PSCI 2075 & PSCI 3075 | Quantitative Research Methods and Applied Political Science Research | |
| PSYC 2111 & PSYC 3111 | Psychological Science I: Statistics and Psychological Science 2: Research Methods in Psychology | |
| SOCY 2061 & SOCY 3201 | Introduction to Social Statistics and Sociological Research Methods | |
| AHUM 1825 & INFO 2301 | Inclusive Interdisciplinary Data Science for All and Quantitative Reasoning for Information Science | |
| **Electives** | | **6** |
| Elective coursework in areas related to data science; one of these courses must be in Information Science | | |
| INFO 3401 | Information Exploration | |
| INFO 3402 | Information Exposition | |
| INFO 3507 | Foundations and Futures in Digital Humanities | |
| INFO 3510 | Music as Information | |
| INFO 4601 | Information Ethics and Policy | |
| INFO 4602 | Information Visualization | |
| INFO 4603 | Survey Research Design | |
| INFO 4604 | Applied Machine Learning | |
| INFO 4607 | Software Engineering for Data-Centered Systems | |
| INFO 4614 | Information and Data Retrieval Systems | |
| INFO 4747 | Defamiliarizing Data: The Ethnography and Design of Making Data Strange | |
| AHUM 3106 | Introduction to Literary Study with Data S | |
| ANTH 4745 | Science, Technology and Society | |
| APRD 4300 | Strategic Communication Analytics and Metrics | |
| ENGL 3106 | Introduction to Literary Study with Data Science | |
| ENGL 4106 | Literary Study with Data Science | |
| GEOG 4403 | Geographic Information Science: Space Time Analytics | |
| LING 4632 | Machine Learning and Linguistics | |
| CSCI 4022 | Advanced Data Science | |
| WRTG 3070 | Advocating with Data | |
| INFO 4615 | Fair Machine Learning | |
| **Total Credit Hours** | | **19-22** |

# Information Science - Minor

All courses in the information science minor are taken in the Department of Information Science. The minor in information science requires one introduction course (4 credits) and one literacies course (3–4 credits), then allows students to personalize by selecting two of any level INFO courses (6–8 credits) and two upper-division INFO courses (6 credits). Courses may not be applied to both the required courses and personalization areas. Courses may be used only in one area.

Information science majors may not receive an information science minor nor a data science minor. Students may not receive both the information science minor and the data science minor.

## Requirements

All coursework applied to the minor must be completed with a grade of C- or better (no pass/fail work may be applied). The GPA for all coursework attempted in the minor department must be equal to 2.00 (C) or higher. Students may apply no more than six credit hours of transfer work, including three hours of upper-division credit.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| Students must choose one Introduction course and one Literacies course and meet any prerequisites. | | |
| *Introduction Courses (choose one)* | | |
| INFO 1111 | Introduction to Information Science: Understanding the World Through Data | 4 |
| or INFO 1121 | Designing Interactions | |
| *Literacies Courses (choose one)* | | *3-4* |
| INFO 1701 | Programming for Information Science 1 | |
| or INFO 1101 | Computation in Society | |
| or INFO 1201 | Computational Reasoning | |
| or INFO 2201 | Programming for Information Science 2 | |
| **Personalization** | | |

| | | |
|---|---|---|
| Choose four of the following, two of which must be upper division (3000-4000 level) and meet any prerequisites [1] | | 12-14 |
| INFO 1101 | Computation in Society | |
| INFO 1111 | Introduction to Information Science: Understanding the World Through Data | |
| INFO 1121 | Designing Interactions | |
| INFO 1201 | Computational Reasoning | |
| INFO 1301 | Statistics for Information Science | |
| INFO 2131 | Information Ecosystems | |
| INFO 1701 | Programming for Information Science 1 | |
| INFO 2201 | Programming for Information Science 2 | |
| INFO 2301 | Quantitative Reasoning for Information Science | |
| INFO 3101 | History of Computing and Information | |
| INFO 3401 | Information Exploration | |
| INFO 3402 | Information Exposition | |
| INFO 3XXX or INFO 4XXX | Any upper-division Information Science elective | |
| **Total Credit Hours** | | **19-22** |

[1] Courses cannot count as both required and personalization. Must meet prerequisites for courses that require them.

## Learning Outcomes

By the completion of the program, students will be able to:

- Apply foundational methods for designing, analyzing, implementing and/or critiquing information artifacts.
- Communicate information to diverse audiences.
- Understand key ethical and social implications of information technologies.
- Learn how to apply information science contexts to their primary area of study.

# Journalism

The Department of Journalism is founded on the principle that a well-informed and engaged public is essential to democracy—perhaps more so now, at a time of dizzying change, than it has ever been—and that, in the face of this change, journalism retains a unique role in contributing to civic life and to the quality of public discourse.

We put this principle to work by helping students become constructive participants in an ever-evolving global media landscape, where distinctions between producers and consumers of content have blurred. More specifically, we prepare them, at both the undergraduate and graduate levels, for careers in journalism and other fields of public communication. We train students to gather information from a diversity of sources, to analyze it critically, and to report what is significant, through stories and other media forms across multiple platforms—including video production, social media, radio/podcasting, livestreaming, television and print. We encourage ethical awareness so that students will think independently, being prepared to reflect on and to help shape media practices and norms rather than take them at face value.

We believe in the integration of classroom instruction with practical experience. Many of our students work for, and manage, campus online news and entertainment sites, television programs and a radio station. They intern at broadcast stations, newspapers, magazines, websites and social media companies. Lastly, as a faculty, and with the help of colleagues elsewhere in our College who are working on new and innovative forms of human communication, we are committed to improving journalism through pioneering research and creative work.

**Course code for this program is JRNL.**

## Bachelor's Degree

- Journalism - Bachelor of Arts (BA) (p. 761)

## Minor

- Journalism - Minor (p. 763)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ackland, Len (https://experts.colorado.edu/display/fisid_103930/)
Professor Emeritus; MA, Johns Hopkins University

Bergen, Lori Ann (https://experts.colorado.edu/display/fisid_155986/)
Professor; PhD, Indiana University Bloomington

Brinkman, P. Delbert
Professor Emeritus

Chuang, Angie (https://experts.colorado.edu/display/fisid_159485/)
Associate Chair, Associate Professor; MA, Stanford University

Daugherty, Paul J. (https://experts.colorado.edu/display/fisid_128801/)
Senior Instructor; MA, University of Colorado Boulder

Dmukhovskaya, Marina (https://experts.colorado.edu/display/fisid_166268/)
Instructor, Faculty Director; MA, Indiana University Bloomington

Jones, Stephen B. (https://experts.colorado.edu/display/fisid_101578/)
Assistant Dean, Senior Instructor Emeritus; PhD, University of Utah

Kaplan, Frank L.
Professor Emeritus

Kim, Hun Shik (https://experts.colorado.edu/display/fisid_141126/)
Associate Professor; PhD, University of Missouri–Columbia

Larson, Christine M. (https://experts.colorado.edu/display/fisid_159789/)
Assistant Professor; PhD, Stanford University

McDevitt, Michael Joseph (https://experts.colorado.edu/display/fisid_122949/)
Professor; PhD, Stanford University

Moritz, Marguerite J.
Professor Emerita

Plunkett, Chuck (https://experts.colorado.edu/display/fisid_164006/)
Instructor, Faculty Director; MFA, University of Pittsburgh

Rosner, Hillary (https://experts.colorado.edu/display/fisid_164326/)
Instructor; MFA, New York University

Ryan, Kathleen Marie (https://experts.colorado.edu/display/fisid_148481/)
Associate Professor; PhD, University of Oregon

Sama, Vicky
Scholar in Residence; MA, University of Colorado Boulder

Skewes, Elizabeth (https://experts.colorado.edu/display/fisid_122724/)
Associate Professor; PhD, Syracuse University

Taylor, Ross (https://experts.colorado.edu/display/fisid_156501/)
Assistant Professor; MS, Syracuse University

Voakes, Paul S.
Professor Emeritus

Whitt, Jan
Professor Emeritus; PhD, University of Denver

Yulsman, Thomas (https://experts.colorado.edu/display/fisid_109386/)
Professor; MS, Columbia University

# Courses

**JRNL 1000 (3) Principles of Journalism and Networked Communication**
Surveys the history, practices and responsibilities of journalism in a democracy. Examines ethics, best practices in institutional and network settings, reporting and writing, international news systems, personal branding, and strategies for creating and distributing content across media platforms. Promotes the highest professional values and encourages students to be leaders who recognize the possibilities of journalism in a democratic society.

**JRNL 1871 (1-3) Special Topics for First-Year Students**
Special studies in media that are specific for first-year students. May be repeated for a maximum of three credit hours.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**JRNL 2000 (3) Writing for the Media**
Introduces students to writing news for a range of news media platforms, including print / online, broadcast, social media and more, and teaches them how to use the appropriate grammar and style conventions for those media types. Also introduces students to various types of stories, from breaking news to features to profiles, and to basic reporting skills. Students encouraged to take concurrently with JRNL 2001.
**Requisites:** Requires prerequisite of JRNL 1000 (minimum grade C-). Restricted to students with JRNL plan (Major or Minor) or who are on-track admitted to JRNL.

**JRNL 2001 (3) Fundamentals of Reporting Technologies**
Develops news-gathering skills for work in news enterprises. Students learn skills for working with technologies used in news reporting and in storytelling for various media formats. Students are introduced to a range of technologies for recording, editing and producing. Students encouraged to take concurrently with JRNL 2000.
**Requisites:** Requires prerequisite of JRNL 1000 (minimum grade C-). Restricted to students with JRNL plan (Major or Minor) or who are on-track admitted to JRNL.

**JRNL 2003 (3) Data Journalism**
Instructs students in data-driven reporting, from practice to ethical considerations. The class includes hands-on, in-depth instruction in gathering data, processing, presenting, and writing about data as a critical tool in journalistic storytelling. Students learn to read, interpret and critique data analysis for journalistic purposes.

**JRNL 2014 (3) Race and Sports Journalism**
Examines the intersection of sports journalism and race. It investigates the subject from two distinct but related perspectives. First, the class looks historically at how race has been covered in both journalism generally and sports journalism more specifically. Then it seeks to understand the effects of said coverage.

**JRNL 2301 (3) Journalism Ethics and History in Film**
Examines how the depiction of journalists evolves over time through watching classic films. Also, the course studies how journalists depicted in film enact (or do not enact) ethical norms of the profession. Through the reading of cinema as text, and in conjunction with written texts, the class will discuss how these depictions in popular culture have, over time, impacted the way American society views the media.

**JRNL 2401 (3) Media Coverage of Diverse Populations**
Explores the ways in which issues of gender, gender expression, sexual orientation, race, ethnicity and religion play out in news coverage and how news organizations approach coverage of marginalized groups in society.

**JRNL 3000 (3) Intermediate Reporting**
Builds on basic reporting, writing, and multimedia skills to produce text-story-centered packages on a variety of topics. Students develop beat reporting and enterprise skills, developing sources and progressive stories over the course of a semester.
**Requisites:** Requires prerequisite courses of JRNL 2000 and JRNL 2001 (all minimum grade C-). Restricted to JRNL majors and minors.

**JRNL 3102 (3) Photojournalism I**
Introduces the basic elements of visual communication. Covers the use of camera systems, digital imaging techniques and other aspects of photojournalism including law, ethics, history and critical decision-making.
**Requisites:** Requires a prerequisite course of JRNL 2001 (min grade C-). Restricted to Journalism (JRNL) majors or minors with a minimum of 57 credits only.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 3112 (3) Concepts in Visual Culture**
Studies the principles, theories and language of visual communication, emphasizing the evaluation and use of images in mass media. Designed to help students build theories and practices learned in previous classes and perfect their skills integrating words and pictures in communication to gain a greater appreciation of the visual world.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 3201 (3) Critical Perspectives on Journalism**
Introduces students to the critical perspectives most often employed in qualitative analysis of journalistic texts and practice: Marxism, psychoanalytical criticism, semiology, sociological criticism, structuralism, etc. Emphasis is upon texts from contemporary print and broadcast media, although students may also explore documentary film and literary journalism.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 3202 (3) Covering Political Campaigns**
Provides a blend of theoretical understanding and on the ground experience for students interested in learning about the forces that shape election coverage and the practicalities of reporting on the local and national races for public office.
**Requisites:** Requires prerequisite course of JRNL 2000 (minimum grade C-).

**JRNL 3211 (3) History of Broadcasting**
Offers a broad overview of significant broadcast programs, the institutions and sociocultural and economic influences that have steered the course of radio, television and electronic media history in the United States.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 3221 (3) History of Digital Journalism**
Explores the history, economics and traditions of digital technologies. Addresses the interaction between digital technologies, culture and economy with particular emphasis on the effects on digital journalism. Concludes with a focus on how these concepts are embraced by new journalism market models.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 3231 (3) History of Documentary Film**
Explores the evolution of the documentary, both in feature films and on television, to understand how the genre offers both historical context and an understanding of the world in which we live.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 3241 (3) History of Journalism**
Explores the foundations of journalism practice in a historical context. Students study the evolution of the news industry and analyze examples of contemporary broadcasting, photography, online and print media in light of the past.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 3251 (3) History of Sports Journalism**
Explores the foundations of sports journalism practice in a historical context. The class provides an overview of sports journalism, reporting, and media from early documentation and myths surrounding competition in ancient civilizations through the exponential growth of the craft throughout the 20th century, to the current state of sports journalism across numerous traditional and digital platforms as a part of a multi-billion dollar sports media industry.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 3301 (1) Camera Workshop for Video**
Develop competent skills using camcorders to get the most compelling visuals and professional audio. Learn time-saving strategies to shoot footage for unplanned news events, scripted shows, and documentaries. Explore types of shots, the axis, camera movement, and ways to shoot for the edit with sequences and in-camera transitions. Students will be introduced to basic camcorder functions, rule of thirds, depth of field, exposure settings, white balance, and focus techniques. Students will also learn how to obtain the best audio for interviews and natural sound, and how to light interview shots.
**Recommended:** Prerequisite JRNL 2001.

**JRNL 3302 (1) Video Editing Skills**
Explore time-saving editing workflows using shortcut editing techniques to create compelling and dynamic content. Understand file management, saving and importing media properly. Recognize and interpret film language and the grammar of editing, such as cross-cutting, montage, screen direction, cutting on the action, match action, and even ways to manipulate time. Students will also learn how to create graphics, perform colour correcting, and do basic animation.
**Recommended:** Prerequisite JRNL 2001.

**JRNL 3303 (1) Motion Graphics**
Explore how to enhance visuals and produce animated graphics using Adobe After Effects. Learn ways to work within virtual 3D environments to create production elements that include titles, lower thirds, bumps, and full-screen graphic presentations. Develop skills with using masks, virtual cameras, parallax in photos, tracking motion, and rotoscoping.
**Recommended:** Prerequisite JRNL 2001.

**JRNL 3304 (1) Contemporary News and Ethics Intensive**
This course uses cases coming from the contemporary media world to explore issues that include conflicts of interest, privacy, bias in media coverage, incorporating diverse voices, social responsibility, and source relationships through the lens of various theories and frameworks for ethical decision-making.

**JRNL 3305 (1) Writing Fundamentals**
An intensive refresher or introduction to the basics of writing for journalism majors and journalism and sport media minors. This short course is offered to students who need additional writing coaching and practice, or to those who seek intensive writing instruction and practice prior to or in addition to JRNL 2000.

**JRNL 3306 (1) Writing for the Ear**
Offers an intensive refresher or introduction to the basics of journalistic writing for audio and video. Students develop an understanding of how writing for the ear differs from writing for the eye, and practice how to effectively integrate video and audio into multimedia writing.

**JRNL 3307 (1) Copyright and Fair Use for Content Creators**
The explosion of web-based content and Creative Commons licenses make understanding copyright and fair use a thorny and confusing area. This course, designed for content creators both inside and outside of journalism, will enable students to better understand when they can use content created by others, and when that content is off limits.

**JRNL 3344 (3) Short Form Documentary**
Teaches students how to raise the production value of their work based on standards used by professionals. Students learn theory of various short forms in video; how to implement tools such as lenses, lights, and other video gear to enhance the cinematic quality of their video; how to edit their video clips with professional pacing and rhythm; how to apply color grading techniques for a cinematic look; and how to create motion graphics to illustrate data, create titles and lower thirds.
**Requisites:** Requires a prerequisite course of JRNL 2000 and JRNL 2001 (minimum grade C-). Restricted to JRNL majors or minors only.
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 3401 (3) Sociology of News**
Provides students with an introduction to the factors that shape news reporting and production, including gatekeeping, intermedia agenda setting, pack journalism, beat structures, news values and issues unique to the various platforms on which news is delivered.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 3402 (3) Social Media Storytelling**
Investigates the theory, ethics and best practices in storytelling across a variety of social media platforms including, but not limited to, Facebook, Twitter, Instagram, Snapchat, Medium and YouTube. Examines best practices for social media engagement. Students develop a story for multiple platforms and analyze the story performance in the sites and make recommendations for best practices.
**Requisites:** Requires prerequisite courses of JRNL 2000 and JRNL 2001 (all minimum grade C-). Restricted to JRNL majors and minors with 57-180 credits (Juniors or Seniors).

**JRNL 3552 (3) Online Production and Editing**
Explores the best practices for newsroom web production and copyediting, working with web-based stories and online audience engagement. Students develop story packages for online audiences, learn to work with content management systems (CMS), build webpages using industry leading platform, and learn the fundamentals of search engine optimization (SEO). Students also develop visual multimedia skills that enhance their visual communication skills.
**Requisites:** Requires prerequisite courses of JRNL 2000 and JRNL 2001 (all minimum grade C-). Restricted to JRNL majors and minors.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 3614 (3) Audio Storytelling and Podcasting**
Introduces audio production techniques using digital technologies. Students learn to apply fundamental principles to create professional radio and online programs and podcasts.
**Requisites:** Restricted to College of Communication, Media, Design and Information (CMDI) or Journalism (JRNL) majors and minors with a minimum of 45 hours taken.
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 3644 (3) Video News Production and Reporting**
This course teaches essential video production skills in both field and studio operation, camera and editing work, lighting, and multi-camera studio directing. Students will learn how to develop visual narratives, shoot quality footage for the story, and apply best journalistic practices to positively impact society on multiple media platforms.
**Requisites:** Requires prerequisite courses of JRNL 2000 and JRNL 2001 (minimum grade C-). Restricted to JRNL majors or minors with a minimum of 45 completed hours.
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 3651 (3) Media Law and Ethics**
Studies state and federal laws and court decisions that affect the media in order to develop knowledge of media rights and responsibilities and an understanding of the legal system. Provides students with an overview of the theories, ethics, codes, and analytical models that are used in journalism, and introduces students to a variety of ethical issues that can arise in journalism.
**Requisites:** Restricted to College of Communication, Media, Design and Information (CMDI) or Journalism (JRNL) majors and minors with a minimum of 45 hours taken.

**JRNL 3704 (3) Sports Reporting I**
Prepares students for the world of sport journalism. Combines the skills of a hard news reporter, the perspective of an entertainment reporter and the persuasive abilities of an editorial writer.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 3804 (3) Sports, Media and Society**
Examines how sports, culture and especially the media, with a specific focus on journalism, all come together to influence society. Explores how sports communication affects, and is affected by, the issues and tension that touch society at large, such as law and politics, race, gender, sexuality and disability.
**Requisites:** Restricted to CMDI students with a minimum of 45 credits completed or non-CMDI students who have completed CMDI 2001 (minimum grade D-).

**JRNL 3904 (3) Sports Journalism and Gender**
Analyzes the role gender has played in providing opportunities for women to compete in athletics and journalistic coverage of those athletes and the sporting events in which they participate. It will also examine how gender has influenced opportunities for sports journalists in the past and in the contemporary sports media industry.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 4004 (3) The Sports Media Industry**
Examines the business practices and frameworks of the sports that journalists cover. Topics include market-driven journalism, the growth of sports coverage throughout in the 20th century, the technologies impacting sports business today, and the way money impacts coverage. Finally, the class explores the unique issues and challenges posed by the different financial structures of amateur and professional sports and how they influence sports coverage and reporting.
**Requisites:** Restricted to CMDI students with a minimum of 45 credits completed or non-CMDI students who have completed CMDI 2001 (minimum grade D-).

**JRNL 4011 (3) Principles of Media Relations**
Provides students with information about the ethics, history and practice of media relations (community affairs, community relations, customer relations, government relations, industry relations, internal communications, public relations, press agentry, public affairs, publicity, etc.). Introduces students from multiple academic disciplines to the genres of writing required for a media relations career.
**Requisites:** Restricted to students with a minimum of 45 credits completed.

**JRNL 4102 (3) Photojournalism II**
Advanced course intended to give students a forum in which technical skills will be brought to professional standards. Build a polished portfolio of work to present to editors and buyers.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5102
**Requisites:** Requires a prerequisite course of JRNL 3102 (minimum grade C-).
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 4311 (3) Literary Journalism**
Explores the telling of nonfiction stories through the techniques of fiction, through study of American literary journalists, from the New Journalism of the 1960s through current longform narrative multimedia. Students will read and analyze narrative nonfiction from several periods of American history in order to expand their own storytelling repertoire. The class will emphasize in-depth reporting for narrative, character and scene development, narrative arc and structure and the use of dialogue. They will also explore the particular ethical dilemmas faced by writers of creative nonfiction.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5311
**Requisites:** Requires prerequisite course of JRNL 2000 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 4344 (3) Video Documentary Production**
Designed to give students the experience of researching, writing, shooting and editing their own documentaries.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5344
**Requisites:** Requires a prerequisite course of JRNL 3644 (minimum grade C-). Restricted to Journalism (JRNL) majors or minors.
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 4351 (3) Reporting Wars, Conflict and Peace**
Explores how journalists report international breaking news with a focus on war, disaster and peace and how these news events affect peoples' lives, governmental decisions and news media operations.

**JRNL 4354 (3) Video News Reporting**
Focuses on writing and reporting compelling visual stories using mobile devices and video cameras. Students also learn storytelling techniques of backpack video journalism and reporting for broadcast television and online news.
**Requisites:** Requires a prerequisite course of JRNL 3644 (minimum grade C-). Restricted to Journalism (JRNL) majors or minors.
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 4401 (3) News and Public Perception**
Considers the impact that news and journalistic practice have on the public through processes like agenda setting and second-level agenda setting, as well as issues such as news avoidance, the spiral of silence and political cynicism.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 4402 (3) Journalism and Social Identity**
Provides a discussion-based inquiry into the role of journalism and journalists in the representation of intersectional identities, focusing on race, gender, sexual expression and socioeconomic class in the United States. The study and practice of journalism in this course will address issues of trust, power, privilege and ethics inherent in reporting across difference.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5402
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite JRNL 2401.

**JRNL 4411 (3) International Media and Global Crises**
Investigates how media organizations, audiences and other international organizations function during various global crises, such as national disasters, climate change and health epidemics, due to imbalanced distribution of wealth and resources, ethnic tensions and diplomatic failures.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 4562 (3) Digital Journalism**
Builds upon digital production skills through the creation of multimedia project. Applies media theory to evaluate digital media content and explore how digital forms influence the news industry, politics, culture and society.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5562
**Requisites:** Requires prerequisite courses of JRNL 2000 and JRNL 2001 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 4572 (3) News Corps**
CU News Corps provides students the opportunity to immerse themselves in a single project and then produce an in-depth text based or multimedia explanatory/investigative story for publication in professional media. Students spend several weeks studying the subject in question before reporting and producing their stories.
**Requisites:** Requires prerequisite course of JRNL 3674 or JRNL 4002 or JRNL 4354 or JRNL 3402 or JRNL 3552 or JRNL 4344 or JRNL 4602 or JRNL 4614 or JRNL 4702 or JRNL 4802 or JRNL 4822 (min grade C-).
**Grading Basis:** Letter Grade

**JRNL 4573 (3) CU News Corps Investigative Reporting & Leadership**
Take lessons learned from the CU News Corps capstone to the next level with this course designed to give elite students the opportunity to broaden and deepen their investigative reporting by either expanding on their capstone project's subject matter, or beat, or by taking a deep dive into a different field of research. Further develop brainstorming and editing skills.
**Requisites:** Requires prerequisite course of JRNL 4572 (minimum grade B).

**JRNL 4602 (3) Opinion Writing**
Concentrates on several of the subjective areas of journalism. Emphasizes editorial and column writing, editorial pages and blogging.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5602
**Requisites:** Requires a prerequisite course of JRNL 2000 (minimum grade C-). Restricted to Journalism (JRNL) majors or minors with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 4614 (3) Narrative Audio Storytelling and Podcasting**
Develops audio storytelling techniques using digital technologies and expands on podcasting skills. Students expand their abilities to create professional radio and online stories, podcasts and programs.
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 4624 (4) NewsTeam**
Students participate in Newsteam Boulder, a program broadcast live over the Boulder cable television system.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5624
**Requisites:** Requires prerequisite course of JRNL 4354 (minimum grade C-).
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 4634 (1-3) Broadcast Projects**
Covers interpretation, preparation, and/or reporting in programs for broadcast media. Students produce radio or television documentaries and informational/entertainment programs.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5634
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires a prerequisite course of JRNL 3644 (minimum grade C-). Restricted to JRNL majors or minors.
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 4651 (3) Advanced Media Ethics**
Examines the responsibilities, the power and the problems of news media through the lens of ethical inquiry. Applies the philosophical an other perspectives from humanities and social sciences to consider ethical frameworks for guiding journalism in an era of technological disruption. Examines issues including privacy, conflicts of interest, undercover reporting, use of graphic images, interviewing trauma victims and other concerns in journalism through the lens of moral philosophy, best practices and codes of ethics.
**Requisites:** Requires prerequisite course of JRNL 3651 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 4674 (3) Live Streaming and Studio Producing**
Students develop, plan, and produce visual stories and live streaming productions both in the field and in studio. Additionally, students learn how to conduct live reporting, sharpen their visual storytelling, camera, and digital editing skills, and apply professional workflows and standards to their work.
**Requisites:** Requires a prerequisite course of JRNL 3344 or JRNL 3644 (minimum grade C-).
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 4702 (3) Arts/Cultural Reporting and Criticism**
Emphasizes composition of criticism for the performing arts and other areas of entertainment.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5702
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 4704 (3) Athletic Media Relations**
Offers the opportunity to both observe and experience what is required to work in the world of intercollegiate athletic media relations and professional sports public relations. Covers how to write and how to budget the vital components of publications, media bias and crisis management.

**JRNL 4710 (3) Sports Reporting II**
Prepares students for the world of sport journalism. Combines the skills of a hard news reporter, the perspective of an entertainment reporter and the persuasive abilities of an editorial writer. The class focuses on how to cover sports from all angles.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5710
**Requisites:** Requires prerequisite course of JRNL 3704 (minimum grade C-).
**Recommended:** Prerequisite restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 4714 (3) Sports Broadcasting**
Teaches students how to do live sports television production. Students will learn the sports TV business from the ground up, and be responsible for participating in the broadcasting of three to four live sporting events.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 4724 (3) Sports Announcing**
Teaches students about sports talk and sports announcing, how to interview sports celebrities and the legal considerations and ethics of the business. Students will be doing play-by-play and color of live sporting events. Department consent required.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 4802 (3) Feature Writing**
Provides practice in writing freelance articles. Considers types, sources, methods, titles, illustrations, and freelance markets. Students submit work for publication.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5802
**Requisites:** Requires prerequisite courses of JRNL 2000 and JRNL 2001 (minimum grade C-). Restricted to JRNL majors or minors with 57-180 credits (Juniors or Seniors).

**JRNL 4822 (3) Environmental Journalism**
Explores environmental topics including climate change, energy, water, biodiversity, and food. To enrich their skills and approaches, students produce stories on a range of environmental topics and examine media coverage of the environment, discussing the complex issues involved in reporting these stories, and exploring the ways that environmental crises intersect with other stories in the news.
**Requisites:** Requires prerequisite courses of JRNL 2000 and JRNL 2001 (minimum grade C-). Restricted to JRNL majors or minors with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 4841 (1-6) Undergraduate Independent Study**
Involves in-depth independent research and/or project work completed under the direction of a faculty member that demonstrates learning at the upper-division level within the discipline. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**JRNL 4874 (1-3) Special Topics**
Special Topics
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to JRNL majors or minors with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 4920 (3) Seminar in Honors Writing & Research**
This course supports seniors accepted into departmental Honors Programs in developing the research foundation for their projects, whether they are scholarly, creative, or hybrid. Course topics include topic development, primary and secondary source research, and the writing of a scholarly literature review. Project and time management, planning for creative and scholarly field research, and peer support and editing are also emphasized. Formerly offered as a special topics course.
**Grading Basis:** Letter Grade

**JRNL 4931 (1-6) Internship**
Internship
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of JRNL 3674 or JRNL 4002 or JRNL 4354 or JRNL 3402 or JRNL 3552 or JRNL 4344 or JRNL 4602 or JRNL 4614 or JRNL 4702 or JRNL 4802 or JRNL 4822 (min grade C-).

# Journalism - Bachelor of Arts (BA)

Journalism majors develop skills in information gathering, storytelling and analysis across a variety of platforms—including video production, social media, radio/podcasting, livestreaming, television and print—using an ever-expanding variety of media tools and mobile technologies.

Following a core curriculum that provides a range of conceptual and interdisciplinary options, students will develop an individualized secondary area of study (18 credit hours). Students can also complement their skills with studies in sports journalism, media and diversity, ethics, history, data journalism, international media law, literary journalism, news and public perception, sociology of news, visual culture, and other conceptual courses offered in the department, the college and elsewhere in the university.

# Requirements

## Required Courses and Credits

Within the college standard of 120 credit hours for the bachelor's degree, the BA in journalism requires 36-37 credit hours (depends on capstone choice) as follows.

| Code | Title | Credit Hours |
|---|---|---|
| **JRNL Core Curriculum** | | |
| JRNL 1000 | Principles of Journalism and Networked Communication | 3 |
| JRNL 2000 | Writing for the Media | 3 |
| JRNL 2001 | Fundamentals of Reporting Technologies | 3 |
| JRNL 3651 | Media Law and Ethics | 3 |
| **Intermediate Reporting Course** | | **3** |
| Choose one from the following: (Additional on this list may also count as electives; see below) | | |
| JRNL 3000 | Intermediate Reporting | |
| JRNL 3344 | Short Form Documentary | |
| JRNL 3614 | Audio Storytelling and Podcasting | |
| JRNL 3644 | Video News Production and Reporting | |
| **Conceptual Courses in Journalism** | | **6** |
| Choose two from the following (one must be upper-division): | | |
| JRNL 2014 | Race and Sports Journalism | |
| JRNL 2301 | Journalism Ethics and History in Film | |
| JRNL 2401 | Media Coverage of Diverse Populations | |
| JRNL 3112 | Concepts in Visual Culture | |
| JRNL 3201 | Critical Perspectives on Journalism | |
| JRNL 3211 | History of Broadcasting | |
| JRNL 3221 | History of Digital Journalism | |
| JRNL 3231 | History of Documentary Film | |
| JRNL 3241 | History of Journalism | |
| JRNL 3251 | History of Sports Journalism | |
| JRNL 3401 | Sociology of News | |
| JRNL 3804 | Sports, Media and Society | |
| JRNL 3904 | Sports Journalism and Gender | |
| JRNL 4004 | The Sports Media Industry | |
| JRNL 4311 | Literary Journalism | |
| JRNL 4351 | Reporting Wars, Conflict and Peace | |
| JRNL 4401 | News and Public Perception | |
| JRNL 4402 | Journalism and Social Identity | |
| JRNL 4411 | International Media and Global Crises | |
| JRNL 4651 | Advanced Media Ethics | |
| **Capstone** | | **3-4** |
| Students must choose one of the following two courses as a capstone | | |
| JRNL 4572 | News Corps | |
| JRNL 4624 | NewsTeam | |
| **Internship** | | |
| JRNL 4931 | Internship | 3 |
| **Reporting Electives** | | **9** |
| Choose an additional 9 credits of advanced journalism reporting courses from the following: | | |
| JRNL 2003 | Data Journalism | |
| JRNL 3102 | Photojournalism I | |
| JRNL 3202 | Covering Political Campaigns | |
| JRNL 3402 | Social Media Storytelling | |
| JRNL 3552 | Online Production and Editing | |
| JRNL 3704 | Sports Reporting I | |
| JRNL 4011 | Principles of Media Relations | |
| JRNL 4102 | Photojournalism II | |
| JRNL 4344 | Video Documentary Production | |
| JRNL 4351 | Reporting Wars, Conflict and Peace | |
| JRNL 4354 | Video News Reporting | |
| JRNL 4411 | International Media and Global Crises | |
| JRNL 4562 | Digital Journalism | |
| JRNL 4573 | CU News Corps Investigative Reporting & Leadership | |
| JRNL 4602 | Opinion Writing | |
| JRNL 4614 | Narrative Audio Storytelling and Podcasting | |
| JRNL 4634 | Broadcast Projects | |
| JRNL 4674 | Live Streaming and Studio Producing | |
| JRNL 4702 | Arts/Cultural Reporting and Criticism | |
| JRNL 4704 | Athletic Media Relations | |
| JRNL 4710 | Sports Reporting II | |
| JRNL 4714 | Sports Broadcasting | |
| JRNL 4724 | Sports Announcing | |
| JRNL 4802 | Feature Writing | |
| JRNL 4822 | Environmental Journalism | |
| JRNL 4841 | Undergraduate Independent Study | |
| JRNL 4874 | Special Topics | |
| **Total Credit Hours** | | **36-37** |

## Secondary Area of Study (18 credit hours)

In addition to the coursework required for the major, all students in JRNL must complete a secondary area of study outside of JRNL. This can be met by any of the following: a minor, a double degree, a second major or an approved minor substitute composed of at least 18 credit hours. Application for a minor substitute must be submitted and approved before the student has earned 50 credit hours.

# Sample Four-Year Plan of Study

This is an example of how the requirements for a BA in Journalism could be scheduled within a four-year period. For more information on the Core Curriculum requirements for the College of Communication, Media, Design and Information, please read the Policies & Requirements (https://catalog.colorado.edu/undergraduate/colleges-schools/media-communication-information/policies-requirements/#corecurriculumtext) section of this catalog.

| Year One | | |
|---|---|---|
| **Fall Semester** | | **Credit Hours** |
| JRNL 1000 | Principles of Journalism and Networked Communication | 3 |
| CMDI 1040 Foundational CMDI (4), or CMDI Core or Elective (3) | | 4 |
| Quantitative Thinking | | 3 |

| | | |
|---|---|---|
| Lower Division Writing | | 3 |
| | **Credit Hours** | **13** |
| **Spring Semester** | | |
| JRNL Major Course (Conceptual Course) | | 3 |
| CMDI Core Elective (3), or CMDI 1040 Foundational CMCI (4) | | 3 |
| CMDI Core Computing | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 6 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| JRNL 2000 | Writing for the Media | 3 |
| JRNL 2001 | Fundamentals of Reporting Technologies | 3 |
| CMDI Core (Natural World) | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 3 |
| Secondary Area | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| CMDI Core (Natural World w/Lab) | | 4 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 6 |
| JRNL Elective | | 3 |
| Secondary Area | | 3 |
| | **Credit Hours** | **16** |
| **Year Three** | | |
| **Fall Semester** | | |
| JRNL 3651 | Media Law and Ethics | 3 |
| JRNL Major Course (Upper-Division Reporting) | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 7 |
| Secondary Area | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| JRNL Major Course (Upper-Division Conceptual Course) | | 3 |
| JRNL 4931 | Internship | 3 |
| JRNL Elective | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 3 |
| Secondary Area | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| JRNL Elective | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 6 |
| Secondary Area | | 6 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| JRNL 4572 | News Corps | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 9 |
| Secondary Area | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **120** |

## Learning Outcomes

The Department of Journalism is accredited by the Accrediting Council for Education in Journalism and Mass Communication (ACEJMC). The Council requires that graduates of accredited programs be aware of the following professional values and competencies, and be able to:

- Apply the principles and laws of freedom of speech and press, in a global context, and for the country in which the institution that invites ACEJMC is located.
- Demonstrate an understanding of the multicultural history and role of professionals and institutions in shaping communications.
- Demonstrate culturally proficient communication that empowers those traditionally disenfranchised in society, especially as grounded in race, ethnicity, gender, sexual orientation and ability, domestically and globally, across communication and media contexts.
- Present images and information effectively and creatively, using appropriate tools and technologies.
- Write correctly and clearly in forms and styles appropriate for the communications professions, audiences and purposes they serve.
- Demonstrate an understanding of professional ethical principles and work ethically in pursuit of truth, accuracy, fairness and diversity.
- Apply critical thinking skills in conducting research and evaluating information by methods appropriate to the communications professions in which they work.
- Effectively and correctly apply basic numerical and statistical concepts.
- Critically evaluate their own work and that of others for accuracy and fairness, clarity, appropriate style and grammatical correctness.
- Apply tools and technologies appropriate for the communications professions in which they work.

# Journalism - Minor

In consultation with their advisers, students who are majoring in another discipline may pursue a minor in journalism. Because journalism is a popular career choice for students in other units—art and art history, business, communication, English, sociology, women and gender studies, and other fields in the College of Arts and Sciences, the College of Media, Communication and Information and the Leeds School of Business—we offer an 18-credit hour journalism minor (six courses) with the courses and options listed under the Requirements tab.

## Requirements

Students must complete 18 credit hours of coursework toward the minor with a grade of C- or better and an overall GPA in the minor of 2.0. Students may apply no more than six credit hours of transfer work, including three hours of upper-division credit.

Students will take two required courses, JRNL 1000 and JRNL 2000, which will introduce them to a range of possible interests from broadcasting to print and online media to digital and emerging media and writing for the media. After successfully completing JRNL 1000 and 2000, students should select one 2000-level course and three 3000- or 4000-level journalism courses.

Students may emphasize conceptual and theory courses, may select skills courses that help to prepare them for possible careers, or complete a combination of the two. Students in the minor may take up to three credits of independent study and three credits of internship. Students may apply no more than six credit hours of transfer work, including three hours of upper-division credit.

Students may not use the same JRNL course for the JRNL major or minor and the sports media minor with the exception of JRNL 3804.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Course** | | |
| JRNL 1000 | Principles of Journalism and Networked Communication | 3 |
| JRNL 2000 | Writing for the Media | 3 |
| **Electives** | | |
| Select one 2000-level JRNL course from the following: | | 3 |
| JRNL 2001 | Fundamentals of Reporting Technologies | |
| JRNL 2014 | Race and Sports Journalism | |
| JRNL 2301 | Journalism Ethics and History in Film | |
| JRNL 2401 | Media Coverage of Diverse Populations | |
| Select three 3000- or 4000-level JRNL courses | | 9 |
| JRNL 3000 | Intermediate Reporting | |
| JRNL 3102 | Photojournalism I | |
| JRNL 3112 | Concepts in Visual Culture | |
| JRNL 3201 | Critical Perspectives on Journalism | |
| JRNL 3202 | Covering Political Campaigns | |
| JRNL 3211 | History of Broadcasting | |
| JRNL 3221 | History of Digital Journalism | |
| JRNL 3231 | History of Documentary Film | |
| JRNL 3241 | History of Journalism | |
| JRNL 3344 | Short Form Documentary | |
| JRNL 3401 | Sociology of News | |
| JRNL 3402 | Social Media Storytelling | |
| JRNL 3552 | Online Production and Editing | |
| JRNL 3614 | Audio Storytelling and Podcasting | |
| JRNL 3644 | Video News Production and Reporting | |
| JRNL 3651 | Media Law and Ethics | |
| JRNL 4011 | Principles of Media Relations | |
| JRNL 4102 | Photojournalism II | |
| JRNL 4311 | Literary Journalism | |
| JRNL 4344 | Video Documentary Production | |
| JRNL 4351 | Reporting Wars, Conflict and Peace | |
| JRNL 4354 | Video News Reporting | |
| JRNL 4401 | News and Public Perception | |
| JRNL 4402 | Journalism and Social Identity | |
| JRNL 4411 | International Media and Global Crises | |
| JRNL 4502 | | |
| JRNL 4562 | Digital Journalism | |
| **Total Credit Hours** | | **18** |

# Media Studies

The Department of Media Studies specializes in scholarly and industry-based research on media and technologies that underlie contemporary culture, economics, and politics. Students learn how media industries, practices and narratives shape the way we think about, relate to and engage with the world around us. Enter our tight-knit community and participate in innovative media production work and research projects that engage emerging technology practices, seek to understand new digital cultures and change society in meaningful ways.

Media studies students examine ways of thinking about and conducting research into the intersection of media, communication and cultural practices in both historical and contemporary perspectives. Encompassing humanistic, social scientific and multimodal approaches to the study of media and culture, and interdisciplinary in its theoretical and methodological approaches, the media studies degrees span traditional boundaries between theory and practice. The program fosters media "literacy" in the broadest sense by providing students with critical skills to analyze contemporary media and culture, along with technical, aesthetic and intellectual principles that facilitate strong media practices.

**Course code for this program is MDST.**

## Bachelor's Degree

- Media Studies - Bachelor of Arts (BA) (p. 768)

## Minor

- Media Studies - Minor (p. 770)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ardizzoni, Michela (https://experts.colorado.edu/display/fisid_145152/)
Assistant Professor, Director; PhD, Indiana University Bloomington

Berggreen, Shu-Ling Chen (https://experts.colorado.edu/display/fisid_101636/)
Associate Professor; PhD, University of Tennessee-Knoxville

Calabrese, Andrew (https://experts.colorado.edu/display/fisid_101073/)
Professor; PhD, Ohio State University

Echchaibi, Nabil (https://experts.colorado.edu/display/fisid_145054/)
Associate Chair; PhD, Indiana University Bloomington

Fisher, Jolene (https://experts.colorado.edu/display/fisid_158335/)
Assistant Professor; PhD, University of Oregon

Frost, Steven (https://experts.colorado.edu/display/fisid_156502/)
Instructor, Associate Chair; MFA, School of Art Institute of Chicago

Goldstein, Donna M. (https://experts.colorado.edu/display/fisid_100448/)
Professor; PhD, University of California, Berkeley

Hall, Kira (https://experts.colorado.edu/display/fisid_123111/)
Professor; PhD, University of California, Berkeley

Hoover, Stewart (https://experts.colorado.edu/display/fisid_104549/)
Professor; PhD, University of Pennsylvania

McLean, Polly E. (https://experts.colorado.edu/display/fisid_100614/)
Associate Professor; PhD, University of Texas at Austin

Mody, Bella
Professor Emeritus; PhD, Gujarat University, India; PhD, Gujarat University, India

Oakes, Tim (https://experts.colorado.edu/display/fisid_109269/)
Professor; PhD, University of Washington

Peck, Janice Anne (https://experts.colorado.edu/display/fisid_106765/)
Professor Emerita; PhD, Simon Fraser University (Canada)

Rajabi, Samira (https://experts.colorado.edu/display/fisid_165414/)
Assistant Professor; PhD, University of Colorado Boulder

Ristovska, Sandra (https://experts.colorado.edu/display/fisid_159835/)
Assistant Professor; PhD, University of Pennysylvania

Rowland, Willard D.
Professor Emeritus

Schneider, Nathan Todd (https://experts.colorado.edu/display/fisid_156512/)
Director, Associate Faculty Director; MA, University of California, Santa Barbara

Shepperd, Josh (https://experts.colorado.edu/display/fisid_167233/)
Assistant Professor; PhD, University of Wisconsin-Madison

Simonson, Peter D.
Professor; PhD, University of Iowa

Stevens, John Richard (https://experts.colorado.edu/display/fisid_145848/)
Associate Professor, Chair; PhD, University of Texas at Austin

Striphas, Theodore G. (https://experts.colorado.edu/display/fisid_156205/)
Associate Professor; PhD, University of North Carolina Chapel Hill

Tracey, Michael (https://experts.colorado.edu/display/fisid_104259/)
Professor Emeritus; PhD, Univ of Leicester (England)

Trager, Robert
Professor Emeritus

# Courses

**MDST 1001 (3) Foundations of Media Studies**
Introduces students to key issues and debates and contemporary applications of critical media studies focusing on economic, social, political and cultural implications. Provides an understanding of the relationship between theory and practice and equips students with the tools to critically analyze various forms of textual transmission.
**Grading Basis:** Letter Grade

**MDST 1002 (3) Introduction to Social Media**
Introduces students to network structures and principles, the technology and infrastructures that allow them to flourish, and the cultures that grow up through and around them. Explores how social media enables community, how it assembles and empowers agents of change and how design informs individual and group behavior.
**Grading Basis:** Letter Grade

**MDST 1003 (3) Critical Media Literacies**
Learn to strategically access, analyze, evaluate, and produce communication in a variety of forms. This course explores the expanding nature of literacy in a digital world. Students will use applied research practices and communication tools to expand their existing media literacy skills and to design innovative presentations and projects that take advantage of new media. Meets Practice Course Requirement.
**Grading Basis:** Letter Grade

**MDST 1009 (3) Truth, Beauty, and Conspiracy**
With conspiracy at the forefront of social and political discourse, this course illuminates these problems of knowledge and representation by approaching conspiracy culture from the perspective of media theory. Explores conspiracy theories as narratives, analyzing their specific narrative features and the ways that different media platforms represent conspiracy. Students also consider how conspiracy narratives complicate the relationship between knowledge and aesthetic form. Offered in Fall or Spring.

**MDST 2001 (3) Introduction to Global Media**
Explores a world in which new media have enabled humans to be joined in a global system of socio-cultural and economic relations. Underscores the political dimensions of global media, the convergence of global culture, and the ways in which values are produced. Prepares students to become critical of media practices and empowered as active civic participants.

**MDST 2002 (3) Media and Communication History**
Examines the historical development of communication forms, tools, technologies and institutions (orality, writing, printing, photography, film, radio, television, computers, internet); their influence on culture (forms of expression and social relationships); and their impact on social and individual experience. Applies knowledge of communication history to contemporary social issues and problems in media and society, domestically and internationally.

**MDST 2010 (3) Media and Social Movements**
Surveys the history and contemporary efforts of social activists to bring about democratic media reform and examines how media are used as tools for connecting and advancing social movements. Emphasis is given to media activism and social movements in the United States, as well as to similar and related transnational activism and movements. Meets Practice Course Requirement.
**Requisites:** Requires a prerequisite course of MDST 1001 (minimum grade C-).
**Grading Basis:** Letter Grade

**MDST 2011 (3) Disruptive Entrepreneurship in the Internet's New Economies**
Grapples with the disruptive business models that drive the online economy: both the dominant ones and the alternatives vying to transform it. In addition to the Silicon Valley model, this course explores lesser known internet economies around the world and proposals for a more equitable online future. Meets Practice Course Requirement.
**Grading Basis:** Letter Grade

**MDST 2012 (3) Hacker Culture**
Chronicles the evolution of hacker culture from its origins as a geeky subculture to a criminal underground to its adaptation by CEOs. Considers how hacker formations sometimes represent a new kind of politics, sometimes a rejection of politics. Explores the contested figure of the hacker in the past, present and science-fiction of the internet. Meets Practice Course Requirement.
**Grading Basis:** Letter Grade

**MDST 2031 (3) Documentary and Social Change**
Explores how local, national and international filmmakers use documentaries to provide cultural observation, education, entertainment and memories to making sense of and transform the realities of contemporary societies. Emphasizes contemporary issues and practices in the production of documentaries, including the participatory means such as the crowdsourcing of documentary footage and the use of newer, non-theatrical means of distribution. Meets Practice Course Requirement.
**Grading Basis:** Letter Grade

**MDST 2032 (3) Visual Literacies & Design**
Examines cultural visual experiences from critical perspectives and social effects. The course acquaints students with visual design in ways that include image-making as a cognitive and perceptual practice, the production of visual significance and meaning, and the role of technology in creating and understanding mediated images. Students will use a variety of means to produce visual narratives. Meets Practice Course Requirement.
**Grading Basis:** Letter Grade

**MDST 2046 (3) Future Histories of Technology**
This class explores both literature about future technologies and literary technologies that move across periods, regions, and disciplines. Our cultural and historical approach to future histories of technology will illuminate how race, gender and sexuality, class, and nationality structure seemingly neutral research and development, usage, and innovation. Ultimately, our goal is to see how we¿re not passive consumers but active participants in reimagining the present and future of technology.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 2046

**MDST 3001 (3) Media Research**
Introduces theoretical approaches and practices used to analyze the content, structure, influence and contexts of media. Explores factors shaping media, including: politics, economics, technology, cultural traditions. Studies concepts, theoretical approaches and research methods of media criticism, and adopts and adapts these frameworks in analyses of mediated communication.

**MDST 3002 (3) Digital Culture and Politics**
Examines issues at the intersection of digital media, culture and politics, such as regulation and network architecture, piracy and hacking, and grassroots activism. Engage with a range of theories about cultural politics, democracy, liberalism and neo-liberalism in relation to digital information and communication technologies.

**MDST 3021 (3) Comic Books: Culture and Industry**
Explores practices of comic culture across a broad range of graphic stories. Using culture studies approaches to industry analysis and fan community discourses, students examine culture created through and around graphic texts, particularly representations of race, gender, sexuality, institutions and ideology. Considers the political economy of the comic industry, the struggles of independent producers and active fan practices.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**MDST 3022 (3) Social Media Cultures**
Expands students' understanding of network cultures, including how social media tools influence conversation strategies, how interfaces interact with perceived communication values, and how network boundaries reinforce distinct cultural identities. Students engage in projects to measure network behavior, create strategic messages to achieve communication and information goals, and to engage in social listening.
**Requisites:** Restricted to students with 55 or more hours.
**Grading Basis:** Letter Grade

**MDST 3101 (3) History of Computing and Information**
Focusing on two topics: the changing role of information in everyday life over time and the increasing role of information in disciplinary studies such as social science, engineering, computer science, mathematics, digital humanities. Examines information related academic disciplines, businesses, industries and technologies from multiple perspectives from the 17th century to the present.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3101

**MDST 3201 (3) Media, Culture and Globalization**
Surveys the political and economic structures of media system in developed and developing countries and discusses the impact of privatization, ownership consolidation, and globalization on the flow of information across national borders. Also looks at how global media flows and counter-flows affect conceptions of nationhood and cultural identity.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Communication, Media, Design and Information (CMDI) or International Affairs (IAFS) majors only.

**MDST 3321 (3) Media Industries and Economics**
Focuses on the institutions and practices of the media industries. Surveys the histories, structures, and activities of these organizations and the contemporary issues surrounding them.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) in College of Communication, Media, Design and Information (CMCIU).
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 3331 (3) Sports-Media Complex**
Explores the rich connections between the sports industry, spectating, the media complex and social life. Using theories of cultural studies and drawing on specific examples from the sports world, students focus on how sport shapes and reinforces understandings of gender, race, class and sexuality. Addresses major questions about the political economy, commodification, mediation and reception of the spectacle of the sports complex, as well as politics and cultural consequences of its transnational reach.
**Requisites:** Restricted to College of Communication, Media, Design and Information (CMDI) students with a minimum of 45 credit hours completed, or non-CMDI students who have completed CMDI 2001 (minimum grade D-).
**Grading Basis:** Letter Grade

**MDST 3341 (3) Designing Alternative Media Platforms**
Explores alternative forms of media to exhibit student research and build connections with community leaders. Surveys alternative exhibition traditions such as Social Practice, Relational Aesthetics and Craftvism to expand the impact of student work, culminating in the design of a unique cultural event focusing on each individual's research. Software/digital presentation skills. Meets Practice Course Requirement.

**MDST 3401 (3) Media, Food and Culture**
Explores the topic of food as a subject of popular culture: essential to life and the enter of local, national and transnational conflict and social movements. Students will examine media representations of food, what our food choices say about us and what the mediated politics of food mean for our collective future.
**Requisites:** Requires a prerequisite course of MDST 2002 (minimum grade C-).
**Grading Basis:** Letter Grade

**MDST 3711 (3) Media and Popular Culture**
Examines culture in the form of discourse, symbols, and texts transmitted through the media. Explores the relationship between such mediated culture and social myth and ideology.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 3791 (3) Media and the Public**
Provides an overview of how publishing in print and electronic forms has been tied closely to democratic ideals for centuries. Explores how the idea of the public is central to the theory and practice of media politics, and how the contested concepts of "the public sphere" and "public opinion" have long been linked to debates about the proper relationship between media and democratic citizenship.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) in College of Communication, Media, Design and Information (CMCIU), and MDST minors.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 4000 (3) Media Genre Studies**
Introduces students to the critical study of genres in media cultures. Genre exists as a form of organizing and packaging mediated content, but also as formulaic patterns for analysis that work for and against audience expectations to produce culture. Topics will vary by genre, medium, and transmedia strategies.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 5000
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**MDST 4003 (3) Digital Media Production and Design**
Introduces techniques, technologies of online development and online media presentation. Contextualizes the technical and social implications of the Internet through historical and critical perspectives. Students engage in online media projects designed to emphasize the affordances, conventions and usability considerations of effective online communication. Meets Practice Course Requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 5003
**Requisites:** Restricted to students with 55 or more hours.
**Grading Basis:** Letter Grade

**MDST 4071 (3) Screenwriting**
Students will be taught the fundamentals of screenwriting, but will also learn from peers. Students will workshop scenes, share, and discuss. Students will work scenes through description, dialogue, and action, combine those scenes into sequences, and those sequences into scripts. Students will learn how to create dramatic tension, how to write compelling dialogue, how to deal with character development.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 5071
**Requisites:** Requires prerequisite course of MDST 2002 or MDST 3021 (minimum grade B).

**MDST 4111 (3) Crime, Media and Contemporary Culture**
Addressed in the course are a range of issues from within a variety of literatures that consider the ways in which the media cover crime. Those literatures are particularly drawn from sociology and the emergent, and increasingly dominant, field of cultural criminology. The focus of the class is to get students to think of "crime" as a constructed and mediated concept and set of narratives that often create problematic public "understandings".
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**MDST 4121 (3) Deconstructing Disney: Mediated American Mythology**
Explores various Disney cultural products ¿ some with which students will be very familiar, some students may have never seen ¿ in order to discuss the cultural messaging The Walt Disney Company has presented over its long and illustrious history. Students will conduct analysis research in popular culture studies.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**MDST 4211 (3) Asian Media and Culture**
Offers an understanding of the various people, cultures and nations of East Asia through their media systems. Provides a critical overview of the historical, cultural, social, political and economic dimensions of East Asian communication systems in today's digitally connected/disconnected world.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 5211
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Asia Content

**MDST 4220 (3) Viral Video & Media**
Students will examine how viral videos are produced and shared on social media platforms by developing an understanding of the components that make a viral video as well as by engaging in a critical analysis of those viral videos. Students will engage in critical analysis, consider strategies for virality, and learn about production and publishing. Students will analyze their own and their peers¿ work in terms of genre, convention, format, structure, and audience.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 5220
**Requisites:** Requires prerequisite course of MDST 2002 OR MDST 3021 (minimum grade B).

**MDST 4221 (3) Media Technology and Cultural Change**
Explores how media technologies affect social orders and shape cultural practices across the globe. Compares and critically evaluates different theories of technology, emphasizes the social construction of technology, asks how media technologies inform conceptions of social reality and individual identity and considers how media technologies can be understood across a range of academic disciplines.
**Requisites:** Requires prerequisite courses of MDST 2002 and MDST 3001 and MDST 3002 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior).
**Grading Basis:** Letter Grade

**MDST 4231 (3) Youth Media: Culture and Politics**
Emphasizes the sociological understandings of youth cultures, identities and practices in relation to media and politics. Topics include the influences of consumer branding, participatory culture, youth media production and representation, use of social media, mobile phones, gaming, and other digital media, and integrating them around themes of youth styles, gender, ethic, political identities, consumer culture, social behavior and other trends.
**Requisites:** Requires prerequisite course of MDST 3711 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**MDST 4241 (3) Visual Culture and Human Rights**
Provides the critical tools needed to understand images and their impact on the recognition and restitution of human rights claims. The course examines both visual practices (e.g. documentation, archiving, witnessing, advocacy and surveillance) and visual media (e.g. photography, film, video, drone and satellite images), unpacking the growing entanglement between visual culture and human rights.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**MDST 4311 (3) Mass Communication Criticism**
Introduces the critical perspectives most often employed in qualitative media analysis: semiology, structuralism, Marxism, psychoanalytical criticism, sociological criticism. Texts from contemporary print and broadcast media. Meets Practice Course Requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 5311

**MDST 4331 (3) Gender, Race, Class, and Sexuality in Popular Culture**
Studies the construction, interconnections, and replications of gender, race, class, and sexuality in popular culture and how these constructs become cultural norms and mores. Uses critical methods with a focus on producing responsible viewers and readers.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**MDST 4341 (3) International Media and Global Crises**
Examines strengths and limits on media¿s role in globalized crises (e.g. financial, climate change, health) in light of changing distribution of global power. Introduction to current crises; context-analytical approach to media technologies, financing and uses; application to national cases.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Media Studies (MDST) majors and minors, Journalism (JRNL) majors or International Affairs (IAFS) majors only.
**Additional Information:** Departmental Category: Asia Content

**MDST 4361 (3) TV and the Family in American Culture and Society**
Examines the history and character of two central institutions in American society--the family and television--to gain deeper understanding of their formative and enduring roles. Topics include: intersecting histories of the family and television; economic logic of the TV industry and programming; representations of the family in television programming; how families use and interact with television.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**MDST 4371 (3) Media and Religion**
Examines the way religion uses media as a social and political force. Introduces the major themes and trends in the mediation of religion and the religious inflection of the media in professional, popular, and emerging media contexts.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**MDST 4372 (3) Islam, Pop Culture and Media**
Explores the shifting boundaries of cultural and religious Muslim identities through media representation and production in Muslim-majority countries and in the West. Using popular culture as a complex site of struggle, this course examines how Muslims address questions of gender, ethnicity, class, democracy, sexuality, religion, and modernity in a variety of media forms and practices.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**MDST 4401 (3) Fan and Audience Studies**
Considers how audiences and fans are conceptualized, how they are constructed by media enterprises and how they operate within their cultural ecosystems. While media shape the sociocultural, political and economic dimensions of the social world, fan studies suggest a more active set of practices form sites of resistance and enable a greater degree of influence over cultural production.
**Requisites:** Requires prerequisite courses of MDST 2002 and MDST 3001 and MDST 3002 (all minimum grade C-).
**Grading Basis:** Letter Grade

**MDST 4402 (3) Transmedia Worldbuilding**
Guides students to develop entertainment concepts for transmedia delivery. Students will develop concepts and characters built around storytelling themes capable of producing serial and multimedia storylines. This course considers essential elements of storytelling; how to design and actively participate across media platforms; essential elements of meta-narratives; and how to create an immersive and interactive experience for audiences.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**MDST 4405 (3) Queer and Trans Identities in Popular Culture**
Gives students the theory, media history, and cultural frameworks to advocate for better queer & trans presentation in popular media. Uses queer studies, critical theory, media surveys, and trans theory as a tool for discussing and addressing gaps in media representation. Explores the emergence, codification, and rejection of queer and trans identities to deconstruct the documentaries, televisions shows, advertisements, print media, music, and digital media that contributed to the formation of these identities.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 5405
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**MDST 4601 (3) Media Law, Policy and Ethics**
Explores ethical and legal complexities of information and communication technology. Combines real-world inquiry with creative speculation to probe everyday ethical dilemmas faced by digital consumers, creators and coders, as well as policy-makers. Explore themes such as privacy, intellectual property, social justice, free speech, artificial intelligence, social media and ethical lessons from science fiction.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**MDST 4841 (1-6) Undergraduate Independent Study**
Involves in-depth independent research and/or project work completed under the direction of a faculty member that demonstrates learning at the upper-division level within the discipline. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 4871 (1-3) Special Topics**
Special Topics.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with a minimum of 27 hours taken.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 4931 (1-6) Internship**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Prerequisite of MDST 2002 and MDST 3001 and MDST 3002. (All require minimum grade of C-). Restricted to MDST majors
**Additional Information:** Departmental Category: Core Curriculum and General Electives

# Media Studies - Bachelor of Arts (BA)

The Bachelor of Arts in Media Studies emphasizes the creative and analytical skills needed to make sense of current and future trends in

media, and to gain a deep understanding of the history and development of various means and forms of communication.

Explorations of media theory, history, criticism, practices, popular culture, technology and emerging cultures are enhanced by practical training in media design, storytelling, digital art, online community engagement, documentary filmmaking and social media.

# Requirements

## Required Courses and Credits

Students pursuing the BA in media studies complete 12 courses, for 36 credit hours. MDST requires an internship (3 credit hours; MDST 4931) in a field of the student's choice, and a capstone course (3 credit hours; MDST 4221 or MDST 4401), both usually completed in the senior year.

| Code | Title | Credit Hours |
|---|---|---|
| **MDST Core** | | |
| **Required Courses** | | |
| MDST 1001 | Foundations of Media Studies | 3 |
| MDST 1002 | Introduction to Social Media | 3 |
| MDST 2002 | Media and Communication History | 3 |
| MDST 3001 | Media Research | 3 |
| MDST 3002 | Digital Culture and Politics | 3 |
| MDST 4221 | Media Technology and Cultural Change | 3 |
| or MDST 4401 | Fan and Audience Studies | |
| MDST 4931 | Internship | 3 |
| Students would then take six hours of Media Practice courses offered by MDST, other departments or programs in CMDI or departments outside CMDI. Courses meeting this requirement include: MDST 1003, MDST 2010, MDST 2011, MDST 2012, MDST 2031, MDST 2032, MDST 3341, MDST 4003, MDST 4071, MDST 4220, MDST 4331, MDST 4402, ATLS 1300, ATLS 2000, ATLS 2100, ATLS 2200, ATLS 2300, CMDP 2500, CMDP 2860, CMDP 2870, CMDP 3510, CMDP 3600, CMDP 3610, CMDP 3620, CMDP 3700, CMDP 3720, CMDP 3810, CMDP 3820, CMDP 3830, CMDP 3840, CMDP 3860, CMDP 4610, CMDP 4620, CMDP 4640, CMDP 4900, INFO 1111, INFO 1121, INFO 4602, JRNL 2001, JRNL 3102, JRNL 3552, JRNL 3614 and JRNL 3644. | | 6 |
| **Electives/Areas of Concentration** | | |
| Select three courses from any of the following (at least one must be upper division): [1] | | 9 |
| **Media, Technology & Society** | | |
| MDST 2010 | Media and Social Movements [2] | |
| MDST 2011 | Disruptive Entrepreneurship in the Internet's New Economies [2] | |
| MDST 2012 | Hacker Culture [2] | |
| MDST 2032 | Visual Literacies & Design [2] | |
| MDST 2046 | Future Histories of Technology | |
| MDST 3021 | Comic Books: Culture and Industry | |
| MDST 3101 | History of Computing and Information | |
| MDST 3022 | Social Media Cultures | |
| MDST 3331 | Sports-Media Complex | |
| MDST 3341 | Designing Alternative Media Platforms [2] | |
| MDST 3401 | Media, Food and Culture | |
| MDST 3711 | Media and Popular Culture | |
| MDST 4111 | Crime, Media and Contemporary Culture | |
| MDST 4121 | Deconstructing Disney: Mediated American Mythology | |
| MDST 4221 | Media Technology and Cultural Change | |
| MDST 4311 | Mass Communication Criticism [2] | |
| MDST 4331 | Gender, Race, Class, and Sexuality in Popular Culture | |
| MDST 4361 | TV and the Family in American Culture and Society | |
| MDST 4371 | Media and Religion | |
| MDST 4372 | Islam, Pop Culture and Media | |
| MDST 4401 | Fan and Audience Studies | |
| MDST 4402 | Transmedia Worldbuilding [2] | |
| MDST 4601 | Media Law, Policy and Ethics | |
| MDST 4841 | Undergraduate Independent Study | |
| MDST 4871 | Special Topics | |
| **Global Media Industries & Culture** | | |
| MDST 2001 | Introduction to Global Media | |
| MDST 2010 | Media and Social Movements [2] | |
| MDST 3201 | Media, Culture and Globalization | |
| MDST 3321 | Media Industries and Economics | |
| MDST 3331 | Sports-Media Complex | |
| MDST 3401 | Media, Food and Culture | |
| MDST 4211 | Asian Media and Culture | |
| MDST 4241 | Visual Culture and Human Rights | |
| MDST 4341 | International Media and Global Crises | |
| MDST 4371 | Media and Religion | |
| MDST 4372 | Islam, Pop Culture and Media | |
| MDST 4601 | Media Law, Policy and Ethics | |
| MDST 4841 | Undergraduate Independent Study | |
| MDST 4871 | Special Topics | |
| **Advocacy, Entrepreneurship & Social Change** | | |
| MDST 1003 | Critical Media Literacies [2] | |
| MDST 1009 | Truth, Beauty, and Conspiracy | |
| MDST 2010 | Media and Social Movements [2] | |
| MDST 2011 | Disruptive Entrepreneurship in the Internet's New Economies [2] | |
| MDST 2012 | Hacker Culture [2] | |
| MDST 2031 | Documentary and Social Change [2] | |
| MDST 3321 | Media Industries and Economics | |
| MDST 3341 | Designing Alternative Media Platforms [2] | |
| MDST 3401 | Media, Food and Culture | |
| MDST 3711 | Media and Popular Culture | |
| MDST 3791 | Media and the Public | |
| MDST 4003 | Digital Media Production and Design [2] | |
| MDST 4071 | Screenwriting [2] | |
| MDST 4220 | Viral Video & Media [2] | |
| MDST 4231 | Youth Media: Culture and Politics | |
| MDST 4405 | Queer and Trans Identities in Popular Culture | |
| MDST 4601 | Media Law, Policy and Ethics | |
| MDST 4841 | Undergraduate Independent Study | |
| MDST 4871 | Special Topics | |

| | | |
|---|---|---|
| **Self-Designed Concentration** | | |
| MDST 4841 | Undergraduate Independent Study | |
| MDST 4871 | Special Topics | |
| **Total Credit Hours** | | **36** |

1 The concentrations represent the priorities and specialities of the MDST curriculum, but students work with faculty to develop their own concentrated emphasis from available electives (to help determine which courses may or may not need to be available).

2 Meets Practice Course Requirement.

## Secondary Area of Study

In addition to coursework required for the major, all students in MDST must complete a secondary area of study outside of MDST. This secondary area of study can be met by any of the following: a minor, a second major within CMDI, a double degree or any credit-based certificate program of at least 12 credit hours.

# Sample Four-Year Plan of Study

This sample plan of study is one possible approach to completing degree requirements and that students should use their degree audit and work with their academic advisors to plan classes.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| CMDI 1040: Foundational Concepts and Creativity in Communication, Media, Design and Information (4) or CMDI Elective (3) | | |
| MDST 1001 | Foundations of Media Studies | 3 |
| Quantitative Thinking | | 3 |
| WRTG 1160 or other first year writing course | | 3 |
| | **Credit Hours** | **9** |
| **Spring Semester** | | |
| CMDI Elective (3) or CMDI 1040: Foundational Concepts and Creativity in Communication, Media, Design and Information (4) | | 3 |
| MDST 1002 | Introduction to Social Media | 3 |
| CMDI Core Computing | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 6 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| MDST 2002 | Media and Communication History | 3 |
| CMDI Core (Natural World) | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 7 |
| Secondary Area | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| Media Practice course | | 3 |
| CMDI Core (Natural World w/Lab) | | 4 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 6 |
| Secondary Area | | 3 |
| | **Credit Hours** | **16** |
| **Year Three** | | |
| **Fall Semester** | | |
| MDST 3001 | Media Research | 3 |
| Media Practice course. Courses meeting this requirement include: MDST 1003, MDST 2010, MDST 2011, MDST 2012, MDST 2031, MDST 2032, MDST 3341, MDST 4003, MDST 4071, MDST 4220, MDST 4402, MDST 4311, ATLS 1300, ATLS 2000, ATLS 2100, ATLS 2200, ATLS 2300, CMDP 2500, CMDP 2860, CMDP 2870, CMDP 3510, CMDP 3600, CMDP 3610, CMDP 3620, CMDP 3700, CMDP 3720, CMDP 3810, CMDP 3820, CMDP 3830, CMDP 3840, CMDP 3860, CMDP 4610, CMDP 4620, CMDP 4640, CMDP 4900, INFO 1111, INFO 1121, INFO 4602, JRNL 2001, JRNL 3102, JRNL 3552, JRNL 3614 and JRNL 3644 | | 3 |
| CMDI core or elective (P/S; H & A; Hist V; Div & Global) | | 6 |
| Secondary Area | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| MDST 3002 | Digital Culture and Politics | 3 |
| MDST Electives | | 6 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 3 |
| Secondary Area | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| MDST 4221 or MDST 4401 capstone course | | 3 |
| Area of Media Concentration | | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 3 |
| Secondary Area | | 6 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| MDST 4931 | Internship | 3 |
| CMDI Core or elective (P/S; H & A; Hist V; Div & Global) | | 9 |
| Secondary Area | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **116** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Awareness of communication and power within and across networks.
- An understanding of the historic and contemporary systems of inequity across social identities, nationalities, socioeconomic class and the role of media, communication and information in both creating and addressing them.
- Competence to conduct research using at least one method appropriate to media research.
- The ability to produce compelling and effective problem-solving in their given fields.

# Media Studies - Minor

The minor in media studies (MDST) emphasizes the creative and analytical skills needed to make sense of current and future trends in media, and to gain a deep understanding of the history and development of various means and forms of communication.

Explorations of media theory, history, criticism, practices, popular culture, technology and emerging cultures are enhanced by practical training in media design, storytelling, digital art, online community engagement, documentary filmmaking and social media.

## Requirements

A minimum of 18 credit hours is required for the minor, including 9 credit hours of courses numbered 3000 or above.

All courses counted toward the minor must be completed with a grade of C- or better. No pass/fail work may be applied. No more than six credit hours of transfer work may be applied to the minor, including 3 hours of upper-division credit. The grade point average for minor degree coursework must be equal to 2.00 or higher.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MDST 1001 | Foundations of Media Studies [1] | 3 |
| or MDST 1002 | Introduction to Social Media | |
| MDST 2002 | Media and Communication History [1] | 3 |
| **Additional Courses** | | |
| Select 12 hours of MDST courses, 9 of which must be 3000 or 4000 level [1] | | 12 |
| MDST 1001 | Foundations of Media Studies | |
| MDST 1009 | Truth, Beauty, and Conspiracy | |
| MDST 1002 | Introduction to Social Media | |
| MDST 1003 | Critical Media Literacies | |
| MDST 2001 | Introduction to Global Media | |
| MDST 2010 | Media and Social Movements | |
| MDST 2011 | Disruptive Entrepreneurship in the Internet's New Economies | |
| MDST 2012 | Hacker Culture | |
| MDST 2031 | Documentary and Social Change | |
| MDST 2032 | Visual Literacies & Design | |
| MDST 2046 | Future Histories of Technology | |
| MDST 3001 | Media Research | |
| MDST 3002 | Digital Culture and Politics | |
| MDST 3021 | Comic Books: Culture and Industry | |
| MDST 3022 | Social Media Cultures | |
| MDST 3101 | History of Computing and Information | |
| MDST 3201 | Media, Culture and Globalization | |
| MDST 3321 | Media Industries and Economics | |
| MDST 3331 | Sports-Media Complex | |
| MDST 3341 | Designing Alternative Media Platforms | |
| MDST 3401 | Media, Food and Culture | |
| MDST 3711 | Media and Popular Culture | |
| MDST 3791 | Media and the Public | |
| MDST 4003 | Digital Media Production and Design | |
| MDST 4071 | Screenwriting | |
| MDST 4111 | Crime, Media and Contemporary Culture | |
| MDST 4121 | Deconstructing Disney: Mediated American Mythology | |
| MDST 4211 | Asian Media and Culture | |
| MDST 4220 | Viral Video & Media | |
| MDST 4221 | Media Technology and Cultural Change | |
| MDST 4231 | Youth Media: Culture and Politics | |
| MDST 4241 | Visual Culture and Human Rights | |
| MDST 4311 | Mass Communication Criticism | |
| MDST 4331 | Gender, Race, Class, and Sexuality in Popular Culture | |
| MDST 4341 | International Media and Global Crises | |
| MDST 4361 | TV and the Family in American Culture and Society | |
| MDST 4371 | Media and Religion | |
| MDST 4372 | Islam, Pop Culture and Media | |
| MDST 4401 | Fan and Audience Studies | |
| MDST 4402 | Transmedia Worldbuilding | |
| MDST 4405 | Queer and Trans Identities in Popular Culture | |
| MDST 4601 | Media Law, Policy and Ethics | |
| MDST 4841 | Undergraduate Independent Study | |
| MDST 4871 | Special Topics | |
| MDST 4931 | Internship | |
| **Total Credit Hours** | | **18** |

[1] The minor requires either MDST 1001 or MDST 1002 as a core course. The other introductory course may be used as an elective towards the 18 required hours, but the minor must still result in 18 hours (the introductory course used as a core requirement does not also count as an elective).

## Learning Outcomes

By the completion of the program, students will be able to:

- Awareness of communication and power within and across networks.
- An understanding of the historic and contemporary systems of inequity across social identities, nationalities, socioeconomic class and the role of media, communication and information in both creating and addressing them.
- Competence to conduct research using at least one method appropriate to media research.
- The ability to produce compelling and effective problem-solving in their given fields.

# Sports Media

CMDI provides students with training in all areas of sports media through its programs in Journalism and through its interdisciplinary Sports Media Minor. These programs allow students the opportunity to study sports as culture, as communication, as an industry and as a social force.

The Sports Media Minor offers students the freedom to explore many aspects of one of the largest industries in the world. The minor harnesses the strength of all of CMDI's academic departments to deliver an introduction to numerous fields in the sports industry such as sports journalism, promotion and publicity, the economics of the industry, and sports media relations. The sports media minor is open to all CU Boulder undergraduates, regardless of college, school or major.

# Sports Media - Minor

The mission of the minor in sports media is to broaden students' understanding of the role of sports in society by enhancing the quality of public communication on sports, especially the quality of sports journalism and the delivery of sporting events. The goal of the minor is to take the student's interest in sports and provide perspective so that they can tell a meaningful story of the sport either through journalistic reporting, media relations or entertainment.

Additional information on the minor may be found on CMDI's Sports Media Minor (https://www.colorado.edu/cmci/sportsmediaminor/) webpage.

## Requirements

### Required Courses and Credits for CMDI Students

Students who minor in journalism may not use the same JRNL courses for the JRNL major or minor and for the sports media minor, with the exception of JRNL 3804. Only courses with grades of C- or better count toward the minor, and the overall minor GPA must be 2.0.

Students may apply no more than six credit hours of transfer work, including three hours of upper-division credit.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| JRNL 3804 | Sports, Media and Society | 3 |
| **Electives** | | |
| Select 4 from the list below; at least 2 must be upper-division. [1] | | 12 |
| CMCI 3910 | CMDI Practicum [2] | |
| CMCI 4021 | Prime Time: Public Performance and Leadership | |
| CMCI 4931 | Internship [2] | |
| COMM 3430 | Communication, Culture and Sport | |
| ETHN 3024 | Introduction to Critical Sports Studies | |
| ETHN 3104 | Selected Topics in American Studies (Governance of Sport) | |
| ETHN 3701 | Gender, Sport and Culture | |
| ETHN 3702 | African American Sport Experience | |
| ETHN 3704 | Athlete as a National Symbol: Nationhood/Nationalism, Sport | |
| ETHN 4714 | Sport for Social Justice | |
| HIST 2516 | America Through Baseball | |
| JRNL 2014 | Race and Sports Journalism | |
| JRNL 3251 | History of Sports Journalism | |
| JRNL 3704 | Sports Reporting I | |
| JRNL 3904 | Sports Journalism and Gender | |
| JRNL 4004 | The Sports Media Industry | |
| JRNL 4704 | Athletic Media Relations | |
| JRNL 4714 | Sports Broadcasting | |
| JRNL 4724 | Sports Announcing | |
| MDST 3331 | Sports-Media Complex | |
| PHIL 2240 | Philosophy and Sports | |
| **Total Credit Hours** | | **15** |

1 JRNL majors may not use any JRNL classes to meet the requirements in this section.

2 If students would like to take a practicum or internship: Practicums are preferred; students must petition the minor's director to be able to complete internship credit. The internship does *not* replace the internship required for the major. Prerequisites for either the practicum or the internship are MDST 3331 or JRNL 3804 and at least junior standing.

### Required Courses and Credits for Non-CMDI Students

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CMCI 2001 | Introduction to Sports Media Practices | 2 |
| JRNL 3804 | Sports, Media and Society | 3 |
| **Electives** | | |
| Select 4 from the list below; at least 2 must be upper-division, including one practice (P) and one conceptual (C) course | | 12 |
| COMM 3430 | Communication, Culture and Sport (C) | |
| CMCI 3910 | CMDI Practicum [1] | |
| CMCI 4931 | Internship [1] | |
| ETHN 3024 | Introduction to Critical Sports Studies (C) | |
| ETHN 3104 | Selected Topics in American Studies (Governance of Sport) | |
| ETHN 3701 | Gender, Sport and Culture (C) | |
| ETHN 3702 | African American Sport Experience (C) | |
| ETHN 3704 | Athlete as a National Symbol: Nationhood/Nationalism, Sport (C) | |
| ETHN 4714 | Sport for Social Justice (C) | |
| HIST 2516 | America Through Baseball (C) | |
| JRNL 2014 | Race and Sports Journalism | |
| JRNL 3251 | History of Sports Journalism | |
| JRNL 3704 | Sports Reporting I (P) | |
| JRNL 3904 | Sports Journalism and Gender | |
| JRNL 4004 | The Sports Media Industry | |
| JRNL 4704 | Athletic Media Relations (P) | |
| JRNL 4714 | Sports Broadcasting (P) | |
| JRNL 4724 | Sports Announcing (P) | |
| MDST 3331 | Sports-Media Complex | |
| PHIL 2240 | Philosophy and Sports (C) | |
| **Total Credit Hours** | | **17** |

1 If students would like to take a practicum or internship: Practicums are preferred; students must petition the minor's director to be able to complete internship credit. Prerequisites for either the practicum or the internship are CMCI 2001 and MDST 3331 or JRNL 3804 and at least junior standing.

# Education

The School of Education offers programs that prepare individuals to lead in a wide array of educational settings, including teaching in K–12 classrooms, conducting educational research, developing evidence-informed policy and designing innovative learning environments both in schools and in community-based settings.

Whether it is the dream to be a classroom teacher, a community activist or an innovator in research and policy, the School of Education programs are designed for a student's success with field-based experiences, mentorship and community at the core.

# Mission

Our mission in the School of Education is grounded in a lived commitment to democracy, diversity, equity and justice. We teach and conduct research to make a positive difference with and in schools and communities. The work of our faculty, researchers, staff and students leads to evidence-based policy and practice. We aim for our graduates to be engaged and informed educators, researchers, policymakers and community leaders.

# Licensure

The School of Education is authorized by the Colorado Department of Education and the Colorado Department of Higher Education to offer teacher preparation programs.

Because each state has its own laws and standards regarding teacher preparation, our teacher education programs do not prepare candidates for licensure in states other than Colorado. It is strongly recommended that students planning to seek professional licensure or certification in a state other than Colorado contact the appropriate licensing entity (https://www.colorado.edu/education/out-state-licensing-or-reciprocity-co-licensure-other-states/) in that state to seek information and guidance regarding licensure or certification requirements and how a degree from CU Boulder aligns with another state's requirements for licensure in advance of program completion.

# Policies & Requirements

## Admission Requirements

Individuals who are not currently enrolled at CU Boulder should apply for admission following Office of Admissions (https://www.colorado.edu/admissions/) guidelines.

Students interested in the BA in Leadership and Community Engagement or in Education Studies should apply to the School of Education. These two degrees are non-licensure degrees and can be paired with another degree outside of the School of Education. Applicants interested in becoming qualified for licensure as a teacher, should apply either to the BA in Elementary Education (grades K-6) or to the BA in Middle and High School Teaching (grades 6-12). Applicants pursuing secondary teaching grades 6-12 must also complete a content area degree, often in the College of Arts and Sciences, and will indicate on their application which degree they intend to pursue. That degree will be added to their record once the student begins their program, after consultation with a School of Education academic advisor.

Undergraduate students currently enrolled in a degree program at CU Boulder must complete an intra-university transfer (IUT) application to be considered for admission to School of Education BA or licensure programs. All IUT applicants to licensure programs must meet with a School of Education advisor before their application will be processed. Non-licensure applicants are not required to meet with an advisor before applying but are strongly encouraged to do so. Details about IUT applications, including prompts for the required essay, are available on the School of Education website (https://www.colorado.edu/education/admissions/change-or-add-your-cu-boulder-major/).

Individuals who have completed a baccalaureate degree at an accredited institution and wish to pursue secondary licensure only, may apply by following the "Post-BA Licensure Application" link on the School of Education website (https://www.colorado.edu/education/admissions/). Please note that post-baccalaureate licensure is only available for secondary licensure in mathematics, science and Spanish.

Personal statements are required of all applicants. Decisions are made holistically, with consideration to an applicant's academic record as well as supplemental materials.

## Transfer Credit

Coursework completed at another college or university will be considered for transfer credit in accordance with CU Boulder policies upon receipt of an official transcript from the credit-granting institution. (https://catalog.colorado.edu/undergraduate/admissions/transfer-college-level-credit/) Advanced Placement, International Baccalaureate, CLEP, and other approved examination credit will be evaluated in accordance with CU Boulder policies (https://catalog.colorado.edu/undergraduate/admissions/credit-examination/) upon receiving an official score report from the examining organization. Courses evaluated as direct equivalents to other CU Boulder courses will satisfy the same requirements as if the student took the class at CU Boulder. Courses that transfer without direct equivalents may satisfy content or general education requirements.

Transfer credit typically cannot satisfy specific education requirements toward licensure. Education courses approved for transfer will typically go toward elective credit. Licensure programs will take at least two years to complete, regardless of the number of credits a student is able to transfer.

## Associate's Degrees from Colorado Community Colleges

Students who have completed an Associate of Arts (AA) or Associate of Science (AS) degree from a Colorado Community College will be exempt from School of Education general education requirements. However, licensed students may still be required to complete courses toward specifically-required content requirements.

Elementary Education majors who have completed the Colorado Community College AA in Elementary Education, a Degree with Designation for statewide transfer, can finish their Elementary Education degree at CU Boulder in four consecutive fall and spring semesters, provided they took world history as one of their electives as specified in the Colorado Department of Higher Education's guide to electives for the Elementary Education degree (https://cdhe.colorado.gov/sites/highered/files/documents/Revised%20ELEMENTARY%20EDUCATION%20STAA%20IHE%20ELECTIVE%20CREDITS%20JULY%202023.pdf). Students who completed the AA without taking the world history elective will need to take a world history class as part of their CU Boulder coursework.

## Scholarships and Awards

The School of Education offers over 60 scholarships each year. Application instructions and step-by-step information is accessible through CU Boulder's scholarship application. (http://www.colorado.edu/scholarships/)

Students are eligible to apply for university-wide financial assistance through the Office of Financial Aid. State and federal programs are available for loan cancellation or forgiveness for Colorado teachers of certain subjects or who teach in designated schools serving students

from low-income families. Information about these opportunities may be found at the School of Education Financial Aid and Scholarships (https://www.colorado.edu/education/student-life/financial-aid-scholarships/) page.

# Graduation with Distinction

School of Education BA students who have a cumulative GPA of 3.75 or above upon graduation are awarded "Graduation with Distinction" honors. This designation will appear on the student's transcript and diploma.

# Academic Standards

School of Education students are responsible for familiarizing themselves with degree and/or licensure requirements detailed in the CU Boulder Catalog, the School of Education Student Handbook, and, if applicable, the School of Education Teacher Education Handbook. Students pursuing teacher licensure are in a professional program guided by a code of conduct and other requirements beyond classroom performance. A student not meeting professional licensure expectations may be subject to additional requirements or performance reviews even if they maintain satisfactory grades in their coursework, and may be transitioned to a non-licensure major if professional expectations are not fulfilled.

# Academic Standing

Please see the Undergraduate Academic Records (https://catalog.colorado.edu/undergraduate/academic-records/#academicstandingtext) page for Academic Standing information. If you have questions about academic standing and related options, see your School of Education academic advisor.

# General Education Requirements

The School of Education General Education (Gen Ed) curriculum consists of at least 40 credits in three basic categories of requirements: Skills, Distribution and Diversity. Courses used to fulfill the diversity requirements may also fulfill a distribution requirement, otherwise courses may not simultaneously fulfill more than one requirement. EDUC 3013 (https://catalog.colorado.edu/search/?P=EDUC%203013) fulfills both the Social Science Distribution and the US Perspective Diversity requirements.

- Skills requirement: 9 credits (6 Written Communication [including one upper-division course], 3 Quantitative Reasoning and Mathematical Skills) plus a third-level proficiency in a world language other than English
- Distribution requirement: 31 credits (12 Arts & Humanities, 12 Social Sciences, 7 Natural Sciences and Natural Sciences lab)
- Diversity requirement: 6 credits (3 US Perspective and 3 Global Perspective)

The world language graduation requirement for the School of Education's undergraduate BA programs is third-level proficiency in a modern or classical language (other than English). Students may fulfill this requirement by:

- Successfully completing three years of high school coursework in a single language, or
- Earning AP or IB credit for an appropriate third-semester college-level course that is part of a three-course sequence, or
- Passing, with a C- or better, an appropriate third-semester college-level course that is part of a three-course sequence, or
- Passing a CU Boulder approved language proficiency examination at third-level proficiency.

The world language area of the Skills requirement aligns with the School of Education's commitment to prepare graduates who are well equipped to serve the needs of all students and advocate for educational equity and justice in our increasingly diverse communities and schools.

# Residency Requirement

School of Education undergraduate students must complete a minimum of 30 credit hours in coursework through the Boulder campus. Of these 30 credit hours, a minimum of 15 upper-division credit hours must be completed as a matriculated student in the School of Education. A maximum of 6 credit hours completed at other University of Colorado campuses can be counted towards the minimum 30 credit hours in coursework completed through the Boulder campus. Coursework completed through a CU Boulder-approved education abroad program will count towards the 30 credit hours in coursework though the Boulder campus.

# Grading Policies

### Passing Grades

Undergraduate teacher licensure candidates must earn a grade of C- or better for a course to fulfill degree requirements, skills requirements, or content requirements for elementary or secondary licensure. For elementary education candidates, whose content requirements are the same as their distribution requirements, this means that C- or better grades must be earned in courses fulfilling distribution requirements as well.

All undergraduate teacher licensure candidates must earn a grade of B- or better in their upper-division EDUC courses to progress through course sequences required for licensure. Courses in which grades of D+, D, or D- are earned may apply toward elective credit only.

Undergraduate majors in non-licensure programs must earn grades of C- or better in all courses applied toward major requirements. A grade of D- or better is required for all other courses applied toward non-licensure undergraduate majors (e.g., skills and distribution requirements, except the world language requirement as defined above).

### Incomplete Grades

An incomplete (I) grade indicates that the student did not complete the requirements for the class by the end of the grading period for that semester, and has made a written agreement with the instructor for additional time to do so. Requests for incomplete grades must be initiated by the student and only when, for reasons beyond their control, the student is unable to complete the class requirements within the semester of enrollment.

To be eligible to request an incomplete grade in a course, a student must have

1. satisfactorily completed at least 60% of all course requirements;
2. a grade below the minimum grade required for that course to apply to degree or licensure requirements, calculating the missing coursework as zero.

If the instructor approves the request, the student and instructor should work together to generate a list of the outstanding work to be completed, its weighted value towards the final grade, and clear timelines for submission. The student must document the expectations on the Incomplete Grade Agreement Form, located on the School of Education website (https://www.colorado.edu/education/student-life/policies-forms/), and submit it for the instructor's signature.

Submission deadlines should take into consideration time needed to read the materials and submit the grade change paperwork before university grading deadlines. The university allows up to one year to complete requirements, but the instructor may specify a shorter time period. If no updated agreement is in place and work is not submitted by agreed-upon deadlines specified in the agreement, the instructor will update the grade based on the work that has been submitted at that time. It is the student's responsibility to keep track of their deadlines. If no update is submitted by the grading deadline of the semester one year after the semester in which the incomplete grade was earned, it will convert to an F grade per campus policies (https://catalog.colorado.edu/undergraduate/credits-grading/).

### Pass/Fail and No-Credit Coursework

Coursework applied toward School of Education degree, minor, certificate, or licensure requirements may not be taken pass/fail or as a no-credit course. During the Spring 2020 semester, the Boulder campus created an exception to this policy due to the COVID-19 shutdown of in-person campus activities. In accordance with the requirements for passing grades described above, P+ grades, reflective of C- or better, are required for applicability to degree or licensure requirements for courses taken in spring of 2020.

### Grade Replacement

Students may retake certain courses for grade replacement in accordance with university policies (https://www.colorado.edu/registrar/students/degree-planning/grade-replacement/).

### Grade Changes

To request a change in grade status after published deadlines (e.g. pass/fail to letter grade), you must complete and submit a School of Education Petition Form, located on the School of Education (https://www.colorado.edu/education/student-life/policies-forms/) website. Please contact your primary academic advisor for details.

### Attendance Policy

The education discipline is collaborative, therefore classroom presence and engagement is critical to appropriately reach a class's learning goals. Classes may have a maximum number of absences after which work cannot be made up and the course is automatically failed, regardless of the nature of or reason for the absence. Each course's attendance policies and expectations for make-up work will be clearly outlined in its syllabus.

## Student Grievance Policy

The School of Education Student Grievance Procedure is intended to provide a procedure for the resolution of disputes between students and faculty or staff of the School of Education, as well as procedures for handling student disciplinary matters. Please consult the School of Education's Student Handbook for the grievance procedures, located on the School of Education (https://www.colorado.edu/education/student-life/policies-forms/) website. Any question about these procedures should be directed to the Associate Dean for Undergraduate and Teacher Education.

If you have a grievance with an individual faculty member, the first step is to speak directly to the faculty member about your concerns. However, if you feel that this would put your safety or wellbeing at risk, or if this doesn't resolve the issue, please meet with your academic advisor.

Your academic advisor will help you navigate this process. If the complaint involves your academic advisor, the Director of Advising can support you in this process. Students in INVST Community Studies should first go through that program's grievance procedures.

## Advising

Academic advisors are students' primary point of contact in the School of Education, and students should maintain regular contact with their assigned advisor, including meeting at least once per semester, to ensure that they maintain progress toward graduation and licensure requirements, if applicable. Undergraduate majors will have a hold placed on their record several weeks before their assigned registration date each term, and must meet with their advisor before they will be allowed to register unless otherwise exempted. Students in secondary teacher education programs (for teaching grades 6-12), who are also completing a major outside the School of Education, should maintain contact with advisors from the School of Education and from the School, College, or Department where their content-area major is located. In addition to working with their advisor(s), students should familiarize themselves with all policies and deadlines.

Students may make appointments with an advisor through Buff Portal Advising or by emailing edadvise@colorado.edu. More information is available on the School of Education's Advising (https://www.colorado.edu/education/student-life/advising/) webpage.

## Graduation

Students wishing to graduate at the end of a term must submit an online application to graduate in Buff Portal, meeting all appropriate application deadlines published by the Office of the Registrar. Students who do not apply to graduate will not have degrees conferred, regardless of completion of requirements, and must apply to graduate for a future term.

Both the university and the School of Education hold graduation ceremonies only at the end of the spring semester. The School of Education spring ceremony is open to School of Education majors, minors, and certificate students who graduate that semester, as well as those who graduated in the previous fall or summer and those who will graduate in the subsequent summer or fall. The ceremony is also open to students pursuing teaching licensure who complete their student teaching in the spring or the previous fall semesters, regardless of the term in which they graduate (if different).

Students who apply to graduate but do not fulfill all degree requirements by the deadline for that term/year must submit a new online graduation application for the term in which they will fulfill remaining requirements.

# Programs of Special Interest

## CU Engage

The mission of CU Engage is to leverage the resources of the Boulder campus to work collaboratively with community groups to address complex public challenges. CU Engage, which is part of the School of Education, develops and sustains equity-oriented partnerships, organizes opportunities for students to learn alongside community members and supports participatory research methods focused on the public good.

CU Engage provides support for two focal activities: 1) community-based learning pathways and 2) community-based research. These activities are linked through the formation of community partnerships that support both learning and research. Community-based learning pathways—including INVST Community Studies, Public Achievement, CU Dialogues and the Leadership Studies Minor—prioritize experience (learning by doing), reciprocity (work with rather than for communities) and intellectual rigor rooted in academic disciplines. Community-based research refers to projects that bring people together with varied training and expertise, working collectively in mutually beneficial ways, on research studies that matter to the public.

## Equity & Diversity Initiatives

As an important part of its mission, the CU Boulder School of Education has a strong commitment to democracy, diversity and social justice. Given that education is a cornerstone of individuals' life chances and opportunities as well as an informed and engaged public, the unwavering evidence of inequality in American education demands the sustained and dedicated attention of researchers, educators and policymakers.

### Education Diversity Scholars Program

The Education Diversity Scholars (EDS) program works with the University of Colorado's LEAD Alliance Neighborhood to provide students of color and first-generation college students with social and academic support, as well as advising on financial support and career preparation. The goal of the program is to offer students a welcoming environment and a strong support network in order to help them excel in their chosen fields. By participating in the Education Diversity Scholars neighborhood, students have access to the personal contact and support of a small community while still being able to take advantage of the benefits of a large university.

### INVST Community Studies

Consistent with their vision for a just and sustainable world, the INVST Community Studies program develops engaged citizens and leaders who work for the benefit of humanity and the environment. INVST Community Studies innovatively operates as a community-based organization, practicing service learning and participatory education. In order to fulfill this mission, the program offers:

- Comprehensive two-year Community Leadership Program (CLP) focused on developing community leaders who engage in compassionate action as a lifetime commitment;
- Community Studies electives that foster civic responsibility and leadership potential;
- Public Achievement Program where CU undergrads coach local primary and secondary school students in the design and implementation of public action projects; and
- Youth Council for Public Policy that empowers young people to use the democratic process as a tool for positive social change.

The INVST CLP offers a unique and transformational educational experience to all majors. Each year the INVST CLP admits a small group of students who are committed to making a positive difference with their lives. The two-year program is designed to cultivate deep understanding about issues facing people and the planet and to provide skills and experiences for community leaders to fulfill progressive visions for change. Specifically, students participate in theory classes, skills-training classes and two summer service-learning experiences, one domestic and one international. In addition, students intern six hours each week with community-based organizations during their first academic year, and collectively design, implement and evaluate community leadership projects during their second academic year. Students learn and serve together in a small group environment throughout the program. Applications for the INVST CLP are due every year in February.

### Multicultural Leadership Scholars Program

The Multicultural Leadership Scholars (MLS) program offers engaging courses, advising and co-curricular activities, and is open to first-year students from all majors. Based on a social justice approach, coursework for the the MLS program emphasizes that building community, collaboration, ethical reflection, respect and valuing diversity are hallmarks of contemporary leadership practice. Taking classes as a Multicultural Leadership Scholar as a first-year student allows one to complete 8 of the 16 credits needed to earn a Leadership Studies Minor.

## STEM Initiatives

CU is a leader in Science Technology Engineering and Math (STEM) education. The School of Education, in collaboration with the College of Arts & Sciences, developed and is a national leader in the Learning Assistant model. Additionally, CU Boulder was one of the original 13 institutions selected to replicate the U Teach Model which started at the University of Texas, Austin. Both the LA and CU Teach programs help us prepare outstanding secondary math and science teachers.

The Learning Assistant (LA) Model at CU Boulder uses the transformation of large-enrollment science courses as a mechanism for achieving four goals:

- Recruit and prepare talented science majors for careers in teaching;
- Engage science faculty in the recruitment and preparation of future teachers;
- Improve the quality of science education for all undergraduates; and
- Transform departmental cultures to value research-based teaching for ourselves and for our students.

The transformation of large-enrollment courses involves creating environments in which students can interact with one another, engage in collaborative problem solving and articulate and defend their ideas. To accomplish this, undergraduate LAs are hired to facilitate small-group interaction in our large-enrollment courses.

CU Teach is a four-year degree/licensure program that allows students to complete a rigorous education in a mathematics, science or engineering major and fulfill requirements for a Colorado initial teaching license in secondary mathematics or secondary science. It is a unique collaborative program between the College of Arts and Sciences, the College of Engineering and Applied Science, and the School of Education. CU Teach students get immediate hands-on teaching experience by enrolling in the first course in the program, EDUC 2035 Designing STEM

Learning Environments and Experiences. Students can enroll in EDUC 2035 as early as their first semester at CU. In addition to taking courses from research faculty in the School of Education, the College of Arts & Sciences, and the College of Engineering and Applied Science, CU Teach students get support from Mentor Teachers (current K–12 teachers) and Master Teachers (CU faculty who are veteran classroom teachers). The student organization hosts activities and events that are social as well as service-oriented, and that help students develop career networks.

# Programs of Study

The School of Education provides initial teacher licensure programs that ensure rigorous content preparation and extensive clinical experience in local partner schools. Initial teacher licensure programs are available at the undergraduate, post-baccalaureate and master's level. The School of Education collaborates with the College of Arts & Sciences, the College of Engineering and Applied Science and the College of Music to design initial teacher licensure programs for undergraduates that combine a major in Arts & Sciences, Engineering and Applied Science or Music with courses and field experiences in education. Undergraduates pursing licensure in Secondary or K–12 Music complete the teacher licensure requirements while earning a bachelor's degree from another college on campus. Undergraduate students interested in K–6 Elementary Education pursue a major in Elementary Education.

The Education Studies major is an option for undergraduates interested in the study of education, but not necessarily classroom teaching. This program does not lead to teacher licensure but rather prepares students for a broad range of career paths, which could include advocacy, policymaking, higher education or graduate work.

The Leadership and Community Engagement major integrates college courses with work in real world settings. Through this program, undergraduates are provided opportunities to participate in community-based research and programs.

In addition, the School of Education offers two undergraduate minors – one in Education and one in Leadership Studies – and an undergraduate certificate in STEM Education.

**Course codes for the programs are EDUC, INST, INVS, and LEAD.**

## Bachelor's Degrees

- Education Studies - Bachelor of Arts (BA) (p. 792)
- Elementary Education - Bachelor of Arts (BA) (p. 794)
- Leadership and Community Engagement - Bachelor of Arts (BA) (p. 798)

## Minors

- Education - Minor (p. 808)
- Leadership Studies - Minor (p. 809)

## Certificates

- STEM Education - Certificate (p. 813)

## Teacher Licensure Programs

- Post-Baccalaureate (p. 814)
- Undergraduate Teacher Licensure (p. 821)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Boardman, Alison Gould (https://experts.colorado.edu/display/fisid_141887/)
Associate Professor; PhD, University of Texas at Austin

Boninger, Faith Gleicher (https://experts.colorado.edu/display/fisid_150087/)
Assistant Research Professor; PhD, Ohio State University

Braaten, Melissa (https://experts.colorado.edu/individual/fisid_157744/)
Associate Professor, Associate Dean; PhD, University of Washington

Briggs, Derek Christian Mauthner (https://experts.colorado.edu/display/fisid_129597/)
Professor; PhD, University of California, Berkeley

Cartun, Ashley (https://experts.colorado.edu/display/fisid_157851/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Contreras, Ana (https://experts.colorado.edu/display/fisid_168932/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Crawley, Adam (https://experts.colorado.edu/display/fisid_172505/)
Associate Teaching Professor; PhD, University of Georgia

DiStefano, Philip (https://experts.colorado.edu/display/fisid_101934/)
Dean Emeritus, Professor; PhD, Ohio State University

Donato, Ruben (https://experts.colorado.edu/display/fisid_105537/)
Professor Emeritus; PhD, Stanford University

Dutro, Elizabeth (https://experts.colorado.edu/display/fisid_141157/)
Professor, Associate Dean; PhD, University of Michigan Ann Arbor

Dyrness, Andrea E. (https://experts.colorado.edu/display/fisid_159487/)
Associate Professor; PhD, University of California-Berkeley

Engel, Mimi (https://experts.colorado.edu/display/fisid_159488/)
Associate Professor; PhD, Northwestern University

Escamilla, Kathy M. (https://experts.colorado.edu/display/fisid_109224/)
Professor Emerita; PhD, University of California, Los Angeles

Farrell, Caitlin (https://experts.colorado.edu/display/fisid_155193/)
Associate Research Professor; PhD, University of Southern California

Furtak, Erin M. (https://experts.colorado.edu/display/fisid_144504/)
Professor; PhD, Stanford University

Gleason, Emily (https://experts.colorado.edu/display/fisid_164268/)
Teaching Professor, Faculty Director; PhD, University of California, Berkeley

Glenn, Wendy J. (https://experts.colorado.edu/display/fisid_159489/)
Professor; PhD, Arizona State University

Gort, Mileidis (https://experts.colorado.edu/display/fisid_157992/)
Professor, Associate Dean; EdD, Boston University

Gumina, Deena (https://experts.colorado.edu/display/fisid_168202/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Gurantz, Oded (https://experts.colorado.edu/display/fisid_171734/)
Associate Professor; PhD, Stanford University

Hackett, Chelsea (https://experts.colorado.edu/display/fisid_148516/)
Assistant Teaching Professor; PhD, New York University

Her Many Horses, Ian (https://experts.colorado.edu/display/fisid_144780/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Hildreth, Roudy (https://experts.colorado.edu/display/fisid_155457/)
Assistant Teaching Professor; PhD, University of Minnesota

Jurow, Aachey Susan (https://experts.colorado.edu/display/fisid_129478/)
Professor, Associate Dean; PhD, University of California, Berkeley

Kirshner, Benjamin R. (https://experts.colorado.edu/display/fisid_134707/)
Professor; PhD, Stanford University

Korbelik, Jennifer (https://experts.colorado.edu/display/fisid_165078/)
Assistant Teaching Professor; MA, University of Denver

Leonardi, Bethy (https://experts.colorado.edu/display/fisid_151475/)
Associate Professor; PhD, University of Colorado Boulder

Lindsay, William (https://experts.colorado.edu/display/fisid_168224/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Lopez, Enrique J. (https://experts.colorado.edu/display/fisid_151426/)
Associate Professor, Faculty Director; PhD, Stanford University

McIntosh, Betsy (https://experts.colorado.edu/display/fisid_160017/)
Assistant Teaching Professor; PhD, University of Pennsylvania

Meyer, Elizabeth Jackson (https://experts.colorado.edu/display/fisid_156354/)
Professor; PhD, McGill University (Canada)

Molnar, Alex John (https://experts.colorado.edu/display/fisid_148836/)
Research Professor; MSW, University of Wisconsin-Milwaukee

Moses, Michele S. (https://experts.colorado.edu/display/fisid_141025/)
Professor, Vice Provost; PhD, University of Colorado Boulder

Nogueron-Liu, Silvia (https://experts.colorado.edu/display/fisid_155783/)
Associate Professor; PhD, Arizona State University

Nzinga, Kalonji (https://experts.colorado.edu/display/fisid_165958/)
Assistant Professor; PhD, Northwestern University

Otero, Valerie K. (https://experts.colorado.edu/display/fisid_118377/)
Professor, Faculty Director; PhD, University of California, San Diego

Palmer, Deborah (https://experts.colorado.edu/display/fisid_157996/)
Professor; PhD, University of California, Berkeley

Pasquesi, Kira (https://experts.colorado.edu/display/fisid_158236/)
Associate Teaching Professor; PhD, University of Iowa

Penuel, William Richard (https://experts.colorado.edu/display/fisid_149719/)
Distinguished Professor; PhD, Clark University

Polman, Joseph Louis (https://experts.colorado.edu/display/fisid_151296/)
Professor, Associate Dean; PhD, Northwestern University

Rexroth, Grace (https://experts.colorado.edu/display/fisid_167469/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Santiago Schwarz, Vanessa (https://experts.colorado.edu/display/fisid_163872/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Schultz, Kathy (https://experts.colorado.edu/individual/fisid_157988/)
Professor; PhD, University of Pennsylvania

Scornovacco, Karla
Assistant Teaching Professor; PhD, University of Colorado Boulder

Shear, Benjamin R. (https://experts.colorado.edu/display/fisid_157747/)
Assistant Professor; PhD, Stanford University

Shepard, Lorrie A. (https://experts.colorado.edu/display/fisid_105949/)
Professor Emeritus; PhD, University of Colorado Boulder

Sideris, Sabrina (https://experts.colorado.edu/display/fisid_120493/)
Assistant Teaching Professor; PhD, University of Denver

Sinha, Vandna (https://experts.colorado.edu/display/fisid_165162/)
Associate Research Professor; PhD, University of Denver

Staley, Sara J. (https://experts.colorado.edu/display/fisid_155137/)
Assistant Professor; PhD, University of Colorado Boulder

Stillman, Jamy A. (https://experts.colorado.edu/display/fisid_156381/)
Associate Professor; PhD, University of California, Los Angeles

Taylor, Edward V. (https://experts.colorado.edu/display/fisid_151510/)
Associate Teaching Professor; PhD, University of California, Berkeley

Valladares, Michelle
Associate Research Professor, Associate Director; PhD, University of California, Los Angeles

Van Buskirk, Allison (https://experts.colorado.edu/display/fisid_159795/)
Assistant Teaching Professor; MA, Naropa University

Veveer, Elaina
Assistant Teaching Professor; MA, University of Colorado Boulder

Webb, David C. (https://experts.colorado.edu/display/fisid_141204/)
Associate Professor; PhD, University of Wisconsin–Madison

Welner, Kevin G. (https://experts.colorado.edu/display/fisid_115565/)
Professor Emeritus; PhD, University of California, Los Angeles

White, Terrenda Corisa (https://experts.colorado.edu/display/fisid_152828/)
Associate Professor; PhD, Teachers College at Columbia University

Wilson, Terri Suzanne (https://experts.colorado.edu/display/fisid_155469/)
Associate Professor, Faculty Director; PhD, Columbia University

# Courses

## Education

**EDUC 1001 (1) Humanities Teaching for Equity: Naming**
Critically frames learning to teach for equity and justice. Focuses on naming and examining students' identities and positionalities. Orients students to the School of Education's mission and guiding principles of the Secondary Humanities program. Meets weekly on CU campus.
**Requisites:** Restricted to teacher licensure students with an EDEN-LICU, EDSS-LICU, or EDSP-LICU plan
**Grading Basis:** Letter Grade

**EDUC 1020 (1) First Year Success at CU**
Introduces first-year majors to campus resources and academic success strategies. Students learn about a wide range of topics, including time management, research, and student involvement. This course also serves as a forum for continued conversations about concepts from EDUC 3013: School in Society, as well as the social justice implications for emerging leaders and educators.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to Education (EDUC) or Leadership/Community Engagement (LDCE) majors only.

**EDUC 1080 (3) Decolonizing Education: Design for New Futures**
What does critical pedagogy mean? What does it mean to be a transformative educator? What does emancipatory, critical, culturally sustaining education praxis, actually look like? These are the central questions that guide this course. In this course, students will have the opportunity to explore the intersection of curriculum design, critical pedagogy, and learning theory through conversations with scholars, teaching sample lessons, reflective writing, practice-based pedagogical activities, and examinations of current-events related to critical pedagogy. Formerly offered as a special topics course.
**Grading Basis:** Letter Grade

**EDUC 1500 (1) Success Strategies in Higher Education**
Introduces students to learning theories and a range of college success strategies to deepen their engagement with their academic work. Students will learn metacognitive practices to identify the values and aims driving their academic ambitions and craft their most successful path through their undergraduate experience.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Education

**EDUC 1580 (3) Energy and Interactions**
Engages non-physics majors in hands-on, minds-on activities and labs to investigate the physical world, the nature of science, and how science knowledge is constructed. This introductory course is especially relevant for future elementary and middle school teachers although it will meet the needs of most non-physics and non-science majors. Physics content focuses on interactions and energy.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 1580
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: General Education
MAPS Course: Chemistry
MAPS Course: Natural Science
MAPS Course: Physics

**EDUC 2001 (2) Humanities Teaching for Equity: Noticing**
Critically frames learning to teach for equity and justice. Focuses on noticing classroom and school spaces. Orients students to the School of Education's mission and guiding principles of the Secondary Humanities program. Meets weekly on CU campus. Includes 4 hours of middle school practicum each week.
**Requisites:** Requires prerequisite or corequisite course of EDUC 1001 (minimum grade C-). Restricted to teacher licensure students with an EDEN-LICU, EDSS-LICU, or EDSP-LICU plan.
**Grading Basis:** Letter Grade

**EDUC 2015 (1) Elementary Mathematics and Science Teaching for Social Justice**
Working for social justice is central to teaching mathematics and science with elementary-aged children. This course engages prospective elementary teachers with a multitude of early math and science experiences that children draw upon to understand their worlds. Participants will develop interest-driven, culturally sustaining, and inclusive action plans for teaching math and science for social justice with young learners.
**Requisites:** Restricted to Elementary Education (EDEL) majors only.
**Grading Basis:** Letter Grade

**EDUC 2020 (2) Step 1: Inquiry Approaches to Teaching STEM**
Invites science, mathematics and engineering students to explore teaching as a career by providing first-hand experiences teaching science/math lessons in local elementary classrooms. Introduces theory and practice necessary to design and deliver excellent instruction. Master teachers provide ongoing support and feedback. Meets weekly on CU campus (1.5 hours/week) and involves five visits to an elementary school.
**Additional Information:** Departmental Category: General Education

**EDUC 2025 (1) Step 1: Inquiry Approach to Teaching in Informal Settings**
Invites science, mathematics and engineering students to explore teaching and learning in informal K-12 environments. Introduces theory and practice necessary to design and deliver excellent instruction. Meets weekly on CU campus (1.5 hours/week) and requires participants to work a minimum of five hours with K-12 students at STEM-related special events such as science fairs, after school programs, and science camps.
**Requisites:** Restricted to AMEN, ASTR, BCHM, CHEM, EBIO, GEOL, IPHY, MATH, MCDB, PHYS, IDEN, NRSC, Arts and Sciences Open Option majors, Exploratory Studies or College of Engineering majors, or Education minors only.
**Additional Information:** Departmental Category: General Education

**EDUC 2030 (2) Step 2: Inquiry-Based Lesson Design**
Builds on EDUC 2020 and further develops lesson design and inquiry-based teaching practice. Offers opportunity to explore teaching career and learn about middle school culture. Master teacher provides support as students design and deliver lessons in middle school classrooms. Emphasizes assessment of student learning. Meets weekly on CU campus (1.5 hours/week) and involves five visits to a local middle school.
**Requisites:** Requires prerequisite of EDUC 2020 or EDUC 4610 (all minimum grade C).
**Additional Information:** Departmental Category: General Education

**EDUC 2035 (3) Designing STEM Learning Environments and Experiences**
This introductory course to the CU Teach licensure program will facilitate students exploring secondary STEM teaching as a career and provide foundational knowledge for the design of learning environments. Following an introduction to the theory and practice behind research-based and equity-seeking STEM instruction, students will observe and team-teach lessons in a middle school classroom to obtain introductory, firsthand experience in the design of learning environments and experiences.

**EDUC 2050 (1) Step Up to Social Justice Teaching**
Engages students in theory and practice for justice-centered teaching. This first required course for majors introduces the principles guiding the elementary program and provides opportunities for students to enact those principles in collaboration with children and teachers in public school classrooms. Meets weekly on CU campus (1.25 hours/week). Involves additional visits to local schools.
**Requisites:** Restricted to School of Education (EDUC) undergraduates only
**Additional Information:** Departmental Category: General Education

**EDUC 2060 (3) Step Up to Social Justice Teaching**
Engages students in theory and practice for justice-centered teaching. This first required course for majors introduces the principles guiding the elementary education program in connection to teaching literacy, mathematics, and science. This semester-long inquiry space provides opportunities for students to observe, explore, and enact the guiding principles in collaboration with children and teachers in public school classrooms and/or other community spaces. Teacher candidates will learn how schooling can open up, sustain, and/or close down opportunities for children to be seen, heard, and regarded as knowers and do-ers.
**Requisites:** Restricted to Elementary Education (ELED-BA) majors only.

**EDUC 2125 (3) History of American Public Education**
Provides an overview of the history of American education by exploring major reforms efforts from the common school movement to "Nation at Risk." Examines what intellectuals were thinking about public schools and what ordinary people experienced in them. Assesses how differences in race/ethnicity, class, gender, and power shaped public schools.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: General Education

**EDUC 2130 (3) Teaching and Learning Math: Calculus, Trig and Adv Functions**
This course focuses on the design and facilitation of mathematics experiences that embody more active approaches to learning advanced mathematics topics, including advanced algebra, trigonometry, and calculus. The parallel investigation of mathematics content, task design, and issues of teaching and learning occur throughout the course; this intertwining of perspectives is accomplished through the use of various instructional materials, readings, activities, and mathematics curricula. One overarching goal is to engage participants in advanced mathematical reasoning, to reflect on their own knowledge of mathematical relationships, and to examine pedagogical ideas that can foster productive mathematical teaching and learning.
**Additional Information:** Arts Sci Gen Ed: Quantitative Reasoning Math

**EDUC 2150 (3) Education in Film**
Provides opportunities to view and analyze how facets of education are represented (or misrepresented) in film. Considers narratives constructed about education and how those stories fuel popular conceptions of and assumptions about students, teachers, and schools. Examines how issues of race, class, and gender are embedded in how films represent schools, teachers, students, and communities.
**Additional Information:** Departmental Category: General Education

**EDUC 2311 (3) Children's Literature and Literacy Engagement in Elementary Schools**
Focuses on teaching children's literature in elementary schools & youth organizations. Participants will understand theoretical and developmental processes associated with literary learning, methods for teaching literature in a diverse society, and the integration of classroom instruction with the Colorado Academic Content Standards that foster such processes.
**Additional Information:** Departmental Category: Elementary Education

**EDUC 2400 (3) Cultural Diversity and Awareness**
Enhances students' self-awareness in a variety of educational and cultural settings. Investigates self within a cultural context, inviting students to engage more deeply with their cultural assumptions and lenses, as well as the cultural practices and beliefs of other distinct groups. Explores themes relating to diversity through works of fiction, cultural contexts, contemplative practices, poetry, music and experiential activities.
**Additional Information:** Departmental Category: General Education

**EDUC 2411 (3) Educational Psychology for Elementary Schools**
Integrates theories and ideas from elementary school child development, educational psychology and the learning sciences. Explores theories of learning and child development and considers implications for teaching, student engagement and the design of equitable and effective learning environments. Students are required to attend a practicum off-site for this class.
**Additional Information:** Departmental Category: General Education

**EDUC 2425 (3) Foundations of Bilingual/Multicultural Education**
Provides the conceptual, linguistic, sociological, historical, political, and legal foundations that have shaped bilingual education policies, program models, and teaching and assessment practices of bilingual and multicultural education in the U.S. Designed for undergraduate elementary teacher education majors, the course presents an overview of the types of bilingual education programs and the principles that anchor equitable and quality bilingual and multicultural education for emergent bilingual students, including those identified as English learners. Can be taken concurrently with EDUC 2615 (but should not be taken after).

**EDUC 2490 (3) Educational Psychology for Elementary Schools**
This course integrates theories and ideas from human development, educational psychology, and the learning sciences. Together, we will explore theories of learning and human development and consider implications for teaching, student engagement, and the design of equitable and effective learning environments.
**Recommended:** Prerequisite EDUC 3013 School and Society.

**EDUC 2500 (3) Strategies for Social Change**
Examines strategies for social change locally and internationally. Critically explores a range of social change case studies including: community organizations, social movements, social entrepreneurship, philanthropy, political and legal advocacy and technology. Students will develop their own proposal for a social change initiative.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Education

**EDUC 2615 (3) Foundations of Language Acquisition for Bilingual Learners**
This course provides an overview of the processes associated with bilingual and biliteracy development with a focus on children who are learning and living in two (or more) languages in their homes, communities, and schools. Designed for undergraduate elementary teacher education majors and preservice teachers, the course examines the complexity of bilingualism and biliteracy in school-age children, including the roles of language and culture in schooling.
**Recommended:** Corequisite EDUC 2425.

**EDUC 2625 (3) Teaching English Language Development**
Exposes students to strategies used to teach English Language Development. Covers both theoretical and applied aspects of language learning and teaching. Exposes students to techniques, activities, strategies and resources to plan instruction for students learning English Language Development. Emphasizes oral language development, literacy and content-area instruction for teaching K-12 students.
**Additional Information:** Departmental Category: General Education

**EDUC 2800 (1-3) Special Topics**
Designed to meet needs of students with topics of interest.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General Education

**EDUC 2910 (1-3) Field Practicum 1**
Offers supervised campus and off-campus experiences tied to course work in the INVST program. See also EDUC 2920.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General Education

**EDUC 2919 (3) Renewing Democracy in Communities and Schools**
Examines curriculum theory, K-12 reform, and the concepts of citizenship, democracy, power, and diversity through classroom discussion and participation in a school-based Public Achievement program. Students will dialogue with diverse groups of people; identify multiple perspectives around controversial issues; and learn to use research and writing to articulate public problems and advocate for their solutions.
**Equivalent - Duplicate Degree Credit Not Granted:** INVS 2919
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: General Education

**EDUC 2920 (1-3) Field Practicum 2**
Offers supervised campus and off-campus experiences tied to course work in the INVST program. See also EDUC 2910.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General Education

**EDUC 3001 (2) Humanities Teaching for Equity: Negotiating**
Critically frames learning to teach for equity and justice. Focuses on how relationships are negotiated in classroom spaces. Orients students to the School of Education's mission and guiding principles of the Secondary Humanities program. Meets weekly on CU campus. Includes 4 hours of high school practicum each week.
**Requisites:** Requires prerequisite or corequisite course of EDUC 1001 (minimum grade C-). Restricted to teacher licensure students with an EDEN-LICU, EDSS-LICU, or EDSP-LICU plan.
**Grading Basis:** Letter Grade

**EDUC 3013 (3) School and Society**
Introduces students - both future teachers and those simply interested in education - to pressing issues surrounding education within the United States. The course reveals the complex relationship between schools and the larger society of which they are a part. Examines issues of diversity and equity from different disciplinary lenses, including history, philosophy, sociology and anthropology.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: General Education

**EDUC 3030 (3) Race, Class, and Gender in Young Adult Literature**
This course is designed for students who are interested in learning more about how race, class, and gender appear in literature for young people, ages 10-18, and how literary explorations of these intersecting elements of identity might enrich, complicate, and/or challenge how we see ourselves, others, and our world. Together and independently, we will read and share in conversation around several multicultural young adult texts across multiple genres, including novels, short stories, poetry, drama, and nonfiction.
**Grading Basis:** Letter Grade

**EDUC 3190 (3) Introduction to Teaching and Learning**
This course engages students in questions about what it means to teach and what it means to learn. Through readings, video, and illustrations of teaching and learning in and outside of schools, the course builds understandings about some key areas of teaching, learning, and schooling that will complement the content from other courses in the program. The course is centered in a framework of educational equity and justice that is threaded through the modules. The course is designed to support students in their post-degree goals across career contexts in which knowledge of teaching learning will enhance their work.
**Grading Basis:** Letter Grade

**EDUC 3320 (3) Literacy in the Elementary Classroom 1**
Over the two-course sequence in literacy, students in the elementary major develop a foundational knowledge of core aspects of literacy learning and instruction and apply this knowledge in practica settings, working at individual, small group, and whole-class levels. Literacy 1 focuses primarily on the structure and components of equitable and robust reading instruction in K-5 classrooms, the five pillars of the reading process (phonics, phonemic awareness, fluency, vocabulary, and comprehension), and the analysis and implementation of evidence-based reading instruction practices, with some connections to writing development and assessment and writing instruction.
**Requisites:** Requires corequisite courses of EDUC 3350 and EDUC 4535 and EDUC 4595. Restricted to Elementary Education (ELED-BA) majors only.
**Grading Basis:** Letter Grade

**EDUC 3321 (3) Literacy in the Elementary Classroom 2**
Over the course of the two-course sequence in literacy, students in the elementary major develop a foundational knowledge of core aspects of literacy learning and instruction and apply this knowledge in practica settings, working at individual, small group, and whole-class levels. Literacy 2 builds on the goals of the first course in the sequence and provides a central focus on the structure and components of equitable and robust writing instruction in K-5 classrooms. The course addresses the skills and processes of writing, how to support and engage writers, writing assessment, and the analysis and enactment of evidence-based writing instruction practices. In addition, the course includes content area literacy and continues building students¿ facilities with digital and multimodal literacy in elementary classrooms.
**Requisites:** Requires prerequisite courses of EDUC 3320 and EDUC 3350 and EDUC 4535 and EDUC 4595 (all minimum grade B-). Requires corequisite courses of EDUC 4205 and EDUC 4435 and EDUC 4455. Restricted to Elementary Education (ELED-BA) majors only.
**Grading Basis:** Letter Grade

**EDUC 3350 (3) Dis/Ability in Contemporary Classrooms**
Examines major issues in special education focusing on a) developing an inclusive stance to teaching all students; b) understanding laws, responsibilities and RTI/MTSS; c) planning for and delivering differentiated instruction in a universally designed classroom environment; e) the social construction and identification of dis/abilities; f) understanding potential variations across federal disabilities categories; g) teaching students with gifts and talents and; h) collaborating with families and professionals.
**Requisites:** Requires corequisite courses of EDUC 3320 and EDUC 4535 and EDUC 4595. Requires prerequisite or corequisite courses of EDUC 2425 and EDUC 2615 (minimum grade D-). Restricted to Elementary Education (ELED-BA) majors only.

**EDUC 3570 (3) Learning With Technology In and Out of School**
Examines ways digital media are changing the way young people learn, play, make friends, and participate in civic life. Studies widely implemented digital tools intended to support literary, math, and science learning of children ages 4-18. Involves brief internship (5 hours outside class) and design projects that integrate these tools to transform in either a classroom or after-school program.
**Additional Information:** Departmental Category: General Education

**EDUC 3621 (1-3) Art for the Elementary Teacher**
Introduces elementary education students to art education. Introduces many visual art techniques, art media and processes used in art education. Includes hands-on studio art experiences in a format that supports subjects such as literature, writing, music and social studies. Emphasizes the role of art education and materials in supporting the artistic development and visual literacy of children. Department enforced prerequisite: completion of 30 hours of course work.
**Requisites:** Restricted to School of Education (EDUC) undergraduates only
**Additional Information:** Departmental Category: Elementary Education

**EDUC 4001 (3) Framing Equity and Justice in the Humanities Classroom**
Critically frames learning to teach for equity and justice within schools as systems. Orients students to the School of Education's mission and guiding principles of the Secondary Humanities program. Provides opportunities for students to enact those principles with mentor teachers in local classrooms. Meets weekly on CU campus and involves a minimum of 50 hours in local schools.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5001
**Requisites:** Restricted to EDEN-LICU, EDSS-LICU or EDSP-LICU students.
**Grading Basis:** Letter Grade

**EDUC 4010 (3) Race and Equity in Higher Education**
This course introduces students to recent research and theory surrounding race, ethnicity, access, inclusion, and equity in higher education. It focuses on the development of knowledge, skills and awareness that is crucial in becoming an engaged scholar and practitioner in the areas of diversity, equity, and inclusion. We discuss the responsibilities, tensions, and opportunities one must have in creating and maintaining a pluralistic and inclusive campus for all. We also discuss ways in which themes of identity and diversity operate far beyond one-on-one relationships but rather extend to systems and structures that comprise a college and/or university environment.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5010

**EDUC 4015 (3) International / Comparative Education**
Comparatively studies education in other countries, emphasizing its role in developing nations, with an emphasis on successful models in basic literacy, primary education, secondary curriculum and teacher education. Analyzes political, social and economic policies and ideologies for their relevance to the development process, including the role of international organizations: World Bank, UNICEF, UNESCO, Peace corps and Volunteer Agencies.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5015
**Additional Information:** Departmental Category: General Education

**EDUC 4023 (3) Differentiating Instruction in Diverse Secondary Classrooms**
Focuses on teaching culturally and linguistically diverse students, special education students, and differentiation in the classroom. Emphasizes evidence-based teaching practices and programmatic interventions that support student learning. Includes practicum.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4351
**Requisites:** Restricted to EDEN, EDFR, EDGR, EDIT, EDJP, EDLT, EDMA, EDMU, EDSC, EDRU, EDSP, EDSS or MMED majors only.
**Additional Information:** Departmental Category: Secondary Education

**EDUC 4035 (3) Family and Community Engagement**
Supports teachers to develop, improve and maintain positive relationships between families, communities, and schools. Discusses theories of family/community engagement with focus on embracing an assets-orientation. Explores the impacts families and communities can have in education, policies that impact family/community engagement in schools, and other potential bridges and barriers to meaningful partnerships. Challenges students to understand and embrace community-driven systemic education reform.
**Requisites:** Requires prerequisite courses of EDUC 3321 and EDUC 4205 and EDUC 4435 and EDUC 4455 (all minimum grade B-). Requires corequisite courses of EDUC 4215 and EDUC 4331 and EDUC 4710. Restricted to Elementary Education (ELED-BA) majors only.
**Grading Basis:** Letter Grade

**EDUC 4050 (3) Knowing and Learning in Mathematics and Science**
Explores current theories of learning in mathematics and science at the secondary level. This course focuses on learners' opportunities to learn mathematics and science in a classroom context from the perspective of different theoretical orientations. Students examine their own assumptions about learning, and critically examine the needs of a diverse student population in the classroom. Includes a weekly two hour field component.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5050
**Requisites:** Restricted to AMEN, ASTR, BCHM, CHEM, EBIO, GEOL, IPHY, MATH, MCDB, PHYS, IDEN, NRSC, Arts and Sciences Open Option majors, Exploratory Studies or College of Engineering majors, or Education minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Secondary Education

**EDUC 4060 (3) Classroom Interactions**
Students design and implement instructional activities informed by what it means to know and learn mathematics and science, and then evaluate the outcomes of those activities on the basis of classroom artifacts. Students examine how content and pedagogy combine to make effective teaching. Students are required to work in a classroom 4 hours per week.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5060
**Requisites:** Restricted to School of Education (EDUC), Mathematics-Secondary Education (EDMA) or Science-Secondary Education (EDSC) majors only.
**Additional Information:** Departmental Category: Secondary Education

**EDUC 4110 (1-3) Cultural Mentoring with Dual Language Learners**
Introduces students to cultural mentoring, the role of cultural identity in schooling, and culturally responsive pedagogies through a partnership with a local elementary School. Students will be assigned fifth grade mentees to work with throughout the semester and will work with other mentors to plan group activities for the after-school program. Requires 2 hours/per week outside of meeting times for participant-observation at a local elementary school. Mentors can repeat the mentoring component one time for 1-credit. This course is designed for first generation and/or students from minoritized backgrounds who can serve as role models for Elementary students in a Dual Language Program. Interested students should contact the instructor prior to enrolling. Previously offered as a special topics course.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Requires prerequisite of EDUC 3013 (minimum grade C-) or Ethnic Studies (ETHN) majors. Restricted to students with 57-180 credits (Juniors or Seniors).

**EDUC 4112 (3) Adolescent Development and Learning for Teachers**
Examines current theory and research about adolescent learning and development and explore implications for secondary teaching. Topics include human diversity as a resource for learning, adversity and agency, connecting instruction to students' everyday lives, and the role of belonging and relationships in positive youth development. This course is appropriate for masters degree students.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5112
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Departmental Category: Secondary Education

**EDUC 4125 (3) Secondary World Language Methods**
Presents and discusses issues in secondary school curriculum, instruction, and classroom management as they play out in world language classroom. Examines, analyzes, and evaluates a variety of teaching strategies, their effectiveness for students, and teacher dispositions to facilitate learning. Includes in-school experiences.
**Additional Information:** Departmental Category: Secondary Education

**EDUC 4135 (3) Story and Memoir**
Explores narrative theory and the epistemological/stylistic commitments of stories as the basis for writing memoir, as well as for studying the written and spoken memoirs of others. We use the word memoir to mean a story of "how one remembers one's own life." Introduces and discusses narrative theory and selected memoirs. Students engage in reflection on their own narrative-making processes and evaluate their practical and analytic understanding of daily narrative practice.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5135
**Additional Information:** Departmental Category: Secondary Education

**EDUC 4150 (3) Introduction to Qualitative Research Methods**
Introduces students to qualitative research in education. Examines the foundations, design, methods and analysis of qualitative research methods. Readings include texts about the foundations and purposes of qualitative inquiry, and methodological readings about the application of research techniques. Students will complete a variety of small, hands-on projects that introduce major dimensions of qualitative research including observation, interviewing, and document analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5150
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Education

**EDUC 4161 (1-3) Children's Literature**
Addresses reading and evaluation of books, children's, interests, authors and illustrators, folk literature, multicultural literature, modern fanciful tales, and trends.
**Additional Information:** Departmental Category: General Education

**EDUC 4205 (3) Elementary School Mathematics Theory and Methods**
The course focuses on learning theories, different instructional practices, models, and tools that can be utilized to elicit, assess, and build on elementary students¿ mathematical reasoning. The course subscribes to a view of mathematics that (1) all students can learn mathematics, (2) that powerful mathematics learning is an active process that engages students in deep mathematical inquiry, and (3) that equitable and culturally responsive teaching of mathematics requires strong mathematics knowledge for teaching.
**Requisites:** Requires prerequisite courses of EDUC 3320 and EDUC 3350 and EDUC 4535 and EDUC 4595 (all minimum grade B-). Requires corequisite courses of EDUC 3321 and EDUC 4435 and EDUC 4455. Restricted to Elementary Education (ELED-BA) majors only.
**Grading Basis:** Letter Grade

**EDUC 4215 (3) Elementary Science Theory and Methods**
Provides pre-service elementary teachers opportunities to explore contemporary theories of learning, curriculum development, pedagogical strategies, and assessment. Blends scientific content, pedagogy, and practical applications.
**Requisites:** Requires prerequisite courses of EDUC 3321 and EDUC 4205 and EDUC 4435 and EDUC 4455 (all minimum grade B-). Requires corequisite courses of EDUC 4035 and EDUC 4331 and EDUC 4710. Restricted to Elementary Education (ELED-BA) majors only.

**EDUC 4220 (3) Gender Issues in Education**
Provides a strong foundation in the various issues of gender and sexual diversity in education. Stimulates explorations into the ways the construct of "gender" affects and is affected by the educational system and process. Presents theory and research about contemporary educational issues related to sexism, homophobia, and transphobia. Encourages development of well-considered views about the various issues, research, and theories.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite EDUC 3013.

**EDUC 4222 (3) Language Study for Educators**
Focuses on the nature of linguistic development and performance. Examines works that reflect a range of scholarly approaches to language study, explores language use both in and out of school, takes up the relationships between language practices and power and considers implications for classroom teaching.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5222
**Additional Information:** Departmental Category: General Education

**EDUC 4232 (3) Language and Literacy across the Curriculum**
Explores the relationship between language and learning in math and science classrooms with the goal of developing teaching practices that engage students in using language as a tool for understanding and constructing meaning across the curriculum. Explores how language/literacy take on different forms and functions in different social contexts and academic disciplines.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5235
**Requisites:** Restricted to undergraduate Science-Secondary Education (EDSC) or Mathematics-Secondary Education (EDMA) majors only.
**Additional Information:** Departmental Category: Secondary Education

**EDUC 4240 (3) African American Education in the United States**
Explores development of schooling for African Americans in the U.S.. Emphasizes historical and contemporary struggles of this group in their quest to access meaningful educational opportunities. Examines how social, economic, political, and judicial action defined and organized policy and practice for this group. Degree credit not granted for EDUC 4240 and 6240.
**Additional Information:** Departmental Category: General Education

**EDUC 4295 (3) Narrative and Story in the Humanities**
Explores a wide variety of texts that might be used in secondary English and Social Studies classrooms. Examines philosophies and instructional approaches to the teaching of reading and literature. Considers the influence of story and storytelling in the construction of personal and societal meaning.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5295
**Requisites:** Requires corequisite of EDUC 3001 or EDUC 4001. Restricted to teacher licensure students in English (EDEN-LICU).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Secondary Education

**EDUC 4301 (3) Queer(ing) Topics in Education**
Bring critical and queer theoretical perspectives to bear on an inquiry into what's counted as "normal" in social, historical, and political contexts of education in the United States. We'll explore queerness, queer theory, and queer pedagogy, in an effort to examine schooling as a heteronormative institution that has tended toward (re)producing heterosexism, homophobia, and violence against queer bodies and identities.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5301
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Education

**EDUC 4310 (3) Social and Emotional Learning in Schools**
Explore the ways SEL benefits students through investigating its purposes and goals, the competencies it seeks to promote, the characteristics of effective programs, and the range of program formats. We frame these topics through examining ongoing dilemmas in the field. We also conduct in-depth reviews of several programs and the research that supports them.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5310

**EDUC 4315 (3) Perspectives on Science**
Explores contemporary ideas and issues in the history, philosophy and sociology of science education and science, science as a social and cultural activity and how contemporary issues in science relate to and impact educational practice.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5315
**Additional Information:** Departmental Category: General Education

**EDUC 4316 (3) Nature of Social Studies and Social Studies Education**
Prepares teacher education candidates for teaching social studies in a social context. Participants will understand theoretical and developmental processes associated with social studies learning, methods for teaching social studies in a diverse society, andthe integration of classroom instruction with the Colorado Academic Content Standards that foster such processes.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5316
**Requisites:** Restricted to Social Studies Secondary Education (EDSS-LICU or EDSS-LICG) students only.

**EDUC 4317 (3) Perspectives on Mathematics**
Explores the historical development of mathematics as a human construct, and the relationship between the discipline and the contemporary school mathematics curriculum. Focuses on the sociology of mathematics education and how cultural traditions and societal needs influence the school mathematics curriculum and educational practice.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5317

**EDUC 4320 (3) Reading Instruction for Elementary Schools**
Participants will engage theories and processes of literacy learning, reading development, and equity-oriented teaching. Students will learn, develop, and enact instructional strategies and lessons to support all students' successful participation in a range of print and multimodal literacy practices embedded in reading instruction in elementary classrooms.
**Requisites:** Restricted to Elementary Education (EDEL) majors only.
**Additional Information:** Departmental Category: Elementary Education

**EDUC 4321 (3) Writing Instruction for Elementary Schools**
Participants will engage theories and processes of literacy learning, writing development, and equity-oriented teaching. Students will learn, develop, and enact instructional strategies and lessons to support all students' successful participation in a range of multimodal literacy practices embedded in writing instruction in elementary classrooms.
**Requisites:** Requires prerequisite courses of EDUC 3350, EDUC 4320, EDUC 4535 and EDUC 4615 (minimum grade C-). Requires corequisite courses of EDUC 4205, EDUC 4435, EDUC 4455 and EDUC 4595. Restricted to Elementary Education (ELED) majors only.
**Additional Information:** Departmental Category: Elementary Education

**EDUC 4325 (3) Queering Literacy in Secondary Classrooms**
Engages theories and practices of literacy teaching and learning that challenge multiple forms of oppression. Using the tools of queer pedagogy, students will learn, develop, and enact strategies for planning and implementing literacy instruction that moves beyond inclusion of differences in the English/language arts and social studies curriculum.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5325
**Requisites:** Restricted to students with an English-Secondary Education Licensure pan (EDEN-LICU) or Social Studies-Secondary Education Licensure plan (EDSS-LICU).
**Grading Basis:** Letter Grade

**EDUC 4330 (3) Secondary Social Studies Methods I**
Explores effective social studies teaching techniques used to prepare secondary students for success in college, career, and civic life. An emphasis is placed on interpreting sources, understanding multiple perspectives, and employing critical thinking with diverse students.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5330
**Requisites:** Requires a prerequisite of EDUC 3001 or EDUC 4001 (both minimum grade C-). Restricted to teacher licensure students in Social Studies (EDSS-LICU).
**Grading Basis:** Letter Grade

**EDUC 4331 (3) Elementary Social Studies Methods**
Prepares teacher education candidates for teaching social studies in a social justice and equity context. Participants will understand theoretical and developmental processes associated with social studies learning, culturally responsive teaching pedagogy in social studies, methods for teaching social studies in a diverse society, and the integration of classroom instruction with the Colorado Academic Content Standards.
**Requisites:** Requires prerequisite courses of EDUC 3321 and EDUC 4205 and EDUC 4435 and EDUC 4455 (all minimum grade B-). Requires corequisite courses of EDUC 4035 and EDUC 4215 and EDUC 4710. Restricted to Elementary Education (ELED-BA) majors only.
**Additional Information:** Departmental Category: Elementary Education

**EDUC 4340 (3) Advanced Issues of Assessment, Teaching, and Learning in Reading, Mathematics, and Science**
In this course, students engage with theories and practices of assessment and instruction in the key content areas of reading, mathematics, and science. This course is taught in two half-semester modules¿one focused on reading and one on mathematics/science¿and occurs in the fourth and final year of the elementary major. The course addresses issues of assessment, teaching, and learning that build from and extend knowledge and practice from the assessment course and the methods courses in the three focal content areas. Modules will examine the purposes and practices of assessment in reading, mathematics and science education in elementary education. Particular attention will be given to theoretical foundations in assessment, applications of theory in classroom practice, and the design and use of assessment techniques and tools to support teaching for student understanding. While some attention will be given to large-scale assessment, this will be necessarily limited and addressed only as it pertains to the in
**Requisites:** Requires prerequisite courses of EDUC 4035 and EDUC 4215 and EDUC 4331 and EDUC 4710 (all minimum grade B-). Requires corequisite course of EDUC 4720. Restricted to Elementary Education (ELED-BA) majors only.
**Grading Basis:** Letter Grade

**EDUC 4341 (3) Elementary Reading Assessment and Instruction**
Builds on knowledge and teaching practices introduced in EDUC 4320. Addresses five critical components of reading. Refines understanding of research-based practices for diagnostic assessments and intervention, and teaching strategies for elementary age learners. Prepares candidates to deliver a comprehensive reading curriculum in the elementary grades.
**Requisites:** Requires corequisite courses of EDUC 4331 and EDUC 5215. Restricted to Elementary Education (EDEL) majors only.
**Additional Information:** Departmental Category: Elementary Education

**EDUC 4345 (3) Secondary English Methods I**
Explores the underlying principles and philosophies of several approaches to the teaching of English in the areas of language, writing, and speaking and the practical application of these methods in the secondary classroom. Provides support in constructing activities, assignments, assessments, and units that meet the differentiated needs of students given their diverse identities, lives, interests, and needs.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5345
**Requisites:** Requires a prerequisite of EDUC 3001 or EDUC 4001 (both minimum grade C-). Restricted to teacher licensure students in English (EDEN-LICU).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Secondary Education

**EDUC 4351 (3) Language and Equity in Inclusive Learning Environmnents**
Focuses on responsive instructional approaches for elementary school students, including culturally and linguistically diverse students requiring special education services. Addresses relevant educational laws and policies aimed at protecting students' rights to a quality education. Includes practicum experiences in elementary school settings.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4023
**Requisites:** Requires corequisite course of EDUC 5205. Restricted to Music (EDMU) Education majors or Elementary (EDEL) majors only.
**Additional Information:** Departmental Category: Elementary Education

**EDUC 4355 (3) Secondary Social Studies Methods II**
Explores effective techniques associated with reading, processing, and assessing social studies subject area content with an emphasis on developing critical thinking skills and meeting the needs of diverse students.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5355
**Requisites:** Requires prerequisite course of EDUC 4330 (minimum grade C-). Restricted to Social Studies - Secondary Education (EDSS-LICU) students only.

**EDUC 4365 (3) Secondary English Methods II**
Explores the underlying principles and philosophies of several approaches to the teaching of English in the areas of reading, thinking, and viewing and the practical application of these methods in the secondary classroom. Provides support in constructing activities, assignments, assessments, and units that meet the differentiated needs of students given their diverse identities, lives, interests, and needs.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5365
**Requisites:** Requires prerequisite course of EDUC 4345 (minimum grade C-). Restricted to English - Secondary Education (EDEN-LICU) students only.

**EDUC 4375 (3-4) Problem-Based Math Instruction**
Focuses on curriculum, materials, methods and assessment, and related aspects of instruction. Introduces best practices in teaching mathematics in middle and high schools. Students are required to work in a classroom 4 hours per week. Examines the Colorado Academic Content Standards.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5375
**Requisites:** Restricted to EDCI, EDSC, or EDMA majors only.
**Recommended:** Corequisite EDUC 4023.

**EDUC 4385 (4) Phenomenon-Based Science Instruction**
Focuses on curriculum, materials, methods, assessment, and related aspects of instruction. Introduces best practices in teaching science in middle and high schools. Students are required to work in a classroom 4 hours per week. Examines the Colorado Academic Content Standards.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5385
**Requisites:** Requires prerequisite of EDUC 4060.
**Recommended:** Corequisite EDUC 4023.

**EDUC 4390 (3) Teaching for Equity and Justice**
Supports candidates as they continue to develop the skills and stance to teach for equity and justice in public school settings. Explores how educators for equity and justice sustain their commitments through ongoing learning and reflection, care for their students and themselves, and collaboration and advocacy. Supports candidates in making the transition from the university into the profession in a way that allows them to remain true to their vision of who they are and want to be as educators.
**Requisites:** Requires prerequisite course of EDUC 4330 or EDUC 4345 (all minimum grade C-). Restricted to English - Secondary Education (EDEN-LICU) and Social Studies - Secondary Education (EDSS-LICU) students only.
**Grading Basis:** Letter Grade

**EDUC 4425 (3) Introduction to Bilingual/Multicultural Education**
Provides an introduction for education minors and others with an interest in education policy and practice to bilingual and multicultural education programs for emergent bilinguals. Includes an overview of the history and legislation related to the education of emergent bilingual students, identification and placement, as well as the various models, theoretical and philosophical underpinnings, and pedagogical practices that constitute sound educational practices for emergent bilingual students.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5425
**Additional Information:** Departmental Category: General Education

**EDUC 4435 (3) Culturally Sustaining Pedagogies for Bilingual Learners**
Explores multicultural education, critical pedagogy, and culturally sustaining pedagogies, including their underlying theories, curriculum design, and curriculum examples. Students will analyze curriculum with a focus on its representation of different socio-cultural groups, identities, points of view, relationship to different communities, and ideology. Students will also begin planning, teaching, and evaluating instruction anchored in critical, culturally sustaining pedagogies.
**Requisites:** Requires prereq courses of EDUC 3320 and EDUC 3350 and EDUC 4535 and EDUC 4595 (all min B-). Requires coreq courses of EDUC 3321 and EDUC 4205 and EDUC 4455. Requires prereq or coreq courses of EDUC 2425 and EDUC 2615. RSTR to Elem Ed (ELED-BA) mjrs.

**EDUC 4455 (3) Methods of Biliteracy Instruction**
Critique and analyze the linguistic, social, political and cultural factors that influence the acquisition of literacy for emerging bilingual (EB) learners. We will examine and apply evidence-based practices that support the development of reading, writing, speaking and listening in all of the students¿ languages regardless of the program model schools enact to serve them.
**Requisites:** Requires prerequisite courses of EDUC 3320 and EDUC 3350 and EDUC 4535 and EDUC 4595 (all minimum grade B-). Requires corequisite courses of EDUC 3321 and EDUC 4205 and EDUC 4435. Restricted to Elementary Education (ELED-BA) majors only.

**EDUC 4460 (3) Teaching and Learning Physics**
Learn how people understand key concepts in physics. Through examination of physics content, pedagogy and problems, through teaching, and through research in physics education, students will explore the meaning and means of teaching physics. Students will gain a deeper understanding of how education research is done and how people learn. Useful for all students, especially for those interested in physics, teaching, and education research.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5460 and PHYS 4460 and PHYS 5460
**Requisites:** Requires prerequisite courses of PHYS 3210 and PHYS 3310 (all minimum grade C-).
**Additional Information:** Departmental Category: Graduate Education

**EDUC 4490 (3) Blurring Disciplinary Lines in the Humanities**
Explores theories, methods, and materials for building interdisciplinary connections within and across secondary English and Social Studies classrooms. Provides opportunities for collaborative work in building lessons and unit plans that challenge disciplinary boundaries and advocate for complex problem solving.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5490
**Requisites:** Requires prerequisite of EDUC 3001 or EDUC 4001 (minimum grade C-). Restricted to teacher licensure students in English (EDEN-LICU) or Social Studies (EDSS-LICU).
**Grading Basis:** Letter Grade

**EDUC 4500 (3) Community-Based Research for Social Change**
Complete a research project that draws on theories of social change and is developed in partnership with a community or civic agency. Become skilled at doing original research to address complex social problems.
**Requisites:** Requires prerequisite course of EDUC 2500 (minimum grade B-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Education

**EDUC 4513 (2) Education and Practice**
Meets during student teaching assignment. Includes topics of concern to teachers, such as classroom organization and management, lesson planning, assessment, preparation of edTPA, etc.
**Requisites:** Requires corequisite course of EDUC 4691 or 4712 or 4722. Restricted to EDEL, EDEN, EDFR, EDGR, EDJP, EDLT, EDMA, EDRU, EDSC, EDSP or EDSS majors only.
**Additional Information:** Departmental Category: General Teacher Education

**EDUC 4535 (3) Assessment for Bilingual Learners**
Introduce students to the theory, methods, practice, and problems in the testing and assessment of bilingual students at the classroom and large-scale level. Topics include the specification of English Learners as a student population and the assessment of their language proficiency and academic achievement. The course additionally addresses reliability, validity, and fairness in the testing of linguistically diverse populations.
**Requisites:** Requires corequisite courses of EDUC 3320 and EDUC 3350 and EDUC 4595. Restricted to Elementary Education (ELED-BA) majors only.

**EDUC 4595 (3) Practicum for Bilingual/Multicultural and ELD Education**
University supervised, school based field experiences teaching culturally and linguistically diverse students. Accompanies university coursework required for the Colorado endorsement in Culturally and Linguistically Diverse Education.
**Requisites:** Requires corequisite courses of EDUC 3320 and EDUC 3350 and EDUC 4535. Restricted to Elementary Education (ELED-BA) majors only.

**EDUC 4610 (2) Becoming a Learning Assistant**
Introduces undergraduate Learning Assistants (LAs) to education research, active learning, and strategies that support: (1) eliciting student ideas and helping all group members become active and engaged in the class; (2) listening and questioning; (3) building relationships; and (4) integrating learning theories with effective practices. Also "LA Pedagogy Course." Department enforced prequisite: Learning Assistant Program admission. First-semester LAs requirement.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Education

**EDUC 4611 (1) Advanced Topics in Learning Assistant Pedagogy**
Builds on education research and inclusive pedagogical principles discussed in EDUC 4610, and introduces new topics for experienced Learning Assistants to learn and apply to their LA-student interactions. This course is also referred to as Returning LA Professional Development.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of EDUC 4610 (minimum grade C-).

**EDUC 4615 (3) Language Acquisition for Bilingual Learners**
Provides an introduction for education minors and others with an interest in education and human development topics to the variables that interact in the process of bilingual development in emergent bilinguals, from birth to adolescence. These variables include the learner¿s background, motivation, linguistic, cognitive, emotional, social, cultural, and political factors. The course will examine these factors and generate understandings about how they work together to foster or inhibit successful development of bilingualism in community, home, and school contexts.

**EDUC 4620 (2) LA Mentoring I: Becoming a Mentor**
This field-based course is the second in a three-sequence course intended for Learning Assistants. This course provides opportunities for advanced Learning Assistants (LAs) to practice mentoring strategies as they mentor first-time LAs. LA mentors will observe and consult with their LA mentees each week and observe entire contexts in which LAs are used. In the seminar component of the course, LA mentors will discuss their readings about mentoring, skillful teaching, and group facilitation and they will reflect on their work with their LA mentees.
**Requisites:** Requires prerequisite course of EDUC 4610 (minimum grade C-).
**Grading Basis:** Letter Grade

**EDUC 4621 (1) Learning Assistant Mentoring in Practice: Building Inclusive Learning Communities**
Builds on education research and inclusive mentoring and pedagogical principles and practices discussed in EDUC 4610 and EDUC 4620, and creates opportunities for LA Mentors to plan for, receive feedback about, and reflect upon, their individual and group mentoring experiences.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Requires prerequisite course of EDUC 4610 and prerequisite or corequisite course of EDUC 4620 (all minimum grade C-).

**EDUC 4625 (3) Methods of Teaching English Language Development**
Prepares students to teach English as a new language in K-6 U.S. public schools. Grounded in theoretical understandings of language acquisition and development, students develop resources and strategies to plan instruction for emergent bilingual children. Oral language development, literacy, and content-area language instruction are emphasized, with a focus on supporting children¿s linguistic, cognitive, academic and social development.
**Grading Basis:** Letter Grade

**EDUC 4630 (2) LA Mentoring II: Improving the Program**
This is a continuation of EDUC 4620. LA mentors will continue to mentor first-time LAs, but they will also design and test projects intended to address issues with the LA program that they have identified in the field. LA mentors will complete instructional innovation projects through cycles of design, testing, feedback, and revision. In this course, LA mentors enact projects leading to the improvement of the LA program through improved student and faculty experiences.
**Requisites:** Requires prerequisite course of EDUC 4620 (minimum grade D-).
**Grading Basis:** Letter Grade

**EDUC 4691 (10) Student Teaching: Elementary School 1**
Kindergarten through sixth grades. Department enforced prerequisite: completion of all education and content-specific arts and sciences requirements, and passing required licensure exam.
**Requisites:** Requires corequisite course of EDUC 4513. Restricted to Elementary Education (EDEL-LICU or LICG) majors only.
**Additional Information:** Departmental Category: General Teacher Education

**EDUC 4706 (3) Assessment in Mathematics and Science Education**
Examines purposes and practices of assessment in mathematics and science education. Particular attention is given to application of theoretical foundations and contemporary research in the design and use of assessment techniques and tools to support teaching for student understanding. Addresses the role of effective formative assessment in teaching and learning.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5706

**EDUC 4710 (3) Elementary Student Teaching for Cultural and Linguistic Diversity 1**
This course is the first semester of a year-long, elementary classroom-based internship. Building on prior and concurrent Education courses, candidates are expected to design and deliver culturally and linguistically responsive instruction in collaboration with an experienced elementary teacher, as well as independently. Assignments and the required student teaching seminar support candidates to reflect critically on their practice and learning. Recommendation for a Colorado initial teaching license requires excellent performance in both semesters of student teaching.
**Requisites:** Requires prerequisite courses of EDUC 3321 and EDUC 4205 and EDUC 4435 and EDUC 4455 (all minimum grade B-). Requires corequisite courses of EDUC 4035 and EDUC 4215 and EDUC 4331. Restricted to Elementary Education (ELED-BA) majors only.
**Grading Basis:** Letter Grade

**EDUC 4712 (10) Student Teaching: Secondary School**
Student teacher apprentices in a middle/junior or senior high school. Must be admitted to a secondary teacher education program in English, Japanese, Latin, math, Russian, science or social studies. Department enforced prerequisites: completed all education and content-specific artsand sciences courses and passed required licensure exam.
**Requisites:** Requires corequisite course of EDUC 4513. Restricted to EDEN, EDJP, EDLT, EDMA, EDRU, EDSC or EDSS (LICU or LICG) majors only.
**Additional Information:** Departmental Category: General Teacher Education

**EDUC 4715 (3) Elementary Student Teaching Seminar Part 1**
This seminar supports sense making during elementary student teaching through deliberative dialogues, culture circles, and teacher inquiry. During the final year of the Elementary Education program, teacher candidates complete advanced coursework and engage in extended student teaching field experiences in local schools. These activities raise important problems of practice that can fuel teacher learning. This seminar provides structure, support, and guidance from skillful facilitators and peers to support sensemaking during the elementary student teaching experience.
**Requisites:** Requires co-requisite course of EDUC 4710. Restricted to Elementary Education (ELED-BA) majors only.
**Grading Basis:** Letter Grade

**EDUC 4716 (3) Basic Statistical Methods**
Introduces descriptive statistics including graphic presentation of data, measures of central tendency and variability, correlation and prediction, and basic inferential statistics, including the t-test.
**Additional Information:** Departmental Category: General Education

**EDUC 4720 (9) Elementary Student Teaching for Cultural and Linguistic Diversity 2**
This course is the second semester of a year-long, elementary classroom-based internship. Building on prior and concurrent Education courses, candidates are expected to design and deliver culturally and linguistically responsive instruction in collaboration with an experienced elementary teacher, as well as independently. Assignments and the required student teaching seminar support candidates to reflect critically on their practice and learning. Recommendation for a Colorado initial teaching license requires excellent performance in both semesters of student teaching.
**Requisites:** Requires prerequisite courses of EDUC 4035 and EDUC 4215 and EDUC 4331 and EDUC 4710 (all minimum grade B-). Requires corequisite course of EDUC 4340. Restricted to Elementary Education (ELED-BA) majors only.
**Grading Basis:** Letter Grade

**EDUC 4722 (5) Student Teaching: Secondary School 2**
Student teacher apprentices in a middle/junior high or senior high school. Department enforced prerequisites: completed all education and content-specific arts and sciences courses and passed required licensure exam.
**Requisites:** Requires corequisite course of EDUC 4513. Restricted to EDFR, EDGR or EDSP (LICU or LICG) majors only.
**Additional Information:** Departmental Category: General Teacher Education

**EDUC 4725 (3) Elementary Student Teaching Seminar Part 2**
This seminar supports sense making during elementary student teaching through deliberative dialogues, culture circles, and teacher inquiry. During the final year of the Elementary Education program, teacher candidates complete advanced coursework and engage in extended student teaching field experiences in local schools. These activities raise important problems of practice that can fuel teacher learning. This seminar provides structure, support, and guidance from skillful facilitators and peers to support sensemaking during the elementary student teaching experience.
**Requisites:** Requires co-requisite course of EDUC 4720. Restricted to Elementary Education (ELED-BA) majors only.
**Grading Basis:** Letter Grade

**EDUC 4732 (4-12) Student Teaching K-12**
Required experience for music students seeking education at both elementary and secondary levels. Department enforced prerequisites: completed all education and content-specific music courses and passed required licensure exam.
**Requisites:** Requires corequisite course of MUSC 4193. Restricted to EDMU (LICU or LICG) majors only.
**Additional Information:** Departmental Category: General Teacher Education

**EDUC 4742 (9) Student Teaching: Secondary for Engineers**
Student teacher apprentices in a middle/junior or senior high school. Must be admitted to a secondary teacher education program in English, Japanese, Latin, math, Russian, science or social studies. Department enforced prerequisites: completed all education and content-specific arts and sciences courses and passed required licensure exam.
**Requisites:** Requires a prerequisite course of EDUC 4513 or EDUC 4050 (minimum grade C-). Restricted to EDMA or EDSC majors only.
**Additional Information:** Departmental Category: Secondary Education

**EDUC 4800 (1-9) Special Topics**
Designed to meet needs of students with topics of pertinent interest.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General Education

**EDUC 4801 (3) Race and its Implications for Science Education**
Science and science-related professionals have played an important role in supporting and challenging conceptions of ¿race.¿ In this class, we explore historical constructions of race and their implications for teaching and learning in science education. Our goal is to develop a deep understanding of how ¿race¿ manifests in educational contexts. We conclude our class by constructing our own social dream about what science education ought to be. Formerly offered as a special topics course.

**EDUC 4810 (1-9) Special Topics**
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General Education

**EDUC 4811 (3) Teaching and Learning Biology**
Provides an introduction to recent research into student learning on the conceptual foundations of modern biology, together with pedagogical methods associated with effective instruction and its evaluation. Students will be involved in active research into conceptual and practical issues involved in biology education, methods to discover student preconceptions, and the design, testing and evaluation of various instructional interventions.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 6811 and MCDB 4811 and MCDB 5811 and EBIO 4811
**Recommended:** Prerequisite At least two semesters of Biology.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EDUC 4815 (3) Teaching K-12 Mathematics: Number Sense**
Provides teachers opportunity to explore fundamental mathematical theories and pedagogical perspectives pertaining to the teaching and learning of number and operation. Engages students in explorations of mathematical content underlying number and operations, while highlighting relevant problem solving, reasoning and proof, and mathematical connections. Explores implications of teachers' mathematical learning on their classroom teaching. Develops practices supporting learner's number sense development.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5815

**EDUC 4821 (3) Teaching K-12 Mathematics: Algebraic Thinking**
Uses reform-based mathematics curricula to engage participants in algebraic thinking, to reflect on their own knowledge of algebraic concepts, and to examine pedagogical ideas that can foster K-12 students' algebraic thinking and learning. Algebraic topics include patterning, variable, functions, multiple representations, equality, and solving linear and systems of equations.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5821

**EDUC 4822 (3) Teaching and Learning Chemistry**
Explores issues related to how people learn and teach chemistry. Reviews high school and early college chemistry concepts both from the content and pedagogical perspectives. Delves into the chemistry education research, education, psychology, and cognitive science literature. Provides an opportunity to observe and/or teach K-12 or college chemistry classes.
**Recommended:** Prerequisite of one semester of college-level chemistry.
**Additional Information:** Departmental Category: General Education

**EDUC 4831 (3) Advanced Peer Education**
Second semester of an academic year's training for students interested in peer counseling. Expand upon what you learned in ARSC 2274. Focus on presentations, leadership, and group facilitation. Basic group leadership, facilitation theory, and technique taught. Co-create and co-lead your own small groups/presentations for other CU students. Offered only spring semesters.
**Requisites:** Requires prerequisite course of ARSC 2274 (minimum grade D-).
**Additional Information:** Departmental Category: General Education

**EDUC 4833 (3) Teaching and Learning Earth Systems**
Learn and develop pedagogically effective strategies for teaching and understanding Earth Science concepts. Particular emphasis is placed on understanding the importance of geoscience habits of mind (i.e. spatial/temporal reasoning, multiple working hypotheses, geographic context). Focuses upon inquiry and evaluation of evidence, the importance of background knowledge and misconceptions, and developing effective discourse within and outside the classroom.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5833 and GEOL 4833 and GEOL 5833
**Requisites:** Requires prerequisite course of ATOC 1060 or ENVS 1000 or GEOL 1010 or GEOL 1020 or GEOL 1060 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Teacher Education

**EDUC 4835 (3) Teaching K-12 Mathematics: Geometry & Measurement**
Provides an opportunity to explore how to foster geometric thinking while examining fundamental mathematical theory underlying the content area of geometry and measurement. Emphasizes investigative approach involving problem solving, reasoning, connections, and communication as well as learning mathematics content in a flexible and conceptual way. Challenges participants to apply their understanding to teaching practices that foster geometric thinking in K-12 learners. Also see EDUC 5835.

**EDUC 4840 (1-4) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General Education

**EDUC 4844 (3) Teaching and Learning Computational Thinking**
This course is designed for current and future STEM educators interested in understanding Computational Thinking and how it can be enacted to support student learning. Computational Thinking is the process by which people make sense of problems where computation, or computational tools, could be leveraged to enact the solution. For example, when students are tasked with solving a word problem they engage in computational thinking by identifying important elements in the written problem and then leveraging mathematical or scientific methods that would lead to a solution. During this course, students will engage with research-based theories, conceptualizations, and practices for engaging with Computational Thinking in STEM learning environments and experiences. Following an introduction to Computational Thinking, students will be supported in making sense of the ideas and practices through published research, existing tools, classroom activities, and reflection on experiences of problem solving and overcoming

**EDUC 4850 (3) Teaching K-12 Mathematics: Probability & Statistics**
Focuses on teaching probability, data analysis, and statistics in K-12 classrooms. Explores curriculum and assessment strategies in the areas of probability and statistics. Examines research on students' thinking on stochastic tasks and how this research informs teaching practice. Emphasizes deepening of one's conceptual understanding of probability and statistics and their importance in the current information age.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5850

**EDUC 4901 (3) Student Teaching**
Provides opportunities for practice around classroom community building, instruction, assessment, etc. in partnership with a mentor teacher and public school students. Experiences will vary depending upon the context, grade level, and school/course placement.
**Requisites:** Requires prerequisite of EDUC 5001 (minimum grade C-). Requires corequisite of EDUC 5330 or EDUC 5345. Restricted to MA+ teacher licensure students in English (EDEN-LICG), Mathematics (EDMA-LICG), Science (EDSC-LICG), or Social Studies (EDSS-LICG).
**Grading Basis:** Letter Grade

**EDUC 4902 (4) Student Teaching II**
Provides opportunities for practice around classroom community building, instruction, assessment, etc. in partnership with a mentor teacher and public school students. Although experiences will vary depending upon the context, grade level, and school/course placement, in this practicum students will build upon their work in Student Teaching I and take greater responsibility for teaching.
**Requisites:** Requires prerequisite of EDUC 4901 (minimum grade C-) and corequisite of EDUC 5355 or 5365. Restricted to students with an English-Secondary Education Licensure pan (EDEN-LICU) or Social Studies-Secondary Education Licensure plan (EDSS-LICU).
**Grading Basis:** Letter Grade

**EDUC 4910 (3) Peer Counseling Practicum**
Controlled enrollment. Credit given for peer counseling activities. Students are selected to participate in this class and act as peer counselors or TAs for the peer counseling training. Repeatable up to 9 total credit hours.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Departmental Category: General Education

**EDUC 4912 (1) Practicum in Teacher Education**
Provides in-school practicum experience
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General Teacher Education

## INVST Community Studies

**INVS 1000 (4) Responding to Social and Environmental Problems Through Service Learning**
By integrating theory with required community service, students explore how problems are shaped by cultural values and how alternative value paradigms affect the definition of problems in areas such as education and the environment. Students examine different approaches to solving problems and begin to envision new possibilities.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Invst Community Studies

**INVS 1513 (3) Civic Engagement: Using the Electoral Process as a Tool for Social Change**
Designed to educate and inspire civic engagement primarily in the area of electoral politics. Examines various explanations of why people participate in the electoral process and whom they choose to support. Develops the practical skills necessary to participate successfully in the electoral arena. Through a service component, the course provides experience working on a campaign and mobilizing others to participate in the electoral process.
**Additional Information:** Departmental Category: Invst Community Studies

**INVS 2005 (2) Puksta Scholars Practicum**
Integrates critical reflection and community-based experiences for undergraduates in the Puksta Scholars Program. This two-semester course will focus on the development of knowledge, attitudes and skills to productively engage the public realm. Examines topics includes ethical leadership, frameworks for social action, project design and participatory action research.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**INVS 2919 (3) Renewing Democracy in Communities and Schools**
Examines concepts of activism, citizenship, democracy, power, and diversity through classroom discussions and participation in a local K-12 school's Public Achievement project. Through community-based partnerships, students will develop leadership skills; dialogue with diverse groups of people; identify multiple perspectives around controversial issues; and learn to use research and writing to articulate public problems and advocate for their solutions.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 2919
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Invst Community Studies

**INVS 2989 (3) Dialogue Across Difference**
Provides practical facilitation training that equips students to be change makers in any setting. Students examine models of dialogic communication and theories of intergroup relations to understand how dialogue can build deeper understanding of self/others, reinvigorate democratic values and foster a more just society. Through hands-on experience participating in, observing, and leading dialogue, students learn to facilitate dialogue among their peers.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**INVS 3000 (3-4) Innovative Approaches to Contemporary Issues through Service Learning**
Explores creative approaches for solving complex social and environmental issues, with a focus on peace and population. Students analyze the root causes of issues in theoretical and historical contexts, and develop their understanding of effective and innovative approaches to change. This course has a requirement of community service.
**Recommended:** Requisite upper-division status.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Invst Community Studies

**INVS 3041 (3) Self and Consciousness**
Explores human development from a psychosocial perspective, focusing on the interplay between psychological patterns and social forms. Issues such as self-image and social consciousness are studied within the larger context of individual and collective forces leading to transformation.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 3041
**Requisites:** Requires prerequisite courses of SOCY 1001 and SOCY 3001 or SOCY 3011 (all minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Invst Community Studies

**INVS 3100 (3) Social Justice, Leadership and Community Engagement Internships**
Focuses on leadership theories and skills necessary for effectiveness in social justice settings. Students gain understanding of traditional and culturally diverse approaches to leadership and change. Community service required.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 3201
**Recommended:** Prerequisite ETHN 2001.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Departmental Category: Invst Community Studies

**INVS 3301 (3) Climate Justice Summer**
The Climate Justice Summer for 1st-year students in The INVST Program focuses on community organizing, antiracism, climate change, environmental sustainability, activism, energy, power, equity & social justice.

**INVS 3302 (3) Facilitating Peaceful Community Change**
Students gain knowledge and skills that enable them to become effective agents of community change. Focuses on understanding the processes of community building with a multicultural emphasis. Students are encouraged to apply their own life experiences and to examine themselves as potential change agents.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3302
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Invst Community Studies

**INVS 3402 (3) Implementing Social and Environmental Change**
Examines grassroots innovation as a means for creating comprehensive, solution-based strategies to address social and environmental problems. Students develop an understanding of the root causes of problems, identify how changes are initiated at the grassroots level, and learn the theory and practice of effective and responsible change efforts.
**Additional Information:** Departmental Category: Invst Community Studies

**INVS 3671 (3) People of Color and Social Movements**
People of color the world over are struggling for sovereignty, independence, civil and human rights, food security, decent wages and working conditions, healthy housing, and freedom from environmental racism and other forms of imperialism. Course analyzes and brings alive these struggles.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 3671

**INVS 3931 (3) The Community Leadership Internship, Part 1**
Develops students' competencies as community leaders working for a just and sustainable world. Under the supervision of an instructor and a community supervisor, students learn organizational leadership skills by serving as volunteer staff members at community-based organizations. Required requisite, admission into INVST CLP.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Invst Community Studies

**INVS 3932 (3) Community Leadership Internship, Part 2**
Develops students' competencies as community leaders working for a just and sustainable world. Under the supervision of an instructor and a community supervisor, students learn organizational leadership skills by serving as volunteer staff members at community-based organizations. Required requisite, membership in INVST CLP.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of INVS 3931 (minimum grade D-).
**Additional Information:** Departmental Category: Invst Community Studies

**INVS 4302 (3) Critical Thinking in Development**
Exposes students to current issues in the political economy of development. Subjects range from globalization, democratization and economic development. Specifically explores the international and domestic determinants of economic development with special reference to currency markets, foreign direct investment, trade, and democratization.
**Equivalent - Duplicate Degree Credit Not Granted:** PSCI 4732
**Requisites:** Requires prerequisite courses of PSCI 2012 or IAFS 1000 and ECON 2010 and 2020 (all minimum grade D-).
**Recommended:** Prerequisite one upper-division PSCI course.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Departmental Category: Invst Community Studies

**INVS 4402 (3) Nonviolent Social Movements**
Explores theories of democracy and development in relation to movements for nonviolent social change. Focuses on means and ends, spirituality, leadership, decision-making, civil society, cooperative economics, ecology and decentralized powers.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Sociology (SOCY) or Political Science (PSCI) majors only.
**Additional Information:** Departmental Category: Invst Community Studies

**INVS 4919 (1-2) Teaching Social Justice for Public Achievement**
Participate as teaching assistants for the practicum course INVS 2919. Focusing on the issues of democratic education, diversity, social justice and social change, students learn how to foster undergraduates' skills as experiential educators.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of INVS 2919 (minimum grade B).

**INVS 4931 (1-6) Community Leadership in Action, Part 1**
Develops students' expertise as community leaders. Under the supervision of an instructor and a community advisor, students design a community-based project.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of INVS 3931 and INVS 3932 (all minimum grade D-).
**Recommended:** Prerequisite admission to INVST CLP.
**Additional Information:** Departmental Category: Invst Community Studies

**INVS 4932 (1-6) Community Leadership in Action, Part 2**
Develops students' expertise as community leaders working for a just and sustainable world. Under the supervision of an instructor and a community advisor, students learn organizational and leadership skills by designing, implementing and evaluating a community-based project. First-hand experience provides students with a deepened understanding of the complex issues facing humanity, and competence with solution-based strategies.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of INVS 4931 (minimum grade D-).
**Additional Information:** Departmental Category: Invst Community Studies

**INVS 4999 (1-4) Teaching Social Justice**
Students participate in a service-learning practicum under the supervision of a Community Studies instructor. They explore teaching strategies for implementing concrete educational goals. Focusing on the issues of social justice and social change, they learn how to encourage higher levels of creativity and analysis among students.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Invst Community Studies

## LEAD

**LEAD 1000 (3) Becoming a Leader**
The foundation course will prepare students to exercise leadership in business, government and community organizations. Introduces leadership skills useful in a variety of settings including community and civic activities. Helps students to improve self awareness, understand multiple theories, recognize moral courage, build analytic and critical thinking skills and adapt leadership practices to different people and contexts.
**Additional Information:** Departmental Category: CU Engage

**LEAD 1001 (3) Becoming a Leader: Multicultural Leadership Scholars**
Introduces students to the theories and practices of historical and contemporary leadership studies. Students will also examine both the moral and ethical dimensions of leadership and how cultural diversity, inclusivity and social justice apply to culturally competent leadership in the 21st century.
**Equivalent - Duplicate Degree Credit Not Granted:** LEAD 1000
**Requisites:** Requires corequisite course of EDUC 2910.
**Recommended:** restricted to students admitted into the Multicultural Leadership Scholars Program.

**LEAD 1002 (3) Becoming a Leader: Leadership & Community Engagement**
Introduces students to the theories and practices of historical and contemporary leadership studies. Serves as the foundation course for the Leadership and Community Engagement Major. Students examine the relationships between leadership and social identities, ethics, democratic engagement, diversity and inclusion, and social practices.
**Equivalent - Duplicate Degree Credit Not Granted:** LEAD 1000
**Requisites:** Restricted to Leadership/CommunityEngagement (LDCE) majors only.

**LEAD 1571 (2) Topics in Leadership: Introduction to Research Methods**
Participants will establish their understanding of research through critical exploration of research language, ethics, and approaches. The course introduces the language of research, ethical principles and challenges, and the elements of the research process within quantitative, qualitative, and mixed methods approaches. Participants will use these theoretical underpinnings to begin to critically review literature relevant to their field or interests and determine how research findings are useful in forming their understanding of their work, social, local and global environment. Their work will culminate in a research project proposal submitted to CU's Undergraduate Research Opportunity Program.
**Requisites:** Requires prerequisite courses of LEAD 1001, LEAD 2410 and INVS 3100 (all minimum grade C-).
**Recommended:** Students in the Multicultural Leadership Scholars program.
**Grading Basis:** Letter Grade

**LEAD 2410 (3) Dynamics of Power, Privilege, Oppression and Empowerment in Leadership**
Examines the theoretical frameworks of social identity and power dynamic development (individual, group, institutional, cultural) and the resulting inequalities formed by systems of privilege and oppression - and their intersections - are manifested in society and how leadership is used to continue these systems or lead to empowerment and liberation.
**Requisites:** Requires prerequisite course of LEAD 1000 (minimum grade C).
**Additional Information:** Departmental Category: CU Engage

**LEAD 4000 (4) Leadership in Context and Emerging Challenges: A Capstone**
Integrates leadership topics and experiences students pursued through the Leadership Studies Minor. Using advanced critical thinking skills, the seminar requires students to evidence their knowledge, competencies and skills related to leadership theory and practice through examining contemporary leadership challenges. Further, the seminar directs students to justify decision-making processes, demonstrating their ability to synthesize prior knowledge to effect desirable, ethical outcomes.
**Requisites:** Requires a prerequisite course of LEAD 1000 or LDSP 1000 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: CU Engage

**LEAD 4501 (3) Leadership Capstone 1**
Apply skills and knowledge developed throughout the Leadership and Community Engagement Major to design and implement public action project. Critically examine local context, including organizations, agencies, firms, and movements. Identify partners and develop relationships based on reciprocity and mutually. Develop theory of change for project and design evaluation tools to measure impact.
**Requisites:** Requires corerequisite course of EDUC 4500. Restricted to Leadership and Community Engagement (LDCE) majors only.
**Recommended:** Prerequisite EDUC 4150.
**Grading Basis:** Letter Grade

**LEAD 4502 (3) Leadership Capstone 2**
Apply skills and knowledge developed throughout the Leadership and Community Engagement Major to design and implement public action project. Manage complex project with team of students and multiple community partners. Evaluate public impact of project with partners.
**Requisites:** Requires prerequisite courses of LEAD 4501 and EDUC 4500 (all minimum grade C-). Restricted to Leadership and Community Engagement (LDCE-BA) majors only.

# Education Studies - Bachelor of Arts (BA)

Education studies majors engage in a deep study of how political, cultural, social and historical dynamics shape both policy and practice in education. In addition to three core courses, students complete an additional ten courses chosen from four areas of emphasis:

- Curriculum and Instruction
- Educational Foundations, Policy and Practice
- Equity, Bilingualism and Biliteracy
- Learning Sciences and Human Development

Students work with an education advisor to select coursework that best supports their career trajectory. Education studies graduates are engaged

and informed educators, researchers, policymakers and community leaders.

# Requirements

Students complete a minimum of 39 credit hours in the major. Of those 39 credit hours, 24 must be at the upper-division level. All major requirements must be completed with a grade of C- or better.

The Education Studies major consists of nine credit hours of core coursework and 30 credit hours chosen from a list of approved courses, of which at least three credit hours must include a field-based or community-engagement component.

In addition to the education studies core requirements, the major's curriculum is divided into four main areas:

- Curriculum and Instruction
- Educational foundations, Policy and Practice
- Equity, Bilingualism and Biliteracy
- Learning Sciences and Human Development

Students must complete at least one course from each of the four areas above. For the remaining credits required for the major, students work in consultation with an academic advisor to pursue a combination of coursework that will support their career trajectory.

| Code | Title | Credit Hours |
|---|---|---|
| **Education Studies Core** | | |
| EDUC 3013 | School and Society | 3 |
| EDUC 4150 | Introduction to Qualitative Research Methods | 3 |
| EDUC 4716 | Basic Statistical Methods | 3 |
| **Curriculum and Instruction Requirements** | | |
| Curriculum and Instruction undergraduate courses focus on teaching and learning in the following curricular areas: Literacy Studies and Humanities, and STEM Education. Coursework focuses on foundations of learning, foundations of education and subject matter knowledge and pedagogy. Choose at least one course from the following: | | |
| *Literacy Studies and Humanities* | | |
| EDUC 2150 | Education in Film | |
| EDUC 2311 | Children's Literature and Literacy Engagement in Elementary Schools | |
| EDUC 3030 | Race, Class, and Gender in Young Adult Literature | |
| EDUC 4135 | Story and Memoir | |
| EDUC 4222 | Language Study for Educators | |
| EDUC 4310 | Social and Emotional Learning in Schools | |
| EDUC 4316 | Nature of Social Studies and Social Studies Education | |
| *STEM Education* | | |
| EDUC 2130 | Teaching and Learning Math: Calculus, Trig and Adv Functions | |
| EDUC 4050 | Knowing and Learning in Mathematics and Science | |
| EDUC 4315 | Perspectives on Science | |
| EDUC 4317 | Perspectives on Mathematics | |
| EDUC 4815 | Teaching K-12 Mathematics: Number Sense | |
| EDUC 4821 | Teaching K-12 Mathematics: Algebraic Thinking | |
| EDUC 4835 | Teaching K-12 Mathematics: Geometry & Measurement | |
| EDUC 4844 | Teaching and Learning Computational Thinking | |
| EDUC 4850 | Teaching K-12 Mathematics: Probability & Statistics | |
| **Educational Foundations, Policy and Practice** | | |
| Choose at least one course from the following: | | |
| EDUC 2125 | History of American Public Education | |
| EDUC 4015 | International / Comparative Education | |
| EDUC 4220 | Gender Issues in Education | |
| EDUC 4240 | African American Education in the United States | |
| EDUC 4301 | Queer(ing) Topics in Education | |
| **Equity, Bilingualism and Biliteracy** | | |
| Choose at least one course from the following: | | |
| EDUC 2625 | Teaching English Language Development | |
| EDUC 4425 | Introduction to Bilingual/Multicultural Education | |
| EDUC 4435 | Culturally Sustaining Pedagogies for Bilingual Learners | |
| EDUC 4615 | Language Acquisition for Bilingual Learners | |
| **Learning Sciences and Human Development** | | |
| Choose at least one course from the following: | | |
| EDUC 2411 | Educational Psychology for Elementary Schools | |
| EDUC 3570 | Learning With Technology In and Out of School | |
| EDUC 4112 | Adolescent Development and Learning for Teachers | |

# Plan(s) of Study

**Year One**

| Fall Semester | | Credit Hours |
|---|---|---|
| EDUC 3013 | School and Society | 3 |
| MATH 1012 | Quantitative Reasoning and Mathematical Skills | 3 |
| Social Science Distribution Requirement | | 3 |
| Arts & Humanities Distribution Requirement | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| EDUC 2125 | History of American Public Education | 3 |
| WRTG 1150 | First-Year Writing and Rhetoric | 3 |
| Social Science Distribution Requirement | | 3 |
| Arts & Humanities Distribution Requirement | | 3 |

| | | |
|---|---|---|
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| EDUC 2625 | Teaching English Language Development | 3 |
| Natural Science Distribution Requirement with Lab | | 4 |
| Elective | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| EDUC 3570 | Learning With Technology In and Out of School | 3 |
| Natural Science Distribution Requirement | | 3 |
| Global Perspective Diversity Requirement | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| EDUC 3030 | Race, Class, and Gender in Young Adult Literature | 3 |
| WRTG 3030 | Writing on Science and Society | 3 |
| Social Science Distribution Requirement | | 3 |
| Arts & Humanities Distribution Requirement | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| EDUC 4015 | International / Comparative Education | 3 |
| EDUC 4301 | Queer(ing) Topics in Education | 3 |
| Arts & Humanities Distribution Requirement | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| EDUC 4240 | African American Education in the United States | 3 |
| EDUC 4615 | Language Acquisition for Bilingual Learners | 3 |
| EDUC 4716 | Basic Statistical Methods | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| EDUC 4150 | Introduction to Qualitative Research Methods | 3 |
| EDUC 4220 | Gender Issues in Education | 3 |
| EDUC 4850 | Teaching K-12 Mathematics: Probability & Statistics | 3 |
| Elective | | 3 |
| Elective | | 2 |
| | **Credit Hours** | **14** |
| | **Total Credit Hours** | **120** |

## Learning Outcomes

By the completion of the program, students will be able to:

- Examine the historical, cultural and ideological contexts of public schooling.
- Explore theories of learning and teaching across families, schools, peer groups, communities and cultures.
- Develop and apply strong critical thinking, analysis, communication, interpersonal/team-building and problem-solving skills based on skills, knowledge and dispositions in the discipline of education.
- Recognize and develop a skill set to support and create supportive learning experiences that are culturally responsive and build on the strengths and knowledge of all participants.
- Gain expertise in important topics in contemporary educational topics, such as: roles and meanings of education in a democratic society; justice and equity in education; creativity and agency of youth from nondominant backgrounds; explorations of popular representations or conventional narratives of students, teachers, and schooling; perspectives on multicultural and bilingual education; perspective on learning mathematics; teaching and reading children's literature.

# Elementary Education - Bachelor of Arts (BA)

Responding to increasing diversity and inequality in public schools, the BA in Elementary Education, with the endorsement in Culturally and Linguistically Diverse Education, is designed to dramatically change schooling for the underserved students of Colorado and the nation. The program aims to prepare reflective, ethical, anti-racist and inclusive elementary (K-6) teachers who are committed to making the world more equitable and just, through their work in public schools.

The program requires that students take a range of education courses, including those focused on the roles of schooling in the broader society and on theories of learning as they relate to historically underserved students and communities. The program also requires numerous "methods" courses, which engage students in the practices and skills needed for teaching all subject areas in self-contained classrooms, and for teaching students with a range of identities and abilities, who represent diverse cultural, linguistic, ethnic, racial, economic and religious communities. In order to be recommended for teacher licensure, students must additionally complete extensive fieldwork in public elementary classrooms serving diverse learners.

The BA in Elementary Education's guiding principles that students will work on across their courses and field experience include learning how to engage in humanizing pedagogies; becoming critically conscious educators; developing a holistic understanding of bilingualism and a dynamic understanding of culture; designing curriculum and instruction, and enacting teaching practices, grounded in research centered on learning and learners; and viewing themselves as agents of change, who advocate on behalf of minoritized students, including bilingual learners.

To learn more, contact the Education advisors at 303-492-6555 or edadvise@colorado.edu. To apply, visit the CU Boulder Admissions (http://www.colorado.edu/admissions/) website.

# Requirements

A total of 120 credit hours is required to earn a BA, including content requirements, licensure and major requirements, and electives. Students must complete all EDUC coursework in the final two years with a grade of B- or better. All other requirements must be completed with a grade of C- or better.

## Required Courses and Credits

### Major and Licensure Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Elementary Major Requirements** | | |
| EDUC 2060 | Step Up to Elementary Teaching | 3 |
| **Elementary Licensure Requirements** | | |
| EDUC 2311 | Children's Literature and Literacy Engagement in Elementary Schools | 3 |
| EDUC 2411 | Educational Psychology for Elementary Schools | 3 |
| EDUC 3013 | School and Society | 3 |
| EDUC 3320 | Literacy in the Elementary Classroom 1 [1] | 3 |
| EDUC 3321 | Literacy in the Elementary Classroom 2 [1] | 3 |
| EDUC 3350 | Dis/Ability in Contemporary Classrooms [1] | 3 |
| EDUC 4205 | Elementary School Mathematics Theory and Methods [1] | 3 |
| EDUC 4215 | Elementary Science Theory and Methods [1] | 3 |
| EDUC 4331 | Elementary Social Studies Methods [1] | 3 |
| EDUC 4340 | Advanced Issues of Assessment, Teaching, and Learning in Reading, Mathematics, and Science [1] | 3 |
| EDUC 4710 | Elementary Student Teaching for Cultural and Linguistic Diversity 1 [1] | 3 |
| EDUC 4715 | Elementary Student Teaching Seminar Part 1 [1] | 3 |
| EDUC 4720 | Elementary Student Teaching for Cultural and Linguistic Diversity 2 [1] | 9 |
| EDUC 4725 | Elementary Student Teaching Seminar Part 2 [1] | 3 |
| **Culturally & Linguistically Diverse (CLD) Education Endorsement Requirements** | | |
| EDUC 2425 | Foundations of Bilingual/Multicultural Education | 3 |
| EDUC 2615 | Foundations of Language Acquisition for Bilingual Learners | 3 |
| EDUC 4035 | Family and Community Engagement [1] | 3 |
| EDUC 4435 | Culturally Sustaining Pedagogies for Bilingual Learners [1] | 3 |
| EDUC 4455 | Methods of Biliteracy Instruction [1] | 3 |
| EDUC 4535 | Assessment for Bilingual Learners [1] | 3 |
| EDUC 4595 | Practicum for Bilingual/Multicultural and ELD Education [1] | 3 |
| **Total Credit Hours** | | **72** |

[1] Must be completed with a grade of B- or better.

### Content Requirements/General Education Requirements

Content requirements include coursework designed to expose elementary education majors to the array of subject matter that K-6 educators are responsible for introducing to their students. Because the expectations of the final two years of the elementary education program, known as the "professional sequence," are inflexible and not compatible with much additional coursework, students are expected to complete all of their content requirements (except upper-division writing), as well as their lower-division licensure requirements and EDUC 3013, before they will be allowed to begin the professional sequence.

The content areas and some licensure requirements overlap with the School of Education general education requirements. General Education requirements are fulfilled by elementary education majors as follows:

#### Skills Requirement

- Written Communication: 6 credit hours (Including one upper-division course.)
- Quantitative Reasoning and Mathematical Skills: 4-6 credits (One 4-5 credit calculus course OR two 3-credit math courses. Many elementary education majors choose MATH 1110 & 1120, Math for Elementary Educators 1 and 2, to complete this requirement.)
- World Language: Third-level proficiency in a single modern or classical language (other than English).

#### Distribution Requirement

- Arts and Humanities (12 credit hours)
  - United States History (content requirement; 3 credit hours)
  - World History (content requirement; 3 credit hours)
  - Literature and the Arts (content requirement; 3 credit hours)
  - EDUC 2311 Children's Literature (licensure requirement; 3 credit hours)
- Social Science (12 credit hours)
  - United States Government (content requirement; 3 credit hours)
  - Cultural Geography (content requirement; 3 credit hours)
  - EDUC 3013 School & Society (licensure requirement; 3 credit hours)
  - EDUC 2411 Educational Psychology for Elementary Schools (licensure requirement; 3 credit hours)
- Natural Science (7 credit hours)
  - Biological Science (content requirement; 3 credit hours)
  - Physical Science (content requirement; 3 credit hours)
  - Science lab (content requirement; 1 credit hour)

**Diversity Requirement**

- U.S. Perspective: 3 credit hours (Fulfilled by EDUC 3013.)
- Global Perspective: 3 credit hours (May be fulfilled by a course that also fulfills a distribution requirement, e.g., world history, literature and the arts, or cultural geography.

The courses listed below are representative of the types of courses that students commonly take to fulfill the content/general education requirements for which they can choose from multiple options. The lists below are not exhaustive. The full range of options available to a student to complete content requirements can be found in their degree audits or by consulting with a School of Education academic advisor

**Distributions**

| Code | Title | Credit Hours |
|---|---|---|
| **Arts & Humanities Distribution** | | |
| *U.S. History* | | *3* |
| CAMW 2001 | The American West | |
| EDUC 2125 | History of American Public Education | |
| ENGL 2115 | American Frontiers | |
| ETHN 2432 | African American History | |
| ETHN 2536 | Survey of Chicana/o History and Culture | |
| HIST 1015 | American History to 1865 | |
| HIST 1025 | American History since 1865 | |
| HIST 2126 | Issues in Modern U.S. Politics and Foreign Relations | |
| HIST 2166 | The Vietnam Wars | |
| HIST 2316 | History of American Popular Culture | |
| HIST 2516 | America Through Baseball | |
| MUEL 3642 | History of Jazz | |
| SOCY 1021 | United States Race and Ethnic Relations I | |
| *World History* | | *3* |
| ANTH 1180 | Maritime People: Fishers and Seafarers | |
| ANTH 1190 | Origins of Ancient Civilizations [1] | |
| ANTH 2200 | The Archaeology of Human History | |
| ANTH/CLAS 3009 | Modern Issues, Ancient Times | |
| ARTH/CLAS 1509 | Trash and Treasure, Temples and Tombs: Art and Archaeology of the Ancient World | |
| ARTH/CLAS 3019 | Pompeii and the Cities of Vesuvius | |
| CLAS/HIST 1051 | The World of the Ancient Greeks | |
| CLAS/HIST 1061 | The Rise and Fall of Ancient Rome | |
| CLAS 1140 | Bread and Circuses: Society and Culture in the Roman World | |
| GRMN 2301 | Inside Nazi Germany: Politics, Culture, and Everyday Life in the Third Reich | |
| HIST 1028 | Latin American History since Independence | |
| HIST 1228 | Introduction to Sub-Saharan African History Since 1850 [1] | |
| HIST 1800 | Introduction to Global History | |
| ITAL 1400 | Sexuality and Gender Wars in Italy and France [1] | |
| SCAN 2202 | The Viking Age | |
| SCAN 3302 | Witchcraft and Magic in Scandinavia | |
| *Literature and the Arts* | | *3* |
| ANTH 1170 | Exploring Culture and Gender through Film [1] | |
| ARTH 1500 | Global Art and Visual Culture [1] | |
| ARTS 1212 | Painting for Non-Majors | |
| ARTS 2126 | Digital Art 1 | |
| CINE 1502 | Introduction to Cinema Studies | |
| DNCE 1017 | Dance in Popular Culture and Media | |
| EDUC 2150 | Education in Film | |
| ENGL 1191 | Introduction to Creative Writing | |
| ENGL 1250 | Introduction to World Literature by Women [1] | |
| ENGL 2212 | Science Fiction | |
| ETHN 2203 | American Indians in Film | |
| ETHN 2746 | Introduction to Chicana/o/x Literature | |
| FREN 1200 | Medieval Epic Through Game of Thrones | |
| FREN 1880 | The Zombie in History and Popular Culture | |
| GRMN 2503 | Fairy Tales of Germany | |
| JPNS 2441 | Japanese Culture through Film and Anime | |
| JRNL 2014 | Race and Sports Journalism | |
| KREN 3851 | Studies in Korean Popular Culture | |
| LGBT 2707 | Introduction to Queer Literature | |
| MDST 1003 | Critical Media Literacies | |
| MUEL 1832 | Appreciation of Music | |
| MUEL 2782 | World Music: Africa, Europe, and the Americas [1] | |
| REES/SCAN 3251 | Arctic Thrillers: Environment, Landscape and Literature of the Far North | |
| SCAN 3204 | Medieval Icelandic Sagas | |
| THTR 1003 | Acting 1 | |
| THTR 1009 | Theatre and Society | |
| THTR 1050 | Introduction to Stagecraft and Design | |
| WGST 2050 | Gender, Sexuality, and Popular Culture | |
| WGST 3250 | Disney's Women and Girls | |
| **Natural Science Distribution** | | |
| *Biological Science* | | *3* |
| ANTH 2010 | Introduction to Biological Anthropology 1 | |
| ANTH 3000 | Primate Behavior | |
| ANTH 3010 | The Human Animal | |
| EBIO 1100 | Biology and Society | |
| EBIO 1210 | General Biology 1 | |
| EBIO 1220 | General Biology 2 | |
| IPHY 2420 | Introduction to Nutrition | |
| MCDB 1150 | Introduction to Cellular and Molecular Biology | |
| MCDB 3150 | Biology of the Cancer Cell | |
| SLHS 2010 | Science of Human Communication | |
| *Physical Science* | | *3* |
| ASTR 1000 | The Solar System | |
| ASTR 1010 | Introductory Astronomy: The Solar System w/Lab | |

| | |
|---|---|
| ASTR 1030 | Accelerated Introductory Astronomy 1 |
| ASTR 1200 | Stars and Galaxies |
| ASTR 2000 | Ancient Astronomies of the World [1] |
| ASTR 2010 | Modern Cosmology-Origin and Structure of the Universe |
| ASTR 2020 | Space Astronomy and Exploration |
| ASTR 2030 | Black Holes |
| ASTR/GEOL 2040 | The Search for Life in the Universe |
| CHEM 1011 | Environmental Chemistry 1 |
| CHEM 1021 | Introductory Chemistry |
| CHEM 1113 | General Chemistry 1 |
| CHEM 1400 | Foundations of Chemistry |
| EDUC 1580 | Energy and Interactions |
| ENVS/PHYS 3070 | Energy and the Environment |
| GEOG 1001 | Our Changing Planet: Climate and Vegetation |
| GEOL 1010 | Exploring Earth |
| GEOL 2100 | Environmental Geology |
| GEOL 3040 | Global Change: The Recent Geological Record |
| GEOL 3720 | Evolution of Life: The Geological Record |
| GEOL 3950 | Natural Catastrophes and Geologic Hazards |
| PHYS 1010 | Physics of Everyday Life 1 |
| PHYS 1110 | General Physics 1 |
| PHYS 1230 | Light and Color for Nonscientists |
| PHYS 1240 | Sound and Music |
| PHYS 2010 | General Physics 1 |
| PSYC 2012 | Biological Psychology |
| *Science Lab* [2] | *1* |
| ANTH 2030 | Laboratory in Biological Anthropology 1 |
| ATOC 1070 | Weather and the Atmosphere Laboratory |
| EBIO 1110 | Biology and Society Laboratory |
| CHEM 1114 | Laboratory in General Chemistry 1 |
| CHEM 1401 | Foundations of Chemistry Lab |
| EBIO 1230 | General Biology Laboratory 1 |
| GEOL 1030 | Introduction to Geology Laboratory 1 |
| MCDB 1043 | Exploring Genetics Laboratory |
| PHYS 1140 | Experimental Physics 1 |
| **Social Science Distribution** | |
| *U.S. Government* | *3* |
| PSCI 1101 | Introduction to American Politics |
| *Cultural Geography* | *3* |
| GEOG 1962 | Geographies of Global Change |
| GEOG 1972 | Sustainable Futures, Environment and Society [1] |
| GEOG 1982 | Global Geographies: Societies, Places, Connections |
| GEOG 1992 | Human Geographies |
| GEOG 2092 | Advanced Introduction to Human Geography |
| GEOG 2852 | Contemporary Southeast Asia: Environmental Politics |
| GEOG 3402 | Natural Hazards |
| GEOG 3412 | Conservation Practice and Resource Management |
| GEOG 3622 | Cities of the Global South [1] |
| GEOG 3672 | Who Runs the World? Sex, Power, and Gender in Geography [1] |
| **Total Credit Hours** | **22** |

1 Indicates that a course also fulfills Global Perspective Diversity

2 Some science labs are built into 4-credit courses, some must be taken either concurrently with or after taking an associated lecture, and some can be taken as a standalone course. Consult a School of Education academic advisor for more information.

## Required Tests and Assessments

Recommendation for licensure requires passing scores on each subtest of the Praxis Elementary Education Three-Subject Bundle exam (code 5901), as well as the Praxis Teaching Reading: Elementary exam (code 5205). All exams must be attempted at least once before students before students begin student teaching. Students who have not attempted all exams before they are scheduled to begin student teaching may either delay student teaching by a year and take their exams in the interim, or switch to a non-licensure degree. Students who have not passed all their Praxis exams by the degree conferral date for the semester in which they complete student teaching may complete their exams at a later date, but their recommendation for licensure will be delayed and they may not be able to timely accept employment.

# Four-Year Plan of Study

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| EDUC 2060 | Step Up to Elementary Teaching | 3 |
| EDUC 3013 | School and Society | 3 |
| General Education Requirement | | 3 |
| General Education Requirement | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| EDUC 2311 | Children's Literature and Literacy Engagement in Elementary Schools | 3 |
| General Education Requirement | | 3 |
| General Education Requirement | | 3 |
| General Education Requirement | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| EDUC 2425 | Foundations of Bilingual/Multicultural Education | 3 |
| General Education Requirement | | 3 |
| General Education Requirement | | 3 |
| General Education Requirement | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |

| | | |
|---|---|---|
| **Spring Semester** | | |
| EDUC 2411 | Educational Psychology for Elementary Schools | 3 |
| EDUC 2615 | Foundations of Language Acquisition for Bilingual Learners | 3 |
| General Education Requirement | | 3 |
| General Education Requirement | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| EDUC 3350 | Dis/Ability in Contemporary Classrooms | 3 |
| EDUC 3320 | Literacy in the Elementary Classroom 1 | 3 |
| EDUC 4535 | Assessment for Bilingual Learners | 3 |
| EDUC 4595 | Practicum for Bilingual/Multicultural and ELD Education | 3 |
| General Education Requirement | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| EDUC 3321 | Literacy in the Elementary Classroom 2 | 3 |
| EDUC 4205 | Elementary School Mathematics Theory and Methods | 3 |
| EDUC 4435 | Culturally Sustaining Pedagogies for Bilingual Learners | 3 |
| EDUC 4455 | Methods of Biliteracy Instruction | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| EDUC 4035 | Family and Community Engagement | 3 |
| EDUC 4215 | Elementary Science Theory and Methods | 3 |
| EDUC 4331 | Elementary Social Studies Methods | 3 |
| EDUC 4710 | Elementary Student Teaching for Cultural and Linguistic Diversity 1 | 3 |
| EDUC 4715 | Elementary Student Teaching Seminar Part 1 | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| EDUC 4340 | Advanced Issues of Assessment, Teaching, and Learning in Reading, Mathematics, and Science | 3 |
| EDUC 4720 | Elementary Student Teaching for Cultural and Linguistic Diversity 2 [1] | 9 |
| EDUC 4725 | Elementary Student Teaching Seminar Part 2 | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **120** |

[1] Due to the intensive nature of student teaching, students may not take other coursework during this semester.

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate content knowledge in subject areas they are becoming licensed to teach.
- Develop pedagogical expertise in planning for instruction for students in K-6 settings, including bi/multilingual students and students with disabilities.
- Develop pedagogical expertise in teaching students in K-6 settings, including bi/multilingual students and students with disabilities.
- Develop the knowledge and skills required to work with, and advocate for, culturally and linguistically diverse students and families in schools.

# Leadership and Community Engagement - Bachelor of Arts (BA)

The Bachelor of Arts in Leadership and Community Engagement (LDCE) prepares ethical, skilled leaders committed to addressing complex public challenges. The major integrates theory and practice. Students will learn about theories of leadership, applied research and learning in community settings. This knowledge is put into practice through structured experiences working with communities to diagnose social problems and design innovative solutions.

This major prepares students for careers in community or nonprofit organizations, higher education, international development, urban planning, social work and government, as well as for graduate study.

The coursework builds on the work of CU Engage: Center for Community-Based Learning and Research (http://www.colorado.edu/cuengage/).

# Requirements

## Secondary Area of Study

The Leadership and Community Engagement major requires students to complete a secondary area of study outside of the major. The secondary area of study can be fulfilled by completing a second degree, a minor or a certificate. Leadership and Community Engagement majors may not complete a minor in leadership studies.

## Pathways

There are three pathways in the Leadership and Community Engagement major. The first is the general pathway. There are additional pathways for students in the Multicultural Leadership Scholars (https://www.colorado.edu/lsm/coursework/minor-pathways/multicultural-leadership-scholars-pathway/) program or the INVST Community Studies (https://www.colorado.edu/invst/) program. These programs are selective cohort-based programs. MLS applications are restricted to incoming first year students. INVST Community Studies Program applications are open to incoming first-year students, first-year students and second-year students.

### General Pathway

**Required Courses and Credits**

| Code | Title | Credit Hours |
|---|---|---|
| **Core Requirements** | | |
| EDUC 2919 | Renewing Democracy in Communities and Schools | 3 |
| or INVS 2989 | Dialogue Across Difference | |
| EDUC 3013 | School and Society | 3 |

| | | |
|---|---|---|
| LEAD 1002 | Becoming a Leader: Leadership & Community Engagement | 3 |
| **Theoretical Foundations** | | |
| EDUC 2500 | Strategies for Social Change | 3 |
| INVS 3100 | Social Justice, Leadership and Community Engagement Internships | 3 |
| INVS/ETHN 3671 | People of Color and Social Movements | 3 |
| or INVS 4402 | Nonviolent Social Movements | |
| **Applied Research** | | |
| SOCY 2061 | Introduction to Social Statistics | 3 |
| or PSCI 2075 | Quantitative Research Methods | |
| or PSYC 2111 | Psychological Science I: Statistics | |
| EDUC 4150 | Introduction to Qualitative Research Methods | 3 |
| EDUC 4500 | Community-Based Research for Social Change | 3 |
| **Learning in Community Settings** | | |
| EDUC 2411 | Educational Psychology for Elementary Schools | 3-4 |
| or EDUC 4112 | Adolescent Development and Learning for Teachers | |
| or EDUC 4110 | Cultural Mentoring with Dual Language Learners | |
| LEAD 4501 | Leadership Capstone 1 | 3 |
| LEAD 4502 | Leadership Capstone 2 | 2 |
| **Total Credit Hours** | | **35-36** |

### Multicultural Leadership Scholars Pathway

**Required Courses and Credits**

| Code | Title | Credit Hours |
|---|---|---|
| **Core Requirements** | | |
| EDUC 2919 | Renewing Democracy in Communities and Schools | 3 |
| or INVS 2989 | Dialogue Across Difference | |
| EDUC 3013 | School and Society | 3 |
| LEAD 1001 | Becoming a Leader: Multicultural Leadership Scholars | 3 |
| **Theoretical Foundations** | | |
| LEAD 2410 | Dynamics of Power, Privilege, Oppression and Empowerment in Leadership | 3 |
| INVS 3100 | Social Justice, Leadership and Community Engagement Internships | 3 |
| INVS/ETHN 3671 | People of Color and Social Movements | 3 |
| or INVS 4402 | Nonviolent Social Movements | |
| **Applied Research** | | |
| SOCY 2061 | Introduction to Social Statistics | 3 |
| or PSCI 2075 | Quantitative Research Methods | |
| or PSYC 2111 | Psychological Science I: Statistics | |
| EDUC 4150 | Introduction to Qualitative Research Methods | 3 |
| EDUC 4500 | Community-Based Research for Social Change | 3 |
| **Learning in Community Settings** | | |
| EDUC 2411 | Educational Psychology for Elementary Schools | 3-4 |
| or EDUC 4112 | Adolescent Development and Learning for Teachers | |
| or EDUC 4110 | Cultural Mentoring with Dual Language Learners | |
| LEAD 4501 | Leadership Capstone 1 | 3 |
| LEAD 4502 | Leadership Capstone 2 | 2 |
| **Total Credit Hours** | | **35-36** |

### INVST Community Studies Pathway

**Required Courses and Credits**

| Code | Title | Credit Hours |
|---|---|---|
| **Core Requirements** | | |
| EDUC 2919 | Renewing Democracy in Communities and Schools | 3 |
| or INVS 2989 | Dialogue Across Difference | |
| EDUC 3013 | School and Society | 3 |
| **Theoretical Foundations** | | |
| INVS 3100 | Social Justice, Leadership and Community Engagement Internships | 3 |
| INVS/WGST 3302 | Facilitating Peaceful Community Change | 3 |
| INVS/ETHN 3671 | People of Color and Social Movements | 3 |
| **Applied Research** | | |
| SOCY 2061 | Introduction to Social Statistics | 3 |
| or PSCI 2075 | Quantitative Research Methods | |
| or PSYC 2111 | Psychological Science I: Statistics | |
| EDUC 4150 | Introduction to Qualitative Research Methods | 3 |
| EDUC 4500 | Community-Based Research for Social Change | 3 |
| **Learning in Community Settings** | | |
| INVS 3931 | The Community Leadership Internship, Part 1 | 3 |
| INVS 3932 | Community Leadership Internship, Part 2 | 3 |
| INVS 4931 | Community Leadership in Action, Part 1 | 3 |
| INVS 4932 | Community Leadership in Action, Part 2 | 3 |
| **Total Credit Hours** | | **36** |

## Four-Year Plan of Study

**With a second degree in the College of Arts & Sciences fulfilling the Secondary Area of Study**

**Year One**

| Fall Semester | | Credit Hours |
|---|---|---|
| LEAD 1002 | Becoming a Leader: Leadership & Community Engagement | 3 |
| Gen Ed (Natural Science with a lab is recommended) | | 4 |
| Arts and Science Degree Major Course | | 3 |
| Arts and Science Degree Major Course | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| EDUC 2500 | Strategies for Social Change | 3 |
| EDUC 3013 | School and Society | 3 |
| Arts and Science Degree Major Course | | 3 |

| | | |
|---|---|---|
| Gen Ed (Natural Science is recommended) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| INVS 2989 | Dialogue Across Difference | 3 |
| INVS 3100 | Social Justice, Leadership and Community Engagement Internships | 3-4 |
| Arts and Science Degree Major Course | | 3 |
| Gen Ed | | 3 |
| Gen Ed | | 3 |
| | **Credit Hours** | **15-16** |
| **Spring Semester** | | |
| SOCY 2061 | Introduction to Social Statistics | 3 |
| Arts and Science Degree Major Course | | 3 |
| Arts and Science Degree Major Course | | 3 |
| Gen Ed | | 3 |
| Gen Ed | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| EDUC 4112 | Adolescent Development and Learning for Teachers | 3 |
| Arts and Science Degree Major Course | | 3 |
| Gen Ed | | 3 |
| Gen Ed | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| EDUC 4150 | Introduction to Qualitative Research Methods | 3 |
| INVS 4402 | Nonviolent Social Movements | 3 |
| Arts and Science Degree Major Course | | 3 |
| Arts and Science Degree Major Course | | 3 |
| Gen Ed | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **18** |
| **Year Four** | | |
| **Fall Semester** | | |
| LEAD 4501 | Leadership Capstone 1 | 3 |
| EDUC 4500 | Community-Based Research for Social Change | 3 |
| Arts and Science Degree Major Course | | 3 |
| Gen Ed | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| LEAD 4502 | Leadership Capstone 2 | 2 |
| Arts and Science Degree Major Course | | 3 |
| Arts and Science Degree Major Course | | 3 |
| Gen Ed | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **14** |
| | **Total Credit Hours** | **123-124** |

# Learning Outcomes

Learning goals can be understood in terms of five strands of expertise. By the completion of the program, students will be able to:

- Understand the theoretical foundations of leadership and community engagement.
- Develop expertise in applied research and evaluation.
- Develop understanding of learning and identity formation in community settings
- Develop their identity as a community leader through academic study, action and reflection.
- Develop disciplinary expertise through a secondary area of study.

# Middle and High School Teaching - Bachelor of Arts (BA)

Our Bachelor of Arts in Middle and High School Teaching (MHST) prepares classroom teachers in grades 7–12 in English, math, science, social studies or Spanish. Our program is designed to support the preparation of reflective, ethical and responsive teachers committed to making the world more equitable and just through their work in public schools and with the communities they serve.

Program graduates earn a Bachelor of Arts in Middle and High School Teaching and a Colorado provisional teacher license in Secondary (7–12) English, math, science, social studies or Spanish. Given the dual-degree nature of the program, they simultaneously pursue and earn a BA/BS in their content area major. Completion of the bachelor's degree requires candidates satisfy the general education requirements for the School of Education as well as the coursework and fieldwork required to be recommended for licensure. For candidates with content area majors in the College of Arts and Sciences, this requires no additional coursework. For candidates with content majors in other colleges or schools, additional coursework to complete School of Education general education requirements may be required.

Over the course of the program, candidates engage with teachers and students in public secondary school classrooms through a series of supported practicum placements that result in over 800 hours of school-based experience.

# Requirements

## Grade Requirements

Middle and High School Teaching students must maintain a 2.00 GPA in cumulative, content and education coursework. All grades in Education courses must be a B- or better to maintain good standing in the program. All grades must be a C- or better to satisfy a content coursework requirement.

## Content Major Requirement

Middle and High School Teaching students must pursue a degree in another college on campus with a major in a content area aligning with their chosen Middle and High School Teaching content area

track. To learn more, contact the Education advisors at 303-492-6555 or edadvise@colorado.edu.

## Content Exam Requirement

Middle and High School Teaching students must pass the state-approved licensure exam aligning with their chosen Middle and High School Teaching content area track. To learn more, contact the Education advisors at 303-492-6555 or edadvise@colorado.edu.

## Student Teaching Requirement

Middle and High School Teaching students will complete an intensive final year of field experiences while taking courses. Students will generally not be able to take other coursework in the final, student teaching semester of the program. To learn more, contact the Education advisors at 303-492-6555 or edadvise@colorado.edu.

## Content Area Track Course Requirements

### English Language Arts Track

#### Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| Advanced Writing: Critical or creative writing beyond the lower-division/introductory composition level. | | 3 |
| Visual or Digital Communication: Includes theatre, film, or digital media courses. | | 3 |
| Literature: Must include a component of American literature, British literature, World literature (non-American/non-British literature), and Multicultural literature. | | 12 |
| English and English Language Arts related courses. | | 30 |
| Acceptable coursework may be in communication/speech, composition, drama/ theatre, humanities, journalism and/or literature. (May include courses from the content requirements above.) | | |

#### Education Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Take Any Time Prior to Final Year in the Program** | | |
| EDUC 1001 | Humanities Teaching for Equity: Naming | 1 |
| EDUC 2001 | Humanities Teaching for Equity: Noticing | 2 |
| EDUC 3001 | Humanities Teaching for Equity: Negotiating | 2 |
| EDUC 3013 | School and Society | 3 |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms | 3 |
| EDUC 4112 | Adolescent Development and Learning for Teachers | 3 |
| EDUC 4295 | Narrative and Story in the Humanities | 3 |
| EDUC 4490 | Blurring Disciplinary Lines in the Humanities | 3 |
| **Take in the Final Year in the Program** | | |
| EDUC 4325 | Queering Literacy in Secondary Classrooms (Fall only) | 3 |
| EDUC 4345 | Secondary English Methods I (Fall only) | 3 |
| EDUC 4365 | Secondary English Methods II (Spring only) | 3 |
| EDUC 4712 | Student Teaching: Secondary School (Spring only) | 10 |
| EDUC 4390 | Teaching for Equity and Justice (Spring only) | 3 |
| **Total Credit Hours** | | **42** |

### Mathematics Track

#### Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| MATH 1300 | Calculus 1 | 5 |
| or MATH 1310 | Calculus for Life Sciences | |
| or APPM 1350 | Calculus 1 for Engineers | |
| MATH 2001 | Introduction to Discrete Mathematics | 3 |
| or MATH 2002 | Number Systems: An Introduction to Higher Mathematics | |
| MATH 2135 | Introduction to Linear Algebra for Mathematics Majors | 3 |
| MATH 2300 | Calculus 2 | 5 |
| or APPM 1360 | Calculus 2 for Engineers | |
| MATH 2400 | Calculus 3 | 5 |
| or APPM 2350 | Calculus 3 for Engineers | |
| MATH 3001 | Analysis 1 | 3 |
| MATH 3110 | Introduction to Theory of Numbers | 3 |
| or MATH 3140 | Abstract Algebra 1 | |
| MATH 3120 | Functions and Modeling | 3 |
| MATH 3510 | Introduction to Probability and Statistics | 3 |
| MATH 3210 | Euclidean and Non-Euclidean Geometry | 3 |
| MATH 4820 | History of Mathematical Ideas | 3 |

#### Education Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Take Any Time Prior to the Final Semester in the Program** | | |
| EDUC 2035 | Designing STEM Learning Environments and Experiences | 3 |
| EDUC 3013 | School and Society | 3 |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms (Includes up to four (4) hours per week of school-based practicum. Should be taken concurrently with EDUC 4375. EDUC 4060 is a prerequisite.) | 3 |
| EDUC 4050 | Knowing and Learning in Mathematics and Science | 3 |
| EDUC 4060 | Classroom Interactions (Includes up to five (5) hours per week of school-based practicum. This course is a prerequisite for EDUC 4023 and EDUC 4375. Fall only.) | 3 |
| EDUC 4232 | Language and Literacy across the Curriculum (Spring Only) | 3 |
| EDUC 4317 | Perspectives on Mathematics | 3 |
| EDUC 4375 | Problem-Based Math Instruction | 3 |
| **Take in the Final Semester of the Program** | | |
| EDUC 4513 | Education and Practice | 2 |

| | | |
|---|---|---|
| EDUC 4712 | Student Teaching: Secondary School | 10 |
| **Total Credit Hours** | | **36** |

## Science Track

### Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credits** | | |
| *Mathematics* | | |
| MATH 1300 | Calculus 1 | 5 |
| or MATH 1310 | Calculus for Life Sciences | |
| or APPM 1350 | Calculus 1 for Engineers | |
| *Science* | | |
| Choose one biology course. | | 3 |
| Choose one chemistry course. | | 3 |
| Choose one earth/space science course. | | 3 |
| Choose one physics course. | | 3 |
| Complete three out of four of the following content area lab courses separately or as part of a course: | | 1 |
| Biology lab | | |
| Chemistry lab | | |
| Earth/space science lab | | |
| Physics lab | | |
| Science coursework. Students must complete 24 credit hours from one of the content areas below: | | 24 |
| Biology: Complete a major in Ecology & Evolutionary Biology, Integrative Physiology, Neuroscience, or Molecular, Cellular & Developmental Biology (may include courses from the content requirements above). | | |
| Chemistry: Complete a major in Chemistry or Biochemistry (may include courses from the content requirements above). | | |
| Earth/Space Science: Complete a major in Astronomy, Atmospheric & Oceanic Sciences or Geology (may include courses from the content requirements above). Please contact an education advisor for more information (edadvise@colorado.edu). | | |
| Environmental Science: Complete a major in environmental studies with coursework in astronomy, ecology, and 17 credit hours of biology (may include courses from the content requirements above). Please contact an education advisor for more information (edadvise@colorado.edu). | | |
| Complete a major in Physics with Plan 3 (may include courses from the content requirements above). Students pursuing Plan 1 or Plan 2 in the Physics major, or a major in Engineering Physics, should contact an education advisor (edadvise@colorado.edu). | | |

### Education Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Take Any Time Prior to the Final Semester in the Program** | | |
| EDUC 2035 | Designing STEM Learning Environments and Experiences | 3 |
| EDUC 3013 | School and Society | 3 |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms (Includes up to four (4) hours per week of school-based practicum. Should be taken concurrently with EDUC 4385. EDUC 4060 is a prerequisite.) | 3 |
| EDUC 4050 | Knowing and Learning in Mathematics and Science | 3 |
| EDUC 4060 | Classroom Interactions (Includes up to five (5) hours per week of school-based practicum. This course is a prerequisite for EDUC 4023 and EDUC 4385. Fall only.) | 3 |
| EDUC 4232 | Language and Literacy across the Curriculum (Spring Only) | 3 |
| EDUC 4385 | Problem-Based Science Instruction (Includes up to six (6) hours per week of school-based practicum. Should be taken concurrently with EDUC 4023. EDUC 4060 is a prerequisite. Spring only.) | 3 |
| Choose two courses from the following: | | 6 |
| EDUC/PHYS 1580 | Energy and Interactions | |
| EDUC 4460/ PHYS 1580 | Teaching and Learning Physics | |
| EDUC/EBIO/MCDB 4811 | Teaching and Learning Biology | |
| EDUC 4822 | Teaching and Learning Chemistry | |
| EDUC 4833 | Teaching and Learning Earth Systems | |
| GEEN 4400 | Teaching Design | |
| **Take in the Final Semester of the Program** | | |
| EDUC 4513 | Education and Practice | 2 |
| EDUC 4712 | Student Teaching: Secondary School | 10 |
| **Total Credit Hours** | | **39** |

## Social Studies Track

### Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| U.S. History | | 6 |
| World History | | 6 |
| Economics: Must be completed in an economics department. | | 3 |
| Political Science: Must be completed in a political science department. | | 3 |
| Cultural/Human Geography: Must be completed in a geography department. Physical geography does NOT qualify. | | 3 |
| Sociology or Social/Cultural Anthropology: Must be completed in a sociology or anthropology department. Physical anthropology does NOT qualify. | | 3 |
| Thirty credit hours or coursework in one of the following disciplines: Anthropology, Economics, Ethnic Studies, Geography, History, International Affairs or Political Science (may include courses from the content requirements above). A minimum of 12 credits must be upper division. | | 30 |

**Education Coursework Requirements**

| Code | Title | Credit Hours |
|---|---|---|
| **Take Any Time Prior to Final Year in the Program** | | |
| EDUC 1001 | Humanities Teaching for Equity: Naming | 1 |
| EDUC 2001 | Humanities Teaching for Equity: Noticing | 2 |
| EDUC 3001 | Humanities Teaching for Equity: Negotiating | 2 |
| EDUC 3013 | School and Society | 3 |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms | 3 |
| EDUC 4112 | Adolescent Development and Learning for Teachers | 3 |
| EDUC 4490 | Blurring Disciplinary Lines in the Humanities | 3 |
| EDUC 4316 | Nature of Social Studies and Social Studies Education (Fall only) | 3 |
| **Take in the Final Year in the Program** | | |
| EDUC 4325 | Queering Literacy in Secondary Classrooms (Fall only) | 3 |
| EDUC 4330 | Secondary Social Studies Methods I (Fall only) | 3 |
| EDUC 4355 | Secondary Social Studies Methods II (Spring only) | 3 |
| EDUC 4712 | Student Teaching: Secondary School (Spring only) | 10 |
| EDUC 4390 | Teaching for Equity and Justice (Spring only) | 3 |
| **Total Credit Hours** | | **42** |

### Spanish Track

**Content Coursework Requirements**

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| SPAN 3000 | Advanced Spanish Language Skills | 5 |
| SPAN 3002 | Advanced Spanish Conversation | 3 |
| SPAN 3050 | Spanish Phonology and Phonetics | 3 |
| SPAN 3100 | Literary and Cultural Analysis in Spanish | 3 |
| SPAN 3120 | Advanced Spanish Grammar | 3 |
| Hispanic Linguistics. Choose one of the following courses: | | 3 |
| SPAN 3010 | Advanced Rhetoric and Composition | |
| SPAN 4430 | Special Topics in Hispanic Linguistics | |
| SPAN 4450 | Introduction to Hispanic Linguistics | |
| Peninsular Literature. Choose one of the following courses: | | 3 |
| SPAN 4150 | Major Works and Trends in Literature and Culture in Spain Up to 1700 | |
| SPAN 4160 | Major Works and Trends in Literature and Culture in Spain: 1700-Present | |
| Latin American Literature. Choose one of the following courses: | | 3 |
| SPAN 4170 | Major Works/Trends in Literature and Culture in Latin America Up to the 19th Century | |
| SPAN 4180 | Major Works and Trends in Literature and Culture in Latin America: 1900-Present | |
| Literature. One additional 4000-level course in Spanish or Latin American Literature. | | 3 |
| Culture & Civilization: Peninsular or Latin American | | 3 |
| Please contact an education advisor for a list of acceptable courses (edadvise@colorado.edu). | | |
| Thirty credit hours in Spanish at the 3000-level or above (may include courses from the content requirements above). | | 30 |

**Education Coursework Requirements**

| Code | Title | Credit Hours |
|---|---|---|
| **Take Any Time Prior to Final Semester in the Program** | | |
| EDUC 1001 | Humanities Teaching for Equity: Naming | 1 |
| EDUC 2001 | Humanities Teaching for Equity: Noticing | 2 |
| EDUC 3001 | Humanities Teaching for Equity: Negotiating | 2 |
| EDUC 3013 | School and Society | 3 |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms (Includes up to 4 hours per week of school-based practicum; should be taken concurrently with SPAN 4650.) | 3 |
| EDUC 4112 | Adolescent Development and Learning for Teachers (Includes up to 2 hours per week of outside-class service learning.) | 3 |
| EDUC 4125 | Secondary World Language Methods (Includes up to 5 hours per week of school-based practicum. Fall only.) | 3 |
| SPAN 4650 | Methods of Teaching Spanish (Should be taken concurrently with EDUC 4023. Spring only.) | 3 |
| **Take in the Final Semster in the Program** | | |
| EDUC 4513 | Education and Practice | 2 |
| EDUC 4722 | Student Teaching: Secondary School 2 | 5 |
| SPAN 4660 | High School Spanish Teaching | 6 |
| **Total Credit Hours** | | **33** |

# Plans of Study

## English Language Arts Track

Sample four-year plan of study (with BA in English – Literature and Cultural Studies Track).

**Year One**

| Fall Semester | | Credit Hours |
|---|---|---|
| EDUC 1001 | Humanities Teaching for Equity: Naming | 1 |
| ENGL 2102 | Literary Analysis | 3 |
| ENGL Required Elective [1] | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| | **Credit Hours** | **13** |
| **Spring Semester** | | |
| ENGL 2017 | World Literature [2] | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |

| | | |
|---|---|---|
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| EDUC 2001 | Humanities Teaching for Equity: Noticing | 2 |
| EDUC 3013 | School and Society [3] | 3 |
| ENGL 2112 | Introduction to Literary Theory | 3 |
| ENGL Requirement (example: Medieval and Early Modern Period) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| EDUC 4112 | Adolescent Development and Learning for Teachers | 3 |
| ENGL Requirement (example: 18th- or 19th-Century Literature) | | 3 |
| ENGL Requirement (example: Studies in Ethnicity, Race, Disability, Gender, and Sexuality) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| EDUC 3001 | Humanities Teaching for Equity: Negotiating | 2 |
| EDUC 4295 | Narrative and Story in the Humanities | 3 |
| ENGL Requirement (example: Form, Genre, or Poetics) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Natural Sciences with Lab) | | 4 |
| Gen. Ed. Skills course (example: Upper-Division Written Communication) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms | 3 |
| EDUC 4490 | Blurring Disciplinary Lines in the Humanities | 3 |
| ENGL Required Elective | | 3 |
| ENGL Required Elective | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| EDUC 4325 | Queering Literacy in Secondary Classrooms | 3 |
| EDUC 4345 | Secondary English Methods I | 3 |
| ENGL 4039 | Capstone in Literary Studies | 3 |
| ENGL Required Elective | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| EDUC 4365 | Secondary English Methods II | 3 |
| EDUC 4390 | Teaching for Equity and Justice | 3 |
| EDUC 4712 | Student Teaching: Secondary School | 10 |
| | **Credit Hours** | **16** |
| | **Total Credit Hours** | **121** |

1 The ENGL Requirements (Medieval and Early Modern Period; 18th- or 19th- Century Literature; Studies in Ethnicity, Race, Disability, Gender, and Sexuality; and Form, Genre, and Poetics) and/or ENGL Electives may also count towards the Secondary English Language Arts track's American Literature, British Literature, Multicultural Literature and Visual/Digital Communication requirements.

2 ENGL 2017 fulfils the Secondary English Language Arts track's World Literature requirement.

3 EDUC 3013 satisfies a Social Sciences Distribution requirement and the US Perspective Diversity requirement for both the College of Arts & Sciences and the School of Education.

## Mathematics Track

Sample four-year plan of study (with BA in Mathematics – Secondary Education Track).

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| EDUC 2035 | Designing STEM Learning Environments and Experiences | 3 |
| MATH 1300 | Calculus 1 | 5 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| MATH 2300 | Calculus 2 | 5 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| | **Credit Hours** | **14** |
| **Year Two** | | |
| **Fall Semester** | | |
| EDUC 3013 | School and Society [1] | 3 |
| MATH 2400 | Calculus 3 | 5 |
| MATH 2001 | Introduction to Discrete Mathematics | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| EDUC 4050 | Knowing and Learning in Mathematics and Science | 3 |
| MATH 2135 | Introduction to Linear Algebra for Mathematics Majors | 3 |
| MATH 3001 | Analysis 1 | 3 |

| | | |
|---|---|---|
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| EDUC 4060 | Classroom Interactions | 3 |
| MATH 3510 | Introduction to Probability and Statistics | 3 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms | 3 |
| EDUC 4232 | Language and Literacy across the Curriculum | 3 |
| EDUC 4375 | Problem-Based Math Instruction | 3 |
| MATH 3140 | Abstract Algebra 1 | 3 |
| MATH 3210 | Euclidean and Non-Euclidean Geometry | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| EDUC 4317 | Perspectives on Mathematics | 3 |
| MATH 3120 | Functions and Modeling | 3 |
| MATH 4820 | History of Mathematical Ideas | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Elective | | 2 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| EDUC 4513 | Education and Practice | 2 |
| EDUC 4712 | Student Teaching: Secondary School | 10 |
| | **Credit Hours** | **12** |
| | **Total Credit Hours** | **120** |

[1] EDUC 3013 satisfies a Social Sciences Distribution requirement and the U.S. Perspective Diversity requirement for both the College of Arts & Sciences and the School of Education.

## Science Track

Sample four-year plan of study (with BA in Ecology and Evolutionary Biology).

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| EDUC 2035 | Designing STEM Learning Environments and Experiences | 3 |
| EBIO 1210 | General Biology 1 | 3 |
| EBIO 1230 | General Biology Laboratory 1 | 1 |
| MATH 1310 | Calculus for Life Sciences [1] | 5 |
| Gen. Ed. Distribution/Diversity course (example: Arts & Humanities/Global Perspective) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| EBIO 1220 | General Biology 2 | 3 |
| EBIO 1240 | General Biology Laboratory 2 | 1 |
| EBIO 1010 | Introduction to Statistics and Quantitative Thinking for Biologists | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| | **Credit Hours** | **16** |
| **Year Two** | | |
| **Fall Semester** | | |
| EDUC 3013 | School and Society [2] | 3 |
| EBIO 2040 | Principles of Ecology | 4 |
| CHEM 1113 | General Chemistry 1 [3] | 4 |
| CHEM 1114 | Laboratory in General Chemistry 1 [3] | 1 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| EDUC 4050 | Knowing and Learning in Mathematics and Science | 3 |
| EBIO laboratory or field course (Upper-Division) | | 4 |
| PHYS 2010 | General Physics 1 [3] | 5 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| EDUC 4060 | Classroom Interactions | 3 |
| EDUC 4811 | Teaching and Learning Biology | 3 |
| EBIO 2070 | Genetics: Molecules to Populations | 4 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Arts & Humanities) | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms | 3 |
| EDUC 4232 | Language and Literacy across the Curriculum | 3 |
| EDUC 4385 | Problem-Based Science Instruction | 3 |
| EBIO 3080 | Evolutionary Biology | 4 |
| Gen. Ed. Skills course (example: Upper-division Written Communication) | | 3 |
| | **Credit Hours** | **16** |
| **Year Four** | | |
| **Fall Semester** | | |
| EDUC 4833 | Teaching and Learning Earth Systems | 3 |
| EBIO Upper-Division | | 4 |
| EBIO Upper-Division | | 4 |
| EBIO Upper-Division | | 4 |
| | **Credit Hours** | **15** |

| | | |
|---|---|---|
| **Spring Semester** | | |
| EDUC 4513 | Education and Practice | 2 |
| EDUC 4712 | Student Teaching: Secondary School | 10 |
| | **Credit Hours** | **12** |
| | **Total Credit Hours** | **120** |

1 MATH 1310 counts towards the EBIO Ancillary Mathematics/Science Coursework, and satisfies the QRMS Skills requirement for both the College of Arts & Sciences and the School of Education.

2 EDUC 3013 satisfies a Social Sciences Distribution requirement and the U.S. Perspective Diversity requirement for both the College of Arts & Sciences and the School of Education.

3 Counts towards the EBIO Ancillary Mathematics/Science Coursework, and satisfies the Science Content requirements for the School of Education.

## Social Studies Track

Sample four-year plan of study (with BA in History).

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| EDUC 1001 | Humanities Teaching for Equity: Naming | 1 |
| Any of the required 1000-level HIST United States geographic survey courses | | 3 |
| Any of the required 1000-level HIST World Areas geographic survey courses | | 3 |
| Ancillary lower-division written communication course | | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective[1]) | | 3 |
| | **Credit Hours** | **13** |
| **Spring Semester** | | |
| Any of the required 1000-level HIST Europe geographic survey courses | | 3 |
| 1000-level Global History (usually HIST 1800) | | 3 |
| Gen. Ed. Skills course (example: QRMS) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| EDUC 2001 | Humanities Teaching for Equity: Noticing | 2 |
| EDUC 3013 | School and Society [2] | 3 |
| HIST 3020 | Historical Thinking & Writing [3] | 3 |
| HIST upper or lower division level elective | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen Ed Distribution course (example: Social Sciences) | | 3 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| EDUC 4112 | Adolescent Development and Learning for Teachers | 3 |
| HIST upper or lower division level elective | | 3 |
| Either a 2000 or 4000-level HIST elective (4000-level preferred) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen Ed Distribution course (example: Social Sciences) | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| EDUC 3001 | Humanities Teaching for Equity: Negotiating | 2 |
| EDUC 4316 | Nature of Social Studies and Social Studies Education | 3 |
| Two 4000-level HIST geographic area requirements | | 6 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms | 3 |
| EDUC 4490 | Blurring Disciplinary Lines in the Humanities | 3 |
| Two 4000-level HIST geographic area requirements | | 6 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| EDUC 4325 | Queering Literacy in Secondary Classrooms | 3 |
| EDUC 4330 | Secondary Social Studies Methods I | 3 |
| Social Studies Content Area course not fulfilled with Social Sciences Distribution course [1] | | 3 |
| HIST 3000-level Senior Seminar | | 3 |
| HIST 4000-level elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| EDUC 4355 | Secondary Social Studies Methods II | 3 |
| EDUC 4390 | Teaching for Equity and Justice | 3 |
| EDUC 4712 | Student Teaching: Secondary School | 10 |
| | **Credit Hours** | **16** |
| | **Total Credit Hours** | **121** |

1 The Social Sciences Distribution requirements may also count towards the Secondary Social Studies track's Content Area requirements in Cultural/Human Geography, Economics, Political Science and Sociology or Social/Cultural Anthropology.

2 EDUC 3013 satisfies a Social Sciences Distribution requirement and the U.S. Perspective Diversity requirement for both the College of Arts & Sciences and the School of Education.

3 HIST 3020 fulfills Gen. Ed. Skills Upper-Division Written Communication requirement for both the College of Arts & Sciences and the School of Education.

## Spanish Track

Sample four-year plan of study (with BA in Spanish – Spanish Language and Literatures Track).

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| EDUC 1001 | Humanities Teaching for Equity: Naming | 1 |
| SPAN 1010 | Beginning Spanish 1 (If needed, does not fulfill Spanish major or Spanish licensure course requirements) | 5 |
| Gen. Ed. Skills course (example: Lower-division Written Communication) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences with Lab) | | 4 |
| Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| SPAN 1020 | Beginning Spanish 2 (If needed, does not fulfill Spanish major or Spanish licensure course requirements) | 5 |
| Gen. Ed. Skills course (example: QRMS | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| | **Credit Hours** | **14** |
| **Year Two** | | |
| **Fall Semester** | | |
| EDUC 2001 | Humanities Teaching for Equity: Noticing | 2 |
| EDUC 3013 | School and Society [1] | 3 |
| SPAN 2110 | Second-Year Spanish 1 ((If needed, does not fulfill Spanish major or Spanish licensure course requirements) | 3 |
| Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Related Fields course outside of Spanish | | 3 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| EDUC 4112 | Adolescent Development and Learning for Teachers | 3 |
| SPAN 2120 | Second-Year Spanish 2 (If needed, does not fulfill Spanish major or Spanish licensure course requirements) | 3 |
| Related Fields course outside of Spanish | | 3 |
| Gen. Ed. Distribution course (example: Natural Sciences) | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **15** |
| **Year Three** | | |
| **Fall Semester** | | |
| EDUC 3001 | Humanities Teaching for Equity: Negotiating | 2 |
| EDUC 4125 | Secondary World Language Methods | 3 |
| SPAN 3000 | Advanced Spanish Language Skills | 5 |
| Gen. Ed. Distribution course (example: Social Sciences) | | 3 |
| SPAN Culture & Civilization course [2] | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms | 3 |
| SPAN 4650 | Methods of Teaching Spanish | 3 |
| SPAN 3010 | Advanced Rhetoric and Composition [3] | 3 |
| SPAN 3100 | Literary and Cultural Analysis in Spanish | 3 |
| SPAN 3120 | Advanced Spanish Grammar | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| SPAN 3002 | Advanced Spanish Conversation | 3 |
| SPAN 3050 | Spanish Phonology and Phonetics | 3 |
| SPAN 4150<br>or SPAN 4160 | Major Works and Trends in Literature and Culture in Spain Up to 1700<br>or Major Works and Trends in Literature and Culture in Spain: 1700-Present | 3 |
| SPAN 4170<br>or SPAN 4180 | Major Works/Trends in Literature and Culture in Latin America Up to the 19th Century<br>or Major Works and Trends in Literature and Culture in Latin America: 1900-Present | 3 |
| SPAN 4000 level literature course | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| EDUC 4513 | Education and Practice | 2 |
| EDUC 4722 | Student Teaching: Secondary School 2 | 5 |
| SPAN 4660 | High School Spanish Teaching | 6 |
| | **Credit Hours** | **13** |
| | **Total Credit Hours** | **121** |

1. EDUC 3013 satisfies a Social Sciences Distribution requirement and the U.S. Perspective Diversity requirement for both the College of Arts & Sciences and the School of Education.
2. Choosing an upper-division Culture & Civilization course will also count towards the nine credits of upper-division SPAN electives in the Spanish major.
3. SPAN 3010 fulfills Gen. Ed. Skills Upper-Division Written Communication requirement for both the College of Arts & Sciences and the School of Education.

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate expertise in teaching and learning within and, when relevant, across content domains (e.g., Literacy, STEM Education).
- Demonstrate knowledge of research and practitioner inquiry for evidence-informed teaching and equitable learning experiences within and, when relevant, across content domains.
- Demonstrate knowledge of research, scholarship, principles, and practices for broadening participation among youth, families, and communities in the design of equitable learning opportunities within and, when relevant, across content domains.

# Education - Minor

The Education Minor is designed for students who wish to supplement their academic major with studies in the field of education. The Education Minor allows students to explore the intersection of their chosen major and career path with the field of education, without committing to becoming a classroom teacher. The Education Minor provides a deep study into to how political, cultural, social and historical dynamics shape both policy and practice in education, as well as opportunities to focus on particular areas of education as a field of study and practice.

The minor, comprising three credit hours of core coursework and 15 credit hours of electives, is available to all undergraduates. Students are encouraged to meet with an education advisor to help determine which elective courses provide the best opportunities to supplement their specific field of study and/or explore a career path in the field of education.

# Requirements

## Declaration Process and Minor Requirements

Students may declare the Education Minor at any point in their undergraduate career. To declare the Education Minor, please submit a declaration form online on the School of Education website (https://www.colorado.edu/education/academics/undergraduate-programs/education-minor/).

A B (3.00) grade point average must be maintained in education minor coursework (with C- as lowest acceptable course grade) to complete the minor.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Core Course** | | **3** |
| EDUC 3013 | School and Society | |
| **Elective Options** | | **15** |
| Choose 5 courses from the options below: | | |
| EDUC 1080 | Decolonizing Education: Design for New Futures | |
| EDUC/PHYS 1580 | Energy and Interactions | |
| EDUC 2035 | Designing STEM Learning Environments and Experiences | |
| EDUC 2125 | History of American Public Education | |
| EDUC 2130 | Teaching and Learning Math: Calculus, Trig and Adv Functions | |
| EDUC 2150 | Education in Film | |
| EDUC 2311 | Children's Literature and Literacy Engagement in Elementary Schools | |
| EDUC 2400 | Cultural Diversity and Awareness | |
| EDUC 2411 | Educational Psychology for Elementary Schools | |
| EDUC 2490 | Educational Psychology for Elementary Schools | |
| EDUC 2625 | Teaching English Language Development | |
| EDUC 2919 | Renewing Democracy in Communities and Schools | |
| EDUC 3030 | Race, Class, and Gender in Young Adult Literature | |
| EDUC 3190 | Introduction to Teaching and Learning | |
| EDUC 3570 | Learning With Technology In and Out of School | |
| EDUC 4015 | International / Comparative Education | |
| EDUC 4050 | Knowing and Learning in Mathematics and Science | |
| EDUC 4110 | Cultural Mentoring with Dual Language Learners | |
| EDUC 4112/ PSYC 4114 | Adolescent Development and Learning for Teachers | |
| EDUC 4125 | Secondary World Language Methods | |
| EDUC 4135 | Story and Memoir | |
| EDUC 4222 | Language Study for Educators | |
| EDUC 4232 | Language and Literacy across the Curriculum | |
| EDUC 4240 | African American Education in the United States | |
| EDUC 4301 | Queer(ing) Topics in Education | |
| EDUC 4310 | Social and Emotional Learning in Schools | |
| EDUC 4317 | Perspectives on Mathematics | |
| EDUC 4425 | Introduction to Bilingual/Multicultural Education | |
| EDUC 4460 | Teaching and Learning Physics | |
| EDUC 4615 | Language Acquisition for Bilingual Learners | |
| EDUC 4716 | Basic Statistical Methods | |
| EDUC 4811 | Teaching and Learning Biology | |
| EDUC 4815 | Teaching K-12 Mathematics: Number Sense | |
| EDUC 4821 | Teaching K-12 Mathematics: Algebraic Thinking | |
| EDUC 4835 | Teaching K-12 Mathematics: Geometry & Measurement | |
| EDUC 4850 | Teaching K-12 Mathematics: Probability & Statistics | |
| EDUC 4822 | Teaching and Learning Chemistry | |
| EDUC 4833 | Teaching and Learning Earth Systems | |
| EDUC 4844 | Teaching and Learning Computational Thinking | |
| ETHN 4306 | The Chicana and Chicano and U.S. Social Systems | |
| GEEN 4400 | Teaching Design | |
| INVS 3100 | Social Justice, Leadership and Community Engagement Internships | |
| WGST 3302 | Facilitating Peaceful Community Change | |
| **Total Credit Hours** | | **18** |

# Learning Outcomes

The education minor curriculum values and promotes the central role of education for preparing critically/socially engaged and democratically-minded citizens for an increasingly complex, socially diverse, and culturally rich world. The education minor curriculum organizes learning experiences for non-majors that foster, among other things, critical awareness, empathy, flexibility, vulnerability, open-mindedness,

imagination, comfort with ambiguity, and an understanding of common experiences, amidst diverse contexts and student histories.

By the completion of the program, students will be able to:

- Examine the historical, cultural and ideological contexts of public schooling.
- Explore theories of learning across families, schools, peer groups, communities and cultures.
- Analyze and explore a self-selected range of topics related to education and connected to major areas of study, for example: roles and meanings of education in a democratic society; justice and equity in education; creativity and agency of youth from non-dominant backgrounds; explorations of popular representations or conventional narratives of students, teachers, and schooling; perspectives on multicultural and bilingual education; perspective on learning mathematics; teaching and reading children's literature.

# Leadership Studies - Minor

The Leadership Studies Minor prepares students to courageously lead through a combination of academic study, critical self-reflection and team projects. The 16-credit hour academic program includes an introductory course (LEAD 1000), three individualized electives and an experiential capstone course (LEAD 4000). LEAD 1000 and 4000 feature interactive and hands-on learning applicable to a variety of life experiences, leadership contexts and chosen fields of study. The minor is open access to all undergraduate students from any college or major.

# Requirements

## Core Requirements

To declare the Leadership Studies Minor, students should submit an online declaration form (https://www.colorado.edu/lsm/coursework/declare-minor/) and an advisor in the School of Education will add the minor to their degree audit. The program accepts declaration forms on a rolling basis.

The 16 credit hour academic minor is comprised of:

1. LEAD 1000 introductory course or an approved substitute for a pre-existing leadership program (3 credit hours)
2. Three individualized elective courses across three elective categories (3 credit hours per category, 9 credit hours total)
3. LEAD 4000 capstone course (4 credit hours)

All coursework must be completed with a grade of a C- or better to fulfill the above requirements.

LEAD 4000 includes a 3 credit hour seminar course with a corresponding 1 credit hour experiential practicum. Through the practicum, student teams will partner with organizations to critically examine a complex social or ecological issue. Capstone students will be automatically enrolled in the practicum when registering for the seminar course. The introductory course requirement and at least two out of three elective courses must be completed to register for the capstone.

Students can meet with an academic advisor in the School of Education to plan a course of study in the minor (edadvise@colorado.edu) after declaring. Contact leadershipstudies@colorado.edu for general inquiries or additional information.

**Completion Options**

The majority of students will complete the Leadership Studies Minor as open enrollment through the core requirements outlined above (LEAD 1000, 3 elective courses and LEAD 4000). Elective courses options are flexible and individualized to incorporate a variety of student interests and meet degree requirements in other areas.

Students admitted to a partnering leadership program can complete the Leadership Studies Minor through an approved course sequence. Participating "pathway" programs include the Presidents Leadership Class, INVST, Engineering Leadership program, Multicultural Leadership Scholars, and ROTC units (Air Force, Army, Naval).

**Open Enrollment Electives**

The Leadership Studies Minor requires students to complete 9 credit hours of elective coursework across three categories:

1. **Leadership foundations**: Courses focused on moral and ethical reasoning, ability to evaluate behavior, and improved decision-making. (3 credit hours)
2. **Leadership application**: Courses focused on leadership in practice, including building teams with diverse perspectives and leading teams to accomplish shared goals. (3 credit hours)
3. **Leadership in context**: Courses focused on historical and situational analysis of leadership, critical evaluation of historical or contemporary leaders, and ability to connect leadership behaviors to organizational outcomes. (3 credit hours)

Students can submit a petition (https://www.colorado.edu/lsm/lsm-elective-petition/) for a course not on the approved list to count as a minor elective and complete electives through Education Abroad (https://abroad.colorado.edu/?FuseAction=Abroad.ViewLink&Parent_ID=B207274A-0059-71AF-E694D487757CFC7C&Link_ID=0B53051A-5056-BA1F-7479E530E19C7B18&Wrapper=1). Students should contact leadershipstudies@colorado.edu to correct an issue on their degree audit, move an elective to a different category for their plan of study, and/or inquire about a course petition.

## Pathway Options

### General Pathway

**Approved Electives by Category**

| Code | Title | Credit Hours |
|---|---|---|
| *1. Leadership Foundations* | | |
| AIRR 3010 | Leading People and Effective Communication 1 | |
| ANTH 1200 | Culture and Power | |
| ARSC/NRLN 2000 | Ways of Knowing: Constructions of Knowledge in the Academy and Beyond | |
| BUSM 3031 | Business Leadership | |
| BUSO 2100 | No-Stress Leadership | |
| COMM 2400 | Discourse, Culture and Identities | |
| COMM 2500 | Interpersonal Communication | |
| COMM 3410 | Intercultural Communication | |
| COMM 3420 | Gender and Communication | |
| EDUC 2400 | Cultural Diversity and Awareness | |
| EDUC 2919 | Renewing Democracy in Communities and Schools | |

| | |
|---|---|
| ENLP 3100 | Complex Leadership Challenges |
| ETHN 2001 | Foundations of Comparative Ethnic Studies: Race, Gender and Culture(s) |
| ETHN 2304 | Introduction to Social Justice |
| ETHN 3015 | Asian Pacific American Communities |
| ETHN 3026 | Women of Color: Chicanas in U.S. Society |
| GEOG 1972 | Sustainable Futures, Environment and Society |
| GEOG 1982 | Global Geographies: Societies, Places, Connections |
| GEOG 3742 | Place, Power, and Contemporary Culture |
| HONR 1810 | Honors Diversity Seminar |
| INVS 2919 | Renewing Democracy in Communities and Schools |
| MILR 2031 | Methods of Leadership and Management 1 |
| NAVR 4020 | Leadership and Ethics |
| ORGN 4040 | Individual, Team, and Organizational Development |
| PACS 2500 | Introduction to Peace, Conflict and Security Studies |
| PHIL 2140 | Environmental Justice |
| PHIL 2270 | Philosophy and Race |
| PHIL 2290 | Philosophy and Gender |
| PHIL 3140 | Environmental Ethics |
| PHIL 3180 | |
| PHIL 3200 | Social and Political Philosophy |
| PHIL 3260 | Philosophy and the International Order |
| PSCI 2004 | Survey of Western Political Thought |
| PSCI 3774 | Free Speech and Dangerous Ideas |
| PSCI 3084 | Diversity, Disagreement, and Democracy: an Introduction to the Theory and Practice of Democracy |
| PSYC 2606 | Social Psychology |
| PSYC 3456 | Psychology of Personality |
| PSYC 3684 | Developmental Psychology |
| SOCY 1021 | United States Race and Ethnic Relations I |
| SOCY 2011 | Contemporary Social Issues and Human Values |
| SOCY 2031 | Social Problems |
| SOCY 2077 | Environment and Society |
| SOCY 3171 | Whiteness Studies |
| *2. Leadership Application* | |
| AIRR 3020 | Leading People and Effective Communication 2 |
| ANTH 2100 | Introduction to Cultural Anthropology |
| ANTH 4180 | Anthropological Perspectives: Contemporary Issues |
| CESR 4000 | Leadership Challenges |
| CESR 4005 | Business Solutions for Global Development |
| CESR 4828 | Experimental Seminar: Corporate Boards in Action |
| COMM 1300 | Public Speaking |
| COMM 1600 | Group Interaction |
| COMM 2410 | The Practice of Intercultural Communication |
| COMM 2650 | Business and Professional Communication |
| COMM 3320 | Persuasion in Society |
| CVEN 5564 | Water Profession: Communication and Utility Finance |
| EDUC 2500 | Strategies for Social Change |
| EDUC 2919 | Renewing Democracy in Communities and Schools |
| EDUC 3190 | Introduction to Teaching and Learning |
| EDUC 4610 & EDUC 4620 | Becoming a Learning Assistant and LA Mentoring I: Becoming a Mentor |
| EMEN 4050 | Leadership and Professional Skills |
| EMEN 4825 | New Venture Creation |
| ENLP 3000 | Intelligent Leadership |
| ESBM 3700 | Entrepreneurial Environments |
| ETHN 3201 | Social Justice, Leadership and Community Engagement Internships |
| GEOG 3682 | International Development: Economics, Power, and Place |
| INVS 1000 | Responding to Social and Environmental Problems Through Service Learning |
| INVS 2989 | Dialogue Across Difference |
| INVS 3302 | Facilitating Peaceful Community Change |
| INVS 3931 | The Community Leadership Internship, Part 1 |
| INVS 3932 | Community Leadership Internship, Part 2 |
| MUSC 4968 | Management and Leadership in the Arts |
| ORGN 3030 | Critical Leadership Skills |
| ORGN 4010 | Redefining the Employee-Employer Relationship |
| ORGN 4030 | Managing Employee Reward Systems |
| ORGN 4040 | Individual, Team, and Organizational Development |
| PACS 3700 | Communication and Conflict Management |
| PACS 4100 | Managing Organizational Conflict |
| PRLC 1820 | Leadership Foundations & Applications II |
| PSCI 2106 | Introduction to Public Policy Analysis |
| PSCI 3031 | Political Parties and Interest Groups |
| PSYC 4136 | Judgment and Decision Making |
| PSYC 4553 | Women's Mental Health: A Biopsychosocial Approach |
| SOCY 4935 | Internship in Social Innovation |
| WGST 3302 | Facilitating Peaceful Community Change |
| *3. Leadership in Context* | |
| ARSC 3100 | Multicultural Perspective and Academic Discourse |
| BUSO 2200 | Sports Entrepreneurship |
| BUSO 3100 | The Business of Nonprofits |

| | |
|---|---|
| CMCI 4021 | Prime Time: Public Performance and Leadership |
| EDUC 3013 | School and Society |
| EMEN 4830 | CU in D.C. Our Sustainable Future (Maymester) |
| ENLP 4000 | The Empire of Modern Science |
| ETHN 2232 | Contemporary African American Social Movements |
| ETHN 2536 | Survey of Chicana/o History and Culture |
| ETHN 3024 | Introduction to Critical Sports Studies |
| ETHN 3403 | Indigenous Rights and Red Power Movement |
| ETHN 3671 | People of Color and Social Movements |
| ETHN 3701 | Gender, Sport and Culture |
| ETHN 3777 | Inside-Out: Prison and Social Justice |
| ETHN 4306 | The Chicana and Chicano and U.S. Social Systems |
| ETHN 4672 | Seminar on the Civil Rights and Black Power Movements |
| ETHN 4714 | Sport for Social Justice |
| GEOG 1962 | Geographies of Global Change |
| GEOG 3612 | Reimagining Cities: Spaces of Power, Privilege, and Possibility |
| GEOG 4712 | Political Geography |
| HIST 2100 | Revolution in History |
| HIST 2126 | Issues in Modern U.S. Politics and Foreign Relations |
| HIST 2326 | Issues in the History of U.S. Society and Culture |
| HIST 4021 | Athens and Greek Democracy |
| HIST 4031 | Alexander the Great and the Rise of Macedonia |
| HIST 4116 | History of U.S. Foreign Relations, 1865-1940 |
| HIST 4126 | History of U.S. Foreign Relations Since 1941 |
| HIST 4166 | The Vietnam War in US Politics and Culture |
| INVS 4302 | Critical Thinking in Development |
| INVS 4402 | Nonviolent Social Movements |
| MILR 4072 | Leadership 1: Adaptive Leadership |
| MILR 4082 | Leadership 2: Leadership in a Complex World |
| NAVR 4010 | Leadership and Management |
| ORGN 4040 | Individual, Team, and Organizational Development |
| PRLC 3800 | Global Inquiry for 21st Century Leadership |
| PRLC 3810 | Global Issues in Leadership |
| PACS 3870 | Nonviolent Civil Resistance: Movements and Strategies |
| PSCI 2004 | Survey of Western Political Thought |
| PSCI 2012 | Introduction to Comparative Politics |
| PSCI 2106 | Introduction to Public Policy Analysis |
| PSCI 2223 | Introduction to International Relations |
| PSCI 3011 | The American Presidency and the Executive Branch |
| PSCI 3031 | Political Parties and Interest Groups |
| PSCI 3163 | American Foreign Policy |
| PSCI 4012 | Global Development |
| PSCI 4173 | International Organizations |
| SOCY 3044 | Race, Class, Gender, and Crime |
| SOCY 3141 | Social Movements and the Politics of Protest |

## INVST Pathway

Contact INVST (https://www.colorado.edu/invst/) faculty or staff for application information and program details.

| Code | Title | Credit Hours |
|---|---|---|
| **Introductory Course** | | |
| EDUC 4800 | Special Topics Climate Justice | 3 |
| Will accept alternative courses for cohorts impacted by COVID-19. | | |
| **Electives** | | |
| One elective required from each of the three categories below | | |
| *1. Leadership Foundations* | | *3* |
| INVS 3671 | People of Color and Social Movements | |
| *2. Leadership Application* | | *3* |
| INVS 3302 | Facilitating Peaceful Community Change | |
| or INVS 3931 | The Community Leadership Internship, Part 1 | |
| or INVS 3932 | Community Leadership Internship, Part 2 | |
| *3. Leadership in Context* | | *3* |
| INVS 4931 | Community Leadership in Action, Part 1 | |
| **Capstone** | | |
| LEAD 4000 | Leadership in Context and Emerging Challenges: A Capstone | 4 |

## Engineering Leadership Program Pathway

Students should meet with ENLP faculty for additional guidance.

| Code | Title | Credit Hours |
|---|---|---|
| **Introductory Course** | | |
| ENLP 2000 | Leadership, Fame and Failure | 3 |
| **Electives** | | |
| One elective required from each of the three categories below | | |
| *1. Leadership Foundations* | | *3* |
| ENLP 3100 | Complex Leadership Challenges | |
| *2. Leadership Application* | | *3* |
| ENLP 3000 | Intelligent Leadership | |
| *3. Leadership in Context* | | *3* |
| ENLP 4000 | The Empire of Modern Science | |
| **Capstone** | | |
| LEAD 4000 | Leadership in Context and Emerging Challenges: A Capstone | 4 |

## Multicultural Leadership Scholars Pathway

Students should meet with MLS faculty for additional guidance.

| Code | Title | Credit Hours |
|---|---|---|
| **Introductory Course** | | |
| LEAD 1001 | Becoming a Leader: Multicultural Leadership Scholars | 3 |
| **Electives** | | |
| All courses required from each of the three categories below | | |
| *1. Leadership Foundations* | | *2* |
| LEAD 1571 | Topics in Leadership: Introduction to Research Methods | |
| *2. Leadership Application* | | *4* |
| LEAD 2410 | Dynamics of Power, Privilege, Oppression and Empowerment in Leadership | |
| EDUC 2910 | Field Practicum 1 | |
| *3. Leadership in Context* | | *3* |
| INVS 3100 | Social Justice, Leadership and Community Engagement Internships | |
| **Capstone** | | |
| LEAD 4000 | Leadership in Context and Emerging Challenges: A Capstone | 4 |

## Presidents Leadership Class Pathway

Students who are selected members of the Presidents Leadership Class can meet the requirements of the Leadership Studies Minor as outlined below. Students should meet with the PLC professional staff for additional guidance.

| Code | Title | Credit Hours |
|---|---|---|
| **Introductory Course** | | |
| PRLC 1810 | Leadership Foundations and Applications I | 3 |
| **Electives** | | |
| One elective required from each of the three categories below | | |
| *1. Leadership Foundations* | | *3* |
| PRLC 2820 | Multilevel Issues in Leadership (or PRLC 4010 (Maymester) CU in D.C. Science Policy) | |
| or ENLP 3100 | Complex Leadership Challenges | |
| *2. Leadership Application* | | *3* |
| PRLC 1820 | Leadership Foundations & Applications II | |
| or PRLC 3810 | Global Issues in Leadership | |
| *3. Leadership in Context* | | *3* |
| PRLC 3810 | Global Issues in Leadership | |
| or PRLC 3800 | Global Inquiry for 21st Century Leadership | |
| **Capstone** | | |
| LEAD 4000 | Leadership in Context and Emerging Challenges: A Capstone | 4 |

## Air Force ROTC Pathway

Students pursuing the Leadership Studies Minor through Air Force ROTC can meet the requirements for the Minor as outlined below.

| Code | Title | Credit Hours |
|---|---|---|
| **Introductory Course** | | |
| AIRR 1020 | Competition and Security | 1 |
| AIRR 2010 | Team and Leadership Fundamentals 1 | 1 |
| AIRR 2020 | Team and Leadership Fundamentals 2 | 1 |
| **Electives** | | |
| One elective required from each of the three categories below | | |
| *1. Leadership Foundations* | | *3* |
| AIRR 3010 | Leading People and Effective Communication 1 | |
| *2. Leadership Application* | | *3* |
| AIRR 3020 | Leading People and Effective Communication 2 | |
| *3. Leadership in Context* | | *3* |
| AIRR 4010 | National Security, Leadership Responsibilities/Commissioning Preparation 1 | |
| **Capstone** | | |
| LEAD 4000 | Leadership in Context and Emerging Challenges: A Capstone | 4 |

## Army ROTC Pathway

Students pursuing the Leadership Studies Minor through Army ROTC can meet the requirements for the minor as outlined below.

| Code | Title | Credit Hours |
|---|---|---|
| **Introductory Course** | | |
| MILR 1011 | Adventures in Leadership 1 | 2 |
| MILR 1021 | Adventures in Leadership 2 | 2 |
| **Electives** | | |
| One elective required from each of the three categories below | | |
| *1. Leadership Foundations* | | *3* |
| MILR 2031 | Methods of Leadership and Management 1 | |
| *2. Leadership Application* | | *3* |
| MILR 3052 | Military Operations and Training 1 | |
| *3. Leadership in Context* | | *3* |
| MILR 4072 | Leadership 1: Adaptive Leadership | |
| **Capstone** | | |
| LEAD 4000 | Leadership in Context and Emerging Challenges: A Capstone | 4 |

## Naval ROTC Pathway

Students pursuing the Leadership Studies Minor through Naval ROTC, including traditional Midshipmen programs, Seaman to Admiral (STA-21) and Marine Corps Enlisted Commissioning Educational Program (MECEP), can meet the requirements for the minor as outlined below.

| Code | Title | Credit Hours |
|---|---|---|
| **Introductory Course** | | |
| NAVR 4010 | Leadership and Management | 3 |
| **Electives** | | |
| One elective required from each of the three categories below | | |
| *1. Leadership Foundations* | | *3* |
| NAVR 4020 | Leadership and Ethics | |
| *2. Leadership Application* | | *3* |
| NAVR 2020 | Seapower and Maritime Affairs | |

| | | |
|---|---|---|
| *3. Leadership in Context* | | *3* |
| NAVR 3020 | Naval Operations and Seamanship | |
| **Capstone** | | |
| LEAD 4000 | Leadership in Context and Emerging Challenges: A Capstone | 4 |

# Learning Outcomes

By the completion of the program, students will be able to:

- Analyze leadership theories or approaches from multiple perspectives.
- Critically reflect on personal leadership capacities, social identities, and values.
- Meaningfully collaborate with others across difference.

# STEM Education - Certificate

At both the state and national level, the importance of a technologically literate workforce is essential to meeting the challenges of the 21st Century.

Preparing students for this workforce depends not only on producing high quality science, technology, engineering and mathematics (STEM) majors, but also improving their ability to communicate STEM concepts and work effectively with others. Whether they become doctors, teachers, or engineers, it is imperative that STEM majors are able to work in a variety of collaborative environments. Paramount to creating collaborative environments is recognizing the inherent strengths in embracing diverse perspectives, creating safe and affirming spaces, and valuing social justice and equitable teaching/learning.

The STEM Education Certificate provides STEM majors with skills in how to effectively communicate STEM related concepts, as well as an awareness of discipline-specific approaches to teaching and learning. Students enrolled in the STEM Education Certificate become part of a supportive CU Teach community. They work collaboratively teaching STEM concepts in local elementary and secondary schools and also experience working with youth in programs across campus and in the community. Moreover, the STEM Education Certificate allows students to graduate with a skill set that can be applied in business and industry, while providing them required foundational courses if they choose to complete a secondary mathematics or science teaching license.

The STEM Education Certificate is a collaborative venture between the School of Education, the College of Engineering and Applied Science, and the College of Arts and Sciences and focuses on creating learning environments that support the sharing of diverse perspectives in the process of solving interesting and relevant mathematical, scientific and engineering problems.

# Requirements

## Student Eligibility

Degree-seeking undergraduate students majoring in math, science or engineering (through Engineering Plus) are eligible to enroll in the STEM Education Certificate. Students must maintain at least a 3.0 GPA in the STEM Education Certificate courses.

Many of the courses included in the STEM Education Certificate are also applicable to the curriculum for obtaining licensure in secondary math or science; thus, students who decide to pursue a STEM secondary teaching license will be able to do so in a timely manner (approximately two additional semesters plus student teaching).

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| EDUC 2035 | Designing STEM Learning Environments and Experiences | 3-4 |
| or EDUC 2020 & EDUC 2030 | Step 1: Inquiry Approaches to Teaching STEM and Step 2: Inquiry-Based Lesson Design | |
| EDUC 4050 | Knowing and Learning in Mathematics and Science | 3 |
| Choose two: | | 6 |
| EDUC 1580 | Energy and Interactions | |
| EDUC 2130 | Teaching and Learning Math: Calculus, Trig and Adv Functions | |
| EDUC 4317 | Perspectives on Mathematics | |
| EDUC/PHYS 4460 | Teaching and Learning Physics | |
| EDUC 4706 | Assessment in Mathematics and Science Education | |
| EDUC/MCDB 4811 | Teaching and Learning Biology | |
| EDUC 4815 | Teaching K-12 Mathematics: Number Sense | |
| EDUC 4821 | Teaching K-12 Mathematics: Algebraic Thinking | |
| EDUC 4822 | Teaching and Learning Chemistry | |
| EDUC 4833 | Teaching and Learning Earth Systems | |
| EDUC 4835 | Teaching K-12 Mathematics: Geometry & Measurement | |
| EDUC 4844 | Teaching and Learning Computational Thinking | |
| EDUC 4850 | Teaching K-12 Mathematics: Probability & Statistics | |
| GEEN 4400 | Teaching Design | |
| **Total Credit Hours** | | **12-13** |

In addition to the required courses listed above, students must complete a total of 15 hours in various STEM education and outreach institutions that partner with CU Teach (Possible collaborators/venues include tutoring in BVSD, SVVSD, CU Science Discovery, CU Fiske Planetarium, WOW! Children's Museum, Destination Imagination, Butterfly Pavilion, and Science Fair judging). Students may propose their own partnership/collaboration (future or in the past) for approval by a co-chair of CU Teach.

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate knowledge of disciplinary-specific approaches to teaching and learning STEM.
- Effectively communicate STEM related concepts in educational, business and industry settings.
- Describe approaches for improving STEM education in formal and informal learning environments.

# Teacher Licensure Program

The School of Education offers coursework leading to a Colorado initial teaching license to undergraduate, post-baccalaureate and master's degree students. Colorado requires public school teachers to be licensed by its state department of education. Students who successfully complete all School of Education requirements will be recommended for a Colorado initial teaching license. The initial teaching license is for Colorado only. Licensure requirements vary from state to state and from teaching area to area. Students who are interested in teaching in other states should familiarize themselves with the requirements of those states so they may plan an appropriate degree program.

Teacher education at the University of Colorado, while administered by the School of Education, is a university-wide function. Many academic departments provide coursework that supports teacher preparation. Undergraduate students follow a prescribed set of core courses that meet state content preparation standards, complete a major and satisfy professional education requirements concurrently. The program involves a combination of courses at the university and K–12 school placements.

Students interested in pursuing Elementary (grades K–6) Education teacher licensure should refer to the Elementary Education - Bachelor of Arts (BA) (p. 794) section of the catalog for more information.

## Program Mission & Commitments

The School of Education prepares educators who are able to enact commitments to social justice and equitable access to deep content learning in school, family and community contexts.

The following principles guide our work in preparing the next generation of educators:

- Teachers must position students as sense-makers and knowledge-generators, who desire to invest and succeed in school. This involves noticing children/youth, building relationships with them, valuing their perspectives and attending to their thinking, curiosities and capabilities.
- Teaching is both intellectual work and a craft. Deep knowledge of content and pedagogy, creativity and passion fuel both learning and teaching.
- Teachers must design equitable learning environments in which all children are engaged in robust and consequential learning.
- Teacher's instruction and student learning is always conducted within the context of larger social systems, structures and hierarchies.
- What we do and say matters and must be analyzed. Our language and action constructs or constrains opportunities for children to build meaningful, positive and sustained relationships to learning and one another.

## Colorado Teacher Quality Standards

Teacher education candidates engage in a planned sequence of courses and accompanying clinical experiences in local community and school sites. Courses and assessments ensure candidates have demonstrated appropriate mastery of (1) content taught in the Colorado Academic Standards and (2) professional practices and dispositions associated with the Colorado Teacher Quality Standards listed below.

1. Teachers demonstrate mastery of and pedagogical expertise in the content they teach. The secondary teacher has knowledge of literacy and mathematics and is an expert in his or her content endorsement area(s).
2. Teachers establish a safe, inclusive and respectful learning environment for a diverse population of students.
3. Teachers plan and deliver effective instruction and create an environment that facilitates learning for their students.
4. Teachers demonstrate professionalism through ethical conduct, reflection and leadership.

## Admission Requirements

To be eligible for admission to the undergraduate nondegree or the post-baccalaureate teacher licensure program, applicants must meet all of the requirements below. Please note, satisfying the minimum criteria does not guarantee acceptance.

- **GPA**: Secondary students must have a 2.50 (on a 4.00 scale) cumulative GPA, 2.50 at CU Boulder, 2.50 in their subject area (secondary teacher fields) and 2.50 in education to be considered for admission. K-12 Music Education students must have and maintain a 3.00 overall and in their subject area.
- **Prior Degrees**: Students applying to Post-Baccalaureate programs must have a bachelor's degree from an accredited institution.
- **Basic Skills**: All teacher education students must demonstrate basic skills competence in mathematics and literacy. This may be done through acceptable grades in appropriate college coursework, or by acceptable standardized test scores. Contact the School of Education for more information.
- **Letters of Recommendation**: Students applying to an undergraduate nondegree program must have one letter of recommendation from a college-level instructor, professor, graduate student instructor, lab instructor, or a teaching assistant. Students applying to post-baccalaureate programs must have two letters of recommendation from a college-level instructor, professor, graduate student instructor, lab instructor, or a teaching assistant.
- **Personal Statement**
- **Background Check and Fee**: Please contact the School of Education for the most updated information.

# Post-Baccalaureate

The post-baccalaureate teacher licensure programs are designed for students who have previously completed a BA/BS/BM degree and are only pursuing a Colorado initial teaching license. The programs do not lead to a degree.

## Post-Baccalaureate (Non-Master's Degree) Teacher Licensure Programs

- Music Education (K–12) (p. 815)
- Middle School Math (6–8) (p. 815)
- Secondary Math (6–12) (p. 816)
- Secondary Science (6–12) (p. 817)
- World Languages (6 (p. 818)– (p. 817)12) (p. 818) - French, German, Japanese, Latin or Spanish

# Music Education (K–12) Teacher Licensure Program for Post-Baccalaureate Students

K-12 Music Education teacher licensure candidates must maintain a 2.00 GPA in cumulative, content and education coursework. All grades in Education courses must be a B- or better to maintain good standing in the program. All grades must be a C- or better to satisfy a content coursework requirement.

## Content Coursework Requirements

The College of Music evaluates all music content requirements, and recommends applicants to the School of Education. Students who have an undergraduate degree in music (BA, BM) may apply to the Masters of Music Education plus licensure program. Please contact the College of Music for details.

## Non-Music Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| Arts & Humanities (excluding music courses) | | 3 |
| Quantitative Reasoning and Mathematical Skills: Three credit hours in college-level mathematics. | | 3 |
| Natural Sciences | | 3 |
| Social Sciences or World Language (third semester or higher) | | 3 |
| Written Communication: Three credit hours in college-level composition or writing. | | 3 |
| Non-music Electives: Any coursework offered outside of music, excluding any School of Education (EDUC) courses. | | 9 |

## Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| EDUC 3013 | School and Society | 3 |
| EDUC 4112 | Adolescent Development and Learning for Teachers (Includes up to two hours per week of outside-class service learning. May be taken at any time.) | 3 |
| or EDUC 2411 | Educational Psychology for Elementary Schools | |
| MUSC 4323 | Differentiating Instruction in K-8 Music Classrooms | 3 |
| or EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms | |
| **Total Credit Hours** | | **9** |

## Student Teaching

Satisfactory completion of all content and education course requirements is a prerequisite for student teaching. No other courses may be taken during the student teaching semester.

- EDUC 4732 Student Teaching K-12 (8 credits). Pass/fail only.
- MUSC 4133 Student Teaching Practicum (3 credits). This course may be optional. Please check with the College of Music.
- MUSC 4193 Student Teaching Seminar (1 credit).

## Required Tests and Assessments

### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

### Licensure Exam: Prior to Student Teaching

Pass the state-approved licensure exam, PRAXIS Music: Content Knowledge (test code 5113).

# Middle School Mathematics (6–8) Teacher Licensure Program for Post-Baccalaureate Students

Middle School Mathematics teacher licensure candidates must maintain a 2.00 GPA in cumulative, content and education coursework. All grades in Education courses must be a B- or better to maintain good standing in the program. All grades must be a C- or better to satisfy a content coursework requirement.

## Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| Literature & Arts | | 3 |
| Natural Science | | 3 |
| Social Science | | 3 |
| Written Communication: College-level composition or writing | | 3 |
| EDUC 2130 | Teaching and Learning Math: Calculus, Trig and Adv Functions (or a 4-5 credit Calculus 1 course or equivalent.) | 3-5 |
| or APPM 1350 | Calculus 1 for Engineers | |
| or MATH 1300 | Calculus 1 | |
| or MATH 1310 | Calculus for Life Sciences | |
| EDUC 4815 | Teaching K-12 Mathematics: Number Sense (Spring only.) | 3 |
| EDUC 4821 | Teaching K-12 Mathematics: Algebraic Thinking (Spring only.) | 3 |
| EDUC 4835 | Teaching K-12 Mathematics: Geometry & Measurement (Fall only.) | 3 |
| EDUC 4850 | Teaching K-12 Mathematics: Probability & Statistics (Fall only.) | 3 |
| Math or applied math coursework. 24 credit hours at the college-level or higher. (May include requirements above. May include EDUC 4317.) | | 24 |
| Recent mathematics coursework in the past five years. (May include EDUC 4317.) | | 6 |

## Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| EDUC 2035 | Designing STEM Learning Environments and Experiences | 3 |
| EDUC 3013 | School and Society | 3 |

| | | |
|---|---|---|
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms (Includes up to four (4) hours per week of school-based practicum. Should be taken concurrently with EDUC 5375 Problem-Based Instruction. EDUC 4060 is a prerequisite.) | 3 |
| EDUC 4050 | Knowing and Learning in Mathematics and Science (May be taken any time. Includes up to two (2) hours per week of school-based practicum.) | 3 |
| EDUC 4060 | Classroom Interactions (Includes up to five (5) hours per week of school-based practicum. This course is a prerequisite for EDUC 4023 and EDUC 5375. Fall only.) | 3 |
| EDUC 4232 | Language and Literacy across the Curriculum (May be taken at any time. Spring only.) | 3 |
| EDUC 4317 | Perspectives on Mathematics (May be taken at any time. Fall only.) | 3 |
| EDUC 5375 | Problem-Based Math Instruction (Includes up to six (6) hours per week of school-based practicum. Should be taken concurrently with EDUC 4023 Differentiating Instruction in Diverse Secondary Classrooms. EDUC 4060 is a prerequisite. Spring only.) | 3 |
| **Total Credit Hours** | | **24** |

## Student Teaching

Satisfactory completion of all content and education course requirements is a prerequisite for student teaching. No other courses may be taken during the student teaching semester.

- EDUC 4513 Education and Practice (2 credits). Must be taken with EDUC 4712.
- EDUC 4712 Student Teaching: Secondary School (10 credits). Must be taken with EDUC 4513.

## Required Tests and Assessments

### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

### Licensure Exam: Prior to Student Teaching

Pass the state-approved licensure exam, PRAXIS: Middle School Mathematics (test code 5164).

### Teacher Performance Assessment

Pass a performance-based, subject-specific assessment designed by program faculty.

# Secondary Mathematics (7–12) Teacher Licensure Program for Post-Baccalaureate Students

Secondary Mathematics teacher licensure candidates must maintain a 2.00 GPA in cumulative, content and education coursework. All grades in Education courses must be a B- or better to maintain good standing in the program. All grades must be a C- or better to satisfy a content coursework requirement.

## Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| Literature & Arts | | 3 |
| Natural Science | | 3 |
| Social Science | | 3 |
| Written Communication: College-level composition or writing. | | 3 |
| Calculus 1: Including or equivalent to APPM 1350, MATH 1300 or MATH 1310. | | 4-5 |
| Calculus 2: Including or equivalent to APPM 1360 or MATH 2300. | | 4-5 |
| Linear Algebra: Including or equivalent to MATH 2135. | | 3 |
| Functions & Modeling/Analysis/Abstract Mathematics: One course in functions and modeling, analysis, or topology. | | 3 |
| Geometry: One course in modern geometry. | | 3 |
| Probability & Statistics: One course in probability theory and mathematical statistics. | | 3 |
| Math or applied math coursework. Eighteen of the required 24 credit hours above must be completed at the sophomore level or higher. (May include requirements above). | | 24 |
| Recent mathematics coursework in the past five years. (May include EDUC 4317.) | | 6 |

## Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| EDUC 2035 | Designing STEM Learning Environments and Experiences | 3 |
| EDUC 3013 | School and Society | 3 |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms (Includes up to four (4) hours per week of school-based practicum. Should be taken concurrently with EDUC 5375 Problem-Based Instruction. EDUC 4060 is a prerequisite.) | 3 |
| EDUC 4050 | Knowing and Learning in Mathematics and Science (May be taken any time. Includes up to two (2) hours per week of school-based practicum.) | 3 |
| EDUC 4060 | Classroom Interactions (Includes up to five (5) hours per week of school-based practicum. This course is a prerequisite for EDUC 4023 and EDUC 5375. Fall only.) | 3 |
| EDUC 4232 | Language and Literacy across the Curriculum (May be taken at any time. Spring only.) | 3 |
| EDUC 4317 | Perspectives on Mathematics (May be taken any time. Fall only.) | 3 |

| | | |
|---|---|---|
| EDUC 5375 | Problem-Based Math Instruction (Includes up to six (6) hours per week of school-based practicum. Should be taken concurrently with EDUC 4023 Differentiating Instruction in Diverse Secondary Classrooms. EDUC 4060 is a prerequisite. Spring only.) | 3 |
| **Total Credit Hours** | | **24** |

## Student Teaching

Satisfactory completion of all content and education course requirements is a prerequisite for student teaching. No other courses may be taken during the student teaching semester.

- EDUC 4513 Education and Practice (2 credits). Must be taken with EDUC 4712.
- EDUC 4712 Student Teaching: Secondary School (10 credits). Must be taken with EDUC 4513.

## Required Tests and Assessments

### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

### Licensure Exam: Prior to Student Teaching

Pass the state-approved licensure exam, Praxis: Mathematics (test code 5165).

### Teacher Performance Assessment

Pass a performance-based, subject-specific assessment designed by program faculty.

# Secondary Science (7–12) Teacher Licensure Program for Post-Baccalaureate Students

Secondary Science teacher licensure candidates must maintain a 2.00 GPA in cumulative, content and education coursework. All grades in Education courses must be a B- or better to maintain good standing in the program. All grades must be a C- or better to satisfy a content coursework requirement.

## Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| Literature & Arts | | 3 |
| Social Science | | 3 |
| Written Communication: College-level composition or writing. | | 3 |
| Calculus I: Including or equivalent to APPM 1350,MATH 1300, or MATH 1310. | | 4-5 |
| Choose one biology course. | | 3 |
| Choose one chemistry course. | | 3 |
| Choose one earth/space science course. | | 3 |
| Choose one physics course. | | 3 |
| *Complete three out of four of the following content area lab courses separately or as part of a course:* | | |
| Biology lab | | |
| Earth/space science lab | | |
| Chemistry lab | | |
| Physics lab | | |
| Recent science coursework in the past five years. | | 6 |
| Students must complete 24 credit hours in one of the sections below: | | 24 |
| Biology (may include courses from biology area above). Coursework must include the study of general biology, matter & energy in living systems, ecology, evolution, genetics, molecular biology, human anatomy, environmental biology and biotechnology. | | |
| Chemistry (may include courses from chemistry area above). Coursework must include the study of analytical, inorganic, organic and physical chemistry. | | |
| Earth/space science (may include courses from earth/space science area above). Coursework must include the study of environmental science, astronomy, historical & physical geology, meteorology, oceanography, and geomorphology & earth systems. | | |
| Environmental science. Coursework must include the study of ecology and astronomy, and 17 credit hours in biology. | | |
| Physics (may include courses from Physics area above). Coursework must include the study of mathematics through differential equations, astronomy, atomic & nuclear, classical mechanics, electricity & magnetism, heat & thermodynamics, optics & sound, quantum mechanics, radiation & radioactivity, relativity and waves. | | |

## Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| EDUC 2035 | Designing STEM Learning Environments and Experiences | 3 |
| EDUC 3013 | School and Society | 3 |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms (Includes up to four (4) hours per week of school-based practicum. Should be taken concurrently with EDUC 5385 Project-Based Instruction. EDUC 4060 is a prerequisite.) | 3 |
| EDUC 4050 | Knowing and Learning in Mathematics and Science (May be taken any time. Includes up to two (2) hours per week of school-based practicum.) | 3 |
| EDUC 4060 | Classroom Interactions (Includes up to five (5) hours per week of school-based practicum. This course is a prerequisite for EDUC 4023 and EDUC 5385. Fall only.) | 3 |
| EDUC 4232 | Language and Literacy across the Curriculum (May be taken at any time. Spring only.) | 3 |

| | | |
|---|---|---|
| EDUC 5385 | Phenomenon-Based Science Instruction (Includes up to six (6) hours per week of school-based practicum. Should be taken concurrently with EDUC 4023 Differentiating Instruction in Diverse Secondary Classrooms. EDUC 4060 is a prerequisite. Spring only.) | 4 |
| *Choose two courses from the following:* | | *6* |
| EDUC/PHYS 1580 | Energy and Interactions | |
| EDUC 4811 | Teaching and Learning Biology | |
| EDUC 4822 | Teaching and Learning Chemistry | |
| EDUC/PHYS 4460 | Teaching and Learning Physics | |
| EDUC 4833 | Teaching and Learning Earth Systems | |
| GEEN 4400 | Teaching Design | |
| **Total Credit Hours** | | **28** |

## Student Teaching

Satisfactory completion of all content and education course requirements is a prerequisite for student teaching. No other courses may be taken during the student teaching semester.

- EDUC 4513 Education and Practice (2 credits). Must be taken with EDUC 4712.
- EDUC 4712 Student Teaching: Secondary School (10 credits). Must be taken with EDUC 4513.

## Required Tests and Assessments

### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

### Licensure Exam: Prior to Student Teaching

Pass the state-approved licensure exam, PRAXIS General Science (test code 5436).

### Teacher Performance Assessment

Pass a performance-based, subject-specific assessment designed by program faculty.

# World Languages

## Secondary French (7–12) Teacher Licensure Program for Post-Baccalaureate Students

Secondary French teacher licensure candidates must maintain a 2.00 GPA cumulative GPA. All grades in Education courses must be a B- or better to maintain good standing in the program. All grades that satisfy a content coursework requirement must be a C- or better.

### Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| Mathematics: College-level mathematics. | | 3 |
| Natural Science | | 3 |
| Social Science | | 3 |
| Written Communication: College-level composition or writing. | | 3 |
| French Phonetics and Pronunciation: Including and equivalent to FREN 3010. | | 3 |
| Advanced French Composition 1: Including and equivalent to FREN 3050. | | 3 |
| Critical reading and writing in French literature: Including and equivalent to FREN 3100. | | 3 |
| French Literature Middle Ages to 1750: Including and equivalent to FREN 3110. | | 3 |
| French Literature 1750 Present Day: Including and equivalent to FREN 3120. | | 3 |
| Advanced Course on Francophone and or French Culture: Including and equivalent to FREN 3500. | | 3 |
| Recent French coursework in the past five years. | | 6 |
| 30 credit hours in French at the 3000-level or above. May include requirements from above. | | 30 |

### Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| EDUC 3013 | School and Society | 3 |
| EDUC 4112 | Adolescent Development and Learning for Teachers (Includes up to two (2) hours per week of outside-class service learning. May be taken at any time.) | 3 |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms (Includes up to four (4) hours per week of school-based practicum. Should be taken concurrently with FREN 4690) | 3 |
| EDUC 4125 | Secondary World Language Methods (Includes up to five (5) hours per week of school-based practicum. Fall only.) | 3 |
| FREN 5770 | Methods of Teaching French as a Foreign Language (Fall only.) | 2 |
| FREN 4750 | Methods of Teaching French and Professional Orientation (Fall only.) | 3 |
| **Total Credit Hours** | | **17** |

### Student Teaching

Satisfactory completion of all content and education course requirements is a prerequisite for student teaching. No other courses may be taken during the student teaching semester.

- EDUC 4513 Education and Practice (2 credits). Must be taken with EDUC 4722 and FREN 4960.
- EDUC 4722 Student Teaching: Secondary School 2 (5 credits). Must be taken with EDUC 4513 and FREN 4960.
- FREN 4960 High School French Teaching (6 credits). Must be taken with EDUC 4513 and EDUC 4722.

### Required Tests and Assessments

#### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

#### Oral Proficiency Interview: Prior to Student Teaching

Pass the ACTFL Oral Proficiency Interview with a score of Advanced Low or better.

**Licensure Exam: Prior to Student Teaching**
Pass the state-approved licensure exam, PRAXIS French: World Language (test code 5174).

## Secondary German (7–12) Teacher Licensure Program for Post-Baccalaureate Students

Secondary German teacher licensure candidates must maintain a 2.00 GPA in cumulative, content and education coursework. All grades in Education courses must be a B- or better to maintain good standing in the program. All grades must be a C- or better to satisfy a content coursework requirement.

### Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| Mathematics: College-level mathematics. | | 3 |
| Natural Science | | 3 |
| Social Science | | 3 |
| Written Communication: College-level composition or writing. | | 3 |
| Advanced German 1: Including or equivalent to GRMN 3010. | | 3 |
| Advanced German 2: Including or equivalent to GRMN 3020. | | 3 |
| Advanced Grammar, Stylistics, and Conversation: Including or equivalent to GRMN 4010. | | 3 |
| Four (4) upper-division or graduate courses in German, at least two (2) of which must be taught in German. | | 12 |
| Recent German coursework in the past five years. | | 6 |
| 30 credit hours in German above introductory language sequence (first-year level). May include requirements from above. | | 30 |

### Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| EDUC 3013 | School and Society | 3 |
| EDUC 4112 | Adolescent Development and Learning for Teachers (Includes up to two (2) hours per week of outside-class service learning. May be taken at any time.) | 3 |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms (Includes up to four (4) hours per week of school-based practicum. Should be taken concurrently with GRMN 4660.) | 3 |
| EDUC 4125 | Secondary World Language Methods (Includes up to five (5) hours per week of school-based practicum. Fall Only.) | 3 |
| GRMN 4450 | Methods of Teaching German | 3 |
| or GRMN 5020 | Applied Linguistics and Foreign Language Teaching Methodology | |
| Note: May not count GRMN 5020 for academic preparation in German (section C, item 6) and for methods. | | |
| **Total Credit Hours** | | **15** |

### Student Teaching

Satisfactory completion of all content and education course requirements is a prerequisite for student teaching. No other courses may be taken during the student teaching semester.

- EDUC 4513 Education and Practice (2 credits). Must be taken with EDUC 4722 and GRMN 4460.
- EDUC 4722 Student Teaching: Secondary School 2 (5 credits). Must be taken with EDUC 4513 and GRMN 4460.
- GRMN 4460 High School German Teaching (6 credits). Must be taken concurrently EDUC 4513 & EDUC 4722. Pass/fail only.

### Required Tests and Assessments

**Basic Skills: Prior to Student Teaching**
Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

**Oral Proficiency Interview: Prior to Student Teaching**
Pass the ACTFL Oral Proficiency Interview with a score of Advanced Low or better.

**Licensure Exam: Prior to Student Teaching**
Pass the state-approved licensure exam, PRAXIS German: World Language (test code 5183).

## Secondary Japanese (7–12) Teacher Licensure Program for Post-Baccalaureate Students

Secondary Japanese teacher licensure candidates must maintain a 2.00 GPA in cumulative, content and education coursework. All grades in Education courses must be a B- or better to maintain good standing in the program. All grades must be a C- or better to satisfy a content coursework requirement.

### Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| Mathematics: College-level mathematics. | | 3 |
| Natural Science | | 3 |
| Social Science | | 3 |
| Written Communication: College-level composition or writing. | | 3 |
| Advanced Japanese 1: Including or equivalent to JPNS 3110 | | 5 |
| Advanced Japanese 2: Including or equivalent to JPNS 3120 | | 5 |
| Japanese Literature | | 6 |
| Japanese Culture | | 6 |
| Recent Japanese coursework in the past five years. | | 6 |
| 30 credit hours in Japanese above introductory language sequence (first-year level). May include requirements from above. | | 30 |

### Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| EDUC 3013 | School and Society | 3 |
| EDUC 4112 | Adolescent Development and Learning for Teachers (Includes up to two (2) hours per week of outside-class service learning. May be taken at any time.) | 3 |

| | | |
|---|---|---|
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms (Includes up to four (4) hours per week of school-based practicum.) | 3 |
| EDUC 4125 | Secondary World Language Methods (Includes up to five (5) hours per week of school-based practicum. Fall only.) | 3 |
| **Total Credit Hours** | | **12** |

### Student Teaching

Satisfactory completion of all content and education course requirements is a prerequisite for student teaching. No other courses may be taken during the student teaching semester.

- EDUC 4513 Education and Practice (2 credits). Must be taken with EDUC 4712.
- EDUC 4712 Student Teaching: Secondary School (10 credits). Must be taken with EDUC 4513.

### Required Tests and Assessments

#### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

#### Oral Proficiency Interview: Prior to Student Teaching

Pass the ACTFL Oral Proficiency Interview with a score of Intermediate High or better.

#### Licensure Exam: Prior to Student Teaching

Pass the state-approved licensure exam (at this time, exams are not available for Japanese; please contact the School of Education for more information).

## Secondary Latin (7–12) Teacher Licensure Program for Post-Baccalaureate Students

Secondary Latin teacher licensure candidates must maintain a 2.00 GPA in cumulative, content and education coursework. All grades in Education courses must be a B- or better to maintain good standing in the program. All grades must be a C- or better to satisfy a content coursework requirement.

### Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| Mathematics: College-level mathematics. | | 3 |
| Natural Science | | 3 |
| Social Science | | 3 |
| Written Communication: College-level composition or writing. | | 3 |
| Beginning Latin 1: Including or equivalent to LATN 1014. | | 4 |
| Beginning Latin 2: Including or equivalent to LATN 1024. | | 4 |
| Intermediate Latin 1: Including or equivalent to LATN 2114. | | 4 |
| Intermediate Latin 2: Including or equivalent to LATN 2124. | | 3 |
| Latin Prose: Including or equivalent to CLAS 3014. | | 3 |
| Latin Poetry: Including or equivalent to CLAS 3024 | | 3 |
| Recent Latin coursework in the past five years. | | 6 |
| 30 credit hours in Latin above introductory language sequence (first-year level). May include requirements from above. | | 30 |

### Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| EDUC 3013 | School and Society | 3 |
| EDUC 4112 | Adolescent Development and Learning for Teachers (Includes up to two (2) hours per week of outside-class service learning. May be taken at any time.) | 3 |
| or EDUC 6368 | Adolescent Psychology and Development for Teachers | |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms (Includes up to four (4) hours per week of school-based practicum. ) | 3 |
| EDUC 4125 | Secondary World Language Methods (Includes up to five (5) hours per week of school-based practicum. Fall Only.) | 3 |
| LATN 4824 | Latin Teaching Methods: Open Topics | 3 |
| or LATN 5824 | Latin Teaching Methods: Open Topics | |
| **Total Credit Hours** | | **15** |

### Student Teaching

Satisfactory completion of all content and education course requirements is a prerequisite for student teaching. No other courses may be taken during the student teaching semester.

- EDUC 4513 Education and Practice (2 credits). Must be taken with EDUC 4712.
- EDUC 4712 Student Teaching: Secondary School (10 credits). Must be taken with EDUC 4513.

### Required Tests and Assessments

#### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

#### Licensure Exam: Prior to Student Teaching

Pass the state-approved licensure exam, PRAXIS Latin (test code 5601).

## Secondary Spanish (7–12) Teacher Licensure Program for Post-Baccalaureate Students

Secondary Spanish teacher licensure candidates must maintain a 2.00 GPA in cumulative, content and education coursework. All grades in Education courses must be a B- or better to maintain good standing in the program. All grades must be a C- or better to satisfy a content coursework requirement.

### Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| Mathematics: College-level mathematics. | | 3 |
| Natural Science | | 3 |
| Social Science | | 3 |
| Written Communication: College-level composition or writing. | | 3 |
| Advanced Spanish Grammar | | 3 |
| Advanced Spanish Composition/Hispanic Linguistics | | 3 |

| | |
|---|---|
| Advanced Spanish Conversation | 3 |
| Culture & Civilization: Peninsular or Latin American. | 3 |
| Literary Analysis in Spanish | 3 |
| Spanish Language Literature: Must include three credits of peninsular literature and three credits of Latin American literature. | 9 |
| Recent Spanish coursework in the past five years. | 6 |
| Thirty (30) credit hours of upper-division Spanish coursework. May include courses from above. | 30 |

### Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| EDUC 1001 | Humanities Teaching for Equity: Naming | 1 |
| EDUC 2001 | Humanities Teaching for Equity: Noticing | 2 |
| EDUC 3001 | Humanities Teaching for Equity: Negotiating | 2 |
| EDUC 3013 | School and Society | 3 |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms (Includes up to four (4) hours per week of school-based practicum. Should be taken concurrently with SPAN 4650.) | 3 |
| EDUC 4112 | Adolescent Development and Learning for Teachers (Includes up to two (2) hours per week of outside-class service learning. May be taken at any time.) | 3 |
| EDUC 4125 | Secondary World Language Methods | 3 |
| SPAN 4650 | Methods of Teaching Spanish (Spring only.) | 3 |
| **Total Credit Hours** | | **20** |

### Student Teaching

Satisfactory completion of all content and education course requirements is a prerequisite for student teaching. No other courses may be taken during the student teaching semester.

- EDUC 4722 Student Teaching: Secondary School 2 (2 credits). Must be taken with EDUC 4722 and SPAN 4660.
- EDUC 4712 Student Teaching: Secondary School (5 credits). Must be taken with EDUC 4513 and SPAN 4660.
- SPAN 4660 High School Spanish Teaching (6 credits). Must be taken with EDUC 4513 and EDUC 4722.

### Required Tests and Assessments

#### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

#### Licensure Exam: Prior to Student Teaching

Pass the state-approved licensure exam, PRAXIS Spanish: World Language (test code 5195).

Secondary Spanish licensure candidates will need to demonstrate content knowledge and Advanced Low communication skills in Spanish on the PRAXIS exam. An additional measure of oral proficiency at the Advanced Low level is the Oral Proficiency Interview (OPI). The faculty advisor in the Spanish Department can provide more information about the benefits of taking the OPI and how to sign up for it.

## Learning Outcomes

In their development as teachers for equity and justice who value and center humanistic, anti-oppressive, anti-racist, and queer-inclusive stances and practices, candidates in the CU licensure programs:

- Demonstrate expertise in teaching and learning within and, when relevant, across content domains (e.g., Literacy, STEM Education).
- Demonstrate knowledge of research and practitioner inquiry for evidence-informed teaching and equitable learning experiences within and, when relevant, across content domains.
- Demonstrate knowledge of research, scholarship, principles, and practices for broadening participation among youth, families, and communities in the design of equitable learning opportunities within and, when relevant, across content domains.

# Undergraduate Teacher Licensure

The undergraduate nondegree teacher licensure programs are designed for current, CU Boulder undergraduates in a college or school outside of the School of Education. The students will complete teacher licensure coursework simultaneously with their undergraduate degree coursework.

Secondary licensure in English, mathematics, science, social studies or Spanish can be completed with or without also completing a bachelor's degree in Middle & High School Teaching. Completion of the bachelor's degree requires the undergraduate candidate satisfy the general education requirements for the School of Education as well as the coursework and fieldwork required to be recommended for licensure. For candidates with content area majors in the College of Arts and Sciences, this requires no additional coursework. For candidates with content majors in other colleges or schools, additional coursework to complete School of Education general education requirements may be required. If, upon consultation with the School of Education academic advisor, a candidate determines they would like to pursue the requirements for licensure without also earning the bachelor's degree in Middle & High School Teaching, the nondegree option is available.

# Undergraduate Nondegree Teacher Licensure Programs

- Music Education (K–12) (p. 821)
- Secondary English Language Arts (6–12) (p. 822)
- Middle School Math (6–8) (p. 823)
- Secondary Math (6–12) (p. 824)
- Secondary Science (6–12) (p. 824)
- Secondary Social Studies (6–12) (p. 825)
- World Languages (p. 826) (French, German, Japanese, Latin or Spanish)

# Music Education (K–12) Teacher Licensure Program

## Grade Requirements

K-12 Music Education teacher licensure candidates must maintain a 2.00 GPA in cumulative, content and education coursework. All grades in Education courses must be a B- or better to maintain good standing

in the program. All grades must be a C- or better to satisfy a content coursework requirement.

## Content Coursework Requirements

K-12 Music Education teacher licensure candidates will meet content coursework requirements with the completion of their Bachelor of Music Education (p. 1081) degree program. Please contact the College of Music for details.

## Non-Music Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| Arts & Humanities (excluding music courses) | | 3 |
| Quantitative Reasoning and Mathematical Skills | | 3 |
| Natural Sciences | | 3 |
| Social Sciences or World Language (3rd semester or higher) | | 3 |
| Written Communication: Three credit hours in college-level composition or writing. | | 3 |
| Non-Music Electives: any courses outside of the College of Music, excluding any School of Education (EDUC) courses. | | 9 |

## Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| EDUC 3013 | School and Society | 3 |
| EDUC 4112 | Adolescent Development and Learning for Teachers (includes up to 2 hours per week of outside-class service learning; may be taken at any time) | 3 |
| or EDUC 2411 | Educational Psychology for Elementary Schools | |
| MUSC 4323 | Differentiating Instruction in K-8 Music Classrooms | 3 |
| or EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms | |
| **Total Credit Hours** | | **9** |

## Student Teaching

Satisfactory completion of all content and education course requirements is a prerequisite for student teaching. No other courses may be taken during the student teaching semester.

| Code | Title | Credit Hours |
|---|---|---|
| EDUC 4732 | Student Teaching K-12 (Pass/fail only.) | 8 |
| MUSC 4133 | Student Teaching Practicum (This course may be optional. Pease contact the College of Music.) | 3 |
| MUSC 4193 | Student Teaching Seminar | 1 |
| **Total Credit Hours** | | **12** |

## Required Tests and Assessments

### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

### Licensure Exam: Prior to Student Teaching

Pass the state-approved licensure exam, PRAXIS Music: Content Knowledge (test code 5113).

# Secondary English Language Arts (6–12) Teacher Licensure Program

## Major Requirements

Secondary English Language Arts teacher licensure candidates must major in English Literature, Ethnic Studies, Communication, Journalism, or Humanities with a literature concentration.

## Grade Requirements

Secondary English Language Arts teacher licensure candidates must maintain a cumulative 2.00 GPA in content and education coursework. All grades in Education courses must be a B- or better to maintain good standing in the program. All grades must be a C- or better to satisfy a content coursework requirement.

## Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| Advanced Writing: Critical or creative writing beyond the lower-division/introductory composition level. | | 3 |
| Visual or Digital Communication: Includes theatre, film, or digital media courses. | | 3 |
| Literature: Must include a component of American literature, British literature, World literature (non-American/non-British literature), and Multicultural literature. | | 12 |
| Thirty credit hours or coursework in one of the following disciplines: Communication/Speech, Composition, Drama/Theatre, Humanities, Journalism, or Literature (may include courses from the content requirements above). | | 30 |

## Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Take Prior to Final Year in the Program** | | |
| EDUC 1001 | Humanities Teaching for Equity: Naming | 1 |
| EDUC 2001 | Humanities Teaching for Equity: Noticing | 2 |
| EDUC 3001 | Humanities Teaching for Equity: Negotiating | 2 |
| EDUC 3013 | School and Society | 3 |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms | 3 |
| EDUC 4112 | Adolescent Development and Learning for Teachers (Includes up to 2 hours per week of outside-class service learning.) | 3 |
| EDUC 4295 | Narrative and Story in the Humanities | 3 |
| EDUC 4490 | Blurring Disciplinary Lines in the Humanities | 3 |
| **Final Year in Program** | | |
| EDUC 4325 | Queering Literacy in Secondary Classrooms (Fall Only.) | 3 |
| EDUC 4345 | Secondary English Methods I (Fall Only.) | 3 |

| | | |
|---|---|---|
| EDUC 4712 | Student Teaching: Secondary School (Spring Only.) | 10 |
| EDUC 4365 | Secondary English Methods II (Spring Only.) | 3 |
| EDUC 4390 | Teaching for Equity and Justice (Spring Only.) | 3 |
| **Total Credit Hours** | | **42** |

## Student Teaching

Candidates will complete an intensive final year of field experiences while taking courses. Candidates will generally not be able to take other coursework in the final Spring semester of the program. Please contact an Education advisor for more information.

## Required Tests and Assessments

### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

### Licensure Exam: Prior to Student Teaching

Pass the state-approved licensure exam, PRAXIS English Language Arts: Content Knowledge (test code 5038).

# Middle School Mathematics (6–8) Teacher Licensure Program

## Grade Requirements

Middle School Mathematics teacher licensure candidates must maintain a 2.00 GPA in cumulative, content and education coursework. All grades in Education courses must be a B- or better to maintain good standing in the program. All grades must be a C- or better to satisfy a content coursework requirement.

## Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| EDUC 2130 | Teaching and Learning Math: Calculus, Trig and Adv Functions | 3 |
| or MATH 1300 | Calculus 1 | |
| or MATH 1310 | Calculus for Life Sciences | |
| or APPM 1350 | Calculus 1 for Engineers | |
| EDUC 4815 | Teaching K-12 Mathematics: Number Sense (Spring only.) | 3 |
| EDUC 4821 | Teaching K-12 Mathematics: Algebraic Thinking (Spring only.) | 3 |
| EDUC 4835 | Teaching K-12 Mathematics: Geometry & Measurement (Fall only.) | 3 |
| EDUC 4850 | Teaching K-12 Mathematics: Probability & Statistics (Fall only.) | 3 |
| Math or applied math coursework. 24 credit hours at the college-level or higher. (May include requirements above. May include EDUC 4317.) | | 24 |

## Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Take Any Time (Do not have to be admitted to teacher licensure program)** | | |
| EDUC 2035 | Designing STEM Learning Environments and Experiences | 3-4 |
| or EDUC 2020 | Step 1: Inquiry Approaches to Teaching STEM | |
| and EDUC 2030 | Step 2: Inquiry-Based Lesson Design | |
| EDUC 3013 | School and Society | 3 |
| EDUC 4050 | Knowing and Learning in Mathematics and Science (Includes up to 2 hours per week of school-based practicum.) | 3 |
| EDUC 4317 | Perspectives on Mathematics (Fall only.) | 3 |
| **Education Coursework (must be admitted to teacher licensure program)** | | |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms (Includes up to four (4) hours per week of school-based practicum. Should be taken concurrently with EDUC 5375. EDUC 4060 is a prerequisite.) | 3 |
| EDUC 4060 | Classroom Interactions (Includes up to five (5) hours per week of school-based practicum. This course is a prerequisite for EDUC 4023 and EDUC 5375. Fall only.) | 3 |
| EDUC 4232 | Language and Literacy across the Curriculum (Spring only.) | 3 |
| EDUC 5375 | Problem-Based Math Instruction (Includes up to six (6) hours per week of school-based practicum. Should be taken concurrently with EDUC 4023. EDUC 4060 is a prerequisite. Spring only.) | 3 |
| **Total Credit Hours** | | **24-25** |

## Student Teaching

Satisfactory completion of all content and education course requirements is a prerequisite for student teaching. No other courses may be taken during the student teaching semester.

- EDUC 4513 Education and Practice (2 credits). Must be taken with EDUC 4712.
- EDUC 4712 Student Teaching: Secondary School (10 credits). Must be taken with EDUC 4513.

## Required Tests and Assessments

### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

### Licensure Exam: Prior to Student Teaching

Pass the state-approved licensure exam, PRAXIS: Middle School Mathematics (test code 5164).

### Teacher Performance Assessment

Pass a performance-based, subject-specific assessment designed by program faculty.

# Secondary Mathematics (6–12) Teacher Licensure Program

## Grade Requirements

Secondary Mathematics teacher licensure candidates must maintain a 2.00 GPA in cumulative, content and education coursework. All grades in Education courses must be a B- or better to maintain good standing in the program. All grades must be a C- or better to satisfy a content coursework requirement.

## Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| MATH 1300 | Calculus 1 | 4-5 |
| or MATH 1310 | Calculus for Life Sciences | |
| or APPM 1350 | Calculus 1 for Engineers | |
| MATH 2300 | Calculus 2 | 4-5 |
| or APPM 1360 | Calculus 2 for Engineers | |
| MATH 2400 | Calculus 3 | 4-5 |
| or APPM 2350 | Calculus 3 for Engineers | |
| MATH 2001 | Introduction to Discrete Mathematics | 3 |
| or MATH 2002 | Number Systems: An Introduction to Higher Mathematics | |
| MATH 3001 | Analysis 1 | 3 |
| MATH 3110 | Introduction to Theory of Numbers | 3 |
| or MATH 3140 | Abstract Algebra 1 | |
| MATH 3120 | Functions and Modeling | 3 |
| MATH 3510 | Introduction to Probability and Statistics | 3 |
| MATH 2135 | Introduction to Linear Algebra for Mathematics Majors | 3 |
| MATH 3210 | Euclidean and Non-Euclidean Geometry | 3 |
| MATH 4820 | History of Mathematical Ideas | 3 |

## Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Take Any Time (do not have to be admitted to teacher licensure program)** | | |
| EDUC 2035 | Designing STEM Learning Environments and Experiences | 3-4 |
| or EDUC 2020 | Step 1: Inquiry Approaches to Teaching STEM | |
| and EDUC 2030 | Step 2: Inquiry-Based Lesson Design | |
| EDUC 3013 | School and Society | 3 |
| EDUC 4050 | Knowing and Learning in Mathematics and Science (Includes up to 2 hours per week of school-based practicum.) | 3 |
| EDUC 4317 | Perspectives on Mathematics (Fall only.) | 3 |
| **Education Coursework (must be admitted to teacher licensure program)** | | |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms (Includes up to four (4) hours per week of school-based practicum. Should be taken concurrently with EDUC 5375. EDUC 4060 is a prerequisite.) | 3 |
| EDUC 4060 | Classroom Interactions (Includes up to five (5) hours per week of school-based practicum. This course is a prerequisite for EDUC 4023 and EDUC 5375. Fall only.) | 3 |
| EDUC 4232 | Language and Literacy across the Curriculum (Spring only.) | 3 |
| EDUC 5375 | Problem-Based Math Instruction (Includes up to six (6) hours per week of school-based practicum. Should be taken concurrently with EDUC 4023. EDUC 4060 is a prerequisite. Spring only.) | 3 |
| **Total Credit Hours** | | **24-25** |

## Student Teaching

Satisfactory completion of all content and education course requirements is a prerequisite for student teaching. No other courses may be taken during the student teaching semester.

- EDUC 4513 Education and Practice (2 credits). Must be taken with EDUC 4712.
- EDUC 4712 Student Teaching: Secondary School (10 credits). Must be taken with EDUC 4513.

## Required Tests and Assessments

### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

### Licensure Exam: Prior to Student Teaching

Pass the state-approved licensure exam, PRAXIS Mathematics (test code 5165).

### Teacher Performance Assessment

Pass a performance-based, subject-specific assessment designed by program faculty.

# Secondary Science (6–12) Teacher Licensure Program

## Grade Requirements

Secondary Science teacher licensure candidates must maintain a 2.00 GPA in cumulative, content and education coursework. All grades in Education courses must be a B- or better to maintain good standing in the program. All grades must be a C- or better to satisfy a content coursework requirement.

## Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| **Mathematics** | | |
| MATH 1300 | Calculus 1 | 4-5 |
| or MATH 1310 | Calculus for Life Sciences | |

| | | |
|---|---|---|
| or APPM 1350 | Calculus 1 for Engineers | |
| **Science** | | |
| Choose one biology course. | | 3 |
| Choose one chemistry course. | | 3 |
| Choose one earth/space science course. | | 3 |
| Choose one physics course. | | 3 |
| Complete three out of four of the following content area lab courses separately or as part of a course: | | |
| Biology lab | | |
| Chemistry lab | | |
| Earth/space science lab | | |
| Physics lab | | |

### Content Majors

- **Biology**: Complete a major in ecology & evolutionary biology, integrative physiology, neuroscience, or molecular, cellular & developmental biology (may include courses from the content requirements above).
- **Chemistry**: Complete a major in chemistry or biochemistry (may include courses from the content requirements above).
- **Earth/Space Science**: Complete a major in astronomy, atmospheric & oceanic sciences or geology (may include courses from the content requirements above). Please contact an education advisor for more information (edadvise@colorado.edu).
- **Environmental Science**: Complete a major in environmental studies with coursework in astronomy, ecology, and 17 credit hours of biology (may include courses from the content requirements above). Please contact an education advisor for more information (edadvise@colorado.edu).
- **Physics**: Complete a major in physics with Plan 3 (may include courses from the content requirements above). Students pursuing Plan 1 or Plan 2 in the physics major, or a major in engineering physics, should contact an education advisor (edadvise@colorado.edu).

## Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Take Any Time (Do not have to be admitted to teacher licensure program)** | | |
| EDUC 2035 | Designing STEM Learning Environments and Experiences | 3-4 |
| or EDUC 2020 | Step 1: Inquiry Approaches to Teaching STEM | |
| and EDUC 2030 | Step 2: Inquiry-Based Lesson Design | |
| EDUC 3013 | School and Society | 3 |
| EDUC 4050 | Knowing and Learning in Mathematics and Science (Includes up to 2 hours per week of school-based practicum.) | 3 |
| Choose two courses from the following: | | 6 |
| EDUC/PHYS 1580 | Energy and Interactions | |
| EDUC/PHYS 4460 | Teaching and Learning Physics | |
| EDUC 4811 | Teaching and Learning Biology | |
| EDUC 4822 | Teaching and Learning Chemistry | |
| EDUC 4833 | Teaching and Learning Earth Systems | |
| GEEN 4400 | Teaching Design | |
| **Education Coursework (must be admitted to teacher licensure program)** | | |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms (Includes up to four (4) hours per week of school-based practicum. Should be taken concurrently with EDUC 5385, EDUC 4060 is a prerequisite.) | 3 |
| EDUC 4060 | Classroom Interactions (Includes up to five (5) hours per week of school-based practicum. This course is a prerequisite for EDUC 4023 and EDUC 5385. Fall only.) | 3 |
| EDUC 4232 | Language and Literacy across the Curriculum (Spring only.) | 3 |
| EDUC 5385 | Phenomenon-Based Science Instruction (Includes up to six (6) hours per week of school-based practicum. Should be taken concurrently with EDUC 4023. EDUC 4060 is a prerequisite. Spring only.) | 4 |
| **Total Credit Hours** | | **28-29** |

## Student Teaching

Satisfactory completion of all content and education course requirements is a prerequisite for student teaching. No other courses may be taken during the student teaching semester.

- EDUC 4513 Education and Practice (2 credits). Must be taken with EDUC 4712.
- EDUC 4712 Student Teaching: Secondary School (10 credits). Must be taken with EDUC 4513.

## Required Tests and Assessments

### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

### Licensure Exam: Prior to Student Teaching

Pass the state-approved licensure exam, PRAXIS General Science (test code 5436).

### Teacher Performance Assessment

Pass a performance-based, subject-specific assessment designed by program faculty.

# Secondary Social Studies (6–12) Teacher Licensure Program

## Grade Requirements

Secondary Social Studies teacher licensure candidates must maintain a cumulative 2.00 GPA in content and education coursework. All grades in Education courses must be a B- or better to maintain good standing in the program. All grades must be a C- or better to satisfy a content coursework requirement.

## Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| U.S. History | | 6 |

| | |
|---|---|
| World History | 6 |
| Economics: Must be completed in an economics department. | 3 |
| Political Science: Must be completed in a political science department. | 3 |
| Cultural/Human Geography: Must be completed in a geography department. Physical geography does NOT qualify. | 3 |
| Sociology or Social/Cultural Anthropology: Must be completed in a sociology or anthropology department. Physical anthropology does NOT qualify. | 3 |
| Thirty credit hours or coursework in one of the following disciplines: anthropology, economics, ethnic studies, geography, history, international affairs or political science (may include courses from the content requirements above). | 30 |

## Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Take Prior to Final Year in Program** | | |
| EDUC 1001 | Humanities Teaching for Equity: Naming | 1 |
| EDUC 2001 | Humanities Teaching for Equity: Noticing | 2 |
| EDUC 3001 | Humanities Teaching for Equity: Negotiating | 2 |
| EDUC 3013 | School and Society | 3 |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms | 3 |
| EDUC 4112 | Adolescent Development and Learning for Teachers (includes up to 2 hours per week of outside-class service learning) | 3 |
| EDUC 4316 | Nature of Social Studies and Social Studies Education | 3 |
| EDUC 4490 | Blurring Disciplinary Lines in the Humanities | 3 |
| **Final Year in Program** | | |
| EDUC 4325 | Queering Literacy in Secondary Classrooms (Fall Only.) | 3 |
| EDUC 4330 | Secondary Social Studies Methods I (Fall Only.) | 3 |
| EDUC 4355 | Secondary Social Studies Methods II (Spring Only.) | 3 |
| EDUC 4390 | Teaching for Equity and Justice (Spring Only.) | 3 |
| EDUC 4712 | Student Teaching: Secondary School (Spring Only) | 10 |
| **Total Credit Hours** | | **42** |

## Student Teaching

Candidates complete an intensive final year of field experiences while taking courses. Candidates will generally not be able to take other coursework in the final Spring semester of the program. Please contact an Education advisor for more information.

## Required Tests and Assessments

### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

### Licensure Exam: Prior to Student Teaching

Pass the state-approved licensure exam, PRAXIS Social Studies: Content Knowledge (test code 5581).

# World Languages

## Secondary French (7–12) Teacher Licensure Program

### Grade Requirements

Secondary French teacher licensure candidates must maintain a 2.00 GPA in cumulative, content and education coursework. All grades in Education courses must be a B- or better to maintain good standing in the program. All grades must be a C- or better to satisfy a content coursework requirement.

### Content Coursework Requirements

Students must complete at least 30 credits in French at the 3000-level level or above.

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| FREN 3010 | French Phonetics and Pronunciation | 3 |
| FREN 3050 | French Composition | 3 |
| FREN 3100 | Introduction to Critical Reading and Writing in French Literature | 3 |
| FREN 3110 | Main Currents of French Literature 1 | 3 |
| FREN 3120 | Main Currents of French Literature 2 | 3 |
| FREN 3500 | French Current Events: Conversation and Composition | 3 |
| Thirty credit hours of upper-division French coursework. May include courses from above. | | 30 |

### Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| EDUC 3013 | School and Society | 3 |
| EDUC 4112 | Adolescent Development and Learning for Teachers (includes up to 2 hours per week of outside-class service learning) | 3 |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms (includes up to 4 hours per week of school-based practicum) | 3 |
| EDUC 4125 | Secondary World Language Methods (fall only; includes up to 5 hours per week of school-based practicum) | 3 |
| FREN 5770 | Methods of Teaching French as a Foreign Language (fall only) | 2 |
| **Total Credit Hours** | | **14** |

### Student Teaching

Satisfactory completion of all content and education course requirements is a prerequisite for student teaching. No other courses may be taken during the student teaching semester.

- EDUC 4513 Education and Practice (2 credits). Must be taken with EDUC 4722 and FREN 4960.
- EDUC 4722 Student Teaching: Secondary School 2 (5 credits). Must be taken with EDUC 4513 and FREN 4960.

- FREN 4960 High School French Teaching (6 credits). Must be taken with EDUC 4513 and EDUC 4722.

### Required Tests and Assessments

#### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

#### Oral Proficiency Interview: Prior to Student Teaching

Pass the ACTFL Oral Proficiency Interview with a score of Advanced Low or better.

#### Licensure Exam: Prior to Student Teaching

Pass the state-approved licensure exam, PRAXIS French: World Language (test code 5174).

## Secondary German (7–12) Teacher Licensure Program

### Grade Requirements

Secondary German teacher licensure candidates must maintain a 2.00 GPA in cumulative, content and education coursework. All grades in Education courses must be a B- or better to maintain good standing in the program. All grades must be a C- or better to satisfy a content coursework requirement.

### Content Coursework Requirements

Students must complete at least 30 credits in German. GRMN 4450 or GRMN 5020 may not count towards requirements.

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| GRMN 2010 | Intermediate German 1 | 4 |
| GRMN 2020 | Intermediate German 2 | 4 |
| GRMN 3010 | Advanced German 1 | 3 |
| GRMN 3020 | Advanced German 2 | 3 |
| GRMN 4010 | Advanced German III | 3 |
| Fifteen credit hours of German coursework. At least six hours must be upper-division, and least six hours must be taught in German. | | 15 |

### Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| EDUC 3013 | School and Society | 3 |
| EDUC 4112 | Adolescent Development and Learning for Teachers (Includes up to two (2) hours per week of outside-class service learning. May be taken at any time.) | 3 |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms (Includes up to four (4) hours per week of school-based practicum) | 3 |
| EDUC 4125 | Secondary World Language Methods (Includes up to five (5) hours per week of school-based practicum. Fall only.) | 3 |
| GRMN 4450 | Methods of Teaching German | 3 |
| or GRMN 5020 | Applied Linguistics and Foreign Language Teaching Methodology | |
| Note: May not count GRMN 5020 for academic preparation in German (section C, item 6) and for methods. | | |
| **Total Credit Hours** | | **15** |

### Student Teaching

Satisfactory completion of all content and education course requirements is a prerequisite for student teaching. No other courses may be taken during the student teaching semester.

- EDUC 4513 Education and Practice (2 credits). Must be taken with EDUC 4722.
- EDUC 4722 Student Teaching: Secondary School 2 (5 credits). Must be taken with EDUC 4513.
- GRMN 4460 High School German Teaching (6 credits). Pass/fail only. Must be taken concurrently EDUC 4513 & EDUC 4722.

### Required Tests and Assessments

#### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

#### Oral Proficiency Interview: Prior to Student Teaching

Pass the ACTFL Oral Proficiency Interview with a score of Advanced Low or better.

#### Licensure Exam: Prior to Student Teaching

Pass the state-approved licensure exam, PRAXIS German: World Language (test code 5183).

## Secondary Japanese (7–12) Teacher Licensure Program

### Grade Requirements

Secondary Japanese teacher licensure candidates must maintain a 2.00 GPA in cumulative, content and education coursework. All grades in Education courses must be a B- or better to maintain good standing in the program. All grades must be a C- or better to satisfy a content coursework requirement.

### Content Coursework Requirements

Students must complete at least 30 credits in Japanese.

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| JPNS 2120 | Intermediate Japanese 2 | 5 |
| JPNS 3110 | Advanced Japanese 1 | 5 |
| JPNS 3120 | Advanced Japanese 2 | 5 |
| JPNS 4110 | Advanced Readings in Modern Japanese 1 | 3 |
| JPNS 4120 | Advanced Readings in Modern Japanese 2 | 3 |
| Fifteen upper-division credits in Japanese language, literature and/or culture. | | 15 |

### Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| EDUC 3013 | School and Society | 3 |
| EDUC 4112 | Adolescent Development and Learning for Teachers (includes up to 2 hours per week of outside-class service learning) | 3 |

| | | |
|---|---|---|
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms (includes up to 4 hours per week of school-based practicum) | 3 |
| EDUC 4125 | Secondary World Language Methods (fall only; includes up to 5 hours per week of school-based practicum) | 3 |
| **Total Credit Hours** | | **12** |

### Student Teaching

Satisfactory completion of all content and education course requirements is a prerequisite for student teaching. No other courses may be taken during the student teaching semester.

- EDUC 4513 Education and Practice (2 credits). Must be taken with EDUC 4712.
- EDUC 4712 Student Teaching: Secondary School (10 credits). Must be taken with EDUC 4513.

### Required Tests and Assessments

#### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

#### Oral Proficiency Interview: Prior to Student Teaching

Pass the ACTFL Oral Proficiency Interview with a score of Intermediate High or better.

#### Licensure Exam: Prior to Student Teaching

Pass the state-approved licensure exam (at this time, exams are not available for Japanese; please contact the School of Education for more information).

## Secondary Latin (7–12) Teacher Licensure Program

### Grade Requirements

Secondary Latin teacher licensure candidates must maintain a 2.00 GPA in cumulative, content and education coursework. All grades in Education courses must be a B- or better to maintain good standing in the program. All grades must be a C- or better to satisfy a content coursework requirement.

### Content Coursework Requirements

Students must complete at least 30 credits in Latin language and literature courses beyond 1000-level language courses.

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| LATN 2114 | Intermediate Latin 1 | 4 |
| LATN 2124 | Intermediate Latin 2 | 4 |
| LATN 3014 | Introduction to Latin Prose | 3 |
| LATN 3024 | Introduction to Latin Poetry | 3 |
| Thirty credit hours of Latin coursework above the 1000-level. May include courses from above. | | 30 |

### Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| EDUC 3013 | School and Society | 3 |
| EDUC 4112 | Adolescent Development and Learning for Teachers (Includes up to two (2) hours per week of outside-class service learning. May be taken at any time.) | 3 |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms (Includes up to four (4) hours per week of school-based practicum) | 3 |
| EDUC 4125 | Secondary World Language Methods (Includes up to five (5) hours per week of school-based practicum. Fall only.) | 3 |
| LATN 4824 | Latin Teaching Methods: Open Topics | 3 |
| or LATN 5824 | Latin Teaching Methods: Open Topics | |
| **Total Credit Hours** | | **15** |

### Student Teaching

Satisfactory completion of all content and education course requirements is a prerequisite for student teaching. No other courses may be taken during the student teaching semester.

- EDUC 4513 Education and Practice (2 credits).
- EDUC 4712 Student Teaching: Secondary School (10 credits).

### Required Tests and Assessments

#### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

#### Licensure Exam: Prior to Student Teaching

Pass the state-approved licensure exam, PRAXIS Latin (test code 5601).

## Secondary Spanish (7–12) Teacher Licensure Program

### Grade Requirements

Secondary Spanish teacher licensure candidates must maintain a 2.00 GPA in cumulative, content and education coursework. All grades in Education courses must be a B- or better to maintain good standing in the program. All grades must be a C- or better to satisfy a content coursework requirement.

### Content Coursework Requirements

Students must complete at least 30 credits in Spanish at the 3000-level or above.

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| SPAN 3000 | Advanced Spanish Language Skills | 5 |
| SPAN 3002 | Advanced Spanish Conversation | 3 |
| SPAN 3050 | Spanish Phonology and Phonetics | 3 |
| SPAN 3100 | Literary and Cultural Analysis in Spanish | 3 |
| SPAN 3120 | Advanced Spanish Grammar | 3 |
| Hispanic Linguistics. Choose one of the following courses: | | 3 |
| SPAN 3010 | Advanced Rhetoric and Composition | |
| SPAN 4450 | Introduction to Hispanic Linguistics | |
| SPAN 4430 | Special Topics in Hispanic Linguistics | |

| | | |
|---|---|---|
| Peninsular Literature. Choose one of the following courses: | | 3 |
| SPAN 4150 | Major Works and Trends in Literature and Culture in Spain Up to 1700 | |
| SPAN 4160 | Major Works and Trends in Literature and Culture in Spain: 1700-Present | |
| Latin American Literature. Choose one of the following courses: | | 3 |
| SPAN 4170 | Major Works/Trends in Literature and Culture in Latin America Up to the 19th Century | |
| SPAN 4180 | Major Works and Trends in Literature and Culture in Latin America: 1900-Present | |
| Literature. One additional 4000-level course in Spanish or Latin American Literature. | | 3 |
| Culture & Civilization: Peninsular or Latin American | | 3 |
| Please contact an education advisor for a list of acceptable courses. | | |

### Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| EDUC 1001 | Humanities Teaching for Equity: Naming | 1 |
| EDUC 2001 | Humanities Teaching for Equity: Noticing | 2 |
| EDUC 3001 | Humanities Teaching for Equity: Negotiating | 2 |
| EDUC 3013 | School and Society | 3 |
| EDUC 4112 | Adolescent Development and Learning for Teachers (includes up to 2 hours per week of outside-class service learning) | 3 |
| EDUC 4125 | Secondary World Language Methods (fall only; includes up to 5 hours per week of school-based practicum) | 3 |
| EDUC 4023 | Differentiating Instruction in Diverse Secondary Classrooms (includes up to 4 hours per week of school-based practicum; should be taken concurrently with SPAN 4650.) | 3 |
| SPAN 4650 | Methods of Teaching Spanish (should be taken concurrently with SPAN 4023.) | 3 |
| **Total Credit Hours** | | **20** |

### Student Teaching

Satisfactory completion of all content and education course requirements is a prerequisite for student teaching. No other courses may be taken during the student teaching semester.

- EDUC 4513 Education and Practice (2 credits). Must be taken with EDUC 4722 and SPAN 4660.
- EDUC 4722 Student Teaching: Secondary School 2 (5 credits). Must be taken with EDUC 4513 and SPAN 4660.
- SPAN 4660 High School Spanish Teaching (6 credits). Must be taken with EDUC 4513 and EDUC 4722.

### Required Tests and Assessments

**Basic Skills: Prior to Student Teaching**

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

**Licensure Exam: Prior to Student Teaching**

Pass the state-approved licensure exam, PRAXIS Spanish: World Language (test code 5195).

Secondary Spanish licensure candidates will need to demonstrate content knowledge and Advanced Low communication skills in Spanish on the PRAXIS exam. An additional measure of oral proficiency at the Advanced Low level is the Oral Proficiency Interview (OPI). The faculty advisor in the Spanish Department can provide more information about the benefits of taking the OPI and how to sign up for it.

## Learning Outcomes

In their development as teachers for equity and justice who value and center humanistic, anti-oppressive, anti-racist, and queer-inclusive stances and practices, candidates in the CU licensure programs:

- Demonstrate expertise in teaching and learning within and, when relevant, across content domains (e.g., Literacy, STEM Education).
- Demonstrate knowledge of research and practitioner inquiry for evidence-informed teaching and equitable learning experiences within and, when relevant, across content domains.
- Demonstrate knowledge of research, scholarship, principles, and practices for broadening participation among youth, families, and communities in the design of equitable learning opportunities within and, when relevant, across content domains.

# Engineering & Applied Science

The College of Engineering and Applied Science has a tradition of excellence in engineering education dating back to 1893, and we continually update and improve our programs to reflect the highest standards in teaching and learning, discovery, innovation, community and culture. Our college is the top-ranked engineering school in the Rocky Mountain region.

## Mission & Vision

The College of Engineering & Applied Science's mission is to generate new knowledge in engineering and related fields, and to equip students from diverse backgrounds to become leaders and citizens responsible for the betterment of individuals and society. Our vision is to be a recognized world leader for excellence and innovation in engineering research and education, with an emphasis on inclusive excellence, active learning and global society.

## Degrees

The College of Engineering and Applied Science offers Bachelor of Science degrees in:

- Aerospace engineering sciences (p. 842)
- Applied mathematics (p. 854)
- Architectural engineering (p. 900)
- Biological engineering (p. 877)
- Biomedical engineering (p. 865)
- Chemical engineering (p. 880)
- Civil engineering (p. 904)
- Computer science (p. 941)
- Creative technology and design (p. 956)
- Electrical engineering (p. 975)
- Electrical and computer engineering (p. 970)

- Engineering physics (p. 994)
- Environmental engineering (p. 907)
- Integrated design engineering (p. 1003)
- Mechanical engineering (p. 1029)

Along with a Bachelor of Arts degree in Computer Science (p. 937) and a post-baccalaureate Bachelor of Science degree in Applied Computer Science (p. 945).

# Accreditation

The CU Boulder campus is accredited by the Higher Learning Commission. Programs accredited by ABET (https://www.abet.org/) can be found on the College of Engineering & Applied Science Accreditation (https://www.colorado.edu/engineering/accreditation/) webpage. The degrees in applied mathematics and engineering physics are offered in cooperation with the Department of Applied Mathematics and Department of Physics in the College of Arts and Sciences.

# Professional Registration

Professional registration is recommended for all fields of engineering in order to protect the health, safety and welfare of the public. Registration is required in all states for the legal right to practice professional engineering. Although there are variations in state laws regarding engineering licensure, there is a general four-step process for licensure candidates: earn a degree from an EAC/ABET-accredited engineering program, pass the FE exam, gain acceptable work experience under the supervision of a PE and pass the PE exam. Students typically take the FE exam during their senior year in college.

# Areas of Interest

## BOLD Center

The BOLD Center (https://www.colorado.edu/engineering/bold/) is part of the College of Engineering and Applied Science's (CEAS) commitment to cultivate community, belonging and a positive educational environment for students. Students are engaged with academic, cultural, social, professional and leadership experiences to enhance their skillsets and preparedness to implement engineering and social solutions in an increasingly complex world. Our scholarship programs and student societies incorporate mentoring and meaningful engagement with alumni and industry partners. BOLD's academic services are central to supporting student success in the CEAS.

## Colorado Space Grant Consortium

CU's Space Grant program provides interdisciplinary students with access to space through innovative courses and real-world, hands-on space hardware programs that include short and long-duration, high altitude balloon payloads, sounding rocket payloads and low-Earth orbiting satellite missions. NASA's Colorado Space Grant Consortium (http://spacegrant.colorado.edu) (also known as Space Grant) is part of a national program.

Space Grant students interact with engineers and scientists from NASA and industry to develop, test and fly new space technologies. All missions are entirely student run—including students in the roles of team members, team leads, systems engineers, project managers and mission operators. Students participate in programs that aid them in their future academic courses and careers.

## Engineering Connections

Engineering Connections is the residential community for first-year engineering students (https://www.colorado.edu/engineering/engineering-residential-community/), which has staff and faculty dedicated to developing curricular, co-curricular, social and wellness programs just for them. These programs are specifically designed to help engineering and applied science students build the sense of community and belonging they need to succeed—from their first day through graduation day.

## Engineering Honors Program

Incoming first-year students are selected to participate in the Engineering Honors Program via an online application process. The Engineering Honors Program (http://www.cuhonorsengineering.com/) (EHP) provides an educational experience that transcends the classroom and matches the unique abilities, needs and ambitions of this select group of students. The program is for students who want to help build an honors culture that cares more about learning than grades; more about maximizing opportunities than meeting minimum requirements; and more about being thoughtful, critical, engaged and intentional than being passively defined by the vague expectations of others. Being part of EHP means belonging to a community that is ambitious without being competitive and committed to a wide range of goals from international development work to graduate school, from research to teaching, and from industry to service. It means living next to students already doing research, returning from summer internships, working with Engineers without Borders and applying to graduate school.

## Engineering Leadership Program

The Engineering Leadership Program (https://www.colorado.edu/engineering/academics/engineering-leadership-program/) (ENLP) explores leadership challenges in applied science using liberal arts pedagogy. The program aims to cultivate leaders of curiosity and character, whose technical expertise is enriched through the study of the political, moral and philosophic dilemmas posed by the perpetual advancement of science and technology. The program offers a wide variety of courses on the thought and practice of leadership, many of which utilize primary source texts in history, the philosophy of science, moral philosophy, political science and anthropology. The program's courses (with ENLP course prefix) count for humanities and social sciences credit in the College of Engineering and Applied Science, and most courses are discussion-based seminars. Students with a deep interest in ENLP's curriculum are encouraged to pursue the Engineering Leadership Certificate (https://www.colorado.edu/engineering/academics/engineering-leadership-program/). The program also addresses contemporary concerns in engineering practice. CU engineering alumni and established leaders from engineering industry, business and politics frequently visit ENLP classes to give guest lectures, hold interview sessions and converse with students over informal lunches. The Engineering Leadership Program has also partnered with the Engineering Management Program to offer coursework for ENLP students interested in engineering project management, engineering entrepreneurship and engineering economics.

## Global Engineering

In today's global environment, engineers can expect to work in multilingual and multicultural teams and to engage in projects with global impact. It is therefore essential that students develop global engineering competencies alongside their technical skills, and engineering students have numerous pathways to build those competencies. The Global Engineering Residential Academic Program (https://www.colorado.edu/

center/mortenson/residential-academic-program/program/) prepares students for the global marketplace of ideas. The program not only supports students in understanding the global context and their role as engineers through coursework, but also provides a community through which to explore, discuss and apply the concepts of global engineering in their personal and professional lives. Students have direct interaction with faculty, staff, graduate and undergraduate students who are engaging in global engineering research, policy and practice. The program also builds connections with international experts outside of CU Boulder, drawing on the experience of alumni, international research partners and organizations based in the Greater Denver area.

Additional opportunities include engineering study abroad and completing a Global Engineering Minor. For more information, visit the college's International Programs (http://www.colorado.edu/engineering-international/) website.

### Herbst Program for Engineering, Ethics & Society

The Herbst Program for Engineering, Ethics & Society (http://www.colorado.edu/herbst/) enriches and broadens the education of engineering students with seminar and lecture courses in literature, philosophy, history, social issues and the arts.

In its two seminars, ENES 1010 and ENES 3100, class time is devoted almost exclusively to roundtable discussion of original texts in literature, philosophy and the fine arts. These seminars have fewer than 14 students, so students can hone their critical thinking skills through reading, discussion and extensive writing. Both of these seminars satisfy the college's writing requirement. Note: ENES 1010 satisfies the writing requirement only when taken in a student's freshman year.

### Idea Forge

The Idea Forge (http://www.colorado.edu/ideaforge/) is a flexible, cross-disciplinary collaborative space where students can imagine, design, create and test products and solutions to meet a range of societal and customer needs. The space serves as the home for Design Center Colorado and Catalyze CU. It supports student teams working on invention and innovation as part of courses, as well as design and development driven by entrepreneurial-minded individuals and service-oriented groups. With all these students working side-by-side, the Idea Forge boosts student learning through collaborative, hands-on experience, while supporting industry interaction through scheduled workshops as well as spontaneous exchanges. The mission of the Idea Forge is to enhance interdisciplinary creativity and synergy to develop flexible, adaptable and practical graduates. To do this, the Idea Forge supports design from a variety of perspectives, from the most formal engineering design process to the human-centered design philosophy. By providing students the opportunity to design, build and test their concepts, the Idea Forge builds creative confidence and promotes the formation of strong professional skills.

The Idea Forge boasts a variety of flexible spaces to achieve its mission and to fit individual student needs. These spaces fit into three categories: fabrication shops, project space and community space. The fabrication shops provide students with the tools and equipment needed for prototyping through machining, welding, 3D printing, laser cutting, woodworking and sewing with an additional emphasis on electronics and micro-controllers. Students learn safe, efficient use of the tools and equipment through action, by taking workshops or tackling a project. Project spaces fill the Idea Forge – students are able to find their nearest wood-topped workbench to assemble their design. The central Idea Forge Commons, an inspiring environment for teamwork and brainstorming, doubles as a project space and a community space. Just off the Commons, the Thinking Lounge community space provides students with a comfortable place to take a break. Additional community space consists of two impressive conference rooms, which are perfect for meetings with industry and community members.

### Integrated Teaching and Learning Program

The Integrated Teaching and Learning (ITL) program (http://itll.colorado.edu) provides K–16 engineering education initiatives aimed at supporting the teaching and learning of hands-on, minds-on engineering curriculum so that students of all ages can imagine a future in engineering. With a focus on engineering design, undergraduate engineering students have the ability to create what they dream via modern manufacturing and electronics capabilities—reinforced through innovative engineering courses, as well as through time set aside for the creation of personal projects to expand one's creative thinking.

Through ITL Program skill-building workshops on tools, machining, soldering, circuits, strain gauges, laser cutters, Arduino microcontrollers, LabVIEW, SolidWorks, spatial visualization and more, students become comfortable with the resources that help them do the engineering that impacts everyday life. The multidisciplinary, hands-on ITL Laboratory features two open and interactive laboratory plazas that support inquiry-based experimentation, data acquisition and analysis capability. The laboratory also hosts design studios, team work areas, active learning spaces—all designed to be used by all disciplines of CU engineering students as they do engineering.

### ProReady

The ProReady (https://www.colorado.edu/engineering/proready/) initiative is designed to prepare College of Engineering & Applied Science students for professional readiness and career success in their chosen field. The ProReady formula helps students: chart their career path, gain relevant experience and grow their professional network. Career exploration and preparation, internships, undergraduate research, study abroad, student organization leadership, graduate school preparation and more are all part of being ProReady!

# Policies & Requirements

## Admission

### First-Year Applicants

When students apply to the College of Engineering and Applied Science from high school, they may apply to enter the college as "open option" (unsure of engineering major), or they may apply to a specific engineering major. Students may declare, change, or add a major (https://www.colorado.edu/engineering-advising/get-your-degree/first-year-freshmen/changing-your-major-or-adding-major/) by following the procedure on the College website.

Specific admission requirements are detailed in the Admissions (p. 29) section of this catalog. Contact the campus Admissions Office (http://www.colorado.edu/admissions/) for more information.

### Transfer Students

Students desiring to transfer (http://www.colorado.edu/engineering/future-students/transferring-cu/) from other accredited collegiate institutions are considered for admission on an individual basis. Transfer students must be admitted to the college prior to the last 45 credit hours

of their degree program. Admission criteria for students from other CU campuses are the same as for other transfer students.

### Intra-University Transfer Students

Intra-University Transfers (IUTs) (https://www.colorado.edu/engineering-advising/transfer-within-cu/) on the Boulder campus to the College of Engineering and Applied Science are considered on designated criteria.

## Former Students

Former students may readmit to the university (https://www.colorado.edu/admissions/process/readmit/). Courses taken at other collegiate institutions may or may not be a determining factor in the student's readmission to CU Boulder, but transcripts on all such work must be submitted.

Interruption of studies may require completion of current degree work in addition to repetition of coursework for new degree requirements.

A former student returning to the college after a break in attendance must have coursework reevaluated by the student's major department/program if it is older than 10 years from the date of their return.

# Academic Excellence

## Dean's List

An undergraduate student in the College of Engineering and Applied Science who completes at least 12 credit hours of coursework for a letter grade during the fall or spring semester on the Boulder campus, and who earns a semester grade point average (GPA) of at least 3.600, will be designated as making the college dean's list for that semester. An actual list of students is not published, but the notation of "Dean's List" is placed on the student's transcript and is viewable at the end of the semester in which the designation is earned.

## Honors at Graduation

Undergraduate students my be eligible for honors designations at graduation (http://www.colorado.edu/engineering-advising/get-your-degree/graduation/honors-graduation/).

## Engineering Scholarships

Undergraduate engineering scholarships (http://www.colorado.edu/engineering/future-students/financial-aid-scholarships/) are provided by public funds and private donations by alumni, corporations and friends of the college. In some cases, endowments have been established; other scholarships are based on annual gifts. Some companies provide matching funds for gifts from their employees who are alumni.

Anyone interested in providing an undergraduate scholarship or contributing to the scholarship fund may contact:

Engineering Advancement
University of Colorado Boulder
422 UCB
Boulder, CO 80309-0422
303-492-7899

# Academic Standards

## Academic Policies

Students in the College of Engineering and Applied Science must abide by all college policies and procedures as outlined on the college's Student Support & Advising Services (http://www.colorado.edu/engineering-advising/) website, such as Academic Expectations and Policies (http://www.colorado.edu/engineering-advising/get-your-degree/academic-expectations-policies/). Students should refer to these webpages often since policies, procedures and forms may be updated throughout the academic year.

## Petition Policy

A student desiring a waiver of college or department/program policies must request and secure approval for this waiver through a petition procedure. Petitions (http://www.colorado.edu/engineering-advising/forms/) are first presented to the student's major department/program for review, followed by review at the dean's office if applicable. It is the student's responsibility to obtain official notification of the final petition decision from the major department, program and/or dean's office.

## Academic Integrity

Students in the College of Engineering and Applied Science are required to pass an annual Academic Integrity Quiz. See also the campus wide Honor Code (https://www.colorado.edu/sccr/students/honor-code-and-student-code-conduct/) website.

## Academic Standing

University Academic Standing policies (p. 28) apply to all degree-seeking undergraduate students at CU Boulder. More details regarding good academic standing, academic alert, academic warning, academic suspension, and academic dismissal are available on the Office of the Registrar's website (https://www.colorado.edu/registrar/students/your-information-records/academic-standing/).

# Credit and Enrollment

## Attendance

Successful work in the College of Engineering and Applied Science is dependent upon regular attendance in all classes. Students may be administratively dropped from classes for any non-attendance during the first few weeks of the semester. Students who are unavoidably absent should make arrangements with instructors to make up the work missed. Non-attendance does not constitute withdrawal from a class. If students stop attending a class in which they are formally enrolled, they are likely to receive a failing grade (F).

## Registration and Enrollment

To ensure the prompt completion of degree requirements and satisfaction of the four-year guarantee, the undergraduate student is expected to register for, and complete each semester, a full-time course load as outlined in the relevant major department/program curriculum. Part-time enrollment (less than 12 credit hours) will negatively impact the student's financial aid and scholarships, and is likely to negatively impact student health insurance, on-campus housing and the four-year graduation guarantee. Students must also petition to be enrolled in more than 19 credit hours in any given semester. New students in their first semester at CU Boulder are limited to 17 credit hours.

## Add and Drop Policies

See the Office of the Registrar website (https://www.colorado.edu/registrar/students/registration/register/) for campuswide add and drop policies, and specific deadline dates for a given semester/term. See Late Drops (https://www.colorado.edu/engineering-advising/get-your-degree/academic-expectations-policies/) for eligibility to drop a class after the 10th week semester deadline but before the last day of classes.

## Withdrawal from the University

Withdrawal is the term used when a student wishes to drop all classes in a given semester/term. See the the Office of the Registrar website (https://www.colorado.edu/registrar/students/withdraw/) for campus-wide withdrawal deadlines and procedures, along with withdrawals (https://www.colorado.edu/engineering-advising/get-your-degree/academic-expectations-policies/) on the college website. Students who interrupt their course of study may be required to complete all current degree requirements and to repeat courses previously completed.

## Sequence of Courses

Students are expected to follow the curriculum recommended by their major department/program. All courses are not necessarily offered each semester. According to college policy, undergraduate courses having an enrollment of fewer than 20 students may be cancelled. Students can minimize scheduling problems by closely following the curricular sequence recommended by their major department/program. If a course is unavailable, a student may petition to enroll for equivalent study.

## Prerequisites and Passing Grades

The minimum passing grade for a course that is considered a prerequisite for another course is C-, allowing a student to progress through the curriculum and apply these courses towards degree requirements. If the minimum required grade in a prerequisite course is not achieved, the student is required to repeat the course until the minimum acceptable grade has been earned (maximum of 3 graded attempts total to master the subject content at the required level). If a student takes the advanced (post-requisite) course, it does not remove the obligation to meet the prerequisite course minimum grade requirement, even if the grade earned in the advanced course is acceptable.

In general, the minimum passing grade for a course that is not specifically a prerequisite for another required course is D-. However, individual degree programs in the College may require higher minimum grades for specific terminal courses in their curricula.

Academic departments and programs reserve the right to drop students enrolled in their courses who have not met the minimum prerequisite requirement. It is the student's responsibility to communicate with their major department/program if summer coursework and/or transfer credit will be used to meet the prerequisite requirement.

## Repeating Courses

A student is permitted a maximum of three graded attempts to demonstrate sufficient proficiency in a particular subject area (such as Calculus 1, Physics 2, etc.), including attempts at CU Boulder or other collegiate institutions. A "W" is not considered an attempt towards demonstrating sufficient proficiency. After the third unsuccessful attempt, a student may not be able to retake the course or substitute it with a course in the same subject area from CU Boulder or another institution.

The College will apply the grade a student earned in their most recent course attempt to determine if the student meets the grade required for a pre-requisite course. If a student has already earned AP, IB or transfer college credit for a course, the letter grade from a subsequent attempt of the class through CU Boulder will become part of the student's CU cumulative GPA. Students cannot retroactively claim AP or earlier earned credit for a course after a subsequent unsuccessful attempt of the class.

## Grade Replacement

Students may also retake a course for grade replacement (https://www.colorado.edu/registrar/students/degree-planning/grade-replacement/) under the grade replacement policy. When a student retakes a course for grade replacement, the grade earned in the most recent prior attempt will still appear on the transcript, but their cumulative GPA and credit totals on the transcript will only include the grade from the latest attempt.

## Incompletes

Incomplete grades are given only when students, for documented reasons beyond their control, are unable to complete course requirements. A substantial amount of work must have been satisfactorily completed before approval for such a grade is given. An Incomplete Grade Record Form (https://www.colorado.edu/engineering-advising/forms/) must be completed by the instructor and student. In addition to reflecting the course and term taught, it also states what work must be completed to award the final grade and when the work must be finished (not to exceed one year). Incomplete grades are not calculated into the GPA. If a student does not complete a course assigned an Incomplete grade within one year, the Incomplete grade will automatically convert to an F grade. Students cannot repeat an equivalent course at another campus of the university or at another institution and expect the CU Boulder grade of “I” to be removed, changed or excluded from conversion to an F. A student is expected to complete any course with an “I” grade and not to re-enroll in a course in which a grade of “I” was awarded. Once the work has been completed, the instructor completes an online grade change from "I" to the final earned grade. However, it is the student's responsibility to verify that the grade change was processed and is reflected properly on the transcript.

## Final Grade Appeal

If a student (rostered in any college/school on campus) wishes to appeal the final grade in a course offered by a College of Engineering and Applied Science academic unit, refer to the college’s official grade appeal policy and procedures (http://www.colorado.edu/p17ac5aa8dc5/rules-policies/grade-appeal-policy/).

## Credit Policies

### Advanced Placement (AP)

College credit may be granted on the basis of scores earned on the College Board's Advanced Placement (AP) exams. See the Advanced Placement (AP) Credit table (p. 37) for additional details.

### International Baccalaureate (IB)

College credit may be granted on the basis of International Baccalaureate (IB) program exam scores. See the International Baccalaureate (IB) Credit table (p. 40) for additional details.

### College-Level Examination Program Credit

College credit may be granted for select College-Level Examination Program (CLEP) examinations. See the list of eligible CLEP exams (p. 44) for more information.

### Credit for Reserve Officers Training Corps (ROTC)

Up to 6 credit hours of approved ROTC courses may be counted toward a student's degree requirements in the humanities/social sciences. These approved courses may be found at the Humanities, Social Sciences and Writing Requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/) webpage. With written approval from the student's

major department/program, additional ROTC credit hours may be applied as free electives and/or technical professional electives.

### No Credit Restrictions

In the College of Engineering and Applied Science, courses required for fulfillment of graduation requirements *cannot be taken for no credit (NC)*. Once a course has been taken for no credit, the course cannot be repeated for credit. Engineering students must be approved by the College after making a request of the Office of the Registrar to enroll in any course NC.

### Pass/Fail Option

The primary purpose for offering courses on a pass/fail grading option is to encourage students to broaden their educational experience by selecting elective courses with this grade option without serious risk to their academic record. See Pass/Fail (https://www.colorado.edu/engineering-advising/get-your-degree/academic-expectations-policies/) policy for details.

### Transfer Credit

After a prospective transfer student has been admitted, the Office of Admissions issues a transfer credit evaluation listing those courses acceptable for transfer by University of Colorado Boulder standards. A copy of this evaluation is made a part of the student's college record. The student's major department/program will then indicate which of those courses are acceptable in meeting engineering degree requirements. It is the responsibility of the transfer student to request final validation of the transfer credit hours by the major department/program and confirm that this validation is noted in the student's record. *Note*: if a student changes major, the new major department/program will reassess how the transfer credit applies toward the new degree program.

If at any time a student wishes to have a course not previously accepted reconsidered for transfer, the student should consult with the faculty transfer credit evaluator in the relevant academic department/program.

#### Nontransferable Credit Hours

Students desiring to transfer credit hours from engineering technology programs should note that such credit hours are accepted only upon submission of evidence that the work involved was fully equivalent to that offered in this college.

Some technology courses are taught with titles and textbooks identical to those in similar engineering courses. These courses may still not be equivalent to engineering courses because the areas of academic emphasis are divergent.

In order to assist engineering technology students with transfer problems, the following guidelines have been established:

1. Courses on basic subjects such as mathematics, physics, foreign languages, literature or history may be acceptable for transfer credit if they were taught as part of an accredited program for all students and were not specifically designated for technology students.
2. Students who have taken courses with technology designations that may be valid equivalents for engineering courses have these options:
   - They may petition for permission to waive the course requirement. The course requirement can be waived if students demonstrate that, by previous coursework, individual study or work experience, they have acquired the background and training normally provided by the course. No credit is given for a waived course, but students may benefit from the waiver by being able to include more advanced work in their curriculum. A student will need to substitute an equivalent number of credit hours (approval by major department/program and college required). Other students may profit by repeating the course at this college and thus establishing a fully sound basis for what follows.
   - The appropriate University of Colorado Boulder academic department may recommend to the dean's office that credit be transferred to count toward the requirements for a related course in its curriculum. Credit cannot be given for vocational/technical or remedial courses under rules of the university.
   - The student may seek credit for the course by examination, if available, and the student pays the appropriate fee.

For more information on transfer of credit policies, see Transfer of College-Level Credit (p. 48) in the Admission section of this catalog.

# Requirements

## Academic Advising

Students are advised by professional staff advisors (https://www.colorado.edu/engineering-advising/people/) and faculty mentors from their respective major department/program, typically at least once a semester. Students use Buff Portal Advising (https://www.colorado.edu/buffportaladvising/) to communicate with professional academic advisors, schedule appointments, explore majors, etc.

## Premedical Option

Students interested in meeting requirements for entry into medical or other health professions schools while earning a degree in engineering should consult with a pre-health advisor (https://www.colorado.edu/programs/prehealth-advising/). Students should also discuss their plans with their primary academic advisor, since some of the required coursework may fulfill electives in their engineering curriculum.

## Four-Year Graduation Guarantee

For academically prepared freshmen who do not wish to extend their studies beyond eight semesters, the University of Colorado extends a guarantee (http://www.colorado.edu/engineering-advising/get-your-degree/graduation/four-year-graduation-guarantee/) that required or essential courses, or acceptable alternative courses, will be available to allow each student to complete all coursework required for a baccalaureate degree from the College of Engineering and Applied Science no later than the end of eight consecutive semesters of full-time enrollment. In the event the University of Colorado is not successful in meeting the terms of this guarantee, the university will reimburse the student all tuition and course fees for those courses remaining to successfully complete the previously designated bachelor of science degree.

## Degree and Graduation Requirements

To be eligible for any of the baccalaureate degrees from the College of Engineering and Applied Science, students must meet graduation requirements (http://www.colorado.edu/engineering-advising/get-your-degree/graduation-requirements/). Students should run an online degree audit and meet with their academic advisor to discuss progress towards degree requirements, and then when appropriate, apply for graduation in Buff Portal (https://buffportal.colorado.edu/) according to timelines provided by the college and the Office of the Registrar.

## Dual Degrees

A student in the College of Engineering and Applied Science may be able to obtain two degrees in engineering, or obtain one degree in engineering and obtain one in another field, such as business, music or one of the

arts and sciences disciplines. Full degree requirements must be met for each degree program. Students should apply to graduate from both degree programs for the same term (the same graduation date is required for both degrees and the student must submit a separate graduation application for each degree program).

### BAM (Bachelor's–Accelerated Master's) Degree Programs in Engineering

The Bachelor's–Accelerated Master's (BAM) program (https://www.colorado.edu/registrar/students/degree-planning/bam-program/) offers currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first, but begin taking graduate coursework as undergraduates, typically in their senior year. Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

Students with strong academic records who plan to continue in the Graduate School usually find it advantageous to apply for admission to a BAM degree program. Application is made to the Graduate School through the appropriate academic department. Application and admission may occur as early as the junior year; consult individual departments for their exact timing. The College of Engineering and Applied Science requires a minimum GPA of 3.000 for admission to this program; some departments may have higher requirements. Requirements for the two degrees are the same as those for two degrees taken separately: 128 credit hours for the BS degree (fewer credit hours for the BA in Computer Science or post-baccalaureate degree programs); plus 30 credit hours including 4–6 thesis hours (Plan I) or 30 credit hours (Plan II) for the MS degree. In some departments, up to 6 hours of graduate coursework may be applied to the undergraduate degree.

For additional details on this program, contact the appropriate engineering academic department/program or the Graduate School.

# Programs of Study

# Aerospace Engineering Sciences

Aerospace engineering sciences prepares students for successful and rewarding careers in aerospace and other high-tech industries, national research laboratories, government services and academia. This program provides students unique opportunities to develop in-depth technical knowledge, effective communication skills and a systems engineering perspective that enables them to develop creative solutions to complex problems. The curriculum encompasses core aerospace engineering subjects including fluid dynamics, thermodynamics, materials and structures, dynamical systems, orbital mechanics, air and space vehicle design with multidisciplinary applications including bioastronautics, unmanned systems, remote sensing and GPS.

The mission of the Ann and H.J. Smead Department of Aerospace Engineering Sciences (https://www.colorado.edu/aerospace/) is to provide students the highest quality education in aerospace engineering sciences, emphasizing hands-on learning, and to conduct fundamental, applied and interdisciplinary research to meet societal needs through analysis, design and implementation of aerospace systems, leveraging synergies between aerospace engineering and related sciences.

The department is uniquely characterized by:

- Blending aeronautics, astronautics and science applications.
- Providing an undergraduate experience characterized by rigorous preparation in mathematics and engineering sciences, a hands-on experiential approach to learning and an extensive emphasis on design in a systems context.
- Emphasizing our graduate education and research programs in the forefront of aerospace fundamentals, technology development, and integration of engineering and science activities to solve critical problems in the earth and space sciences.
- Creating graduates who are broadly educated, interdisciplinary, agile, team-oriented engineers and scientists, with end-to-end mission and systems perspectives.

**Course code for this program is ASEN.**

## Bachelor's Degree

- Aerospace Engineering Sciences - Bachelor of Science (BSAE) (p. 842)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ahmed, Nisar R. (https://experts.colorado.edu/display/fisid_153237/)
Associate Professor, Director; PhD, Cornell University

Akos, Dennis M. (https://experts.colorado.edu/display/fisid_131119/)
Professor; PhD, Ohio University

Ali, Hisham (https://experts.colorado.edu/display/fisid_168718/)
Assistant Professor; PhD, Georgia Institute of Technology

Argrow, Brian M. (https://experts.colorado.edu/display/fisid_102860/)
Distinguished Professor, Director, Endowed/Named Professor; PhD, University of Oklahoma

Arquilla, Katya (https://experts.colorado.edu/display/fisid_173943/)
Assistant Professor; PhD, University of Colorado

Arya, Vischala (https://experts.colorado.edu/display/fisid_176850/)
Assistant Professor; PhD, Texas AM University

Axelrad, Penina (https://experts.colorado.edu/display/fisid_100792/)
Distinguished Professor, Endowed/Named Professor; PhD, Stanford University

Bosanac, Natasha (https://experts.colorado.edu/display/fisid_158199/)
Assistant Professor; PhD, Purdue University

Boyd, Iain (https://experts.colorado.edu/display/fisid_165828/)
Professor, Director, Endowed/Named Professor; PhD, University of Southampton (England)

Brasseur, James G. (https://experts.colorado.edu/display/fisid_156801/)
Research Professor; PhD, Stanford University

Chu, Xinzhao (https://experts.colorado.edu/display/fisid_141893/)
Professor; PhD, Peking University (China)

Clark, Torin K. (https://experts.colorado.edu/display/fisid_155959/)
Associate Professor, Associate Chair; PhD, Massachusetts Institute of Technology

Culp, Robert D.
Professor Emeritus; PhD, University of Colorado Boulder

Doostan, Alireza (https://experts.colorado.edu/display/fisid_147382/)
Professor, Faculty Fellow; PhD, Johns Hopkins University

Emery, William J. (https://experts.colorado.edu/display/fisid_106038/)
Professor Emeritus; PhD, University of Hawaii

Evans, John A. (https://experts.colorado.edu/display/fisid_152970/)
Associate Professor, Associate Chair, Faculty Fellow; PhD, University of Texas at Austin

Farnsworth, John A. (https://experts.colorado.edu/display/fisid_153255/)
Associate Professor; PhD, Rensselaer Polytechnic Institute

Felippa, Carlos A. (https://experts.colorado.edu/display/fisid_105701/)
Professor Emeritus; PhD, University of California, Berkeley

Forbes, Jeffrey M. (https://experts.colorado.edu/display/fisid_100264/)
Professor Emeritus; PhD, Harvard University

Frew, Eric W. (https://experts.colorado.edu/display/fisid_134685/)
Professor; PhD, Stanford University

Gerren, Donna S. (https://experts.colorado.edu/display/fisid_108563/)
Teaching Professor Emerita; PhD, University of Kansas

Ghobadi-Far, Khosro (https://experts.colorado.edu/display/fisid_174031/)
Assistant Professor; PhD, University of Newcastle

Glusman, F. Jeff (https://experts.colorado.edu/display/fisid_172040/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Gremban, Keith (https://experts.colorado.edu/display/fisid_166519/)
Research Professor; PhD, Carnegie Mellon University

Hayman, Allison P. (https://experts.colorado.edu/display/fisid_156275/)
Associate Professor; PhD, Massachusetts Institute of Technology

Hodgkinson, Robert F. (https://experts.colorado.edu/display/fisid_153274/)
Associate Teaching Professor; MS, University of Colorado Boulder

Hoke, Charles (https://experts.colorado.edu/display/fisid_175280/)
Associate Teaching Professor; PhD, University of New South Whales

Holzinger, Marcus J. (https://experts.colorado.edu/display/fisid_164054/)
Professor, Endowed/Named Professor; PhD, University of Colorado Boulder

Hussein, Mahmoud I. (https://experts.colorado.edu/display/fisid_144300/)
Professor, Endowed/Named Professor; PhD, University of Michigan Ann Arbor

Jansen, Kenneth E. (https://experts.colorado.edu/display/fisid_147360/)
Professor, Endowed/Named Professor; PhD, Stanford University

Kantha, Lakshmi H. (https://experts.colorado.edu/display/fisid_100231/)
Professor Emeritus; PhD, Massachusetts Institute of Technology

Khan, Alia (https://experts.colorado.edu/display/fisid_158495/)
Associate Professor; PhD, University of Colorado Boulder

Klaus, David M. (https://experts.colorado.edu/display/fisid_107103/)
Professor Emeritus; PhD, University of Colorado Boulder

Knipp, Delores Jane (https://experts.colorado.edu/display/fisid_147655/)
Research Professor; PhD, University of California, Los Angeles

Knudsen, Erik (https://experts.colorado.edu/display/fisid_172046/)
Associate Teaching Professor; PhD, University of Florida

Koster, Jean N.
Professor Emeritus; PhD, Karlsruher Institut für Technologie (Germany)

Lahijanian, Morteza Mehdi (https://experts.colorado.edu/display/fisid_164179/)
Assistant Professor; PhD, Boston University

Larson, Kristine M.
Professor Emerita; PhD, Scripps Institution of Oceanography

Lawrence, Dale A. (https://experts.colorado.edu/display/fisid_104057/)
Professor Emeritus; PhD, Cornell University

Le Moine, Alexandra (https://experts.colorado.edu/display/fisid_168419/)
Assistant Teaching Professor; MS, University of Wisconsin

Leben, Robert R.
Research Professor Emeritus; PhD, University of Colorado Boulder

Li, Xinlin (https://experts.colorado.edu/display/fisid_100016/)
Professor; PhD, Dartmouth College

Lopez Jimenez, Francisco (https://experts.colorado.edu/display/fisid_157867/)
Assistant Professor; PhD, California Institute of Technology

Macdonald, Robyn (https://experts.colorado.edu/display/fisid_165823/)
Assistant Professor; PhD, University of Illinois at Urbana-Champaign

Mah, John K. (https://experts.colorado.edu/display/fisid_164214/)
Associate Teaching Professor; MS, Stanford University

Marshall, David B. (https://experts.colorado.edu/display/fisid_158629/)
Research Professor; PhD, Monash University (Australia)

Marshall, Robert A. (https://experts.colorado.edu/display/fisid_155957/)
Associate Professor, Associate Chair; PhD, Stanford University

Maslanik, James
Research Professor Emeritus

Matsuo, Tomoko (https://experts.colorado.edu/display/fisid_145041/)
Associate Professor, Faculty Fellow; PhD, SUNY at Stony Brook

Maute, Kurt (https://experts.colorado.edu/display/fisid_113875/)
Professor, Associate Dean, Endowed/Named Professor; PhD, University of Stuttgart (Germany)

McMahon, Jay W. (https://experts.colorado.edu/display/fisid_150062/)
Associate Professor, Faculty Fellow; PhD, University of Colorado Boulder

Minton, Timothy K. (https://experts.colorado.edu/display/fisid_167230/)
Professor; PhD, University of California Berkeley

Morton, Yu Jade (https://experts.colorado.edu/display/fisid_159076/)
Professor, Endowed/Named Professor; PhD, The Pennsylvania State University

Nabity, James A. (https://experts.colorado.edu/display/fisid_153102/)
Associate Professor, Associate Chair; PhD, University of Colorado Boulder

Neogi, Sanghamitra (https://experts.colorado.edu/display/fisid_156773/)
Associate Professor; PhD, Pennsylvania State University

Nerem, R. Steven (https://experts.colorado.edu/display/fisid_118478/)
Professor, Director; PhD, University of Texas at Austin

Niederwieser, Tobias (https://experts.colorado.edu/display/fisid_164789/)
Assistant Research Professor; PhD, University of Colorado Boulder

Palo, Scott E. (https://experts.colorado.edu/display/fisid_109033/)
Professor, Endowed/Named Professor; PhD, University of Colorado Boulder

Park, Kwang-Chun
Professor Emeritus; PhD, Clarkson College

Peters, Sean (https://experts.colorado.edu/display/fisid_174034/)
Assistant Professor; PhD, Stanford University

Rafi, Melvin
Assistant Teaching Professor; PhD, Wichita State University

Rhode, Matthew (https://experts.colorado.edu/display/fisid_165079/)
Assistant Teaching Professor; BS, University of Colorado

Schaub, Hanspeter (https://experts.colorado.edu/display/fisid_143818/)
Distinguished Professor, Endowed/Named Professor, Chair; PhD, Texas A&M University

Scheeres, Daniel J. (https://experts.colorado.edu/display/fisid_145035/)
Distinguished Professor, Endowed/Named Professor; PhD, University of Michigan Ann Arbor

Schwartz, Trudy L. (https://experts.colorado.edu/display/fisid_108607/)
Teaching Professor, Associate Chair; MS, University of Colorado Boulder

Shakiba, Maryam (https://experts.colorado.edu/display/fisid_172206/)
Assistant Professor; PhD, Texas AM University

Sirangelo, Mark (https://experts.colorado.edu/individual/fisid_164135/)
Entrepreneur in Residence; JD, Seton Hall University

Sternovsky, Zoltan (https://experts.colorado.edu/display/fisid_115211/)
Professor; PhD, Charles University (Czech Republic)

Stodieck, Louis S. (https://experts.colorado.edu/display/fisid_105272/)
Research Professor; PhD, University of Colorado Boulder

Sunberg, Zachary (https://experts.colorado.edu/individual/fisid_165833/)
Assistant Professor; PhD, Stanford University

Thayer, Jeffrey P. (https://experts.colorado.edu/display/fisid_134469/)
Professor Emeritus, Research Professor, Director; PhD, University of Michigan Ann Arbor

Williams, Christopher (https://experts.colorado.edu/display/fisid_105765/)
Research Professor; PhD, University of Colorado Boulder

Wingate, Kathryn (https://experts.colorado.edu/display/fisid_164029/)
Associate Teaching Professor; PhD, University of Colorado Boulder

**ASEN 1000 (1) Introduction to Aerospace Engineering Sciences**
Introduces aerospace history, curriculum, ethics, and the many areas of emphasis within aerospace engineering. Academic and industry speakers are invited to address various aerospace topics.
**Requisites:** Restricted to students with 0-26 credits (Freshmen) Aerospace Engineering (ASEN) or Engineering Open Option majors only.
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 1009 (1) Undergraduate Aerospace Seminar**
Introduce aerospace undergraduate students to world-class aerospace researchers and technical, policy, and/or current events topics.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to Undergraduate Aerospace (ASEN-BSAE) or Undergraduate Engineering Open Option majors only.

**ASEN 1022 (3) Materials Science for Aerospace Engineers**
Covers prerequisite chemistry topics for materials science and introduces material types, properties and behavior for aerospace engineers. Topics include review of chemistry; atomic bonding; crystals; diffusion; mechanical/thermal properties; phase diagrams; heat treatment; failure mechanisms; materials selection; and a general introduction to modern materials for aerospace engineering applications including composites and materials with engineered properties. Lab project or tensile testing is included.
**Requisites:** Requires pre/co-reqs APPM 1350 or MATH 1300 or APPM 1340 or APPM 1345 ASEN 1320 or CHEN 1310 or CSCI 1300 or CSCI 1310 or CSCI 1320 or ECEN 1310 (all min grade C-). Restricted to ASEN mjs, IDEN-BSIDE mjrs w/ Aero emphasis, IUT On Track students.
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 1030 (3) Introduction to Computing for Aerospace Engineering**
Develop a foundational understanding of computational thinking required to approach engineering challenges with systematic problem-solving skills. By the end of this class, students will be able to apply computational thinking principles to design, implement, and debug programs using a high-level programming language. Additionally, students will demonstrate proficiency in fundamental programming concepts, including variables, control structures, arrays, and functions, while also showcasing the ability to analyze problems, decompose them into smaller tasks, and devise algorithmic solutions.
**Requisites:** Requires a prerequisite or corequisite course APPM 1340 or APPM 1345 or APPM 1350 or MATH 1300 or MATH 1310 (all minimum grade C-). Restricted to College of Engineering majors IUT On Track applicants.

**ASEN 1400 (3) Gateway to Space**
Introduces the basics of atmosphere and space sciences, space exploration, spacecraft design, rocketry and orbits. Students design, build, and launch a miniature satellite on a high altitude balloon. Explores the current research in space through lectures from industry.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 2500, GEEN 1400, ASEN 1403 and ECEN 1400
**Requisites:** Restricted to College of Engineering students with 75 credit hours or less completed.
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 1403 (3) Introduction to Rocket Engineering**
Introduces students to the engineering profession through completion of a team-based project. Students design, build, and static test-fire a liquid-solid hybrid rocket motor. Topics explored include: pressure vessels, combustion, ideal fluid behavior, systems engineering, data acquisition, and model verification. Learned skills will include technical writing, teamwork, computer modelling and analysis tools, 3D printing and prototyping technologies.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 2500, GEEN 1400, ASEN 1400 and ECEN 1400
**Requisites:** Restricted to College of Engineering students with 75 credits or less completed.

**ASEN 1969 (3) Pathway to Space**
Explore the many paths one can take to be a part of a space-related career in a unique, engaging and interactive course. Students will learn about the following topics: space science and exploration, human spaceflight and life sciences, aeronautics and near space, launch and spacecraft systems, climate and environment, space business, policy and politics, space arts, media, and history.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 2012 (2) Experimental and Computational Methods in Aerospace Engineering Sciences**
Introduces statistical, experimental, and computational methods used in aerospace engineering sciences. Usage of MatLab is extensive.
**Requisites:** Requires prereqs ASEN 1320 or CSCI 1300 or CHEN 1310 or ECEN 1310 PHYS 1110 (all min grade C-). Requires pre/co-req APPM 2360 or MATH 2130 MATH 3430 (min grade C-). Restricted to ASEN mjrs, IDEN-BSIDE mjrs w Aero emphasis, IUT On Track students.
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 2401 (3) Statics**
Introduces applied vector mechanics with an emphasis on static equilibrium. Focuses on vectors, free body diagrams, and static equilibrium in 2D and 3D. Covers analysis of trusses, frames, and machines. Examines internal forces in structures and the development of shear and bending moment diagrams.
**Requisites:** Requires prerequisite courses APPM 1360 or MATH 2300 and PHYS 1110 (all minimum grade C-).

**ASEN 2402 (3) Thermodynamics**
Introduces the fundamental concepts and principles of thermodynamics with an emphasis on understanding how these basic physical principles can be used to solve numerical problems. Covers the properties of pure substances, control volume analysis, first law of thermodynamics, ideal gas law, second law of thermodynamics, and thermodynamic cycles. Synthesizes as a primary goal basic science (physics) and mathematics for the analysis and design of thermodynamic systems.
**Requisites:** Requires prerequisite courses APPM 1360 or MATH 2300 and PHYS 1110 (all minimum grade C-).
**Recommended:** Corequisites MCEN 1024 or CHEN 1201 or CHEN 1211 or CHEM 1113 or CHEM 1400.

**ASEN 2403 (3) Dynamics**
Provides students with essential concepts in dynamics, serving as a prerequisite for advanced courses that build upon these foundational principles, including those focused on the dynamics and control of air and space vehicles.¿
**Requisites:** Requires prerequisite courses ASEN 1030 or ASEN 1320 or CSCI 1300 or CHEN 1310 or ECEN 1310 and ASEN 2401 or MCEN 2023 or CVEN 2121 or GEEN 2851 (all minimum grade C-). Requires corequisites APPM 2360 or MATH 2130 and MATH 3430.

**ASEN 2501 (3) Introduction to Astronautics**
Introduces spacecraft mission topics such as orbital mechanics, spacecraft design, rocket propulsion, communications, remote sensing, and the space environment. Utilizes active and problem-based learning techniques to expose students to the space industry.
**Requisites:** Requires prerequisite courses ASEN 1030 or ASEN 1320 or CSCI 1300 or CHEN 1310 or ECEN 1310 and APPM 1360 or MATH 2300 and PHYS 1110 (all minimum grade C-).

**ASEN 2502 (3) Introduction to Aeronautics**
Introduces theory and methods for the design and performance analysis of aeronautical vehicles with a focus on fixed wing aircraft. Emphasizes systems engineering aspects, touching upon relevant subdisciplines including: the standard atmosphere and air transport environment, aerodynamics, propulsion, stability and control, and structural dynamics. Incorporates hands-on laboratory and design components throughout the semester.
**Requisites:** Requires prerequisite courses ASEN 1030 or ASEN 1320 or CSCI 1300 or CHEN 1310 or ECEN 1310 and APPM 1360 or MATH 2300 and PHYS 1110 (all minimum grade C-).

**ASEN 2519 (1-3) Special Topics**
Studies specialized aspects of the aerospace engineering sciences or innovative treatment of required subject matter at the lower-division level. Course content is indicated in the online Schedule Planner. Department enforced prerequisites: varies.
**Repeatable:** Repeatable for up to 10.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 2701 (3) Introduction to Statics, Structures, and Materials**
Introduces the fundamental analytical tools for statics and structural analysis in the context of the physics of aerospace materials. Topics include force/moment equilibrium, truss analysis, beam theory, stress and strain, stiffness and strength of material, and aerospace structural design.
**Requisites:** Requires prereqs APPM 1360 or MATH 2300 PHYS 1110 (all min grade C-). Requires pre/co-req of APPM 2360 or MATH 2130 MATH 3430 (all min grade C-). Restricted to Aero(ASEN) mjrs, Integ Dsgn Engr(IDEN-BSIDE) mjrs w Aero emphasis, IUT OnTrack students

**ASEN 2702 (3) Introduction to Thermodynamics and Aerodynamics**
Introduces the fundamental principles and concepts of thermodynamics and aerodynamics. Topics include the first law of thermodynamics, properties of pure substances, control volume analysis, one-dimensional incompressible and compressible flows, two-dimensional lift and drag, and introduction to viscous flows.
**Requisites:** Requires prereqs APPM 1360 or MATH 2300 PHYS 1110 (all min grade C-). Requires pre/co-req of APPM 2360 or MATH 2130 MATH 3430 (all min grade C-). Restricted to Aero(ASEN) mjrs, Integ Dsgn Engr(IDEN-BSIDE) mjrs w Aero emphasis, IUT OnTrack students

**ASEN 2703 (3) Introduction to Dynamics and Systems**
Introduces the principles of particle and planar rigid body dynamics, systems, and controls. Topics include kinematics, kinetics, momentum and energy methods, system modeling, and simple feedback control.
**Requisites:** Requires prerequisite courses ASEN 2701 and APPM 2360 or MATH 2130 MATH 3430 (all min grade C-). Requires prerequisite or corequisite course of APPM 2350 or MATH 2400 (min grade C-). Restricted to ASEN majors and IDEN majors with an Aerospace emphasis

**ASEN 2704 (3) Introduction to Aerospace Vehicle Design and Performance**
Introduction to the theory and methods for design and performance analysis of aircraft and spacecraft. Aircraft topics include wing design, propulsion, aircraft performance, and stability and control. Spacecraft topics include mission design, rocket performance, orbital mechanics and spacecraft subsystems. Emphasis is placed on introducing systems engineering aspects of design and analysis for aerospace vehicles.
**Requisites:** Requires prerequisite courses ASEN 2702 and APPM 2360 or MATH 2130 MATH 3430 (all min grade C-). Requires prerequisite or corequisite course of APPM 2350 or MATH 2400 (min grade C-). Restricted to ASEN majors and IDEN majors with an Aerospace emphasis

**ASEN 2802 (1) Aerospace Sciences Lab I**
Provides an introductory laboratory experience in aerospace sciences, with a focus on statics, structural mechanics, thermodynamics, and aerodynamics. Emphasizes model-based design, experimental data collection, and interpretation of experimental data.
**Requisites:** Requires prereq ASEN 1320 or CHEN 1310 or CSCI 1300 or 1310 or 1320 or ECEN 1310 (min grade C-). Requires pre/co-reqs ASEN 2012 ASEN 2701 ASEN 2702 (min grade C-). Restricted to ASEN mjrs, IDEN-BSIDE mjrs w Aero emphasis, IUT On Track students.

**ASEN 2803 (1) Dynamics and Controls Lab**
Experimental and design laboratory exercises for aerospace applications of dynamics, systems, and controls principles.
**Requisites:** Requires prereqs ASEN 1320 or CHEN 1310 or CSCI 1300 or 1310 or 1320 or ECEN 1310 (min. grade C-). Requires pre/co-req ASEN 2012 and ASEN 2703. Restricted to Aerospace (ASEN) majors and IDEN majors with Aero emphasis.

**ASEN 2804 (2) Aerospace Vehicle Design Lab**
Design lab focused on integrating knowledge of 2000-level aerospace course concepts towards the open-ended exploration of conceptual and preliminary designs of an aerospace vehicle.
**Requisites:** Requires prereq ASEN 1320 or CHEN 1310 or CSCI 1300 or 1310 or 1320 or ECEN 1310 (min. grade C-). Requires pre or coreqs ASEN 2012 and ASEN 2704 (min. grade C-). Restricted to Aerospace Eng (ASEN) mjrs IDEN mjrs w/Aerospace emphasis.

**ASEN 2849 (1-3) Independent Study**
Study of special projects agreed upon by student and instructor. Department consent required.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 3036 (3) Introduction to Human Spaceflight**
Introduces students to the challenges of human space flight. Historical and current space programs and spacecraft are discussed with emphasis on those systems specific to sustaining human crews. Other topics include space environment with respect to sustaining human life and health, physiological and psychological concerns in a space habitat, astronaut selection and training, anomalies, mission operations motivation, costs rationale for human space exploration, and future program directions. Not accepted as a Professional Area Elective for ASEN majors.
**Additional Information:** Departmental Category: Bioastronautics and Microgravity Science

**ASEN 3046 (3) Introduction to Humans in Aviation**
Investigates the history of crewed aviation accomplished through a review of the history of flight, the physiological and psychological limitations facing aviators, and investigates the human related causal factors in aviation accidents. The course also looks at the social and economic impacts of aviation in modern society. Not accepted as a Professional Area Elective for ASEN majors.
**Additional Information:** Departmental Category: Bioastronautics and Microgravity Science

**ASEN 3300 (4) Aerospace Electronics and Communications**
Provides the fundamentals of electronics and communications widely used in aerospace engineering. Includes analog instrumentation electronics, data acquisition, digital electronics and radio communication.
**Requisites:** Requires prerequisite courses ASEN 2703 and PHYS 1120 and APPM 2350 or MATH 2400 and APPM 2360 or MATH 2130 MATH 3430 (all minimum grade C-). Restricted to Aerospace Engineering (ASEN) majors and Integrated Design Eng majors with an Aerospace emphasis
**Additional Information:** Departmental Category: Systems and Control

**ASEN 3401 (3) Aerospace Structures**
Introduces concepts of stress and strain; axial loading, torsion, simple bending, transverse shear, and deflections of beams; analysis of stress and strain in 2-D and 3-D; failure analysis of structural components; and criteria for designing structural elements to meet requirements for aerospace structures.
**Requisites:** Requires prerequisite course of ASEN 2401 or MCEN 2023 or CVEN 2121 or GEEN 2851 (minimum grade C-).
**Recommended:** Prerequisites APPM 2350 or MATH 2400 and APPM 2360 or MATH 2130 & MATH 3430.

**ASEN 3402 (3) Aerospace Heat Transfer**
Introduces the fundamental concepts and principles of heat transfer in aerospace contexts. Covers the mechanisms of heat transfer by conduction, convection, and radiation. Emphasizes problem formulation and selection of appropriate solution techniques, with applications to modern aerospace engineering systems.
**Requisites:** Requires prerequisite courses of ASEN 2402 or MCEN 3012 or GEEN 3852 or AREN 2110 or EVEN 3012 and APPM 2360 or MATH 2130 MATH 3430 (all minimum grade C-). Requires corequisite course of APPM 2350 or MATH 2400.

**ASEN 3403 (3) Aerodynamics**
Introduces models for the analysis of subsonic, transonic, and supersonic flow. Teaches methodologies for the prediction of aerodynamics forces and moments experienced by aerospace vehicles and systems. Develops a fundamental understanding of gas dynamics in nozzles with application to wind tunnels and rocket propulsion.
**Requisites:** Requires prerequisite courses of ASEN 2402 or MCEN 3012 or GEEN 3852 or AREN 2110 or EVEN 3012 and APPM 2350 or MATH 2400 and APPM 2360 or MATH 2130 MATH 3430 (all minimum grade C-).

**ASEN 3404 (3) Aerospace Dynamics and Control**
Provides an overview of fundamental topics for aerospace vehicle dynamics and control. Introduces 3D rigid body dynamics, attitude representations, environmental forces and moments, linearization, modal responses and stability, control analysis and design, and attitude determination with examples from aircraft and spacecraft throughout.
**Requisites:** Requires prereqs ASEN 2403 or MCEN 2043 or CVEN 3111 and APPM 2350 or MATH 2400 and APPM 2360 or MATH 2130 MATH 3430.

**ASEN 3405 (3) Astrodynamics**
Provides a foundational knowledge of astrodynamics with a focus on spacecraft traveling near a single central body.
**Requisites:** Requires prerequisite course of ASEN 2501 (minimum grade C-). Requires corequisite course of ASEN 3404.

**ASEN 3406 (3) Aircraft Dynamics**
Provides a framework and methods for analyzing aircraft dynamics and designing aircraft control systems building on fundamental dynamics and control theory.
**Requisites:** Requires prerequisite courses of ASEN 2502 and ASEN 3403 (all minimum grade C-).

**ASEN 3501 (3) Aerospace Experimental Methods**
Introduces the essential aspects of hands-on experimentation for aerospace engineering applications, allowing students to learn the practical skills required for designing and conducting experiments in addition to analyzing results and quantifying confidence and uncertainty. Explores the importance of systematically analyzing experimental data, emphasizing the application of basic statistical methods and validation of fundamental engineering models.¿
**Requisites:** Requires prerequisite courses of ASEN 2402 or MCEN 3012 or GEEN 3852 or AREN 2110 or EVEN 3012 and ASEN 2403 or MCEN 2043 or CVEN 3111 and APPM 2350 or MATH 2400 and APPM 2360 or MATH 2130 MATH 3430 (all minimum grade C-).
**Recommended:** Prerequisites ASEN 2501 and ASEN 2502.

**ASEN 3502 (3) Aerospace Computational Methods**
Introduces computational methods commonly employed in the aerospace industry, emphasizing computational cost, accuracy, and error control.¿ Covers numerical solution of systems of algebraic and differential equations, numerical optimization, and regression.¿ Explores application to modeling, simulation, design, and control of aerospace systems.
**Requisites:** Requires prerequisite courses of ASEN 2402 or MCEN 3012 or GEEN 3852 or AREN 2110 or EVEN 3012 and ASEN 2403 or MCEN 2043 or CVEN 3111 and APPM 2350 or MATH 2400 and APPM 2360 or MATH 2130 MATH 3430 (all minimum grade C-).
**Recommended:** Prerequisites ASEN 2501 and ASEN 2502.

**ASEN 3503 (3) Aerospace Electronics**
Provides an overview of the fundamentals of analog and digital electronics widely used in aerospace engineering. Covers DC and AC circuits, frequency domain analysis, operational amplifiers, digital logic circuits, and computer interfaces.
**Requisites:** Requires prereqs ASEN 2403 or MCEN 2043 or CVEN 3111 and APPM 2360 or MATH 2130 MATH 3430 and PHYS 1120

**ASEN 3519 (1-3) Special Topics**
Studies specialized aspects of the aerospace engineering sciences or innovative treatment of required subject matter at the upper-division level. Course content is indicated in the online Schedule Planner. Department enforced prerequisite: varies.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 3700 (3) Orbital Mechanics/Attitude Dynamics and Control**
Presents the fundamentals of orbital mechanics, 3D rigid body dynamics and satellite attitude dynamics and controls.
**Requisites:** Requires prerequisite courses of ASEN 2703 and ASEN 2704 and APPM 2350 or MATH 2400 (all minimum grade C-). Restricted to Aerospace Engineering (ASEN) majors and IDEN majors with an Aerospace emphasis.

**ASEN 3711 (3) Aerodynamics**
Introduces models for the analysis of subsonic, transonic, and supersonic flow. Teaches methodologies for the prediction of aerodynamics forces and moments experienced by aircraft. Develops a fundamental understanding of gas dynamics in nozzles with application to aircraft and rocket propulsion.
**Requisites:** Requires prerequisite courses of ASEN 2704 and APPM 2350 or MATH 2400 (all minimum grade C-). Restricted to Aerospace Engineering (ASEN) majors and IDEN majors with an Aerospace emphasis.

**ASEN 3712 (3) Structures**
Teaches Mechanics of Materials methods of stress and deformation analysis applicable to the design and verification of aircraft and space structures. It offers an introduction to matrix and finite element methods for truss structures, and to mechanical vibrations.
**Requisites:** Requires prerequisite courses of ASEN 2703 and APPM 2350 or MATH 2400 (all minimum grade C-). Restricted to Aerospace Engineering (ASEN) majors and IDEN majors with an Aerospace emphasis.

**ASEN 3713 (3) Thermodynamics and Heat Transfer**
Focuses on the applications of the first and second laws of thermodynamics and teaches the fundamental concepts of different modes of energy and heat transfer, with applications of these concepts in gas dynamics, high-speed vehicle and spacecraft design, environmental systems, and energy analysis.
**Requisites:** Requires prerequisite courses ASEN 2702 and APPM 2350 or MATH 2400 and APPM 2360 or MATH 2130 MATH 3430 (all minimum grade C-). Restricted to ASEN majors and IDEN majors with an Aerospace emphasis.

**ASEN 3728 (3) Aircraft Dynamics**
Develops the fundamental concepts of aircraft dynamics. Covers flight mechanics, performance, dynamics and control of aircraft and how they impact aircraft design.
**Requisites:** Requires prerequisite courses of ASEN 2703 and ASEN 2704 and APPM 2350 or MATH 2400 (all minimum grade C-). Restricted to Aerospace Engineering (ASEN) majors and IDEN majors with an Aerospace emphasis.

**ASEN 3801 (1) Aerospace Vehicles Dynamics and Controls Lab**
Emphasizes applications of engineering dynamics and control principles for modeling, simulating, designing, analyzing, and evaluating aerospace vehicle systems. Experimental and computational focus on problems in aircraft flight stabilization and spacecraft attitude control.
**Requisites:** Requires prerequisite courses ASEN 2803 and ASEN 2804 (all minimum grade C-).Requires prerequisite or corequisite ASEN 3700 and ASEN 3728 (all minimum grade C-).Restricted to Aerospace Engineering (ASEN) majors and IDEN majors with an Aerospace emphasis

**ASEN 3802 (1) Aerospace Sciences Lab II**
Provides an intermediate laboratory experience in aerospace sciences, with a focus on aerodynamics, structural mechanics, thermodynamics, and heat transfer. Emphasizes design and analysis of experiments, processing and analysis of experimental data, and model validation using experimental data.
**Requisites:** Requires prerequisite courses ASEN 2012 and ASEN 2802 (min grade C-). Requires prerequisite or corequisite courses ASEN 3711, ASEN 3712 and ASEN 3713 (min grade C-). Restricted to Aerospace Engineering (ASEN) majors and IDEN majors w/ Aerospace emphasis

**ASEN 3930 (6) Aerospace Engineering Cooperative Education**
Students will participate in a previously arranged, department-sponsored cooperative education program with a government agency or industry. 0.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Aerospace Engineering (ASEN) majors only.
**Recommended:** Prerequisite GPA above 3.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 4013 (3) Foundations of Propulsion**
Describes aerothermodynamics and design of both rocket and air-breathing engines. Includes ramjets, turbojets, turbofans, and turboprop engines, as well as liquid, solid, and hybrid rockets.
**Requisites:** Requires prerequisite courses of ASEN 3711 and ASEN 3713 (all minimum grade C-). Restricted to Aerospace Engineering (ASEN), Aerospace Engineering Concurrent Degree (C-ASEN) or IDEN-BSIDE majors with Aerospace emphasis.
**Additional Information:** Departmental Category: Thermodynamics and Propulsion

**ASEN 4018 (4) Senior Projects 1: Design Synthesis**
Focuses on the synthesis of technical knowledge, project management, design process, leadership, and communications within a team environment. Students progress through the design process beginning with requirements development, then preliminary design and culminating with critical design. Offered fall only.
**Requisites:** Restricted to ASEN mjrs w/ prereqs ASEN 1022, 3711, 3712, 3713, 3728, 3700, 3300, 3801 and 3802 (all min grade C-). OR restricted to IDEN majors with an Aero emphasis w/ prereqs GEEN 2400, 3400, ASEN 1022, 3713, and 3300 (all min grade C-).
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 4028 (4) Senior Projects 2: Design Practicum**
Focuses on the fabrication, integration, verification and validation of designs produced in ASEN 4018. Students work within the same teams from ASEN 4018. Offered spring only.
**Requisites:** Requires prerequisite course of ASEN 4018 (minimum grade C-). Restricted to Aerospace Engineering (ASEN) majors and Integrated Design Engineering majors with an Aerospace emphasis.
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 4057 (3) Aerospace Software**
Provides an overview of prevalent software and hardware computing concepts utilized in practice and industry. Establishes the background necessary to tackle programming projects on different computing platforms with various software tools and programming languages.
**Requisites:** Requires prerequisite course of ASEN 1320 or CSCI 1300 or ECEN 1310 or CHEN 1310 (minimum grade C-). Restricted to Aerospace Engineering (ASEN) or Aerospace Engineering Concurrent Degree (C-ASEN) majors only.
**Recommended:** Prerequisite CSCI 2270 or instructor consent.
**Additional Information:** Departmental Category: Computational and Analytic Methods

**ASEN 4067 (3) Microavionics: Introduction to PIC Microcontrollers for Aerospace Systems**
Provide students an introduction into embedded systems that teaches a basic understanding about the fundamental architecture of a microcontroller and how it operates and interfaces with both sensors and actuators applicable to aerospace engineering. Students will learn how to interface sensors to a PIC microcontroller, collect input, make decisions and take an action in real-time. To gain a full appreciation about how microcontrollers work, students develop their own software code using MPLAB X to program the development board hardware, which uses the Microchip PIC18F87K22 microcontroller as the foundation of the course. Students learn-by-doing through lab assignments and a semester final project. This includes programming in assembly language and then C, to collect data from external sources such as a serial terminal, temperature and rotary sensors, etc. and outputting results to a liquid crystal display (LCD), and sending commands to an actuator such as a servo.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 5067
**Requisites:** Requires prereq courses ASEN 1320 or CSCI 1300 or CSCI 1310 or CHEN 1310 or ECEN 1310 and ASEN 3300 (all minimum grade C-).

**ASEN 4090 (3) Global Positioning Systems Applications**
Focuses on GPS technology, software development, and applications. Lectures will cover the principal concepts used in GPS, and weekly laboratories will apply that knowledge. Culminates in student design projects using GPS.
**Requisites:** Requires prerequisite courses of APPM 2360 and CHEN 1310 (all minimum grade C).
**Recommended:** Prerequisite junior/senior standing in engineering.
**Additional Information:** Departmental Category: Global Positioning Systems

**ASEN 4114 (3) Automatic Control Systems**
Methods of analysis and design of feedback control for dynamic systems. Covers nyquist, bode and linear quadratic methods based on frequency domain and state space models. Laboratory experiments provide exposure to computation for simulation and real time control, and typical control system sensors and actuators. Degree credit not granted for MCEN 4138 and MCEN 5138 and ECEN 4138 and ECEN 5138.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 5114
**Requisites:** Requires prereq courses ASEN 3128 or ASEN 3728 and ASEN 3200 or ASEN 3700 (all minimum grade C-). Restricted to Aerospace Engineering (ASEN) majors only.
**Additional Information:** Departmental Category: Systems and Control

**ASEN 4123 (3) Vibration Analysis**
Highlights free and forced vibration of discrete and continuous systems. Examines Lagrange's equation, Fourier series, Laplace transforms, and matrix and computational methods. Applies knowledge to practical engineering problems.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4123
**Requisites:** Requires prerequisite course of ASEN 3112 or MCEN 3030 (minimum grade C). Restricted to Aerospace Engineering (ASEN) majors only.
**Additional Information:** Departmental Category: Thermodynamics and Propulsion

**ASEN 4128 (3) Human Factors in Engineering and Design**
Introduces the field of human factors engineering and investigates human psychological, physiological and performance limitations in complex systems and why it is vital for engineers to understand human operational limitations when designing complex systems. Course includes studies of real accidents caused by human error, good and bad designs, latent conditions and accident-producing designs. Goal is an understanding of how to conduct engineering design with consideration of human factors.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 4138 (3) Aircraft Design**
Two lectures and one lab per week. Examines principles of aircraft configuration and design to meet given performance specifications, taking into account aerodynamic, stability and control, and flying quality considerations, as well as airworthiness regulations. Includes preliminary design of the major elements of an aircraft.
**Requisites:** Requires prerequisite course of ASEN 3128 or ASEN 3728 (minimum grade C-). Restricted to Aerospace Engineering (ASEN) or Aerospace Engineering Concurrent Degree (C-ASEN) majors only.
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 4218 (3) Large Space Structures Design**
Develops the necessary structural analysis skills for conducting conceptual and preliminary designs of large space structures with a practical emphasis on structures considered by NASA over the past 20 years. Applies analysis skills to a broad range of space missions requiring large space structures, emphasizing low cost and practical design.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 5218
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Aerospace Engineering (ASEN) or Mechanical Engineering (MCEN) majors only.
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 4338 (3) Computer Analysis of Structures**
Covers basic structural design concepts and finite element modeling techniques. Emphasizes use of finite element static and dynamic analysis to validate and refine an initial design. Introduces basic design optimization and tailoring. Proficiency in Matlab required.
**Requisites:** Requires prerequisite course of ASEN 3112 (minimum grade C). Restricted to Aerospace Engineering (ASEN) majors only
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 4401 (3) Aerospace Communication Systems**
Provides students with an understanding of basic wireless communication concepts relevant to aerospace systems and the near-earth atmosphere as well as an understanding of space-environment conditions that impact wireless aerospace communication systems.
**Requisites:** Requires prerequisite courses of ASEN 2501 and ASEN 3503 (all minimum grade C-)

**ASEN 4402 (3) Aerospace Materials and Structural Analysis**
Reviews essential concepts normally covered in undergraduate solid mechanics or mechanics of materials courses, such as concepts of stress and strain in two dimensions and three-dimensional systems. Covers more advanced topics such as structural instabilities and vibrations, materials classification and basic properties, viscoelastic and plastic material behavior and commonly used ductile failure theories. Introduces the finite-element (FE) method to analyze complex geometries and exposes students to methods utilized extensively by companies engaged in structural design.
**Requisites:** Requires prerequisite courses of ASEN 3401 and MCEN 1024 or CHEN 1201 or CHEN 1211 or CHEM 1113 or CHEM 1400 (all minimum grade C-).

**ASEN 4519 (1-3) Special Topics**
Studies specialized aspects of the aerospace engineering sciences or innovative treatment of required subject matter at the upper-division level. Course content is indicated in the online Schedule Planner. Department enforced prerequisite varies.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 4849 (1-3) Independent Study**
Special projects agreed upon by student and instructor. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 4859 (1-6) Undergraduate Research**
Assigns a research problem on an individual basis. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Specialized Courses

# Aerospace Engineering Sciences - Bachelor of Science (BSAE)

The undergraduate curriculum in aerospace engineering sciences is designed to prepare students to advance to a distinguished professional career in the aerospace industry or for graduate school, consistent with our stated program educational objectives. In particular, this involves

providing students with an interdisciplinary systems perspective of aerospace engineering. The curriculum accomplishes these goals by:

- providing a strong basis in mathematics, science and engineering fundamentals;
- extending these fundamentals to advanced topics in aerospace engineering;
- complementing the engineering education with sufficient exposure to the humanities and social sciences; and
- beginning and ending in major design experiences that stress an interdisciplinary systems perspective.

AES students are also encouraged to consider a technical minor or double major in electrical engineering, computer science, applied math, engineering physics, astrophysical and planetary sciences or atmospheric and oceanic sciences. In most cases, the junior- and senior-level courses required for the above-mentioned minors can be applied to the technical elective requirements.

For students having sufficient ability and interest, planning for graduate study should begin by the start of the junior year. Such a plan should consider the foreign language requirements of appropriate graduate schools and an advanced mathematics program. Students who wish to combine the business and aerospace engineering sciences curricula are advised to consider obtaining the BS degree in aerospace and a master's degree in business rather than a combined BS degree.

For more information, visit the department's Prospective Students (https://www.colorado.edu/aerospace/prospective-students/undergraduates/) webpage.

# Requirements

The Bachelor of Science curriculum in Aerospace Engineering Sciences is revised annually to keep up with advances in technology, to make use of new educational methodologies and to satisfy current program accreditation criteria. A minimum of 128 credit hours is required. For up-to-date program requirements, visit the Bachelor of Science in Aerospace Engineering Sciences web page (https://www.colorado.edu/aerospace/current-students/undergraduates/curriculum/).

Note: This major cannot be combined with a BS in Integrated Design Engineering with an aerospace engineering emphasis.

In addition, students must meet the general undergraduate degree requirements of the College of Engineering and Applied Science. (https://www.colorado.edu/engineering-advising/get-your-degree/graduation-requirements/)

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ASEN 1030 | Introduction to Computing for Aerospace Engineering | 3 |
| or CSCI 1300 | Computer Science 1: Starting Computing | |
| or CHEN 1310 | Introduction to Engineering Computing | |
| or ECEN 1310 | Introduction to C Programming | |
| ASEN 1400/ ASTR 2500 | Gateway to Space | 3 |
| or ASEN 1403 | Introduction to Rocket Engineering | |
| or GEEN 1400 | Engineering Projects | |
| or ECEN 1400 | Introduction to Digital and Analog Electronics | |
| ASEN 2401 | Statics | 3 |
| or CVEN 2121 | Analytical Mechanics 1 | |
| or GEEN 2851 | Statics for Engineers | |
| or MCEN 2023 | Statics and Structures | |
| ASEN 2402 | Thermodynamics | 3 |
| or AREN 2110 | Thermodynamics | |
| or EVEN 3012 | Thermodynamics for Environmental Science and Engineering | |
| or GEEN 3852 | Thermodynamics for Engineers | |
| or MCEN 3012 | Thermodynamics | |
| ASEN 2403 | Dynamics | 3 |
| or CVEN 3111 | Analytical Mechanics 2 | |
| or MCEN 2043 | Dynamics | |
| ASEN 2501 | Introduction to Astronautics | 3 |
| ASEN 2502 | Introduction to Aeronautics | 3 |
| ASEN 3401 | Aerospace Structures | 3 |
| ASEN 3402 | Aerospace Heat Transfer | 3 |
| ASEN 3403 | Aerodynamics | 3 |
| ASEN 3404 | Aerospace Dynamics and Control | 3 |
| ASEN 3501 | Aerospace Experimental Methods | 3 |
| ASEN 3502 | Aerospace Computational Methods | 3 |
| ASEN 3503 | Aerospace Electronics | 3 |
| ASEN 4013 | Foundations of Propulsion | 3 |
| ASEN 4018 | Senior Projects 1: Design Synthesis | 4 |
| ASEN 4028 | Senior Projects 2: Design Practicum | 4 |
| *Astronautics Focus:* [1] | | *6* |
| ASEN 3405 | Astrodynamics | |
| ASEN 4401 | Aerospace Communication Systems | |
| *Aeronautics Focus:* [1] | | *6* |
| ASEN 3406 | Aircraft Dynamics | |
| ASEN 4402 | Aerospace Materials and Structural Analysis | |
| **Basic Engineering Electives** | | |
| *Required Math* | | |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| or MATH 1300 | Calculus 1 | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| or MATH 2300 | Calculus 2 | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| or MATH 2400 | Calculus 3 | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| or MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |
| or MATH 2135 & MATH 3430 | Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations | |
| *Required Science* | | |
| MCEN 1024 | Chemistry for Energy and Materials Science | 3 |

| | | |
|---|---|---|
| or CHEM 1113 | General Chemistry 1 | |
| or CHEM 1400 | Foundations of Chemistry | |
| or CHEN 1201 | General Chemistry for Engineers 1 | |
| or CHEN 1211 | Accelerated Chemistry for Engineers | |
| PHYS 1110 | General Physics 1 | 4 |
| or PHYS 1115 | General Physics 1 for Majors | |
| PHYS 1120 | General Physics 2 | 4 |
| or PHYS 1125 | General Physics 2 for Majors | |
| **Required Humanities, Social Sciences and Writing** | | |
| College-approved humanities & social sciences courses. At least 6 credits must be upper-division (3000 level or higher). [2] | | 15 |
| College-approved writing course. [2] | | 3 |
| **Electives** | | |
| Aerospace Engineering Elective [3] | | 3 |
| Math and Science Elective [4] | | 3 |
| Free Electives | | 6 |
| Technical Electives [5] | | 12 |

1 Students select from either the Aeronautics Focus Area or the Astronautics Focus Area and complete 6 credit hours of required coursework in that area.

2 Courses from approved Humanities, Social Sciences and Writing Requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/).

3 Any ASEN course at the 4000-level or above that is not a required course can be used to satisfy the Aerospace Engineering Elective requirement. Additionally, for Astronautics Focus students, either ASEN 3406 or ASEN 4402 can be used to satisfy the Aerospace Engineering Elective requirement, while for Aeronautics Focus students, either ASEN 3405 or ASEN 4401 can be used to satisfy the Aerospace Engineering Elective requirement.

4 A full listing of approved math and science elective courses can be found in the degree audit.

5 A technical elective is generally a course in math, engineering, or science at the 3000 level or above. Any ASEN course at the 4000 level or above that is not a required course can be used as a technical elective if it is not used to satisfy the Aerospace Engineering Elective requirement. Additionally, for Astronautics Focus students, either ASEN 3406 or ASEN 4402 can be used as a technical elective if it is not used to satisfy the Aerospace Engineering Elective requirement, while for Aeronautics Focus students, either ASEN 3405 or ASEN 4401 can be used as a technical elective if it is not used to satisfy the Aerospace Engineering Elective requirement. A full listing of approved technical elective courses can be found in the degree audit.

## Prerequisites and Passing Grades

The minimum passing grade for a course that is a prerequisite for another required course is C-. If a grade of D+ or lower is earned in a course which is a prerequisite to another, the student may not register for the subsequent course until the first grade has been raised to a C- or higher.

The minimum passing grade for a course that is not specifically a prerequisite for another required course is D-.

The Ann and HJ Smead Department of Aerospace Engineering Sciences (AES) reserves the right to drop students enrolled in ASEN courses who have not met the minimum prerequisite grade requirements. It is the student's responsibility to communicate with the department if summer coursework and/or transfer credit will be used to meet the prerequisite requirement.

# Recommended Four-Year Plan of Study

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| APPM 1350 or MATH 1300 | Calculus 1 for Engineers or Calculus 1 | 4 |
| GEEN 1400 or ASEN 1403 | Engineering Projects or Introduction to Rocket Engineering | 3 |
| PHYS 1110 | General Physics 1 | 4 |
| COEN 1500 | CEAS First Year Seminar [2] | 1 |
| Humanities/Social Science Elective [1] | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| APPM 1360 or MATH 2300 | Calculus 2 for Engineers or Calculus 2 | 4 |
| ASEN 1030 | Introduction to Computing for Aerospace Engineering | 3 |
| MCEN 1024 | Chemistry for Energy and Materials Science | 3 |
| Humanities/Social Science Elective [1] | | 6 |
| | **Credit Hours** | **16** |
| **Year Two** | | |
| **Fall Semester** | | |
| APPM 2360 or MATH 2130 ***and*** MATH 3430 | Introduction to Differential Equations with Linear Algebra or Introduction to Linear Algebra for Non-Mathematics Majors ***and*** Ordinary Differential Equations | 4 |
| ASEN 2401 | Statics | 3 |
| ASEN 2402 | Thermodynamics | 3 |
| ASEN 2501 | Introduction to Astronautics | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| APPM 2350 or MATH 2400 | Calculus 3 for Engineers or Calculus 3 | 4 |
| ASEN 2403 | Dynamics | 3 |
| ASEN 2502 | Introduction to Aeronautics | 3 |
| PHYS 1120 | General Physics 2 | 4 |
| Free Elective | | 3 |
| | **Credit Hours** | **17** |
| **Year Three** | | |
| **Fall Semester** | | |
| ASEN 3401 | Aerospace Structures | 3 |
| ASEN 3402 | Aerospace Heat Transfer | 3 |
| ASEN 3404 | Aerospace Dynamics and Control | 3 |
| ASEN 3501 | Aerospace Experimental Methods | 3 |
| Math and Science Elective [3] | | 3 |
| Humanities/Social Science Elective [1] | | 2 |
| | **Credit Hours** | **17** |

| | | |
|---|---|---|
| **Spring Semester** | | |
| ASEN 3403 | Aerodynamics | 3 |
| ASEN 3405<br>or ASEN 3406 | Astrodynamics<br>or Aircraft Dynamics | 3 |
| ASEN 3502 | Aerospace Computational Methods | 3 |
| ASEN 3503 | Aerospace Electronics | 3 |
| Technical Elective [5] | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| ASEN 4013 | Foundations of Propulsion | 3 |
| ASEN 4018 | Senior Projects 1: Design Synthesis | 4 |
| Aerospace Engineering Elective [4] | | 3 |
| College-Approved Writing Course [1] | | 3 |
| Technical Elective [5] | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| ASEN 4028 | Senior Projects 2: Design Practicum | 4 |
| ASEN 4401<br>or ASEN 4402 | Aerospace Communication Systems<br>or Aerospace Materials and Structural Analysis | 3 |
| Humanities/Social Science Elective [1] | | 3 |
| Technical Elective [5] | | 6 |
| | **Credit Hours** | **16** |
| | **Total Credit Hours** | **128** |

1. Courses from approved Humanities, Social Sciences and Writing Requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/).
2. Students may elect to apply this course towards free elective or Humanities and Social Sciences credits.
3. A full listing of approved math and science elective courses can be found in the degree audit.
4. Any ASEN course at the 4000-level or above that is not a required course can be used to satisfy the Aerospace Engineering Elective requirement. Additionally, for Astronautics Focus students, either ASEN 3406 or ASEN 4402 can be used to satisfy the Aerospace Engineering Elective requirement, while for Aeronautics Focus students, either ASEN 3405 or ASEN 4401 can be used to satisfy the Aerospace Engineering Elective requirement.
5. A technical elective is generally a course in math, engineering, or science at the 3000 level or above. Any ASEN course at the 4000 level or above that is not a required course can be used as a technical elective. Upper-division independent study courses from technical areas (math, science and engineering) are acceptable for up to 6 credit hours of technical elective credit. A full listing of approved technical elective courses can be found in the degree audit.

# Learning Outcomes

By the completion of the program, students will be able to:

- Identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics.
- Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.
- Communicate effectively with a range of audiences.
- Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.
- Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives.
- Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- Acquire and apply new knowledge as needed, using appropriate learning strategies.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## Admission Requirements

### BS and MS in Aerospace Engineering Sciences

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a CU cumulative GPA of 3.50 or higher.
- Have a minimum major GPA (in sophomore level/2000+ coursework and above) of 3.50.
- Have at least junior class standing; enrolled in ASEN 3000-level courses.
- Completion of all MAPS requirements and no deficiencies remaining (students admitted to CU Boulder prior to Summer 2023 only).
- Transfer students must have completed a minimum of 24 credit hours at CU Boulder.

### BS in Aerospace Engineering Sciences, Professional ME in Engineering Management

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a CU cumulative GPA of 3.0 or higher.
- Have at least junior class standing.
- Completion of all MAPS requirements and no deficiencies remaining (students admitted to CU Boulder prior to Summer 2023 only).

### Program Requirements

For both programs named above, students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only 6 credits may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

Please see the Aerospace Engineering Sciences BAM program (https://www.colorado.edu/aerospace/academics/graduates/bachelors-accelerated-masters/) webpage for more information on the BS and MS in Aerospace Engineering Sciences BAM program.

Please see the Lockheed Martin Engineering Management Program (https://www.colorado.edu/emp/graduate-programs/bachelors-accelerated-masters-bam/) webpage for more information on the BS in Aerospace Engineering Sciences and a Professional ME in Engineering Management BAM program.

# Applied Mathematics

Applied mathematics graduates have the expertise and mathematical sophistication necessary to make contributions in a wide variety of fields, including scientific computation, actuarial science, financial modeling and most areas of science and engineering that have a mathematical basis.

A professional applied mathematician may work with engineers, scientists, programmers and other specialists. The curriculum at CU Boulder is designed to have the breadth for such an interdisciplinary career.

Course offerings at the undergraduate level focus on providing students with mathematical tools, problem-solving strategies and expertise useful in science and engineering. To fulfill requirements, a concentrated area of engineering courses (or approved natural science courses) must be completed. The college has formulated several recommended options within the discipline.

The Department of Applied Mathematics offers a BS degree in applied mathematics through the College of Engineering & Applied Science and a BA degree in Statistics and Data Science through the College of Arts & Sciences. Both undergraduate degrees are designed to prepare graduates for exciting and diverse professional careers, and for graduate study in a wide variety of disciplines. A minor in applied mathematics (p. 105) and a minor in statistics and data science (p. 118) are offered through the College of Arts & Sciences.

The objectives of the Department of Applied Mathematics at CU Boulder are summarized below:

- provide undergraduate and graduate students with high-quality education and training in applied mathematics, and prepare them for careers in industry, laboratories and the academic professions;
- offer and monitor degree programs leading to BS, MS and PhD degrees in applied mathematics and BA in statistics and data science;
- nourish and maintain a professional environment in which excellence in teaching, learning, scholarship and creativity are of central importance;
- assure teaching and research expertise in a number of key areas of applied mathematics, including the methodology of applied mathematics, computational mathematics and algorithms, industrial applications, mathematical biology, applied probability and statistics.

Courses at the undergraduate level provide training in a broad range of mathematical and statistical techniques and problem-solving strategies. These courses teach the concepts and methods central to applications of linear algebra, ordinary and partial differential equations, numerical analysis, probability and statistics, complex variables and nonlinear dynamics. Since alumni are often involved in interdisciplinary work, the undergraduate degrees require an in-depth knowledge of some area of science or engineering where mathematics is used. This knowledge prepares graduates to successfully communicate and cooperate with engineers and scientists. Both the BA and BS degrees also requires knowledge of a programming language and skill in using the computer.

**Course codes for this program are APPM and STAT.**

## Desired Outcomes

The undergraduate degree in applied mathematics emphasizes knowledge and awareness of:

- differential and integral calculus in one and several variables;
- vector spaces and matrix algebra;
- ordinary and partial differential equations;
- at least one programming language;
- at least one application software package in either mathematics or statistics;
- methods of complex variables as used in applications; and
- numerical solutions of linear and nonlinear problems.

In addition, students completing a degree in applied mathematics acquire:

- an in-depth knowledge of an area of application (an engineering discipline or a natural science field or one of the quantitative areas of business and economics);
- knowledge of problem-formulation, problem-solving and modeling techniques, and strategies central to applications; and
- the ability to communicate analytic arguments clearly and concisely in oral and written forms.

## Bachelor's Degree

- Applied Mathematics - Bachelor of Science (BSAM) (p. 854)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ablowitz, Mark J. (https://experts.colorado.edu/display/fisid_100691/)
Distinguished Professor; PhD, Massachusetts Institute of Technology

Appelö, Daniel E. (https://experts.colorado.edu/display/fisid_159438/)
Assistant Professor Adjunct; PhD, KTH Royal Institute of Technology (Sweden)

Becker, Stephen R. (https://experts.colorado.edu/display/fisid_154263/)
Associate Professor; PhD, California Institute of Technology

Benim, W. Robert (https://experts.colorado.edu/display/fisid_167716/)
Assistant Teaching Professor

Beylkin, Gregory (https://experts.colorado.edu/display/fisid_100437/)
Professor; PhD, New York University

Bhat, Yermal Sujeet (https://experts.colorado.edu/display/fisid_146506/)
Associate Teaching Professor; PhD, University of Florida

Bortz, David Matthew (https://experts.colorado.edu/display/fisid_143348/)
Professor; PhD, North Carolina State University

Chang, Silva (https://experts.colorado.edu/display/fisid_145582/)
Teaching Professor; MS, Yale University

Chi, Jocelyn T.
Assistant Professor; PhD, North Carolina State University

Corcoran, Jem (https://experts.colorado.edu/display/fisid_118142/)
Associate Professor Emeritus; PhD, Colorado State University

Cox, Rachel (https://experts.colorado.edu/display/fisid_158450/)
Assistant Teaching Professor; MS, University of Colorado Boulder

Curry, James H. (https://experts.colorado.edu/display/fisid_105730/)
Professor; PhD, University of California, Berkeley

Dougherty, Anne Margaret (https://experts.colorado.edu/display/fisid_101349/)
Associate Chair, Teaching Professor; PhD, University of Wisconsin–Madison

Dukic, Vanja (https://experts.colorado.edu/display/fisid_148718/)
Professor; PhD, Brown University

Fornberg, Bengt (https://experts.colorado.edu/display/fisid_108048/)
Professor Emeritus; PhD, University of Uppsala (Sweden)

Gillman, Adrianna (https://experts.colorado.edu/display/fisid_165224/)
Associate Professor; PhD, University of Colorado Boulder

Grooms, Ian G. (https://experts.colorado.edu/display/fisid_155588/)
Associate Professor; PhD, University of Colorado Boulder

Hoefer, Mark (https://experts.colorado.edu/display/fisid_154264/)
Professor; PhD, University of Colorado Boulder

Huang, Yu-Jui (https://experts.colorado.edu/display/fisid_157746/)
Assistant Professor; PhD, University of Michigan Ann Arbor

Kilpatrick, Zachary Peter (https://experts.colorado.edu/display/fisid_155782/)
Associate Professor; PhD, University of Utah

Kish, Jonathan (https://experts.colorado.edu/individual/fisid_153629/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Kleiber, William Paul (https://experts.colorado.edu/display/fisid_151943/)
Associate Professor; PhD, University of Washington

Law, Judith (https://experts.colorado.edu/individual/fisid_167501/)
Assistant Teaching Professor; PhD, The University of Maryland, College Park

Li, Congming
Professor Emeritus

Lindsey, Daniel Seneca (https://experts.colorado.edu/display/fisid_156477/)
Assistant Teaching Professor

Lladser, Manuel E. (https://experts.colorado.edu/display/fisid_134170/)
Associate Professor; PhD, The Ohio State University

Manteuffel, Thomas A.
Professor Emeritus

Martinsson, Per-Gunnar
Visiting Professor

McCormick, Steven
Professor Emeritus

Mcnamara, Rich (https://experts.colorado.edu/display/fisid_167770/)
Lecturer

Meiss, James D. (https://experts.colorado.edu/display/fisid_103702/)
Professor; PhD, University of California, Berkeley

Meyer, Francois Georges (https://experts.colorado.edu/individual/fisid_115559/)
Professor; PhD, INRIA (France)

Mitchell, Colin
Lecturer

Nixon, Sean (https://experts.colorado.edu/display/fisid_167600/)
Instructor

Norris, Jan Adam (https://experts.colorado.edu/display/fisid_101412/)
Teaching Professor; PhD, University of Colorado Boulder

Pruitt, Kris
Associate Teaching Professor

Reichenbach, Matt
Assistant Teaching Professor; PhD, University of Nebraska Lincoln

Restrepo, Juan G. (https://experts.colorado.edu/display/fisid_145811/)
Associate Professor; PhD, University of Maryland, College Park

Rodriguez, Nancy (https://experts.colorado.edu/display/fisid_164028/)
Assistant Professor; PhD, University of California-Los Angeles

Segur, Harvey (https://experts.colorado.edu/display/fisid_102287/)
Professor Emeritus; PhD, University of California, Berkeley

Thaler, Eric R. (https://experts.colorado.edu/display/fisid_155505/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Vance, Eric (https://experts.colorado.edu/display/fisid_158342/)
Associate Professor; PhD, Duke University

Zaharatos, Brian R. (https://experts.colorado.edu/display/fisid_156225/)
Teaching Professor, Faculty Director; PhD, Colorado School of Mines

# Courses

**APPM 1235 (4) Pre-Calculus for Engineers**
Prepares students for the challenging content and pace of the calculus sequence required for all engineering majors. Covers algebra, trigonometry and selected topics in analytical geometry. Prepares students for the calculus courses offered for engineering students. Requires students to engage in rigorous work sessions as they review topics that they must be comfortable with to pursue engineering course work. Structured to accustom students to the pace and culture of learning encountered in engineering math courses. For more information about the math placement referred to in the "Enrollment Requirements", please contact your academic advisor. Formerly GEEN 1235.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 1021 or MATH 1150
**Requisites:** Requires an ALEKS math exam taken in 2016 or earlier, or placement into pre-calculus based on your admissions data and/or CU Boulder coursework.

**APPM 1236 (1) Precalculus Work Group**
Develops and enhances problem solving skills for students enrolled in APPM 1235. Course is conducted in a collaborative learning environment with students working in groups under the guide of a facilitator.
**Requisites:** Requires enrollment in corequisite course of APPM 1235.

**APPM 1340 (4) Calculus 1 with Algebra, Part A**
Studies selected topics in analytical geometry and calculus: rates of change of functions, limits, derivatives and their applications. This course and APPM 1345 together are equivalent to APPM 1350. The sequence of this course and APPM 1345 is specifically designed for students whose manipulative skills in the techniques of high school algebra and precalculus may be inadequate for APPM 1350. For more information about the math placement referred to in the "Enrollment Requirements", please contact your academic advisor.
**Requisites:** Requires prerequisite course of APPM 1235 or MATH 1021 or MATH 1150 or MATH 1160 (minimum grade C-) or an ALEKS math exam taken in 2016 or earlier, or placement into pre-calculus based on your admissions data and/or CU Boulder coursework.
**Additional Information:** Arts Sci Gen Ed: Quantitative Reasoning Math

**APPM 1345 (4) Calculus 1 with Algebra, Part B**
Continuation of APPM 1340. Studies selected topics in calculus: derivatives and their applications, integration, differentiation and integration of transcendental functions. Algebraic and trigonometric topics are studied throughout, as needed.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1350 or ECON 1088 or MATH 1081 or MATH 1300 or MATH 1310 or MATH 1330
**Requisites:** Requires prerequisite course of APPM 1340 (minimum grade C-).

**APPM 1350 (4) Calculus 1 for Engineers**
Topics in analytical geometry and calculus including limits, rates of change of functions, derivatives and integrals of algebraic and transcendental functions, applications of differentiations and integration. Students who have already earned college credit for calculus 1 are eligible to enroll in this course if they want to solidify their knowledge base in calculus 1. For more information about the math placement referred to in the "Enrollment Requirements", contact your academic advisor.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1345 or ECON 1088 or MATH 1081 or MATH 1300 or MATH 1310 or MATH 1330
**Requisites:** Requires prerequisite course of APPM 1235 or MATH 1021 or MATH 1150 or MATH 1160 or MATH 1300 (minimum grade C-) or an ALEKS math exam taken in 2016 or earlier, or placement into calculus based on your admissions data and/or CU Boulder coursework.
**Additional Information:** GT Pathways: GT-MA1 - Mathematics
Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**APPM 1351 (1) Calculus 1 Work Group**
Provides problem-solving assistance to students enrolled in APPM 1350. Student groups work in collaborative learning environment. Student participation is essential.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Requires enrollment in corequisite course of APPM 1350 or APPM 1345.

**APPM 1360 (4) Calculus 2 for Engineers**
Continuation of APPM 1350. Focuses on applications of the definite integral, methods of integration, improper integrals, Taylor's theorem, and infinite series.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 2300
**Requisites:** Requires prerequisite course of APPM 1345 or APPM 1350 or MATH 1300 (minimum grade C-).

**APPM 1361 (1) Calculus 2 Work Group**
Provides problem solving assistance for students enrolled in APPM 1360. Conducted in a collaborative learning environment. Student work groups solve calculus problems with assistance of facilitator.
**Requisites:** Requires enrollment in corequisite course of APPM 1360.

**APPM 1390 (1) A Game for Calculus**
Coaches students to implement study strategies geared specifically toward APPM Calculus in a structured, supportive, small group environment. Department consent required.
**Repeatable:** Repeatable for up to 3.00 total credit hours.

**APPM 1650 (4) Python for Math and Data Science Applications**
Uses Python to teach the fundamentals of computer programming with an emphasis on mathematical and statistical applications. Topics will include data types, data structures, iteration, visualization, and simulations. Techniques covered will be applicable to many scientific and technical fields. No prior programming experience is required. Formerly offered as a special topics course.
**Requisites:** Requires prerequisite or corequisite courses of APPM 1350 or APPM 1345 or MATH 1300 or MATH 1310 (all minimum grade C-).

**APPM 2340 (4) Calculus 3 for Statistics and Data Science**
Covers vectors and vector analysis, partial derivatives and the multivariable Taylor theorem, and multiple integrals. Introduces matrices and statistical applications.
**Requisites:** Requires prerequisite courses APPM 1360 or MATH 2300 (both minimum grade C-).

**APPM 2350 (4) Calculus 3 for Engineers**
Covers multivariable calculus, vector analysis, and theorems of Gauss, Green, and Stokes.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 2400
**Requisites:** Requires prerequisite course of APPM 1360 or MATH 2300 (minimum grade C-).

**APPM 2351 (1) Calculus 3 Work Group**
Provides problem solving assistance to students enrolled in APPM 2350. Conducted in a collaborative learning environment. Student work groups solve calculus problems with the assistance of a facilitator.
**Requisites:** Requires enrollment in corequisite course of APPM 2350.

**APPM 2360 (4) Introduction to Differential Equations with Linear Algebra**
Introduces ordinary differential equations, systems of linear equations, matrices, determinants, vector spaces, linear transformations, and systems of linear differential equations.
**Equivalent - Duplicate Degree Credit Not Granted:** both MATH 2130 and MATH 3430
**Requisites:** Requires prerequisite course of APPM 1360 or MATH 2300 (minimum grade C-).

**APPM 2361 (1) Differential Equations Work Group**
Provides problem solving assistance to students enrolled in APPM 2360. Conducted in a collaborative learning environment. Student work in groups solve ordinary differential equations and linear algebra problems with the assistance of a facilitator.
**Requisites:** Requires corequisite course of APPM 2360.

**APPM 2450 (1) Calculus 3 Computer Lab**
Selected topics in analytic geometry and calculus with a focus on symbolic computation using Mathematica.
**Requisites:** Requires a corequisite course of APPM 2350.

**APPM 2460 (1) Differential Equations Computer Lab**
Selected topics in differential equations and linear algebra with a focus on symbolic computation using MATLAB.
**Requisites:** Requires enrollment in a corequisite course of APPM 2360.

**APPM 2720 (1-3) Open Topics in Lower Division Applied Mathematics**
Provides a vehicle for the development and presentation of new topics that are accessible to lower division Applied Mathematics students. These topics have the potential to be incorporated into the core APPM curriculum.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of APPM 1350 or MATH 1300 (minimum grade C-).
**Grading Basis:** Letter Grade

**APPM 2750 (4) Java: Training, Mathematical Algorithms, and Mobile Apps**
Preparatory course for Java programming. Provides necessary background for Java language: basic object-oriented concepts, analysis, and design. Learn to create Java applets, applications and mobile apps, create graphic context, and identify the key features of Java foundation classes as well as other Java-related technology. Material is taught in the context of mathematical algorithms from calculus. Department enforced requisite, knowledge of a programming language.
**Requisites:** Requires prerequisite course of APPM 1350 or MATH 1300 (minimum grade C-).

**APPM 3010 (3) Chaos in Dynamical Systems**
Introduces undergraduate students to chaotic dynamical systems. Topics include smooth and discrete dynamical systems, bifurcation theory, chaotic attractors, fractals, Lyapunov exponents, synchronization and networks of dynamical systems. Applications to engineering, biology and physics will be discussed.
**Requisites:** Requires prerequisite course of APPM 2360 or MATH 3430 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 3050 (3) Scientific Computing in Matlab**
Topics covered include: approximations in computing, computer arithmetic, interpolation, matrix computations, nonlinear equations, optimization, and initial-value problems with emphasis on the computational cost, efficiency, and accuracy of algorithms. The problem sets are application-oriented with examples taken from orbital mechanics, physics, genetics, and fluid dynamics.
**Requisites:** Requires prerequisite course of APPM 2360 or MATH 3430 (minimum grade C-).

**APPM 3170 (3) Discrete Applied Mathematics**
Introduces students to ideas and techniques from discrete mathematics that are widely used in science and engineering. Mathematical definitions and proofs are emphasized. Topics include formal logic notation, proof methods; set theory, relations; induction, well-ordering; algorithms, growth of functions and complexity; integer congruences; basic and advanced counting techniques, recurrences and elementary graph theory. Other selected topics may also be covered.
**Requisites:** Requires a prerequisite of APPM 1360 or MATH 2300 (all minimum grade C-).

**APPM 3310 (3) Matrix Methods and Applications**
Introduces linear algebra and matrices with an emphasis on applications, including methods to solve systems of linear algebraic and linear ordinary differential equations. Discusses vector space concepts, decomposition theorems, and eigenvalue problems.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 2130 and MATH 2135
**Requisites:** Requires prerequisite course of APPM 2340 or APPM 2350 or APPM 2360 or MATH 2400 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 3311 (1) Matrix Methods Workgroup**
Provides problem-solving assistance to students enrolled in APPM 3310. Student groups work in collaborative learning environment. Student participation is essential.
**Requisites:** Requires enrollment in corequisite course of APPM 3310.

**APPM 3350 (3) Advanced Engineering Calculus**
Extends the treatment of engineering mathematics beyond the topics covered in Calculus 3 and differential equations. Topics include non-dimensionalization, elementary asymptotics and perturbation theory, Reynold's transport theorem and extensions of Leibnitz's rule, as applied to continuum conservation equations, Hamiltonian formulations, Legendre and Laplace transforms, special functions and their orthogonality properties.
**Requisites:** Requires prerequisite course of APPM 2350 or MATH 2400 and APPM 2360 (all minimum grade C-).

**APPM 3570 (3) Applied Probability**
Studies axioms, counting formulas, conditional probability, independence, random variables, continuous and discrete distribution, expectation, joint distributions, moment generating functions, law of large numbers and the central limit theorem.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3810 or MATH 4510 STAT 3100
**Requisites:** Requires a prerequisite or corequisite course of APPM 2350 or APPM 2340 or MATH 2400 (prereq minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 3650 (3) Algorithms and Data Structures in Python**
Covers data structures (stacks, queues, linked lists, hash tables, heaps), algorithms (divide and conquer, sorting, greedy, graph, dynamic programming), and asymptotic complexity with an emphasis on applied math topics. Assignments will include programming projects written in Python
**Requisites:** Requires prerequisite courses of APPM 1650 and (APPM 1360 or MATH 2300) (minimum grade C-) or instructor consent.

**APPM 4120 (3) Introduction to Operations Research**
Studies linear and nonlinear programming, the simplex method, duality, sensitivity, transportation and network flow problems, some constrained and unconstrained optimization theory, and the Kuhn-Tucker conditions, as time permits.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5120 and MATH 4120 and MATH 5120
**Requisites:** Requires a prerequisite course of APPM 3310 or MATH 2130 or MATH 2135 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4320 (3) Introduction to Dynamics on Networks**
Introduces modern approaches to model and analyze dynamical processes on complex networks. Many dynamical processes such as epidemic propagation, opinion formation, synchronization, and cascading processes take place on complex social or technological networks. This course will introduce the tools to understand the interplay between network structure and the outcome of these dynamical processes. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5320
**Requisites:** Requires prerequisite courses of APPM 2360 and APPM 3310 (all minimum grade C-).
**Grading Basis:** Letter Grade

**APPM 4350 (3) Methods in Applied Mathematics: Fourier Series and Boundary Value Problems**
Reviews ordinary differential equations, including solutions by Fourier series. Physical derivation of the classical linear partial differential equations (heat, wave, and Laplace equations). Solution of these equations via separation of variables, with Fourier series, Fourier integrals, and more general eigenfunction expansions.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5350
**Requisites:** Requires prerequisite courses of APPM 2350 or MATH 2400 and APPM 2360 (all minimum grade C-) and a prerequisite or corequisite course of APPM 3310 (prereq minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4360 (3) Methods in Applied Mathematics: Complex Variables and Applications**
Introduces methods of complex variables, contour integration and theory of residues. Applications include solving partial differential equations by transform methods, Fourier and Laplace transforms and Reimann-Hilbert boundary-value problems, conformal mapping to ideal fluid flow and/or electrostatics.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5360
**Requisites:** Requires prerequisite courses of APPM 2350 or MATH 2400 and APPM 2360 (all minimum grade C-) and a prerequisite or corequisite course of APPM 3310 (prereq minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4370 (3) Computational Neuroscience**
Applies mathematical and computational methods to neuroscience. Techniques from linear algebra, differential equations, introductory dynamical systems, probability, stochastic processes, model validation, and machine learning will be learned and used. Neuroscience topics include neural spiking, network dynamics, probabilistic inference, learning, and plasticity. Will learn how the brain uses computational principles to enact decision making, vision, and memory. Recommended background includes linear algebra, differential equations, probability, and programming. Students will hone programming skills in MATLAB/Python and TensorFlow.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5370
**Requisites:** Requires prerequisite courses of APPM 2360 and APPM 3310 (all minimum grade C-).
**Recommended:** Prerequisite APPM 3570/STAT 3100, STAT 2600 or CSCI 3022.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4380 (3) Modeling in Applied Mathematics**
An exposition of a variety of mathematical models arising in the physical and biological sciences. Students' modeling projects are presented in class. Topics may include: GPS navigation, medical imaging, ocean waves, and computerized facial recognition.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5380
**Requisites:** Requires prerequisite courses of APPM 2350 or MATH 2400 and APPM 2360 (all minimum grade C-).
**Recommended:** Prerequisites APPM 3310 and APPM 4350 and APPM 4650.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4390 (3) Modeling in Mathematical Biology**
Investigates how complex systems in biology can be studied using applied mathematics. Examines several case studies which include topics from microbiology, enzyme reaction kinetics, neuroscience, ecology, epidemiology, physiology and bioengineering.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5390
**Requisites:** Requires prerequisite courses of APPM 2360 and APPM 3310 or MATH 3130 or MATH 3135 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4440 (3) Undergraduate Applied Analysis 1**
Provides a rigorous treatment of topics covered in Calculus 1 and 2. Topics include convergent sequences; continuous functions; differentiable functions; Darboux sums, Riemann sums, and integration; Taylor and power series and sequences of functions.
**Requisites:** Requires prerequisite courses of APPM 2350 or MATH 2400 and APPM 2360 (all minimum grade C-) and a prerequisite or corequisite course of APPM 3310 (prereq minimum grade C-).

**APPM 4450 (3) Undergraduate Applied Analysis 2**
Continuation of APPM 4440. Study of multidimensional analysis including n-dimensional Euclidean space, continuity and uniform continuity of functions of several variables, differentiation, linear and nonlinear approximation, inverse function and implicit function theorems, and a short introduction to metric spaces.
**Requisites:** Requires prerequisite course of APPM 4440 or MATH 3001 (minimum grade C-).

**APPM 4490 (3) Theory of Machine Learning**
Presents the underlying theory behind machine learning in proofs-based format. Answers fundamental questions about what learning means and what can be learned via formal models of statistical learning theory. Analyzes some important classes of machine learning methods. Specific topics may include the PAC framework, VC-dimension and Rademacher complexity.
**Requisites:** Requires prerequisite course of APPM 4440 (minimum grade C-).
**Recommended:** Prerequisite CSCI 5622 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4510 (3) Data Assimilation in High Dimensional Dynamical Systems**
Develops and analyzes approximate methods of solving the Bayesian inverse problem for high-dimensional dynamical systems. After briefly reviewing mathematical foundations in probability and statistics, the course covers the Kalman filter, particle filters, variational methods and ensemble Kalman filters. The emphasis is on mathematical formulation and analysis of methods.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5510, STAT 4250 and STAT 5250
**Requisites:** Requires prerequisite courses of APPM 3310 and (STAT 4520 or MATH 4520). All minimum grade C-.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4515 (3) High-Dimensional Probability for Data Science**
Provides students with an exposition of the most recent methods of high-dimensional probability for the analysis of high dimensional datasets. Applications include randomized algorithms and high-dimensional random models of datasets.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5515
**Requisites:** Requires prerequisite courses of APPM 3310 and APPM 3570 (minimum grade C-).

**APPM 4530 (3) Stochastic Analysis for Finance**
Studies mathematical theories and techniques for modeling financial markets. Specific topics include the binomial model, risk neutral pricing, stochastic calculus, connection to partial differential equations and stochastic control theory.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5530, STAT 4230 and STAT 5230
**Requisites:** Requires prerequisite courses of APPM 3310 and APPM 3570, or STAT 3100, or MATH 4510 (all minimum grade C-).

**APPM 4560 (3) Markov Processes, Queues, and Monte Carlo Simulations**
Brief review of conditional probability and expectation followed by a study of Markov chains, both discrete and continuous time, including Poisson point processes. Queuing theory, terminology and single queue systems are studied with some introduction to networks of queues. Uses Monte Carlo simulation of random variables throughout the semester to gain insight into the processes under study.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5560 and STAT 4100
**Requisites:** Requires prerequisite courses of APPM 3570 or STAT 3100 or MATH 4510 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4565 (3) Random Graphs**
Introduces mathematical techniques, including generating functions, the first- and second-moment method and Chernoff bounds to study the most fundamental properties of the Erdos-Renyl model and other celebrated random graph models such as preferential attachment, fixed degree distribution, and stochastic block models.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5565
**Requisites:** Requires prerequisite APPM 3570 or MATH 4510 (both minimum grade C).

**APPM 4600 (4) Numerical Methods and Scientific Computing**
Provides an introduction to numerical analysis and scientific computing. Numerical analysis topics include root finding, interpolation, quadrature, linear system solution techniques, and techniques for approximating eigenvalues. Scientific computing topics include code development and repository management in addition to an introduction to shared and distributed memory computing. Involves hands-on learning with weekly group interactions and a final project including a report and in-class presentation.
**Requisites:** Requires prerequisite course of APPM 3310 (minimum grade C-).
**Recommended:** Prerequisite knowledge of a programming language such as Python, and C++.

**APPM 4610 (3) Numerical Differential Equations**
Provides an introduction to the most commonly used techniques for numerically solving boundary value problems and time dependent problems and the corresponding linear systems. Topics include finite difference methods, the finite element method, the spectral method, spectral collocation methods, Euler and Runge-Kutta methods. Scientific computing skills such as advanced code and memory management will be developed. Involves hands-on learning with weekly group interactions and a final project. Department enforced prerequisite: Knowledge of a programming language such as Python, and C++ is required.
**Requisites:** Requires prerequisite courses of APPM 2360 and APPM 4600 (all minimum grade C-).

**APPM 4650 (3) Intermediate Numerical Analysis 1**
Focuses on numerical solution of nonlinear equations, interpolation, methods in numerical integration, numerical solution of linear systems, and matrix eigenvalue problems. Stresses significant computer applications and software. Department enforced prerequisite: knowledge of a programming language.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4650
**Requisites:** Requires a prerequisite course of MATH 3430 or APPM 2360 and APPM 3310 (minimum grade C-).

**APPM 4720 (1-3) Open Topics in Applied Mathematics**
Provides a vehicle for the development and presentation of new topics that may be incorporated into the core courses in applied mathematics. Department enforced prerequisite: variable, depending on the topic, see instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5720
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.

**APPM 4840 (1-3) Reading and Research in Applied Mathematics**
Introduces undergraduate students to the research foci of the Department of Applied Mathematics. Department enforced prerequisite: variable depending on the topic.
**Repeatable:** Repeatable for up to 9.00 total credit hours.

**APPM 4950 (1-3) Seminar in Applied Mathematics**
Introduces undergraduate students to the research foci of the program in applied mathematics. It is also designed to be a capstone experience for the program's majors. Department enforced prerequisite: variable depending on the topic.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**STAT 2600 (4) Introduction to Data Science**
Introduces students to importing, tidying, exploring, visualizing, summarizing, and modeling data and then communicating the results of these analyses to answer relevant questions and make decisions. Students will learn how to program in R using reproducible workflows. During weekly lab sessions students will collaborate with their teammates to pose and answer questions using real-world datasets.
**Requisites:** Requires prerequisite or corequisite of APPM 1350 or APPM 1345 or MATH 1300 (minimum grade C-).
**Grading Basis:** Letter Grade

**STAT 3100 (3) Applied Probability**
Studies axioms, counting formulas, conditional probability, independence, random variables, continuous and discrete distribution, expectation, joint distributions, moment generating functions, law of large numbers and the central limit theorem.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3810 or MATH 4510 APPM 3570
**Requisites:** Requires a prerequisite or corequisite course of APPM 2350 or APPM 2340 or MATH 2400 (prereq minimum grade C-).

**STAT 3101 (1) Probability Workgroup**
Provides problem-solving assistance to students enrolled in STAT 3100 and APPM 3570. Student groups work in collaborative learning environment. Student participation is essential.
**Requisites:** Requires enrollment in corequisite course of STAT 3100 or APPM 3570.

**STAT 3400 (3) Applied Regression**
Introduces methods, theory, and applications of linear statistical models, covering topics such as estimation, residual diagnostics, goodness of fit, transformations, and various strategies for variable selection and model comparison. Examples will be demonstrated using statistical programming language R.
**Requisites:** Requires prerequisite STAT 2600 and STAT 3100 or MATH 4510 (all minimum grade C-). Requires corequisite APPM 3310.
**Grading Basis:** Letter Grade

**STAT 4000 (3) Statistical Methods and Application I**
Introduces exploratory data analysis, probability theory, statistical inference, and data modeling. Topics include discrete and continuous probability distributions, expectation, laws of large numbers, central limit theorem, statistical parameter estimation, hypothesis testing, and regression analysis. Considerable emphasis on applications in the R programming language.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5000
**Requisites:** Requires prerequisite APPM 1360 or MATH 2300 (both minimum grade C-).
**Grading Basis:** Letter Grade

**STAT 4010 (3) Statistical Methods and Applications II**
Expands upon statistical techniques introduced in STAT 4000. Topics include modern regression analysis, analysis of variance (ANOVA), experimental design, nonparametric methods, and an introduction to Bayesian data analysis. Considerable emphasis on application in the R programming language.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5010
**Requisites:** Requires prerequisite STAT 4000 (minimum grade C-).
**Grading Basis:** Letter Grade

**STAT 4100 (3) Markov Processes, Queues, and Monte Carlo Simulations**
Brief review of conditional probability and expectation followed by a study of Markov chains, both discrete and continuous time, including Poisson point processes. Queuing theory, terminology and single queue systems are studied with some introduction to networks of queues. Uses Monte Carlo simulation of random variables throughout the semester to gain insight into the processes under study.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4560 and APPM 5560
**Requisites:** Requires prerequisite courses of APPM 3570 or STAT 3100 or MATH 4510 (all minimum grade C-).

**STAT 4230 (3) Stochastic Analysis for Finance**
Studies mathematical theories and techniques for modeling financial markets. Specific topics include the binomial model, risk neutral pricing, stochastic calculus, connection to partial differential equations and stochastic control theory.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4530, APPM 5530 and STAT 5230
**Requisites:** Requires prerequisite courses of APPM 3310 and APPM 3570, or STAT 3100, or MATH 4510 (all minimum grade C-).

**STAT 4250 (3) Data Assimilation in High Dimensional Dynamical Systems**
Develops and analyzes approximate methods of solving the Bayesian inverse problem for high-dimensional dynamical systems. After briefly reviewing mathematical foundations in probability and statistics, the course covers the Kalman filter, particle filters, variational methods and ensemble Kalman filters. The emphasis is on mathematical formulation and analysis of methods.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5510, APPM 4510 and STAT 5250
**Requisites:** Requires prerequisite courses of APPM 3310 and (STAT 4520 or MATH 4520). All minimum grade C-.

**STAT 4350 (3) Applied Deep Learning 1**
Introduces students to state-of-the-art deep learning techniques employed in the industry. This course will focus on training neural networks and computer vision, including image classification and transformation, object detection, and facial recognition. Advanced topics will include domain adaptation and learning techniques. There will be an emphasis on reading current literature.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5350
**Requisites:** Requires prerequisite courses of APPM 3570 or STAT 3100 and STAT 3400 or STAT 4520 and APPM 4650 or APPM 4600 (all minimum grade C-).
**Recommended:** Prerequisite knowledge of Python is required, and familiarity with TensorFlow and PyTorch is a plus but is not a requirement.

**STAT 4360 (3) Applied Deep Learning 2**
Introduces students to state-of-the-art deep learning techniques employed in the industry. This course will focus on natural language processing, multimodal learning, generative and graph neural networks, speech and music recognition, and reinforcement learning. Students will learn software engineering techniques using Python. There will be an emphasis on reading current literature.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5360
**Requisites:** Requires prerequisite course of STAT 4350 (minimum grade C-).

**STAT 4400 (3) Advanced Statistical Modeling**
Introduces methods, theory and applications of modern statistical models, from linear to hierarchical linear models, to generalized hierarchical linear models, including hierarchical logistic and hierarchical count regression models. Topics such as estimation, residual diagnostics, goodness of fit, transformations, and various strategies for variable selection and model comparison will be discussed in depth. Examples will be demonstrated using statistical programming language R.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5400
**Requisites:** Requires prerequisite STAT 3400 and (STAT 4520 or STAT 5010) (all minimum grade C-).
**Grading Basis:** Letter Grade

**STAT 4430 (3) Spatial Statistics**
Introduces the theory of spatial statistics with applications. Topics include basic theory for continuous stochastic processes, spatial prediction and kriging, simulation, geostatistical methods, likelihood and Bayesian approaches, spectral methods and an overview of modern topics such as nonstationary models, hierarchical modeling, multivariate processes, methods for large datasets and connections to splines.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5430
**Requisites:** Requires prerequisite courses of STAT 3400 AND APPM 3310 (all minimum grade C-).
**Recommended:** Prerequisites STAT 4520 OR STAT 5520 OR MATH 4520 OR MATH 5520.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**STAT 4520 (3) Introduction to Mathematical Statistics**
Examines point and confidence interval estimation. Principles of maximum likelihood, sufficiency, and completeness: tests of simple and composite hypotheses, linear models, and multiple regression analysis if time permits. Analyzes various distribution-free methods.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5520 and MATH 4520 and MATH 5520
**Requisites:** Requires prerequisites APPM 3570 or STAT 3100 or MATH 4510 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**STAT 4540 (3) Introduction to Time Series**
Studies basic properties, trend-based models, seasonal models modeling and forecasting with ARIMA models, spectral analysis and frequency filtration.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5540 and MATH 4540 and MATH 5540
**Requisites:** Requires prerequisite course of APPM 4520 or STAT 4520 or MATH 4520 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**STAT 4610 (3) Statistical Learning**
Consists of applications and methods of statistical learning. Reviews multiple linear regression and then covers classification, regularization, splines, tree-based methods, support vector machines, unsupervised learning and Gaussian process regression.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5610
**Requisites:** Requires prerequisite course of STAT 3400 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**STAT 4630 (3) Computational Bayesian Statistics**
Introduces Bayesian statistics, normal and non-normal approximation to likelihood and posteriors, the EM algorithm, data augmentation, and Markov Chain Monte Carlo (MCMC) methods. Additionally, introduces more advanced MCMC algorithms and requires significant statistical computing. Examples from a variety of areas, including biostatistics, environmental sciences, and engineering, will be given throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5630
**Requisites:** Requires prerequisite courses of (APPM 4560 or STAT 4100) and STAT 3400 and (STAT 4520 or MATH 4520) (minimum grade C-).
**Recommended:** Prerequisite prior programming experience.

**STAT 4640 (3) Capstone in Statistics and Data Science**
Course provides senior-level and graduate students the opportunity to apply the knowledge, skills, and abilities developed throughout the Statistics and Data Science major. Working in teams, students undertake a data-driven problem presented by domain experts from government, industry, or academia. The course provides valuable real-world experience for students intending to pursue graduate education or technical careers. Topics include team building, problem solving, research methods, project management, data ethics, and clear communication (oral, written, and visual).
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5640
**Requisites:** Requires prerequisite course of STAT 4400 or STAT 4610 (minimum grade C-)
**Grading Basis:** Letter Grade

**STAT 4680 (3) Statistics and Data Science Collaboration**
Educates and trains students to become effective interdisciplinary collaborators by developing the communication and collaboration skills necessary to apply technical statistics and data science skills to help domain experts answer research or policy questions. Topics include structuring effective meetings and projects; communicating statistics to non-statisticians; using peer feedback, self-reflection and video analysis to improve collaboration skills; creating reproducible statistical workflows; working ethically.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5680
**Requisites:** Requires a prerequisite course of STAT 4400 or STAT 4010 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**STAT 4690 (2) Advanced Statistical Collaboration**
Educates and trains students to become advanced interdisciplinary collaborators by developing and refining the communication, collaboration and technical statistics and data science skills necessary to collaborate with domain experts to answer research questions. Students work on multiple projects. Discussions center on technical skills necessary to solve research problems and video analysis to improve communication and collaboration skills.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5690
**Requisites:** Requires prerequisite course of STAT 4680 or STAT 5680 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**STAT 4700 (3) Philosophical and Ethical Issues in Statistics**
Introduces students to philosophical issues that arise in statistical theory and practice. Topics include interpretations of probability, philosophical paradigms in statistics, inductive inference, causality, reproducible, and ethical issues arising in statistics and data analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5700
**Requisites:** Requires prerequisites STAT 4520 or STAT 3400 or STAT 4000 (all minimum grade C-).
**Grading Basis:** Letter Grade

**STAT 4720 (1-3) Open Topics in Statistics and Data Science**
Provides a vehicle for the development and presentation of new topics that may be incorporated into the core courses in statistics and data science. Department enforced prerequisite: variable, depending on the topic, see instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5720
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.

**STAT 4840 (1-3) Reading and Research in Statistics**
Introduces undergraduate students to research in statistics and data science. Department enforced prerequisite: variable depending on the topic.
**Repeatable:** Repeatable for up to 9.00 total credit hours.

# Applied Mathematics - Bachelor of Science (BSAM)

The Department of Applied Mathematics in the College of Arts and Sciences offers a Bachelor of Science degree in applied mathematics through the College of Engineering and Applied Science. The BS degree is designed to prepare graduates for exciting and diverse professional careers, and for graduate study in a wide variety of disciplines.

Courses at the undergraduate level provide training in a broad range of mathematical techniques and problem--solving strategies. These courses teach the concepts and methods central to applications of linear algebra, ordinary and partial differential equations, numerical analysis, probability, statistics and data science, complex variables and nonlinear dynamics. Since applied mathematicians often are involved in interdisciplinary work, the BS degree requires an in-depth knowledge of some area of science or engineering where mathematics is used. This knowledge prepares graduates to successfully communicate and cooperate with engineers and scientists. The BS degree also requires knowledge of a programming language and skill in using the computer.

For more information, visit the department's Prospective Students (https://www.colorado.edu/amath/prospective-students/undergraduate/) webpage.

## Research Opportunities

The Department of Applied Math offers a broad range of undergraduate research opportunities funded by multiple agencies including the National Science Foundation. Working with faculty, applied math students have developed solutions to a variety of problems in fluids, dynamical systems, data analysis, networks, signal processing, math biology, math education and numerics. Students can do both theoretical and experimental work in the Dispersive Hydrodynamics Lab (https://www.colorado.edu/amath/research/dispersive-hydrodynamics-lab/), gain practical experience in statistics and data science through LISA, the Laboratory for Interdisciplinary Statistical Analysis (https://www.colorado.edu/lab/lisa/) or work on individual research projects with departmental and affiliated faculty.

Students can gain professional exposure through the student chapter of the Society of Industrial and Applied Mathematics (SIAM) or through the Data Buffs, the student chapter of the American Statistical Association. Applied Math also has a local chapter of AWM, the Association for Women in Mathematics.

## Requirements

### Required Courses and Credits

The BS degree in applied mathematics requires the satisfactory completion of a minimum of 128 credit hours as follows. All prerequisite courses must be passed with a C- or better.

All AMEN-BS majors are required to take a minimum of 19 credits in APPM or STAT on the CU Boulder campus, with a minimum of 16 credits being upper-division APPM or STAT coursework.

| Code | Title | Credit Hours |
|---|---|---|
| **Calculus** | | |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| or MATH 1300 | Calculus 1 | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| or MATH 2300 | Calculus 2 | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| or MATH 2400 | Calculus 3 | |
| **Computing Experience** | | |
| APPM 1650 | Python for Math and Data Science Applications | 4 |
| or CSCI 1300 | Computer Science 1: Starting Computing | |
| or CSCI 2275 | Programming and Data Structures | |
| or CHEN 1310 | Introduction to Engineering Computing | |
| or ECEN 1310 | Introduction to C Programming | |
| **Science Requirement** | | |
| PHYS 1110 | General Physics 1 | 4 |
| or PHYS 1115 | General Physics 1 for Majors | |
| PHYS 1120 | General Physics 2 | 4 |
| or PHYS 1125 | General Physics 2 for Majors | |
| PHYS 1140 | Experimental Physics 1 [1] | 1 |

| | | |
|---|---|---|
| *Select one of the following options (including at least 1 credit of laboratory science):* [2] | | *4* |
| CHEN 1201<br>& CHEM 1114 | General Chemistry for Engineers 1<br>and Laboratory in General Chemistry 1 | |
| CHEN 1211<br>& CHEM 1221 | Accelerated Chemistry for Engineers<br>and Engineering General Chemistry Lab | |
| CHEM 1113<br>& CHEM 1114 | General Chemistry 1<br>and Laboratory in General Chemistry 1 | |
| EBIO 1210<br>& EBIO 1220<br>& EBIO 1230<br>& EBIO 1240 | General Biology 1<br>and General Biology 2<br>and General Biology Laboratory 1<br>and General Biology Laboratory 2 | |
| MCDB 1150<br>& MCDB 2150 | Introduction to Cellular and Molecular Biology<br>and Principles of Genetics (and one 2-credit lab) [3] | |
| PHYS 2130<br>& PHYS 2150 | Introduction to Quantum Mechanics and Its Applications<br>and Experimental Physics 2 | |
| PHYS 2170<br>& PHYS 2150 | Foundations of Modern Physics<br>and Experimental Physics 2 | |
| **APPM Courses** | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| or MATH 2130<br>& MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors<br>and Ordinary Differential Equations | |
| or MATH 2135<br>& MATH 3430 | Introduction to Linear Algebra for Mathematics Majors<br>and Ordinary Differential Equations | |
| APPM 3310 | Matrix Methods and Applications | 3 |
| APPM 4350 | Methods in Applied Mathematics: Fourier Series and Boundary Value Problems | 3 |
| APPM 4360 | Methods in Applied Mathematics: Complex Variables and Applications | 3 |
| APPM 4440 | Undergraduate Applied Analysis 1 | 3 |
| or MATH 3001 | Analysis 1 | |
| or MATH 3140 | Abstract Algebra 1 | |
| APPM 4600 | Numerical Methods and Scientific Computing | 4 |
| **APPM or STAT Senior Sequence** | | |
| Complete a two-semester course sequence of applied mathematics or statistics courses numbered 4000 or above, chosen from the following [4] | | 6 |
| APPM 4380<br>& APPM 4390 | Modeling in Applied Mathematics<br>and Modeling in Mathematical Biology | |
| APPM 4440<br>& APPM 4450 | Undergraduate Applied Analysis 1<br>and Undergraduate Applied Analysis 2 | |
| APPM 4600<br>& APPM 4610 | Numerical Methods and Scientific Computing<br>and Numerical Differential Equations | |
| APPM 3570<br>& STAT 4520 | Applied Probability<br>and Introduction to Mathematical Statistics [4] | |
| APPM 3570<br>& APPM 4560 | Applied Probability<br>and Markov Processes, Queues, and Monte Carlo Simulations [4] | |
| APPM 4560<br>& STAT 4520 | Markov Processes, Queues, and Monte Carlo Simulations<br>and Introduction to Mathematical Statistics | |
| STAT 4000<br>& STAT 4010 | Statistical Methods and Application I<br>and Statistical Methods and Applications II | |
| **APPM or STAT Courses Numbered 3000 or Above** | | |
| Select additional coursework to bring total upper-division APPM or STAT credit hours to at least 25 including required courses above. [5] | | 3 |
| **Area of Application** | | |
| A minimum of 24 credit hours in Engineering, Arts & Sciences, Business, or other approved courses with significant mathematical content (see "Recommended Areas of Application"). | | 24 |
| **Humanities, Social Sciences and Writing Requirements** [6] | | **18** |
| **Free Electives** | | **28** |
| Free electives should be chosen to bring the total credit hours to a minimum of 128. | | |
| **Total Credit Hours** | | **128** |

1 Waived for students also completing B.S. in Aerospace Engineering Sciences. If waived, student completes additional Free Elective credits.

2 Students completing a B.S. in Aerospace Engineering Sciences or a B.S. in Mechanical Engineering may use MCEN 1024 to complete this requirement. If this course is used to fulfill this requirement, one additional credit of Free Electives is needed.

3 Plus one MCDB lab course for 2 credits, chosen from MCDB 1161, MCDB 1171, MCDB 1181, or MCDB 2171.

4 APPM 3570 is the only 3000-level course that can be used to satisfy this requirement.

5 No more than 3 credit hours of APPM 4840 may count towards these 25. No more than 6 credit hours of independent study are allowed for credit towards the BS degree in applied mathematics.

6 Students may choose from the list of college-approved humanities and social sciences (HSS) and writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/).

# Recommended Areas of Application

To fulfill their degree requirements, applied mathematics majors are required to take a coherent set of 24 credit hours in Engineering, Arts & Sciences, or Business courses with significant mathematical content. Areas of application must include:

- At least 6 credit hours in courses numbered 3000 or above.
- At least 15 credit hours in courses numbered 2000 or above.

Several possible options are listed below. It should be stressed that the listed courses and options are *suggestions* and not *requirements*. Students may formulate their own option to meet their educational and career goals, but final course selection should be made in consultation with an applied math advisor or faculty mentor.

Students cannot double count area of application courses with credits applying toward other requirements for their Applied Math degree, including the APPM/STAT Senior Sequence, Humanities & Social Science,

computing, or science requirement. Students cannot count coursework toward their area of application that is equivalent to another course that is already applying toward degree requirements (e.g., a student who has completed CHEN 1201 for a degree requirement cannot apply CHEM 1113 toward their area of application).

For additional information and planning advice, consult the Applied Mathematics Undergraduate Curriculum Guide on the Applied Mathematics Major webpage (https://www.colorado.edu/amath/academics/undergraduate-program/applied-math-major-bs/).

## I. Actuarial

Students must be admitted to the Actuarial Studies and Quantitative Finance Certificate Program (https://www.colorado.edu/program/asqf/) to enroll in required BCOR/FNCE courses.

Students cannot double count area of application courses with credits applying toward other requirements for their Applied Math degree, including the upper division APPM, APPM/STAT Senior Sequence, Humanities & Social Science, computing, or science requirement.

| Code | Title | Credit Hours |
|---|---|---|
| BCOR 2203 | Principles of Accounting I [1] | 1.5 |
| BCOR 2204 | Principles of Financial Management [1] | 1.5 |
| ECON 3070 | Intermediate Microeconomic Theory | 4 |
| ECON 4070 | Topics in Microeconomics | 3 |
| FNCE 3010 | Corporate Finance | 3 |
| APPM 3570 | Applied Probability [2] | 3 |
| STAT 4520 | Introduction to Mathematical Statistics | 3 |
| STAT 4540 | Introduction to Time Series | 3 |
| At least one of the following courses must be taken | | 3 |
| FNCE 3030 | Investment and Portfolio Management | - |
| FNCE 4040 | Derivative Securities | - |
| ECON 4818 | Introduction to Econometrics | - |
| **Total Credit Hours** | | **25** |

1. The prerequisites for BCOR 2203 and BCOR 2204 are waived for students enrolled in the Actuarial Studies and Quantitative Finance Certificate Program (https://www.colorado.edu/program/asqf/).
2. The first actuarial examination, Exam P/1, can be taken after completing this course.

## II. Aerospace Engineering Sciences

Students who pursue this area of application are usually double majors. Students who wish to enroll in ASEN courses without being a double major should see their applied mathematics advisor for next steps.

## III. Chemical Engineering

Students completing this area of application must take at least 24 credits of coursework in this area. See recommended courses below:

| Code | Title | Credit Hours |
|---|---|---|
| Recommended courses include: | | |
| CHEN 1310 | Introduction to Engineering Computing | |
| CHEN 2120 | Chemical Engineering Material and Energy Balances | |
| CHEN 3200 | Chemical Engineering Fluid Mechanics | |
| CHEN 3210 | Chemical Engineering Heat and Mass Transfer | |
| CHEN 3220 | Chemical Engineering Separations | |
| CHEN 3320 | Chemical Engineering Thermodynamics 1 | |
| CHEN 3660 | Energy Fundamentals | |
| CHEN 4330 | Kinetics and Reactor Design | |
| CHEN 4521 | Physical Chemistry for Engineers | |
| CHEM 3311 | Organic Chemistry 1 | |

## IV. Civil, Environmental and Architectural Engineering

Students completing this area of application must take at least 24 credits of AREN/CVEN/EVEN coursework (see recommended courses below). Students completing this area of emphasis may wish to complete a minor in Architectural (https://catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/civil-environmental-architectural-engineering/architectural-engineering-minor/#requirementstext) or Civil (https://catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/civil-environmental-architectural-engineering/civil-engineering-minor/#requirementstext) Engineering.

Students wishing to enroll in AREN or CVEN courses that are restricted to majors only must do so through the departmental course request form (https://www.colorado.edu/engineering-advising/departmental-course-request-forms/).

| Code | Title | Credit Hours |
|---|---|---|
| **Recommended Basic Courses** | | |
| AREN 2110 | Thermodynamics | 3 |
| CVEN 2121 | Analytical Mechanics 1 | 3 |
| CVEN 3161 | Mechanics of Materials 1 | 3 |
| CVEN 3313 | Theoretical Fluid Mechanics | 3 |
| or AREN 2120 | Fluid Mechanics and Heat Transfer | |
| **Additional Courses** | | |
| Select two courses from any one of the following groups plus additional AREN, CVEN, or EVEN courses to bring the total credit hours to 24: | | 12 |
| *Environmental and Water Resources Engineering* | | |
| CVEN 3414 | Fundamentals of Environmental Engineering | |
| CVEN 4333 | Engineering Hydrology | |
| *Structural Engineering* | | |
| CVEN 3525 | Structural Analysis | |
| CVEN 3708 | Geotechnical Engineering 1 | |
| CVEN 4545 | Steel Design | |
| CVEN 4555 | Reinforced Concrete Design | |
| *Architectural Engineering* | | |
| AREN 2050 | Building Materials and Systems | |
| AREN 3010 | Energy Efficient Buildings | |
| AREN 3540 | Illumination I | |
| **Total Credit Hours** | | **24** |

## V. Computational Biology and Bioinformatics

The following concentration of selected courses from computer science, biology and chemistry provide the foundation for work in mathematical biology, computational biology and/or bioinformatics.

Complete at least 24 credits from the following:

| Code | Title | Credit Hours |
|---|---|---|
| CSCI 2270 | Computer Science 2: Data Structures | 4 |
| or APPM 3650 | Algorithms and Data Structures in Python | |
| CHEM 3311 & CHEM 3321 | Organic Chemistry 1 and Laboratory in Organic Chemistry 1 | 5 |
| MCDB 1150 & MCDB 1152 | Introduction to Cellular and Molecular Biology and Problem Solving Co-Seminar for Introduction to Molecular and Cellular Biology | 4 |
| MCDB 2150 & MCDB 2152 | Principles of Genetics and Problem Solving Co-Seminars for Genetics | 4 |
| MCDB 3135 & MCDB 3140 | Molecular Biology and Cell Biology Laboratory | 5 |
| CSCI 3104 | Algorithms | 4 |
| CSCI 4314 | Dynamic Models in Biology | 3 |

## VI. Computer Science

Students completing this area of application should have a minor in computer science (https://catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/computer-science/computer-science-minor/) plus take additional CSCI coursework to bring the total to at least 24 credits.

## VII. Creative Technology and Design

Students interested in this area of application should complete requirements for the Creative Technology and Design Minor (https://www.colorado.edu/atlas/ctd-minor/) plus additional ATLS or CSCI coursework to bring the total to at least 24 credits.

Students must declare the Creative Technology and Design Minor (https://www.colorado.edu/atlas/ctd-minor/) to enroll in ATLS classes.

## VIII. Electrical, Computer & Energy Engineering

Students interested in this area of application should consult with the Electrical, Computer and Energy Engineering website (https://www.colorado.edu/ecee/academics/undergraduate-programs/minor-programs/), as several minors are available. A minimum of 24 credits is required.

## IX. Engineering Physics/Physics

Students completing the physics area of application should complete the Minor in Physics (https://catalog.colorado.edu/undergraduate/colleges-schools/arts-sciences/programs-study/physics/physics-minor/), plus additional PHYS coursework to bring the total to at least 24 credits.

Note: PHYS 1230, PHYS 1240, PHYS 2010 and PHYS 2020 cannot count toward this area of application.

## X. Finance

Students must be admitted to the Actuarial Studies and Quantitative Finance Certificate Program (https://www.colorado.edu/program/asqf/) to enroll in required BCOR/FNCE courses.

Students cannot double count area of application courses with credits applying toward other requirements for their Applied Math degree, including the upper division APPM, APPM/STAT Senior Sequence, Humanities & Social Science, computing, or science requirement.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| BCOR 2203 | Principles of Accounting I | 1.5 |
| BCOR 2204 | Principles of Financial Management | 1.5 |
| FNCE 3010 | Corporate Finance | 3 |
| ECON 3070 | Intermediate Microeconomic Theory | 4 |
| ECON 4818 | Introduction to Econometrics | 3 |
| Complete a minimum of two of the following courses | | 6 |
| ACCT 3220 | Corporate Financial Reporting 1 | |
| FNCE 3030 | Investment and Portfolio Management | |
| FNCE 4040 | Derivative Securities | |
| FNCE 4820 | Topics in Finance | |
| FNCE 4070 | Financial Markets and Institutions | |
| Additional courses that may be taken to bring the total to 24 credits | | 5 |
| ACCT 3230 | Corporate Financial Reporting 2 | |
| FNCE 4000 | Financial Institutions Management | |
| FNCE 4050 | Capital Investment Analysis | |
| FNCE 4060 | Special Topics in Finance | |
| **Total Credit Hours** | | **24** |

## XI. Geographic Information Science (GIS)

Students interested in this area of application must complete the requirements for the Certificate in GIS and Computational Science (https://www.colorado.edu/geography/undergraduate-certificate-gis-and-computational-science/) plus additional GIS Electives to bring the total to at least 24 credits.

## XII. Geological Sciences

Students interested in this area of application must complete the requirements for the Minor in Geology (https://catalog.colorado.edu/undergraduate/colleges-schools/arts-sciences/programs-study/geological-sciences/geology-minor/) plus additional GEOL Electives to bring the total to at least 24 credits.

## XIII. Mechanical Engineering

Students completing this area of application must take at least 24 credits of MCEN coursework (see recommended courses below).

Students wishing to enroll in MCEN courses that are restricted to majors must do so through the departmental course request form (https://www.colorado.edu/engineering-advising/departmental-course-request-forms/).

| Code | Title | Credit Hours |
|---|---|---|
| **Recommended Courses** | | |
| MCEN 2023 | Statics and Structures | 3 |
| MCEN 2043 | Dynamics | 3 |
| MCEN 2063 | Mechanics of Solids | 3 |
| MCEN 3012 | Thermodynamics | 3 |
| MCEN 3021 | Fluid Mechanics | 3 |
| MCEN 3022 | Heat Transfer | 3 |
| MCEN 3025 | Component Design | 3 |
| MCEN 4043 | System Dynamics | 3 |

## XIV. Statistics and Data Science

Students interested in this area of application must complete the requirements for the Statistics and Data Science Minor (https://catalog.colorado.edu/undergraduate/colleges-schools/arts-sciences/programs-study/applied-mathematics/statistics-minor/) plus additional Minor electives to bring the total to at least 24 credits.

Note: the 12 upper-division statistics credits required for the minor may not be counted toward the 25 credits of upper-division math courses for the bachelor's degree.

## XV. Advisor Approved Option

Students may formulate their own area of application to meet their educational and career goals.

The area of application must have a focused theme that is significantly different from the areas of application listed above. Final course selection must be approved by an applied math advisor or faculty mentor.

# Recommended Four-Year Plan of Study

Students must complete 128 hours for graduation.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| CHEN 1201 | General Chemistry for Engineers 1 | 4 |
| CHEM 1114 | Laboratory in General Chemistry 1 | 1 |
| APPM 1650 | Python for Math and Data Science Applications | 4 |
| COEN 1500 | CEAS First Year Seminar | 1 |
| Humanities or Social Sciences Elective [1] | | 2 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| PHYS 1110 | General Physics 1 | 4 |
| Free Electives | | 3 |
| Area of Application Course | | 3 |
| Humanities or Social Sciences Elective [1] | | 3 |
| | **Credit Hours** | **17** |
| **Year Two** | | |
| **Fall Semester** | | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| PHYS 1120 | General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| APPM 3170 | Discrete Applied Mathematics (Recommended, but not required) | 3 |
| Humanities or Social Sciences Elective [1] | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| APPM 2460 | Differential Equations Computer Lab (Recommended, but not required) | 1 |
| APPM 3310 | Matrix Methods and Applications | 3 |
| Area of Application course | | 3 |
| Free Electives | | 3 |
| Humanities or Social Sciences Elective [1] | | 3 |
| | **Credit Hours** | **17** |
| **Year Three** | | |
| **Fall Semester** | | |
| APPM 4350 | Methods in Applied Mathematics: Fourier Series and Boundary Value Problems | 3 |
| APPM 4440 | Undergraduate Applied Analysis 1 | 3 |
| Area of Application Course | | 3 |
| Area of Application Course | | 3 |
| College-approved writing course [2] | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| APPM 4360 | Methods in Applied Mathematics: Complex Variables and Applications | 3 |
| Area of Application Course | | 3 |
| Free Electives | | 7 |
| Humanities or Social Sciences Elective [1] | | 3 |
| | **Credit Hours** | **16** |
| **Year Four** | | |
| **Fall Semester** | | |
| APPM 4600 | Numerical Methods and Scientific Computing | 4 |
| Senior Sequence Course #1 | | 3 |
| Area of Application Course | | 3 |
| Free Electives | | 6 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| Senior Sequence Course #2 | | 3 |
| Area of Application Course | | 3 |
| Area of Application Course | | 3 |
| Free Electives | | 7 |
| | **Credit Hours** | **16** |
| | **Total Credit Hours** | **128** |

1. Students may choose courses from the list of college-approved humanities and social sciences (HSS) electives (http://www.colorado.edu/engineering/academics/policies/hss/).
2. Students may choose a course from the list of college-approved writing courses (http://www.colorado.edu/engineering/academics/policies/hss/).

# Learning Outcomes

## Content Knowledge

Students completing the undergraduate degree in Applied Mathematics will be broadly knowledgeable in a number of mathematical areas including:

- Differential and integral calculus in one and several variables.
- Vector spaces and matrix algebra.
- Ordinary and partial differential equations.
- At least one programming language.
- At least one application software package in either mathematics or statistics.
- Methods of complex variables as used in applications.
- Numerical solutions of linear and nonlinear problems.
- An in-depth knowledge of an area of application (statistics, an engineering discipline, a natural science field, or one of the quantitative areas of business and economics).

## Student Outcomes

Upon graduation, students will:

- Acquire foundational knowledge in calculus, ordinary and partial differential equations, vector spaces and matrix methods, analysis, numerical analysis, complex variables, and probability and statistics.
- Develop proficiency in at least one programming language.
- Acquire an in-depth knowledge of an area of application (statistics, an engineering or natural science field, or one of the quantitative areas of finance and economics).
- Acquire problem-solving and modeling skills that allow them to formulate a real-world problem in a mathematical setting and implement a numerical solution.
- The ability to clearly and concisely, in oral and in written forms, communicate analytic arguments.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BS and MS in Applied Mathematics

### Admissions Requirements

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.40 or higher.
- Have a minimum GPA of 3.40 in APPM, STAT, and MATH courses.
- Have at least junior class standing.
- Completion of all MAPS requirements and no deficiencies remaining (students admitted to CU Boulder prior to Summer 2023 only).
- Satisfactory completion of at least two APPM courses numbered 3000 or higher.
- Two letters of recommendation from CU Boulder Department of Applied Mathematics faculty.

### Program Requirements

Students may take up to and including 12 graduate credit hours while in the undergraduate program which can later be used toward the master's degree. However, only six credits may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

Please see the Applied Mathematics/Applied Mathematics BAM degree program (https://www.colorado.edu/amath/academics/bs-ms-program/) webpage for more information.

# Biomedical Engineering

Biomedical engineering is an exciting, multidisciplinary field that lies at the interface of medicine, biology and engineering. Biomedical engineers use engineering principles to analyze and solve problems in biology and medicine, providing an overall enhancement to healthcare. Biomedical engineers create technology to save lives and improve the quality of life. Much of the equipment in hospitals and clinics across the globe was designed, built and tested by biomedical engineers. At the same time, biomedical engineers employ concepts learned from biology and medicine to generate new (biomimetic) engineering designs in fields such as robotics and artificial intelligence.

**Course code for this program is BMEN.**

# Bachelor's Degree

- Biomedical Engineering - Bachelor of Science (BSBM) (p. 865)

# Minor

- Biomedical Engineering - Minor (p. 870)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ahmed, Alaa A. (https://experts.colorado.edu/display/fisid_144736/)
Assistant Professor; PhD, University of Michigan

Alistar, Mirela (https://experts.colorado.edu/display/fisid_164177/)
Assistant Professor; PhD, Technical University of Denmark

Allen, Mary Ann (https://experts.colorado.edu/display/fisid_149077/)
Research Associate Professor; PhD, University of Colorado Boulder

Borden, Mark A. (https://experts.colorado.edu/display/fisid_148514/)
Associate Professor; PhD, University of California, Davis

Bottenus, Nick (https://experts.colorado.edu/individual/fisid_165371/)
Assistant Professor; PhD, Duke University

Bruns, Carson J. (https://experts.colorado.edu/display/fisid_159851/)
Assistant Professor; PhD, Northwestern University

Calve, Sarah (https://experts.colorado.edu/individual/fisid_165779/)
Associate Professor; PhD, University of Michigan

Cha, Jennifer N. (https://experts.colorado.edu/display/fisid_151746/)
Professor; PhD, University of California, Santa Barbara

Clark, Torin K. (https://experts.colorado.edu/display/fisid_155959/)
Assistant Professor; PhD, Massachusetts Institute of Technology

Davis, Robert H. (https://experts.colorado.edu/individual/fisid_113653/)
Associate Faculty Director; PhD, Stanford University

Del Rio Flores, Antonio
Assistant Professor; PhD, University of California, Berkeley

Ding, Xiaoyun (https://experts.colorado.edu/display/fisid_158563/)
Assistant Professor; PhD, Pennsylvania State University

Dowell, Robin D. (https://experts.colorado.edu/display/fisid_147779/)
Professor; DSc, Washington University

Enoka, Roger M. (https://experts.colorado.edu/display/fisid_110122/)
Professor; PhD, University of Washington

Ferguson, Virginia L. (https://experts.colorado.edu/display/fisid_110131/)
Associate Professor; PhD, University of Colorado Boulder

Fox, Jerome Michael (https://experts.colorado.edu/display/fisid_156682/)
Assistant Professor; PhD, University of California, Berkeley

Gopinath, Juliet T. (https://experts.colorado.edu/display/fisid_147075/)
Associate Professor; PhD, Massachusetts Institute of Technology

Grabowski, Alena Marie (https://experts.colorado.edu/display/fisid_149727/)
Associate Professor; PhD, University of Colorado Boulder

Hayman, Allison P. (https://experts.colorado.edu/display/fisid_156275/)
Assistant Professor; PhD, Massachusetts Institute of Technology

Hind, Laurel (https://experts.colorado.edu/individual/fisid_165642/)
Assistant Professor; PhD, University of Pennsylvania

Huang, Shu-Wei (https://experts.colorado.edu/display/fisid_159847/)
Assistant Professor; PhD, MIT, Cambridge

Jayaram, Kaushik (https://experts.colorado.edu/display/fisid_165370/)
Assistant Professor; PhD, University of California-Berkeley

Layer, Ryan M. (https://experts.colorado.edu/display/fisid_163567/)
Assistant Professor; PhD, University of Virginia

Lynch, Maureen Ellen (https://experts.colorado.edu/display/fisid_163404/)
Assistant Professor; PhD, Cornell University

McLaughin, Jessica (https://experts.colorado.edu/individual/fisid_167401/)
Teaching Assistant Professor; PhD, Northeastern University

McLeod, Robert R. (https://experts.colorado.edu/display/fisid_107547/)
Professor; PhD, University of Colorado Boulder

Mukherjee, Debanjan (https://experts.colorado.edu/individual/fisid_164181/)
Assistant Professor; PhD, University of California, Berkeley

Murray, Todd W. (https://experts.colorado.edu/display/fisid_146549/)
Professor; PhD, Johns Hopkins University

Myers, Chris (https://experts.colorado.edu/display/fisid_167168/)
Professor; PhD, Stanford University

Neu, Corey P. (https://experts.colorado.edu/display/fisid_156210/)
Associate Professor; PhD, University of California, Davis

Park, Won (https://experts.colorado.edu/display/fisid_122676/)
Associate Professor, Associate Chair; PhD, Georgia Institute of Technology

Piestun, Rafael (https://experts.colorado.edu/display/fisid_118538/)
Professor; PhD, Israel Instit of Tech (Israel)

Regueiro, Richard A. (https://experts.colorado.edu/display/fisid_134705/)
Associate Professor; PhD, Stanford University

Rentschler, Mark E. (https://experts.colorado.edu/display/fisid_146091/)
Associate Professor; PhD, University of Nebraska-Lincoln

Sankaranarayanan, Sriram (https://experts.colorado.edu/display/fisid_147413/)
Associate Professor; PhD, Stanford University

Shields, C. Wyatt IV (https://experts.colorado.edu/individual/fisid_165173/)
Assistant Professor; PhD, Duke University

Spencer, Sabrina Leigh (https://experts.colorado.edu/display/fisid_154911/)
Associate Professor; PhD, Massachusetts Institute of Technology

Sprenger, Kayla (https://experts.colorado.edu/individual/fisid_165650/)
Assistant Professor; PhD, University of Washington

Tan, Wei (https://experts.colorado.edu/display/fisid_141464/)
Associate Professor; PhD, University of Illinois at Chicago

Welker, Cara (https://experts.colorado.edu/display/fisid_168549/)
Assistant Professor; Ph.D., Stanford University

Xu, Nicole (https://experts.colorado.edu/display/fisid_172095/)
Assistant Professor; PhD, Stanford University

Yeh, Tom (https://experts.colorado.edu/display/fisid_151584/)
Associate Professor; PhD, Massachusetts Institute of Technology

Zhang, Yide
Assistant Professor; PhD, University of Notre Dame

# Courses

**BMEN 1000 (1) Exploring Biomedical Engineering**
Introduces the biomedical engineering profession, curriculum, career pathways, ethics and responsibilities, and research opportunities. Academic and industry speakers are invited to address various biomedical engineering topics.
**Requisites:** Restricted to Biomedical Engineering (BMEN) and Open Option Engineering (XXEN) majors only.

**BMEN 1025 (4) Computer-Aided Design & Fabrication**
Introduces engineering drawing techniques through modern computer aided design (CAD) software, and fabrication of some of these designs. The course will begin with an introduction of spatial visualization skills, then an in-depth introduction to Solidworks, an industry standard CAD software tool, along with introduction to fabrication processes including laser cutting, and 3D printing. Additional topics include geometric design and tolerancing techniques and design for manufacturing.
**Requisites:** Restricted to Biomedical Engineering (BMEN) majors only.

**BMEN 1035 (1) Introduction to Fabrication for Biomedical Engineering**
The purpose of this course is to provide biomedical and other engineering students with an introduction to fabrication processes and rapid prototyping techniques including laser cutting, 3D printing, and 3D scanning. Additional topics include geometric design and tolerancing (GD&T) techniques and design for manufacturing (DFM) methods. Provides additional fabrication experience for students in CEAS who have already taken CAD courses and do not want to duplicate material by taking BMEN 1025.
**Equivalent - Duplicate Degree Credit Not Granted:** the fabrication component of BMEN 1025
**Requisites:** Requires prerequisite course of GEEN 1017 (minimum grade C-).

**BMEN 2000 (3) Introduction to Biomedical Engineering**
Reviews concepts from molecular and cellular biology. Establishes important aspects of human physiology and engineering principles to develop a basic understanding of the biomedical engineering field. Introduces topics such as biomechanics, bioinstrumentation, bioimaging and biotechnology.
**Requisites:** Requires prerequisite or co-requisite Biology course MCDB 1150 or BIEN 2810 or EBIO 1210 (min grade C-). Requires prerequisite Chemistry course CHEN 1201 or CHEN 1211 or CHEM 1113 or MCEN 1024 (min grade C-). Restricted to BMEN minors.

**BMEN 2010 (3) Biomaterials**
Introduces the science and engineering of biomaterials, with an emphasis on biomechanical aspects. Addresses the design, fabrication, testing, applications and performance of synthetic and natural materials that are used in a wide variety of biomedical prosthetics, implants and devices. In addition to attending lectures, students will conduct a laboratory experiment and a case study.
**Requisites:** Requires prerequisite course of CHEN 1201 or CHEN 1211 or CHEM 1113 (minimum grade C-). Restricted to Biomedical Engineering (BMEN) majors only.
**Recommended:** for students in fourth semester of Biomedical Engineering curriculum or higher.

**BMEN 2100 (3) Biomedical Engineering Principles and Methods**
This course is an introduction to the fundamental principles and mathematical methods of biomedical engineering. Core conservation equations are applied to mass, energy, charge, and momentum transfer in biomedical systems. Additional topics may cover a breadth of exposure in diagnostics and analytical techniques, statistical analysis of biomedical data, bioinformatics, bioinstrumentation.
**Requisites:** Required prereqs (APPM 1350 or Math 1300 or APPM 1345) and (CHEN 1201 or CHEN 1211 or CHEM 1113) and (PHYS 1110 or PHYS 1115) and (MCDB 1150 or BIEN 2810 or EBIO 1210) (all min grade C-). Restricted to BMEN majors, minors IUT On Track applicants.

**BMEN 3010 (3) Biotransport**
An introduction to the modeling of complex biological systems using principles of transport phenomena and biochemical kinetics. Includes the conservation of mass and momentum; rheology of Newtonian and non-Newtonian fluids; steady and transient diffusion in reacting systems; dimensional analysis; homogeneous versus heterogeneous reaction systems; and physiological transport systems, including receptor-mediated endocytosis and oxygen and drug transport.
**Requisites:** Requires prereq courses BMEN 2100 or BMEN 2000; CHEN 1310 or ASEN 1320 or CSCI 1300 or ECEN 1310; PHYS 1100 or PHYS 1115; and coreq of APPM 2360 or MATH 3430 (min grade C-). Restricted to Biomedical Engineering (BMEN) majors.
**Recommended:** for students in fifth semester of Biomedical Engineering curriculum or higher.

**BMEN 3030 (3) Bioinstrumentation**
This course will provide an overview of instrumentation systems used in clinical medicine and biomedical research. Systems for measuring biologic signals will be discussed including biopotentials, stress and strain, pressure, temperature, and optical properties to interpret data from living systems. There will be applications to engineering design, including a semester-long design project that incorporates the interactions between living and non-living systems. There will also be discussion of ethical and regulatory issues related to bioinstrumentation.
**Requisites:** Requires prerequisite courses of BMEN 2000 or BMEN 2100 and ECEN 2260 and ECEN 2270 (all minimum grade C-). Restricted to Biomedical Engineering (BMEN) major students.
**Recommended:** for students in sixth semester of Biomedical Engineering curriculum or higher.

**BMEN 4010 (3) Biomedical Engineering Capstone Design I**
Offers the first in a two-course sequence of capstone design. Project supervisors and teams are paired through a pitch process, wherein teams pitch their design ideas to meet an existing need on a project. Project is in an area of biomedical engineering, such as biomedical instrumentation, biosensors, tissue engineering, biological signal processing, biological modeling and simulation, clinical imaging or informational systems, etc. Projects will be conducted by teams of typically three to five students, and projects must include significant design experience. The first semester focuses on research of background, planning, crafting of needs statement, and initial work on senior design project . Formal proposal must be approved by technical advisor.
**Requisites:** Prereq of (BMEN 1025 or MCEN 1025) and BMEN 2010 and BMEN 3010. Pre or coreq of ENES 1010 or ENES 3100 or ENLP 3100 or PHYS 3050 or WRTG 3030 or WRTG 3035 (all min. grade C-). Restricted to BMEN majors w 87-180 credits.

**BMEN 4020 (3) Biomedical Engineering Capstone Design II**
Continues BMEN 4010. Teams continue to develop, construct, and evaluate prototypes with consideration of real-world fiscal, regulatory, and safety conditions. Progress is monitored through a series of oral presentations and peer review of teamwork and team dynamics. Requires students to complete a working prototype or simulation as appropriate, and a final written report with oral presentation at the semester Design Expo. Written final report must be approved by the faculty.
**Requisites:** Requires prerequisite course of BMEN 4010 (minimum grade C-). Restricted to Biomedical Engineering (BMEN) majors.

**BMEN 4110 (3) Regenerative Biology and Tissue Repair**
Presents the regenerative biology behind tissue systems, along with the regenerative medicine of that tissue with an emphasis on engineering principles, using the assigned reading as a guideline. Follows lectures with class discussions of current papers on the regenerative biology of the same tissue system. In the final 1 ¿ 2 classes assigned to this topic, individual graduate students give 20 min presentations on a relevant regenerative medicine/engineering-focused paper.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4110, BMEN 5110, and MCEN 5110
**Requisites:** Restricted to Biomedical Engineering majors with 57+ credits only.

**BMEN 4111 (3) Introduction to Microfluidics**
Microfluidics deals with the behavior of fluids in small scale. It is a highly multidisciplinary field at the intersection of engineering, physics, chemistry, biology, medicine, nanotechnology, and biotechnology. This course covers the fundamentals and fabrication of microfluidic devices and their applications, particularly in lab-on-a-chip. Includes lectures, literature discussion, team presentations, and possibly one lab on microfluidic devices. Enhances your understanding of microfluidic technologies and their broad applications.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5111 and MCEN 4111 and BMEN 5111
**Requisites:** Requires prerequisite course of MCEN 3021 or CHEN 3200 or CVEN 3313 (all minimum grade C-). Restricted to Biomedical Engineering majors only.

**BMEN 4113 (3) Mechanics of Cancer**
Cancer is considered to be an organ or an ecosystem, in which a critical component of the tumor microenvironment is mechanical forces. This course will cover the role of mechanics in cancer and cancer-related processes, with a focus on solid mechanics and fluid mechanics. In this course, you will apply engineering principles to come away with an appreciation of how mechanics influence cancer and its etiology as well as the development of future treatments.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4113 and MCEN 5113 and BMEN 5113
**Requisites:** Requires prerequisite course of MCEN 3021 or CHEN 3200 or CVEN 3313 or MCEN 2063 or CVEN 3161 (all minimum grade C-). Restricted to Biomedical Engineering majors with 57+ credits only.

**BMEN 4117 (3) Anatomy and Physiology for Biomedical Engineering**
The main objective of this multidisciplinary course is to explore human physiological function from the viewpoint of an engineer. It provides an introduction to human anatomy and physiology with a focus on learning anatomical structures, biological signaling, physiological and pathological conditions, as well as fundamental biomedical engineering concepts that apply quantitative analyses (mass transfer, fluid dynamics, mechanics, modeling) and engineering concepts (e.g., device design to restore defective physiological functions) to understand physiology and pathology.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4117 or MCEN 5117 BMEN 5117
**Requisites:** Requires prerequisite of BMEN 2000 or BMEN 2100 (minimum grade C-). Restricted to Biomedical Engineering (BMEN) and Mechanical Engineering (MCEN) majors.
**Recommended:** Prerequisites BMEN 2010 or BMEN 3010 (all minimum grade C-).

**BMEN 4127 (3) Biomedical Ultrasound**
Covers the design of ultrasound systems for medical imaging and therapy, including the physics of wave propagation, transducers, pulse-echo imaging, flow, tissue characterization, and microbubble contrast, with an emphasis on current topics in biomedical ultrasound. Includes lectures on theory, practice and special topics; a laboratory on wave propagation; oral presentations on current literature; signal processing exercises; and a team project. Some experience with MATLAB is strongly encouraged for exercises throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4127 and BMEN 5127 and MCEN 5127
**Requisites:** Requires prerequisite course of ECEN 3300 or ECEN 3301 or MCEN 4043. Restricted to Biomedical Engineering majors with 87+ credits only.

**BMEN 4157 (3) Modeling of Human Movement**
Human movement analysis is used in physical rehabilitation, sport training, human-robot interaction, animation, and more. Course provides a systematic overview of human movement on multiple levels of analysis, with an emphasis on the phenomenology amenable to computational modeling. Covers muscle physiology, movement-related brain areas, musculoskeletal mechanics, forward and inverse dynamics, optimal control and Bayesian inference, learning and adaptation. Inspires students to see and appreciate the complexities of movement control in all aspects of daily life.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4157 and MCEN 5157 and BMEN 5157
**Requisites:** Requires prerequisite of (MCEN2043 or GEEN 3024 or ASEN 1022) and (APPM2360 or MATH2130 or MATH3130) all minimum grade C-. Restricted to students with 57-180 credits (Jrs/Srs) Biomedical Engineering (BMEN) majors only.

**BMEN 4171 (3) Biofluids on the Micro Scale**
Introduces fundamental physical concepts and basic mechanisms of biological fluids in microscale. Elaborates on the application of fluid mechanics principles to major biological systems, including human organ systems and animal locomotion in microscale. Covers physiologically relevant fluid flow phenomena on the cellular level and the underlying physical mechanisms from an engineering perspective. Related state-of-art technologies such as organ-on-a-chip and micro/nano fabrication will be emphasized. Will enhance your understanding of organ-on-a-chip technologies and their broad applications.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4171 and MCEN 5171 and BMEN 5171
**Requisites:** Requires prerequisite course of MCEN 3021 or CHEN 3200 or CVEN 3313 (all minimum grade C-). Restricted to Biomedical Engineering majors only.

**BMEN 4195 (3) Bioinspired Robotics**
Bioinspired design views the process of how we learn from nature as an innovation strategy translating principles of function, performance, and aesthetics, from biology to human technology. The creative design process is driven by interdisciplinary exchange among engineering, biology, medicine, art, architecture and business. Diverse teams of students will collaborate on, create, and present original bioinspired design projects in the ITLL.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5195, BMEN 5195 and MCEN 4195
**Requisites:** Requires prerequisite courses of MCEN 3017 and MCEN 3025 (minimum grade C-). Restricted to students with 57+ credits, BMEN majors only.

**BMEN 4231 (3) Computational Fluid Dynamics**
This course is an in-depth introduction to the basic principles and applications of computational fluid dynamics (CFD). Students learn about fundamental CFD concepts such as discretization, meshing, error and accuracy; and focus on computational solutions of flow and transport problems using the finite element method. Students conduct multiple hands-on simulation-based activities and exercises on canonical and realistic engineering flow/transport problems. Final project for the course culminates in a mini-conference/symposium where students present their work.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4231 and MCEN 5231 and BMEN 5231
**Requisites:** Requires prerequisite courses of MCEN 3021 or CHEN 3200 or CVEN 3313 and MCEN 3030 or APPM 4650 or CSCI 3656 (all minimum grade C-). Restricted to Biomedical Engineering majors only.

**BMEN 4292 (3) Materials and Devices in Medicine**
The main objective of this multidisciplinary course is to provide students with a broad survey of biomaterials and their use in medical devices for restoring or replacing the functions of injured, diseased, or aged human tissues and organs. The topics to be covered include: evolution in the medical device industry, a broad introduction to the materials used in medicine and their chemical, physical, and biological properties, discovery of medical problems, potential impacts of treatment innovations, existing devices and design considerations for several major physiological systems (cardiovascular, neuromuscular, skeletal, pulmonary, renal, dermal), materials interaction with the human body, basic mechanisms of wound healing, biocompatibility issues, testing methods and techniques in accordance with standards and relevant regulations, biofunctionalities required for specific applications, as well as state-of-the-art approaches for the development of new regenerative materials targeting cellular mechanisms. Sam
**Requisites:** Requires prerequisite courses of MCEN 2024 and MCEN 4117 or MCEN 5117 (all minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) BMEN majors only.

**BMEN 4519 (1-3) Special Topics in Biomedical Engineering**
Credit hours and subject matter to be selected from topics of current interest.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits. Biomedical Engineering (BMEN) majors only.

**BMEN 4840 (1-3) Independent Study**
Provides opportunities for independent study at the undergraduate level. Subject and/or project agreed upon by the student and instructor to fit the needs of the student.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Biomedical Engineering (BMEN) majors only.

**BMEN 5110 (3) Regenerative Biology and Tissue Repair**
Presents the regenerative biology behind tissue systems, along with the regenerative medicine of that tissue with an emphasis on engineering principles, using the assigned reading as a guideline. Follows lectures with class discussions of current papers on the regenerative biology of the same tissue system. In the final 1 ¿ 2 classes assigned to this topic, individual graduate students give 20 min presentations on a relevant regenerative medicine/engineering-focused paper.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5110, BMEN 4110, and MCEN 4110
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Biomedical Engineering undergraduate majors only.

**BMEN 5111 (3) Introduction to Microfluidics**
Microfluidics deals with the behavior of fluids in small scale. It is a highly multidisciplinary field at the intersection of engineering, physics, chemistry, biology, medicine, nanotechnology, and biotechnology. This course covers the fundamentals and fabrication of microfluidic devices and their applications, particularly in lab-on-a-chip. Includes lectures, literature discussion, team presentations, and possibly one lab on microfluidic devices. Enhances your understanding of microfluidic technologies and their broad applications.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5111 and MCEN 4111 and BMEN 4111
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Biomedical Engineering undergraduate majors only.

**BMEN 5113 (3) Mechanics of Cancer**
Cancer is considered to be an organ or an ecosystem, in which a critical component of the tumor microenvironment is mechanical forces. This course will cover the role of mechanics in cancer and cancer-related processes, with a focus on solid mechanics and fluid mechanics. In this course, you will apply engineering principles to come away with an appreciation of how mechanics influences cancer and its etiology as well as the development of future treatments.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5113 and BMEN 4113 and MCEN 4113
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Biomedical Engineering undergraduate majors only.

**BMEN 5117 (3) Anatomy and Physiology for Biomedical Engineering**
The main objective of this multidisciplinary course is to explore human physiological function from the viewpoint of an engineer. It provides an introduction to human anatomy and physiology with a focus on learning anatomical structures, biological signaling, physiological and pathological conditions, as well as fundamental biomedical engineering concepts that apply quantitative analyses (mass transfer, fluid dynamics, mechanics, modeling) and engineering concepts (e.g., device design to restore defective physiological functions) to understand physiology and pathology. Graduate students will be required to present a primary literature review and lead discussion during a class period, as well as take the lead on the final project: a mock NIH grant proposal.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4117 or MCEN 5117 BMEN 4117
**Requisites:** Restricted to graduate Biomedical Engineering students only.

**BMEN 5127 (3) Biomedical Ultrasound**
Covers the design of ultrasound systems for medical imaging and therapy, including the physics of wave propagation, transducers, pulse-echo imaging, flow, tissue characterization, and microbubble contrast, with an emphasis on current topics in biomedical ultrasound. Includes lectures on theory, practice and special topics; a laboratory on wave propagation; oral presentations on current literature; signal processing exercises; and a team project. Some experience with MATLAB is strongly encouraged for exercises throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5127 and MCEN 4127 and BMEN 4127
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**BMEN 5133 (3) Intro to Tissue Biomechanics**
Focuses on developing an understanding of the fundamental mechanical principles that govern the response of hard and soft biological tissue to mechanical loading. Specifically, covers mechanical behavior of biological materials/tissues, classical biomechanics problems in various tissues, the relationship between molecular, cellular and physiological processes and tissue biomechanics and critical analysis of related journal articles.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4133 and MCEN 5133
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Biomedical Engineering undergraduate majors only.

**BMEN 5157 (3) Modeling of Human Movement**
Human movement analysis is used in physical rehabilitation, sport training, human-robot interaction, animation, and more. Course provides a systematic overview of human movement on multiple levels of analysis, with an emphasis on the phenomenology amenable to computational modeling. Covers muscle physiology, movement-related brain areas, musculoskeletal mechanics, forward and inverse dynamics, optimal control and Bayesian inference, learning and adaptation. Inspires students to see and appreciate the complexities of movement control in all aspects of daily life.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5157 and MCEN 4157 and BMEN 4157
**Requisites:** Restricted to graduate students in the College of Engineering and Applied Science or undergraduate Biomedical Engineering (BMEN) majors with 57+ credits (Junior or Senior).

**BMEN 5171 (3) Biofluids on the Micro Scale**
Introduces fundamental physical concepts and basic mechanisms of biological fluids in microscale. Elaborates on the application of fluid mechanics principles to major biological systems, including human organ systems and animal locomotion in microscale. Covers physiologically relevant fluid flow phenomena on the cellular level and the underlying physical mechanisms from an engineering perspective. Related state-of-art technologies such as organ-on-a-chip and micro/nano fabrication will be emphasized. Will enhance your understanding of organ-on-a-chip technologies and their broad applications.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5171 and MCEN 4171 and BMEN 4171
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Biomedical Engineering undergraduate majors only.

**BMEN 5195 (3) Bioinspired Robotics**
Bioinspired design views the process of how we learn from nature as an innovation strategy translating principles of function, performance, and aesthetics, from biology to human technology. The creative design process is driven by interdisciplinary exchange among engineering, biology, medicine, art, architecture and business. Diverse teams of students will collaborate on, create, and present original bioinspired design projects in the ITLL.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4195, BMEN 4195, and MCEN 5195
**Requisites:** Restricted to graduate students in the College of Engineering and Applied Science or undergraduate Biomedical Engineering (BMEN) majors with 57+ credits (Junior or Senior).

**BMEN 5231 (3) Computational Fluid Dynamics**
This course is an in-depth introduction to the basic principles and applications of computational fluid dynamics (CFD). Students learn about fundamental CFD concepts such as discretization, meshing, error and accuracy; and focus on computational solutions of flow and transport problems using the finite element method. Students conduct multiple hands-on simulation-based activities and exercises on canonical and realistic engineering flow/transport problems. Final project for the course culminates in a mini-conference/symposium where students present their work.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5231 and MCEN 4231 and BMEN 4231
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Biomedical Engineering undergraduate majors only.

**BMEN 5292 (3) Materials and Devices in Medicine**
The main objective of this multidisciplinary course is to provide students with a broad survey of biomaterials and their use in medical devices for restoring or replacing the functions of injured, diseased, or aged human tissues and organs. The topics to be covered include: evolution in the medical device industry, a broad introduction to the materials used in medicine and their chemical, physical, and biological properties, discovery of medical problems, potential impacts of treatment innovations, existing devices and design considerations for several major physiological systems (cardiovascular, neuromuscular, skeletal, pulmonary, renal, dermal), materials interaction with the human body, basic mechanisms of wound healing, biocompatibility issues, testing methods and techniques in accordance with standards and relevant regulations, biofunctionalities required for specific applications, as well as state-of-the-art approaches for the development of new regenerative materials targeting cellular mechanisms. Sam
**Requisites:** Requires prerequisite course of MCEN 4117 or MCEN 5117 (minimum grade C-). Restricted to any College of Engineering and Applied Science graduate students or to BMEN undergraduate majors only.

**BMEN 5840 (1-6) Independent Study**
Provides opportunities for independent study at the graduate level. Subject and/or project agreed upon by the student and instructor to fit the needs of the student.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate Biomedical Engineering students only.

**BMEN 5939 (1-6) Biomedical Engineering Internship**
Grants credit to international graduate students for conducting research via professional research opportunities in the biomedical engineering field. Students are responsible for securing their own internships.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BMEN 6519 (1-3) Special Topics in Biomedical Engineering**
Credit hours and subject matter to be arranged.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.

**BMEN 6949 (1) Master's Candidate for Degree**
Credit hours and subject matter to be arranged.

**BMEN 6950 (1-6) Master's Thesis**
Work with a faculty advisor on a masters thesis.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate Biomedical Engineering students only.

**BMEN 7840 (1-6) Independent Study**
Provides opportunities for independent study at the graduate (PhD) level. Subject and/or project agreed upon by the student and instructor to fit the needs of the student.
**Repeatable:** Repeatable for up to 10.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Biomedical Engineering BMEN-PhD students only.

**BMEN 8990 (1-10) Doctoral Dissertation**
Work with a faculty advisor on a doctoral dissertation.
**Repeatable:** Repeatable for up to 60.00 total credit hours.
**Requisites:** Restricted to Biomedical Engineering (BMEN) Ph.D. graduate students only.

# Biomedical Engineering - Bachelor of Science (BSBM)

Biomedical engineering is an exciting, multidisciplinary field that lies at the interface of medicine, biology and engineering. Biomedical engineers use engineering principles to analyze and solve problems in biology and medicine, providing an overall enhancement to healthcare. Biomedical engineers create technology to save lives and improve the quality of life. Much of the equipment in hospitals and clinics across the globe was designed, built and tested by biomedical engineers. At the same time, biomedical engineers employ concepts learned from biology and medicine to generate new (biomimetic) engineering designs in fields such as robotics and artificial intelligence.

### Western Colorado University/University of Colorado Boulder Engineering Partnership Program

Western Colorado University (Western) (https://western.edu/school/paul-m-rady-school-of-computer-science-engineering/) and CU Boulder have created a partnership to deliver specific engineering baccalaureate programs **in their entirety in Gunnison, Colorado.** The first two years of coursework are taught by Western faculty and the second two years of coursework are taught by CU Boulder faculty located in Gunnison. Students completing the programs will be awarded a Bachelor of Science from CU Boulder.

Degrees are offered in biomedical engineering and mechanical engineering. Additional details can be found on the CU Boulder/Western Engineering Partnership Program website. (https://western.edu/school/paul-m-rady-school-of-computer-science-engineering/)

# Requirements

## Prerequisites and Passing Grades

The minimum passing grade for a course that is a prerequisite or corequisite for another required course is C-. If a grade of D+ or lower is received in a course that is a prerequisite to another, the student may not register for the subsequent course and must repeat the prerequisite course until a grade of C- or higher is achieved.

The minimum passing grade for a course that is not specifically a prerequisite or corequisite for another required course is D-.

The biomedical engineering program reserves the right to drop students enrolled in BMEN courses who have not met the minimum prerequisite requirements. It is the student's responsibility to communicate with the program if summer coursework and/or transfer credit will be used to meet the prerequisite requirement.

## Required Courses and Credits

Required courses in engineering, physical science, and mathematics are interwoven throughout the curriculum to provide a balanced education in the fundamentals of the biomedical engineering profession. The core courses are complemented by technical electives, humanities and social sciences electives (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/), free electives, and a writing course (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/), for a total of 128 credits required for the degree.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Biomedical Courses** | | |
| BMEN 1000 | Exploring Biomedical Engineering | 1 |
| or AREN 1316 | Introduction to Architectural Engineering | |
| or ASEN 1009 | Undergraduate Aerospace Seminar | |
| or CHEN 1300 | Introduction to Chemical and Biological Engineering | |
| or CSCI 1000 | Computer Science as a Field of Work and Study | |
| or CVEN 1317 | Introduction to Civil and Environmental Engineering | |
| or ECEN 1100 | Exploring ECE | |
| or EVEN 1000 | Introduction to Environmental Engineering | |
| or MCEN 2000 | Mechanical Engineering as a Profession | |
| BMEN 1025 | Computer-Aided Design & Fabrication | 4 |
| or MCEN 1025 | Computer-Aided Design and Fabrication | |
| or GEEN 1017 & BMEN 1035 | Engineering Drawing and Introduction to Fabrication for Biomedical Engineering | |
| BMEN 2100 | Biomedical Engineering Principles and Methods | 3 |
| BMEN 2010 | Biomaterials | 3 |
| BMEN 3010 | Biotransport | 3 |
| BMEN 3030 | Bioinstrumentation | 4 |
| BMEN 4010 | Biomedical Engineering Capstone Design I | 3 |
| BMEN 4020 | Biomedical Engineering Capstone Design II | 3 |
| BMEN 4117 | Anatomy and Physiology for Biomedical Engineering | 3 |
| or MCEN 4117 | Anatomy and Physiology for Engineers | |
| or MCEN 5117 | Anatomy and Physiology for Engineers | |
| or BMEN 5117 | Anatomy and Physiology for Biomedical Engineering | |
| **Required Mechanics Courses** | | |
| MCEN 2023 | Statics and Structures | 3 |
| or GEEN 2851 | Statics for Engineers | |
| or CVEN 2121 | Analytical Mechanics 1 | |
| **Required Electrical Courses** | | |
| ECEN 2250 | Introduction to Circuits and Electronics | 3 |
| ECEN 3301 | Biomedical Signals and Systems | 3 |
| **Technical Electives** | | |
| Choose 24 credit hours of technical elective coursework. At least 18 of 24 must be 3000 level or above, and at least 15 must be Engineering Technical Electives, including 6 credits from BME approved focused electives. [1] | | 24 |
| **Required Mathematics Courses** | | |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or MATH 1300 | Calculus 1 | |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| or MATH 2300 | Calculus 2 | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| or MATH 2400 | Calculus 3 | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| or MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |
| or MATH 2135 & MATH 3430 | Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations | |
| **Required Physics Course** | | |
| PHYS 1110 | General Physics 1 | 4 |
| or PHYS 1115 | General Physics 1 for Majors | |
| PHYS 1120 | General Physics 2 | 4 |
| or PHYS 1125 | General Physics 2 for Majors | |
| PHYS 1140 | Experimental Physics 1 | 1 |
| **Required Chemistry Courses** | | |
| *Select one of the following chemistry sequence options:* | | 7 |
| *Option 1:* | | |
| CHEN 1201 | General Chemistry for Engineers 1 [3] | |
| or CHEN 1211 | Accelerated Chemistry for Engineers | |
| or CHEM 1113 | General Chemistry 1 | |
| or CHEM 1400 | Foundations of Chemistry | |
| CHEN 1203 | General Chemistry for Engineers 2 [3] | |
| or CHEN 1211 | Accelerated Chemistry for Engineers | |
| or CHEM 1133 | General Chemistry 2 | |
| or CHEM 2100 | Foundations of Chemistry 2 | |
| CHEM 1221 | Engineering General Chemistry Lab | |
| or CHEM 1134 | Laboratory in General Chemistry 2 | |
| or CHEM 1114 | Laboratory in General Chemistry 1 | |
| or CHEM 2101 | Laboratory in Foundations of Chemistry 2 | |
| *Option 2: (Students who take Option 2 must take two extra Free Electives)* | | |
| CHEN 1211 | Accelerated Chemistry for Engineers | |
| CHEM 1221 | Engineering General Chemistry Lab | |
| or CHEM 1134 | Laboratory in General Chemistry 2 | |
| or CHEM 1114 | Laboratory in General Chemistry 1 | |
| or CHEM 1401 | Foundations of Chemistry Lab | |
| **Required Biology Course** | | |
| BIEN 2810 | Biology for Engineers | 3 |
| or MCDB 1150 | Introduction to Cellular and Molecular Biology | |
| or EBIO 1210 & EBIO 1220 | General Biology 1 and General Biology 2 | |
| **Required Computing and Data Analysis Courses** | | |
| CHEN 1310 | Introduction to Engineering Computing [4] | 3 |
| or CSCI 1300 | Computer Science 1: Starting Computing | |
| CHEN 3010 | Applied Data Analysis [4] | 3 |
| or STAT 4000 | Statistical Methods and Application I | |
| **Humanities, Social Sciences and Writing** | | |
| Complete the college's humanities, social sciences and writing requirement as specified [2] | | 18 |
| **Free Electives** | | |
| Choose at least 9 credit hours of free electives to meet the minimum 128 credit hours required for the bachelor's degree. | | 9 |
| **Total Credit Hours** | | **128** |

1 Choose from the course options listed on the program's Advising & Curriculum webpage.

2 For more information, see the College of Engineering & Applied Science (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/) website.

3 For CHEN 1201–CHEM 1113 and CHEM 1400 substitutions and for CHEN 1203–CHEM 1133 substitution are restricted to transfer students only.

4 For CHEN 1310–CSCI 1300 and for CHEN 3010–STAT 4000 substitutions are restricted to CS minors only.

## Optional Program Track

The BME Program offers a Pre-medical track option (https://www.colorado.edu/bme/academics/bachelors-program/advising-curriculum/#pre_med_bioinstrumentation_track_sample_curriculum-287) for students preparing for medical school and who are in interested in learning about medical devices, biomechanics, therapeutics, imaging and diagnostics.

### Premedical Track

For more information, including curriculum requirements, visit the program's Advising & Curriculum (https://www.colorado.edu/bme/academics/bachelors-program/advising-curriculum/) webpage.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Biomedical Courses** | | |
| BMEN 1000 | Exploring Biomedical Engineering | 1 |
| or AREN 1316 | Introduction to Architectural Engineering | |
| or ASEN 1009 | Undergraduate Aerospace Seminar | |
| or CHEN 1300 | Introduction to Chemical and Biological Engineering | |
| or CSCI 1000 | Computer Science as a Field of Work and Study | |
| or CVEN 1317 | Introduction to Civil and Environmental Engineering | |
| or ECEN 1100 | Exploring ECE | |
| or EVEN 1000 | Introduction to Environmental Engineering | |
| or MCEN 2000 | Mechanical Engineering as a Profession | |
| BMEN 1025 | Computer-Aided Design & Fabrication | 4 |
| or MCEN 1025 | Computer-Aided Design and Fabrication | |
| or GEEN 1017 & BMEN 1035 | Engineering Drawing and Introduction to Fabrication for Biomedical Engineering | |
| BMEN 2100 | Biomedical Engineering Principles and Methods | 3 |
| BMEN 2010 | Biomaterials | 3 |
| BMEN 3010 | Biotransport | 3 |
| BMEN 3030 | Bioinstrumentation | 4 |
| BMEN 4117 | Anatomy and Physiology for Biomedical Engineering | 3 |
| BMEN 4010 | Biomedical Engineering Capstone Design I | 3 |
| BMEN 4020 | Biomedical Engineering Capstone Design II | 3 |
| **Required Electrical Courses** | | |
| ECEN 2250 | Introduction to Circuits and Electronics | 3 |
| ECEN 3301 | Biomedical Signals and Systems | 3 |
| **Required Mechanical Course** | | |
| MCEN 2023 | Statics and Structures | 3 |
| or GEEN 2851 | Statics for Engineers | |
| or CVEN 2121 | Analytical Mechanics 1 | |
| **Technical Electives** | | |
| Choose 9 credit hours of 3000 level or above of Engineering Technical Electives, including 3 credit hours from the BME focused electives list. [1] | | 9 |
| **Required Mathematics Courses** | | |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or MATH 1300 | Calculus 1 | |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| or MATH 2300 | Calculus 2 | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| or MATH 2400 | Calculus 3 | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| or MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |
| or MATH 2135 & MATH 3430 | Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations | |
| **Required Physics Courses** | | |
| PHYS 1110 | General Physics 1 | 4 |
| or PHYS 1115 | General Physics 1 for Majors | |
| PHYS 1120 | General Physics 2 | 4 |
| or PHYS 1125 | General Physics 2 for Majors | |
| PHYS 1140 | Experimental Physics 1 | 1 |
| **Required Chemistry Courses** | | |
| CHEN 1201 | General Chemistry for Engineers 1 [3] | 4 |
| or CHEN 1211 | Accelerated Chemistry for Engineers | |
| or CHEM 1113 | General Chemistry 1 | |
| or CHEM 1400 | Foundations of Chemistry | |
| CHEM 1114 | Laboratory in General Chemistry 1 | 1 |
| or CHEM 1221 | Engineering General Chemistry Lab | |
| or CHEM 1401 | Foundations of Chemistry Lab | |
| CHEM 1133 | General Chemistry 2 | 4 |
| or CHEM 2100 | Foundations of Chemistry 2 | |
| CHEM 1134 | Laboratory in General Chemistry 2 | 1 |
| or CHEM 2101 | Laboratory in Foundations of Chemistry 2 | |
| CHEM 3311 | Organic Chemistry 1 | 4 |
| CHEM 3321 | Laboratory in Organic Chemistry 1 | 1 |
| CHEM 3331 | Organic Chemistry 2 | 4 |
| CHEM 3341 | Laboratory in Organic Chemistry 2 | 1 |
| **Required Biochemistry Course** | | |
| BCHM 4611 | Principles of Biochemistry | 3 |
| **Required Biology Courses** | | |
| MCDB 1150 | Introduction to Cellular and Molecular Biology | 3 |
| or BIEN 2810 | Biology for Engineers | |

| | | |
|---|---|---|
| or EBIO 1210 & EBIO 1220 | General Biology 1 and General Biology 2 | |
| MCDB 1161 | From Dirt to DNA: Phage Genomics Laboratory I | 2 |
| or MCDB 1171 | Antibiotics Discovery Through Hands-on Screens I | |
| or MCDB 1181 | Biological Probiotic/Drug Discovery Through Hands-on Screens | |
| or MCDB 2171 | Chemotherapeutic Discovery Through Hands-On Screens 2 | |
| MCDB 2150 | Principles of Genetics | 3 |
| **Required Computing and Data Analysis Courses** | | |
| CHEN 1310 | Introduction to Engineering Computing [4] | 3 |
| or CSCI 1300 | Computer Science 1: Starting Computing | |
| CHEN 3010 | Applied Data Analysis [4] | 3 |
| or STAT 4000 | Statistical Methods and Application I | |
| **Humanities, Social Sciences and Writing** | | |
| Complete the college's humanities, social sciences and writing requirement as specified [2] | | 18 |
| **Free Electives** | | |
| Choose at least 3 credit hours of free electives to meet the minimum 128 credit hours required for the bachelor's degree. | | 3 |
| **Total Credit Hours** | | **128** |

1. Choose from the course options listed on the program's Advising & Curriculum webpage.
2. For more information, see the College of Engineering & Applied Science website.
3. For CHEN 1201–CHEM 1113 and CHEM 1400 substitutions are restricted to transfer students only.
4. For CHEN 1310–CSCI 1300 and for CHEN 3010–STAT 4000 substitutions are restricted to CS minors only.

# Plan(s) of Study

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| APPM 1350 | Calculus 1 for Engineers | 4 |
| CHEN 1201 | General Chemistry for Engineers 1 | 4 |
| BIEN 2810 | Biology for Engineers | 3 |
| BMEN 1025 | Computer-Aided Design & Fabrication | 4 |
| COEN 1500 | CEAS First Year Seminar | 1 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| BMEN 1000 | Exploring Biomedical Engineering | 1 |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| CHEN 1203 | General Chemistry for Engineers 2 | 2 |
| CHEM 1221 | Engineering General Chemistry Lab | 1 |
| PHYS 1110 | General Physics 1 | 4 |
| Humanities or Social Sciences | | 2 |
| | **Credit Hours** | **14** |

**Year Two**

| **Fall Semester** | | |
|---|---|---|
| BMEN 2100 | Biomedical Engineering Principles and Methods | 3 |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| PHYS 1120 | General Physics 2 | 4 |
| Humanities or Social Science Elective [1] | | 6 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| BMEN 2010 | Biomaterials | 3 |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| MCEN 2023 | Statics and Structures | 3 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| CHEN 1310 | Introduction to Engineering Computing | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **17** |

**Year Three**

| **Fall Semester** | | |
|---|---|---|
| BMEN 3010 | Biotransport | 3 |
| BMEN 4117 | Anatomy and Physiology for Biomedical Engineering | 3 |
| CHEN 3010 | Applied Data Analysis | 3 |
| ECEN 2250 | Introduction to Circuits and Electronics | 3 |
| Humanities or Social Sciences | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| BMEN 3030 | Bioinstrumentation | 4 |
| ECEN 3301 | Biomedical Signals and Systems | 3 |
| Writing Requirement | | 3 |
| Technical Elective [3] | | 6 |
| | **Credit Hours** | **16** |

**Year Four**

| **Fall Semester** | | |
|---|---|---|
| BMEN 4010 | Biomedical Engineering Capstone Design I | 3 |
| Technical Elective [3] | | 9 |
| Free Elective | | 3 |
| Focus Technical Elective | | 3 |
| | **Credit Hours** | **18** |
| **Spring Semester** | | |
| BMEN 4020 | Biomedical Engineering Capstone Design II | 3 |
| Focus Technical Elective [3] | | 3 |
| Technical Elective [3] | | 3 |
| Humanities or Social Sciences Elective [1] | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **128** |

1. Students may choose courses from the list of college-approved humanities and social sciences (HSS) electives. (http://www.colorado.edu/engineering/academics/policies/hss/)
2. Students may choose a course from the list of college-approved writing courses (http://www.colorado.edu/engineering/academics/policies/hss/). (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/)

[3] Standard curriculum requires a total of 24 credit hours of technical elective coursework. At least 18 of 24 must be 3000 level or above, and at 15 must be Engineering Technical Electives with 6 credits from the approved BME focus technical elective list. Visit the program's Advising & Curriculum webpage for options.

## Premedical Track

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| CHEN 1201 | General Chemistry for Engineers 1 | 4 |
| CHEM 1114 | Laboratory in General Chemistry 1 | 1 |
| MCDB 1150 | Introduction to Cellular and Molecular Biology | 3 |
| BMEN 1025 | Computer-Aided Design & Fabrication | 4 |
| COEN 1500 | CEAS First Year Seminar | 1 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| BMEN 1000 | Exploring Biomedical Engineering | 1 |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| CHEM 1133 | General Chemistry 2 | 4 |
| CHEM 1134 | Laboratory in General Chemistry 2 | 1 |
| CHEN 1310 | Introduction to Engineering Computing | 3 |
| PHYS 1110 | General Physics 1 | 4 |
| | **Credit Hours** | **17** |
| **Year Two** | | |
| **Fall Semester** | | |
| BMEN 2100 | Biomedical Engineering Principles and Methods | 3 |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| PHYS 1120 | General Physics 2 | 4 |
| MCDB 1161 | From Dirt to DNA: Phage Genomics Laboratory I | 2 |
| Humanities or Social Science Elective [1] | | 2 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| BMEN 2010 | Biomaterials | 3 |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| CHEM 3311 | Organic Chemistry 1 | 4 |
| CHEM 3321 | Laboratory in Organic Chemistry 1 | 1 |
| MCEN 2023 | Statics and Structures | 3 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| | **Credit Hours** | **16** |
| **Year Three** | | |
| **Fall Semester** | | |
| BMEN 3010 | Biotransport | 3 |
| CHEM 3331 | Organic Chemistry 2 | 4 |
| CHEM 3341 | Laboratory in Organic Chemistry 2 | 1 |
| Humanities or Social Science Elective [1] | | 3 |
| BMEN 4117 | Anatomy and Physiology for Biomedical Engineering | 3 |
| ECEN 2250 | Introduction to Circuits and Electronics | 3 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| BMEN 3030 | Bioinstrumentation | 4 |
| CHEN 3010 | Applied Data Analysis | 3 |
| MCDB 2150 | Principles of Genetics | 3 |
| ECEN 3301 | Biomedical Signals and Systems | 3 |
| BCHM 4611 | Principles of Biochemistry | 3 |
| | **Credit Hours** | **16** |
| **Year Four** | | |
| **Fall Semester** | | |
| BMEN 4010 | Biomedical Engineering Capstone Design I | 3 |
| Humanities or Social Science Elective [1] | | 3 |
| Eng Technical Elective [3] | | 6 |
| Writing Requirement [2] | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| BMEN 4020 | Biomedical Engineering Capstone Design II | 3 |
| Focus Technical Elective [3] | | 3 |
| Humanities or Social Science Elective [1] | | 6 |
| Free Electives | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **128** |

[1] Students may choose courses from the list of college-approved humanities and social sciences (HSS) electives.

[2] Students may choose a course from the list of college-approved writing courses.

[3] Choose 9 credit hours of 3000 level or above of Engineering Technical Electives, including 3 credit hours from the BME focused electives list. Visit the program's Advising & Curriculum webpage for options.

# Learning Outcomes

## Program Educational Objectives

The biomedical engineering program at CU Boulder is dedicated to preparing each of our graduating students for one or more the following achievements within 5-10 years of receiving their undergraduate degrees:

- Professional engineering employment in life sciences and healthcare industries, in interdisciplinary areas including but not limited to the medical device industry, engineering consulting, biomechanics, digital health and biotechnology, with promotions and increasing levels of leadership and responsibility over time.
- Completion of graduate degree in biomedical engineering or related fields, with subsequent employment in academy, industry or related professions.
- Completion of medical or other professional school, with subsequent placement in residency, clinical practice and/or other professional employment.

## General Learning Outcomes

By the completion of the program, students will be able to:

- Identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics.
- Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.
- Communicate effectively with a range of audiences.
- Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.
- Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives.
- Develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions.
- Acquire and apply new knowledge as needed, using appropriate learning strategies.

### Biomedical Engineering Specific Outcomes

Upon graduation, students will be able to:

- Apply principles of engineering, biology, human physiology, chemistry, calculus-based physics, mathematics (through differential equations) and statistics.
- Solve biomedical engineering problems, including those associated with the interaction between living and non-living systems.
- Analyze, model, design and realize biomedical engineering devices, systems, components or processes.
- Make measurements on and interpret data from living systems.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BS and MS in Biomedical Engineering

### Admission Requirements

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.000 or higher.
- Have no MAPS deficiencies (students admitted to CU Boulder prior to Summer 2023 only).
- Have at least junior class standing.
- Have completed all prerequisite courses with a passing grade at the time of admission: BMEN 2000 or BMEN 2100; BMEN 2010 and BMEN 3010.

### Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only 6 credits may be double-counted toward the bachelor's degree and the master's degree. Students must maintain a 3.000 GPA while in the BAM program.

Students must apply to graduate with the bachelor's degree and apply to continue with the master's degree early in the semester in which the undergraduate requirements will be completed.

# Biomedical Engineering - Minor

The biomedical engineering minor is open to undergraduate students from engineering or non-engineering majors who are interested in an exciting, multidisciplinary field that lies at the interface of medicine, biology and engineering.

Biomedical engineers use engineering principles to analyze and solve problems in biology and medicine, providing an overall enhancement to healthcare. At the same time, biomedical engineers employ concepts learned from biology and medicine to generate new engineering designs.

Current research in biomedical engineering focuses on innovative areas such as biomechanics and mechanobiology; medical devices; imaging and diagnostics; and therapeutics.

For more information, visit the college's Minor in Biomedical Engineering (https://www.colorado.edu/bme/academics/minor-program/) webpage.

# Requirements

## Course Requirements

Completion of 18 credit hours is required for the minor, distributed as follows:

| Code | Title | Credit Hours |
|---|---|---|
| BMEN 2000 | Introduction to Biomedical Engineering | 3 |
| or BMEN 2100 | Biomedical Engineering Principles and Methods | |
| Focused Elective - choose one of the following: | | 3 |
| BMEN 2010 | Biomaterials | |
| BMEN 2100 | Biomedical Engineering Principles and Methods [1] | |
| BMEN 4117 | Anatomy and Physiology for Biomedical Engineering [2] | |
| BIEN 3800 | Fundamentals of Biotechnology | |
| BIEN 4802 | Tissue Engineering and Biofabrication | |
| IPHY 3410 | Human Anatomy | |
| IPHY 3430 | Human Physiology | |
| ECEN 4933 | Engineering Genetic Circuits | |
| MCDB 2150 | Principles of Genetics | |
| MCDB 3300 | Personalized Medicine - Recent Advances in Diagnostics and Therapeutics | |
| PHIL 1160 | Introduction to Medical Ethics | |
| PHIL 3160 | Bioethics | |
| Electives [3] | | 12 |
| **Total Credit Hours** | | **18** |

[1] If BMEN 2100 is taken in place of BMEN 2000, it cannot also count as a focused elective.

[2] Students who take IPHY 3410 or 3430 cannot count BMEN 4117 as either a focused elective or general elective.

[3] For more information and a list of approved electives, visit the college's Minor in Biomedical Engineering (https://www.colorado.edu/bme/academics/minor-program/) webpage.

Requirements for the minor are met by completing the required gateway course, one focused elective from the list above and 12 elective credit hours identified below. Here are additional guidelines regarding the focus elective and electives requirements:

- At least 12 credit hours must be upper-division (3000 or higher level).
- 6 credit hours must be taken in engineering courses (including computer science). Submit enrollment requests for department-restricted courses using the departmental course request forms (https://www.colorado.edu/engineering-advising/departmental-course-request-forms/).
- Up to 9 credit hours can be taken outside of engineering (i.e. IPHY, MCDB, PHIL).
- Relevant independent study coursework can be petitioned.
- 5000-level courses are allowed where undergraduate students are eligible to enroll.
- Prior coursework may be transferred from other institutions with approval.
- At least 9 credit hours need to be taken on the CU Boulder campus, at least 6 credits of which must be at the upper-division level.

### Grade Requirements

A grade point average (GPA) of 2.000 or better is required in the courses that are used to satisfy the requirements for this minor. Each individual course that is counted towards these degree requirements must be passed with a D- or better. Note, however, that a C- or better is required in all prerequisite courses to move on to a subsequent course.

# Chemical and Biological Engineering

The Department of Chemical and Biological Engineering (http://www.colorado.edu/chbe/) offers degrees at the bachelor's, master's and doctoral levels. The department offers two distinct BS degree programs, one in chemical engineering and one in biological engineering.

Chemical engineering prepares students for careers in a range of industries including energy, consumer products, sustainability and semiconductors. Modern industry depends on chemical engineers to tailor manufacturing technology to the requirements of its products, and chemical engineers play a central role in development of new polymeric materials, alternative energy sources and safe, efficient processes for chemical synthesis.

The biological engineering undergraduate program prepares students for careers in biotechnology, pharmaceuticals, medicine and materials. Exploring the structure of protein molecules, the functioning of cells and the growth and regeneration of tissues are among the new frontiers that biological engineering students will address.

In addition to the standard chemical and biological curricula, a premedicine curriculum is also offered. The chemical and biological engineering department has active research and educational programs in the exciting field of biotechnology, which involves the use of individual cells and their components for producing pharmaceuticals and other important products. The department is also active in biomedical engineering, which involves medical devices, tissues and biomaterials.

There are opportunities to specialize via electives, independent study, research and senior thesis.

Students can carry out part of their studies in another country while staying on track to a four-year degree. This is a wonderful opportunity to delve into a new culture and learning environment, and can be valuable professional experience given the international ties of many companies and researchers. Many faculty members have significant international experience.

**Course codes for these programs are CHEN and BIEN.**

### Senior Thesis

The department offers this program for undergraduates with a strong interest in research. The student carries out a yearlong project under the direction of a faculty member in lieu of taking CHEN 4130 (for CHEN students) or BIEN 4810 (for BIEN students). Students must apply at the end of their junior year.

### Research Facilities

Chemical and biological engineering research facilities are extensive and modern. Nearly all research equipment is interfaced to computers for automated data collection, monitoring and control. A full description of chemical and biological engineering research facilities can be found on the department website. (http://www.colorado.edu/chbe/)

## Bachelor's Degrees

- Biological Engineering - Bachelor of Science (BSBE) (p. 877)
- Chemical Engineering - Bachelor of Science (BSCHE) (p. 880)

## Minors

- Biological Engineering - Minor (p. 883)
- Chemical Engineering - Minor (p. 884)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Anseth, Kristi S. (https://experts.colorado.edu/display/fisid_103471/)
Distinguished Professor; PhD, University of Colorado Boulder

Bay, R. Kōnane (https://experts.colorado.edu/display/fisid_172688/)
Assistant Professor; PhD, University of Massachusetts at Amherst

Bowman, Christopher N. (https://experts.colorado.edu/display/fisid_102043/)
Distinguished Professor; PhD, Purdue University

Bryant, Stephanie J. (https://experts.colorado.edu/display/fisid_111810/)
Professor; PhD, University of Colorado Boulder

Burdick, A. Jason (https://experts.colorado.edu/display/fisid_168868/)
Professor; PhD, University of Colorado Boulder

Cha, Jennifer N. (https://experts.colorado.edu/display/fisid_151746/)
Professor; PhD, University of California, Santa Barbara

Clough, David Edwards (https://experts.colorado.edu/display/fisid_102332/)
Professor Emeritus; PhD, University of Colorado Boulder

Davis, Robert H. (https://experts.colorado.edu/individual/fisid_113653/)
Distinguished Professor; PhD, Stanford University

deGrazia, Janet (https://experts.colorado.edu/display/fisid_107661/)
Teaching Professor Emerita; PhD, University of Colorado Boulder

Falconer, John L. (https://experts.colorado.edu/display/fisid_101426/)
Professor Emeritus; PhD, Stanford University

Fox, Jerome Michael (https://experts.colorado.edu/display/fisid_156682/)
Assistant Professor; PhD, University of California, Berkeley

Franklin, Trevor (https://experts.colorado.edu/display/fisid_175743/)
Teaching Assistant Professor; PhD, Cornell University

Goodwin, Andrew Pratt (https://experts.colorado.edu/display/fisid_151595/)
Associate Professor; PhD, University of California, Berkeley

Gupta, Ankur (https://experts.colorado.edu/display/fisid_165822/)
Assistant Professor; PhD, Massachusetts Institute of Technology

Hayward, Ryan (https://experts.colorado.edu/individual/fisid_166416/)
Endowed/Named Professor; PhD, University of California Santa Barbara

Heinz, Hendrik (https://experts.colorado.edu/display/fisid_156488/)
Professor; PhD, ETH Zurich (Switzerland)

Hind, Laurel (https://experts.colorado.edu/individual/fisid_165642/)
Assistant Professor; PhD, University of Pennsylvania

Holewinski, Adam P. (https://experts.colorado.edu/display/fisid_155859/)
Assistant Professor; PhD, University of Michigan Ann Arbor

Hrenya, Christine M.
Professor Emerita; PhD, Carnegie Mellon University

Keyvani, Ehsan
Teaching Assistant Professor; PhD, Northeastern University

Kohlmeier, Carolyn (https://experts.colorado.edu/individual/fisid_158386/)
Teaching Associate Professor; PhD, University of Colorado Boulder

Krantz, William
Professor Emeritus

Mahoney, Melissa J.
Teaching Professor; PhD, Cornell University

Marder Seth (https://experts.colorado.edu/display/fisid_167617/)
Professor; PhD, University of Wisconsin-Madison

McGehee, Michael D. (https://experts.colorado.edu/display/fisid_163453/)
Professor; PhD, University of California, Santa Barbara

Medlin, James William (https://experts.colorado.edu/display/fisid_122699/)
Professor; PhD, University of Delaware

Nuttelman, Charles Raymond (https://experts.colorado.edu/display/fisid_142758/)
Teaching Professor; PhD, University of Colorado Boulder

O'Harra, Katie
Teaching Assistant Professor; PhD, University of Alabama

Ramirez, Walter
Professor Emeritus

Randolph, Theodore W. (https://experts.colorado.edu/display/fisid_101768/)
Professor; PhD, University of California, Berkeley

Schwartz, Daniel K. (https://experts.colorado.edu/display/fisid_118479/)
Professor, Endowed Chair; PhD, Harvard University

Shields, C. Wyatt IV (https://experts.colorado.edu/individual/fisid_165173/)
Assistant Professor; PhD, Duke University

Shirts, Michael R. (https://experts.colorado.edu/display/fisid_156474/)
Professor; PhD, Stanford University

Smith, Wilson (https://experts.colorado.edu/display/fisid_166095/)
Professor; PhD, University of Georgia

Sprenger, Kayla (https://experts.colorado.edu/individual/fisid_165650/)
Assistant Professor; PhD, University of Washington

Stansbury, Jeffrey W.
Professor; PhD, University of Maryland

Toney, Michael (https://experts.colorado.edu/individual/fisid_167235/)
Professor; PhD, University of Washington

Weimer, Alan W. (https://experts.colorado.edu/display/fisid_109152/)
Professor; PhD, University of Colorado Boulder

White, Timothy J. (https://experts.colorado.edu/display/fisid_163899/)
Professor, Associate Chair; PhD, University of Iowa

Whitehead, Timothy Andrew (https://experts.colorado.edu/display/fisid_164364/)
Associate Professor; PhD, University of California-Berkeley

Young, Wendy Mores (https://experts.colorado.edu/display/fisid_146942/)
Teaching Professor, Associate Chair; PhD, University of Colorado Boulder

# Courses

**BIEN 2810 (3) Biology for Engineers**
Develops a basic understanding of the science of biology, including an introduction to the disciplines of biochemistry, cell organization, metabolism, genetics, genomics, molecular biology, recombinant DNA technology and evolution. Provides a basic introduction to several key techniques used in biological engineering laboratories. Uses examples of complex and creative structures engineered by natural processes. Formerly CHEN 2820.
**Requisites:** Requires prereq or coreq course of CHEN 1201 or CHEN 1211 or CHEM 1113 or MCEN 1024 (minimum grade C-). Restricted to College of Engineering (ENGRU) undergraduates and IUT On Track applicants only.

**BIEN 2840 (1-4) Independent Study**
Available to sophomores with approval of Department of Chemical and Biological Engineering. Subject arranged to fit needs of student.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**BIEN 3800 (3) Fundamentals of Biotechnology**
Surveys the five areas of modern biotechnology (human, industrial, agricultural, animal, environmental), highlighting engineering principles in biology in all five areas. Delves into how biology is used to create useful materials and medicines. Imparts a working knowledge of synthetic DNA technology, including recombinant DNA, genome editing, DNA synthesis, and DNA sequencing.
**Requisites:** Requires prerequisite courses of BIEN 2810 or MCDB 1150 or EBIO 1220 and APPM 1350 or MATH 1300 and CHEN 1201 or CHEN 1211 or CHEM 1113 or MCEN 1024 (all minimum grade C-).

**BIEN 3840 (1-4) Independent Study**
Available to juniors with approval of the Department of Chemical and Biological Engineering. Subject arranged to fit needs of the student.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**BIEN 4010 (2) Biological Engineering Senior Thesis 1**
Provides an opportunity for advanced students to conduct exploratory research in biological engineering.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**BIEN 4020 (2) Biological Engineering Senior Thesis 2**
Continuation of BIEN 4010.
**Requisites:** Requires prerequisite course of BIEN 4010 (minimum grade C-). Restricted to College of Engineering students only.

**BIEN 4520 (3) Biological Process and Product Design**
Provides a team-based capstone design experience for biological engineering students. The design synthesis activities, the considerations of numerous options, and the practical application of the fundamentals all need to be integrated from first year courses through to this senior design course. The sequence provides a culmination for all previous chemical and biological engineering courses (transport processes, thermodynamics, reaction kinetics, unit operations, etc.). Students are expected to know the basics of fluids, heat transfer, bioseparations, and reactor engineering (kinetics). In BIEN 4520, students will be exposed to design of equipment used for separations and reactions. Students will be taught how to select process units and interconnect them in an overall process flowsheet with the primary goal being to find the optimal design conditions for the best possible design scenario among various conceptualized alternatives. With the exception of cost estimation, process economics, heat integration, se
**Requisites:** Requires prerequisite courses of CHEN 3010 and BIEN 4820 and BIEN 4830 and BIEN 3800 or MCDB 2150 (all minimum grade C-). Restricted to College of Engineering majors only.

**BIEN 4530 (2) Biological Engineering Design Project**
This is the 2nd course in the team-based capstone biodesign sequence of classes. Projects are sponsored by industry and student design teams collaborate with industrial consultants. Projects consider biological process and product design with emphasis on economic analysis. Deliverables include an oral mid-project design review, a final oral presentation and a final written design report.
**Requisites:** Requires prerequisite course of BIEN 4520 (minimum grade C-). Restricted to College of Engineering majors only.

**BIEN 4801 (3) Pharmaceutical Biotechnology**
Focuses on the engineering needed to bring therapeutic products derived from living organisms (e.g., proteins, peptides, DNA, RNA) from the production plant to the patient. Covers the challenges of keeping these products "active" as they are stored, shipped, and administered to patients. Formerly CHEN 4801.
**Requisites:** Requires prerequisite courses of CHEN 3320 and prerequisite or corequisite courses of BIEN 4830 or CHEN 4330 (all minimum grade C-). Restricted to College of Engineering majors only.

**BIEN 4802 (3) Tissue Engineering and Biofabrication**
Tissue engineering demonstrates enormous potential for improving human health and the field of biofabrication has advanced our ability to position cells and materials into 3D configurations for the engineering of new tissues. This course explores principles of tissue engineering and biofabrication, drawing upon diverse fields such as cell biology, material science, and chemical and biological engineering. Current and developing methods of tissue engineering, as well as specific applications will be discussed in the context of these principles. The course will involve review of current literature within this developing field, as well as focus on translational concepts of tissue engineering. Formerly known as CHEN 4802.
**Equivalent - Duplicate Degree Credit Not Granted:** BIEN 5802
**Requisites:** Requires prerequisite course of BIEN 2810 or MCDB 1150 or EBIO 1210 and EBIO 1220 and prerequisite or corequisite of BIEN 4520 or CHEN 4520 or BMEN 4010 (minimum grade C-). Restricted to College of Engineering students only.

**BIEN 4803 (3) Metabolic Engineering**
Introduces basic concepts in metabolic engineering and explores modern approaches in metabolic and strain engineering. Application areas that will be discussed will include the use of metabolic engineering approaches in biofuels and biorefining as well as biopharmaceutical production. Formerly CHEN 4803.
**Equivalent - Duplicate Degree Credit Not Granted:** BIEN 5803
**Requisites:** Requires prerequisite course of BCHM 4611 (minimum grade C-). Restricted to College of Engineering majors only.

**BIEN 4804 (3) Protein and Enzyme Engineering**
This course reviews various applications of protein and enzyme engineering and covers key concepts in protein and enzyme design, including protein structure-function relationships; rational and evolutionary engineering approaches; genetic code expansion; cell-free protein synthesis; computational design; and biophysical methods for protein characterization. Additionally, students gain valuable experience reading, analyzing, and interpreting research results from scientific literature, as well as drafting an original research proposal.
**Equivalent - Duplicate Degree Credit Not Granted:** BIEN 5804
**Requisites:** Requires prerequisite courses of CHEN 3320 and BIEN 2810 and BCHM 4611 (minimum grade C-). Restricted to College of Engineering undergraduates only.

**BIEN 4805 (3) Biomaterials**
Provides an overview of biomaterials. Covers major classes of materials used in medical applications, properties, degradation mechanisms, and characterization methods, foreign body response, methods to control physiological response to biomaterial surfaces, biocompatibility, biomaterials used in soft and hard tissue replacements, drug delivery devices and tissue engineering, and design criteria for developing a material for a given biological application.
**Requisites:** Requires prerequisite courses of BIEN 2810 or MCDB 1150 or EBIO 1220 and CHEM 3311 (all minimum grade C-). Restricted to College of Engineering students only.
**Recommended:** Prerequisite CHEM 3331.

**BIEN 4806 (3) Immunoengineering**
Examines the fundamentals of immunology and covers engineering approaches to study and control immune reactions and their applications in therapy and diagnostics for infectious disease, cancer, allergy, and autoimmune disease.
**Equivalent - Duplicate Degree Credit Not Granted:** BIEN 5806
**Requisites:** Requires prerequisite course of BIEN 2810 and prerequisite or corequisite of CHEN 4330 or BIEN 4830 or BMEN 3010 (minimum grade C-). Restricted to College of Engineering students only.

**BIEN 4810 (3) Biological Engineering Laboratory**
Involves planning and execution of chemical engineering experiments on mass transfer operations, bioseparations, and biological reactors. Interprets experimental data with theoretical principles and statistical analysis. Emphasizes communication with written memos, full reports and oral presentations.
**Requisites:** Requires prerequisite courses of BIEN 2810 or MCDB 1150 or (EBIO 1210 and EBIO 1220) and CHEN 3010 and BIEN 4820 and BIEN 4830 (all minimum grade C-). Restricted to College of Engineering majors only.

**BIEN 4820 (3) Biochemical Separations**
Lect. and lab. Presents purification methods, mass transfer coefficients, problems specific to biologicals, and scale-up of processes. Also covers chromatography, phase extraction, supercritical fluids, sedimentation, precipitation, electrophoresis, dialysis, affinity techniques, cell separation, application of separations to bioreactors, and comparison of batch and continuous processes. Formerly CHEN 4820.
**Requisites:** Requires prerequisite course of CHEN 3210 and prereq or coreq of CHEN 4330 or BIEN 4830 (all minimum grade C-). Restricted to College of Engineering majors only.

**BIEN 4830 (3) Biokinetics and Reactor Design**
Introduces chemical kinetics, chemical reactor design, and biological kinetics. Involves mass and energy balances for steady-state and transient reactor systems. Also covers residence time distribution, mass transfer, catalytic reactions, multiple steady states in reactors, enzyme kinetics, metabolic networks, and cell growth kinetics.
**Requisites:** Requires prerequisite courses of CHEN 3320 and CHEN 3210 and (CHEN 4521 or CHEM 4531) (all minimum grade C-). Restricted to College of Engineering majors only.

**BIEN 4838 (1-3) Special Topics in Biological Engineering**
Examines a special topic in Biological Engineering.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**BIEN 4840 (1-4) Independent Study**
Available to seniors with approval of Chemical and Biological Engineering department. Subject arranged to fit needs of student.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**CHEN 1000 (3) Creative Technology**
Delve into cutting-edge topics such as the science of climate change, biotechnology, biomedical devices, advanced materials, renewable energy, and environmental sustainability! This course will introduce undergraduate students to the most recent concepts in technology and how these concepts impact all aspects of life, including human health and the health of the planet.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEN 1100 (3) Gourmet Science: Exploring Chemistry, Biology, and Technology through Food**
This course explores chemistry, biology, and technology fundamentals through food. Ingredients utilized in cooking and baking processes demonstrate a breadth of key science and engineering concepts, intertwined with social significance and historical context. Students will learn about the chemical behaviors and biological interactions of molecules in food, understand critical ratios and reactions in baking and cooking, survey techniques and relevant technology, evaluate industrial and agricultural developments, and analyze global impacts of trade and policy on food science and engineering.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEN 1201 (4) General Chemistry for Engineers 1**
Designed to meet the general chemistry requirement for some engineering students and serve as part one for students whose academic plans require advanced work in chemistry. Topics include components of matter, stoichiometry, electron configuration, chemical bonding, molecular shapes, covalent bonding, classes of reactions, thermochemistry, gases, atomic structure, organic compounds, intermolecular forces, and phase equilibria. Examples and problems illustrate the application of chemistry to engineering sub-disciplines. Department enforced prerequisites: High school Algebra, one year of high school Chemistry or CHEM 1021 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 1211, CHEM 1113, CHEM 1400 and MCEN 1024
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates and IUT On Track applicants only.
**Recommended:** Not recommended for students with grade below B- in CHEM 1021.

**CHEN 1203 (2) General Chemistry for Engineers 2**
Designed for students whose academic plans require advanced work in chemistry. Topics include kinetics, solubility/solubility equilibria, acid-bases, buffers and titrations, thermodynamics, and electrochemistry. Examples and problems illustrate the application of chemistry to engineering sub-disciplines. AP Chemistry credit not accepted in lieu of any of these prereq classes.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 1211 or CHEM 1133 or CHEM 2100
**Requisites:** Requires prerequisite courses of CHEN 1201 or CHEM 1113 or MCEN 1024 (all minimum grade C-). Restricted to College of Engineering undergraduates (ENGRU) and IUT On Track applicants only.
**Recommended:** Corequisite CHEM 1221.

**CHEN 1211 (4) Accelerated Chemistry for Engineers**
One-semester lecture and recitation course designed for engineering students with more advanced chemistry backgrounds. Topics include stoichiometry; thermodynamics; gases, liquids, and solids; equilibrium; acids and bases; bonding concepts; kinetics; reactions; and materials science. Examples and problems illustrate the application of chemistry to engineering sub-disciplines. Department enforced prerequisite of 3, 4 or 5 on the AP Chemistry exam or equivalent IB scores or a passing score on the "Chemistry Readiness Exam for Engineers." Degree credit not granted for this course and CHEM 1113 and CHEM 1400 and CHEN 1201 and MCEN 1024.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates and IUT On Track applicants only.
**Recommended:** Corequisite CHEM 1221.

**CHEN 1300 (1) Introduction to Chemical and Biological Engineering**
Meets for one lecture per week. Examines the different fields of chemical engineering and chemical & biological engineering including energy, materials, pharma, and biomedical; addresses how to be successful in college and engineering; and showcases some of the opportunities here at CU.
**Requisites:** Restricted to Chemical Engineering, Chemical Biological Engineering, Biological Engineering, and open option (XXEN) majors only with a maximum of 50 credit hours.

**CHEN 1310 (3) Introduction to Engineering Computing**
Introduces the use of computers in engineering problem solving, including elementary numerical methods. Teaches programming fundamentals, including data and algorithm structure, and modular programming. Software vehicles include Excel/Vba and Matlab. Formerly GEEN 1300 and COEN 1300.
**Requisites:** Requires prerequisite or corequisite course of APPM 1340 or 1345 or 1350 or GEEN 3830 or MATH 1300 (all minimum grade C-). Restricted to College of Engineering majors and IUT On Track applicants only

**CHEN 1400 (3) Drugs, Driving and Dynamic Processes**
Project-based course that applies the principles of chemistry, biology, mechanics and electronics to the production and application of sustainable commodities (fuels, drugs, chemicals, and energy). Examples include student-developed green vehicles, sustainable nutraceuticals, or renewable electrical generation.
**Requisites:** Restricted to Chemical Engineering (CHEN) and Chemical and Biological Engineering (CBEN), and open option (XXEN) majors only with a maximum of 70 credit hours.

**CHEN 2120 (3) Chemical Engineering Material and Energy Balances**
Provides a basic understanding of chemical engineering calculations involving material and energy balances around simple chemical processes.
**Requisites:** Requires prerequisite courses of CHEN 1211 or CHEN 1201 or CHEM 1400 or CHEM 1113 or MCEN 1024 (all min grade C-). Requires corequisite courses of CHEN 1310 (CHEN 1203 or CHEM 1133). Restricted to Coll of Engineering mjrs IUT On Track applicants onl

**CHEN 2840 (1-4) Independent Study**
Available to sophomores with approval of Department of Chemical Engineering. Subject arranged to fit needs of student.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**CHEN 3010 (3) Applied Data Analysis**
Teaches students to analyze and interpret data. Topics include engineering measurements, graphical presentation and numerical treatment of data, statistical inference, and regression analysis.
**Requisites:** Requires prerequisite course of CHEN 1310 and APPM 2360 or MATH 2130 and MATH 3430 (all minimum grade C-). Restricted to College of Engineering students only.

**CHEN 3200 (3) Chemical Engineering Fluid Mechanics**
Introduces fluid mechanics and momentum transfer, emphasizing the application of these principles to chemical engineering systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 3313 and MCEN 3021
**Requisites:** Requires prereq courses of PHYS 1110 and (APPM 2350 or MATH 2400) and (CHEN 2120 or CVEN 2121 or GEEN 2851 or MCEN 2023) (all min grade C-).Requires prereq or coreq courses of APPM 2360 or (MATH 2130 and MATH 3430) (min grade C-). Restricted to ENGR mjr

**CHEN 3210 (4) Chemical Engineering Heat and Mass Transfer**
Examines conservation and transfer of mass and thermal energy. Focuses on conduction and convection of heat in the context of chemical processes and heat exchangers. Addresses radiation. Also studies mass transfer rate processes, including diffusion, microscopic material balances, and correlations for mass transfer coefficients.
**Requisites:** Requires prerequisite courses of (CHEN 3200 or MCEN 3021) and (APPM 2360 or MATH 3430) (minimum grade C-). Restricted to College of Engineering majors only

**CHEN 3211 (1) Chemical Engineering Mass Transfer**
Study of mass-transfer rate processes, including diffusion, convection, microscopic material balances, and correlations for mass-transfer coefficients. Requires department approval and a department-approved heat transfer course.
**Requisites:** Requires prerequisite course of either CHEN 3200 or MCEN 3021 (minimum grade C-). Restricted to College of Engineering (ENGRU) undergraduates only.

**CHEN 3220 (3) Chemical Engineering Separations**
Studies separation methods including distillation, absorption, extraction, and membranes, and graphical and computer-based solutions to separation problems. Applies mass transfer rate theory to packed and tray columns.
**Requisites:** Requires prerequisite courses of CHEN 3210 and CHEN 3320 and (CHEN 4521 or a prerequisite or corequisite of CHEM 4531) (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 3320 (3) Chemical Engineering Thermodynamics**
Applies thermodynamic principles to nonideal systems, phase equilibrium, chemical equilibrium, power generation, refrigeration, and chemical processes.
**Requisites:** Requires prerequisite courses of CHEN 2120 and (CHEN 4521 or a prerequisite or corequisite of CHEM 4531) and (APPM 2360 or MATH 3430) (all minimum grade C-). Restricted to College of Engineering majors only

**CHEN 3660 (3) Energy Fundamentals**
Explains the most important energy technologies and systems; provides tools to analyze performance using science and engineering principles. This course will investigate important energy concepts from sources and extraction to utilization, storage and efficiency. Topics include fossil fuels, hydropower, renewable energy, biofuels, carbon capture and waste disposal.
**Requisites:** Requires prerequisite courses of CHEN 1201 or CHEN 1211 or CHEM 1113 or MCEN 1024 and PHYS 1110 and APPM 1360 or MATH 2300 (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 3670 (3) Sustainable Design of Chemical and Materials Systems**
Explains the principles of green engineering and provides tools to analyze sustainability of engineered processes and materials. This course will investigate important sustainability concepts from utilization of renewable feedstocks for chemicals and materials manufacturing to recycling, waste elimination, and toxicology. Topics include analysis of environmental effects of chemical processes and products, mechanical and chemical recycling of plastics and other materials, minimizing fossil energy demands in manufacturing processes, and approaches to life cycle assessment of candidate technologies.
**Requisites:** Requires prerequisite courses of PHYS 1110 and (CHEN 1211 or CHEN 1201 or CHEM 1113 or MCEN 1024) and (APPM 1360 or MATH 2300) (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 3840 (1-4) Independent Study**
Available to juniors with approval of the Department of Chemical Engineering. Subject arranged to fit needs of the student.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**CHEN 3930 (6) Chemical Engineering Cooperative Education**
Students enrolled in this course participate in a previously arranged, department-sponsored cooperative education program.
**Requisites:** Requires prerequisite course of CHEN 2120 (minimum grade C-). At least a 2.85 cumulative GPA is required. Restricted to College of Engineering majors only.
**Recommended:** Prerequisite 3.00 GPA or higher.

**CHEN 4010 (2) Chemical Engineering Senior Thesis 1**
Provides an opportunity for advanced students to conduct exploratory research in chemical engineering.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**CHEN 4020 (2) Chemical Engineering Senior Thesis 2**
Continuation of CHEN 4010. This course and CHEN 4020 can substitute for CHEN 4130.
**Requisites:** Requires prerequisite course of CHEN 4010 (minimum grade C-). Restricted to College of Engineering students only.

**CHEN 4090 (1) Undergraduate Seminar**
Provides chemical engineering career and professional information, facilitates contact with faculty and industry representatives, and improves communication and leadership skills. Consists of a series of seminars and field trips and requires a research project involving a written and oral report.
**Requisites:** Restricted to Chemical (CHEN) Engineering or Chemical and Biological (CBEN) Engineering or Biological (BIEN) Engineering majors only.

**CHEN 4130 (3) Chemical Engineering Laboratory**
Involves planning and execution of chemical engineering experiments on mass transfer operations, separations, and chemical reactors. Interprets experimental data with theoretical principles and statistical analysis. Emphasizes communication with written memos, full reports, and oral presentations.
**Requisites:** Requires prerequisite courses of CHEN 3010 and CHEN 3220 and CHEN 3320 and CHEN 4330 (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 4330 (3) Kinetics and Reactor Design**
Introduces chemical kinetics and chemical reactor design. Involves mass and energy balances for steady-state and transient reactor systems. Also covers residence time distribution, mass transfer,catalytic reactions, and multiple steady states in reactors.
**Requisites:** Requires prerequisite courses of CHEN 3320 and CHEN 3210 and (CHEN 4521 or CHEM 4531) (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 4440 (3) Chemical Engineering Materials**
Introduces materials engineering, including properties of polymers, metals, ceramics, and semiconductors, especially as related to chemical engineering processes.
**Requisites:** Requires prerequisite courses of CHEN 3320 and CHEM 3311 (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 4450 (3) Polymer Chemistry**
Introduces polymer science with a focus on polymer chemistry and polymerization reactions. Focuses on polymerization reaction engineering and how polymer properties depend on structure.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 5450
**Requisites:** Requires prerequisite courses of CHEN 4830 or CHEN 4330 and CHEM 3311 (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 4460 (3) Polymer Engineering**
Introductory polymer engineering course reviewing basic terminology and definitions; the properties and synthetic routes of important industrial polymers; and processing of polymers and their applications.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 5460
**Requisites:** Requires prerequisite courses of CHEM 3311 and CHEN 3320 (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 4480 (3) Solar Cells and Optical Devices for Sustainable Buildings**
This course assumes no background in electronic materials and explains how silicon and cutting-edge metal halide perovskite solar cells are designed, fabricated and characterized. Topics will include optics, band diagrams, wafer fabrication, most thin film deposition techniques, module design and economics. Other optical devices that can help the world rapidly reduce its carbon emissions, such as light-emitting diodes and energy saving windows with dynamic tinting, will also be covered.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 5480
**Recommended:** Prerequisite a course in materials science (for example CHEN 4440), the physics of electromagnetism and optics at a very basic level.

**CHEN 4490 (3) Electrochemical Engineering**
This course discusses fundamentals and applications of electrochemical systems from an engineering perspective. Aspects of thermodynamics, reaction kinetics, and transport phenomena relevant to the description of electrode/electrolyte interfaces and charge transfer reactions are covered. Topics include cell equilibrium (Nernst equation), reactions rates within Butler-Volmer and Marcus theory, electrochemical double layer structure, ion transport (Poisson-Nernst-Planck equation), potential and current distributions in electrochemical cells, and experimental electroanalytical techniques. Applications include fuel cells, electrolyzers, batteries, sensors, and corrosion. Contact instructor to request to take prerequisites as corequisites.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 5490
**Requisites:** Requires prerequisite courses of (CHEN 4330 or CHEN 4830) and PHYS 1120 (minimum grade C-). Restricted to College of Engineering (ENGRU) undergraduates only.

**CHEN 4520 (3) Chemical Process Design**
Studies applied chemical process design including equipment specification and economic evaluation.
**Requisites:** Requires prerequisite courses of CHEN 3010 and CHEN 3210 and CHEN 3220 and CHEN 4330 or CHEN 4830 (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 4521 (3) Physical Chemistry for Engineers**
Examines the laws of classical thermodynamics followed by physical transformations of pure substances, the thermodynamics of simple mixtures and chemical equilibrium. Applies quantum theory to atomic and molecular structure. Presents the concepts and applications of statistical thermodynamics. Introduces rates of chemical reactions, reaction dynamics and catalysis.
**Requisites:** Requires prereq courses of APPM 2350 or MATH 2400 and CHEN 1211 or CHEN 1203 or CHEM 1133 (all min. grade C-). Requires a prereq or coreq course of APPM 2360 or MATH 2130 and MATH 3430 (min. grade C-). Restricted to College of Engineering majors only.

**CHEN 4530 (2) Chemical Engineering Design Project**
Provides a team-based capstone design experience for chemical engineering students. Projects are sponsored by industry and student design teams collaborate with industrial consultants. Projects consider chemical process and product design with emphasis on economic analysis. Deliverables include an oral mid-project design review, a final oral presentation and final written design report.
**Requisites:** Requires prerequisite course of CHEN 4520 (minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 4570 (4) Process Dynamics and Control**
Examines principles of controls theory and controls application to chemical processes. Focuses on feedback, feedforward and distributed control systems. Laboratory sessions cover measurement fundamentals, signal transmission, dynamic testing, control system synthesis, and implementation and adjustment.
**Requisites:** Requires prerequisite courses of CHEN 3220 and CHEN 4330 or BIEN 4830 and PHYS 1120 and APPM 2360 or MATH 2130 and MATH 3430 (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 4630 (1) Intellectual Property Law and Engineering**
Learn the fundamentals of the various types of intellectual property, obtain the ability to search the USPTO database for patents, learn the difference between provisional patents, utility patents and foreign patents and learn the timing requirements related to the filing of patents and public disclosure, use, and/or sale of an invention.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 5630
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) College of Engineering majors only.

**CHEN 4650 (3) Particle Technology**
Aims to identify the important physical mechanisms occurring in processes involving particles, formulate and solve mathematical descriptions of such processes, and analyze experimental and theoretical results in both a qualitative and quantitative manner. Teaches students to apply this knowledge to the design of particulate systems. Conveys the breadth and depth of natural and industrial applications involving particulates.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 5650
**Requisites:** Requires prerequisite courses of APPM 2360 or MATH 2130 and MATH 3430 and CHEN 3200 or MCEN 3021 (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 4831 (1) Biokinetics and Bioreactors Module**
Study of biokinetics of enzyme reactions, cell growth and bioproduct formation. Design of batch, semi-batch and continuous bioreactors. Overview of biotechnology industry. Introduction to pharmacokinetics and drug delivery. Requires department approval and a department-approved kinetics and reactor design course.
**Requisites:** Requires prerequisite course CHEN 3210 (minimum grade C-). Restricted to College of Engineering (ENGRU) undergraduates only.

**CHEN 4836 (3) Nanomaterials**
Presents fundamental chemical and physical concepts that give rise to the unique optical, electronic and magnetic properties of nanoscale materials. Introduces important synthetic routes for producing nanomaterials, and interparticle forces governing colloidal behavior and self-assembly. Discusses current and potential applications in catalysis, biomedicine, renewable energy, and other fields.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 5836
**Requisites:** Require prerequisite or corequisite of CHEN 3320 (minimum grade C-). Restricted to College of Engineering students only.

**CHEN 4838 (1-3) Special Topics in Chemical Engineering**
Examines a special topic in Chemical Engineering.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**CHEN 4840 (1-4) Independent Study**
Available to seniors with approval of chemical engineering department. Subject arranged to fit needs of student.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) College of Engineering majors only.

# Biological Engineering - Bachelor of Science (BSBE)

Vaccine and therapeutic development. Genome-engineering for gene therapy and biofuels applications. Tissue engineering directing tissue growth for regenerating cartilage and cardiac muscle using stem cells. Quantum dots for imaging and therapeutics. Nanomaterials for labs-on-a-chip diagnostics. Polymers for drug delivery and in vivo imaging (e.g., detecting cancer). Synthetic biology to redesign organisms for useful purposes. Immunoengineering to create tools which investigate and change the immune system.

Biological engineers at CU Boulder learn the skills necessary to work on these cutting-edge technologies and more. Learn from world-class faculty leveraging innovative, award-winning education practices and hands-on lab experiences. Join the ranks of engineers making an impact in these life-saving fields!

## Requirements

### Prerequisites and Passing Grades

Unless otherwise specified, minimum passing grades for all courses that are prerequisites for other required courses is C-. If a grade of D+ or lower is received in a course which is a prerequisite to another, the student may not register for the subsequent course until the first grade has been raised to a C- or higher. In addition, biological engineering and/or CHEN core courses taken in a student's senior year also require a minimum grade of C-, even though they are not prerequisites.

Unless specified otherwise, the minimum passing grade for a course that is not specifically a prerequisite for another required course is D-.

Students may be dropped from courses if they do not meet the minimum prerequisite grade requirements. It is the student's responsibility to communicate with the department if summer coursework and/or transfer credit will be used to meet the prerequisite requirement.

### Course Requirements

#### Required Engineering Courses

A total of 128 credit hours is required.

| Code | Title | Credit Hours |
|---|---|---|
| CHEN 1310 | Introduction to Engineering Computing | 3 |
| CHEN 2120 | Chemical Engineering Material and Energy Balances | 3 |
| BIEN 2810 | Biology for Engineers | 3 |

| | | |
|---|---|---|
| or MCDB 1150 | Introduction to Cellular and Molecular Biology | |
| or EBIO 1220 | General Biology 2 | |
| CHEN 3010 | Applied Data Analysis | 3 |
| CHEN 3200 | Chemical Engineering Fluid Mechanics | 3 |
| or MCEN 3021 | Fluid Mechanics | |
| CHEN 3210 | Chemical Engineering Heat and Mass Transfer | 4 |
| CHEN 3320 | Chemical Engineering Thermodynamics 1 | 3 |
| BIEN 3800 | Fundamentals of Biotechnology | 3 |
| or MCDB 2150 | Principles of Genetics | |
| CHEN 4090 | Undergraduate Seminar | 1 |
| BIEN 4520 | Biological Process and Product Design | 3 |
| CHEN 4521 | Physical Chemistry for Engineers | 3 |
| BIEN 4530 | Biological Engineering Design Project | 2 |
| BIEN 4805 | Biomaterials | 3 |
| BIEN 4810 | Biological Engineering Laboratory | 3 |
| or BIEN 4010 & BIEN 4020 | Biological Engineering Senior Thesis 1 and Biological Engineering Senior Thesis 2 | |
| BIEN 4820 | Biochemical Separations | 3 |
| BIEN 4830 | Biokinetics and Reactor Design | 3 |
| **Focus Technical Electives** | | **3** |
| Choose one of the following: | | |
| BIEN 4801 | Pharmaceutical Biotechnology | |
| BIEN 4802 | Tissue Engineering and Biofabrication | |
| BIEN 4803 | Metabolic Engineering | |
| BIEN 4804 | Protein and Enzyme Engineering | |
| BIEN 4806 | Immunoengineering | |
| BIEN 4838 | Special Topics in Biological Engineering | |

### Required Mathematics Courses

| Code | Title | Credit Hours |
|---|---|---|
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or MATH 1300 | Calculus 1 | |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| or MATH 2300 | Calculus 2 | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| or MATH 2400 | Calculus 3 | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| or MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |
| or MATH 2135 & MATH 3430 | Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations | |

### Required Science Courses

| Code | Title | Credit Hours |
|---|---|---|
| CHEM 1221 | Engineering General Chemistry Lab | 1 |
| or CHEM 1134 | Laboratory in General Chemistry 2 | |
| CHEN 1201 | General Chemistry for Engineers 1 (If a student completes CHEN 1211 instead of CHEN 1201 & CHEN 1203, then student must complete 2 additional credits as Free Electives) | 4 |
| or CHEN 1211 | Accelerated Chemistry for Engineers | |
| CHEN 1203 | General Chemistry for Engineers 2 (If a student completes CHEN 1211 instead of CHEN 1201 & CHEN 1203, then student must complete 2 additional credits as Free Electives) | 2 |
| or CHEN 1211 | Accelerated Chemistry for Engineers | |
| or CHEM 1133 | General Chemistry 2 | |
| BCHM 4611 | Principles of Biochemistry | 3 |
| CHEM 3311 | Organic Chemistry 1 | 4 |
| CHEM 3321 | Laboratory in Organic Chemistry 1 | 1 |
| CHEM 3331 | Organic Chemistry 2 | 4 |
| CHEM 3341 | Laboratory in Organic Chemistry 2 | 1 |
| PHYS 1110 | General Physics 1 | 4 |
| or PHYS 1115 | General Physics 1 for Majors | |

### Humanities, Social Sciences and Writing

Complete the College's Humanities, Social Sciences, and Writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/) (18 credits total).

### Technical Electives

General Technical Electives must meet specific requirements (9 credits total). Visit the department's Current Students (https://www.colorado.edu/chbe/current-students/) webpage and consult the current advising guide.

### Free Electives

3 credits of Free Electives allowed.

# Modified Pathways

## Premed Path

This path is offered for students preparing for medical school. Since biological engineering already requires most of the premed courses, it is a logical choice for students who desire an engineering degree and the opportunity to pursue a medical profession. For information on the premed path, visit the department's current students (http://www.colorado.edu/chbe/academics/undergraduate-program/current-students/) webpage and consult the current advising guide.

# Recommended Four-Year Plan of Study

| Year One | | |
|---|---|---|
| **Fall Semester** | | **Credit Hours** |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| CHEN 1201 | General Chemistry for Engineers 1 | 4 |
| CHEN 1300 | Introduction to Chemical and Biological Engineering (Optional 1-Credit Technical Elective) [1] | 1 |
| CHEN 1310 | Introduction to Engineering Computing | 3 |
| COEN 1500 | CEAS First Year Seminar | 1 |

| | | |
|---|---|---|
| Humanities or Social Science Elective [2] | | 2 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| CHEM 1221 | Engineering General Chemistry Lab | 1 |
| CHEN 1203 | General Chemistry for Engineers 2 | 2 |
| BIEN 2810 | Biology for Engineers | 3 |
| PHYS 1110 | General Physics 1 | 4 |
| Humanities or Social Science Elective [2] | | 3 |
| | **Credit Hours** | **17** |
| **Year Two** | | |
| **Fall Semester** | | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| CHEM 3311 | Organic Chemistry 1 | 4 |
| CHEM 3321 | Laboratory in Organic Chemistry 1 | 1 |
| CHEN 2120 | Chemical Engineering Material and Energy Balances | 3 |
| BIEN 3800 or MCDB 2150 | Fundamentals of Biotechnology or Principles of Genetics | 3 |
| Free Elective [3] | | 3 |
| | **Credit Hours** | **18** |
| **Spring Semester** | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| CHEM 3331 | Organic Chemistry 2 | 4 |
| CHEM 3341 | Laboratory in Organic Chemistry 2 | 1 |
| CHEN 3200 | Chemical Engineering Fluid Mechanics | 3 |
| CHEN 4090 | Undergraduate Seminar | 1 |
| CHEN 4521 | Physical Chemistry for Engineers | 3 |
| | **Credit Hours** | **16** |
| **Year Three** | | |
| **Fall Semester** | | |
| CHEN 3010 | Applied Data Analysis | 3 |
| CHEN 3210 | Chemical Engineering Heat and Mass Transfer | 4 |
| CHEN 3320 | Chemical Engineering Thermodynamics 1 | 3 |
| College-Approved Writing Course [4] | | 3 |
| Humanities or Social Science Elective [2] | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| BCHM 4611 | Principles of Biochemistry | 3 |
| BIEN 4820 | Biochemical Separations | 3 |
| BIEN 4805 | Biomaterials | 3 |
| BIEN 4830 | Biokinetics and Reactor Design | 3 |
| Technical Elective [1, 3] | | 3 |
| Humanities or Social Science Elective [2] | | 3 |
| | **Credit Hours** | **18** |
| **Year Four** | | |
| **Fall Semester** | | |
| BIEN 4520 | Biological Process and Product Design | 3 |
| BIEN 4810 | Biological Engineering Laboratory | 3 |
| BIEN/CHEN Technical Elective [5] | | 3 |
| Technical Electives [1, 3] | | 6 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| BIEN 4530 | Biological Engineering Design Project | 2 |
| BIEN/CHEN Technical Elective [5] | | 3 |
| Technical Elective [1, 3] | | 3 |
| Focus Technical Elective [6] | | 3 |
| Humanities or Social Science Elective [2] | | 3 |
| | **Credit Hours** | **14** |
| | **Total Credit Hours** | **128** |

1. CHEN 1300 is an optional Engineering Technical Elective. If it is taken, one of the Technical Elective courses in this Plan of Study will only require 2 credits (instead of 3 credits).
2. Students may choose courses from the list of college-approved humanities and social sciences (HSS) electives (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/).
3. General Technical Electives and Free Electives must meet specific requirements. Visit the department's Current Students (https://www.colorado.edu/chbe/current-students/) webpage for more information.
4. Students may choose a course from the list of college-approved writing courses (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/).
5. BIEN/CHEN Technical Electives can be any BIEN or CHEN 3000+ course.
6. Focus Technical Electives can be any BIEN 4000+ course. These courses will be taught in alternating years and should be taken in the junior or senior year as available.

# Learning Outcomes

## Program Educational Objectives

The department prepares graduates to make significant contributions in many diverse areas. Specifically, within a few years of graduation our graduates will have achieved one or more of the following attributes:

- In their chosen field, be established in a professional career, be pursuing an advanced degree or be seeking advanced certification.
- Be recognized as successful in an academic, industrial, or entrepreneurial position.
- Be successfully working and contributing in a variety of technical fields.
- Be adapting to new technologies and changing professional environments.

## Student Outcomes

By the completion of the program, students will be able to:

- Identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics.
- Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.
- Communicate effectively with a range of audiences.

- Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.
- Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives.
- Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- Acquire and apply new knowledge as needed, using appropriate learning strategies.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BS in Biological Engineering, MS in Chemical Engineering

### Admissions Requirements

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.00 or higher.
- Have a minimum GPA of 3.00 in CHEN coursework.
- Have completed CHEN 2120, CHEN 3200, CHEN 3210, CHEN 3320 and CHEN 3010 prerequisite courses with grades of B- in each course.
- Have at least junior class standing.
- Provide a one-page statement of purpose. The statement should describes briefly your past work in the field, including non-course educational experiences, teaching, or other relevant employment, publication, theses, research in progress, other scholarly activities, and your plans for graduate study and a professional career.
- GRE.
- Provide an unofficial transcript.

### Program Requirements

Students may take up to and including 12 credit hours while in the undergraduate program which can later be used toward the master's degree. However, only six credit hours may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

## BS in Biological Engineering, Professional MS in Materials Science

### Admissions Requirements

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.25 or higher.
- Completion of the following five CHEN core courses with a minimum grade of B- in each course: CHEN 2120, CHEN 3200, CHEN 3210, CHEN 3320 and CHEN 3010.
- Be enrolled in BIEN 4805.
- Provide an unofficial transcript.

Students with a GPA below 3.25 (but above 3.00, the university minimum standard) may submit a petition with a letter of recommendation from a professor and a one-page statement of purpose. The statement should briefly describe the student's past work in the field, including any non-course educational experiences or other relevant employment, and the student's plans for graduate study and a professional career.

### Program Requirements

Students must declare a track in which to specialize. Students may take up to and including 12 hours while in the undergraduate program that satisfy the specialized track courses and/or the breadth elective courses, which can later be used toward the master's degree. However, only six credit hours may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

Please see the BAM degree program (https://www.colorado.edu/chbe/undergraduate-program/undergraduate-opportunities/) webpage for more information.

# Chemical Engineering - Bachelor of Science (BSCHE)

Alternative and renewable energy. Carbon capture and CO2 emissions reduction. Semiconductor and microprocessor fabrication. Novel nanomaterials and polymers. Plastic upcycling. Data science. Chemical engineers are on the front lines of all of these cutting-edge technologies.

Chemical engineering students at CU Boulder learn the skills necessary to address the energy, climate change and technology challenges of tomorrow. Learn from world-class faculty leveraging innovative, award-winning education practices and hands-on lab experiences. Benefit from department connections to the National Renewable Energy Laboratory, the BioFrontiers Institute, the Renewable and Sustainable Energy Institute and more.

# Requirements

## Prerequisites and Passing Grades

Unless otherwise specified, minimum passing grades for all courses that are prerequisites for other required courses is C-. If a grade of D+ or lower is received in a course which is a prerequisite to another, the student may not register for the subsequent course until the first grade has been raised to a C- or higher. In addition, CHEN core courses taken in a student's senior year also require a minimum grade of C-, even though they are not prerequisites.

Unless specified otherwise, the minimum passing grade for a course that is not specifically a prerequisite for another required course is D-.

Students may be dropped from courses if they do not meet the minimum prerequisite grade requirements. It is the student's responsibility to communicate with the department if summer coursework and/or transfer credit will be used to meet the prerequisite requirement.

## Required Courses

A total of 128 credit hours is required.

| Code | Title | Credit Hours |
|---|---|---|
| CHEN 1310 | Introduction to Engineering Computing | 3 |
| CHEN 2120 | Chemical Engineering Material and Energy Balances | 3 |
| BIEN 2810 | Biology for Engineers | 3 |
| or MCDB 1150 | Introduction to Cellular and Molecular Biology | |
| or EBIO 1220 | General Biology 2 | |
| CHEN 3010 | Applied Data Analysis | 3 |
| CHEN 3200 | Chemical Engineering Fluid Mechanics | 3 |
| or MCEN 3021 | Fluid Mechanics | |
| CHEN 3210 | Chemical Engineering Heat and Mass Transfer | 4 |
| CHEN 3220 | Chemical Engineering Separations | 3 |
| CHEN 3320 | Chemical Engineering Thermodynamics 1 | 3 |
| CHEN 4090 | Undergraduate Seminar | 1 |
| CHEN 4130 | Chemical Engineering Laboratory | 3 |
| or CHEN 4010 & CHEN 4020 | Chemical Engineering Senior Thesis 1 and Chemical Engineering Senior Thesis 2 | |
| CHEN 4330 | Kinetics and Reactor Design | 3 |
| CHEN 4440 | Chemical Engineering Materials | 3 |
| CHEN 4520 | Chemical Process Design | 3 |
| CHEN 4521 | Physical Chemistry for Engineers | 3 |
| CHEN 4530 | Chemical Engineering Design Project | 2 |
| CHEN 4570 | Process Dynamics and Control | 4 |

### Required Mathematics Courses

| Code | Title | Credit Hours |
|---|---|---|
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or MATH 1300 | Calculus 1 | |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| or MATH 2300 | Calculus 2 | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| or MATH 2400 | Calculus 3 | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| or MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |
| or MATH 2135 & MATH 3430 | Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations | |

### Required Science Courses

| Code | Title | Credit Hours |
|---|---|---|
| CHEM 1221 | Engineering General Chemistry Lab | 1 |
| or CHEM 1134 | Laboratory in General Chemistry 2 | |
| CHEN 1201 | General Chemistry for Engineers 1 (If a student completes CHEN 1211 instead of CHEN 1201 & CHEN 1203, then student must complete 2 additional credits as Free Electives) | 4 |
| or CHEN 1211 | Accelerated Chemistry for Engineers | |
| CHEN 1203 | General Chemistry for Engineers 2 (If a student completes CHEN 1211 instead of CHEN 1201 & CHEN 1203, then student must complete 2 additional credits as Free Electives) | 2 |
| or CHEN 1211 | Accelerated Chemistry for Engineers | |
| or CHEM 1133 | General Chemistry 2 | |
| CHEM 3311 | Organic Chemistry 1 | 4 |
| CHEM 3321 | Laboratory in Organic Chemistry 1 | 1 |
| CHEM 3331 | Organic Chemistry 2 | 4 |
| CHEM 3341 | Laboratory in Organic Chemistry 2 | 1 |
| PHYS 1110 | General Physics 1 | 4 |
| or PHYS 1115 | General Physics 1 for Majors | |
| PHYS 1120 | General Physics 2 | 4 |
| or PHYS 1125 | General Physics 2 for Majors | |
| PHYS 1140 | Experimental Physics 1 | 1 |
| **Advanced Chemistry Elective** | | **3** |
| Choose one of the following: | | |
| BCHM 4611 | Principles of Biochemistry | |
| CHEM 4011 | Modern Inorganic Chemistry | |
| CHEM 4531 | Physical Chemistry 2 | |

### Humanities, Social Sciences and Writing

Complete the College's Humanities, Social Sciences and Writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/) (18 credits total).

### Technical Electives

General Technical and Engineering Technical Electives must meet specific requirements (15 credits total). Visit the department's Current Students (https://www.colorado.edu/chbe/current-students/) webpage and consult the current advising guide.

### Free Electives

3 credits of Free Electives allowed.

# Modified Pathways

To follow a curricular pathway in a field of particular interest requires careful planning and course selection by student and advisor.

## Premed Path

This path is offered for students preparing for medical school. Since chemical engineering already requires most of the premed courses, it is a logical choice for students who desire an engineering degree and the opportunity to pursue a medical profession. For information on the premed path, visit the department's current students (http://

www.colorado.edu/chbe/academics/undergraduate-program/current-students/) webpage and consult the current advising guide.

# Recommended Four-Year Plan of Study

The standard curriculum is shown below. For more details, visit the department's Current Students (https://www.colorado.edu/chbe/current-students/) webpage.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| CHEN 1201 | General Chemistry for Engineers 1 | 4 |
| CHEN 1300 | Introduction to Chemical and Biological Engineering (Optional 1-Credit Technical Elective) [1] | 1 |
| CHEN 1310 | Introduction to Engineering Computing | 3 |
| COEN 1500 | CEAS First Year Seminar | 1 |
| Humanities or Social Science Elective [2] | | 2 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| CHEM 1221 | Engineering General Chemistry Lab | 1 |
| CHEN 1203 | General Chemistry for Engineers 2 | 2 |
| BIEN 2810 | Biology for Engineers | 3 |
| PHYS 1110 | General Physics 1 | 4 |
| Humanities or Social Science Elective [2] | | 3 |
| | **Credit Hours** | **17** |
| **Year Two** | | |
| **Fall Semester** | | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| CHEM 3311 | Organic Chemistry 1 | 4 |
| CHEM 3321 | Laboratory in Organic Chemistry 1 | 1 |
| CHEN 2120 | Chemical Engineering Material and Energy Balances | 3 |
| PHYS 1120 | General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| CHEM 3331 | Organic Chemistry 2 | 4 |
| CHEM 3341 | Laboratory in Organic Chemistry 2 | 1 |
| CHEN 3200 | Chemical Engineering Fluid Mechanics | 3 |
| CHEN 4090 | Undergraduate Seminar | 1 |
| CHEN 4521 | Physical Chemistry for Engineers | 3 |
| | **Credit Hours** | **16** |
| **Year Three** | | |
| **Fall Semester** | | |
| CHEN 3010 | Applied Data Analysis | 3 |
| CHEN 3210 | Chemical Engineering Heat and Mass Transfer | 4 |
| CHEN 3320 | Chemical Engineering Thermodynamics 1 | 3 |
| College-Approved Writing Course [3] | | 3 |
| Free Electives [5] | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| CHEN 3220 | Chemical Engineering Separations | 3 |
| CHEN 4330 | Kinetics and Reactor Design | 3 |
| CHEN 4440 | Chemical Engineering Materials | 3 |
| Advanced Chemistry Elective [4] | | 3 |
| Technical Elective [1, 5] | | 3 |
| Humanities or Social Science Elective [2] | | 3 |
| | **Credit Hours** | **18** |
| **Year Four** | | |
| **Fall Semester** | | |
| CHEN 4130 | Chemical Engineering Laboratory | 3 |
| CHEN 4520 | Chemical Process Design | 3 |
| CHEN/BIEN 3000+ Technical Elective [5] | | 3 |
| Technical Elective [1, 5] | | 3 |
| Humanities or Social Science Elective [2] | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| CHEN 4530 | Chemical Engineering Design Project | 2 |
| CHEN 4570 | Process Dynamics and Control | 4 |
| CHEN/BIEN 3000+ Technical Elective [5] | | 3 |
| Technical Elective [1, 5] | | 3 |
| Humanities or Social Science Elective [2] | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **128** |

1. CHEN 1300 is an optional Engineering Technical Elective. If it is taken, one of the Technical Elective courses in this Plan of Study will only require 2 credits (instead of 3 credits).
2. Students may choose courses from the list of college-approved humanities and social sciences (HSS) electives (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/).
3. Students may choose a course from the list of college-approved writing courses (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/).
4. Advanced Chemistry Electives include: Principles of Biochemistry (BCHM 4611, 3), Modern Inorganic Chemistry (CHEM 4011, 3), and Physical Chemistry 2 (CHEM 4531, 3).
5. General Technical Electives, Engineering Technical Electives, and Free Electives must meet specific requirements. Visit the department's Current Students (https://www.colorado.edu/chbe/current-students/) webpage for more information.

# Learning Outcomes

## Program Educational Objectives

The department prepares graduates to make significant contributions in many diverse areas. Specifically, within a few years of graduation our graduates will have achieved one or more of the following attributes:

- In their chosen field, be established in a professional career, be pursuing an advanced degree or be seeking advanced certification.
- Be recognized as successful in an academic, industrial, or entrepreneurial position.
- Be successfully working and contributing in a variety of technical fields.
- Be adapting to new technologies and changing professional environments.

### Student Outcomes

By the completion of the program, students will be able to:

- Identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics.
- Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.
- Communicate effectively with a range of audiences.
- Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.
- Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives.
- Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- Acquire and apply new knowledge as needed, using appropriate learning strategies.

## Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

### BS and MS in Chemical Engineering

#### Admissions Requirements

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.00 or higher.
- Have a minimum GPA of 3.00 in CHEN coursework.
- Students must have completed CHEN 2120, CHEN 3200, CHEN 3210, CHEN 3320 and CHEN 3010 prerequisite courses with grades of B- in each course.
- Have at least junior class standing.
- Completion of all MAPS requirements and no deficiencies remaining (students admitted to CU Boulder prior to Summer 2023 only).
- Provide a one-page Statement of Purpose. The statement should briefly describe your past work in the field, including non-course educational experiences, teaching, or other relevant employment, publication, theses, research in progress, other scholarly activities and your plans for graduate study and a professional career
- GRE.
- Provide an unofficial transcript.

#### Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only six credit hours may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

### BS in Chemical Engineering, Professional MS in Materials Science

#### Admissions Requirements

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.25 or higher.
- Completion of all MAPS requirements (students admitted to CU Boulder prior to Summer 2023 only).
- Completion of the following five CHEN core courses with a minimum grade of B- in each course: CHEN 2120, CHEN 3200, CHEN 3210, CHEN 3320 and CHEN 3010.
- Be enrolled in CHEN 4440.
- Provide an unofficial transcript.

Students with a GPA below 3.25 (but above 3.0, the university minimum standard) may submit a petition with a letter of recommendation from a professor and a one-page statement of purpose. The statement should briefly describe the student's past work in the field, including any non-course educational experiences or other relevant employment, and the student's plans for graduate study and a professional career.

#### Program Requirements

Students must declare a track in which to specialize. Students may take up to and including 12 hours while in the undergraduate program that satisfy the specialized track courses and/or the breadth elective courses, which can later be used toward the master's degree. However, only six credit hours may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

Please see the BAM degree program (https://www.colorado.edu/chbe/undergraduate-program/undergraduate-opportunities/) web page for more information.

## Biological Engineering - Minor

Biological engineers are instrumental in driving fields such as tissue engineering, personalized medicine, sustainable biofuels, pharmaceuticals, biotechnology, biomaterials and therapeutics. A biological engineering minor prepares students to approach these fields from a biochemical engineering perspective.

Students first complete fundamental courses on topics such as mass and energy balances and transport and then pick from a wide array of more advanced biological engineering classes to suite their individual interests.

A minor in biological engineering can be earned in conjunction with any CU Boulder engineering major.

# Requirements

## Course Requirements

The biological engineering minor requires a minimum of 18 credit hours, distributed as follows:

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CHEN 2120 | Chemical Engineering Material and Energy Balances | 3 |
| or BMEN 2100 | Biomedical Engineering Principles and Methods | |
| CHEN 3210 | Chemical Engineering Heat and Mass Transfer | 4 |
| or BMEN 3010 | Biotransport | |
| **Electives** | | |
| Choose 11-12 credits from any of the following: | | 11-12 |
| BCHM 4611 | Principles of Biochemistry | |
| BMEN 2010 | Biomaterials | |
| BIEN 3800 | Fundamentals of Biotechnology | |
| BIEN 4010 | Biological Engineering Senior Thesis 1 | |
| BIEN 4020 | Biological Engineering Senior Thesis 2 | |
| BIEN 4520 | Biological Process and Product Design | |
| BIEN 4530 | Biological Engineering Design Project | |
| BIEN 4801 | Pharmaceutical Biotechnology | |
| BIEN 4802 | Tissue Engineering and Biofabrication | |
| BIEN 4803 | Metabolic Engineering | |
| BIEN 4804 | Protein and Enzyme Engineering | |
| BIEN 4805 | Biomaterials | |
| BIEN 4806 | Immunoengineering | |
| BIEN 4810 | Biological Engineering Laboratory | |
| BIEN 4820 | Biochemical Separations | |
| BIEN 4830 | Biokinetics and Reactor Design | |
| BIEN 4838 | Special Topics in Biological Engineering | |
| **Total Credit Hours** | | **18-19** |

Additional guidelines regarding the requirements:

- Relevant independent study coursework can be petitioned.
- 5000-level BIEN courses are allowed where undergraduate students are eligible to enroll.
- Prior coursework may be transferred from other institutions with approval.
- At least 9 credit hours need to be taken on the CU Boulder campus, at least 6 credits of which must be at the upper-division level.

## Grade Requirements

A grade point average (GPA) of 2.000 or better is required in the courses that are used to satisfy the requirements for this minor. Each individual course that is counted towards these requirements must be passed with a C- or better.

# Plan(s) of Study

| | | |
|---|---|---|
| **Year Two** | | |
| **Fall Semester** | | **Credit Hours** |
| CHEN 2120 or BMEN 2000 | Chemical Engineering Material and Energy Balances or Introduction to Biomedical Engineering | 3 |
| | **Credit Hours** | **3** |
| **Year Three** | | |
| **Fall Semester** | | |
| CHEN 3210 or BMEN 3010 | Chemical Engineering Heat and Mass Transfer or Biotransport | 4 |
| Elective [1] | | 3 |
| | **Credit Hours** | **7** |
| **Spring Semester** | | |
| Elective [1] | | 3 |
| | **Credit Hours** | **3** |
| **Year Four** | | |
| **Fall Semester** | | |
| Elective [1] | | 3 |
| | **Credit Hours** | **3** |
| **Spring Semester** | | |
| Elective [1] | | 2 |
| | **Credit Hours** | **2** |
| | **Total Credit Hours** | **18** |

[1] This is a sample distribution of electives. A total of at least 11 credit hours of approved electives must be completed for the minor and the actual distribution may look different depending on actual courses chosen.

# Chemical Engineering - Minor

The chemical engineering minor provides students with a foundational set of tools to tackle the world's energy and climate change challenges from a new perspective. From materials and microelectronics to alternative energy, chemical engineers have the technical background to provide sustainable solutions.

Upon taking select core chemical engineering classes including separations and heat & mass transfer, students can pick from more advanced chemical engineering electives based on their interests.

A minor in chemical engineering can be earned in conjunction with any CU Boulder engineering major.

# Requirements

## Course Requirements

The chemical engineering minor requires a minimum of 18 credit hours, distributed as follows:

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CHEN 2120 | Chemical Engineering Material and Energy Balances | 3 |
| CHEN 3210 | Chemical Engineering Heat and Mass Transfer | 4 |
| CHEN 3320 | Chemical Engineering Thermodynamics 1 | 3 |
| CHEN 3220 | Chemical Engineering Separations | 3 |
| **Electives** | | |
| Choose five credits from any of the following: | | 5 |
| CHEN 1300 | Introduction to Chemical and Biological Engineering | |
| CHEN 3660 | Energy Fundamentals | |
| CHEN 4130 | Chemical Engineering Laboratory | |
| CHEN 4440 | Chemical Engineering Materials | |
| CHEN 4450 | Polymer Chemistry | |
| CHEN 4460 | Polymer Engineering | |
| CHEN 4480 | Solar Cells and Optical Devices for Sustainable Buildings | |
| CHEN 4490 | Electrochemical Engineering | |
| CHEN 4520 | Chemical Process Design | |
| CHEN 4530 | Chemical Engineering Design Project | |
| CHEN 4570 | Process Dynamics and Control | |
| CHEN 4630 | Intellectual Property Law and Engineering | |
| CHEN 4650 | Particle Technology | |
| CHEN 4836 | Nanomaterials | |
| CHEN 4838 | Special Topics in Chemical Engineering | |
| **Total Credit Hours** | | **18** |

Additional guidelines regarding the requirements:

- Relevant independent study coursework can be petitioned.
- 5000-level CHEN courses are allowed where undergraduate students are eligible to enroll.
- Prior coursework may be transferred from other institutions with approval.
- At least 9 credit hours need to be taken on the CU Boulder campus, at least 6 credits of which must be at the upper-division level.

### Grade Requirements

A grade point average (GPA) of 2.000 or better is required in the courses that are used to satisfy the requirements for this minor. Each individual course that is counted towards these requirements must be passed with a C- or better.

## Plan(s) of Study

| | | |
|---|---|---|
| **Year Two** | | |
| **Fall Semester** | | **Credit Hours** |
| CHEN 2120 | Chemical Engineering Material and Energy Balances | 3 |
| | **Credit Hours** | **3** |
| **Year Three** | | |
| **Fall Semester** | | |
| CHEN 3210 | Chemical Engineering Heat and Mass Transfer | 4 |
| CHEN 3320 | Chemical Engineering Thermodynamics 1 | 3 |
| | **Credit Hours** | **7** |
| **Spring Semester** | | |
| CHEN 3220 | Chemical Engineering Separations | 3 |
| | **Credit Hours** | **3** |
| **Year Four** | | |
| **Fall Semester** | | |
| Elective [1] | | 3 |
| | **Credit Hours** | **3** |
| **Spring Semester** | | |
| Elective [1] | | 2 |
| | **Credit Hours** | **2** |
| | **Total Credit Hours** | **18** |

[1] This is a sample distribution of electives. A total of at least 5 credit hours of approved electives must be completed for the minor and the actual distribution may look different depending on actual courses chosen.

# Civil, Environmental & Architectural Engineering

## Civil Engineering

Civil engineering offers a wide range of careers for students interested in the planning, design and construction management of facilities essential to modern life in both the public and private sectors. Varying widely in nature, size and scope, such facilities include buildings, bridges, tunnels, highways, transit systems, dams, airports, irrigation projects, water treatment and distribution facilities, waste treatment and processing facilities, structures for space exploration and offshore engineering designs applications. This course of study fulfills the academic requirements for registration as a professional engineer.

In the coming decades, almost two billion more people will populate earth in both developed and developing countries. This growth will create unprecedented demands and opportunities for new methods and innovations in energy production, food supply, land development, water treatment, transportation systems, materials processing, waste disposal, healthcare delivery, environmental preservation and structural designs. Civil engineers play both direct and indirect roles in meeting many of these needs, with the goal of providing and improving the quality and infrastructure of life.

## Environmental Engineering

Environmental engineering plays a vital role in maintaining the quality of both public health and the natural environment. Environmental engineering encompasses the scientific assessment and development of sustainable engineering solutions to environmental problems impacting the biosphere and land, water and air quality. Environmental issues affect almost all commercial and industrial sectors, and are a central concern for the public, for all levels of government and in international

relations. This course of study fulfills the academic requirements for registration as a professional engineer.

In common with other engineering fields, courses in solid mechanics, fluid dynamics and thermal sciences are central to the environmental engineering degree. Coursework specific to environmental engineering includes environmental chemistry and microbiology, as well as treatment processes and approach.

# Architectural Engineering

Architectural engineering prepares students for leadership careers in the building design, consulting, construction and management industry and for research at the graduate level on building- and sustainability-related topics. In particular, the architectural engineering program prepares students to design, build and operate facilities that improve our quality of life. This course of study fulfills the academic requirements for registration as a professional engineer.

The architectural engineering curriculum is recommended for those wishing to specialize within the building industry in engineering design (heating, cooling, illumination, electrical, solar and structures) or construction and contracting (facilities management). Architectural engineering students may select from several focus areas, including: electrical systems; lighting systems; heating, ventilating and air conditioning (HVAC) systems; materials and structural systems; construction engineering and management.

**Course codes for these programs are AREN, CVEN and EVEN.**

# Bachelor's Degrees

- Architectural Engineering - Bachelor of Science (BSARE) (p. 900)
- Civil Engineering - Bachelor of Science (BSCV) (p. 904)
- Environmental Engineering - Bachelor of Science (BSEV) (p. 907)

# Minors

- Architectural Engineering - Minor (p. 911)
- Civil Engineering - Minor (p. 912)
- Sustainability Engineering - Minor (p. 912)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Amadei, Bernard (https://experts.colorado.edu/display/fisid_105978/)
Professor Emeritus; PhD, University of California, Berkeley

Amy, Gary L.
Professor Emeritus

Arehart, Joseph Hoberg (https://experts.colorado.edu/display/fisid_164349/)
Assistant Teaching Professor; BS, University of Colorado Boulder

Ayer, Steven
Associate Professor; PhD, Pennsylvania State University

Baker, Kyri A. (https://experts.colorado.edu/display/fisid_159754/)
Associate Professor; PhD, Carnegie Mellon University

Balaji, Rajagopalan (https://experts.colorado.edu/display/fisid_118480/)
Professor, Associate Chair; PhD, Utah State University

Becker, William
Scholar in Residence; PhD, The Johns Hopkins University

Behzadan, Amir
Professor; PhD, University of Michigan Ann Arbor

Bhaskar, Aditi
Associate Professor; Ph.D, University of Maryland, Baltimore County

Bielefeldt, Angela R. (https://experts.colorado.edu/display/fisid_110322/)
Professor; PhD, University of Washington; P.E.

Bolhari, Azadeh (https://experts.colorado.edu/display/fisid_167399/)
Associate Teaching Professor; PhD, Colorado State University

Brandemuehl, Michael J. (https://experts.colorado.edu/display/fisid_102573/)
Professor Emeritus; PhD, University of Wisconsin-Madison

Celoza, Amelia (https://experts.colorado.edu/display/fisid_172038/)
Assistant Professor; Ph.D., University of Texas at Austin

Cook, Sherri M. (https://experts.colorado.edu/display/fisid_154773/)
Associate Professor; PhD, University of Michigan Ann Arbor

Corotis, Ross B. (https://experts.colorado.edu/display/fisid_100942/)
Professor Emeritus; PhD, Massachusetts Institute of Technology

Crimaldi, John P. (https://experts.colorado.edu/display/fisid_115733/)
Professor; PhD, Stanford University

Dashti, Shideh (https://experts.colorado.edu/display/fisid_148493/)
Associate Professor; PhD, University of California, Berkeley

Davis, Robert
Scholar in Residence; PhD, University of Colorado Boulder

DiLaura, David L.
Professor Emeritus

Dow, John O.
Associate Professor Emeritus

Frangopol, Dan M.
Professor Emeritus

Gooseff, Michael N. (https://experts.colorado.edu/display/fisid_155922/)
Professor; PhD, University of Colorado Boulder

Gupta, Vijay
Professor Emeritus

Halek, Milan F.
Senior Instructor Emeritus

Hallowell, Matthew Ryan (https://experts.colorado.edu/display/fisid_146163/)
Professor; PhD, Oregon State University

Hearn, George (https://experts.colorado.edu/display/fisid_101059/)
Associate Professor; PhD, Columbia University

Henze, Gregor P. (https://experts.colorado.edu/display/fisid_146496/)
Professor; PhD, University of Colorado Boulder

Hernandez, Mark T. (https://experts.colorado.edu/display/fisid_107635/)
Professor, Lecturer; PhD, University of California, Berkeley

Hubler, Mija H. (https://experts.colorado.edu/display/fisid_155134/)
Associate Professor; PhD, Northwestern University

Javernick-Will, Amy N. (https://experts.colorado.edu/display/fisid_146430/)
Professor; PhD, Stanford University

Kasprzyk, Joseph R. (https://experts.colorado.edu/display/fisid_151506/)
Associate Professor, Associate Chair; PhD, Pennsylvania State University

Klees, Rita C. (https://experts.colorado.edu/display/fisid_145391/)
Associate Faculty Director, Scholar in Residence; PhD, University of Colorado

Ko, Hon-Yim
Professor Emeritus

Korak, Julie A. (https://experts.colorado.edu/display/fisid_155070/)
Assistant Professor; PhD, University of Colorado Boulder

Krarti, Moncef (https://experts.colorado.edu/display/fisid_104154/)
Professor; PhD, University of Colorado Boulder

Liel, Abbie B. (https://experts.colorado.edu/display/fisid_146431/)
Professor; PhD, Stanford University

Linden, Karl G. (https://experts.colorado.edu/display/fisid_143747/)
Professor, Chair; PhD, University of California, Davis

Livneh, Ben (https://experts.colorado.edu/display/fisid_151999/)
Associate Professor; PhD, University of Washington

Madabhushi, Srikanth (https://experts.colorado.edu/individual/fisid_165826/)
Assistant Professor; PhD, University of Cambridge (England)

Mansfeldt, Cresten (https://experts.colorado.edu/display/fisid_165411/)
Assistant Professor; PhD, Cornell University

Masters, Sheldon (https://experts.colorado.edu/display/fisid_168570/)
Assistant Professor; PhD, Virginia Polytechnic Institute and State University

McKnight, Diane M. (https://experts.colorado.edu/display/fisid_110517/)
Professor; PhD, Massachusetts Institute of Technology

Molenaar, Keith Robert (https://experts.colorado.edu/display/fisid_102373/)
Professor, Dean; PhD, University of Colorado Boulder

Morris, Matthew R. (https://experts.colorado.edu/display/fisid_150037/)
Teaching Professor; MS, University of Colorado Boulder

Neupauer, Roseanna M. (https://experts.colorado.edu/display/fisid_134747/)
Professor; PhD, New Mexico Institute of Mining and Technology

Pak, Ronald Y.S. (https://experts.colorado.edu/display/fisid_105977/)
Professor; PhD, California Institute of Technology

Pourahmadian, Fatemeh (https://experts.colorado.edu/display/fisid_158562/)
Assistant Professor; PhD, University of Minnesota

Regueiro, Richard A. (https://experts.colorado.edu/display/fisid_134705/)
Professor, Associate Chair; PhD, Stanford University

Rosario-Ortiz, Fernando L. (https://experts.colorado.edu/display/fisid_146165/)
Director, Professor; DEnv, University of California, Los Angeles

Ryan, Joseph N. (https://experts.colorado.edu/display/fisid_101037/)
Professor; PhD, Massachusetts Institute of Technology

Salvinelli, Carlo (https://experts.colorado.edu/display/fisid_159846/)
Assistant Teaching Professor; PhD, Missouri University of Science and Technology

Saouma, Victor E. (https://experts.colorado.edu/display/fisid_100429/)
Professor Emeritus; PhD, Cornell University

Scheib, Jennifer G. (https://experts.colorado.edu/display/fisid_159887/)
Assistant Teaching Professor; MS, University of Colorado Boulder

Senseney, Christopher (https://experts.colorado.edu/individual/fisid_166693/)
Associate Teaching Professor; PhD, Colorado School of Mines

Sholtes, Joel Stephen (https://experts.colorado.edu/display/fisid_164757/)
Assistant Teaching Professor; PhD, Colorado State University

Sholtes, Kari A. (https://experts.colorado.edu/display/fisid_164995/)
Assistant Teaching Professor; MS, University of North Carolina Chapel Hill

Silverstein, JoAnn (https://experts.colorado.edu/display/fisid_101482/)
Professor Emeritus; PhD, University of California, Davis

Song, Jeong-Hoon (https://experts.colorado.edu/display/fisid_154468/)
Associate Professor; PhD, Northwestern University

Srubar, Wil V. III (https://experts.colorado.edu/display/fisid_153058/)
Professor; PhD, Stanford University

Straub, Anthony (https://experts.colorado.edu/display/fisid_165027/)
Assistant Professor; PhD, Yale University

Strzepek, Kenneth M.
Professor Emeritus

Sture, Stein
Professor Emeritus

Summers, Scott R. (https://experts.colorado.edu/display/fisid_113151/)
Professor Emeritus; PhD, Stanford University

Techera, Ulises (https://experts.colorado.edu/display/fisid_163403/)
Associate Teaching Professor; PhD, University of Colorado, Boulder

Thomas, Evan (https://experts.colorado.edu/display/fisid_163895/)
Professor, Assistant Professor; PhD, University of Colorado Boulder

Torres-Machi, Cristina (https://experts.colorado.edu/display/fisid_159884/)
Assistant Professor; PhD, Universitat Politecnica de Valencia, Spain

Vàsconez, Sandra L. (https://experts.colorado.edu/display/fisid_144198/)
Teaching Professor; MA, University of Denver

William, Kaspar J.
Professor Emeritus

Xi, Yunping (https://experts.colorado.edu/display/fisid_110518/)
Professor; PhD, Northwestern University

Zhai, John Z. (https://experts.colorado.edu/display/fisid_130604/)
Professor; PhD, Massachusetts Institute of Technology

Zhang, Yida (https://experts.colorado.edu/display/fisid_158222/)
Associate Professor; PhD, Northwestern University

# Courses

## Architectural Engineering

**AREN 1027 (3) Engineering Drawing**
Introduces engineering drawing including sections and dimensioning, print readings, computer 3D, and building information modeling (BIM).
**Requisites:** Restricted to Engineering Physics (EPEN), Architectural (AREN), Integrated Design Engineering (IDEN) or Civil (CVEN) Engineering majors only and to IUT On Track students.
**Additional Information:** Departmental Category: Miscellaneous

**AREN 1316 (1) Introduction to Architectural Engineering**
Surveys the broad subject of architectural engineering and professional practices. Includes professional design services, design documents, methods of construction delivery, materials for construction, codes and standards, life safety, professional ethics, structural systems, mechanical systems, electrical systems, and building systems integration.
**Requisites:** Restricted to students with 0-56 (Freshmen or Sophomore) College of Engineering majors only.
**Additional Information:** Departmental Category: Miscellaneous

**AREN 2050 (3) Building Materials and Systems**
Covers the broad subject of building materials and systems. Includes a practical approach to assembly details, methods of construction, codes, foundations, steel, concrete, masonry, cladding, doors and windows, interiors, finishes, mechanical, plumbing, electrical, life safety and conveyance. Includes investigation of an existing facility along with a team presentation trends in commercial building construction.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) Civil (CVEN) or Architectural (AREN) or Integrated Design Engineering (IDEN) or Applied Mathematics (AMEN) majors or IUT On Track students only.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 2110 (3) Thermodynamics**
Explores fundamental principles of thermodynamics, including first and second law of thermodynamics, thermophysical properties, power and refrigeration cycles, gas mixtures and psychrometrics.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 3012 or GEEN 3852
**Requisites:** Requires a prereq course of PHYS 1110 (min grade C-) and a prereq or coreq course of APPM 1360 or MATH 2300 (min grade C-). Restricted to AREN, CVEN, EVEN, IDEN, or AMEN majors or to IUT On Track students only.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Building Systems Engineering

**AREN 2120 (3) Fluid Mechanics and Heat Transfer**
Explores fundamental principles of fluid mechanics and heat transfer. Topics include fluid statics, momentum and energy conservations; laminar and turbulent viscous flows; conduction, convection and radiation heat transfer. Emphasizes topics and problems that are important to Architectural Engineers including flow of fluids in pipes and ducts, heat transfer in buildings and building systems.
**Requisites:** Requires prereq or coreq of (APPM 2350 or MATH 2400) (APPM 2360 or (MATH 2130 3430)) prereq course (AREN 2110 or GEEN 3852 or MCEN 3012 or ASEN 2002 or ASEN 2702) (all min grade C-).Restricted to Coll of Engineering mjrs IUT on track students onl
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 2121 (1) Heat Transfer**
This is an elective course for students who want to obtain an AREN BS degree and have taken Fluid Mechanics course but not heat transfer. This course will fulfill their curriculum requirement and allow them to take the following courses that require heat transfer knowledge. Previously offered as a special topics course.
**Requisites:** Requires prereq or coreq courses (APPM 2350 or MATH 2400) (APPM 2360 or (MATH 2130 3430)) prerequisite course (AREN 2110 or GEEN 3852 or MCEN 3012 or ASEN 2002 or ASEN 2702) (all minimum grade C-). Restricted to College of Engineering majors only

**AREN 2830 (1-3) Special Topics**
Supervised study of special topics of interest to students under instructor guidance.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: Special Topics

**AREN 3010 (3) Energy Efficient Buildings**
Lecture course on the analysis and design of buildings and their systems to satisfy the requirements for a comfortable and healthy indoor environment. Examines psychometrics, thermal comfort, building heating and cooling loads, fluid flow basics, and HVAC components and systems.
**Requisites:** Requires prerequisite courses of AREN 2050 and (AREN 2120 or ((MCEN 3022 or AREN 2121) and (CVEN 3313 or MCEN 3021 or CHEN 3200))) (all minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 3040 (3) Circuits for Architectural Engineers**
This course will cover the basics of DC and AC circuit theory relevant to the modeling, design, and control of residential and commercial building systems, including Kirchoff's laws, Thevenin/Norton theorems, transient analysis of DC systems, three phase analysis, induction and synchronous motors, AC power (including real and reactive power analysis), power factor correction, and transformers.
**Requisites:** Requires prerequisite courses of (APPM 2360 or (MATH 2130 and 3430)) and PHYS 1120 (all minimum grade C-). Restricted to AREN, CVEN, and EVEN majors only.

**AREN 3080 (3) Architectural Design Studio 1**
Learn about the fundamentals of architectural design and the ways in which it compliments architectural engineering. This introductory studio welcomes students to explore the strategies and techniques through which architects design and communicate. As a studio, the course culminates in a small-scale architecture project through which students will explore and become trained in the architectural design process.
**Requisites:** Requires prerequisite of AREN 1027 (minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) College of Engineering majors only.

**AREN 3140 (3) Illumination Laboratory**
Introduces the measurement of photometric and psychophysical quantities used in lighting. Experience is acquired in using light measurement instruments to evaluate lighting equipment and luminous environments. Taught intermittently.
**Requisites:** Requires prerequisite course of AREN 3540 (minimum grade C-).
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 3430 (3) Architectural (Interior) Lighting Design**
Studies the fundamentals of architectural illumination with an emphasis in design and application. Introduces and applies basic principles and vocabulary to problems in the lighting of interior environments for the performance of visual work, the proper interaction with architecture, and compliance of energy requirements.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only. College of Engineering majors are excluded from this course.

**AREN 3440 (3) Architectural Daylighting Design**
Enables students to develop sufficient working facility with the core principles and practices of architectural daylighting to allow for meaningful integration into future design work. Students work in active project-based environments to explore both quantitative and qualitative aspects of primary daylighting issues and precepts. Previously offered as a special topics course.
**Requisites:** Restricted to junior and above non-engineering majors only.
**Recommended:** Prerequisite AREN 3430.

**AREN 3540 (3) Illumination I**
Studies the fundamentals of architectural illumination. Introduces and applies basic principles and vocabulary to elementary problems in the lighting of environments for the performance of visual work and the proper interaction with architecture.
**Requisites:** Requires prerequisite courses of (CSCI 1200 or CHEN 1310 or CSCI 1300 or ASEN 1320 or ECEN 1310) and (APPM 2350 or MATH 2400) (all minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4010 (3) Energy System Modeling and Control**
Engineering course devoted to building automation and control systems. Topics include HVAC control technology and strategies, measurement and device technologies, analysis and modeling of dynamic systems, simulation of conventional and advanced control approaches, assessment of control loop performance and hands-on direct digital control (DDC) programming exercises as used in current building control practice.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5010
**Requisites:** Requires prerequisite course of AREN 4110 (minimum grade C-).
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4040 (3) Building Energy Audits**
Provides students with the fundamental tools and procedures required to perform energy audits of building systems typically required for energy efficiency projects including performance contracting and retro-commissioning projects.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5020
**Requisites:** Requires prerequisite course of AREN 3010 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).

**AREN 4061 (3) Distributed Electricity Generation**
Introduces basic distributed generation (DG) technologies including fuel-based systems and renewable energy technologies and overview approaches to conduct energy, economical, and environmental analysis of selected DG technologies using state-of-the-art analysis tools to evaluate optimal hybrid distributed generation systems to meet required electrical loads specific to urban centers, campuses, and residential communities.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5061
**Requisites:** Requires prerequisite course of AREN 3010 (minimum grade C-). Restricted to juniors and seniors.
**Grading Basis:** Letter Grade

**AREN 4110 (3) Building Energy Systems Engineering**
Prepares students for professional practice in building energy systems engineering, i.e., analysis and design of residential and commercial buildings, including district energy systems. Upon completion, students possess the skills to calculate heating, cooling, and ventilation requirements, as well as analyze, design, and evaluate integrated building energy systems to meet the following goals: indoor environmental health, safety, and productivity (codes and standards); economic drivers (affordability, life cycle cost), and societal needs (environmental equity, energy justice, decarbonization).
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5110
**Requisites:** Requires prerequisite course of AREN 3010 (minimum grade C-).
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4130 (3) Optical Design for Illumination and Solid State Lighting**
Covers the optical design process for illumination-based optics, emphasis on applications in architectural lighting. In-depth coverage of luminaire photometry, lamps, materials, manufacturing methods, product performance requirements. Projects utilize optical design software and include a variety of lamp types including LEDs using both reflector/lens optics.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5130
**Requisites:** Requires prerequisite course of AREN 3540 (minimum grade C-). Restricted to Architectural (AREN) or Civil (CVEN) Engineering majors only.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4315 (3) Design of Masonry Structures**
Covers modern masonry construction; properties and behavior of the reinforced masonry component materials, clay and concrete masonry units, mortar, grout, and steel reinforcement; vertical and lateral load types and intensities; and design of reinforced masonry walls, beams and columns by the strength design method.
**Requisites:** Requires prerequisite course of CVEN 3525 (minimum grade C-).
**Additional Information:** Departmental Category: Structures

**AREN 4318 (5) Architectural Engineering Design 1**
Provides a capstone experience to AREN students. Students design a modest commercial building and complete an integrated engineering design of the building systems executed for the conceptual and schematic design phases. Students' teams work on structural, mechanical, electrical/lighting, and construction engineering management design. Each stage produces a professional-quality design document. Faculty and industry mentors participate in the teaching and evaluation.
**Requisites:** Requires prerequisites of AREN 3080, AREN 4110, AREN 4506 and AREN 4550. Requires prerequisite or corequisite of AREN 4570 and (CVEN 4545 or 4555) (all minimum grade C-).

**AREN 4319 (2) Architectural Engineering Design 2**
Continues the capstone experience for AREN students. Student teams continue their design of a modest commercial building through the Design Development phase with support from faculty and industry mentors. Additionally, topics of professionalism, engineering ethics, and life-long learning are covered.
**Requisites:** Requires prerequisites of AREN 4318 (minimum grade C-).

**AREN 4440 (3) Lighting Design Capstone**
Synthesizes and applies knowledge and skills from previous lighting design courses in the Lighting Design Certificate. Students work on a real-world lighting design project following industry-standard phases of design while learning about lighting design professional practice, current design topics, trends, and industry issues.
**Requisites:** Requires prerequisites of AREN 3430 and (AREN 4530 or AREN 4620 or THTR 3055) (all minimum grade C-). Restricted to students in the Lighting Design Certificate (LGHT-CERU plan).

**AREN 4506 (3) Pre-construction Estimating and Scheduling**
Covers project management estimating and scheduling methods with an emphasis on the techniques used to create pre-construction estimates and schedules for architectural and civil engineering projects.
**Requisites:** Requires prerequisite course of CVEN 3246 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Architectural (AREN), Civil (CVEN) or Integrated Design (IDEN) Engineering majors only.
**Additional Information:** Departmental Category: Construction

**AREN 4540 (3) Architectural Exterior and Landscape Lighting Design**
Introduces the fundamentals of nighttime illumination for architectural exteriors and landscapes. Students will learn about the interaction of light and human vision at night; lighting technologies used in outdoor settings; societal, environmental and ecological issues related to the application of light at night; lighting design principles and techniques that use light and darkness both creatively and responsibly.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5540
**Requisites:** Requires prerequisite course of AREN 3430 (minimum grade C-). Restricted to junior and above non-engineering majors only.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4550 (3) Illumination 2**
Applies the principles studied in Illumination 1. Provides further study in architectural lighting design methods. Uses lighting studio work to develop a broad knowledge of lighting equipment, design methods, and their application in a series of practical design problems in modern buildings.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5550
**Requisites:** Requires prerequisite course of AREN 3540 (minimum grade C-).
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4560 (3) Luminous Radiative Transfer**
Teaches fundamentals of radiative exchange as applied to illumination engineering. Describes and uses principal numerical techniques for radiative transfer analysis. Applies techniques to lighting design and analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5560
**Requisites:** Requires prerequisite course of AREN 3540 (minimum grade C-).
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4570 (3) Building Electrical Systems Design 1**
Introduces the generation and distribution of electrical power. Focuses on understanding the loads, control, and protection of secondary electrical distribution systems in building. Applies the national electric code to residential and commercial buildings.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5570
**Requisites:** Requires prerequisite of AREN 3040 or ECEN 2250 or MCEN 3017 or GEEN 3010 (all minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4580 (3) Daylighting**
Applies the fundamental principles of illumination engineering to architectural daylighting design, exploring the quantitative methods and tools used to develop daylighting designs and evaluate their performance. Topics include solar resource models, energy transfer models, design methods, and controls for integration with electric lighting systems.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5580
**Requisites:** Requires prerequisite courses of AREN 4130 and AREN 4550 (minimum grade C-).
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4590 (3) Computer Graphics in Lighting Engineering**
Studies the numerical methods and computer implementation of computer graphics visualization for architectural lighting engineering and design. Implements finite element radiative transfer and ray-tracing in computer programs. Studies the use of computer graphics visualization in lighting analysis. Taught intermittently.
**Requisites:** Requires prerequisite courses of AREN 3540 and AREN 4560 (minimum grade C-).
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4606 (3) Construction Project Execution and Control**
Integrates project execution and control techniques for construction scope, cost and schedule. Includes progress measurement, resource planning, earned value methods, productivity, risk management methods and key contract clauses.
**Requisites:** Requires prerequisite courses of CVEN 3246 and AREN 4506 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Civil (CVEN), Architectural (AREN) or Integrated Design (IDEN) Engineering majors only.
**Additional Information:** Departmental Category: Construction

**AREN 4620 (3) Adaptive Lighting Systems**
Builds on architectural lighting principles studied in Illumination 1 and 2. Explores quantitative methods and the design process to develop architectural lighting control solutions. Topics include adaptive lighting applications such as daylight integration and occupant well-being, as well as control system architecture and components, codes and standards, and design implementation.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5620
**Requisites:** Requires prerequisites AREN 3540 and AREN 4550 (both minimum grade C-), or prerequisite of AREN 3430 (minimum grade C-) for students in the LGHT-CERU program.
**Recommended:** Prerequisite AREN 4130.

**AREN 4630 (3) Advanced Lighting Design**
Intended to help students understand light as a medium in design, begin the formulation of a philosophical perspective for its application, and continue to develop the skills required to design and implement lighting systems. Knowledge from previous lighting classes (Illumination I and Illumination II) is essential to this course. Formerly AREN 4530.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5630
**Requisites:** Requires prerequisite courses of (AREN 3540 and AREN 4550) (all minimum grade C-) or AREN 3430 (minimum grade C-). Restricted to AREN majors or students in the Lighting Design Certificate (LGHT-CERU).
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4830 (1-3) Special Topics for Seniors/Grads**
Supervised study of special topics of interest to students under instructor guidance.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: Special Topics

**AREN 4849 (1-3) Independent Study**
Offers an independent, in-depth study, research or design in a selected area of architectural engineering. Offerings are coordinated with individual faculty. Students should consult the Department of Civil, Environmental, and Architectural Engineering.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Special Topics

**AREN 4890 (3) Sustainable Building Design**
Introduces green building design procedure/approach and provides insight into evolving design principles; explores aspects of building thermal/energy performance, indoor/outdoor environmental quality, occupant comfort and climate relevant to building design (structures not covered); emphasizes both comprehensive understanding and practical applications of sustainable building design strategies; applies prevailing simulation tools to assist green building design.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5890
**Requisites:** Requires a prerequisite course of AREN 3010 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) College of Engineering students only.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4990 (3) Compu Fluid Dynamics (CFD) Analysis for Built/Natural Envmnts**
Explores the fundamentals of simulating/analyzing civil and architectural environments with Computational Fluid Dynamics (CFD) method. Run with two parallel sessions: fundamentals and applications, with fundamental lectures presenting the principles of CFD technologies, and application sessions demonstrating the application of CFD for resolving building and environmental engineering problems (different than MCEN/ASEN) with hands-on exercises.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5990
**Requisites:** Requires prerequisite courses of AREN 2120 and (APPM 2360) or (MATH 2130 and 3430)) (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) College of Engineering majors only.
**Additional Information:** Departmental Category: Building Systems Engineering

## Civil Engineering

**CVEN 1027 (3) Civil Engineering Drawing**
Develops drawing and drafting skills for civil engineering projects in both hand drawing and software tools. Students will learn to read and interpret design and construction drawings.
**Requisites:** Restricted to Civil Engineering (CVEN) majors and IUT on track students only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 1317 (1) Introduction to Civil and Environmental Engineering**
Surveys the broad subject of civil and environmental engineering and professional practice. Includes the subdisciplines of structures, water resources, geotechnics, transportation, environment, and construction. Discusses professional ethics, important skills for engineers, and the engineering design process as it fulfills multiple objectives.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) College of Engineering majors only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 1837 (1-3) Special Topics**
Supervised study of special topics of interest to student under instructor guidance.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 2012 (3) Introduction to Geomatics**
Presents basic techniques of land and construction surveying, including measurement of position, elevation, orientation and length of lines, area, volume and layout calculations. Optical, GPS and GIS equipment and methods are included.
**Requisites:** Restricted to Architectural (AREN) or Civil (CVEN) or Integrated Design (IDEN) Engineering majors and IUT on track students only.
**Additional Information:** Departmental Category: Surveying and Transportation

**CVEN 2017 (1) Excel Matlab R Primer**
Introduces basic usage of Excel, Matlab, and R software programs. Includes overview of fundamental operations such as data input and output, arithmetic, graphics, and programming syntax; more specific operations such as algebraic functions, linear algebra, plotting, loops, conditional statements, statistics and data analysis. Students will complete a final programming project with one of the software programs.
**Requisites:** Requires prerequisite course of CSCI 1200 or CHEN 1310 or CSCI 1300 or ECEN 1310 (all minimum grade C-). Restricted to College of Engineering majors or IUT on track students only.
**Recommended:** Corequisite APPM 2360.

**CVEN 2121 (3) Analytical Mechanics 1**
Applies mechanics to the study of static equilibrium of rigid and elastic bodies. Includes composition/resolution of forces; moments/couples; equivalent force systems; free-body diagrams; equilibrium of particles and rigid bodies; forces in trusses/beams; frictional forces; first/second moments of area; moments and products of inertia.
**Equivalent - Duplicate Degree Credit Not Granted:** GEEN 2851 and MCEN 2023
**Requisites:** Requires a prereq course of PHYS 1110 (min grade C-). Requires a prereq or coreq course of APPM 2350 or MATH 2400 (min grade C-). Restricted CVEN or EVEN or AREN or AMEN or EPEN or IDEN majors with a CIV, ENR or ARC subplan or IUT on track students.
**Additional Information:** Departmental Category: Mechanics

**CVEN 2545 (3) Construction Materials**
Introduce material science of engineering materials, such as atomic and crystal structures, defects, and phase diagrams; discusses in details three construction materials: Portland cement concrete, metals, and asphalts including classification and composition, engineering properties, and testing methods. Covers basic information of two materials: fiber reinforced polymers and wood.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) College of Engineering students only.
**Recommended:** Prerequisite CVEN 2121.
**Grading Basis:** Letter Grade

**CVEN 2837 (1-3) Special Topics**
Supervised study of special topics of interest to student under instructor guidance.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 2909 (3) Introduction to Global Sustainability**
This course introduces engineering and non-engineering students to basic definitions and principles of sustainability (i.e., environment, economy, society) and the historical context regarding modern social and technical sustainability challenges as they pertain to population growth and climate change. The course places an emphasis on identifying the drivers, determinants and solutions favoring equitable access to water, sanitation, energy, food, transportation and shelter. Topics include technology development and validation, data collection and impact evaluation.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 2909

**CVEN 2919 (3) Sustainability in Action**
Using contemporary case studies, this course introduces students to real-world applications of sustainability principles in developing and deploying social and technological solutions to sustainability challenges in climate change, energy, water, oceans, buildings, air quality, human health, food and agriculture, environmental justice, ethics, business, policy, and education. This course answers the following question: Given that sustainability challenges persist, what can we do about it?
**Recommended:** Prerequisite CVEN 2909.

**CVEN 3022 (3) Construction Surveying**
Studies construction and highway surveying, horizontal and vertical curves, earthwork, and analysis of data.
**Requisites:** Requires prerequisite course of CVEN 2012 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Surveying and Transportation

**CVEN 3032 (3) Photogrammetry**
Familiarizes students with characteristics of aerial photographs. Measures and interprets aerial photos for planimetric, topographic, hydrological, soil, and land use surveys. Analyzes and presents field measurements over extensive reaches.
**Additional Information:** Departmental Category: Surveying and Transportation

**CVEN 3042 (3) Advanced Engineering Drawing for Infrastructure**
Applying drawing and drafting skills for infrastructure projects using advanced CAD software tools. This course will provide an overview of general CAD standards related to civil engineering. Students will create and modify 3D infrastructure CAD models. Students will learn advanced topics, including terrain surface modeling and grading, earthwork calculations, horizontal and vertical alignment design, subsurface pipe design, and development of construction plans.
**Requisites:** Requires prerequisite course of CVEN 1027 (minimum grade C-). Restricted to College of Engineering students only.
**Grading Basis:** Letter Grade

**CVEN 3111 (3) Analytical Mechanics 2**
Studies the motion (kinematics) of particles and rigid bodies, and the forces that cause the motion (kinetics). Newton's laws as well as energy methods are used to study the motion of particles and rigid bodies in two and three dimensions.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 2043
**Requisites:** Requires prerequisite courses of CVEN 2121 or GEEN 2851 or MCEN 2023 or ASEN 2001 or ASEN 2701 (all minimum grade C-). Restricted to AREN, CVEN, EVEN, or IDEN majors only.
**Additional Information:** Departmental Category: Mechanics

**CVEN 3141 (2) Engineering Materials Lab**
**Additional Information:** Departmental Category: Mechanics

**CVEN 3161 (3) Mechanics of Materials 1**
Addresses concepts of stress and strain; material properties, axial loading, torsion, simple bending, and transverse shear; analysis of stress and strain; and deflections of beams. Includes selected experimental and computational laboratories.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 2063
**Requisites:** Requires prereq of (CVEN 2121 or GEEN 2851 or MCEN 2023 or ASEN 2001 or ASEN 2701) and prereq or coreq of (APPM 2360 or (MATH 2130 and 3430)) (all min grade C-). Restricted to AREN, CVEN, EVEN, or IDEN majors with CIV, ENR or ARC subplan.
**Additional Information:** Departmental Category: Mechanics

**CVEN 3227 (3) Probability, Statistics and Decision**
Introduces uncertainty based analysis concepts and applications in the planning and design of civil engineering systems emphasizing probabilistic, statistics, and design concepts and methods.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 3246 (3) Introduction to Construction**
Provides a broad view of concerns, activities, and objectives of people involved in construction: the owner, architect/engineer, contractor, labor and inspector. Interactive gaming situation relates these people to the construction contract, plans/specifications, estimates/bids, scheduling, law and financial management. Students with a Business School Real Estate emphasis may be considered for this course.
**Requisites:** Restricted to junior or senior Civil (CVEN) or Architectural (AREN), Environmental (EVEN) or Integrated Design (IDEN) Engineering majors only.
**Additional Information:** Departmental Category: Construction

**CVEN 3256 (3) Construction Equipment and Methods**
Integrated study of construction equipment, methods, and economics. Topics include equipment productivity, equipment selection, and construction engineering design within economic constraints. Examples include earthmoving, concrete formwork, and temporary construction.
**Requisites:** Requires prerequisite course of CVEN 3246 (minimum grade C-). Restricted to Architectural (AREN) or Civil (CVEN) or Integrated Design (IDEN) Engineering majors only.
**Additional Information:** Departmental Category: Construction

**CVEN 3313 (3) Theoretical Fluid Mechanics**
Basic principles of fluid mechanic. Covers fluid properties, hydrostatics, fluid flow concepts, including continuity, energy, momentum, dimensional analysis and similitude and flow in closed conduits.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 3200 and MCEN 3021
**Requisites:** Requires prerequisite course of CVEN 2121 or GEEN 2851 or ASEN 2001 or ASEN 2701 or MCEN 2023 (all min grade C-). Restricted to Civil (CVEN) or Environmental (EVEN) majors, or Integrated Design Engineering (IDEN-BSIDE) majors with a CIV or ENR subplan.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 3323 (3) Hydraulic Engineering**
Studies hydraulic engineering theory and applications. Topics include incompressible flow in conduits, pipe system analysis and design, open channel flow, flow measurement, analysis and design of hydraulic machinery.
**Requisites:** Requires prerequisite course of CVEN 3313 or MCEN 3021 or AREN 2120 or CHEN 3200 (all minimum grade C-). Restricted to Civil (CVEN), Environmental (EVEN), Architectural (AREN) or Integrated Design (IDEN) Engineering majors only.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 3414 (3) Fundamentals of Environmental Engineering**
Emphasizes chemical, ecological and hydrological fundamentals and importance of mass and energy balances in solving environmental engineering problems related to water quality, water and wastewater treatment, air pollution, solid and hazardous waste management, sustainability and risk assessment.
**Requisites:** Requires prereq courses CHEN 1201 or CHEN 1211 or CHEM 1113 or MCEN 1024 and APPM 1360 or MATH 2300 (all min grade C-). Restricted to CVEN, AREN, EVEN, MCEN, CHEN, IDEN or AMEN majors only.
**Additional Information:** Departmental Category: Environmental

**CVEN 3424 (3) Water and Wastewater Treatment**
Introduces design and operation of facilities for treatment of municipal water supplies and wastewater. Provides an engineering application of physical, chemical, and biological unit processes and operations for removal of impurities and pollutants. Involves an integrated design of whole treatment systems combining process elements.
**Requisites:** Requires prerequisite course of CVEN 3414 (minimum grade C-).
**Additional Information:** Departmental Category: Environmental

**CVEN 3434 (3) Introduction to Applied Ecology**
Emphasizes the integration of physical, chemical and biological processes in controlling terrestrial and aquatic ecosystems. Ecosystem concepts are applied to current environmental and water quality problems. Includes field trips and a group project.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3434
**Requisites:** Requires prereq courses of (CHEN 1201 or CHEN 1211 or CHEM 1113 or CHEM 1400 or MCEN 1024) and (CHEM 1114 or CHEM 1221) (all min grade C-).Restricted to students w/ 57-180 credits (Jr or Sr) Civil (CVEN), Environ (EVEN) or Arch Eng (AREN) or (IDEN) mjrs
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Departmental Category: Environmental

**CVEN 3525 (3) Structural Analysis**
Studies structural analysis of statically determinate and indeterminate systems, deflections, energy methods, and force and stiffness methods.
**Requisites:** Requires prerequisite course of CVEN 3161 or MCEN 2063 (minimum grade C-). Restricted to Civil (CVEN), Environmental (EVEN), Architectural (AREN), Integrated Design (IDEN) or Applied Mathematics (AMEN) majors only.
**Additional Information:** Departmental Category: Structures

**CVEN 3602 (3) Transportation Systems**
Introduces the principles of transportation systems with a focus on highway engineering and traffic analysis. Provides the basic skill set that will allow students to solve transportation problems related with highway design and traffic control and analysis. Provides an introduction to technology, operating characteristics, and relative merits of highway, airway, waterway, railroad, pipeline, and convey or transportation systems.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: Surveying and Transportation

**CVEN 3698 (3) Engineering Geology**
Highlights the role of geology in engineering minerals; rocks; surficial deposits; rocks and soils as engineering materials; distribution of rocks at and below the surface; hydrologic influences; geologic exploration of engineering sites; geologic hazards; mapping; and geology of underground excavations, slopes, reservoirs and dam sites.
**Requisites:** Requires prereq or coreq courses of (CVEN 2121 or GEEN 2851 or ASEN 2001 or ASEN 2701 or MCEN 2023) and (APPM 2350 or MATH 2400) (all minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 3708 (3) Geotechnical Engineering 1**
Covers basic engineering characteristics of geological materials; soil and rock classifications; site investigation; physical, mechanical, and hydraulic properties of geologic materials; the effective stress principle; soil and rock improvement; seepage analysis; stress distribution; and consolidation and settlement analyses. Selected experimental and computational laboratories.
**Requisites:** Requires prerequisite course of CVEN 3161 or MCEN 2063 (minimum grade C-). Restricted to Civil (CVEN), Environmental (EVEN), Architectural (AREN), Integrated Design (IDEN) or Applied Mathematics (AMEN) majors only.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 3718 (3) Geotechnical Engineering 2**
Covers stress analysis and plastic equilibrium, sheer strength of soil, bearing capacity, lateral earth pressures, slope stability and underground construction. Analysis and design of shallow and deep foundations, retaining walls and other earth and rock structures. Selected experimental and computational laboratories.
**Requisites:** Requires prerequisite course of CVEN 3708 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 3837 (1-3) Special Topics**
Supervised study of special topics of interest to student under instructor guidance.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 4122 (3) The Colorado River Water Crisis: Water Policy, Hydrological Variability, and Climate Change**
Analyzes the physical basis and policy origins for today¿s Colorado River water crisis. Surveys the history of Colorado River water development, and allocation. Examines political and policy decisions that have occurred. Unravels the physical drivers for the river¿s flow, its variability, and change. Places timelines of policy choices into context of emerging scientific understanding of Colorado River hydro-climate. Integrates evolving policy and physical factors to address today¿s water crisis that informs pathways for solutions.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5122
**Requisites:** Restricted to students in College of Engineering and Applied Science (ENGR) and students in ATOC, HIST, CAMW, ENVS, GEOG, PSCI, Law School, Getches-Wilkinson Law Center, Ecology and Evolutionary Biology, Journalism, or Environmental Journalism.
**Recommended:** Prerequisite physical hydrology; This is a multi-disciplinary upper division lecture course open to both undergraduate and graduate students with interest in history, policy, politics, humanities, geography, hydrology, and meteorology.

**CVEN 4133 (3) Land Use and Water Quality**
Principles, processes, and control of nonpoint source pollution. Particular emphasis is placed on non-point source (NPS) problems associated with urban runoff, agricultural influences on water quality, and impacts of mining and forestry. Surface and ground water pollution in diverse aquatic systems including stream, river, lake, reservoir, estuarine environments are considered. Students are exposed to a variety of structural and non-structural management principles.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5133
**Requisites:** Restricted to students in College of Engineering and Applied Science (ENGR) only.
**Recommended:** Prerequisite CVEN 4333, Engineering Hydrology.

**CVEN 4147 (3) Civil Engineering Systems**
Theory and application of the principles of engineering economics and classical and metaheuristic optimization techniques for evaluating problems in civil and environmental engineering.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5147
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) College of Engineering majors only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 4157 (3) A Systems Approach to Global Engineering**
Introduces engineering students to the global context in which engineers are asked to operate in the 21st century using system dynamics tools and other decision-making tools (network analysis, agent based modeling, etc.) necessary to analyze the uncertainty and complexity inherent in global projects.
**Equivalent - Duplicate Degree Credit Not Granted:** EDEN 4147, CVEN 5157 and EDEN 5147
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**CVEN 4161 (3) Mechanics of Materials 2**
Covers advanced topics in the mechanics of solids. Some topics such as asymmetric bending of beams, torsion of non-circular cross-sections, are extensions of topics seen in CVEN 3161. Others like 3-D stress and strain analysis, failure theories and stability of columns and frames are new. Includes selected laboratory experiments.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5161
**Requisites:** Requires prerequisite course of CVEN 3161 (minimum grade C-).
**Additional Information:** Departmental Category: Mechanics

**CVEN 4303 (3) Analysis of Urban Water Systems**
Examines water systems in the urban environment in an integrated manner. Focus is placed on analyzing the behavior of urban water distribution and collection systems using model applications. Students completing this course will be able to understand local urban water resources problems, effectively use complementary urban water models, and examine the interactions between water supply, drainage systems, surface water, and groundwater.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5303
**Requisites:** Requires prerequisite course of CVEN 3313 or MCEN 3021 or CHEN 3200 or AREN 2120 (minimum grade C-). Restricted to College of Engineering students only.
**Recommended:** Prerequisite CVEN 3323 (Hydraulic Engineering).

**CVEN 4323 (3) Water Resources Engineering Design**
Studies principles and techniques of water resources engineering design. Introduces environmental modeling under uncertainty, stormwater design, precipitation estimation and flow routing. Surveys hydropower, reservoir management and water resources economics.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5423
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 4333 (3) Engineering Hydrology**
Studies engineering applications of principles of hydrology, including hydrologic cycle, rainfall and runoff, groundwater, storm frequency and duration studies, stream hydrography, flood frequency, and flood routing.
**Requisites:** Requires prerequisite course of CVEN 3313 or AREN 2120 or CHEN 3200 or MCEN 3021 (all minimum grade C-). Requires prerequisite or corequisite course of CVEN 3227 or MCEN 3047 or CHEN 3010 or GEEN 3853 (all minimum grade C-).
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 4353 (3) Groundwater Engineering**
Studies the occurrence, movement, extraction for use,and quantity and quality aspects of groundwater. Introduces and uses basic concepts to solve engineering and geohydrologic problems.
**Requisites:** Requires prerequisite course of CVEN 3313 or MCEN 3021 or CHEN 3200 or AREN 2120 (minimum grade C-).
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 4383 (3) Applied Groundwater Modeling**
Studies analytical and numerical methods for solving problems of groundwater flow and chemical transport. Emphasizes fundamental modeling techniques and the relationship between the physical system and the model results. Applies models and modeling techniques to solve problems in ground water hydrology using contemporary software. Include computer laboratory sessions.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5383
**Requisites:** Requires prerequisite course of CVEN 3313 or MCEN 3021 or CHEN 3200 or AREN 2120 (minimum grade C-).
**Recommended:** Prerequisite CVEN 4353 (minimum grade C-).
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 4404 (3) Water Chemistry**
Introduces chemical fundamentals of inorganic aqueous compounds and contaminants in lecture and laboratory. Lecture topics include thermodynamics and kinetics of acids and base reactions, carbonate chemistry, air-water exchange, precipitation, dissolution, complexation, oxidation-reduction and sorption.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 4404
**Requisites:** Requires prerequisite course of (CHEN 1203 or CHEN 1211 or CHEM 1133) and (CHEM 1221 or CHEM 1134) (all minimum grade C-). Requires corequisite course of CVEN 3414.
**Additional Information:** Departmental Category: Environmental

**CVEN 4414 (1) Water Chemistry Laboratory**
Reinforces chemical fundamentals of inorganic aqueous compounds and contaminants from CVEN/EVEN 4404 in laboratory experiments and reports. Topics include acids and bases, carbonate chemistry (alkalinity) and other water chemistry characteristics (hardness, dissolved oxygen); precipitation, complexation and oxidation-reduction reactions; and laboratory techniques and reporting.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 4414
**Requisites:** Requires prerequisite courses of CHEN 1201, CHEN 1203, CHEM 1221 or CHEN 1211 or CHEM 1113 and CHEM 1133 (all minimum grade C-). Requires corequisite course of CVEN 4404. Restricted to Civil (CVEN) or Environmental (EVEN) Engineering majors only.
**Additional Information:** Departmental Category: Environmental

**CVEN 4424 (3) Environmental Organic Chemistry**
Examines the fundamental physical and chemical transformations affecting the fate and transport of organic contaminants in natural and treated waters. Emphasizes quantitative approach to solubility, vapor pressure, air-water exchange, sorption, hydrolysis and redox reactions, and photodegradation.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 4424
**Requisites:** Requires prerequisite course of (CHEN 1211 or CHEN 1203 or CHEM 1133 or CHEM 2100) and CVEN 4404 (minimum grade C-).
**Additional Information:** Departmental Category: Environmental

**CVEN 4434 (4) Environmental Engineering Design**
Examines the design of facilities for the treatment of municipal water and wastewater, hazardous industrial waste, contaminated environmental sites and sustainable sanitation in developing countries. Economic, societal and site specific criteria impacting designs are emphasized.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 4434
**Requisites:** Requires prerequisite course of CVEN 3414 and CVEN 4464 or CVEN 3424 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environmental

**CVEN 4464 (3) Environmental Engineering Processes**
Develops and utilizes analytic solutions for environmental process models that can be used in a) reactor design for processes used in the treatment of water, wastewater and hazardous waste and b) process analysis of natural systems, such as streams and groundwater flow. Models facilitate the tracking of contaminants in engineered and natural systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5464 and EVEN 4464
**Requisites:** Requires prerequisite courses of (CVEN 3313 or CHEN 3200 or MCEN 3021 or AREN 2120) and CVEN 3414 (all minimum grade C-).
**Additional Information:** Departmental Category: Environmental

**CVEN 4474 (3) Hazardous and Industrial Waste Management**
Evaluates processes used for treatment of wastes requiring special handling and disposal: toxic organic chemicals, heavy metals, acidic, caustic and radioactive waste material. Discusses techniques for destruction, immobilization and resource recovery and assessment of environmental impact of treatment process end products.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5474
**Requisites:** Requires prerequisite course of CVEN 3414 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Environmental

**CVEN 4484 (3) Integrative Environmental and Molecular Microbiology**
Surveys microbiology topics germane to modern civil and environmental engineering. Provides fundamentals needed to understand microbial processes and ecology in engineered and natural systems and reviews applications emphasizing the interface between molecular biology and classical civil engineering.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 4484, CVEN 5484, and EVEN 5484
**Requisites:** Requires prerequisite courses of CHEN 1211 or CHEN 1201 or CHEM 1113 and CHEM 1221 and APPM 1350 or MATH 1300 (all minimum grade C-).
**Additional Information:** Departmental Category: Environmental

**CVEN 4511 (3) Introduction to Finite Element Analysis**
Covers systematic formulation of finite element approximation and isoparametric interpolation (weighted residual and energy methods, triangular and quadrilateral elements). Includes computation applications to the solution of one- and two-dimensional stress-deformation problems and steady and transient heat conduction.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5511
**Requisites:** Requires prerequisite courses of CVEN 3161, CVEN 3525 and (APPM 2360 or (MATH 2130 and 3430)) (all minimum grade C-).
**Additional Information:** Departmental Category: Mechanics

**CVEN 4525 (3) Computational Structural Analysis 1**
Covers the principles and formulations of the direct stiffness method and its transition to the finite element method with the computational modelling and analysis of framed structures in 2D plane and 3D space. The dynamic analysis and the introduction to the nonlinear structural problems are provided. Familiarity with the modern computing and programming environments is increased to address the needs in the structural engineering and mechanics area. Computer programming is applied to the solution of problems in structural analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5525
**Requisites:** Requires prerequisite course of CVEN 3525 (minimum grade C-).
**Additional Information:** Departmental Category: Structures

**CVEN 4537 (3) Numerical Methods in Civil Engineering**
Introduces the use of numerical methods in the solution of civil engineering problems, emphasizing obtaining solutions with high-speed electronic computers. Applies methods to all types of civil engineering problems.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5537
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) College of Engineering majors only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 4545 (3) Steel Design**
Applies basic principles of structural engineering and mechanics to design of steel structures; design of tension members, columns, beams, open-web joists, steel decks, bolts, bolted connections, welding processes, and welded connections.
**Requisites:** Requires prerequisite course of CVEN 3525 (minimum grade C-).
**Additional Information:** Departmental Category: Structures

**CVEN 4554 (3) Fundamentals of Air Quality Management**
Introduces engineering methods for the study of air quality. Topics include: indoor air quality, greenhouse gases, dispersion modeling, source apportionment modeling, chemistry of combustion, pollution sources and controls, human exposure to air pollutants. A focus on Engineering for Developing Communities runs throughout. Elective for the EVEN air quality track or an environmental concentration course for CVEN.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5554
**Requisites:** Requires prerequisite courses of APPM 2360 or MATH 2130 and MATH 3430 and CVEN 3313 or CHEN 3200 or MCEN 3021 (all minimum grade C-).
**Additional Information:** Departmental Category: Environmental

**CVEN 4555 (3) Reinforced Concrete Design**
Applies basic principles of structural engineering and mechanics to the design of reinforced concrete structures, including design of beams, columns, slabs, and footings; continuous beams and frames; cast-in-place buildings.
**Requisites:** Requires prerequisite course of CVEN 3525 (minimum grade C-).
**Additional Information:** Departmental Category: Structures

**CVEN 4565 (3) Design of Wood Structures**
Applies basic principles of structural engineering and mechanics to the design of wood structures, including the design and analysis of columns, trusses, beams and connections using dimensional lumber, glulam and cross-laminated timber.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5565
**Requisites:** Requires prerequisite course of CVEN 3525 (minimum grade C-).
**Additional Information:** Departmental Category: Structures

**CVEN 4594 (3) Water Reuse and Reclamation**
Explores development of a safe, reliable and acceptable program for reusing impaired waters. As fresh water becomes scarcer around the world, communities are looking for security through development of new water resources. Reuse of impaired water is one solution to the growing water crisis. Focus is on advanced treatment technologies with emphasis on public perception, economics and regulations.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5594
**Requisites:** Requires prerequisite course of CVEN 3414 (minimum grade C-). Restricted to College of Engineering students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite CVEN 3424.
**Additional Information:** Departmental Category: Environmental

**CVEN 4718 (3) Mechanics and Dynamics of Glaciers**
Develops a quantitative physical basis for understanding the functions of snow, ice and glaciers in the environment, with emphasis on developing an understanding of continuum mechanics and thermodynamics and their application to Earth systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5718
**Requisites:** Requires prereq course of (APPM 2350 or MATH 2400) and (APPM 2360 or (MATH 2130 and 3430)) and (AREN 2110 or GEEN 3852 or MCEN 3012 or ASEN 2002) and (CHEN 1310 or CSCI 1200 or CSCI 1300 or ASEN 1320 or ECEN 1310) (all min. grade C-).
**Additional Information:** Departmental Category: Geotechnical

**CVEN 4728 (3) Foundation Engineering**
Focuses on geotechnical design of shallow and deep foundations, including spread footings, mats, driven piles and drilled piers. Coverage includes bearing capacity, settlement, group effects and lateral load capacity of the various foundation types. The application of lower and upper bound plasticity analyses for the structural and geotechnical design of foundation systems, and how these relate to design codes, is additionally covered.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5728
**Requisites:** Requires prerequisite course of CVEN 3718 (minimum grade C-).
**Additional Information:** Departmental Category: Geotechnical

**CVEN 4833 (1-3) Special Topics**
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 4834 (1-3) Special Topics**
Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: Environmental

**CVEN 4835 (1-3) Special Topics**
Supervised study of special topics of interest to students under instructor guidance.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students in College of Engineering and Applied Science (ENGR) only.
**Additional Information:** Departmental Category: Structures

**CVEN 4836 (1-3) Special Topics**
Offers a supervised study of special topics, under instructor guidance.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**CVEN 4837 (1-3) Special Topics**
Supervised study of special topics of interest to students under instructor guidance.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) CVEN, AREN, or EVEN students only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 4838 (1-3) Special Topics**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 4839 (3-6) Special Topics for Seniors**
Offers a supervised study of special topics, under instructor guidance. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Special Topics

**CVEN 4849 (1-3) Independent Study**
Involves an independent, in-depth study, research, or design in a selected area of civil or environmental engineering. Offerings are coordinated with individual faculty. Students should consult the Department of Civil, Environmental, and Architectural Engineering.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Special Topics

**CVEN 4897 (2) Professional Issues in Civil Engineering**
Educates students about the knowledge and skills required for professional civil engineers. Students learn about the path to a professional license, prepare for the FE exam, analyze a situation involving multiple conflicting ethical interests, identify aspects of sustainability in civil engineering projects, and understand the role of project management, public policy, business and public administration, and leadership in civil engineering.
**Requisites:** Restricted to students with 87-180 credits (Seniors) Civil (CVEN), Environmental (EVEN), or Architectural Engineering (AREN) majors only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 4899 (4) Civil Engineering Senior Project Design**
Provides a simulated real world design and construction planning experience where teams integrate across multiple civil engineering sub-disciplines to create a solution that satisfies multiple constraints, including design, client requirements, budget, schedule, technical, regulatory, and societal. Final deliverables include: detailed design drawings, specifications, cost estimate, project schedule, construction plan, oral and written presentation.
**Requisites:** Restricted to students with 87-180 credits (Senior) Civil (CVEN) or Integrated Design (IDEN) engineering majors only.
**Additional Information:** Departmental Category: Special Topics

**CVEN 4969 (3) Water and Sanitation in Developing Countries**
Studies the design and fundamentals behind effective treatment processes and engineering solutions targeted for developing countries. Approaches to clean water and sanitation in lesser industrialized countries often demand alternative solutions to those developed for industrialized societies. Explores issues and solutions developed to tackle these problems.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 4969
**Requisites:** Requires prerequisite course of CVEN 3414 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Environmental

## Engineering for Developing Communities

**EDEN 4147 (3) A Systems Approach to Global Engineering**
Introduces engineering students to the global context in which engineers are asked to operate in the 21st century using system dynamics tools and other decision-making tools (network analysis, agent based modeling, etc.) necessary to analyze the uncertainty and complexity inherent in global projects.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4157, CVEN 5157 and EDEN 5147

**EDEN 5001 (1-3) Special Topics in Global Engineering**
At the graduate level, covers topics of interest in global engineering. Content varies by section and from semester to semester.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.

**EDEN 5147 (3) A Systems Approach to Global Engineering**
Introduces engineering students to the global context in which engineers are asked to operate in the 21st century using system dynamics tools and other decision-making tools (network analysis, agent based modeling, etc.) necessary to analyze the uncertainty and complexity inherent in global projects.
**Equivalent - Duplicate Degree Credit Not Granted:** EDEN 4147, CVEN 4157 and CVEN 5157

## Environmental Engineering

**EVEN 1000 (1) Introduction to Environmental Engineering**
Introduces first-year students to the environmental engineering program from an academic and a career perspective. Covers air quality, applied ecology, chemical processing, energy, engineering for developing communities, environmental remediation, and water resources and treatment. Includes reading and writing on the history of environmental engineering, major environmental issues, and professional ethics.
**Requisites:** Restricted to students with 0-60 units completed. Restricted to Environmental Engineering (EVEN) and Open Option Engineering (XXEN) majors only.

**EVEN 1001 (3) Environmental Engineering 101: An Introduction to Pollution Science**
Surveys the science and engineering needed to understand the environmental and energy challenges which face urbanizing society: air and water pollution, climate change, and mining. Introduces how environmental engineers leverage basic science concepts to reduce pollution and optimize energy use. Analyzes how the mainstream media presents the environmental science of climate change and modern environmental disasters.

**EVEN 2840 (1-3) Independent Study: General Topics**
General topics relating to environmental engineering. One-on-one assistance with an instructor.

**EVEN 2909 (3) Introduction to Global Sustainability**
This course introduces engineering and non-engineering students to basic definitions and principles of sustainability (i.e., environment, economy, society) and the historical context regarding modern social and technical sustainability challenges as they pertain to population growth and climate change. The course places an emphasis on identifying the drivers, determinants and solutions favoring equitable access to water, sanitation, energy, food, transportation and shelter. Topics include technology development and validation, data collection and impact evaluation.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 2909
**Recommended:** for engineering students.

**EVEN 3012 (3) Thermodynamics for Environmental Science and Engineering**
Introduces students to fundamentals of thermodynamics. Includes focused coverage of the laws of thermodynamics, system energy balances, state properties (internal energy, enthalpy, entropy, etc.) and property estimation for ideal gases and steam. Additionally, this course will introduce the following concepts: thermodynamic cycles, chemical reaction thermodynamics, psychrometrics, process devices (pumps, heat exchangers, etc.) and reversibility.
**Requisites:** Requires prerequisite of PHYS 1110 and (APPM 1360 or MATH 2300) and (CHEN 1201 or CHEN 1211 or CHEM 1113) (all minimum grade C-).

**EVEN 3414 (3) Fundamentals of Environmental Engineering**
Emphasizes chemical, ecological and hydrological fundamentals and importance of mass and energy balances in solving environmental engineering problems related to water quality, water and wastewater treatment, air pollution, solid and hazardous waste management, sustainability and risk assessment.
**Requisites:** Requires prereq courses CHEN 1201 or CHEN 1211 or CHEM 1113 or MCEN 1024 and APPM 1360 or MATH 2300 (all min grade C-). Restricted to CVEN, AREN, EVEN, MCEN, CHEN, IDEN or AMEN majors only.

**EVEN 3550 (3) Sustainability Principles for Engineers**
An introduction to sustainability principles in the field of environmental engineering. Students will apply these principles to engineering problems in order to evaluate the environmental, economic and social implications of engineering and design decisions. Topics include definitions of sustainability, main engineering sustainability challenges (e.g., water, climate and materials), pollution generation and prevention and sustainability assessment tools.
**Requisites:** Requires a corequisite course of CVEN / EVEN 3414. Restricted to Environmental Engineering (EVEN) majors only.

**EVEN 3650 (3) Sustainable Energy Systems Analysis**
This course introduces students to the fundamentals of technology utilized in sustainable energy systems. Students will learn performance modeling, environmental life cycle assessment, and economic viability evaluation with a focus on the following: sensitivity analysis of cost-performance models, uncertainty and risk assessment, multi-criteria decision making and sustainability assessment. This course highlights the limits and obstacles facing the integration.
**Requisites:** Requires prerequisite courses of (MCEN 3012 or GEEN 3852 or AREN 2110 or EVEN 3012) AND PHYS 1120 AND (EVEN 3550 or MCEN 3032) (minimum grade D-).

**EVEN 3830 (1-3) Special Topics**
Study of technical topics within the field of environmental engineering. Subject matter to be selected from topics of current interest.
**Repeatable:** Repeatable for up to 9.00 total credit hours.

**EVEN 4100 (3) Environmental Sampling and Analysis**
Introduces students to techniques for characterization of surface water, subsurface water, soils and sediments, and air and planning of sampling and analysis efforts. Laboratories include stream sampling, drilling, monitoring well installation, water level, slug tests, air sampling.
**Requisites:** Requires prerequisite courses of CVEN 4404 and CVEN 4424 (all minimum grade C-). Restricted to Environmental Engineering (EVEN) majors only.

**EVEN 4131 (3) Air Pollution Control Engineering**
Introduces air quality regulations, meteorology and modeling. Examines methods for controlling major classes of air pollutants, including particulate matter and oxides of sulfur and nitrogen, as well as control technology for industrial sources and motor vehicles. Requires interdisciplinary design projects.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4131 and MCEN 5131 and EVEN 5131
**Requisites:** Requires prerequisite courses of (MCEN 3021 or CHEN 3200 or CVEN 3313) and (MCEN 3012 or GEEN 3852 or AREN 2110 or EVEN 3012) (all minimum grade C-). Restricted to Mechanical Engineering or Environmental Engineering majors with 57+ credits only.

**EVEN 4141 (3) Indoor Air Pollution**
Describes the impact of indoor air pollutants on human health, including an introduction to key pollutants and their sources. Students will estimate emission factors, calculate generation/ventilation rates, quantify the impact of deposition and chemical reactions and explore relevant control technology. Current issues will also be addressed, including climate change, green building design, economic concerns and relevance to the developing world.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4141, MCEN 5141, and EVEN 5141
**Requisites:** Requires prerequisite courses of (MCEN 3022 or CHEN 3210) (minimum grade C-). Restricted to Mechanical and Environmental Engineering majors with 57+ credits only.

**EVEN 4404 (3) Water Chemistry**
Introduces chemical fundamentals of inorganic aqueous compounds and contaminants in lecture and laboratory. Lecture topics include thermodynamics and kinetics of acids and base reactions, carbonate chemistry, air-water exchange, precipitation, dissolution, complexation, oxidation-reduction and sorption.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4404
**Requisites:** Requires prerequisite course of (CHEN 1203 or CHEN 1211 or CHEM 1133) and (CHEM 1221 or CHEM 1134) (all minimum grade C-). Requires corequisite course of CVEN 3414. Restricted to Civil (CVEN) or Environmental (EVEN) Engineering majors only.

**EVEN 4414 (1) Water Chemistry Laboratory**
Reinforces chemical fundamentals of inorganic aqueous compounds and contaminants from CVEN/EVEN 4404 in laboratory experiments and reports. Topics include acids and bases, carbonate chemistry (alkalinity) and other water chemistry characteristics (hardness, dissolved oxygen); precipitation, complexation and oxidation-reduction reactions; and laboratory techniques and reporting.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4414
**Requisites:** Requires prerequisite courses of CHEN 1201, CHEN 1203, CHEM 1221 or CHEN 1211 or CHEM 1113 and CHEM 1133 (all minimum grade C-). Requires corequisite course of CVEN 4404. Restricted to Civil (CVEN) or Environmental (EVEN) Engineering majors only.

**EVEN 4424 (3) Environmental Organic Chemistry**
Examines the fundamental physical and chemical transformations affecting the fate and transport of organic contaminants in natural and treated waters. Emphasizes quantitative approach to solubility, vapor pressure, air-water exchange, sorption, hydrolysis and redox reactions, and photodegradation.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4424
**Requisites:** Requires prereq course (CHEN 1211 or CHEN 1203 or CHEM 1133 or CHEM 2100) and EVEN 4404 (min grade C-).

**EVEN 4434 (4) Environmental Engineering Design**
Examines the design of facilities for the treatment of municipal water and wastewater, hazardous industrial waste, contaminated environmental sites and sustainable sanitation in developing countries. Economic, societal and site specific criteria impacting designs are emphasized.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4434
**Requisites:** Requires prerequisite course of CVEN 3414 and EVEN 4464 or CVEN 3424 (minimum grade C-).
**Grading Basis:** Letter Grade

**EVEN 4464 (3) Environmental Engineering Processes**
Develops and utilizes analytic solutions for environmental process models that can be used in a) reactor design for processes used in the treatment of water, wastewater and hazardous waste and b) process analysis of natural systems, such as streams and groundwater flow. Models facilitate the tracking of contaminants in engineered and natural systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5464 and CVEN 4464
**Requisites:** Requires prerequisite courses of (CVEN 3313 or CHEN 3200 or MCEN 3021 or AREN 2120) and CVEN 3414 (all minimum grade C-).

**EVEN 4484 (3) Integrative Environmental and Molecular Microbiology**
Surveys microbiology topics germane to modern civil and environmental engineering. Provides fundamentals needed to understand microbial processes and ecology in engineered and natural systems and reviews applications emphasizing the interface between molecular biology and classical civil engineering.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4484, CVEN 5484, and EVEN 5484
**Requisites:** Requires prerequisite courses of (CHEN 1211 or CHEN 1201 or CHEM 1113) and (CHEN 1221 or CHEM 1114) and (APPM 1350 or MATH 1300) (all minimum grade C-).

**EVEN 4494 (3) Contaminant Fate and Transport**
The course requires students to design and conduct experiments, analyze, interpret data, and write technical engineering reports. This lab-based course gives students an understanding of processes that govern the behavior of pollutants in the environment. The subject includes aspects of intermedia contaminant transport, surface and groundwater hydrology, air pollution modeling, degradation processes and remediation, human exposure pathways and risk analysis.
**Requisites:** Requires prerequisite courses of CVEN 4404 or EVEN 4404 (minimum grade D-). Requires corequisite courses of CVEN 4424 or EVEN 4424.
**Recommended:** Prerequisite or corequisite EVEN 4464 (Environmental Engineering Processes).

**EVEN 4544 (3) Solid Waste Management and Resource Recovery**
Covers the scope of the nonhazardous solid waste problem and regulations that drive its management; discussions of nonengineering factors that impact waste management and recycling; design of incinerators, composting facilities, and landfills used to treat and dispose of solid waste. Formerly EVEN 4444.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 5544 and CVEN 5544
**Requisites:** Requires prereq courses (CHEN 1201 or CHEN 1211 or CHEM 1113 or MCEN 1024) and (APPM 1350 or MATH 1300) (all min grade C-). Restricted to CVEN, AREN, EVEN, MCEN, CHEN, IDEN or AMEN majors only.
**Recommended:** Prerequisite CVEN 3414.

**EVEN 4830 (3) Special Topics**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.

**EVEN 4840 (1-3) Independent Study: General Topics**
General topics relating to environmental engineering. One-on-one assistance with an instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**EVEN 4959 (3) International Environmental Impact Assessment**
Provide elements needed to develop Environmental Impact Assessments (EIA) in countries around the world. Familiarizes students with terms and definitions used in environmental practice. Explains the application of methodologies/tools used globally in EIA studies, taking into consideration the cause-effect relationships between project activities and the environment. Overview of World Bank and regional evaluation criteria driven by local ecosystems, society, and regulations. Case studies focus on the application of tools/methodologies and criteria in various international scenarios.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 5959
**Requisites:** Requires prerequisite or corequisite course of EVEN 3414 (minimum grade C-).
**Recommended:** Prerequisite or corequisite EVEN 3550.

**EVEN 4969 (3) Water and Sanitation in Developing Countries**
Studies the design and fundamentals behind effective treatment processes and engineering solutions targeted for developing countries. Approaches to clean water and sanitation in lesser industrialized countries often demand alternative solutions to those developed for industrialized societies. Explores issues and solutions developed to tackle these problems.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4969
**Requisites:** Requires prerequisite course of CVEN 3414 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).

**EVEN 4980 (3) Senior Thesis 1**
Provides faculty-supervised independent research in environmental engineering for students planning to complete a senior thesis. To be taken prior to EVEN 4990, during the final year before graduation. Department consent required.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Environmental Engineering (EVEN) majors only.

**EVEN 4990 (3) Senior Thesis 2**
Continuation of EVEN 4980. Consists of final phase of faculty-supervised research, the preparation of a written thesis, and an oral defense of the research to
**Requisites:** Requires prerequisite course of EVEN 4980 (minimum grade C-).

# Architectural Engineering - Bachelor of Science (BSARE)

Architectural engineering is the application of engineering principles and technology to building design and construction. Architectural engineering combines aspects of electrical, mechanical, and civil engineering to design integrated systems for buildings. Building systems include heating, ventilating and air conditioning (HVAC) systems; illumination and electrical systems; materials and structural systems; and construction methods applied to buildings.

The Bachelor of Science degree program is administered by the Department of Civil, Environmental and Architectural Engineering. Students also take a course in architectural history and theory from the Environmental Design (ENVD) Program.

# Requirements

## Program Requirements

To earn a bachelor's degree in architectural engineering, students must complete the curriculum in the undergraduate major program as outlined below. For up-to-date program requirements, visit the Bachelor of Science in Architectural Engineering (https://www.colorado.edu/ceae/current-students/undergraduate-studies/architectural-engineering/) webpage. *Note*: Some variations may be possible; see an architectural engineering academic advisor.

In addition, students must meet the general undergraduate degree requirements of the College of Engineering and Applied Science (https://www.colorado.edu/engineering-advising/get-your-degree/graduation-requirements/) and all graduation requirements specified on the CEAE Department website.

Students may earn a Bachelor of Science in Architectural Engineering and a Bachelor of Science in Integrated Design Engineering with an architectural engineering emphasis.

## Prerequisites and Passing Grades

The minimum passing grade for a course that is a prerequisite or corequisite for another required course is C-. The minimum passing grade for a course that is not specifically a prerequisite or corequisite for another required course is D-.

It is the student's responsibility to communicate with the department if summer coursework and/or transfer credit will be used to meet a prerequisite requirement.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| AREN 1027 | Engineering Drawing | 3 |
| AREN 1316 | Introduction to Architectural Engineering | 1 |
| or ASEN 1000 | Introduction to Aerospace Engineering Sciences | |
| or BMEN 1000 | Exploring Biomedical Engineering | |
| or CHEN 1300 | Introduction to Chemical and Biological Engineering | |
| or CSCI 1000 | Computer Science as a Field of Work and Study | |
| or CVEN 1317 | Introduction to Civil and Environmental Engineering | |
| or ECEN 1100 | Exploring ECE | |
| or EVEN 1000 | Introduction to Environmental Engineering | |
| AREN 2050 | Building Materials and Systems | 3 |
| AREN 2110 | Thermodynamics | 3 |
| or ASEN 2702 | Introduction to Thermodynamics and Aerodynamics | |
| or EVEN 3012 | Thermodynamics for Environmental Science and Engineering | |
| or GEEN 3852 | Thermodynamics for Engineers | |
| or MCEN 3012 | Thermodynamics | |
| AREN 2120 | Fluid Mechanics and Heat Transfer | 3 |
| or CVEN 3313 & AREN 2121 | Theoretical Fluid Mechanics and Heat Transfer | |
| AREN 3010 | Energy Efficient Buildings | 3 |
| AREN 3040 | Circuits for Architectural Engineers | 3 |
| AREN 3080 | Architectural Design Studio 1 | 3 |
| AREN 3540 | Illumination I | 3 |
| AREN 4110 | Building Energy Systems Engineering | 3 |
| AREN 4318 | Architectural Engineering Design 1 | 5 |
| AREN 4319 | Architectural Engineering Design 2 | 2 |

| | | |
|---|---|---|
| AREN 4506 | Pre-construction Estimating and Scheduling | 3 |
| AREN 4550 | Illumination 2 | 3 |
| AREN 4570 | Building Electrical Systems Design 1 | 3 |
| CSCI 1200 | Introduction to Computational Thinking | 3 |
| or ASEN 1320 | | |
| or CHEN 1310 | Introduction to Engineering Computing | |
| or CSCI 1300 | Computer Science 1: Starting Computing | |
| or ECEN 1310 | Introduction to C Programming | |
| or MCEN 1030 | Introduction to Engineering Computing | |
| CVEN 2017 | Excel Python R Primer | 1 |
| CVEN 2121 | Analytical Mechanics 1 | 3 |
| or ASEN 2401 | Statics | |
| or ASEN 2701 | Introduction to Statics, Structures, and Materials | |
| or GEEN 2851 | Statics for Engineers | |
| or MCEN 2023 | Statics and Structures | |
| CVEN 3161 | Mechanics of Materials 1 | 3 |
| or MCEN 2063 | Mechanics of Solids | |
| CVEN 3246 | Introduction to Construction | 3 |
| CVEN 3525 | Structural Analysis | 3 |
| CVEN 4545 | Steel Design | 3 |
| or CVEN 4555 | Reinforced Concrete Design | |
| GEEN 1400 | Engineering Projects [1] | 3 |
| or ASEN 1400 | Gateway to Space | |
| or ASEN 1403 | Introduction to Rocket Engineering | |
| or CHEN 1400 | Drugs, Driving and Dynamic Processes | |
| or ECEN 1400 | Introduction to Digital and Analog Electronics | |
| **Technical Electives** | | **12** |
| At least two technical electives must be selected from the specialization lists below. The remaining technical electives may be any upper-division AREN or CVEN course or any course on the approved Technical Elective List. [2] | | |
| *Construction Engineering & Management* | | |
| AREN 4315 | Design of Masonry Structures | |
| AREN 4606 | Construction Project Execution and Control (strongly recommended) | |
| CVEN 3256 | Construction Equipment and Methods (strongly recommended) | |
| CVEN 3708 | Geotechnical Engineering 1 | |
| CVEN 3718 | Geotechnical Engineering 2 | |
| CVEN 4565 | Design of Wood Structures | |
| *Lighting Systems* | | |
| AREN 4130 | Optical Design for Illumination and Solid State Lighting | |
| AREN 4560 | Luminous Radiative Transfer | |
| AREN 4580 | Daylighting | |
| AREN 4620 | Adaptive Lighting Systems | |
| AREN 4630 | Advanced Lighting Design | |
| *Electrical Systems* | | |
| AREN 4061 | Distributed Electricity Generation | |
| AREN 4040 | Building Energy Audits | |
| *Mechanical Systems* | | |
| AREN 4010 | Energy System Modeling and Control | |
| AREN 4040 | Building Energy Audits | |
| AREN 4890 | Sustainable Building Design | |
| AREN 4990 | Compu Fluid Dynamics (CFD) Analysis for Built/Natural Envmnts | |
| AREN 5080 | Computer Simulation of Building Energy Systems | |
| *Structural Systems* | | |
| AREN 4315 | Design of Masonry Structures | |
| AREN 5660 | Embodied Carbon in Buildings | |
| CVEN 4161 | Mechanics of Materials 2 | |
| CVEN 4545 | Steel Design [3] | |
| or CVEN 4555 | Reinforced Concrete Design | |
| CVEN 4565 | Design of Wood Structures | |
| CVEN 4728 | Foundation Engineering | |
| **Required Mathematics Courses** | | |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or MATH 1300 | Calculus 1 | |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| or MATH 2300 | Calculus 2 | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| or MATH 2400 | Calculus 3 | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| or MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |
| or MATH 2135 & MATH 3430 | Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations | |
| **Required Science Courses** | | |
| CHEM 1114 | Laboratory in General Chemistry 1 | 1 |
| or CHEM 1221 | Engineering General Chemistry Lab | |
| or PHYS 1140 | Experimental Physics 1 | |
| CHEN 1201 | General Chemistry for Engineers 1 | 4 |
| or ASEN 1022 | Materials Science for Aerospace Engineers | |
| or CHEN 1211 | Accelerated Chemistry for Engineers | |
| or CHEM 1113 | General Chemistry 1 | |
| or MCEN 1024 | Chemistry for Energy and Materials Science | |
| PHYS 1110 | General Physics 1 | 4 |
| or PHYS 1115 | General Physics 1 for Majors | |
| PHYS 1120 | General Physics 2 | 4 |
| or PHYS 1125 | General Physics 2 for Majors | |
| **Humanities, Social Sciences and Writing** | | |
| *Writing* | | *3* |
| College-approved writing course. [4] | | |
| *Humanities & Social Sciences* | | *15* |
| ARCH 3214 | History and Theory of Architecture 2 | |
| Other approved Humanities & Social Sciences Electives. At least 6 credits (including ARCH 3214) must be at the upper-division level (3000 level or higher). [4] | | |
| **Free Electives** | | **3** |
| **Total Credit Hours** | | **128** |

1 Students who do not take a first-year projects course may substitute a basic engineering elective: any 3-credit technical course offered in ASEN, AREN, APPM, CHEN, COEN, CVEN, CSCI, ECEN, EMEN, EVEN, GEEN, MCEN, or other course approved by the CEAE Curriculum Committee. Remedial courses (such as precalculus) or courses approved as Humanities & Social Sciences electives may not be used.

2 The approved Technical Elective List can be found on the CEAE Department website (https://www.colorado.edu/ceae/current-students/undergraduate-studies/architectural-engineering/).

3 Either CVEN 4545 or CVEN 4555 may be taken as a technical elective—whichever course is *not* used to fulfill the required structural design course.

4 Refer to the College's approved list of courses that fulfill the Humanities, Social Sciences and Writing Requirement (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/).

## Sample Four-Year Plan of Study

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| AREN 1316 | Introduction to Architectural Engineering | 1 |
| CHEM 1114 or PHYS 1140 | Laboratory in General Chemistry 1 [3] or Experimental Physics 1 | 1 |
| CHEN 1201 | General Chemistry for Engineers 1 | 4 |
| CSCI 1200 | Introduction to Computational Thinking | 3 |
| COEN 1500 | CEAS First Year Seminar | 1 |
| Humanities & Social Sciences elective [1] | | 2 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| AREN 1027 | Engineering Drawing | 3 |
| PHYS 1110 | General Physics 1 | 4 |
| First-Year Projects course or Basic Engineering Elective | | 3 |
| College Approved Writing Course [2] | | 3 |
| | **Credit Hours** | **17** |
| **Year Two** | | |
| **Fall Semester** | | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| AREN 2050 | Building Materials and Systems | 3 |
| AREN 2110 | Thermodynamics | 3 |
| CVEN 2121 | Analytical Mechanics 1 | 3 |
| PHYS 1120 | General Physics 2 | 4 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| AREN 2120 | Fluid Mechanics and Heat Transfer | 3 |
| AREN 3080 | Architectural Design Studio 1 | 3 |
| CVEN 2017 | Excel Python R Primer | 1 |
| CVEN 3161 | Mechanics of Materials 1 | 3 |
| ARCH 3214 | History and Theory of Architecture 2 | 3 |
| | **Credit Hours** | **17** |
| **Year Three** | | |
| **Fall Semester** | | |
| AREN 3010 | Energy Efficient Buildings | 3 |
| CVEN 3246 | Introduction to Construction | 3 |
| CVEN 3525 | Structural Analysis | 3 |
| AREN 3040 | Circuits for Architectural Engineers | 3 |
| AREN 3540 | Illumination I | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| AREN 4110 | Building Energy Systems Engineering | 3 |
| AREN 4550 | Illumination 2 | 3 |
| AREN 4506 | Pre-construction Estimating and Scheduling | 3 |
| CVEN 4545 or CVEN 4555 | Steel Design or Reinforced Concrete Design | 3 |
| AREN 4570 | Building Electrical Systems Design 1 | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| AREN 4318 | Architectural Engineering Design 1 | 5 |
| Humanities & Social Sciences elective [1] | | 3 |
| Technical elective | | 3 |
| Technical elective | | 3 |
| Humanities & Social Sciences elective [1] | | 3 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| AREN 4319 | Architectural Engineering Design 2 | 2 |
| Free elective | | 3 |
| Humanities & Social Sciences elective [1] | | 3 |
| Technical elective | | 3 |
| Technical elective | | 3 |
| | **Credit Hours** | **14** |
| | **Total Credit Hours** | **128** |

1 Students may choose courses from the list of college-approved humanities and social sciences (HSS) electives (http://www.colorado.edu/engineering/academics/policies/hss/).

2 Students may choose a course from the list of college-approved writing courses (http://www.colorado.edu/engineering/academics/policies/hss/).

3 Students who choose PHYS 1140 will take it in Year Two or later (with or after PHYS 1120)

## AREN Electives and Opportunities for Specialization

Upon consultation with their advisors, students select technical elective courses applicable to their areas of interest and specialization. The areas of specialization are construction engineering and management, mechanical systems, structural systems, and lighting and electrical systems.

Courses may be chosen from any emphasis area. At least two technical electives must be selected from this list. Some technical electives are offered intermittently and are not guaranteed to be offered every year.

| Code | Title | Credit Hours |
|---|---|---|
| **Construction Engineering & Management** | | |
| AREN 4315 | Design of Masonry Structures | 3 |
| AREN 4606 | Construction Project Execution and Control | 3 |
| CVEN 3256 | Construction Equipment and Methods | 3 |
| CVEN 3708 | Geotechnical Engineering 1 | 3 |
| CVEN 3718 | Geotechnical Engineering 2 | 3 |
| CVEN 4565 | Design of Wood Structures | 3 |
| Students with an interest in construction are also encouraged to take CVEN 2012 as a Basic Engineering Elective or Free Elective | | |
| **Mechanical Systems** | | |
| AREN 4010 | Energy System Modeling and Control | 3 |
| AREN 4040 | Building Energy Audits | 3 |
| AREN 4890 | Sustainable Building Design | 3 |
| AREN 4990 | Compu Fluid Dynamics (CFD) Analysis for Built/Natural Envmnts | 3 |
| AREN 5080 | Computer Simulation of Building Energy Systems | 3 |
| **Structural Systems** | | |
| AREN 4315 | Design of Masonry Structures | 3 |
| AREN 5660 | Embodied Carbon in Buildings | 3 |
| CVEN 4161 | Mechanics of Materials 2 | 3 |
| CVEN 4545 | Steel Design [1] | 3 |
| or CVEN 4555 | Reinforced Concrete Design | |
| CVEN 4565 | Design of Wood Structures | 3 |
| CVEN 4728 | Foundation Engineering | 3 |
| **Lighting Systems** | | |
| AREN 4130 | Optical Design for Illumination and Solid State Lighting | 3 |
| AREN 4560 | Luminous Radiative Transfer | 3 |
| AREN 4580 | Daylighting | 3 |
| AREN 4620 | Adaptive Lighting Systems | 3 |
| AREN 4630 | Advanced Lighting Design | 3 |
| **Electrical Systems** | | |
| AREN 4061 | Distributed Electricity Generation | 3 |
| AREN 4040 | Building Energy Audits | 3 |

[1] CVEN 4545 or CVEN 4555, whichever course is ***not*** used to fulfill the required course in spring semester of year 3, may be taken as a technical elective.

# Learning Outcomes

## Program Educational Objectives

The educational objectives of the architectural engineering bachelor of science degree program are to produce graduates capable of reaching the following career goals within five years:

- Our alumni will build on the educational foundation gained through our program by establishing themselves in engineering, science or other professional careers.
- Our alumni will begin advancing the state-of-the-art of their profession including one of five core disciplines of the building industry: electrical systems, lighting systems, heating, ventilating and air conditioning (HVAC) systems, materials and structural systems, construction engineering and management.
- Our alumni will exercise leadership in their field.
- Our alumni will enhance the sustainability of the built environment.

## Student Outcomes

The outcomes that students are expected to have attained upon graduation with the bachelor of science degree in Architectural Engineering are:

1. An ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

## Areas of Knowledge

The areas of knowledge that define these objectives include both technical and non-technical areas.

Technical areas are:

- Elementary: The fundamentals for architectural engineering, including basic science and mathematics, building design and construction processes, overview of building systems, elementary principles and processes of architecture, and laboratory measurement and data analysis.
- Intermediate: Introduction to building systems and their components, with corresponding analysis of electrical, HVAC and lighting systems, as well as structural elements and components.
- Proficiency: Design, integration and advanced analysis of electrical, HVAC, lighting and structural systems, as well as the standards, codes and recommended practices that govern these building systems.
- Specialization: Advanced design, coupled with industry experience via internships, for building lighting and electrical system design, building HVAC systems design, building structural system design, and construction engineering and management.

Non-technical areas include:

- Professional life, including methods of time and resource management and professional ethics.
- Processes and requirements of written and oral communication.

- Broad areas in the humanities and social sciences, including architectural history and language.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BS in Architectural Engineering, MS in Architectural Engineering or Civil Engineering

### Admissions Requirements

In order to gain admission to the BAM programs named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.000 or higher.
- Completion of all MAPS requirements and no deficiencies remaining (students admitted to CU Boulder prior to Summer 2023 only).
- Have at least junior status within the bachelor's degree program.

### Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only 6 credits may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

Please see the BAM degree program (https://www.colorado.edu/ceae/current-students/undergraduate-studies/bsms-program/) webpage for more information.

# Civil Engineering - Bachelor of Science (BSCV)

The curriculum in civil engineering within the Department of Civil, Environmental and Architectural Engineering has been designed to prepare students for entry-level positions in professional practice or for graduate study in the following subdisciplines of civil engineering:

- construction engineering and management.
- environmental engineering.
- geotechnical engineering and geomechanics.
- structural engineering and structural mechanics.
- water resource engineering and management.

For undergraduates who want additional preparation for graduate study and careers in research and development within civil engineering, a theoretically-based engineering science track is also available.

# Colorado Mesa University/University of Colorado Boulder Partnership Program

Colorado Mesa University (CMU) (http://www.coloradomesa.edu/engineering/) and CU Boulder have created a partnership to deliver specific engineering baccalaureate programs **in their entirety in Grand Junction**, Colorado. The first two years of coursework are taught by CMU faculty and the second two years of coursework are taught by CU Boulder faculty located in Grand Junction. Students completing the programs will be awarded a Bachelor of Science from CU Boulder.

Degrees are offered in civil engineering, electrical & computer engineering, and mechanical engineering, with additional details on the engineering partnership program website (https://www.coloradomesa.edu/engineering/partnership-program/).

Coursework requirements and plans of study specific to this partnership can be found on the Colorado Mesa University civil engineering partnership website (https://www.coloradomesa.edu/engineering/degrees/civil-egineering.html). Learn more about this program on the CU Boulder partnership website (https://www.colorado.edu/academics/cmu-cu-bs-civil-engineering/).

# Program Requirements

To earn a bachelor's degree in civil engineering, students must complete the curriculum in the undergraduate major program, as outlined below. For up-to-date program requirements, visit the Bachelor of Science in Civil Engineering (https://www.colorado.edu/ceae/current-students/undergraduate-studies/civil-engineering/)webpage. **Note:** Some variations may be possible; see a civil engineering academic advisor.

In addition, students must meet the general undergraduate degree requirements of the College of Engineering and Applied Science (https://www.colorado.edu/engineering-advising/get-your-degree/graduation-requirements/) and all graduation requirements specified on the CEAE Department website (https://www.colorado.edu/ceae/current-students/undergraduate-studies/graduation-requirements-advising-guide/).

Students are allowed to earn a BS in civil engineering + BS in integrated design engineering with a civil engineering emphasis.

Civil engineering is also offered in partnership with Colorado Mesa University (https://www.coloradomesa.edu/engineering/partnership-program/) in Grand Junction, Colorado. Specific coursework requirements and plans of study can be found on the partnership website (https://www.coloradomesa.edu/engineering/partnership-program/).

## Prerequisites and Passing Grades

The minimum passing grade for a course that is a prerequisite or corequisite for another required course is C-. The minimum passing grade for a course that is not specifically a prerequisite or corequisite for another required course is D-.

It is the student's responsibility to communicate with the department if summer coursework and/or transfer credit will be used to meet a prerequisite requirement.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| AREN 2110 | Thermodynamics | 3 |
| or ASEN 2402 | Thermodynamics | |
| or ASEN 2702 | Introduction to Thermodynamics and Aerodynamics | |
| or EVEN 3012 | Thermodynamics for Environmental Science and Engineering | |
| or GEEN 3852 | Thermodynamics for Engineers | |
| or MCEN 3012 | Thermodynamics | |
| or CVEN 2545 | Construction Materials | |
| CSCI 1200 | Introduction to Computational Thinking | 3 |
| or CHEN 1310 | Introduction to Engineering Computing | |
| or CSCI 1300 | Computer Science 1: Starting Computing | |
| or ECEN 1310 | Introduction to C Programming | |
| or MCEN 1030 | Introduction to Engineering Computing | |
| CVEN 1027 | Civil Engineering Drawing | 3 |
| or AREN 1027 | Engineering Drawing | |
| CVEN 1317 | Introduction to Civil and Environmental Engineering | 1 |
| or AREN 1316 | Introduction to Architectural Engineering | |
| or ASEN 1000 | Introduction to Aerospace Engineering Sciences | |
| or BMEN 1000 | Exploring Biomedical Engineering | |
| or CHEN 1300 | Introduction to Chemical and Biological Engineering | |
| or CSCI 1000 | Computer Science as a Field of Work and Study | |
| or ECEN 1100 | Exploring ECE | |
| or EVEN 1000 | Introduction to Environmental Engineering | |
| CVEN 2012 | Introduction to Geomatics | 3 |
| CVEN 2017 | Excel Python R Primer | 1 |
| CVEN 2121 | Analytical Mechanics 1 | 3 |
| or GEEN 2851 | Statics for Engineers | |
| or MCEN 2023 | Statics and Structures | |
| or ASEN 2401 | Statics | |
| or ASEN 2701 | Introduction to Statics, Structures, and Materials | |
| CVEN 3111 | Analytical Mechanics 2 | 3 |
| or MCEN 2043 | Dynamics | |
| CVEN 3161 | Mechanics of Materials 1 | 3 |
| or MCEN 2063 | Mechanics of Solids | |
| CVEN 3227 | Probability, Statistics and Decision | 3 |
| CVEN 3246 | Introduction to Construction | 3 |
| CVEN 3313 | Theoretical Fluid Mechanics | 3 |
| or AREN 2120 | Fluid Mechanics and Heat Transfer | |
| or CHEN 3200 | Chemical Engineering Fluid Mechanics | |
| or MCEN 3021 | Fluid Mechanics | |
| CVEN 3323 | Hydraulic Engineering | 3 |
| CVEN 3414 | Fundamentals of Environmental Engineering | 3 |
| CVEN 3525 | Structural Analysis | 3 |
| CVEN 3698 | Engineering Geology | 3 |
| CVEN 3708 | Geotechnical Engineering 1 | 3 |
| CVEN 4897 | Professional Issues in Civil Engineering | 2 |
| CVEN 4899 | Civil Engineering Senior Project Design | 4 |
| GEEN 1400 | Engineering Projects [1] | 3 |
| or ASEN 1400 | Gateway to Space | |
| or ASEN 1403 | Introduction to Rocket Engineering | |
| or CHEN 1400 | Drugs, Driving and Dynamic Processes | |
| or ECEN 1400 | Introduction to Digital and Analog Electronics | |
| **Required Math and Science Courses** | | |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or MATH 1300 | Calculus 1 | |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| or MATH 2300 | Calculus 2 | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| or MATH 2400 | Calculus 3 | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| or MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |
| or MATH 2135 & MATH 3430 | Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations | |
| CHEM 1114 | Laboratory in General Chemistry 1 | 1 |
| or CHEM 1221 | Engineering General Chemistry Lab | |
| CHEN 1201 | General Chemistry for Engineers 1 | 4 |
| or CHEN 1211 | Accelerated Chemistry for Engineers | |
| or CHEM 1113 | General Chemistry 1 | |
| or MCEN 1024 | Chemistry for Energy and Materials Science | |
| or ASEN 1022 | Materials Science for Aerospace Engineers | |
| PHYS 1110 | General Physics 1 | 4 |
| or PHYS 1115 | General Physics 1 for Majors | |
| PHYS 1120 | General Physics 2 | 4 |
| or PHYS 1125 | General Physics 2 for Majors | |
| PHYS 1140 | Experimental Physics 1 | 1 |
| **Required Proficiency Courses** | | **9** |
| Choose three: | | |
| CVEN 3256 | Construction Equipment and Methods | |
| CVEN 3424 | Water and Wastewater Treatment | |
| CVEN 3718 | Geotechnical Engineering 2 | |
| CVEN 4333 | Engineering Hydrology | |
| CVEN 4545 | Steel Design | |
| or CVEN 4555 | Reinforced Concrete Design | |
| **Required Technical Electives** | | |
| At least 6 credits of technical electives must be upper-division AREN or CVEN courses. | | 6 |
| Remaining technical electives may be upper-division AREN or CVEN courses, or any course on the approved Technical Elective List. [2] | | 6 |
| **Free Electives** | | **3** |
| **Humanities, Social Sciences and Writing** | | **18** |

| | |
|---|---|
| Complete the College's Humanities, Social Sciences, and Writing requirements [3] | |
| **Total Credit Hours** | **128** |

1. Students who do not take a first-year projects course may substitute a basic engineering elective: any 3-credit technical course offered in ASEN, AREN, APPM, CHEN, COEN, CVEN, CSCI, ECEN, EMEN, EVEN, GEEN, MCEN, or other course approved by the CEAE Curriculum Committee. Remedial courses (such as precalculus) or courses approved as Humanities & Social Sciences electives may not be used.
2. The approved Technical Elective List can be found on the CEAE Department website (https://www.colorado.edu/ceae/current-students/undergraduate-studies/civil-engineering/).
3. For more information, see the Humanities, Social Sciences and Writing Requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/) webpage.

**Sample Four-Year Plan of Study**

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| CHEN 1201 | General Chemistry for Engineers 1 | 4 |
| CHEM 1114 | Laboratory in General Chemistry 1 | 1 |
| CVEN 1317 | Introduction to Civil and Environmental Engineering | 1 |
| CSCI 1200 | Introduction to Computational Thinking | 3 |
| Humanities & Social Sciences Elective [1] | | 2 |
| COEN 1500 | CEAS First Year Seminar | 1 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| PHYS 1110 | General Physics 1 | 4 |
| CVEN 1027 or AREN 1027 | Civil Engineering Drawing or Engineering Drawing | 3 |
| First-Year Projects course or Basic Engineering Elective | | 3 |
| | **Credit Hours** | **14** |
| **Year Two** | | |
| **Fall Semester** | | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| PHYS 1120 | General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| CVEN 2012 | Introduction to Geomatics | 3 |
| CVEN 2121 | Analytical Mechanics 1 | 3 |
| Humanities & Social Sciences elective [1] | | 3 |
| | **Credit Hours** | **18** |
| **Spring Semester** | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| AREN 2110 or CVEN 2545 | Thermodynamics or Construction Materials | 3 |
| CVEN 2017 | Excel Python R Primer | 1 |
| CVEN 3161 | Mechanics of Materials 1 | 3 |
| CVEN 3313 | Theoretical Fluid Mechanics | 3 |
| CVEN 3698 | Engineering Geology | 3 |
| | **Credit Hours** | **17** |
| **Year Three** | | |
| **Fall Semester** | | |
| CVEN 3246 | Introduction to Construction | 3 |
| CVEN 3323 | Hydraulic Engineering | 3 |
| CVEN 3414 | Fundamentals of Environmental Engineering | 3 |
| CVEN 3525 | Structural Analysis | 3 |
| CVEN 3708 | Geotechnical Engineering 1 | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| CVEN 3111 | Analytical Mechanics 2 | 3 |
| CVEN 3227 | Probability, Statistics and Decision | 3 |
| CVEN Proficiency I | | 3 |
| College-approved writing course [2] | | 3 |
| Humanities & Social Sciences elective [1] | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| CVEN 4897 | Professional Issues in Civil Engineering | 2 |
| Technical Electives [3] | | 6 |
| CVEN Proficiency II | | 3 |
| Free Elective | | 3 |
| Humanities & Social Sciences elective [1] | | 3 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| CVEN 4899 | Civil Engineering Senior Project Design | 4 |
| CVEN Proficiency III | | 3 |
| Humanities & Social Sciences elective [1] | | 3 |
| Technical Electives [3] | | 6 |
| | **Credit Hours** | **16** |
| | **Total Credit Hours** | **128** |

1. Students may choose courses from the list of college-approved humanities and social sciences (HSS) electives (http://www.colorado.edu/engineering/academics/policies/hss/).
2. Students may choose a course from the list of college-approved writing courses (http://www.colorado.edu/engineering/academics/policies/hss/).
3. See approved Technical Electives list on the CEAE website (https://www.colorado.edu/ceae/current-students/undergraduate-studies/civil-engineering/).

# Learning Outcomes

## Program Educational Objectives

The program objectives for the bachelor of science degree in civil engineering are that within five years:

- Graduates will be successfully employed in engineering, science or technology careers.
- Graduates will be assuming management or leadership roles.

- Graduates will engage in continual learning by pursuing advanced degrees or additional educational opportunities through coursework, professional conferences and training and/or participation in professional societies.
- Graduates will pursue professional registration or other appropriate certifications.
- Graduates will be engaged in activities that provide benefit to communities.

### Student Outcomes

The outcomes that students are expected to have attained upon graduation with a bachelor of science degree in civil engineering are:

- An ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics.
- An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.
- An ability to communicate effectively with a range of audiences.
- An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.
- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions.
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Before their graduation, students in civil and environmental engineering will take a capstone design course in addition to training in structural and foundation design, civil engineering systems, construction, engineering geology, engineering materials, geotechnical engineering, soil mechanics, water quality, environmental engineering, fluid mechanics, computer-aided and manual engineering drawing, mechanics and dynamics, computer modeling, professional practice and ethics seminars, structural analysis and design, surveying and transportation systems via required and elective courses.

## Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

### BS in Civil Engineering, MS in Civil Engineering or Architectural Engineering

#### Admissions Requirements

In order to gain admission to the BAM programs named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.000 or higher.
- Completion of all MAPS requirements and no deficiencies remaining (students admitted to CU Boulder prior to Summer 2023 only).
- Have at least junior status within the bachelor's degree program.

#### Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only six credits may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

Please see the BAM degree program (https://www.colorado.edu/ceae/current-students/undergraduate-studies/bsms-program/) web page for more information.

# Environmental Engineering - Bachelor of Science (BSEV)

Environmental engineers play a vital role in maintaining the quality of both public health and the natural environment. Environmental engineering encompasses the scientific assessment and development of engineering solutions to environmental problems impacting the biosphere, land, water and air quality. Environmental issues affect almost all municipal, commercial and industrial sectors, and are a central concern for the public, for all levels of government, and in international relations. These issues include safe drinking water, wastewater processing, solid and hazardous waste disposal, outdoor and indoor air pollution, human health and ecological risk management, prevention of pollution through alternative product or process design, and renewable and sustainable energy sources.

To address these challenges, environmental engineers often encounter challenging problems that must be solved in data-poor situations as members of multidisciplinary teams. Environmental problems require creative solutions blended with contributions from scientists, lawyers, business people and the public. Good communication skills, as well as technical proficiency, are essential for success in this arena. In addition, technology designed to address environmental problems is marketed globally, opening up increasing opportunities for international work in the environmental engineering field.

## Mission

The mission of the Environmental Engineering Program (http://www.colorado.edu/even/) is to provide a multidisciplinary undergraduate environmental engineering education that emphasizes mastery of principles and practices, inspires service for the global public good, endows a desire for lifelong learning and prepares students for broad and dynamic career paths in environmental engineering.

# Faculty

The faculty of the Environmental Engineering (EVEN) Program (http://www.colorado.edu/even/people/) are drawn from the Departments of Civil, Environmental, and Architectural Engineering; Mechanical Engineering; Chemical and Biological Engineering; and Aerospace Engineering Sciences. The EVEN faculty, its Professional Advisory Board (representing prospective employers of its graduates) and EVEN alumni and current students have contributed to the creation of the program's mission and the educational objectives of the BS in environmental engineering degree.

# Requirements

To earn a bachelor's degree in environmental engineering, students must complete the curriculum in the undergraduate major program, as outlined below. For up-to-date program requirements, visit Bachelor of Science in Environmental Engineering (https://www.colorado.edu/even/current-students/undergraduate-studies/) webpage. In addition, students must meet the general undergraduate degree requirements of the College of Engineering and Applied Science (https://www.colorado.edu/engineering-advising/get-your-degree/graduation-requirements/).

Note: This major cannot be combined with a BS in integrated design engineering with an environmental engineering emphasis.

Some variations may be possible; see undergraduate advisor to work on approval.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CHEN 1310 | Introduction to Engineering Computing | 3 |
| CVEN 2121 | Analytical Mechanics 1 | 3 |
| or MCEN 2023 | Statics and Structures | |
| or GEEN 2851 | Statics for Engineers | |
| CVEN 3227 | Probability, Statistics and Decision | 3 |
| or STAT 4000 | Statistical Methods and Application I | |
| CVEN 3246 | Introduction to Construction | 3 |
| or CVEN 4147 | Civil Engineering Systems | |
| or EMEN 4100 | Engineering Economics | |
| CVEN 3313 | Theoretical Fluid Mechanics | 3 |
| or MCEN 3021 | Fluid Mechanics | |
| or CHEN 3200 | Chemical Engineering Fluid Mechanics | |
| or GEEN 3853 | Data Analysis for Engineers | |
| CVEN 3414 | Fundamentals of Environmental Engineering | 3 |
| CVEN 4333 | Engineering Hydrology | 3 |
| EVEN 1000 | Introduction to Environmental Engineering | 1 |
| or AREN 1316 | Introduction to Architectural Engineering | |
| or ASEN 1000 | Introduction to Aerospace Engineering Sciences | |
| or BMEN 1000 | Exploring Biomedical Engineering | |
| or CHEN 1300 | Introduction to Chemical and Biological Engineering | |
| or COEN 1500 | CEAS First Year Seminar | |
| or CSCI 1000 | Computer Science as a Field of Work and Study | |
| or CVEN 1317 | Introduction to Civil and Environmental Engineering | |
| or ECEN 1100 | Exploring ECE | |
| EVEN 3012 | Thermodynamics for Environmental Science and Engineering | 3 |
| or AREN 2110 | Thermodynamics | |
| or GEEN 3852 | Thermodynamics for Engineers | |
| or MCEN 3012 | Thermodynamics | |
| or CHEN 3320 | Chemical Engineering Thermodynamics 1 | |
| EVEN 3550 | Sustainability Principles for Engineers | 3 |
| EVEN 4404 | Water Chemistry | 3 |
| EVEN 4414 | Water Chemistry Laboratory | 1 |
| EVEN 4424 | Environmental Organic Chemistry | 3 |
| EVEN 4434 | Environmental Engineering Design | 4 |
| EVEN 4464 | Environmental Engineering Processes | 3 |
| EVEN 4484 | Integrative Environmental and Molecular Microbiology | 3 |
| EVEN 4494 | Contaminant Fate and Transport | 3 |
| GEEN 1400 | Engineering Projects | 3 |
| or ASEN 1400 | Gateway to Space | |
| or ASEN 1403 | Introduction to Rocket Engineering | |
| or ECEN 1400 | Introduction to Digital and Analog Electronics | |
| MCEN 4131 | Air Pollution Control Engineering | 3 |
| Engineering Fundamentals Course | | 3 |
| MCEN 3022 | Heat Transfer | |
| CVEN 3424 | Water and Wastewater Treatment | |
| CVEN 3323 | Hydraulic Engineering | |
| **Required Science Courses** | | |
| CHEM 1221 | Engineering General Chemistry Lab | 1 |
| or CHEM 1134 | Laboratory in General Chemistry 2 | |
| CHEN 1201 | General Chemistry for Engineers 1 | 4 |
| CHEN 1203 | General Chemistry for Engineers 2 [1] | 2 |
| or CHEN 1211 | Accelerated Chemistry for Engineers | |
| or CHEM 1133 | General Chemistry 2 | |
| PHYS 1110 | General Physics 1 | 4 |
| or PHYS 1115 | General Physics 1 for Majors | |
| PHYS 1120 | General Physics 2 | 4 |
| or PHYS 1125 | General Physics 2 for Majors | |
| PHYS 1140 | Experimental Physics 1 | 1 |
| **Required Mathematics Courses** | | |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or MATH 1300 | Calculus 1 | |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| or MATH 2300 | Calculus 2 | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| or MATH 2400 | Calculus 3 | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| or MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |

| | | |
|---|---|---|
| or MATH 2135 & MATH 3430 | Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations | |
| **Humanities, Social Sciences and Writing** [2] | | **18** |
| **Required Technical Electives** | | |
| Choose one lower-division and two upper-division technical electives, one of which must satisfy earth science requirement. [3] | | |
| **EVEN Areas of Specialization** | | |
| Choose one from the department's areas of specialization List A and two from List B [4] | | |
| **Free Electives** | | |
| Choose three credit hours of free electives to meet the minimum 128 credit hours required for the BS degree. | | 3 |

1. If student completes CHEN 1211 instead of CHEN 1201 & CHEN 1203, then student must complete 2 additional credits as Free Electives.
2. Complete the College's Humanities, Social Sciences and Writing (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/) requirements (18 credits total) as specified.
3. See department's list of Technical Elective Suggestions for EVEN Students (https://www.colorado.edu/even/sites/default/files/attached-files/technical_elective_offered_in_2019-2020-nov2019_0.pdf).
4. See department's website for more information about EVEN Areas of Specialization (https://www.colorado.edu/even/current-students/undergraduate-studies/even-areas-specialization/).

# Sample Four-Year Plan of Study

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| APPM 1350 | Calculus 1 for Engineers | 4 |
| CHEN 1201 | General Chemistry for Engineers 1 | 4 |
| EVEN 1000 | Introduction to Environmental Engineering | 1 |
| COEN 1500 | CEAS First Year Seminar | 1 |
| First-Year Engineering Projects course | | 3 |
| Humanities and social science elective [1] | | 2 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| CHEN 1203 | General Chemistry for Engineers 2 | 2 |
| CHEM 1221 | Engineering General Chemistry Lab | 1 |
| CHEN 1310 | Introduction to Engineering Computing | 3 |
| PHYS 1110 | General Physics 1 | 4 |
| Humanities and social science elective [1] | | 3 |
| | **Credit Hours** | **17** |

**Year Two**

| **Fall Semester** | | |
|---|---|---|
| APPM 2350 | Calculus 3 for Engineers | 4 |
| PHYS 1120 | General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| Select one of the following in Statics: | | 3 |
| CVEN 2121 | Analytical Mechanics 1 | |
| GEEN 2851 | Statics for Engineers | |
| MCEN 2023 | Statics and Structures | |
| Humanities and social science elective [1] | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| CVEN 3414 | Fundamentals of Environmental Engineering | 3 |
| Select one of the following in Fluids Mechanics: | | 3 |
| CVEN 3313 | Theoretical Fluid Mechanics | |
| GEEN 3853 | Data Analysis for Engineers | |
| MCEN 3021 | Fluid Mechanics | |
| CHEN 3200 | Chemical Engineering Fluid Mechanics (Select one of the following in Fluids Mechanics:) | |
| Technical Elective [2] | | 3 |
| Humanities and social science elective [1] | | 3 |
| | **Credit Hours** | **16** |

**Year Three**

| **Fall Semester** | | |
|---|---|---|
| EVEN 4404 | Water Chemistry | 3 |
| EVEN 4414 | Water Chemistry Laboratory | 1 |
| EVEN 3550 | Sustainability Principles for Engineers | 3 |
| Select one of the following in Engineering Economics: | | 3 |
| CVEN 3246 | Introduction to Construction | |
| EMEN 4100 | Engineering Economics | |
| Select one of the following in Thermodynamics: | | 3 |
| EVEN 3012 | Thermodynamics for Environmental Science and Engineering | |
| AREN 2110 | Thermodynamics | |
| MCEN 3012 | Thermodynamics | |
| CHEN 3320 | Chemical Engineering Thermodynamics 1 | |
| GEEN 3852 | Thermodynamics for Engineers | |
| College-approved writing course [3] | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| EVEN 4424 | Environmental Organic Chemistry | 3 |
| EVEN 4484 | Integrative Environmental and Molecular Microbiology | 3 |
| Engineering Fundamental Course | | 3 |
| MCEN 3022 | Heat Transfer | |
| CVEN 3424 | Water and Wastewater Treatment | |
| CVEN 3323 | Hydraulic Engineering | |
| Select one of the following in Probability and Statistics: | | 3 |
| CVEN 3227 | Probability, Statistics and Decision | |
| STAT 4000 | Statistical Methods and Application I | |
| CHEN 3010 | Applied Data Analysis | |
| Environmental engineering design/technical elective I [4] | | 3 |
| | **Credit Hours** | **15** |

| | | |
|---|---|---|
| **Year Four** | | |
| **Fall Semester** | | |
| EVEN 4464 | Environmental Engineering Processes | 3 |
| EVEN 4494 | Contaminant Fate and Transport | 3 |
| MCEN 4131 | Air Pollution Control Engineering | 3 |
| Environmental engineering design/technical elective II [4] | | 3 |
| Select one of the following: | | 3 |
| Technical elective II [2] | | |
| Senior Thesis [5] | | |
| Environmental engineering design/technical elective III [4] | | |
| Humanities and social science elective [1] | | 3 |
| | **Credit Hours** | **18** |
| **Spring Semester** | | |
| CVEN 4333 | Engineering Hydrology | 3 |
| EVEN 4434 | Environmental Engineering Design | 4 |
| Select one of the following: | | 3 |
| Environmental engineering design/technical elective III [4] | | |
| Technical Elective II [2] | | |
| Select one of the following: | | 3 |
| Technical elective III [2] | | |
| Senior Thesis [5] | | |
| Free elective | | 3 |
| | **Credit Hours** | **16** |
| | **Total Credit Hours** | **128** |

1. Students may choose courses from the list of college-approved humanities and social sciences (HSS) electives (http://www.colorado.edu/engineering/academics/policies/hss/).
2. A total of 9 credit hours of technical electives is required. Three technical elective credit hours may be lower-division (1000–2000-level). Three technical elective credit hours must be in the earth sciences, either lower or upper division. Remaining technical elective credit hours must be upper division in engineering, mathematics or sciences. Independent study (EVEN 4840) or senior thesis (EVEN 4980 and EVEN 4990) may be completed as technical electives for up to 6 credits hours.
3. Students may choose a course from the list of college-approved writing courses (http://www.colorado.edu/engineering/academics/policies/hss/).
4. A nine-credit-hour (three-course) sequence in environmental engineering – one environmental engineering design course and two environmental engineering technical electives.
5. A senior thesis can be completed on a single research topic, with faculty approval and direction, and can apply toward technical elective requirements.

# Learning Outcomes

## Program Educational Objectives

The educational objective of the Environmental Engineering Bachelor of Science degree is to produce graduates who are capable of reaching the following career goals three to five years after graduation:

1. Graduates will be employed in engineering, science or other professional careers.
2. Graduates will respond to the needs of society by pursuing professional registration or other appropriate certifications.
3. Graduates will be engaged in continual learning and advancing knowledge by pursuing advanced degrees or additional educational opportunities through coursework, professional conferences and training, and/or participation in professional societies.
4. Graduates will apply critical thinking and creativity as they develop solutions that provide benefits to communities, the environment and/or public health.
5. Graduates will conduct themselves ethically and professionally, while demonstrating that they value diversity and inclusion in work interactions and engagement with the public.

## Student Outcomes

Upon graduation, students are expected to be able to:

- Identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics.
- Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.
- Communicate effectively with a range of audiences.
- Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.
- Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives.
- Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- Acquire and apply new knowledge as needed, using appropriate learning strategies.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BS in Environmental Engineering, MS in Environmental Engineering, Civil Engineering or Mechanical Engineering

### Admissions Requirements

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.000 to earn either the EVEN or CVEN MS or a 3.25 GPA to earn the MCEN MS.

- Completion of all MAPS requirements and no deficiencies remaining (students admitted to CU Boulder prior to Summer 2023 only).
- Have at least junior status within the bachelor's degree program.

### Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only six credits may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

Please see the BAM degree program (https://www.colorado.edu/even/current-students/undergraduate-studies/5-year-bsms/) web page for more information.

# Architectural Engineering - Minor

The undergraduate minor in architectural engineering serves CU Boulder students who are interested in building science, engineering and systems design.

Architectural engineering is the application of engineering principles and technology to building design and construction. Architectural engineering combines aspects of electrical, mechanical and civil engineering to design integrated systems for buildings. Building systems include heating, ventilating and air conditioning (HVAC) lighting systems; electrical systems; materials and structural systems; and construction engineering and management.

# Requirements

## Admission Requirements

A cumulative GPA of 2.750 or higher is required to be admitted to the minor.

The minor is not open to students pursuing the Bachelor of Science in Architectural Engineering or the Bachelor of Science in Integrated Design Engineering with an architectural engineering disciplinary emphasis. In addition, the structural systems and construction engineering and management tracks (shown below) are not open to students pursuing the Bachelor of Science in Civil Engineering or the Bachelor of Science in Integrated Design Engineering with a civil engineering disciplinary emphasis.

## Prerequisites

The following prerequisite courses are required, with a grade of C- or higher in each. A student may be accepted into the minor with no more than two of these courses as deficiencies. All deficiencies must be completed before the minor is awarded.

- Calculus 1 (APPM 1350, MATH 1300 or APPM 1345 )
- Calculus 2 (APPM 1360 or MATH 2300)
- Calculus 3 (APPM 2350 or MATH 2400)
- Differential Equations and Linear Algebra (APPM 2360 , or MATH 2130 and MATH 3430 )
- Two semesters of calculus-based physics (PHYS 1110 or PHYS 1115, and PHYS 1120 or PHYS 1125 )
- Statics (CVEN 2121 , ASEN 2701 , GEEN 2851 or MCEN 2023 )

## Program Requirements

### Grade Requirements

A cumulative GPA of 2.000 is required in the courses used to satisfy the minor requirements, with no individual grade lower than C-.

### Residency

The minor requires 18 credit hours, at least nine of which must be AREN/CVEN courses completed on the CU Boulder campus. The minor is composed of three required courses, two courses in a single track, plus one elective course.

### Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Required Core Courses** | | |
| AREN 2050 | Building Materials and Systems | 3 |
| CVEN 3246 | Introduction to Construction | 3 |
| CVEN 3161 | Mechanics of Materials 1 | 3 |
| or MCEN 2063 | Mechanics of Solids | |
| **Tracks** | | **6** |
| Choose one: | | |
| *Mechanical Systems Track* | | |
| AREN 3010 | Energy Efficient Buildings | |
| AREN 4110 | Building Energy Systems Engineering | |
| *Structural Systems Track* [1] | | |
| CVEN 3525 | Structural Analysis | |
| CVEN 4545 | Steel Design | |
| or CVEN 4555 | Reinforced Concrete Design | |
| or CVEN 4565 | Design of Wood Structures | |
| *Electrical Systems Track* | | |
| AREN 3040 | Circuits for Architectural Engineers | |
| or ECEN 2250 | Introduction to Circuits and Electronics | |
| or ECEN 3010 | Circuits and Electronics for Mechanical Engineers | |
| or GEEN 3010 | Circuits for Engineers | |
| AREN 4570 | Building Electrical Systems Design 1 | |
| *Lighting Track* | | |
| AREN 3540 | Illumination I | |
| AREN 4550 | Illumination 2 | |
| *Construction Engineering & Management Track* [1] | | |
| AREN 4506 | Pre-construction Estimating and Scheduling | |
| AREN 4606 | Construction Project Execution and Control | |
| **Elective** | | **3** |
| ARCH 3214 | History and Theory of Architecture 2 | |
| AREN 1027 | Engineering Drawing | |
| CVEN 1027 | Civil Engineering Drawing | |
| ENVD 2352 | Special Topics: Beginning Digital Applications [2] | |
| AREN 4010 | Energy System Modeling and Control | |
| AREN 4130 | Optical Design for Illumination and Solid State Lighting | |
| AREN 4315 | Design of Masonry Structures | |
| AREN 4560 | Luminous Radiative Transfer | |
| AREN 4580 | Daylighting | |

| | |
|---|---|
| AREN 4620 | Adaptive Lighting Systems |
| AREN 4630 | Advanced Lighting Design |
| AREN 4830 | Special Topics for Seniors/Grads (Sustainable Lighting Workshop, Computer Simulation of Building Systems, or Forensic Engineering) |
| AREN 4890 | Sustainable Building Design |
| AREN 4990 | Compu Fluid Dynamics (CFD) Analysis for Built/Natural Envmnts |
| CVEN 5830 | Special Topics for Seniors/Grads (Distributed Generation Systems, Color Theory/Light Source, or Applied Data Analysis & Modeling.) [3] |
| AREN 5660 | Embodied Carbon in Buildings [3] |
| AREN 4040 | Building Energy Audits |
| AREN 5090 | Optimizing Grid Connected Systems [3] |
| **Total Credit Hours** | **18** |

1 Not open to students pursuing the Bachelor of Science in Civil Engineering or the Bachelor of Science in Integrated Design Engineering with a civil engineering disciplinary emphasis.

2 Only the Intro 3-D Modeling (RHINO) and INTRO BIM (Revit) sections are approved as an elective.

3 Enrollment by instructor permission only.

# Civil Engineering - Minor

The undergraduate minor in civil engineering serves CU Boulder students interested in an introductory exposure to the broad discipline of civil engineering. The minor is intended to expose students to five sub-disciplines of civil engineering.

# Requirements

## Admission Requirements

A cumulative GPA of 2.750 or higher is required to be admitted to the minor.

The minor is not open to students pursuing the Bachelor of Science in Civil Engineering or the Bachelor of Science in Integrated Design Engineering with a civil engineering disciplinary emphasis.

## Prerequisites

The following prerequisite courses are required, with a grade of C- or higher in each. A student may be accepted into the minor with no more than two of these courses as deficiencies. All deficiencies must be completed before the minor is awarded.

- Calculus 1 (APPM 1350 or MATH 1300 or APPM 1345)
- Calculus 2 (APPM 1360 or MATH 2300)
- Calculus 3 (APPM 2350 or MATH 2400)
- Differential Equations and Linear Algebra (APPM 2360, or MATH 2130 and MATH 3430)
- Two semesters of calculus-based physics (PHYS 1110 or PHYS 1115, and PHYS 1120 or PHYS 1125)
- Statics (CVEN 2121, ASEN 2701, GEEN 2851 or MCEN 2023)
- Fluid Mechanics (CVEN 3313, AREN 2120, MCEN 3021, or GEEN 3853)
- Mechanics of Materials (CVEN 3161 or MCEN 2063)

## Program Requirements

### Grade Requirements

A cumulative GPA of 2.000 is required in the courses used to satisfy the minor requirements, with no individual grade lower than C-.

### Residency

The minor requires 18 credit hours, at least nine of which must be CVEN courses completed on the CU Boulder campus. The minor is composed of five required courses plus one additional proficiency or advanced course.

### Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Required Core Courses** | | |
| CVEN 3246 | Introduction to Construction | 3 |
| CVEN 3323 | Hydraulic Engineering | 3 |
| CVEN 3414 | Fundamentals of Environmental Engineering | 3 |
| CVEN 3525 | Structural Analysis | 3 |
| CVEN 3708 | Geotechnical Engineering 1 | 3 |
| **Additional Courses** | | |
| One additional proficiency or advanced course in one of the following sub-disciplines: | | 3 |
| *Construction Engineering and Management* | | |
| CVEN 3256 | Construction Equipment and Methods | |
| AREN 4506 | Pre-construction Estimating and Scheduling | |
| *Environmental Engineering* | | |
| CVEN 3424 | Water and Wastewater Treatment | |
| CVEN 4404 | Water Chemistry | |
| CVEN 3434 | Introduction to Applied Ecology | |
| CVEN 4474 | Hazardous and Industrial Waste Management | |
| CVEN 4484 | Integrative Environmental and Molecular Microbiology | |
| *Geotechnical Engineering* | | |
| CVEN 3718 | Geotechnical Engineering 2 | |
| *Structural Engineering* | | |
| CVEN 4545 | Steel Design | |
| CVEN 4555 | Reinforced Concrete Design | |
| *Water Resource Engineering* | | |
| CVEN 4333 | Engineering Hydrology | |
| CVEN 4353 | Groundwater Engineering | |
| *Civil Systems* | | |
| CVEN 4147 | Civil Engineering Systems | |
| **Total Credit Hours** | | **18** |

# Sustainability Engineering - Minor

The undergraduate minor in sustainability engineering serves all CU Boulder students who are interested in obtaining a strong foundation in sustainability principles. The minor exposes students to the drivers, determinants and solutions to modern sustainability problems facing our planet.

# Requirements

The minor requires 15 credit hours, at least nine of which must be courses completed on the CU Boulder campus. Students must take six (6) credits of foundational, required coursework and an additional nine (9) credits of approved sustainability-related coursework (electives) offered by several departments, programs and colleges across campus. A cumulative GPA of 2.000 is required in the courses used to satisfy the minor requirements.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | **6** |
| CVEN 2909 | Introduction to Global Sustainability | |
| CVEN 2919 | Sustainability in Action | |
| **Elective Courses** | | **9** |
| Students may select any combination of three (3) approved elective courses to satisfy the minor requirement. Electives are listed in the following four categories. Students do not have to take all electives in one category. Students should review the prerequisites of each course before registration. | | |
| *Science and Engineering* | | |
| AREN 3010 | Energy Efficient Buildings | |
| AREN 4890 | Sustainable Building Design | |
| ATOC 4770 | Renewable Energy Meteorology | |
| CHEM 3251 | Sustainable Energy from a Chemistry Perspective | |
| CHEM 4141 | Environmental Water and Soil Chemistry | |
| CHEN 4480 | Solar Cells and Optical Devices for Sustainable Buildings | |
| COEN 3210 | Climate Change and Engineering | |
| CVEN 3414 | Fundamentals of Environmental Engineering | |
| CVEN 4565 | Design of Wood Structures | |
| CVEN 4834 | Special Topics (Solid Waste Management and Resource Recovery) | |
| CVEN 4969 | Water and Sanitation in Developing Countries | |
| ENVS 1000 | Introduction to Environmental Studies | |
| ENVS 2000 | Applied Ecology for Environmental Studies | |
| ENVS 3033 | Governing the Environment | |
| ENVS 3070 | Energy and the Environment | |
| ENVS 3140 | Environmental Ethics | |
| ENVS 3525 | Intermediate Environmental Problem Analysis: Topical Cornerstones | |
| ENVS 3555 | Sustainable Economies | |
| ENVS 4800 | Capstone: Critical Thinking in Environmental Studies | |
| EVEN 3550 | Sustainability Principles for Engineers | |
| EVEN 3650 | Sustainable Energy Systems Analysis | |
| EVEN 4434 | Environmental Engineering Design | |
| EVEN 4544 | Solid Waste Management and Resource Recovery | |
| EVEN 4969 | Water and Sanitation in Developing Countries | |
| GEOG 2271 | Introduction to the Arctic Environment | |
| GEOG 3402 | Natural Hazards | |
| GEOG 3601 | Principles of Climate | |
| GEOL 1150 | Water, Energy and Environment: An Introduction to Earth Resources | |
| MCEN 4032 | Sustainable Energy | |
| *Business, Economics, and Policy* | | |
| BUSM 3060 | Environmental Sustainability in a Globalized World | |
| CESR 4130 | Sustainable Operations | |
| CESR 4850 | The Sustainable Firm: Strategies and Practice | |
| ECON 3535 | Natural Resource Economics | |
| ECON 3545 | Environmental Economics | |
| ENVS 3555 | Sustainable Economies | |
| ENVS 3621 | Energy Policy and Society | |
| GEOG 3022 | Climate and Energy Justice | |
| GEOG 4501 | Water Issues in the American West | |
| MGMT 4130 | Sustainable Operations | |
| PSCI 2116 | Introduction to Environmental Policy and Policy Analysis | |
| PSCI 3064 | Environmental Political Theory | |
| PSCI 3206 | The Environment and Public Policy | |
| PSCI 4106 | Issues and Challenges in American Green Energy Policy | |
| SEWL 2000 | America, the Environment, and the Global Economy | |
| *Arts, Technology, Media, and Education* | | |
| ATLS 4606 | Critical Technical Practice | |
| PLAN 3102 | Strategies and Techniques for Sustainable Planning and Urban Design | |
| PLAN 4101 | Sustainable Futures Planning | |
| *History, Sociology, and Environmental Justice* | | |
| ENVS 1001 | Introduction to Human Dimensions of Environmental Studies | |
| ETHN 3201 | Social Justice, Leadership and Community Engagement Internships | |
| HONR 4075 | Environmental Justice | |
| PHIL 2140 | Environmental Justice | |
| PHIL 3140 | Environmental Ethics | |
| SOCY 4117 | Food and Society | |
| **Total Credit Hours** | | **15** |

# Learning Outcomes

By the completion of the program, students will:

- Introduce the historical causes and present conditions of global climate change, and identify the opportunities and limitations of professional sustainability engagement.
- Identify and promote the relevance and role of engineers in supporting global sustainability and increasing prosperity.
- Introduce and identify technological, policy, social and practical solutions to global sustainability challenges.

# Global Engineering - Minor

The undergraduate minor in global engineering will expand your understanding of how to operate within an international context from an engineering perspective. Advances in engineering and applied science offer immense promise to solving some of the most challenging global issues of our time, making exposure to other cultures and contexts crucial for a well-rounded engineering education. This minor will prepare students for international practice in multiple ways:

- It will reveal the profession's global impact on economies, society, and the environment.
- It will make students more sensitive to and aware of other cultures.
- It will help students recognize the issues at the core of development challenges and how to partner holistically will local communities to implement engineering solutions that improve quality of life.

Graduates with this minor will be capable of negotiating complex, uncertain and ambiguous circumstances, whether at home or abroad. Coursework includes a choice between two cornerstone courses, foreign language study through the intermediate level and students' choice of coursework that expands their understanding of:

- A particular country, region or language (e.g., CHIN 3341 Literature and Popular Culture in Modern China , FREN 3600 Business French 1 or PSCI 3082 Political Systems of Sub-Saharan Africa )
- Global topics (e.g., GEOG 3682 International Development: Economics, Power, and Place , IAFS 3850 International Conflict Resolution and Peacebuilding or PSCI 3064 Environmental Political Theory )
- Global Engineering (e.g., EMEN 4200 Engineering and Entrepreneurship for the Developing World, CVEN 5119 Introduction to Global Health for Engineers, EVEN 5979 Introduction to Humanitarian Aid or other Mortenson Center courses)

Most of these courses fit seamlessly into existing humanities and social science (H&SS) and technical elective credit requirements so that students do not have to add significant additional coursework to their major. Finally, students pursuing the minor must study, intern or volunteer abroad through an approved program--or complete an approved project through the Mortenson Center in Global Engineering & Resilience (https://www.colorado.edu/center/mortenson/).

For more information, visit the Global Engineering Minor webpage (https://www.colorado.edu/center/mortenson/global-engineering-minor-0/).

# Requirements

To enroll in the global engineering minor, a student must be admitted to the College of Engineering & Applied Science and have a minimum 2.50 cumulative GPA. The minor requires a minimum completion of 18 credit hours, along with an approved global experience. A cumulative GPA of 2.000 or better is required for courses used to satisfy the requirements of this minor.

## Required Courses and Credits

### Foundation Course

Choose one from the following:

| Code | Title | Credit Hours |
|---|---|---|
| ENES 2360 | Gaining a Global State of Mind for Effective Engineering Practice [1] | 3 |
| ENES 3360 | Gaining a Global State of Mind for Effective Engineering Practice [1] | 3 |
| GEEN 1400 | Engineering Projects [2] | 3 |
| EVEN 2909 | Introduction to Global Sustainability [3] | 3 |

1 May take as upper- or lower-division.

2 Only the global sections of GEEN 1400, taught by a Mortenson Center faculty members or affiliate faculty members, will count as the foundation course.

3 EVEN 2909 will be offered next in Spring 2026.

Students may take two foundation courses and count the second course toward the regional, global or technical perspective requirements.

### Foreign Language

Students must demonstrate intermediate foreign language ability through any of the following avenues:

- Completing the second semester, intermediate level of their chosen foreign language
- Testing into the 3000-level of a foreign language through CU's foreign language placement test.
- Completing "intermediate II" level of a foreign language through the ALTEC language lab. Must earn certificate of completion, which requires 80% attendance.
- Undergoing a language proficiency evaluation through ALTEC.

There is no specific credit allocation for this requirement. International students from non-English-speaking countries are exempt from this requirement but must take a total of 18 approved credits to earn the minor.

Students who do not receive academic credit for a foreign language (e.g., because they tested out of the intermediate level) must take a minimum of 18 approved credits to earn for the minor. Course options include taking an upper-division foreign language course or selecting additional credits from the regional, global or technical perspective category.

| Code | Title | Credit Hours |
|---|---|---|
| ARAB 2120 | Intermediate Arabic 2 | 4 |
| HIND 2120 | Intermediate Hindi 2 | 4 |
| KREN 2120 | Intermediate Korean 2 | 5 |
| CHIN 2120 | Intermediate Chinese 2 | 5 |
| JPNS 2120 | Intermediate Japanese 2 | 5 |
| FREN 2120 | Second-Year French Grammar Review and Reading 2 | 3 |
| ITAL 2120 | Intermediate Italian Reading, Grammar, and Composition 2 | 4 |
| GRMN 2020 | Intermediate German 2 | 4 |
| SWED 2020 | Intermediate Swedish 2 - DILS | 4 |
| HEBR 2120 | Intermediate Modern Hebrew, Second Semester | 4 |
| DANE 2020 | Intermediate Danish II - DILS | 4 |
| PORT 2120 | Second-Year Portuguese 2 | 3 |

| | | |
|---|---|---|
| RUSS 2020 | Second-Year Russian 2 | 4 |
| TBTN 2020 | Intermediate Colloquial Tibetan 2 | 4 |
| SPAN 2150 | Intensive Second-Year Spanish | 5 |
| SPAN 2120 | Second-Year Spanish 2 | 3 |
| GRMN 2030 | Intensive Intermediate German | 5 |

### Regional, Global, and Technical Perspective Courses

Students may choose 12 credits of their choice (9 must be upper-division) that expand their understanding of:

- A particular country, region, or language
- Global topics
- Global Engineering

Many global and regional context courses also count toward Humanities & Social Sciences requirements, allowing students to double dip. Global engineering courses may also be eligible to double dip as technical, professional or focus-area electives in the major. Students should confirm classes they are considering with their academic advisor.

Students may submit a petition to the Managing Director of the Global Engineering Minor for consideration of courses not on this list.

International students may choose U.S. context courses to fulfill these requirements.

| Code | Title | Credit Hours |
|---|---|---|
| ANTH 1105 | Exploring a Non-Western Culture: Tibet | 3 |
| ANTH 1140 | Exploring a Non-Western Culture: The Maya | 3 |
| PHIL 1030 | Introduction to Global Philosophy | 3 |
| PHIL 1250 | Poverty, Power, and Patriotism: Issues of Global Justice | 3 |
| PHIL 2140 | Environmental Justice | 3 |
| PHIL 3030 | Asian Philosophies | 3 |
| PHIL 3040 | African Philosophy: Personhood and Morality | 3 |
| PHIL 3260 | Philosophy and the International Order | 3 |
| PHIL 2220 | Philosophy and Law | 3 |
| PHIL 1200 | Contemporary Social Problems | 3 |
| PSCI 2012 | Introduction to Comparative Politics | 3 |
| PSCI 2223 | Introduction to International Relations | 3 |
| PSCI 3022 | Russian Politics | 3 |
| PSCI 3032 | Democracy, Inequality and Violence in Latin America | 3 |
| PSCI 3052 | Gender and Politics in Latin America | 3 |
| PSCI 3064 | Environmental Political Theory | 3 |
| PSCI 3072 | Government and Politics in Southeast Asia | 3 |
| PSCI 3082 | Political Systems of Sub-Saharan Africa | 3 |
| PSCI 3092 | Comparative Political Economy | 3 |
| PSCI 3102 | South Asian Politics | 3 |
| PSCI 3143 | Current Affairs in International Relations | 3 |
| PSCI 3163 | American Foreign Policy | 3 |
| PSCI 3172 | Democracy and Its Citizens in the US and EU | 3 |
| PSCI 3183 | International Law | 3 |
| PSCI 3193 | International Behavior | 3 |
| PSCI 3213 | International Political Economy | 3 |
| PSCI 3223 | International Human Rights | 3 |
| PSCI 4002 | Western European Politics | 3 |
| PSCI 4012 | Global Development | 3 |
| PSCI 4016 | Inequality and Public Policy in the U.S. and Europe | 3 |
| PSCI 4022 | Chinese Foreign Policy | 3 |
| PSCI 4052 | Chinese Politics | 3 |
| PSCI 4062 | East European Politics | 3 |
| PSCI 4173 | International Organizations | 3 |
| PSCI 4213 | Europe and the International System | 3 |
| PSCI 4242 | Middle Eastern Politics | 3 |
| PSCI 4283 | International Migration and Policy | 3 |
| PSCI 4302 | European Union Politics | 3 |
| PSCI 4391 | Gender Politics and Global Activism | 3 |
| PSCI 4703 | Technology, Society and the Future | 3 |
| PSCI 4732 | Critical Thinking in Development | 3 |
| PSCI 4792 | Issues in Latin American Politics | 3 |
| ANTH 1155 | Exploring Global Cultural Diversity | 3 |
| ANTH 1156 | Class and Consumption: Global Cultures of Inequality, Anxiety, and Shopping | 3 |
| ANTH 1200 | Culture and Power | 3 |
| ANTH 3009 | Modern Issues, Ancient Times | 3 |
| ANTH 2525 | Environmental Anthropology | 3 |
| ANTH 3100 | Africa: Peoples and Societies in Change | 3 |
| ANTH 3110 | Ethnography of Mexico and Central America | 3 |
| ANTH 3160 | Peoples of the South Pacific | 3 |
| ANTH 3760 | Exploring Culture and Media in Southeast Asia | 3 |
| ANTH 4505 | Globalization and Transnational Culture | 3 |
| ANTH 4050 | Anthropology of Jews and Judaism | 3 |
| ANTH 4525 | Global Islams | 3 |
| COMM 3410 | Intercultural Communication | 3 |
| MDST 2001 | Introduction to Global Media | 3 |
| MDST 3201 | Media, Culture and Globalization | 3 |
| MDST 4211 | Asian Media and Culture | 3 |
| MDST 4341 | International Media and Global Crises | 3 |
| ANTH 4620 | Nationalism and Cultural Citizenship | 3 |
| ANTH 4690 | Anthropology of Tibet | 3-6 |
| ANTH 4730 | Latin American Politics and Culture through Film and Text | 3 |
| ANTH 4735 | Contemporary Cuban Culture: Race, Gender and Power | 3 |
| ANTH 4740 | Peoples and Cultures of Brazil | 3 |
| ANTH 4745 | Science, Technology and Society | 3 |
| ANTH 4750 | Culture and Society in South Asia | 3 |
| ANTH 4760 | Ethnography of Southeast Asia and Indonesia | 3 |
| ANTH 4800 | Language and Culture | 3 |
| ARAB 3110 | Advanced Arabic 1 | 4 |
| ARAB 3120 | Advanced Arabic 2 | 4 |

| | | |
|---|---|---|
| ARAB 3220 | Arabian Nights, Arabian Days: Popular Literature in the Arab World and Beyond | 3 |
| ARAB 3221 | The Making of Middle Eastern Identities: Arabs and Their "Others" | 3 |
| ARAB 3230 | Islamic Culture and the Iberian Peninsula | 3 |
| ARAB 3231 | In the Footsteps of Travelers: Travel Writing in Arabic Lit | 3 |
| ARAB 3241 | Art in Islamic Cultures | 3 |
| ARAB 3330 | The Arabic Novel | 3 |
| ARAB 3340 | Representing Islam | 3 |
| ARAB 3350 | Narrating the City: Literary Mappings of the Urban Landscape | 3 |
| ARAB 3360 | Truth and Prophecy in Islam | 3 |
| ARAB 3410 | Gender, Sexuality and Culture in the Modern Middle East | 3 |
| ARAB 4200 | Advanced Readings in Arabic | 3 |
| ARAB 4250 | Arabic Media | 3 |
| ARTH 1500 | Global Art and Visual Culture | 3 |
| ARTH 3619 | The Arts of China | 3 |
| ARTH 3629 | The Arts of Japan | 3 |
| ARTH 3729 | Foundations in Latin American Art | 3 |
| ARTH 4449 | Arts of India and Southeast Asia | 3 |
| ARTH 4559 | Twentieth-Century Architecture | 3 |
| ASIA 1000 | Origins of Contemporary Southeast Asia | 3 |
| ASIA 2000 | Gateway to Modern Asia: Exploring Regional Connections | 3 |
| ASIA 2852 | Contemporary Southeast Asia: Environmental Politics | 3 |
| ASIA 3300 | Sex and Gender in Asian Film and Literature | 3 |
| ASIA 3900 | Discovering Urban China: Tradition, Modernity, Nostalgia | 3 |
| CEES 1623 | Introduction to Central and East European History since 1770 | 3 |
| CHIN 2441 | Film and the Dynamics of Chinese Culture | 3 |
| CHIN 3110 | Advanced Chinese 1 | 5 |
| CHIN 3120 | Advanced Chinese 2 | 5 |
| CHIN 3200 | Adv Wrtg Topics on Chinese & Japanese Literature and Civilization | 3 |
| CHIN 3334 | Premodern Chinese Fiction | 3 |
| CHIN 3341 | Literature and Popular Culture in Modern China | 3 |
| CHIN 3342 | Sinophone Literature in the Contemporary World | 3 |
| CHIN 3361 | Women and the Supernatural in Chinese Literature | 3 |
| CHIN 3371 | Topics in Chinese Film | 3 |
| CHIN 4110 | Advanced Readings in Modern Chinese 1 | 3 |
| CHIN 4120 | Advanced Readings in Modern Chinese 2 | 3 |
| CINE 2002 | Recent International Cinema | 3 |
| CINE 2513 | Major Asian Filmmakers | 3 |
| CINE 2521 | Classics of the Foreign Cinema: 1960s to Present | 3 |
| CINE 3402 | European Film and Culture | 3 |
| ECON 3403 | International Economics and Policy | 3 |
| ECON 3784 | Economic Development and Policy | 3 |
| ECON 4413 | International Trade | 3 |
| ECON 4423 | International Finance | 3 |
| ECON 4514 | Economic History of Europe | 3 |
| ECON 4534 | Chinese Economic History in Comparative Perspective | 3 |
| ECON 4784 | Economic Development | 3 |
| ENGL 1250 | Introduction to World Literature by Women | 3 |
| ENGL 2017 | World Literature | 3 |
| ENVS 3022 | Climate and Energy Justice | 3 |
| ENVS 3033 | Governing the Environment | 3 |
| ENVS 3140 | Environmental Ethics | 3 |
| ENVS 3640 | Data Analysis for Global Environmental Affairs | 3 |
| ENVS 4027 | Inequality, Democracy, and the Environment | 3 |
| ENVS 4030 | Sociology of Climate Change | 3 |
| ENVS 4340 | Conservation Biology and Practice in Brazil's Atlantic Forest | 4 |
| GEOG 3022 | Climate and Energy Justice | 3 |
| PHIL 3140 | Environmental Ethics | 3 |
| ENGL 4018 | Literature and Globalization | 3 |
| ENVD 1024 | History of the Built Environment | 3 |
| ENVD 2001 | Human Behavior and Design | 3 |
| ENVD 2003 | Ecological Systems in Design | 3 |
| GEOG 1962 | Geographies of Global Change | 3 |
| GEOG 1982 | Global Geographies: Societies, Places, Connections | 3 |
| GEOG 1992 | Human Geographies | 3 |
| GEOG 2053 | Mapping Our World | 3 |
| GEOG 2092 | Advanced Introduction to Human Geography | 3 |
| GEOG 2852 | Contemporary Southeast Asia: Environmental Politics | 3 |
| GEOG 3622 | Cities of the Global South | 3 |
| GEOG 3672 | Who Runs the World? Sex, Power, and Gender in Geography | 3 |
| GEOG 3682 | International Development: Economics, Power, and Place | 3 |
| GEOG 3692 | Introduction to Global Public Health | 4 |
| GEOG 3742 | Place, Power, and Contemporary Culture | 3 |
| GEOG 3812 | Mexico, Central America, and the Caribbean | 3 |
| GEOG 3822 | China's Diverse Geographies: Environment, Society, Politics | 3 |
| GEOG 3832 | Love & War Geographies: Imperialism, Militarism, and Development in South Asia | 3 |
| GEOG 3842 | Human Geography of Czechia: Political, Economic and Social Transitions | 3 |
| GEOG 3862 | Global Africa: Environment, Development, and Culture | 3 |
| GEOG 3882 | Geography of the Former Soviet Union | 3 |

| | | |
|---|---|---|
| GEOG 4292 | Migration, Immigrant Adaptation, and Development | 3 |
| GEOG 3351 | Biogeography | 3 |
| GSLL 2350 | Introduction to Jewish Culture | 3 |
| GSLL 2551 | Modern Jewish Literature | 3 |
| GSLL 3401 | The Heart of Europe: Filmmakers and Writers in 20th Century Central Europe | 3 |
| GSLL 3600 | Contemporary Jewish Societies | 3 |
| HEBR 3010 | Third Year Modern Hebrew, First Semester | 3 |
| HEBR 3020 | Third Year Modern Hebrew, Second Semester | 3 |
| HEBR 3202 | Women, Gender & Sexuality in Jewish Texts & Traditions | 3 |
| HEBR 4203 | Israeli Literature: Exile, Nation, Home | 3 |
| GEOG 3402 | Natural Hazards | 3 |
| GEOG 3422 | Political Ecology | 3 |
| GEOG 4762 | Geographies of Political Islam | 3 |
| GEOG 4812 | Political Ecology & Latin America | 3 |
| GEOG 4822 | Environment and Development in China | 3 |
| GEOG 4832 | Geography of Tibet | 3 |
| GEOG 4852 | Health and Medical Geography | 3 |
| GEOG 4892 | Geography of Western Europe | 3 |
| GEOL 1150 | Water, Energy and Environment: An Introduction to Earth Resources | 3 |
| GEOL 3050 | GIS for Geologists | 2 |
| HIND 3110 | Advanced Hindi 1 | 4 |
| HIND 3120 | Advanced Hindi 2 | 4 |
| HIND 3441 | Screening India: A History of Bollywood Cinema | 3 |
| HIND 3651 | Living Indian Epics: The Ramayana and the Mahabharata in the Modern Political Imagination | 3 |
| HIND 3661 | South Asian Diasporas: Imagining Home Abroad | 3 |
| HIND 3811 | The Power of the Word: Subversive and Censored 20th Century Indo-Pakistani Literature | 3 |
| HIND 3831 | The Many Faces of Krishna in South Asia Literature and Culture | 3 |
| HIND 3851 | Devotional Literature in South Asia | 3 |
| HIST 1028 | Latin American History since Independence | 3 |
| HIST 1308 | Introduction to Middle Eastern History | 3 |
| HIST 1123 | Introduction to British History Since 1660 | 3 |
| HIST 1528 | Introduction to South Asian History since 1757 | 3 |
| HIST 1623 | Introduction to Central and East European History since 1770 | 3 |
| HIST 1628 | Introduction to Chinese History since 1644 | 3 |
| HIST 1708 | Japan from Clay Pots to Robots | 3 |
| HIST 1800 | Introduction to Global History | 3 |
| HIST 1828 | Jewish History Since 1492 | 3 |
| HIST 1830 | Global History of Holocaust and Genocide | 3 |
| HIST 2126 | Issues in Modern U.S. Politics and Foreign Relations | 3 |
| HIST 2166 | The Vietnam Wars | 3 |
| HIST 2629 | China in World History | 3 |
| HIST 2728 | Japan: From Samurai to Kamikaze | 3 |
| HIST 2830 | Disease and Public Health in Global History | 3 |
| IAFS 1000 | Global Issues and International Affairs | 4 |
| IAFS 3010 | Islam, Geopolitics and Society: Gender, Identity and Place | 3 |
| IAFS 3500 | French Connections: Contemporary France and America in Historical Context | 3 |
| IAFS 3520 | Global Seminar: Justice, Human Rights and Democracy in Israel | 6 |
| IAFS 3530 | Global Seminar: Jews and Muslims - The Multiethnic History of Istanbul | 3 |
| IAFS 3540 | Migration, Human Rights, and Conflict in the Mediterranean | 3 |
| IAFS 3600 | Contemporary Jewish Societies | 3 |
| IAFS 3630 | Radical Nationalism in Contemporary Northern Europe | 3 |
| IAFS 3631 | Arctic Society and Culture | 3 |
| IAFS 3632 | Scandinavia and the European Union | 3 |
| IAFS 3640 | Data Analysis for Global Environmental Affairs | 3 |
| IAFS 3650 | History of Arab-Israeli Conflict | 3 |
| IAFS 3670 | Cities of the Global South | 3 |
| IAFS 3681 | Refugees in German Culture | 3 |
| IAFS 3850 | International Conflict Resolution and Peacebuilding | 3 |
| IAFS 4500 | The Post-Cold War World | 3 |
| ITAL 1300 | La Dolce Vita: How to Live a Good Life, Italian Style | 3 |
| ITAL 1500 | That's Amore: Introduction to Italian Culture | 3 |
| ITAL 3015 | Advanced Composition 1 | 3 |
| ITAL 3030 | Italian Conversation Through Art History | 3 |
| ITAL 3040 | Italian Conversation Through Cinema | 3 |
| ITAL 3140 | Main Current of Italian Culture and Literature 3 | 3 |
| ITAL 4010 | Problems in Translation, Advanced Grammar, and Stylistics 1 | 3 |
| ITAL 4030 | Contemporary Italian Culture, Politics, and the Media | 3 |
| JPNS 1012 | Introduction to Japanese Civilization | 4 |
| JPNS 1051 | Portals to Japanese Literature | 3 |
| JPNS 2441 | Japanese Culture through Film and Anime | 3 |
| JPNS 3110 | Advanced Japanese 1 | 5 |
| JPNS 3120 | Advanced Japanese 2 | 5 |
| JPNS 3311 | Japanese Minority and Transnational Literature | 3 |
| JPNS 3321 | Japanese Sci-Fi and Speculative Fiction | 3 |

| | | |
|---|---|---|
| JPNS 3331 | Business Japanese | 3 |
| JPNS 3511 | Paper Worlds, Screen Worlds: Contemporary Japanese Literature | 3 |
| JPNS 3811 | The World of the Shining Prince: The Tale of Genji and Heian Literature | 3 |
| JPNS 3841 | Transforming Worlds: Japanese Literature in Modernity | 3 |
| JPNS 3851 | Japanese Popular Culture | 3 |
| JPNS 3861 | Imagining the Samurai in Japanese Literature and Culture | 3 |
| JPNS 3871 | Horror and the Macabre in Japanese Literature, Film, Culture | 3 |
| JPNS 3881 | Environment, Nature and Disaster in Japanese Literature and Culture | 3 |
| JPNS 3891 | Travel/Travel Writing in Japanese Literature and Culture | 3 |
| JPNS 4030 | Japanese Syntax | 3 |
| JPNS 4050 | Japanese Sociolinguistics | 3 |
| ITAL 4040 | Business Italian Style | 3 |
| ITAL 4145 | The Age of Dante in Italian | 3 |
| ITAL 4147 | Visualizing Dante's Inferno: A Global Seminar in Florence Italy | 3 |
| JWST 1828 | Jewish History Since 1492 | 3 |
| JWST 1830 | Global History of Holocaust and Genocide | 3 |
| JWST 2350 | Introduction to Jewish Culture | 3 |
| JWST 2551 | Modern Jewish Literature | 3 |
| JWST 2600 | Judaism, Christianity, and Islam: Abrahamic Religions | 3 |
| JWST 3100 | Judaism | 3 |
| JWST 3150 | Jerusalem: The Holy City in History, Legend, and Religious Thought | 3 |
| JWST 3200 | Religion and Feminist Thought | 3 |
| JWST 3202 | Women, Gender & Sexuality in Jewish Texts & Traditions | 3 |
| JWST 3310 | The Bible as Literature | 3 |
| JWST 3401 | The Heart of Europe: Filmmakers and Writers in 20th Century Central Europe | 3 |
| JWST 3501 | The German-Jewish Experience: From the Enlightenment to the Present | 3 |
| JWST 3530 | Global Seminar: Jews and Muslims - The Multiethnic History of Istanbul | 3 |
| JWST 3600 | Contemporary Jewish Societies | 3 |
| JWST 3650 | History of Arab-Israeli Conflict | 3 |
| JWST 3681 | Refugees in German Culture | 3 |
| JWST 4050 | Anthropology of Jews and Judaism | 3 |
| JWST 4122 | Music in Jewish Culture | 3 |
| JWST 4170 | God and Politics | 3 |
| JWST 4203 | Israeli Literature: Exile, Nation, Home | 3 |
| JWST 4302 | Global Seminar: Justice, Human Rights and Democracy in Israel | 6 |
| JWST 4338 | History of Modern Israel/Palestine | 3 |
| JWST 4378 | Jews in and of the Middle East | 3 |
| JWST 4388 | History Today: Nationalism & Collective Memory in Israel/Palestine | 3 |
| JWST 4524 | Expulsions and Diasporas: The Jews of Spain and Portugal | 3 |
| JWST 4800 | Ethics, Medicine and the Holocaust: Legacies in Health and Society | 3 |
| JWST 4534 | | 3 |
| KREN 2441 | Film and Korean Culture | 3 |
| KREN 3110 | Advanced Korean 1 | 5 |
| KREN 3120 | Advanced Korean 2 | 5 |
| KREN 3841 | Modern Korean Literature in English Translation | 3 |
| LAMS 1000 | Introduction to Latin American and Latinx Studies | 3 |
| LING 1020 | Languages of the World | 3 |
| LING 2000 | Introduction to Linguistics | 3 |
| LING 2500 | Race, Ethnicity, and Language | 3 |
| LING 3545 | World Language Policies | 3 |
| LING 4050 | Japanese Sociolinguistics | 3 |
| LING 4100 | Perspectives on Language (Alternate title: Language and Embodiment) | 3 |
| PACS 2500 | Introduction to Peace, Conflict and Security Studies | 3 |
| PACS 3540 | Migration, Human Rights, and Conflict in the Mediterranean | 3 |
| PACS 3850 | International Conflict Resolution and Peacebuilding | 3 |
| PACS 3860 | Environmental Conflict and Conflict Resolution | 3 |
| PORT 2350 | Portuguese for Romance Language Speakers | 3 |
| PORT 2800 | Brazil: Past and Present | 3 |
| PORT 3003 | Advanced Portuguese Language Skills | 3 |
| PORT 3220 | Latin American Culture: Spanish America and Brazil | 3 |
| PORT 3230 | Transatlantic Relations in the Portuguese Speaking World | 3 |
| PORT 3270 | Socio-Environmental Dynamics in Brazil | 3 |
| PORT 4110 | Brazilian Literature | 3 |
| PORT 4150 | Literature of the Portuguese Speaking World | 3 |
| RLST 1620 | Religious Dimensions of Human Experience | 3 |
| RLST 1828 | Jewish History Since 1492 | 3 |
| RLST 1830 | Global History of Holocaust and Genocide | 3 |
| RLST 2400 | Religion, Ethics and Politics | 3 |
| RLST 2600 | Judaism, Christianity, and Islam: Abrahamic Religions | 3 |
| RLST 2620 | Religions of East Asia | 3 |
| RLST 3000 | Christian Traditions | 3 |
| RLST 2202 | Islam | 3 |
| RLST 3001 | Modern Christianity: Culture, Politics, Religion | 3 |
| RLST 3100 | Judaism | 3 |
| RLST 3150 | Jerusalem: The Holy City in History, Legend, and Religious Thought | 3 |

| | | |
|---|---|---|
| RLST 3200 | Yoga, Castes and Magic: Hindu Society and Spirituality | 3 |
| RLST 3300 | Foundations of Buddhism | 3 |
| RLST 3530 | Global Seminar: Jews and Muslims - The Multiethnic History of Istanbul | 3 |
| RLST 3550 | Tibetan Buddhism | 3 |
| RLST 3750 | Women in Buddhism | 3 |
| RLST 3800 | Chinese Religions | 3 |
| RLST 4353 | Indigenous Traditions and Law: A Global Perspective | 3 |
| RLST 4650 | Islam in the Modern World | 3 |
| RLST 4780 | New Religions of East Asia | 3 |
| RUSS 3000 | Advanced Conversation | 3 |
| RUSS 3010 | Third-Year Russian 1 | 4 |
| RUSS 3020 | Third-Year Russian 2 | 4 |
| RUSS 3060 | Advanced Russian for Heritage Speakers (Part 1) | 4 |
| RUSS 4230 | Russian Cultural Idioms | 3 |
| RUSS 4850 | Russian Film and Society | 4 |
| SPAN 3340 | 20th Century Spanish American Literature | 3 |
| SPAN 3900 | Cosmos Latinos: Hispanic Science Fiction and New Worlds | 3 |
| SPAN 4110 | Hispanic Women Writers | 3 |
| WGST 3208 | Women in Nordic Society: Modern States of Welfare | 3 |
| WGST 3410 | Gender, Sexuality and Culture in the Modern Middle East | 3 |
| WGST 3500 | Global Gender Issues | 3 |
| WGST 3510 | Gender, Sexuality and Global Health | 3 |
| WGST 3520 | Gender and Sexuality in Africa | 3 |
| WGST 3650 | Gender and Politics in Latin America | 3 |
| WGST 3670 | Gender, Race, Sexuality and Global Migration | 3 |
| WGST 3672 | Who Runs the World? Sex, Power, and Gender in Geography | 3 |
| SPAN 4150 | Major Works and Trends in Literature and Culture in Spain Up to 1700 | 3 |
| SPAN 4170 | Major Works/Trends in Literature and Culture in Latin America Up to the 19th Century | 3 |
| SPAN 4450 | Introduction to Hispanic Linguistics | 3 |
| SOCY 3161 | Global Perspectives on Race and Ethnicity | 3 |
| PORT 3170 | Lisbon as a Global City: Cosmopolitanism, Diversity, and Innovation | 3 |
| PSCI 3142 | Politics, History and Society of Cuba | 3 |
| PSCI 4222 | Russia and Space Politics | 3 |
| PSCI 4252 | Politics of Ethnicity and Nationalism | 3 |
| PSCI 4374 | Global Seminar: Revolutions in Paris | 3 |
| LAMS 3100 | Travel, Science and Adventure | 3 |
| KREN 3851 | Studies in Korean Popular Culture | 3 |
| ITAL 2271 | Space, Invention, and Wonder in Fairy Tales, Literature and Film | 3 |
| ITAL 4250 | History of Modern Italy | 3 |
| ITAL 4260 | Mafia and Terrorism: Organized Violence in Italy | 3 |
| ITAL 4290 | Italian Culture Through Cinema | 3 |
| ITAL 4300 | Multiculturalism in Italy | 3 |
| ITAL 4730 | Italian Feminisms: Culture, Theory, and Narratives of Difference | 3 |
| IAFS 3621 | Rogues to Revolutionaries: Russian Rebels, Past and Present | 3 |
| HIST 3012 | Seminar in Modern European History | 3 |
| HIST 3018 | Seminar in Latin American History | 3 |
| HIST 3109 | Seminar in Asian History | 3 |
| HIST 3218 | Seminar in African History | 3 |
| HIST 3328 | Seminar in Middle Eastern History | 3 |
| HIST 3414 | Seminar in Modern European Thought and Culture | 3 |
| HIST 3628 | Seminar in Recent Chinese History | 3 |
| HIST 3713 | Seminar in Russian History | 3 |
| HIST 3718 | Seminar in Japanese History | 3 |
| HIST 3800 | Seminar in Global History | 3 |
| GRMN 2402 | Sports and Athleticism in German and Global Culture | 3 |
| ETHN 3704 | Athlete as a National Symbol: Nationhood/Nationalism, Sport | 3 |
| ETHN 3705 | Sport and Culture in Latin America and the Caribbean | 3 |
| ETHN 4353 | Indigenous Traditions and Law: A Global Perspective | 3 |
| CHIN 1051 | Masterpieces of Chinese Literature in Translation | 3 |
| CHIN 1012 | Introduction to Chinese Civilization | 4 |
| CHIN 2442 | Modern Chinese Media Cultures | 3 |
| CHIN 3333 | Race and Ethnicity in Chinese Literature: Sinophone Culture, Diaspora, and Identity | 3 |
| CHIN 3343 | Chinese Science Fiction | 3 |
| CHIN 3372 | Chinese Media and the Environment | 3 |
| ASIA 1700 | Introduction to Tibetan Civilization | 3 |
| ASIA 2500 | Catastrophe and Resilience: Asia's Experiences of Climate Change | 3 |
| ARAB 1011 | Introduction to Arab and Islamic Civilizations | 3 |
| ANTH 1110 | Anthropology of Japan: Culture, Diversity, and Identity | 3 |
| ANTH 3770 | Primates of Vietnam:  Conservation in a R | 3/eloping C |
| RUSS 4010 | Advanced Conversation and Composition 1 | 4 |
| RUSS 4020 | Advanced Conversation and Composition 2 | 4 |
| RUSS 4050 | Professional Russian | 4 |
| RUSS 4060 | Advanced Russian for Heritage Speakers (Part 2) | 4 |
| SCAN 2201 | Introduction to Modern Nordic Culture and Society | 3 |
| SCAN 3020 | Advanced Readings in Scandinavian | 3 |

| | | |
|---|---|---|
| SCAN 3101 | Global Seminar: Identity, Arts & Ethics in Contemporary Norway | 3 |
| SCAN 3201 | Contemporary Nordic Society and Culture | 3 |
| SCAN 3209 | Contemporary Nordic Literature and Film | 3 |
| SCAN 3251 | Arctic Thrillers: Environment, Landscape and Literature of the Far North | 3 |
| SCAN 3301 | Radical Nationalism in Contemporary Northern Europe | 3 |
| SCAN 3631 | Arctic Society and Culture | 3 |
| SCAN 3632 | Scandinavia and the European Union | 3 |
| SOCY 2011 | Contemporary Social Issues and Human Values | 3 |
| SOCY 3012 | Gender and Development | 3 |
| SPAN 2450 | Catalan for Spanish Speakers | 3 |
| SPAN 3000 | Advanced Spanish Language Skills | 5 |
| SPAN 3001 | Spanish Conversation | 3 |
| SPAN 3002 | Advanced Spanish Conversation | 3 |
| SPAN 3010 | Advanced Rhetoric and Composition | 3 |
| SPAN 3030 | Professional Spanish for Business 1 | 3 |
| SPAN 3040 | Professional Spanish for Business 2 | 3 |
| SPAN 3050 | Spanish Phonology and Phonetics | 3 |
| SPAN 3060 | Spanish for Careers in Environmental Studies and Sustainable Development | 3 |
| SPAN 3070 | Spanish 21st Century Media Professions | 3 |
| SPAN 3080 | Spanish Health Professions | 3 |
| SPAN 3100 | Literary and Cultural Analysis in Spanish | 3 |
| SPAN 3120 | Advanced Spanish Grammar | 3 |
| SPAN 3150 | Linguistic Analysis of Spanish | 3 |
| SPAN 3200 | Spanish Culture | 3 |
| SPAN 3215 | Urban History and Culture in the Spanish-Speaking World | 3 |
| SPAN 3220 | Latin American Culture: Spanish America and Brazil | 3 |
| SPAN 3230 | Discovering Barcelona: Culture and Heritage | 3 |
| SPAN 3240 | Catalan Culture 1: Nation and Art | 3 |
| SPAN 3250 | Catalan Culture 2: Contemporary Trends and Barcelona | 3 |
| SPAN 3260 | Late 19th and 20th Century Argentine Narrative | 3 |
| SPAN 3270 | Barcelona: Understanding Local and Immigrant Cultures | 3 |
| SPAN 3280 | Introduction to Catalan Literature & Film | 3 |
| SPAN 3290 | Argentine Culture and History in a Latin American Context | 3 |
| SPAN 3310 | 20th Century Spanish Literature | 3 |
| SPAN 4060 | Problems of Translation for Professions in Spanish 1 | 3 |
| SPAN 4070 | Problems of Translation for Professions in Spanish 2 | 3 |
| SPAN 4120 | Literature and Cinema in Spain and Latin America | 3 |
| SPAN 4130 | The Power of Storytelling: Oral, Textual and Digital Narratives | 3 |
| SPAN 4160 | Major Works and Trends in Literature and Culture in Spain: 1700-Present | 3 |
| SPAN 4180 | Major Works and Trends in Literature and Culture in Latin America: 1900-Present | 3 |
| SPAN 4215 | Spanish in the United States | 3 |
| SWED 3010 | Advanced Swedish 1-DILS | 3 |
| SWED 3020 | Advanced Swedish 2 - DILS | 3 |
| TBTN 3210 | Beginning Literary Tibetan 1 | 4 |
| TBTN 3220 | Beginning Literary Tibetan 2 | 4 |
| TBTN 4210 | Intermediate Literary Tibetan 1 | 4 |
| WGST 2600 | Introduction to Global Gender, Race and Sexuality Studies | 3 |
| WGST 3012 | Gender and Development | 3 |
| ENES 2020 | The Meaning of Information Technology | 3 |
| ENES 3700 | Culture Wars in Rome | 3 |
| ENES 3720 | Voices of Vienna: Freud, Wittgenstien, Mozart | 3 |
| ENES 3750 | Xi'an, China: Self-Awareness and Images of the Other | 3 |
| CVEN 4157 | A Systems Approach to Global Engineering | 3 |
| EMEN 4200 | Engineering and Entrepreneurship for the Developing World | 3 |
| COMM 2410 | The Practice of Intercultural Communication | 3 |
| PRLC 3800 | Global Inquiry for 21st Century Leadership | 3-4 |
| PRLC 3810 | Global Issues in Leadership | 3 |
| CVEN 4969 | Water and Sanitation in Developing Countries | 3 |
| ENLP 3100 | Complex Leadership Challenges | 3-4 |
| EVEN 4969 | Water and Sanitation in Developing Countries | 3 |
| FREN 1850 | Introduction to French Society and Culture through Cinema | 3 |
| FREN 1900 | Modern Paris in Literature, Photographs, Paintings and Movies | 3 |
| FREN 2500 | Conversation in French | 3 |
| FREN 3010 | French Phonetics and Pronunciation | 3 |
| FREN 3020 | French Phonetics Through Musical Performance | 3 |
| FREN 3050 | French Composition | 3 |
| FREN 3100 | Introduction to Critical Reading and Writing in French Literature | 3 |
| FREN 3110 | Main Currents of French Literature 1 | 3 |
| FREN 3120 | Main Currents of French Literature 2 | 3 |
| FREN 3200 | Introduction to Literary Theory and Advanced Critical Analysis | 3 |
| FREN 3300 | French Culture Through Fashion | 3 |
| FREN 3400 | Culture, Performance and Development in Dakar, Senegal | 3 |
| FREN 3450 | Underground Paris | 3 |
| FREN 3500 | French Current Events: Conversation and Composition | 3 |
| FREN 3600 | Business French 1 | 3 |

| | | |
|---|---|---|
| FREN 3700 | French-American Cultural Differences | 3 |
| FREN 3800 | France and the Muslim World | 3 |
| FREN 4030 | Advanced Oral Practice and Interpreting | 3 |
| CSCI 2750 | Computing, Ethics and Society | 3 |
| DNCE 2501 | African Dance | 2 |
| DNCE 4017 | Dancing Histories: Sex, Gender and Race in U.S. Concert Dance | 3 |
| EMEN 4110 | Supply Chain Management | 3 |
| MCEN 4228 | Special Topics in Mechanical Engineering ("Project Based Learning in Rural Schools" is the only special topics course that applies toward the minor.) | 3 |
| CVEN 4834 | Special Topics ("Solid Waste - Resource Recovery" is the only special topics course that will apply toward the minor. ) | 1-3 |
| CVEN 3434 | Introduction to Applied Ecology | 3 |
| GRMN 2141 | Topics in Modern German Culture and Society | 3 |
| GRMN 2301 | Inside Nazi Germany: Politics, Culture, and Everyday Life in the Third Reich | 3 |
| GRMN 2302 | Nazis on Screen: Hollywood, War, Propaganda | 3 |
| GRMN 2501 | Miniatures of Modern Life: From Berlin to Vienna and Beyond | 3 |
| GRMN 2502 | Representing the Holocaust | 3 |
| GRMN 2503 | Fairy Tales of Germany | 3 |
| GRMN 2601 | Kafka and the Kafkaesque | 3 |
| GRMN 3010 | Advanced German 1 | 3 |
| GRMN 3020 | Advanced German 2 | 3 |
| GRMN 3030 | Business German | 3 |
| GRMN 3050 | German for Science and Engineering | 3 |
| GRMN 3120 | German Literature from the Enlightenment to Expressionism | 3 |
| GRMN 3140 | Current Issues in German Culture | 3 |
| GRMN 3141 | Topics in Modern German Culture and Society | 3 |
| GRMN 3150 | Issues in German Politics, Literature and Media | 3 |
| GRMN 3301 | Modern Art and Design at the Bauhaus | 3 |
| GRMN 3401 | The German Experience in North America | 3 |
| GRMN 3501 | The German-Jewish Experience: From the Enlightenment to the Present | 3 |
| GRMN 3502 | The Creation of the Modern Individual in German Culture | 3 |
| GRMN 3503 | German Film Through World War II | 3 |
| GRMN 3504 | Topics in German Film | 3 |
| GRMN 3505 | The Enlightenment: Tolerance and Emancipation | 3 |
| GRMN 3506 | Tracing the Criminal: Crime in 19th C Society and Culture | 3 |
| GRMN 3507 | Engineering and the Practice of Literature | 3 |
| GRMN 3508 | Masters of Suspicion: Marx, Nietzsche, Freud | 3 |
| GRMN 3513 | German Film and Society 1945-1989 | 3 |
| GRMN 3514 | German Film & Society After 1989 | 3 |
| GRMN 3520 | Open Topics in the Cultural Context | 3 |
| GRMN 3601 | German Women Writers | 3 |
| GRMN 3681 | Refugees in German Culture | 3 |
| GRMN 3702 | Dada and Surrealist Literature | 3 |
| GRMN 3802 | Politics and Culture in Berlin 1900-1939 | 3 |
| GRMN 3900 | Independent Study | 1-6 |
| GRMN 3130 | Issues in German Philosophy and Literature | 3 |
| GRMN 4010 | Advanced German III | 3 |
| GRMN 4051 | Critical Theory of the Frankfurt School | 3 |
| GRMN 4231 | The Invention of Sexuality | 3 |
| GRMN 4251 | Marxism | 3 |
| GRMN 4301 | Gender, Race and Immigration in Germany and Europe | 3 |
| GRMN 4330 | The Age of Goethe | 3 |
| GRMN 4340 | Seminar in German Literature | 3 |
| GRMN 4450 | Methods of Teaching German | 3 |
| GRMN 4460 | High School German Teaching | 6 |
| GRMN 4501 | Seminar: Literature in Cultural Context | 3 |
| GRMN 4502 | Nietzsche: Literature and Values | 3 |
| GRMN 4503 | Issues in German Thought | 3 |
| GRMN 4504 | Goethe's Faust | 3 |
| FREN 4110 | French Special Topics | 3 |
| FREN 4120 | French Special Topics | 3 |
| FREN 4170 | Francophone Literature | 3 |
| FREN 4250 | Medieval and Renaissance Readings | 3 |
| FREN 4300 | Theatre and Modernity in 17th Century France | 3 |
| FREN 4330 | Moliere and 17th Century French Comedy | 3 |
| FREN 4350 | French Enlightenment | 3 |
| FREN 4430 | Survey of 19th Century French Literature | 3 |
| FREN 4470 | 20th Century French Theatre and Poetry | 3 |
| FREN 4480 | 20th Century French Novel | 3 |
| FREN 4600 | Topics in French Film | 3 |
| FREN 4700 | Encountering Animals: Contemporary Discourse and the Dialog of Species | 3 |
| FREN 4750 | Methods of Teaching French and Professional Orientation | 3 |
| FREN 4800 | Postmodernist French Novel in Translation | 3 |
| FREN 4840 | Independent Study: Language | 1-6 |
| FREN 4860 | War, Trauma, and Memory: Amnesias, Revisions, and Representations of Traumatic History | 3 |
| FREN 4960 | High School French Teaching | 6 |
| ENES 3320 | Don Quixote's Spain | 3 |
| ENES 3340 | Leonardo da Vinci's World | 3 |
| ENES 3360 | Gaining a Global State of Mind for Effective Engineering Practice (Cannot double count as foundation AND regional, global and technical perspective credits.) | 3 |
| MCEN 4291 | Project Based Learning in Rural Schools | 1-2 |

| | | |
|---|---|---|
| COEN 4000 | Global Intensive Studies | 1-3 |
| ENES 2360 | Gaining a Global State of Mind for Effective Engineering Practice (Cannot double count as foundation AND regional, global and technical perspective credits.) | 3 |

### Global Experience

Global engineering minor students should seek global experience as part of their undergraduate studies. This can include CU-approved education abroad programs of any duration, overseas internships/practica, travel with EWB-USA or Bridge Buffs, or other relevant international experience by petition.

There is no specific credit allocation for this requirement.

Students may substitute this requirement on a case-by-case basis by completing an approved project through the Mortenson Center in Global Engineering & Resilience.

# Computer Science

Computer science is an exciting and challenging field that has impact on many parts of our lives. Computer scientists craft the technologies that enable the digital devices we use every day. They develop the large-scale software that powers business and industry, advance the computational techniques and write the software that supports scientists in their study of the world around us. Many new applications of computing technology remain to be discovered. Computing will be at the heart of future revolutions in business, science and society. Students who study computer science will be at the forefront of these important advances.

Computer science offers study in the fields of computer systems, cyber security, robotics, algorithm design, artificial intelligence, software and web engineering, programming languages, database design, human–computer interaction, machine learning, data science, numerical and parallel computing, speech and language processing and theoretical computer science.

Computer science is concerned with how computers are constructed, how they store and process data, how they are used in problem-solving and how the quality of those solutions is assessed. It is about the science of creating software for a variety of users, and understanding how that software interacts with the hardware on which it is run and goes well beyond the machine to the study of how people interact with the technologies around them. Applications of computer science reach far and wide.

For more information, visit the Department of Computer Science (http://www.colorado.edu/cs/) website.

**Course code for this program is CSCI.**

# Career Possibilities

Computer science graduates from CU Boulder are engaged in a wide variety of jobs with many different companies in locations all over the world. They produce the software and systems that touch lives every day in fields as diverse as scientific exploration, communication, finance, medicine, manufacturing, entertainment and research. Many are software developers, but others become teachers, writers, doctors, lawyers, scientists, military leaders and entrepreneurs. They work at some of the largest, most influential companies in the world, at research institutions, nonprofits and at the smallest start-ups of every type imaginable.

# Facilities, Programs and Opportunities

The Department of Computer Science uses a modern computing infrastructure that supports its research and educational missions. This includes general purpose computing labs provided by the university, additional instructional labs and administrative computing resources provided by the department and specialized labs dedicated to the work of individual research groups. A wide variety of computing resources are available so that students have the opportunity to learn about and use cutting-edge equipment and software. The university research computing service maintains a supercomputer, high-speed networking and advanced computing infrastructure for the campus. The computer science educational culture emphasizes the use of individual laptop computers, including their use in courses and group work.

There are many networking opportunities available with companies offering paid internships. Boulder's tech start-up community, tech companies and research labs provide students with many employment opportunities while earning their degrees. There are also extensive opportunities for undergraduate students to participate in research projects across the campus.

# Bachelor's Degree

- Computer Science - Bachelor of Science (BSCS) (p. 941)
- Computer Science - Bachelor of Arts (BA) (p. 937)
- Applied Computer Science - Post-Baccalaureate Bachelor of Science (BSACS) (p. 945)

# Minors

- Computational Biology - Minor (p. 947)
- Computer Science - Minor (p. 948)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Acuna, Daniel (https://experts.colorado.edu/display/fisid_172426/)
Associate Professor; PhD, University of Minnesota Twin Cities

Agocs, Fruzsina
Assistant Professor; PhD, University of Cambridge

Ahmed, Nisar R. (https://experts.colorado.edu/display/fisid_153237/)
Associate Professor; PhD, Cornell University

Alistar, Mirela (https://experts.colorado.edu/display/fisid_164177/)
Assistant Professor; PhD, Technical University of Denmark

Anderson, Kenneth M. (https://experts.colorado.edu/display/fisid_113566/)
Chair, Professor; PhD, University of California, Irvine

Antoniak, Maria
Visiting Assistant Professor; Ph.D., Cornell University

Ashraf, Asa
Associate Teaching Professor; MS, South Dakota State University

Ayanzadeh, Ramen
Assistant Professor; PhD, University of Maryland

Banic, Amy
Visiting Associate Professor

Bastias, Alfonso (https://experts.colorado.edu/display/fisid_143688/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Bennett, Huck (https://experts.colorado.edu/display/fisid_174352/)
Assistant Professor; PhD, New York University

Black, John (https://experts.colorado.edu/display/fisid_126540/)
Associate Professor; PhD, University of California, Davis

Bortz, David Matthew (https://experts.colorado.edu/display/fisid_143348/)
Associate Professor; PhD, North Carolina State University

Bradley, Elizabeth (https://experts.colorado.edu/display/fisid_100546/)
Professor; PhD, Massachusetts Institute of Technology

Brown, Jed (https://experts.colorado.edu/display/fisid_153965/)
Associate Professor; DSc, ETH Zürich (Switzerland)

Brubaker, Jed Richards (https://experts.colorado.edu/display/fisid_156193/)
Assistant Professor; PhD, University of California, Irvine

Burke, Robin D. (https://experts.colorado.edu/display/fisid_165005/)
Professor; PhD, Northwestern University

Cai, Xiao-Chuan (https://experts.colorado.edu/display/fisid_100636/)
Professor Emeritus; PhD, New York University

Chang, Bor-Yuh Evan (https://experts.colorado.edu/display/fisid_146087/)
Associate Chair, Associate Professor; PhD, University of California, Berkeley

Chaspari, Theodora (https://experts.colorado.edu/display/fisid_173681/)
Associate Professor; PhD, University of Southern California

Chen, Lijun (https://experts.colorado.edu/display/fisid_149472/)
Associate Professor; PhD, California Institute of Technology

Chen, Yueqi (https://experts.colorado.edu/display/fisid_171984/)
Assistant Professor; PhD, Pennsylvania State University

Clauset, Aaron (https://experts.colorado.edu/display/fisid_147554/)
Professor; PhD, University of New Mexico

Colunga, Eliana (https://experts.colorado.edu/display/fisid_129477/)
Associate Professor; PhD, Indiana University Bloomington

Correll, Nikolaus J. (https://experts.colorado.edu/display/fisid_147555/)
Associate Professor; PhD, Ecole Polytech Federale de Lausanne (Switzerland)

Cox, Murray William (https://experts.colorado.edu/display/fisid_153192/)
Associate Teaching Professor; PhD, Texas A&M University

D'Mello, Sidney (https://experts.colorado.edu/display/fisid_159117/)
Professor; PhD, University of Memphis

Devendorf, Laura (https://experts.colorado.edu/display/fisid_158564/)
Assistant Professor; PhD, University of California, Berkeley

Do, Ellen Yi-Luen (https://experts.colorado.edu/display/fisid_159925/)
Professor; PhD, Georgia Institute of Technology

Dowell, Robin D. (https://experts.colorado.edu/display/fisid_147779/)
Associate Professor; DSc, Washington University

Dykes Jim (https://experts.colorado.edu/display/fisid_156791/)
Assistant Teaching Professor; MS, University of Colorado Boulder

Eichen, Elliot
Research Professor; PhD, University of Arizona

El Helbawy, Mona
Associate Faculty Director, Associate Teaching Professor; PhD, University of Colorado Boulder

Fiesler, Casey Lynn (https://experts.colorado.edu/display/fisid_155950/)
Associate Professor; PhD, Georgia Institute of Technology

Frew, Eric W. (https://experts.colorado.edu/display/fisid_134685/)
Professor; PhD, Stanford University

Frongillo, Rafael M. (https://experts.colorado.edu/display/fisid_156416/)
Associate Professor; PhD, University of California, Berkeley

Gifford, Kevin K. (https://experts.colorado.edu/display/fisid_104361/)
Faculty Director, Research Professor; PhD, University of Colorado Boulder

Godley Christopher (https://experts.colorado.edu/display/fisid_172491/)
Assistant Teaching Professor; MS, University of Colorado Boulder

Grochow, Joshua A. (https://experts.colorado.edu/display/fisid_158240/)
Associate Professor; PhD, University of Chicago

Gross, Mark D. (https://experts.colorado.edu/display/fisid_100095/)
Director, Professor; PhD, Massachusetts Institute of Technology

Grunwald, Dirk C. (https://experts.colorado.edu/display/fisid_102261/)
Associate Chair, Professor; PhD, University of Illinois at Urbana–Champaign

Guinn, Curry
Associate Teaching Professor; Ph.D, Duke University

Gurari Danna (https://experts.colorado.edu/display/fisid_104361/)
Assistant Professor; PhD, Boston University

Ha, Sangtae (https://experts.colorado.edu/display/fisid_153246/)
Associate Professor; PhD, North Carolina State University

Hamza, Ahmed
Associate Teaching Professor; PhD, University of Portsmouth (England)

Hauser, Thomas (https://experts.colorado.edu/individual/fisid_148662/)
Associate Professor Adjunct; PhD, Technische Universität München (Germany)

Hayes, Bradley H. (https://experts.colorado.edu/display/fisid_159810/)
Associate Professor; PhD, Yale University

Heckman, Christoffer (https://experts.colorado.edu/display/fisid_155294/)
Associate Professor; PhD, Cornell University

Herman, C.J. (https://experts.colorado.edu/individual/fisid_152265/)
Faculty Director, Associate Teaching Professor; BS, Stony Brook University

Herzfeld, Ute C. (https://experts.colorado.edu/display/fisid_106575/)
Research Professor; PhD, Johannes Gutenberg-Universität Mainz (Germany)

Hoenigman, Rhonda (https://experts.colorado.edu/display/fisid_152997/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Hunter, Lawrence (https://experts.colorado.edu/display/fisid_143568/)
Professor; PhD, Yale University

Izraelevitz, Joe (https://experts.colorado.edu/display/fisid_166042/)
Assistant Professor; PhD, University of Rochester

Jansen, Kenneth E. (https://experts.colorado.edu/display/fisid_147360/)
Professor; PhD, Stanford University

Jessup, Elizabeth R. (https://experts.colorado.edu/display/fisid_102065/)
Professor Emeritus; PhD, Yale University

Kaki, Gowtham (https://experts.colorado.edu/individual/fisid_167225/)
Assistant Professor; PhD, Purdue University

Karimzadeh, Morteza (https://experts.colorado.edu/display/fisid_166081/)
Assistant Professor; PhD, Pennsylvania State University

Keegan, Brian (https://experts.colorado.edu/display/fisid_158122/)
Assistant Professor; PhD, Northwestern University

Keller, Eric Robert (https://experts.colorado.edu/display/fisid_151647/)
Associate Professor; PhD, Princeton University

King, Roger A.
Professor Emeritus

Kissler, Stephen
Assistant Professor; PhD, University of Cambridge

Knox, David Allen (https://experts.colorado.edu/display/fisid_158054/)
Assistant Teaching Professor; PhD, University of Colorado Health Sciences Center

Lahijanian, Morteza Mehdi (https://experts.colorado.edu/display/fisid_164179/)
Assistant Professor; PhD, Boston University

Larremore, Daniel B. (https://experts.colorado.edu/display/fisid_159893/)
Assistant Professor; PhD, University of Colorado Boulder

Layer, Ryan M. (https://experts.colorado.edu/display/fisid_163567/)
Assistant Professor; PhD, University of Virginia

Lehman, Tamara (https://experts.colorado.edu/display/fisid_165649/)
Assistant Professor; PhD, Duke University

Lewis, Clayton H. (https://experts.colorado.edu/display/fisid_100307/)
Professor Emeritus; PhD, University of Michigan Ann Arbor

Lladser, Manuel E. (https://experts.colorado.edu/display/fisid_134170/)
Associate Professor; PhD, The Ohio State University

Lofquist, Mark
Assistant Research Professor; PhD, University of Colorado Boulder

Lv, Qin (https://experts.colorado.edu/display/fisid_145832/)
Professor, Associate Chair; PhD, Princeton University

MacCurdy, Robert B. (https://experts.colorado.edu/display/fisid_163307/)
Assistant Professor; PhD, Cornell University

Martin, James H. (https://experts.colorado.edu/display/fisid_100495/)
Professor; PhD, University of California, Berkeley

Mishra, Shivakant (https://experts.colorado.edu/display/fisid_118376/)
Professor; PhD, University of Arizona

Monteleoni, Claire Elizabeth (https://experts.colorado.edu/display/fisid_163979/)
Associate Professor; PhD, Massachusetts Institute of Technology

Morrison, Rebecca E. (https://experts.colorado.edu/display/fisid_159999/)
Assistant Professor; PhD, University of Texas Austin

Mozer, Michael C. (https://experts.colorado.edu/display/fisid_105922/)
Research Professor; PhD, University of California, San Diego

Naidu, Supriya (https://experts.colorado.edu/display/fisid_166267/)
Assistant Teaching Professor; MS, University of Colorado Boulder

Nath Sreesha (https://experts.colorado.edu/display/fisid_165807/)
Associate Chair, Assistant Teaching Professor; MS, University of Colorado Boulder

Nielsen Katherine (https://experts.colorado.edu/display/fisid_172532/)
Assistant Teaching Professor; PhD, University of California, Los Angeles

Onyejekwe, Osita Eluemuno (https://experts.colorado.edu/display/fisid_164235/)
Assistant Teaching Professor; PhD, Florida Institute of Technology

Oscamou, Maribeth B. (https://experts.colorado.edu/display/fisid_159794/)
Associate Teaching Professor; MS, University of Colorado Boulder

Pacheco, Maria
Assistant Professor; PhD, Purdue University

Palen, Leysia A. (https://experts.colorado.edu/display/fisid_114604/)
Distinguished Professor, Associate Chair; PhD, University of California, Irvine

Palmer, Martha
Research Professor; PhD, University of Edinburgh (Scotland)

Paradise, Alan (https://experts.colorado.edu/display/fisid_158849/)
Associate Teaching Professor; MS, Washington University in St. Louis

Peleg, Orit (https://experts.colorado.edu/display/fisid_159998/)
Associate Professor; PhD, ETH Zürich (Switzerland)

Perigo, Levi (https://experts.colorado.edu/display/fisid_155562/)
Scholar in Residence; PhD, Nova Southeastern University

Phillips, Caleb Timothy (https://experts.colorado.edu/individual/fisid_152384/)
Assistant Professor Adjunct

Quigley, David Philp (https://experts.colorado.edu/display/fisid_164079/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Reckwerdt, Eric
Assistant Teaching Professor; PhD, University of Hawaii Manoa

Reed, David P. (https://experts.colorado.edu/display/fisid_152458/)
Scholar in Residence; PhD, Carnegie Mellon University

Repenning, Alexander (https://experts.colorado.edu/display/fisid_104946/)
Professor Adjunct; PhD, University of Colorado Boulder

Rivera, Michael (https://experts.colorado.edu/display/fisid_169859/)
Assistant Professor; PhD, Carnegie Mellon University

Rolf, Esther
Assistant Professor; PhD, University of California Berkeley

Roncone, Alessandro (https://experts.colorado.edu/display/fisid_164509/)
Assistant Professor; PhD, Istituto Italiano di Tecnologia (Italy)

Roque, Ricarose (https://experts.colorado.edu/display/fisid_158315/)
Assistant Professor; PhD, Massachusetts Institute of Technology

Rozenberg, Grzegorz (https://experts.colorado.edu/display/fisid_100478/)
Professor Adjoint

Sankaranarayanan, Sriram (https://experts.colorado.edu/display/fisid_147413/)
Assistant Dean, Professor, Associate Chair; PhD, Stanford University

Santos, Jose R. (https://experts.colorado.edu/display/fisid_124623/)
Associate Teaching Professor; MS, University of Colorado Boulder

Schnabel, Robert B. (https://experts.colorado.edu/display/fisid_100499/)
Professor, Faculty Director; PhD, Cornell University

Schreüder, Willem A. (https://experts.colorado.edu/display/fisid_143834/)
Associate Professor Adjunct; PhD, University of Stellenbosch

Stade, Elisabeth Cote (https://experts.colorado.edu/display/fisid_147089/)
Associate Teaching Professor, Faculty Director; MA, University of Colorado Boulder

Sumner, Tamara (https://experts.colorado.edu/display/fisid_105742/)
Professor; PhD, University of Colorado Boulder

Thrall, Lloyd Gregory
Associate Faculty Director; MA, University of London (England)

Trivedi, Ashutosh (https://experts.colorado.edu/display/fisid_156589/)
Associate Professor; PhD, University of Warwick (UK)

Truong, Le Hoang (https://experts.colorado.edu/display/fisid_172198/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Tufo, Henry (https://experts.colorado.edu/display/fisid_127040/)
Professor; PhD, Brown University

Velasquez, Alvara (https://experts.colorado.edu/display/fisid_172313/)
Visiting Assistant Professor; PhD, University of Central Florida

Vernerey, Divya E. (https://experts.colorado.edu/display/fisid_145131/)
Teaching Professor; PhD, Northwestern University

Voida, Amy Kathryn Mitchell (https://experts.colorado.edu/display/fisid_155855/)
Associate Professor; PhD, Georgia Institute of Technology

Voida, Stephen A. (https://experts.colorado.edu/display/fisid_155856/)
Associate Professor; PhD, Georgia Institute of Technology

von der Wense, Katharina (https://experts.colorado.edu/display/fisid_166417/)
Assistant Professor; PhD, University of Munich (Germany)

Waggoner, Bo (https://experts.colorado.edu/individual/fisid_164188/)
Assistant Professor; PhD, Harvard University

Ward, Wayne Hinson (https://experts.colorado.edu/display/fisid_114680/)
Research Professor; PhD, University of Colorado Boulder

Wright, William
Assistant Teaching Professor; MS, Stanford University

Wustrow, Eric A. (https://experts.colorado.edu/display/fisid_156419/)
Assistant Professor; BE, University of Michigan Ann Arbor

Yeh, Tom (https://experts.colorado.edu/display/fisid_151584/)
Associate Professor; PhD, Massachusetts Institute of Technology

Yuan, Lei (https://experts.colorado.edu/individual/fisid_167699/)
Assistant Professor; PhD, Northwestern University

Zagrodzki, Maciej
Associate Chair, Associate Teaching Professor; MSc, Colorado School of Mines

Zamani, Majid (https://experts.colorado.edu/individual/fisid_164967/)
Associate Professor; PhD, University of California, Los Angeles

# Courses

**CSCI 1000 (1) Computer Science as a Field of Work and Study**
Introduces curriculum, learning techniques, time management and career opportunities in Computer Science. Includes presentations from alumni and others with relevant educational and professional experience.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 1000
**Requisites:** Restricted to students with 0-26 credits (Freshmen) Computer Science (CSEN-BSCS or CSEN-BA) or Engineering Open Option (XXEN) majors only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 1200 (3) Introduction to Computational Thinking**
Teaches computational thinking and techniques for writing computer programs using the Python programming language. Intended for students who realize that computational skills are beneficial to all fields of study, but who have little or no experience in programming or are not Computer Science majors. Students will be expected to create computer programs to solve problems in a range of disciplines. Does not count as Computer Science credit for the Computer Science BA, BS, or minor.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 1200 or INFO 1701

**CSCI 1300 (4) Computer Science 1: Starting Computing**
Teaches techniques for writing computer programs in higher level programming languages to solve problems of interest in a range of application domains. Appropriate for students with little to no experience in computing or programming.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 1310 CSPB 1300
**Requisites:** Requires a prerequisite or corequisite course of APPM 1235 or APPM 1340 or APPM 1345 or APPM 1350 or MATH 1150 or MATH 1300 or MATH 1310 (all minimum grade C-).

**CSCI 2270 (4) Computer Science 2: Data Structures**
Studies data abstractions (e.g., stacks, queues, lists, trees, graphs, heaps, hash tables, priority queues) and their representation techniques (e.g., linking, arrays). Introduces concepts used in algorithm design and analysis including criteria for selecting data structures to fit their applications. Knowledge of C++ is highly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 2275 CSPB 2270
**Requisites:** Requires prerequisite course of ((CSCI 1300 or CSCI 1320 or ECEN 1310 minimum grade C-) or (ASEN 1320 minimum grade B-)) and prerequisite or corequisite course of (MATH 1300 or MATH 1310 or APPM 1345 or APPM 1350 minimum grade C-).
**Additional Information:** Departmental Category: General Computer Science

**CSCI 2275 (4) Programming and Data Structures**
Combines the content in CSCI 1300 and CSCI 2270 and is intended for students with experience with at least one object oriented programming language. Assumes knowledge of programming constructs- data types, conditionals, loops and classes. Students must pass a programming competency exam administered by the computer science department to take this class. The course includes an expedited instruction in the C++ programming language and then primarily focuses on the content in CSCI 2270: data abstractions (e.g., stacks, queues, lists, trees, graphs, heaps, hash tables, priority queues) and their representation techniques (e.g., linking, arrays). Introduces concepts used in algorithm design and analysis including criteria for selecting data structures to fit their applications.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 2270 or CSPB 2270
**Requisites:** Requires prerequisite or co-requisite of MATH 1300 or MATH 1310 or APPM 1345 or APPM 1350 (all minimum grade C-).

**CSCI 2400 (4) Computer Systems**
Covers how programs are represented and executed by modern computers, including low-level machine representations of programs and data, an understanding of how computer components and the memory hierarchy influence performance.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 2400
**Requisites:** Requires prerequisite of CSCI 2270 or CSCI 2275 (minimum grade C-).
**Additional Information:** Departmental Category: General Computer Science

**CSCI 2750 (3) Computing, Ethics and Society**
Satisfies the ethics requirement for computer science BA and BS majors. This course is intended to provide students with perspectives which help them deal with ethical and societal implications in their careers as computing professionals. Examines ethical ramifications of current and future computing systems and technologies and reflects upon the broad implications of computing upon our society. Student work consists of reading, participation in class discussions and presentations, essays, and a final project. Students from outside computer science also are welcome. Necessary background is basic familiarity with computing. Does not count as Computer Science elective credit for the Computer Science BA, BS, or minor.
**Recommended:** Sophomore standing or beyond, and a basic familiarity with computing.

**CSCI 2820 (3) Linear Algebra with Computer Science Applications**
Introduces the fundamentals of linear algebra in the context of computer science applications. Includes vector spaces, matrices, linear systems, and eigenvalues. Includes the basics of floating point computation and numerical linear algebra.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 2820
**Requisites:** Requires prerequisite courses of (CSCI 2270 or CSCI 2275) and (APPM 1360 or MATH 2300) (all minimum grade C-).
**Additional Information:** Departmental Category: General Computer Science

**CSCI 2824 (3) Discrete Structures**
Covers foundational materials for computer science that is often assumed in advanced courses. Topics include set theory, Boolean algebra, functions and relations, graphs, propositional and predicate calculus, proofs, mathematical induction, recurrence relations, combinatorics, discrete probability. Focuses on examples based on diverse applications of computer science.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 2824
**Requisites:** Requires prerequisite courses of (ASEN 1320 or CSCI 1200 or CSCI 1300 or CSCI 1320 or CSCI 2275 or ECEN 1310 or MCEN 1030) and (APPM 1345 or APPM 1350 or MATH 1300 or MATH 1310) (all minimum grade C-).
**Recommended:** Prerequisite Calc 2 (APPM 1360 or MATH 2300) is strongly recommended.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 2830 (1-4) Special Topics in Computer Science**
Covers topics of interest in computer science at the sophomore level. Content varies from semester to semester. Does not count as Computer Science credit for the Computer Science BA, BS or minor.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 2834 (1) Discrete Structures Workgroup**
Provides additional problem-solving practice and guidance for students enrolled in CSCI 2824. Students work in a collaborative environment to further develop their problem-solving skills with the assistance of facilitators. Does not count as Computer Science credit for the Computer Science BA, BS, or minor.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires corequisite course of CSCI 2824.

**CSCI 2897 (3) Calculating Biological Quantities**
Master practical mathematical techniques for representing and analyzing biological quantities of different kinds. Develop mathematical intuition about biological calculations. Learn to model and solve simple feedback processes. Learn to model and solve simple accumulation processes. Learn to model and decompose simple vector spaces. Learn standard approximation and optimization strategies. Adapt and combine methods to solve real-world problems. Background in biology not required. This course is intended for students who are interested in Computational Biology, but will not take Differential Equations (APPM 2360/MATH 3430) as part of their degree plan. Does not count as Computer Science credit for for the Computer Science BA, BS or minor.
**Requisites:** Requires prerequisite course of APPM 1345 or APPM 1350 or MATH 1300 or MATH 1310 (minimum grade C-)

**CSCI 2900 (1-3) Lower Division, Undergraduate Level Independent Study**
Offers selected topics at the elementary level for students with little or no previous computing experience. Does not count as Computer Science credit for the Computer Science BA, BS or minor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 3002 (4) Fundamentals of Human Computer Interaction**
Introduces the practice and research of human-computer interaction, including its history, theories, the techniques of user-centered design, and the development of interactive technologies. Covers computing in society at large with respect to domains such as health, education, assistive technology, ethics, environment, and more.
**Requisites:** Requires prerequisite course of CSCI 2270 or CSCI 2275 (both minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 3010 (3) Intensive Programming Workshop**
Explores concepts and techniques for design and construction of larger, reliable, and maintainable software systems in the context of object-oriented programming. Covers various topics including: object-oriented programming paradigms, scope, inheritance, program structure and design, practical use of version control, working with established code bases, and building graphical user interfaces. Emphasizes coding individually and in pairs and includes in class lab work, smaller coding assignments, and multiple weeks-long projects. Not intended for students in their final year of the Computer Science BA or BS degree. Formerly offered as a special topics course.
**Requisites:** Requires a prerequisite course of (CSCI 2270 or CSCI 2275) and a prerequisite or co-requisite course of CSCI 3308 (all minimum grade C-).

**CSCI 3022 (3) Introduction to Data Science with Probability and Statistics**
Introduces students to the tools, methods and theory behind extracting insights from data. Covers algorithms of cleaning and munging data, probability theory and common distributions, statistical simulation, drawing inferences from data, and basic statistical modeling.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 3022
**Requisites:** Requires prerequisite course of (CSCI 2270 or CSCI 2275) and (APPM 1360 or MATH 2300) and (CSCI 2824 or ECEN 2703 or APPM 3170 or MATH 2001) (all minimum grade C-).
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 3090 (3) Introduction to Quantum Computing**
Covers the basics of quantum computation, including the basics of quantum information; axioms of quantum mechanics; quantum circuits and universality; the relationship between quantum and classical complexity classes; simple quantum algorithms such as the quantum Fourier transform; Shor factoring algorithm; Grover search algorithm; physical implementation of quantum computation; error correction and fault tolerance.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 3090 and ECEN 3090
**Requisites:** Requires prerequisite course of APPM 2360 or APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135 (minimum grade C-).

**CSCI 3100 (1) Software and Society**
Provides students with an understanding of the professional, ethical, legal and social issues and responsibilities of software developers, as well as providing them with the ability to analyze the local and global impacts of computing on individuals, organizations and society. Required for, and restricted to, Computer Science majors completing a Senior Thesis. Department consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4308 and CSCI 4328 and CSCI 4338 and CSCI 4348
**Requisites:** Restricted to Computer Science majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Computer Science

**CSCI 3104 (4) Algorithms**
Covers the fundamentals of algorithms and various algorithmic strategies, including time and space complexity, sorting algorithms, recurrence relations, divide and conquer algorithms, greedy algorithms, dynamic programming, linear programming, graph algorithms, problems in P and NP, and approximation algorithms.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 3104
**Requisites:** Requires prerequisite courses of (CSCI 2270 or CSCI 2275) and (APPM 1360 or MATH 2300) and (one of the following: CSCI 2824 or ECEN 2703 or APPM 3170 or MATH 2001) (all minimum grade C-).
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 3112 (1) Professional Development in Computer Science**
Supports students in developing professional skills and practices in computing, including: preparing for technical and behavioral interviews, professional networking, mastering new technologies not addressed in the curriculum, presenting work, the role of graduate study, and exploring career and research directions.
**Requisites:** Requires prerequisite course of CSCI 2270 or CSCI 2275 (minimum grade C-). Restricted to Computer Science majors, Computer Science minors, and Computational Biology minors.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 3150 (3) Universal Design for Digital Media**
Focusing on the concepts of universal design and Web Standards, this course will address issues that occur at the nexus of web standards, Universal Design and the needs of persons with disabilities. Students will gain the expertise and skills to create media and web sites which are accessible, usable and effective for all users and device platforms.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 3150
**Requisites:** Requires prerequisite course of CSCI 1300 (minimum grade C-).
**Recommended:** Prerequisite some knowledge of creating web pages with either direct HTML coding or with web design software.

**CSCI 3155 (4) Principles of Programming Languages**
Studies principles governing the design and analysis of programming languages and their underlying execution models. Explores values, scoping, recursion, higher-order functions, type systems, control structures, and objects. Introduces formal semantics as a framework for understanding programming features. Introduces advanced programming concepts such as functional programming, higher-order functions, immutable values and structures, inductive types, functors, continuation-passing; and object-oriented programming using inheritance, generics and covariance/contravariance in a functional programming language such as Scala.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 3155
**Requisites:** Requires prerequisite courses of (CSCI 2270 or CSCI 2275) and (CSCI 2400 or ECEN 2360 or ECEN 3350) and (CSCI 2824 or ECEN 2703 or APPM 3170 or MATH 2001) (all minimum grade C-).
**Additional Information:** Departmental Category: Programming Languages

**CSCI 3202 (3) Introduction to Artificial Intelligence**
Surveys artificial intelligence techniques of search, knowledge representation and reasoning, probabilistic inference, machine learning, and natural language. Knowledge of Python is strongly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 3202
**Requisites:** Requires prereqs (CSCI 2270 or CSCI 2275) (APPM 3170 or CSCI 2824 or ECEN 2703 or MATH 2001) (APPM 3570 or CHEN 3010 or CSCI 3022 or CVEN 3227 or ECEN 3810 or ECON 3818 or MATH 3510 or MATH 4510 or STAT 3100 or STAT 4000) (all min grade C-).
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 3287 (3) Design and Analysis of Database Systems**
Introduces the fundamental concepts of database requirements analysis, database design, and database implementation with emphasis on the relational model and the SQL programming language. Introduces the concepts of Big Data and NoSQL systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 3287
**Requisites:** Requires prerequisite course of CSCI 2270 or CSCI 2275 (minimum grade C-).
**Additional Information:** Departmental Category: Database Systems

**CSCI 3302 (3) Introduction to Robotics**
Introduces students to fundamental concepts in autonomous robotics: mechanisms, locomotion, kinematics, control, perception and planning. Consists of lectures and lab sessions that are geared toward developing a complete navigation stack on a miniature mobile robotic platform.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3303 and CSPB 3302
**Requisites:** Requires prerequisite courses of (CSCI 2270 or CSCI 2275) and (APPM 3170 or CSCI 2824 or ECEN 2703 or MATH 2001) and (APPM 2360 or APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135) (all minimum grade C-).
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 3308 (3) Software Development Methods and Tools**
Covers tools and techniques for successful software development with a strong focus on best practices used in industry. Students work in small teams to complete a semester-long application development project. Students learn front-end design and construction using HTML & CSS, back-end database design and construction, and full-stack integration. Students gain exposure to agile methodologies, web services, distributed version control, requirements definition, automated integration testing, and cloud-based application deployment.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 3308
**Requisites:** Requires prerequisite course of CSCI 2270 or CSCI 2275 (both minimum grade C-).
**Additional Information:** Departmental Category: Software Engineering

**CSCI 3352 (3) Biological Networks**
This course examines the computational representation and analysis of biological phenomena through the structure and dynamics of networks, from molecules to species. Attention focuses on algorithms for clustering network structures, predicting missing information, modeling flows, regulation, and spreading-process dynamics, examining the evolution of network structure, and developing intuition for how network structure and dynamics relate to biological phenomena.
**Requisites:** Prereqs(1 of APPM3650/CSCI2270/2275/INFO2201/PHYS2600) (1 of APPM1345/1350/MATH1300/1310) (1 of APPM3570/CHEN3010/CSCI3022/CVEN3227/EBIO4410/ECEN3810/ECON3818/IPHY3280/MATH3510/4510/4520/MCDB3450/MCEN3047/PSYC2111/STAT2600/3100/4000/4520)(min C-)

**CSCI 3403 (4) Introduction to CyberSecurity for a Converged World**
Introduces core concepts in cybersecurity including confidentiality, integrity, authentication, risk management, and adversarial thinking. The concepts will be applied to both traditional information technology (IT) systems and cyber physical systems (CPS). At the conclusion of the course students should have a solid foundation in cybersecurity and hands-on experience.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 3403
**Requisites:** Requires prerequisite course of CSCI 2400 or ECEN 2360 or ECEN 3350 (minimum grade C-).
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 3434 (3) Theory of Computation**
Introduces the foundations of formal language theory, computability, and complexity. Shows relationship between automata and various classes of languages. Addresses the issue of which problems can be solved by computational means, and studies complexity of solutions.
**Requisites:** Requires prerequisite course of CSCI 3104 (minimum grade C-).
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 3593 (3) Computer Organization**
Studies computer design at the microarchitecture level. Discusses instruction set architecture design, arithmetic and logic unit design, control logic, memory design and caches, simple pipelining, I/O and peripheral devices. Briefly covers aspects of modern computer architecture, such as multicore processors and hardware security.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3593 ECEN 5590
**Requisites:** Requires prerequisite course of ECEN 2360 or ECEN 3350 or CSCI 2400 (minimum grade C-).
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 3656 (3) Numerical Computation**
Covers development, computer implementation, and analysis of numerical methods for applied mathematical problems. Explores topics such as floating point arithmetic, numerical solution of linear systems of equations, root finding, numerical interpolation, differentiation, and integration.
**Requisites:** Requires prerequisite courses of (ASEN 1320 or CSCI 1300 or CSCI 1320 or CSCI 2275 or ECEN 1310) and (APPM 1360 or MATH 2300) and (APPM 2360 or APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135) (all min. grade C-).
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 3702 (3) Cognitive Science**
Introduces cognitive science, drawing from psychology, philosophy, artificial intelligence, neuroscience, and linguistics. Studies the linguistic relativity hypothesis, consciousness, categorization, linguistic rules, the mind-body problem, nature versus nurture, conceptual structure and metaphor, logic/problem solving and judgment. Emphasizes the nature, implications and limitations of the computational model of mind.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3702 and LING 3005 and PHIL 3310 and PSYC 3005 and SLHS 3003 and CSPB 3702
**Recommended:** Prerequisites two of the following CSCI 1300 or CSCI 2275 or LING 2000 or PHIL 2440 or PSYC 2145.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Distribution-Social Sciences

**CSCI 3753 (4) Design and Analysis of Operating Systems**
Analyzes the software that extends hardware to provide a computing environment, including the role of linkers, file systems, resource sharing, security and networking. Studies the history of operating system organization and design and their influence on security, functionality and reliability.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 3753
**Requisites:** Requires prerequisite courses of (CSCI 2270 or CSCI 2275) and (CSCI 2400 or ECEN 2360 or ECEN 3350) (all minimum grade C-).
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 3832 (3) Natural Language Processing**
Explores the theoretical and practical issues that arise in getting computers to perform useful and interesting tasks with human languages. Topics include information extraction, dialog systems and machine translation. Focus is on the use of language data and machine learning algorithms to build robust systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 3832
**Requisites:** Requires prerequisite courses of (CSCI 2270 or CSCI 2275) and (CSCI 2824 or MATH 2001 or ECEN 2703 or APPM 3170) (all minimum grade C-).
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 4022 (3) Advanced Data Science**
Introduces students to advanced tools, methods, and theory for extracting insights from data. Covers computational tools for storing and working with large data sets and computational techniques for common big data scenarios like graph data, recommender systems, and dimensionality reduction. Emphasizes both the efficient implementation of algorithms as well as the mathematical foundations behind techniques.
**Requisites:** Prereqs of (APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135) (CSCI 3022 or APPM 3570 or CHEN 3010 or CVEN 3227 or MATH 3510 or MATH 4510 or ECEN 3810 or ECON 3818 or STAT 3100 or STAT 4000 or 4520) CSCI 3104 (all min grade C-).
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 4113 (3) Linux System Administration**
Introduces Linux Unix system administration and related topics. Includes hardware and software installation, storage management, configuration of user accounts and system services, development of automation and monitoring tools, and the provisioning of common network services. This laboratory-focused course will provide significant exposure to the network security concerns of Internet connected hosts. Students will build a network of Linux servers from the ground up using provided computing resources and must maintain and secure these servers themselves.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5113 and CYBR 5113 CSCI 5030 and CYBR 5030
**Requisites:** Requires prerequisite course of CSCI 3753 (minimum grade C-).
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 4114 (3) Practical Algorithmic Complexity**
When coming across an algorithmic problem, how do we think about how hard it is? Beyond just how much time or memory it takes, computational complexity offers a plethora of concepts for understanding this fundamental question. This leads to the appropriate choice of algorithm for the job, the development of new algorithms, and understanding the role of algorithmic complexity in natural settings such as biology and physics.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5114
**Requisites:** Requires a prerequisite course of CSCI 3104 (minimum grade C-).

**CSCI 4118 (3) Software Engineering for Scientists**
Learn the core principles of software engineering to develop scientific software that is robust and reproducible. This class targets quantitative scientists in any discipline who have programming skills (any language) and want to use software to further their research. The course covers version control, testing, benchmarking, data structures, algorithms, and pipelines. Instructor approval is required for CS majors and CS minors.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 6118
**Requisites:** Restricted to non-Computer Science majors and non-Computer Science minors only.
**Recommended:** Prerequisites ASEN 1320 or CSCI 1200 or CSCI 1300 or CSCI 2275 or ECEN 1310 or INFO 1201 and knowledge of a programming language, preferably Python.

**CSCI 4122 (3) Information Visualization**
Studies interactive visualization techniques that help people analyze data. This course introduces design, development, and validation approaches for interactive visualizations with applications in various domains, including the analysis of text collections, software visualization, network analytics, and the biomedical sciences. It covers underlying principles, provides an overview of existing techniques, and teaches the background necessary to design innovative visualizations.
**Requisites:** Requires prerequisite courses (CSCI 2270 or CSCI 2275) and (CSCI 2824 or ECEN 2703 or APPM 3170) (all minimum grade C-).

**CSCI 4133 (3) Fundamentals of Computer Security**
Practice thinking like an attacker by exploring several modern computer security attacks and defenses through hands-on programming projects. Topics include applied cryptography (encryption, authentication), web security (XSS, CSRF, SQL Injection), network security (TLS, MITM attacks), application security (shell injection, buffer overflows), and other current events and trends (government surveillance, botnets, cryptocurrencies).
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4133
**Requisites:** Requires prerequisites: (CSCI 2270 or CSCI 2275) and (CSCI 2400 or ECEN 2360 or ECEN 3350) (all minimum grade C-).
**Recommended:** Corequisite CSCI 4593 (soon to be CSCI 3593).
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 4200 (3) Introduction to Wireless Systems**
Overviews the distinctive characteristics of the wireless communications medium. Topics covered include: Analog signals, Antennas and Propagation, Digital Signals, Sampling, Quadrature Signals, Digital Modulation, SNR and SINR Concepts, Channel Models, Channel Statistics, and Link Budgets. The course includes an introduction to MIMO and beam-forming as implemented in modern communication systems. Software Defined Radio (SDR) is introduced to facilitate student hands-on learning of radio operation. Recommended: Familiarity with basic programming, statistics, and computer networking concepts. Formerly CYBR 4200.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5200 and CSCI 5200
**Requisites:** Requires prerequisites (CSCI 2400 or ECEN 2360 or ECEN 3350) and (APPM 3570 or CHEN 3010 or CSCI 3022 or CVEN 3227 or ECEN 3810 or ECON 3818 or MATH 3510 or MATH 4510 or MCEN 3047 or STAT 3100 or STAT 4000 or STAT 4520) and PHYS 1120 (all min grade C-).

**CSCI 4214 (3) Big Data Architecture**
Provides students with a comprehensive survey of technologies used today in the collection, storage, processing, analytics and display of big data. Focuses on cultivating real world skills with students working on semester long projects to execute on a group project.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5214, CSCI 5214, and ATLS 4214
**Requisites:** Requires prerequisite course of CSCI 2270 or CSCI 2275 (minimum grade C-).

**CSCI 4229 (3) Computer Graphics**
Studies design, analysis and implementation of computer graphics techniques. Topics include interactive techniques, 3D viewing and models, clipping, transformations, projection, removal of hidden surfaces, lighting, textures and shadows. Knowledge of basic linear algebra is required.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5229
**Requisites:** Requires prerequisite course of CSCI 2270 or CSCI 2275 (minimum grade C-).
**Additional Information:** Departmental Category: Graphics

**CSCI 4239 (3) Advanced Computer Graphics**
Studies design, analysis and implementation of advanced computer graphics techniques. Topics include shaders, using the GPU for high performance computing, graphics programming on embedded devices such as mobile phones; advanced graphics techniques such as ray tracing.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5239
**Requisites:** Requires prerequisite course of CSCI 4229 (minimum grade C-).
**Additional Information:** Departmental Category: Graphics

**CSCI 4240 (3) Introduction to Blockchain**
Examines an emerging technology known as blockchain. Blockchain refers to the distributed and decentralized database technology behind popular cryptocurrencies such as Bitcoin and Ethereum. However, it can be used to record and transfer any digital asset, not just currency. This course explores the fundamentals of blockchain technology and its application from three key perspectives: policy and governance, technology, and application. Students gain an understanding of key concepts and how to apply them in the industry.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5240 and CSCI 5240
**Requisites:** Requires prerequisite courses of (CSCI 2270 or CSCI 2275) and (CSCI 2824 or ECEN 2703 or APPM 3170 or MATH 2001) (all minimum grade C-).

**CSCI 4250 (3) History of Computing**
Explores the multifaceted histories of computing as punctuated by "great works" of computer science within the context of historical and social changes influencing and influenced by computing. We will consider people, institutions, and innovations starting with mechanical calculation and mathematical frameworks such as by Lovelace, Pascal, and Turing; early computers such as ABC and ENIAC; the pivotal role of military funding; the founding and development of fields transforming our lives such as artificial intelligence and the internet; and ways other fields, from engineering to cognitive science, interweave in the evolution of computing. Does not count as CS credit for the Computer Science BA, BS or minor.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: General Computer Science

**CSCI 4253 (3) Datacenter Scale Computing - Methods, Systems and Techniques**
Covers the primary problem solving strategies, methods and tools needed for data-intensive programs using large collections of computers typically called "warehouse scale" or "data-center scale" computers. Examines methods and algorithms for processing data-intensive applications, methods for deploying and managing large collections of computers in an on-demand infrastructure and issues of large-scale computer system design.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5253
**Requisites:** Requires prerequisite course of CSCI 3753 (minimum grade C-).
**Recommended:** Prerequisite CSCI 4273.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 4273 (3) Network Systems**
Focuses on design and implementation of network programs and systems, including topics in network protocols, file transfer, client-server computing, remote procedure call and other contemporary network system design and programming techniques. Familiarity with C and Unix or Linux is required.
**Requisites:** Requires prerequisite course of CSCI 3753 (minimum grade C-).
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 4302 (3) Advanced Robotics**
An intensive exploration of major challenges in robotics, providing a hands-on review of current research topics in the context of a "robotics grand challenge" problem. Topics include online planning and control, state estimation, simultaneous localization and mapping, and operating under partial observability.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5302
**Requisites:** Requires prerequisite course of CSCI 3302 (minimum grade C-).
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 4303 (1) Cybersecurity Club Companion Course**
Gives students hands-on experience applying practical security skills and adversarial thinking to real-world problems. Students will work in small teams on internal challenges, lab development, open source contributions, and will represent the university in larger teams for external challenges at the national and global level, such as those hosted by Collegiate Cyber Defense Competition (CCDC), Wicked6, DOE CyberForce, etc. Students will be expected to participate in both internal and external challenges, attend meetings, and present short presentations to the group when appropriate. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5303 and CSCI 5303
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires prerequisite course of CSCI 3403 (minimum grade C-).

**CSCI 4308 (4) Software Engineering Project 1**
Senior capstone course in which students design, implement, document and test software systems for use in industry, non-profits, government and research institutions. Also offers extensive experience in oral and written communication throughout the development process. Department consent required. Department-enforced prerequisites differ for BS and BA degrees. Contact academic advisor for details. Senior Capstone courses are optional for BA students. BA students interested in taking this course should contact their advisor early in their major. Students must take this course and CSCI 4318 contiguously as the project spans the entire academic year. Duplicate degree
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4328
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Computer Science (CSEN) majors only.
**Additional Information:** Departmental Category: Software Engineering

**CSCI 4313 (3) Concurrent Programming**
Introduces the theory and practice of multicore programming. The first part of the course presents foundations of concurrent programming: mutual exclusion, wait-free and lock-free synchronization, spin locks, monitors, memory consistency models. The second part presents a sequence of concurrent data structures and techniques used in their implementations (coarse-grained, fine-grained, optimistic and lock-free synchronization).
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4313 and ECEN 5313 and CSCI 5313
**Requisites:** Requires prerequisite course of CSCI 2400 (minimum grade C-).
**Recommended:** Prerequisite ECEN 3593 or CSCI 3593.

**CSCI 4314 (3) Dynamic Models in Biology**
Surveys computational and mathematical modeling to illuminate biological processes. Students work together to learn to build and analyze models using a variety of numerical tools, tackle meaningful biological problems, and communicate effectively across disciplines. Specific topics: Langevin dynamics of protein folding, agent-based models, finite difference models of organismal growth, stochastic and deterministic cellular automata game of life, models of behavior.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5314
**Requisites:** Requires prerequisite of APPM 3650 or ASTR 2600 or CSCI 2270 or CSCI 2275 or INFO 2201 or PHYS 2600 (minimum grade C-).
**Recommended:** Prerequisite Linear Algebra (CSCI 2820 or CSCI 2897 or MATH 2130 or MATH 2135 or APPM 2360 or APPM 3310), and intended for students in their third or fourth years of Computing or other majors.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 4318 (4) Software Engineering Project 2**
Second semester of a senior capstone course in computer science. Students must take this course and CSCI 4308 or 4328 contiguously as the project spans the entire academic year.
**Requisites:** Requires prerequisite course of CSCI 4308 or CSCI 4328 (minimum grade C-).
**Additional Information:** Departmental Category: Software Engineering

**CSCI 4328 (4) Software Project Management and Mentoring**
Review software project management and discuss the latest approaches, methodologies and standards of software development. Learn to develop software quality, documentation, testing and prototype goals. Study project risk management and cost estimation approaches. Students will mentor other Senior Software Project Teams. Intended for students with professional software development experience. Department consent required, see Senior Project Director for permission.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4308
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Computer Science (CSEN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Software Engineering

**CSCI 4338 (2) Software Project Management**
Intended for double majors doing interdisciplinary projects in other departments. Not intended for students who will be enrolling in CSCI 4368. Review software project management and discuss the latest approaches, methodologies and standards of software development. Learn to develop software quality, documentation, testing, and prototype goals. Study project risk management and cost estimation approaches. Department consent required, see Senior Project Director for permission.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Computer Science (CSEN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Software Engineering

**CSCI 4348 (4) Startup Essentials: Entrepreneurial Projects in Computing**
Provide students with the tools to be successful technical co-founders of their own startups. Explores the initial stages of founding a startup, including team formation, idea validation, pivoting and pitching, while employing an iterative methodology. Student teams will develop a minimum viable product, pitch their final startup concept, and be evaluated on product/market fit. Department consent required. Department-enforced prerequisites differ for BS and BA degrees. Contact academic advisor for details. Senior Capstone courses are optional for BA students. BA students interested in taking this course should contact their advisor(s) early in their major. Students must take this course and CSCI 4358 contiguously as the project spans the entire academic year.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5340
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Computer Science (CSEN) majors only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 4358 (4) Entrepreneurial Projects II**
Follows CSCI 4348. In the second semester of this entrepreneurial project capstone, student teams will seek to find market traction for a high-fidelity Minimum Viable Product (MVP), software and/or hardware, that they will develop as part of their startup project. Teams will further learn to incorporate principles of marketing, business finance and legal issues into the business model for their startup concept. Students must take this course and CSCI 4348 contiguously as the project spans the entire academic year.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5350
**Requisites:** Requires a prerequisite course of CSCI 4348 (minimum grade C-).
**Additional Information:** Departmental Category: General Computer Science

**CSCI 4368 (4) Multidisciplinary Design Project 1**
Design, develop, test, and deploy software that is integrated into a mechanical system. Participate as a member of a multi-disciplinary team that could include students from computer science, mechanical, and electrical disciplines. Develop project management and communication skills as they pertain to a multi-disciplinary team. Support the project team through self-directed study. First semester of a senior capstone course. Students must take this course and CSCI 4378 contiguously as the project spans the entire academic year. Department-enforced prerequisites differ for BS and BA degrees. Contact academic advisor for details. Senior Capstone courses are optional for BA students. BA students interested in taking this course should contact their advisor(s) early in their major.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Computer Science (CSEN) majors only.

**CSCI 4378 (4) Multidisciplinary Design Project 2**
Design, develop, test, and deploy software that is integrated into a mechanical system. Participate as a member of a multi-disciplinary team that could include students from computer science, mechanical, and electrical disciplines. Develop project management and communication skills as they pertain to a multi-disciplinary team. Support the project team through self-directed study. Second semester of a senior capstone course. Students must take this course and CSCI 4368 contiguously as the project spans the entire academic year.
**Requisites:** Requires prerequisite course of CSCI 4368 (minimum grade C-).

**CSCI 4413 (3) Computer Security and Ethical Hacking**
Teaches basic exploit design and development through hands-on experimentation and testing. Uses a controlled environment to give students a "playground" in which to test penetration skills that are normally not allowed on live networks.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5413
**Requisites:** Requires prerequisite course of CSCI 4273 (minimum grade C-).
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 4444 (3) Algorithms and Data Structures for Analyzing DNA**
Covers the basic concepts of genetics and genomics and how DNA analysis problems translate into computational problems. Covers core algorithms such as genome assembly, string matching, string indexing, and string set comparisons. Covers core data structures such as suffix trees and tries, FM index, and Bloom Filters.
**Requisites:** Requires prerequisite courses: (one of APPM 3650 or ASTR 2600 or CSCI 2270 or CSCI 2275 or INFO 2201 or PHYS 2600) and ((one of APPM 1350 or MATH 1300 or MATH 1310) or (APPM 1340 and APPM 1345)) (all minimum grade C-).

**CSCI 4446 (3) Chaotic Dynamics**
Explores chaotic dynamics theoretically and through computer simulations. Covers the standard computational and analytical tools used in nonlinear dynamics and concludes with an overview of leading-edge chaos research. Topics include time and phase-space dynamics, surfaces of section, bifurcation diagrams, fractal dimension and Lyapunov exponents.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5446 and ECEN 4423 and ECEN 5423
**Requisites:** Requires prerequisite course of (ASEN 1320 or CSCI 1300 or CSCI 1320 or CSCI 2275 or ECEN 1310) and (APPM 2350 or MATH 2400) (all minimum grade C-).
**Recommended:** Prerequisites PHYS 1120 and CSCI 3656 and (APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135 or MATH 3130 or MATH 3135).
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 4448 (3) Object-Oriented Analysis and Design**
An applied analysis and design class that addresses the use of object-oriented techniques. Topics include domain modeling, use cases, architectural design and modeling notations. Students apply the techniques in analysis and design projects.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5448
**Requisites:** Requires prerequisite course of CSCI 3308 (minimum grade C-).
**Additional Information:** Departmental Category: Software Engineering

**CSCI 4502 (3) Data Mining**
Introduces basic data mining concepts and techniques for discovering interesting patterns hidden in large-scale data sets, focusing on issues relating to effectiveness and efficiency. Topics covered include data preprocessing, data warehouse, association, classification, clustering, and mining specific data types such as time-series, social networks, multimedia, and Web data.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5502 and CSPB 4502
**Requisites:** Requires prerequisite course of CSCI 2270 or CSCI 2275 (minimum grade C-).
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 4550 (3) Designing for Defense 1**
Designing for Defense/Hacking for Defense is a national service program running at leading research universities across the country. Interdisciplinary teams¿chosen by competitive selection¿work on real-world national security challenges, in close contact with national security agencies. Teams employ the Lean Launchpad entrepreneurship methodology to develop engineering and business concepts to solve real-world challenges for special operations forces, the intelligence community, and other government agencies. Winning teams are eligible for real-world capital investment. The first semester of a two-course sequence. Students take CSCI 4550 in the fall and CSCI 4580 contiguously in the spring as the sequence spans the academic year.
**Recommended:** D4D is open to students from any discipline or major; Enrollment is limited; Application and one Info Session required; See Class Notes for course website and application link.

**CSCI 4555 (3) Compiler Construction**
Introduces the principles and techniques for compiling high-level programming languages to assembly code. Topics include parsing, instruction selection, register allocation, and compiling high-level features such as polymorphism, first-class functions, and objects. Students build a complete compiler for a simple language.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5523 and ECEN 4553 and CSCI 5525
**Requisites:** Requires prerequisite course of CSCI 3155 (minimum grade C-).
**Additional Information:** Departmental Category: Programming Languages

**CSCI 4576 (4) High-Performance Scientific Computing**
Introduces computing systems, software and methods used to solve large-scale problems in science and engineering. Students use high-performance workstations and a supercomputer.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5576
**Recommended:** Prerequisite APPM 4600 or APPM 4650 or CSCI 3656 or MATH 4650 or MCEN 3030.
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 4580 (3) Designing for Defense 2**
This course allows teams to continue their D4D journey from semester one (CSCI 4550), guiding students in launching a business entity that will deploy agile development tools to refine and enhance their first semester MVP, seek funding for that development work, deliver a functioning solution to their sponsor, and extract real value for the members of the business unit. The second semester of a two-course sequence. Students take CSCI 4550 in the fall and CSCI 4580 contiguously in the spring as the sequence spans the academic year.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5580 and CYBR 5580 and ASEN 5580
**Requisites:** Prerequisite of CSCI 4550 (minimum grade B).

**CSCI 4616 (3) Introduction to Virtual Reality**
Introduces students to the field of virtual reality (VR). Covers the historical development of virtual reality technologies and virtual reality as a research field, the mathematics of 3D coordinate systems, fundamental principles, algorithms, and design patterns in developing interactive virtual environments, the perceptual science behind mixed reality technologies, and libraries and tools for creating VR experiences.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4616
**Requisites:** Requires prerequisite course of CSCI 2270 or CSCI 2275 (minimum grade C-).

**CSCI 4622 (3) Machine Learning**
Introduces students to tools, methods, and theory to construct predictive and inferential models that learn from data. Focuses on supervised machine learning techniques including practical and theoretical understanding of the most widely used algorithms (decision trees, support vector machines, ensemble methods, and neural networks). Emphasizes both efficient implementation of algorithms and understanding of mathematical foundations.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 4622
**Requisites:** Requires prereqs (CSCI2270 or 2275) (1 of APPM2360/3310,CSCI2820,MATH2130/2135) (1 of CSCI2824,ECEN2703,APPM3170,MATH2001) (1 of APPM3570,CHEN3010,CSCI 3022,CVEN 3227,ECEN 3810,ECON 3818,MATH 3510/45 (all min C-)
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 4722 (3) Computer Vision**
Explores algorithms that can extract information about the world from images or sequences of images. Topics covered include: imaging models and camera calibration, early vision (filters, edges, texture, stereo, optical flow), mid-level vision (segmentation, tracking), vision-based control and object recognition.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5722
**Requisites:** Requires prerequisite courses of (APPM 2360 or APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135) and CSCI 3104 (all minimum grade C-).
**Recommended:** Prerequisite CSCI 3022 or APPM 3570 or STAT 4520 or STAT 4000 or CHEN 3010 or CVEN 3227 or MATH 3510 or MATH 4510 or ECEN 3810 or ECON 3818.

**CSCI 4753 (3) Computer Performance Modeling**
Presents a broad range of system measurement and modeling techniques, emphasizing applications to computer systems. Covers topics including system measurement, workload characterization and analysis of data; design of experiments; queuing theory and queuing network models; and simulation.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5753 and ECEN 4753 and ECEN 5753
**Requisites:** Requires prerequisites of (APPM 1360 or MATH 2300) and CSCI 3753 (all minimum grade C-).
**Recommended:** Prerequisite a course in statistics.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 4802 (1) Data Science Team Companion Course**
Gives students hands-on experience applying data science techniques and machine learning algorithms to real-world problems. Students work in small teams on internal challenges, many of which will be sponsored by local companies and organizations and will represent the university in larger teams for external challenges at the national and global level, such as those hosted by Kaggle. Students will be expected to participate in both internal and external challenges, attend meetings and present short presentations to the group when appropriate.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5802
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires a prerequisite course of (APPM 3310, CSCI 2820, MATH 2130, MATH 2135) OR (APPM 3570, CHEN 3010, CSCI 3022, CVEN 3227, ECEN 3810, ECON 3818, MATH 3510, MATH 4510, MCEN 3047, STAT 3100, STAT 4000, STAT 4520) (min grade C-).
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 4809 (3) Computer Animation**
Develops a firm understanding of the general principles of computer animation. Lectures cover the creation of models, materials, textures, surfaces, and lighting. Path and key frame animation, particle dynamics, and rendering are introduced. Students are assigned a number of animation tutorials to carry out.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5809 and ATLS 4809 and CSCI 5809
**Additional Information:** Departmental Category: Graphics

**CSCI 4830 (1-4) Special Topics in Computer Science**
Covers topics of interest in computer science at the senior undergraduate level. Content varies from semester to semester. Only 9 credit hours from CSCI 4830 and/or CSCI 4831 can count toward Computer Science BS or BA.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of CSCI 2400 or ECEN 2360 or ECEN 3350 (minimum grade C-).
**Additional Information:** Departmental Category: General Computer Science

**CSCI 4831 (1-4) Special Topics in Algorithms**
Covers topics of interest in computer science at the upper-division undergraduate level. Content varies from semester to semester. Only 9 credit hours from CSCI 4830 and/or CSCI 4831 can count toward Computer Science BS or BA.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of CSCI 3104 and (APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135) (all minimum grade C-).
**Additional Information:** Departmental Category: General Computer Science

**CSCI 4849 (3) Input, Interaction, and Accessibility**
Explores input and interaction techniques with an emphasis on universal design and alternative interfaces. Students explore traditional input methods such as keyboard and mouse input, and alternative techniques such as voice and eye gaze. Students conduct performance evaluations of existing techniques, and prototype new interaction methods. Students design technologies to support people with varying abilities and disabilities.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5849
**Requisites:** Requires prerequisite of CSCI 3002 (minimum grade C-).

**CSCI 4897 (3) Computational and Mathematical Modeling of Infectious Diseases**
Explores the ways we model infectious diseases using math and computing, from the dynamic spread of infectious diseases between humans, to a pathogen's growth within the body. Learning goals include (i) gaining a mastery of both classic and modern infectious disease models (ii) learning about a variety of infectious diseases, and (iii) engaging with the ethics of infectious disease modeling. Requires beginner or advanced-beginner skill in Python or R.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5897
**Requisites:** Prereqs:(One of MATH1300/1310/APPM1345/50) (One of APPM3650/CSCI2270/2275/INFO2201) (One of APPM3570/CHEN3010/CSCI3022/CVEN3227/EBIO4410/ECEN3810/ECON3818/IPHY3280/MATH3510/4510/4520/MCDB3450/MCEN3047/PSYC2111/STAT2600/3100/4000/4520) min C-
**Recommended:** Prerequisites Calculus 2 and Intermediate skill in Python or R.

**CSCI 4900 (1-3) Upper Division, Undergraduate Level Independent Study**
Provides opportunities for independent study at the upper-division undergraduate level. Students work on a small research problem. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of ASEN 1320 or CSCI 1300 or CSCI 1320 or CSCI 2275 (all minimum grade C-).
**Additional Information:** Departmental Category: General Computer Science

**CSCI 4950 (2-4) Senior Thesis**
Provides an opportunity for senior computer science majors to conduct exploratory research in computer science as an option for the capstone requirement. Department enforced prerequisites: 35 hours of Computer Science coursework including Foundation courses, Upper-Division writing, CS GPA 3.0. Department consent required, contact academic advisor for details. Senior Capstone courses are optional for BA students. BA students interested in taking this course should contact their advisor early in their major.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Requires a prerequisite or corequisite course of CSCI 3100 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior).
**Additional Information:** Departmental Category: General Computer Science

**CSCI 4960 (2-4) Computer Science Honors Thesis**
Provides an opportunity for senior Computer Science BA majors to conduct exploratory research in computer science and complete an Honors Thesis as part of the Arts and Sciences Honors Program. Department-enforced prerequisites: 35 hours of Computer Science coursework including Foundation courses, Upper-Division writing, CS GPA 3.0. Department consent required, contact academic advisor for details.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior).
**Additional Information:** Departmental Category: General Computer Science

**CSPB 1000 (1) Computer Science as a Field of Work and Study**
Introduces curriculum, learning techniques, time management and career opportunities in Computer Science. Includes presentations from alumni and others with relevant educational and professional experience.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 1000
**Requisites:** Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 1300 (4) Computer Science 1: Starting Computing**
Teaches techniques for writing computer programs in higher level programming languages to solve problems of interest in a range of application domains. Appropriate for students with little to no experience in computing or programming.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 1310 CSCI 1300
**Requisites:** Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 2270 (4) Computer Science 2: Data Structures**
Studies data abstractions (e.g., stacks, queues, lists, trees, graphs, heaps, hash tables, priority queues) and their representation techniques (e.g., linking, arrays). Introduces concepts used in algorithm design and analysis including criteria for selecting data structures to fit their applications. Knowledge of C++ is highly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 2275 CSCI 2270
**Requisites:** Requires prerequisite course of (ASEN 1320 minimum grade B-) or (CSCI 1300 or CSCI 1310 or CSPB 1300 or ECEN 1310 (minimum grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 2400 (4) Computer Systems**
Covers how programs are represented and executed by modern computers, including low-level machine representations of programs and data, an understanding of how computer components and the memory hierarchy influence performance.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 2400
**Requisites:** Requires corequisite course of CSPB 2270 or CSCI 2270 or CSCI 2275. Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 2820 (3) Linear Algebra with Computer Science Applications**
Introduces the fundamentals of linear algebra in the context of computer science applications. Includes vector spaces, matrices, linear systems, and eigenvalues. Includes the basics of floating point computation and numerical linear algebra.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 2820
**Requisites:** Requires prerequisite courses of CSPB 2824 or CSCI 2824 or APPM 1345 or APPM 1350 or MATH 1300 or MATH 1310 (all minimum grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 2824 (3) Discrete Structures**
Covers foundational materials for computer science that is often assumed in advanced courses. Topics include set theory, Boolean algebra, functions and relations, graphs, propositional and predicate calculus, proofs, mathematical induction, recurrence relations, combinatorics, discrete probability. Focuses on examples based on diverse applications of computer science.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 2824
**Requisites:** Requires prerequisite or corequisite course of ASEN 1320 or CSCI 1300 or CSPB 1300 or ECEN 1310 (all minimum grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 3022 (3) Introduction to Data Science with Probability and Statistics**
Introduces students to the tools, methods and theory behind extracting insights from data. Covers algorithms of cleaning and munging data, probability theory and common distributions, statistical simulation, drawing inferences from data, and basic statistical modeling.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3022
**Requisites:** Requires prereq or coreq of (ASEN 1320 or CSCI 1300 or CSPB 1300 or ECEN 1310) (APPM 3170 or CSCI 2824 or CSPB 2824 or ECEN 2703 or MATH 2001) (min grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) onl

**CSPB 3104 (4) Algorithms**
Covers the fundamentals of algorithms and various algorithmic strategies, including time and space complexity, sorting algorithms, recurrence relations, divide and conquer algorithms, greedy algorithms, dynamic programming, linear programming, graph algorithms, problems in P and NP, and approximation algorithms.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3104
**Requisites:** Requires prereq course (APPM 3170 or CSCI 2824 or CSPB 2824 or ECEN 2703 or MATH 2001) prereq or coreq course of (CSCI 2270 or CSPB 2270) (all min grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only

**CSPB 3112 (1) Professional Development in Computer Science**
Supports students in developing professional skills and practices in computing, including: preparing for technical and behavioral interviews, professional networking, mastering new technologies not addressed in the curriculum, presenting work, the role of graduate study, and exploring career and research directions.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Requires prerequisite course of CSPB 2270 or CSCI 2270 or CSCI 2275 (minimum grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 3155 (4) Principles of Programming Languages**
Studies principles governing the design and analysis of programming languages and their underlying execution models. Explores values, scoping, recursion, higher-order functions, type systems, control structures, and objects. Introduces formal semantics as a framework for understanding programming features. Introduces advanced programming concepts such as functional programming, higher-order functions, immutable values and structures, inductive types, functors, continuation-passing; and object-oriented programming using inheritance, generics and covariance/contravariance in a functional programming language such as Scala.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3155
**Requisites:** Requires prerequisite courses of (CSCI 2270 or CSPB 2270 or CSCI 2275) and (APPM 3170 or CSCI 2824 or CSPB 2824 or ECEN 2703 or MATH 2001) (all min grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 3202 (3) Introduction to Artificial Intelligence**
Surveys artificial intelligence techniques of search, knowledge representation and reasoning, probabilistic inference, machine learning, and natural language. Knowledge of Python is strongly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3202
**Requisites:** Req. prereq of (CSPB/CSCI2270 or CSCI2275) (APPM3170 or CSPB/CSCI2824 or ECEN2703 or MATH2001) one of: (APPM3570/4570/CHEN3010/CSCI3022/CSPB3022/CVEN3227/ECEN3810/ECON3818/MATH3510/4510/STAT4520) (all min C-). Rstr to AppCompSci post-bac(CSAP).

**CSPB 3287 (3) Design and Analysis of Database Systems**
Introduces the fundamental concepts of database requirements analysis, database design, and database implementation with emphasis on the relational model and the SQL programming language. Introduces the concepts of Big Data and NoSQL systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3287
**Requisites:** Requires prerequisite course of CSCI 2270 or CSCI 2275 or CSPB 2270 (minimum grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 3302 (3) Introduction to Robotics**
Introduces students to fundamental concepts in autonomous robotics: mechanisms, locomotion, kinematics, control, perception and planning. Consists of lectures and lab sessions that are geared toward developing a complete navigation stack on a miniature mobile robotic platform.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3303 and CSCI 3302
**Requisites:** Requires prereqs of (CSCI 2270 or CSPB 2270 or CSCI 2275) (APPM 3170 or CSCI 2824 or CSPB 2824 or ECEN 2703 or MATH 2001) (CSCI 2820 or CSPB 2820)(all min grade C-). Restricted to students in the Applied Computer Science Post-bac program(CSAP) only

**CSPB 3308 (3) Software Development Methods and Tools**
Covers tools and techniques for successful software development with a strong focus on best practices used in industry. Students work in small teams to complete a semester-long application development project. Students learn front-end design and construction using HTML & CSS, back-end database design and construction, and full-stack integration. Students gain exposure to agile methodologies, web services, distributed version control, requirements definition, automated integration testing, and cloud-based application deployment.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3308
**Requisites:** Requires prerequisite or corequisite course of CSPB 2270 or CSCI 2270 or CSCI 2275 (minimum grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 3403 (4) Introduction to CyberSecurity for a Converged World**
Introduces core concepts in cybersecurity including confidentiality, integrity, authentication, risk management, and adversarial thinking. The concepts will be applied to both traditional information technology (IT) systems and cyber physical systems (CPS). At the conclusion of the course students should have a solid foundation in cybersecurity and hands-on experience.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3403
**Requisites:** Requires prerequisite course of CSCI 2400 or ECEN 2360 or ECEN 3350 (minimum grade C-).

**CSPB 3702 (3) Cognitive Science**
Introduces cognitive science, drawing from psychology, philosophy, artificial intelligence, neuroscience, and linguistics. Studies the linguistic relativity hypothesis, consciousness, categorization, linguistic rules, the mind-body problem, nature versus nurture, conceptual structure and metaphor, logic/problem solving and judgment. Emphasizes the nature, implications and limitations of the computational model of mind.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3702 and LING 3005 and PHIL 3310 and PSYC 3005 and SLHS 3003 and CSCI 3702
**Requisites:** Requires prerequisite or corequiste of ASEN 1320 or CSCI 1300 or CSCI 2275 or CSPB 1300 or ECEN 1310 (minimum grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.
**Recommended:** Prerequisites LING 2000 or PHIL 2440 or PSYC 2145.

**CSPB 3753 (4) Design and Analysis of Operating Systems**
Analyzes the software that extends hardware to provide a computing environment, including the role of linkers, file systems, resource sharing, security and networking. Studies the history of operating system organization and design and their influence on security, functionality and reliability.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3753
**Requisites:** Requires prerequisite courses of (CSCI 2270 or CSPB 2270 or CSCI 2275) and (CSCI 2400 or CSPB 2400 or ECEN 3350) (all minimum grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 3832 (3) Natural Language Processing**
Explores the theoretical and practical issues that arise in getting computers to perform useful and interesting tasks with human languages. Topics include information extraction, dialog systems and machine translation. Focus is on the use of language data and machine learning algorithms to build robust systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3832
**Requisites:** Requires prerequisite courses of (CSPB 2270 or CSCI 2270 or CSCI 2275) and (CSPB 2824 or CSCI 2824 or MATH 2001 or ECEN 2703 or APPM 3170) (all minimum grade C-). Restricted to students in the Applied Computer Science Post-bacc program (CSAP) only.

**CSPB 4122 (3) Information Visualization**
Studies interactive visualization techniques that help people analyze data. This course introduces design, development, and validation approaches for interactive visualizations with applications in various domains, including the analysis of text collections, software visualization, network analytics, and the biomedical sciences. It covers underlying principles, provides an overview of existing techniques, and teaches the background necessary to design innovative visualizations.
**Requisites:** Requires prerequisite or corequisite courses CSCI 1300 or CSPB 1300 and CSCI 2824 or CSPB 2824 (all minimum grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 4502 (3) Data Mining**
Introduces basic data mining concepts and techniques for discovering interesting patterns hidden in large-scale data sets, focusing on issues relating to effectiveness and efficiency. Topics covered include data preprocessing, data warehouse, association, classification, clustering, and mining specific data types such as time-series, social networks, multimedia, and Web data.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5502 and CSCI 4502
**Requisites:** Requires prerequisite course of CSPB 2270 or CSCI 2270 or CSCI 2275 (minimum grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 4622 (3) Machine Learning**
Introduces students to tools, methods, and theory to construct predictive and inferential models that learn from data. Focuses on supervised machine learning techniques including practical and theoretical understanding of the most widely used algorithms (decision trees, support vector machines, ensemble methods, and neural networks). Emphasizes both efficient implementation of algorithms and understanding of mathematical foundations.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4622
**Requisites:** Prereqs: (CSCI/CSPB2270 or CSCI2275)(1 of APPM3310,CSCI/CSPB2820,MATH2130/2135)(1 of CSCI2824,CSPB2824,ECEN2703,APPM3170,MATH2001) (1 of APPM3570,CSCI/CSPB3022,CVEN3227,ECEN3810,ECON3818,MATH3510,MCEN3047,STAT3100/4000 (all min C-). CSAP students only

**CSPB 4830 (1-4) Special Topics in Applied Computer Science**
Covers topics of interest in applied computer science at the undergraduate level. Content varies from semester to semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 4900 (1-3) Upper Division, Undergraduate Level Independent Study**
Provides opportunities for independent study at the upper-division undergraduate level. Students work on a small research problem or tutor lower-division computer science students. Department consent required.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires prerequisite course of CSPB 1300 or CSCI 1300 (minimum grade C-).

# Computer Science - Bachelor of Arts (BA)

Computer science is an exciting and challenging field that has impact on many parts of our lives. Computer scientists craft the technologies that enable the digital devices we use every day. They develop the large-scale software that powers business and industry, and they advance the computational techniques and write the software that supports scientists in their study of the world around us. They create the software that social scientists use to identify and analyze patterns in the behavior of social groups and human behavior in social networks and the applications that humanists and linguists use to research language development. Many new applications of computing technology remain to be discovered. Indeed, computing will be at the heart of future revolutions in business, science and society. Students who study computer science now will be at the forefront of those important advances.

Computer science offers study in the fields of computer systems, cyber security, robotics, algorithm design, artificial intelligence, software and web engineering, programming languages, database design, human-computer interaction, machine learning, data science, numerical and parallel computing, speech and language processing and theoretical computer science.

Computer science is concerned with how computers are constructed, how they store and process data, how they are used in problem solving and how the quality of those solutions is assessed. It is about the science of creating software for a variety of users. It is about understanding how that software interacts with the hardware on which it is run. Computer science goes well beyond the machine to the study of how people interact with the technologies around them. Applications of computer science reach far and wide.

For more information, visit the department's BA Degree (https://www.colorado.edu/cs/academics/undergraduate-programs/bachelor-arts/bachelor-arts-degree-requirements/) webpage.

A student may not earn both the BS and BA in computer science. A student may not earn both a bachelor's degree in computer science and the minor in computer science from CU Boulder.

# Requirements

The degree provides considerable freedom in the selection of specific courses to fulfill major requirements, allowing students to tailor the degree to their individual needs and interests.

For more information, visit the department's BA Degree (https://www.colorado.edu/cs/academics/undergraduate-programs/bachelor-arts/bachelor-arts-degree-requirements/) webpage.

Students earning a BA in Computer Science from the College of Engineering and Applied Science must meet the graduation requirements (https://www.colorado.edu/engineering-advising/get-your-degree/graduation-requirements/) as laid out by the College of Engineering and Applied Science. A student may not earn both a BA degree in computer science and a BS degree in computer science from CU Boulder. A student may not earn a bachelor's degree in computer science and a minor in computer science from CU Boulder.

*Note:* Prior to the 2020–2021 academic year, this program was offered by the College of Arts & Sciences. **Students who declared this program prior to the 2020–2021 academic year** should refer to the requirements as defined during the academic year the major was declared (see the University Catalog archive (p. 2834)).

## Required Courses and Credits

General Education: Students must complete General Education course work which totals about 42–48 credit hours. These credits are in addition to the required courses for the CS major listed below. Students will complete one lower division and one upper division writing course, 12 credit hours of Arts & Humanities, 12 credit hours of Social Sciences, 12 credit hours of Natural Science, 3 credit hours of Diversity with U.S. Perspective, and 3 credit hours of Diversity with Global Perspective. The courses that fulfill the Diversity requirement are allowed to double count with other areas of General Education as appropriate by the assigned course attributes. Writing courses approved by the College of Engineering and Applied Science can be counted for the lower and upper-division writing requirements in the General Education writing categories. Students can use courses from their General Education to also count for their additional area of study or major requirements.

Students are required to pursue an Additional Area of Study as part of earning a BA in computer science. The additional area can be any available minor or certificate from any of CU Boulder's colleges and schools (Arts & Sciences, Business, EAS, CMDI, Education, Music). Students completing a dual degree (by pursuing another major) fulfill the Additional Area of Study requirement with those plans.

Any Additional Area of Study that is not part of a dual degree must be at least 15 credit hours. Programs that do not meet this requirement will be considered by petition and students will be required to add additional coursework.

The minimum required hours to complete the CSEN-BA degree is 120 total credit hours.

| Code | Title | Credit Hours |
|---|---|---|
| **Foundations Courses** | | **23** |
| CSCI 1300 | Computer Science 1: Starting Computing | 4 |
| CSCI 2270 | Computer Science 2: Data Structures | 4 |
| or CSCI 2275 | Programming and Data Structures | |
| CSCI 2400 | Computer Systems | 4 |
| CSCI 3104 | Algorithms | 4 |
| CSCI 3155 | Principles of Programming Languages | 4 |
| CSCI 3308 | Software Development Methods and Tools | 3 |
| **Core Courses** | | |
| Choose four: | | 12-15 |
| CSCI 3002 | Fundamentals of Human Computer Interaction | |
| CSCI 3202 | Introduction to Artificial Intelligence | |
| CSCI 3287 | Design and Analysis of Database Systems | |

| | |
|---|---|
| CSCI 3302 | Introduction to Robotics |
| CSCI 3403 | Introduction to CyberSecurity for a Converged World |
| CSCI 3434 | Theory of Computation |
| CSCI 3656 | Numerical Computation |
| or APPM 4600 | Numerical Methods and Scientific Computing |
| or MATH 4650 | Intermediate Numerical Analysis 1 |
| CSCI 3753 | Design and Analysis of Operating Systems |
| CSCI 4022 | Advanced Data Science |
| CSCI 4273 | Network Systems |
| CSCI 4448 | Object-Oriented Analysis and Design |

**CSCI Upper-Division Electives**

| | |
|---|---|
| Choose two to four additional upper-division CSCI courses or approved courses from outside CSCI to reach 45 CSCI credit hours. | 7-10 |

## Required Ancillary Coursework

| Code | Title | Credit Hours |
|---|---|---|
| **Mathematics** | | |
| *Calculus* | | *8-10* |
| MATH 1300 | Calculus 1 | |
| or APPM 1350 | Calculus 1 for Engineers | |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| or MATH 1310 | Calculus for Life Sciences | |
| MATH 2300 | Calculus 2 | |
| or APPM 1360 | Calculus 2 for Engineers | |
| *Discrete Mathematics* | | |
| Choose one: | | 3 |
| CSCI 2824 | Discrete Structures | |
| or ECEN 2703 | Discrete Mathematics for Computer Engineers | |
| or APPM 3170 | Discrete Applied Mathematics | |
| or MATH 2001 | Introduction to Discrete Mathematics | |
| *Linear Algebra or Probability/Statistics* | | |
| Choose one: | | 3-4 |
| Linear Algebra | | |
| CSCI 2820 | Linear Algebra with Computer Science Applications | |
| MATH 2130 | Introduction to Linear Algebra for Non-Mathematics Majors | |
| MATH 2135 | Introduction to Linear Algebra for Mathematics Majors | |
| APPM 3310 | Matrix Methods and Applications | |
| Probability/Statistics | | |
| CSCI 3022 | Introduction to Data Science with Probability and Statistics | |
| MATH 3510 | Introduction to Probability and Statistics | |
| MATH 4510 | Introduction to Probability Theory | |
| APPM 3570 | Applied Probability | |
| STAT 3100 | Applied Probability | |
| ECON 3818 | Introduction to Statistics with Computer Applications | |
| STAT 4000 | Statistical Methods and Application I | |
| **Logic & Ethics** | | |
| *Logic* | | |
| Choose one: | | 3 |
| PHIL 1440 | Critical Thinking | |
| PHIL 2440 | Symbolic Logic | |
| *Ethics* | | |
| Choose one: | | 3 |
| CSCI 2750 | Computing, Ethics and Society | |
| PHIL 1100 | Ethics | |
| PHIL 1200 | Contemporary Social Problems | |
| PHIL 2160 | Ethics and Information Technology | |
| PHIL 3100 | Ethical Theory | |
| EHON 1151 | Critical Encounters | |
| ENLP 2000 | Leadership, Fame and Failure | |
| INFO 4601 | Information Ethics and Policy | |
| **Additional Area of Study** | | |
| Approved minor, certificate or dual degree program at CU Boulder | | 15 |

# Recommended Four-Year Plan of Study

This four-year plan of study is based on students starting at the Calculus 1 level. This plan is flexible and CSCI course substitutions in year two based on starting MATH or other requirements should be discussed with an academic advisor.

General Education Distribution and Diversity requirements (https://www.colorado.edu/artsandsciences/undergraduate/degree-requirements/general-education-requirements/) can be met with courses for the Additional Area of Study. Some additional areas of study may exceed 120 total credit hours.

For more information on required courses including all options for Calculus, additional MATH, PHIL and CSEN-BA Core and Upper Division electives, see the Requirements tab. Detailed information is also available on the BA Degree Requirements (https://www.colorado.edu/cs/current-students/undergraduate-students/ba-degree/ba-degree-requirements/) webpage.

**Year One**

| Fall Semester | | Credit Hours |
|---|---|---|
| CSCI 1300 | Computer Science 1: Starting Computing | 4 |
| MATH 1300 or APPM 1350 | Calculus 1 or Calculus 1 for Engineers | 4-5 |
| Logic or Ethics Course (Logic recommended prior to Discrete Structures, also counts toward Gen Ed) | | 3 |
| General Education Distribution Course (example: Social Science or Arts & Humanities) | | 3 - 4 |
| COEN 1500 | CEAS First Year Seminar (free elective) | 1 |
| | **Credit Hours** | **15-17** |
| **Spring Semester** | | |
| CSCI 2270 or CSCI 2275 | Computer Science 2: Data Structures or Programming and Data Structures | 4 |
| MATH 2300 or APPM 1360 | Calculus 2 or Calculus 2 for Engineers | 4-5 |
| Logic or Ethics Course (Logic recommended prior to Discrete Structures, also counts toward Gen Ed) | | 3 |

| | | |
|---|---|---|
| General Education Skills course (example: Lower-division Written Communication) | | 3 |
| | **Credit Hours** | **14-15** |
| **Year Two** | | |
| **Fall Semester** | | |
| CSCI 2400 | Computer Systems | 4 |
| CSCI 2824 | Discrete Structures | 3 |
| General Education Distribution course (example: Arts & Humanities) | | 3 |
| Additional Area of Study Course | | 3 |
| General Education Distribution course (example: Natural Science) | | 3 - 4 |
| | **Credit Hours** | **16-17** |
| **Spring Semester** | | |
| CSCI 3104 | Algorithms | 4 |
| CSCI 3308 | Software Development Methods and Tools | 3 |
| Linear Algebra, Probability or Statistics course | | 3-4 |
| Additional Area of Study | | 3 |
| Additional Area of Study | | 3 |
| | **Credit Hours** | **16-17** |
| **Year Three** | | |
| **Fall Semester** | | |
| CSCI 3155 | Principles of Programming Languages | 4 |
| CSCI Core course or CSCI Upper-division Elective | | 3-4 |
| Additional Area of Study | | 3 |
| Upper-divison General Education Skills course (example: Upper-division Written Communication) | | 3 |
| General Education Distribution course (example: Natural Sciences with or without lab) | | 3-5 |
| | **Credit Hours** | **16-19** |
| **Spring Semester** | | |
| CSCI Core course or CSCI Upper-division Elective | | 3-4 |
| CSCI Core course or CSCI Upper-division Elective | | 3-4 |
| Additional Area of Study | | 3 |
| General Education Distribution/Diversity course (example: Social Sciences/Global Perspective) | | 3 |
| Free Elective | | 4 |
| | **Credit Hours** | **16-18** |
| **Year Four** | | |
| **Fall Semester** | | |
| CSCI Core course or CSCI Upper-division Elective | | 3-4 |
| CSCI Upper-division Elective or Capstone-1 | | 3-4 |
| Additional Area of Study or General Education Distribution course | | 3 |
| Additional Area of Study or General Education Distribution course | | 3 |
| General Education Distribution course | | 3 |
| | **Credit Hours** | **15-17** |
| **Spring Semester** | | |
| CSCI Upper-division Elective | | 3-4 |
| CSCI Upper-division Elective or Capstone-2 | | 3-4 |
| Additional Area of Study or General Education Distribution course | | 3 |
| Additional Area of Study or General Education Distribution/ Diversity course (example: Social Sciences/US Perspective) | | 3 |
| | **Credit Hours** | **12-14** |
| | **Total Credit Hours** | **120-134** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Design, implement and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Communicate effectively in a variety of professional contexts.
- Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- Apply computer science theory and software development fundamentals to produce computing-based solutions.

# Program Educational Objectives

Within 3–5 years after graduating with a Bachelor of Arts degree in computer science, our graduates will be:

- *Broadly educated and versatile*. Able to draw upon foundational knowledge, learn, adapt and successfully bring to bear analytical and computational approaches on changing societal and technological challenges.
- *Inspiring and collaborative*. Are leaders and responsible citizens whose strengths come from an ability to draw on and contribute to diverse teams, expertise and experiences.
- *Innovative*. Drive scientific and societal advancement through technological innovation and entrepreneurship.
- *Engaged*. Are engaged with the University of Colorado, the state of Colorado and technical and scientific professional communities.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## Admissions Requirements

### BA and MS in Computer Science

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.50 or higher.
- Have completed all prerequisite courses with grades of B or better:

| Code | Title | Credit Hours |
|---|---|---|
| CSCI 1300 | Computer Science 1: Starting Computing | 4 |
| CSCI 2270 | Computer Science 2: Data Structures | 4 |
| CSCI 2400 | Computer Systems | 4 |
| CSCI 3104 | Algorithms | 4 |
| CSCI 3155 | Principles of Programming Languages (or CSCI 3753 Design and Analysis of Operating Systems) | 4 |

- Students who do not meet the first two criteria, must have one letter of reference from a faculty member or your undergraduate academic advisor outlining why you should be considered. Your letter-writer should send their letter directly to gradadms@cs.colorado.edu.
- Have at least junior status within the bachelor's degree program.
- Students may submit their intent to apply during the term they are completing their final class from the list of prerequisites.

### BA in Computer Science, MS in Computational Linguistics, Analytics, Search and Informatics

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.50 or higher.
- Have completed all prerequisite courses with grades of B or better:

| Code | Title | Credit Hours |
|---|---|---|
| CSCI 1300 | Computer Science 1: Starting Computing | 4 |
| CSCI 2270 | Computer Science 2: Data Structures | 4 |
| CSCI 3104 | Algorithms | 4 |
| or CSCI 3022 | Introduction to Data Science with Probability and Statistics | |
| LING 2000 | Introduction to Linguistics | 3 |
| CSCI 3832/5832 | Natural Language Processing | 3 |
| or CSCI 3202 | Introduction to Artificial Intelligence | |
| or CSCI 4622 | Machine Learning | |
| One of the following courses during the semester the student applies: | | |
| LING 5430 | Semantics and Pragmatics | |
| LING 5420 | Morphology and Syntax | |
| LING 5030 | Linguistic Phonetics | |

- Have at least junior status within the bachelor's degree program.
- Provide two letters of reference, one written by the course instructor of the LING 5XXX course they are taking during the semester they apply, the other by the instructor from an upper-division course in computer science. Letters should be sent directly to the CLASIC Program Coordinator.

### BA in Computer Science, MS in Data Science

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.25 or higher.
- Have completed all prerequisite courses with grades of B or better:

| Code | Title | Credit Hours |
|---|---|---|
| CSCI 1300 | Computer Science 1: Starting Computing | 4 |
| CSCI 2270 | Computer Science 2: Data Structures | 4 |
| CSCI 2400 | Computer Systems | 4 |
| CSCI 3022 | Introduction to Data Science with Probability and Statistics | 3 |
| CSCI 3308 | Software Development Methods and Tools | 3 |

- Have at least junior status within the bachelor's degree program.
- Students may submit their intent to apply during the term they are completing their final class from the list of prerequisites.

### BA in Computer Science, MS in Network Engineering

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.30 or higher
- Have completed the following prerequisite courses with a B or better. (If a student has transfer credit for one of the following courses, or has taken a commonly accepted course substitution for one of the above courses, their grade in that alternate course can be used to determine their eligibility for this BAM program.)

| Code | Title | Credit Hours |
|---|---|---|
| CSCI 1300 | Computer Science 1: Starting Computing | 4 |
| CSCI 2270 | Computer Science 2: Data Structures | 4 |
| CSCI 2400 | Computer Systems | 4 |
| CSCI 3308 | Software Development Methods and Tools | 3 |
| CSCI 3753 | Design and Analysis of Operating Systems | 4 |

- Have at least junior status within the bachelor's degree program.
- Students may submit their intent to apply during the term they are completing their final class from the list of prerequisites.

## Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only 6 credits may be double-counted toward the bachelor's degree and the master's master's degree. The remaining 6 credits must be reserved for the graduate degree only and not count toward the bachelor's degree requirements.

Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

Please see the computer science accelerated master's webpage (https://www.colorado.edu/cs/academics/undergraduate-programs/accelerated-

masters-programs/computer-science-accelerated-masters/) for more information.

# Computer Science - Bachelor of Science (BSCS)

The goal of the Department of Computer Science is to prepare students for an intriguing and satisfying career in computer science in industry, research or academia. The huge number of technical jobs and the continuing shortage of people to fill them mean that opportunities are great for today's computer science graduates when seeking career options or continuing on to graduate school.

The BS degree program in computer science emphasizes knowledge and awareness of computing at all levels, from circuits and computer architecture through operating systems and programming languages to large application systems; the theoretical and mathematical aspects of computing; the interdependence of hardware and software; and the challenge of large-scale software production and the engineering principles used to meet that challenge. Students may choose to take classes that touch on a wide variety of computing topics, or may select classes that focus on a particular specialization.

For more information, visit the department's BS Degree (https://www.colorado.edu/cs/academics/undergraduate-programs/bachelor-science/bachelor-science-degree-requirements/) webpage.

## Requirements

Requirements for the BS degree in computer science include coursework in computer science, mathematics, natural science and the humanities and social sciences, as well as free elective coursework. Students must meet the graduation requirements of earning the BS degree as laid out by the College of Engineering and Applied Science (https://www.colorado.edu/engineering-advising/get-your-degree/graduation-requirements/).

The degree provides considerable freedom in the selection of specific courses to fulfill these requirements, allowing students to tailor the degree to their individual needs and interests.

A student may not earn both a BS degree in computer science and a BA degree in computer science (https://catalog.colorado.edu/undergraduate/colleges-schools/arts-sciences/programs-study/computer-science/computer-science-bachelor-arts-ba/) from CU Boulder. A student may not earn a bachelor's degree in computer science and a minor in computer science from CU Boulder.

For more information, visit the department's BS Degree (http://www.colorado.edu/cs/current-students/undergraduate-students/bs-degree/) webpage.

### Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Computer Science Foundation** | | |
| CSCI 1000 | Computer Science as a Field of Work and Study | 1 |
| or ASEN 1000 | Introduction to Aerospace Engineering Sciences | |
| or BMEN 1000 | Exploring Biomedical Engineering | |
| or CHEN 1300 | Introduction to Chemical and Biological Engineering | |
| or CVEN 1317 | Introduction to Civil and Environmental Engineering | |
| or ECEN 1100 | Exploring ECE | |
| or EVEN 1000 | Introduction to Environmental Engineering | |
| or MCEN 2000 | Mechanical Engineering as a Profession | |
| CSCI 1300 | Computer Science 1: Starting Computing | 4 |
| or ECEN 1310 | Introduction to C Programming | |
| CSCI 2270 | Computer Science 2: Data Structures | 4 |
| or CSCI 2275 | Programming and Data Structures | |
| CSCI 2400 | Computer Systems | 4 |
| CSCI 3104 | Algorithms | 4 |
| CSCI 3155 | Principles of Programming Languages | 4 |
| CSCI 3308 | Software Development Methods and Tools | 3 |
| **Computer Science Core** | | **15-18** |
| Select five courses from approved list below; exact number of credit hours earned may vary based on courses selected. | | |
| CSCI 3002 | Fundamentals of Human Computer Interaction | |
| CSCI 3202 | Introduction to Artificial Intelligence | |
| CSCI 3287 | Design and Analysis of Database Systems | |
| CSCI 3302 | Introduction to Robotics | |
| CSCI 3403 | Introduction to CyberSecurity for a Converged World | |
| CSCI 3434 | Theory of Computation | |
| CSCI 3656 | Numerical Computation | |
| or APPM 4600 | Numerical Methods and Scientific Computing | |
| or MATH 4650 | Intermediate Numerical Analysis 1 | |
| or MCEN 3030 | Computational Methods | |
| CSCI 3753 | Design and Analysis of Operating Systems | |
| CSCI 4022 | Advanced Data Science | |
| CSCI 4273 | Network Systems | |
| CSCI 4448 | Object-Oriented Analysis and Design | |
| **Computer Science Electives** | | **10-12** |
| Select additional approved coursework to bring total Computer Science credit hours to at least 58. [1] | | |
| **Senior Capstone** | | |
| CSCI 4308 & CSCI 4318 | Software Engineering Project 1 and Software Engineering Project 2 | 8 |
| or CSCI 4348 & CSCI 4358 | Startup Essentials: Entrepreneurial Projects in Computing and Entrepreneurial Projects II | |
| or CSCI 4950 & CSCI 3100 | Senior Thesis and Software and Society | |
| or CSCI 4368 & CSCI 4378 | Multidisciplinary Design Project 1 and Multidisciplinary Design Project 2 | |
| or CSCI 4550 & CSCI 4580 | Designing for Defense 1 and Designing for Defense 2 | |
| **Mathematics** | | |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or MATH 1300 | Calculus 1 | |
| or MATH 1310 | Calculus for Life Sciences | |

| | | |
|---|---|---|
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| or MATH 2300 | Calculus 2 | |
| CSCI 2824 | Discrete Structures | 3 |
| or ECEN 2703 | Discrete Mathematics for Computer Engineers | |
| or APPM 3170 | Discrete Applied Mathematics | |
| or MATH 2001 | Introduction to Discrete Mathematics | |
| CSCI 2820 | Linear Algebra with Computer Science Applications | 3 |
| or MATH 2130 | Introduction to Linear Algebra for Non-Mathematics Majors | |
| or MATH 2135 | Introduction to Linear Algebra for Mathematics Majors | |
| or MATH 3130 | Introduction to Linear Algebra | |
| or MATH 3135 | Honors Introduction to Linear Algebra | |
| or APPM 3310 | Matrix Methods and Applications | |
| CSCI 3022 | Introduction to Data Science with Probability and Statistics | 3 |
| or APPM 3570 | Applied Probability | |
| or CHEN 3010 | Applied Data Analysis | |
| or CVEN 3227 | Probability, Statistics and Decision | |
| or ECEN 3810 | Introduction to Probability Theory | |
| or ECON 3818 | Introduction to Statistics with Computer Applications | |
| or MATH 3510 | Introduction to Probability and Statistics | |
| or MATH 4510 | Introduction to Probability Theory | |
| or STAT 3100 | Applied Probability | |
| or STAT 4000 | Statistical Methods and Application I | |
| **Logic & Ethics** | | |
| *Logic* | | |
| PHIL 1440 | Critical Thinking | 3 |
| or PHIL 2440 | Symbolic Logic | |
| *Ethics* | | |
| PHIL 1100 | Ethics | 3 |
| or PHIL 1160 | Introduction to Medical Ethics | |
| or PHIL 1200 | Contemporary Social Problems | |
| or PHIL 2160 | Ethics and Information Technology | |
| or CSCI 2750 | Computing, Ethics and Society | |
| or INFO 4601 | Information Ethics and Policy | |
| or ENLP 2000 | Leadership, Fame and Failure | |
| or EHON 1151 | Critical Encounters | |
| or HONR 2250 | Ethics of Ambition | |
| **Humanities/Social Sciences/Writing** [2] | | **18** |
| **Physics & Natural Science with Lab** | | |
| PHYS 1110 | General Physics 1 | 4 |
| or PHYS 1115 | General Physics 1 for Majors | |
| PHYS 1120 & PHYS 1140 | General Physics 2 and Experimental Physics 1 (Natural Science with Lab) | 5 |
| or PHYS 1125 & PHYS 1140 | General Physics 2 for Majors and Experimental Physics 1 | |
| or CHEN 1201 & CHEM 1114 | General Chemistry for Engineers 1 and Laboratory in General Chemistry 1 | |
| or CHEN 1211 & CHEM 1221 | Accelerated Chemistry for Engineers and Engineering General Chemistry Lab | |
| or CHEM 1113 & CHEM 1114 | General Chemistry 1 and Laboratory in General Chemistry 1 | |
| or EBIO 1210 & EBIO 1230 | General Biology 1 and General Biology Laboratory 1 | |
| or MCDB 1150 & MCDB 1161 | Introduction to Cellular and Molecular Biology and From Dirt to DNA: Phage Genomics Laboratory I | |
| or MCDB 1150 & MCDB 1171 | Introduction to Cellular and Molecular Biology and Antibiotics Discovery Through Hands-on Screens I | |
| **Natural Science Electives** | | **8-9** |
| Additional natural science electives to reach 17 credits, number of credits needed may vary based on natural science sequence completed. See department website for list of approved courses. | | |
| **Free Electives** | | **13** |
| Additional coursework to bring cumulative total credit hours to at least 128, number of credits needed may vary based on options selected to complete other requirements. | | |
| **Total Credit Hours** | | **128-134** |

1 For list of approved courses, see department website (https://www.colorado.edu/cs/academics/undergraduate-programs/bachelor-science/bachelor-science-degree-requirements/#Electives).

2 Complete the College's Humanities, Social Sciences and Writing (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/) requirements (18 credits total) as specified.

# Recommended Four-Year Plan of Study

**First Year**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| APPM 1350 | Calculus 1 for Engineers | 4 |
| CSCI 1000 | Computer Science as a Field of Work and Study | 1 |
| CSCI 1300 | Computer Science 1: Starting Computing | 4 |
| Natural Science Elective | | 3 |
| Humanities and social sciences elective [1] | | 2 |
| COEN 1500 | CEAS First Year Seminar | 1 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| CSCI 2270 | Computer Science 2: Data Structures | 4 |
| PHYS 1110 | General Physics 1 | 4 |
| Logic | | 3 |
| | **Credit Hours** | **15** |

**Second Year**

| **Fall Semester** | | |
|---|---|---|
| CSCI 2400 | Computer Systems | 4 |
| CSCI 2824 | Discrete Structures (or other approved course) | 3 |

| | | |
|---|---|---|
| CSCI 3308 | Software Development Methods and Tools | 3 |
| Natural science elective | | 3 |
| Ethics | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| CSCI 3104 | Algorithms | 4 |
| CSCI Core course (1 of 5) | | 3 |
| CSCI 2820 | Linear Algebra with Computer Science Applications (or other approved course) | 3 |
| Natural science elective | | 3 |
| Humanities and social sciences elective [1] | | 3 |
| | **Credit Hours** | **16** |
| **Third Year** | | |
| **Fall Semester** | | |
| CSCI 3155 | Principles of Programming Languages | 4 |
| CSCI Core course (2 of 5) | | 3 |
| Computer Science Elective | | 3 |
| CSCI 3022 | Introduction to Data Science with Probability and Statistics (or other approved course) | 3 |
| College-approved writing course [2] | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| CSCI Core course (3 of 5) | | 4 |
| Computer Science Elective | | 3 |
| Natural science sequence option | | 5 |
| Humanities and social sciences elective [1] | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **18** |
| **Fourth Year** | | |
| **Fall Semester** | | |
| CSCI Senior Capstone I | | 4 |
| CSCI Core course (4 of 5) [3] | | 3 |
| Computer Science Elective | | 3 |
| Humanities and social sciences elective [1] | | 3 |
| Free elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| CSCI Senior Capstone II | | 4 |
| CSCI Core course (5 of 5) | | 3 |
| Computer Science Elective | | 3 |
| Humanities and social sciences elective [1] | | 3 |
| Free elective | | 3 |
| | **Credit Hours** | **16** |
| | **Total Credit Hours** | **128** |

1 Students may choose courses from the list of college-approved humanities and social sciences (HSS) electives (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/).

2 Students may choose a course from the list of college-approved writing courses (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/).

3 See department website (https://www.colorado.edu/cs/academics/undergraduate-programs/bachelor-science/bachelor-science-degree-requirements/#Electives) for Computer Science Electives

# Learning Outcomes

By the completion of the program, students will be able to:

- Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Design, implement and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Communicate effectively in a variety of professional contexts.
- Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- Apply computer science theory and software development fundamentals to produce computing-based solutions.

# Program Educational Objectives

Within 3–5 years after graduating with a Bachelor of Science degree in computer science, our graduates will be:

- *Broadly educated and versatile*. Able to draw upon foundational knowledge, learn, adapt and successfully bring to bear analytical and computational approaches on changing societal and technological challenges.
- *Inspiring and collaborative*. Are leaders and responsible citizens whose strengths come from an ability to draw on and contribute to diverse teams, expertise and experiences.
- *Innovative*. Drive scientific and societal advancement through technological innovation and entrepreneurship.
- *Engaged*. Are engaged with the University of Colorado, the state of Colorado and technical and scientific professional communities.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

The following BAM programs are available with the BS in computer science:

- BS and MS in Computer Science
- BS in Computer Science, MS in Computational Linguistics, Analytics, Search and Informatics
- BS in Computer Science, MS in Data Science
- BS in Computer Science, MS in Network Engineering

## Admissions Requirements

### BS and MS in Computer Science

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.50 or higher.
- Have completed all prerequisite courses with grades of B or better:

| Code | Title | Credit Hours |
|---|---|---|
| CSCI 1300 | Computer Science 1: Starting Computing | 4 |
| CSCI 2270 | Computer Science 2: Data Structures | 4 |
| CSCI 2400 | Computer Systems | 4 |
| CSCI 3104 | Algorithms | 4 |
| or CSCI 3434 | Theory of Computation | |
| CSCI 3155 | Principles of Programming Languages | 4 |
| or CSCI 3753 | Design and Analysis of Operating Systems | |

- Students who do not meet the first two criteria, must have one letter of reference from a faculty member or their undergraduate academic advisor outlining why they should be considered. The letter-writer should send their letter directly to gradadms@cs.colorado.edu.
- Have at least junior status within the bachelor's degree program.

### BS in Computer Science, MS in Computational Linguistics, Analytics, Search and Informatics

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.50 or higher.
- Have completed all prerequisites with grades of B or better:

| Code | Title | Credit Hours |
|---|---|---|
| CSCI 1300 | Computer Science 1: Starting Computing | 4 |
| CSCI 2270 | Computer Science 2: Data Structures | 4 |
| CSCI 3104 | Algorithms | 4 |
| or CSCI 3022 | Introduction to Data Science with Probability and Statistics | |
| LING 2000 | Introduction to Linguistics | 3 |
| CSCI 3832/5832 | Natural Language Processing | 3 |
| or CSCI 3202/4622 | Introduction to Artificial Intelligence | |
| One of the following during the semester the student applies: | | |
| LING 5430 | Semantics and Pragmatics | |
| LING 5420 | Morphology and Syntax | |
| LING 5030 | Linguistic Phonetics | |

- Have at least junior status within the bachelor's degree program.
- Provide two letters of reference, one from the instructor of the LING 5XXX course they are taking during the semester they apply, the other from an instructor from an upper-division course in Computer Science. Letters should be sent directly to the CLASIC Program Coordinator.

### BS in Computer Science, MS in Data Science

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.250 or higher.
- Have completed all prerequisite courses with grades of B or better:

| Code | Title | Credit Hours |
|---|---|---|
| CSCI 1300 | Computer Science 1: Starting Computing | 4 |
| CSCI 2270 | Computer Science 2: Data Structures | 4 |
| CSCI 2400 | Computer Systems | 4 |
| CSCI 3022 | Introduction to Data Science with Probability and Statistics | 3 |
| CSCI 3308 | Software Development Methods and Tools | 3 |

- Have at least junior status within the bachelor's degree program.
- Students may submit their intent to apply during the term they are completing their final class from the list of prerequisites.

### BS in Computer Science, MS in Network Engineering

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.300 or higher
- Have completed the following prerequisite courses with a B or better. (If a student has transfer credit for one of the following courses, or has taken a commonly accepted course substitution for one of the above courses, their grade in that alternate course can be used to determine their eligibility for this BAM program.)

| Code | Title | Credit Hours |
|---|---|---|
| CSCI 1300 | Computer Science 1: Starting Computing | 4 |
| CSCI 2270 | Computer Science 2: Data Structures | 4 |
| CSCI 2400 | Computer Systems | 4 |
| CSCI 3403 | Introduction to CyberSecurity for a Converged World | 4 |
| CSCI 3753 | Design and Analysis of Operating Systems | 4 |

- Have at least junior status within the bachelor's degree program.
- Students may submit their intent to apply during the term they are completing their final class from the list of prerequisites.
- If a student not have at least a 3.3 cumulative GPA or required prerequisite courses, they must have one letter of reference from a faculty member or their academic advisor outlining why they should be considered. The letter-writer should send their letter directly to nteng@colorado.edu.

## Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's

degree. However, only 6 credits may be double-counted toward the bachelor's degree and the master's degree. Students must maintain a 3.000 GPA while in the BAM program.

Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

Please see the computer science accelerated master's webpage (https://www.colorado.edu/cs/academics/undergraduate-programs/accelerated-masters-programs/computer-science-accelerated-masters/) for more information.

# Applied Computer Science - Post-Baccalaureate Bachelor of Science (BSACS)

The Applied Computer Science Program (CSPB) in the Department of Computer Science at CU Boulder is a unique academic program designed for adult students to obtain a second bachelor's degree in computer science. This post-baccalaureate program is an *online-only* degree for professionals with a prior non-computer science bachelor's degree.

Students who do not have a previous bachelor's degree from an accredited university or college should apply to one of the on-campus programs: the Computer Science - Bachelor of Arts (BA) (p. 937) or the Computer Science - Bachelor of Science (BS) (https://catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/computer-science/computer-science-bachelor-science-bs/). Only the latter degree program is accredited by the Computing Accreditation Commission of ABET (http://www.abet.org/).

The second post-baccalaureate degree in computer science consists of 45 credit hours of computer science courses. Students can start any term—spring, summer or fall—and can study from anywhere in the world with an internet connection at any time of day.

For more information, visit the department's CS Online website (https://www.colorado.edu/cs/academics/online-programs/).

**Course code for this program is CSPB**.

# Requirements

## Program Requirements

Current curricular requirements may be found on the department's Applied Computer Science BS Degree Requirements (https://www.colorado.edu/cs/cs-online/cs-online-future-students/cs-online-curriculum/) website.

Students must complete 26 credits of required computer science courses, as well as a minimum of 19 credits of elective computer science courses. Currently, the courses below are offered online, with additional courses to be added in the future.

*Note*: The course prefix used for post-baccalaureate courses is **CSPB**. However, please be aware these courses are equivalent to the corresponding **CSCI** courses.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CSPB 1300 | Computer Science 1: Starting Computing | 4 |
| CSPB 2270 | Computer Science 2: Data Structures | 4 |
| CSPB 2400 | Computer Systems | 4 |
| CSPB 2824 | Discrete Structures | 3 |
| CSPB 3104 | Algorithms | 4 |
| CSPB 3155 | Principles of Programming Languages | 4 |
| CSPB 3308 | Software Development Methods and Tools | 3 |
| **Elective Courses** | | |
| CSPB 1000 | Computer Science as a Field of Work and Study | 1 |
| CSPB 2820 | Linear Algebra with Computer Science Applications | 3 |
| CSPB 3022 | Introduction to Data Science with Probability and Statistics | 3 |
| CSPB 3112 | Professional Development in Computer Science | 1-3 |
| CSPB 3202 | Introduction to Artificial Intelligence | 3 |
| CSPB 3287 | Design and Analysis of Database Systems | 3 |
| CSPB 3302 | Introduction to Robotics | 3 |
| CSPB 3403 | Introduction to CyberSecurity for a Converged World | 4 |
| CSPB 3702 | Cognitive Science | 3 |
| CSPB 3753 | Design and Analysis of Operating Systems | 4 |
| CSPB 4122 | Information Visualization | 3 |
| CSPB 4253 | Datacenter Scale Computing - Methods, Systems and Techniques | 3 |
| CSPB 4502 | Data Mining | 3 |
| CSPB 4622 | Machine Learning | 3 |
| CSPB 4830 | Special Topics in Applied Computer Science | 1-4 |
| CSPB 4900 | Upper Division, Undergraduate Level Independent Study | 1-3 |

### Program Residency and Transfer Credits

Students are required to complete a minimum of 45 credit hours of computer science courses in order to graduate. The residency requirement for the program is that at least 30 credit hours must be taken from CU Boulder courses in the program (online courses) after the student has matriculated in the program as an Applied Computer Science student.

Students who have taken on-campus computer science courses at CU Boulder can receive credit for a maximum of 15 credit hours before matriculating into the program. Due to the degree residency requirement transfer credit cannot be accepted after a student has begun the program.

Students who have taken computer science courses from other universities can transfer a maximum of 9 credit hours to the program assuming that the courses are equivalent to the courses in the program.

Courses that have been taken over 10 years ago may not be transferred to the program. These courses are evaluated on a case by case basis.

# Plans of Study

Students may begin this program in the spring, summer or fall term and have the freedom to customize their pathway to completion.

The program recommends working students follow a 2–3 year plan. Post-baccalaureate students may petition to pursue an accelerated pathways. However, they require *significant* time commitments, and program approval. Once accepted into the program, students are encouraged to speak with their advisor to discuss options and whether an accelerated pathway is right for them.

Visit the Post-Baccalaureate website (https://www.colorado.edu/cs/cs-online/cs-online-future-students/pathways-completion/) to learn more about pathways to completion.

# Learning Outcomes

## Program Educational Objectives

The post-baccalaureate BS program aims to produce alumni that, within three to five years after graduation:

- Are prepared to be valued individual contributors in a software-oriented organization, to be programmers and designers in an entrepreneurial pursuit, to lead small projects and generally begin preparation for a management career, or to succeed in rigorous postgraduate programs.
- Are able to focus their careers on pure computer science technology or to bring computer science expertise to a companion discipline.
- Are prepared, where appropriate, to specialize in a broad spectrum of computer science sub-disciplines, ranging across formal computer science (e.g., computational science, bioinformatics and theory), cognitive science (e.g., human/machine learning, human-computer interaction, collaborative work and human language technologies) and core computing (e.g., systems, networks and software engineering).

## Student Outcomes

The post-baccalaureate BS degree program has as its primary educational outcome the production of students who have strong skills in computing and information technology that can be applied within a variety of business or research contexts, skills that allow these students to achieve rewarding careers in a variety of disciplines.

By the completion of the program, the post-baccalaureate BS degree program aims to produce students who will be able to:

- Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Design, implement and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Communicate effectively in a variety of professional contexts.
- Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- Apply computer science theory and software development fundamentals to produce computing-based solutions.

# Post-baccalaureate Accelerated Master's Degree Program(s)

The post-baccalaureate–accelerated master's (PBAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the post-bacc degree first, but begin taking graduate coursework as undergraduates (typically two to three semesters before graduation). Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. Post-bacc students should discuss the requirements of the program carefully with their advisor, as there are both financial and relocation impacts to being accepted to the PBAM program.

The following PBAM programs are available with the BS in Applied Computer Science:

- BS in Applied Computer Science, MS in Computational Linguistics, Analytics, Search and Informatics
- BS in Applied Computer Science, MS in Computer Science
- BS in Applied Computer Science, MS in Data Science
- BS in Applied Computer Science, MS in Network Engineering

## Admissions Requirements

### BS in Applied Computer Science, MS in Computational Linguistics, Analytics, Search and Informatics

- Have a cumulative GPA of 3.50 or higher.
- Have completed all prerequisite courses with grades of B or better: CSPB 1300, CSPB 2270, CSPB 3104 (or CSPB 3022), LING 2000, CSCI 3832/CSCI 5832 (or CSPB 3202 or CSCI 4622) and one of the following during the semester they apply: LING 5430, LING 5420 or LING 5030.
- Have completed at least 15 credits in CSPB courses at CU Boulder.
- Provide two letters of reference, one written by the course instructor of the LING 5XXX course they are taking during the semester they apply, the other by the instructor from an upper division course in Computer Science. Letters should be sent directly to the CLASIC Program Coordinator.

### BS in Applied Computer Science, MS in Computer Science

In order to gain admission to the PBAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.50 or higher.
- Have completed all prerequisite courses with grades of B or better: CSPB 1300, CSPB 2270, CSPB 2400, CSPB 3104 and CSPB 3155 (or CSCI 3753)
- Students who do not meet the first two criteria, must have one letter of reference from a faculty member or their undergraduate academic advisor outlining why they should be considered. The letter-writer should send their letter directly to gradadms@cs.colorado.edu (p. 16).
- Have three semesters remaining in the bachelor's degree program.
- Students who are interested in applying to the **research-based MS option**, must provide a letter of support from the faculty with whom

they wish to do their research. (Upload that letter with the department application.)
- Graduate work is expected to be completed on the Boulder campus.

### BS in Applied Computer Science, MS in Data Science

In order to gain admission to the PBAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.50 or higher.
- Have completed all prerequisite courses with grades of B or better: CSPB 1300, CSPB 2270, CSPB 2400, CSPB 3022 and CSPB 3308.
- Have at least three semesters remaining in the bachelor's degree program
- Graduate work is expected to be completed on the Boulder campus.

### BS in Applied Computer Science, MS in Network Engineering

In order to gain admission to the PBAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.300 or higher.
- Have completed the following prerequisite courses with a B or better: CSPB 1300, CSPB 2270, CSPB 2400, CSPB 3308 and CSPB 3753. (If a student has transfer credit for one of the following courses or has taken a commonly accepted course substitution for one of the above courses, their grade in that alternate course can be used to determine their eligibility for this BAM program.)
- Students who do not meet the first two criteria, must have one letter of reference from a faculty member or their undergraduate academic advisor outlining why they should be considered. The letter-writer should send their letter directly to neteng@colorado.edu.
- Have at least three semesters remaining in the bachelor's degree program.
- Graduate work is expected to be completed on the Boulder campus.

## Program Requirements

Students may take up to and including 12 hours while in the undergraduate program that can later be used toward the master's degree. However, only 6 credits may be double-counted toward the post-baccalaureate degree and the master's degree. Students must maintain a 3.000 cumulative GPA once accepted to the PBAM program. Students must apply to graduate with the post-baccalaureate degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

Please see the computer science accelerated master's (https://www.colorado.edu/cs/academics/undergraduate-programs/accelerated-masters-programs/computer-science-accelerated-masters/) webpage for more information.

# Computational Biology - Minor

Computational biology is an interdisciplinary field that develops and applies computational methods to understand biological systems and address societal challenges.

The computational biology minor is a cross-college minor that welcomes students from a diversity of majors. Students come together from disciplines in biology, math, computer science and engineering in interdisciplinary learning settings. The minor curriculum is intentionally designed to provide students overlap with their respective computational and biological expertise while challenging students to integrate core concepts and skills.

The minor teaches students to combine computational thinking and algorithms to tackle complex biological systems and topics like epidemiology, biotechnology, precision medicine & human health, genetics & genomics, environmental systems and scientific research. Students learn:

- Computational biology core concepts and experimental techniques.
- Representing and understanding biological data and patterns.
- Biologically relevant skills in applied math, data science and statistics, and computing.
- Modeling and predicting biological processes and dynamics.
- Biological phenomena under uncertainty with probabilistic and statistical analyses.

Visit the Computational Biology Minor webpage (https://www.colorado.edu/biofrontiers/cbiominor/) for the most recent information.

# Requirements

A prerequisite is Calculus I or equivalent with a C- or better such as provided by MATH 1300/MATH 1310/APPM 1345/APPM 1350. Students must have a minimum cumulative GPA of 2.500 to declare this minor. Students interested in declaring should visit the Computational Biology Minor webpage (https://www.colorado.edu/biofrontiers/cbiominor/) and submit an interest form. A cumulative GPA of 2.000 or better is required in the courses that are used to satisfy the minor. Each individual course that is used to satisfy the minor must be passed with a C- or better.

## Required Courses and Credits

The minor is divided into three course areas: Skills, BioElectives, and Data & Structure + Bioprocesses. The common pathways through the minor are: a computing or math background, which fulfills most Skills coursework, or a biology background, which fulfills BioElective coursework. Data & Structure + Bioprocesses course offerings emphasize the integration of Skills and BioElective core concepts. Completion of 8 courses from the three course areas is required for the minor; courses may not double count to satisfy multiple minor requirements. Relevant coursework can be petitioned. Course lists are maintained on the Computational Biology Minor webpage (https://www.colorado.edu/biofrontiers/cbiominor/).

| Code | Title | Credit Hours |
|---|---|---|
| **Skills** | | |
| *Mathematical Biology* | | *3-4* |
| Choose one: | | |
| CSCI 2897 | Calculating Biological Quantities | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | |
| MATH 3430 | Ordinary Differential Equations | |
| *Data Science & Statistics* | | *3-4* |
| Choose one: | | |
| MCDB 3450 | Biological Data Science (recommended) | |
| CSCI 3022 | Introduction to Data Science with Probability and Statistics (recommended) | |

| | |
|---|---|
| CHEN 3010 | Applied Data Analysis |
| EBIO 4410 | Biological Statistics |
| IPHY 3280 | Intro to Data Science and Biostatistics |
| MATH 3510 | Introduction to Probability and Statistics |
| PSYC 2111 | Psychological Science I: Statistics |
| STAT 2600 | Introduction to Data Science |
| STAT 4000 | Statistical Methods and Application I |
| *Computing* | *6-8* |
| Choose one, two-course sequence: | |
| APPM 1650 & APPM 3650 | Python for Math and Data Science Applications and Algorithms and Data Structures in Python |
| CSCI 1300 & CSCI 2270 | Computer Science 1: Starting Computing and Computer Science 2: Data Structures |
| or CSCI 2275 | Programming and Data Structures |
| CSCI 1200 & INFO 2201 | Introduction to Computational Thinking and Programming for Information Science 2 |
| INFO 1701 & INFO 2201 | Programming for Information Science 1 and Programming for Information Science 2 |
| **BioElectives** | **3-4** |
| Choose one (from any biological area): [1] | |
| *Biochemistry* | |
| BCHM 4611 | Principles of Biochemistry |
| BCHM 4720 | Metabolic Pathways and Human Disease |
| BCHM 4740 | Biochemistry of Gene Transmission, Expression and Regulation |
| *Biomedical Engineering* | |
| BMEN 4117 | Anatomy and Physiology for Biomedical Engineering |
| *Ecology & Evolutionary Biology* | |
| Petition any upper-division EBIO course focused in biological knowledge and theory, e.g.: | |
| EBIO 3040 | Conservation Biology |
| EBIO 3080 | Evolutionary Biology |
| EBIO 3400 | Microbiology |
| *Environmental Studies* | |
| ENVS 3040 | Conservation Biology |
| ENVS 4185 | Geomicrobiology |
| *Integrative Physiology* | |
| IPHY 3410 | Human Anatomy |
| IPHY 3430 | Human Physiology |
| *Molecular & Cellular Biology* | |
| MCDB 3135 | Molecular Biology |
| MCDB 3145 | Cell Biology |
| MCDB 3150 | Biology of the Cancer Cell |
| MCDB 3160 | Infectious Disease |
| MCDB 3501 | Structural Methods for Biological Macromolecules |
| MCDB 3650 | The Brain - From Molecules to Behavior |
| **Data & Structure + Bioprocesses** | **9-10** |
| Choose three (with at least one course from each list below) to explore biological data and modeling: | |
| *Data & Structure* | |
| CSCI 3352 | Biological Networks |
| CSCI 4444 | Algorithms and Data Structures for Analyzing DNA |
| MCDB 4520 | Bioinformatics and Genomics |
| *Bioprocesses* | |
| CSCI 4118 | Software Engineering for Scientists |
| CSCI 4314 | Dynamic Models in Biology |
| CSCI 4897 | Computational and Mathematical Modeling of Infectious Diseases |
| APPM 4370 | Computational Neuroscience |
| APPM 4390 | Modeling in Mathematical Biology |
| BCHM 4631 | Computational Genomics Lab |
| EBIO 4290 | Phylogenetics and Comparative Biology |
| EBIO 4420 | Computational Biology |
| EBIO 4700 | Quantitative Genetics |
| MCDB 4312 | Quantitative Optical Imaging |
| PHYS 4560 | Introduction to Biophysics |
| **Total Credit Hours** | **24-30** |

[1] BioElectives have prerequisite lectures or labs prior to enrollment, and we list the approximate number of them for students on the Computational Biology Minor webpage (https://www.colorado.edu/biofrontiers/cbiominor/). If a biological area of interest is not (fully) represented above, please contact CBIOminor@colorado.edu to petition BioElectives.

# Learning Outcomes

By the completion of the program, students will be able to:

- Effectively identify and communicate Computational Biology topics and applications to specialists and non-specialists.
- Reframe and evaluate biological research questions in the context of computational theory and techniques.
- Contextualize data and modeling problems based on biological principles and the scientific discovery process.
- Collect and access biological data sources to study Computational Biology challenges.
- Evaluate methods of biological data collection, validation, extension, and reproducibility.
- Use and/or build computer-based systems, programs, and algorithms based in software design principles.
- Model structured biological data and systems using computational techniques.
- Predict and interpret biological phenomena under uncertainty with probabilistic and statistical analyses.

# Computer Science - Minor

The department offers a minor in computer science that is available to CU Boulder undergraduates. The minor offers a basic introduction to the field of computer science.

A student may not earn both a bachelor's degree in computer science (or applied computer science) and the minor in computer science from CU Boulder.

For more information, visit the department's Minor in Computer Science (http://www.colorado.edu/cs/current-students/undergraduate-students/minor/) webpage.

# Requirements

A minimum of 18 credit hours of computer science coursework is required for the minor. A minor in computer science can be earned in conjunction with any CU Boulder major degree, except for the BA and BS in computer science and applied computer science majors. For more information, visit the department's Minor in Computer Science (http://www.colorado.edu/cs/current-students/undergraduate-students/minor/) webpage.

## Prerequisites/Corequisites

Calculus and Starting Computing courses do not count toward the 18 credit hours required for the computer science minor. Certain computer science courses may have additional prerequisites that are not otherwise required for or counted toward the minor.

Students should complete the following before declaring the minor:

- Calculus 1 (MATH 1300, MATH 1310, APPM 1350 or APPM 1345)
- Calculus 2 (MATH 2300 or APPM 1360)
- CSCI 1300 Computer Science 1: Starting Computing

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CSCI 2270 | Computer Science 2: Data Structures [1] | 4 |
| or CSCI 2275 | Programming and Data Structures | |
| CSCI 2824 | Discrete Structures | 3 |
| or APPM 3170 | Discrete Applied Mathematics | |
| or ECEN 2703 | Discrete Mathematics for Computer Engineers | |
| or MATH 2001 | Introduction to Discrete Mathematics | |
| CSCI 2400 | Computer Systems | 4 |
| At least one of the following is required. | | 4 |
| CSCI 3104 | Algorithms | |
| CSCI 3155 | Principles of Programming Languages | |
| CSCI 3753 | Design and Analysis of Operating Systems | |
| Additional approved upper-division Computer Science elective to reach minimum 18 credit hours, see CS Minor website for list of approved classes. A minimum of 4 out of 5 classes for the minor must be from CSCI. | | 3 |
| **Total Credit Hours** | | **18** |

[1] CSCI 1300 must be completed before declaring the minor.

## Time to Complete

Students should allow at least six semesters to complete the computer science minor and are advised to start the minor no later than the first semester of their sophomore year. Otherwise, students should plan to complete summer courses or delay graduation.

## Residency Requirements

At least three computer science classes must be taken on the CU Boulder campus. At least two of these three must be upper-division courses (3000-level or higher).

## Grade Requirements

A GPA of 2.000 or better is required in the courses used to complete this minor.

A grade of C- or better is required for all prerequisites and required core courses for the minor. A grade of D- or better is acceptable for computer science elective.

# Creative Technology and Design

Degrees in creative technology and design are conferred by the College of Engineering and Applied Science and administered by the ATLAS Institute (https://www.colorado.edu/atlas/), a center for radical creativity and invention fostering interdisciplinary research, learning and innovation. With strong ties to the technology sector in Colorado and beyond, ATLAS is a vibrant and growing community of researchers, instructors and students interested in the creative application of diverse technologies.

Created to equip students with new and adaptable skill sets for the expanding digital landscape, the undergraduate program offers a bachelor of science, as well as a minor. Through its core curriculum and electives, students choose from a wide range of learning opportunities in subjects such as programming, physical computing, virtual reality, mobile application design/development, web design/development, user-interface/user-experience, history of technology, big data, robotics, wearable technology and game design/development.

**Course code for this program is ATLS.**

# Centers and Labs

ATLAS Institute degrees are offered through the College of Engineering and Applied Science. With a strong emphasis on design, research, project-based learning and creative production, the institute includes a range of research labs, creative studios and learning facilities:

## Brain Music Lab (https://www.colorado.edu/atlas/brain-music-lab/)

The Brain Music Lab pursues research and develops creative practices to promote health and wellbeing by combining new music technologies with EEG (brainwave data) and other physiological measurement techniques.

## Unstable Design Lab (https://www.colorado.edu/atlas/unstable-design-lab/)

A research lab that studies technology and culture through the design and development of technologies that embrace chance and uncertainty.

## Laboratory for Emergent Nanomaterials (https://www.colorado.edu/atlas/laboratory-emergent-nanomaterials/)

A research lab that manipulates matter on the smallest of scales to create materials with emergent properties, characterized by novel and sometimes surprising features arising from the interactions of multiple bodies.

### ACME Lab (https://www.colorado.edu/atlas/acme-lab/)

The ACME Creativity Machine Environment (ACME) research lab explores computational tools for design, creativity, cognition, tangible and embedded interaction, and computing for health and wellness.

### Programmable Reality Lab (https://www.colorado.edu/atlas/programmable-reality-lab/)

The Programmable Reality Lab is a research lab dedicated to make our whole living environment dynamic, interactive and programmable to transform our living space into a dynamic medium.

### Living Matter Lab (https://www.colorado.edu/atlas/living-matter-lab/)

The Living Matter Lab is a research lab that pioneers new technologies empowering individuals by making information about their own biology and biome more accessible.

### Utility Research Lab (https://www.colorado.edu/atlas/utility-research-lab/)

The Utility Research Lab invents and investigates digital fabrication technology, tools and techniques that empower us to create things that positively impact people, society and the environment.

### TYPO Lab (https://www.colorado.edu/atlas/typo-lab/)

TYPO Lab is an experimental studio for creative work and research related to the technologies of language. It empowers faculty and students to explore and appreciate the media and methods of words.

### BTU Lab (https://www.colorado.edu/atlas/blow-things-btu-lab-0/)

A dynamic teaching facility, creative studio and hackerspace that provides a range of physical computing, electronics and fabrication technologies, including a laser cutter, 3D printers and computers.

### Whaaat!? Lab (https://www.colorado.edu/atlas/whaaat-lab/)

A game-focused learning lab that provides a range of emerging technologies for the exploration, project development and creative application of games and experimental interactions.

### Helio Lab (https://www.colorado.edu/atlas/helio-lab/)

The Helio Lab is a learning lab that supports students' exploration of technologies that capture, edit and display imagery and light-based media which emphasizes storytelling through photography, animation, video, projection, AR/VR, 3D and 360 experiences and more.

### B2 Center for Media, Arts and Performance (https://www.colorado.edu/atlas/labscenters/center-media-arts-and-performance-cmap/center-media-arts-and-performance-cmap/)

Centered around the ATLAS Black Box Experimental Studio, where creativity and engineering blend with the performing arts, B2 is an incubator for the novel and experimental use of technology in music, dance, visual art, theater, film and new media.

## Bachelor's Degree

- Creative Technology and Design - Bachelor of Science (BSTM) (p. 956)

## Minor

- Creative Technology and Design - Minor (p. 958)

## Certificates

- Design Technologies - Certificate (p. 959)
- User Experience - Certificate (p. 959)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Alistar, Mirela (https://experts.colorado.edu/display/fisid_164177/)
Assistant Professor; PhD, Technical University of Denmark

Bruns, Carson J. (https://experts.colorado.edu/display/fisid_159851/)
Assistant Professor; PhD, Northwestern University

Chopra, Aidan
Lecturer; MArch, Rice University

Cohen, Ruscha (https://experts.colorado.edu/display/fisid_149781/)
Scholar in Residence, Director; MS, University of Colorado Denver

Devendorf, Laura (https://experts.colorado.edu/display/fisid_158564/)
Assistant Professor; PhD, University of California, Berkeley

Do, Ellen Yi-Luen (https://experts.colorado.edu/display/fisid_159925/)
Professor; PhD, Georgia Institute of Technology

Gross, Mark D. (https://experts.colorado.edu/display/fisid_100095/)
Professor, Institute Director; PhD, Massachusetts Institute of Technology

Johnson, Gabriel
Lecturer; PhD, Carnegie Mellon University

Leslie, Grace (https://experts.colorado.edu/display/fisid_172297/)
Assistant Professor; PhD, University of California San Diego

Margaret, Annie (https://experts.colorado.edu/display/fisid_159961/)
Associate Teaching Professor; PhD, Northwestern University

Pinter, Anthony (https://experts.colorado.edu/display/fisid_171867/)
Assistant Teaching Professor; Ph.D., University of Colorado Boulder

Rankin, Daniel (https://experts.colorado.edu/display/fisid_156453/)
Associate Teaching Professor, Associate Director; MS, University of Colorado Boulder

Rezvani, Sheiva
Associate Teaching Professor, Faculty Director; MA, New York University

Rivera, Michael (https://experts.colorado.edu/display/fisid_169859/)
Assistant Professor; PhD, Carnegie Mellon University

Schaal, David A. (https://experts.colorado.edu/display/fisid_114824/)
Associate Teaching Professor; MFA, University of Colorado Boulder

Suzuki, Ryo (https://experts.colorado.edu/display/fisid_167629/)
Assistant Professor; PhD, University of Colorado Boulder

Swanson, Joel E. (https://experts.colorado.edu/display/fisid_134311/)
Associate Professor; MFA, University of California, San Diego

Weaver, Zachary (https://experts.colorado.edu/display/fisid_166757/)
Assistant Teaching Professor; MArch, Carnegie Mellon University

Zamore, Shaz (https://experts.colorado.edu/display/fisid_166083/)
Assistant Teaching Professor; PhD, University of Washington

# Courses

**ATLS 1100 (3) Design Foundations**
Introduces foundational principles, practices and methods of design. Emphasizes design as an expressive and creative problem solving tool. This course engages with design from a broad perspective including visual, computational, physical and auditory design practices. Through lectures, discussions and creative projects, students will gain a familiarity with the diverse applications of creative technology through design.

**ATLS 1300 (4) Computational Foundations 1**
Explores computation as a powerful tool for creative design and expression in a project-based studio environment. Students learn the fundamentals of creative coding, computational thinking, and object-oriented programming. Hands-on topics include generative art and design, interactivity, animation, and visualization.
**Requisites:** Restricted to Creative Technology and Design majors (TMEN) and (MTAM) minors and IUT On Track applicants.

**ATLS 1350 (3) Computational Foundations for Non-Majors**
Explores computation as a powerful tool for creative design and expression in a project-based studio environment. Students learn the fundamentals of creative coding, computational thinking, and object-oriented programming. Hands-on topics include generative art and design, interactivity, animation, and visualization.

**ATLS 2000 (3) The Meaning of Information Technology**
A survey of the mutual influence of technology, media, and society. Equips students with an understanding of technological transformations in interpersonal, organizational, and mass communication. Emphasis is on the technological, social and political changes that underlie the movement toward a digital society. As such, the class acts as a survey of various technologies and their relationship to socio-political issues. We not only address ¿how does it work¿ and ¿where does this come from¿ but ¿why is it here¿ and ¿how does it impact us as individuals and as a society¿.

**ATLS 2001 (3) Design Technologies: Toolkit**
Introduces students to the fundamentals of creative design through digital media production. Throughout the semester, students explore a number of disciplines related to digital media including imaging, web development, animation, video production, and more. Class sessions are in lecture format and are aimed at helping students attain a strong conceptual and technical understanding of creative design.
**Requisites:** Requires prerequisite or corequisite course of ATLS 2000 (minimum grade C-). Restricted to PATL students.
**Grading Basis:** Letter Grade

**ATLS 2002 (3) Design Technologies: Process**
Introduces foundational principles, practices and methods relating to the process of creative design. Emphasis on the pre-production process as a creative problem-solving tool in order to produce innovative and interesting creative work. Through lectures, discussion and creative projects, students will gain a familiarity with diverse applications and practices related to creative technology and design
**Requisites:** Requires prerequisite or corequisite courses of ATLS 2000. Restricted to PATL students.

**ATLS 2036 (3) Introduction to Media Studies in the Humanities**
Serves as an introduction to media studies specifically from a humanities perspective. Studies both histories and theories of media from the 20th and 21st centuries. Touches on methodologies for undertaking media studies (including distant ready and media archaeology). Objects of study may include such topics as film, radio, social media platforms and games, as well as digital art and literature.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 2036 and AHUM 2036
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Creative Technology Design (TMEN) majors and (MTAM) minors, or the ATLAS (PATL) student group only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ATLS 2100 (3) Image**
Introduces techniques, technologies and concepts of digital image making and manipulation through lectures, projects and critiques. Focuses on digital photography, digital animation and digital video as a means to formal and expressive ends. This course also contextualizes practices and methodologies of digital imaging with historical and critical perspectives.
**Requisites:** Requires prereq courses of ATLS 1100. Requires prereq or coreq of ATLS 1300 or ATLS 1350 or INFO 1701 or CSCI 1300, and ATLS 2000 or ENES 2020 (all min grade C-).
**Grading Basis:** Letter Grade

**ATLS 2200 (3) Web**
Introduces techniques, technologies and concepts of web design and development through lectures, projects and critiques. Focuses technically on HTML, CSS and JavaScript as the primary web technologies. Contextualizes the technical and societal implications of the Internet through historical and critical perspectives.
**Requisites:** Requires prereq courses ATLS 1100 ATLS 1300 or ATLS 1350 or INFO 1701 or CSCI 1300 (all min grade C-). Requires prereq or coreq course ATLS 2000 or ENES 2020.

**ATLS 2270 (4) Computational Foundations 2**
Builds on the fundamental programming concepts introduced in ATLS 1300. Students will learn to write sophisticated programs that employ efficient means of representing and manipulating information. They will learn to analyze algorithms in terms of complexity, gain an understanding of fundamental data structures (lists, stacks, queues, trees), and acquire practical experience implementing algorithms to solve common problems (sorting, graph traversal).
**Requisites:** Requires prerequisite courses of ATLS 1300 or CSCI 1300 or INFO 1701 or ASEN 1320 (all minimum grade C-). Requires prerequisite or corequisite course ATLS 2000 or ENES 2020.

**ATLS 2300 (3) Text**
Introduces technologies, terminology and histories related to the design of text within digital and analogue media. Students will learn the fundamentals of design, typography and layout through lectures, projects and critiques. The curriculum surveys significant theoretical perspectives, historical periods and significant practitioners that influence the practice of typographic design.
**Requisites:** Requires prereq of ATLS 1100. Requires prereq or coreq ATLS 1300, ATLS 1350, INFO 1701 or CSCI 1300. Requires prereq or coreq ATLS 2000 or ENES 2020 (all min grade C-).

**ATLS 2519 (1-4) Special Topics in Creative Technology and Design**
Analyzes special interest areas of creative technology and design research and practice.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Creative Technology Design (TMEN) majors and (MTAM) minors, or the ATLAS (PATL) student group only.
**Grading Basis:** Letter Grade

**ATLS 3040 (3) Introduction to Games and Play**
Introduces students to foundational concepts, culture, history, and creation of games and playful experiences. Through readings, playing games, and completing design exercises, students will learn to analyze how various formal elements of play function to make successful games.
**Requisites:** Requires prerequisite or corequisite course of ATLS 1100 (minimum grade C-).

**ATLS 3100 (3) Form**
Teaches the fundamentals of 3D modeling, 3D animation and 3D printing / rapid prototyping from a conceptual and sculptural perspective. Through topical lectures, technical demonstrations and creative projects the course will introduce students to the potentials of thinking and working within 3-dimensional spaces.
**Requisites:** Requires prereq course of ATLS 1100. Requires prereq or coreq of courses ATLS 1300 or ATLS 1350 or INFO 1701 or CSCI 1200 or CSCI 1300 or CSCI 1320, and ATLS 2000 or ENES 2020 (all min grade C-).

**ATLS 3110 (3) Motion Design**
An animation-based projects course that advances student understanding of motion design in today's culture. Through active production and critical analysis, students will create new media projects and critically examine the history, social implications, and impacts of these forms of mass media.
**Requisites:** Requires prerequisite course of ATLS 2100 (minimum grade C-).

**ATLS 3120 (3) Creative Web Development**
An Internet-based projects course that advances student understanding of Internet culture. Through active production and critical analysis, students will explore their individual roles in the digital landscape and critically examine the social implications and impacts of digital communities.
**Requisites:** Requires prerequisite courses of ATLS 2000 and ATLS 2200 (all minimum grade C-). Restricted to Creative Technology and Design (TMEN) majors and (MTAM) minors.

**ATLS 3150 (3) Universal Design for Digital Media**
Focusing on the concepts of universal design and Web Standards, this course will address issues that occur at the nexus of web standards, Universal Design and the needs of persons with disabilities. Students will gain the expertise and skills to create media and web sites which are accessible, usable and effective for all users and device platforms.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3150
**Requisites:** Requires prerequisite course of ATLS 1300 or CSCI 1300 (minimum grade C-).
**Recommended:** Prerequisite some knowledge of creating web pages with either direct HTML coding or with web design software.

**ATLS 3173 (3) Creative Climate Communication**
We generate multimodal compositions on the subject of climate change and engage with various dimensions of issues associated with sustainability. We work to deepen our understanding of how issues associated with climate change are or can be communicated, by analyzing previously created expressions from a variety of media (interactive theatre, film, fine art, television programming, blogs, performance art, for example) and then be creating our own work.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3173 and THTR 4173
**Recommended:** Prerequisite ENVS 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Distribution-Social Sciences

**ATLS 3200 (3) Sound**
Introduces techniques, technologies and concepts of digital sound through lectures, projects and critiques. Focuses technically on digital sound creation, production, synthesis and interactivity. Explores various approaches to digital sound production through historical and conceptual perspectives.
**Requisites:** Requires prereq course of ATLS 1100. Requires prereq or coreq course of (ATLS 2000 or ENES 2020) and (ATLS 1300 or ATLS 1350 or INFO 1701 or CSCI 1200 or CSCI 1300 or CSCI 1320) (all min grade C-).

**ATLS 3300 (3) Object**
Introduces the fundamentals of physical computing. This class is an exploration of computing that starts from the perspective that humans are fundamentally physical beings. Students will design projects that interact with humans and the physical world and will learn to integrate sensors, motors, and simple electronics into creative projects. Projects will include interactive installations, art projects, games, and audio controllers.
**Requisites:** Requires prereq courses of ATLS 1100 ATLS 1300 or (ATLS 1350 or INFO 1701 or CSCI 1200 or CSCI 1300 or CSCI 1320 or ASEN 1320) (all min grade C-). Requires prereq or coreq course of ATLS 2000 or ENES 2020 (all min grade C-).
**Grading Basis:** Letter Grade

**ATLS 3500 (1-3) Client Projects in Creative Technology and Design**
Allows undergraduate students to work on collaborative projects with faculty and with external organizations under faculty supervision. Focuses on teamwork, conceptual planning, technical design and development and working within real-world client environments. Critical skills include project research, planning, design, development, trouble-shooting and presentation.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ATLS 2000 or HUEN 2020 or ENES 2020 (all min grade C-).

**ATLS 3519 (1-3) Special Topics**
Analyzes special interest areas of multidisciplinary creative technology and design research and practice.
**Repeatable:** Repeatable for up to 21.00 total credit hours. Allows multiple enrollment in term.

**ATLS 3523 (3) The Art and Strategy of Science Communication: Branding Climate Change**
Integrating the science of climate change and science communication with the research, strategy and execution practices of strategic communication (e.g., advertising and public relations).
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 3523
**Grading Basis:** Letter Grade

**ATLS 3529 (1-3) Critical Topics**
Analyzes critical perspectives in creative technology and design. Within these courses, students will develop vocabularies, theoretical perspectives and critical approaches relevant to technology and its effects on culture and society.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**ATLS 3539 (1-3) Topics: How-to**
Analyzes special interest areas of multidisciplinary creative technology and design research and practice.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**ATLS 3710 (3) Material Studies and Practice**
Surveys the broad array of physical materials used in design and practically applies this knowledge via hands-on projects that introduce basic tools and techniques for fabrication in the domains of woods, plastics, ceramics, concrete, fibers and metals. Practical work is complemented with inquiry into the social, aesthetic, and ecological significance of materials used in design.
**Requisites:** Requires prerequisite course of ATLS 1100 (minimum grade C-).

**ATLS 4000 (3) Research Methods and Professional Practice**
Research Methods and Professional Practice lays the foundation for students to produce culminating work in their major. In this course, students will engage in domain exploration, learn to define a research problem, utilize tools and methods for professional design research, refine presentation skills, and engage in iterative and collaborative work. This course is focused on domain research, idea validation, and prototyping in order to prepare students for a culminating semester-long Capstone project based on this research. Formerly offered as a special topics course.
**Requisites:** Requires prerequisite courses of ATLS 3100 and ATLS 3300 (all min grade C-). Restricted to Creative Technology and Design (TMEN) majors.

**ATLS 4010 (4) Capstone Projects**
Focuses on the development of an individual thesis project. Specific class sessions will feature a combination of lectures, demonstrations, guest speakers, lab sessions, and critiques. This course also entails group work, portfolio development, critical theoretical readings, and a significant written component.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Requires prerequisite course of ATLS 4000 (minimum grade C-). Restricted to Creative Technology and Design (TMEN) majors only.

**ATLS 4040 (3) Game Design**
Introduces students to game design, development, history, theory and culture through readings, discussion, game analysis and the iterative design process of non-digital games.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5040
**Requisites:** Requires prerequisite course of ATLS 1100 (minimum grade C-).

**ATLS 4050 (3) Alt Arcade Interfaces**
In this project-based studio course, students will move beyond conventional button and joystick interfaces into the design of bespoke interfaces for game control, with an emphasis on games designed for public exhibition. Students will, both individually and in groups, design and develop multiple games, and build custom control interfaces for them.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5050
**Requisites:** Requires prerequisite ATLS 1300 or ATLS 1350 or CSCI 1300 (all minimum grade C-).
**Recommended:** Prerequisite ATLS 3300 (Object), and ATLS 4050 (Game Development).

**ATLS 4060 (3) Tiny Games**
Guides students into fluency across a suite of technical tools (Bitsy, PuzzleScript, Pico-8, and others) to construct tiny games: short games with tight technical constraints, created in relatively brief amounts of time, and built around singular ideas.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5060
**Recommended:** Prerequisite ATLS 1100 (Design Foundations) and ATLS 1300 (Computational Foundations), or ATLS 1350, or CSCI 1300.

**ATLS 4112 (3) Neurohacking**
Explores psychotechnologies for developing high level metacognition and individual sovereignty. We investigate the optimization of conscious human experience, mindfulness, and creativity through the lenses of neuroscience, cognitive science, evolutionary psychology, and philosophy. Students will learn to critique primary literature, experimental design, and be guided in developing a set of practices to enhance cognition and achieve various desired mental states.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5112
**Requisites:** Requires prereq or coreq course of ATLS 2000 or HUEN 2020 or ENES 2020 (minimum grade C-).

**ATLS 4120 (3) Mobile Application Development**
Provides a comprehensive overview of developing mobile applications using a range of technologies including software developers' kits, object-oriented programming and human interface design principles. Students incorporate leading edge technologies with their own academic pursuits and personal interests to develop mobile applications. Explores the social and cultural effects of app and mobile-based computing.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5120
**Requisites:** Requires prerequisite course of ATLS 1300 or CSCI 1300 or CSCI 1320 (minimum grade C-).

**ATLS 4130 (3) Experimental Typography**
This course is an advanced investigation of typography for visual communication and expression. Emphasis is placed on the analysis of meaning as conveyed through materials, technology, and design. Projects are experimental and are designed to challenge you to expand your understanding of the function of typography in communication, design, art, and culture.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5130
**Requisites:** Requires prerequisites ATLS 2200 and ATLS 2300 (all minimum grade C-). Restricted to Creative Technology and Design (TMEN) majors and (MTAM) students.

**ATLS 4140 (3) Game Development**
Builds on concepts and processes learned in ATLS 4040/5040. Reinforces game design principles through analysis and discussion of digital games, and introduces students to key practices in the development of digital game experiences, including game flow, mechanics, 2D and 3D graphics, and artificial intelligence.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5140
**Requisites:** Requires prerequisite ATLS 4040 (minimum grade C-).

**ATLS 4141 (3) Color**
Examines the generation and perception of colors in the context of physics, chemistry, biology, and psychology as a foundation for making. Explores the synthesis and applications of color dyes and pigments in art and design through lectures, readings, experiments, and projects.
**Requisites:** Requires prerequisite course of ATLS 2000 or HUEN 2020 or ENES 2020 (all min grade C-).

**ATLS 4151 (3) Flow Visualization**
Explores techniques for the visualization of the physics of fluid flows including seeding with dyes, particles and bubbles, and shadowgraphy and schlieren. Reviews optics and fluid physics, especially atmospheric clouds. Assignments are student-driven, to individuals and mixed teams of graduates, undergraduates, engineering majors and photography/video majors.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5200, MCEN 5151, MCEN 4151 and ATLS 5151
**Requisites:** Restricted to students with 57+ credits (juniors and above) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ATLS 4201 (3) Biodesign**
This class covers basic design techniques, together with essential wetlab skills. Students will learn how to culture and work with various types of organisms, such as bacteria, algae (dynoflagellates, cyanobacteria) and fungus. These organisms will become the living media or processed biomaterials that the students will design with. This is a lab-based class.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5201

**ATLS 4202 (3) Computational Fabrication**
This course will explore techniques, representations, and workflows for computational fabrication. Digital fabrication machines like 3D printers and laser-cutters bring complicated designs into physical form, and computer programming helps overcome design challenges that are difficult or nearly impossible. Blending these two tools, students will use computational fabrication techniques to design and build functional, creative objects leveraging existing computer-aided design (CAD) tools, programming languages and digital fabrication machinery.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5202
**Requisites:** Required prerequisites: ATLS 1300 or CSCI 1300.
**Recommended:** Prerequisites Prior programming experience in Python/C ++ and ATLS 1300 (Form) or prior CAD/3D Modeling experience.

**ATLS 4203 (3) Light and Perception**
Traces human and camera vision in close detail. Students explore visual perception between two and three dimensions by exploring advanced experiments in designing light. Starting with different analog illustration exercises, students explore how light informs the perception of three dimensional space and objects. Students then explore techniques to play with visual perception, using advanced technologies like Augmented and Virtual Reality, Interactive Sculpture, Digital Games, and Immersive Media.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5203
**Recommended:** Prerequisite ATLS 2100.

**ATLS 4214 (3) Big Data Architecture**
Provides students with a comprehensive survey of technologies used today in the collection, storage, processing, analytics and display of big data. Focuses on cultivating real world skills with students working on semester long projects to execute on a group project.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5214, CSCI 5214, and CSCI 4214
**Requisites:** Requires prerequisite course of ATLS 2270 or CSCI 2270 or CSCI 2275 (all minimum grade C-). Restricted to Creative Technology and Design (TMEN) majors or (MTAM) minors and CSEN majors and CSCI majors.

**ATLS 4221 (3) Interactive Sound**
Interactive Sound explores generative coding to produce unique audio design systems that can be employed in a wide array of interactive projects. Students will learn to use Max (a visual programing tool) to combine and control sound, video, OpenGL 3D objects, and microcontrollers. Example inputs: real time video, data scraping for the sonification of natural phenomena, or environmental sensor data collected via Arduino. Example outputs: reactive audio-visual installations, immersive projection, or multichannel spatial sound systems.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5221
**Recommended:** Prerequisite ATLAS 3200 Sound, or have equivalent music technology experience.

**ATLS 4230 (3) Case Studies in Social Impact**
Students will evaluate case studies across a range of technologies and applications. Students will learn how to match available technologies to human and environmental needs and resources, be introduced to the seminal work and leaders in the field, and discuss the future of Creative Technology Design as an emerging area of academic focus.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5230
**Requisites:** Restricted to Creative Technology and Design (TMEN) majors and (MTAM) minors.

**ATLS 4244 (3) Empathy and Technology**
Explores how the creative integration of empathy and compassion with design and technology can benefit society. Reviews foundational neuroscience and evolution of empathy. Through readings, discussion, and reflection students will develop personal practices for fostering empathy and critically investigate: empathy as a finite resource, tribalism/polarization, the weaponization of empathy, and principles for designing social systems that promote well-being. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5244
**Requisites:** Requires prerequisite course of ATLS 2000 or HUEN 2020 or ENES 2020 (all min grade C-).
**Grading Basis:** Letter Grade

**ATLS 4279 (3) Aesthetics in Design**
Focuses on aesthetic aspects of design via hands-on design-build experiences. Students individually create dynamic artifacts of their own choice with the assistance of teammates. Content includes major design movements since 1900, constructive critique practice, hand sketching techniques and other selected industrial design topics. Students publish their design work on an archival public blog which provides a professional portfolio element.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4279 and MCEN 5279 and ATLS 5279

**ATLS 4320 (3) Mobile Application Development: Advanced Topics**
Explores advanced topics in mobile application design and development, including examining different approaches to information design and the various user interaction models associated with them. Understanding how data is structured, accessed, stored and flows through apps is a core theme of the course. Explores the interaction with external data sources and storage models.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5320
**Requisites:** Requires a prerequisite course of ATLS 4120 (minimum grade C-). Restricted to College of Engineering (ENGRU) undergraduates only.

**ATLS 4330 (3) Wearable Technologies**
Introduces elements of embedding electronic and computational behaviors into clothing and accoutrements such as watches, handbags, and other wearable accessories. In weekly exercises students build, test, and demonstrate canonical wearable projects. Readings and video viewings survey past and current trends in wearable technologies, including materials, components, fashion and social acceptability. Participants design, develop, debug and document a wearable technology term project.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5330
**Requisites:** Requires prerequisite course of ATLS 3300 (minimum grade C-).

**ATLS 4340 (3) Experimental Textiles**
Introduces students to the design and creation of soft interactive objects using textile techniques with a focus on weaving. Specifically, students are guided through exercises intended to cultivate and embodied a sense of textile structures and the mechanical and aesthetic effects they afford. Then, students learn the state of the art of integrating electronics into these soft/deformable textiles structures. With applications from sports, medicine, fashion, architecture, and soft robotics, smart/interactive textiles require a unique set of understandings and design considerations. Students learn about textile structure development, surface design, material sourcing, and electronics integration through project-based assignments.

**ATLS 4519 (1-4) Advanced Special Topics**
Analyzes special interest areas of multidisciplinary creative technology and design research and practice.
**Repeatable:** Repeatable for up to 32.00 total credit hours. Allows multiple enrollment in term.

**ATLS 4529 (1-3) Adv Critical Topics**
Analyzes critical perspectives in technology, art and media. Within these courses, students will develop vocabularies, theoretical perspectives and critical approaches relevant to technology and its effects on culture and society.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5529
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**ATLS 4539 (1-4) AdvTopics: How-to**
Analyzes special interest areas of multidisciplinary creative technology and design research and practice.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**ATLS 4606 (3) Critical Technical Practice**
Surveys design theory and methods that can be used to question relationships between technology, culture, and the environment. Students will discuss readings and synthesize those readings through design exercises. The course will equip students with resources for thinking more critically and creatively about design and possible future human-technology relationships.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5606, INFO 4606, and ATLS 5606
**Grading Basis:** Letter Grade

**ATLS 4616 (3) Introduction to Virtual Reality**
Introduces students to the field of virtual reality (VR). Covers the historical development of virtual reality technologies and virtual reality as a research field, the mathematics of 3D coordinate systems, fundamental principles, algorithms, and design patterns in developing interactive virtual environments, the perceptual science behind mixed reality technologies, and libraries and tools for creating VR experiences.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4616
**Requisites:** Requires prerequisite course of ATLS 2270 or CSCI 2270 (minimum grade C-). Restricted to Creative Technology and Design (TMEN) majors and (MTAM) minors.

**ATLS 4620 (3) User-Experience Design 1**
Teaches the end-to-end UX Design process. Through lectures, industry illustrations and hands-on projects students will develop a professional design portfolio piece, understand contemporary UX design methodologies, and learn how to innovate when designing at scale.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5620
**Requisites:** Restricted to Creative Technology and Design (TMEN) majors and (MTAM) minors.

**ATLS 4630 (3) Web Front-End Development**
Explores interactivity on the web using front-end web development concepts and technologies. Students will work with a range of technologies including JavaScript, jQuery, HTML5, APIs and user interface design methods to create interactive web applications. Individual and group projects will include animations, games, interactive narratives and web applications.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5630
**Requisites:** Requires prerequisite courses of ATLS 2200 and ATLS 1300 or ATLS 3000 or CSCI 1300 or CSCI 1320 (all minimum grade C-).

**ATLS 4720 (3) User-Experience Design 2**
Expands on techniques and opportunities presented in User-Experience Design 1 with a deeper dive into research and prototyping practices as means to insight into user desires and preference, adoption, and execution of product and branded experiences in a variety of contexts and locations within the global experience economy.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5720
**Requisites:** Requires prerequisite course of ATLS 4620 (minimum grade C).

**ATLS 4809 (3) Computer Animation**
Develops a firm understanding of the general principles of computer animation. Lectures cover the creation of models, materials, textures, surfaces, and lighting. Path and key frame animation, particle dynamics, and rendering are introduced. Students are assigned a number of animation tutorials to carry out.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5809 and CSCI 4809 and CSCI 5809

**ATLS 4900 (1-3) Undergraduate Independent Study**
Provides opportunities for independent study at the upper-division undergraduate level. Students work on research or a creative project guided by faculty. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of ATLS 1100 and ATLS 1300 (minimum grade C-).

# Creative Technology and Design - Bachelor of Science (BSCTD)

The Bachelor of Science in Creative Technology and Design (https://www.colorado.edu/atlas/academics/undergraduate/) is an engineering degree like no other. Encompassing a broad, transdisciplinary course of study, the degree blends creativity and design with a rigorous engineering curriculum that emphasizes critical thinking, problem-solving and creative production. Attracting designers, technologists, makers and inventors who seek diverse and adaptable skills, the degree opens doors to a wide range of 21st-century challenges and opportunities.

# Industry and Career Paths

Students graduating with a major in Creative Technology and Design and prepared to enter professional positions in the following disciplines:

- Human-computer interaction.
- Information design and data visualization.
- Web design and development.
- Video and narrative media.
- Robotics and physical computing.
- Internet of Things design.
- Graphic design and visual communication.
- Game design and development.
- User-interface and user-experience design (UI/UX)
- Experience design.
- Digital sound, audio production and electronic music.
- Mobile application design and development.

Students who complete the BS degree program are also poised to pursue graduate or advanced degrees in engineering, other technological fields and design.

# Hallmarks of the Program

- Most classes are small, studio-based courses that encourage group work and collaboration.
- Most classes are greater than 50 percent female-identifying or non-binary students, a percentage well above most engineering and computing programs.
- The interdisciplinary coursework stresses knowledge, skills and expertise in technology development through both design and engineering.
- Projects use an iterative creative process from problem finding and ideation through user-testing, implementation and deployment.
- Students learn to think critically about the ethical and cultural impacts of emerging technology.
- Faculty are engineers, designers and artists from diverse fields who are experts in working with students of varied backgrounds, abilities and interests.

## Unique

With a solid engineering foundation, the BS in Creative Technology and Design program caters to an emerging generation of hybrid students. Students develop skills that extend beyond traditional engineering disciplines, eagerly producing technical and creative projects that integrate both engineering and design.

## Transdisciplinary

The degree program is discipline agnostic, encouraging students to pursue their interests and passions in ways that conform to, as well as transcend, traditional disciplinary fields. By helping students discover, explore and expand these interests, faculty members prepare students for rapid shifts and innovations in tomorrow's technology landscape.

## Creative Production and Critical Perspectives

Students are prolific creators who learn to critically and conceptually assess the works they create. Courses are designed on the studio model that integrates faculty and peer critique at every level. Graduates of the program are savvy and resourceful engineers, equal parts creator and critic, artist and theorist.

# Requirements

## Course Requirements

Students must complete a total of 128 credits in order to graduate with a BS in creative technology and design. The last 45 credit hours of the 128 for the BS degree must be earned via CU Boulder coursework only and while rostered in the College of Engineering & Applied Science.

The minimum passing grade for a course that is considered a prerequisite for another course is C-. A grade of C or better is required in all terminal Foundation, Core and Capstone courses. A grade of C- or higher is required in all terminal Focus, CPT and How-to Electives.

| Code | Title | Credit Hours |
|---|---|---|
| **General Coursework (69-72 credit hours)** | | |
| *Writing, Humanities and Social Sciences* | | |
| College-Approved Writing Course [1] | | 3 |
| Humanities/Social Sciences Electives [2] | | 18 |
| *Mathematics Courses and Natural Science Electives* | | |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or MATH 1300 | Calculus 1 | |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| MATH 2001 | Introduction to Discrete Mathematics | 3 |
| or MATH 2002 | Number Systems: An Introduction to Higher Mathematics | |
| or CSCI 2824 | Discrete Structures | |
| or ECEN 2703 | Discrete Mathematics for Computer Engineers | |
| or APPM 3170 | Discrete Applied Mathematics | |
| Mathematics Electives [3] | | 6 |
| Natural Science Electives [4] | | 12 |
| *Engineering and Computation Coursework* | | |
| ATLS 1300 | Computational Foundations 1 | 4 |
| or APPM 1650 | Python for Math and Data Science Applications | |
| or CSCI 1300 | Computer Science 1: Starting Computing | |
| or ECEN 1310 | Introduction to C Programming | |
| or INFO 1701 | Programming for Information Science 1 | |
| ATLS 2270 | Computational Foundations 2 | 4 |
| or APPM 3650 | Algorithms and Data Structures in Python | |
| or CSCI 2270 | Computer Science 2: Data Structures | |
| or INFO 2201 | Programming for Information Science 2 | |
| *Free Electives* | | |
| Free Electives | | 15 |

**BS Program Coursework (59 hours)**

| | | |
|---|---|---|
| *ATLS Foundation and Core Coursework* | | |
| ATLS 1100 | Design Foundations | 3 |
| ATLS 2000 | The Meaning of Information Technology | 3 |
| or ENES 2020 | The Meaning of Information Technology | |
| ATLS 2100 | Image | 3 |
| ATLS 2200 | Web | 3 |
| ATLS 2300 | Text | 3 |
| ATLS 3100 | Form | 3 |
| ATLS 3200 | Sound | 3 |
| ATLS 3300 | Object | 3 |
| *Capstone Coursework* | | |
| ATLS 4000 | Research Methods and Professional Practice | 3 |
| ATLS 4010 | Capstone Projects | 4 |
| *Critical Perspectives in Technology (CPT) Electives* | | |
| CPT Electives [5] | | 6 |
| *Focus Electives (project-based courses)* | | |
| Focus Electives [6] | | 18 |
| How-To Electives [7] | | 4 |
| **Total Credit Hours** | | **128** |

1. Students may choose a course from the list of college-approved writing courses (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/).
2. Students may choose courses from the list of college-approved humanities and social sciences (HSS) electives (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/).
3. Students may choose two courses from the list of mathematics electives (found in degree audit).
4. Natural Science Courses (use Class Search (https://classes.colorado.edu/) and under *Advanced Search*, choose "A&S GenEd: Distribution-Natural Sciences").
5. Students may choose two courses from the list of CPT Electives (found in degree audit).
6. Students may choose six courses from the list of Focus Electives (found in degree audit); at least 12 credits of which must be upper-division coursework; at least 12 credits must be ATLS courses.
7. Students may choose four courses from the list of How-To electives (found in degree audit).

**Sample Four-Year Plan of Study**

**First Year**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| ATLS 1100 | Design Foundations | 3 |
| CSCI 1300 or ATLS 1300 | Computer Science 1: Starting Computing or Computational Foundations 1 | 4 |
| APPM 1350 or MATH 1300 | Calculus 1 for Engineers or Calculus 1 | 4-5 |
| COEN 1500 | CEAS First Year Seminar | 1 |
| Humanities or Social Science Elective [1] | | 3 |
| | **Credit Hours** | **15-16** |

**Spring Semester**

| | | |
|---|---|---|
| ATLS 2000 | The Meaning of Information Technology | 3 |
| ATLS 2270 or CSCI 2270 | Computational Foundations 2 or Computer Science 2: Data Structures | 4 |
| MATH 2001 or MATH 2002 or CSCI 2824 or ECEN 2703 or APPM 3170 | Introduction to Discrete Mathematics or Number Systems: An Introduction to Higher Mathematics or Discrete Structures or Discrete Mathematics for Computer Engineers or Discrete Applied Mathematics | 3 |
| Natural Science Course [3] | | 3-4 |
| How-to Elective [7] | | 1 |
| | **Credit Hours** | **14-15** |

**Second Year**

**Fall Semester**

| | | |
|---|---|---|
| ATLS 2100 | Image | 3 |
| ATLS 2200 | Web | 3 |
| ATLS 2300 | Text | 3 |
| Mathematics Course [4] | | 3 |
| Natural Science Course [3] | | 3-4 |
| | **Credit Hours** | **15-16** |

**Spring Semester**

| | | |
|---|---|---|
| ATLS 3100 | Form | 3 |
| ATLS 3200 | Sound | 3 |
| ATLS 3300 | Object | 3 |
| Mathematics Course [4] | | 3-4 |
| Humanities or Social Sciences Elective [1] | | 3 |
| How-to Elective [7] | | 1 |
| | **Credit Hours** | **16-17** |

**Third Year**

**Fall Semester**

| | | |
|---|---|---|
| Critical Perspectives in Technology Elective [5] | | 3 |
| Focus Electives [6] | | 6 |
| Natural Science Course [3] | | 3-4 |
| Humanities or Social Sciences Elective [1] | | 3 |
| College-Approved Writing Course [2] | | 3 |
| | **Credit Hours** | **18-19** |

**Spring Semester**

| | | |
|---|---|---|
| Focus Electives [6] | | 6 |
| Humanities or Social Sciences Electives [1] | | 5 |
| Natural Science Course (if needed to fulfill 12 credits hours total of science) [3] | | 3 |
| Free Elective | | 3 |
| How-to Elective [7] | | 1 |
| | **Credit Hours** | **18** |

**Fourth Year**

**Fall Semester**

| | | |
|---|---|---|
| ATLS 4000 | Research Methods and Professional Practice | 3 |
| Critical Perspectives in Technology Elective [5] | | 3 |
| Focus Elective [6] | | 3 |

| | | |
|---|---|---|
| Humanities or Social Science Elective [1] | | 3 |
| Free Electives | | 6 |
| | **Credit Hours** | **18** |
| **Spring Semester** | | |
| ATLS 4010 | Capstone Projects | 4 |
| Focus Elective [6] | | 3 |
| Free Electives | | 6 |
| How-To Elective [7] | | 1 |
| | **Credit Hours** | **14** |
| | **Total Credit Hours** | **128-133** |

1 Students may choose courses from the list of college-approved humanities and social sciences electives (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/).

2 Students may choose a course from the list of college-approved writing courses (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/).

3 Natural Science Courses (use Class Search (https://classes.colorado.edu/) and under *Advanced Search*, choose "A&S GenEd: Distribution-Natural Sciences").

4 Students may choose two courses from the list of Mathematics Electives (https://www.colorado.edu/atlas/academics/undergraduate/ctd-curriculum/#ucb-accordion-id--7-content1).

5 Students may choose two courses from the list of CPT Electives (https://www.colorado.edu/atlas/academics/undergraduate/cpt/).

6 Students may choose six courses from the list of Focus Electives (https://www.colorado.edu/atlas/bs-ctd-focus-electives/); at least 12 credits of which must be upper-division coursework; and at least 12 credits must be ATLS courses.

7 Students may choose from a list of one credit variable Special Topics: How-To courses.

# Learning Outcomes

By the completion of the program, students will be able to:

- Develop work that addresses complex interdisciplinary problems, applying principles of engineering, computational thinking, and design using industry standard and emerging technologies.
- Understand the historical, cultural and psychological factors that impact the human experience of design.
- Engage in research, critical assessment and critique.
- Engage in iterative design and production to contribute novel functionalities, aesthetics or interactions.
- Collaborate on a team that effectively demonstrates task management, accountability and makes progress towards common goals.
- Recognize ethical and professional responsibilities and make informed discernments in applying creative technology solutions.
- Effectively communicate the functionality, purpose and impact of creative technology solutions in a wide range of professional contexts in a way that is thoughtful and respectful to others.

# Creative Technology and Design - Minor

The minor in Creative Technology & Design compliments a host of undergraduate majors, blending design and programming skills with critical perspectives on the role of technology within the realm of human creativity.

## Goals

- Take hands-on, project-based courses across a diverse array of creative domains, producing a variety of portfolio-ready work.
- Tailor a flexible curriculum to gain the technical and design skills relevant to your interests and passions.
- Critically reflect on the social, environmental and cultural implications of design and technology.
- Collaborate with the ATLAS Institute's vibrant community of engineers, designers, scientists and creative technologists to wield creativity in a rapidly-changing technological landscape.

For more information, visit the Minor (https://www.colorado.edu/atlas/ctd-minor/) webpage.

# Requirements

## Program Requirements

Students must have a 2.000 cumulative GPA to be admitted to the minor in creative technology and design.  Students may not earn both this minor and the BS in creative technology and design.

Students must complete a minimum of 22 credit hours with 8 courses, as detailed below. Coursework used to satisfy the minor requirements cannot be taken pass/fail. A minimum of 15 credit hours must be taken on the Boulder campus. Six of the eight courses for the CTD minor must be ATLS courses.

A cumulative GPA of 2.000 or better is required for courses used to satisfy the requirements of this minor. The minimum grade for prerequisite courses in the minor is C-; all other courses must be a minimum grade of C to apply towards the minor. Failing to meet the minimum grade for any individual ATLS required course twice will result in automatic removal from the creative technology and design minor.

Courses may be taken concurrently, although some courses may have recommended and/or required prerequisites.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| ATLS 1100 | Design Foundations | 3 |
| ATLS 1350 | Computational Foundations for Non-Majors | 3 |
| or ATLS 1300 | Computational Foundations 1 | |
| or APPM 1650 | Python for Math and Data Science Applications | |
| or CSCI 1300 | Computer Science 1: Starting Computing | |
| or ECEN 1310 | Introduction to C Programming | |
| or INFO 1701 | Programming for Information Science 1 | |
| ATLS 2000 | The Meaning of Information Technology | 3 |
| or ENES 2020 | The Meaning of Information Technology | |
| Two of the following: | | 6 |

| | | |
|---|---|---|
| ATLS 2100 | Image | |
| ATLS 2200 | Web | |
| ATLS 2300 | Text | |
| ATLS 3200 | Sound | |
| ATLS 3300 | Object | |
| ATLS 3100 | Form | |
| Elective (Upper-division course) [1] | | 6 |
| How-To Electives [2] | | 1 |
| **Total Credit Hours** | | **22** |

1 For a list of approved electives, please reference the CTD Minor Degree Audit.

2 Students may choose one course from the list of How-To electives (found in degree audit).

# Design Technologies - Certificate

The certificate in design technologies provides a fundamental understanding of information technology and digital media production. Students will create work that develops their digital design skillset, all while being prompted to critically analyze the impacts of technology on society.

This certificate equips the next generation of artists, designers and media producers with the necessary technical, theoretical and historical background to become critically aware users of design technology.

## Requirements

### Certificate Requirements

Students must have a 2.300 cumulative GPA to be admitted to the certificate in design technologies. The certificate consists of a four-course sequence (12 credit hours) and typically takes a minimum of two semesters to complete. A grade of C or higher is required for all certificate courses.

This certificate is available to students in any CU Boulder major or minor (except for students earning a Creative Technology & Design Bachelor of Science degree or Minor). It may also be earned in addition to the ATLAS User Experience certificate.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| ATLS 2000 | The Meaning of Information Technology | 3 |
| ATLS 2001 | Design Technologies: Toolkit | 3 |
| ATLS 2002 | Design Technologies: Process | 3 |
| ATLS Elective (Core, Focus, or CPT) | | 3 |
| **Total Credit Hours** | | **12** |

# User Experience - Certificate

The certificate in user experience gives students the skills and vision to re-imagine how humans interact with technology. From crafting wireframes and prototyping to understanding user journeys and usability testing, students gain the expertise to design interfaces and experiences that delight and inspire.

This certificate is built from the suite of current user experience design courses that have been taught at ATLAS for the past six years. It allows students from a variety of academic careers to develop in-demand skills in the world of UX design.

## Requirements

### Certificate Requirements

Students must have a 2.300 cumulative GPA or higher to be admitted to the certificate in user experience. The certificate consists of a four-course sequence (12 credit hours) and typically takes a minimum of two semesters to complete. A grade of C or higher is requires for all certificate courses.

This certificate is available to students in any CU Boulder major or minor. It may also be earned in addition to the ATLAS Design Technologies certificate.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| ATLS 1100 | Design Foundations | 3 |
| or INFO 1121 | Designing Interactions | |
| ATLS 4620 | User-Experience Design 1 | 3 |
| ATLS 4720 | User-Experience Design 2 | 3 |
| UX Elective [1] | | 3 |
| **Total Credit Hours** | | **12** |

1 Students may choose one course from the list of UX electives (found in degree audit)

# Electrical, Computer & Energy Engineering

Electrical engineering offers study of the basic science and technology of information and energy. Its areas of knowledge include:

- Information theory and communications systems
- Computers and digital systems
- Signal processing and instrumentation
- Feedback systems and automatic control
- Electrical and electronic devices and systems
- Power electronics and renewable energy
- Electromagnetics and microwave devices
- Optics and photonic systems
- Embedded systems engineering

Students learn how this basic knowledge is applied to such modern technologies as computers, telecommunications, biomedical systems and remote sensing. The curriculum accommodates a variety of student interests including design, production, testing, consulting services, research, teaching and management. Graduates pursue careers in a large variety of fields in the computer, telecommunications, instrumentation, biomedical, aerospace, energy, materials and semiconductors industries, as well as academia. Some go on to careers in other professions such as law or medicine.

Electrical and computer engineering offers the same curriculum as electrical engineering, except that required courses in computer hardware and software replace some upper-division electives. As with electrical engineering, it accommodates broad student interests from design to

service, and from research to management. Its graduates take positions in fields as diverse as those listed above for electrical engineering.

**Course code for this program is ECEN.**

# Bachelor's Degree

- Electrical and Computer Engineering - Bachelor of Science (BSEC) (p. 970)
- Electrical Engineering - Bachelor of Science (BSEE) (p. 975)

# Minor

- Computer Engineering - Minor (p. 978)
- Electrical Engineering - Minor (p. 979)
- Quantum Engineering - Minor (p. 980)
- Signals and Systems - Minor (p. 980)

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Akos, Dennis M. (https://experts.colorado.edu/display/fisid_131119/)
Professor; PhD, Ohio University

Anderson, Dana Z. (https://experts.colorado.edu/display/fisid_102371/)
Professor; PhD, University of Arizona

Baker, Kyri A. (https://experts.colorado.edu/display/fisid_159754/)
Assistant Professor; PhD, Carnegie Mellon University

Barnes, Frank S. (https://experts.colorado.edu/display/fisid_104148/)
Distinguished Professor Emeritus; PhD, Stanford University

Barton, Taylor Wallis (https://experts.colorado.edu/display/fisid_157939/)
Faculty Fellow, Associate Professor; DSc, Massachusetts Institute of Technology

Becker, Stephen R. (https://experts.colorado.edu/display/fisid_154263/)
Associate Professor; PhD, California Institute of Technology

Blum, Arielle Melissa (https://experts.colorado.edu/display/fisid_154695/)
Instructor; MS, University of Colorado Boulder

Bogatin, Eric (https://experts.colorado.edu/display/fisid_151431/)
Lecturer; PhD, University of Arizona

Brancucci, Carlo
Lecturer; PhD, Technische Universiteit Delft (Netherlands)

Bright, Victor Mark (https://experts.colorado.edu/display/fisid_112696/)
Professor; PhD, Georgia Institute of Technology

Carter Carston, Ronald McKell (https://experts.colorado.edu/display/fisid_154921/)
Assistant Professor; PhD, California Institute of Technology

Chang, Bor-Yuh Evan (https://experts.colorado.edu/display/fisid_146087/)
Associate Professor; PhD, University of California, Berkeley

Chaudhary, Sumeet (https://experts.colorado.edu/display/fisid_167980/)
Instructor; PhD, University of Cincinnati

Chen, Xudong (https://experts.colorado.edu/display/fisid_158323/)
Assistant Professor; PhD, Harvard University, Cambridge, MA

Clauset, Aaron (https://experts.colorado.edu/display/fisid_147554/)
Associate Professor; PhD, University of New Mexico

Cogswell, Carol (https://experts.colorado.edu/display/fisid_141919/)
Research Professor; MArch, University of Oregon

Combes, Josh (https://experts.colorado.edu/display/fisid_166284/)
Assistant Professor; PhD, Griffith University

Corradini, Luca (https://experts.colorado.edu/display/fisid_146380/)
Associate Professor, Visiting Associate Professor; PhD, University of Padova (Italy)

Correll, Nikolaus J. (https://experts.colorado.edu/display/fisid_147555/)
Associate Professor; PhD, Ecole Polytech Federale de Lausanne (Switzerland)

Dall'Anese, Emiliano (https://experts.colorado.edu/display/fisid_158949/)
Assistant Professor; PhD, University of Padova (Italy)

Diddams, Scott A. (https://experts.colorado.edu/display/fisid_148274/)
Visiting Professor, Professor Adjoint; PhD, University of New Mexico

Erickson, Robert W. (https://experts.colorado.edu/display/fisid_105514/)
Professor; PhD, California Institute of Technology

Femrite, Andrew
Senior Instructor, Faculty Director; BS, University of Colorado Boulder

Fiez, Terri S. (https://experts.colorado.edu/display/fisid_156578/)
Professor; PhD, Oregon State University

Filipovic, Dejan S. (https://experts.colorado.edu/display/fisid_126278/)
Professor; PhD, University of Michigan Ann Arbor

Gasiewski, Albin J. (https://experts.colorado.edu/display/fisid_142882/)
Professor; PhD, Massachusetts Institute of Technology

Gopinath, Juliet T. (https://experts.colorado.edu/display/fisid_147075/)
Professor; PhD, Massachusetts Institute of Technology

Grunwald, Dirk C. (https://experts.colorado.edu/display/fisid_102261/)
Professor; PhD, University of Illinois at Urbana–Champaign

Hauser, John (https://experts.colorado.edu/display/fisid_102555/)
Associate Professor; PhD, University of California, Berkeley

Heckman, Christoffer (https://experts.colorado.edu/display/fisid_155294/)
Assistant Professor; PhD, Cornell University

Herzfeld, Ute C. (https://experts.colorado.edu/display/fisid_106575/)
Research Professor; PhD, Johannes Gutenberg-Universität Mainz (Germany)

Hodge, Bri-Mathias (https://experts.colorado.edu/display/fisid_158358/)
Associate Professor; PhD, Purdue University

Huang, Shu-Wei (https://experts.colorado.edu/display/fisid_159847/)
Assistant Professor; PhD, MIT, Cambridge

Izraelevitz, Joe (https://experts.colorado.edu/display/fisid_166042/)
Assistant Professor; PhD, University of Rochester

Kapteyn, Henry C. (https://experts.colorado.edu/display/fisid_115334/)
Professor; PhD, University of California, Berkeley

Keller, Eric Robert (https://experts.colorado.edu/display/fisid_151647/)
Associate Professor; PhD, Princeton University

Kuester, Edward F.
Professor Emeritus

Lasser, Gregor (https://experts.colorado.edu/display/fisid_156178/)
Assistant Research Professor; PhD, Technische Universität Wien (Austria)

Le, Hanh-Phuc
Assistant Professor; PhD, University of California, Berkeley

Lehman, Tamara (https://experts.colorado.edu/display/fisid_165649/)
Assistant Professor; PhD, Duke University

Lightner, Michael R. (https://experts.colorado.edu/display/fisid_101723/)
Professor; PhD, Carnegie Mellon University

Liu, Youjian (https://experts.colorado.edu/display/fisid_126283/)
Associate Professor; PhD, Ohio State University

MacCurdy, Robert B. (https://experts.colorado.edu/display/fisid_163307/)
Assistant Professor; PhD, Cornell University

Majerfeld, Arnoldo
Professor Emeritus

Maksimovic, Dragan (https://experts.colorado.edu/display/fisid_105609/)
Professor; PhD, California Institute of Technology

Mathys, Peter (https://experts.colorado.edu/display/fisid_100084/)
Associate Professor; PhD, ETH Zürich (Switzerland)

McAuliffe, Rik
Lecturer

McClure, Linden
Professor Adjunct

McLeod, Robert R. (https://experts.colorado.edu/display/fisid_107547/)
Professor; PhD, University of Colorado Boulder

Mendelson, Jay
Lecturer

Mihran, Richard
Professor Adjunct

Mishra, Shivakant (https://experts.colorado.edu/display/fisid_118376/)
Professor; PhD, University of Arizona

Moddel, Garret (https://experts.colorado.edu/display/fisid_105440/)
Professor; PhD, Harvard University

Murnane, Margaret (https://experts.colorado.edu/display/fisid_115333/)
Distinguished Professor; PhD, University of California, Berkeley

Nicotra, Marco M. (https://experts.colorado.edu/display/fisid_164182/)
Assistant Professor; PhD, Universite Libre de Bruxelles

Palo, Scott E. (https://experts.colorado.edu/display/fisid_109033/)
Professor; PhD, University of Colorado Boulder

Pao, Lucy Y. (https://experts.colorado.edu/display/fisid_107151/)
Professor; PhD, Stanford University

Park, Won (https://experts.colorado.edu/display/fisid_122676/)
Professor, Associate Chair; PhD, Georgia Institute of Technology

Perkins, Mike
Lecturer; PhD, Stanford University

Piestun, Rafael (https://experts.colorado.edu/display/fisid_118538/)
Professor; PhD, Israel Instit of Tech (Israel)

Piket-May, Melinda J. (https://experts.colorado.edu/display/fisid_102097/)
Associate Professor; PhD, Northwestern University

Pleszkun, Andrew R.
Professor Emeritus

Popovic, Zoya (https://experts.colorado.edu/display/fisid_101494/)
Distinguished Professor; PhD, California Institute of Technology

Poveda, Jorge
Assistant Professor

Psychogiou, Dimitra (https://experts.colorado.edu/display/fisid_158311/)
Assistant Professor; PhD, ETH Zürich (Switzerland)

Sankaranarayanan, Sriram (https://experts.colorado.edu/display/fisid_147413/)
Professor; PhD, Stanford University

Scherr, Timothy (https://experts.colorado.edu/display/fisid_156259/)
Senior Instructor; MS, University of Utah

Schibli, Thomas Richard (https://experts.colorado.edu/display/fisid_143464/)
Professor; PhD, Univ of Karlsruhe (Germany)

Shaheen, Sean Eric (https://experts.colorado.edu/display/fisid_153664/)
Professor; PhD, University of Arizona

Sheafor, Steve
Lecturer; PhD, University of Illinois

Siewert, Sam
Associate Professor Adjunct

Sluiter, David
Professor Adjunct; BS, Michigan Technological University

Somenzi, Fabio (https://experts.colorado.edu/display/fisid_103969/)
Professor, Associate Chair; PhD, Politecnico Di Torino (Italy)

Spriggs, Benjamin
Lecturer, Scholar in Residence

Thayer, Jeffrey P. (https://experts.colorado.edu/display/fisid_134469/)
Professor; PhD, University of Michigan Ann Arbor

Trivedi, Ashutosh (https://experts.colorado.edu/display/fisid_156589/)
Assistant Professor; PhD, University of Warwick (UK)

Van Zeghbroeck, Bart J. (https://experts.colorado.edu/display/fisid_104113/)
Professor, Associate Chair; PhD, University of Colorado Boulder

Varanasi, Mahesh K. (https://experts.colorado.edu/display/fisid_103090/)
Professor; PhD, Rice University

Wagner, Kelvin (https://experts.colorado.edu/display/fisid_105344/)
Professor; PhD, California Institute of Technology

Walkes, Dan
Lecturer

Williamson, James A.
Lecturer

Wustrow, Eric A. (https://experts.colorado.edu/display/fisid_156419/)
Assistant Professor; BE, University of Michigan Ann Arbor

Zabotin, Nikolay
Research Professor; DSc, Russian Academy of Science

# Courses

**ECEN 1030 (1-4) Special Topics**
Special topics class.

**ECEN 1100 (1) Exploring ECE**
Introduces students to areas of emphasis with the ECE department through seminars presented by faculty and outside speakers. Emphasizes career opportunities, professional ethics and practices, history of the profession, and resources for academic success. Several sessions promote team building and problem solving, and provide opportunities for first year students to meet their classmates.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: General

**ECEN 1310 (4) Introduction to C Programming**
This introductory programming course teaches fundamental concepts using the C programming language. The class generally meets programming requirements for majors within the engineering school and assumes no prior programming experience. Includes a weekly computer lab session. Covered topics include pointers, control flow, dynamic memory, and abstract data types.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 1300 and CSPB 1300
**Recommended:** Corequisite APPM 1350 or equivalent.
**Additional Information:** Departmental Category: General

**ECEN 1400 (3) Introduction to Digital and Analog Electronics**
This course introduces students to electrical and computer engineering centered around creative projects in a team based setting. Through the design and implementation of functional engineering systems, students gain an understanding of the engineering design process, using real-world design tools such as prototyping, computer-aided design (CAD), 3D printing, laser cutting, printed circuit board (PCB) manufacturing and testing. The projects-based curriculum provides students with a basis in the fundamentals of analog and digital electronics with an emphasis of developing student¿s understanding of how the electronics and software operate within an interdisciplinary context. Students gain hands-on experience with the creation of systems using sensors, actuators, programming microcontrollers, prototyping circuits using breadboards, and designing systems. No prior experience or knowledge of electronics or software is required.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 2500, GEEN 1400, ASEN 1400 and ASE
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) College of Engineering majors only.
**Additional Information:** Departmental Category: General

**ECEN 1500 (3) Sustainable Energy**
Explores how energy is generated and used in today's society. Through collaborative discussion and hands-on data collection, students will analyze the engineering challenges, fundamental limits, and potential solutions to meeting our energy needs sustainably. Students will learn to analyze numerical data, estimate orders of magnitude, and apply mathematical methods in their own lives and in the ongoing energy debate. Basic algebra required.
**Requisites:** College of Engineering majors are excluded from this course.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
Departmental Category: General

**ECEN 1840 (1-6) Independent Study**
Provides an opportunity for freshmen to do independent, creative work. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: General

**ECEN 2000 (1) Electrical and Computer Engineering as a Profession**
Provides an introduction to the profession of electrical and computer engineering. Specific topics addressed include career opportunities in electrical and computer engineering, internship search skills, expectations for professional behavior in the classroom and in industry, and current events/ethics topics relevant to the field. Course format may include additional evening/weekend activities.
**Requisites:** Restricted to students with at least 27 credits (Sophomores, Juniors or Seniors). Electrical and Computer Engineering (ECEN) majors only. Restricted to students in the CMU/CU-Boulder Engineering Partnership Program only.

**ECEN 2010 (1-5) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: General

**ECEN 2020 (1-5) Special Topics**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: General

**ECEN 2050 (1-5) Special Topics**
**Additional Information:** Departmental Category: General

**ECEN 2060 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisite or corequisite PHYS 1140.
**Additional Information:** Departmental Category: General

**ECEN 2250 (3) Introduction to Circuits and Electronics**
Introduces linear circuit analysis and design, including OP-Amps. Presents DC networks, including node and mesh analysis with controlled sources. Analysis of RL and RC circuits for both transient and sinusoidal steady-state responses using phasors.
**Requisites:** Requires prerequisite course of (APPM 1360 or MATH 2300) and PHYS 1120 (all minimum grade C-) and pre OR corequisite course of (APPM 2360 or MATH 3430). Restricted to College of Engineering majors or IUT On Track applicants or Electrical Eng minors.
**Recommended:** Prerequisites ECEN 1310 or CSCI 1300.
**Additional Information:** Departmental Category: General

**ECEN 2260 (3) Circuits as Systems**
Continues basic circuit analysis of ECEN 2250: Laplace transform techniques, transfer functions, frequency response, Bode diagrams, resonant circuits, Fourier series expansions, and convolution.
**Requisites:** Requires prerequisite course of ECEN 2250 and (APPM 2360 or MATH 3430) (minimum grade C-). Restricted to College of Engineering students or Electrical Engineering minors or IUT On Track applicants.
**Recommended:** Corequisite ECEN 2270.
**Additional Information:** Departmental Category: General

**ECEN 2270 (3) Electronics Design Lab**
Provides an introduction to analysis, modeling, design, and testing of analog electronic circuits in a practical laboratory setting. The laboratory is centered around a robot platform and includes design, SPICE simulations, prototyping and testing of circuits necessary to drive and remotely control the robot.
**Requisites:** Requires prerequisite course of ECEN 2260 or corequisite course of ECEN 2260. Restricted to College of Engineering majors or Electrical Engineering minors or IUT On Track applicants.
**Additional Information:** Departmental Category: General

**ECEN 2350 (4) Digital Logic**
Covers the design and applications of digital logic circuits, including both combinational and sequential logic circuits. Introduces hardware descriptive language, simulating and synthesis software, and programming of field programmable arrays (FPGAs). This course is 3 lectures and 1 lab per week.
**Requisites:** Requires prerequisite course of ECEN 1310 or CSCI 1300 or ASEN 1320 (minimum grade C-). Restricted to College of Engineering majors or IUT On Track applicants or Computer Engineering minors.
**Additional Information:** Departmental Category: General

**ECEN 2360 (3) Programming Digital Systems**
Explores how computers and programmable hardware in general are used to implement digital systems by looking at the capabilities of central processing units, the use and control of various input/output (I/O) devices, memory organization, and concurrency management. Topics include computer architecture, instruction sets, I/O device programming, interrupts, data transfer mechanisms, semaphores, and memory management.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3350
**Requisites:** Requires prerequisite course of ECEN 2350 (minimum grade C-). Restricted to College of Engineering majors or Computer Engineering minors.

**ECEN 2370 (3) Embedded Software Engineering**
Introduces digital system design, including system software and hardware building blocks, and system software-hardware integration. Emphasizes hands-on system development and debugging. Uses mainstream electronic system design platforms, featuring ARM processors, embedded and mobile computing platforms, using the C programming language.
**Requisites:** Requires prereq courses of ECEN 1310 or CSCI 1300 and ECEN 2350 and prereq or corequisite course of ECEN 2360 or CSCI 2400 (all minimum grade C-). Restricted to College of Engineering majors or IUT On Track applicants or Computer Engineering minors.

**ECEN 2410 (3) Renewable Sources and Efficient Electrical Energy Systems**
Introduces electrical power generation and renewable energy, including solar, wind, micro, hydro, coal, nuclear and natural gas and some of the issues in integrating renewable energy sources in the grid.
**Requisites:** Requires prerequisite course of PHYS 1120 (minimum grade C-). Requires prerequisite OR corequisite course of ECEN 2250. Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: General

**ECEN 2420 (3) Electronics for Wireless Systems**
Explores fundamental principles behind the operation of a radio, including a practical introduction to circuit elements. Covers the components and operation of a radio (transmitter and receiver) with simple signals. Students learn lab exercises the operation principles behind components of a complete practical radio system.
**Requisites:** Requires prerequisite course of PHYS 1120 and (APPM 1360 or MATH 2300) (all minimum grade C-). Requires prerequisite course of ECEN 2250 (min grade C-). Restricted to Electrical and Computer Engineering (ECEN) or Electrical Engineering (EEEN) majors onl
**Additional Information:** Departmental Category: General

**ECEN 2440 (3) Application of Embedded Systems**
Introduces embedded systems and key computer architecture concepts through a variety of projects involving programming a microcontroller in C. Provides students hands-on projects that combine the knowledge gained in their digital and analog coursework in order to engineer hardware, firmware and application software design solutions. Includes a weekly lecture and two weekly laboratory sessions.
**Requisites:** Requires a prerequisite course of ECEN 1310 or CSCI 1300 or ASEN 1320 (minimum grade C-). Requires prerequisite OR corequisite course of ECEN 2250.
**Additional Information:** Departmental Category: General

**ECEN 2450 (3) Electronic and Semiconductor Device Laboratory**
Explores the operation of electronic and semiconductor devices, including: resistors, transparent conductors, capacitors, inductors, diodes and light emitting diodes, photovoltaics, photodiodes, bipolar junction and field effect transistors, organic electrochemical transistors, and various sensor devices. Laboratories will involve device characterization and implementation into simple circuits, data analysis, and function fitting. Some of the laboratories will involve partial fabrication of the devices. Previously offered as a special topics course. Recommended restriction: sophomores or juniors; seniors cannot enroll in the course.
**Requisites:** Requires prerequisite or corequisite course of ECEN 2250 (minimum grade C-). Restricted to College of Engineering students only.
**Recommended:** Prerequisite PHYS 1140.

**ECEN 2703 (3) Discrete Mathematics for Computer Engineers**
Emphasizes elements of discrete mathematics appropriate for computer engineering. Topics: logic, proof techniques, algorithms, complexity, relations, and graph theory.
**Requisites:** Requires prerequisite courses of ECEN 1310 or CSCI 1300 or ASEN 1320 and APPM 1360 or MATH 2300 (all minimum grade C-). Restricted to College of Engineering students only.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 2830 (1-5) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General

**ECEN 2840 (1-6) Independent Study**
Offers an opportunity for sophomores to do independent, creative work. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: General

**ECEN 3002 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 3003 (3-5) Special Topics**
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 3004 (3-5) Special Topics**
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 3010 (3) Circuits and Electronics for Mechanical Engineers**
Covers analysis of electrical circuits by use of Ohm's law, network reduction, node and loop analysis, Thevenin's and Norton's theorems, DC and AC signals, transient response of simple circuits, transfer functions, basic diode and transistor circuits, and operational amplifiers. Includes introductory digital electronics and microprocessors/microcontrollers.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 3017
**Requisites:** Requires prereq course of PHYS 1120 and a prereq or coreq course of APPM 2360 or APPM 3310 or MATH 3430 (all min grade C-). Restricted to MCEN or EVEN or Integrated Design Engr (IDEN-BSIDE) students.
**Additional Information:** Departmental Category: General

**ECEN 3090 (3) Introduction to Quantum Computing**
Covers the basics of quantum computation, including the basics of quantum information; axioms of quantum mechanics; quantum circuits and universality; the relationship between quantum and classical complexity classes; simple quantum algorithms such as the quantum Fourier transform; Shor factoring algorithm; Grover search algorithm; physical implementation of quantum computation; error correction and fault tolerance.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3090 and PHYS 3090
**Requisites:** Requires prerequisite course of APPM 2360 or APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135 (minimum grade C-).

**ECEN 3103 (3) Automation of Industrial Processes**
Introduces students to Programmable Logic Controller (PLC) architecture, ladder logic programming, and programming Human Machine Interfaces (HMI). Students learn how to automate manufacturing processes and applications of PID control.
**Requisites:** Requires prerequisite course of ECEN 2250 (minimum grade D-). Restricted to students in the CMU/CU-Boulder Engineering Partnership Program only.

**ECEN 3170 (3) Electromagnetic Energy Conversion 1**
Real and reactive power in single phase circuits, power triangle, balanced three-phase circuits, wye and delta connections, introduction to electromagnetic machines, transformers (single and three-phase) and their equivalent circuits, AC-machinery fundamentals, synchronous generator from a magnetic field point of view, synchronous motors and condensers, three-phase induction motors, DC machinery fundamentals, DC motors, single phase motors. Matlab/Simulink will be used.
**Requisites:** Requires prerequisite courses of ECEN 2260 and PHYS 1120 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Power

**ECEN 3250 (3) Microelectronics**
Develops a basic understanding of active semiconductor devices. Focuses on building an understanding of BJT and CMOS devices in both digital and analog applications.
**Requisites:** Requires prerequisite course of ECEN 2250 (minimum grade C-). Restricted to College of Engineering students or Electrical Engineering minors.
**Additional Information:** Departmental Category: General

**ECEN 3300 (3) Linear Systems**
Characterization of linear time-invariant systems in time and frequency domains. Continuous time systems are analyzed using differential equations and Laplace and Fourier transforms. Discrete time systems are analyzed using difference equations, Z-transforms and discrete time Fourier transforms. Sampling and reconstruction of signals using the sampling theorem. Applications of linear systems include communications, signal processing, and control systems.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3301
**Requisites:** Requires prerequisite course of ECEN 2260 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: General

**ECEN 3301 (3) Biomedical Signals and Systems**
Introduces theory and methods to characterize and process biological signals from a variety of sources and engineering applications in the time and frequency domains. This course covers mathematical and computational tools for signal analysis with emphasis on discrete time signals and digital processing. Topics include noise, sampling, Fourier transforms, filter design, LTI systems, and image processing with exercises in MATLAB.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3300
**Requisites:** Requires prerequisite course of ECEN 2260 (minimum grade C-).
**Recommended:** Prerequisite BMEN 3030.

**ECEN 3303 (3) Introduction to Robotics**
Introduces students to fundamental concepts in autonomous robotics: mechanisms, locomotion, kinematics, control, perception and planning. Consists of lectures and lab sessions that are geared toward developing a complete navigation stack on a miniature mobile robotic platform.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3302 and CSPB 3302
**Requisites:** Requires prerequisite courses of (CSCI 2270 or CSCI 2275) and (APPM 3170 or CSCI 2824 or ECEN 2703 or MATH 2001) and (APPM 2360 or APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135) (all minimum grade C-).
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 3320 (3) Semiconductor Devices**
Highlights the fundamentals of semiconductor materials and devices. Topics include the electrical and optical properties of semiconductors, the theory of Pn junctions, bipolar and field-effect transistors, and optoelectronic devices.
**Requisites:** Requires prerequisite course of ECEN 2250 (minimum grade C-). Restricted to College of Engineering students or Electrical Engineering minors.
**Additional Information:** Departmental Category: General

**ECEN 3350 (3) Programming Digital Systems**
Explores how computers and programmable hardware in general are used to implement digital systems by looking at the capabilities of central processing units, the use and control of various input/output (I/O) devices, memory organization, and concurrency management. Topics include computer architecture, instruction sets, I/O device programming, interrupts, data transfer mechanisms, semaphores, and memory management.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 2360
**Requisites:** Requires prerequisite course of ECEN 2350 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 3400 (3) Electromagnetic Fields and Waves**
Electromagnetic fields are covered at an introductory level, starting with electrostatics and continuing with DC current, magnetostatics, time-varying magnetic fields, waves on transmission lines, Maxwell's equations and the basics of plane waves. The use of fields in inductors, capacitors, resistors, transformers, and energy and power concepts are studied.
**Requisites:** Requires prerequisites (APPM 2350 or MATH 2400) and (APPM 2360 or MATH 3430) and PHYS 1120 and ECEN 2250 (all minimum grade C-). Restricted to College of Engineering majors or Electrical Engineering minors.
**Additional Information:** Departmental Category: General

**ECEN 3410 (3) Electromagnetic Waves and Transmission**
Covers reflected and transmitted plane waves in layered media, Poynting's theorem of electromagnetic power, two-conductor transmission line theory and practice, Smith chart usage and impedance matching, waveguides, and elements of antenna theory.
**Requisites:** Requires prerequisite course ECEN 3400 (minimum grade C-). Restricted to College of Engineering majors or Electrical Engineering minors.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 3593 (3) Computer Organization**
Studies computer design at the microarchitecture level. Discusses instruction set architecture design, arithmetic and logic unit design, control logic, memory design and caches, simple pipelining, I/O and peripheral devices. Briefly covers aspects of modern computer architecture, such as multicore processors and hardware security.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3593 ECEN 5590
**Requisites:** Requires prerequisite course of ECEN 2360 or ECEN 3350 or CSCI 2400 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 3730 (3) Practical Printed Circuit Board Design and Manufacture**
This course prepares students with all skills needed to convert a back-of-the-napkin circuit sketch into a working widget with first time success. Students will master the seven steps in every board project: planning, selecting components, schematic entry, layout, assembly, bring up and debug, and documentation. This process will be exercised with three different board design projects with increasing challenge. A commercial EDA tool widely used in the electronics industry will be used for all projects. Previously offered as a special topics course. Formerly ECEN 4730.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4720 or ECEN 5720 or ECEN 5730
**Requisites:** Requires prerequisite courses of ECEN 2250 and ECEN 2260 and ECEN 2270 (all minimum grade C-).

**ECEN 3753 (3) Real-Time Operating Systems**
Today's electronic systems require real-time management and scheduling of hardware resources alongside complex multi-threaded software applications. This course covers what is an Operating Systems, the development of multi-threaded applications, and satisfying real-time system obligations. Real-Time profiling tools will be used to learn and visualize how the operating system is scheduling the software tasks and hardware resources to meet resource constraint embedded system applications. Formerly offered as a special topics course.
**Requisites:** Requires prerequisite course (ECEN 2370 or ECEN 3360) and CSCI 2270 (all minimum grade C-). Restricted to College of Engineering students only.

**ECEN 3763 (3) FPGA Design and HDL**
Build upon the foundations of Digital Logic to learn the theory of FPGA architectures, design practices, and design processes. The emphasis is to architect and design complex FPGA based projects demonstrating overall project organization and creation of milestones, testing requirements, proper use of physical and design constraints, and successful implementation and demonstration. Previously offered as a special topics course.
**Requisites:** Requires prerequisite courses of ECEN 2350 and (ECEN 1310 or CSCI 1300 or ASEN 1320) (minimum grade C-). Restricted to College of Engineering students only.
**Recommended:** Prerequisites ECEN 2360 and ECEN 2370.

**ECEN 3810 (3) Introduction to Probability Theory**
Covers the fundamentals of probability theory, and treats the random variables and random processes of greatest importance in electrical engineering. Provides a foundation for study of communication theory, control theory, reliability theory, and optics.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4510 or APPM 3570
**Requisites:** Requires prerequisite course of APPM 2350 or MATH 2400 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: General

**ECEN 3840 (1-6) Independent Study**
Offers an opportunity for juniors to do independent, creative work. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: General

**ECEN 3841 (1-6) Independent Study**
Offers an opportunity for juniors to do independent, creative work.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: General

**ECEN 3915 (3) Foundations of Quantum Engineering**
Introduces engineers to quantum theory. In this course you will learn how to describe many different physical systems (such as atoms, electrons, light, mechanical oscillators, and tops) mathematically. It also explores different notions of quantumness such as entanglement and non-contextuality. The foundations obtained in this course are important for further study of quantum hardware (sensors), communication, and computing. Formerly ECEN 4915.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5915
**Requisites:** Requires prerequisite courses of (ASEN 1320 OR ECEN 1310 OR ECEN 2310 OR CSCI 1300 OR APPM 3050 OR PHYS 2600) (MATH 3135 OR MATH 2130 OR MATH 2135 OR APPM 2360 OR APPM 3310 OR CSCI 2820) all minimum grade C-.
**Recommended:** Prerequisite MATH 3430 or APPM 2360.

**ECEN 4000 (1-3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General

**ECEN 4001 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Bioengineering

**ECEN 4002 (1-4) Special Topics**
Credit and subject matter to be arranged. Department enforced prerequisite: varies
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 4003 (1-4) Special Topics**
Credit and subject matter to be arranged. Department enforced prerequisite: varies
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.

**ECEN 4004 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**ECEN 4005 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**ECEN 4006 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Departmental Category: Optics

**ECEN 4007 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**ECEN 4009 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: VLSI CAD Methods

**ECEN 4011 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5011
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Departmental Category: Bioengineering

**ECEN 4012 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 4013 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 4016 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Additional Information:** Departmental Category: Optics

**ECEN 4017 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Additional Information:** Departmental Category: Power

**ECEN 4018 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 4021 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) College of Engineering majors only.
**Additional Information:** Departmental Category: Bioengineering

**ECEN 4024 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5024
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 4028 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 4031 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.

**ECEN 4033 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**ECEN 4043 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.

**ECEN 4053 (1-4) Special Topics**
Special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5053
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 4111 (3) Engineering Applications in Biomedicine: Cardiovascular Devices and Systems**
Application of engineering in medicine has grown dramatically in recent years. Engineers enter the clinical and experimental medical arenas with many new devices and procedures emerging as alternatives to conventional surgical and pharmacological treatments. This course, presents general principles of biomedical engineering as applied to the development of a variety of specific devices and techniques for therapy and diagnosis, with a focus on devices and systems for the cardiovascular system. This class will present relevant anatomy and physiology as part of the class discussion, which will be supplemented by a physiology reference text. Questions, exchanges of ideas, and active classroom discussion are encouraged. Biomedical engineering is an emerging field which is highly interdisciplinary- engineers and scientists from all fields are invited and encouraged to participate in this course. There are no formal prerequisites.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5111
**Recommended:** Prerequisite ECEN 2250 or equivalent circuits course.

**ECEN 4114 (3) Automation of Industrial Processes**
Introduces students to Programmable Logic Controller (PLC) architecture, ladder logic programming, and programming Human Machine Interfaces (HMI). Students learn how to automate manufacturing processes and applications of PID control.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4114
**Requisites:** Prerequisite MCEN 3017 Circuits and Electronics for Mechanical Engineers.

**ECEN 4121 (3) Design of Implantable Medical Devices: Neuromodulation**
Application of engineering in medicine has grown dramatically in recent years. Engineers enter the clinical and experimental medical arenas with many new devices and procedures emerging as alternatives to conventional surgical and pharmacological treatments. This course, presents general principles of biomedical engineering as they are applied to the development of a variety of specific implantable devices.It will present relevant anatomy and physiology as part of the class discussion, which will be supplemented by a physiology reference text. Questions, exchanges of ideas, and active classroom discussion are encouraged throughout the course. Biomedical engineering is an emerging field which is highly interdisciplinary- engineers and scientists from all fields are invited and encouraged to participate in this course.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5121
**Recommended:** Prerequisite ECEN 2250 or equivalent circuits course.

**ECEN 4133 (3) Fundamentals of Computer Security**
Practice thinking like an attacker by exploring several modern computer security attacks and defenses through hands-on programming projects. Topics include applied cryptography (encryption, authentication), web security (XSS, CSRF, SQL Injection), network security (TLS, MITM attacks), application security (shell injection, buffer overflows), and other current events and trends (government surveillance, botnets, cryptocurrencies).
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4133
**Requisites:** Requires prerequisite courses of CSCI 2270 and ECEN 2360 or CSCI 2400 or ECEN 3350 (all minimum grade C-).
**Recommended:** Corequisite ECEN 3593 (Computer Organization).

**ECEN 4138 (3) Control Systems Analysis**
Analysis and design of continuous time control systems using classical and state space methods. Laplace transforms, transfer functions and block diagrams. Stability, dynamic response, and steady-state analysis. Analysis and design of control systems using root locus and frequency response methods. Computer aided design and analysis. Department enforced prerequisite: background in Laplace transforms, linear algebra,and ordinary differential equations.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 4114 and ASEN 5114 ECEN 5138 and MCEN 4138 and MCEN 5138
**Requisites:** Requires prerequisite course of ECEN 3300 or MCEN 4043 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 4224 (3) High Speed Digital Design**
Covers fundamentals of high-speed properties of logic gates, measurement techniques, transmission lines, ground planes and layer stacking, terminations, vias, power systems, connectors, ribbon cables, clock distribution and clock oscillators.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5224
**Requisites:** Requires prerequisites of ECEN 2260 and ECEN 3400 (minimum grade C-). Restricted to College of Engineering students only.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 4242 (3) Communication Theory**
Covers modern digital and analog communication systems. Analysis and design of communication signals, transmitters, channels, and receivers. Amplitude and angle modulation and demodulation are treated as well as theory and application of digital data transmission. Emphasis is also placed on the analysis and mitigation of the effects of noise through signal design at the transmitter and signal processing at the receiver.
**Requisites:** Requires prerequisite course of (ECEN 3300 or ECEN 3301) and (ECEN 3810 or APPM 3570 or MATH 4510 or STAT 3100) (all minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 4295 (3) Foundations of Quantum Hardware**
Introduces students to the principles and operation of quantum hardware. In this course you will learn how to describe many different physical systems (trapped Ions, superconducting circuits, and optical systems) mathematically. This will allow you to model quantum sensors, communication systems and computing hardware.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5295

**ECEN 4313 (3) Concurrent Programming**
Introduces the theory and practice of multicore programming. The first part of the course presents foundations of concurrent programming: mutual exclusion, wait-free and lock-free synchronization, spin locks, monitors, memory consistency models. The second part presents a sequence of concurrent data structures and techniques used in their implementations (coarse-grained, fine-grained, optimistic and lock-free synchronization).
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4313 and ECEN 5313 and CSCI 5313
**Requisites:** Requires prerequisite courses of CSCI 2270 and (ECEN 2360 or ECEN 3350 or CSCI 2400) (minimum grade C-). Restricted to College of Engineering students only.
**Recommended:** Prerequisite ECEN 3593 or CSCI 3593.

**ECEN 4322 (3) Data and Network Science**
The course covers the theory and design of algorithms that are used to model, analyze, and extract information from large scale datasets and networks. The course includes a project.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5322
**Requisites:** Prereq of(APPM 2350 or MATH 2400) (APPM 2360 or MATH 3430) (CSCI 1200 or CSCI 1300 or CSCI 1320 or ECEN 1310 or ASEN 1320 or INFO 1201 or ATLS 1300 or CHEN 1310) (ECEN 2703 or CSCI 2824 or APPM 3170 or MATH 2001)(min grade C-).Restricted to ENGR mjrs

**ECEN 4341 (3) Bioelectromagnetics**
Effects of electric and magnetic fields on biological systems are described with applications to therapy and safety. The complexity of biological systems is described to provide a better understanding of the distribution of fields inside the body. Risk analysis is also introduced.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5341
**Requisites:** Requires prerequisite courses of ECEN 3400 and (ECEN 3810 or APPM 3570 or MATH 4510 or STAT 3100) (all minimum grade C-). Restricted to College of Engineering students only.
**Additional Information:** Departmental Category: Bioengineering

**ECEN 4395 (3) Organic Electronic Materials and Devices**
Covers the materials and physics principles of organic electronic devices, including organic light emitting diodes (OLEDs), photovoltaics (OPVs), field effect transistors (OFETs), electrochemical transistors (OECTs), and bioelectronic and neuromorphic devices. The molecular, structural, and electronic properties of organic semiconductors are introduced, and the architectures and operating principles of the devices are then taught. Assignments will require computational solutions and simulations. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5395
**Recommended:** Prerequisite ECEN 5345.

**ECEN 4423 (3) Chaotic Dynamics**
Explores chaotic dynamics theoretically and through computer simulations. Covers the standard computational and analytical tools used in nonlinear dynamics and concludes with an overview of leading-edge chaos research. Topics include time and phase-space dynamics, surfaces of section, bifurcation diagrams, fractal dimension and Lyapunov exponents.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5446 and CSCI 4446 and ECEN 5423
**Requisites:** Requires prerequisite courses of (APPM 1360 or MATH 2300) and (ECEN 1310 or CSCI 1300 or ASEN 1320) and PHYS 1110 (all minimum grade C-). Restricted to College of Engineering students only.
**Recommended:** Prerequisites PHYS 1120 and CSCI 3656 and (APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135 or MATH 3130 or MATH 3135).
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 4517 (3) Power Electronics and Photovoltaic Power Systems Laboratory**
Focuses on analysis, modeling, design and testing of electrical energy processing systems in a practical laboratory setting. Studies power electronics converters for efficient utilization of available energy sources, including solar panels and utility. Experimental projects involve design, fabrication and testing of a solar power system.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5517
**Requisites:** Requires prerequisite course of ECEN 4797 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Power

**ECEN 4532 (3) Digital Signal Processing Laboratory**
Develops experience in code development, debugging and testing of real-time digital signal processing algorithms using dedicated hardware. Applications include filtering, signal synthesis, audio special effects and frequency domain techniques based on the Fast Fourier Transform.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5532
**Requisites:** Requires prerequisite course of ECEN 4632 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 4553 (3) Compiler Construction**
Introduces the principles and techniques for compiling high-level programming languages to assembly code. Topics include parsing, instruction selection, register allocation, and compiling high-level features such as polymorphism, first-class functions, and objects. Students build a complete compiler for a simple language.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5523 and CSCI 4555 and CSCI 5525
**Requisites:** Requires prerequisite courses of (ECEN 2703 or APPM 3170 or CSCI 2824 or MATH 2001) and (ECEN 2360 or ECEN 3350 or CSCI 2400) (all minimum grade C-). Restricted to College of Engineering students or Computer Engineering minors.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 4555 (3) Principles of Energy Systems and Devices**
Develops principles underlying electronic, optical and thermal devices, materials and nanostructures for renewable energy. Provides a foundation in statistical thermodynamics and uses it to analyze the operation and efficiency limits of devices for photovoltaics, energy storage (batteries & ultra-capacitors), chemical conversion (fuel cells and engines), solid state lighting, heat pumps, cooling and potentially harvesting zero-point energy from the vacuum.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5555
**Requisites:** Requires prerequisite courses of (ECEN 3810 or APPM 3570 or MATH 4510 or STAT 3100) and (PHYS 2130 or PHYS 2170) (all minimum grade C-). Restricted to College of Engineering students only.
**Additional Information:** Departmental Category: Nanostructures and Devices

**ECEN 4606 (3) Undergraduate Optics Laboratory**
Introduces fundamental concepts, techniques, and technology of modern optical and photonic systems. Individual labs cover particular fields of optical technology, including light sources such as lasers and Leds, interferometers, fiber-optic communications, photodetection, spectrometers, and holography. Practical skills such as how to align an optical system will also be emphasized.
**Requisites:** Requires prerequisite course of ECEN 3400 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Optics

**ECEN 4610 (3) Capstone Laboratory Part 1**
Hands-on laboratory experience utilizing teams in the systematic proposal, design, integration, and testing of an electronic/computer based system. Results will be the prototype of a stand-alone analog/digital system. Must have completed all required Advanced Analog Core courses for major, except one course may be taken concurrently by petition. Must take ECEN 4620 to complete the sequence. Minimum required grade for this course and ECEN 4620 is C-. IDEN majors follow different requisites and should work with their advisor for requisite planning and enrollment assistance.
**Requisites:** PrereqsECEN 2270,2370(ECEN 2360orCSCI 2400) (ECEN 3250 3300)or(ECEN 3250 3400)or(ECEN 3300 3400)or(ECEN 3753 3250)or(ECEN 3753 3300)or(ECEN 3753 3400)orIDEN-ELE prereq ECEN 2260,2270,GEEN 2400,3400 3 of: ECEN 2360,2370,3250,3300,3400 min grade C
**Additional Information:** Departmental Category: General

**ECEN 4616 (3) Optoelectronic System Design**
Examines optical components and electro-optic devices with the goal of integrating into well design optoelectronic systems. Sample systems include optical storage, zoom lenses and telescopes.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5616
**Requisites:** Requires prerequisite course of ECEN 3400 (minimum grade C-).
**Additional Information:** Departmental Category: Optics

**ECEN 4620 (3) Capstone Lab, Part 2**
Hands-on laboratory experience for teams in the systematic proposal, design, build integration, test and documentation of an electronic/computer based system. Results will be a reliably operating, stand-alone analog/digital system, with publication quality technical documentation. Department enforced prerequisite: advanced analog core courses.
**Requisites:** Requires prerequisite course of ECEN 4610 (minimum grade C-).
**Additional Information:** Departmental Category: General

**ECEN 4632 (3) Introduction to Digital Filtering**
Covers both the analysis and design of FIR and IIR digital filters. Discusses implementations in both software and hardware. Emphasizes use of the FFT as an analysis tool. Includes examples in speech processing, noise canceling, and communications.
**Requisites:** Requires prerequisite course of ECEN 3300 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 4634 (3) Microwave and RF Laboratory**
This course is a hands-on introduction to RF and microwave topics, from fundamentals including vector network analyzer (VNA) calibration and operation, power measurements, and antenna characterization, to system-level topics such as RADAR systems and superheterodyne links. Students work in small groups on weekly experiments based on both coaxial and waveguide setups. An understanding of electromagnetic waves (such as covered in ECEN 3400 and ECEN 3410) is assumed. The graduate version of the course (ECEN 5634) includes additional homework and exam problems and extended laboratory exercises compared to ECEN 4634.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5634
**Requisites:** Requires prerequisite course of ECEN 3410 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 4638 (3) Control Systems Laboratory**
Provides experience in control system design and analysis, using both real hardware and computer simulation. Covers the entire control system design cycle: modeling the system, synthesizing a controller, conducting simulations, analyzing the design to suggest modifications and improvements, and implementing the design for actual testing.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5638, MCEN 4638, and MCEN 5638
**Requisites:** Requires prerequisite course of ECEN 4138 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 4693 (3) Advanced Computer Architecture**
Provides a broad-scope treatment of important concepts in the design and implementation of high-performance computer systems. Discusses important issues in the pipelining of a processor, out-of-order instruction issue and superscalar designs, design of cache memory systems for such systems, and architectural features required for multicore processor designs. Also studies current and historically important computer architectures.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5593 and CSCI 5593
**Requisites:** Requires prerequisite course of ECEN 3593 or CSCI 3593 (minimum grade C-). Restricted to ECEN or EEEN majors and Computer Engineering minors.
**Recommended:** Prerequisite knowledge of C/C++ and Assembly programming languages, and computer organization and experience using a Linux system for programming and its associated capabilities of compilation and debugging.

**ECEN 4720 (1) Practical Printed Circuit Board Design Accelerator**
This course introduces students to the most important skills needed to convert a back-of-the-napkin circuit sketch into a working widget with first time success. Students will learn the seven steps in every board project: planning, selecting components, schematic entry, layout, assembly, bring up and debug, and documentation. This process will be exercised with a custom board design project. A commercial EDA tool widely used in the electronics industry will be used for the project. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5720 ECEN 3730 or ECEN 5730
**Requisites:** Requires prerequisite courses of ECEN 2250 and ECEN 2260 and ECEN 2270 (all minimum grade C-).

**ECEN 4732 (3) Deep Learning and Its Connections to Information Theory**
Provides a hands-on introduction to deep learning using Python and explores related concepts in information theory to guide the design of neural networks. Covers basic and advanced mechanisms and architectures of neural networks such as Transformers, an introduction to related concepts in information theory, and information theory-guided neural network design and optimization.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5732
**Requisites:** Prerequisite or corequisite of ECEN 3810 Introduction to Probability Theory.

**ECEN 4752 (3) Communication Laboratory**
Analysis and design of realistic communication signals in a modern digital signal processing environment. Covers both analog and digital communication signals with and without noise and distortion. Pulse amplitude modulation is used initially at baseband and then combined with amplitude and phase/frequency modulation to produce the kind of bandpass signals that are used in cell phones and wireless data networks. Formerly ECEN 4652.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5752
**Requisites:** Requires prerequisite course of ECEN 4242 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 4753 (3) Computer Performance Modeling**
Presents a broad range of system measurement and modeling techniques, emphasizing applications to computer systems. Covers topics including system measurement, workload characterization and analysis of data; design of experiments; queuing theory and queuing network models; and simulation.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5753 and CSCI 4753 and ECEN 5753
**Requisites:** Requires prerequisite course of CSCI 3753 or ECEN 3753 (minimum grade C-). Restricted to College of Engineering students only.
**Recommended:** Prerequisite a course in statistics.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 4763 (3) Embedded Software Algorithms**
Embedded Systems are defined by resource restrictions that could include computational performance, energy, memory space, and cost. These algorithms need to be evaluated against the targeted end-system constraints. Applications in many areas of real-time decision-making are discussed, from hybrid vehicle battery usage to queue management systems in real-time-priced tollways, aircraft holding patterns, and hard disk drive performance optimization. This is a programming course.
**Requisites:** Requires prerequisite courses of (ECEN 2370 or ECEN 3360) and CSCI 2270 (all minimum grade C-). Restricted to College of Engineering students only.

**ECEN 4797 (3) Introduction to Power Electronics**
An introduction to switched-mode converters. Includes steady-state converter modeling and analysis, switch realization, discontinuous conduction mode and transformer-isolated converters. Ac modeling of converters using averaged methods, small-signal transfer functions, feedback loop design and transformer design.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5797
**Requisites:** Requires prerequisite course of ECEN 3250 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Power

**ECEN 4827 (3) Analog IC Design**
Covers the fundamentals of transistor-level analog integrated circuit design. Starting with motivations from application circuits, the course develops principles of dc biasing, device models, amplifier stages, frequency response analysis and feedback and compensation techniques for multi-stage operational amplifiers.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5827
**Requisites:** Requires prerequisite course of ECEN 3250 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Power

**ECEN 4840 (1-6) Independent Study**
Offers an opportunity for seniors to do independent, creative work. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General

**ECEN 4841 (1-6) Independent Study**
Offers an opportunity for seniors to do independent, creative work.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ECEN 4925 (3) Foundations of Quantum Hardware**
Introduces students to the principles and operation of quantum hardware. In this course you will learn how to describe many different physical systems (trapped Ions, superconducting circuits, and optical systems) mathematically. This will allow you to model quantum sensors, communication systems and computing hardware.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5295
**Requisites:** Requires prerequisite courses of ECEN 3915 OR (pre-req PHYS 3220 AND co-Req PHYS 4410) (all minimum grade C-). Restricted to College of Engineering students or Quantum Engineering minors.

**ECEN 4933 (3) Engineering Genetic Circuits**
Presents recent research into methods and software tools for the modeling, analysis, and design of genetic circuits that are enabling the new field of synthetic biology. Teaches both biological and engineering principles in order to enable collaborations between engineers and biologists working in the field of synthetic biology.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5933
**Recommended:** Prerequisite some familiarity with genetics, cell biology, molecular biology or biochemistry or familiarity with engineering methods for modeling, analysis and design, but students are not expected to have knowledge in both.

# Electrical and Computer Engineering - Bachelor of Science (BSEC)

A degree in electrical and computer engineering provides graduates the opportunity to enter the profession of engineering and to engage in work as a design, production, testing, consulting, research, teaching, or management professional in a wide variety of careers in the computer industry, embedded systems, telecommunications, instruments, the power and renewable energy industry, the biomedical industry, aerospace and academia. Some graduates also go on to develop careers in other professions like law and medicine.

Examples of career opportunities include development of new electrical or electronic devices, instruments or products; design of equipment or systems; production and quality control of electrical products for private industry or government; sales or management for a private firm or government; and teaching and research in a university.

# Colorado Mesa University/University of Colorado Boulder Partnership Program (Electrical & Computer Engineering)

Colorado Mesa University (CMU) (http://www.coloradomesa.edu/engineering/) and CU Boulder have created a partnership to deliver specific engineering baccalaureate programs **in their entirety in Grand Junction**, Colorado. The first two years of coursework are taught by CMU faculty and the second two years of coursework are taught by CU Boulder

faculty located in Grand Junction. Students completing the programs will be awarded a Bachelor of Science from CU Boulder.

Degrees are offered in civil engineering, electrical & computer engineering, and mechanical engineering, with additional details on the engineering partnership program website (https://www.coloradomesa.edu/engineering/partnership-program/).

Coursework requirements and plans of study specific to this partnership can be found on the Colorado Mesa University electrical and computer engineering partnership website (https://www.coloradomesa.edu/engineering/degrees/electrical-computer-engineering.html). Learn more about this program on the CU Boulder partnership website (https://www.colorado.edu/academics/cmu-cu-bs-electrical-computer-engineering/).

# Requirements

Required courses in engineering, physical science and mathematics are interwoven throughout the curriculum to provide a balanced education in the fundamentals of the electrical engineering profession. The core courses are complemented by technical electives, humanities and social sciences electives (http://www.colorado.edu/engineering/academics/policies/hss/), free electives and a writing course (http://www.colorado.edu/engineering/academics/policies/hss/) for a total of 128 credits required for the degree. Electrical and Computer Engineering is also offered in partnership with Colorado Mesa University (https://www.coloradomesa.edu/engineering/partnership-program/) in Grand Junction, Colorado. Specific coursework requirements and plans of study can be found on the partnership website (https://www.coloradomesa.edu/engineering/degrees/electrical_computer-engineering-partnership.html).

A BS in Electrical & Computer Engineering *cannot* be earned in combination with a BS in Electrical Engineering or Integrated Design Engineering, Electrical Emphasis. A BS in Electrical & Computer Engineering also cannot be completed alongside any of the following minors: electrical engineering, computer engineering and signals & systems engineering.

## Prerequisites and Passing Grades

All courses must be taken for a letter grade. The minimum passing grade for a course that is a prerequisite or corequisite for another required course is C-. If a grade of D+ or lower is received in a course which is a prerequisite to another, the student may not register for the subsequent course until the first grade has been raised to a C- or higher. If a grade of D+ or lower is received in a course which is a corequisite to another, the course must be repeated until a grade of C- or higher is achieved. ECEN 4610 Capstone Laboratory Part 1 and ECEN 4620 Capstone Lab, Part 2 both require a grade of C- or higher for graduation.

The minimum passing grade for a course that is not specifically a prerequisite or corequisite for another required course is D-.

The Electrical, Computer and Energy Engineering Department reserves the right to drop students enrolled in ECEN courses who have not met the minimum prerequisite requirements. It is the student's responsibility to communicate with the department if summer coursework and/or transfer credit will be used to meet the prerequisite requirement.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Humanities, Social Sciences and Writing** | | |
| Writing [1] | | 3 |
| Humanities & Social Sciences - at least 6 credits must be upper-division (3000-level or higher) [1] | | 15 |
| **Math and Science** | | |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or MATH 1300 | Calculus 1 | |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| or MATH 2300 | Calculus 2 | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| or MATH 2400 | Calculus 3 | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| or MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |
| or MATH 2135 & MATH 3430 | Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations | |
| ECEN 3810 | Introduction to Probability Theory | 3 |
| or APPM 3570 | Applied Probability | |
| or STAT 3100 | Applied Probability | |
| or MATH 4510 | Introduction to Probability Theory | |
| PHYS 1110 | General Physics 1 | 4 |
| or PHYS 1115 | General Physics 1 for Majors | |
| PHYS 1120 | General Physics 2 | 4 |
| or PHYS 1125 | General Physics 2 for Majors | |
| PHYS 1140 | Experimental Physics 1 | 1 |
| General Science Elective [2] | | 3 |
| **Electrical & Computer Engineering** | | |
| ECEN 1100 | Exploring ECE | 1 |
| or AREN 1316 | Introduction to Architectural Engineering | |
| or BMEN 1000 | Exploring Biomedical Engineering | |
| or CHEN 1300 | Introduction to Chemical and Biological Engineering | |
| or CSCI 1000 | Computer Science as a Field of Work and Study | |
| or CVEN 1317 | Introduction to Civil and Environmental Engineering | |
| or EVEN 1000 | Introduction to Environmental Engineering | |
| ECEN 1400 | Introduction to Digital and Analog Electronics | 3 |
| or GEEN 1400 | Engineering Projects | |
| or ASEN 1400 | Gateway to Space | |
| or ASEN 1403 | Introduction to Rocket Engineering | |
| or GEEN 2400 | Engineering Projects for the Community | |
| ECEN 1310 | Introduction to C Programming | 4 |
| or CSCI 1300 | Computer Science 1: Starting Computing | |
| ECEN 2703 | Discrete Mathematics for Computer Engineers | 3 |
| or APPM 3170 | Discrete Applied Mathematics | |

| | | |
|---|---|---|
| or CSCI 2824 | Discrete Structures | |
| or MATH 2001 | Introduction to Discrete Mathematics | |
| CSCI 2270 | Computer Science 2: Data Structures | 4 |
| or CSCI 2275 | Programming and Data Structures | |
| ECEN 2250 | Introduction to Circuits and Electronics | 3 |
| ECEN 2260 | Circuits as Systems | 3 |
| ECEN 2270 | Electronics Design Lab | 3 |
| ECEN 2350 | Digital Logic | 4 |
| ECEN 2360 | Programming Digital Systems | 3 |
| or CSCI 2400 | Computer Systems | |
| ECEN 2370 | Embedded Software Engineering | 3 |
| ECEN 3753 | Real-Time Operating Systems | 3 |
| or CSCI 3753 | Design and Analysis of Operating Systems | |
| ECEN/CSCI 3593 | Computer Organization | 3 |
| ECEN 4610 | Capstone Laboratory Part 1 | 3 |
| ECEN 4620 | Capstone Lab, Part 2 | 3 |
| *Sophomore Elective* | | *3* |
| Choose one from: | | |
| ECEN 2410 | Renewable Sources and Efficient Electrical Energy Systems | |
| ECEN 2420 | Electronics for Wireless Systems | |
| ECEN 2440 | Application of Embedded Systems | |
| ECEN 2450 | Electronic and Semiconductor Device Laboratory | |
| *Advanced Analog Core* | | *3* |
| Choose one from: | | |
| ECEN 3250 | Microelectronics | |
| ECEN 3300 | Linear Systems | |
| ECEN 3400 | Electromagnetic Fields and Waves | |
| **Additional Electives** | | |
| *Software Elective* | | *3* |
| Choose one from: | | |
| ECEN 3303/ CSCI 3302 | Introduction to Robotics | |
| ECEN 4133 | Fundamentals of Computer Security | |
| ECEN 4313 | Concurrent Programming | |
| ECEN 4322 | Data and Network Science | |
| ECEN 4553 | Compiler Construction | |
| CSCI 3002 | Fundamentals of Human Computer Interaction | |
| CSCI 3104 | Algorithms | |
| CSCI 3202 | Introduction to Artificial Intelligence | |
| CSCI 3287 | Design and Analysis of Database Systems | |
| CSCI 3308 | Software Development Methods and Tools | |
| CSCI 4113 | Linux System Administration | |
| CSCI 4253 | Datacenter Scale Computing - Methods, Systems and Techniques | |
| CSCI 4273 | Network Systems | |
| CSCI 4413 | Computer Security and Ethical Hacking | |
| CSCI 4446 | Chaotic Dynamics | |
| *Advanced Concentration Electives (ACE)* | | *6* |
| Complete 6 credits of Advanced Concentration Elective coursework - at least 3 credits must be 4000-level or higher [3] | | |
| *Technical Electives* | | *12* |
| Complete 12 credits of Technical Elective coursework - at least 9 credits must be upper-division (3000-level or higher) [4] | | |
| *Free Electives* | | *6* |
| Complete 6 credits of Free Electives to meet the minimum 128 credit hours required for the BS degree. | | |
| **Total Credit Hours** | | **128** |

1. Refer to the College's Humanities, Social Sciences and Writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/) webpage.
2. Refer to ECEE's General Science Electives webpage (https://www.colorado.edu/ecee/students/undergraduate-students/advising/general-science-electives/).
3. Refer to ECEE's Advanced Concentration Electives (https://www.colorado.edu/ecee/students/undergraduate-students/advising/advanced-concentration-electives-ace/) webpage.
4. Refer to ECEE's Technical Electives (https://www.colorado.edu/ecee/students/undergraduate-students/advising/technical-electives/)webpage.

# Recommended Four-Year Plan of Study

The following information represents a sample eight-semester sequence of study only. Up-to-date curricular information and policies can be found on the ECEE Advising website. (https://www.colorado.edu/ecee/undergraduate-program/advising/)

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| ECEN 1100 | Exploring ECE | 1 |
| ECEN 1400 | Introduction to Digital and Analog Electronics | 3 |
| PHYS 1110 | General Physics 1 | 4 |
| COEN 1500 | CEAS First Year Seminar | 1 |
| Humanities & Social Sciences Elective [1] | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| PHYS 1120 | General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| ECEN 1310 | Introduction to C Programming | 4 |
| Humanities & Social Sciences Elective [1] | | 2 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| ECEN 2250 | Introduction to Circuits and Electronics | 3 |
| ECEN 2350 | Digital Logic | 4 |
| CSCI 2270 | Computer Science 2: Data Structures | 4 |

| | | |
|---|---|---|
| Humanities & Social Sciences Elective [1] | | 3 |
| | **Credit Hours** | **18** |
| **Spring Semester** | | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| ECEN 2260 | Circuits as Systems | 3 |
| ECEN 2270 | Electronics Design Lab | 3 |
| ECEN 2360 | Programming Digital Systems | 3 |
| ECEN 24XX | Sophomore Elective [2] | 3 |
| | **Credit Hours** | **16** |
| **Year Three** | | |
| **Fall Semester** | | |
| ECEN 2370 | Embedded Software Engineering | 3 |
| ECEN 2703 | Discrete Mathematics for Computer Engineers | 3 |
| ECEN 3810 | Introduction to Probability Theory | 3 |
| ECEN 3XXX | Advanced Analog Core [3] | 3 |
| General Science Elective [4] | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ECEN 3593 | Computer Organization | 3 |
| ECEN 3753 | Real-Time Operating Systems | 3 |
| Software Elective [5] | | 3 |
| Technical Elective [6] | | 3 |
| College-Approved Writing Course [1] | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **18** |
| **Year Four** | | |
| **Fall Semester** | | |
| ECEN 4610 | Capstone Laboratory Part 1 | 3 |
| Advanced Concentration Elective [7] | | 3 |
| Technical Elective [6] | | 3 |
| Free Elective | | 3 |
| Humanities & Social Sciences Elective [1] | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ECEN 4620 | Capstone Lab, Part 2 | 3 |
| Advanced Concentration Elective [7] | | 3 |
| Technical Elective [6] | | 3 |
| Technical Elective [6] | | 3 |
| Humanities & Social Sciences Elective [1] | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **128** |

1. Refer to the College's Humanities, Social Sciences, and Writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/) webpage.
2. Refer to ECEE's Sophomore Electives (https://www.colorado.edu/ecee/students/undergraduate-students/advising/sophomore-electives/) webpage.
3. The three options for Advanced Analog Core courses are ECEN 3250, ECEN 3300 and ECEN 3400.
4. Refer to ECEE's General Science Electives webpage (https://www.colorado.edu/ecee/students/undergraduate-students/advising/general-science-electives/).
5. Refer to ECEE's Software (https://www.colorado.edu/ecee/students/undergraduate-students/advising/software-electives/)Electives (https://www.colorado.edu/ecee/students/undergraduate-students/advising/sophomore-electives/) webpage.
6. Refer to ECEE's Technical Electives (https://www.colorado.edu/ecee/students/undergraduate-students/advising/technical-electives/)webpage.
7. Refer to ECEE's Advanced Concentration Electives (https://www.colorado.edu/ecee/students/undergraduate-students/advising/advanced-concentration-electives-ace/) webpage.

# Program Educational Objectives

The following set of program objectives for the Electrical and Computer Engineering program was developed by our faculty and our other stakeholders.

During the first several years after completion of their baccalaureate studies,

- ECE-1: Graduates will be situated in growing careers involving the design, development or support of electrical, electronic, and computer hardware and software systems, software engineering, devices, instruments, or products, or will be successfully pursuing an advanced degree.
- ECE-2: Graduates will have advanced in professional standing based on their technical accomplishments and will have accumulated additional technical expertise to remain globally competitive.
- ECE-3: Graduates will have demonstrated professional and personal leadership and growth.

The EE curriculum is designed to prepare our graduates to meet these objectives as follows:

- ECE-1: Graduates will be situated in growing careers involving the design, development or support of electrical, electronic, and computer hardware and software systems, software engineering, devices, instruments, or products, or will be successfully pursuing an advanced degree.

  Graduates attaining the ECE degree will have comprehensive knowledge and experience in the concepts and design of electrical, electronic, and computer devices, circuits, and systems. Besides emphasizing computer hardware and software, the ECE curriculum also emphasizes design, integration, and application of computer systems, as well as experience in software development. This is achieved through a sequence of required courses in these areas, culminating in a major design project incorporating realistic engineering constraints. The curriculum also provides opportunities for specialization in areas such as compiler design, embedded systems, software engineering, and VLSI design, as well as in the electrical engineering specialities.

  ECE graduates will have attained other professional skills that will be useful throughout their careers, including verbal and written communication and the ability to function on multi-disciplinary teams.

  The ECE curriculum is rich in laboratory work. ECE graduates will have achieved extensive practical experience in the laboratory

techniques, tools, and skills that provide a bridge between theory and practice.

- ECE-2: Graduates will have advanced in professional standing based on their technical accomplishments and will have accumulated additional technical expertise to remain globally competitive.

  ECE graduates experience a curriculum that contains a broad core of classes focused on mathematical and physical principles that are fundamental to the fields of electrical and computer engineering. Hence, they understand the physical and mathematical principles underlying electrical and electronic technology and computer systems and are able to analyze and solve electrical and computer engineering problems using this knowledge. In addition to basic classes in mathematics, science, and computing, the ECE curriculum includes a sequence of courses in analog and digital electronic circuits and systems, and electromagnetic fields, probability, computer software, and computer design and architecture.

- ECE-3: Graduates will have demonstrated professional and personal leadership and growth.

  To lay the foundation for a long career in a rapidly changing field, a broad background of fundamental knowledge is required. This is achieved in the ECE curriculum through a sequence of required classes in mathematics, physics, and the ECE core. In addition, the graduate must be capable of lifelong learning; this is taught through assignments and projects that require independent research and study.

  The curriculum includes a significant component of electives in the humanities and social sciences. ECE graduates will have knowledge of the broader contemporary issues that impact engineering solutions in a global and societal context. They will have the verbal and written communications skills necessary for a successful career in industry or academia. Graduates also understand the meaning and importance of professional and ethical responsibility.

# Student Outcomes

The ECE curriculum is designed to prepare our graduates to meet these as follows:

- An ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics.
- An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.
- An ability to communicate effectively with a range of audiences.
- An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.
- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## Admissions Requirements

### BS in Electrical and Computer Engineering, MS in Electrical Engineering

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.000 or higher.
- Complete all prerequisite courses with a minimum grade of solid B for 5000-level coursework taken as an undergraduate student; minimum of solid C for undergraduate coursework.
- Have completed 9-10 core ECEN courses (see BAM degree (https://www.colorado.edu/ecee/academics/undergraduate-programs/bachelors-accelerated-masters/) website for more information).
- Have at least junior class standing.

### BS in Electrical and Computer Engineering, Professional ME in Engineering Management

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.000 or higher.
- Have at least junior class standing.

## Program Requirements

For all programs above, students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only 6 credits of coursework may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

Students can refer to the Electrical & Computer Engineering/Electrical Engineering BAM (https://www.colorado.edu/ecee/academics/undergraduate-programs/bachelors-accelerated-masters/) and Engineering Management BAM (https://www.colorado.edu/emp/graduate-programs/bachelors-accelerated-masters-bam/) webpages for more information.

# Electrical Engineering - Bachelor of Science (BSEE)

A degree in electrical engineering provides graduates the opportunity to enter the profession of engineering and to engage in work as a design, production, testing, consulting, research, teaching or management professional in a wide variety of careers in the computer industry, embedded systems, telecommunications, instruments, the power and renewable energy industry, the biomedical industry, aerospace and academia. Some graduates also go on to develop careers in other professions like law and medicine.

Examples of career opportunities include development of new electrical or electronic devices, instruments or products; design of equipment or systems; production and quality control of electrical products for private industry or government; sales or management for a private firm or government; and teaching and research in a university.

## Requirements

Required courses in engineering, physical science and mathematics are interwoven throughout the curriculum to provide a balanced education in the fundamentals of the electrical engineering profession. The core courses are complemented by technical electives, humanities and social sciences electives (http://www.colorado.edu/engineering/academics/policies/hss/), free electives and a writing course (http://www.colorado.edu/engineering/academics/policies/hss/) for a total of 128 credits required for the degree.

A Bachelor's of Science in Electrical Engineering cannot be earned in combination with a BS in Electrical & Computer Engineering or Integrated Design Engineering-Electrical Emphasis. A BS in Electrical Engineering also cannot be completed alongside any of the following minors: electrical engineering, computer engineering and signals & systems engineering.

## Prerequisites and Passing Grades

All courses must be taken for a letter grade. The minimum passing grade for a course that is a prerequisite or corequisite for another required course is C-. If a grade of D+ or lower is received in a course which is a prerequisite to another, the student may not register for the subsequent course until the first grade has been raised to a C- or higher. If a grade of D+ or lower is received in a course which is a corequisite to another, the course must be repeated until a grade of C- or higher is achieved. ECEN 4610 Capstone Laboratory Part 1 and ECEN 4620 Capstone Lab, Part 2 both require a grade of C- or higher for graduation.

The minimum passing grade for a course that is not specifically a prerequisite or corequisite for another required course is D-.

The Electrical, Computer and Energy Engineering Department reserves the right to drop students enrolled in ECEN courses who have not met the minimum prerequisite requirements. It is the student's responsibility to communicate with the department if summer coursework and/or transfer credit will be used to meet the prerequisite requirement.

### Required Courses

| Code | Title | Credit Hours |
|---|---|---|
| **Humanities, Social Sciences and Writing** | | |
| Writing [1] | | 3 |
| Humanities & Social Sciences - at least 6 credits must be upper-division (3000-level or higher) [1] | | 15 |
| **Math and Science** | | |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or MATH 1300 | Calculus 1 | |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| or MATH 2300 | Calculus 2 | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| or MATH 2400 | Calculus 3 | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| or MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |
| or MATH 2135 & MATH 3430 | Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations | |
| ECEN 3810 | Introduction to Probability Theory | 3 |
| or APPM 3570 | Applied Probability | |
| or STAT 3100 | Applied Probability | |
| or MATH 4510 | Introduction to Probability Theory | |
| PHYS 1110 | General Physics 1 | 4 |
| or PHYS 1115 | General Physics 1 for Majors | |
| PHYS 1120 | General Physics 2 | 4 |
| or PHYS 1125 | General Physics 2 for Majors | |
| PHYS 1140 | Experimental Physics 1 | 1 |
| General Science Elective [2] | | 3 |
| **Electrical Engineering** | | |
| ECEN 1100 | Exploring ECE | 1 |
| or AREN 1316 | Introduction to Architectural Engineering | |
| or BMEN 1000 | Exploring Biomedical Engineering | |
| or CHEN 1300 | Introduction to Chemical and Biological Engineering | |
| or CSCI 1000 | Computer Science as a Field of Work and Study | |
| or CVEN 1317 | Introduction to Civil and Environmental Engineering | |
| or EVEN 1000 | Introduction to Environmental Engineering | |
| ECEN 1400 | Introduction to Digital and Analog Electronics | 3 |
| or GEEN 1400 | Engineering Projects | |
| or ASEN 1400 | Gateway to Space | |
| or ASEN 1403 | Introduction to Rocket Engineering | |
| or GEEN 2400 | Engineering Projects for the Community | |
| ECEN 1310 | Introduction to C Programming | 4 |
| or CSCI 1300 | Computer Science 1: Starting Computing | |
| ECEN 2250 | Introduction to Circuits and Electronics | 3 |
| ECEN 2260 | Circuits as Systems | 3 |
| ECEN 2270 | Electronics Design Lab | 3 |
| ECEN 2350 | Digital Logic | 4 |
| ECEN 2360 | Programming Digital Systems | 3 |
| or CSCI 2400 | Computer Systems | |
| ECEN 2370 | Embedded Software Engineering | 3 |
| ECEN 3250 | Microelectronics | 3 |

| | | |
|---|---|---|
| ECEN 3300 | Linear Systems | 3 |
| ECEN 3400 | Electromagnetic Fields and Waves | 3 |
| ECEN 4610 | Capstone Laboratory Part 1 | 3 |
| ECEN 4620 | Capstone Lab, Part 2 | 3 |
| *Sophomore Electives* | | |
| Choose two: | | 6 |
| ECEN 2410 | Renewable Sources and Efficient Electrical Energy Systems | |
| ECEN 2420 | Electronics for Wireless Systems | |
| ECEN 2440 | Application of Embedded Systems | |
| ECEN 2450 | Electronic and Semiconductor Device Laboratory | |
| **Additional Electives** | | |
| *Advanced Concentration Electives* | | *12* |
| Complete 12 credits of Advanced Concentration Elective coursework - at least 6 credits must be 4000-level or higher [3] | | |
| *Technical Electives* | | *12* |
| Complete 12 credits of Technical Elective coursework - at least 9 credits must be upper-division (3000-level or higher) [4] | | |
| *Free Electives* | | *7* |
| Complete 7 credits of Free Electives to meet the minimum 128 credit hours required for the BS degree. | | |
| **Total Credit Hours** | | **128** |

1. Refer to the College's Humanities, Social Sciences, and Writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/) webpage.
2. Refer to ECEE's General Science Electives (https://www.colorado.edu/ecee/students/undergraduate-students/advising/general-science-electives/) webpage.
3. Refer to ECEE's Advanced Concentration Electives (https://www.colorado.edu/ecee/students/undergraduate-students/advising/advanced-concentration-electives-ace/) webpage.
4. Refer to ECEE's Technical Electives (https://www.colorado.edu/ecee/students/undergraduate-students/advising/technical-electives/) webpage.

# Sample Four-Year Plan of Study

The following information represents a sample 8-semester sequence of study only. Up-to-date curricular information and policies can be found on the ECEE Advising website (https://www.colorado.edu/ecee/undergraduate-program/advising/).

| **Year One** | | |
|---|---|---|
| **Fall Semester** | | **Credit Hours** |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| ECEN 1100 | Exploring ECE | 1 |
| ECEN 1400 | Introduction to Digital and Analog Electronics | 3 |
| PHYS 1110 | General Physics 1 | 4 |
| Humanities/Social Sciences Elective [1] | | 3 |
| COEN 1500 | CEAS First Year Seminar | 1 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| ECEN 1310 | Introduction to C Programming | 4 |
| PHYS 1120 | General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| Humanities & Social Sciences Elective [1] | | 2 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| ECEN 2250 | Introduction to Circuits and Electronics | 3 |
| ECEN 2350 | Digital Logic | 4 |
| ECEN 24XX Sophomore Elective [2] | | 3 |
| Humanities & Social Sciences Elective [1] | | 3 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| ECEN 2260 | Circuits as Systems | 3 |
| ECEN 2270 | Electronics Design Lab | 3 |
| ECEN 2360 | Programming Digital Systems | 3 |
| ECEN 24XX Sophomore Elective [2] | | 3 |
| | **Credit Hours** | **16** |
| **Year Three** | | |
| **Fall Semester** | | |
| ECEN 2370 | Embedded Software Engineering | 3 |
| ECEN 3810 | Introduction to Probability Theory | 3 |
| ECEN 3XXX Advanced Analog Core [3] | | 3 |
| ECEN 3XXX Advanced Analog Core [3] | | 3 |
| General Science Elective [4] | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ECEN 3XXX Advanced Analog Core [3] | | 3 |
| Advanced Concentration Elective [6] | | 3 |
| Technical Elective [5] | | 3 |
| Technical Elective [5] | | 3 |
| College-Approved Writing Course [1] | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **18** |
| **Year Four** | | |
| **Fall Semester** | | |
| ECEN 4610 | Capstone Laboratory Part 1 | 3 |
| Advanced Concentration Elective [6] | | 3 |
| Advanced Concentration Elective [6] | | 3 |
| Humanities & Social Sciences Elective [1] | | 3 |
| Free Elective | | 4 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| ECEN 4620 | Capstone Lab, Part 2 | 3 |
| Advanced Concentration Elective [6] | | 3 |
| Technical Elective [5] | | 3 |
| Technical Elective [5] | | 3 |

| | |
|---|---|
| Humanities & Social Sciences Elective [1] | 3 |
| **Credit Hours** | **15** |
| **Total Credit Hours** | **128** |

1 Refer to the College's Humanities, Social Sciences, and Writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/) webpage.

2 Refer to ECEE's Sophomore Electives (https://www.colorado.edu/ecee/students/undergraduate-students/advising/sophomore-electives/) webpage.

3 The three options for Advanced Analog Core courses are ECEN 3250, ECEN 3300 and ECEN 3400.

4 Refer to ECEE's General Science Electives webpage (https://www.colorado.edu/ecee/students/undergraduate-students/advising/general-science-electives/).

5 Refer to ECEE's Technical (https://www.colorado.edu/ecee/students/undergraduate-students/advising/technical-electives/)Electives (https://www.colorado.edu/ecee/students/undergraduate-students/advising/sophomore-electives/) webpage.

6 Refer to ECEE's Advanced Concentration (https://www.colorado.edu/ecee/students/undergraduate-students/advising/advanced-concentration-electives-ace/)Electives (https://www.colorado.edu/ecee/students/undergraduate-students/advising/sophomore-electives/) webpage.

# Learning Outcomes

During the first several years after completion of their baccalaureate studies:

- Graduates will be situated in growing careers involving the design, development or support of electrical or electronic systems, devices, instruments, or products, or will be successfully pursuing an advanced degree.
- Graduates will have advanced in professional standing based on their technical accomplishments and will have accumulated additional technical expertise to remain globally competitive.
- Graduates will have demonstrated professional and personal leadership and growth.

The electrical engineering curriculum is designed to prepare graduates to meet these objectives as follows:

- Graduates will be situated in growing careers involving the design, development or support of electrical or electronic systems, devices, instruments, or products, or will be successfully pursuing an advanced degree.
  - Graduates attaining the electrical engineering degree will have comprehensive knowledge and experience in the concepts and design of electrical and electronic devices, circuits and systems. This is achieved through a sequence of required courses in these areas, culminating in a major design project incorporating realistic engineering constraints. Moreover, graduates will have advanced, specialized knowledge and skills in elective areas such as communications and digital signal processing, control systems, analog and digital integrated circuit design, semiconductor devices and optoelectronics, electromagnetics and wireless systems, power electronics and renewable energy, bioelectronics and digital systems.
  - Electrical engineering graduates will have attained other professional skills that will be useful throughout their careers, including verbal and written communication and the ability to function on multi-disciplinary teams.
  - The electrical engineering curriculum is rich in laboratory work. Graduates will have achieved extensive practical experience in the laboratory techniques, tools and skills that provide a bridge between theory and practice.
- Graduates will have advanced in professional standing based on their technical accomplishments and will have accumulated additional technical expertise to remain globally competitive.
  - Electrical engineering graduates experience a curriculum that contains a broad core of classes focused on mathematical and physical principles that are fundamental to the field of electrical engineering. Hence, they understand the physical and mathematical principles underlying electrical and electronic technology, and are able to analyze and solve electrical engineering problems using this knowledge. In addition to basic classes in mathematics, science and computing, the electrical engineering curriculum includes a sequence of courses in analog and digital electronic circuits and systems and electromagnetic fields.
- Graduates will have demonstrated professional and personal leadership and growth.
  - To lay the foundation for a long career in a rapidly changing field, a broad background of fundamental knowledge is required. This is achieved in the electrical engineering curriculum through a sequence of required classes in mathematics, physics, and the electrical engineering core. In addition, the graduate must be capable of lifelong learning; this is taught through assignments and projects that require independent research and study.
  - The curriculum includes a significant component of electives in the humanities and social sciences. EE graduates will have knowledge of the broader contemporary issues that impact engineering solutions in a global and societal context. They will have the verbal and written communications skills necessary for a successful career in industry or academia. Graduates also understand the meaning and importance of professional and ethical responsibility.

# Student Outcomes

By the completion of the program, students will be able to:

- Identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics.
- Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.
- Communicate effectively with a range of audiences.
- Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.
- Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives.
- Develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions.

- Acquire and apply new knowledge as needed, using appropriate learning strategies.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## Admissions Requirements

### BS and MS in Electrical Engineering

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.000 or higher.
- Complete all prerequisite courses with a minimum grade of solid B for 5000-level coursework taken as an undergraduate student; minimum of solid C for undergraduate coursework.
- Have completed 9-10 core ECEN courses (see BAM degree (https://www.colorado.edu/ecee/academics/undergraduate-programs/bachelors-accelerated-masters/) website for more information).
- Have at least junior class standing.

### BS in Electrical Engineering, Professional ME in Engineering Management

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.000 or higher.
- Have at least junior class standing.

## Program Requirements

For all programs above, students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only six credits of coursework may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

Students can refer to the Electrical & Computer Engineering/Electrical Engineering BAM (https://www.colorado.edu/ecee/academics/undergraduate-programs/bachelors-accelerated-masters/) and Engineering Management BAMwebpages for more information.

# Computer Engineering - Minor

The minor in computer engineering provides training in computer engineering beyond the training usually received by science and mathematics majors. It can also broaden the training of students majoring in other engineering and applied science fields to provide more depth in computer engineering. The goal is to introduce students to the fundamentals of computer engineering and introduce them to a more advanced field. Such skills are important to students who expect to participate in real world situations that increasingly involve computer engineering solutions.

# Requirements

The computer engineering minor requires a minimum of 20 credit hours.

A minor in computer engineering can be earned in conjunction with any CU Boulder major, except for BS degrees in electrical engineering, electrical & computer engineering and integrated design engineering-electrical emphasis. The computer engineering minor cannot be completed alongside the following minors: computer science, electrical engineering and signals & systems engineering.

## Prerequisites

Students must be currently enrolled or have already completed one of these computing courses with a C- or higher before declaring the minor: ECEN 1310, CSCI 1300, APPM 3050, PHYS 2600 or similar.

## Grade Requirements

A minimum cumulative GPA of 2.000 is required in the courses used to satisfy the minor requirements. Each individual course that is counted toward this minor must be passed with a grade of D- or higher (note that a minimum grade of C- is required in all prerequisite courses).

## Residency Requirements

At least 9 credit hours for the minor must be taken on the CU Boulder campus.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CSCI 2270 | Computer Science 2: Data Structures | 4 |
| or CSCI 2275 | Programming and Data Structures | |
| ECEN 2350 | Digital Logic | 4 |
| ECEN 2360 | Programming Digital Systems | 3 |
| or CSCI 2400 | Computer Systems | |
| ECEN 2370 | Embedded Software Engineering | 3 |
| ECEN/CSCI 3593 | Computer Organization | 3 |
| **Emphasis Area** | | |
| Choose one: | | 3 |
| ECEN 2250 | Introduction to Circuits and Electronics | |
| ECEN 2260 | Circuits as Systems | |
| ECEN 2270 | Electronics Design Lab | |
| ECEN 2410 | Renewable Sources and Efficient Electrical Energy Systems | |
| ECEN 2420 | Electronics for Wireless Systems | |
| ECEN 2440 | Application of Embedded Systems | |
| ECEN 2450 | Electronic and Semiconductor Device Laboratory | |
| ECEN 3250 | Microelectronics | |
| ECEN 3300 | Linear Systems | |
| or ECEN 3301 | Biomedical Signals and Systems | |

| | |
|---|---|
| ECEN 3303/ CSCI 3302 | Introduction to Robotics |
| ECEN 3320 | Semiconductor Devices |
| ECEN 3400 | Electromagnetic Fields and Waves |
| ECEN 3730 | Practical Printed Circuit Board Design and Manufacture |
| ECEN 3753 | Real-Time Operating Systems |
| or CSCI 3753 | Design and Analysis of Operating Systems |
| ECEN 3763 | FPGA Design and HDL |
| ECEN 3915 | Foundations of Quantum Engineering |
| ECEN 4111 | Engineering Applications in Biomedicine: Cardiovascular Devices and Systems |
| ECEN 4133 | Fundamentals of Computer Security |
| ECEN/MCEN 4138 | Control Systems Analysis |
| ECEN 4224 | High Speed Digital Design |
| ECEN 4395 | Organic Electronic Materials and Devices |
| ECEN 4313 | Concurrent Programming |
| ECEN 4322/5322 | Data and Network Science |
| ECEN 4553/ CSCI 4555 | Compiler Construction |
| ECEN 4693/5593/ CSCI 5593 | Advanced Computer Architecture |
| ECEN 4763 | Embedded Software Algorithms |
| ECEN 4925 | Foundations of Quantum Hardware |
| ECEN 4933 | Engineering Genetic Circuits |
| ECEN 5139 | Computer-Aided Verification |
| **Total Credit Hours** | **20** |

# Electrical Engineering - Minor

The minor in electrical engineering provides training in electrical engineering beyond the training usually received by science, mathematics and applied mathematics majors. It can also broaden the training of students majoring in other engineering fields to provide more depth in electrical engineering. The goal is to teach students the fundamentals of electrical engineering and introduce them to at least one of its many advanced application areas. Such skills are important to students who expect to participate in real world situations that increasingly involve electrical engineering applications.

# Requirements

The electrical engineering minor requires a minimum of 18 credit hours.

A minor in electrical engineering can be earned in conjunction with any CU Boulder major, except for BS degrees in electrical engineering, electrical & computer engineering and integrated design engineering-electrical emphasis. The electrical engineering minor cannot be completed alongside any of the following minors: computer engineering and signals & systems engineering.

## Prerequisites

Students must complete these courses with a C- or higher before declaring the minor:

- Calculus 1
- Calculus 2
- APPM 2360 Introduction to Differential Equations with Linear Algebra or MATH 2130 Introduction to Linear Algebra for Non-Mathematics Majors & MATH 3430 Ordinary Differential Equations

(Students who have completed all above course requirements are encouraged to apply for the minor. Additionally, students who have completed all but one of the above course requirements, with the last required course currently in-progress, are also eligible to apply for the minor.)

## Grade Requirements

A minimum cumulative GPA of 2.000 is required in the courses used to satisfy the minor requirements. Each individual course that is counted toward this minor must be passed with a grade of D- or higher (note that a minimum grade of C- is required in all prerequisite courses).

## Residency Requirements

At least 9 credit hours for the minor must be taken on the CU Boulder campus.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ECEN 2250 | Introduction to Circuits and Electronics | 3 |
| or GEEN 3010 | Circuits for Engineers | |
| or MCEN 3017 | Circuits and Electronics for Mechanical Engineers | |
| or ECEN 3010 | Circuits and Electronics for Mechanical Engineers | |
| ECEN 2260 | Circuits as Systems | 3 |
| ECEN 2270 | Electronics Design Lab | 3 |
| **Emphasis Areas** | | |
| Complete 9 credits, chosen from the following: | | 9 |
| ECEN 2350 | Digital Logic | |
| ECEN 2360 | Programming Digital Systems | |
| or CSCI 2400 | Computer Systems | |
| ECEN 2370 | Embedded Software Engineering | |
| ECEN 3170 | Electromagnetic Energy Conversion 1 | |
| ECEN 3250 | Microelectronics | |
| ECEN 3300 | Linear Systems | |
| or ECEN 3301 | Biomedical Signals and Systems | |
| ECEN 3320 | Semiconductor Devices | |
| ECEN 3400 | Electromagnetic Fields and Waves | |
| ECEN 3410 | Electromagnetic Waves and Transmission | |
| ECEN 3730 | Practical Printed Circuit Board Design and Manufacture | |
| ECEN 3753 | Real-Time Operating Systems | |
| or CSCI 3753 | Design and Analysis of Operating Systems | |
| ECEN 4111 | Engineering Applications in Biomedicine: Cardiovascular Devices and Systems | |
| ECEN 4121 | Design of Implantable Medical Devices: Neuromodulation | |
| ECEN 4138 | Control Systems Analysis | |
| ECEN 4242 | Communication Theory | |
| ECEN 4341 | Bioelectromagnetics | |
| ECEN 4395 | Organic Electronic Materials and Devices | |

| | |
|---|---|
| ECEN 4517 | Power Electronics and Photovoltaic Power Systems Laboratory |
| ECEN 4555 | Principles of Energy Systems and Devices |
| ECEN 4606 | Undergraduate Optics Laboratory |
| ECEN 4616 | Optoelectronic System Design |
| ECEN 4632 | Introduction to Digital Filtering |
| ECEN 4634 | Microwave and RF Laboratory |
| ECEN 4638 | Control Systems Laboratory |
| ECEN 4752 | Communication Laboratory |
| ECEN 4797 | Introduction to Power Electronics |
| ECEN 4827 | Analog IC Design |
| ECEN 4925 | Foundations of Quantum Hardware |
| ASEN 3300 | Aerospace Electronics and Communications |
| BMEN 3030 | Bioinstrumentation |
| **Total Credit Hours** | **18** |

# Quantum Engineering - Minor

The minor in quantum engineering provides training and a solid foundation in quantum technologies. Quantum technologies have applications in quantum-enhanced sensors, quantum communications and quantum computing. The goal is to introduce students to the fundamentals of quantum theory and explore all of the major hardware platforms. This will allow graduates to easily adapt to the variety of technologies seen in industry. The skills obtained in this minor are important to students who expect to participate in real-world situations that increasingly involve quantum technologies.

## Requirements

The quantum engineering minor requires a minimum of 18 credit hours.

A minor in quantum engineering can be earned in conjunction with any CU Boulder major. The quantum engineering minor can be completed alongside no more than one of the following minors: computer engineering, electrical engineering and signals & systems engineering.

### Prerequisites

- **Programming**: ECEN 1310, CSCI 1200, CSCI 1300, APPM 3050, PHYS 2600, ASTR 2600, MCEN 1030 or similar (C- or higher)
- **Calculus 2** (minimum): APPM 1360 or MATH 2300 (C- or higher)
- **Linear Algebra**: APPM 2360, MATH 2130, MATH 2135, MATH 3135, APPM 3310 or CSCI 2820 (C- or higher)

Additionally, it is recommended that students have taken Calculus 3 (APPM 2350 or MATH 2400), Probability (APPM 3570, STAT 3100, MATH 3510, ECEN 3810 or similar) and PHYS 2130 as preparatory subjects for the minor.

Students who have completed all above courses are encouraged to apply for the minor. Additionally, students who have completed all but one of the above courses, with the last required course currently in-progress, are also eligible to apply for the minor.

### Grade Requirements

A minimum cumulative GPA of 2.000 is required in the courses used to satisfy the minor requirements. Each individual course that is counted toward this minor must be passed with a grade of D- or higher (note that a minimum grade of C- is required in all prerequisite courses).

### Residency Requirements

At least 9 credit hours for the minor must be taken on the CU Boulder campus.

### Required Courses and Credits

The Quantum Engineering minor consists of a set of required core courses and a selection of electives, as follows.

| Code | Title | Credit Hours |
|---|---|---|
| **Foundations Courses** | | |
| ECEN 3915 | Foundations of Quantum Engineering | 3-6 |
| or PHYS 3220 & PHYS 4410 | Quantum Mechanics 1 and Quantum Mechanics 2 | |
| ECEN 4925 | Foundations of Quantum Hardware | 3 |
| CSCI/PHYS/ECEN 3090 | Introduction to Quantum Computing | 3 |
| **Electives** | | |
| Choose 9 credit hours of approved upper-division technical coursework. [1] | | 9 |
| **Total Credit Hours** | | **18-21** |

[1] Refer to the course options listed on the ECEE Quantum Engineering Minor (https://www.colorado.edu/ecee/academics/undergraduate-programs/minor-programs/#quantum_engineering-545)webpage.

# Signals and Systems - Minor

The minor provides training in control systems, digital signal processing or communications beyond the training usually received by science, mathematics and applied mathematics majors. It can also broaden the training of students majoring in other engineering fields to provide depth in signals and systems. The goal is to teach students the fundamentals of signals and systems and introduce them to laboratory applications.

## Requirements

The signals & systems minor requires a minimum of 18 credit hours.

A minor in signals & systems can be earned in conjunction with any CU Boulder major, except for BS degrees in electrical engineering, electrical & computer engineering and integrated design engineering-electrical emphasis. This minor cannot be completed alongside any of the following minors: computer engineering and electrical engineering

### Prerequisites

Students must meet these requirements before declaring the minor.

- PHYS 1120 General Physics 2 or PHYS 1125 General Physics 2 for Majors, with a minimum grade of C-. *May be completed or currently in progress to be eligible to apply for the minor.*
- Solid mathematics background in Fourier series, Laplace transforms, transfer functions and sinusoidal response.

Some courses require a probability prerequisite, which may be met with ECEN 3810, APPM 3570, MATH 4510, STAT 3100 or an equivalent transfer course. A grade of C- or better is required in all prerequisite courses.

## Grade Requirements

A minimum cumulative GPA of 2.000 is required in the courses used to satisfy the minor requirements. Each individual course that is counted toward this minor must be passed with a grade of D- or higher (note that a minimum grade of C- is required in all prerequisite courses).

## Residency Requirements

At least 9 credit hours for the minor must be taken on the CU Boulder campus.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ECEN 2250 | Introduction to Circuits and Electronics | 3 |
| ECEN 2260 | Circuits as Systems | 3 |
| ECEN 3300 | Linear Systems | 3 |
| or ECEN 3301 | Biomedical Signals and Systems | |
| **Electives** | | |
| Choose the remaining 9 credits from any combination of the following theory and lab courses: [1] | | 9 |
| ECEN 2360 | Programming Digital Systems | |
| or CSCI 2400 | Computer Systems | |
| ECEN 4138 | Control Systems Analysis | |
| ECEN 4638 | Control Systems Laboratory | |
| ECEN 4242 | Communication Theory | |
| ECEN 4752 | Communication Laboratory | |
| ECEN 4632 | Introduction to Digital Filtering | |
| **Total Credit Hours** | | **18** |

[1] Students may petition to replace one of these courses with a 3-credit 5000-level ECEN course in digital signal processing, communications or controls.

# Engineering and Applied Science

Interdisciplinary programs managed by the College (http://www.colorado.edu/engineering/) are included here. The listing of courses includes college-sponsored courses as well as those offered by the Engineering Honors Program (http://www.cuhonorsengineering.com/) and Engineering Leadership Program (https://www.colorado.edu/engineering/academics/engineering-leadership-program/).

# Certificates

- Engineering Leadership - Certificate (p. 984)
- Lighting Design - Certificate (p. 985)

# Courses

**COEN 1015 (3) Everyday Excel**
Microsoft Excel is one of the most popular software tools worldwide, used in industries such as project management, office administration, engineering, science, business, finance, and data analysis. In this unique, thought-provoking course, you will learn how to create and manage Excel spreadsheets, sort and filter data, present and interpret data in graphical format, and perform a variety of mathematical, logical, and statistical calculations. A laptop computer with Microsoft Excel is mandatory.

**COEN 1500 (1) CEAS First Year Seminar**
The CEAS First Year Seminar is a small, discussion-based course designed to provide incoming first-year students a foundation to thrive as university scholars, meeting with them from their first day of classes through getting back the results of their first round of midterms. The seminar is a combination of a common curriculum (40% ) exploring texts concerning creating an engineering identity, the purpose of an engineering education and the larger values of the college community (mattering, belonging, agency, ownership, inclusivity and service) and a unique curriculum (60%) in which faculty members cultivate these values through their own areas of expertise and interest. This seminar represents the commitment of dedicated faculty to help incoming first-year students become an active and contributing part of the intellectual, inclusive, healthy, inquisitive, diverse, sustainable and socially engaged culture of the College of Engineering.
**Requisites:** Restricted to Fall incoming first year students living in Engineering Connections from College of Engineering Applied Science.

**COEN 1510 (1) Self Management and Leadership Principles 1**
Prepares first-year students for personal and academic success in their transition to college. Focuses on academic success strategies, time and stress management, study skills, S.M.A.R.T. goal setting and developing self-awareness. Students identify their strengths and participate in peer-to-peer interaction to foster collaboration and community. Students will also explore leadership capabilities, professional development, and insights into career interests. Speakers provide students with unique insights into academic and engineering experiences.
**Requisites:** Restricted to Engineering Goldshirt (PENG) students only.

**COEN 1515 (1) Essential Strategies for Engineering Success**
This course will support students in developing financial knowledge and skills related to financial wellness, academic success, and personal well-being, as CU Engineering students. In learning about financial wellness, students will explore, share, and discuss experiences and beliefs that have shaped their attitudes and behaviors related to money, and they will develop financial goals for the future while learning and practicing financial wellness skills. In addition to financial wellness, students will learn about resources and practice skills and strategies they can use to support their academic success and personal well-being in and beyond their academic experience. Students will learn and work toward achieving the course outcomes through interactive discussion, activities, and personal reflection, where students¿ own experiences, knowledge, skills, and goals are critically important to the learning process.

**COEN 1520 (1) Self Management and Leadership Principles 2**
Continuation of COEN 1510. Self-management and student development is reiterated. Includes time and stress management, study skills and S.M.A.R.T. goal setting. Leadership skills are explored through group projects. Students complete professional development activities and assignments geared toward preparing students for engineering internships and research opportunities.
**Requisites:** Requires prerequisite course of COEN 1510 (minimum grade C-). Restricted to Engineering Goldshirt (PENG) students only.

**COEN 1550 (1) Fundamentals of Undergraduate Research (FUTURE)**
Exposes first or second year undergraduate students to engineering research careers through a partner program (Fundamentals of Undergraduate Research), panel discussions with researchers in academics and industry, and exposure to research labs. Department consent required.

**COEN 1830 (1-3) Special Topics**
Explores topics of interest in engineering. Content varies by instructor and semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**COEN 2830 (1-3) Special Topics**
Explores topics of interest in engineering. Content varies by instructor and semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**COEN 2850 (1-3) Independent Study**
Provides opportunities for independent study at the lower-division undergraduate level. Subject and/or project agreed upon by the student and the instructor to fit the needs of the student.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**COEN 2880 (1) Fresh Start for Success**
Fresh Start is a class for students in the College of Engineering who want to work toward a Fresh Start! This course focuses on learning the mindsets and skills necessary to achieve academic and personal change goals. Topics include the science of learning (metacognition) and the use of metacognition in everyday life, including strategies supporting mastery of the material in engineering, effective study planning and test-taking, maintaining balance throughout the semester, and the science and creation of sustainable change through habits, support, and resiliency. This class focuses on the actions necessary to reflect deeply and develop awareness and skills to help create change. Enrolled students must engage in the class and commit to applying knowledge and skills acquired during lessons and reflection to their other classes and aspects of their student experience. This course is best suited for students looking for support in the pursuit of success in achieving academic goals.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to Engineering Fresh Start (PEEA) students only.

**COEN 3051 (2) Leadership Seminar 1: Launching the Leadership Experience**
Practicing needs assessment, decision-making and planning skills, students take this seminar to prepare for their Leadership Experience (required for completion of the Engineering Leadership Certificate). Students work in collaboration with each other, their Engineering Leadership Program mentors and campus/community organizations and leaders to lay the foundation for and launch their individually unique Leadership Experiences.
**Requisites:** Requires a prerequisite course of COEN 2050 (minimum grade C-). Restricted to Engineering Leadership Program (PENL) students only.

**COEN 3053 (2) Leadership Seminar 3: ELP Synthesis and Final ePortfolio**
Progressing through this course, students complete the ePortfolio that demonstrates fulfillment of the requirements of the Engineering Leadership Certificate, reflecting upon synthesizing and discerning practical applications of the leadership experiences tackled throughout throughout their time at CU.
**Requisites:** Restricted to Engineering Leadership Program (PENL) students only.

**COEN 3100 (1) Engineering Transfer Student Success Seminar**
Designed to aid in a successful transition to CU Engineering for students transferring from another two- or four-year institution. Through this course students will learn about college, campus and academic resources, evaluate their skills, explore relevant engineering transfer student issues, build on their strengths and education related to overall career goals, and establish a supportive transfer student community.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**COEN 3210 (3) Climate Change and Engineering**
Explores the fundamentals of climate change science, but from an engineering perspective. After learning the fundamentals, the relationship between climate change and different engineering disciplines will be discussed. Topics covered include geoengineering, renewable energy, sustainable engineering, coastal engineering, building design, etc. Career options and entrepreneurial opportunities will also be discussed.
**Requisites:** Requires prerequisite courses of PHYS 1110 and APPM 1350 (minimum grade D-).

**COEN 3930 (1-6) Engineering Internship/Co-op**
Students enrolled in this course participate in a pre-approved internship or cooperative education program with an employer that allows them to explore the relationship between theory and practice and demonstrate evidence of significant learning (e.g., academic assignments and employer/sponsor evaluations). Credits may apply towards BS or BA degree program in CEAS, please check with the department for specifics (even if student has multiple enrollments in this course and/or COEN 4950).
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only (minimum GPA 2.0).

**COEN 4000 (1-3) Global Intensive Studies**
Provides a hands-on exploration of a particular engineering/applied science subject area in an overseas setting. Serves as a complement to an existing engineering or applied science course taught at CU. Topic areas will vary.
**Equivalent - Duplicate Degree Credit Not Granted:** ENES 3844 COEN 5000
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**COEN 4830 (1-3) Special Topics**
Explores topics of interest in engineering. Content varies by instructor and semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**COEN 4850 (1-3) Independent Study**
Provides opportunities for independent study at the upper-division undergraduate level. Subject and/or project agreed upon by the student and the instructor to fit the needs of the student.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**COEN 4934 (3) Art, Design, and Engineering: Thinking and Making**
Examines the aesthetics, design, and engineering of sculpture, installation, and public art. Through research presentations, readings, and field trips, students learn about the process of making art. In addition to classroom learning, students engage in internships with artists and art fabricators. Highlights national and international hybrid art, design, and engineering advanced degree programs and additional art-related internships and job opportunities. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5934 and ARTS 4934
**Grading Basis:** Letter Grade

**COEN 4950 (1-6) Global Engineering Internship**
Students enrolled in this course participate in a pre-approved global internship with an employer that allows them to explore the relationship between theory and practice and demonstrate evidence of significant learning (e.g., academic assignments and employer/sponsor evaluations). Up to 3 credits may apply towards BS degree program's Free Electives (even if student has multiple enrollments in this course and/or COEN 3930). Students may also earn COEN 4950 credit for international internship facilitated through CU-approved providers that contract with CU's Education Abroad Office. These placements must be pre-approved by the student's department/program to be eligible for credit.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only (minimum GPA 2.0).

**COEN 5000 (1-3) Global Intensive Studies**
Provides a hands-on exploration of a particular engineering/applied science subject area in an overseas setting. Serves as a complement to an existing engineering or applied science course taught at CU. Topic areas will vary.
**Equivalent - Duplicate Degree Credit Not Granted:** ENES 3844 COEN 4000
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**COEN 5830 (1-6) Special Topics**
Explores topics of interest in engineering. Content varies by instructor and semester. May be repeated for up to 9 total credit hours.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering graduate students only.
**Grading Basis:** Letter Grade

**COEN 5850 (1-6) Independent Study**
Provides opportunities for independent study at the graduate level. Subject and/or project agreed upon by the student and the instructor to fit the needs of the student.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Engineering graduate students only.

**EHON 1151 (3) Critical Encounters**
Explores critical, literary and philosophical approaches to the following related problems: 1) how we organize knowledge and construct meaning, and 2) how we locate a sense of self as both individuals and members of various groups amidst the resources and demands of competing interpretations, traditions challenges and circumstances. Department restriction, honors standing or instructor consent required.
**Requisites:** Restricted to Engineering Honors Program (PEHN) students only.

**EHON 1500 (1) Honors Reading Group**
Faculty led reading seminars, focusing on specific test or texts chosen by the faculty. Special attention will be paid to group formation and the process of collaborative learning.
**Requisites:** Restricted to Engineering Honors Program (PEHN) students only.
**Additional Information:** Engineering Honors Course

**EHON 3843 (3) Special Topics**
Explores different important themes relative to the Engineering Honors Program. Check with department for specific semester topics.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Engineering Honors Program (PEHN) students only.
**Additional Information:** Engineering Honors Course

**EHON 4051 (1) Dimensions of Leadership**
Explores the many dimensions of leadership that exceed technical knowledge: the ethical, societal, cultural, interpersonal, and personal. Through seminars, workshops and exposure to leaders, students will reflect upon their engineering education in light of the multifaceted demands of effective leadership and their own personal career goals. Students will take an active role in shaping the course. Department restriction, honors standing or instructor consent required.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**EHON 4151 (3) Critical Encounters 2**
Fosters critical reflection on students¿ college experience and rigorous philosophical analysis of personal and professional goals after graduation. Critical Encounters 2 uses literature and philosophy to look both backwards and forwards at the following questions: Who am I and who do I want to be? How do I intentionally cultivate personal and professional values? How am I shaped by tradition and culture? How can I actively shape various cultures to which I belong?
**Requisites:** Requires prerequisite course of EHON 1151 (minimum grade D-). Restricted to Engineering Honors (PEHN) students only. Restricted to Seniors only.

**ENLP 2000 (3) Leadership, Fame and Failure**
Examines the ambition, moral character, prudence and grit required for effective leadership. Common causes of leadership failure are also considered. A wide variety of ancient and modern leaders are studied in the disciplines of science and technology, politics, business and military affairs using primary source readings in history, philosophy and literature. Also explores whether leadership is a teachable art.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) College of Engineering majors only.

**ENLP 3000 (3) Intelligent Leadership**
Investigates what it means to be a "smart" leader. In small, discussion-based classes, explores science fiction texts and social science research that generate fundamental questions about the dimensions, manifestations and value of intelligence in contexts related to leadership. Students explore social science research about how course themes are reflected in present-day, "real-life" technologies, policies and cultural phenomena.
**Requisites:** Restricted to College of Engineering undergraduate students only.

**ENLP 3052 (2) Leadership Seminar 2: Leadership Experience**
Tackling a leadership experience of their own design, students undertake a key component of the Engineering Leadership Program experience and a requirement for the completion of the Engineering Leadership Certificate. Guides students through a process of planning, executing and evaluating their leadership experience and progress toward personalized leadership development goals. Coursework involves working with a mentor, collaborating with peers and conducting research. Formerly COEN 3052.
**Requisites:** Requires a prerequisite course of COEN 2050 (minimum grade D-). Restricted to Engineering Leadership Program (PENL) students only.

**ENLP 3060 (3) Our Sustainable Future CU-in-DC Seminar**
Taught in Washington, D.C., this seminar combines traditional classroom learning with diverse site visits with sustainability practitioners, analysts, regulators, and business and community leaders. Students will engage complex and interdependent problems of regional and global sustainability, they will critically explore what role business and science should have in creating environmental policies, and they will learn how stakeholders across the private, non-profit, and public sectors can work collaboratively to achieve a more socially-equitable and environmentally-sustainable world.
**Equivalent - Duplicate Degree Credit Not Granted:** CESR 3060
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Recommended:** preference will be given to Engineering and Business majors.

**ENLP 3100 (3-4) Complex Leadership Challenges**
Approaches leadership as a process of inquiry, empathy, and action, cultivating skills leaders need to understand, communicate about, and generate innovative approaches to complex issues. Each student conducts extensive, principled research about a complex social issue of their choice, investigating its multidimensionality by applying different analytic lenses. Instructor consent required for students not in Engineering Leadership. Formerly COEN 3050.
**Requisites:** Requires prerequisite course of ENLP 2000 or ENLP 3000 (minimum grade C).

**ENLP 3843 (3) Special Topics**
Explores different important themes in leadership; check with department for specific semester topics.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students in College of Engineering and Applied Science (ENGR) only.

**ENLP 4000 (3) The Empire of Modern Science**
Examines science and technology's rise to the status of political, cultural and economic leader of the modern world. Also considers the ambitions and limits of the modern scientific enterprise, and investigates whether scientists are adequately equipped to lead humanity's political, spiritual and evolutionary future. Readings are drawn from primary sources in history, economics politics, philosophy and literature. Recommended restriction: this course is recommended for Sophomores, Juniors, and Seniors.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Recommended:** Prerequisite ENLP 2000 or ENLP 3000.

# Engineering Leadership - Certificate

The Engineering Leadership Program (ENLP) confronts leadership challenges in applied science using liberal arts pedagogy. The program aims to cultivate engineering leaders of curiosity and character who combine technical expertise with moral principles and political literacy to address society's most pressing scientific and technological problems.

ENLP offers a wide variety of courses on the thought and practice of leadership, many of which utilize primary source texts in history, the philosophy of science, moral philosophy, political science and anthropology. The program's courses count for humanities and social sciences credit in the College of Engineering and Applied Science and most courses are discussion-based seminars. Students with a deep interest in ENLP's curriculum are encouraged to pursue the Engineering Leadership Certificate and develop long-term relationships with faculty. Such students may also wish to take courses in the Herbst Program for Engineering, Ethics & Society, many of which count for credit toward the certificate.

In addition to introducing students to the intellectual complexities of leadership, the program also addresses contemporary concerns in engineering practice. CU Boulder's engineering alumni and established leaders from engineering industry, business and politics frequently visit ENLP classes to give guest lectures, hold interview sessions and converse with students over informal lunches. The Engineering Leadership Program has also partnered with the Engineering Management Program to offer coursework for ENLP students interested in engineering project management, engineering entrepreneurship and engineering economics.

## Requirements

Courses offered by the Engineering Leadership Program are open to all students in the College of Engineering and Applied Science. *All ENLP courses count for humanities and social sciences credit.* Students interested in ENLP are advised (but not required) to begin their course of study with ENLP 2000, the program's introductory course.

The certificate requires 12 credit hours of coursework to be completed prior to graduation. All 12 credit hours must be earned with CU Boulder coursework only. Graduating students who have completed their certificate requirements must fill out the Certificate Completion Form on the ENLP website (https://cuboulder.qualtrics.com/jfe/form/SV_9oZdz8yfUnARmwm/) to receive certificate status on their transcripts.

Students may take any ENLP course to sample the program's offerings, or they may choose to take multiple courses and pursue the Engineering Leadership Certificate. The certificate is designed for students who are deeply curious about leadership and its manifold relationship with science, technology, humanity and political society.

Most ENLP courses are discussion-based seminars focused on primary source readings spanning a wide variety of scientific, humanistic, and social scientific disciplines. ENLP courses also offer opportunities to attend guest lectures, travel abroad, network with CU alumni and meet leaders from the public and private sectors.

### Required Courses and Credits

Students are required to take any four courses from the list of core requirements *or* any three courses from the list of core requirements and one approved elective.

A list of approved electives is also available on the ENLP website (https://www.colorado.edu/engineeringleadershipprogram/). Students may petition the Engineering Leadership Program Director to consider other

electives, including transfer credits from other universities, not listed below.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Requirements** | | |
| ENLP 2000 | Leadership, Fame and Failure | 3 |
| ENLP 3000 | Intelligent Leadership | 3 |
| ENLP 3100 | Complex Leadership Challenges | 3-4 |
| ENLP 4000 | The Empire of Modern Science | 3 |
| **Approved Electives** | | |
| ASEN 3046 | Introduction to Humans in Aviation | 3 |
| ASIA 4500 | Urban Asia: Tradition, Modernity, Challenges | 3 |
| ASTR 4800 | Space Science: Practice and Policy | 3 |
| ATLS 2000 | The Meaning of Information Technology | 3 |
| EHON 1151 | Critical Encounters | 3 |
| EMEN 4030 | Project Management Systems | 3 |
| EMEN 4100 | Engineering Economics | 3 |
| EMEN 4050 | Leadership and Professional Skills | 3 |
| ENES 1850 | Engineering in History: The Social Impact of Technology | 3 |
| ENES 2100 | History of Science and Technology to Newton | 3 |
| ENES 2120 | History of Modern Science from Newton to Einstein | 3 |
| ENES 2130 | History of Modern Technology from 1750 to the Atomic Bomb | 3 |
| ENES 2210 | Modern Science and Technological Society | 3 |
| ENES 2020 | The Meaning of Information Technology | 3 |
| ENES 3100 | Ethical Awareness for Engineers | 3 |
| ENES 3350 | Gods, Heroes and Engineers: The Western Quest for Excellence | 3 |
| ENES 3843 | Special Topics | 1-3 |
| ENVS 3140 | Environmental Ethics | 3 |
| ENVS 3621 | Energy Policy and Society | 3 |
| MILR 4072 | Leadership 1: Adaptive Leadership | 3 |
| MILR 4082 | Leadership 2: Leadership in a Complex World | 3 |
| NAVR 4020 | Leadership and Ethics | 3 |
| PHIL 1400 | Philosophy and the Sciences | 3 |
| PHIL 3160 | Bioethics | 3 |
| PHIL 3200 | Social and Political Philosophy | 3 |
| PHYS 3000 | Science and Public Policy | 3 |
| PRLC 1810 | Leadership Foundations and Applications I | 3 |
| PRLC 3800 | Global Inquiry for 21st Century Leadership | 4 |
| PSCI 1101 | Introduction to American Politics | 3 |
| PSCI 2004 | Survey of Western Political Thought | 3 |
| PSCI 2106 | Introduction to Public Policy Analysis | 3 |
| PSCI 2116 | Introduction to Environmental Policy and Policy Analysis | 3 |
| PSCI 3011 | The American Presidency and the Executive Branch | 3 |
| PSCI 3054 | American Political Thought | 3 |

# Lighting Design - Certificate

Our sense of sight is responsible for much of our perception of the world around us. Through the proper application of light, whether indoors or outdoors, we can shape a viewer's understanding of architecture and influence the outcome of our architectural designs.

The undergraduate certificate in Lighting Design (http://www.colorado.edu/lightingprogram/lighting-design-certificate/) is offered to non-engineering students, in particular those majoring in environmental design, theater and film, to expose them to the basics of architectural interior, exterior and landscape lighting design. Topics include:

- Metrics of light
- Vision and color vision
- Proper use of light sources, lighting fixtures and controls
- Lighting effects on perception of architecture and how it fits into the architectural design process
- Lighting design techniques and specification
- Quantification of light to ensure visual comfort and limit energy use
- Light at night and its correct application in exterior architecture and landscape

The certificate prepares students for entry-level jobs in lighting design firms. A combination of lighting design with architecture, landscape architecture or design studies could also open doors in architecture and interior design firms.

# Requirements

## Admission Requirements

A cumulative GPA of 2.500 or higher is required to enroll. This certificate is not open to students rostered in the College of Engineering & Applied Science. First-year students are not eligible to take certificate courses - students may sign up for the certificate in the spring of their freshman year and start taking classes in their sophomore year.

To enroll, students should complete the Lighting Certificate Declaration Form (http://bit.ly/LightingCertificate/).

## Program Requirements

### Grade Requirements

A cumulative GPA of 2.500 for all certificate courses is required. A grade of C or higher is required for AREN 4440 Lighting Design Capstone. For all other certificate courses, a grade of C- or higher is required. A course not passed with the minimum grade may be repeated one time.

### Course Requirements

The certificate is achieved through completion of four lighting courses: two required courses, one technical elective, and a capstone course. Courses listed below represent current offerings and are subject to change.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| AREN 3430 | Architectural (Interior) Lighting Design | 3 |
| AREN 4540 | Architectural Exterior and Landscape Lighting Design | 3 |
| **Technical Elective** | | |
| Choose one: | | 3 |
| AREN 4620 | Adaptive Lighting Systems | |
| AREN 4630 | Advanced Lighting Design | |
| THTR 3055 | Stage Lighting Design 1 | |
| **Capstone** | | |
| AREN 4440 | Lighting Design Capstone | 3 |
| **Total Credit Hours** | | **12** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate a mastery of the fundamentals of lighting.
- Design and analyze lighting solutions that address vision and perception, architecture and compliance.
- Communicate lighting solutions through effective use of lighting design tools and techniques.

# Engineering Management

The Lockheed Martin Engineering Management Program (EMP) (http://www.colorado.edu/emp/) is a management and leadership program that prepares students in the technical and engineering fields for early to mid-career positions. It is designed for students who are looking to advance in management, successfully contribute to the overall business or venture and develop their leadership skills.

The program offers an engineering entrepreneurship minor, engineering management minor and various courses for undergraduate students in the College of Engineering and Applied Science. The minors and courses are designed for junior- and senior-level engineering students who seek to develop business and industry acumen to complement their engineering majors. Courses are offered on campus, remote and online.

**Course code for this program is EMEN.**

# Minors

- Engineering Entrepreneurship - Minor (p. 988)
- Engineering Management - Minor (p. 988)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Angel, George
Lecturer; BS, University of Albuquerque

Bouvier, Claudia
Lecturer; ME, University of Colorado Boulder

Bozic, Christy L. (https://experts.colorado.edu/display/fisid_155482/)
Instructor Adjunct; PhD, Purdue University

Crofton, Karen (https://experts.colorado.edu/display/fisid_164479/)
Scholar in Residence; MBA, Rice University

Dietrich, Alex
Lecturer; MBA, George Washington University

Duren, Ron G. Jr. (https://experts.colorado.edu/display/fisid_157263/)
Teaching Associate Professor; ME, University of Colorado Boulder

Egan, Kristen
Lecturer; ME, University of Colorado Boulder

Gazarik, Michael
Scholar in Residence, Director; PhD, Georgia Institute of Technology

Katz, Tami
Lecturer; PhD, Colorado State University

Kirschling, Wayne (https://experts.colorado.edu/display/fisid_123149/)
Professor Emeritus; DBA, University of Colorado Boulder

Kramer, Amy
Lecturer; JD, University of Colorado Boulder

Leeker, Eric
Lecturer; MBA, Purdue University

Leeker, Jessica Rush (https://experts.colorado.edu/display/fisid_167166/)
Instructor Adjunct; PhD, Purdue University

Martin, Wendy Lynn (https://experts.colorado.edu/display/fisid_154942/)
Teaching Associate Professor; ME, University of Colorado Boulder

McCluskey, Alyssa
Lecturer; PhD, University of Colorado Boulder

Moorer, Daniel F. Jr. (https://experts.colorado.edu/display/fisid_151590/)
Scholar in Residence; PhD, University of Colorado Boulder

Murray, Seth (https://experts.colorado.edu/display/fisid_148038/)
Teaching Assistant Professor; ME, University of Colorado Boulder

Readey, Michael J. (https://experts.colorado.edu/display/fisid_157363/)
Instructor Adjunct; PhD, Case Western Reserve University

Songer, Anthony
Lecturer; PhD, University of California Berkeley

Svoboda, John D. (https://experts.colorado.edu/display/fisid_154884/)
Lecturer; MBA, University of California-Los Angeles

Thomas, John (https://experts.colorado.edu/display/fisid_167167/)
Scholar in Residence; PhD, Arizona State University

Tobey, Kathryn
Scholar in Residence; ME, University of Colorado Boulder

Van Atten, Bill
Lecturer; MS, Johns Hopkins University

# Courses

**EMEN 3100 (3) Introduction to Engineering Management**
Examines topics important to the management of engineering activities within organizations. Topics include the relationship of engineering to business and management disciplines, the functions of an engineering manager, principles and techniques for managing financial resource and business ownership. Explores best practices in global engineering management, process management, legal issues, ethics, organizational behavior and communications.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) College of Engineering students only.

**EMEN 4030 (3) Project Management Systems**
A practical approach is used to help students learn about project management to help develop the skills needed to be successful in this dynamic profession. This course is designed for students with various experience levels and provides lessons learned examples from real-world projects in different industries. The course covers project management in both theory and practice by introducing globally recognized processes, tools, techniques, and methods used to effectively manage projects through their life cycle.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4050 (3) Leadership and Professional Skills**
Accelerate your personal and professional growth with the essential skills required to become an effective leader/manager. Conduct personal development through exercises in communication and leadership effectiveness. Explore leadership styles, managing commitments, change management, negotiation, conflict resolution, organizational culture, emotional intelligence, team dynamics and business ethics.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4055 (3) Designing for Diversity, Equity and Inclusion in Engineering**
Students will focus on the historical narrative of institutions and structures that have shaped instances of inclusion and exclusion in engineering, how their own identity and background shape their thoughts and actions, how transformational leadership is enacted for diversity, equity, and inclusion (DEI), and how involving DEI in the strategic planning process of designing can create additional innovations and opportunities.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**EMEN 4100 (3) Engineering Economics**
Introduces engineering cost concepts, financial statements and the corporate economic environment. Includes concepts and methods of analysis of the time value of money, project cost estimation, cash flow analysis, replacement analysis, risk management and financial case statements.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4110 (3) Supply Chain Management**
Explores the key issues related to the design and management of supply chains. Covers the efficient integration of suppliers, production facilities, warehouses, and stores so that the right products in the right quantity reach customers at the right time. Focuses on the minimization of the total supply chair cost subject to service requirements imposed by a variety of industries.
**Equivalent - Duplicate Degree Credit Not Granted:** MGMT 4110
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4120 (3) Managing Business Processes**
Covers the concepts and tools to design and manage business processes. Emphasizes modeling an analysis, information technology support for process activities, and management of process flows. Graphical simulation software is used to create dynamic models of business processes and predict the effect of changes. Prepares students for a strong management or consulting career path in business processes.
**Equivalent - Duplicate Degree Credit Not Granted:** MGMT 4120 and MGMT 5120
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4200 (3) Engineering and Entrepreneurship for the Developing World**
Use your engineering and problem solving skills, combined with market/industry research, customer interviews, design for manufacturability, stakeholder management and financial modeling to promote entrepreneurship and sustainable change in the developing world. Explore alternative energy, medical devices, phones, internet, recycling, cook stoves, clean water, sanitation and infrastructure.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4400 (3) Quality Management**
Examine the concepts, tools, and techniques used in managing and measuring quality and productivity in business. Topics include foundational concepts of quality, customers, the workforce, and processes. Apply the tools and techniques associated with the quality sciences, including statistical methods, design quality, measurement, control, process improvement, six sigma. Discover the basics of performance excellence management, Baldrige Award criteria, strategic planning, leadership, and daily management. Specific examples, case studies from modern companies will be studied.
**Equivalent - Duplicate Degree Credit Not Granted:** MGMT 4400
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4405 (3) Systems Engineering**
Examines the disciplined process of designing a complex system to meet a specified customer need. We begin with identifying the needed capability through operational and functional analysis, then progress through defining requirements that articulate operational and environmental capabilities that address reliability, maintainability, and producibility considerations across the system lifecycle. The course also introduces technical management tasks to include risk management, technology readiness assessment, and program controls using real-world, current aerospace industry examples.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4800 (3) Entrepreneurship and Marketing**
Offers an in-depth exploration of entrepreneurship through the lens of "The Lean Startup" methodology. You'll gain a comprehensive understanding of key startup concepts like Minimum Viable Product (MVP), venture capital, and the dynamics of early-stage companies. The curriculum combines lectures, workshops, and hands-on projects to equip you with the critical thinking skills and practical experience needed to identify and seize business opportunities in the world. Guest speakers from leading companies will occasionally enrich the classroom, providing industry insights.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4820 (3) Entrepreneurial Product Development**
Organizations are increasingly looking for employees with training and experience in design thinking and innovation. This course will look at product development through a design thinking lens. In addition, this course will be teamwork-oriented, but you will also complete readings and independent activities that will support the group work and ensure your depth of knowledge.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4825 (3) New Venture Creation**
Relevant to students seeking to acquire an entrepreneurial toolkit of knowledge and skills for working in the startup world or launching a new venture. Covers the techniques for evaluating the probability of success for a new venture and develops a methodology for entrepreneurial thinking that provides benefits for big and small ventures. The final deliverable is a professional pitch to a group of seasoned investors and the submission of a complete business plan.
**Equivalent - Duplicate Degree Credit Not Granted:** ESBM 4830
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4830 (1-3) Special Topics**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4840 (1-3) Independent Study Project**
Available only through approval of Engineering Management Program. Subjects arranged to fit the needs of the particular student.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**EMEN 4850 (3) Entrepreneurial Leadership**
Investigate the importance of entrepreneurship, value creation, and the entrepreneurial leader's role in driving innovation and growth. Explore and discuss building a culture of practical, ethical, and empowered leaders, developing a shared purpose, understanding the meaning of values in an organizational setting, and identifying potential negative issues in different roles within an entrepreneurial team. Essential skills learned will facilitate the development of capabilities to adapt leadership approaches/practices in various business and organizational contexts.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**EMEN 4875 (3) Entrepreneurial Finance**
Teaches the importance of company formation, what metrics are important to investors, types of investments and their pros and cons, company valuation as well as when and how to fundraise.

# Engineering Entrepreneurship - Minor

The undergraduate engineering entrepreneurship minor prepares students with the knowledge, understanding and skills essential to entrepreneurship in a start-up venture or within a larger corporation. This minor develops entrepreneurial and leadership skills, while introducing students to the multiple facets of entrepreneurship, innovation, creative development and the overall entrepreneurial process. After completion of the requirements, the undergraduate minor in engineering entrepreneurship will be listed on the student's transcript at the time of graduation along with the student's bachelor's degree.

For more information, visit the program's Undergraduate Engineering Entrepreneurship Minor (https://www.colorado.edu/emp/undergraduate-programs/engineering-entrepreneurship-minor/) webpage.

## Requirements

### Eligibility

The engineering entrepreneurship minor is open to all undergraduate students in the College of Engineering and Applied Science who are in good academic standing (https://www.colorado.edu/engineering-advising/academic-standing/) within the college. Please see the Engineering Management minor website (https://www.colorado.edu/emp/undergraduate-programs/undergraduate-minors/) for the application process.

### Program Requirements

The minor requires 12 credit hours consisting of two required courses and two elective courses.

To be awarded the minor, the students must successfully complete the 12 credit hour program requirements. A cumulative GPA of 2.000 or better is required for courses used to satisfy the requirements of this minor.

Each individual course that is counted towards these degree requirements must be passed with a D- or better (note, however, a C- or better is required in all prerequisite courses to move on to a subsequent course). Prior coursework may be transferred from other institutions with approval.

To meet the minor's residency requirement, at least three courses need to be taken at CU Boulder (in person or online).

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| EMEN 4800 | Entrepreneurship and Marketing | 3 |
| EMEN 4820 | Entrepreneurial Product Development | 3 |
| **Electives (choose two)** | | **6** |
| EMEN 4055 | Designing for Diversity, Equity and Inclusion in Engineering | |
| EMEN 4200 | Engineering and Entrepreneurship for the Developing World | |
| EMEN 4825 | New Venture Creation | |
| EMEN 4850 | Entrepreneurial Leadership | |
| EMEN 4875 | Entrepreneurial Finance | |
| **Total Credit Hours** | | **12** |

# Engineering Management - Minor

The engineering management minor complements the technical knowledge of a baccalaureate engineering degree by introducing business skills engineers need to succeed in today's job market. After completion of the requirements, the undergraduate minor in engineering management will be listed on the student's transcript at the time of graduation along with the student's bachelor's degree.

For more information, visit the program's Undergraduate Engineering Management Minor (https://www.colorado.edu/emp/undergraduate-programs/engineering-management-minor/) webpage.

# Requirements

## Eligibility

The engineering management minor is open to undergraduate students rostered in the College of Engineering and Applied Science. Please see the engineering management minor website (https://www.colorado.edu/emp/undergraduate-programs/undergraduate-minors/) for the application process.

## Program Requirements

Students must complete 12 credit hours: two required courses totaling 6 credit hours, plus an additional 6 credit hours of electives.

A cumulative GPA of 2.000 or better is required for courses used to satisfy the requirements of this minor. Each course requires a minimum grade of D- or better (note, however, that a C- or better is required in all prerequisite courses to qualify to take a subsequent course).

To meet the minor's residency requirement, at least three courses need to be taken at CU Boulder (in person or online).

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| EMEN 4030 | Project Management Systems | 3 |
| EMEN 4100 | Engineering Economics | 3 |
| **Electives** | | |
| Choose two of the following: | | 6 |
| EMEN 3100 | Introduction to Engineering Management | |
| EMEN 4050 | Leadership and Professional Skills | |
| EMEN 4110 | Supply Chain Management | |
| EMEN 4120 | Managing Business Processes | |
| EMEN 4400 | Quality Management | |
| EMEN 4405 | Systems Engineering | |
| **Total Credit Hours** | | **12** |

# Engineering Physics

Engineering physics provides students with a broad exposure to the basic physical theories and mathematical techniques underlying engineering. The program may be specialized to meet the student's interests through engineering electives. Most students become involved in laboratory research, and graduates find opportunities in optics, electronics, magnetics and other hardware-based job markets. The program also provides excellent preparation for graduate study in physics, applied physics and other areas of the natural sciences and engineering.

The engineering physics program focuses on the foundations of modern technology. The program prepares students for research, development and entrepreneurial careers in many frontier areas of engineering, including quantum devices, ultra fast lasers, adaptive optics, cryogenic electronics, computer simulation of physical systems, solar cells, magnetic storage technology, micro-mechanical systems and molecular electronics. All students study the core theoretical subjects of mechanics, electricity and magnetism, thermal physics and quantum mechanics, supplemented by courses in mathematics, computation and laboratory technique. The program can be tailored to a student's interests through electives in engineering, physics or other sciences.

*Note:* Students may not earn a bachelor's degree in physics from the College of Arts & Sciences as well as a bachelor's degree in engineering physics from the College of Engineering & Applied Science. Furthermore, the physics minor may not be earned with either of these two baccalaureate programs.

**Course code for this program is PHYS.**

# Bachelor's Degree

- Engineering Physics - Bachelor of Science (BSEP) (p. 994)

# Courses

**PHYS 1000 (3) Preparatory Physics**
Introduces basic physics, emphasizing an analytical approach to prepare for PHYS 1110 and PHYS 1120, the engineering majors sequence. Does not satisfy any MAPS deficiency in either the sciences or math. Department enforced prerequisite: 1 year high school algebra.
**Additional Information:** Arts Sci Core Curr: MAPS Course

**PHYS 1010 (3) Physics of Everyday Life 1**
Intended primarily for nonscientists, this course covers physics encountered in everyday life. Topics include balls, scales, balloons, stoves, insulation, light bulbs, clocks, nuclear weapons, basics of flashlights, and microwave ovens. Department enforced prereq., high school algebra or equivalent. This course should not be taken if the student has a MAPS deficiency in math.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Quantitative Reasoning Math
MAPS Course: Chemistry
MAPS Course: Physics

**PHYS 1110 (4) General Physics 1**
First semester of three-semester sequence for science and engineering students. Covers kinematics, dynamics, momentum of particles and rigid bodies, work and energy, gravitation, and simple harmonic motion.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 1115
**Requisites:** Requires prerequisite course of GEEN 3830 (minimum grade C-) or prerequisite or corequisite course of APPM 1345 or APPM 1350 or MATH 1300 or MATH 1310 (minimum grade C-).
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 1115 (4) General Physics 1 for Majors**
First semester of three semester sequence for physics, engineering physics and astronomy majors. Covers kinematics, dynamics momentum of particles and rigid bodies, work and energy, gravitation, and simple harmonic motion.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 1110
**Requisites:** Requires prerequisite course of GEEN 3830 or prerequisite or corequisite course of APPM 1345 or APPM 1350 or MATH 1300 or MATH 1310 (minimum grade C-). Restricted to Physics (PHYS-BA) or Engineering Physics (EPEN-BS) or Astronomy (ASTR-BA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 1120 (4) General Physics 2**
Three lect., one rec. per week, plus three evening exams in the fall and spring semesters. Second semester of three-semester introductory sequence for science and engineering students. Covers electricity and magnetism, wave motion and optics. Normally is taken concurrently with PHYS 1140.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 1125
**Requisites:** Requires prerequsite courses of PHYS 1110 or PHYS 1115 and a prerequisite or corequisite course of APPM 1360 or MATH 2300 (all minimum grade of C-).
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 1125 (4) General Physics 2 for Majors**
Three lect., one rec per week, plus three evening exams in the fall and spring semesters. Second semester of three semester introductory sequence for physics, engineering and astronomy majors. Covers electricity and magnetism, wave motion and optics. Normally is taken concurrently with PHYS 1140.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 1120
**Requisites:** Requires a prerequisite course of PHYS 1110 or PHYS 1115. Requires a prerequisite or corequisite course of APPM 1360 or MATH 2300 (all minimum grade C-). Restricted to Physics (BA), Engineering Physics (BS) and Astronomy (BA) students only.
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 1140 (1) Experimental Physics 1**
Introduces experimental physics through laboratory observation of a wide range of phenomena. Covers experiments on physical measurements, including mechanics, electricity & magnetism, and optics, with the mathematical analysis of physical errors associated with the experimental process.
**Requisites:** Requires a prerequisite or corequisite course of PHYS 1120 or PHYS 1125 (minimum grade C-).
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 1230 (3) Light and Color for Nonscientists**
Discusses light, color, vision, and perception. Covers reflection, refraction, lenses, and applications to photography and other methods of light sensing. Other topics include lasers and holography. Course is geared toward nonscience majors. Department enforced prereq., high school algebra or equivalent. Should not be taken by students with a math MAPS deficiency.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Chemistry
MAPS Course: Natural Science
MAPS Course: Physics

**PHYS 1240 (3) Sound and Music**
Explores the physical processes that underlie the diversity of sound and musical phenomena. Topics covered include the physical nature of sound, the perception of sound, the perception of pitch and harmony, musical instruments, synthesizers and samplers, and room acoustics. Geared toward nonscience majors. Department enforced prereq., high school algebra or equivalent. Should not be taken by students with a math MAPS deficiency.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Chemistry
MAPS Course: Natural Science
MAPS Course: Physics

**PHYS 1400 (1) Fundamentals of Scientific Inquiry**
Engages students in discussions and experimentation to uncover the aspects of physics that won't be found in a textbook, centered around how to do scientific research and be a part of the greater scientific community. Topics include model-building, metacognition, failure in science, and presentation skills. Students will have the opportunity to interact with real scientists through panels, lab tours, and direct mentorship as they engage in a hands-on group research project culminating in a poster presentation session. Geared toward first-year and transfer physics and engineering physics students. Does not count toward the PHYS-BA major requirements. For more information, please visit: http://www.cuprime.org/class.

**PHYS 1580 (3) Energy and Interactions**
Engages non-physics majors in hands-on, minds-on activities and labs to investigate the physical world, the nature of science, and how science knowledge is constructed. This introductory course is especially relevant for future elementary and middle school teachers although it will meet the needs of most non-physics and non-science majors. Physical content focuses on interactions and energy.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 1580
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Chemistry
MAPS Course: Natural Science
MAPS Course: Physics

**PHYS 2010 (5) General Physics 1**
Includes three lectures, one two-hour laboratory/recitation per week, plus three evening exams in the fall and spring semesters. Covers mechanics, heat and sound. Thorough presentation of fundamental facts and principles of physics using algebra and trigonometry. Designed for life science majors, including premed students. Natural science majors with a knowledge of calculus and others taking calculus are urged to take the calculus-based courses PHYS 1110, PHYS 1120, PHYS 1140 and PHYS 2130, rather than PHYS 2010 and PHYS 2020. Department enforced prerequisites: ability to use high school algebra and trigonometry.
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**PHYS 2020 (5) General Physics 2**
Includes three lectures, one two-hour laboratory/recitation per week, plus three evening exams in the fall and spring semesters. Covers electricity and magnetism, light and modern physics. Designed for life science majors, including premed students. Natural science majors with a knowledge of calculus and others taking calculus are urged to take the calculus-based courses PHYS 1110, PHYS 1120, PHYS 1140 and PHYS 2130, rather than PHYS 2010 and PHYS 2020.
**Requisites:** Requires a prerequisite course of PHYS 1110 or PHYS 2010 (minimum grade C-).
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 2130 (3) Introduction to Quantum Mechanics and Its Applications**
Learn about a leading edge of physics and engineering along with its applications to much of modern technology. Topics include quantum theory, atomic physics, solid state and nuclear physics. Applications discussed may include special relatively, lasers, diodes/transistors, nuclear energy, quantum computing and encryption. Third semester of introductory sequence for science and engineering students. Physics majors should take PHYS 2170 instead of this course. May be taken concurrently with PHYS 2150.
**Requisites:** Requires a prerequisite course of PHYS 1120 or PHYS 1125, and a prerequisite or corequisite course of MATH 2400 or APPM 2350 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 2150 (1) Experimental Physics 2**
One lect., one 2-hour lab per week. Includes many experiments of modern physics, including atomic physics, solid state physics, electron diffraction, radioactivity and quantum effects. Normally taken concurrently with PHYS 2130 or PHYS 2170, this course may be taken after PHYS 2130 or PHYS 2170.
**Requisites:** Requires a prerequisite course of PHYS 1140 and a prerequisite or corequisite course of PHYS 2130 or PHYS 2170 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 2170 (3) Foundations of Modern Physics**
Covers special relativity, quantum mechanics and atomic structure. Completes the three-semester sequence of general physics for physics and engineering physics majors. Normally taken with the laboratory PHYS 2150.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 2130
**Requisites:** Requires a prerequisite course of PHYS 1120 or PHYS 1125, and a prerequisite or corequisite course of MATH 2400 or APPM 2350 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 2210 (3) Classical Mechanics and Mathematical Methods 1**
Theoretical Newtonian mechanics, including position and velocity dependent forces, oscillation, stability, non-inertial frames and gravitation from extended bodies. Ordinary differential equations, vector algebra, curvilinear coordinates, complex numbers, and Fourier series will be introduced in the context of the mechanics.
**Requisites:** Requires a prerequisite course of PHYS 2130 or PHYS 2170 and a prerequisite or corequisite course of APPM 2350 or MATH 2400 and a prerequisite or corequisite course of APPM 2360 or MATH 3430 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 2600 (3) Introduction to Programming and Scientific Computing**
Covers basic concepts in programming and scientific computing, including numerical integration and simulation of physical systems. Students will learn the programming language Python and associated graphics libraries. Programming examples will be drawn from classical physical systems that can only be solved numerically, such as projectile motion with drag and N-body problems.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 2600
**Requisites:** Requires prerequisite course of PHYS 1120 (minimum grade C-). Requires prerequisite or corequisite course of PHYS 2170 or PHYS 2130 (minimum grade C-).

**PHYS 2840 (1-3) Independent Study**
Selected topics for undergraduate independent study. Subject matter to be arranged.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**PHYS 3000 (3) Science and Public Policy**
For nonscience majors. Reading, discussions, debates and lectures are used to study how science affects society economically, intellectually, and in terms of health and national security. Another focus is how government fosters and funds scientific activities. Department enforced prerequisite: completion of core science requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** ARSC 3200

**PHYS 3050 (3) Writing in Physics: Problem-Solving and Rhetoric**
Teaches strategies used in scientific writing with an emphasis on argument, reviews and reinforces essential writing skills, provides experience in writing both academic and professional communications in a style appropriate to the literature of physics. Department enforced prerequisite: lower-division core writing requirement. Does not count toward the PHYS-BA major requirements or major GPA.
**Requisites:** Requires a prerequisite course of PHYS 2130 or PHYS 2170 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**PHYS 3070 (3) Energy and the Environment**
Contemporary issues in energy consumption and its environmental impact, including fossil fuel use and depletion; nuclear energy and waste disposal; solar, wind, hydroelectric, and other renewable sources; home heating; energy storage; fuel cells; and alternative transportation vehicles. Included are some basic physical concepts and principles that often constrain choices. No background in physics is required.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3070
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 3090 (3) Introduction to Quantum Computing**
Covers the basics of quantum computation, including the basics of quantum information; axioms of quantum mechanics; quantum circuits and universality; the relationship between quantum and classical complexity classes; simple quantum algorithms such as the quantum Fourier transform; Shor factoring algorithm; Grover search algorithm; physical implementation of quantum computation; error correction and fault tolerance.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3090 and ECEN 3090
**Requisites:** Requires prerequisite course of APPM 2360 or APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135 (minimum grade C-).

**PHYS 3210 (3) Classical Mechanics and Mathematical Methods 2**
Lagrangian and Hamiltonian treatment of theoretical mechanics, including coupled oscillations, waves in continuous media, central force motion, rigid body motion and fluid dynamics. The calculus of variations, linear algebra, tensor algebra, vector calculus, and partial differential equations will be introduced in the context of the mechanics.
**Requisites:** Requires a prerequisite course of PHYS 2210 and a prerequisite course of APPM 2350 or MATH 2400 and a prerequisite course of MATH 3430 or APPM 2360 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 3220 (3) Quantum Mechanics 1**
Introduces quantum mechanics with wave, operator and matrix computational techniques. Investigates solutions for harmonic oscillator, potential well and systems with angular momentum. Develops a quantitative description of one-electron atoms in lowest order.
**Requisites:** Requires a prerequisite course of PHYS 3210 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 3221 (1) Tutorial Practicum for Quantum Mechanics 1**
Uses interactive group work to aid student learning in corequisite course PHYS 3220. In this tutorial, students will work in small groups to practice how to solve challenging problems and their underlying conceptual basis, as well as using hands-on activities, demonstrations, and other techniques to help learn content.
**Requisites:** Requires a corequisite course of PHYS 3220.

**PHYS 3310 (3) Principles of Electricity and Magnetism 1**
Covers mathematical theory of electricity and magnetism, including electrostatics, magnetostatics, and polarized media, and provides an introduction to electromagnetic fields, waves, and special relativity.
**Requisites:** Requires a prerequisite course of PHYS 2210 and a prerequisite course of APPM 2350 or MATH 2400 and a prerequisite course of MATH 3430 or APPM 2360 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 3311 (1) Tutorial Practicum for Electricity & Magnetism 1**
Uses interactive group work to aid student learning in corequisite course PHYS 3310. In this tutorial, students will work in small groups to practice how to solve challenging problems and their underlying conceptual basis, as well as using hands-on activities, demonstrations, and other techniques to help learn content.
**Requisites:** Requires a corequisite course of PHYS 3310.

**PHYS 3320 (3) Principles of Electricity and Magnetism 2**
Continuation of PHYS 3310. Electromagnetic induction; magnetic energy; microscopic theory of magnetic properties; Ac circuits; Maxwell's Equations; planewaves; waveguides and transmission lines; radiation from electric and magnetic dipoles and from an accelerated charge.
**Requisites:** Requires a prerequisite course of PHYS 3310 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 3330 (2) Electronics for the Physical Sciences**
Introduces laboratory electronics for physical science students. Includes basic electronic instruments, dc bridge circuits, operational amplifiers, bipolar transistors, field-effect transistors, photodiodes, noise in electronic circuits, digital logic and microcontrollers. Students gain hands-on experience in designing, building and debugging circuits. Two lectures and one three hour laboratory per week. Concludes with a three-week project in which students design and build an experiment of their choice and present a seminar on the results.
**Requisites:** Requires prerequisite courses of PHYS 2150 and PHYS 2130 or PHYS 2170 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4130 (3) Biological Electron Microscopy: Principles and Recent Advances**
Covers basic mechanisms for imaging and recent advances used in current biological research, elements of electron optics, image optimization, resolution, radiation damage, various imaging modes (TEM, HVEM, Sem, Stem, Stm), specimen quantitation and reconstruction (stereo and 3-D), microanalysis and electron diffraction. Specimen preparation treated only incidentally.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5130
**Requisites:** Requires a prerequisite course of EBIO 1220 or MCDB 1150 or MCDB 4550 or MCDB 5550 or PHYS 1120 or PHYS 2020 (minimum grade D-).

**PHYS 4150 (3) Plasma Physics**
Discusses the fundamentals of plasma physics, including particle motion in electromagnetic fields, wave propagation, collisions, diffusion, and resistivity. Presents examples from space plasmas, astrophysical plasmas, laboratory fusion plasmas, and plasmas in accelerators.
**Requisites:** Requires a prerequsite course of PHYS 3310 and a prerequisite or corequisite course of PHYS 3320 (all minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4230 (3) Thermodynamics and Statistical Mechanics**
Statistical mechanics applied to macroscopic physical systems; statistical thermodynamics, classical thermodynamics systems; applications to simple systems. Examines relationship of statistical to thermodynamic points of view.
**Requisites:** Requires a prerequisite course of PHYS 2210 and a prerequisite or corequisite course of PHYS 3220 (all minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4340 (3) Introduction to Solid State Physics**
Discusses crystal structure, lattice dynamics, band theory, semiconductors and ferromagnetism.
**Requisites:** Requires a prerequsite course of PHYS 3220 (minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4410 (3) Quantum Mechanics 2**
Extends quantum mechanics to include perturbation theory and its applications to atomic fine structure, multi-particle systems, interactions with external forces, the periodic table and dynamical processes including electromagnetic transition rates.
**Requisites:** Requires prerequisite courses of PHYS 3220 and PHYS 3310 (all minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4420 (3) Nuclear and Particle Physics**
Introduces structure of the atomic nucleus, spectroscopy of subnuclear particles, scattering, reactions, radioactive decay, fundamental interactions of quarks and leptons.
**Requisites:** Requires prerequsite courses of PHYS 3320 and PHYS 4410 (all minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4430 (3) Advanced Laboratory**
Two lectures, one lab per week. Experiments introduce students to realities of the experimental physics so they gain a better understanding of theory and an appreciation of the vast amount of experimental work done in the physical sciences today.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5430
**Requisites:** Requires a prerequsite course of PHYS 3330 (minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4450 (3) History and Philosophy of Physics**
Discusses the epistemic question of what characterizes good physics research as well as the metaphysical question of what our best physics research tells us about the world. Topics may include case studies of physics experiments, theory choice, and scientific methodology in physics, as well as foundational metaphysical questions in statistical mechanics, quantum mechanics, special and general relativity, chance and probability, and the laws of nature.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5450 and PHIL 4450 and PHYS 5450
**Requisites:** Requires a prerequisite course of PHYS 1020 or PHYS 1120 or PHYS 1125 or PHYS 2020 (minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4460 (3) Teaching and Learning Physics**
Learn how people understand key concepts in physics. Through examination of physics content, pedagogy and problems, through teaching, and through research in physics education, students will explore the meaning and means of teaching physics. Students will gain a deeper understanding of how education research is done and how people learn. Useful for all students, especially for those in interested in physics, teaching and education research.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5460 and EDUC 4460 and EDUC 5460
**Requisites:** Requires prerequisite courses of PHYS 3210 and PHYS 3310 (all minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4510 (3) Optics**
Basic electromagnetic theory of light, using Maxwell's equations. Examples in geometrical optics; extensive applications in physical optics including diffraction and polarization. Spectra, including Zeeman effect and fluorescence. Recent advances in experimental techniques: microwaves, lasers, image converters.
**Requisites:** Requires a prerequisite course of PHYS 3320 (minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4550 (3) Cells, Molecules and Tissues: A Biophysical Approach**
Focuses on the biophysics governing the structure/function of enzymes, cells, extracellular matrix and tissue. Synthesizes ideas from molecular biology, physics, and biochemistry, emphasizing how low Reynolds number physics, not Newtonian physics, is relevant to life inside a cell. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5550 and MCDB 4550 and PHYS 5550
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 and PHYS 2010 and PHYS 2020 and CHEM 1133 or MATH 1300 and/or CHEM 3311 (minimum grade C-) or instructor consent required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4560 (3) Introduction to Biophysics**
Covers an introduction to the physics of living systems. Focuses on how living systems are able to generate order, with both physical principles and biological examples. Covers the development of quantitative models for biological systems, including estimates. Taught from a physics perspective, with biology background introduced as needed.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5560 and MCDB 4560 and MCDB 5560
**Requisites:** Requires a prerequisites course of PHYS 2210 (minimum grade C-).
**Recommended:** Prerequisite PHYS 4230.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4610 (2) Physics Honors**
Students are matched with a faculty member and work independently on a research topic. Typically, the honors program lasts three semesters. A senior thesis and an oral presentation of the work are required. See also PHYS 4620 and PHYS 4630. Department enforced prerequisite: mininimum 3.00 GPA. Registration by special arrangement with the Department of Physics.
**Additional Information:** Arts Sciences Honors Course

**PHYS 4620 (2) Physics Honors**
Students are matched with a faculty member and work independently on a research topic. Typically, the honors program lasts three semesters. A senior thesis and an oral presentation of the work are required. See also PHYS 4610 and PHYS 4630. Department enforced prerequisite: mininimum 3.00 GPA. Registration by special arrangement with the Department of Physics.
**Additional Information:** Arts Sciences Honors Course

**PHYS 4630 (2) Physics Honors**
Students are matched with a faculty member and work independently on a research topic. Typically, the honors program lasts three semesters. A senior thesis and an oral presentation of the work are required. See also PHYS 4610 and PHYS 4620. Department enforced prerequisite: mininimum 3.00 GPA. Registration by special arrangement with the Department of Physics.
**Additional Information:** Arts Sciences Honors Course

**PHYS 4700 (3) Quantum Forge I**
Provides junior- and senior-level engineering and physical science students an opportunity to gain professional and technical quantum science skills and experience through participation in real-world projects in collaboration with industry leaders and academic investigators. Alongside project activity, students will engage in skill- and concept-focused modules to ensure proficiency in the skills necessary to participate in the quantum workforce. This capstone experience is intended for students who do not intend to continue on to graduate study in physics or engineering, but rather to enter the workforce directly.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4700
**Requisites:** Requires prerequisite course of PHYS 3330 (minimum grade C-).
**Recommended:** Prerequisite or corequisite PHYS 4410.

**PHYS 4710 (3) Quantum Forge II**
Continuation of PHYS 4700, Quantum Forge I. The Quantum Forge provides junior- and senior-level engineering and physical science students an opportunity to gain professional and technical quantum science skills and experience through participation in real-world projects in collaboration with industry leaders and academic investigators. In the second semester, students will expand upon the knowledge and skills gained through the first-semester to bring projects to a point of completion and readiness for deployment in the industry context. As with Quantum Forge I, this capstone experience is intended for students who do not intend to continue on to graduate study in physics or engineering, but rather to enter the workforce directly.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4710
**Requisites:** Requires prerequisite course of PHYS 4700 or MCEN 4700 (minimum grade C-).

**PHYS 4810 (1-3) Special Topics in Physics**
Various topics not normally covered in the curriculum. Offered intermittently depending on student demand and availability of instructors.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4840 (1-3) Independent Study**
Selected topics for undergraduate independent study. Subject matter to be arranged. See also PHYS 4850.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**PHYS 4850 (1-3) Independent Study**
Selected topics for undergraduate independent study. Subject matter to be arranged. See also PHYS 4840.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**PHYS 4970 (3) Seminar on Physical Methods in Biology**
Covers basic mechanisms and applications of physical methods used in current biological research, microprobe analysis, Eels, elementary electron and x-ray crystallography, biomedical imaging (NMR, MRI, Pet, Cat), Fourier analysis, synchrotron radiation, Exafs, neutron scattering and novel ultramicroscopy techniques. Includes lectures, student presentations, occasional demonstrations. Emphasis depends on student interest.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5970
**Requisites:** Requires a prerequisite course of PHYS 1120 or PHYS 2020 and MCDB 1150 or EBIO 1220 (all minimum grade D-).

# Engineering Physics - Bachelor of Science (BSEP)

During the freshman and sophomore years, students receive a broad introduction to physics, chemistry, applied mathematics and mathematical methods in physics. Starting in the sophomore year, students take electrodynamics, quantum mechanics, classical mechanics, mathematical methods, thermodynamics and statistical mechanics, and advanced mathematics. In addition, there is a core of four laboratory courses that students take. Laboratory courses emphasize student-developed and student-designed independent projects in which students use the knowledge acquired to build apparatus of their own choosing. One of the capstone lab courses, PHYS 4430 , provides students with hands-on experience with optical spectroscopy, nuclear magnetic resonance, scanning tunneling microscopy, and laser cooling and trapping of atoms, among other experiments. The other capstone course, PHYS 4700, provides students an opportunity to gain professional and technical quantum science skills and experience through participation in real-world projects in collaboration with industry leaders and academic investigators.

The program encourages the formation of student research collaborations with faculty in the pursuit of senior thesis projects. Recent projects include research in pulsed laser deposition of high-temperature superconductors, electron diffraction studies of protein structure, and lattice distortion theory of colossal magnetoresistance materials.

Students who plan to become registered professional engineers should check the requirements for registration in their state before choosing their engineering major.

*Note:* Students may not earn a bachelor's degree in physics from the College of Arts & Sciences as well as a bachelor's degree in engineering physics from the College of Engineering & Applied Science. Furthermore, the physics minor may not be earned with either of these two baccalaureate programs.

# Requirements

## Program Requirements

In order to earn a bachelor's degree in engineering physics, students must complete the curriculum in the undergraduate major program, as outlined below. For up-to-date program requirements, visit the Bachelor of Science in Engineering Physics (https://www.colorado.edu/physics/academics/undergraduate-students/bachelor-science-engineering-physics/) webpage.

Students may not earn a BS in Engineering Physics + BA in Physics or a minor in physics.

*Note*: Some variations may be possible; students are advised to see their engineering physics academic advisor.

In addition, students must meet the general undergraduate degree requirements of the College of Engineering and Applied Science (https://www.colorado.edu/engineering-advising/get-your-degree/graduation-requirements/).

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| PHYS 1115 | General Physics 1 for Majors | 4 |
| or PHYS 1110 | General Physics 1 | |
| PHYS 1125 | General Physics 2 for Majors | 4 |
| or PHYS 1120 | General Physics 2 | |
| PHYS 1140 | Experimental Physics 1 | 1 |
| PHYS 2150 | Experimental Physics 2 | 1 |
| PHYS 2170 | Foundations of Modern Physics | 3 |
| or PHYS 2130 | Introduction to Quantum Mechanics and Its Applications | |
| PHYS 2210 | Classical Mechanics and Mathematical Methods 1 | 3 |
| PHYS 3210 | Classical Mechanics and Mathematical Methods 2 | 3 |
| PHYS 3220 | Quantum Mechanics 1 | 3 |
| PHYS 3310 | Principles of Electricity and Magnetism 1 | 3 |
| PHYS 3320 | Principles of Electricity and Magnetism 2 | 3 |
| PHYS 3330 | Electronics for the Physical Sciences | 2 |
| PHYS 4230 | Thermodynamics and Statistical Mechanics | 3 |
| PHYS 4410 | Quantum Mechanics 2 | 3 |
| **Upper-Division Physics Electives** | | |
| Complete one of the three options listed in the next table. | | 9 |
| **Required Chemistry & Natural Science Courses** | | |
| CHEM 1113 | General Chemistry 1 | 4 |
| or CHEN 1201 | General Chemistry for Engineers 1 | |
| or CHEN 1211 | Accelerated Chemistry for Engineers | |
| CHEM 1114 | Laboratory in General Chemistry 1 | 1 |
| or CHEM 1221 | Engineering General Chemistry Lab | |
| Natural Science Electives [1] | | 5 |
| **Required Mathematics Courses** | | |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or MATH 1300 | Calculus 1 | |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| or MATH 2300 | Calculus 2 | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| or MATH 2400 | Calculus 3 | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| or MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |
| Upper-division APPM, MATH, or STAT course. [2] | | 3 |
| **Required Engineering and Computing Courses** | | **25** |
| Choose two of the following computing options | | |
| PHYS 2600 | Introduction to Programming and Scientific Computing | |
| or APPM 1650 | Python for Math and Data Science Applications | |
| CSCI 1300 | Computer Science 1: Starting Computing | |
| ECEN 1310 | Introduction to C Programming | |
| AREN 1027 | Engineering Drawing | |
| or MCEN 1025 | Computer-Aided Design and Fabrication | |
| CSCI 3+ credit course at the 2000 level or above. | | |
| Choose engineering courses to reach a minimum of 25 credits in addition to computing and other degree requirements. Must be offered by CEAS departments. [3] | | |
| **Humanities, Social Sciences and Writing** | | |
| Complete the College's Humanities, Social Sciences and Writing requirements. [4] | | 18 |
| **Free Electives** | | |
| Choose at least 11 credit hours of free electives to meet the minimum 128 credit hours required for the BS degree. | | 11 |
| **Total Credit Hours** | | **128** |

1. Students may choose courses from the list of Engineering Physics approved natural science electives.
2. Excludes MATH 3430 and courses that are approved to count for the CEAS Humanities and Social Science requirement.
3. Choose from the following subject codes: APPM, AREN, ASEN, ATLS, BIEN, BMEN, CHEN, COEN, CSCI, CVEN, ECEN, EMEN, ENEN, EVEN, GEEN, IDEN, MCEN or STAT. Excluded: ASEN 3036, ASEN 3046, CHEN 1201, CHEN 1211 and any other courses otherwise approved for the CEAS Humanities and Social Sciences requirement.
4. Students may choose courses from the list of college-approved humanities and social sciences (HSS) electives.

## Upper-Division Physics Electives

The selection of course offerings changes each semester. See the Engineering Physics Advising Guide (https://www.colorado.edu/physics/academics/undergraduate-students/bachelor-science-engineering-physics/) for an up-to-date selection.

| Code | Title | Credit Hours |
|---|---|---|
| **Research/Lab Electives [1,2]** | | **3-6** |
| PHYS 4430 | Advanced Laboratory | |
| or PHYS 5430 | Advanced Laboratory | |
| PHYS 4610 | Physics Honors [2] | |
| PHYS 4620 | Physics Honors [2] | |
| PHYS 4630 | Physics Honors [2] | |
| PHYS 4700 | Quantum Forge I | |
| PHYS 4710 | Quantum Forge II | |
| PHYS 4840 | Independent Study [2] | |
| **Other Upper-Division Physics Electives** | | **3-6** |
| PHYS 3070 | Energy and the Environment | |
| PHYS 3090 | Introduction to Quantum Computing | |
| PHYS 4150 | Plasma Physics | |
| PHYS 4340 | Introduction to Solid State Physics | |
| PHYS 4420 | Nuclear and Particle Physics | |
| PHYS 4450 | History and Philosophy of Physics | |
| PHYS 4460 | Teaching and Learning Physics | |
| PHYS 4510 | Optics | |
| PHYS 4550 | Cells, Molecules and Tissues: A Biophysical Approach | |

| | | |
|---|---|---|
| PHYS 4560 | Introduction to Biophysics | |
| PHYS 4810 | Special Topics in Physics | |
| Any PHYS graduate-level courses (5000 level or above), with permission of instructor. | | |
| **Total Credit Hours** | | **9** |

1 Students may satisfy the research/lab electives with documentation of accomplishments as an intern with a research group in the Physics Department or suitable cognate department. Approval by an Engineering Physics faculty mentor is required and should be obtained in advance. Students pursuing this option must take 9 credit hours of upper-division physics electives.

2 Students may count a maximum of 6 credit hours from a combination of PHYS 4610/PHYS 4620/PHYS 4630 and PHYS 4840 as physics electives.

# Sample Four-Year Plan of Study

Below is a suggested schedule only. For a complete description of the engineering physics course requirements, visit the Department of Physics (http://www.colorado.edu/physics/) website.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| First Computing Course [1] | | 4 |
| PHYS 1115 or PHYS 1110 | General Physics 1 for Majors or General Physics 1 | 4 |
| COEN 1500 | CEAS First Year Seminar | 1 |
| Humanities or Social Science Elective [2] | | 2 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| Second Computing Course [1] | | 3 |
| PHYS 1125 or PHYS 1120 | General Physics 2 for Majors or General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| Humanities or Social Science Elective [2] | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| **Fall Semester** | | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| CHEM 1113 | General Chemistry 1 | 4 |
| CHEM 1114 | Laboratory in General Chemistry 1 | 1 |
| PHYS 2150 | Experimental Physics 2 | 1 |
| PHYS 2170 or PHYS 2130 | Foundations of Modern Physics or Introduction to Quantum Mechanics and Its Applications | 3 |
| Engineering Electives [1] | | 4 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| PHYS 2210 | Classical Mechanics and Mathematical Methods 1 | 3 |
| Engineering Electives [1] | | 4 |
| CHEM 1133 | General Chemistry 2 [3] | 4 |
| CHEM 1134 | Laboratory in General Chemistry 2 [3] | 1 |
| | **Credit Hours** | **16** |
| **Year Three** | | |
| **Fall Semester** | | |
| PHYS 3210 | Classical Mechanics and Mathematical Methods 2 | 3 |
| PHYS 3310 | Principles of Electricity and Magnetism 1 | 3 |
| PHYS 3330 | Electronics for the Physical Sciences | 2 |
| Engineering Elective [1] | | 3 |
| Humanities or Social Science Elective [2] | | 3 |
| Free Electives | | 2 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| PHYS 3220 | Quantum Mechanics 1 | 3 |
| PHYS 3320 | Principles of Electricity and Magnetism 2 | 3 |
| PHYS 4230 | Thermodynamics and Statistical Mechanics | 3 |
| Upper Division Math or Applied Math elective | | 3 |
| Physics Electives [1] | | 3 |
| Humanities or Social Science Elective [2] | | 3 |
| | **Credit Hours** | **18** |
| **Year Four** | | |
| **Fall Semester** | | |
| PHYS 4410 | Quantum Mechanics 2 | 3 |
| Engineering Electives [1] | | 3 |
| Physics Electives [1] | | 3 |
| College-Approved Writing Course [4] | | 3 |
| Free Electives | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| Engineering Electives [1] | | 4 |
| Physics Electives [1] | | 3 |
| Humanities or Social Science Elective [2] | | 3 |
| Free Electives | | 6 |
| | **Credit Hours** | **16** |
| | **Total Credit Hours** | **128** |

1 For additional information, course options, and planning advice, consult the Engineering Physics Advising Guide on the Engineering Physics Major Website (https://www.colorado.edu/physics/academics/undergraduate-students/bachelor-science-engineering-physics/).

2 Students may choose courses from the list of college-approved humanities and social sciences (HSS) electives (http://www.colorado.edu/engineering/academics/policies/hss/).

3 Students may choose courses from the list of Engineering Physics approved natural science electives.

4 Students may choose a course from the list of college-approved writing courses.

## Learning Outcomes

By the completion of the program, students will be able to:

- Have the knowledge of the basic subfields of physics (classical mechanics, electricity and magnetism, quantum mechanics, statistical mechanics and thermodynamics), as well as at least one specialty area of application (e.g., condensed matter physics or optics).
- Apply major principles of physics towards solving problems in various subfields of physics, including the use of mathematical and computational tools as appropriate.
- Use skills in assembling and using experimental apparatus to conduct and analyze measurements of physical phenomena.
- Have the knowledge of the role of systematic and random experimental errors, along with methods used to analyze experimental uncertainty and compare experiment with theory.
- Use skills in collaborating effectively and communicating results of scientific inquiries verbally and in writing.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BS in Engineering Physics, MS in Physics

The BAM program in engineering physics aims to provide new opportunities for undergraduate engineering physics majors. The program is specifically addressed to engineering physics majors in the Department of Physics. The engineering physics major gives students a thorough grounding in theoretical physics, applied mathematics and broad exposure to engineering topics, so that they are well prepared either to proceed with graduate work or with professional employment in either basic science or in applied fields.

For students interested in graduate studies, the BAM program in engineering physics allows for participation in graduate coursework and research in a broad range of areas. For students interested in immediate professional employment, this program would serve as a terminal degree program that qualifies students for a higher level of employment.

### Admissions Requirements

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.30 or higher and a physics major GPA of 3.30 or higher.
- Have completed a minimum of 80 credit hours of coursework.
- Completion of all MAPS requirements and no deficiencies remaining (students admitted to CU Boulder prior to Summer 2023 only).
- Transfer students must have completed a minimum of 24 credit hours at CU Boulder.
- Have a letter of support from a faculty advisor to complete master's level research.

### Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only six hours may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

If you are interested in the BAM degree program, please contact the Engineering Physics Faculty Director for more information.

# Engineering, Ethics & Society

Since 1989, the Herbst Program for Engineering, Ethics and Society has engaged engineering students in the weighty questions of human existence and in linking these to the ethical practice of engineering. As our students discuss great works, they hone their skills at critical thinking and clear communication—essential skills for future engineers. Courses use foundational works from different eras and cultures to address the complexities where these three fields overlap:

- Engineering, as an educational process and a profession
- Ethics, or personal responsibility
- Society, as the rich socio-cultural world in which we live

All Herbst courses count toward Humanities and Social Sciences requirements in the College of Engineering and Applied Science.

**Course code for this program is ENES.**

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ambler, Catherine
Assistant Teaching Professor; PhD, Columbia University

Ambler, Wayne (https://experts.colorado.edu/display/fisid_127519/)
Associate Professor Emeritus; PhD, Boston College

Byrne, James
Teaching Assistant Professor; PhD, Princeton University

de Alwis, Lisa (https://experts.colorado.edu/display/fisid_152569/)
Teaching Assistant Professor; PhD, University of Southern California

Diduch, Paul Jordan (https://experts.colorado.edu/display/fisid_154510/)
Teaching Associate Professor; PhD, University of Dallas

Douglass, Scot Ray (https://experts.colorado.edu/display/fisid_102347/)
Professor; PhD, University of Colorado Boulder

Fredricksmeyer, Hardy (https://experts.colorado.edu/display/fisid_115446/)
Teaching Professor; PhD, University of Texas at Austin

Giovannelli, Leland (https://experts.colorado.edu/display/fisid_100755/)
Teaching Professor Emerita; PhD, University of Chicago

Kowalchuk, Andrea (https://experts.colorado.edu/display/fisid_154509/)
Teaching Associate Professor; PhD, University of Dallas

Lange, Anja K. (https://experts.colorado.edu/display/fisid_104576/)
Teaching Professor, Faculty Director; PhD, University of Colorado Boulder

Sieber, Diane E. (https://experts.colorado.edu/display/fisid_101394/)
Associate Professor; PhD, Princeton University

Stanford-McIntyre, Sarah (https://experts.colorado.edu/display/fisid_163315/)
Assistant Professor; PhD, University of Wyoming

Swanson, Joel E. (https://experts.colorado.edu/display/fisid_134311/)
Associate Professor; MFA, University of California, San Diego

Sylvester, Roshanna (https://experts.colorado.edu/display/fisid_164037/)
Associate Professor; PhD, Yale University

Thieman Dino, Angela Lea (https://experts.colorado.edu/display/fisid_145591/)
Teaching Professor; PhD, University of Colorado Boulder

Turner, A. Kane
Lecturer; PhD, University of Dallas

# Courses

**ENES 1010 (3) Humanity in a Technological Age**
This seminar considers what it means to be human in an increasingly technological age. Designed for engineering students, it also looks at the role of technology designers and creators in shaping the human environment. Students focus on sharpening their written and oral communication skills through a series of iterative assignments and projects. Fulfills College of Engineering writing requirement for first-year students only.
**Requisites:** Restricted to students with 0-26 (Freshmen) College of Engineering majors only.

**ENES 1843 (3) Special Topics**
Explores different important themes in engineering, ethics, and society; check with the department for specific semester topics. Formerly HUEN 1843.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) College of Engineering majors only.

**ENES 1850 (3) Engineering in History: The Social Impact of Technology**
Investigates how technology and engineering have both shaped our modern world and been shaped by it. Inquiry-based projects examine the history of technology through historical sources and provide opportunities for critical reflection on how historical thinking can inform engineering practice. Alongside an overview of modern engineering and technology, we investigate questions such as whether new technologies made household labor easier in the 20th century and how the needs of end-users shaped the development of computing. Formerly HUEN 1850.
**Requisites:** Restricted to students with 0-56 (Freshmen or Sophomore) College of Engineering majors only.

**ENES 2010 (3) Tradition and Identity**
Explores the place and possibility of personal identity both within and against the influence of tradition, including family, culture, language, and social, political and economic institutions. Via literature and film, wrestles with the nature of freedom, self-determination, and belonging. Formerly HUEN 2010.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 2020 (3) The Meaning of Information Technology**
A survey of the mutual influence of technology, media, and society. Equips students with an understanding of technological transformations in interpersonal, organizational, and mass communication. Emphasis is on the technological, social and political changes that underlie the movement toward a digital society. As such, the class acts as a survey of various technologies and their relationship to socio-political issues. We not only address ¿how does it work¿ and ¿where does this come from¿ but ¿why is it here¿ and ¿how does it impact us as individuals and as a society¿.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 2100 (3) History of Science and Technology to Newton**
Spans invention and discovery from the Stone Age to the age of Newton, raising questions about culture, history, and personal expectation; studies Pyramids, odometers, cathedrals , Galileo, etc., on the way. Formerly HUEN 2100.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 2120 (3) History of Modern Science from Newton to Einstein**
Surveys the great discoveries and theoretical disputes from Newtonian celestial mechanics to the theory of relativity. Includes physics, astronomy, chemistry, geology, and biology; closely examines scientific method, evolution, light and quantum theory. Uses original sources by Newton, Faraday, Lavoisier, Darwin, etc., for immediate contact with the great minds in science. Formerly HUEN 2120.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 2130 (3) History of Modern Technology from 1750 to the Atomic Bomb**
Surveys the great innovations from the Steam Age to the Atomic Age: transportation, modern construction, communications, internal combustion, etc. Supplements textbook accounts with drawings, patents, and original selections by Edison, Carnegie, Tesla, Bell, etc. Studies the sociological impact of social change via contemporary sources in literature, philosophy, painting and film. Formerly HUEN 2130.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 2160 (3) Energy, Society, and the Climate Question**
Examines the social, political, and cultural dynamics of energy production and consumption with a focus on the ¿green¿ energy transition. Analyzes historic and contemporary efforts to address climate change in the US and around the globe and contextualizes technical and infrastructural developments; students collectively identify barriers and develop possible solutions.
**Equivalent - Duplicate Degree Credit Not Granted:** ENES 3160
**Requisites:** Restricted to students in College of Engineering and Applied Science (ENGR) only.

**ENES 2210 (3) Modern Science and Technological Society**
Explores challenges that engineering and science pose for society plus the ways that societies shape or impede science and engineering. Case studies range from contemporary issues (global warming, nuclear weapons, and genetic engineering) to classic cases (the execution of Socrates). Core texts in the Western Tradition supplement contemporary articles and films. Formerly HUEN 2210.
**Equivalent - Duplicate Degree Credit Not Granted:** ENES 3210
**Requisites:** Restricted to College of Engineering majors only.

**ENES 2346 (3) Women and Engineering**
Explores the role of women as shaping and shaped by engineering, from the past into the future. Texts from history, women¿s studies, philosophy, film, and literature shed light on how gender has contributed to the forging of our identities, both personal and professional. Engineering professors guest-lecture, sharing their life stories and their research.
**Equivalent - Duplicate Degree Credit Not Granted:** ENES 3346
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Grading Basis:** Letter Grade

**ENES 2360 (3) Gaining a Global State of Mind for Effective Engineering Practice**
Ranges across cultures and centuries to reveal many dimensions of globalization; shows how cultural awareness enhances effectiveness in the increasingly global profession of engineering. This highly interactive course uses history, philosophy, geography, religion, economics, the arts, etc., to illustrate the complexity of global engineering¿s cultural context. Concurrently, it encourages new insights into culture and identity, both at home and abroad. Formerly HUEN 2360.
**Equivalent - Duplicate Degree Credit Not Granted:** ENES 3360
**Recommended:** restricted to students in the College of Engineering and Applied Science.

**ENES 2840 (1-3) Lower Division: Independent Study**
Offers opportunity for lower-division Engineering students to do independent study work in humanities, appropriate to their academic level. Subject determined, with a Herbst instructor, to fit the needs of the student. Department and faculty consent required. Formerly HUEN 2840.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Grading Basis:** Letter Grade

**ENES 2843 (3) Special Topics**
Explores different important themes in engineering, ethics, and society; check with the department for specific semester topics. Formerly HUEN 2843.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 3100 (3) Ethical Awareness for Engineers**
This seminar introduces engineering students to a variety of essential texts and works drawn from literature, history, philosophy, and the arts. Through class discussions and a variety of writing assignments, students reflect on their personal values, goals, commitments, and responsibilities, and how these align with the ethical challenges of engineering. Fulfills the College of Engineering and Applied Science writing requirement.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**ENES 3160 (3) Energy, Society, and the Climate Question**
Examines the social, political, and cultural dynamics of energy production and consumption with a focus on the ¿green¿ energy transition. Analyzes historic and contemporary efforts to address climate change in the US and around the globe and contextualizes technical and infrastructural developments; students collectively identify barriers and develop possible solutions.
**Equivalent - Duplicate Degree Credit Not Granted:** ENES 2160
**Requisites:** Restricted to students in College of Engineering and Applied Science (ENGR) only.

**ENES 3210 (3) Modern Science and the Technological Society**
Explores challenges that engineering and science pose for society as well as the ways that societies shape or impede science and engineering. Case studies range from contemporary issues (global warming, nuclear weapons, and genetic engineering) to classic cases (the execution of Socrates). Core texts in the Western Tradition supplement contemporary articles and films.
**Equivalent - Duplicate Degree Credit Not Granted:** ENES 2210
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**ENES 3280 (3) Science and Religion**
Explores relationship between science and religion from multiple contrasting stances, including Western and non-Western culture; ancient and modern viewpoints; pro and counter Enlightenment arguments. The course uses history, philosophy, psychology, cognitive science, biology, poetry, theology, sociology, political theory, literature, film, and social media to show the pervasiveness and complexity of the relation between science and religion. The course also promotes sympathetic treatment of perspectives, cutting widely across the political, cultural, and belief spectrums. Previously offered as a special topics course.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Grading Basis:** Letter Grade

**ENES 3320 (3) Don Quixote's Spain**
Examines the first modern novel in the context of modern society¿s preoccupation with fake news and the difficulty of separating fictions from truth. As a global intensive, focuses on the origins of modern Spain, the rise of Madrid at its center, and the continuing presence of Don Quixote and Sancho Panza in the popular imagination. Interrogates the virtuality of our own perceptions and the role that imagination plays in our construction of self and other.
**Recommended:** Spanish language experience; fluency not required.

**ENES 3330 (3) Science Fiction and Philosophy**
Examines significant philosophical concepts through global science fiction novels, stories and films. Relates these concepts to the life, choices and professional career of the future engineer.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 3340 (3) Leonardo da Vinci's World**
Examines Leonardo da Vinci¿s notebooks, his art and his socio-historical context while interrogating his various engineering roles, his creativity, and his synthesis of science, technology, and art.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 3346 (3) Women and Engineering**
Explores the role of women as shaping and shaped by engineering, from the past into the future. Texts from history, women¿s studies, philosophy, film, and literature shed light on how gender has contributed to the forging of our identities, both personal and professional. Engineering professors guest-lecture, sharing their life stories and their research.
**Equivalent - Duplicate Degree Credit Not Granted:** ENES 2346
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Grading Basis:** Letter Grade

**ENES 3350 (3) Gods, Heroes and Engineers: The Western Quest for Excellence**
Investigates the intensely competitive quest of the ancient Greeks for excellence in everything from art and literature to science and war and also the odyssey of the mind generated by this quest, culminating in our modern world. Formerly HUEN 3350.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**ENES 3360 (3) Gaining a Global State of Mind for Effective Engineering Practice**
Ranges across cultures and centuries to reveal many dimensions of globalization; shows how cultural awareness enhances effectiveness in the increasingly global profession of engineering. This highly interactive course uses history, philosophy, geography, religion, economics, the arts, etc., to illustrate the complexity global engineering¿s cultural context. Concurrently, it encourages new insights into culture and identity, both at home and abroad. Formerly HUEN 3360.
**Equivalent - Duplicate Degree Credit Not Granted:** ENES 2360
**Requisites:** Restricted to students in College of Engineering and Applied Science (ENGR) only.

**ENES 3370 (3) Harry Potter and the Conflict of Being**
Addressing the idea of conflict from a wide variety of perspectives: personal identity, class, race, morality, education, age, ambition, leadership and friendship, this course will explore how these themes are worked out both within this extended coming of age narrative and against the classical background that J.K. Rowling so freely appropriates. Through a close reading of the texts, themselves, we will map out their philosophical/existential significance and how this is related to their popularity. Formerly offered as a special topics course.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 3430 (3) Ethics of Genetic Engineering: A Multidisciplinary Approach**
Investigates the metaphorical, ideological and scientific constructs that inform debates over the genetic modification of humans, animals and plants. Begins with a close reading of Shelley's Frankenstein, proceeds to a consideration of philosophical arguments for and against human modification and concludes with a consideration of the scientific and political contexts that inform the regulation of genetically modified foods. Formerly HUEN 3430.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 3450 (3) Narrative Medicine**
Explores the foundations of a narrative practice of medicine through rigorous engagement with various texts, guided writing, and class conversation. Medicine here is defined broadly as engagement with illness and healing, including the practices of doctors, nurses, social workers, researchers, and caregivers. Special attention is given to the role of artists and craftspeople and how such practices might be integrated with an increasingly specialized and technical medical system.
**Recommended:** Prerequisite a minimum of 30 credit hours.

**ENES 3543 (3) History of Western Medicine**
Introduces the intriguing and appalling history of western medicine, from prehistory to the present. Includes grave-robbers, leeches and the Black Death. This course links past to present, in discussion of evidence, innovation, ethics and standards of medical education and practice. Based on original sources, textbook accounts and modern scholarship, and featuring student presentations on the Disease of the Week. Formerly HUEN 3543.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Grading Basis:** Letter Grade

**ENES 3700 (3) Culture Wars in Rome**
Investigates in Rome, Italy (during Maymester), the cultural contrasts among three different cities: ancient, pagan, aristocratic Rome; medieval, Christian, theocratic Rome; and modern, secular, democratic Rome. Draws on evidence from Roman literature, politics, art and architecture. Must have completed a minimum of 26 credit hours by start of course. Requires some preparatory work in Boulder. Formerly HUEN 3700.

**ENES 3720 (3) Voices of Vienna: Freud, Wittgenstien, Mozart**
Study and visit Vienna, a city famous for Mozart's music, Freud's psychology and Wittgenstein's philosophy. As the seat of the Habsburg Empire, Vienna was a rich cultural and political center; it was a crossroads for international trade and exciting new ideas. As the lively capital of present-day Austria, it remains in the forefront of social change. Formerly HUEN 3720.

**ENES 3750 (3) Xi'an, China: Self-Awareness and Images of the Other**
Explores Chinese culture abroad, focusing on ideas of self and other within special historical, social, political, and economical circumstances. Chinese and American concepts of self and society, and of individual, collective, and national identities will be analyzed. Held on the campus of Xi'an Jiaotong University, China. Formerly HUEN 3750.
**Recommended:** Prerequisite completion of lower-division Humanities course.
**Additional Information:** Departmental Category: Asia Content

**ENES 3840 (1-3) Independent Study**
Offers an opportunity for students to do independent work in the humanities. Subject arranged to fit the needs of the student. Department consent required. Formerly HUEN 3840.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) College of Engineering students only.

**ENES 3843 (3) Special Topics**
Explores different important themes in engineering, ethics, and society; check with department for specific semester topics. Formerly HUEN 3843.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 3844 (3) Special Topics Global Intensive**
Explores different important themes in the humanities and includes a Global component; check with department for specific semester topics.
**Equivalent - Duplicate Degree Credit Not Granted:** COEN 4000 or COEN 5000
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students in College of Engineering and Applied Science (ENGR) only.

**ENES 4800 (1) Leadership & Ethics in the Real World**
Formerly HUEN 4800.

**ENES 4830 (3) Special Topics**
Explores different important themes in engineering, ethics, and society; check with department for specific semester topics. Formerly HUEN 4830.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ENES 1010 or ENES 3100. Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

# Certificate Program

- Engineering, Ethics and Society - Certificate (p. 1001)

# Engineering, Ethics and Society - Certificate

The Certificate in Engineering, Ethics & Society (EES) leads students to courses that help them understand engineering in different contexts. Students select courses in consultation with the co-directors and engage with contemporary debates, themes, and issues related to engineering and applied science.

Through participation in the certificate, students will pair broad, complex questions with more specific inquiry. For example:

- What role should engineers play in policy-making?
- How can engineers help build workable relationships between scientific advancements and contemporary society?
- What are the likely benefits and risks of biomedical advancements, especially genetic engineering?
- How can engineers help offset worldwide environmental degradation?
- What is the appropriate role of AI in the workplace? In our daily lives?

Students will meet with one of the certificate's co-directors to identify four 3-credit courses (12 hrs total) that will help them explore questions that are relevant to their own particular interests.

The list of possible courses is open-ended, but might include:

- Courses that view engineering in social, economic and legal contexts.
- Courses that study science and technology in the past, thereby illuminating their influence in the present.
- Courses that explore the environmental impact of STEM innovation.
- Courses that explore the arts and humanities as they relate to engineering design.

# Requirements

## Eligibility

To begin the certificate, students must be in good academic standing (https://www.colorado.edu/registrar/students/your-information-records/academic-standing/) at CU Boulder and must complete a certificate of enrollment with Dr. Sarah Stanford-McIntyre of the Herbst Program for Engineering, Ethics & Society.

To complete the certificate, students must submit a certificate completion form to Dr. Stanford-McIntyre.

## Program Requirements

Students must complete 12 credits, including four courses (at least one upper-division) with a minimum grade in each course of C+.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| *Great Books Seminar* | | |
| Choose one: | | 3 |
| ENES 1010 | Humanity in a Technological Age | |
| ENES 3100 | Ethical Awareness for Engineers | |
| EHON 1151 | Critical Encounters | |
| *STEM & H&SS Intersection* | | |
| Choose one: | | 3 |
| ENES 1850 | Engineering in History: The Social Impact of Technology | |
| ENES 2020 | The Meaning of Information Technology | |
| ENES 2120 | History of Modern Science from Newton to Einstein | |
| ENES 2130 | History of Modern Technology from 1750 to the Atomic Bomb | |
| ENES 2210 | Modern Science and Technological Society | |
| ENES 2360 | Gaining a Global State of Mind for Effective Engineering Practice | |
| ENES 3360 | Gaining a Global State of Mind for Effective Engineering Practice | |
| ENES 3430 | Ethics of Genetic Engineering: A Multidisciplinary Approach | |
| ENLP 2000 | Leadership, Fame and Failure | |
| ENLP 4000 | The Empire of Modern Science | |
| INFO 3101 | History of Computing and Information | |
| **Additional coursework** | | |
| Additional Herbst or EHON (Engineering Honors) course [1] | | 3 |
| Course in Humanities or Social Science from the College of Arts & Sciences linked to EES (Engineering, Ethics & Society) themes [2] | | 3 |
| **Total Credit Hours** | | **12** |

1. This could be an additional course from the list above, or it could include Herbst or EHON Special Topics courses, Herbst Global Seminars or Global Intensives, or other Herbst courses.
2. Students must confer with the EES Certificate Director to determine the suitability of a particular course.

# Integrated Design Engineering

Integrated design is a process defined by its use of highly collaborative, multidisciplinary teamwork and consideration of all aspects of an engineering project. The Integrated Design Engineering (https://www.colorado.edu/program/ide/) program provides students with a solid grounding in the fundamentals of engineering, and both instills and is structured by integrated design. Our majors customize their degree plans through their choice of one of six engineering emphases (selected from aerospace, architectural, civil, electrical, environmental or mechanical engineering) and a concentration in an approved second area such as business, engineering management, environmental planning, pre-medical or STEM education. At the core of our program are three hands-on iterative design project courses that explore and reinforce engineering principles, and which jointly form a continuous experiential thread uniting the four-year IDE curriculum. These team-based projects showcase individual students' growing multidisciplinary knowledge and expertise toward developing vital skills in communication, innovation and leadership, as well as reinforce engineering methodologies required by the emphasis area capstone design experience. Our students graduate with the knowledge, skills and confidence required for success in a diverse and changing world.

Integrated design engineering is an approach that favors creativity, diversity and collaboration across disciplines in creating practical and innovative solutions in the service of humanity. Graduates from our program find enriching careers in engineering and related professional fields, establish and support new enterprises, teach secondary-level STEM education and enroll in graduate and professional degree programs.

For more information, visit the program (https://www.colorado.edu/program/ide/) website.

**Course code for this program is GEEN.**

## Bachelor's Degree

- Integrated Design Engineering - Bachelor of Science (BSIDE) (p. 1003)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Bielefeldt, Angela R. (https://experts.colorado.edu/display/fisid_110322/)
Affiliate Professor; PhD, University of Washington; P.E.

Godrick, Daniel (https://experts.colorado.edu/display/fisid_154955/)
Assistant Teaching Professor; MS, University of Colorado Boulder; P.E.

Soltys, Michael A. (https://experts.colorado.edu/display/fisid_152021/)
Teaching Professor, Associate Faculty Director; PhD, University of Colorado Boulder

Stites, Nick
Assistant Teaching Professor Adjoint; PhD, Purdue University

Tisdale, Joany (https://experts.colorado.edu/display/fisid_172327/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Zarske, Malinda Schaefer (https://experts.colorado.edu/display/fisid_120823/)
Faculty Director, Teaching Professor; PhD, University of Colorado Boulder

## Courses

**GEEN 1010 (4) Engineering Explorations Through Physics**
Explore the world of engineering through understanding physics concepts, engaging in active learning assignments, and conducting hands-on labs and experiments. Students will analyze product designs and engineering decisions based on the physics surrounding the situation. Formerly COEN 1010.
**Requisites:** Restricted to College of Engineering majors with 75 or less cumulative hours.

**GEEN 1017 (3) Engineering Drawing**
Introduces CAD software; relevant concepts, including orthographic projection, sections, engineering drawing, geometric dimensioning and tolerancing; and rapid manufacturing methods. Final design project involves rapid prototyping. Not recommended for AREN majors.

**GEEN 1400 (3) Engineering Projects**
First-year students solve real-world engineering design problems in interdisciplinary teams. Design projects vary by section. Curriculum focuses on iterative design process, teamwork and team dynamics, supporting design with testing and analysis, and technical writing. Completed projects are exhibited at an end-of-semester design expo. Students responsible for contributing towards their design project budget (approximately $75).
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 2500, ASEN 1400, ASEN 1403 and ECEN 1400
**Requisites:** Restricted to College of Engineering majors with 75 or less cumulative hours or IUT On Track applicants only.

**GEEN 1830 (1-4) Special Topics in Engineering**
Explores topics of interest in engineering. Content varies by instructor and semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**GEEN 2010 (3) Engineering Tools and Analysis**
Taught by engineering faculty, this course utilizes active learning pedagogies to connect math content to engineering problems (across multiple disciplines) by using real engineering tools. Students are introduced to circuits, multimeters, oscilloscopes, sensors and more. They learn to program in MATLAB (no previous programming experience necessary). Students work collaboratively with other students to collect and analyze experimental data. There is one lecture, one mixed lecture/hands-on problem session, and one lab period each week.

**GEEN 2400 (3) Engineering Projects for the Community**
Design engineering products for local community clients, with emphasis on humanitarian engineering and integrated systems with electrical, mechanical, and software components. Students are challenged to take design projects to a higher level by requiring an additional iteration through design cycle and more engaged user-testing, in order to infuse student projects with robustness necessary for public-use products. Students responsible for contributing towards their design project budget, workshop, and expo costs (approximately $100). Cannot be taken concurrently with GEEN 3400.
**Requisites:** Restricted to students with 45-180 credits (Sophomores, Juniors or Seniors) or requires prerequisite course of GEEN 1400 or COEN 1400 or ASEN 1400 or ECEN 1400 (minimum grade C-). Must be College of Engineering majors or IUT On Track applicants only.

**GEEN 2830 (1-4) Special Topics**
Explores topics of interest in engineering. Content varies by instructor and semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours.

**GEEN 2851 (3) Statics for Engineers**
Examines vector treatment of force systems and their resultants; equilibrium of frames and machines, including internal forces and three-dimensional configurations; static friction; properties of surfaces, including first and second moments; hydrostatics; and minimum potential energy and stability.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 2121 and MCEN 2023
**Requisites:** Requires prerequisite course of PHYS 1110 and APPM 1360 or MATH 2300 (all minimum grade C-). Restricted to College of Engineering majors or IUT On Track applicants only.

**GEEN 3010 (3) Circuits for Engineers**
Examines basic concepts of electricity, digital systems, circuit analysis, and circuit design. Specific topics covered include analysis of electric circuits by use of Ohm's law, network reduction, node and loop analysis, Thevenin and Norton theorems, DC and AC signals, transient response of simple circuits, basic diode and transistor circuits, operational amplifiers, and microcontrollers. Students are challenged to integrate their knowledge in a final design project.
**Requisites:** Requires a prerequisite course of PHYS 1140 and a prerequisite or corequisite course of (APPM 2360 or MATH 2130 and MATH 3430) (all minimum grade C-). Restricted to College of Engineering undergraduate majors only.

**GEEN 3024 (3) Materials Science for Engineers**
Examines structure, properties, processing and uses of metallic, polymeric, ceramic and composite materials. Specific topics covered include perfect and imperfect solids, phase equilibria, transformation kinetics, mechanical and electrical behavior and failure modes. Approach incorporates both materials science and materials engineering applications. Formerly GEEN 2024.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 2024
**Requisites:** Requires a prerequisite course of PHYS 1110 (minimum grade C-). Restricted to College of Engineering students only.
**Grading Basis:** Letter Grade

**GEEN 3400 (3) Invention and Innovation**
Introduction to business development and product innovation with a hands-on approach. Students explore invention process, hone their engineering design skills, and explore initial stages of entrepreneurship (patenting, intellectual property, marketing research, and raising capital). Student teams design, create, and test a commercial product, and exhibit at an end-of-semester design expo. Students are responsible for contributing towards their design project budget, workshop, and expo costs (approximately $100). Cannot be taken concurrently with GEEN 2400.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**GEEN 3830 (1-4) Special Topics**
Explores topics of interest in engineering. Content varies by instructor and semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to College of Engineering undergraduate students only.

**GEEN 3852 (3) Thermodynamics for Engineers**
Explores fundamental concepts and basic theory, including first and second laws of thermodynamics, properties, states, thermodynamic functions and cycles. Links theory and application with labs and a design project involving a functioning thermodynamic process.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 3012 or AREN 2110
**Requisites:** Requires prerequisite course of PHYS 1110 (minimum grade C-). Restricted to College of Engineering majors only.

**GEEN 3853 (4) Data Analysis for Engineers**
Learn to design and execute experiments and analyze the results. Topics covered include measurement fundamentals, design of experiments, probability, descriptive statistics, linear regression, propagation of uncertainty, and hypothesis testing (t-tests and ANOVA).
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 3047
**Requisites:** Requires prereqs PHYS 1140 (APPM 1360 or MATH 2300) (ASEN 1320 or CHEN/ECEN 1310 or CSCI 1200 or 1300 or 1310 or 1320). Requires prereq or coreqs (ECEN/GEEN 3010 or MCEN 3017) (WRTG 3030 or 3035 or ENES 1010 or 3100 or ENLP 3100) (all min grade C-

**GEEN 4400 (3) Teaching Design**
Examines teaching engineering design to a variety of audiences including secondary schools, project teams, and other communities. Students examine the process of teaching hands-on design including scoping, stages of team evolution, and iteration. Students also explore different design methods, the development of engineering identity, and the interface between engineering and society. Students practice integrating design thinking into local schools and companies, develop ready-to-use tools and resources, and explore the design education literature.
**Requisites:** Requires prerequisite courses of GEEN 1400 and GEEN 2400 and prerequisite or corequisite course of GEEN 3400 (all minimum grade B).

**GEEN 4848 (1-3) Independent Study**
Subjects arranged in consultation with instructor and undergraduate advisor. Instructor and program consent required.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Integrated Design Engineering (IDEN-BSIDE) students with a minimum of 60 credit hours.
**Grading Basis:** Letter Grade

# Integrated Design Engineering - Bachelor of Science (BSIDE)

Integrated design is a process defined by its use of highly collaborative, multidisciplinary teamwork and consideration of all aspects of an engineering project. The Integrated design engineering program provides students with a solid grounding in the fundamentals of engineering and both instills and is structured by integrated design. Our majors customize their degree plans through their choice of one of six engineering emphases (selected from aerospace, architectural, civil, electrical, environmental or mechanical engineering) and a concentration in an approved second area such as engineering leadership, entrepreneurship, environmental planning or pre-medical. At the core of our program are three hands-on iterative design project courses that explore and reinforce engineering principles, which jointly form a continuous experiential thread uniting the four-year IDE curriculum. These team-based projects showcase individual students' growing multidisciplinary knowledge and expertise toward developing vital skills in communication, innovation and leadership, as well as reinforce engineering methodologies required by the emphasis area capstone design experience. Our students graduate

with the knowledge, skills and confidence required for success in a diverse and changing world.

Integrated design engineering is an approach that favors creativity, diversity and collaboration across disciplines in creating practical and innovative solutions in the service of humanity. Graduates from our program find enriching careers in engineering and related professional fields, establish and support new enterprises, teach secondary-level STEM education and enroll in graduate and professional degree programs.

For more information, visit the program (https://www.colorado.edu/program/ide/) website.

# Requirements

## Program Requirements

In order to earn a Bachelor of Science degree in Integrated Design Engineering (IDE), students must complete the curriculum in the undergraduate major program as outlined below. For up-to-date program information, visit the Integrated Design Engineering (https://www.colorado.edu/program/ide/) webpage. Required courses in engineering, mathematics and physical science are interwoven throughout the curriculum to provide a multifaceted education. The degree requires coursework in math and science (a minimum of 30 credits), a core of project-based integrated design-focused engineering courses taught by IDE faculty, a disciplinary emphasis (which includes engineering and design content), a selected concentration (https://www.colorado.edu/program/ide/academics/concentrations/) (12 or more credits), humanities and social sciences electives (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/), a writing course (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/) and free electives, for a total of 128 credits required for the degree.

## Disciplinary Emphases

Integrated design engineering majors select one disciplinary emphasis (i.e., aerospace, architectural, civil, electrical, environmental or mechanical engineering), and then complete requirements associated with developing competency in that area. To meet graduation requirements, the combination of engineering core and disciplinary emphasis coursework must sum to 52 credits or more. All engineering core and disciplinary emphasis courses require a minimum grade of C-. All integrated design engineering students, regardless of emphasis, are required to take the Fundamentals of Engineering (FE) exam prior to graduation. With the exception of architectural engineering or civil engineering, students are not permitted to double major in a degree program in the same disciplinary area as their IDE emphasis. Students are not permitted to declare a minor in the same disciplinary area as their IDE emphasis.

- Aerospace Emphasis
- Architectural Emphasis
- Civil Emphasis
- Electrical Emphasis
- Environmental Emphasis
- Mechanical Emphasis

## Concentration

The integrated design engineering concentration (minimum 12 credits) allows students to select additional coursework in a chosen field of study, either within or outside of engineering. The concentration course sequence must be a series of courses with increasing specificity or depth within a field, typically culminating in senior-level courses. Most concentrations will consist of at least four 3-credit courses. Every concentration *must* be pre-approved by the Integrated Design Engineering academic advisor *prior* to the commencement of the coursework. All concentration courses require a minimum grade of C-. All IDE majors must declare one approved concentration by the end of their fourth semester and students who transfer into the program after their fourth semester must declare an approved concentration by the end of their first semester in the major. No one is permitted to declare more than one concentration. Visit the program website for the current concentration requirements. (https://www.colorado.edu/program/ide/academics/concentrations/)

The Integrated Design Engineering degree is built around student choice and flexibility. The combinations of engineering emphases and approved concentrations allow for over 100 possible pathways. The sample curriculum represents only a general idea of what is possible with integrated design engineering. Students are encouraged to visit the Integrated Design Engineering **(**https://www.colorado.edu/program/ide/academics/**)** website or an advisor for more specifics in planning their own unique pathway and to ensure that all degree requirements are met.

## Prerequisites and Passing Grades

The minimum passing grade for a course that is a prerequisite or corequisite for another required course is a C-. If a grade of D+ or lower is received in a course which is a prerequisite to another, the student may not register for the subsequent course until the first grade has been raised to a C- or higher. If a grade of D+ or lower is received in a course which is a corequisite to another, the course must be repeated until a grade of C- or higher is achieved.

The minimum passing grade for all required engineering core, disciplinary emphasis and concentration courses is a C-. The minimum passing grade for a course that is not specifically a prerequisite or corequisite for another required course is D-, if not otherwise noted above.

## Additional Graduation Requirements

- **FE Exam**: All integrated design engineering students, regardless of emphasis, are required to take the Fundamentals of Engineering (FE) exam prior to graduation.
- **Senior Survey:** All integrated design engineering students, regardless of emphasis, are required to take the Senior Survey prior to graduation.

# Disciplinary Emphases

### Aerospace Emphasis

| Code | Title | Credit Hours |
|---|---|---|
| **Engineering Requirement** | | |
| GEEN 1400 | Engineering Projects | 3 |
| or ASEN 1400 | Gateway to Space | |
| or ASEN 1403 | Introduction to Rocket Engineering | |
| or ECEN 1400 | Introduction to Digital and Analog Electronics | |
| GEEN 2400 | Engineering Projects for the Community | 3 |

| | | |
|---|---|---|
| GEEN 2851 | Statics for Engineers | 3 |
| or ASEN 2401 | Statics | |
| or ASEN 2701 | Introduction to Statics, Structures, and Materials | |
| or CVEN 2121 | Analytical Mechanics 1 | |
| or MCEN 2023 | Statics and Structures | |
| GEEN 3400 | Invention and Innovation | 3 |
| GEEN 3852 | Thermodynamics for Engineers | 3 |
| or ASEN 2402 | Thermodynamics | |
| or AREN 2110 | Thermodynamics | |
| or EVEN 3012 | Thermodynamics for Environmental Science and Engineering | |
| or MCEN 3012 | Thermodynamics | |
| **Aerospace Requirement** | | |
| ASEN 1030 | Introduction to Computing for Aerospace Engineering | 3 |
| or CHEN 1310 | Introduction to Engineering Computing | |
| or CSCI 1300 | Computer Science 1: Starting Computing | |
| or ECEN 1310 | Introduction to C Programming | |
| or MCEN 1030 | Introduction to Engineering Computing | |
| ASEN 2403 | Dynamics | 3 |
| or ASEN 2703 | Introduction to Dynamics and Systems | |
| or MCEN 2043 | Dynamics | |
| or CVEN 3111 | Analytical Mechanics 2 | |
| ASEN 2501 | Introduction to Astronautics | 3 |
| ASEN 2502 | Introduction to Aeronautics | 3 |
| or ASEN 2704 | Introduction to Aerospace Vehicle Design and Performance | |
| ASEN 3404 | Aerospace Dynamics and Control | 3 |
| ASEN 4018 | Senior Projects 1: Design Synthesis [1] | 4 |
| ASEN 4028 | Senior Projects 2: Design Practicum | 4 |
| Emphasis Elective #1 | | 6 |
| Select two: | | |
| ASEN 3401 | Aerospace Structures | |
| or ASEN 3712 | Structures | |
| ASEN 3402 | Aerospace Heat Transfer | |
| ASEN 3403 | Aerodynamics | |
| or ASEN 3711 | Aerodynamics | |
| ASEN 3503 | Aerospace Electronics | |
| Emphasis Elective #2: | | 3 |
| ASEN 3501 | Aerospace Experimental Methods | |
| or ASEN 3502 | Aerospace Computational Methods | |
| Emphasis Elective #3: | | 3 |
| ASEN 3405 | Astrodynamics | |
| or ASEN 3406 | Aircraft Dynamics | |
| **Concentration Requirement** [2] | | **12** |
| **Math and Science Requirement** | | |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| or MATH 1300 | Calculus 1 | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| or MATH 2300 | Calculus 2 | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| or MATH 2400 | Calculus 3 | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| or MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |
| or MATH 2135 & MATH 3430 | Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations | |
| MCEN 1024 | Chemistry for Energy and Materials Science | 3 |
| or CHEN 1201 | General Chemistry for Engineers 1 | |
| or CHEN 1211 | Accelerated Chemistry for Engineers | |
| or CHEM 1113 | General Chemistry 1 | |
| or CHEM 1400 | Foundations of Chemistry | |
| PHYS 1110 | General Physics 1 | 4 |
| or PHYS 1115 | General Physics 1 for Majors | |
| PHYS 1120 | General Physics 2 | 4 |
| or PHYS 1125 | General Physics 2 for Majors | |
| PHYS 1140 | Experimental Physics 1 | 1 |
| **Math or Science Electives** [3] | | **3** |
| **Humanities, Social Sciences, and Writing** | | |
| Complete the College's Humanities, Social Sciences, and Writing requirements. [4] | | 18 |
| **Free Electives** | | **17** |
| **Fundamentals of Engineering (FE) Exam** | | |
| **Senior Survey** | | |
| **Total Credit Hours** | | **128** |

1. IDE students must meet the following prerequisites to enroll in ASEN 4018: GEEN 2400, GEEN 3400, ASEN 3404, ASEN 3501 or 3502, and two of the following emphasis electives: ASEN 3401, ASEN 3402, ASEN 3403, ASEN 3503.
2. Select from current list of Concentrations (https://www.colorado.edu/program/ide/academics/concentrations/) on the IDE website.
3. View the IDE Advising (https://www.colorado.edu/program/ide/academics/advising/) webpage for math or science elective options.
4. View the College's Humanities, Social Sciences and Writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/)webpage for more information.

Note: The BS in Integrated Design Engineering with an aerospace engineering emphasis cannot be earned in combination with the BS in Aerospace Engineering Sciences.

## Architectural Emphasis

| Code | Title | Credit Hours |
|---|---|---|
| **Engineering Requirement** | | |
| CSCI 1200 | Introduction to Computational Thinking | 3 |
| or CHEN 1310 | Introduction to Engineering Computing | |
| or CSCI 1300 | Computer Science 1: Starting Computing | |
| or ECEN 1310 | Introduction to C Programming | |
| or MCEN 1030 | Introduction to Engineering Computing | |
| GEEN 1400 | Engineering Projects | 3 |

| | | |
|---|---|---|
| or ASEN 1400 | Gateway to Space | |
| or ASEN 1403 | Introduction to Rocket Engineering | |
| or ECEN 1400 | Introduction to Digital and Analog Electronics | |
| GEEN 2400 | Engineering Projects for the Community | 3 |
| GEEN 3400 | Invention and Innovation | 3 |
| GEEN 2851 | Statics for Engineers | 3 |
| or CVEN 2121 | Analytical Mechanics 1 | |
| or ASEN 2401 | Statics | |
| or ASEN 2701 | Introduction to Statics, Structures, and Materials | |
| or MCEN 2023 | Statics and Structures | |
| GEEN 3010 | Circuits for Engineers | 3 |
| or AREN 3040 | Circuits for Architectural Engineers | |
| or ASEN 3503 | Aerospace Electronics | |
| or ECEN 3010 | Circuits and Electronics for Mechanical Engineers | |
| or MCEN 3017 | Circuits and Electronics for Mechanical Engineers | |
| GEEN 3852 | Thermodynamics for Engineers | 3 |
| or AREN 2110 | Thermodynamics | |
| or ASEN 2402 | Thermodynamics | |
| or ASEN 2702 | Introduction to Thermodynamics and Aerodynamics | |
| or MCEN 3012 | Thermodynamics | |
| GEEN 3853 | Data Analysis for Engineers | 4 |
| or CVEN 3227 | Probability, Statistics and Decision | |
| or MCEN 3047 | Data Analysis and Experimental Methods | |
| **Architectural Requirement** | | |
| AREN 1027 | Engineering Drawing | 3 |
| AREN 2050 | Building Materials and Systems | 3 |
| CVEN 3161 | Mechanics of Materials 1 | 3 |
| or MCEN 2063 | Mechanics of Solids | |
| AREN 4318 | Architectural Engineering Design 1 [1] | 5 |
| AREN 4319 | Architectural Engineering Design 2 | 2 |
| *Select one Focus Area and complete its listed courses:* | | *6* |
| Construction | | |
| CVEN 3246 & AREN 4506 | Introduction to Construction and Pre-construction Estimating and Scheduling | |
| Electrical/Lighting | | |
| AREN 3540 & AREN 4550 | Illumination I and Illumination 2 | |
| or AREN 4570 | Building Electrical Systems Design 1 | |
| Mechanical Systems [2] | | |
| AREN 2120 & AREN 3010 & AREN 4110 | Fluid Mechanics and Heat Transfer and Energy Efficient Buildings and Building Energy Systems Engineering | |
| Structures | | |
| CVEN 3525 & CVEN 4545 | Structural Analysis and Steel Design | |
| or CVEN 4555 | Reinforced Concrete Design | |
| **Emphasis Electives** | | |
| *Choose two Emphasis Electives:* | | *6* |
| AREN 3010 | Energy Efficient Buildings | |
| AREN 3080 | Architectural Design Studio 1 | |
| AREN 3540 | Illumination I | |
| AREN 4110 | Building Energy Systems Engineering | |
| AREN 4506 | Pre-construction Estimating and Scheduling | |
| AREN 4550 | Illumination 2 | |
| AREN 4570 | Building Electrical Systems Design 1 | |
| CVEN 3246 | Introduction to Construction | |
| CVEN 3525 | Structural Analysis | |
| CVEN 4545 | Steel Design | |
| CVEN 4555 | Reinforced Concrete Design | |
| **Concentration Requirement [3]** | | **12** |
| **Math and Science Requirement** | | |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or MATH 1300 | Calculus 1 | |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| or MATH 2300 | Calculus 2 | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| or MATH 2400 | Calculus 3 | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| or MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |
| or MATH 2135 & MATH 3430 | Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations | |
| PHYS 1110 | General Physics 1 | 4 |
| or PHYS 1115 | General Physics 1 for Majors | |
| PHYS 1120 | General Physics 2 | 4 |
| or PHYS 1125 | General Physics 2 for Majors | |
| PHYS 1140 | Experimental Physics 1 | 1 |
| CHEN 1201 | General Chemistry for Engineers 1 | 4 |
| or CHEN 1211 | Accelerated Chemistry for Engineers | |
| or CHEM 1113 | General Chemistry 1 | |
| or MCEN 1024 | Chemistry for Energy and Materials Science | |
| **Math or Science Elective [4]** | | **1** |
| **Humanities, Social Sciences, and Writing** | | |
| Complete the College's Humanities, Social Sciences, and Writing requirements. [5] | | 18 |
| **Free Electives** | | **15** |
| **Fundamentals of Engineering (FE) Exam** | | |
| **Senior Survey** | | |
| **Total Credit Hours** | | **128** |

1 IDE students must meet the following prerequisites to enroll in AREN 4318: GEEN 2400 and GEEN 3400 and all required courses from a Focus Area listed above and one of: CVEN 3246 or AREN 3540 or AREN 4570 or AREN 3010 or CVEN 3525.

2 The Mechanical Systems Focus Area requires 9 credits to complete. Students pursuing this Focus Area will complete 3 fewer Free Elective credits.

3 Select from current list of Concentrations (https://www.colorado.edu/program/ide/academics/concentrations/) on the IDE website.

4 View the IDE Advising (https://www.colorado.edu/program/ide/academics/advising/)webpage for math or science elective options.

5 View the College's Humanities, Social Sciences and Writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/)webpage for more information.

Students are allowed to earn a BS in Integrated Design Engineering with an architectural engineering emphasis + BS in Architectural Engineering.

## Civil Emphasis

| Code | Title | Credit Hours |
|---|---|---|
| **Engineering Requirement** | | |
| CVEN 1027 | Civil Engineering Drawing | 3 |
| or GEEN 1017 | Engineering Drawing | |
| or AREN 1027 | Engineering Drawing | |
| CSCI 1200 | Introduction to Computational Thinking | 3 |
| or CHEN 1310 | Introduction to Engineering Computing | |
| or CSCI 1300 | Computer Science 1: Starting Computing | |
| or ECEN 1310 | Introduction to C Programming | |
| or MCEN 1030 | Introduction to Engineering Computing | |
| GEEN 1400 | Engineering Projects | 3 |
| or ASEN 1400 | Gateway to Space | |
| or ASEN 1403 | Introduction to Rocket Engineering | |
| or ECEN 1400 | Introduction to Digital and Analog Electronics | |
| GEEN 2400 | Engineering Projects for the Community | 3 |
| GEEN 3400 | Invention and Innovation | 3 |
| GEEN 2851 | Statics for Engineers | 3 |
| or CVEN 2121 | Analytical Mechanics 1 | |
| or ASEN 2401 | Statics | |
| or ASEN 2701 | Introduction to Statics, Structures, and Materials | |
| or MCEN 2023 | Statics and Structures | |
| GEEN 3010 | Circuits for Engineers | 3 |
| or AREN 3040 | Circuits for Architectural Engineers | |
| or ASEN 3503 | Aerospace Electronics | |
| or ECEN 3010 | Circuits and Electronics for Mechanical Engineers | |
| or MCEN 3017 | Circuits and Electronics for Mechanical Engineers | |
| GEEN 3852 | Thermodynamics for Engineers | 3 |
| or AREN 2110 | Thermodynamics | |
| or ASEN 2402 | Thermodynamics | |
| or ASEN 2702 | Introduction to Thermodynamics and Aerodynamics | |
| or MCEN 3012 | Thermodynamics | |
| GEEN 3853 | Data Analysis for Engineers | 4 |
| or CVEN 3227 | Probability, Statistics and Decision | |
| or MCEN 3047 | Data Analysis and Experimental Methods | |
| **Civil Requirement** | | |
| CVEN 3161 | Mechanics of Materials 1 | 3 |
| or MCEN 2063 | Mechanics of Solids | |
| CVEN 3313 | Theoretical Fluid Mechanics | 3 |
| or AREN 2120 | Fluid Mechanics and Heat Transfer | |
| or MCEN 3021 | Fluid Mechanics | |
| or CHEN 3200 | Chemical Engineering Fluid Mechanics | |
| CVEN 3323 | Hydraulic Engineering | 3 |
| or CVEN 3708 | Geotechnical Engineering 1 | |
| Choose two Emphasis Electives: | | 6 |
| CVEN 3246 | Introduction to Construction | |
| CVEN 3323 | Hydraulic Engineering | |
| CVEN 3414 | Fundamentals of Environmental Engineering | |
| CVEN 3525 | Structural Analysis | |
| CVEN 3708 | Geotechnical Engineering 1 | |
| *Select one Focus Area and complete its two listed courses:* | | *6* |
| Construction | | |
| CVEN 3256 & AREN 4506 | Construction Equipment and Methods and Pre-construction Estimating and Scheduling | |
| Environmental | | |
| CVEN 3424 & CVEN 4474 | Water and Wastewater Treatment and Hazardous and Industrial Waste Management | |
| or CVEN 3434 | Introduction to Applied Ecology | |
| or CVEN 4404 | Water Chemistry | |
| or CVEN 4484 | Integrative Environmental and Molecular Microbiology | |
| Geotechnical | | |
| CVEN 3718 & CVEN 4728 | Geotechnical Engineering 2 and Foundation Engineering | |
| Structures | | |
| CVEN 4545 & CVEN 4555 | Steel Design and Reinforced Concrete Design | |
| Water Resources | | |
| CVEN 4333 & CVEN 4353 | Engineering Hydrology and Groundwater Engineering | |
| CVEN 4899 | Civil Engineering Senior Project Design [1] | 4 |
| **Concentration Requirement [2]** | | **12** |
| **Math and Science Requirement** | | |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or MATH 1300 | Calculus 1 | |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| or MATH 2300 | Calculus 2 | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| or MATH 2400 | Calculus 3 | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| or MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |
| or MATH 2135 & MATH 3430 | Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations | |
| PHYS 1110 | General Physics 1 | 4 |
| or PHYS 1115 | General Physics 1 for Majors | |
| PHYS 1120 | General Physics 2 | 4 |
| or PHYS 1125 | General Physics 2 for Majors | |
| PHYS 1140 | Experimental Physics 1 | 1 |

| | | |
|---|---|---|
| CHEN 1201 | General Chemistry for Engineers 1 | 4 |
| or CHEM 1113 | General Chemistry 1 | |
| or CHEN 1211 | Accelerated Chemistry for Engineers | |
| CHEM 1114 | Laboratory in General Chemistry 1 | 1 |
| or CHEM 1221 | Engineering General Chemistry Lab | |
| **Math or Science Elective** [3] | | |
| **Humanities, Social Sciences, and Writing** | | |
| Complete the College's Humanities, Social Sciences, and Writing requirements. [4] | | 18 |
| **Free Electives** | | **15** |
| **Fundamentals of Engineering (FE) Exam** | | |
| **Senior Survey** | | |
| **Total Credit Hours** | | **128** |

1 IDE students must meet the following requisites to enroll in CVEN 4899: GEEN 2400 and GEEN 3400 and one set of requisites from the following focus areas: Construction: prerequisites CVEN 3256 and AREN 4506; Environmental: prerequisite CVEN 3424 and pre- or co-requisite CVEN 4474 or CVEN 3434 or CVEN 4404 or CVEN 4484; Geotechnical: prerequisite CVEN 3718 and pre- or co-requisite CVEN 4728; Structures: prerequisite CVEN 4555 and pre- or co-requisite CVEN 4545; Water Resources: pre- or co-requisite CVEN 4333 and CVEN 4353.

2 Select from current list of Concentrations (https://www.colorado.edu/program/ide/academics/concentrations/) on the IDE website.

3 Science Requirement met by listed civil emphasis courses.

4 View the College's Humanities, Social Sciences and Writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/)webpage for more information.

Students are allowed to earn a BS in Civil Engineering + BS in Integrated Design Engineering with a civil engineering emphasis.

## Electrical Emphasis

| Code | Title | Credit Hours |
|---|---|---|
| **Engineering Requirement** | | |
| CSCI 1300 | Computer Science 1: Starting Computing | 4 |
| or ECEN 1310 | Introduction to C Programming | |
| GEEN 1400 | Engineering Projects | 3 |
| or ECEN 1400 | Introduction to Digital and Analog Electronics | |
| or ASEN 1400 | Gateway to Space | |
| or ASEN 1403 | Introduction to Rocket Engineering | |
| GEEN 2400 | Engineering Projects for the Community | 3 |
| GEEN 3400 | Invention and Innovation | 3 |
| GEEN 2851 | Statics for Engineers | 3 |
| or MCEN 2023 | Statics and Structures | |
| or ASEN 2401 | Statics | |
| or ASEN 2701 | Introduction to Statics, Structures, and Materials | |
| or CVEN 2121 | Analytical Mechanics 1 | |
| GEEN 3024 | Materials Science for Engineers | 3 |
| or MCEN 2024 | Materials Science | |
| GEEN 3852 | Thermodynamics for Engineers | 3 |
| or MCEN 3012 | Thermodynamics | |
| or AREN 2110 | Thermodynamics | |
| or ASEN 2402 | Thermodynamics | |
| or ASEN 2702 | Introduction to Thermodynamics and Aerodynamics | |
| GEEN 3853 | Data Analysis for Engineers | 4 |
| or MCEN 3047 | Data Analysis and Experimental Methods | |
| or CVEN 3227 | Probability, Statistics and Decision | |
| **Electrical Requirement** | | |
| ECEN 2250 | Introduction to Circuits and Electronics | 3 |
| ECEN 2260 | Circuits as Systems | 3 |
| ECEN 2270 | Electronics Design Lab | 3 |
| ECEN 2350 | Digital Logic | 4 |
| Choose three Emphasis Electives: | | 9 |
| ECEN 2360 | Programming Digital Systems | |
| ECEN 2370 | Embedded Software Engineering | |
| ECEN 3250 | Microelectronics | |
| ECEN 3300 | Linear Systems | |
| ECEN 3400 | Electromagnetic Fields and Waves | |
| ECEN 4610 | Capstone Laboratory Part 1 [1] | 3 |
| ECEN 4620 | Capstone Lab, Part 2 | 3 |
| **Concentration Requirement** [2] | | **12** |
| **Math and Science Requirement** | | |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or MATH 1300 | Calculus 1 | |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| or MATH 2300 | Calculus 2 | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| or MATH 2400 | Calculus 3 | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| or MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |
| or MATH 2135 & MATH 3430 | Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations | |
| PHYS 1110 | General Physics 1 | 4 |
| or PHYS 1115 | General Physics 1 for Majors | |
| PHYS 1120 | General Physics 2 | 4 |
| or PHYS 1125 | General Physics 2 for Majors | |
| PHYS 1140 | Experimental Physics 1 | 1 |
| **Math or Science Electives** [3] | | **5** |
| **Humanities, Social Sciences, and Writing** | | |
| Complete the College's Humanities, Social Sciences, and Writing requirements. [4] | | 18 |
| **Free Electives** | | **14** |
| **Fundamentals of Engineering (FE) Exam** | | |
| **Senior Survey** | | |
| **Total Credit Hours** | | **128** |

1 IDE students must meet the following requisites to enroll in ECEN 4610: ECEN 2260 and ECEN 2270 and GEEN 2400 and GEEN 3400 and the three chosen emphasis electives from the list of five above.

[2] Select from current list of concentrations (https://www.colorado.edu/program/ide/academics/concentrations/) on the IDE website.

[3] View the IDE Advising (https://www.colorado.edu/program/ide/academics/advising/) webpage for math or science elective options.

[4] View the College's Humanities, Social Sciences and Writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/)webpage for more information.

Note: The BS in Integrated Design Engineering with an electrical engineering emphasis cannot be earned in combination with the BS in Electrical Engineering.

## Environmental Emphasis

| Code | Title | Credit Hours |
|---|---|---|
| **Engineering Requirement** | | |
| CHEN 1310 | Introduction to Engineering Computing | 3 |
| or CSCI 1300 | Computer Science 1: Starting Computing | |
| or ECEN 1310 | Introduction to C Programming | |
| GEEN 1400 | Engineering Projects | 3 |
| or ASEN 1400 | Gateway to Space | |
| or ASEN 1403 | Introduction to Rocket Engineering | |
| or ECEN 1400 | Introduction to Digital and Analog Electronics | |
| GEEN 2400 | Engineering Projects for the Community | 3 |
| GEEN 2851 | Statics for Engineers | 3 |
| or ASEN 2401 | Statics | |
| or ASEN 2701 | Introduction to Statics, Structures, and Materials | |
| or CVEN 2121 | Analytical Mechanics 1 | |
| or MCEN 2023 | Statics and Structures | |
| GEEN 3010 | Circuits for Engineers | 3 |
| or ECEN 3010 | Circuits and Electronics for Mechanical Engineers | |
| or AREN 3040 | Circuits for Architectural Engineers | |
| or ASEN 3503 | Aerospace Electronics | |
| or MCEN 3017 | Circuits and Electronics for Mechanical Engineers | |
| GEEN 3024 | Materials Science for Engineers | 3 |
| or MCEN 2024 | Materials Science | |
| GEEN 3400 | Invention and Innovation | 3 |
| GEEN 3852 | Thermodynamics for Engineers | 3 |
| or MCEN 3012 | Thermodynamics | |
| or AREN 2110 | Thermodynamics | |
| or ASEN 2402 | Thermodynamics | |
| or ASEN 2702 | Introduction to Thermodynamics and Aerodynamics | |
| GEEN 3853 | Data Analysis for Engineers | 4 |
| or CVEN 3227 | Probability, Statistics and Decision | |
| or MCEN 3047 | Data Analysis and Experimental Methods | |
| **Environmental Requirement** | | |
| CVEN 3313 | Theoretical Fluid Mechanics | 3 |
| or CHEN 3200 | Chemical Engineering Fluid Mechanics | |
| or MCEN 3021 | Fluid Mechanics | |
| CVEN 3414 | Fundamentals of Environmental Engineering | 3 |
| CVEN 3323 | Hydraulic Engineering | 3 |
| EVEN 4434 | Environmental Engineering Design [1] | 4 |
| or CVEN 4434 | Environmental Engineering Design | |
| EVEN 4464 | Environmental Engineering Processes | 3 |
| or CVEN 4464 | Environmental Engineering Processes | |
| Choose two Emphasis Electives: | | 6 |
| CVEN 3424 | Water and Wastewater Treatment | |
| CVEN 3434 | Introduction to Applied Ecology | |
| CVEN 4333 | Engineering Hydrology | |
| CVEN 4474 | Hazardous and Industrial Waste Management | |
| EVEN 4404 | Water Chemistry | |
| or CVEN 4404 | Water Chemistry | |
| EVEN 4484 | Integrative Environmental and Molecular Microbiology | |
| MCEN 4131 | Air Pollution Control Engineering | |
| **Concentration Requirement [2]** | | **12** |
| **Math and Science Requirement** | | |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or MATH 1300 | Calculus 1 | |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| or MATH 2300 | Calculus 2 | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| or MATH 2400 | Calculus 3 | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| or MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |
| or MATH 2135 & MATH 3430 | Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations | |
| CHEN 1201 | General Chemistry for Engineers 1 | 4 |
| or CHEM 1113 | General Chemistry 1 | |
| CHEN 1203 | General Chemistry for Engineers 2 | 2 |
| or CHEN 1211 | Accelerated Chemistry for Engineers | |
| or CHEM 1133 | General Chemistry 2 | |
| CHEM 1221 | Engineering General Chemistry Lab | 1 |
| or CHEM 1134 | Laboratory in General Chemistry 2 | |
| PHYS 1110 | General Physics 1 | 4 |
| or PHYS 1115 | General Physics 1 for Majors | |
| PHYS 1120 | General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| **Math or Science Electives [3]** | | |
| **Humanities, Social Sciences, and Writing** | | |
| Complete the College's Humanities, Social Sciences, and Writing requirements. [4] | | 18 |
| **Free Electives** | | **16** |
| **Fundamentals of Engineering (FE) Exam** | | |
| **Senior Survey** | | |
| **Total Credit Hours** | | **128** |

[1] IDE students must meet the following requisites to enroll in EVEN 4434: GEEN 2400, GEEN 3400, and EVEN 4464 OR CVEN 3424.

2 Select from current list of Concentrations (https://www.colorado.edu/program/ide/academics/concentrations/) on the IDE website.

3 Math and Science Requirements met by listed Environmental Emphasis courses.

4 View the College's Humanities, Social Sciences and Writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/)webpage for more information.

## Mechanical Emphasis

| Code | Title | Credit Hours |
|---|---|---|
| **Engineering Requirement** | | |
| MCEN 1030 | Introduction to Engineering Computing | 4 |
| or CSCI 1300 | Computer Science 1: Starting Computing | |
| or CHEN 1310 | Introduction to Engineering Computing | |
| or ECEN 1310 | Introduction to C Programming | |
| GEEN 1017 | Engineering Drawing | 3 |
| or MCEN 1025 | Computer-Aided Design and Fabrication | |
| or BMEN 1025 | Computer-Aided Design & Fabrication | |
| GEEN 1400 | Engineering Projects | 3 |
| or ASEN 1400 | Gateway to Space | |
| or ASEN 1403 | Introduction to Rocket Engineering | |
| or ECEN 1400 | Introduction to Digital and Analog Electronics | |
| GEEN 2400 | Engineering Projects for the Community | 3 |
| GEEN 3400 | Invention and Innovation | 3 |
| GEEN 2851 | Statics for Engineers | 3 |
| or MCEN 2023 | Statics and Structures | |
| or CVEN 2121 | Analytical Mechanics 1 | |
| or ASEN 2701 | Introduction to Statics, Structures, and Materials | |
| or ASEN 2401 | Statics | |
| GEEN 3010 | Circuits for Engineers | 3 |
| or AREN 3040 | Circuits for Architectural Engineers | |
| or ASEN 3503 | Aerospace Electronics | |
| or ECEN 3010 | Circuits and Electronics for Mechanical Engineers | |
| or MCEN 3017 | Circuits and Electronics for Mechanical Engineers | |
| **Mechanical Requirement** | | |
| GEEN 3024 | Materials Science for Engineers | 3 |
| or MCEN 2024 | Materials Science | |
| or ASEN 1022 | Materials Science for Aerospace Engineers | |
| GEEN 3852 | Thermodynamics for Engineers | 3 |
| or MCEN 3012 | Thermodynamics | |
| or AREN 2110 | Thermodynamics | |
| or ASEN 2402 | Thermodynamics | |
| or EVEN 3012 | Thermodynamics for Environmental Science and Engineering | |
| GEEN 3853 | Data Analysis for Engineers | 4 |
| or MCEN 3047 | Data Analysis and Experimental Methods | |
| MCEN 2043 | Dynamics | 3 |
| or CVEN 3111 | Analytical Mechanics 2 | |
| or ASEN 2703 | Introduction to Dynamics and Systems | |
| or ASEN 2403 | Dynamics | |
| or PHYS 3210 | Classical Mechanics and Mathematical Methods 2 | |
| MCEN 2063 | Mechanics of Solids | 3 |
| or ASEN 3401 | Aerospace Structures | |
| or CVEN 3161 | Mechanics of Materials 1 | |
| MCEN 3021 | Fluid Mechanics | 3 |
| or CHEN 3200 | Chemical Engineering Fluid Mechanics | |
| or CVEN 3313 | Theoretical Fluid Mechanics | |
| MCEN 3025 | Component Design | 3 |
| MCEN 4043 | System Dynamics | 3 |
| or ECEN 3300 & ECEN 4138 | Linear Systems and Control Systems Analysis | |
| MCEN 4045 | Mechanical Engineering Design Project 1 [1] | 3 |
| MCEN 4085 | Mechanical Engineering Senior Design Project 2 | 3 |
| **Concentration Requirement [2]** | | **12** |
| **Math and Science Requirement** | | |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or MATH 1300 | Calculus 1 | |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| or MATH 2300 | Calculus 2 | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| or MATH 2400 | Calculus 3 | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| or MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |
| or MATH 2135 & MATH 3430 | Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations | |
| PHYS 1110 | General Physics 1 | 4 |
| or PHYS 1115 | General Physics 1 for Majors | |
| PHYS 1120 | General Physics 2 | 4 |
| or PHYS 1125 | General Physics 2 for Majors | |
| PHYS 1140 | Experimental Physics 1 | 1 |
| MCEN 1024 | Chemistry for Energy and Materials Science | 3 |
| or CHEN 1201 | General Chemistry for Engineers 1 | |
| or CHEN 1211 | Accelerated Chemistry for Engineers | |
| or CHEM 1113 | General Chemistry 1 | |
| **Math or Science Electives [3]** | | **2** |
| **Humanities, Social Sciences, and Writing** | | |
| Complete the College's Humanities, Social Sciences and Writing requirements. [4] | | 18 |
| **Free Electives** | | **15** |
| **FE Exam** | | |
| **Senior Survey** | | |
| **Total Credit Hours** | | **128** |

Note: The BS in Integrated Design Engineering with a mechanical engineering emphasis cannot be earned in combination with the BS in Mechanical Engineering.

1 IDE students must meet the following requisites to enroll in MCEN 4045: GEEN 2400, GEEN 3400, GEEN 3010, GEEN 3852, MCEN 3021, MCEN 3025, one of: GEEN 3853 or MCEN 4043. Co-requisites: One of: GEEN 3853 or MCEN 4043, Writing Requirement.

2 Select from current list of Concentrations (https://www.colorado.edu/program/ide/academics/concentrations/) on the IDE website.

3 View the IDE Advising (https://www.colorado.edu/program/ide/academics/advising/) webpage for math or science elective options.

4 View the College's Humanities, Social Sciences and Writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/)webpage for more information.

# Sample Four-Year Plans of Study

## Aerospace Emphasis

**First Year**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| APPM 1350 | Calculus 1 for Engineers | 4 |
| ASEN 1030 | Introduction to Computing for Aerospace Engineering | 3 |
| COEN 1500 | CEAS First Year Seminar | 1 |
| GEEN 1400 | Engineering Projects | 3 |
| PHYS 1110 | General Physics 1 | 4 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| MCEN 1024 | Chemistry for Energy and Materials Science | 3 |
| PHYS 1120 | General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| Humanities or Social Sciences Elective [1] | | 3 |
| | **Credit Hours** | **15** |

**Second Year**

| **Fall Semester** | | |
|---|---|---|
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| ASEN 2501 | Introduction to Astronautics | 3 |
| GEEN 2851 | Statics for Engineers | 3 |
| GEEN 3852 | Thermodynamics for Engineers | 3 |
| Humanities or Social Sciences Elective [1] | | 2 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| ASEN 2403 | Dynamics | 3 |
| ASEN 2502 | Introduction to Aeronautics | 3 |
| GEEN 2400 | Engineering Projects for the Community | 3 |
| Humanities or Social Sciences Elective [1] | | 3 |
| | **Credit Hours** | **16** |

**Third Year**

| **Fall Semester** | | |
|---|---|---|
| ASEN 3404 | Aerospace Dynamics and Control | 3 |
| GEEN 3400 | Invention and Innovation | 3 |
| Emphasis Elective #1 | | 3 |
| Concentration Course [2] | | 3 |
| College-Approved Writing Course [1] | | 3 |
| Math or Science Elective [4] | | 3 |
| | **Credit Hours** | **18** |
| **Spring Semester** | | |
| Emphasis Elective #1 | | 3 |
| Emphasis Elective #2 | | 3 |
| Concentration Course [2] | | 3 |
| Upper Division Humanities or Social Science Elective [1] | | 3 |
| Free Elective | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **18** |

**Fourth Year**

| **Fall Semester** | | |
|---|---|---|
| ASEN 4018 | Senior Projects 1: Design Synthesis [3] | 4 |
| Emphasis Elective #3 | | 3 |
| Concentration Course [2] | | 3 |
| Free Elective | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| ASEN 4028 | Senior Projects 2: Design Practicum | 4 |
| Concentration Course [2] | | 3 |
| Upper Division Humanities or Social Sciences Elective [1] | | 3 |
| Free Elective | | 3 |
| Free Elective | | 2 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **128** |

1 View the College's Humanities, Social Sciences and Writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/ humanities-social-sciences-and-writing-requirements/) webpage for more information.

2 Select from current list of Concentrations (https://www.colorado.edu/program/ide/academics/concentrations/) on the IDE website.

3 IDE students must meet the following prerequisites to enroll in ASEN 4018: GEEN 2400, GEEN 3400, ASEN 3404, ASEN 3501 or 3502, and two of the following emphasis electives: ASEN 3401, ASEN 3402, ASEN 3403, ASEN 3503.

4 View the IDE Advising (https://www.colorado.edu/program/ide/academics/advising/) webpage for math or science elective.

## Architectural Emphasis

**First Year**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| APPM 1350 | Calculus 1 for Engineers | 4 |
| COEN 1500 | CEAS First Year Seminar | 1 |
| GEEN 1400 | Engineering Projects | 3 |
| PHYS 1110 | General Physics 1 | 4 |
| Humanities or Social Science elective [1] | | 2 |
| | **Credit Hours** | **14** |

| | | |
|---|---|---|
| **Spring Semester** | | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| AREN 1027 | Engineering Drawing | 3 |
| PHYS 1120 | General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| Approved Writing Course [1] | | 3 |
| | **Credit Hours** | **15** |
| **Second Year** | | |
| **Fall Semester** | | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| AREN 2050 | Building Materials and Systems | 3 |
| CSCI 1200 | Introduction to Computational Thinking | 3 |
| GEEN 2851 | Statics for Engineers | 3 |
| Humanities or Social Science Elective [2] | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| CHEN 1201 | General Chemistry for Engineers 1 | 4 |
| CVEN 3161 | Mechanics of Materials 1 | 3 |
| GEEN 2400 | Engineering Projects for the Community | 3 |
| Humanities or Social Science Elective [1] | | 3 |
| | **Credit Hours** | **17** |
| **Third Year** | | |
| **Fall Semester** | | |
| GEEN 3010 | Circuits for Engineers | 3 |
| GEEN 3852 | Thermodynamics for Engineers | 3 |
| Focus Area Course | | 3 |
| Concentration Course [2] | | 3 |
| Upper Division Humanities or Social Science Elective [1] | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **18** |
| **Spring Semester** | | |
| GEEN 3400 | Invention and Innovation | 3 |
| Focus Area Course | | 3 |
| Emphasis Elective | | 3 |
| Math or Science Elective [3] | | 1 |
| Concentration Course | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **16** |
| **Fourth Year** | | |
| **Fall Semester** | | |
| AREN 4318 | Architectural Engineering Design 1 [4] | 5 |
| Concentration Course | | 3 |
| Upper Division Humanities or Social Science Elective [1] | | 3 |
| Free Elective | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| AREN 4319 | Architectural Engineering Design 2 | 2 |
| GEEN 3853 | Data Analysis for Engineers | 4 |
| Emphasis Elective | | 3 |
| Concentration Course [2] | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **128** |

1. View the College's Humanities, Social Sciences and Writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/)webpage for more information.
2. Select from current list of Concentrations (https://www.colorado.edu/program/ide/academics/concentrations/) on the IDE website.
3. View the IDE Advising (https://www.colorado.edu/program/ide/academics/advising/)webpage for math or science elective options.
4. IDE students must meet the following prerequisites to enroll in AREN 4318: GEEN 2400 and GEEN 3400 and all required courses from a Focus Area listed above and one of: CVEN 3246 or AREN 3540 or AREN 4570 or AREN 3010 or CVEN 3525.

## Civil Emphasis

| | | |
|---|---|---|
| **First Year** | | |
| **Fall Semester** | | **Credit Hours** |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| COEN 1500 | CEAS First Year Seminar | 1 |
| GEEN 1400 | Engineering Projects | 3 |
| PHYS 1110 | General Physics 1 | 4 |
| Humanities or Social Sciences Elective [1] | | 2 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| AREN 1027 | Engineering Drawing | 3 |
| PHYS 1120 | General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| College-Approved Writing Course [1] | | 3 |
| | **Credit Hours** | **15** |
| **Second Year** | | |
| **Fall Semester** | | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| CSCI 1200 | Introduction to Computational Thinking | 3 |
| GEEN 2400 | Engineering Projects for the Community | 3 |
| GEEN 2851 | Statics for Engineers | 3 |
| Humanities or Social Science Elective [1] | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| CHEN 1201 | General Chemistry for Engineers 1 | 4 |
| CHEM 1114 | Laboratory in General Chemistry 1 | 1 |
| CVEN 3161 | Mechanics of Materials 1 | 3 |
| CVEN 3313 | Theoretical Fluid Mechanics | 3 |
| Concentration Course [2] | | 3 |
| | **Credit Hours** | **18** |

**Third Year**

**Fall Semester**

| | | |
|---|---|---|
| GEEN 3010 | Circuits for Engineers | 3 |
| GEEN 3852 | Thermodynamics for Engineers | 3 |
| Choose One: | | 3 |
| CVEN 3323 or CVEN 3708 | Hydraulic Engineering or Geotechnical Engineering 1 | |
| Emphasis Elective | | 3 |
| Humanities or Social Sciences Elective [1] | | 3 |
| | **Credit Hours** | **15** |

**Spring Semester**

| | | |
|---|---|---|
| GEEN 3400 | Invention and Innovation | 3 |
| GEEN 3853 | Data Analysis for Engineers | 4 |
| Focus Area Course | | 3 |
| Emphasis Elective | | 3 |
| Concentration Course [2] | | 3 |
| | **Credit Hours** | **16** |

**Fourth Year**

**Fall Semester**

| | | |
|---|---|---|
| Focus Area Course | | 3 |
| Concentration Course [2] | | 3 |
| Humanities or Social Science Elective [1] | | 3 |
| Free Elective | | 3 |
| Free Elective | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **18** |

**Spring Semester**

| | | |
|---|---|---|
| CVEN 4899 | Civil Engineering Senior Project Design [3] | 4 |
| Concentration Course [2] | | 3 |
| Humanities or Social Science Elective [1] | | 3 |
| Free Elective | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **16** |
| | **Total Credit Hours** | **128** |

1. View the College's Humanities, Social Sciences and Writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/)webpage for more information.
2. Select from current list of Concentrations (https://www.colorado.edu/program/ide/academics/concentrations/) on the IDE website.
3. IDE students must meet the following requisites to enroll in CVEN 4899: GEEN 2400 and GEEN 3400 and one set of requisites from the following focus areas: Construction: prerequisites CVEN 3256 and AREN 4506; Environmental: prerequisite CVEN 3424 and pre- or co-requisite CVEN 4474 or CVEN 3434 or CVEN 4404 or CVEN 4484; Geotechnical: prerequisite CVEN 3718 and pre- or co-requisite CVEN 4728; Structures: prerequisite CVEN 4555 and pre- or co-requisite CVEN 4545; Water Resources: pre- or co-requisite CVEN 4333 and CVEN 4353.

## Electrical Emphasis

**First Year**

**Fall Semester**

| | | Credit Hours |
|---|---|---|
| APPM 1350 | Calculus 1 for Engineers | 4 |
| COEN 1500 | CEAS First Year Seminar | 1 |
| GEEN 1400 | Engineering Projects | 3 |
| PHYS 1110 | General Physics 1 | 4 |
| Humanities or Social Sciences Elective [1] | | 2 |
| | **Credit Hours** | **14** |

**Spring Semester**

| | | |
|---|---|---|
| APPM 1360 | Calculus 2 for Engineers | 4 |
| ECEN 1310 | Introduction to C Programming | 4 |
| PHYS 1120 | General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| Approved Writing Course [1] | | 3 |
| | **Credit Hours** | **16** |

**Second Year**

**Fall Semester**

| | | |
|---|---|---|
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| GEEN 2400 | Engineering Projects for the Community | 3 |
| GEEN 2851 | Statics for Engineers | 3 |
| Math or Science Elective [2] | | 5 |
| Humanities or Social Sciences Elective [1] | | 3 |
| | **Credit Hours** | **18** |

**Spring Semester**

| | | |
|---|---|---|
| APPM 2350 | Calculus 3 for Engineers | 4 |
| ECEN 2250 | Introduction to Circuits and Electronics | 3 |
| ECEN 2350 | Digital Logic | 4 |
| GEEN 3024 | Materials Science for Engineers (Or Materials course in emphasis) | 3 |
| Humanities or Social Sciences Elective [1] | | 3 |
| | **Credit Hours** | **17** |

**Third Year**

**Fall Semester**

| | | |
|---|---|---|
| ECEN 2260 | Circuits as Systems | 3 |
| ECEN 2270 | Electronics Design Lab | 3 |
| GEEN 3852 | Thermodynamics for Engineers | 3 |
| Emphasis Elective | | 3 |
| Concentration Course [3] | | 3 |
| Free Elective | | 2 |
| | **Credit Hours** | **17** |

**Spring Semester**

| | | |
|---|---|---|
| GEEN 3400 | Invention and Innovation | 3 |
| GEEN 3853 | Data Analysis for Engineers | 4 |
| Emphasis Elective | | 3 |
| Emphasis Elective | | 3 |
| Concentration Course | | 3 |
| | **Credit Hours** | **16** |

| | | |
|---|---|---|
| **Fourth Year** | | |
| **Fall Semester** | | |
| ECEN 4610 | Capstone Laboratory Part 1 [4] | 3 |
| Concentration Course | | 3 |
| Humanities or Social Sciences Elective [1] | | 3 |
| Free Elective | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| ECEN 4620 | Capstone Lab, Part 2 | 3 |
| Concentration Course | | 3 |
| Humanities or Social Sciences Elective [1] | | 3 |
| Free Elective | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **128** |

1 View the College's Humanities, Social Sciences and Writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/)webpage for more information.

2 View the IDE Advising (https://www.colorado.edu/program/ide/academics/advising/) webpage for math or science elective options.

3 Select from current list of concentrations (https://www.colorado.edu/program/ide/academics/concentrations/) on the IDE website.

4 IDE students must meet the following requisites to enroll in ECEN 4610: ECEN 2260 and ECEN 2270 and GEEN 2400 and GEEN 3400 and the three chosen emphasis electives from the list of five above.

## Environmental Emphasis

| | | |
|---|---|---|
| **First Year** | | |
| **Fall Semester** | | **Credit Hours** |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| COEN 1500 | CEAS First Year Seminar | 1 |
| GEEN 1400 | Engineering Projects | 3 |
| PHYS 1110 | General Physics 1 | 4 |
| Humanities or Social Sciences Elective [1] | | 2 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| CHEN 1310 | Introduction to Engineering Computing | 3 |
| PHYS 1120 | General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| College-Approved Writing Course [1] | | 3 |
| | **Credit Hours** | **15** |
| **Second Year** | | |
| **Fall Semester** | | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| CHEN 1201 | General Chemistry for Engineers 1 | 4 |
| GEEN 2400 | Engineering Projects for the Community | 3 |
| GEEN 2851 | Statics for Engineers | 3 |
| Humanities or Social Science Elective [1] | | 3 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| CHEM 1221 | Engineering General Chemistry Lab | 1 |
| CHEN 1203 | General Chemistry for Engineers 2 | 2 |
| CVEN 3313 | Theoretical Fluid Mechanics | 3 |
| GEEN 3024 | Materials Science for Engineers | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **16** |
| **Third Year** | | |
| **Fall Semester** | | |
| CVEN 3323 | Hydraulic Engineering | 3 |
| CVEN 3414 | Fundamentals of Environmental Engineering | 3 |
| GEEN 3010 | Circuits for Engineers | 3 |
| GEEN 3852 | Thermodynamics for Engineers | 3 |
| Concentration Course [1] | | 3 |
| Humanities or Social Science Elective [1] | | 3 |
| | **Credit Hours** | **18** |
| **Spring Semester** | | |
| GEEN 3400 | Invention and Innovation | 3 |
| GEEN 3853 | Data Analysis for Engineers | 4 |
| Emphasis Elective | | 3 |
| Concentration Course [2] | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **16** |
| **Fourth Year** | | |
| **Fall Semester** | | |
| EVEN 4464 or CVEN 4464 | Environmental Engineering Processes or Environmental Engineering Processes | 3 |
| Emphasis Elective | | 3 |
| Concentration Course [2] | | 3 |
| Humanities or Social Science Elective [1] | | 3 |
| Free Elective | | 3 |
| Free Elective | | 1 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| EVEN 4434 | Environmental Engineering Design | 4 |
| Concentration Course [2] | | 3 |
| Humanities or Social Sciences Elective [1] | | 3 |
| Free Elective | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **16** |
| | **Total Credit Hours** | **128** |

1 View the College's Humanities, Social Sciences and Writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/)webpage for more information.

2 Select from current list of Concentrations (https://www.colorado.edu/program/ide/academics/concentrations/) on the IDE website.

3 IDE students must meet the following requisites to enroll in EVEN 4434: GEEN 2400, GEEN 3400, and EVEN 4464 OR CVEN 3424.

## Mechanical Emphasis

**First Year**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| APPM 1350 | Calculus 1 for Engineers | 4 |
| COEN 1500 | CEAS First Year Seminar | 1 |
| GEEN 1400 | Engineering Projects | 3 |
| PHYS 1110 | General Physics 1 | 4 |
| Humanities or Social Sciences Elective [1] | | 2 |
| | **Credit Hours** | **14** |
| **Spring Semester** | | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| GEEN 1017 | Engineering Drawing | 3 |
| PHYS 1120 | General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| Approved Writing Course [1] | | 3 |
| | **Credit Hours** | **15** |
| **Second Year** | | |
| **Fall Semester** | | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| CSCI 1300 | Computer Science 1: Starting Computing | 4 |
| GEEN 2400 | Engineering Projects for the Community | 3 |
| GEEN 2851 | Statics for Engineers | 3 |
| Humanities or Social Sciences Elective [1] | | 3 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| GEEN 3024 | Materials Science for Engineers (Or Materials course in emphasis) | 3 |
| MCEN 1024 | Chemistry for Energy and Materials Science | 3 |
| MCEN 2043 | Dynamics | 3 |
| Humanities or Social Sciences Elective [1] | | 3 |
| | **Credit Hours** | **16** |
| **Third Year** | | |
| **Fall Semester** | | |
| GEEN 3010 | Circuits for Engineers | 3 |
| GEEN 3852 | Thermodynamics for Engineers | 3 |
| MCEN 2063 | Mechanics of Solids | 3 |
| Concentration Course [3] | | 3 |
| Math or Science Elective [2] | | 2 |
| Humanities or Social Science Elective [1] | | 3 |
| | **Credit Hours** | **17** |
| **Spring Semester** | | |
| GEEN 3400 | Invention and Innovation | 3 |
| GEEN 3853 | Data Analysis for Engineers | 4 |
| MCEN 3021 | Fluid Mechanics | 3 |
| MCEN 3025 | Component Design | 3 |
| Concentration Course [3] | | 3 |
| | **Credit Hours** | **16** |
| **Fourth Year** | | |
| **Fall Semester** | | |
| MCEN 4043 | System Dynamics | 3 |
| MCEN 4045 | Mechanical Engineering Design Project 1 [4] | 3 |
| Concentration Course [3] | | 3 |
| Humanities or Social Science Elective [1] | | 3 |
| Free Elective | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **18** |
| **Spring Semester** | | |
| MCEN 4085 | Mechanical Engineering Senior Design Project 2 | 3 |
| Concentration Course [3] | | 3 |
| Free Elective | | 3 |
| Free Elective | | 3 |
| Free Elective | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **128** |

1 View the College's Humanities, Social Sciences and Writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/)webpage for more information.

2 View the IDE Advising (https://www.colorado.edu/program/ide/academics/advising/) webpage for math or science elective options.

3 Select from current list of Concentrations (https://www.colorado.edu/program/ide/academics/concentrations/) on the IDE website.

4 IDE students must meet the following requisites to enroll in MCEN 4045: GEEN 2400, GEEN 3400, GEEN 3010, GEEN 3852, MCEN 3021, MCEN 3025, one of: GEEN 3853 or MCEN 4043. Co-requisites: One of: GEEN 3853 or MCEN 4043, Writing Requirement.

# Additional Information

Students who select the CU Teach Engineering Math or Science Concentration will have a ninth semester student teaching experience. There is financial assistance available for these students.

# Mission Statement

The mission of the Integrated Design Engineering program is to prepare students to be innovators in a wide range of careers, tackling complex global challenges ethically and creatively by integrating technical engineering knowledge with integrated design thinking and multidisciplinary collaboration skills.

# Learning Outcomes

## Program Educational Objectives

Within a few years after graduation, graduates of the Integrated Design Engineering program will have:

- Achieved one or more of the following:
  - established themselves in engineering careers or in a professional field in which they apply their engineering mindset;
  - established themselves as STEM educators; and/or
  - earned or be enrolled in a graduate or professional degree program
- Brought an integrated design mindset to the projects, problems and/or systems they worked on.
- Integrated themselves into teams where they champion inclusive practices and diverse thinking.
- Demonstrated professional and personal leadership through continued learning and growth.
- Advanced in professional standing based on their accomplishments and accumulated additional expertise.
- Contributed to the betterment of society.

## Student Outcomes

By the completion of the program, students will be able to:

- Identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics.
- Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.
- Communicate effectively with a range of audiences.
- Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.
- Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives.
- Develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions.
- Acquire and apply new knowledge as needed, using appropriate learning strategies.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## Admissions Requirements

### BS in Integrated Design Engineering, Professional MS in Mechanical Engineering

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Be a current Integrated Design Engineering major with an emphasis in Mechanical Engineering
- Have submitted the BAM intent application (https://fedauth.colorado.edu/idp/profile/SAML2/POST/SSO/?execution=e1s2), typically in the spring of the junior year
- Have a cumulative GPA of 3.250 or higher
- Have at least junior standing and a minimum of 60 credit hours of completed coursework
- Have no Minimum Academic Preparation Standards (MAPS) deficiencies. (Students who matriculated in Summer 2023 or later will not need to meet MAPS as a part of BAM admission requirements.)
- Have completed courses from the three following categories with a grade of C (2.00) or higher at the time of admission:

| Code | Title | Credit Hours |
|---|---|---|
| **Mathematics (one of the following):** | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | 6 |
| MATH 2135 & MATH 3430 | Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations | 6 |
| **Fluid Mechanics (one of the following):** | | |
| MCEN 3021 | Fluid Mechanics | 3 |
| CVEN 3313 | Theoretical Fluid Mechanics | 3 |
| CHEN 3200 | Chemical Engineering Fluid Mechanics | 3 |
| **Thermodynamics (one of the following):** | | |
| GEEN 3852 | Thermodynamics for Engineers | 3 |
| MCEN 3012 | Thermodynamics | 3 |
| CHEN 3320 | Chemical Engineering Thermodynamics | 3 |
| EVEN 3012 | Thermodynamics for Environmental Science and Engineering | 3 |

### Program Requirements

Students may take up to and including 12 credits of graduate coursework while in the undergraduate program which can later be used toward the master's degree. However, only six credits may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree in Integrated Design Engineering, and also apply to continue with the professional master's degree in Mechanical Engineering, early in the semester in which the undergraduate requirements will be completed.

There are no specific constraints regarding the selection of 5000-level MCEN courses, as long as the student fulfills the required prerequisites. To determine the most suitable courses, students should consult with the Mechanical Engineering graduate advisor.

Students can refer to the **Integrated Design Engineering BAM degree programs** webpage for more information.

## Admissions Requirements

### BS in Integrated Design Engineering, Professional MS in Environmental Engineering

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Be a current Integrated Design Engineering major with an emphasis in Environmental Engineering
- Have submitted the BAM intent application (https://fedauth.colorado.edu/idp/profile/SAML2/POST/SSO/?execution=e1s2), typically in the spring of the junior year
- Have a cumulative GPA of 3.250 or higher
- Have at least junior standing and a minimum of 60 credit hours of completed coursework
- Have no Minimum Academic Preparation Standards (MAPS) deficiencies. (Students who matriculated in Summer 2023 or later will not need to meet MAPS as a part of BAM admission requirements.)
- Have completed the two following environmental emphasis courses with a grade of C (2.00) or higher at the time of admission:

| Code | Title | Credit Hours |
|---|---|---|
| CVEN 3414 | Fundamentals of Environmental Engineering | 3 |
| CVEN 3313 | Theoretical Fluid Mechanics | 3 |
| or MCEN 3021 | Fluid Mechanics | |

### Program Requirements

Students may take up to and including 12 credits of graduate coursework while in the undergraduate program which can later be used toward the master's degree. However, only six credits may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree in Integrated Design Engineering, and also apply to continue with the professional master's degree in Environmental Engineering, early in the semester in which the undergraduate requirements will be completed.

Up to 6 credits of courses required for the IDE environmental emphasis or used as EVEN electives with both a 4000- and 5000-level version may be double counted between the undergraduate and graduate degrees. These include:

| Code | Title | Credit Hours |
|---|---|---|
| CVEN 4464/5464 | Environmental Engineering Processes | 3 |
| CVEN 4404/5404 | Water Chemistry | 3 |
| EVEN 4484/ CVEN 5484 | Integrative Environmental and Molecular Microbiology | 3 |
| MCEN 4131/5131 | Air Pollution Control Engineering | 3 |

There are no specific constraints regarding the selection of the 5000-level EVEN or CVEN courses, as long as the student fulfills the required prerequisites. To determine the most suitable courses, students should consult with the Environmental Engineering graduate advisor.

Students can refer to the **Integrated Design Engineering BAM degree programs** webpage for more information.

# Materials Science & Engineering

Materials science and engineering is an interdisciplinary field that lies at the interface of chemistry, engineering and physics. The minor is for undergraduate students who are majoring in the natural sciences and engineering and who have an interest in materials science and engineering.

## Minor

- Materials Science & Engineering - Minor (p. 1017)

# Materials Science & Engineering - Minor

Materials science and engineering is an interdisciplinary field that lies at the interface of chemistry, engineering and physics. The minor is for undergraduate students who are majoring in the natural sciences and engineering and who have an interest in materials science and engineering.

## Requirements

Requirements for the minor are met by completing the required courses for 6 credit hours and 12 technical elective credit hours. Visit the Materials Science & Engineering webpage (https://www.colorado.edu/mse/academics/materials-science-engineering-undergraduate-minor/) for more information and a list of approved technical electives (https://www.colorado.edu/mse/academics/undergraduate-minor/mse-minor-technical-electives/). At least 12 of the 18 credit hours must be upper-division (3000 or higher level). At least 3 credit hours beyond the required courses must be taken in engineering courses (9 credits total). 5000-level courses are allowed where undergraduate students are eligible to enroll. Prior coursework may be transferred from other institutions with approval.

A GPA of 2.000 or better is required in the courses that are used to satisfy the requirements for this minor. Each individual course that is counted towards these degree requirements must be passed with a D- or better. Note, however, that a C- or better is required in all prerequisite courses to move on to a subsequent course.

Completion of 18 credit hours is required for the minor, distributed as follows.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Course** | | |
| MSEN 2000 | Materials in Technology [1] | 3 |
| **Fundamentals of Materials Science** | | |
| Select one of the following: | | |
| ASEN 1022 | Materials Science for Aerospace Engineers | 3 |
| or MCEN 2024 | Materials Science | |
| or GEEN 3024 | Materials Science for Engineers | |
| or CHEN 4440 | Chemical Engineering Materials | |
| **Technical Electives** | | **12** |
| **Total Credit Hours** | | **18** |

[1] Open to non-CEAS students.

## Learning Outcomes

By the completion of the program, students will be able to:

- Identify the different classes of materials, the chemical properties of different materials and the structure-function relationship of materials.

- Solve complex engineering problems that involve materials by applying principles of engineering, science and mathematics.
- Apply materials science and engineering principles to solve technical challenges in society.
- Work in a team environment to solve complex engineering problems that require materials solutions.
- Recognize ethical and professional responsibilities when designing materials to address solutions that impact public health, safety and welfare.

# Mechanical Engineering

Mechanical engineering prepares students for careers in a variety of industrial sectors including transportation, energy, manufacturing, aerospace, biomedical and environmental. Career opportunities include work in basic and applied research and development, design, manufacturing, project management, consulting and teaching. Mechanical engineers are employed by a wide variety of industrial, governmental and educational organizations. A mechanical engineering background also provides a firm foundation for other professional careers such as engineering management, law and medicine.

A mechanical engineering education from CU Boulder will prepare students for a future in a broad range of fields in science and technology. Students receive a hands-on education that breaks out of the classroom to give them real experience in industry. They learn from and work with a diverse faculty conducting groundbreaking research that is shaping the future of our world.

**Course code for this program is MCEN.**

## Bachelor's Degree

- Mechanical Engineering - Bachelor of Science (BSME) (p. 1029)

## Minor

- Energy Engineering - Minor (p. 1033)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Affrunti, Andrew J. (https://experts.colorado.edu/display/fisid_149937/)
Instructor; MSEE, University of Illinois at Urbana–Champaign

Ahmed, Alaa A. (https://experts.colorado.edu/display/fisid_144736/)
Professor; PhD, University of Michigan

Ban, Chunmei (https://experts.colorado.edu/display/fisid_165780/)
Associate Professor; PhD, SUNY at Binghamton

Barthelat, Francois (https://experts.colorado.edu/display/fisid_164866/)
Professor; PhD, Northwestern University

Bates, Kelvin (https://experts.colorado.edu/display/fisid_173937/)
Assistant Professor; PhD, California Institute of Technology

Blacklock, Jenifer L. (https://experts.colorado.edu/individual/fisid_159680/)
Faculty Director, Senior Instructor, Visiting Instructor; PhD, Wayne State University

Borden, Mark A. (https://experts.colorado.edu/display/fisid_148514/)
Professor; PhD, University of California, Davis

Bottenus, Nick (https://experts.colorado.edu/individual/fisid_165371/)
Assistant Professor; PhD, Duke University

Branch, Melvyn C.
Professor Emeritus

Bright, Victor Mark (https://experts.colorado.edu/display/fisid_112696/)
Professor; PhD, Georgia Institute of Technology

Bruns, Carson J. (https://experts.colorado.edu/display/fisid_159851/)
Assistant Professor; PhD, Northwestern University

Burleson, Grace
Visiting Assistant Professor; PhD, University of Michigan

Calve, Sarah (https://experts.colorado.edu/individual/fisid_165779/)
Assistant Professor; PhD, University of Michigan

Carlson, Lawrence E.
Professor Emeritus; D.Eng, University of California Berkeley

Castro, Francisco (https://experts.colorado.edu/display/fisid_147992/)
Senior Instructor; PhD, University of Colorado Boulder

Cui, Longji (https://experts.colorado.edu/display/fisid_164283/)
Assistant Professor; ME, Beihang University (China)

Daily, John W. (https://experts.colorado.edu/display/fisid_100131/)
Research Professor; PhD, Stanford University

Datta, Subhendu K.
Professor Emeritus

Ding, Xiaoyun (https://experts.colorado.edu/display/fisid_158563/)
Professor; PhD, Pennsylvania State University

Ding, Yifu (https://experts.colorado.edu/display/fisid_146088/)
Professor; PhD, University of Akron

Ferguson, Virginia L. (https://experts.colorado.edu/display/fisid_110131/)
Professor; PhD, University of Colorado Boulder

Geers, Thomas L.
Professor Emeritus

Greenberg, Alan R.
Professor Emeritus

Gupta, Mohit
Instructor Adjunct

Hamlington, Peter Edward (https://experts.colorado.edu/display/fisid_149800/)
Associate Professor, Chair, Faculty Fellow; PhD, University of Michigan Ann Arbor

Hampson, Gregory (https://experts.colorado.edu/display/fisid_166888/)
Scholar in Residence; PhD, University of Wisconsin–Madison

Hannigan, Michael P. (https://experts.colorado.edu/display/fisid_122655/)
Professor, Endowed Chair; PhD, California Institute of Technology

Henze, Daven K. (https://experts.colorado.edu/display/fisid_144858/)
Professor, Associate Chair; PhD, California Institute of Technology

Hertzberg, Jean R. (https://experts.colorado.edu/display/fisid_105315/)
Professor; PhD, University of California, Berkeley

Humbert, J. Sean (https://experts.colorado.edu/display/fisid_156202/)
Professor, Associate Chair; PhD, California Institute of Technology

Jayaram, Kaushik (https://experts.colorado.edu/display/fisid_165370/)
Assistant Professor; PhD, University of California-Berkeley

Kassoy, David R.
Professor Emeritus

Knappe, Svenja A. (https://experts.colorado.edu/display/fisid_139588/)
Associate Research Professor; PhD, Rheinische Friedrich-Wilhelms-Universität (Germany)

Knight, Daniel
Associate Research Professor; PhD, University of Tennessee

Knutsen, Jeffrey S. (https://experts.colorado.edu/display/fisid_145534/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Koch, Jeremy (https://experts.colorado.edu/display/fisid_166589/)
Assistant Teaching Professor; PhD, University of Illinois

Kotys-Schwartz, Daria (https://experts.colorado.edu/display/fisid_144738/)
Teaching Professor; PhD, University of Colorado Boulder

Labbe, Nicole J. (https://experts.colorado.edu/display/fisid_157742/)
Assistant Professor; PhD, University of Massachusetts, Amherst

Lee, Sehee (https://experts.colorado.edu/display/fisid_144739/)
Professor; PhD, Seoul National University (South Korea)

Lee, Yung-Cheng (https://experts.colorado.edu/display/fisid_103170/)
Professor Emeritus

Long, Rong (https://experts.colorado.edu/display/fisid_151301/)
Associate Professor; PhD, Cornell University

Lynch, Maureen Ellen (https://experts.colorado.edu/display/fisid_163404/)
Assistant Professor; PhD, Cornell University

MacCurdy, Robert B. (https://experts.colorado.edu/display/fisid_163307/)
Assistant Professor; PhD, Cornell University

McConnell, Katherine (https://experts.colorado.edu/display/fisid_147567/)
Scholar in Residence; EdD, University of Colorado Denver

McNeill, Nathan John (https://experts.colorado.edu/display/fisid_151518/)
Associate Teaching Professor; PhD, Purdue University

Michelsen, Hope (https://experts.colorado.edu/individual/fisid_165261/)
Associate Professor; PhD, Stanford University

Milford, Jana B. (https://experts.colorado.edu/display/fisid_103268/)
Professor Emerita

Miller, Shelly L. (https://experts.colorado.edu/display/fisid_110394/)
Professor; PhD, University of California, Berkeley

Mitrano, Peter P. (https://experts.colorado.edu/display/fisid_155075/)
Assistant Teaching Professor; PhD, University of Colorado, Boulder

Mizzi, Arthur
Assistant Research Professor; PhD, University of Colorado Boulder

Mukherjee, Debanjan (https://experts.colorado.edu/individual/fisid_164181/)
Assistant Professor; PhD, University of California, Berkeley

Murray, Todd W. (https://experts.colorado.edu/display/fisid_146549/)
Professor, Associate Chair; PhD, Johns Hopkins University

Neu, Corey P. (https://experts.colorado.edu/display/fisid_156210/)
Professor; PhD, University of California, Davis

Norris, Jan Adam (https://experts.colorado.edu/display/fisid_101412/)
Instructor Adjunct; PhD, University of Colorado Boulder

Pacheco, Carmen Consuelo (https://experts.colorado.edu/display/fisid_148773/)
Scholar in Residence; MS, University of Arizona

Pellegrino, John (https://experts.colorado.edu/display/fisid_130902/)
Research Professor; PhD, University of Colorado Boulder

Raj, Rishi (https://experts.colorado.edu/display/fisid_108413/)
Professor; PhD, Harvard University

Reamon, Derek T. (https://experts.colorado.edu/display/fisid_120538/)
Teaching Professor; PhD, Stanford University

Rentschler, Mark E. (https://experts.colorado.edu/display/fisid_146091/)
Professor; PhD, University of Nebraska-Lincoln

Rieker, Gregory Brian (https://experts.colorado.edu/display/fisid_151727/)
Associate Professor, Faculty Fellow; PhD, Stanford University

Riffell, Daniel J. (https://experts.colorado.edu/display/fisid_154141/)
Associate Professor, Lecturer; MS, University of Colorado Boulder

Ruben, Shalom D. (https://experts.colorado.edu/display/fisid_149492/)
Associate Teaching Professor; PhD, University of California, Los Angeles

Saccone, Max (https://experts.colorado.edu/display/fisid_175898/)
Assistant Professor; PhD, California Institute of Technology

Segil, Jacob Lionel (https://experts.colorado.edu/display/fisid_155128/)
Research Professor; PhD, University of Colorado Boulder

Singh, Chahat (https://experts.colorado.edu/display/fisid_175890/)
Assistant Professor; PhD, University of Maryland

Steinbrenner, Julie E. (https://experts.colorado.edu/display/fisid_152041/)
Associate Teaching Professor, Associate Chair; PhD, Stanford University

Stoldt, Conrad R. (https://experts.colorado.edu/display/fisid_126290/)
Professor Emeritus; PhD, Iowa State University

Tan, Wei (https://experts.colorado.edu/display/fisid_141464/)
Associate Professor; PhD, University of Illinois at Chicago

Tsai, Janet Yi-Jen (https://experts.colorado.edu/display/fisid_156447/)
Associate Teaching Professor, Associate Chair; PhD, University of Colorado Boulder

Vance, Marina E. (https://experts.colorado.edu/display/fisid_158217/)
Assistant Professor; PhD, Virginia Polytechnic Institute and State University

Vanderbeek, Greg (https://experts.colorado.edu/display/fisid_159741/)
Assistant Teaching Professor; MS, Colorado School of Mines

Vernerey, Franck J. (https://experts.colorado.edu/display/fisid_144760/)
Professor; PhD, Northwestern University

Vriend, Nathalie Maria (https://experts.colorado.edu/display/fisid_165036/)
Associate Professor; PhD, California Institute of Technology

Walker, Michael Edward (https://experts.colorado.edu/display/fisid_155103/)
Associate Teaching Professor; PhD, Illinois Institute of Technology

Weidman, Patrick D.
Professor Emeritus

Welker, Cara (https://experts.colorado.edu/display/fisid_168549/)
Assistant Professor; Ph.D., Stanford University

Whiting, Gregory L. (https://experts.colorado.edu/display/fisid_159727/)
Associate Professor; PhD, University of Cambridge (England)

Wiedinmeyer, Christine
Research Professor; PhD, University of Texas at Austin

Xiao, Jianliang (https://experts.colorado.edu/display/fisid_149777/)
Associate Professor; PhD, Northwestern University

Xu, Nicole (https://experts.colorado.edu/display/fisid_172095/)
Assistant Professor; PhD, Stanford University

Zable, Jack L.
Professor Emeritus

# Courses

**ENEN 2820 (1-6) Special Topics**
Explores topics related to energy engineering. Content will vary by semester and instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENEN 4321 (3) Oil and Gas Processing**
Provides a foundation in the fundamentals of oil and gas processing, including discovery, extraction and refining. Due to the importance of oil and gas in the current energy infrastructure, this course provides a broad understanding of the industry to students interested in energy engineering.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**ENEN 4600 (3) Interdisciplinary Energy Engineering Projects**
Prepares students to analyze energy systems from technical, economic, and policy perspectives with project topics varying by semester. Provides historical and contemporary context of the energy landscape. Emphasizes application of engineering fundamentals for the design and evaluation of real world energy systems. Projects will be completed by working in interdisciplinary teams.
**Requisites:** Restricted to Energy Engineering Minor (ENMR-MIN) students with 87-180 credits (Seniors).

**ENEN 4840 (1-6) Special Topics**
Explores topics related to energy engineering. Content will vary by semester and instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**MCEN 1024 (3) Chemistry for Energy and Materials Science**
Covers the basic physical and chemical fundamentals underlying the disciplines of energy and materials, with a focus on topics relevant to your mechanical engineering education. These fundamentals include atomic structure, stoichiometry, the periodic table, chemical bonding, states of matter, thermochemistry and chemical reactions.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 1113, CHEM 1400, CHEN 1201, and CHEN 1211
**Requisites:** Restricted to Mechanical Engineering (MCEN), Aerospace (ASEN), or Integrated Design Engineering (IDEN-BSIDE) students with a sub-plan of Mechanical (MEC) or Aerospace (AER).
**Recommended:** Prerequisite one year of high school chemistry.
**Additional Information:** Departmental Category: Materials

**MCEN 1025 (4) Computer-Aided Design and Fabrication**
Introduces CAD software and relevant concepts, including orthographic projection, sections, engineering drawing, geometric dimensioning and tolerancing, and an introduction to manufacturing methods. Lab work includes an introduction to fabrication techniques. Final design project involves reverse engineering of a physical product.
**Requisites:** Restricted to Mechanical Engineering (MCEN) or Engineering Physics (EPEN) majors only.
**Additional Information:** Departmental Category: Design

**MCEN 1030 (4) Introduction to Engineering Computing**
Introduces concepts and methods of computer programming with emphasis on applications to mechanical engineering. Includes vector/array manipulation, for/if/else/while loops, function definition, problem solving with programming. Covers MATLAB/Python with no previous experience expected.
**Requisites:** Requires a prerequisite or corequisite course of APPM 1235 or APPM 1340 or APPM 1345 or APPM 1350 or MATH 1150 or MATH 1300 or MATH 1310 (all minimum grade C-). Restricted to MCEN majors.

**MCEN 1208 (1-4) Special Topics in Mechanical Engineering**
Subject matter to be selected from topics of current interest. Credit to be arranged.
**Requisites:** Restricted to students with 0-26 units (Freshmen) Mechanical Engineering (MCEN) majors only.
**Additional Information:** Departmental Category: Special Topics

**MCEN 2000 (1) Mechanical Engineering as a Profession**
Provides an introduction to the profession of mechanical engineering. Specific topics addressed include career fields and roles relevant to mechanical engineering, internship search skills, professional communication, workplace culture, and current events/ethics topics relevant to the field. Course format may include additional evening/ weekend activities.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) Mechanical Engineering (MCEN) majors, and IUT On Track applicants only.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 2023 (3) Statics and Structures**
Covers statics of particles, equivalent force systems, rigid bodies, equilibrium of rigid bodies in two and three dimensions, analysis of truss and frame structures, uniaxially-loaded members, distributed force systems and friction.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 2121 or GEEN 2851
**Requisites:** Requires prereq courses of (APPM 1360 or MATH 2300) PHYS 1110 (all min grade C-).Restricted to Mech (MCEN) or Enviro (EVEN) or Biomedical (BMEN) or Integrated Design Eng (IDEN-BSIDE) students w a sub-plan of Mechanical (MEC) or IUT On Track applicants
**Additional Information:** Departmental Category: Solids

**MCEN 2024 (3) Materials Science**
Provides an overview of the structure, properties and processing of metallic, polymeric and ceramic materials. Specific topics include perfect and imperfect solids, phase equilibria, transformation kinetics, mechanical behavior and material degradation. Approach incorporates both materials science and materials engineering components.
**Equivalent - Duplicate Degree Credit Not Granted:** GEEN 3024
**Requisites:** Requires prereqs (MCEN 1024 or CHEN 1211 or CHEM 1113 or CHEN 1201) PHYS 1110 (min grade C-). Restricted to Mechanical (MCEN) or Integrated Design (IDEN-BSIDE) students w/ sub-plan of MEC or Materials Sci minors (MTEN-MIN) or IUT On Track applicants.
**Additional Information:** Departmental Category: Materials

**MCEN 2043 (3) Dynamics**
Covers dynamic behavior of particle systems and rigid bodies. Topics include 2-D and 3-D kinematics and kinetics, impulse, momentum, potential and kinetic energy, and work and collision.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 3111
**Requisites:** Requires prerequisite courses of (MCEN 2023 or CVEN 2121 or GEEN 2851or ASEN 2701) and (APPM 1360 or MATH 2300) (all minimum grade C-). Restricted to MCEN or Integrated Design Engineering (IDEN-BSIDE) students with a sub-plan of Mechanical (MEC).
**Additional Information:** Departmental Category: Solids

**MCEN 2063 (3) Mechanics of Solids**
Covers axial forces, transverse forces, bending moments and torque on beams, shafts, columns and tensile members. Calculations of stresses from each of these loads, stresses in pressure vessels, stress concentrations. Stress transformation, principal stresses and maximum shear stress using Mohr¿s circle, combined load, failure criteria. Hooke¿s law, deflection and statically indeterminate structures, thermoelasticity.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 3161
**Requisites:** Requires prereq of (MCEN 2023 or CVEN 2121 or GEEN 2851 or ASEN 2001 or ASEN 2701) and (APPM 1360 or MATH 2300) (all minimum grade C-). Restricted to Mechanical (MCEN) or Biomed (BMEN) or Integrated Design Engr (IDEN-BSIDE) students w/ sub-plan of MEC.
**Additional Information:** Departmental Category: Solids

**MCEN 3012 (3) Thermodynamics**
Explores fundamental concepts and basic theory, including first and second laws of thermodynamics, properties, states, thermodynamic functions and cycles.
**Equivalent - Duplicate Degree Credit Not Granted:** GEEN 3852 or AREN 2110
**Requisites:** Requires prereq course of APPM 1360 or MATH 2300 (min grade C-). Restricted to Mechanical (MCEN) or Environmental (EVEN) or Integrated Design (IDEN-BSID) students w/ sub-plan Mechanical (MEC) or Civil (CVEN) students w/ sub-plan of CMU partnership `1MSC
**Additional Information:** Departmental Category: Thermal

**MCEN 3017 (3) Circuits and Electronics for Mechanical Engineers**
Covers analysis of electrical circuits by use of Ohm's law, network reduction, node and loop analysis, Thevenin's and Norton's theorems, DC and AC signals, transient response of simple circuits, transfer functions, basic diode and transistor circuits, and operational amplifiers. Includes introductory digital electronics and microprocessors/microcontrollers.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3010
**Requisites:** Requires prereq course of PHYS 1120 and a prereq or coreq course of APPM 2360 or APPM 3310 or MATH 3430 (all min grade C-). Restricted to MCEN or EVEN or Integrated Design Engr (IDEN-BSIDE) students.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 3021 (3) Fluid Mechanics**
Examines fundamentals of fluid flow with application to engineering problems. Topics covered include fluid statics and kinematics, Bernoulli equations, laminar and turbulent viscous boundary layers, laminar and turbulent pipe flow, and conservation equations for mass, momentum and energy.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 3200 and CVEN 3313
**Requisites:** Requires prereqs (MCEN 2023 or CVEN 2121 or GEEN 2851 or ASEN 2001 or ASEN 2701 or CHEN 2120) (APPM 2350 or MATH 2400) (all min grade C-). Restricted to MCEN, EVEN, and IDEN-BSIDE students w/ sub-plan of MEC.
**Additional Information:** Departmental Category: Fluids

**MCEN 3022 (3) Heat Transfer**
Studies fundamentals of heat transfer by conduction, convection, and radiation. Emphasizes problem formulation and selection of appropriate solution techniques. Provides applications to modern engineering systems, which may include energy, biological, environmental, and materials engineering problems.
**Requisites:** Requires prereq (MCEN 3021 or CVEN 3313), (MCEN 3012 or AREN 2110 or GEEN 3852 or EVEN 3012), (APPM 2360 or APPM 3310 or MATH 3430) (min grade C-). Restricted to Mech Engineering or Enviro Engineering or Integrated Design Engr w/sub-plan of MEC
**Additional Information:** Departmental Category: Thermal

**MCEN 3025 (3) Component Design**
Application of mechanics and materials science to the detailed design of various machine elements including shafts, bearings, gears, brakes, springs, and fasteners. Emphasizes application and open-ended design problems.
**Requisites:** Requires prerequisite courses of MCEN 1025 and (MCEN 2024 or GEEN 3024 or ASEN 1022), and (MCEN 2063 or CVEN 3161) (all minimum grade C-). Restricted to Mechanical (MCEN) or Integrated Design Eng (IDEN-BSIDE) students with a sub-plan of Mechanical (MEC)
**Additional Information:** Departmental Category: Design

**MCEN 3030 (3) Computational Methods**
Studies fundamental numerical techniques for the solution of commonly encountered engineering problems. Includes methods for linear and nonlinear algebraic equations, data analysis, numerical differentiation and integration, ordinary and partial differential equations.
**Requisites:** Requires prerequisite courses of (APPM 2360 or MATH 3430 or APPM 3310) and (MCEN 1030 or CSCI 1300 or CSCI 1310 or CSCI 1320 or ECEN 1310 or ASEN 1320) (all min grade C-). Restricted to Mechanical Engineering (MCEN) majors only.
**Additional Information:** Departmental Category: Math

**MCEN 3032 (3) Thermodynamics 2**
Offers advanced topics and applications for thermal system design and analysis. Topics include thermodynamics of state, entropy, thermodynamic cycles and reacting and nonreacting mixtures. Provides application to power generation, refrigeration and HVAC with conventional and advanced technologies. Most assignments are design oriented.
**Requisites:** Requires prereq of (MCEN 3021 or CHEN 3200 or CVEN 3313) (MCEN 3012 or GEEN 3852 or AREN 2110 or EVEN 3012 or CHEN 2120) (APPM 2360 or MATH 3430 or APPM 3310) (all min grade C-). Restricted to Mech Engineering or Enviro Engineering majors.
**Additional Information:** Departmental Category: Thermal

**MCEN 3047 (4) Data Analysis and Experimental Methods**
Learn to plan and carry out experiments and analyze the results. Topics covered include measurement fundamentals, design of experiments, elementary statistics and uncertainty analysis. Topics in statistics include probability, error propagation, confidence intervals, hypothesis testing, linear regression, one- and two-factor ANOVA and time series analysis. Formerly MCEN 3037.
**Equivalent - Duplicate Degree Credit Not Granted:** GEEN 3853
**Requisites:** Prereq PHYS 1140 (min grade C-). Coreqs 1 of:(WRTG 3030,3035,ENES 1010,3100,PHYS 3050,COEN 3050,ENLP 3100), 1 of:(ECEN 3010,2270,GEEN 3010,MCEN 3017), 1of:(MCEN 3030,APPM 4650,APPM 4600,CSCI 3656).Restricted to MCEN or IDEN w/MEC, 57+ credits only
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 3208 (1-4) Special Topics in Mechanical Engineering**
Subject matter to be selected from topics of current interest.
**Repeatable:** Repeatable for up to 15.00 total credit hours.
**Requisites:** Requires prereq courses of APPM 2360 PHYS 1140 and prereq or coreq courses of ECEN 3010 and WRTG 3030 or WRTG 3035 or HUEN 1010 or 3100 (all min grade C). Restricted to students with 57-180 credits (Jrs/Srs) Mechanical Engineering (MCEN) majors only.
**Additional Information:** Departmental Category: Special Topics

**MCEN 3930 (6) Mechanical Engineering Cooperative Education**
Students enrolled in this course participate in a previously arranged, department-sponsored education program with a university, government agency, or industry. This course is offered only through Continuing Education.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** At least a 2.75 cumulative GPA is required. Restricted to Mechanical Engineering or students with a plan of Mechanical Engineering Concurrent Degree or Integrated Design Engineering students with a MCEN subplan.
**Recommended:** Prerequisite 3.00 GPA or higher.
**Additional Information:** Departmental Category: Math

**MCEN 4010 (3) Microsystems Integration**
A microsystem consists of microelectronic, optoelectronic, microwave, microelectromechanical and energy components interconnected. Thermal, electrical, fabrication and assembly issues for microsystems represented by iPhone series will be studied. The packaging and interconnection technologies used to establish the design and manufacturing infrastructure of microsystems will be reviewed. Other optoelectronic, MEMS and batter components for microsystems will also be studied.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5010
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechanical Engineering (MCEN) majors only.

**MCEN 4012 (3) Renewable Fuels, Fuel Cells and Internal Combustion Engines**
With the accelerated availability of carbon-free and renewable fuels, we will explore high-efficiency, low-emissions fuel cell and internal combustion engine energy conversion technologies, preparing students to enter the rapidly changing fields of power and propulsion on the path to net-zero greenhouse gas emissions. Through thermodynamic modeling, systems engineering, and requirements flow-down, students will apply the fundamentals of thermodynamics, fluids and heat transfer, combustion and electrochemistry for fuel cells and IC engines.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5012
**Requisites:** Requires corequisite course of MCEN 3032. Restricted to College of Engineering and Applied Sciences students.
**Recommended:** Prerequisites MCEN 4152/5152 or MCEN 4194/5194.

**MCEN 4026 (3) Manufacturing Processes and Systems**
Examines manufacturing processes for metals and polymers, as well as manufacturing systems that integrate these processes. Lecture topics include shape forming, machining, joining, assembling, casting, process integration, statistical process control, total quality management, geometric dimensioning and tolerancing, and electronic packaging. Examines real-world manufacturing operations and applications through guest speakers and examples.
**Requisites:** Requires prerequisite course of MCEN 2024 or GEEN 3024 or ASEN 1022 (minimum grade C-). Restricted to Mechanical Engineering (MCEN) majors only.
**Additional Information:** Departmental Category: Manufacturing and Systems

**MCEN 4032 (3) Sustainable Energy**
Examines sustainability of our current energy systems, including transportation, using environmental and economic indicators. Uses systems analysis that addresses energy supply and demand. Explores the science and technology as well as environmental and economic feasibility of efficiency measures and renewable energy technologies. Additional emphasis is given to the global nature of the challenges and the potential for locally optimal solutions.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5032
**Requisites:** Requires prerequisite or corequisite course of (MCEN 3022 or CHEN 3210 or AREN 2120 or ASEN 3402 or MCEN 3032) (minimum grade C-).
**Additional Information:** Departmental Category: Thermal

**MCEN 4036 (3) Lean Six-Sigma in Manufacturing**
Focuses on Lean Principles and Six-Sigma methodologies for defining, measuring, analyzing, improving, and controlling (DMAIC) manufacturing processes to establish more efficient processes. Incorporates statistical process control methodologies. Teaches students to streamline industry and manufacturing processes and use data to make better informed decisions. Includes lectures, in-class activities, Minitab workshops, industry focused projects, and three exams based on the DMAIC process along with three projects focused on industry tours.
**Requisites:** Restricted to students with 57-180 credits (Jrs/Srs) Mechanical Engineering (MCEN) majors only.

**MCEN 4043 (3) System Dynamics**
Covers linear dynamic systems and mathematical tools for understanding them. Topics include Laplace transform, multi-domain system modeling, input-output relationships, time-domain response, Fourier series, frequency-domain response, and introduction to feedback control.
**Requisites:** Requires prereqs (MCEN 2043 or CVEN 3111), (ECEN 3010 or 2270 or GEEN 3010 or MCEN 3017), coreq (MCEN 3030 or APPM 4650 or APPM 4600 or CSCI 3656) all min grade C-. Restricted to MCEN or IDEN-BSIDE students w/ sub-plan of MEC.
**Additional Information:** Departmental Category: Solids

**MCEN 4045 (3) Mechanical Engineering Design Project 1**
First part of a two-course capstone design experience in mechanical engineering. Covers problem definition, determining design requirements, alternative design concepts, engineering analysis, proof-of-concept prototype and CAD drawings. Students make several oral design reviews, a final design presentation, and prepare a written report. IDEN-BSIDE students are not required to complete MCEN 2000, MCEN 3022, MCEN 3030 or MCEN 4026 but have additional prerequisites of GEEN 1400, 2400 and 3400.
**Requisites:** Restricted to MCEN or IDEN mjrs w/ prereqs (GEEN 1400, 2400, OR 3400) and MCEN 2000, 3012, 3021, 3025, 3030, AND (3022 or 4043 or 3047). Coreqs MCEN 4026, 3022, 4043, 3047, AND (WRTG 3030 or 3035 or ENES 1010 or 3100) (all min grade C-).
**Additional Information:** Departmental Category: Design

**MCEN 4057 (3) Environmental Modeling**
Enables students to develop and evaluate pollutant transport, fate, exposure, and risk models for air, water, and multi-media systems, with a special emphasis on air. Emphasizes the fundamental physics and chemistry that govern contaminant fate and transport and the basic mathematical equations and numerical approaches for describing these processes.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5057
**Requisites:** Requires prerequisite courses of CHEN 1211 or CHEM 1113 or MCEN 1024 and CSCI 1300 or CSCI 1320 (all minimum grade C).
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 4064 (3) Soft Machines**
Introduces soft machines as a new paradigm of engineering that starts to impact healthcare, consumer electronics, renewable energy and collaborative robotics. Prepares students to participate in research on soft machines by starting with fundamentals of soft materials and by covering soft robotics, stretchable electronics, energy harvesting and functional polymers. Includes guest lectures, a literature review and a hands-on lab project.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5046 and MSEN 5046
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechanical Engineering (MCEN) majors only.

**MCEN 4085 (3) Mechanical Engineering Senior Design Project 2**
Second part of a two-course capstone design experience in mechanical engineering. Includes refinement of prototype, design optimization, fabrication, testing, and evaluation. Students orally present the final design and prepare a written report and operation manual for the product. GEEN-BS and GEEN-BSEPL students are not required to complete MCEN 4026.
**Requisites:** Requires prerequisite course of MCEN 4045 (minimum grade C-).
**Additional Information:** Departmental Category: Design

**MCEN 4086 (1) Writing for Design Projects**
Communicate professionally in writing to the technical and nontechnical audience. Develop skills to analyze rhetorical situations and compose documents, such as reports, technical manuals and user guides, that achieve a specific purpose and meet the needs of a particular audience. Writing with clarity, conciseness and correctness will be emphasized.
**Requisites:** Requires prerequisite or corequisite course of MCEN 4045 (minimum grade C-).
**Additional Information:** Departmental Category: Manufacturing and Systems

**MCEN 4110 (3) Regenerative Biology and Tissue Repair**
Presents the regenerative biology behind tissue systems, along with the regenerative medicine of that tissue with an emphasis on engineering principles, using the assigned reading as a guideline. Follows lectures with class discussions of current papers on the regenerative biology of the same tissue system. In the final 1 ¿ 2 classes assigned to this topic, individual graduate students give 20 min presentations on a relevant regenerative medicine/engineering-focused paper.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 4110, BMEN 5110, and MCEN 5110
**Requisites:** Restricted to Mechanical Engineering (MCEN), Biomedical Engineering (BMEN), and Chemical Engineering (CHEN or BIEN) majors with 57+ credits only.

**MCEN 4111 (3) Introduction to Microfluidics**
Microfluidics deals with the behavior of fluids in small scale. It is a highly multidisciplinary field at the intersection of engineering, physics, chemistry, biology, medicine, nanotechnology, and biotechnology. This course covers the fundamentals and fabrication of microfluidic devices and their applications, particularly in lab-on-a-chip. Includes lectures, literature discussion, team presentations, and possibly one lab on microfluidic devices. Enhances your understanding of microfluidic technologies and their broad applications.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5111 and BMEN 4111 and BMEN 5111
**Requisites:** Requires prerequisite course of MCEN 3021 or CHEN 3200 or CVEN 3313 (all minimum grade C-). Restricted to Mechanical Engineering majors only.

**MCEN 4112 (3) Introduction to Nanoscale Transport**
Introduces the basic concepts, theoretical methods, and experimental techniques related to nanoscience and nanoengineering that are ubiquitous in microelectronics, renewable energy technology, heat transfer, nano-optics, MEMS/NEMS, and emerging quantum technologies. Discusses microscopic pictures and theories of various energy transport and conversion phenomena and real-world examples and demonstrations.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5112
**Requisites:** Requires prerequisite courses of PHYS 1110 and (APPM 2360 or MATH 3430) (all minimum C-). Restricted to Mechanical Engineering (MCEN) majors with 57+ credits only.

**MCEN 4113 (3) Mechanics of Cancer**
Cancer is considered to be an organ or an ecosystem, in which a critical component of the tumor microenvironment is mechanical forces. This course will cover the role of mechanics in cancer and cancer-related processes, with a focus on solid mechanics and fluid mechanics. In this course, you will apply engineering principles to come away with an appreciation of how mechanics influence cancer and its etiology as well as the development of future treatments.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 4113 and MCEN 5113 and BMEN 5113
**Requisites:** Requires prerequisite course of MCEN 3021 or CHEN 3200 or CVEN 3313 or MCEN 2063 or CVEN 3161 (all minimum grade C-). Restricted to Mechanical and Biomedical Engineering majors with 57+ credits only.

**MCEN 4114 (3) Automation of Industrial Processes**
Introduces students to Programmable Logic Controller (PLC) architecture, ladder logic programming, and programming Human Machine Interfaces (HMI). Students learn how to automate manufacturing processes and applications of PID control.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4114
**Requisites:** Prerequisite MCEN 3017 Circuits and Electronics for Mechanical Engineers.

**MCEN 4115 (3-4) Mechatronics and Robotics I**
Focuses on design and construction of microprocessor-controlled electro-mechanical systems. Lectures review critical circuit topics, introduce microprocessor architecture and programming, discuss sensor and actuator component selection, robotic systems and design strategies for complex, multi-system devices. Lab work reinforces lectures and allows hands-on experience with robotic design. Students must design and build an autonomous robotic device. Project expenses may be incurred ($50 maximum).
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5115
**Requisites:** Requires prerequisite courses of (MCEN 3017 or ECEN 3010 or 2250 or GEEN 3010) and (MCEN 1030 or ECEN 1310 or CSCI 1300 or CSCI 1320 or ASEN 1320) (all min grade C-). Restricted to Mechanical Engineering majors only.
**Additional Information:** Departmental Category: Design

**MCEN 4116 (3) Heating, Ventilation, and Air Conditioning Design**
Analysis and design of buildings and their systems to satisfy the requirements for a comfortable and healthy indoor environment. Covers psychometrics, thermal comfort, building heating and cooling loads, fluid flow basics, and HVAC components and systems.
**Requisites:** Prerequisite: MCEN 3012 Thermodynamics.

**MCEN 4117 (3) Anatomy and Physiology for Engineers**
Explores human physiological function from an engineering, specifically mechanical engineering, viewpoint. Provides an introduction to human anatomy and physiology with a focus on learning fundamental concepts and applying engineering (mass transfer, fluid dynamics, mechanics, modeling) analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 4117 and BMEN 5117 MCEN 5117
**Requisites:** Restricted to Mechanical or Biomedical Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 4118 (3) Mechanics of Snow**
This course covers the composition, structure and mechanics of ice and snow, from plasticity of ice at the atomic scale, to snowflakes and snow metamorphism, to fracture mechanics and avalanches in large snow slabs. Experiments and models (micromechanics, fracture mechanics) applied to ice and snow are reviewed. Fundamental knowledge is applied to predicting the mechanical strength and reliability of different types of snow. Assessment is largely based on in-class activities, and on a final project.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5118
**Requisites:** Requires prerequisite course of MCEN 2063 Mechanics of Solids, minimum grad C-. Restricted to Mechanical Engineering majors with 57+ credits only.

**MCEN 4123 (3) Vibration Analysis**
Highlights free and forced vibration of discrete and continuous systems. Examines Lagrange's equation, Fourier series, Laplace transforms, and matrix and computational methods. Applies knowledge to practical engineering problems.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 4123
**Requisites:** Requires prerequisite course of (MCEN 3030 or APPM 4650 or APPM 4600 or CSCI 3656 or ASEN 3112) (minimum grade C). Restricted to Mechanical Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Solids

**MCEN 4124 (3) Mechanical Behavior of Materials**
Addresses the relationship between material structure and the fundamental processes of deformation, yield, and fracture. Examines elements of elasticity theory, introduction to plasticity, and formulation of failure criteria. Studies basic deformation processes in terms of dislocation mechanics and macroscopic mechanical behavior. Takes into consideration the influence of compositional and processing strengthening mechanisms on mechanical properties.
**Requisites:** Requires prerequisite courses of (MCEN 2024 or GEEN 3024 or ASEN 1022) and (MCEN 2063 or CVEN 3161) (all minimum grade C). Restricted to Mechanical Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Materials

**MCEN 4125 (3) Optimal Design**
Focuses on linear optimization and will introduce non-linear optimization. Formulating Engineering applications as optimization problems that can be solved using industry known solvers will be learned. Some of these applications will include minimum cost mechanical design, wind farm power maximization, minimum energy control, production control, and more. Previous programming experience required.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5125
**Requisites:** Requires prerequisite course of (MCEN 3030 or APPM 4650 or APPM 4600 or CSCI 3656) (minimum grade C-). Restricted to Mechanical Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Design

**MCEN 4127 (3) Biomedical Ultrasound**
Covers the design of ultrasound systems for medical imaging and therapy, including the physics of wave propagation, transducers, pulse-echo imaging, flow, tissue characterization, and microbubble contrast, with an emphasis on current topics in biomedical ultrasound. Includes lectures on theory, practice and special topics; a laboratory on wave propagation; oral presentations on current literature; signal processing exercises; and a team project. Some experience with MATLAB is strongly encouraged for exercises throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 4127 and BMEN 5127 and MCEN 5127
**Requisites:** Requires prerequisite course of ECEN 3300 or ECEN 3301 or MCEN 4043. Restricted to Mechanical Engineering (MCEN), Biomedical Engineering (BMEN), and Environmental Engineering (ECEN) majors with 57+ credits only.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 4131 (3) Air Pollution Control Engineering**
Introduces air quality regulations, meteorology and modeling. Examines methods for controlling major classes of air pollutants, including particulate matter and oxides of sulfur and nitrogen, as well as control technology for industrial sources and motor vehicles. Requires interdisciplinary design projects.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 4131 and MCEN 5131 and EVEN 5131
**Requisites:** Requires prerequisite courses of (MCEN 3021 or CHEN 3200 or CVEN 3313) and (MCEN 3012 or GEEN 3852 or AREN 2110 or EVEN 3012) (all minimum grade C-). Restricted to Mechanical Engineering or Environmental Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Fluids

**MCEN 4133 (3) Intro to Tissue Biomechanics**
Focuses on developing an understanding of the fundamental mechanical principles that govern the response of hard and soft biological tissue to mechanical loading. Specifically, covers mechanical behavior of biological materials/tissues, classical biomechanics problems in various tissues, the relationship between molecular, cellular and physiological processes and tissue biomechanics and critical analysis of related journal articles.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5133 and BMEN 5133
**Requisites:** Requires prerequisite courses of (MCEN 2024 or GEEN 3024 or ASEN 1022 or BMEN 2010) and MCEN 2063 (both minimum grade C-). Restricted to MCEN and BMEN majors with 57+ credits.
**Additional Information:** Departmental Category: Materials

**MCEN 4135 (3) Wind Energy and Wind Turbine Design**
Focuses on understanding and applying principles related to current wind energy technologies. Students will apply technical coursework from throughout the engineering curriculum (environmental, fluids, statics, dynamics, power, economics, etc.) to the process of designing wind turbines and wind farms. Practical, real world examples will be integrated into the lessons and problems.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5135
**Requisites:** Requires prerequisite courses of (MCEN 3021 or CHEN 3200 or CVEN 3313 or AREN 2120) and (MCEN 3017 or ECEN 3010 or GEEN 3010 or ECEN 2270 or AREN 3040) (all minimum grade C-). Restricted to Mech or Environmental Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Design

**MCEN 4137 (3) Anatomy and Physiology 2**
Provides in-depth understandings of anatomy and physiology as well as introductions to transport phenomena, flow mechanics and solid mechanics in several organ systems: the cardiovascular, pulmonary, kidney, endocrine and digestive systems. Introduces artificial physiological systems to replace or assist physiological functions and introduce the concepts of physiological barriers that prevent diagnosis or effective therapeutics.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5137
**Requisites:** Requires prerequisite course of MCEN 4117 (minimum grade C). Restricted to students with 57-180 credits (juniors/seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 4138 (3) Control Systems Analysis**
Analysis and design of continuous time control systems using classical and state space methods. Laplace transforms, transfer functions and block diagrams. Stability, dynamic response, and steady-state analysis. Analysis and design of control systems using root locus and frequency response methods. Computer aided design and analysis. Department enforced prerequisite: background in Laplace transforms, linear algebra,and ordinary differential equations.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 4114 and ASEN 5114 ECEN 5138 and ECEN 4138 and MCEN 5138
**Requisites:** Requires prerequisite of MCEN 4043 or ECEN 3300 (minimum grade C-). Restricted to students with 57+ credits (Senior, Fifth Year Senior) Mechanical Engineering majors only.

**MCEN 4141 (3) Indoor Air Pollution**
Describes the impact of indoor air pollutants on human health, including an introduction to key pollutants and their sources. Students will estimate emission factors, calculate generation/ventilation rates, quantify the impact of deposition and chemical reactions and explore relevant control technology. Current issues will also be addressed, including climate change, green building design, economic concerns and relevance to the developing world.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 4141, MCEN 5141, and EVEN 5141
**Requisites:** Requires prerequisite courses of (MCEN 3022 or CHEN 3210) (minimum grade C-). Restricted to Mechanical and Environmental Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Fluids

**MCEN 4151 (3) Flow Visualization**
Explores techniques for the visualization of the physics of fluid flows including seeding with dyes, particles and bubbles, and shadowgraphy and schlieren. Reviews optics and fluid physics, especially atmospheric clouds. Assignments are student-driven, to individuals and mixed teams of graduates, undergraduates, engineering majors and photography/video majors.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5200, MCEN 5151, ATLS 4151 and ATLS 5151
**Requisites:** Restricted to College of Engineering and Applied Science students with 57+ credits only.
**Recommended:** Prerequisite MCEN 3021.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Fluids

**MCEN 4152 (3) Introduction to Combustion**
Focuses on the mechanisms by which fuel and oxidizers are converted into combustion products. Application to practical combustion devices such as Otto, Diesel, gas turbine and power plant combustion systems. Consideration of combustion-generated air pollution, fire safety and combustion efficiency.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5152
**Requisites:** Requires prerequisite course of MCEN 3012 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechanical Engineering majors only.
**Recommended:** Prerequisites MCEN 3021 and MCEN 3022.
**Additional Information:** Departmental Category: Thermal

**MCEN 4154 (3) Biocolloids and Biomembranes**
Covers the thermodynamics and mechanics of biological membranes and biomedical colloids. Considers intermolecular and surface forces, self-assembly and colloidal stability. Addresses structure-property relationships and design principles for biomedical applications. Focuses on monolayers, bilayers, micelles, filomicelles, liposomes, polymersomes, emulsions, microbubbles, polyplexes and polyelectrolyte multilayer capsules.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5154
**Requisites:** Requires prerequisite courses of (APPM 2360 or MATH 3130 or MATH 3135 or APPM 3310) and (PHYS 1120 or PHYS 1125) (all minimum grade C). Restricted to Mechanical Engineering students with 57+ credits only
**Additional Information:** Departmental Category: Materials

**MCEN 4155 (3) Automated Mechanical Design Synthesis**
Introduces computational approaches to automatically generate complex multimaterial mechanical designs that satisfy predefined high-level specifications, discusses algorithms to solve design as a constrained non-convex multi-objective optimization problem. Topics: expert-driven design process; computational analysis tools based on mechanical simulation (finite element methods, mesh-free methods); topological optimization; compositional design; multi-objective optimization; evolutionary design; design for manufacturing with additives (FDM, SLA, Inkjet). Students design a part to specifications, fabricate using advanced (3D printing, laser cutting, CNC, etc) tools.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5155
**Requisites:** Requires prerequisite course of MCEN 3030 or APPM 4650 or APPM 4600 or CSCI 3656 (all minimum grade C-). Restricted to Mechanical Engineering majors with 87+ credits only.
**Recommended:** Prerequisite students should be comfortable with MATLAB, PDEs, linear algebra, free body diagrams, mechanical modeling/design; exposure to finite-element modeling and state-space representations.

**MCEN 4157 (3) Modeling of Human Movement**
Human movement analysis is used in physical rehabilitation, sport training, human-robot interaction, animation, and more. Course provides a systematic overview of human movement on multiple levels of analysis, with an emphasis on the phenomenology amenable to computational modeling. Covers muscle physiology, movement-related brain areas, musculoskeletal mechanics, forward and inverse dynamics, optimal control and Bayesian inference, learning and adaptation. Inspires students to see and appreciate the complexities of movement control in all aspects of daily life.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 4157 and MCEN 5157 and BMEN 5157
**Requisites:** Requires prerequisite of (MCEN2043 or GEEN 3024 or ASEN 1022) and (APPM2360 or MATH2130 or MATH3130) all minimum grade C-. Restricted to students with 57-180 credits (Jrs/Srs) Mechanical Engineering (MCEN) and Biomedical Engineering (BMEN) majors only.

**MCEN 4162 (3) Energy Conversion**
Examines common energy-conversion methods and devices. Topics include power-cycle thermodynamics, turbocompressor and expander processes, combustion systems, and applications and limitations of direct energy-conversion systems.
**Requisites:** Requires prerequisite course of (MCEN 3012 or GEEN 3852 or AREN 2110 or EVEN 3012 or CHEN 3320) (minimum grade C). Restricted to Mechanical Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Thermal

**MCEN 4171 (3) Biofluids on the Micro Scale**
Introduces fundamental physical concepts and basic mechanisms of biological fluids in microscale. Elaborates on the application of fluid mechanics principles to major biological systems, including human organ systems and animal locomotion in microscale. Covers physiologically relevant fluid flow phenomena on the cellular level and the underlying physical mechanisms from an engineering perspective. Related state-of-art technologies such as organ-on-a-chip and micro/nano fabrication will be emphasized. Will enhance your understanding of organ-on-a-chip technologies and their broad applications.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 4171 and MCEN 5171 and BMEN 5171
**Requisites:** Restricted to Mechanical Engineering and Biomedical Engineering majors with 57+ credits.
**Recommended:** Prerequisites MCEN 3021 or CHEN 3200 or CVEN 3313 or BMEN 3010.

**MCEN 4173 (3) Finite Element Analysis**
Introduces the theory behind and applications of the finite element method as a general and powerful tool to model a variety of phenomena in mechanical engineering. Applications include structural mechanics, mechanics of elastic continua and heat conduction.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5173
**Requisites:** Requires prerequisite course of (MCEN 2063 or CVEN 3161) (minimum grade C-). Restricted to Mechanical Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Solids

**MCEN 4174 (3) Failure of Engineering Materials**
Examines the fundamental concepts regarding the failure of engineering materials. Case studies are used to integrate a basic understanding of material failure mechanisms with analysis techniques and tools. Topics include the elastic properties (isotropic and anisotropic materials) and the origin of elastic behavior, viscoelasticity, plasticity (dislocation mechanisms, yielding criteria, strengthening mechanisms), creep, fracture and fatigue.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5174
**Requisites:** Requires prerequisite courses of (MCEN 2024 or GEEN 3024 or ASEN 1022) and (MCEN 2063 or CVEN 3161) (all minimum grade C-). Restricted to Mechanical Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Materials

**MCEN 4183 (3) Mechanics of Composite Materials**
Introduces various kinds of composite materials, composite fabrication techniques, the physical and mechanical behavior of composites, and analytical and experimental methodologies.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5183
**Requisites:** Requires prerequisite courses of (MCEN 2024 or GEEN 3024 or ASEN 1022) and (MCEN 2063 or CVEN 3161) (all minimum grade C-). Restricted to Mechanical Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Solids

**MCEN 4193 (3) Design of Coffee**
Serves as an introduction to how engineers use their disciplinary training to approach and solve problems outside of the traditional confines of their discipline, as illustrated by the roasting and brewing of coffee. In addition to focusing on the science, engineering and craftsmanship of making a cup of coffee from bean to cup, we will also study the global sourcing and sustainability aspects of coffee.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5193
**Requisites:** Requires prerequisite course of MCEN 3022 and (MCEN 3021 or CHEN 3200 or CVEN 3313) (minimum grade C-). Restricted to Mechanical Engineering majors with 57+ credits only.
**Recommended:** Prerequisite MCEN 3047.

**MCEN 4194 (3) Electrochemical Energy Conversion and Storage**
Presents the fundamentals, principles and experimental techniques of electrochemistry, the background of ionic or electronic conduction of metal, semiconductor, inorganic and polymer materials and applications in the areas of batteries, fuel cells, electrochemical double layer capacitors, electrochemical photonics, sensors and semiconductor electrochemistry.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5194
**Requisites:** Requires prereq course of (MCEN 2024 or GEEN 3024 or ASEN 1022) and coreq course of MCEN 3032 (all min grade C-). Restricted to Mechanical Engineering majors only.
**Additional Information:** Departmental Category: Materials

**MCEN 4195 (3) Bioinspired Robotics**
Bioinspired design views the process of how we learn from nature as an innovation strategy translating principles of function, performance, and aesthetics, from biology to human technology. The creative design process is driven by interdisciplinary exchange among engineering, biology, medicine, art, architecture and business. Diverse teams of students will collaborate on, create, and present original bioinspired design projects in the ITLL.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5195, BMEN 5195 and BMEN 4195
**Requisites:** Requires prerequisite courses of MCEN 3017 and MCEN 3025 (minimum grade C-). Restricted to students with 57+ credits (Jrs/Srs) Mechanical Engineering (MCEN) majors only.

**MCEN 4215 (3) Design for Inclusion**
Examines the ways technologies like apps, products, public infrastructures and educational systems have excluded the needs of certain user groups while optimizing for others. Explores design approaches including universal design, humanitarian engineering, and culturally responsive design through multiple hands-on projects with the goal of equipping all to become more capable designers for inclusion rather than exclusion.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5215
**Requisites:** Restricted to Mechanical Engineering majors with 87+ credits only.

**MCEN 4225 (3) Product Development and Definition**
Student teams work with project clients to provide a thorough solution to an overarching problem the client or market wants answered. Development focuses on advancing product development through an iterative prototyping and testing cycle. Includes design and development of rigorous product tests to collect critical data on performance criteria. Definition focuses on advancing CAD skills along with print production and definition using advanced GD&T. Skills are applied to the students¿ designed product and testing experiments.
**Requisites:** Corequisite of MCEN 3025.
**Recommended:** Prerequisites ENGR 161 and 162.

**MCEN 4228 (1-4) Special Topics in Mechanical Engineering**
Subject matter to be selected from topics of current interest.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5228
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57+ credits (Jrs/Srs) Mechanical Engineering (MCEN) majors only.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 4231 (3) Computational Fluid Dynamics**
This course is an in-depth introduction to the basic principles and applications of computational fluid dynamics (CFD). Students learn about fundamental CFD concepts such as discretization, meshing, error and accuracy; and focus on computational solutions of flow and transport problems using the finite element method. Students conduct multiple hands-on simulation-based activities and exercises on canonical and realistic engineering flow/transport problems. Final project for the course culminates in a mini-conference/symposium where students present their work.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 4231 and MCEN 5231 and BMEN 5231
**Requisites:** Requires prerequisite courses of MCEN 3021 or CHEN 3200 or CVEN 3313 and MCEN 3030 or APPM 4650 or CSCI 3656 (all minimum grade C-). Restricted to Mechanical Engineering majors only.

**MCEN 4238 (3) Design for Community**
Design for Community (D4C) will provide engineering students with practical experience in consulting while offering valuable engineering services to University and industry clients. Focuses on preparing students for the practice of engineering by acting as a consultancy for clients' engineering-related design and fabrication needs. Students may be expected to work in teams or individually under the supervision of project directors, depending on project scope. Each student or team will assist several clients during the semester. The D4C will pursue the following goals for its students: provide a practical just-in-time learning experience for students interested in engineering consulting; prepare students for the practice of engineering design with underspecified real-world problem sets; prepare students for the professionalism needed to interact with clients; provide outreach that connects communities outside the Department of Mechanical Engineering and serves clients that would not have access to engineering
**Requisites:** Restricted to students with 57-180 credits (Jrs/Srs) Mechanical Engineering (MCEN) majors only.

**MCEN 4279 (3) Aesthetics in Design**
Focuses on aesthetic aspects of design via hands-on design-build experiences. Students individually create dynamic artifacts of their own choice with the assistance of teammates. Content includes major design movements since 1900, constructive critique practice, hand sketching techniques and other selected industrial design topics. Students publish their design work on an archival public blog which provides a professional portfolio element.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4279 and MCEN 5279 and ATLS 5279
**Requisites:** Restricted to students with 57-180 credits (Jrs/Srs) Mechanical Engineering (MCEN) majors only.

**MCEN 4291 (1-2) Project Based Learning in Rural Schools**
Focuses on the use of low cost air quality monitoring tools, dubbed Pods, to implement PBL curriculum in high school environmental science classes in rural communities in Colorado. Each student will be paired with a high school class and will serve as curriculum and technology advisors as well as science experts. During the fall semester, students will be trained to effectively work in those roles and will also travel to their schools to be introduced. During the spring semester, students will support high school teachers in implementing an existing PBL air quality curriculum with the Pods. This will include monthly visits to schools in the spring and reporting back to the class. Enrollment during Fall is required for enrollment during Spring. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5291
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57+ credits (juniors and above) only.

**MCEN 4292 (3) Materials and Devices in Medicine**
The main objective of this multidisciplinary course is to provide students with a broad survey of biomaterials and their use in medical devices for restoring or replacing the functions of injured, diseased, or aged human tissues and organs. The topics to be covered include: evolution in the medical device industry, a broad introduction to the materials used in medicine and their chemical, physical, and biological properties, discovery of medical problems, potential impacts of treatment innovations, existing devices and design considerations for several major physiological systems (cardiovascular, neuromuscular, skeletal, pulmonary, renal, dermal), materials interaction with the human body, basic mechanisms of wound healing, biocompatibility issues, testing methods and techniques in accordance with standards and relevant regulations, biofunctionalities required for specific applications, as well as state-of-the-art approaches for the development of new regenerative materials targeting cellular mechanisms. Sam
**Requisites:** Requires prerequisite courses of MCEN 2024 and MCEN 4117 or MCEN 5117 (all minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechanical Engineering majors only.

**MCEN 4293 (3) Mechanics of Soft Matter**
Provides a general overview of fundamental concepts behind the mechanical behavior of soft matter. The term soft matter (which includes polymers, colloids, liquid crystals and surfactants, to name a few) is typically used to describe classes of materials whose structural unit is much larger than atoms, making their response more complex and often richer that of traditional solids. The objective of this class is to understand how chemical and mechanical forces between these small units yield macroscopic behaviors that one can observe in everyday life. Key engineering applications will also be discussed.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5293
**Requisites:** Requires prerequisite course of MCEN 2063 or CVEN 3161 (minimum grade C). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechanical Engineering majors only.

**MCEN 4298 (3) Introduction to Polymers**
Polymers represent a major class of engineering materials that are used by mechanical engineers. In this class, we will discuss the most fundamental concepts regarding polymeric materials. Topics include synthesis/manufacturing and chemical properties of polymers, statistical properties of polymer chains, multiphase polymers including polymer solutions and polymer blends, crystallization and glass transition of polymers, and viscoelastic properties of polymers.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5298
**Requisites:** Requires prerequisite course of MCEN 2024 (minimum grade C). Restricted to students with 57+ credits (Junior, Senior) Mechanical Engineering majors only.

**MCEN 4299 (3) Household Energy Systems**
Cooking, heating and lighting in the developing world often involves inefficient and incomplete combustion of solid or liquid fuels. The Global Burden of Disease Study in 2010, ranked this combustion as the 4th largest risk factor, causing 4 million premature deaths per year. There is a strong societal need to tackle this problem. Students leaving this course will be able to meet this need as they will have the skills to assess existing and new technology used in the developing world for cooking, heating and lighting. The course will cover (1) food conversion chemistry with the focus on increasing useable calories, (2) combustion and heat transfer as related to cooking, heating and lighting, and (3) combustion emissions and stove use assessment. There will be case studies interlaced throughout the content and the bulk of the workload will be homeworks and projects.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5299
**Requisites:** Requires prerequisite or corequisite course of MCEN 3022 (minimum grade C). Restricted to students with 57+ credits (Junior, Senior) Mechanical Engineering or Environmental Engineering majors only.

**MCEN 4638 (3) Control Systems Laboratory**
Provides experience in control system design and analysis, using both real hardware and computer simulation. Covers the entire control system design cycle: modeling the system, synthesizing a controller, conducting simulations, analyzing the design to suggest modifications and improvements, and implementing the design for actual testing.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5638, ECEN 4638, and MCEN 5638
**Requisites:** Requires prerequisite course of MCEN 4138 (minimum grade C-). Restricted to College of Engineering majors only.

**MCEN 4700 (3) Quantum Forge I**
Provides junior- and senior-level engineering and physical science students an opportunity to gain professional and technical quantum science skills and experience through participation in real-world projects in collaboration with industry leaders and academic investigators. Alongside project activity, students will engage in skill- and concept-focused modules to ensure proficiency in the skills necessary to participate in the quantum workforce. This capstone experience is intended for students who do not intend to continue on to graduate study in physics or engineering, but rather to enter the workforce directly.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 4700
**Requisites:** Requires prerequisite course of PHYS 3330 (minimum grade C-).
**Recommended:** Prerequisite or corequisite PHYS 4410.

**MCEN 4710 (3) Quantum Forge II**
Continuation of PHYS 4700, Quantum Forge I. The Quantum Forge provides junior- and senior-level engineering and physical science students an opportunity to gain professional and technical quantum science skills and experience through participation in real-world projects in collaboration with industry leaders and academic investigators. In the second semester, students will expand upon the knowledge and skills gained through the first-semester to bring projects to a point of completion and readiness for deployment in the industry context. As with Quantum Forge I, this capstone experience is intended for students who do not intend to continue on to graduate study in physics or engineering, but rather to enter the workforce directly.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 4710
**Requisites:** Requires prerequisite course of PHYS 4700 or MCEN 4700 (minimum grade C-).

**MCEN 4848 (1-6) Independent Study**
Subjects arranged in consultation with instructor and undergraduate advisor. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechanical Engineering majors only.
**Additional Information:** Departmental Category: Miscellaneous

# Mechanical Engineering - Bachelor of Science (BSME)

Mechanical engineering is a broad engineering discipline that incorporates skills and expertise in the areas of design, manufacturing, mechanics and thermal sciences that are essential to most sectors of industry.

## Program Educational Objectives

The Mechanical Engineering Program seeks to educate creative engineers who are prepared to contribute positively to society. Within three years of graduation, our alumni will:

- Build on the educational foundation gained through our program by establishing themselves in professional careers and/or pursuing a graduate degree.
- Apply their problem-solving, critical thinking, and communication skills to a professional field of practice within or beyond engineering.
- Exercise leadership, collaboration and communication in their careers.

## Colorado Mesa University/University of Colorado Boulder Partnership Program

Colorado Mesa University (CMU) (http://www.coloradomesa.edu/engineering/) and CU Boulder have created a partnership to deliver specific engineering baccalaureate programs **in their entirety in Grand Junction**, Colorado. The first two years of coursework are taught by CMU faculty and the second two years of coursework are taught by CU Boulder faculty located in Grand Junction. Students completing the programs will be awarded a Bachelor of Science from CU Boulder.

Degrees are offered in civil engineering, electrical & computer engineering, and mechanical engineering, with additional details on the engineering partnership program website (https://www.coloradomesa.edu/engineering/partnership-program/).

Coursework requirements and plans of study specific to this partnership can be found on the Colorado Mesa University mechanical engineering partnership website (https://www.coloradomesa.edu/engineering/degrees/mechanical-engineering.html). Learn more about this program on the CU Boulder partnership website (https://www.colorado.edu/academics/cmu-cu-bs-mechanical-engineering/).

## Western Colorado University/University of Colorado Boulder Partnership Program

Western Colorado University (Western) (https://western.edu/school/paul-m-rady-school-of-computer-science-engineering/) and CU Boulder have created a partnership to deliver specific engineering baccalaureate programs **in their entirety in Gunnison, Colorado.** The first two years of

coursework are taught by Western faculty and the second two years of coursework are taught by CU Boulder faculty located in Gunnison. Students completing the programs will be awarded a Bachelor of Science from CU Boulder.

Degrees are offered in biomedical engineering and mechanical engineering. Additional details can be found on the CU Boulder/Western Engineering Partnership Program website. (https://western.edu/school/paul-m-rady-school-of-computer-science-engineering/)

Coursework requirements and plans of study specific to this partnership can be found on the Western Colorado University mechanical engineering partnership website (https://western.edu/program/mechanical-engineering-university-colorado-partnership/). Learn more about this program on the CU Boulder partnership website (https://www.colorado.edu/academics/western-cu-boulder-bs-mechanical-engineering/).

# Requirements

# Program Requirements

In order to earn a bachelor's degree in mechanical engineering, students must complete the curriculum in the undergraduate major program, as outlined below. For up-to-date program requirements, visit the Bachelor of Science in Mechanical Engineering (https://www.colorado.edu/mechanical/academics/undergraduate-program/)(https://www.colorado.edu/mechanical/academics/undergraduate-program/curriculum/)webpage.

Required courses in engineering, physical science and mathematics are interwoven throughout the curriculum to provide a balanced education in the fundamentals of the mechanical engineering profession. The core courses are complemented by technical electives (https://www.colorado.edu/mechanical/academics/undergraduate-program/curriculum/general-technical-electives/), (http://www.colorado.edu/engineering/academics/policies/hss/)humanities and social sciences electives (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/), free electives, and a writing course (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/) for a total of 128 credits required for the degree.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MCEN 1025 | Computer-Aided Design and Fabrication | 4 |
| MCEN 2000 | Mechanical Engineering as a Profession | 1 |
| MCEN 2023 | Statics and Structures | 3 |
| or GEEN 2851 | Statics for Engineers | |
| or CVEN 2121 | Analytical Mechanics 1 | |
| or ASEN 2701 | Introduction to Statics, Structures, and Materials | |
| or ASEN 2401 | Statics | |
| MCEN 2024 | Materials Science | 3 |
| or GEEN 3024 | Materials Science for Engineers | |
| or ASEN 1022 | Materials Science for Aerospace Engineers | |
| MCEN 2043 | Dynamics | 3 |
| or CVEN 3111 | Analytical Mechanics 2 | |
| or PHYS 3210 | Classical Mechanics and Mathematical Methods 2 | |
| or ASEN 2703 | Introduction to Dynamics and Systems | |
| or ASEN 2403 | Dynamics | |
| MCEN 2063 | Mechanics of Solids | 3 |
| or CVEN 3161 | Mechanics of Materials 1 | |
| or ASEN 3401 | Aerospace Structures | |
| MCEN 3012 | Thermodynamics | 3 |
| or GEEN 3852 | Thermodynamics for Engineers | |
| or AREN 2110 | Thermodynamics | |
| or EVEN 3012 | Thermodynamics for Environmental Science and Engineering | |
| or ASEN 2402 | Thermodynamics | |
| MCEN 3017 | Circuits and Electronics for Mechanical Engineers | 3 |
| or ECEN 3010 | Circuits and Electronics for Mechanical Engineers | |
| or GEEN 3010 | Circuits for Engineers | |
| or ASEN 3503 | Aerospace Electronics | |
| MCEN 3021 | Fluid Mechanics | 3 |
| or CHEN 3200 | Chemical Engineering Fluid Mechanics | |
| or CVEN 3313 | Theoretical Fluid Mechanics | |
| or AREN 2120 | Fluid Mechanics and Heat Transfer | |
| MCEN 3022 | Heat Transfer | 3 |
| or CHEN 3210 | Chemical Engineering Heat and Mass Transfer | |
| or ASEN 3402 | Aerospace Heat Transfer | |
| MCEN 3025 | Component Design | 3 |
| MCEN 3030 | Computational Methods | 3 |
| or APPM 4600 | Numerical Methods and Scientific Computing | |
| or CSCI 3656 | Numerical Computation | |
| or ASEN 3502 | Aerospace Computational Methods | |
| MCEN 3032 | Thermodynamics 2 | 3 |
| MCEN 3047 | Data Analysis and Experimental Methods | 4 |
| or GEEN 3853 | Data Analysis for Engineers | |
| MCEN 4026 | Manufacturing Processes and Systems | 3 |
| MCEN 4043 | System Dynamics | 3 |
| MCEN 4045 | Mechanical Engineering Design Project 1 | 3 |
| MCEN 4085 | Mechanical Engineering Senior Design Project 2 | 3 |
| **Mechanical Engineering (ME) Technical Electives** | | |
| Choose 6 credit hours of ME Technical Elective coursework. [1] | | 6 |
| **General Technical Electives** | | |
| Choose 6 credit hours of General Technical Elective coursework. [2] | | 6 |
| **Math/Science Foundations** | | |
| Choose at least 3 credit hours of approved Math/Science Foundations coursework. [3] | | 3 |
| **Required Mathematics Courses** | | |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| or MATH 1300 | Calculus 1 | |
| or APPM 1345 | Calculus 1 with Algebra, Part B | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| or MATH 2300 | Calculus 2 | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| or MATH 2400 | Calculus 3 | |

| | | |
|---|---|---|
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| or MATH 2130 & MATH 3430 | Introduction to Linear Algebra for Non-Mathematics Majors and Ordinary Differential Equations | |
| or MATH 2135 & MATH 3430 | Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations | |
| **Required Chemistry Course** | | |
| MCEN 1024 | Chemistry for Energy and Materials Science | 3 |
| or CHEN 1201 | General Chemistry for Engineers 1 | |
| or CHEN 1203 | General Chemistry for Engineers 2 | |
| or CHEN 1211 | Accelerated Chemistry for Engineers | |
| or CHEM 1113 | General Chemistry 1 | |
| **Required Physics Courses** | | |
| PHYS 1110 | General Physics 1 | 4 |
| or PHYS 1115 | General Physics 1 for Majors | |
| PHYS 1120 | General Physics 2 | 4 |
| or PHYS 1125 | General Physics 2 for Majors | |
| PHYS 1140 | Experimental Physics 1 | 1 |
| **Required Engineering Courses** | | |
| MCEN 1030 | Introduction to Engineering Computing | 4 |
| or CSCI 1300 | Computer Science 1: Starting Computing | |
| or ECEN 1310 | Introduction to C Programming | |
| GEEN 1400 | Engineering Projects | 3 |
| or GEEN 2400 | Engineering Projects for the Community | |
| or GEEN 3400 | Invention and Innovation | |
| or ASEN 1400 | Gateway to Space | |
| or ASEN 1403 | Introduction to Rocket Engineering | |
| or ECEN 1400 | Introduction to Digital and Analog Electronics | |
| **Humanities, Social Sciences and Writing** | | |
| Writing [4] | | 3 |
| Humanities & Social Sciences - at least 6 credits must be completed at the upper-division level (3000-level or higher). [4] | | 15 |
| **Free Electives** | | |
| Choose at least 6 credit hours of free electives to meet the minimum 128 credit hours required for the BS degree. | | 6 |
| **Total Credit Hours** | | **128** |

1. Refer to the course options listed on the ME Technical Electives (https://www.colorado.edu/mechanical/academics/undergraduate-program/curriculum/me-technical-electives/) webpage.
2. Refer to the course options listed on the General Technical Electives (https://www.colorado.edu/mechanical/academics/undergraduate-program/curriculum/general-technical-electives/) webpage.
3. Refer to the course options listed on the Math/Science Foundations (https://www.colorado.edu/mechanical/academics/undergraduate-program/curriculum/) webpage.
4. Refer to the College's Humanities, Social Sciences, and Writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/) webpage.

## Prerequisites and Passing Grades

The minimum passing grade for a course that is a prerequisite or corequisite for another required course is C-. If a grade of D+ or lower is received in a course which is a prerequisite to another, the student may not register for the subsequent course until the first grade has been raised to a C- or higher. If a grade of D+ or lower is received in a course which is a corequisite to another, the course must be repeated until a grade of C- or higher is achieved.

The minimum passing grade for a course that is not specifically a prerequisite or corequisite for another required course is D-.

The Mechanical Engineering Department reserves the right to drop students enrolled in MCEN courses who have not met the minimum prerequisite requirements. It is the student's responsibility to communicate with the department if summer coursework and/or transfer credit will be used to meet the prerequisite requirement.

## Professional Exam

Completion of a professional exam is required for graduation. Most mechanical engineering students take the Fundamentals of Engineering (FE) Exam. The GRE, MCAT, LSAT and GMAT are also approved options. Students interested in completing an exam not on the approved list may submit a petition for consideration.

## Senior Survey

Graduating students are also required to complete the Senior Survey, administered by the College of Engineering & Applied Science, in their final semester.

# Sample Four-Year Plan of Study

| **Year One** | | |
|---|---|---|
| **Fall Semester** | | **Credit Hours** |
| APPM 1350 | Calculus 1 for Engineers | 4 |
| MCEN 1030 | Introduction to Engineering Computing | 4 |
| PHYS 1110 | General Physics 1 | 4 |
| GEEN 1400 | Engineering Projects | 3 |
| COEN 1500 | CEAS First Year Seminar | 1 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| APPM 1360 | Calculus 2 for Engineers | 4 |
| MCEN 1024 | Chemistry for Energy and Materials Science | 3 |
| MCEN 1025 | Computer-Aided Design and Fabrication | 4 |
| PHYS 1120 | General Physics 2 | 4 |
| PHYS 1140 | Experimental Physics 1 | 1 |
| | **Credit Hours** | **16** |
| **Year Two** | | |
| **Fall Semester** | | |
| APPM 2350 | Calculus 3 for Engineers | 4 |
| MCEN 2000 | Mechanical Engineering as a Profession | 1 |
| MCEN 2023 | Statics and Structures | 3 |
| MCEN 2024 | Materials Science | 3 |
| Math/Science Foundations [1] | | 3 |
| Humanities & Social Sciences Elective [2] | | 3 |
| | **Credit Hours** | **17** |

| | | |
|---|---|---|
| **Spring Semester** | | |
| APPM 2360 | Introduction to Differential Equations with Linear Algebra | 4 |
| MCEN 2043 | Dynamics | 3 |
| MCEN 2063 | Mechanics of Solids | 3 |
| MCEN 3012 | Thermodynamics | 3 |
| Humanities & Social Science Elective [2] | | 2 |
| Free Electives | | 3 |
| | **Credit Hours** | **18** |
| **Year Three** | | |
| **Fall Semester** | | |
| MCEN 3017 | Circuits and Electronics for Mechanical Engineers | 3 |
| MCEN 3021 | Fluid Mechanics | 3 |
| MCEN 3025 | Component Design | 3 |
| MCEN 3030 | Computational Methods | 3 |
| Humanities & Social Science Elective [2] | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| MCEN 3022 | Heat Transfer | 3 |
| MCEN 4026 | Manufacturing Processes and Systems | 3 |
| MCEN 4043 | System Dynamics | 3 |
| College-Approved Writing Course [2] | | 3 |
| General Technical Elective [3] | | 3 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| MCEN 3032 | Thermodynamics 2 | 3 |
| MCEN 3047 | Data Analysis and Experimental Methods | 4 |
| MCEN 4045 | Mechanical Engineering Design Project 1 | 3 |
| Humanities & Social Sciences Elective [2] | | 3 |
| ME Technical Elective [4] | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| MCEN 4085 | Mechanical Engineering Senior Design Project 2 | 3 |
| Humanities & Social Sciences Elective [2] | | 3 |
| General Technical Elective [3] | | 3 |
| ME Technical Elective [4] | | 3 |
| Free Electives | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **128** |

1. Refer to the course options listed on the Math/Science Foundations (https://www.colorado.edu/mechanical/academics/undergraduate-program/curriculum/) webpage.
2. Refer to the College's Humanities, Social Sciences, and Writing requirements (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/) webpage.
3. Refer to the course options listed on the General Technical Electives (https://www.colorado.edu/mechanical/academics/undergraduate-program/curriculum/general-technical-electives/) webpage.
4. Refer to the course options listed on the ME Technical Electives (https://www.colorado.edu/mechanical/academics/undergraduate-program/curriculum/me-technical-electives/) webpage.

# Learning Outcomes

By the completion of the program, students will be able to:

- Identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics.
- Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.
- Communicate effectively with a range of audiences.
- Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.
- Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives.
- Develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions.
- Acquire and apply new knowledge as needed, using appropriate learning strategies.

# Bachelor's–Accelerated Master's Degree Program(s)

The bachelor's–accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's–accelerated master's program enables students to continue working with their established faculty mentors.

## BS and MS in Mechanical Engineering

### Admissions Requirements

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.250 or higher
- Have completed a minimum of 60 credit hours of coursework
- Have completed at least four of the following six courses with a grade of C or higher: MCEN 3012, MCEN 3021, MCEN 3022, MCEN 3025, MCEN 3030 and MCE

### Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only six credits may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the

master's degree, early in the semester in which the undergraduate requirements will be completed.

Students can refer to the Mechanical Engineering BAM degree program (https://www.colorado.edu/mechanical/academics/ms-programs/bachelors-accelerated-masters/) webpage for more information.

## BS in Mechanical Engineering, Professional MS in Materials Science

### Admissions Requirements

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.25 or higher
  - Students with a GPA below 3.25 (but above 3.0, the university minimum standard) may submit a petition with a letter of recommendation from a professor and a one-page statement of purpose. The statement should briefly describe the student's past work in the field, including any non-course educational experiences or other relevant employment, and the student's plans for graduate study and a professional career.
- Have completed at least four of the following six courses with a grade of C or higher: MCEN 3012, MCEN 3021, MCEN 3022, MCEN 3025, MCEN 3030 and MCEN 3032

### Program Requirements

Students must declare a track in which to specialize. Students may take up to and including 12 hours while in the undergraduate program that satisfy the specialized track courses and/or the breadth elective courses, which can later be used toward the master's degree. However, only six credit hours may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

Students can refer to the Materials Science & Engineering Program BAM (https://www.colorado.edu/mse/academics/bachelors-accelerated-masters/) webpage for more information.

## BS in Mechanical Engineering, Professional ME in Engineering Management

### Admission Requirements

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.000 or higher
- Have at least junior class standing

### Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only six credits may be double counted toward the bachelor's degree and the master's degree. Students must apply to graduate with the bachelor's degree, and apply to continue with the master's degree, early in the semester in which the undergraduate requirements will be completed.

Students can refer to the Engineering Management BAM (https://www.colorado.edu/emp/graduate-programs/bachelors-accelerated-masters-bam/) webpage for more information.

# Energy Engineering - Minor

The energy engineering minor provides energy-minded students with a foundational understanding of energy technologies and the energy industry, including technological, policy and economic considerations related to conventional and renewable energy systems.

Required courses include a fundamentals-based energy course, an energy policy/society focused course and 12 credits of energy-focused technical elective courses. Elective courses, selected from across the CU campus, allow students to specialize according to their specific interest in the energy field.

For more information, visit the Mechanical Engineering Department's Energy Engineering Minor (https://www.colorado.edu/mechanical/academics/undergraduate-program/energy-engineering-minor/) webpage.

# Requirements

The energy engineering minor requires completion of a minimum of 18 credit hours.

A minor in energy engineering is open to undergraduate students rostered in the College of Engineering and Applied Science.

## Grade Requirements

A minimum cumulative GPA of 2.000 is required in the courses used to satisfy the minor requirements. Each individual course that is counted toward this minor must be passed with a grade of D- or higher (note that a minimum grade of C- is required in all prerequisite courses).

## Residency Requirements

At least 9 credit hours for the minor must be taken through CU Boulder.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Fundamentals Course** | | **3** |
| Choose one of the following: | | |
| AREN 3010 | Energy Efficient Buildings | |
| CHEN 2120 | Chemical Engineering Material and Energy Balances | |
| ECEN 3170 | Electromagnetic Energy Conversion 1 | |
| MCEN 3032 | Thermodynamics 2 | |
| **Policy Course** | | **3** |
| Choose one of the following: | | |
| MCEN 4032/5032 | Sustainable Energy | |
| ENVS 3621 | Energy Policy and Society | |
| ENVS 3070 | Energy and the Environment | |
| **Electives** | | **12** |
| Choose four of the following: [1,2] | | |
| AREN 3040 | Circuits for Architectural Engineers | |
| AREN 4010 | Energy System Modeling and Control | |
| AREN 4890/5890 | Sustainable Building Design | |
| ASEN 3402 | Aerospace Heat Transfer | |
| ASEN 3503 | Aerospace Electronics | |
| BIEN 4803 | Metabolic Engineering | |

| | |
|---|---|
| CHEN 3210 | Chemical Engineering Heat and Mass Transfer |
| CHEN 3660 | Energy Fundamentals |
| CHEN 4480/5480 | Solar Cells and Optical Devices for Sustainable Buildings |
| CHEN 4490/5490 | Electrochemical Engineering |
| CHEN 4520 | Chemical Process Design |
| CHEN 5360 | Catalysis and Kinetics |
| CVEN 3246 | Introduction to Construction |
| CVEN 3698 | Engineering Geology |
| ECEN 2250 | Introduction to Circuits and Electronics |
| ECEN 2410 | Renewable Sources and Efficient Electrical Energy Systems |
| ECEN 4517 | Power Electronics and Photovoltaic Power Systems Laboratory |
| ECEN 4555 | Principles of Energy Systems and Devices |
| ECEN 4797 | Introduction to Power Electronics |
| ECEN 5407 | Renewable Energy and the Future Power Grid |
| EMEN 4100 | Engineering Economics |
| ENEN 4321 | Oil and Gas Processing |
| ENEN 4600 | Interdisciplinary Energy Engineering Projects |
| ENEN 4840 | Special Topics |
| GEEN 3010 | Circuits for Engineers |
| GEOL 3010 | Introduction to Mineralogy |
| GEOL 3020 | Petrology |
| GEOL 3320 | Introduction to Geochemistry |
| GEOL 3540 | Introduction to Petroleum Geology |
| MCEN 3017 | Circuits and Electronics for Mechanical Engineers |
| MCEN 3022 | Heat Transfer |
| MCEN 4012/5012 | Renewable Fuels, Fuel Cells and Internal Combustion Engines |
| MCEN 4135/5135 | Wind Energy and Wind Turbine Design |
| MCEN 4152/5152 | Introduction to Combustion |
| MCEN 4194/5194 | Electrochemical Energy Conversion and Storage |
| **Total Credit Hours** | **18** |

1 There may be special topics or other elective courses offered that are suitable for the requirements of this minor. For an up-to-date listing of elective courses, visit the Energy Engineering Minor Technical Electives (https://www.colorado.edu/mechanical/academics/undergraduate-program/energy-engineering-minor/energy-engineering-minor-technical/) webpage. Contact the energy engineering minor faculty director (https://www.colorado.edu/mechanical/academics/undergraduate-program/energy-engineering-minor/) for additional course considerations.

2 Additional courses completed from the Fundamentals and Policy course lists above also satisfy as electives for the energy engineering minor.

# Exploratory Studies

The Program in Exploratory Studies (https://www.colorado.edu/exploratorystudies/) is an independent program under the Dean and Vice Provost for Undergraduate Education, serving first-year and transfer students who want to explore the many offerings at CU Boulder before deciding on a specific academic path. In addition, students who apply to a competitive-admission college or school may be offered admission to the program in exploratory studies, where they will work with advisors either to pursue that initial area of interest or identify related and complementary options on campus.

Students in the program eventually transfer to one of the seven degree-granting colleges, schools and programs on the Boulder campus. Advisors and coaches in the University Exploration & Advising Center (https://www.colorado.edu/exploratorystudies/advising/) work with students to develop academic pathways and explore related career options for more than 70 majors.

# Admissions Requirements

## Incoming First-Year and Transfer Applicants

Students applying to CU Boulder who are interested in exploring all academic options available on campus can select the program in exploratory studies as part of their application process.

## Current Students and Intra-University Transfer

Current CU Boulder students interested in exploratory studies can join the program through the Intra-University Transfer (p. 1036) (IUT) process.

### Guaranteed Admission

Undergraduate students enrolled on the Boulder campus with fewer than 30 credit-hours earned and who are in good academic standing may apply to transfer to the program in exploratory studies. Good academic standing includes students in their first semester on campus who have not yet earned a CU Boulder GPA and students who have completed at least one semester on campus and have earned a cumulative GPA of 2.000 or higher. Students who are ineligible for an IUT into Exploratory Studies are encouraged to attend select PES drop-in advising hours (https://www.colorado.edu/exploratorystudies/) for an exploratory conversation to discuss campus majors, minors and certificates.

# Policies and Guidelines

Several policies and guidelines are of particular importance to students in the Program in Exploratory Studies. For details, visit the program's academic policies webpage (https://www.colorado.edu/exploratorystudies/policies-and-forms/).

## Intra-University Transfer

Exploratory studies students work closely with academic advisors throughout their first two to four semesters to establish a degree plan and move into a degree-granting program. This is accomplished through the Intra-University Transfer (p. 1036) (IUT) process and generally takes place after the second or third semester. Requirements vary by college/school.

## Recognition of Academic Achievement

Students in the program in exploratory studies are part of the intellectual community on the Boulder campus. The program holds academic rigor and quality in the highest esteem and encourages students to be curious

and ambitious. In recognition of high academic achievement, the Dean grants scholarly honors each term.

Students achieving a grade point average of 3.600 or higher in any given term are recognized by a letter from the Dean and receive a notation on their transcript. Honors are based on at least 12 credit-hours of coursework completed for a letter grade at CU Boulder. Once in a degree-granting program, students from the Program in Exploratory Studies are encouraged to pursue honors that are recognized by each college at commencement.

## Credit Limitations and Guidelines

### Declaration of Major

Exploratory studies students in good standing must IUT to a degree-granting program once they have completed four semesters of coursework. Students who have not met the requirements to IUT to a competitive program will work closely with advisors to identify programs for which they are eligible to apply.

Students who entered exploratory studies with 30 credit-hours or more as transfer students must IUT within three semesters.

### Repetition of Courses

If a student takes a course for credit more than once, the course credit hours only count toward graduation once, unless a course description specifically states that it can be taken more than once for credit.

Students may also retake a course for grade replacement (p. 52) under the grade replacement policy. When a student retakes a course for grade replacement, the grade earned in the most recent prior attempt will still appear on the transcript, but their cumulative GPA and credit totals on the transcript will only include the grade from the latest attempt.

### Consecutive Withdrawals

Students in the program in exploratory studies who withdraw from all of their registered courses two semesters in a row may have a hold placed on their account, prohibiting them from further registration until they meet with their advisor to assess degree progress.

## GPA Requirements, Academic Alert, Academic Warning and Scholastic Suspension

Students who fail to meet the minimum cumulative grade point requirement of 2.00 may be permitted to continue their studies on a provisional basis. See the Program in Exploratory Studies policy page or the Academic Standards section (p. 28) of the catalog.

Students on Academic Alert or Academic Warning are encouraged to work with an academic advisor to develop an academic improvement plan.

Academic records of students are evaluated at the end of the probationary semester and students are notified of their academic status (e.g., alert, warning, suspension) through official CU email.

# Focus on Exploration

The program in exploratory studies helps students explore their interests across all six colleges and schools on the Boulder campus. In addition to identifying a primary major of interest, exploratory studies encourages students to explore certificates and minors available on campus in order to create a well-rounded and personalized academic experience.

## Pathways within Exploratory Studies

There are two plans of study within Exploratory Studies:

- Exploratory Studies (XXES)
- Pre-Business (PREB)

The pre-business program is by invitation only; students in PREB are advised by the Leeds School of Business.

## Degree-Granting Options and Intra-University Transfer

The program in exploratory studies does not confer degrees. Therefore, students must transfer into a degree-granting program at CU Boulder via the Intra-University Transfer (IUT) process, generally after the second or third semester.

For more information, view the Intra-University Transfer (p. 1036) tab.

# Courses

The Office of Undergraduate Education hosts several academic course offerings that are particularly appropriate for students in exploratory studies:

**FYSM 1000 First Year Seminar (3)** – Have you ever wondered about the origins of the universe? Or what exactly "fake news" means? Or wanted to write a fairy tale? First-Year Seminars tackle these and many other topics by approaching critical thinking and academic curriculum on a completely new level. We asked our inventive professors to develop courses that focus on unusual and thought-provoking topics (e.g., political dialogue, toxic chemicals, morality, and Batman), and then to structure the topics to meet our rigorous academic standards. The First-Year Seminar courses are small, interactive classes that are a great way to explore intriguing topics and establish connections with a faculty member and other students who share similar interests. Most First-Year Seminars are offered in the fall semester with several topics from which to choose.

**FYXP 1000 Academic Exploration & Critical Decision Making (1)** – Taught by advisors in the University Exploration & Advising Center (https://www.colorado.edu/exploratorystudies/advising-coaching/), the Academic Exploration Seminar is a one-credit course designed for first-year students in the Program in Exploratory Studies. Students will work through the major exploration process in a guided and intentional way and be introduced to a variety of college success strategies as they critically evaluate their strengths, interests, and goals. Students can expect to leave the course well-equipped to declare a major of interest in a timely fashion and to make a plan for supplementing their degree with opportunities for education abroad, undergraduate research or other co-curricular experiences that best match their interests, skills and abilities.

**FYXP 1100 Academic Success Seminar (1)** – The Academic Success Seminar is a one-credit course designed for students in the Program in Exploratory Studies and is taught by highly experienced academic advisors in the University Exploration & Advising Center (https://www.colorado.edu/exploratorystudies/advising-coaching/). In this seminar, students develop the skills needed to succeed in college. The class focuses on developing learning strategies, improving executive functioning (time management, organization, self-monitoring, etc.), and setting SMART goals. Students will identify their strengths and participate in peer-to-peer interaction to foster collaboration and positive outcomes.

FYXP 1500 **First Year Success Seminar (1)** - The First Year Success Seminar is designed to assist first-year students with their successful transition to the University of Colorado Boulder. This course is required of all new first-year students and provides a supportive environment for new students to engage with peers, staff, and faculty to support the first eight weeks of the transition to college.

FYXP 2200 **Design Thinking Seminar (1)** - The Design Thinking Seminar introduces students to the principles of the design thinking framework and its application toward solution development and personal brand building. This course is required of all students participating in the Design Your Path Living Learning Community (p. 1097) and provides a shared space for students to develop tools to craft their own path at CU and beyond.

FYXP 3000 **Transfer Success Seminar (1)** - The Transfer Success Seminar is designed to assist first-semester transfer students with their transition to the University of Colorado Boulder. Students learn about various campus and academic resources applicable to an upper-division student; evaluate their skills, interests, strengths and education as they relate to overall career goals; and establish an encouraging transfer student community.

### General Education Requirements

Each college/school on the Boulder campus has a different set of general education requirements. Students in exploratory studies run degree audits (https://www.colorado.edu/registrar/students/degree-planning/audit/run/) by clicking on the "Select a Different Program" option and then running an audit from the degree program they select. Students with interests that span multiple colleges work closely with advisors in the University Exploration & Advising Center (https://www.colorado.edu/exploratorystudies/advising-coaching/) to select courses that meet requirements for multiple degree pathways.

## Intra-University Transfer

Moving from the program in exploratory studies into one of the six degree-granting programs at CU Boulder generally requires completion of specific prerequisite coursework, attainment of a specific GPA and submission of IUT requirements (varies by college/school).

For more information about the IUT process, view the Intra-University Transfer (https://www.colorado.edu/office-undergraduate-education/intra-university-transfer/) webpage.

To filter through all of the majors, minors and certificates offered at CU Boulder, see the undergraduate Programs A-Z (https://catalog.colorado.edu/programs-a-z/#filter=filter_19&filter_20&filter_21) section, or search by the related college/school sections of the catalog:

- College of Arts & Sciences (p. 73): includes majors in the natural sciences, social sciences, and arts and humanities.
- Leeds School of Business (p. 663): includes areas of emphasis in accounting, finance, management and marketing.
- School of Education (p. 773): includes majors in elementary education or leadership & community engagement as well as teacher licensure at all levels.
- College of Engineering & Applied Science (p. 831): includes majors in various engineering fields, computer science, creative technology and design, and applied sciences.
- College of Communication, Media, Design and Information (https://catalog.colorado.edu/undergraduate/colleges-schools/media-communication-information/): includes majors in advertising, PR and media design, communication, critical media practices, information science, intermedia art, writing & performance, journalism and media studies.
- College of Music (p. 1038): includes majors in various areas of music education and performance.

# Music

The CU Boulder College of Music inspires artistry and discovery, together.

The College of Music provides specialized training designed to prepare students for a variety of careers in music. The college offers seven undergraduate and graduate degrees in 24 fields of study, along with an array of interdisciplinary opportunities, including certificates in music technology and entrepreneurship.

Established by the Regents of the University of Colorado in 1920, the College of Music is a fully accredited member of the National Association of Schools of Music.

The widely varied functions of music in the world today present many challenging and interesting opportunities for teachers, performers, creative artists, technicians and commercial personnel. While these different pursuits require specialized emphases, the faculty of the College of Music recognize the musical and educational experiences that are common to all. Therefore, each curriculum of the College of Music is designed to present music as an integrated whole. Solo performance and technique, ensemble performance, historical and theoretical studies, concert and recital opportunities and elective courses both inside and outside the college are intended to give students a balanced approach to musical understanding and musicianship.

The college maintains a ratio of approximately one tenure-track faculty member for every eight students. This close interaction inspires and equips students to develop their talents, refine their passions and ultimately succeed in their professional endeavors.

In addition to training in the various professions of music, the college provides general music studies and activities for the non-major; broad cultural programs (concerts, recitals, lectures) for the university and Boulder communities; favorable conditions for research in music; and service activities to the state and nation.

The Bachelor of Arts in Music, Bachelor of Music and Bachelor of Music Education degrees are granted by the university, upon recommendation of the faculty of the College of Music, to those who have successfully completed prescribed requirements.

Students must complete an online graduation application and schedule a final checkout appointment by December 15 for May/August graduation and by October 1 for December graduation.

## Entrepreneurship Center

The Entrepreneurship Center for Music (ECM) is a national leader in professional development for musicians. The ECM equips today's music students with the skills and tools they need to create sustainable careers in the arts. ECM students are encouraged to develop entrepreneurial skills to explore the vast opportunities inherent in a changing marketplace, and to develop plans to implement career-enhancing ventures across the artistic spectrum. Offerings include courses for credit, an undergraduate

certificate in music entrepreneurship, workshops and internships with a wide range of arts organizations and businesses nationwide.

# Facilities

The College of Music has several beautiful performance halls, including the 2,000-seat Macky Auditorium, the 500-seat Grusin Music Hall, the 270-seat Music Theatre and the 111-seat Recital Hall. The college is located primarily in the Warner Imig Music Building, a large complex of practice rooms, faculty studios, offices, ensemble rehearsal areas, seminar facilities and classrooms. An addition to the east side of the building features a 4,300 square foot rehearsal space with a 35-foot ceiling and acoustical draping. Additional rehearsal and classroom facilities are located in Macky Auditorium.

The college's outstanding Howard B. Waltz Music Library is considered to be among the nation's most comprehensive. The library contains over 150,000 volumes, scores, recordings and periodicals. Computerized facilities are provided for listening to recordings and work stations are available for computer-based reference searching.

The college also features extensive facilities for music technology and electronic music study. The Computer-Assisted Music Laboratories (I and II) are multi-purpose labs designed primarily for classroom instruction. They feature numerous workstations, each with a Musical Instrument Digital Interface, sampling keyboard and a computer. The CRUNCH Lab is a fully-featured electronic music project studio. This lab is optimized for computer music research (including live interactive performance systems), as well as sound recording and editing projects and audio/video production. The Class Piano Laboratory is equipped with 12 digital pianos.

# Performances

Each year the College of Music presents over 400 concerts by students, faculty and guests. In addition to individual musical pursuits, students at all levels have the opportunity to perform in a variety of outstanding ensembles including orchestras, choirs, bands, world music ensembles, chamber and early music groups, jazz ensembles and combos, opera productions and musicals. Many of these groups have been invited to perform at prestigious national and international events. Recitals by students and faculty are supplemented by visits from world-class guest artists, all of which provide the Boulder community with the chance to hear some of the finest music being performed today. The vast majority of these excellent performances are free and open to the public.

Other music programs presented by CU Presents include:

- Artist Series
- Eklund Opera Program
- Takács Quartet Series
- Holiday Festival

For a schedule of all College of Music performances, visit the college's Events (http://www.colorado.edu/music/events/) webpage.

# Student Organizations

The student body of the College of Music has its own government, represented by the College of Music Student Government. Honorary music fraternities are Sigma Alpha Iota, Mu Phi Epsilon and Kappa Kappa Psi. Pi Kappa Lambda, a national music honor society, and the Music Teachers National Association both have active chapters within the College of Music. Music education majors are eligible for membership in student chapters of the National Association for Music Educators, the American Choral Directors Association and the American String Teachers Association. Additional organizations include CU Trombone Society, CU Trumpet Alliance and Diverse Musicians Alliance.

Additional organizations include CU Trombone Society, CU Trumpet Alliance and Diverse Musicians Alliance.

# Major Fields & Degrees

Undergraduate degrees include the Bachelor of Music (BM), the Bachelor of Arts in Music (BA) and the Bachelor of Music Education (BME). Students may also elect to earn a certificate in music technology or music entrepreneurship in conjunction with their degree. In addition to a substantial core of studies in music, the BA in music program allows a wide choice of study in areas outside of music. BM areas of concentration include: composition, musicology, performance and jazz studies. The major emphasis areas in the BME program are: choral, choral-general, instrumental and instrumental-general.

Incoming freshmen and transfer students in the College of Music are declared as music majors at the beginning of their first semester. The music minor may be declared when an active student has a CU Boulder GPA (as early as second semester, freshman year).

Students may pursue double degrees in music and an outside field such as engineering, business, etc. Questions may be directed to the Academic Services office, College of Music, 303-492-0037, or ugradmus@colorado.edu.

# Policies & Requirements

## Academic Excellence

### Honors at Graduation

Students achieving a cumulative GPA of 3.70–3.79 graduate with honors, 3.80–3.89 with high honors and 3.90–4.00 with highest honors. These students are recognized at commencement.

### Scholarships and Awards

A number of scholarships and awards are designed specifically for students in the College of Music. Undergraduate music majors are eligible for scholarships or renewal of their scholarships as long as they make satisfactory degree progress by:

1. demonstrating adequate performance in weekly applied lessons, ensemble and scholarship auditions, applied proficiencies/juries, and recitals/previews;
2. maintaining at least a 3.0 cumulative grade point average in those classes that count toward the music degree; and
3. successfully completing at least two-thirds of the credit hours attempted while a music major at CU Boulder.

## Academic Standards

### Academic Ethics

Students are expected to conduct themselves in accordance with the highest standards of honesty and integrity. Cheating, plagiarism, illegitimate possession and disposition of examinations, alteration, forgery or falsification of official records, and similar acts or the attempt to engage in such acts are grounds for suspension or expulsion from the university.

In particular, students are advised that plagiarism consists of any act involving the offering of the work of someone else as their own. It is recommended that students consult with their instructors as to the proper preparation of reports, papers, etc., in order to avoid this and similar offenses. Students are expected to be acquainted with and abide by provisions of the CU Boulder Honor Code (see the Academic Integrity (p. 24) section).

## Scholastic Requirements

To remain in good academic standing, a student must maintain at least a 2.00 cumulative grade point average (GPA) and make satisfactory progress toward the degree as defined by the College of Music and area faculty. Please refer to campus Academic Standing policies (p. 28) for details.

Undergraduate music majors are eligible for scholarships or renewal of their scholarships as long as they make satisfactory progress in their major (as determined by the faculty), demonstrate satisfactory proficiency in jury exams and auditions, enroll in ensemble and maintain a minimum cumulative GPA of 3.00. Students who have a cumulative GPA below 3.00 will be placed on scholarship probation for one semester. Students on scholarship probation who do not earn a cumulative GPA of 3.00 or higher by the end of the probationary period will have their scholarships revoked. A maximum of two semesters may be granted with approval from the Associate Dean for Undergraduate Studies.

## Appeals

Students have the right to appeal decisions of academic dishonesty and to petition for exceptions to the academic policies stated in this catalog. Appeals should be directed to the Associate Dean for Undergraduate Studies. College of Music policies are in addition to the campus policies.

# Credit and Enrollment

## Admission Requirements

In addition to the entrance requirements of the university outlined in Undergraduate Admission in the General Information section, freshman and transfer students must meet College of Music entrance requirements. Successful College of Music applicants have extensive prior experience in music (including private study), the ability to read and sight-read music notation, an understanding of music fundamentals or basic music theory and elementary piano skills. Students with appropriate skill in piano sight reading and keyboard harmony may be able to test out of all or part of the keyboard musicianship requirement included in their degree plan. Students with an AP Music Theory test score of 4 are credited with one semester of music theory and aural skills, and those with a test score of 5 are credited with two semesters.

### Auditions

An audition is required for all prospective undergraduate music majors. Undergraduate auditions are held in Boulder on selected Saturdays in February. Alternate audition dates may also be scheduled if necessary. If travel distance is prohibitive, prospective students may substitute a high-quality recording. Applicants should identify themselves by name and list selections and titles at the beginning of the recording. In order for students to be fully considered for financial assistance, live auditions should be completed during the general audition weekends in February or recordings should be received by Feb. 15. Students should prepare a 10–20 minute audition program in accordance with the audition requirements listed on the college's Auditions (http://www.colorado.edu/music/admissions/prospective-undergraduates/auditions/) webpage.

Contact the undergraduate office at 303-492-8468 or undergraduate.music@colorado.edu for more information.

Admissions decisions for music composition applicants are based on a review of scores and sound recordings for at least three contrasting works. If the portfolio of scores and recordings is considered acceptable for admission to the music composition program, applicants are then invited to schedule an instrumental/voice audition.

Admissions decisions for music education applicants are based on academic qualifications, audition results and an interview conducted by two or more music education faculty members. Interviews address written and verbal communication skills, motivation and goals related to music teaching, prior music teaching experiences and affective characteristics associated with effective music teachers. For more information about music education interviews, visit the college's Music Education (http://www.colorado.edu/music/departments/music-education/) webpage and contact the music education chair.

### Transfer Students

Transfer students from within the university and from other universities must meet the general requirements of the university and the specific requirements of the College of Music, including the audition. A minimum GPA of 2.0 for students transferring from within the university and 2.75 for students transferring from other universities is required. See the undergraduate Admissions (p. 29) section for specific requirements.

## Attendance Requirements

Successful work in the College of Music is dependent on regular attendance in all classes. At the beginning of each semester, instructors will inform students of policies governing grading and attendance in each class. Students are expected to attend classes and comply with the attendance requirements specified by their instructors. For ensembles and other performance classes, attendance at dress rehearsals, major concerts and other approved/sanctioned performances, as listed in the course syllabus, also is required.

## Ensembles

All undergraduate students enrolled in applied music must participate in a university ensemble appropriate to and required by their degree program. Voice performance majors are not required to be in ensembles during the semester of their senior recital, and bachelor of music education students are exempt from ensemble participation during the student teaching semester. Any student who studies applied music beyond degree requirements must participate concurrently in a university ensemble. Double majors need be in only one ensemble at a time.

## Sophomore Proficiency

Students must pass a variety of jury tests and proficiency exams during their degree work. Each applied area has different requirements, so students need to consult the chair of their area and/or studio professor. However, all students must pass a sophomore proficiency exam. Students who cannot pass this exam receive an incomplete grade and cannot progress to the junior level of applied study until the proficiency is achieved. Studio professors provide students with proficiency and repertoire requirements.

## Course Load

The normal academic load for an undergraduate student in the College of Music is 15–17 credit hours. Schedules of fewer than 12 or more than 19

credit hours must have approval of the associate dean for undergraduate studies of the College of Music.

### Dropping a Course

Students should adhere to the deadlines posted on the Office of the Registrar website for dropping a course each semester. After a certain date each semester, a special action form signed by the instructor and associate dean for undergraduate studies is required to drop a course.

### Pass/Fail Option

The pass/fail option for 12 credit hours is open only to Bachelor of Music and Bachelor of Arts in Music students. Music education students may only use the pass/fail option for student teaching. Pass/fail credit hours are to be selected from non-music courses and are in addition to those that may be taken in honors. Courses so elected are taken according to the pass/fail policies of the college or school concerned.

Pass/fail credit hours that transfer students can apply toward degree requirements from departments within the university are limited to 1 in every 8 credit hours earned in the College of Music.

### Residence Requirement

Of the credit hours required for an undergraduate degree, the last 56 credit hours must be completed in residence in the College of Music. This may be reduced by the associate dean for undergraduate studies for excellent work done in this university and for high scholarship exhibited at previous institutions attended. In no case shall the minimum be fewer than 40 credit hours distributed over three semesters. At least 9 credit hours in applied music (private instruction) must be earned in this college for the degrees bachelor of music and bachelor of music education, and 6 credit hours for the bachelor of arts in music.

### Student Recital Recordings

Any recital required for graduation is recorded. Arrangements are to be made through the College of Music Operations Office, and a recording fee is charged. The original recording is placed in the Music Library.

# Programs of Study

# Music

Undergraduate degrees include the Bachelor of Music (BMus) and the Bachelor of Arts in music (BAMus). Students may also elect to earn a certificate in music entrepreneurship, music technology or music theory in conjunction with their degree.

In addition to a substantial core of studies in music, the BAMus program allows a wide choice of study in areas outside of music.

BMus areas of concentration include: composition, musicology, performance and jazz studies.

## Bachelor's Degrees

- Music - Bachelor of Music (BMus) (p. 1055)
- Music - Bachelor of Arts in Music (BAMus) (p. 1052)

## Minor

- Music - Minor (p. 1067)

## Certificates

- Music Entrepreneurship - Certificate (p. 1067)
- Music Technology - Certificate (p. 1068)
- Music Theory - Certificate (p. 1069)
- Singing Health Specialist - Certificate (p. 1069)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Aaholm, Philip
Professor Emeritus

Austin, James R. (https://experts.colorado.edu/display/fisid_103455/)
Professor; PhD, University of Iowa

Barnett, Michael T. (https://experts.colorado.edu/display/fisid_116467/)
Instructor; DMA, University of Colorado Boulder

Bartels, Justin P. (https://experts.colorado.edu/display/fisid_152074/)
Lecturer

Berg, Margaret H. (https://experts.colorado.edu/display/fisid_118371/)
Professor, Associate Dean; PhD, Northwestern University

Bernstein, Giora
Professor Emeritus

Bird-Arvidsson, Jennifer (https://experts.colorado.edu/display/fisid_147651/)
Associate Professor; MM, University of Michigan Ann Arbor

Brody, James M. (https://experts.colorado.edu/display/fisid_101948/)
Associate Professor; MM, Indiana University Bloomington

Bruns, Steven M. (https://experts.colorado.edu/display/fisid_103483/)
Associate Professor; PhD, University of Wisconsin–Madison

Caballero, Carlo (https://experts.colorado.edu/display/fisid_111681/)
Associate Professor, Faculty Fellow; PhD, University of Pennsylvania

Carthy, Nicholas R. (https://experts.colorado.edu/display/fisid_135356/)
Associate Professor; BA, Guildhall School of Music, London (England)

Chang, Philip C. (https://experts.colorado.edu/display/fisid_143541/)
Senior Instructor; PhD, University of Rochester

Chellis, Matthew Wren (https://experts.colorado.edu/display/fisid_154415/)
Associate Professor; MM, Manhattan School of Music

Conlon, Joan Catoni
Professor Emerita

Cooper, Peter W. (https://experts.colorado.edu/display/fisid_134522/)
Senior Instructor; BM, Northwestern University

Cooperstock, Andrew B. (https://experts.colorado.edu/display/fisid_115393/)
Professor; DMA, Peabody Institute of Johns Hopkins University

Cremaschi, Alejandro M. (https://experts.colorado.edu/display/fisid_134168/)
Professor; DMA, University of Minnesota Twin Cities

Davis, John S. (https://experts.colorado.edu/display/fisid_115443/)
Professor, Dean; DMA, University of Northern Colorado

Dockendorf, Matthew Paul (https://experts.colorado.edu/display/fisid_154511/)
Assistant Professor, Faculty Director; DMA, Michigan State University

Drumheller, John E. (https://experts.colorado.edu/display/fisid_103707/)
Senior Instructor; DMA, University of Colorado Boulder

Dunn, James M. (https://experts.colorado.edu/display/fisid_140593/)
Associate Professor; MM, Arizona State University

Dusinberre, Edward (https://experts.colorado.edu/display/fisid_101358/)
Faculty Fellow, Artist in Residence; Diploma, The Juilliard School

Eakin, Charles
Professor Emeritus

Eckert, Erika L. (https://experts.colorado.edu/display/fisid_101844/)
Associate Professor; BM, University of Rochester

Ellsworth, Oliver
Professor Emeritus

Erhard, Paul M. (https://experts.colorado.edu/display/fisid_100493/)
Professor; DMA, The Juilliard School

Farr, Elizabeth G. (https://experts.colorado.edu/display/fisid_101732/)
Professor Emerita; DMA, University of Michigan Ann Arbor

Fejer, Andras (https://experts.colorado.edu/display/fisid_103923/)
Faculty Fellow, Artist in Residence; Diploma, Franz Liszt Academy of Music

Fink, Robert
Professor Emeritus

Galm, John
Professor Emeritus

Gardner, Ryan (https://experts.colorado.edu/individual/fisid_165331/)
Associate Professor; DMA, Manhattan School of Music

Garland, Andrew B (https://experts.colorado.edu/display/fisid_159725/)
Assistant Professor; MM, University of Cincinnati

Gentry, Gregory R.
Associate Professor, Faculty Director, Faculty Fellow; DMA, University of Missouri–Kansas City

Goode, Bradley M. (https://experts.colorado.edu/display/fisid_134686/)
Associate Professor; MM, DePaul University

Graham, Larry
Professor Emeritus

Gunther, John G. (https://experts.colorado.edu/display/fisid_141165/)
Professor, Faculty Director; PhD, New York University

Hata, Kuniaki
Professor Emeritus

Hayes, Deborah
Professor Emerita

Hayghe, Jennifer C. (https://experts.colorado.edu/display/fisid_155969/)
Associate Professor; DMA, The Juilliard School

Heil, Leila (https://experts.colorado.edu/display/fisid_149780/)
Associate Professor; PhD, University of Colorado Boulder

Hill, Robert Stephen (https://experts.colorado.edu/display/fisid_163943/)
Professor, Endowed Chair; PhD, Harvard University

Holman-Johnson, Leigh (https://experts.colorado.edu/display/fisid_141980/)
Associate Professor; DMA, University of Colorado Boulder

Ishikawa, Yoshiyuki (https://experts.colorado.edu/display/fisid_102125/)
Professor; DMA, University of Michigan Ann Arbor

Jackson, Dennis
Professor Emeritus

Jenkins, Jeff (https://experts.colorado.edu/individual/fisid_146511/)
Instructor; Studied, Univeristy of North Texas

Jennings, Christina A. (https://experts.colorado.edu/display/fisid_143545/)
Professor; MM, The Juilliard School

Kearns, William
Professor Emeritus

Keister, Jay (https://experts.colorado.edu/display/fisid_115734/)
Associate Professor; PhD, University of California, Los Angeles

Kim, Suyeon (https://experts.colorado.edu/display/fisid_153470/)
Instructor; DMA, University of Texas at Austin

Korevaar, David J. (https://experts.colorado.edu/display/fisid_118374/)
Distinguished Professor, Faculty Fellow; DMA, The Juilliard School

Lehnert, Doris Pridonoff
Professor Emerita

Lehnert, Oswald
Professor Emeritus

Leong, Daphne (https://experts.colorado.edu/display/fisid_115747/)
Professor; PhD, University of Rochester

Lewis, Gary J. (https://experts.colorado.edu/display/fisid_145854/)
Professor, Endowed Chair; MM, Texas Tech University

Lin, Hsiao-Ling (https://experts.colorado.edu/display/fisid_149958/)
Instructor; DMA, Northwestern University

Malin, Jonathan (https://experts.colorado.edu/display/fisid_151714/)
Associate Professor; PhD, University of Chicago

Maloy, Rebecca (https://experts.colorado.edu/display/fisid_125582/)
Professor, Faculty Fellow, Endowed/Named Professor; PhD, University of Cincinnati

Mason, Patrick C. (https://experts.colorado.edu/display/fisid_101840/)
Professor Emeritus; MM, University of Nebraska-Lincoln

McCarthy, Kevin
Professor Emeritus

McDonald, Margaret M. (https://experts.colorado.edu/display/fisid_134703/)
Associate Professor; DMA, University of California, Santa Barbara

McKee, Paul (https://experts.colorado.edu/display/fisid_154465/)
Associate Professor; MM, University of Texas at Austin

McKinney, Donald J.
Professor, Faculty Director; DMA, University of Michigan Ann Arbor

McMurray, Allan
Professor Emeritus

Meneghini-Stalker, Tamara L. (https://experts.colorado.edu/display/fisid_146090/)
Associate Professor; MFA, Northern Illinois University

Miranda, Martina L. (https://experts.colorado.edu/display/fisid_140091/)
Associate Professor; DMA, Arizona State University; PhD, Arizona State University

Moteki, Mutsumi (https://experts.colorado.edu/display/fisid_100992/)
Professor, Faculty Fellow; DMA, University of Michigan Ann Arbor

Myer, Tom R. (https://experts.colorado.edu/display/fisid_100922/)
Associate Professor; MM, East Texas State University

Nguyen, Alexandra (https://experts.colorado.edu/display/fisid_145847/)
Associate Professor; DMA, University of Rochester

Nims, Abigail Andrews (https://experts.colorado.edu/display/fisid_152977/)
Associate Professor; MM, Westminster Choir College

Nytch, Jeffrey C. (https://experts.colorado.edu/display/fisid_147341/)
Associate Professor, Faculty Director; DMA, Rice University

Okigbo, Austin Chinagorom (https://experts.colorado.edu/display/fisid_151507/)
Associate Professor; PhD, Indiana University Bloomington

Pann, Carter N. (https://experts.colorado.edu/display/fisid_141461/)
Professor, Faculty Fellow; DMA, University of Michigan Ann Arbor

Peterson, Patti H.
Professor Emerita

Pinkow, David
Professor Emeritus

Reger, Jeremy J. (https://experts.colorado.edu/display/fisid_156224/)
Assistant Professor, Faculty Director; DMA, University of Michigan Ann Arbor

Requiro, David (https://experts.colorado.edu/display/fisid_155785/)
Assistant Professor; MM, University of Michigan Ann Arbor

Rhodes, Harumi B. (https://experts.colorado.edu/display/fisid_155971/)
Associate Professor, Faculty Fellow, Artist in Residence; MM, New England Conservatory of Music

Riis, Thomas L.
Professor Emeritus

Roeder, Matthew J. (https://experts.colorado.edu/display/fisid_120180/)
Associate Professor, Associate Dean; DMA, University of Colorado Boulder

Romero, Brenda M. (https://experts.colorado.edu/display/fisid_106117/)
Professor Emerita; PhD, University of California-Los Angeles

Sable, Barbara Kinsey
Professor Emeritus

Sampsel, Laurie (https://experts.colorado.edu/display/fisid_101802/)
Professor; PhD, University of Pittsburgh

Sawchuk, Terry M.
Associate Professor Emeritus; MM, University of Michigan Ann Arbor

Schranz, Karoly
Senior Instructor; Diploma, Franz Liszt Academy of Music

Schut, Joel
Instructor; DMA, Michigan State University

Scott, F. Wayne
Professor Emeritus

Seesholtz, John (https://experts.colorado.edu/display/fisid_163908/)
Associate Professor, Faculty Director; DMA, University of North Texas

Shay, Robert S. (https://experts.colorado.edu/display/fisid_154671/)
Dean, Professor; PhD, University of North Carolina Chapel Hill

Sher, Daniel (https://experts.colorado.edu/individual/fisid_100194/)
Professor, Dean Emeritus; EdD, Columbia University

Silver, Daniel S. (https://experts.colorado.edu/display/fisid_115564/)
Professor; MM, University of Michigan Ann Arbor

Sim, Claude
Assistant Professor; BM, Oberlin Conservatory

Smith, Jeremy L. (https://experts.colorado.edu/display/fisid_118265/)
Professor; PhD, University of California, Santa Barbara

Spera, Nicolo Ruggero Ferruccio (https://experts.colorado.edu/display/fisid_148406/)
Associate Professor; DMA, University of Colorado Boulder

Spillman, Robert
Professor Emeritus

Stanley, William J. (https://experts.colorado.edu/display/fisid_103616/)
Associate Professor; DMA, University of Illinois at Urbana–Champaign

Steinmetz, Branden (https://experts.colorado.edu/display/fisid_165415/)
Instructor, Faculty Director; DMA, Michigan State University

Swadener, Marc
Professor Emeritus

Swanson, Elizabeth (https://experts.colorado.edu/display/fisid_159726/)
Assistant Professor, Faculty Director; DMA, Northwestern University

Teitelbaum, Benjamin Raphael (https://experts.colorado.edu/display/fisid_151338/)
Associate Professor; PhD, Brown University

Theodore, Michael (https://experts.colorado.edu/display/fisid_113318/)
Associate Professor; PhD, University of California, San Diego

Thomas, Susan
Professor, Faculty Director; PhD, Brandeis University

Thornton, Michael Robert (https://experts.colorado.edu/display/fisid_116318/)
Professor; BM, Temple University

Walter, Douglas W. (https://experts.colorado.edu/display/fisid_101811/)
Professor; DMA, Temple University

Waters, Keith John (https://experts.colorado.edu/display/fisid_107518/)
Professor; PhD, University of Rochester

Weiss, Meta (https://experts.colorado.edu/display/fisid_164484/)
Senior Instructor; DMA, The Juilliard School

Wetherbee, Charles Tyler
Associate Professor; BM, Curtis Institute of Music

Wolzien, Charles
Professor Emeritus

# Courses

**MUSC 1051 (2) Basics of Songwriting**
Introduces students to the art and craft of songwriting. Activities center on creative self-expression through song, developing the fundamental tools and components of songwriting, both conventional and unconventional song forms, developing a personal musical style, developing critical listening/writing/thinking skills, performance, and the study of songs past and present. Examination of melody, harmony, rhythm, lyric writing, style and ensemble presentation.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**MUSC 1081 (3) Intensive Music Theory**
Introduces diatonic harmony and voice leading with intensive work on fundamentals (keys, intervals, triads, seventh chords and four-voice writing). The study of theoretical concepts is closely coordinated with aural skills. Feeds into the intensive section of MUSC 1111. Offered fall only.
**Requisites:** Requires corequisite course of MUSC 1121. Restricted to College of Music (MUSCU) majors or graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 1101 (2) Semester 1 Theory**
Introduces the fundamentals of diatonic harmony and voice leading, focusing on model composition (including one-, two- and four-voice writing) and analysis of excerpts from music literature. Offered fall only.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 1103 (1) Becoming a Music Teacher**
Provides an introduction to basic principles and practices of the music education profession. Explores contexts and methods of public school music teaching through class discussions, practice teaching and directed observations. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 1111 (2) Semester 2 Theory**
Continuation of MUSC 1101. Explores principles of harmony, voice leading and form. Continues emphasis on both model composition and analysis. Introduces chromatic elements (such as applied dominants and modulation), harmonic syntax and structural analysis of excerpts from music literature. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 1101 or MUSC 1081 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 1121 (1) Aural Skills Lab, Semester 1**
Focuses on sight singing, rhythm and dictation of diatonic melodies in major and minor keys (treble, alto and bass clefs). Covers identification of scale types, intervals, triads and dominant seventh chords. Includes individual and group improvisation. Offered fall only.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 1131 (1) Aural Skills Lab, Semester 2**
Continuation of MUSC 1121. Focuses on sight singing, rhythm and dictation of diatonic melodies; adds chromatic elements, more complex rhythms and two-part dictation. Includes harmonic dictation using vocabulary from MUSC 1111. Includes individual and group improvisation within harmonic contexts. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 1121 (minimum grade D-). Restricted to College of Music undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 1325 (1) Piano Sight Reading**
Studies techniques for improving sight-reading skills at the keyboard, with practical work in solo, ensemble and choral literature. Also covers score reading and transposition. Restricted to piano majors or instructor consent required. Offered fall only.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 1326 (2) Guitar Musicianship and Accompanying**
Survey of accompanying repertoire for guitar with solo instruments (flute, violin, voice, etc.), including introductory work in basso continuo. Activities in sight-reading, fretboard harmony and comprehension of harmony and texture. Some work will be tied to the repertoire being studied in studio lessons. Open only to guitar performance majors.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 1544 (1) Italian Diction**
Designed for the understanding of lyric Italian diction, the international phonetic alphabet, and its application to classical singing. Required for freshmen BM voice majors. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 1554 (1) English Diction**
Designed for the understanding of lyric English diction, the international phonetic alphabet, and its application to classical singing as well as various musical styles of English classical voice literature. Required for Freshmen BM voice majors.
**Requisites:** Requires prerequisite course of MUSC 1544 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 1802 (3) Introduction to Musical Styles and Ideas**
Introduces the study of musical traditions of the world; equips students with requisite skills for understanding and analyzing music as an art in historical and cultural contexts using an integrative approach that includes selected styles and genres, critical reading and writing skills and mastery of conceptual issues related to the discipline of music. Satisfies the World Music requirement for undergraduate students in the College of Music.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Musicology

**MUSC 2041 (1) Applications of Music Technology (5-week segment)**
Explores the use of technology, software, applications, and tools in a variety of creative, performance, pedagogical, and entrepreneurial contexts. Addresses the opportunities and challenges posed by evolving technologies. Emphasizes project-oriented learning.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 2061 (3) Introduction to Music Technology**
Surveys the various tools and techniques in the field of music technology. Topics include an introduction to basic synthesis, digital signal processing, MIDI and audio sequencing, music notation and a historical perspective on electronic music.
**Equivalent - Duplicate Degree Credit Not Granted:** MUEL 2061
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2081 (2) Prepared for the Soundcheck**
Provides an overview of the recording process from the performer's perspective from soundcheck through final mastering. Uses recorded material from in-class sessions. Examines differing approaches to recording as well as current technologies.
**Equivalent - Duplicate Degree Credit Not Granted:** CMDP 2860
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2091 (2) Recording Techniques**
Provides hands-on training in various audio recording techniques, acoustics and sound reinforcement, studio maintenance and troubleshooting. Real-world experience is gained through individual recording projects and College of Music events.
**Requisites:** Requires prerequisite course of MUSC 2081 or MUEL 2071 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2101 (2) Semester 3 Theory**
Continuation of MUSC 1111. Reviews harmonic and formal concepts from MUSC 1111. Introduces advanced chromatic concepts such as modal mixture, seventh chords with added dissonance, Neapolitan sixth chord and augmented-sixth chords. Explores in-depth structural analysis of musical works. Offered fall only.
**Requisites:** Requires prerequisite course of MUSC 1111 (minimum grade D-). Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2103 (2) Introduction to Music Education**
Introduces students to the broad range of skills and responsibilities inherent to the music education profession. Explores current topics in public school music teaching while developing teaching skills through supervised field experience. Offered fall only.
**Requisites:** Requires a prerequisite course of MUSC 1103 (minimum grade C-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 2111 (2) Semester 4 Theory**
Continuation of MUSC 2101. Builds on and synthesizes harmonic, melodic and formal concepts from semesters 1-3. Includes writing about musical structure and analyzing relationships of musical structure to extramusical elements (such as text, performance technique, dance, staging, etc.). Introduces 20th century compositional techniques. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 2101 (minimum grade D-). Restricted to College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2121 (1) Aural Skills Lab, Semester 3**
Continuation of MUSC 1131. Applies concepts from MUSC 2101 in performance (prepared, from sight and improvised) and analytical listening (transcription, diction and aural analysis). Offered fall only.
**Requisites:** Requires prerequisite course of MUSC 1131 (minimum grade D-). Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2131 (1) Aural Skills Lab, Semester 4**
Continuation of MUSC 2121. Applies concepts from MUSC 2111 in performance (prepared, from sight and improvised) and analytical listening (transcription, dictation and aural analysis. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 2121 (minimum grade D-). Restricted to College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2325 (2) Applied Harmony for the Keyboard**
Provides an intensive study and application of the harmonic structure of music in a variety of keyboard skills: figured bass realization, chord progressions, harmonization, improvisation, transposition, on-sight harmonic analysis and playing by ear. Offered spring only.
**Requisites:** Requires prerequisite courses of MUSC 1111 and MUSC 1131 and MUSC 1325 (all minimum grade D-). Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 2365 (2) Introduction to Accompanying**
An overall study in the art of working with instrumentalists and singers including repertoire and orchestral reductions. Requires performance with a student instrumentalist or singer to be critiqued and coached by class and instructor. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 1325 (minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 2608 (1) Wellness for Musicians 1**
Explores strategies that help musicians maintain health while achieving peak performance. Investigate and employ powerful somatic methodologies including Alexander Technique and Body Mapping that improve physical functioning and prevent injury. Incorporates a variety of wellness aspects such as performance psychology, mental health, effective exercise, nutrition, breathing, hearing and vocal health.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 2772 (3) World Musics: Asia and Oceania**
Highlights music in Asia and Oceania using current ethnomusicological materials.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Musicology

**MUSC 2782 (3) World Musics: Africa, Europe, and the Americas**
Use current ethnomusicological materials and methods in the study of music outside the Western art tradition. Usually taught in the spring, focuses on music cultures of Africa, Europe and the Americas.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Musicology

**MUSC 2918 (2) Building Your Music Career**
Develop a broad range of tools needed for a professional career in music. Topics include networking, development and use of promotional materials, funding, social media and the internet and financial management, among others - all taught through an entrepreneurial lens. A range of career opportunities is explored, using the entrepreneurial process to assess and explore a variety of paths and opportunities.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 2988 (1) Introduction to Music Research**
Introduces music research tools and basic writing skills to provide information fluency and skills necessary for successful composition of formal music research papers. Applies curricular goals to specific topics of students' choice.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 2997 (1) Sophomore Proficiency**
To be completed by the second semester of the sophomore year.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theses and Recitals

**MUSC 3013 (1) String Class**
For music education majors with choral/general emphasis. Develops basic performance skills on two or more string instruments. Addresses teaching strategies and other specialized topics related to string instruction. Offered fall only.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3023 (1) Woodwind Class**
For music education majors with choral or choral/general emphasis. Develops basic performance skills on two or more woodwind instruments. Addresses teaching strategies and other specialized topics related to beginning and intermediate woodwind instruction. Offered spring only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3033 (1) Brass Class**
For music education majors with choral or choral/general emphasis. Develops basic performance skills on two or more brass instruments. Addresses teaching strategies and other specialized topics related to beginning and intermediate brass instruction. Offered spring only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3041 (2) Instrumentation and Arranging**
Learn to create professional arrangements for a diverse combination of instruments and/or voices. The course will work through instrumentation, score and part preparation, and issues of orchestration to prepare music student to create successful arrangements for a wide range of concert music settings. Final arranging projects will be geared towards individual interests.
**Requisites:** Requires prerequisite course of MUSC 2101 and MUSC 2121 (all minimum grade C). Restricted to College of Music (MUSC) students only.

**MUSC 3043 (1) Percussion Class**
Provides an introduction to playing techniques and pedagogical principles necessary for music educators to teach young students, including general understanding of the techniques used in playing and teaching percussion instruments in the school music program. Required of all string, voice, choral and instrumental general track music education students. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 3051 (2) Beginning Composition**
Covers issues relating to the craft of musical composition with analysis and writing in various styles. This introductory course is designed for music majors who are not composition majors. Some of the assignments will be read in class. Offered spring term of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 3061 (2) Jazz Improvisation I**
Develops skills in jazz improvisation through practical application of harmonic concepts, melodic construction, rhythmic awareness, transcription, repertoire and analysis. Open to all instruments. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Recommended:** Prerequisite for non-jazz majors MUSC 2111.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 3071 (2) Jazz Improvisation II**
Continues and expands upon the material presented in MUSC 3061. Reinforcement of ability to create an improvised melody in a range of harmonic contexts including blues, bebop, modal jazz, free jazz, and other styles. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 3061 (minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 3081 (3) Jazz Theory and Aural Foundations 1**
Presents the grammar and syntax of jazz. Helps to gain a greater understanding of the inner workings and application of chord progressions as they relate to the jazz idiom including major key harmony, secondary dominants, modal interchange and modulation. Students will demonstrate their understanding of these components through written assignments, singing, aural recognition, transcription and keyboard demonstration.
**Requisites:** Requires prerequisite courses of MUSC 1111 and MUSC 1131 and MUSC 3071 (all minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 3091 (3) Jazz Theory and Aural Foundations 2**
Presents the grammar and syntax of jazz and is the second course of the sequence. Units of study include elements of form, harmonic substitution, reharmonization, non-standard forms and harmonic progressions. Post-tonal concepts as they relate to jazz are introduced as well as foundational studies in jazz rhythm. Aural studies of all theoretical material is integrated throughout the semester.
**Requisites:** Requires prerequisite course of MUSC 3081 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.

**MUSC 3133 (2) Teaching General Music I**
Provides an overview of general music teaching with emphasis on developmentally appropriate strategies and materials. Required for all music education majors as partial fulfillment of course work leading to K-12 music licensure. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 2103 (minimum grade C-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3153 (2) Teaching Woodwind Instruments**
For music education majors with instrumental or instrumental/general emphasis. Develops basic performance skills on three or more woodwind instruments. Addresses teaching strategies and other specialized topics related to beginning and intermediate woodwind instruction. Offered spring only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3163 (2) Teaching String Instruments**
For music education majors with instrumental or instrumental/general emphasis. Develops basic performance skills on three or more string instruments. Addresses teaching strategies and other specialized topics related to beginning and intermediate string instruction. Offered fall only.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3176 (2) Conducting 1**
Introduces conducting and rehearsal techniques. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 3186 (2) Conducting II**
Introduces conducting and rehearsal techniques. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 3176 (minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 3191 (2) Studio Recording Techniques**
Introduces various aspects of studio recording techniques and explores the technical side of audio recording in the studio setting. Expands upon knowledge and skills learned in Recording Techniques (MUSC 2091).
**Requisites:** Prerequisite of Recording Techniques MUSC 2091. Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 3193 (2) Vocal Pedagogy and Literature for Young Voices**
Provides an overview of vocal anatomy/function, care of the voice, vocal repertoire, teaching strategies,and other specialized topics related to singing instruction in both private studio and public school choral settings. Fall section for instrumentalists; spring section for vocalists.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3223 (2) Teaching Brass Instruments**
For music education majors with instrumental or instrumental/general emphasis. Develops basic performance skills on three or more brass instruments. Addresses teaching strategies and other specialized topics related to beginning and intermediate brass instruction. Offered spring only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3226 (1) Percussion Literature and Pedagogy for Undergraduate Percussion Majors**
Explores, examines and analyzes percussion music, performance techniques and how to teach them through readings, discussion, analysis, extensive listening, and score study. The course is designed to meet the specific needs and requirements of the individual student.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 2997 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 3243 (2) Teaching Percussion Instruments**
Provides an introduction to playing techniques and pedagogical principles necessary for music educators to teach young students, including general understanding of the techniques used in playing and teaching percussion instruments in the school music program. Required of all instrumental band and instrumental band-jazz track music education students. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 3253 (2) Jazz Techniques for the Music Educator**
Prepares the music educator for successful experiences teaching jazz at the secondary level. Students gain insights into performance and rehearsal techniques for the instrumental jazz ensemble. Explores approaches for teaching jazz theory, improvisation, and selecting literature for young students. Own instrument required for certain classes. Offered spring only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Recommended:** Prerequisites MUSC 1111 and MUSC 2103.
**Additional Information:** Departmental Category: Music Education

**MUSC 3256 (2) Guitar Pedagogy**
Survey and develop appropriate teaching materials and techniques; learn how to identify and address the most common technical problems experienced by guitar students; create strategies for how to avoid the development of problems in guitar beginners.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 3273 (2) String Pedagogy and Literature**
Examines instructional methods/materials and pedagogical approaches appropriate for beginning to advanced string students in private studio, small ensemble, or large ensemble contexts. Topics may include group teaching strategies, as well as contemporary approaches including Rolland and Suzuki. Offered spring only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Recommended:** Prerequisites MUSC 2103 and MUSC 3163.
**Additional Information:** Departmental Category: Music Education

**MUSC 3345 (2) Piano Pedagogy 1**
Discusses teaching philosophies, objectives, and procedures. Examines and evaluates methods and materials. Studies practical aspects with which the private teacher is concerned. Offered fall of even-numbered years.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 3355 (2) Piano Pedagogy 2**
Materials and techniques for teaching piano with a focus on the intermediate level student. Offered only in spring of odd-numbered years.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 3363 (2) Marching Band Techniques**
Helps develop the skills needed to administer and teach all aspects of a contemporary high school marching band. Includes drill conception and design, instruction, organization, and administration. Offered fall only.
**Requisites:** Requires prerequisite course of MUSC 2103 and EMUS 1287 or EMUS 3287 (all minimum grade D-). Restricted to College of Music (MUSCU) majors or graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3444 (1) French Diction**
Designed for the understanding of lyric French diction, the international phonetic alphabet, and its application to classical singing, as well as various musical styles of French classical vocal literature. Required of Junior BM voice majors.
**Requisites:** Requires prerequisite course of MUSC 1554 (minimum grade D-). Restricted to College of Music (MUSCU) majors or graduate students only.
**Recommended:** Prerequisite MUSC 3464.
**Additional Information:** Departmental Category: Voice

**MUSC 3464 (1) German Diction**
Designed for the understanding of lyric German diction, the international phonetic alphabet, and its application to classical singing, as well as various musical styles of German classical vocal literature. Required of sophomore BM voice majors.
**Requisites:** Requires prerequisite course of MUSC 1554 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 3642 (3) History of Jazz 1**
Utilizing musical examples and analysis, this course studies the distinctly American art form of jazz music from its origins up to the 1950's, including the various traditions, practices, historical events and people most important to its evolution. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Musicology

**MUSC 3652 (3) History of Jazz 2**
Utilizing musical examples and analysis, this course studies the distinctly American art form of jazz music from the 1950's to the present, including the various traditions, practices, historical events and people most important to its evolution. Offered spring only.
**Requisites:** Requires a prerequisite course of MUSC 3642 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 3772 (3) West African Music and Culture in Ghana**
Provides hands-on and experiential enrichment for students to interact at several levels with a local community in Ghana. Classroom lectures will be combined with direct participation in drumming and dancing, field trips to participate in festivals and court ceremonies, field trips to kente weaving village, adinkra cloth making, wood carving villages, and museums.
**Equivalent - Duplicate Degree Credit Not Granted:** MUEL 3772
**Requisites:** Requires prerequisite courses of MUSC 2782 and MUEL 2772 (all minimum grade D-). Restricted to students with 27-56 credits (Sophomore) non-College of Music majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 3802 (3) History of Western Music 1**
Surveys Western art music with stylistic analysis of representative works from all major periods through the Baroque. See also MUSC 3812.
**Requisites:** Requires prerequisite course of MUSC 1111 or MUSC 3091 (minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Musicology

**MUSC 3812 (3) History of Western Music 2**
Surveys Western art music with stylistic analysis of representative works from all major periods after the Baroque. See also MUSC 3802.
**Requisites:** Requires prerequisite course of MUSC 1111 (minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Musicology

**MUSC 3997 (1) Junior Recital**
To be completed by the second semester of the junior year.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 2997. Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Theses and Recitals

**MUSC 4001 (2) New Musical Styles and Practices**
Explores a variety of music from the 20th and 21st centuries beginning with Stravinsky and moving through current trends. Involves a mix an analysis/exploration of this music with short composition assignments imitating the different styles. Offered spring of odd-numbered years.
**Requisites:** Requires prerequisite courses of MUSC 2111 and MUSC 2131 (all minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4011 (2) 16th Century Counterpoint**
Provides a stylistic study of the main contrapuntal genres of the period including free, two- and three-part imitative counterpoint in the style of Palestrina. Provides a foundation in species counterpoint, working towards free counterpoint; stresses composing in 16th century styles. Offered fall of even-numbered years.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5011
**Requisites:** Requires prerequisite courses of MUSC 2111 and MUSC 2131 (all minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4012 (3) African Music**
Studies music cultures of Africa and the Black Diaspora, including folk and art music traditions, religious and popular music genres. Specific course topics could cover any or all of these styles, including exploring interconnections of musical stylistics of Africa and the Black Diaspora.
**Equivalent - Duplicate Degree Credit Not Granted:** MUEL 4012 and MUSC 5012
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4021 (2) 18th Century Counterpoint**
Provides a stylistic study of main contrapuntal genres of the period including inventions, suite movements and fugues. Provides a foundation in species counterpoint; stresses analysis and composing in the style. Offered fall only.
**Requisites:** Requires prerequisite courses of MUSC 2111 and MUSC 2131 (all minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4031 (2) Jazz Arranging 1**
Study of notation, score layout, transpositions, basic harmonic and melodic analysis, basic chord voicings, and composition for a small and large jazz ensemble. Use of notation software such as Finale or Sibelius. Offered fall semester only.
**Requisites:** Requires prerequisite course of MUSC 3091 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4034 (3) Musical Theatre History 1 - Antecedents through Musical Comedy**
Introduces musical theatre using historical and cultural contexts. Topics cover the social and historical elements inherent in the development of the Broadway Musical Theatre. Students will evaluate and compare a variety of musicals and their antecedents from the 19th Century to the era of Musical Comedy, including minstrel shows, vaudeville, operetta, burlesque, variety shows and musical revues.
**Requisites:** Restricted to BFA Musical Theatre and BM Musical Theatre students only.
**Grading Basis:** Letter Grade

**MUSC 4041 (2) Orchestration**
Studies advanced orchestration techniques through score analysis and student projects. Offered fall of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4044 (3) American Musical Theatre History 2 - Golden Age to Contemporary**
Continues to investigate Musical Theatre within its historical and cultural contexts, analyzing the cultural influence it has had on society. Students will evaluate and compare musicals from the start of the Golden Age to the modern era including Rock, Popsical, Jukebox, and Contemporary styles. This course is a continuation of Musical Theatre History 1.
**Requisites:** Restricted to Musical Theatre (MMTH-BMUS) students only.
**Grading Basis:** Letter Grade

**MUSC 4061 (2) Tonal Analysis**
Surveys tonal analytical techniques and forms of tonal music, including binary forms, ternary forms, rondo (and others) through study of selected works. Offered spring only.
**Requisites:** Requires prerequisite courses of MUSC 2111 and MUSC 2131 (all minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4071 (2) Post-Tonal Theory and Analysis**
Focuses on theory and analysis of post-tonal literature pre-1945. Offered fall of odd-numbered years.
**Requisites:** Requires prerequisite courses of MUSC 2111 and MUSC 2131 (all minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4078 (1) Piano Technician for Pianists**
Familiarizes pianists with the development of the modern grand piano, its construction and the proper terminology of parts and specifications. Trains pianists in minor repairs and adjustments of the grand piano action and in minor tuning tasks.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5078
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Recommended:** Prerequisite piano majors.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 4091 (2) Jazz Arranging 2**
Continuation and expansion of studies in MUSC 4031. Survey and analysis of major composers and arrangers of the idiom. Course focuses on creating several arranging projects for a jazz ensembles. Offered spring of odd-numbered years.
**Requisites:** Requires prerequisite course of MUSC 4031 (minimum grade D-). Restricted to College of Music undergraduate students only.
**Recommended:** Prerequisite MUSC 3081.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4101 (1-3) Theory and Aural Skills Review**
Reviews tonal harmony, voice leading, and essential aural skills. Prepares graduate students for more advanced work in music theory. Students may register for aural skills only (1 credit), theory only (2 credits) or both theory and aural skills (3 credits). May not be taken pass/fail. Aural skills section offered fall and spring. Theory section offered spring.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4103 (1) Introduction to Student Teaching**
Represents the first half of the professional internship year. Familiarizes students with the schools and music programs in which they plan to student teach. Music placements may consist of elementary and high school, elementary and middle school, or middle school and high school.
**Requisites:** Requires a prerequisite course of MUSC 4113 or MUSC 4313 or MUSC 4443 (minimum grade C-). Restricted to College of Music undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4106 (2) Guitar Literature**
An analytical and historical survey of the repertory of the guitar and its antecedents from the renaissance to the present day.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5106
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 4111 (2) Composing at the Computer**
Discover strategies and techniques for generating and manipulating sound at the computer. Student projects will include compositions, soundscapes, ambient environments and soundtracks for multimedia. Available to students without prior experience with computer music or composition. Offered fall of odd-numbered years.
**Requisites:** Requires prerequisite course of MUSC 2061 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4112 (3) Ethnomusicology**
Examines the definition, scope, and methods of ethnomusicology, the discipline that focuses on approaches to the study of music theory, history, and performance practices of world cultures.
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4113 (3) Teaching General Music 2**
Provides an in-depth examination of teaching and learning processes in the elementary general music classroom, based on the integration of child development and musical development theories with content and delivery skills appropriate for K-5 general music classrooms. Students implement and evaluate music instruction, design curricular projects, and build a repertoire of vocal, instrumental and speech-based arrangements. Offered fall of odd-numbered years.
**Requisites:** Requires prerequisite course of MUSC 2103 (minimum grade C-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4121 (3) Topics in Music Technology**
Exploration of issues, techniques, and tools of music technology. Topics vary from term to term and may include: interactive systems for performance; teaching and learning; computer music instrument design; digital synthesis and signal processing; music in intermedia, sound design and analysis. Lectures on work sessions will support student projects.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 2061 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4122 (3) Music in Jewish Culture**
Introduces students to a wide range of musical styles, traditions, genres, performers, composers, events and works that are part of Jewish culture, focusing on the twentieth and twenty-first centuries. Provides tools for understanding music on its own and in connection with issues of identity, diaspora, memory and liturgy. Includes opportunities for creative and critical engagement with Jewish music.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4122
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Musicology

**MUSC 4133 (3) Student Teaching Practicum**
Offers practice teaching under the guidance of a master music teacher.
**Requisites:** Requires prerequisite course of MUSC 4103 (minimum grade C-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4141 (2) Instrument Design Lab: Sound, Perception & Creativity**
Explores fundamental physical concepts of sound and music in a hands-on laboratory environment. Surveys a number of topics such as tuning, temperament, harmony and timbre through the construction of PVC overtone flutes, an investigation in the timbral intention of Dolly Parton's vocal technique, physical modeling through the testing of 3D-printed vowel flutes, the construction of a "Long String Instrument," and more. The course culminates in each student inventing, designing, and demonstrating their own new instrument.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5141
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Grading Basis:** Letter Grade

**MUSC 4142 (3) American Indian Music**
Examines Native North American musical cultures, emphasizing music as an integral part of religious expression and community life.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5142
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4143 (2) Topics in Choral Music Education**
Prepares students to teach, conduct and facilitate music making in various choral ensembles. Examines skills, teaching techniques and administrative procedures necessary for developing and maintaining various choirs at the elementary through high school levels. Includes discussion of current topics in choral music education and community choral field experiences. Offered fall terms, every two years.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5143
**Requisites:** Requires prerequisite course of MUSC 2103 (minimum grade C-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4151 (2) Topics in Music Analysis**
Examines critically a specific topic or repertory, such as Song Analysis or Music of Brahms. Uses readings and analyses, with grades to be determined from reading responses, analytical assignments and writing. Offered fall of even-numbered years.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of MUSC 2111 and MUSC 2131
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4152 (3) East Asian Music**
Surveys the development of music in Japan, China and Korea through the in-depth study of particular styles of traditional music. The course emphasizes the study of music and culture, particularly music's relationship to religion, politics, language, literature, dance and theatre.
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology
Departmental Category: Asia Content

**MUSC 4153 (1) Percussion Class and Pedagogy**
Required of all music education majors. Presents knowledge and skills necessary for music educators to teach young students, including a general understanding of the techniques used in playing and teaching percussion instruments in the school music program. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4161 (2) Advanced Jazz Composition and Analysis**
Provides in depth listening, score study, and analysis, exploring major composers in jazz and their innovations in composition. "Foundational" topics concerning melody, form, and orchestration are studied to provide a framework for further analysis. Influences of western art music, American folk and popular music considered. Final projects to be performed and recorded by a CU jazz ensemble.
**Requisites:** Requires prerequisite of MUSC 3091 and MUSC 3081 (all minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 4163 (2) Choral Literature for School Ensembles**
Examination of literature, materials, and methods appropriate for teaching choral music in secondary schools. Offered fall of odd-numbered years.
**Requisites:** Requires prerequisite course of MUSC 2103 (minimum grade C-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4168 (3) World Music Theories**
Examines music rules, concepts or music theories and sociocultural elements that musicians use in creating musical sound, with emphasis on music practices from a variety of world traditions; observing shared and diverging principles, making cross-cultural comparisons and developing a new pedagogy that supports the substantive study of global musics.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5168
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Recommended:** Prerequisite MUSC 1802 or MUSC 2772 or MUSC 2782 or MUSC 4112.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4171 (2) Advanced Jazz Improvisation and Analysis**
Surveys important jazz improvisers and their historical context. Students engage in multiple methods of transcription and analysis. Listening plays a central role throughout the course and class discussions will foster the ability to engage in critical analysis of performances. The final project is an in-depth transcription of analysis of an improvisation.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite of MUSC 3081 and MUSC 3091 (all minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 4176 (2) Conducting 3**
This is a study in advanced conducting techniques. Demonstration of advanced score study techniques as well as the application to gesture and rehearsal techniques linked with conducting will be explored. Participation fully in discussion readings and contribute to the learning of all is expected.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5176
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of MUSC 3186 (minimum grade B-). Restricted to College of Music undergraduates majoring in Music Education (MUSE) only.
**Grading Basis:** Letter Grade

**MUSC 4191 (2) Advanced Recording**
Study of advanced recording techniques and concepts beyond those covered in MUSC 2091 involving multiplemicrophones for ensemble concerts and recording sessions within and outside of the College of Music. Offered spring of even-numbered years.
**Requisites:** Requires prerequisite course of MUSC 2091 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4193 (1) Student Teaching Seminar**
Required for all music student teachers. Addresses topics of concern to beginning teachers including classroom management, interpersonal skills, legal issues, job search strategies and capstone project development.
**Requisites:** Requires prerequisite course of MUSC 4103 (minimum grade C-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4202 (3) Special Topic in Musicology: Current and Critical Issues**
Examination of a specific topic of current or critical interest within areas of music history, ethnomusicology, critical theoryand practice across the spectrum of Western, Popular and World Music traditions. Designed as a capstone course for music majors who have completed a full complement of musicology courses. Topics vary from term to term. Instructor consent is required for non-music majors.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Musicology

**MUSC 4203 (1) Music Methods Practicum**
Provides students with opportunities to observe and practice the use of various teaching techniques and relate them to concepts presented in the methods course. Students consult with the instructor to determine appropriate placements in schools.
**Requisites:** Requires prerequisite course of MUSC 2103 (minimum grade C-). Requires corequisite course of MUSC 4313 or MUSC 4443. Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4223 (2) Secondary Music Teaching Approaches**
Prepares students to teach and facilitate musical learning in non-performance secondary music classes. Includes units on music technology, music theory, music appreciation and class guitar. Connects experiential components to strategies for teaching and project design for middle and high school classrooms. Offered fall only.
**Requisites:** Requires a prerequisite course of MUSC 2103 (minimum grade D-).
**Grading Basis:** Letter Grade

**MUSC 4313 (3) Teaching Choral Music**
Examines choral music curricula, instructional materials and teaching techniques appropriate for secondary choral settings. Also addresses administrative strategies for choral music programs. Offered spring only.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5313
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Recommended:** Prerequisite MUSC 2103.
**Additional Information:** Departmental Category: Music Education

**MUSC 4323 (3) Differentiating Instruction in K-8 Music Classrooms**
Designed to focus on differentiating and individualizing instruction for K-8 music students representing diverse cultural, linguistic, and ability backgrounds. Includes developmental and practical orientations to pedagogical issues including planning, instruction and assessment. Emphasizes evidence-based teaching practices and programmatic interventions that support student learning and engagement in music instruction.
**Requisites:** Requires a prerequisite course of MUSC 2103 (minimum grade D-). Restricted to College of Music (MUSC) majors or graduate students only.
**Grading Basis:** Letter Grade

**MUSC 4325 (2) Keyboard Literature 1**
Surveys keyboard music from 1600 to 1830. Offered fall semester of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 4335 (2) Keyboard Literature 2**
Surveys keyboard music from 1830 to the present. Offered spring semester of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 4336 (2) Brass Pedagogy**
Analyzes pedagogical techniques and philosophies of teaching brass instruments, and examines materials. Offered every other spring terms.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5336
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 4346 (2) Woodwind Pedagogy**
Analyzes pedagogical techniques and philosophies of teaching wind instruments, and examines materials. Offered every other spring term.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5346
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 4405 (2) Basso-Continuo Accompaniment**
Studies the history, theory and practice of Basso-continuo accompaniment. Provides practical instruction in realizing harmony from a given bass line (figured or unfigured), projecting affect and creating dynamics at the harpsichord. Emphasizes individual cognition and creativity.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5405
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 4415 (2) Advanced Basso Continuo**
Explores advanced basso continuo, serving as more in depth study for those who have completed or tested out of Basso-Continuo Accompaniment (MUSC 4405).
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5415
**Requisites:** Prerequisite of MUSC 4405. Restricted to College of Music (MUSCU) undergraduate students.

**MUSC 4443 (3) Teaching Instrumental Music**
Examines instrumental music curricula, instructional materials and teaching techniques appropriate for rehearsal, class, and lesson settings. Also addresses administration strategies for instrumental music programs. Offered spring only.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5443
**Requisites:** Requires prerequisite course of MUSC 2103 (minimum grade C-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4608 (1) Wellness for Musicians 2**
Develops and further integrates material covered in Wellness for Musicians 1. Deeper exploration of somatic and wide-ranging wellness strategies, including FM Alexander¿s conception of Inhibition and other approaches for proactive self-care and improvement. Consideration of how to integrate methodologies in teaching, pedagogy, and practice. Students will complete several projects related to their specific musical pursuits and interests.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5808
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 2608 (minimum grade C-). Restricted to College of Music undergraduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 4666 (3) Chamber Music Lit WW/Prc**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 4712 (3) Renaissance Music**
Provides a repertory and analysis of polyphonic music, 1400-1600.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5712
**Requisites:** Requires prerequisite courses of MUSC 1802 and MUSC 3802 (all minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4752 (3) Women in Music**
Examines the role of women as creators and performers of Western Music. Explores related issues in musicology, including canon formation, reception history and feminist aesthetics.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5752
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4772 (3) History of Opera**
Examines representative operas from the 17th through the 21st centuries. Emphasizes both cultural and analytical aspects and surveys related musicological literature.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5772
**Requisites:** Requires prerequisite courses of MUSC 1802 and MUSC 3802 or MUSC 3812 (all minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4802 (3) Studies in 20th Century Music**
Offers intensified work in history of music in the 20th century. Topics vary from year to year.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5802
**Requisites:** Requires prerequisite courses of MUSC 1802 and MUSC 3812 (all minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4808 (1-3) Internship in Music Industry**
Provides an opportunity for music majors to gain real world experience in a professional music organization outside of the CU Boulder academic environment and to engage with music industry organizations in the community (for profit or non-profit) while pursuing specific tasks or projects relevant to the student's career goals.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**MUSC 4852 (3) 17th and Early 18th Century Music**
Examines music and writings about music from the Baroque era. Emphasizes cultural and musical analysis and surveys current musicological literature.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5852
**Requisites:** Requires prerequisite courses of MUSC 1802 and MUSC 3802 (all minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4862 (3) African American Music**
Examines the sacred and secular genres of Black American music from folk spirituals to contemporary gospel and hip-hop in their cultural and historical contexts. Examines individual composers and performers in specific historical contexts in order to understand the meanings behind certain Black musical stylistics, sound ideals and aesthetic preferences. Formerly MUSC 2802.
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4872 (3) Late 18th and 19th Century Music**
Studies European and American music from the last developments of the styles through romanticism and its later 19th century reverberations.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5872
**Requisites:** Requires prerequisite courses of MUSC 1802 and MUSC 3812 (all minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4892 (3) Latin American Music**
Explores music of cultures of the Americas south of the United States and in the diaspora, emphasizing the relationships of music and culture in folk, popular and arts styles.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5892
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4908 (1-3) Arts Administration Internship**
Engage with music/music business organizations in the community (for profit or non-profit) to pursue specific tasks or projects relevant to the student's career goals. A minimum of 48 hours is required per semester for one credit.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5908
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 4957 (1-4) Senior Thesis**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theses and Recitals

**MUSC 4958 (2) Community Performances**
Explore the real-world issues of planning and presenting concerts. Learn to program music for all types of audiences, gain confidence speaking about your music and handle the logistics of concert production. Discuss the role of concerts in the 21st century and examine new styles of presentation, audience engagement and outreach. Course culminates in a concert presented in a local venue.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5958
**Requisites:** Requires prerequisite course of MUSC 2918 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 4968 (3) Management and Leadership in the Arts**
Focus on management, leadership, and communication strategies and their application to arts organizations. Concepts and approaches for leaders of small, medium, and large arts organizations in both the for-profit and nonprofit sectors, including human resource management, problem solving, and effective communication will be examined. Students will practice and refine their written communication skills by writing clearly and concisely throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5938
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 4978 (3) Introduction to Arts Administration**
Introduce students to current trends in arts administration, explore the fundamentals of managing arts organizations and develop concrete tools for managing boards, volunteers and staff, effective fund raising, strategic planning and program development. Current issues, the role of the arts and arts advocacy will be discussed.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5978
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 4988 (3) The Entrepreneurial Artist**
Learn the core principles of entrepreneurship, such as idea formation, venture models, opportunity assessment, market analysis and strategies for launching a venture and apply them to entrepreneurial ideas. Lectures, projects, entrepreneur interviews and case studies will culminate in a feasibility study for an original entrepreneurial concept.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5988
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Recommended:** Prerequisite MUSC 2918.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 4997 (1) Senior Recital**
To be completed by the second semester of the senior year.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite class of MUSC 3997 (minimum grade D-). Restricted to College of Music undergraduate students only.
**Additional Information:** Departmental Category: Theses and Recitals

**MUSC 4998 (1) Music Entrepreneurship Certificate Capstone**
Completes the Certificate in Music Entrepreneurship. Students will develop an art-based entrepreneurial concept, engage in customer discovery, refine their business model, create a marketing plan, research relevant intellectual property issues, and complete a business model canvas for their venture.
**Requisites:** Requires prerequisite courses of MUSC 2918, 4988, BUSM 2001 and BUSM 4001 (min. grade D-). Restricted to senior (90-180 credits) College of Music (MUSCU) majors.
**Grading Basis:** Letter Grade

# Music - Bachelor of Arts in Music (BAMus)

The Bachelor of Arts in Music program provides a broad education in music within a liberal arts context. Although students may elect to pursue special interests, the primary emphasis is on the development of basic musicianship, an ability to perform music and a broad knowledge of the foundations and principles of music as an art. The BA in music may be completed with an emphasis in jazz, music production, musicology and world music, or music technology and media studies. The BA in music degree is ideal for students who desire working on a second major outside of the College of Music.

## Requirements

### General Requirements

A minimum of 120 credit hours with an overall GPA of 2.00 must be earned for the BA in music degree. Of these credit hours, at least 68 (66 for musicology or music technology emphases) must be in non-music courses. Thirty must be at the 3000 or 4000 level. A minimum of 44 credit hours (51 for musicology or music technology emphases) is required in music courses.

In addition to the general requirements listed above, the following specific general education requirements must be met:

- Six credit hours of Written Communication
- Three credit hours of Quantitative Reasoning
- Twelve credit hours of Social Sciences (to include United States Perspective and Global Perspective)
- Twelve credit hours of Natural Sciences
- Basic proficiency in one foreign language equal to three semesters at the university level. This requirement also may be fulfilled by three years of study in high school in one language or by passing a university proficiency examination.
- Non-music requirements to fulfill the minimum requirement of credit hours outside of music.

The normal pattern for private applied instruction in this degree is one 25-minute lesson per week for 2 credit hours. Not more than 16 credit hours (9 for musicology emphasis, 11 for music technology emphasis) in private instruction may be used toward the degree.

Students registered for applied music must participate in an ensemble as recommended by their applied faculty. A maximum of 4 credit hours (6 for musicology emphasis) in ensemble can apply to the BA in music degree.

# Recommended Four-Year Plans of Study

## General Program (No Emphasis)

| Year One | | Credit Hours |
|---|---|---|
| MUSC 1101 & MUSC 1111 | Semester 1 Theory and Semester 2 Theory | 4 |
| MUSC 1121 & MUSC 1131 | Aural Skills Lab, Semester 1 and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1105 & PMUS 1205 | Keyboard Musicianship 1 and Keyboard-Musicianship 2 | 2 |
| PMUS 1XXX | Applied Instruction | 4 |
| Ensemble | | 2 |
| Foreign language | | 3 |
| Written communication | | 6 |
| Non-music requirements | | 6 |
| | **Credit Hours** | **32** |
| **Year Two** | | |
| MUSC 2101 & MUSC 2111 | Semester 3 Theory and Semester 4 Theory | 4 |
| MUSC 2121 & MUSC 2131 | Aural Skills Lab, Semester 3 and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| PMUS 2XXX | Applied Instruction | 4 |
| Ensemble | | 2 |
| Non-music requirements | | 18 |
| | **Credit Hours** | **31** |
| **Year Three** | | |
| MUSC 3802 & MUSC 3812 | History of Western Music 1 and History of Western Music 2 | 6 |
| Upper-division music theory elective: MUSC 3081, MUSC 4001, MUSC 4011, MUSC 4021, MUSC 4061, MUSC 4071, MUSC 4111, MUSC 4121, MUSC 4141 or MUSC 4151. | | 2 |
| Non-music requirements | | 17 |
| Free electives | | 4 |
| | **Credit Hours** | **29** |
| **Year Four** | | |
| 4000 level electives in Musicology | | 6 |
| Non-music requirements | | 18 |
| Free electives | | 4 |
| | **Credit Hours** | **28** |
| | **Total Credit Hours** | **120** |

## Emphasis in Jazz

| Year One | | Credit Hours |
|---|---|---|
| MUSC 1101 | Semester 1 Theory | 2 |
| MUSC 1111 | Semester 2 Theory | 2 |
| MUSC 3061 | Jazz Improvisation I | 2 |
| MUSC 3071 | Jazz Improvisation II | 2 |
| MUSC 1121 | Aural Skills Lab, Semester 1 | 1 |
| MUSC 1131 | Aural Skills Lab, Semester 2 | 1 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1105 | Keyboard Musicianship 1 | 1 |
| PMUS 1106 | Keyboard-Musicianship 2 | 1 |
| PMUS 1XXX | Applied Instruction | 4 |
| Ensemble | | 2 |
| Written Communication | | 6 |
| Quantitative Reasoning | | 3 |
| | **Credit Hours** | **30** |
| **Year Two** | | |
| MUSC 3081 | Jazz Theory and Aural Foundations 1 | 3 |
| MUSC 3091 | Jazz Theory and Aural Foundations 2 | 3 |
| PMUS 1515 | Jazz Piano Class | 2 |
| PMUS 1XXX | Applied Instruction | 4 |
| Ensemble | | 2 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| Foreign Language | | 3 |
| Social Science | | 9 |
| Natural Science | | 6 |
| | **Credit Hours** | **33** |
| **Year Three** | | |
| MUSC 4031 | Jazz Arranging 1 | 2 |
| MUSC 4091 | Jazz Arranging 2 | 2 |
| MUSC 3802 | History of Western Music 1 | 3 |
| MUSC 3812 | History of Western Music 2 | 3 |
| Free Electives | | 4 |
| Natural Sciences | | 3 |
| Non-Music Requirements | | 12 |
| | **Credit Hours** | **29** |
| **Year Four** | | |
| 4000-level Electives in Musicology | | 3 |
| Free Electives | | 4 |
| Social Science | | 3 |
| Natural Science | | 3 |
| Non-Music Requirements | | 15 |
| | **Credit Hours** | **28** |
| | **Total Credit Hours** | **120** |

## Emphasis in Music Production

| Year One | | Credit Hours |
|---|---|---|
| MUSC 1101 | Semester 1 Theory | 2 |
| MUSC 1111 | Semester 2 Theory | 2 |
| MUSC 1121 | Aural Skills Lab, Semester 1 | 1 |
| MUSC 1131 | Aural Skills Lab, Semester 2 | 1 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1105 or PMUS 1184 or MUSC 1326 | Keyboard Musicianship 1 or Voice Class or Guitar Musicianship and Accompanying | 1 |
| PMUS 1205 | Keyboard-Musicianship 2 | 1 |
| MUSC 2061 | Introduction to Music Technology | 3 |
| Free Electives | | 6 |
| Foreign Language | | 3 |
| Written Communication | | 6 |

| | | |
|---|---|---|
| Quantitative Reasoning | | 3 |
| | **Credit Hours** | **32** |
| **Year Two** | | |
| MUSC 2101 | Semester 3 Theory | 2 |
| MUSC 2121 | Aural Skills Lab, Semester 3 | 1 |
| MUSC 2091 | Recording Techniques | 2 |
| Free Electives | | 7 |
| Social Science | | 6 |
| Natural Science | | 6 |
| Technology & Media Electives | | 3 |
| Non-music Electives | | 3 |
| | **Credit Hours** | **30** |
| **Year Three** | | |
| MUSC 3802 | History of Western Music 1 | 3 |
| MUSC 3812 | History of Western Music 2 | 3 |
| MUSC 3191 | Studio Recording Techniques (Studio Recording Techniques) | 2 |
| MUSC 4111 | Composing at the Computer | 2 |
| MUSC 4121 | Topics in Music Technology | 3 |
| Free Electives | | 2 |
| Social Science | | 6 |
| Natural Science | | 6 |
| Technology & Media Electives | | 3 |
| | **Credit Hours** | **30** |
| **Year Four** | | |
| 4000-level elective in musicology | | 3 |
| Free Electives | | 4 |
| Technology & Media Electives | | 6 |
| Non-music Electives | | 15 |
| | **Credit Hours** | **28** |
| | **Total Credit Hours** | **120** |

## Emphasis in Music Technology and Media Studies

| **Year One** | | **Credit Hours** |
|---|---|---|
| MUSC 1101 & MUSC 1111 | Semester 1 Theory and Semester 2 Theory | 4 |
| MUSC 1121 & MUSC 1131 | Aural Skills Lab, Semester 1 and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| MUSC 2061 | Introduction to Music Technology | 3 |
| PMUS 1105 & PMUS 1205 | Keyboard Musicianship 1 and Keyboard-Musicianship 2 | 2 |
| PMUS 1XXX | Applied Instruction | 4 |
| Written communication | | 6 |
| Ensemble | | 2 |
| Foreign language | | 3 |
| Non-music requirements | | 3 |
| | **Credit Hours** | **32** |
| **Year Two** | | |
| MUSC 2081 | Prepared for the Soundcheck | 2 |
| MUSC 2091 | Recording Techniques | 2 |
| MUSC 2101 & MUSC 2111 | Semester 3 Theory and Semester 4 Theory | 4 |
| MUSC 2121 & MUSC 2131 | Aural Skills Lab, Semester 3 and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| PMUS 2XXX | Applied Instruction | 4 |
| Ensemble | | 2 |
| Non-music requirements | | 12 |
| Free elective | | 1 |
| | **Credit Hours** | **30** |
| **Year Three** | | |
| MUSC 3802 & MUSC 3812 | History of Western Music 1 and History of Western Music 2 | 6 |
| MUSC 4111 | Composing at the Computer | 2 |
| MUSC 4121 | Topics in Music Technology | 3 |
| Non-music requirements | | 18 |
| Free elective | | 1 |
| | **Credit Hours** | **30** |
| **Year Four** | | |
| 4000-level elective in musicology | | 3 |
| Non-music requirements | | 24 |
| Free elective | | 1 |
| | **Credit Hours** | **28** |
| | **Total Credit Hours** | **120** |

## Emphasis in Musicology and World Musics

| **Year One** | | **Credit Hours** |
|---|---|---|
| MUSC 1101 & MUSC 1111 | Semester 1 Theory and Semester 2 Theory | 4 |
| MUSC 1121 & MUSC 1131 | Aural Skills Lab, Semester 1 and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1105 & PMUS 1205 | Keyboard Musicianship 1 and Keyboard-Musicianship 2 | 2 |
| PMUS 1XXX | Applied Instruction | 4 |
| Ensemble | | 2 |
| Written communication | | 6 |
| Foreign language | | 3 |
| Non-music requirements | | 6 |
| | **Credit Hours** | **32** |
| **Year Two** | | |
| MUSC 2101 & MUSC 2111 | Semester 3 Theory and Semester 4 Theory | 4 |
| MUSC 2121 & MUSC 2131 | Aural Skills Lab, Semester 3 and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2988 | Introduction to Music Research | 1 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| PMUS 2XXX | Applied Instruction | 2 |
| Ensemble | | 2 |
| Non-music requirements | | 15 |
| Free electives | | 3 |
| | **Credit Hours** | **30** |

| | | |
|---|---|---|
| **Year Three** | | |
| MUSC 3802 & MUSC 3812 | History of Western Music 1 and History of Western Music 2 | 6 |
| MUSC 4168 | World Music Theories | 3 |
| Upper-division music theory elective: MUSC 3081, MUSC 4001, MUSC 4011, MUSC 4021, MUSC 4061, MUSC 4071, MUSC 4111, MUSC 4121, MUSC 4141 or MUSC 4151. | | 2 |
| Ensemble | | 2 |
| Non-music requirements | | 18 |
| | **Credit Hours** | **31** |
| **Year Four** | | |
| MUSC 4112 | Ethnomusicology | 3 |
| 4000-level elective in musicology | | 6 |
| Non-music requirements | | 18 |
| | **Credit Hours** | **27** |
| | **Total Credit Hours** | **120** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Develop basic musicianship.
- Analyze and think critically about music.
- Broaden knowledge of the foundations and principles of music as an art.
- Demonstrate an understanding of theoretical studies, including sight-reading and ear training.
- Demonstrate an understanding of historical studies including the analysis of stylistic periods and music of non-Western cultures.

# Music - Bachelor of Music (BMus)

The undergraduate degrees in music emphasize knowledge and awareness of:

- Solo performance and technique, including the various musical styles used in compositions for students' musical instruments or voice;
- Each composition performed, notation and editorial signs used in the compositions performed, and repertoire for the students' performance medium;
- Ensemble performance, including familiarity with major composers in the student's performance medium and the techniques necessary to blend a number of individual musicians into an ensemble;
- Concert and recital opportunities, including literature composed for different performance forces;
- Theoretical studies, including tonal harmony, counterpoint, voice-leading and notation; formal principles and analytical techniques for tonal music; and instruments in score, including the concert pitch of transposing instruments and nomenclature used in scores; and
- Historical studies, including representative works in the canon of musical literature from chant to the present, the general outlines of the history of music from the Middle Ages to the present, music in the United States and musical cultures other than those of Europe.

# Concentration Areas

The four-year professional curriculum leading to the Bachelor of Music degree emphasizes creative skill, academic achievement and artistic performance in music. Concentration areas are offered in performance, composition, musicology and jazz studies.

# Requirements

## Program Requirements

A half recital in the junior year and a full recital in the senior year are required of students in the performance concentration areas, except musical theatre. Students should check with their advisor about preview policies.

A senior thesis is required of students in musicology. Music composition students must complete a senior project. Musical theatre students produce a senior showcase. Student advisors must approve senior thesis, senior project, and senior showcase plans.

Ensemble and chamber music requirements are specified in the degree plan for each concentration as approved by applied area faculty. Exceptions to these requirements must be approved by the major advisor and associate dean in consultation with area chairs and ensemble conductors.

Students pursuing the Bachelor of Music degree will be required to take one 3-credit-hour course in Written Communication through the Program for Writing and Rhetoric or the English department. Courses such as First-Year Writing and Rhetoric (WRTG 1150), Writing, Reading, Culture (ENGL 1001) or Introduction to Creative Writing (ENGL 1191) fulfill the requirement. The credit hours are applied in the liberal arts electives category. Students are strongly encouraged to complete this requirement by the end of their freshman year.

## Concentration Areas

See the Plans of Study (p. 1055) tab for concentration-specific recommended plans of study.

# Four-Year Plans of Study

## Brass Performance Concentration Area

| | | |
|---|---|---|
| **Year One** | | **Credit Hours** |
| MUSC 1101 & MUSC 1111 | Semester 1 Theory and Semester 2 Theory | 4 |
| MUSC 1121 & MUSC 1131 | Aural Skills Lab, Semester 1 and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1XXX | Applied Instruction | 6 |
| PMUS 1105 & PMUS 1205 | Keyboard Musicianship 1 and Keyboard-Musicianship 2 | 2 |
| Ensemble | | 2 |
| Written communication | | 3 |
| Non-music electives | | 6 |
| | **Credit Hours** | **28** |
| **Year Two** | | |
| MUSC 2101 & MUSC 2111 | Semester 3 Theory and Semester 4 Theory | 4 |
| MUSC 2121 & MUSC 2131 | Aural Skills Lab, Semester 3 and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2918 | Building Your Music Career (5-week segment) | 2 |
| MUSC 2997 | Sophomore Proficiency | 1 |

| | | |
|---|---|---|
| EMUS 1507 | Chamber Music | 2 |
| PMUS 2XXX | Applied Instruction | 5 |
| Ensemble | | 2 |
| Music electives | | 2 |
| MUSC 2081<br>or MUSC 2041<br>or MUSC 2061 | Prepared for the Soundcheck<br>or Applications of Music Technology (5-week segment)<br>or Introduction to Music Technology | 2 |
| Non-music electives | | 9 |
| | **Credit Hours** | **31** |
| **Year Three** | | |
| MUSC 3802<br>& MUSC 3812 | History of Western Music 1<br>and History of Western Music 2 | 6 |
| MUSC 3176 | Conducting 1 | 2 |
| MUSC 3997 | Junior Recital | 1 |
| PMUS 3XXX | Applied Instruction | 5 |
| EMUS 3507 | Chamber Music | 2 |
| Ensemble | | 2 |
| Music electives | | 1 |
| Non-music electives | | 6 |
| Free electives | | 6 |
| | **Credit Hours** | **31** |
| **Year Four** | | |
| MUSC 4997 | Senior Recital | 1 |
| MUSC 4336 | Brass Pedagogy | 2 |
| PMUS 4XXX | Applied Instruction | 5 |
| Upper-division music theory elective (3000- or 4000-level theory classes, except MUSC 4101) | | 2 |
| 4000-level elective in musicology | | 3 |
| Ensemble | | 2 |
| Music electives | | 5 |
| Non-music electives | | 6 |
| Free electives | | 4 |
| | **Credit Hours** | **30** |
| | **Total Credit Hours** | **120** |

## Brass Performance with Secondary Emphasis in Jazz (Available for Trumpet/Trombone)

| **Year One** | | **Credit Hours** |
|---|---|---|
| PMUS 1XXX | Applied Instruction | 6 |
| Ensemble | | 2 |
| MUSC 1101<br>& MUSC 1111 | Semester 1 Theory<br>and Semester 2 Theory | 4 |
| MUSC 1121<br>& MUSC 1131 | Aural Skills Lab, Semester 1<br>and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1105<br>& PMUS 1205 | Keyboard Musicianship 1<br>and Keyboard-Musicianship 2 | 2 |
| MUSC 3061 | Jazz Improvisation I | 2 |
| Written communication | | 3 |
| Non-music electives | | 6 |
| Free electives | | 2 |
| | **Credit Hours** | **32** |
| **Year Two** | | |
| PMUS 2XXX | Applied Instruction | 5 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| Ensemble | | 2 |
| EMUS 1507 | Chamber Music | 2 |
| MUSC 2101<br>& MUSC 2111 | Semester 3 Theory<br>and Semester 4 Theory | 4 |
| MUSC 2121<br>& MUSC 2131 | Aural Skills Lab, Semester 3<br>and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2918 | Building Your Music Career (5-week segment) | 2 |
| MUSC 2081<br>or MUSC 2041<br>or MUSC 2061 | Prepared for the Soundcheck<br>or Applications of Music Technology (5-week segment)<br>or Introduction to Music Technology | 2 |
| Non-music electives | | 6 |
| Free electives | | 4 |
| | **Credit Hours** | **30** |
| **Year Three** | | |
| PMUS 3XXX | Applied Instruction | 5 |
| MUSC 3997 | Junior Recital | 1 |
| Ensemble | | 1 |
| EMUS 3427 | Jazz Ensemble | 1 |
| EMUS 3437 | Jazz Combo | 1 |
| EMUS 3507 | Chamber Music | 1 |
| MUSC 3081 | Jazz Theory and Aural Foundations 1 | 3 |
| MUSC 3802<br>& MUSC 3812 | History of Western Music 1<br>and History of Western Music 2 | 6 |
| MUSC 3176 | Conducting 1 | 2 |
| Non-music electives | | 9 |
| Free electives | | 2 |
| | **Credit Hours** | **32** |
| **Year Four** | | |
| PMUS 4XXX | Applied Instruction | 5 |
| MUSC 4997 | Senior Recital | 1 |
| EMUS 3427 | Jazz Ensemble | 2 |
| EMUS 3437 | Jazz Combo | 2 |
| 4000-level elective in musicology | | 3 |
| Non-music electives | | 6 |
| Free electives | | 7 |
| | **Credit Hours** | **26** |
| | **Total Credit Hours** | **120** |

## Classical Guitar Performance Concentration Area

| **Year One** | | **Credit Hours** |
|---|---|---|
| MUSC 1101<br>& MUSC 1111 | Semester 1 Theory<br>and Semester 2 Theory | 4 |
| MUSC 1121<br>& MUSC 1131 | Aural Skills Lab, Semester 1<br>and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1326 | Guitar Musicianship and Accompanying | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |

| | | |
|---|---|---|
| PMUS 1105 & PMUS 1205 | Keyboard Musicianship 1 and Keyboard-Musicianship 2 | 2 |
| PMUS 1566 | Applied Instruction | 6 |
| Written communication | | 3 |
| Non-music electives | | 6 |
| Ensemble | | 1 |
| Free electives | | 1 |
| | **Credit Hours** | **30** |
| **Year Two** | | |
| MUSC 2101 & MUSC 2111 | Semester 3 Theory and Semester 4 Theory | 4 |
| MUSC 2121 & MUSC 2131 | Aural Skills Lab, Semester 3 and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2918 | Building Your Music Career (5-week segment) | 2 |
| MUSC 3256 | Guitar Pedagogy | 2 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| PMUS 2566 | Applied Instruction | 6 |
| Ensemble | | 2 |
| MUSC 2061 or MUSC 2041 or MUSC 2081 | Introduction to Music Technology or Applications of Music Technology (5-week segment) or Prepared for the Soundcheck | 3 |
| Music electives | | 3 |
| Non-music electives | | 6 |
| | **Credit Hours** | **31** |
| **Year Three** | | |
| MUSC 3176 | Conducting 1 | 2 |
| MUSC 3802 & MUSC 3812 | History of Western Music 1 and History of Western Music 2 | 6 |
| MUSC 3997 | Junior Recital | 1 |
| MUSC 4061 | Tonal Analysis | 2 |
| MUSC 4106 | Guitar Literature | 2 |
| PMUS 3566 | Applied Instruction | 6 |
| Ensemble | | 2 |
| Non-music electives | | 6 |
| Free electives | | 4 |
| | **Credit Hours** | **31** |
| **Year Four** | | |
| MUSC 4997 | Senior Recital | 1 |
| PMUS 4566 | Applied Instruction | 6 |
| 4000-level elective in musicology | | 3 |
| Upper-division music theory elective (3000- or 4000-level theory class, except MUSC 4101) | | 2 |
| Ensemble | | 2 |
| Non-music electives | | 9 |
| Free electives | | 5 |
| | **Credit Hours** | **28** |
| | **Total Credit Hours** | **120** |

## Composition Concentration Area

| **Year One** | | **Credit Hours** |
|---|---|---|
| MUSC 1101 & MUSC 1111 | Semester 1 Theory and Semester 2 Theory | 4 |
| MUSC 1121 & MUSC 1131 | Aural Skills Lab, Semester 1 and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| Keyboard Musicianship and/or Secondary Applied Instruction | | 2 |
| PMUS 1526 | Applied Instruction | 6 |
| Ensemble | | 2 |
| Written communication | | 3 |
| Non-music electives | | 6 |
| Free electives | | 1 |
| | **Credit Hours** | **29** |
| **Year Two** | | |
| MUSC 2081 or MUSC 2041 or MUSC 2061 | Prepared for the Soundcheck or Applications of Music Technology (5-week segment) or Introduction to Music Technology | 2 |
| MUSC 2101 & MUSC 2111 | Semester 3 Theory and Semester 4 Theory | 4 |
| MUSC 2121 & MUSC 2131 | Aural Skills Lab, Semester 3 and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2918 | Building Your Music Career (5-week segment) | 2 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| MUSC 4001 | New Musical Styles and Practices | 2 |
| PMUS 2526 | Applied Instruction | 5 |
| Keyboard Musicianship and/or Secondary Applied Instruction | | 2 |
| Ensemble | | 2 |
| Non-music electives | | 9 |
| Free electives | | 1 |
| | **Credit Hours** | **32** |
| **Year Three** | | |
| MUSC 3176 | Conducting 1 | 2 |
| MUSC 3802 & MUSC 3812 | History of Western Music 1 and History of Western Music 2 | 6 |
| MUSC 4021 | 18th Century Counterpoint | 2 |
| MUSC 4041 | Orchestration | 2 |
| MUSC 4071 | Post-Tonal Theory and Analysis | 2 |
| PMUS 3526 | Applied Instruction | 6 |
| Secondary Applied Instruction or music electives (if admitted without vocal/instrumental audition) | | 2 |
| Ensemble | | 2 |
| Non-music electives | | 6 |
| Free electives | | 1 |
| | **Credit Hours** | **31** |
| **Year Four** | | |
| MUSC 4061 | Tonal Analysis | 2 |
| MUSC 4141 | Instrument Design Lab: Sound, Perception & Creativity | 2 |
| MUSC 4997 | Senior Recital (Senior Project) | 1 |
| PMUS 4526 | Applied Instruction | 5 |

| | | |
|---|---|---|
| 4000-level elective in musicology | | 3 |
| Secondary Applied Instruction or music electives (if admitted without vocal/instrumental audition) | | 2 |
| Ensemble | | 2 |
| Non-music electives | | 6 |
| Free electives | | 5 |
| | **Credit Hours** | **28** |
| | **Total Credit Hours** | **120** |

## Harp Performance Concentration Area

| **Year One** | | **Credit Hours** |
|---|---|---|
| MUSC 1101 & MUSC 1111 | Semester 1 Theory and Semester 2 Theory | 4 |
| MUSC 1121 & MUSC 1131 | Aural Skills Lab, Semester 1 and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1105 & PMUS 1205 | Keyboard Musicianship 1 and Keyboard-Musicianship 2 | 2 |
| PMUS 1576 | Applied Instruction | 6 |
| Ensemble | | 2 |
| Written communication | | 3 |
| Non-music electives | | 6 |
| Free electives | | 2 |
| | **Credit Hours** | **30** |
| **Year Two** | | |
| MUSC 2101 & MUSC 2111 | Semester 3 Theory and Semester 4 Theory | 4 |
| MUSC 2121 & MUSC 2131 | Aural Skills Lab, Semester 3 and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2918 | Building Your Music Career (5-week segment) | 2 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| MUSC 2081 or MUSC 2041 or MUSC 2061 | Prepared for the Soundcheck or Applications of Music Technology (5-week segment) or Introduction to Music Technology | 2 |
| PMUS 2576 | Applied Instruction | 6 |
| Ensemble | | 2 |
| Music electives | | 2 |
| Non-music electives | | 9 |
| Free electives | | 1 |
| | **Credit Hours** | **31** |
| **Year Three** | | |
| MUSC 3802 & MUSC 3812 | History of Western Music 1 and History of Western Music 2 | 6 |
| MUSC 3997 | Junior Recital | 1 |
| MUSC 3176 | Conducting 1 | 2 |
| EMUS 3507 | Chamber Music | 1 |
| PMUS 3576 | Applied Instruction | 6 |
| Ensemble | | 2 |
| Music electives | | 5 |
| Non-music electives | | 6 |
| Free electives | | 2 |
| | **Credit Hours** | **31** |
| **Year Four** | | |
| MUSC 4997 | Senior Recital | 1 |
| EMUS 3507 | Chamber Music | 2 |
| PMUS 4576 | Applied Instruction | 6 |
| Upper-division music theory elective (3000- or 4000-level theory classes, except MUSC 4101) | | 2 |
| 4000-level elective in musicology | | 3 |
| Ensemble | | 2 |
| Non-music electives | | 6 |
| Free electives | | 5 |
| Music electives | | 1 |
| | **Credit Hours** | **28** |
| | **Total Credit Hours** | **120** |

## Harpsichord Performance Concentration Area

| **Year One** | | **Credit Hours** |
|---|---|---|
| MUSC 1101 & MUSC 1111 | Semester 1 Theory and Semester 2 Theory | 4 |
| MUSC 1121 & MUSC 1131 | Aural Skills Lab, Semester 1 and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1586 | Applied Instruction | 6 |
| Ensemble | | 2 |
| Written communication | | 3 |
| Non-music electives | | 9 |
| Free electives | | 3 |
| | **Credit Hours** | **32** |
| **Year Two** | | |
| MUSC 2101 & MUSC 2111 | Semester 3 Theory and Semester 4 Theory | 4 |
| MUSC 2121 & MUSC 2131 | Aural Skills Lab, Semester 3 and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2918 | Building Your Music Career (5-week segment) | 2 |
| MUSC 2061 or MUSC 2041 or MUSC 2081 | Introduction to Music Technology or Applications of Music Technology (5-week segment) or Prepared for the Soundcheck | 3 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| PMUS 2586 | Applied Instruction | 5 |
| Ensemble | | 2 |
| Secondary Applied Instruction | | 4 |
| Non-music electives | | 6 |
| Free electives | | 2 |
| | **Credit Hours** | **31** |
| **Year Three** | | |
| MUSC 3176 | Conducting 1 (fall) | 2 |
| MUSC 4011 | 16th Century Counterpoint | 2 |
| MUSC 3802 & MUSC 3812 | History of Western Music 1 and History of Western Music 2 | 6 |
| MUSC 4061 | Tonal Analysis | 2 |

| | | |
|---|---|---|
| MUSC 3997 | Junior Recital | 1 |
| MUSC 4405 | Basso-Continuo Accompaniment | 2 |
| PMUS 3586 | Applied Instruction | 6 |
| Ensemble | | 2 |
| Non-music electives | | 6 |
| Free electives | | 1 |
| | **Credit Hours** | **30** |
| **Year Four** | | |
| MUSC 4852 | 17th and Early 18th Century Music | 3 |
| MUSC 3345 | Piano Pedagogy 1 | 2 |
| MUSC 4021 | 18th Century Counterpoint (fall) | 2 |
| MUSC 4997 | Senior Recital | 1 |
| PMUS 4586 | Applied Instruction | 6 |
| 4000-level elective in musicology | | 3 |
| Ensemble | | 2 |
| Non-music electives | | 6 |
| Free electives | | 2 |
| | **Credit Hours** | **27** |
| | **Total Credit Hours** | **120** |

## Jazz Piano Performance Concentration Area

| **Year One** | | **Credit Hours** |
|---|---|---|
| EMUS 1427<br>or EMUS 1437 | Jazz Ensemble<br>or Jazz Combo | 2 |
| MUSC 1101<br>& MUSC 1111 | Semester 1 Theory<br>and Semester 2 Theory | 4 |
| MUSC 1121<br>& MUSC 1131 | Aural Skills Lab, Semester 1<br>and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1325 | Piano Sight Reading | 1 |
| MUSC 2365 | Introduction to Accompanying | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| MUSC 3061<br>& MUSC 3071 | Jazz Improvisation I<br>and Jazz Improvisation II | 4 |
| PMUS 1806 | Applied Instruction | 8 |
| Free elective | | 1 |
| Written communication | | 3 |
| | **Credit Hours** | **30** |
| **Year Two** | | |
| EMUS 1427<br>or EMUS 1437 | Jazz Ensemble<br>or Jazz Combo | 2 |
| MUSC 2918 | Building Your Music Career (5-week segment) | 2 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| MUSC 3081 | Jazz Theory and Aural Foundations 1 | 3 |
| MUSC 3091 | Jazz Theory and Aural Foundations 2 | 3 |
| MUSC 3642 | History of Jazz 1 | 3 |
| MUSC 3652 | History of Jazz 2 | 3 |
| MUSC 2041<br>or MUSC 2061<br>or MUSC 2081 | Applications of Music Technology (5-week segment)<br>or Introduction to Music Technology<br>or Prepared for the Soundcheck | 1 |
| PMUS 2806 | Applied Instruction | 8 |
| Non-jazz ensemble | | 2 |
| Free electives | | 3 |
| | **Credit Hours** | **31** |
| **Year Three** | | |
| EMUS 3427<br>or EMUS 3437 | Jazz Ensemble<br>or Jazz Combo | 2 |
| MUSC 3802<br>& MUSC 3812 | History of Western Music 1<br>and History of Western Music 2 | 6 |
| MUSC 3997 | Junior Recital | 1 |
| MUSC 4031 | Jazz Arranging 1 | 2 |
| MUSC 4091 | Jazz Arranging 2 | 2 |
| PMUS 3806 | Applied Instruction | 5 |
| Non-music electives | | 12 |
| | **Credit Hours** | **30** |
| **Year Four** | | |
| EMUS 3427<br>or EMUS 3437 | Jazz Ensemble<br>or Jazz Combo | 2 |
| MUSC 3253 | Jazz Techniques for the Music Educator | 2 |
| MUSC 4997 | Senior Recital | 1 |
| MUSC 4161 | Advanced Jazz Composition and Analysis | 2 |
| MUSC 4171 | Advanced Jazz Improvisation and Analysis | 2 |
| PMUS 4806 | Applied Instruction | 5 |
| African American History | | 3 |
| Non-music electives | | 12 |
| | **Credit Hours** | **29** |
| | **Total Credit Hours** | **120** |

## Jazz Studies Concentration Area

| **Year One** | | **Credit Hours** |
|---|---|---|
| EMUS 1427<br>or EMUS 1437 | Jazz Ensemble<br>or Jazz Combo | 2 |
| MUSC 1101<br>& MUSC 1111 | Semester 1 Theory<br>and Semester 2 Theory | 4 |
| MUSC 1121<br>& MUSC 1131 | Aural Skills Lab, Semester 1<br>and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| MUSC 3061<br>& MUSC 3071 | Jazz Improvisation I<br>and Jazz Improvisation II | 4 |
| PMUS 1105<br>& PMUS 1205 | Keyboard Musicianship 1<br>and Keyboard-Musicianship 2 | 2 |
| PMUS 1XXX | Applied Instruction | 6 |
| Non-jazz ensemble | | 1 |
| Written communication | | 3 |
| Non-music electives | | 3 |
| Free electives | | 2 |
| | **Credit Hours** | **32** |
| **Year Two** | | |
| EMUS 1427<br>or EMUS 1437 | Jazz Ensemble<br>or Jazz Combo | 2 |
| MUSC 2918 | Building Your Music Career (5-week segment) | 2 |
| MUSC 2997 | Sophomore Proficiency | 1 |

| | | |
|---|---|---|
| MUSC 3081 | Jazz Theory and Aural Foundations 1 | 3 |
| MUSC 3091 | Jazz Theory and Aural Foundations 2 | 3 |
| MUSC 3642 | History of Jazz 1 | 3 |
| MUSC 3652 | History of Jazz 2 | 3 |
| PMUS 1515 | Jazz Piano Class | 2 |
| MUSC 2041<br>or MUSC 2061<br>or MUSC 2081 | Applications of Music Technology (5-week segment)<br>or Introduction to Music Technology<br>or Prepared for the Soundcheck | 1 |
| PMUS 2XXX | Applied Instruction | 5 |
| Non-jazz ensemble | | 1 |
| Non-music electives | | 3 |
| Free electives | | 2 |
| | **Credit Hours** | **31** |
| **Year Three** | | |
| EMUS 3427<br>or EMUS 3437 | Jazz Ensemble<br>or Jazz Combo | 2 |
| MUSC 3253 | Jazz Techniques for the Music Educator | 2 |
| MUSC 3802<br>& MUSC 3812 | History of Western Music 1<br>and History of Western Music 2 | 6 |
| MUSC 4031<br>& MUSC 4091 | Jazz Arranging 1<br>and Jazz Arranging 2 | 4 |
| MUSC 3997 | Junior Recital | 1 |
| PMUS 3XXX | Applied Instruction | 5 |
| Non-music electives | | 9 |
| Free electives | | 1 |
| | **Credit Hours** | **30** |
| **Year Four** | | |
| EMUS 3427<br>or EMUS 3437 | Jazz Ensemble<br>or Jazz Combo | 2 |
| MUSC 4997 | Senior Recital | 1 |
| MUSC 4161 | Advanced Jazz Composition and Analysis | 2 |
| MUSC 4171 | Advanced Jazz Improvisation and Analysis | 2 |
| PMUS 4XXX | Applied Instruction | 5 |
| African American History | | 3 |
| Non-music electives | | 9 |
| Free electives | | 3 |
| | **Credit Hours** | **27** |
| | **Total Credit Hours** | **120** |

## Musical Theatre Concentration Area

Students pursuing the musical theatre concentration area must register for an appropriate ensemble each semester that they are enrolled in applied instruction. These may include choral, opera, or musical theatre ensembles. Major role in musical theatre or opera in junior and senior year with approval of Voice/MT/Opera faculty. Senior showcase performance excuses student from ensemble in final semester.

Acting and dance courses offered by Theatre and Dance are encouraged to be a large part of the non-music elective credit hours.

Elective music courses (MUEL) cannot fulfill non-music requirements.

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| Applied Instruction | | 3 |
| University Ensemble | | 1 |
| MUSC 1101 | Semester 1 Theory | 2 |
| MUSC 1121 | Aural Skills Lab, Semester 1 | 1 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1105 | Keyboard Musicianship 1 | 1 |
| MUSC 1554 | English Diction | 1 |
| PMUS 1117 | Musical Theatre Studio I | 2 |
| Dance elective | | 1 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| Applied Instruction | | 3 |
| University Ensemble | | 1 |
| MUSC 1111 | Semester 2 Theory | 2 |
| MUSC 1131 | Aural Skills Lab, Semester 2 | 1 |
| PMUS 1205 | Keyboard-Musicianship 2 | 1 |
| MUSC 1544 | Italian Diction | 1 |
| PMUS 1217 | Musical Theatre Studio II | 2 |
| Written Communication (Gen Ed) | | 3 |
| Dance electives | | 2 |
| | **Credit Hours** | **16** |
| **Year Two** | | |
| **Fall Semester** | | |
| Applied Instruction | | 3 |
| University Ensemble | | 1 |
| MUSC 2101 | Semester 3 Theory | 2 |
| MUSC 2121 | Aural Skills Lab, Semester 3 | 1 |
| MUSC 2918 | Building Your Music Career (5-week segment) | 2 |
| PMUS 2044 | Foundational Musical Theatre Styles | 3 |
| Dance elective | | 1 |
| Non-music electives | | 3 |
| | **Credit Hours** | **16** |
| **Spring Semester** | | |
| Applied Instruction | | 2 |
| University Ensemble | | 1 |
| Music Technology Elective | | 1 |
| MUSC 2041 | Applications of Music Technology (5-week segment) | |
| MUSC 2061 | Introduction to Music Technology | |
| MUSC 2081 | Prepared for the Soundcheck | |
| MUSC 2111 | Semester 4 Theory | 2 |
| MUSC 2131 | Aural Skills Lab, Semester 4 | 1 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| PMUS 2117 | Musical Theatre Studio Class III | 2 |
| Non-music electives | | 6 |
| | **Credit Hours** | **16** |

| | | |
|---|---|---|
| **Year Three** | | |
| **Fall Semester** | | |
| Applied Instruction | | 2 |
| University Ensemble | | 1 |
| MUSC 3802 | History of Western Music 1 | 3 |
| PMUS 4137 | Opera Theatre 1 | 1 |
| Dance electives | | 2 |
| Non-music electives | | 6 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| Applied Instruction | | 3 |
| University Ensemble | | 1 |
| MUSC 3812 | History of Western Music 2 | 3 |
| PMUS 3117 | Musical Theatre Studio Class IV | 2 |
| PMUS 4147 | Opera Theatre 2 | 1 |
| Non-music electives | | 3 |
| Free electives (recommended: high-level Acting or Dance courses) | | 2 |
| | **Credit Hours** | **15** |
| **Year Four** | | |
| **Fall Semester** | | |
| Applied Instruction | | 3 |
| University Ensemble | | 1 |
| MUSC 4XX1 | Upper-Division Music Theory | 2 |
| MUSC 4034 | Musical Theatre History 1 - Antecedents through Musical Comedy | 3 |
| Dance electives | | 2 |
| Non-music electives | | 4 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| Applied Instruction | | 2 |
| MUSC 4044 | American Musical Theatre History 2 - Golden Age to Contemporary | 3 |
| PMUS 4117 | Musical Theatre Studio V | 2 |
| Dance elective | | 1 |
| Non-music elective | | 1 |
| Free electives (recommended: high-level Acting or Dance courses) | | 3 |
| | **Credit Hours** | **12** |
| | **Total Credit Hours** | **120** |

## Musicology Concentration Area

In addition to the requirements applying to all bachelor of music curricula, a second-year proficiency is required in one foreign language.

| **Year One** | | **Credit Hours** |
|---|---|---|
| HIST 1011 | Greeks, Romans, Kings & Crusaders: European History to 1600 | 3 |
| HIST 1012 | Empire, Revolution and Global War: European History Since 1600 | 3 |
| MUSC 1101 & MUSC 1111 | Semester 1 Theory and Semester 2 Theory | 4 |
| MUSC 1121 & MUSC 1131 | Aural Skills Lab, Semester 1 and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1XXX | Applied instruction | 4 |
| PMUS 1105 & PMUS 1205 | Keyboard Musicianship 1 and Keyboard-Musicianship 2 | 2 |
| Ensemble | | 2 |
| Written communication | | 6 |
| Non-music electives | | 3 |
| | **Credit Hours** | **32** |
| **Year Two** | | |
| MUSC 2101 & MUSC 2111 | Semester 3 Theory and Semester 4 Theory | 4 |
| MUSC 2121 & MUSC 2131 | Aural Skills Lab, Semester 3 and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2918 | Building Your Music Career (5-week segment) | 2 |
| MUSC 2988 | Introduction to Music Research | 1 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| MUSC 2041 or MUSC 2061 or MUSC 2081 | Applications of Music Technology (5-week segment) or Introduction to Music Technology or Prepared for the Soundcheck | 1 |
| PMUS 2XXX | Applied instruction | 4 |
| Ensemble | | 2 |
| Music electives | | 4 |
| Non-music electives | | 6 |
| Free electives | | 4 |
| | **Credit Hours** | **31** |
| **Year Three** | | |
| MUSC 3176 | Conducting 1 | 2 |
| MUSC 3802 & MUSC 3812 | History of Western Music 1 and History of Western Music 2 | 6 |
| MUSC 4061 | Tonal Analysis | 2 |
| PMUS 3XXX | Applied instruction | 4 |
| Ensemble | | 2 |
| 4000-level electives in musicology (two non-Western) | | 6 |
| Non-music electives | | 6 |
| Free electives | | 3 |
| | **Credit Hours** | **31** |
| **Year Four** | | |
| MUSC 4011 or MUSC 4021 | 16th Century Counterpoint or 18th Century Counterpoint | 2 |
| MUSC 4071 | Post-Tonal Theory and Analysis | 2 |
| MUSC 4957 | Senior Thesis | 4 |
| TMUS 4403 | Special Studies Music History | 2 |
| 4000-level electives in musicology (two non-Western) | | 6 |
| Non-music electives | | 3 |
| Free electives | | 7 |
| | **Credit Hours** | **26** |
| | **Total Credit Hours** | **120** |

## Organ Performance Concentration Area

| Year One | | Credit Hours |
|---|---|---|
| MUSC 1101 & MUSC 1111 | Semester 1 Theory and Semester 2 Theory | 4 |
| MUSC 1121 & MUSC 1131 | Aural Skills Lab, Semester 1 and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1616 | Applied Instruction | 6 |
| Ensemble | | 2 |
| Performance minor | | 2 |
| Written communication | | 3 |
| Non-music electives | | 3 |
| Free electives | | 3 |
| | **Credit Hours** | **28** |
| **Year Two** | | |
| MUSC 2101 & MUSC 2111 | Semester 3 Theory and Semester 4 Theory | 4 |
| MUSC 2121 & MUSC 2131 | Aural Skills Lab, Semester 3 and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2918 | Building Your Music Career (5-week segment) | 2 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| MUSC 2061 or MUSC 2041 or MUSC 2081 | Introduction to Music Technology or Applications of Music Technology (5-week segment) or Prepared for the Soundcheck | 3 |
| PMUS 2616 | Applied Instruction | 5 |
| Ensemble | | 2 |
| Performance minor | | 2 |
| Music electives | | 2 |
| Non-music electives | | 6 |
| Free electives | | 3 |
| | **Credit Hours** | **32** |
| **Year Three** | | |
| MUSC 3176 | Conducting 1 | 2 |
| MUSC 3345 | Piano Pedagogy 1 | 2 |
| MUSC 3802 & MUSC 3812 | History of Western Music 1 and History of Western Music 2 | 6 |
| MUSC 3997 | Junior Recital | 1 |
| MUSC 4021 | 18th Century Counterpoint | 2 |
| MUSC 4285: Organ Survey | | 3 |
| MUSC 4295: Organ Survey | | 3 |
| PMUS 3616 | Applied Instruction | 6 |
| Ensemble | | 2 |
| Non-music electives | | 6 |
| | **Credit Hours** | **33** |
| **Year Four** | | |
| MUSC 4011 | 16th Century Counterpoint | 2 |
| MUSC 4997 | Senior Recital | 1 |
| PMUS 4616 | Applied Instruction | 6 |
| 4000-level elective in musicology | | 3 |
| Ensemble | | 1 |
| Non-music electives | | 12 |
| Free electives | | 2 |
| | **Credit Hours** | **27** |
| | **Total Credit Hours** | **120** |

## Percussion Performance Concentration Area

| Year One | | Credit Hours |
|---|---|---|
| MUSC 1101 & MUSC 1111 | Semester 1 Theory and Semester 2 Theory | 4 |
| MUSC 1121 & MUSC 1131 | Aural Skills Lab, Semester 1 and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1626 | Applied Instruction | 6 |
| PMUS 1105 & PMUS 1205 | Keyboard Musicianship 1 and Keyboard-Musicianship 2 | 2 |
| Ensemble | | 2 |
| Written communication | | 3 |
| Non-music electives | | 6 |
| | **Credit Hours** | **28** |
| **Year Two** | | |
| EMUS 1417 | Percussion Ensemble | 2 |
| MUSC 2101 & MUSC 2111 | Semester 3 Theory and Semester 4 Theory | 4 |
| MUSC 2121 & MUSC 2131 | Aural Skills Lab, Semester 3 and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2918 | Building Your Music Career (5-week segment) | 2 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| MUSC 2061 or MUSC 2041 or MUSC 2081 | Introduction to Music Technology or Applications of Music Technology (5-week segment) or Prepared for the Soundcheck | 3 |
| PMUS 2626 | Applied Instruction | 5 |
| Ensemble | | 2 |
| Music electives | | 2 |
| Non-music electives | | 9 |
| | **Credit Hours** | **32** |
| **Year Three** | | |
| EMUS 3417 | Percussion Ensemble | 2 |
| MUSC 3802 & MUSC 3812 | History of Western Music 1 and History of Western Music 2 | 6 |
| MUSC 3176 | Conducting 1 | 2 |
| MUSC 3226 | Percussion Literature and Pedagogy for Undergraduate Percussion Majors | 1 |
| MUSC 3997 | Junior Recital | 1 |
| PMUS 3626 | Applied Instruction | 4 |
| Ensemble | | 2 |
| Upper-division music theory elective (3000- or 4000-level theory classes, except MUSC 4101) | | 2 |
| Music electives | | 1 |
| Non-music electives | | 6 |
| Free electives | | 6 |
| | **Credit Hours** | **33** |

| | | |
|---|---|---|
| **Year Four** | | |
| EMUS 3417 | Percussion Ensemble | 2 |
| MUSC 3226 | Percussion Literature and Pedagogy for Undergraduate Percussion Majors | 1 |
| MUSC 4997 | Senior Recital | 1 |
| PMUS 4626 | Applied Instruction | 4 |
| 4000-level elective in musicology | | 3 |
| Ensemble | | 2 |
| Non-music electives | | 6 |
| Free electives | | 8 |
| | **Credit Hours** | **27** |
| | **Total Credit Hours** | **120** |

## Percussion Performance with Secondary Emphasis in Jazz (Available for Vibes/Marimba)

| **Year One** | | **Credit Hours** |
|---|---|---|
| EMUS 1417 | Percussion Ensemble | 2 |
| MUSC 1101 & MUSC 1111 | Semester 1 Theory and Semester 2 Theory | 4 |
| MUSC 1121 & MUSC 1131 | Aural Skills Lab, Semester 1 and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1XXX | Applied Instruction | 6 |
| PMUS 1105 & PMUS 1205 | Keyboard Musicianship 1 and Keyboard-Musicianship 2 | 2 |
| Ensemble | | 2 |
| Written communication | | 3 |
| Non-music electives | | 6 |
| | **Credit Hours** | **30** |
| **Year Two** | | |
| EMUS 1417 | Percussion Ensemble | 2 |
| EMUS 1427 or EMUS 1437 | Jazz Ensemble or Jazz Combo | 1 |
| MUSC 2101 & MUSC 2111 | Semester 3 Theory and Semester 4 Theory | 4 |
| MUSC 2121 & MUSC 2131 | Aural Skills Lab, Semester 3 and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2918 | Building Your Music Career (5-week segment) | 2 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| MUSC 3061 or MUSC 3071 | Jazz Improvisation I or Jazz Improvisation II | 2 |
| MUSC 2061 or MUSC 2041 or MUSC 2081 | Introduction to Music Technology or Applications of Music Technology (5-week segment) or Prepared for the Soundcheck | 3 |
| PMUS 2XXX | Applied Instruction | 5 |
| Ensemble | | 1 |
| Non-music electives | | 6 |
| Free electives | | 1 |
| | **Credit Hours** | **30** |
| **Year Three** | | |
| EMUS 3417 | Percussion Ensemble | 1 |
| EMUS 3427 or EMUS 3437 | Jazz Ensemble or Jazz Combo | 2 |
| MUSC 3081 | Jazz Theory and Aural Foundations 1 | 3 |
| MUSC 3176 | Conducting 1 | 2 |
| MUSC 3802 & MUSC 3812 | History of Western Music 1 and History of Western Music 2 | 6 |
| MUSC 3997 | Junior Recital | 1 |
| PMUS 1515 | Jazz Piano Class | 2 |
| PMUS 3XXX | Applied Instruction | 5 |
| Ensemble | | 1 |
| Non-music electives | | 6 |
| Free electives | | 3 |
| | **Credit Hours** | **32** |
| **Year Four** | | |
| EMUS 3427 or EMUS 3437 | Jazz Ensemble or Jazz Combo | 2 |
| MUSC 3253 | Jazz Techniques for the Music Educator | 2 |
| MUSC 4031 | Jazz Arranging 1 | 2 |
| MUSC 4997 | Senior Recital | 1 |
| PMUS 4XXX | Applied Instruction | 5 |
| 4000-level elective in musicology | | 3 |
| Non-music electives | | 9 |
| Free electives | | 4 |
| | **Credit Hours** | **28** |
| | **Total Credit Hours** | **120** |

## Piano Performance Concentration Area

| **Year One** | | **Credit Hours** |
|---|---|---|
| MUSC 1101 & MUSC 1111 | Semester 1 Theory and Semester 2 Theory | 4 |
| MUSC 1121 & MUSC 1131 | Aural Skills Lab, Semester 1 and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1325 | Piano Sight Reading | 1 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| MUSC 2365 | Introduction to Accompanying | 2 |
| PMUS 1636 | Applied Instruction | 6 |
| Written communication | | 3 |
| Non-music electives | | 9 |
| Free electives | | 1 |
| | **Credit Hours** | **31** |
| **Year Two** | | |
| MUSC 2101 & MUSC 2111 | Semester 3 Theory and Semester 4 Theory | 4 |
| MUSC 2121 & MUSC 2131 | Aural Skills Lab, Semester 3 and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2325 | Applied Harmony for the Keyboard | 2 |
| MUSC 2918 | Building Your Music Career (5-week segment) | 1 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| MUSC 2041 or MUSC 2061 or MUSC 2081 | Applications of Music Technology (5-week segment) or Introduction to Music Technology or Prepared for the Soundcheck | 1 |

| | | |
|---|---|---|
| PMUS 4105 | Supervised Accompanying | 2 |
| PMUS 2636 | Applied Instruction | 5 |
| Non-music electives | | 6 |
| Free electives | | 5 |
| | **Credit Hours** | **29** |
| **Year Three** | | |
| MUSC 3176 | Conducting 1 (fall) | 2 |
| MUSC 3345<br>& MUSC 3355 | Piano Pedagogy 1<br>and Piano Pedagogy 2 | 4 |
| MUSC 3802<br>& MUSC 3812 | History of Western Music 1<br>and History of Western Music 2 | 6 |
| MUSC 3997 | Junior Recital | 1 |
| PMUS 3636 | Applied Instruction | 6 |
| Ensemble | | 2 |
| Secondary Applied Instruction | | 4 |
| Non-music electives | | 6 |
| Free electives | | 1 |
| | **Credit Hours** | **32** |
| **Year Four** | | |
| MUSC 4325<br>& MUSC 4335 | Keyboard Literature 1<br>and Keyboard Literature 2 | 4 |
| MUSC 4997 | Senior Recital | 1 |
| PMUS 4636 | Applied Instruction | 6 |
| MUSC 4061<br>or MUSC 4071 | Tonal Analysis<br>or Post-Tonal Theory and Analysis | 2 |
| Upper-division music theory elective (3000- or 4000-level theory classes, except MUSC 4101) | | 2 |
| 4000-level elective in musicology | | 3 |
| Ensemble | | 2 |
| Non-music electives | | 6 |
| Free electives | | 1 |
| | **Credit Hours** | **27** |
| | **Total Credit Hours** | **119** |

## String Performance Concentration Area: Double Bass, Viola, Violin and Violoncello

| **Year One** | | **Credit Hours** |
|---|---|---|
| EMUS 1327 | Symphony Orchestra | 2 |
| MUSC 1101<br>& MUSC 1111 | Semester 1 Theory<br>and Semester 2 Theory | 4 |
| MUSC 1121<br>& MUSC 1131 | Aural Skills Lab, Semester 1<br>and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1XXX | Applied Instruction | 6 |
| PMUS 1105<br>& PMUS 1205 | Keyboard Musicianship 1<br>and Keyboard-Musicianship 2 | 2 |
| Written communication | | 3 |
| Non-music electives | | 6 |
| Free Electives | | 1 |
| | **Credit Hours** | **29** |
| **Year Two** | | |
| EMUS 1327 | Symphony Orchestra | 2 |
| MUSC 2101<br>& MUSC 2111 | Semester 3 Theory<br>and Semester 4 Theory | 4 |
| MUSC 2121<br>& MUSC 2131 | Aural Skills Lab, Semester 3<br>and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2918 | Building Your Music Career (5-week segment) | 1 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| MUSC 3273 | String Pedagogy and Literature | 2 |
| MUSC 2041<br>or MUSC 2061<br>or MUSC 2081 | Applications of Music Technology (5-week segment)<br>or Introduction to Music Technology<br>or Prepared for the Soundcheck | 1 |
| EMUS 1507 | Chamber Music | 2 |
| PMUS 2XXX | Applied Instruction | 6 |
| Music electives | | 2 |
| Non-music electives | | 9 |
| | **Credit Hours** | **32** |
| **Year Three** | | |
| EMUS 3327 | Symphony Orchestra | 2 |
| MUSC 3176 | Conducting 1 | 2 |
| MUSC 3802<br>& MUSC 3812 | History of Western Music 1<br>and History of Western Music 2 | 6 |
| MUSC 3997 | Junior Recital | 1 |
| PMUS 3XXX | Applied Instruction | 6 |
| PMUS 4517 | Orchestral Repertoire | 2 |
| EMUS 3507 | Chamber Music | 1 |
| Music electives | | 3 |
| Non-music electives | | 6 |
| Free electives | | 2 |
| | **Credit Hours** | **31** |
| **Year Four** | | |
| EMUS 3327 | Symphony Orchestra | 2 |
| MUSC 4997 | Senior Recital | 1 |
| PMUS 4XXX | Applied Instruction | 6 |
| 4000-level elective in musicology | | 3 |
| Upper-division music theory elective (3000- or 4000-level theory classes, except MUSC 4101) | | 2 |
| Music electives | | 1 |
| Non-music electives | | 6 |
| Free electives | | 6 |
| | **Credit Hours** | **27** |
| | **Total Credit Hours** | **119** |

## Voice Performance Concentration Area

One year of study at the university level of each of two foreign languages is required of vocal performance majors.

| **Year One** | | **Credit Hours** |
|---|---|---|
| MUSC 1101<br>& MUSC 1111 | Semester 1 Theory<br>and Semester 2 Theory | 4 |
| MUSC 1121<br>& MUSC 1131 | Aural Skills Lab, Semester 1<br>and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |

| | | |
|---|---|---|
| MUSC 1554<br>& MUSC 1544 | English Diction<br>and Italian Diction | 1 |
| MUSC 3193 | Vocal Pedagogy and Literature for Young Voices | 2 |
| PMUS 1105<br>& PMUS 1205 | Keyboard Musicianship 1<br>and Keyboard-Musicianship 2 | 2 |
| PMUS 1726 | Applied Instruction | 6 |
| Ensemble | | 2 |
| Written communication | | 3 |
| Free electives | | 4 |
| | **Credit Hours** | **29** |
| **Year Two** | | |
| MUSC 2101<br>& MUSC 2111 | Semester 3 Theory<br>and Semester 4 Theory | 4 |
| MUSC 2121<br>& MUSC 2131 | Aural Skills Lab, Semester 3<br>and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2918 | Building Your Music Career (5-week segment) | 1 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| PMUS 2105<br>& PMUS 2205 | Keyboard-Musicianship 3<br>and Keyboard-Musicianship 4 | 2 |
| MUSC 2041<br>or MUSC 2061<br>or MUSC 2081 | Applications of Music Technology (5-week segment)<br>or Introduction to Music Technology<br>or Prepared for the Soundcheck | 1 |
| MUSC 3444<br>& MUSC 3464 | French Diction<br>and German Diction | 2 |
| PMUS 2726 | Applied Instruction | 5 |
| Ensemble | | 2 |
| Non-music electives (including foreign language) | | 9 |
| Free electives | | 2 |
| | **Credit Hours** | **31** |
| **Year Three** | | |
| MUSC 3176 | Conducting 1 | 2 |
| MUSC 3802<br>& MUSC 3812 | History of Western Music 1<br>and History of Western Music 2 | 6 |
| MUSC 3997 | Junior Recital | 1 |
| PMUS 3726 | Applied Instruction | 6 |
| Ensemble | | 2 |
| Ballet or Modern Dance | | 1 |
| Non-music electives (including foreign language) | | 13 |
| | **Credit Hours** | **31** |
| **Year Four** | | |
| MUSC 4997 | Senior Recital | 1 |
| PMUS 4137<br>& PMUS 4147 | Opera Theatre 1<br>and Opera Theatre 2 | 2 |
| PMUS 4726 | Applied Instruction | 6 |
| Ensemble | | 1 |
| Upper-division music theory elective (3000- or 4000-level theory classes, except MUSC 4101) | | 2 |
| 4000-level elective in musicology | | 3 |
| Music electives | | 2 |
| Non-music electives | | 3 |
| Free electives | | 7 |
| | **Credit Hours** | **27** |
| | **Total Credit Hours** | **118** |

## Woodwind Performance Concentration Area

| **Year One** | | **Credit Hours** |
|---|---|---|
| MUSC 1101<br>& MUSC 1111 | Semester 1 Theory<br>and Semester 2 Theory | 4 |
| MUSC 1121<br>& MUSC 1131 | Aural Skills Lab, Semester 1<br>and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1XXX | Applied Instruction | 6 |
| PMUS 1105<br>& PMUS 1205 | Keyboard Musicianship 1<br>and Keyboard-Musicianship 2 | 2 |
| Ensemble | | 2 |
| Written communication | | 3 |
| Non-music electives | | 6 |
| Free Electives | | 1 |
| | **Credit Hours** | **29** |
| **Year Two** | | |
| MUSC 2101<br>& MUSC 2111 | Semester 3 Theory<br>and Semester 4 Theory | 4 |
| MUSC 2121<br>& MUSC 2131 | Aural Skills Lab, Semester 3<br>and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2918 | Building Your Music Career (5-week segment) | 1 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| EMUS 1507 | Chamber Music | 2 |
| MUSC 2041<br>or MUSC 2061<br>or MUSC 2081 | Applications of Music Technology (5-week segment)<br>or Introduction to Music Technology<br>or Prepared for the Soundcheck | 1 |
| PMUS 2XXX | Applied Instruction | 6 |
| Ensemble | | 2 |
| Music electives | | 2 |
| Non-music electives | | 9 |
| | **Credit Hours** | **30** |
| **Year Three** | | |
| MUSC 3176 | Conducting 1 | 2 |
| MUSC 3802<br>& MUSC 3812 | History of Western Music 1<br>and History of Western Music 2 | 6 |
| MUSC 3997 | Junior Recital | 1 |
| EMUS 3507 | Chamber Music | 1 |
| PMUS 3XXX | Applied Instruction | 6 |
| Ensemble | | 2 |
| Upper-division music theory elective (3000- or 4000-level theory classes, except MUSC 4101) | | 2 |
| Music electives | | 2 |
| Non-music electives | | 6 |
| Free electives | | 3 |
| | **Credit Hours** | **31** |
| **Year Four** | | |
| MUSC 4997 | Senior Recital | 1 |

| | | |
|---|---|---|
| MUSC 4346 | Woodwind Pedagogy | 2 |
| PMUS 4XXX | Applied Instruction | 6 |
| Ensemble | | 2 |
| 4000-level elective in musicology | | 3 |
| Music electives | | 3 |
| Non-music electives | | 6 |
| Free electives | | 6 |
| | **Credit Hours** | **29** |
| | **Total Credit Hours** | **119** |

### Woodwind Performance with Secondary Emphasis in Jazz (Available for Saxophone)

| **Year One** | | **Credit Hours** |
|---|---|---|
| PMUS 1XXX | Applied Instruction | 6 |
| Ensemble | | 2 |
| MUSC 1101<br>& MUSC 1111 | Semester 1 Theory<br>and Semester 2 Theory | 4 |
| MUSC 1121<br>& MUSC 1131 | Aural Skills Lab, Semester 1<br>and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1105<br>& PMUS 1205 | Keyboard Musicianship 1<br>and Keyboard-Musicianship 2 | 2 |
| MUSC 3061 | Jazz Improvisation I | 2 |
| Written communication | | 3 |
| Non-music electives | | 6 |
| Free electives | | 1 |
| | **Credit Hours** | **31** |
| **Year Two** | | |
| PMUS 2XXX | Applied Instruction | 5 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| Ensemble | | 2 |
| EMUS 1507 | Chamber Music | 2 |
| MUSC 2101<br>& MUSC 2111 | Semester 3 Theory<br>and Semester 4 Theory | 4 |
| MUSC 2121<br>& MUSC 2131 | Aural Skills Lab, Semester 3<br>and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2918 | Building Your Music Career (5-week segment) | 1 |
| MUSC 2041<br>or MUSC 2061<br>or MUSC 2081 | Applications of Music Technology (5-week segment)<br>or Introduction to Music Technology<br>or Prepared for the Soundcheck | 1 |
| Secondary Applied Instruction (Flute or Clarinet) | | 2 |
| Non-music electives | | 6 |
| Free electives | | 4 |
| | **Credit Hours** | **30** |
| **Year Three** | | |
| PMUS 3XXX | Applied Instruction | 6 |
| MUSC 3997 | Junior Recital | 1 |
| Ensemble | | 1 |
| EMUS 3427 | Jazz Ensemble | 1 |
| EMUS 3437 | Jazz Combo | 1 |
| EMUS 3507 | Chamber Music | 1 |
| MUSC 3081 | Jazz Theory and Aural Foundations 1 | 3 |
| MUSC 3802<br>& MUSC 3812 | History of Western Music 1<br>and History of Western Music 2 | 6 |
| MUSC 3176 | Conducting 1 | 2 |
| Non-music electives | | 9 |
| | **Credit Hours** | **31** |
| **Year Four** | | |
| PMUS 4XXX | Applied Instruction | 6 |
| MUSC 4997 | Senior Recital | 1 |
| EMUS 3427 | Jazz Ensemble | 2 |
| EMUS 3437 | Jazz Combo | 2 |
| MUSC 3642 | History of Jazz 1 | 3 |
| or 4000-level Musicology Elective | | |
| Secondary Applied Instruction (Flute or Clarinet) | | 2 |
| Non-music electives | | 6 |
| Free electives | | 5 |
| | **Credit Hours** | **27** |
| | **Total Credit Hours** | **119** |

Elective music courses (MUEL) cannot fulfill non-music requirements. Students with MAPS deficiencies are required to complete at least one course each semester until all deficiencies have been addressed.

## Learning Outcomes

By the completion of the program, students will be able to:

- Perform solo and ensemble repertoire demonstrating musical artistry, technical proficiency and stylistic understanding.
- Demonstrate an understanding of theoretical studies, including sight-reading and ear training.
- Demonstrate an understanding of historical studies including the analysis of stylistic periods and music of non-Western cultures.

## Dual Degree Programs

### Double Major in Music Performance

Eligible students in the College of Music, with approval of faculty in the relevant areas or departments, may complete a double major in music performance. Normally, such programs take at least five years to complete. Students pursuing a double major in music performance must complete at least 15 additional credit hours beyond the 120 credit hours required for a single performance major. Requirements pertaining to applied study, chamber music, sophomore proficiency, junior recital and senior recital must be fulfilled separately for each degree; up to four credit hours of university ensemble can be applied to both majors when appropriate and with faculty/advisor approval. Students completing all requirements are awarded a single bachelor of music degree with two majors.

The decision to earn more than one degree or major in the College of Music should be carefully weighed, as it may be more advantageous for a student to complete a single degree/major and then begin work on a graduate degree in music.

### BMus/BMusEd in Music Performance and Music Education

Qualified music majors who have been approved by the relevant major departments may elect to complete a dual degree in music performance

(woodwinds, brass and percussion, strings, or voice) and music education (instrumental or choral tracks). Requirements for these dual degree programs range in total credit hours, and typically include a minimum of 10 semesters of study (including one semester of full-time student teaching) to complete all requirements.

### Double Degree in Music and an Outside Major

Students may complete requirements in two fields and receive two degrees from the university. Approximately 20-25 percent of music majors are studying a second major outside of music.

# Music - Minor

The College of Music offers a 19-credit music minor for students across the CU Boulder campus. Students who wish to declare the music minor must be in good standing with the university with a minimum GPA of 2.00. The music minor is open to all students who have a sincere interest in making music a part of their university education, regardless of prior experience levels or backgrounds.

Students pursuing the music minor are required to complete a basic music theory course and participate in at least one music ensemble. Beyond that, students may choose from a variety of course options focused on creating or making music, as well as appreciating and thinking about music in relation to historical or sociocultural issues. Many elective course options for the music minor have been approved for the Arts & Sciences General Education Requirements.

For questions about the music minor, please send a message to the program advisor at music.minor@colorado.edu.

## Requirements

Students who wish to declare their interest in the music minor must submit the Declaration Form (https://www.colorado.edu/music/minor-declaration-form/). A minimum GPA of 2.00 is required for the minor.

Grades in courses applied to the music minor must be a C- or higher. To start planning for the minor, students are encouraged to view the degree checklist (https://www.colorado.edu/music/sites/default/files/attached-files/music_minor_23-24.pdf).

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MUEL 1081 | Basic Music Theory [1] | 3 |
| EMUS 1XX7 or EMUS 3XX7 | Music Ensemble | 1 |
| **Electives** | | |
| *Creating Music* | | *6* |
| EMUS 1XX7 or 3XX7 | Music Ensembles (1), up to three semesters | |
| MUEL 1115 | Piano Class 1 | |
| MUEL 1125 | Piano Class II | |
| MUEL 1145 | Guitar Class | |
| MUEL 1184 | Voice Class | |
| MUEL 2184 | Voice Class (II) | |
| MUEL 2031 | Making Electronic Music | |
| MUEL 2051 | Introduction to Songwriting Techniques | |
| MUEL 2061 | Introduction to Music Technology | |
| MUEL 2071 | Intro to Audio Recording | |
| MUEL 2081 | Prepared for the Soundcheck | |
| MUEL 3051 | Basic Composition | |
| MUEL 4121 | Topics in Music Technology | |
| *Thinking Music* | | *6* |
| MUEL 1832 | Appreciation of Music | |
| MUEL 2742 | Wild West Soundscapes | |
| MUEL 2752 | Music in American Culture | |
| MUEL 2772 | World Musics: Asia and Oceania | |
| MUEL 2782 | World Music: Africa, Europe, and the Americas | |
| MUEL 2852 | Music in the Rock Era | |
| MUEL 2862 | American Film Musical | |
| MUEL 2872 | Heavy Metal | |
| MUEL 3642 | History of Jazz | |
| MUEL 3822 | Words and Music | |
| MUEL 3832 | Music in Literature | |
| MUEL 3862 | Music and Global Health | |
| MUEL 3882 | Music and Violence | |
| MUEL 3892 | Music and Space | |
| MUEL 4012 | African Music | |
| ETHN 3692 | African Am Music: Fr Spirituals and the Blues to Rap/Hip Hop Soul | |
| JWST 4122 | Music in Jewish Culture | |
| *Creating or Thinking Music* | | *3* |
| **Total Credit Hours** | | **19** |

[1] Students with appropriate background and instructor approval may substitute MUSC 1101 and MUSC 1121 for MUEL 1081.

# Music Entrepreneurship - Certificate

The Certificate in Music Entrepreneurship is an innovative program administered by the Entrepreneurship Center for Music (ECM) in partnership with the Leeds School of Business.

The certificate, open to music majors only, will include a minor in business plus academic and experiential credits within the College of Music. This robust curriculum positions the College of Music among the nation's leading programs in arts entrepreneurship.

For more information, contact Jeff Nytch at jeff.nytch@colorado.edu.

## Requirements

The undergraduate certificate in music entrepreneurship requires a minor in business (12 credit hours), plus six academic and experiential credit hours within the College of Music.

To qualify for the certificate, MUSC 2918 Building Your Music Career (5-week segment) must be successfully completed or in-progress.

Interested students should elect participation in the certificate program by no later than the end of the sophomore year.

| Code | Title | Credit Hours |
|---|---|---|
| **Music Courses** | | **6** |
| MUSC 2918 | Building Your Music Career (5-week segment) | |
| MUSC 4988 | The Entrepreneurial Artist | |
| MUSC 4998 | Music Entrepreneurship Certificate Capstone | |
| **Business Minor Courses** | | **9** |
| BUSM 2010 & BUSM 2011 | Principles of Marketing and Principles of Management | |
| BUSM 2020 & BUSM 2021 | Principles of Accounting and Principles of Finance | |
| BUSM 4010 | Entrepreneurship and Innovation | |
| **Track Courses** | | **3** |
| Choose one: | | |
| BUSM 3010 & BUSM 3011 | Product Development I and Product Development II | |
| BUSM 3020 & BUSM 3021 | Business and Financial Analytics I and Business and Financial Analytics II | |
| BUSM 3031 | Business Leadership | |
| BUSM 3040 | Doing Business in Europe | |
| BUSM 3050 | Introduction to Real Estate | |
| **Total Credit Hours** | | **18** |

# Music Technology - Certificate

The College of Music offers a certificate in music technology which requires a total of 18 credits to complete.

The curriculum consists of a variety of courses designed to provide a strong background in using technology to compose and produce music. The courses range from an introductory survey of music software and hardware to in depth studies of DSP, synthesis, algorithmic composition, recording and post-production techniques, film scoring, and many other topics. The software used in many of the classes includes Logic Pro, ProTools, Abelton Live, Finale, Lilypond, MAX, PD, SuperCollider, CSound, Final Cut Pro, Audacity, SoundHack and Spear.

For more information, contact John Drumheller at drumhell@colorado.edu.

# Requirements

This certificate requires 18 credit hours, including five music technology courses.

The certificate program is available to all undergraduates in good standing with the university with a minimum GPA of 2.00. Music majors should enroll under the MUSC heading and non-majors should use the MUEL heading. For those courses that do not have an MUEL prefix, non-majors will need instructor permission to enroll in the class.

To qualify for the certificate, the 2061 introductory course must be successfully completed or in-progress.

| Code | Title | Credit Hours |
|---|---|---|
| **Music Technology** | | **12** |
| MUSC/MUEL 2061 | Introduction to Music Technology | |
| MUSC 2081 | Prepared for the Soundcheck | |
| MUSC 2091 | Recording Techniques | |
| MUSC 4111 | Composing at the Computer | |
| MUSC/MUEL 4121 | Topics in Music Technology [1] | |
| **Electives** | | **6** |
| ARSC 4040 | Arts and Sciences Special Topics | |
| ATLS 3519 | Special Topics | |
| ATLS 4221 | Interactive Sound | |
| ATLS 4519 | Advanced Special Topics | |
| CMDP 3840 | Sound Practices | |
| CMDP 4870 | Sound and Technology | |
| CMDP 4900 | Media Practices Capstone | |
| CSCI 1300 | Computer Science 1: Starting Computing | |
| CSCI 2400 | Computer Systems | |
| ECEN 3010 | Circuits and Electronics for Mechanical Engineers | |
| JRNL 3614 | Audio Storytelling and Podcasting | |
| MUSC/MUEL 4121 | Topics in Music Technology [1] | |
| MUSC 4191 | Advanced Recording | |
| PHYS 1230 | Light and Color for Nonscientists | |
| PHYS 1240 | Sound and Music | |
| **Total Credit Hours** | | **18** |

[1] May be repeated up to three times as topics vary.

# Plan(s) of Study

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| MUSC 2061 or MUEL 2061 | Introduction to Music Technology or Introduction to Music Technology | 3 |
| | **Credit Hours** | **3** |
| **Spring Semester** | | |
| Elective Course | | 3 |
| | **Credit Hours** | **3** |
| **Year Two** | | |
| **Fall Semester** | | |
| MUSC 2081 or MUEL 2081 | Prepared for the Soundcheck or Prepared for the Soundcheck | 2 |
| | **Credit Hours** | **2** |
| **Spring Semester** | | |
| MUSC 2091 | Recording Techniques | 2 |
| | **Credit Hours** | **2** |
| **Year Three** | | |
| **Fall Semester** | | |
| MUSC 4111 | Composing at the Computer | 2 |
| | **Credit Hours** | **2** |
| **Spring Semester** | | |
| MUSC 4121 or MUEL 4121 | Topics in Music Technology or Topics in Music Technology | 3 |
| | **Credit Hours** | **3** |

| | | |
|---|---|---|
| **Year Four** | | |
| **Fall Semester** | | |
| Elective Course | | 3 |
| | **Credit Hours** | **3** |
| | **Total Credit Hours** | **18** |

# Music Theory - Certificate

The certificate in music theory provides students the opportunity to take more varied upper-level courses and develop independent projects under faculty mentorship. The certificate provides students with a formal acknowledgement of their work in music theory, potentially serving as a stepping-stone to graduate school, private teaching, theory teaching in primary or secondary schools or work in music-related media and technology.

## Requirements

### Admission Requirements

Students need a minimum average grade of B+ or higher for freshman and sophomore music theory and aural skills classes to qualify for the certificate.

Application for the certificate takes place either sophomore or junior year. In order to apply, students must submit a statement of purpose. Applications can be sent directly to the chair of Music Theory area, currently Yonatan Malin (yonatan.malin@colorado.edu).

### Required Courses and Credits

The curriculum consists of 18 credit hours. Students will typically take between one or two required courses per semester. Students need to maintain a minimum average grade of B+ or higher.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| MUSC 2101<br>& MUSC 2121<br>& MUSC 2111<br>& MUSC 2131 | Semester 3 Theory<br>and Aural Skills Lab, Semester 3<br>and Semester 4 Theory<br>and Aural Skills Lab, Semester 4 | 6 |
| or MUSC 3081<br>& MUSC 3091 | Jazz Theory and Aural Foundations 1<br>and Jazz Theory and Aural Foundations 2 | |
| MUSC 4957 | Senior Thesis | 3 |
| **Elective Courses** | | |
| Choose from the following: | | 9 |
| MUSC 2988 | Introduction to Music Research | |
| MUSC 4011 | 16th Century Counterpoint | |
| MUSC 4021 | 18th Century Counterpoint | |
| MUSC 4061 | Tonal Analysis | |
| MUSC 4071 | Post-Tonal Theory and Analysis | |
| MUSC 4151 | Topics in Music Analysis | |
| MUSC 5151 | Topics in Music Analysis (with instructor permission, when not double-listed with MUSC 6801) | |
| Elective outside major within or beyond the College of Music, with advisor permission | | |
| **Total Credit Hours** | | **18** |

# Singing Health Specialist - Certificate

The Singing Health Specialist certificate includes courses in speech, language and hearing sciences; vocal pedagogy; and musicians' wellness. The certificate can be completed by both music majors with a focus in vocal music and speech-language pathology majors. The certificate creates an interdisciplinary bridge while also providing specialized training in an area of importance for both fields—vocal health and wellness.

## Requirements

### Admission Requirements

Both music majors with a focus in vocal music (i.e., performance, education or choral conducting) and speech-language pathology majors are eligible to pursue the certificate.

Students will need to have earned a minimum cumulative grade point average of 3.0 or higher to qualify at the time of application. Application of certificate declaration typically takes place at the start of the sophomore year but will be accepted in the second semester of the freshman year after a CU GPA has been established. Applications will be submitted to the Director of Vocal Pedagogy.

### Required Courses and Credits

The singing health specialist certificate is comprised of 14 credits of undergraduate coursework in music and speech, language and hearing sciences. It also includes voice therapy or singing voice lessons observations.

| Code | Title | Credit Hours |
|---|---|---|
| SLHS 2010 | Science of Human Communication [1] | 3 |
| SLHS 3116 | Anatomy, Physiology, and Science of Speech | 3 |
| SLHS 4512 | Speech Disorders Across the Lifespan | 3 |
| MUSC 2608 | Wellness for Musicians 1 | 1 |
| MUSC 4608 | Wellness for Musicians 2 | 1 |
| MUEL 1184<br>or PMUS 1726 | Voice Class<br>Voice | 1 |
| MUSC 3193 | Vocal Pedagogy and Literature for Young Voices | 2 |
| Five observation hours of voice therapy and /or voice lessons | | |

[1] This course is a prerequisite for SLHS 3116.

## Plan(s) of Study

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| SLHS 2010 | Science of Human Communication | 3 |
| | **Credit Hours** | **3** |
| **Spring Semester** | | |
| SLHS 3116 | Anatomy, Physiology, and Science of Speech | 3 |
| | **Credit Hours** | **3** |

| | | |
|---|---|---|
| **Year Two** | | |
| **Fall Semester** | | |
| MUSC 2608 | Wellness for Musicians 1 | 1 |
| MUEL 1184<br>or PMUS 1726 | Voice Class<br>or Voice | 1 |
| | **Credit Hours** | **2** |
| **Spring Semester** | | |
| MUSC 4608 | Wellness for Musicians 2 | 1 |
| MUSC 3193 | Vocal Pedagogy and Literature for Young Voices | 2 |
| | **Credit Hours** | **3** |
| **Year Three** | | |
| **Fall Semester** | | |
| SLHS 4512 | Speech Disorders Across the Lifespan | 3 |
| | **Credit Hours** | **3** |
| | **Total Credit Hours** | **14** |

# Music Education

Music education faculty teach courses and supervise field experiences designed to prepare students for careers in preK-12 music education. The comprehensive curriculum and program standards have combined to produce a near 100 percent job placement rate for music education graduates.

Because of the varying challenges and opportunities associated with teaching music in K–12 school contexts, the undergraduate music education curriculum strikes a balance between specialization and generalization. BME students must demonstrate a sufficiently broad knowledge of the entire music program/curriculum, but also possess the specialized skills necessary to be a successful general music, choir, orchestra or band instructor.

## Admission to the Teacher Education Program

Teacher education is a campuswide function at the University of Colorado. Admission to the music education program in the College of Music does not constitute admission to the teacher education program. Students must apply to the School of Education through the music education chair no later than the second semester of the junior year or by the time 65 credit hours have been completed toward the BMusEd degree (including approved transfer credits). Students may not register for certain education courses and student teaching until they are admitted to the teacher education program.

Requirements for recommended admission to the teacher education program:

- Minimum GPA of 3.00 in music and music education, and a minimum cumulative GPA of 2.75
- Minimum grade of C- in MUSC 2103
- Twenty-five hours of documented, supervised field experience
- Satisfactory functional piano ability as demonstrated by passing the proficiency examination or completing prescribed course work
- Satisfactory performance ability as demonstrated by meeting the sophomore proficiency requirements in an applied area of study
- Recommendation by the music education faculty; an interview with each student is held by the members of the music education faculty during the first semester of the sophomore year to review the student's progress and qualifications for admission to the teacher education program.

For further information, please refer to the *Handbook for Undergraduate Studies in Music Education*.

## Student Teaching

Students wishing to receive a student teaching assignment must complete an application and submit it to the School of Education through the chair of the music education faculty early in the semester preceding the student teaching semester. Prerequisites for student teaching:

- Admission to the teacher education program
- A minimum GPA of 3.00 in music and music education, and a minimum cumulative GPA of 2.75
- Completion of all required music education and education courses in the music education curriculum
- Satisfactory performance ability as demonstrated by passing the junior recital
- Passing score on the PRAXIS II Music Assessment
- Recommendation by the music education faculty

## Bachelor's Degree

- Bachelor of Music Education (BMusEd) (p. 1081)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Austin, James R. (https://experts.colorado.edu/display/fisid_103455/)
Professor; PhD, University of Iowa

Dockendorf, Matthew Paul (https://experts.colorado.edu/display/fisid_154511/)
Instructor; DMA, Michigan State University

Heil, Leila (https://experts.colorado.edu/display/fisid_149780/)
Associate Professor; PhD, University of Colorado Boulder

Miranda, Martina L. (https://experts.colorado.edu/display/fisid_140091/)
Associate Professor; DMA, Arizona State University; PhD, Arizona State University

Rickels, David Aaron (https://experts.colorado.edu/display/fisid_151424/)
Associate Professor; DMA, Arizona State University

Roeder, Matthew J. (https://experts.colorado.edu/display/fisid_120180/)
Associate Professor; DMA, University of Colorado Boulder

# Courses

**MUSC 1051 (2) Basics of Songwriting**
Introduces students to the art and craft of songwriting. Activities center on creative self-expression through song, developing the fundamental tools and components of songwriting, both conventional and unconventional song forms, developing a personal musical style, developing critical listening/writing/thinking skills, performance, and the study of songs past and present. Examination of melody, harmony, rhythm, lyric writing, style and ensemble presentation.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**MUSC 1081 (3) Intensive Music Theory**
Introduces diatonic harmony and voice leading with intensive work on fundamentals (keys, intervals, triads, seventh chords and four-voice writing). The study of theoretical concepts is closely coordinated with aural skills. Feeds into the intensive section of MUSC 1111. Offered fall only.
**Requisites:** Requires corequisite course of MUSC 1121. Restricted to College of Music (MUSCU) majors or graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 1101 (2) Semester 1 Theory**
Introduces the fundamentals of diatonic harmony and voice leading, focusing on model composition (including one-, two- and four-voice writing) and analysis of excerpts from music literature. Offered fall only.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 1103 (1) Becoming a Music Teacher**
Provides an introduction to basic principles and practices of the music education profession. Explores contexts and methods of public school music teaching through class discussions, practice teaching and directed observations. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 1111 (2) Semester 2 Theory**
Continuation of MUSC 1101. Explores principles of harmony, voice leading and form. Continues emphasis on both model composition and analysis. Introduces chromatic elements (such as applied dominants and modulation), harmonic syntax and structural analysis of excerpts from music literature. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 1101 or MUSC 1081 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 1121 (1) Aural Skills Lab, Semester 1**
Focuses on sight singing, rhythm and dictation of diatonic melodies in major and minor keys (treble, alto and bass clefs). Covers identification of scale types, intervals, triads and dominant seventh chords. Includes individual and group improvisation. Offered fall only.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 1131 (1) Aural Skills Lab, Semester 2**
Continuation of MUSC 1121. Focuses on sight singing, rhythm and dictation of diatonic melodies; adds chromatic elements, more complex rhythms and two-part dictation. Includes harmonic dictation using vocabulary from MUSC 1111. Includes individual and group improvisation within harmonic contexts. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 1121 (minimum grade D-). Restricted to College of Music undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 1325 (1) Piano Sight Reading**
Studies techniques for improving sight-reading skills at the keyboard, with practical work in solo, ensemble and choral literature. Also covers score reading and transposition. Restricted to piano majors or instructor consent required. Offered fall only.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 1326 (2) Guitar Musicianship and Accompanying**
Survey of accompanying repertoire for guitar with solo instruments (flute, violin, voice, etc.), including introductory work in basso continuo. Activities in sight-reading, fretboard harmony and comprehension of harmony and texture. Some work will be tied to the repertoire being studied in studio lessons. Open only to guitar performance majors.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 1544 (1) Italian Diction**
Designed for the understanding of lyric Italian diction, the international phonetic alphabet, and its application to classical singing. Required for freshmen BM voice majors. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 1554 (1) English Diction**
Designed for the understanding of lyric English diction, the international phonetic alphabet, and its application to classical singing as well as various musical styles of English classical voice literature. Required for Freshmen BM voice majors.
**Requisites:** Requires prerequisite course of MUSC 1544 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 1802 (3) Introduction to Musical Styles and Ideas**
Introduces the study of musical traditions of the world; equips students with requisite skills for understanding and analyzing music as an art in historical and cultural contexts using an integrative approach that includes selected styles and genres, critical reading and writing skills and mastery of conceptual issues related to the discipline of music. Satisfies the World Music requirement for undergraduate students in the College of Music.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Musicology

**MUSC 2041 (1) Applications of Music Technology (5-week segment)**
Explores the use of technology, software, applications, and tools in a variety of creative, performance, pedagogical, and entrepreneurial contexts. Addresses the opportunities and challenges posed by evolving technologies. Emphasizes project-oriented learning.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 2061 (3) Introduction to Music Technology**
Surveys the various tools and techniques in the field of music technology. Topics include an introduction to basic synthesis, digital signal processing, MIDI and audio sequencing, music notation and a historical perspective on electronic music.
**Equivalent - Duplicate Degree Credit Not Granted:** MUEL 2061
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2081 (2) Prepared for the Soundcheck**
Provides an overview of the recording process from the performer's perspective from soundcheck through final mastering. Uses recorded material from in-class sessions. Examines differing approaches to recording as well as current technologies.
**Equivalent - Duplicate Degree Credit Not Granted:** CMDP 2860
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2091 (2) Recording Techniques**
Provides hands-on training in various audio recording techniques, acoustics and sound reinforcement, studio maintenance and troubleshooting. Real-world experience is gained through individual recording projects and College of Music events.
**Requisites:** Requires prerequisite course of MUSC 2081 or MUEL 2071 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2101 (2) Semester 3 Theory**
Continuation of MUSC 1111. Reviews harmonic and formal concepts from MUSC 1111. Introduces advanced chromatic concepts such as modal mixture, seventh chords with added dissonance, Neapolitan sixth chord and augmented-sixth chords. Explores in-depth structural analysis of musical works. Offered fall only.
**Requisites:** Requires prerequisite course of MUSC 1111 (minimum grade D-). Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2103 (2) Introduction to Music Education**
Introduces students to the broad range of skills and responsibilities inherent to the music education profession. Explores current topics in public school music teaching while developing teaching skills through supervised field experience. Offered fall only.
**Requisites:** Requires a prerequisite course of MUSC 1103 (minimum grade C-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 2111 (2) Semester 4 Theory**
Continuation of MUSC 2101. Builds on and synthesizes harmonic, melodic and formal concepts from semesters 1-3. Includes writing about musical structure and analyzing relationships of musical structure to extramusical elements (such as text, performance technique, dance, staging, etc.). Introduces 20th century compositional techniques. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 2101 (minimum grade D-). Restricted to College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2121 (1) Aural Skills Lab, Semester 3**
Continuation of MUSC 1131. Applies concepts from MUSC 2101 in performance (prepared, from sight and improvised) and analytical listening (transcription, diction and aural analysis). Offered fall only.
**Requisites:** Requires prerequisite course of MUSC 1131 (minimum grade D-). Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2131 (1) Aural Skills Lab, Semester 4**
Continuation of MUSC 2121. Applies concepts from MUSC 2111 in performance (prepared, from sight and improvised) and analytical listening (transcription, dictation and aural analysis. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 2121 (minimum grade D-). Restricted to College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2325 (2) Applied Harmony for the Keyboard**
Provides an intensive study and application of the harmonic structure of music in a variety of keyboard skills: figured bass realization, chord progressions, harmonization, improvisation, transposition, on-sight harmonic analysis and playing by ear. Offered spring only.
**Requisites:** Requires prerequisite courses of MUSC 1111 and MUSC 1131 and MUSC 1325 (all minimum grade D-). Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 2365 (2) Introduction to Accompanying**
An overall study in the art of working with instrumentalists and singers including repertoire and orchestral reductions. Requires performance with a student instrumentalist or singer to be critiqued and coached by class and instructor. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 1325 (minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 2608 (1) Wellness for Musicians 1**
Explores strategies that help musicians maintain health while achieving peak performance. Investigate and employ powerful somatic methodologies including Alexander Technique and Body Mapping that improve physical functioning and prevent injury. Incorporates a variety of wellness aspects such as performance psychology, mental health, effective exercise, nutrition, breathing, hearing and vocal health.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 2772 (3) World Musics: Asia and Oceania**
Highlights music in Asia and Oceania using current ethnomusicological materials.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Musicology

**MUSC 2782 (3) World Musics: Africa, Europe, and the Americas**
Use current ethnomusicological materials and methods in the study of music outside the Western art tradition. Usually taught in the spring, focuses on music cultures of Africa, Europe and the Americas.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Musicology

**MUSC 2918 (2) Building Your Music Career**
Develop a broad range of tools needed for a professional career in music. Topics include networking, development and use of promotional materials, funding, social media and the internet and financial management, among others - all taught through an entrepreneurial lens. A range of career opportunities is explored, using the entrepreneurial process to assess and explore a variety of paths and opportunities.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 2988 (1) Introduction to Music Research**
Introduces music research tools and basic writing skills to provide information fluency and skills necessary for successful composition of formal music research papers. Applies curricular goals to specific topics of students' choice.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 2997 (1) Sophomore Proficiency**
To be completed by the second semester of the sophomore year.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theses and Recitals

**MUSC 3013 (1) String Class**
For music education majors with choral/general emphasis. Develops basic performance skills on two or more string instruments. Addresses teaching strategies and other specialized topics related to string instruction. Offered fall only.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3023 (1) Woodwind Class**
For music education majors with choral or choral/general emphasis. Develops basic performance skills on two or more woodwind instruments. Addresses teaching strategies and other specialized topics related to beginning and intermediate woodwind instruction. Offered spring only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3033 (1) Brass Class**
For music education majors with choral or choral/general emphasis. Develops basic performance skills on two or more brass instruments. Addresses teaching strategies and other specialized topics related to beginning and intermediate brass instruction. Offered spring only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3041 (2) Instrumentation and Arranging**
Learn to create professional arrangements for a diverse combination of instruments and/or voices. The course will work through instrumentation, score and part preparation, and issues of orchestration to prepare music student to create successful arrangements for a wide range of concert music settings. Final arranging projects will be geared towards individual interests.
**Requisites:** Requires prerequisite course of MUSC 2101 and MUSC 2121 (all minimum grade C). Restricted to College of Music (MUSC) students only.

**MUSC 3043 (1) Percussion Class**
Provides an introduction to playing techniques and pedagogical principles necessary for music educators to teach young students, including general understanding of the techniques used in playing and teaching percussion instruments in the school music program. Required of all string, voice, choral and instrumental general track music education students. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 3051 (2) Beginning Composition**
Covers issues relating to the craft of musical composition with analysis and writing in various styles. This introductory course is designed for music majors who are not composition majors. Some of the assignments will be read in class. Offered spring term of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 3061 (2) Jazz Improvisation I**
Develops skills in jazz improvisation through practical application of harmonic concepts, melodic construction, rhythmic awareness, transcription, repertoire and analysis. Open to all instruments. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Recommended:** Prerequisite for non-jazz majors MUSC 2111.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 3071 (2) Jazz Improvisation II**
Continues and expands upon the material presented in MUSC 3061. Reinforcement of ability to create an improvised melody in a range of harmonic contexts including blues, bebop, modal jazz, free jazz, and other styles. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 3061 (minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 3081 (3) Jazz Theory and Aural Foundations 1**
Presents the grammar and syntax of jazz. Helps to gain a greater understanding of the inner workings and application of chord progressions as they relate to the jazz idiom including major key harmony, secondary dominants, modal interchange and modulation. Students will demonstrate their understanding of these components through written assignments, singing, aural recognition, transcription and keyboard demonstration.
**Requisites:** Requires prerequisite courses of MUSC 1111 and MUSC 1131 and MUSC 3071 (all minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 3091 (3) Jazz Theory and Aural Foundations 2**
Presents the grammar and syntax of jazz and is the second course of the sequence. Units of study include elements of form, harmonic substitution, reharmonization, non-standard forms and harmonic progressions. Post-tonal concepts as they relate to jazz are introduced as well as foundational studies in jazz rhythm. Aural studies of all theoretical material is integrated throughout the semester.
**Requisites:** Requires prerequisite course of MUSC 3081 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.

**MUSC 3133 (2) Teaching General Music I**
Provides an overview of general music teaching with emphasis on developmentally appropriate strategies and materials. Required for all music education majors as partial fulfillment of course work leading to K-12 music licensure. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 2103 (minimum grade C-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3153 (2) Teaching Woodwind Instruments**
For music education majors with instrumental or instrumental/general emphasis. Develops basic performance skills on three or more woodwind instruments. Addresses teaching strategies and other specialized topics related to beginning and intermediate woodwind instruction. Offered spring only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3163 (2) Teaching String Instruments**
For music education majors with instrumental or instrumental/general emphasis. Develops basic performance skills on three or more string instruments. Addresses teaching strategies and other specialized topics related to beginning and intermediate string instruction. Offered fall only.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3176 (2) Conducting 1**
Introduces conducting and rehearsal techniques. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 3186 (2) Conducting II**
Introduces conducting and rehearsal techniques. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 3176 (minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 3191 (2) Studio Recording Techniques**
Introduces various aspects of studio recording techniques and explores the technical side of audio recording in the studio setting. Expands upon knowledge and skills learned in Recording Techniques (MUSC 2091).
**Requisites:** Prerequisite of Recording Techniques MUSC 2091. Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 3193 (2) Vocal Pedagogy and Literature for Young Voices**
Provides an overview of vocal anatomy/function, care of the voice, vocal repertoire, teaching strategies,and other specialized topics related to singing instruction in both private studio and public school choral settings. Fall section for instrumentalists; spring section for vocalists.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3223 (2) Teaching Brass Instruments**
For music education majors with instrumental or instrumental/general emphasis. Develops basic performance skills on three or more brass instruments. Addresses teaching strategies and other specialized topics related to beginning and intermediate brass instruction. Offered spring only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3226 (1) Percussion Literature and Pedagogy for Undergraduate Percussion Majors**
Explores, examines and analyzes percussion music, performance techniques and how to teach them through readings, discussion, analysis, extensive listening, and score study. The course is designed to meet the specific needs and requirements of the individual student.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 2997 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 3243 (2) Teaching Percussion Instruments**
Provides an introduction to playing techniques and pedagogical principles necessary for music educators to teach young students, including general understanding of the techniques used in playing and teaching percussion instruments in the school music program. Required of all instrumental band and instrumental band-jazz track music education students. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 3253 (2) Jazz Techniques for the Music Educator**
Prepares the music educator for successful experiences teaching jazz at the secondary level. Students gain insights into performance and rehearsal techniques for the instrumental jazz ensemble. Explores approaches for teaching jazz theory, improvisation, and selecting literature for young students. Own instrument required for certain classes. Offered spring only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Recommended:** Prerequisites MUSC 1111 and MUSC 2103.
**Additional Information:** Departmental Category: Music Education

**MUSC 3256 (2) Guitar Pedagogy**
Survey and develop appropriate teaching materials and techniques; learn how to identify and address the most common technical problems experienced by guitar students; create strategies for how to avoid the development of problems in guitar beginners.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 3273 (2) String Pedagogy and Literature**
Examines instructional methods/materials and pedagogical approaches appropriate for beginning to advanced string students in private studio, small ensemble, or large ensemble contexts. Topics may include group teaching strategies, as well as contemporary approaches including Rolland and Suzuki. Offered spring only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Recommended:** Prerequisites MUSC 2103 and MUSC 3163.
**Additional Information:** Departmental Category: Music Education

**MUSC 3345 (2) Piano Pedagogy 1**
Discusses teaching philosophies, objectives, and procedures. Examines and evaluates methods and materials. Studies practical aspects with which the private teacher is concerned. Offered fall of even-numbered years.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 3355 (2) Piano Pedagogy 2**
Materials and techniques for teaching piano with a focus on the intermediate level student. Offered only in spring of odd-numbered years.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 3363 (2) Marching Band Techniques**
Helps develop the skills needed to administer and teach all aspects of a contemporary high school marching band. Includes drill conception and design, instruction, organization, and administration. Offered fall only.
**Requisites:** Requires prerequisite course of MUSC 2103 and EMUS 1287 or EMUS 3287 (all minimum grade D-). Restricted to College of Music (MUSCU) majors or graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3444 (1) French Diction**
Designed for the understanding of lyric French diction, the international phonetic alphabet, and its application to classical singing, as well as various musical styles of French classical vocal literature. Required of Junior BM voice majors.
**Requisites:** Requires prerequisite course of MUSC 1554 (minimum grade D-). Restricted to College of Music (MUSCU) majors or graduate students only.
**Recommended:** Prerequisite MUSC 3464.
**Additional Information:** Departmental Category: Voice

**MUSC 3464 (1) German Diction**
Designed for the understanding of lyric German diction, the international phonetic alphabet, and its application to classical singing, as well as various musical styles of German classical vocal literature. Required of sophomore BM voice majors.
**Requisites:** Requires prerequisite course of MUSC 1554 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 3642 (3) History of Jazz 1**
Utilizing musical examples and analysis, this course studies the distinctly American art form of jazz music from its origins up to the 1950's, including the various traditions, practices, historical events and people most important to its evolution. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Musicology

**MUSC 3652 (3) History of Jazz 2**
Utilizing musical examples and analysis, this course studies the distinctly American art form of jazz music from the 1950's to the present, including the various traditions, practices, historical events and people most important to its evolution. Offered spring only.
**Requisites:** Requires a prerequisite course of MUSC 3642 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 3772 (3) West African Music and Culture in Ghana**
Provides hands-on and experiential enrichment for students to interact at several levels with a local community in Ghana. Classroom lectures will be combined with direct participation in drumming and dancing, field trips to participate in festivals and court ceremonies, field trips to kente weaving village, adinkra cloth making, wood carving villages, and museums.
**Equivalent - Duplicate Degree Credit Not Granted:** MUEL 3772
**Requisites:** Requires prerequisite courses of MUSC 2782 and MUEL 2772 (all minimum grade D-). Restricted to students with 27-56 credits (Sophomore) non-College of Music majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 3802 (3) History of Western Music 1**
Surveys Western art music with stylistic analysis of representative works from all major periods through the Baroque. See also MUSC 3812.
**Requisites:** Requires prerequisite course of MUSC 1111 or MUSC 3091 (minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Musicology

**MUSC 3812 (3) History of Western Music 2**
Surveys Western art music with stylistic analysis of representative works from all major periods after the Baroque. See also MUSC 3802.
**Requisites:** Requires prerequisite course of MUSC 1111 (minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Musicology

**MUSC 3997 (1) Junior Recital**
To be completed by the second semester of the junior year.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 2997. Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Theses and Recitals

**MUSC 4001 (2) New Musical Styles and Practices**
Explores a variety of music from the 20th and 21st centuries beginning with Stravinsky and moving through current trends. Involves a mix an analysis/exploration of this music with short composition assignments imitating the different styles. Offered spring of odd-numbered years.
**Requisites:** Requires prerequisite courses of MUSC 2111 and MUSC 2131 (all minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4011 (2) 16th Century Counterpoint**
Provides a stylistic study of the main contrapuntal genres of the period including free, two- and three-part imitative counterpoint in the style of Palestrina. Provides a foundation in species counterpoint, working towards free counterpoint; stresses composing in 16th century styles. Offered fall of even-numbered years.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5011
**Requisites:** Requires prerequisite courses of MUSC 2111 and MUSC 2131 (all minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4012 (3) African Music**
Studies music cultures of Africa and the Black Diaspora, including folk and art music traditions, religious and popular music genres. Specific course topics could cover any or all of these styles, including exploring interconnections of musical stylistics of Africa and the Black Diaspora.
**Equivalent - Duplicate Degree Credit Not Granted:** MUEL 4012 and MUSC 5012
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4021 (2) 18th Century Counterpoint**
Provides a stylistic study of main contrapuntal genres of the period including inventions, suite movements and fugues. Provides a foundation in species counterpoint; stresses analysis and composing in the style. Offered fall only.
**Requisites:** Requires prerequisite courses of MUSC 2111 and MUSC 2131 (all minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4031 (2) Jazz Arranging 1**
Study of notation, score layout, transpositions, basic harmonic and melodic analysis, basic chord voicings, and composition for a small and large jazz ensemble. Use of notation software such as Finale or Sibelius. Offered fall semester only.
**Requisites:** Requires prerequisite course of MUSC 3091 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4034 (3) Musical Theatre History 1 - Antecedents through Musical Comedy**
Introduces musical theatre using historical and cultural contexts. Topics cover the social and historical elements inherent in the development of the Broadway Musical Theatre. Students will evaluate and compare a variety of musicals and their antecedents from the 19th Century to the era of Musical Comedy, including minstrel shows, vaudeville, operetta, burlesque, variety shows and musical revues.
**Requisites:** Restricted to BFA Musical Theatre and BM Musical Theatre students only.
**Grading Basis:** Letter Grade

**MUSC 4041 (2) Orchestration**
Studies advanced orchestration techniques through score analysis and student projects. Offered fall of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4044 (3) American Musical Theatre History 2 - Golden Age to Contemporary**
Continues to investigate Musical Theatre within its historical and cultural contexts, analyzing the cultural influence it has had on society. Students will evaluate and compare musicals from the start of the Golden Age to the modern era including Rock, Popsical, Jukebox, and Contemporary styles. This course is a continuation of Musical Theatre History 1.
**Requisites:** Restricted to Musical Theatre (MMTH-BMUS) students only.
**Grading Basis:** Letter Grade

**MUSC 4061 (2) Tonal Analysis**
Surveys tonal analytical techniques and forms of tonal music, including binary forms, ternary forms, rondo (and others) through study of selected works. Offered spring only.
**Requisites:** Requires prerequisite courses of MUSC 2111 and MUSC 2131 (all minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4071 (2) Post-Tonal Theory and Analysis**
Focuses on theory and analysis of post-tonal literature pre-1945. Offered fall of odd-numbered years.
**Requisites:** Requires prerequisite courses of MUSC 2111 and MUSC 2131 (all minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4078 (1) Piano Technician for Pianists**
Familiarizes pianists with the development of the modern grand piano, its construction and the proper terminology of parts and specifications. Trains pianists in minor repairs and adjustments of the grand piano action and in minor tuning tasks.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5078
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Recommended:** Prerequisite piano majors.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 4091 (2) Jazz Arranging 2**
Continuation and expansion of studies in MUSC 4031. Survey and analysis of major composers and arrangers of the idiom. Course focuses on creating several arranging projects for a jazz ensembles. Offered spring of odd-numbered years.
**Requisites:** Requires prerequisite course of MUSC 4031 (minimum grade D-). Restricted to College of Music undergraduate students only.
**Recommended:** Prerequisite MUSC 3081.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4101 (1-3) Theory and Aural Skills Review**
Reviews tonal harmony, voice leading, and essential aural skills. Prepares graduate students for more advanced work in music theory. Students may register for aural skills only (1 credit), theory only (2 credits) or both theory and aural skills (3 credits). May not be taken pass/fail. Aural skills section offered fall and spring. Theory section offered spring.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4103 (1) Introduction to Student Teaching**
Represents the first half of the professional internship year. Familiarizes students with the schools and music programs in which they plan to student teach. Music placements may consist of elementary and high school, elementary and middle school, or middle school and high school.
**Requisites:** Requires a prerequisite course of MUSC 4113 or MUSC 4313 or MUSC 4443 (minimum grade C-). Restricted to College of Music undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4106 (2) Guitar Literature**
An analytical and historical survey of the repertory of the guitar and its antecedents from the renaissance to the present day.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5106
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 4111 (2) Composing at the Computer**
Discover strategies and techniques for generating and manipulating sound at the computer. Student projects will include compositions, soundscapes, ambient environments and soundtracks for multimedia. Available to students without prior experience with computer music or composition. Offered fall of odd-numbered years.
**Requisites:** Requires prerequisite course of MUSC 2061 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4112 (3) Ethnomusicology**
Examines the definition, scope, and methods of ethnomusicology, the discipline that focuses on approaches to the study of music theory, history, and performance practices of world cultures.
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4113 (3) Teaching General Music 2**
Provides an in-depth examination of teaching and learning processes in the elementary general music classroom, based on the integration of child development and musical development theories with content and delivery skills appropriate for K-5 general music classrooms. Students implement and evaluate music instruction, design curricular projects, and build a repertoire of vocal, instrumental and speech-based arrangements. Offered fall of odd-numbered years.
**Requisites:** Requires prerequisite course of MUSC 2103 (minimum grade C-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4121 (3) Topics in Music Technology**
Exploration of issues, techniques, and tools of music technology. Topics vary from term to term and may include: interactive systems for performance; teaching and learning; computer music instrument design; digital synthesis and signal processing; music in intermedia, sound design and analysis. Lectures on work sessions will support student projects.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 2061 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4122 (3) Music in Jewish Culture**
Introduces students to a wide range of musical styles, traditions, genres, performers, composers, events and works that are part of Jewish culture, focusing on the twentieth and twenty-first centuries. Provides tools for understanding music on its own and in connection with issues of identity, diaspora, memory and liturgy. Includes opportunities for creative and critical engagement with Jewish music.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4122
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Musicology

**MUSC 4133 (3) Student Teaching Practicum**
Offers practice teaching under the guidance of a master music teacher.
**Requisites:** Requires prerequisite course of MUSC 4103 (minimum grade C-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4141 (2) Instrument Design Lab: Sound, Perception & Creativity**
Explores fundamental physical concepts of sound and music in a hands-on laboratory environment. Surveys a number of topics such as tuning, temperament, harmony and timbre through the construction of PVC overtone flutes, an investigation in the timbral intention of Dolly Parton's vocal technique, physical modeling through the testing of 3D-printed vowel flutes, the construction of a "Long String Instrument," and more. The course culminates in each student inventing, designing, and demonstrating their own new instrument.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5141
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Grading Basis:** Letter Grade

**MUSC 4142 (3) American Indian Music**
Examines Native North American musical cultures, emphasizing music as an integral part of religious expression and community life.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5142
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4143 (2) Topics in Choral Music Education**
Prepares students to teach, conduct and facilitate music making in various choral ensembles. Examines skills, teaching techniques and administrative procedures necessary for developing and maintaining various choirs at the elementary through high school levels. Includes discussion of current topics in choral music education and community choral field experiences. Offered fall terms, every two years.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5143
**Requisites:** Requires prerequisite course of MUSC 2103 (minimum grade C-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4151 (2) Topics in Music Analysis**
Examines critically a specific topic or repertory, such as Song Analysis or Music of Brahms. Uses readings and analyses, with grades to be determined from reading responses, analytical assignments and writing. Offered fall of even-numbered years.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of MUSC 2111 and MUSC 2131
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4152 (3) East Asian Music**
Surveys the development of music in Japan, China and Korea through the in-depth study of particular styles of traditional music. The course emphasizes the study of music and culture, particularly music's relationship to religion, politics, language, literature, dance and theatre.
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology Departmental Category: Asia Content

**MUSC 4153 (1) Percussion Class and Pedagogy**
Required of all music education majors. Presents knowledge and skills necessary for music educators to teach young students, including a general understanding of the techniques used in playing and teaching percussion instruments in the school music program. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4161 (2) Advanced Jazz Composition and Analysis**
Provides in depth listening, score study, and analysis, exploring major composers in jazz and their innovations in composition. "Foundational" topics concerning melody, form, and orchestration are studied to provide a framework for further analysis. Influences of western art music, American folk and popular music considered. Final projects to be performed and recorded by a CU jazz ensemble.
**Requisites:** Requires prerequisite of MUSC 3091 and MUSC 3081 (all minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 4163 (2) Choral Literature for School Ensembles**
Examination of literature, materials, and methods appropriate for teaching choral music in secondary schools. Offered fall of odd-numbered years.
**Requisites:** Requires prerequisite course of MUSC 2103 (minimum grade C-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4168 (3) World Music Theories**
Examines music rules, concepts or music theories and sociocultural elements that musicians use in creating musical sound, with emphasis on music practices from a variety of world traditions; observing shared and diverging principles, making cross-cultural comparisons and developing a new pedagogy that supports the substantive study of global musics.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5168
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Recommended:** Prerequisite MUSC 1802 or MUSC 2772 or MUSC 2782 or MUSC 4112.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4171 (2) Advanced Jazz Improvisation and Analysis**
Surveys important jazz improvisers and their historical context. Students engage in multiple methods of transcription and analysis. Listening plays a central role throughout the course and class discussions will foster the ability to engage in critical analysis of performances. The final project is an in-depth transcription of analysis of an improvisation.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite of MUSC 3081 and MUSC 3091 (all minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 4176 (2) Conducting 3**
This is a study in advanced conducting techniques. Demonstration of advanced score study techniques as well as the application to gesture and rehearsal techniques linked with conducting will be explored. Participation fully in discussion readings and contribute to the learning of all is expected.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5176
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of MUSC 3186 (minimum grade B-). Restricted to College of Music undergraduates majoring in Music Education (MUSE) only.
**Grading Basis:** Letter Grade

**MUSC 4191 (2) Advanced Recording**
Study of advanced recording techniques and concepts beyond those covered in MUSC 2091 involving multiplemicrophones for ensemble concerts and recording sessions within and outside of the College of Music. Offered spring of even-numbered years.
**Requisites:** Requires prerequisite course of MUSC 2091 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4193 (1) Student Teaching Seminar**
Required for all music student teachers. Addresses topics of concern to beginning teachers including classroom management, interpersonal skills, legal issues, job search strategies and capstone project development.
**Requisites:** Requires prerequisite course of MUSC 4103 (minimum grade C-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4202 (3) Special Topic in Musicology: Current and Critical Issues**
Examination of a specific topic of current or critical interest within areas of music history, ethnomusicology, critical theoryand practice across the spectrum of Western, Popular and World Music traditions. Designed as a capstone course for music majors who have completed a full complement of musicology courses. Topics vary from term to term. Instructor consent is required for non-music majors.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Musicology

**MUSC 4203 (1) Music Methods Practicum**
Provides students with opportunities to observe and practice the use of various teaching techniques and relate them to concepts presented in the methods course. Students consult with the instructor to determine appropriate placements in schools.
**Requisites:** Requires prerequisite course of MUSC 2103 (minimum grade C-). Requires corequisite course of MUSC 4313 or MUSC 4443. Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4223 (2) Secondary Music Teaching Approaches**
Prepares students to teach and facilitate musical learning in non-performance secondary music classes. Includes units on music technology, music theory, music appreciation and class guitar. Connects experiential components to strategies for teaching and project design for middle and high school classrooms. Offered fall only.
**Requisites:** Requires a prerequisite course of MUSC 2103 (minimum grade D-).
**Grading Basis:** Letter Grade

**MUSC 4313 (3) Teaching Choral Music**
Examines choral music curricula, instructional materials and teaching techniques appropriate for secondary choral settings. Also addresses administrative strategies for choral music programs. Offered spring only.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5313
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Recommended:** Prerequisite MUSC 2103.
**Additional Information:** Departmental Category: Music Education

**MUSC 4323 (3) Differentiating Instruction in K-8 Music Classrooms**
Designed to focus on differentiating and individualizing instruction for K-8 music students representing diverse cultural, linguistic, and ability backgrounds. Includes developmental and practical orientations to pedagogical issues including planning, instruction and assessment. Emphasizes evidence-based teaching practices and programmatic interventions that support student learning and engagement in music instruction.
**Requisites:** Requires a prerequisite course of MUSC 2103 (minimum grade D-). Restricted to College of Music (MUSC) majors or graduate students only.
**Grading Basis:** Letter Grade

**MUSC 4325 (2) Keyboard Literature 1**
Surveys keyboard music from 1600 to 1830. Offered fall semester of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 4335 (2) Keyboard Literature 2**
Surveys keyboard music from 1830 to the present. Offered spring semester of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 4336 (2) Brass Pedagogy**
Analyzes pedagogical techniques and philosophies of teaching brass instruments, and examines materials. Offered every other spring terms.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5336
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 4346 (2) Woodwind Pedagogy**
Analyzes pedagogical techniques and philosophies of teaching wind instruments, and examines materials. Offered every other spring term.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5346
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 4405 (2) Basso-Continuo Accompaniment**
Studies the history, theory and practice of Basso-continuo accompaniment. Provides practical instruction in realizing harmony from a given bass line (figured or unfigured), projecting affect and creating dynamics at the harpsichord. Emphasizes individual cognition and creativity.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5405
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 4415 (2) Advanced Basso Continuo**
Explores advanced basso continuo, serving as more in depth study for those who have completed or tested out of Basso-Continuo Accompaniment (MUSC 4405).
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5415
**Requisites:** Prerequisite of MUSC 4405. Restricted to College of Music (MUSCU) undergraduate students.

**MUSC 4443 (3) Teaching Instrumental Music**
Examines instrumental music curricula, instructional materials and teaching techniques appropriate for rehearsal, class, and lesson settings. Also addresses administration strategies for instrumental music programs. Offered spring only.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5443
**Requisites:** Requires prerequisite course of MUSC 2103 (minimum grade C-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4608 (1) Wellness for Musicians 2**
Develops and further integrates material covered in Wellness for Musicians 1. Deeper exploration of somatic and wide-ranging wellness strategies, including FM Alexander¿s conception of Inhibition and other approaches for proactive self-care and improvement. Consideration of how to integrate methodologies in teaching, pedagogy, and practice. Students will complete several projects related to their specific musical pursuits and interests.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5808
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 2608 (minimum grade C-). Restricted to College of Music undergraduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 4666 (3) Chamber Music Lit WW/Prc**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 4712 (3) Renaissance Music**
Provides a repertory and analysis of polyphonic music, 1400-1600.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5712
**Requisites:** Requires prerequisite courses of MUSC 1802 and MUSC 3802 (all minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4752 (3) Women in Music**
Examines the role of women as creators and performers of Western Music. Explores related issues in musicology, including canon formation, reception history and feminist aesthetics.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5752
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4772 (3) History of Opera**
Examines representative operas from the 17th through the 21st centuries. Emphasizes both cultural and analytical aspects and surveys related musicological literature.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5772
**Requisites:** Requires prerequisite courses of MUSC 1802 and MUSC 3802 or MUSC 3812 (all minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4802 (3) Studies in 20th Century Music**
Offers intensified work in history of music in the 20th century. Topics vary from year to year.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5802
**Requisites:** Requires prerequisite courses of MUSC 1802 and MUSC 3812 (all minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4808 (1-3) Internship in Music Industry**
Provides an opportunity for music majors to gain real world experience in a professional music organization outside of the CU Boulder academic environment and to engage with music industry organizations in the community (for profit or non-profit) while pursuing specific tasks or projects relevant to the student's career goals.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**MUSC 4852 (3) 17th and Early 18th Century Music**
Examines music and writings about music from the Baroque era. Emphasizes cultural and musical analysis and surveys current musicological literature.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5852
**Requisites:** Requires prerequisite courses of MUSC 1802 and MUSC 3802 (all minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4862 (3) African American Music**
Examines the sacred and secular genres of Black American music from folk spirituals to contemporary gospel and hip-hop in their cultural and historical contexts. Examines individual composers and performers in specific historical contexts in order to understand the meanings behind certain Black musical stylistics, sound ideals and aesthetic preferences. Formerly MUSC 2802.
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4872 (3) Late 18th and 19th Century Music**
Studies European and American music from the last developments of the styles through romanticism and its later 19th century reverberations.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5872
**Requisites:** Requires prerequisite courses of MUSC 1802 and MUSC 3812 (all minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4892 (3) Latin American Music**
Explores music of cultures of the Americas south of the United States and in the diaspora, emphasizing the relationships of music and culture in folk, popular and arts styles.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5892
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4908 (1-3) Arts Administration Internship**
Engage with music/music business organizations in the community (for profit or non-profit) to pursue specific tasks or projects relevant to the student's career goals. A minimum of 48 hours is required per semester for one credit.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5908
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 4957 (1-4) Senior Thesis**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theses and Recitals

**MUSC 4958 (2) Community Performances**
Explore the real-world issues of planning and presenting concerts. Learn to program music for all types of audiences, gain confidence speaking about your music and handle the logistics of concert production. Discuss the role of concerts in the 21st century and examine new styles of presentation, audience engagement and outreach. Course culminates in a concert presented in a local venue.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5958
**Requisites:** Requires prerequisite course of MUSC 2918 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 4968 (3) Management and Leadership in the Arts**
Focus on management, leadership, and communication strategies and their application to arts organizations. Concepts and approaches for leaders of small, medium, and large arts organizations in both the for-profit and nonprofit sectors, including human resource management, problem solving, and effective communication will be examined. Students will practice and refine their written communication skills by writing clearly and concisely throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5938
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 4978 (3) Introduction to Arts Administration**
Introduce students to current trends in arts administration, explore the fundamentals of managing arts organizations and develop concrete tools for managing boards, volunteers and staff, effective fund raising, strategic planning and program development. Current issues, the role of the arts and arts advocacy will be discussed.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5978
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 4988 (3) The Entrepreneurial Artist**
Learn the core principles of entrepreneurship, such as idea formation, venture models, opportunity assessment, market analysis and strategies for launching a venture and apply them to entrepreneurial ideas. Lectures, projects, entrepreneur interviews and case studies will culminate in a feasibility study for an original entrepreneurial concept.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5988
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Recommended:** Prerequisite MUSC 2918.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 4997 (1) Senior Recital**
To be completed by the second semester of the senior year.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite class of MUSC 3997 (minimum grade D-). Restricted to College of Music undergraduate students only.
**Additional Information:** Departmental Category: Theses and Recitals

**MUSC 4998 (1) Music Entrepreneurship Certificate Capstone**
Completes the Certificate in Music Entrepreneurship. Students will develop an art-based entrepreneurial concept, engage in customer discovery, refine their business model, create a marketing plan, research relevant intellectual property issues, and complete a business model canvas for their venture.
**Requisites:** Requires prerequisite courses of MUSC 2918, 4988, BUSM 2001 and BUSM 4001 (min. grade D-). Restricted to senior (90-180 credits) College of Music (MUSCU) majors.
**Grading Basis:** Letter Grade

**NCMU 1172 (0.3-3) Body Mapping for Musicians**
**Repeatable:** Repeatable for up to 3.00 total credit hours.

**NCMU 1177 (0.3-3) Kabuki: A Musical Theater**
**Repeatable:** Repeatable for up to 3.00 total credit hours.

**NCMU 1178 (0.3-3) Getting Inside the Music of the Colorado Music Festival**
**Repeatable:** Repeatable for up to 3.00 total credit hours.

**NCMU 4101 (0.3-3) Theory and Aural Skills Review**
Reviews tonal harmony, voice leading, and essential aural skills. Prepares graduate students for more advanced work in music theory.
**Repeatable:** Repeatable for up to 3.00 total credit hours.

# Music Education - Bachelor of Music Education (BMusEd)

The Music Education Department's experienced music teacher educators aim to prepare students for successful careers in K–12 music education. Courses focused on learning principles and teaching methods, field experiences in elementary and secondary schools, and opportunities for involvement and leadership in special programs and organizations (e.g., Middle School Ensemble Program, Summer Music Academy, Collegiate Chapter of the National Association for Music Education) provide students with the knowledge base, skills and practical experience needed to teach music effectively. Over the past 20 years, there has been a near 100 percent job placement rate for graduates of the music education program.

Because of the varying challenges and opportunities associated with teaching music in K–12 school contexts, the undergraduate music education curriculum strikes a balance between specialization and comprehensive preparation. BME students must demonstrate a sufficiently broad knowledge of the entire music program/curriculum, but also possess the specialized skills necessary to be a successful general music, choir, orchestra or band instructor.

## Program Emphases

Five basic curricular options are provided for students pursuing the Bachelor of Music Education degree:

- choral
- choral–general
- instrumental
- instrumental–general
- instrumental–jazz

The choral–general and instrumental–general emphases include a larger concentration of coursework and field experiences related to elementary general music teaching, while the choral, instrumental and instrumental–jazz emphases involve more specialized coursework and field experiences related to the teaching of choir, orchestra or band classes at the secondary level. Within each degree emphasis, students have a limited number of elective credits that may be used to further customize degree work according to their interests and needs.

As first-year students, BME students primarily complete core studies in music and liberal arts, but also enroll in their first music education course (Becoming a Music Teacher). The first early field experiences are completed during the sophomore year. During the junior year, students enroll in capstone methods courses and specialized electives that allow for more detailed and sustained study of curricular models, instructional materials and teaching methods. Internships and full-time student teaching provide culminating experiences during the senior year, as students work in partnership with experienced public school teachers and assume the role and responsibilities of a professional music educator. Internship and student teaching placements are chosen in consultation with faculty advisors and the music education chair.

## Requirements

A minimum of 126 credit hours with a cumulative GPA of 2.75 must be earned for the BME degree, with no grade below C- in a course.

In addition to teacher education coursework and 150 clock hours of early field experience, music education majors complete 24 credit hours in liberal arts disciplines (English composition, arts and humanities, mathematics, social sciences, natural sciences) and coursework in music (music theory and aural skills, musicology and ethnomusicology, applied study, ensemble, keyboard and voice, and conducting).

General education requirements in the liberal arts and core requirements in music are designated by the music education faculty and approved by the College of Music curriculum committee.

# Four-Year Plans of Study

## Choral Music Emphasis

Students must take keyboard or voice as the primary applied area, or petition the music education faculty for an exception. A minimum of five of the seven semesters of required ensemble registration must be in a conducted choral ensemble (Chamber Singers, University Choir, Festival Chorus or Treble Chorus). For keyboard majors, two semesters of independent accompanying may be applied to the ensemble requirement.

| Year One | | Credit Hours |
|---|---|---|
| PMUS 1XXX | Applied Instruction | 6 |
| Ensemble | | 2 |
| MUSC 1101 & MUSC 1111 | Semester 1 Theory and Semester 2 Theory | 4 |
| MUSC 1121 & MUSC 1131 | Aural Skills Lab, Semester 1 and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1105 & PMUS 1205 (voice majors) OR PMUS 1184 & PMUS 2184 (piano majors) | | 2 |
| MUSC 1554 | English Diction | 1 |
| MUSC 1103 | Becoming a Music Teacher | 1 |
| Written communication | | 3 |
| Non-music core requirements | | 6 |
| Non-music electives | | 3 |
| | **Credit Hours** | **33** |
| **Year Two** | | |
| PMUS 2XXX | Applied Instruction | 5 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| Ensemble | | 2 |
| MUSC 2101 & MUSC 2111 | Semester 3 Theory and Semester 4 Theory | 4 |
| MUSC 2121 & MUSC 2131 | Aural Skills Lab, Semester 3 and Aural Skills Lab, Semester 4 | 2 |
| PMUS 2105 & PMUS 2205 (voice majors) OR PMUS 1726 (piano majors) | | 2 |
| MUSC 1544 | Italian Diction | 1 |
| MUSC 2103 | Introduction to Music Education | 2 |
| MUSC 3133 | Teaching General Music I | 2 |
| MUSC 3193 | Vocal Pedagogy and Literature for Young Voices | 2 |
| EDUC 3013 | School and Society | 3 |
| Non-music core requirements | | 6 |
| Non-music electives | | 3 |
| | **Credit Hours** | **35** |
| **Year Three** | | |
| PMUS 3XXX | Applied Instruction | 5 |
| MUSC 3997 | Junior Recital | 1 |
| Ensemble | | 2 |
| Upper-division music theory elective: MUSC 3081, MUSC 4001, MUSC 4011, MUSC 4021, MUSC 4061, MUSC 4071, MUSC 4111, MUSC 4121 or MUSC 4151. | | 2 |
| MUSC 3802 & MUSC 3812 | History of Western Music 1 and History of Western Music 2 | 6 |
| MUSC 3444 or MUSC 3464 | French Diction or German Diction | 1 |
| MUSC 3176 & MUSC 3186 | Conducting 1 and Conducting II | 4 |
| Music elective | | 1 |
| MUSC 3013 | String Class | 1 |
| MUSC 3023 or MUSC 3033 | Woodwind Class or Brass Class | 1 |
| MUSC 4313 | Teaching Choral Music | 3 |
| MUSC 4203 | Music Methods Practicum | 1 |
| MUSC 4143 | Topics in Choral Music Education | 2 |
| MUSC 4323 | Differentiating Instruction in K-8 Music Classrooms | 3 |
| | **Credit Hours** | **33** |
| **Year Four** | | |
| PMUS 4XXX | Applied Instruction | 3 |
| Ensemble | | 1 |
| MUSC 3043 | Percussion Class | 1 |
| MUSC 4223 | Secondary Music Teaching Approaches | 2 |
| MUSC 4163 | Choral Literature for School Ensembles | 2 |
| MUSC 4103 | Introduction to Student Teaching | 1 |
| MUSC 4193 | Student Teaching Seminar | 1 |
| EDUC 4112 or EDUC 2411 | Adolescent Development and Learning for Teachers or Educational Psychology for Elementary Schools | 3 |
| EDUC 4732 | Student Teaching K-12 | 8 |
| Non-music electives | | 3 |
| | **Credit Hours** | **25** |
| | **Total Credit Hours** | **126** |

## Choral—General Music Emphasis

Students must take keyboard or voice as the primary applied area, or petition the music education faculty for an exception. A minimum of six of the seven semesters of required ensemble registration must be in a conducted choral ensemble (Chamber Singers, University Choir, Festival Chorus or Treble Chorus) and one semester must be in a world music ensemble. For keyboard majors, two semesters of independent accompanying may be applied to the ensemble requirement.

| Year One | | Credit Hours |
|---|---|---|
| MUSC 1101 & MUSC 1111 | Semester 1 Theory and Semester 2 Theory | 4 |
| MUSC 1103 | Becoming a Music Teacher | 1 |
| MUSC 1121 & MUSC 1131 | Aural Skills Lab, Semester 1 and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1105 & PMUS 1205 (voice majors) OR PMUS 1184 & PMUS 2184 (piano majors) | | 2 |
| PMUS 1XXX | Applied Instruction | 6 |
| Ensemble | | 2 |
| Written communication | | 3 |
| Non-music core requirements | | 6 |

| | | |
|---|---|---|
| Non-music electives | | 3 |
| | **Credit Hours** | **32** |
| **Year Two** | | |
| EDUC 3013 | School and Society | 3 |
| MUSC 2101<br>& MUSC 2111 | Semester 3 Theory<br>and Semester 4 Theory | 4 |
| MUSC 2103 | Introduction to Music Education | 2 |
| MUSC 2121<br>& MUSC 2131 | Aural Skills Lab, Semester 3<br>and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| MUSC 3133 | Teaching General Music I | 2 |
| MUSC 3193 | Vocal Pedagogy and Literature for Young Voices | 2 |
| PMUS 2105 & PMUS 2205 (voice majors) OR PMUS 1726 (piano majors) | | 2 |
| PMUS 2XXX | Applied Instruction | 5 |
| Ensemble | | 2 |
| Music elective | | 1 |
| Non-music core requirements | | 6 |
| Non-music electives | | 3 |
| | **Credit Hours** | **35** |
| **Year Three** | | |
| MUSC 3013 | String Class | 1 |
| MUSC 3023<br>or MUSC 3033 | Woodwind Class<br>or Brass Class | 1 |
| MUSC 3176<br>& MUSC 3186 | Conducting 1<br>and Conducting II | 4 |
| MUSC 3802<br>& MUSC 3812 | History of Western Music 1<br>and History of Western Music 2 | 6 |
| MUSC 3997 | Junior Recital | 1 |
| MUSC 4113 | Teaching General Music 2 | 3 |
| MUSC 4143 | Topics in Choral Music Education | 2 |
| MUSC 4313 | Teaching Choral Music | 3 |
| MUSC 4203 | Music Methods Practicum | 1 |
| MUSC 4323 | Differentiating Instruction in K-8 Music Classrooms | 3 |
| PMUS 3XXX | Applied Instruction | 5 |
| Ensemble | | 2 |
| Upper-division music theory elective: MUSC 3081, MUSC 4001, MUSC 4011, MUSC 4021, MUSC 4061, MUSC 4071, MUSC 4111, MUSC 4121 or MUSC 4151. | | 2 |
| | **Credit Hours** | **34** |
| **Year Four** | | |
| EDUC 4112<br>or EDUC 2411 | Adolescent Development and Learning for Teachers<br>or Educational Psychology for Elementary Schools | 3 |
| EDUC 4732 | Student Teaching K-12 | 8 |
| MUSC 3043 | Percussion Class | 1 |
| MUSC 4103 | Introduction to Student Teaching | 1 |
| MUSC 4193 | Student Teaching Seminar | 1 |
| MUSC 4223 | Secondary Music Teaching Approaches | 2 |
| MUSC 4163 | Choral Literature for School Ensembles | 2 |
| PMUS 4XXX | Applied Instruction | 3 |
| Ensemble | | 1 |
| Non-music electives | | 3 |
| | **Credit Hours** | **25** |
| | **Total Credit Hours** | **126** |

## Instrumental Music Emphasis (Band)

Students must take wind/brass/percussion as the primary applied area, or petition the music education faculty for an exception. A minimum of five of the seven semesters of required ensemble registration must be in a conducted instrumental ensemble (Symphony Orchestra, Philharmonia, Wind Symphony, Symphonic Band or Concert Band) and one semester must be in Marching Band. Freshmen are strongly encouraged to be in Marching Band (EMUS 1287) their first semester.

| **Year One** | | **Credit Hours** |
|---|---|---|
| MUSC 1101<br>& MUSC 1111 | Semester 1 Theory<br>and Semester 2 Theory | 4 |
| MUSC 1103 | Becoming a Music Teacher | 1 |
| MUSC 1121<br>& MUSC 1131 | Aural Skills Lab, Semester 1<br>and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1XXX | Applied Instruction | 6 |
| PMUS 1105<br>& PMUS 1205 | Keyboard Musicianship 1<br>and Keyboard-Musicianship 2 | 2 |
| Ensemble | | 2 |
| Written communication | | 3 |
| Non-music core requirements | | 6 |
| Non-music electives | | 3 |
| | **Credit Hours** | **32** |
| **Year Two** | | |
| EDUC 3013 | School and Society | 3 |
| MUSC 2101<br>& MUSC 2111 | Semester 3 Theory<br>and Semester 4 Theory | 4 |
| MUSC 2103 | Introduction to Music Education | 2 |
| MUSC 2121<br>& MUSC 2131 | Aural Skills Lab, Semester 3<br>and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| MUSC 3133 | Teaching General Music I | 2 |
| MUSC 3153 | Teaching Woodwind Instruments | 2 |
| MUSC 3163 | Teaching String Instruments | 2 |
| PMUS 1184 | Voice Class | 1 |
| PMUS 2XXX | Applied Instruction | 5 |
| Ensemble | | 2 |
| Non-music core requirements | | 6 |
| Non-music electives | | 3 |
| | **Credit Hours** | **35** |
| **Year Three** | | |
| MUSC 3176<br>& MUSC 3186 | Conducting 1<br>and Conducting II | 4 |
| MUSC 3193 | Vocal Pedagogy and Literature for Young Voices | 2 |
| MUSC 3223 | Teaching Brass Instruments | 2 |
| MUSC 3243 | Teaching Percussion Instruments | 2 |
| MUSC 3253 | Jazz Techniques for the Music Educator | 2 |

| | | |
|---|---|---|
| MUSC 3363 | Marching Band Techniques | 2 |
| MUSC 3802 & MUSC 3812 | History of Western Music 1 and History of Western Music 2 | 6 |
| MUSC 3997 | Junior Recital | 1 |
| MUSC 4203 | Music Methods Practicum | 1 |
| MUSC 4323 | Differentiating Instruction in K-8 Music Classrooms | 3 |
| MUSC 4443 | Teaching Instrumental Music | 3 |
| PMUS 3XXX | Applied Instruction | 5 |
| Ensemble | | 2 |
| | **Credit Hours** | **35** |
| **Year Four** | | |
| EDUC 4112 or EDUC 2411 | Adolescent Development and Learning for Teachers or Educational Psychology for Elementary Schools | 3 |
| EDUC 4732 | Student Teaching K-12 | 8 |
| MUSC 4103 | Introduction to Student Teaching | 1 |
| MUSC 4193 | Student Teaching Seminar | 1 |
| MUSC 4223 | Secondary Music Teaching Approaches | 2 |
| PMUS 4XXX | Applied Instruction | 3 |
| Ensemble | | 1 |
| Upper-division music theory elective: MUSC 3081, MUSC 4001, MUSC 4011, MUSC 4021, MUSC 4061, MUSC 4071, MUSC 4111, MUSC 4121 or MUSC 4151. | | 2 |
| Non-music electives | | 3 |
| | **Credit Hours** | **24** |
| | **Total Credit Hours** | **126** |

## Instrumental Emphasis (Strings)

Students must take strings as the primary applied area or petition the music education faculty for an exception. A minimum of five of the seven semesters of required ensemble registration must be in a conducted instrumental ensemble (Symphony Orchestra, Philharmonia or Campus Orchestra).

| **Year One** | | **Credit Hours** |
|---|---|---|
| MUSC 1101 & MUSC 1111 | Semester 1 Theory and Semester 2 Theory | 4 |
| MUSC 1103 | Becoming a Music Teacher | 1 |
| MUSC 1121 & MUSC 1131 | Aural Skills Lab, Semester 1 and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1105 & PMUS 1205 | Keyboard Musicianship 1 and Keyboard-Musicianship 2 | 2 |
| PMUS 1XXX | Applied Instruction | 6 |
| Ensemble | | 2 |
| Written communication | | 3 |
| Non-music core requirements | | 6 |
| Non-music electives | | 3 |
| | **Credit Hours** | **32** |
| **Year Two** | | |
| EDUC 3013 | School and Society | 3 |
| MUSC 2101 & MUSC 2111 | Semester 3 Theory and Semester 4 Theory | 4 |
| MUSC 2103 | Introduction to Music Education | 2 |
| MUSC 2121 & MUSC 2131 | Aural Skills Lab, Semester 3 and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| MUSC 3133 | Teaching General Music I | 2 |
| MUSC 3153 | Teaching Woodwind Instruments | 2 |
| MUSC 3163 | Teaching String Instruments | 2 |
| MUSC 3273 | String Pedagogy and Literature | 2 |
| PMUS 1184 | Voice Class | 1 |
| PMUS 2XXX | Applied Instruction | 5 |
| Ensemble | | 2 |
| Non-music core requirements | | 3 |
| Non-music electives | | 3 |
| | **Credit Hours** | **34** |
| **Year Three** | | |
| MUSC 3043 | Percussion Class | 1 |
| MUSC 3176 & MUSC 3186 | Conducting 1 and Conducting II | 4 |
| MUSC 3193 | Vocal Pedagogy and Literature for Young Voices | 2 |
| MUSC 3223 | Teaching Brass Instruments | 2 |
| MUSC 3802 & MUSC 3812 | History of Western Music 1 and History of Western Music 2 | 6 |
| MUSC 3997 | Junior Recital | 1 |
| MUSC 4203 | Music Methods Practicum | 1 |
| MUSC 4323 | Differentiating Instruction in K-8 Music Classrooms | 3 |
| MUSC 4443 | Teaching Instrumental Music | 3 |
| PMUS 3271 | | |
| PMUS 3XXX | Applied Instruction | 5 |
| Ensemble | | 2 |
| Non-music core requirements | | 3 |
| | **Credit Hours** | **33** |
| **Year Four** | | |
| EDUC 4112 or EDUC 2411 | Adolescent Development and Learning for Teachers or Educational Psychology for Elementary Schools | 3 |
| EDUC 4732 | Student Teaching K-12 | 8 |
| MUSC 4103 | Introduction to Student Teaching | 1 |
| MUSC 4193 | Student Teaching Seminar | 1 |
| MUSC 4223 | Secondary Music Teaching Approaches | 2 |
| PMUS 4XXX | Applied Instruction | 3 |
| Ensemble | | 1 |
| Upper-division music theory elective: MUSC 3081, MUSC 4001, MUSC 4011, MUSC 4021, MUSC 4061, MUSC 4071, MUSC 4111, MUSC 4121 or MUSC 4151. | | 2 |
| Non-music electives | | 3 |
| Music elective | | 1 |
| | **Credit Hours** | **25** |
| | **Total Credit Hours** | **124** |

## Instrumental—General Music Emphasis

Students must take keyboard, strings or wind/brass/percussion as the primary applied area or petition the music education faculty for an exception.

For keyboard majors, a minimum of four of the seven semesters of required ensemble registration must be in a conducted instrumental ensemble (Symphony Orchestra, Philharmonia, Campus Orchestra, Wind Symphony, Symphonic Band, Concert Band or Campus Band), one semester must be in a conducted choral ensemble, and one semester must be in a world music ensemble. One semester of independent accompanying may be applied to the ensemble requirement.

For string majors, a minimum of five of the seven semesters of required ensemble registration must be in a conducted instrumental ensemble, one semester must be in a conducted choral ensemble, and one semester must be in a world music ensemble.

For woodwind, brass and percussion majors, a minimum of four of the seven semesters of required ensemble participation must be in a conducted instrumental ensemble, one semester must be in marching band, one semester must be in a conducted choral ensemble, and one semester must be in a world music ensemble.

Freshmen are strongly encouraged to be in Marching Band (EMUS 1287) their first semester.

| Year One | | Credit Hours |
|---|---|---|
| MUSC 1101<br>& MUSC 1111 | Semester 1 Theory<br>and Semester 2 Theory | 4 |
| MUSC 1103 | Becoming a Music Teacher | 1 |
| MUSC 1121<br>& MUSC 1131 | Aural Skills Lab, Semester 1<br>and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1105<br>& PMUS 1205 | Keyboard Musicianship 1<br>and Keyboard-Musicianship 2 | 2 |
| PMUS 1XXX | Applied Instruction | 6 |
| Ensemble | | 2 |
| Written communication | | 3 |
| Non-music core requirements | | 6 |
| Non-music electives | | 3 |
| | **Credit Hours** | **32** |
| **Year Two** | | |
| EDUC 3013 | School and Society | 3 |
| MUSC 2101<br>& MUSC 2111 | Semester 3 Theory<br>and Semester 4 Theory | 4 |
| MUSC 2103 | Introduction to Music Education | 2 |
| MUSC 2121<br>& MUSC 2131 | Aural Skills Lab, Semester 3<br>and Aural Skills Lab, Semester 4 | 2 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| MUSC 3133 | Teaching General Music I | 2 |
| MUSC 3153 | Teaching Woodwind Instruments | 2 |
| MUSC 3163 | Teaching String Instruments | 2 |
| PMUS 1184 | Voice Class | 1 |
| PMUS 2XXX | Applied Instruction | 5 |
| Ensemble | | 2 |
| Non-music core requirements | | 6 |
| Non-music electives | | 3 |
| | **Credit Hours** | **35** |
| **Year Three** | | |
| MUSC 3043 | Percussion Class | 1 |
| MUSC 3176<br>& MUSC 3186 | Conducting 1<br>and Conducting II | 4 |
| MUSC 3193 | Vocal Pedagogy and Literature for Young Voices | 2 |
| MUSC 3223 | Teaching Brass Instruments | 2 |
| MUSC 3802<br>& MUSC 3812 | History of Western Music 1<br>and History of Western Music 2 | 6 |
| MUSC 3997 | Junior Recital | 1 |
| MUSC 4113 | Teaching General Music 2 | 3 |
| MUSC 4203 | Music Methods Practicum | 1 |
| MUSC 4323 | Differentiating Instruction in K-8 Music Classrooms | 3 |
| MUSC 4443 | Teaching Instrumental Music | 3 |
| PMUS 3XXX | Applied Instruction | 5 |
| Ensemble | | 2 |
| | **Credit Hours** | **33** |
| **Year Four** | | |
| EDUC 4112<br>or EDUC 2411 | Adolescent Development and Learning for Teachers<br>or Educational Psychology for Elementary Schools | 3 |
| EDUC 4732 | Student Teaching K-12 | 8 |
| MUSC 4103 | Introduction to Student Teaching | 1 |
| MUSC 3253<br>or MUSC 3273<br>or MUSC 3363 | Jazz Techniques for the Music Educator<br>or String Pedagogy and Literature<br>or Marching Band Techniques | 2 |
| MUSC 4193 | Student Teaching Seminar | 1 |
| MUSC 4223 | Secondary Music Teaching Approaches | 2 |
| PMUS 4XXX | Applied Instruction | 3 |
| Ensemble | | 1 |
| Upper-division music theory elective: MUSC 3081, MUSC 4001, MUSC 4011, MUSC 4021, MUSC 4061, MUSC 4071, MUSC 4111, MUSC 4121 or MUSC 4151. | | 2 |
| Non-music electives | | 3 |
| | **Credit Hours** | **26** |
| | **Total Credit Hours** | **126** |

## Instrumental—Jazz Emphasis (Saxophone, Trumpet, Trombone, Percussion)

Students will receive classical instrument instruction as the primary applied area and will receive some additional applied instruction in jazz (saxophone, trumpet, trombone or jazz drumset). A minimum of five of the seven semesters of required ensemble registration must be in a classical, conducted instrumental ensemble (Symphony Orchestra, Philharmonia, Wind Symphony, Symphonic Band or Concert Band) with at least one semester required in Marching Band and three semesters must be in either Jazz Ensemble or Jazz Combo. Freshmen are strongly encouraged to be in Marching Band (EMUS 1287) their first semester.

| Year One | | Credit Hours |
|---|---|---|
| MUSC 1101 & MUSC 1111 | Semester 1 Theory and Semester 2 Theory | 4 |
| MUSC 1103 | Becoming a Music Teacher | 1 |
| MUSC 1121 & MUSC 1131 | Aural Skills Lab, Semester 1 and Aural Skills Lab, Semester 2 | 2 |
| MUSC 1802 | Introduction to Musical Styles and Ideas | 3 |
| PMUS 1XXX | Applied Instruction | 6 |
| PMUS 1105 & PMUS 1205 | Keyboard Musicianship 1 and Keyboard-Musicianship 2 | 2 |
| Ensemble | | 2 |
| Written communication | | 3 |
| Non-music core requirements | | 6 |
| Non-music electives | | 3 |
| | **Credit Hours** | **32** |
| **Year Two** | | |
| EDUC 3013 | School and Society | 3 |
| MUSC 2103 | Introduction to Music Education | 2 |
| MUSC 2997 | Sophomore Proficiency | 1 |
| MUSC 3061 & MUSC 3071 | Jazz Improvisation I and Jazz Improvisation II | 4 |
| MUSC 3133 | Teaching General Music I | 2 |
| MUSC 3153 | Teaching Woodwind Instruments | 2 |
| MUSC 3163 | Teaching String Instruments | 2 |
| PMUS 1184 | Voice Class | 1 |
| PMUS 2XXX | Applied Instruction | 5 |
| Ensemble | | 3 |
| Non-music core requirements | | 6 |
| Non-music electives | | 3 |
| | **Credit Hours** | **34** |
| **Year Three** | | |
| MUSC 3176 & MUSC 3186 | Conducting 1 and Conducting II | 4 |
| MUSC 3193 | Vocal Pedagogy and Literature for Young Voices | 2 |
| MUSC 3223 | Teaching Brass Instruments | 2 |
| MUSC 3243 | Teaching Percussion Instruments | 2 |
| MUSC 3253 | Jazz Techniques for the Music Educator | 2 |
| MUSC 3363 | Marching Band Techniques | 2 |
| MUSC 3802 & MUSC 3812 | History of Western Music 1 and History of Western Music 2 | 6 |
| MUSC 3997 | Junior Recital | 1 |
| MUSC 4203 | Music Methods Practicum | 1 |
| MUSC 4323 | Differentiating Instruction in K-8 Music Classrooms | 3 |
| MUSC 4443 | Teaching Instrumental Music | 3 |
| PMUS 3XXX | Applied Instruction | 5 |
| Ensemble | | 2 |
| | **Credit Hours** | **35** |
| **Year Four** | | |
| EDUC 4112 or EDUC 2411 | Adolescent Development and Learning for Teachers or Educational Psychology for Elementary Schools | 3 |
| EDUC 4732 | Student Teaching K-12 | 8 |
| MUSC 3081 | Jazz Theory and Aural Foundations 1 | 3 |
| MUSC 4103 | Introduction to Student Teaching | 1 |
| MUSC 4193 | Student Teaching Seminar | 1 |
| MUSC 4223 | Secondary Music Teaching Approaches | 2 |
| PMUS 4XXX | Applied Instruction | 3 |
| Ensemble | | 1 |
| Non-music electives | | 3 |
| | **Credit Hours** | **25** |
| | **Total Credit Hours** | **126** |

# Dual Degree Program

## BMus/BMusEd in Music Performance and Music Education

Qualified music majors who have been approved by the relevant major departments may elect to complete a dual degree in music performance (woodwinds, brass and percussion, strings or voice) and music education (instrumental or choral tracks). Requirements for these dual degree programs range in total credit hours and typically include a minimum of 10 semesters of study (including one semester of full-time student teaching) to complete all requirements.

# Learning Outcomes

- Perform solo and ensemble repertoire demonstrating musical artistry, technical proficiency and stylistic understanding.
- Demonstrate an understanding of theoretical studies, including sight-reading and ear training.
- Demonstrate an understanding of historical studies including the analysis of stylistic periods and music of non-Western cultures.
- Demonstrate a sufficiently broad knowledge of the entire K-12 music program/curriculum.
- Develop specialized pedagogical skills necessary to be a successful general music, choir, orchestra or band director.

# Academic Enrichment Programs

# Education Abroad

CU Boulder Education Abroad offers more than 350 approved programs in over 65 countries around the world. Program options exist for every major and are offered for every term including winter break and summer break, with numerous options of varying lengths and credit amounts. Planning to go abroad varies by major, but it is recommended that students have an initial planning conversation with an academic advisor as early as possible.

A growing list of over 10,000 pre-approved courses provides approved courses abroad for various degree requirements. Program costs vary, and include over 30 programs that are comparable to semester costs for in-state students. Students can use existing financial aid and institutional scholarships for a semester/year abroad, and additional scholarship opportunities exist.

Please see the following links for additional information and resources:

- Search for programs by major (http://abroad.colorado.edu/?FuseAction=Programs.AdvancedSearch), location, term, program type, cost and more.
- View a list of summer/winter break faculty-led Global Seminar (https://abroad.colorado.edu/?FuseAction=Programs.AdvancedSearch) courses.
- View study abroad guides (http://abroad.colorado.edu/?FuseAction=Abroad.ViewLink&Parent_ID=0&Link_ID=B207274A-0059-71AF-E694D487757CFC7C) for various majors and pre-approved course lists.

# Library Research

Several courses in information access and library research methods are offered to students who wish to explore the structure, organization, retrieval and evaluation of information for their study and career needs.

**Course code for this program is LIBR.**

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Aguliera, Arthur (https://experts.colorado.edu/display/fisid_164519/)
Assistant Professor; MLS, University of Washington

Aldama, Dulce
Assistant Professor; PhD, University of Colorado

Allmendinger, Katerina (https://experts.colorado.edu/display/fisid_165581/)
Teaching Assistant Professor; MLS, University of Denver

Amram, Tess
Teaching Assistant Professor; MLIS, Drexel University

Bonjack, Stephanie Marie (https://experts.colorado.edu/display/fisid_156290/)
Assistant Professor; MM, Northwestern University

Cantrell, Melissa (https://experts.colorado.edu/display/fisid_159556/)
Assistant Professor; MA, University of Denver

Carey, Frederick (https://experts.colorado.edu/display/fisid_159512/)
Assistant Professor; MLIS, University of Denver

Catabay, Keno
Assistant Professor; MLIS, Florida State University

Couture, Juliann Elizabeth (https://experts.colorado.edu/display/fisid_153757/)
Associate Professor; MA, University of Arizona

Dolan, Natalia Sue (https://experts.colorado.edu/display/fisid_147736/)
Associate Professor; MLS, University of Denver

Dommermuth, Emily (https://experts.colorado.edu/display/fisid_158089/)
Assistant Professor; MLIS, University of Denver

Dulock, Michael J. (https://experts.colorado.edu/display/fisid_144338/)
Associate Professor; MLIS, Drexel University

Eichmann-Kalwara, Nickoal (https://experts.colorado.edu/display/fisid_158705/)
Associate Professor; MLS, Indiana University

Ferris, Anna M. (https://experts.colorado.edu/display/fisid_116252/)
Associate Professor; MLS, Southern Connecticut State University

Fong, Judith Yem Siu (https://experts.colorado.edu/display/fisid_101120/)
Professor Emeritus; MA, University of California, Berkeley

Friedel, Megan (https://experts.colorado.edu/display/fisid_163706/)
Assistant Professor; MS, Simmons College

Gerke, Jennifer D. (https://experts.colorado.edu/display/fisid_135135/)
Associate Dean, Associate Professor; MLS, Indiana University at South Bend

Gilbert, Stacy (https://experts.colorado.edu/display/fisid_158706/)
Associate Professor; MLIS, University of North Carolina

Hamilton, Fred A. Jr. (https://experts.colorado.edu/display/fisid_105243/)
Senior Instructor Emeritus; MS, University of Tennessee-Knoxville

Hauser, Thomas (https://experts.colorado.edu/individual/fisid_148662/)
Associate Professor Adjoint; PhD, Technische Universität München (Germany)

Hayworth, Eugene H. (https://experts.colorado.edu/display/fisid_126313/)
Associate Professor Emeritus; MLS, Syracuse University

Hollis, Deborah R. (https://experts.colorado.edu/display/fisid_100664/)
Professor; MLS, University of Arizona

Ibacache, Kathia (https://experts.colorado.edu/display/fisid_164601/)
Assistant Professor; MLIS, San Jose State University

Johnson, Andrew M. (https://experts.colorado.edu/display/fisid_149821/)
Associate Professor; MA, University of Wisconsin–Madison

Keller, Cynthia (https://experts.colorado.edu/display/fisid_159112/)
Teaching Associate Professor; MLS, Indiana University

Knuth, Shelley (https://experts.colorado.edu/display/fisid_147168/)
Assistant Professor Adjoint

Kuglitsch, Rebecca Zuege (https://experts.colorado.edu/display/fisid_152452/)
Associate Professor; MLS, University of Washington

Lewis, Abbey (https://experts.colorado.edu/display/fisid_159174/)
Teaching Associate Professor; MLIS, Catholic University of America

Li, Xiang (https://experts.colorado.edu/display/fisid_145009/)
Associate Professor; MS, University of Michigan Ann Arbor

Lindquist, Thea L. (https://experts.colorado.edu/display/fisid_122803/)
Professor, Faculty Director; PhD, University of Wisconsin–Madison

Lisbon, Adam Harry (https://experts.colorado.edu/display/fisid_152869/)
Associate Professor; MS, SUNY at Albany

Long, Chris Evin (https://experts.colorado.edu/display/fisid_155455/)
Professor; MA, Indiana University Bloomington

Losoff, Barbara Ann (https://experts.colorado.edu/display/fisid_106944/)
Associate Professor Emeritus; MLS, Emporia State University

McDaniel, Kami
Teaching Assistant Professor; MA, University of Colorado Boulder

McDonald, Courtney (https://experts.colorado.edu/display/fisid_164150/)
Associate Professor; MLS, University of Indiana

McDonald, Robert (https://experts.colorado.edu/display/fisid_163978/)
Dean, Professor; MLIS, University of South Carolina

McIntyre, Joanne
Teaching Associate Professor; MLS, CUNY Queens College

McLure, Merinda (https://experts.colorado.edu/display/fisid_159239/)
Professor, Associate Faculty Director; MLIS, University of British Columbia Vancouver

Moeller, Paul D. (https://experts.colorado.edu/display/fisid_122618/)
Associate Professor, Faculty Director; MA, University of Iowa

Novosel, Elizabeth (https://experts.colorado.edu/display/fisid_143082/)
Assistant Professor; MLS, University of Wisconsin--Milwaukee

Pusateri, Christopher
Teaching Associate Professor; MLIS, University of Washington

Radio, Erik (https://experts.colorado.edu/display/fisid_164804/)
Associate Professor; MS, University of Illinois at Urbana-Champaign

Ranganath, Aditya (https://experts.colorado.edu/individual/fisid_167884/)
Teaching Assistant Professor; PhD, University of California, San Diego

Reynolds, Leslie Jean (https://experts.colorado.edu/display/fisid_153008/)
Senior Associate Dean, Professor; MLIS, University of Illinois at Urbana–Champaign

Rybin Koob, Amanda (https://experts.colorado.edu/display/fisid_166576/)
Assistant Professor; MLIS, University of Denver

Semenoff, Emily (https://experts.colorado.edu/individual/fisid_164614/)
Teaching Assistant Professor; MLIS, University of Denver

Sinkinson, Caroline B. (https://experts.colorado.edu/display/fisid_141709/)
Professor, Faculty Director; MLIS, Kent State University

Sparks, Katie
Teaching Assistant Professor; MLS, Valdosta State University

Swanson, Juleah Ann (https://experts.colorado.edu/display/fisid_155854/)
Associate Professor; MLS, University of Washington

Tallman, Kathryn Wood (https://experts.colorado.edu/display/fisid_152383/)
Assistant Professor; MS, University of Illinois at Urbana–Champaign

Trujillo, Nicole (https://experts.colorado.edu/display/fisid_163424/)
Assistant Professor; MS, University of Strathclyde

Van Hoye, Allan (https://experts.colorado.edu/individual/fisid_158902/)
Teaching Assistant Professor; MLIS, University of Denver

VandenBosch, Adrienne (https://experts.colorado.edu/display/fisid_173167/)
Teaching Assistant Professor; MLS, University of Denver

Velte, Ashlyn (https://experts.colorado.edu/individual/fisid_165254/)
Assistant Professor; MLIS, University of North Carolina at Chapel Hill

Wagner, Jamie
Teaching Assistant Professor; MLS, University of Wisconsin

Watkins, Alexander Charlton (https://experts.colorado.edu/display/fisid_151514/)
Associate Professor; MLS, Pratt Institute

Welsh, Megan Elizabeth (https://experts.colorado.edu/display/fisid_153633/)
Associate Professor; MLIS, University of Denver

White, Philip (https://experts.colorado.edu/display/fisid_157730/)
Associate Professor; MLIS, University of North Carolina at Greensboro

Wiersma, Gabrielle Somnee (https://experts.colorado.edu/display/fisid_145475/)
Associate Professor; MLIS, University of Denver

## Courses

**LIBR 2000 (3) Introduction to Information Literacy**
This course will introduce information practices and the integrated literacies for discovering information, exploring how information is produced, and for participating in collaborative creation of new knowledge. Topics include an introduction to the research process, information ethics, and critical analysis of sources. The course will prepare students for both university level research and information practices after graduation.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.

**LIBR 3010 (3) Information Landscapes and Literacies**
Through sustained inquiry into information literacy topics, students will examine the ways that our critical understanding of the world are shaped by information. Students will explore information practices and cultivate the capacity to draw meaning from and to contribute to information landscapes. Emphasizes information literacy, critical thinking, and research.

**LIBR 3030 (1) Civic Engagement in a Changing Information Landscape**
With a 24 hour news cycle, political use of social media, and the growth of disinformation, being an informed citizen has become increasingly more important and difficult. With a practical approach on participation in government, students will research and discuss the United States political system, examine the current political climate, what it means to be a good digital citizen, and engage in opposing views.
**Grading Basis:** Letter Grade

**LIBR 3900 (1-3) Independent Library Research**
In-depth library research project for upper-division students. Instructor consent required.

**LIBR 4029 (1) Art History Research Methods**
In this class we will investigate how art scholarship is formed and organized; learn to expertly navigate the vast array of art research resources; and explore advanced techniques for searching both online and offline sources of art information. We will work to develop a critical understanding of our own research processes and reflect on the tools and techniques that lead to both expert research and successful participation in art discourse.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 4029 and ARTH 5029
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**LIBR 4900 (1-3) Independent Library Research**
In-depth library research project for upper-division students. Instructor consent required.

# Preprofessional Programs

Preprofessional advising resources have been developed at CU Boulder to help undergraduate students, and previously graduated students, prepare for further study at professional schools. CU Boulder does not offer preprofessional undergraduate majors or degrees. Completion of preprofessional prerequisites does not guarantee admission to a professional school. However, preprofessional advisors are well-equipped to provide information about professional schools within Colorado, and beyond, and can help students to prepare well for further professional study.

## Health Professions

Students can prepare to enter the undergraduate professional health science program in nursing at the Anschutz Medical Campus of the University of Colorado by taking courses on the Boulder campus.

Students whose goals include entering the medical, dentistry, physical therapy, physician assistant, pharmacy or public health programs and schools at the Anschutz Medical Campus, or the veterinary medicine or occupational therapy programs at Colorado State University in Fort Collins, can complete any undergraduate major at CU Boulder. In most cases, these students are required to complete a baccalaureate degree before entering professional school. In fact, a baccalaureate degree is recommended for most health professions.

At the time of application to a professional school, students are judged on several factors, including performance in undergraduate courses. For this reason, no required course may be taken on a pass/fail basis. Some fields require specific preprofessional examinations before application. For most fields, interviews are an essential part of the application process.

In all cases, admission committees are concerned with students' compassion, coping and decision-making abilities, intellectual capabilities, realistic self-appraisal, sensitivity in interpersonal relations and staying power (physical and motivational). In addition to formal coursework, students should have experience in people-related activities (especially those related to their field of choice), so that they can be more certain of their motivation for health careers. Also, health-related activities expose premed and other health science hopefuls to various patients and illnesses. The health professions require, or strongly recommend, such experience.

Some of the professional programs at the Anschutz Medical Campus give preference to Colorado residents and residents of WICHE (Western Interstate Commission on Higher Education) states; interested students should check with individual programs for specific policies. Students from other states usually can obtain at CU Boulder the preprofessional courses required by their state schools, but should check with those schools in advance. Students are encouraged to apply to their state school, as well as to other public and private professional schools, to increase their chances of gaining acceptance to the professional program of their choice.

During the preprofessional years, personal intellectual development leads many students to change professional goals. Since there are usually more applicants for these programs than there are spaces available, many students need to pursue alternative goals. Therefore, students should plan college programs to give themselves the greatest flexibility in considering other vocations.

Advising for preprofessional study in the health sciences is conducted through the Preprofessional Advising Office in the University Club. Check the pre-health advising (https://www.colorado.edu/programs/prehealth-advising/) website for information on prerequisite courses, events, volunteer opportunities, student pre-health organizations, applications and many other useful resources. Students should attend a pre-health advising session at orientation, then begin to follow the Pre-Health Pathway sequence of meetings early in their undergraduate careers to help plan coursework and extracurricular experience in preparation for applying to programs of their choice. Current students and alumni may schedule pre-health meetings through Buff Portal Advising (https://www.colorado.edu/buffportaladvising/). The Preprofessional Advising Office offers an extensive array of workshops and informational meetings, as well as a spring Health Professions Information Day.

## Pre-Law

Students who plan to apply to law school upon completing their baccalaureate degree do not have to complete any specific course requirements for admission to law school. Instead, they should major in the discipline that best suits their intellectual interests and talents. Pre-law students should seek a rigorous and broad-based education that will ensure them a fundamental understanding of American society and its institutions. Students should become familiar with mathematical analysis and scientific reasoning, and develop excellent oral and written communication skills.

Pre-law advising is available in the Preprofessional Advising Office. In addition, the Preprofessional Advising Office sponsors a fall Law Fair, spring Law Day and a year-long speaker series. Contact the Preprofessional Advising Office in University Club 111 for more information. Check the pre-law advising (https://www.colorado.edu/career/pre-law/) webpage for information on events, the student pre-law organization, applications and many other useful resources. Current students and alumni may schedule pre-law advising appointments through Buff Portal Advising (https://www.colorado.edu/buffportaladvising/).

# Presidents Leadership Class

The Presidents Leadership Class (PLC) is a scholar community with academic and experiential curricula with focus on leadership development based on program pillars and values. Skills are developed in interdisciplinary, academic, experiential and service environments and through exposure to key social issues and complex problems. PLC students are enrolled in all the schools and/or colleges across campus

and participate in the PLC curriculum as a complement to their regular coursework.

The PLC is a program of CU Boulder and has a Board of Advocates representing Colorado business, educational, nonprofit and government communities.

# Admission and Enrollment

Admission to the PLC is part of being welcomed onto campus and a feeling of belonging for incoming CU Boulder students. Most PLC students are admitted prior to the beginning of their first year at CU Boulder; however, limited spots are reserved for qualified rising sophomores through a second point-of-entry application. Selection criteria include academic performance, mindset, a willingness to challenge oneself, and displays of empathy, humility and resiliency. Each year, 35-40 first-year students are enrolled, comprising both Colorado residents and non-residents. Instructions on how to apply to PLC are available on the PLC website (http://www.colorado.edu/plc/). The application is part of the CU Boulder Scholarship Application through the Office of Financial Aid and Scholarship Services. The application is due by **February 15**. To access the application, visit the Apply Now (http://www.colorado.edu/plc/apply-now/) webpage.

PLC students receive credit for the General Education requirements for Social Sciences for PRLC 1810 and PRLC 1820 in their first year of PLC. Students are required to take three additional PLC courses (PRLC) with a few exceptions: PRLC 2820, PRLC 3810 or PRLC 3800 and PRLC 2930 (the complement course for the ALE experiential requirement).

# Academic Program

The PLC provides students with unique academic courses, purposeful experiential education and real-life experiences that support:

- Academic rigor and professional readiness.
- Growth in critical thinking, research, analytical and synthesizing capabilities.
- Development of innovative and practical creativity in problem solving.
- Opportunities to apply new abilities of thoughtful implementation of sustainable solutions.
- Cultivation and understanding of moral reasoning and ethical decision making.
- Development of an appreciation for a community to which students want to impact and contribute to.

PLC provides opportunities by uniting the support of the university, local, statewide and national leaders. The academic curriculum is supplemented by a substantial experiential learning curriculum and professional development opportunities.

For more information on the PLC Curriculum Strategy and the research behind it, visit the Presidents Leadership Class (http://www.colorado.edu/plc/) website.

## Required Courses and Credits

PLC students tend to declare and complete the Leadership Studies Minor (LSM) (p. 809), however, **it is not a requirement of the PLC program**. Courses in addition to the courses listed below have been added to the list of courses accepted to complete PLC. Information about the other courses and many academic/experiential opportunities available is on the PLC website. (https://www.colorado.edu/plc/current-students/courses/)

The capstone course, LEAD 4000 is not required for PLC students but is required for the Leadership Studies Minor.

| Code | Title | Credit Hours |
|---|---|---|
| PRLC 1810 | Leadership Foundations and Applications I | 3 |
| PRLC 1820 | Leadership Foundations & Applications II | 3 |
| PRLC 2820 | Multilevel Issues in Leadership | 3 |
| PRLC 3810 | Global Issues in Leadership | 3 |
| PRLC 2930 | Leadership Internship | 1-3 |
| LEAD 4000 | Leadership in Context and Emerging Challenges: A Capstone [1] | 4 |

[1] Required for the minor in leadership studies only.

# Scholarship Programs and Opportunities

The PLC offers many scholarships to fully participating students over the course of their undergraduate careers. The first-year award is a merit award of $1,000 that is awarded upon selection into the program. The first-year scholarship is **non-renewable** and **not awarded automatically after the first year.** PLC students have the opportunity **to apply or be nominated** for a number of other scholarships to substantially help fund their undergraduate education upon their second semester in the program. Below is a list of available scholarships primary to PLC students. All PLC-allocated scholarships are dispersed through the Office of Financial Aid and are calculated directly against the cost of attendance.

- William A. Douglas Endowment
- FirstBank Scholars
- Dr. Larry Allen Endowment
- Flanagan & Walker Scholarships
- Hoelscher Memorial Scholarship
- Annabelle K. Lutz Voss Scholars
- Tim Pestotnik Scholarship
- Leo Hill Endowment
- The Ruyle Family Scholarship
- PLC Enrichment Fund Scholarship
- PLC Student Staff Fellowship

# Courses

**PRLC 1810 (3) Leadership Foundations and Applications I**
Introduces fundamental principles of leadership and ethics. Emphasizes application of the principles for self-development and organizational effectiveness.
**Requisites:** Restricted to students in the Presidents Leadership Class (PPLC) only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences

**PRLC 1820 (3) Leadership Foundations & Applications II**
Explores challenges to leadership at the community level such as drug abuse, poverty, decline of infrastructure, care of the aged, etc. Gives particular attention to the development of effective leadership responses to community difficulties at university, city, state, and national levels.
**Requisites:** Restricted to students in the Presidents Leadership Class (PPLC) only.
**Grading Basis:** Letter Grade
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences

**PRLC 2820 (3) Multilevel Issues in Leadership**
Studies multilevel issues that originate in organizational settings but carry community and global implications. Encourages students to fully explore the complexity and interrelatedness of issues with a special emphasis on leadership and ethical implications.
**Requisites:** Restricted to students in the Presidents Leadership Class (PPLC) only.

**PRLC 2930 (1-3) Leadership Internship**
Students analyze the leadership styles within a host organization, examine how successfully an organization fulfills its mission and further refine their own theories of what constitutes effective leadership. Students also complete a meaningful project over the course of the internship. Department enforced prerequisites: PRLC 1810 and PRLC 1820 and PRLC 2820.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**PRLC 3800 (3-4) Global Inquiry for 21st Century Leadership**
Introduces students to the ways in which leadership and sustainable development theory converge, challenges students to examine these issues in specific contexts around the world, and provides them with practical training in cross-cultural competency and leadership skills.
**Requisites:** Requires prerequisites PRLC 1810 (minimum grade C). Restricted to Presidents Leadership Class members.
**Recommended:** Prerequisites PRLC 1820, PRLC 2820 or ENLP 3100.
**Grading Basis:** Letter Grade

**PRLC 3810 (3) Global Issues in Leadership**
Examines the challenges to leadership posed by major global issues. Problems in the areas of human rights, hunger, disease, large-scale collective violence and environmental deterioration are explored with a special emphasis on the development of effective, long-term leadership strategies. Department enforced prerequisites: PRLC 1810 and PRLC 1820 and PRLC 2820.

**PRLC 4010 (3-4) 21st Century Leadership**
An advanced course that focuses on critical analysis of leadership principles and techniques. Designed to provide theoretical and hands-on experience for individuals who wish to function in leadership roles at high levels of competence in the workplace and in the civic arena.
**Requisites:** Requires prerequisite courses of PRLC 1810 and PRLC 1820 (all minimum grade C). Restricted to students in the Presidents Leadership Class (PPLC) only.

**PRLC 4081 (3) Icons of the American Republic**
Examines the founding period of the United States through the events, political concepts and individuals depicted in the art exhibited in the U.S. Capitol Building in Washington, D.C. The course includes a visit to the U.S. Capitol Building, the floor of the U.S. House of Representatives, the floor of the U.S. Senate, and an exploration of the legislative process.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite PSCI 1101 or PSCI 2012 or PSCI 2223 or PSCI 2004.
**Additional Information:** Departmental Category: American

# Reserve Officers Training Corps (ROTC)

Enrollment in Reserve Officers Training Corps (ROTC) programs is open to both men and women, and ROTC lower-level leadership courses are open to all students whether or not they contract with ROTC.

All services provide undergraduate and selected graduate students with the opportunity to combine academic study with a military officer's educational program. The three services conduct courses in their respective areas leading to a regular or reserve commission upon graduation.

## Military Programs

- Air Force Aerospace Studies (U.S. Air Force) (p. 1091)
- Military Science (U.S. Army) (p. 1092)
- Naval Science (U.S. Navy & U.S. Marine Corps) (p. 1094)

# Air Force Aerospace Studies (U.S. Air Force)

The Air Force ROTC curriculum encompasses exclusive classes and leadership workshops that help prepare students for their future careers. The curriculum has three central components: academic classes, leadership laboratory (LLAB) and physical training (PT).

For more information visit the Air Force ROTC website.

## Requirements

All cadets must complete Aerospace Studies Courses (https://www.colorado.edu/afrotc/how-we-make-officer/academics/) with a grade of C- or above. Additionally, cadets must enroll in Leadership Lab (https://www.colorado.edu/afrotc/how-we-make-officer/academics/) every semester.

Cadets on scholarship must maintain a minimum 2.5 cumulative GPA and be enrolled as a full-time student.

For more information on program requirements visit the Air Force ROTC website (https://www.colorado.edu/afrotc/how-we-make-officer/academics/).

## Faculty

Brown, Ethan
Captain, Assistant Professor; MS, Eastern Michigan University

Lange, Rebecca
Colonel, Chair, Professor; MPA, University of Oklahoma

Riester, Melissa
Major, Assistant Professor; MA, St. Mary's University

Rutkovitz, Jared
Major, Assistant Professor; MBA, Naval Postgraduate School

Skrla, Eric
Captain, Assistant Professor; MA, University of Colorado Boulder

Somers, Nichelle
Lieutenant Colonel, Assistant Professor; MA, University of Colorado, Colorado Springs

## Courses

**AIRR 1010 (1) Heritage and Values I**
This course provides an introduction to the Air & Space Forces, encourages students to pursue an AF career or seek additional information to be better informed about the role of the USAF. The course allows students to examine general aspects of the Department of the Air Force, AF Leadership, Air Force benefits, and opportunities for AF officers. The course also lays the foundation for becoming an Airman by outlining our heritage and values.
**Additional Information:** Departmental Category: Air Force Aerospace Studies

**AIRR 1020 (1) Heritages and Values II**
A continuation of AIRR 1010. This course provides a historical perspective including lessons on war and the US military, AF operations, principles of war, and airpower. This course also provides students with an understanding for the employment of air and space power, from an institutional, doctrinal, and historical perspective. The students are introduced to the Air Force way of life and gain knowledge on what it means to be an Airman.
**Additional Information:** Departmental Category: Air Force Aerospace Studies

**AIRR 1947 (0) Air Force ROTC Leadership Laboratory**
All AFROTC cadets must attend leadership lab (two hours per week). The laboratory involves a study of Air Force customs and courtesies, drill and ceremonies, career opportunities and the life and work of an Air Force junior officer. Students (cadets) seeking a commission must take this lab in conjunction with their AIRR lecture/course. "Special Students" NOT seeking a commission, are not required or allowed to attend LLAB (Leadership Lab).

**AIRR 2010 (1) Team and Leadership Fundamentals 1**
This course is designed to provide a fundamental understanding of both leadership and team building. This course teaches students that there are many layers to leadership, including aspects that are not always obvious. Such things include listening, understanding themselves, being a good follower, and problem solving efficiently.
**Additional Information:** Departmental Category: Air Force Aerospace Studies

**AIRR 2020 (1) Team and Leadership Fundamentals 2**
A continuation of AIRR 2010. This course is designed to discuss different leadership perspectives when completing team building activities and discussing things like conflict management. This course also provides students with the ability of demonstrating their basic verbal and written communication skills. Active cadets will apply these lessons at Field Training, which follows the AS200 level.
**Additional Information:** Departmental Category: Air Force Aerospace Studies

**AIRR 3010 (3) Leading People and Effective Communication 1**
This course is designed to build on the leadership fundamentals taught in the AS200 level. The cadets will have the opportunity to utilize their skills as they begin a broader leadership role in the detachment. The goal is for cadets and students to have a more in-depth understanding of how to effectively lead people and provide them with the tools to use throughout their detachment leadership roles.
**Additional Information:** Departmental Category: Air Force Aerospace Studies

**AIRR 3020 (3) Leading People and Effective Communication 2**
A continuation of AIRR 3010. This course is designed to help cadets hone their writing and briefing skills. The course continues into advanced skills and ethics training that will prepare them for becoming an officer and a supervisor.
**Additional Information:** Departmental Category: Air Force Aerospace Studies

**AIRR 4010 (3) National Security, Leadership Responsibilities/ Commissioning Preparation 1**
This course is designed to address the basic elements of national security policy and process. The cadet will comprehend the air and space power operations as well as understand selected roles of the military in society and current domestic and international issues affecting the military profession.
**Additional Information:** Departmental Category: Air Force Aerospace Studies

**AIRR 4020 (3) National Security/Leadership Responsibilities/ Commissioning Preparation 2**
A continuation of AIRR 4010. This course is designed to prepare cadets for life as a second lieutenant. Cadets should comprehend the responsibility, authority, and functions of an Air Force commander and selected provisions of the military justice system.
**Additional Information:** Departmental Category: Air Force Aerospace Studies

# Military Science (U.S. Army)

The Department of Military Science is a leadership program leading to an officer's commission in the Active Army, Army Reserve or National Guard in conjunction with an undergraduate or graduate degree. Military science courses supplement a regular degree program and offer practical leadership and management experience. Scholarships are available for those that qualify. Additionally, financial benefits may be available for enlisted soldiers.

**The course code for this program is MILR.**

## Scholarship Programs

College freshmen, sophomores and juniors may be eligible for four-, three- and two-year scholarships, regardless of academic major. Interested

students must enroll in Army ROTC and meet eligibility requirements, including an army physical fitness test.

High school scholarship applicants may be eligible for four- and three-year college scholarships. High school students can apply during their junior year and before January 10 of their senior year.

All scholarship recipients receive full tuition and fees, a $1,200 book allowance and a stipend of $300–500 per month during the academic year. Students interested in scholarships should contact the enrollment and scholarship officer at armyrotc@colorado.edu, 303-492-3549 or 303-492-6495.

# Simultaneous Membership Program

College sophomore and juniors who want additional leadership training, may participate with an Army Reserve or Army National Guard unit as an officer trainee. Students participating in this program earn approximately $240 in monthly drill pay, plus a monthly ROTC stipend of $300–500. Additionally, SMP participants receive Army National Guard or reserve tuition benefits of up to $4,500 per year. Enlisted and prior service students retain their authorized GI benefits.

# Army ROTC Course Credit

ROTC is an elective credit in most departments. Individual academic advisors verify if ROTC classes count toward the student's degree.

# Registration

Army ROTC classes begin with MILR prefix. Register for classes through the normal course registration process. For more information, visit the the Army ROTC (http://www.colorado.edu/arotc/) website or contact the enrollment and scholarship officer at CU Boulder at armyrotc@colorado.edu, 303-492-3549 or 303-492-6495.

# Requirements

## Four-Year Program

For college freshmen, the four-year program consists of two phases: the basic course (freshman and sophomore years) and the advanced course (junior and senior years).

### Basic Courses (MSI & MSII)

Basic courses (MSI & MSII) cover Army history and organization, as well as military leadership and management. Labs provide the opportunity to develop leadership experience while learning basic military skills. Participating in the basic courses incur no military obligation, except for those receiving an Army scholarship.

### Advanced Courses (MSIII & MSIV)

Advanced courses (MSIII & MSIV) cover leadership, tactics and unit operations, training techniques, military law and professional ethics. Additionally, a four-week summer leadership camp at Fort Knox, Kentucky, is a requirement between the junior and senior year, and is a prerequisite for commissioning. Students enrolled in the advanced courses must have completed the basic courses (or the equivalent) and obtain permission from the Professor of Military Science (PMS).

## Two-Year Program

College students entering as a sophomore, junior or senior with four semesters of college remaining (including Grad School), can attend the two-year Basic Camp, which is a 4-week course conducted at Fort Knox, Kentucky, where students learn the same skills and fundamentals of military science, leadership, values and ethics taught in the basic course classes. Then students are ready to begin the advanced course when they return to college. Basic Camp is a paid internship and the academic equivalent to the MSI/MSII basic courses.

Prior service and enlisted soldiers who have completed basic training may be eligible to enroll in the advanced course without attending Basic Camp or completing the ROTC basic courses. Enlisted soldiers pursuing advanced placement must obtain permission from the PMS.

# Faculty

Braun, Joel D.
Captain, Assistant Professor; MBA, Western International University

Cacic, John D.
Captain, Assistant Professor; MBA, Central Michigan University

Cairney, John T.
Colonel, Chair, Professor; MS, Air Force Institute of Technology

Dawson, Edward E.
Lieutenant, Assistant Professor; BS, The Citadel

Freund, Karl
Sergeant, Military Science Instructor

Garbers, Patrick
Assistant Professor; Contractor, U.S. Army; BS, Chapman University

Gough, Michael J.
Colonel, Chair, Professor; MS, Naval Postgraduate School

Hale, Bobby L.
Captain, Assistant Professor; MBA, Columbia Station University

Johanson, Luke
Captain, Assistant Professor; MA, Northern Arizona University

Kelley, Rebecca
Captain, Assistant Professor; MA, Purdue University

Knutson, Joel P.
Major, Assistant Professor; BA, Pacific Lutheran University

Lawson, Duane W.
Lieutenant, Assistant Professor; BS, University of Florida

League, Dustin R.
Lieutenant, Assistant Professor; BS, University of Kansas

Lojka, Jason
Lieutenant Colonel, Chair, Professor; MS, Naval Postgrad School

Morgan, Walt
Commander, Associate Professor; MA, Naval War College

Palermo, Scott
Major, Assistant Professor; MS, Webster University

## Courses

**MILR 1011 (2) Adventures in Leadership 1**
Introduces fundamentals of leadership and the United States Army. Examines its organization, customs, and history as well as its current relevance and purpose. Students also investigate basic leadership and management skills necessary to be successful in both military and civilian settings. Includes fundamentals of Army leadership doctrine, team-building concepts, time and stress management, an introduction to cartography and land navigation, marksmanship, briefing techniques, and some basic military tactics.
**Additional Information:** Departmental Category: Military Science (U.S. Army)

**MILR 1021 (2) Adventures in Leadership 2**
Continues the investigation of leadership in small organizations. Covers selected topics such as basic troop leading procedures, military first aid and casualty evacuation concepts, creating ethical work climates, an introduction to Army organizations and installations, and a further examination of basic military tactics. Introduces students to effective military writing styles.
**Additional Information:** Departmental Category: Military Science (U.S. Army)

**MILR 2031 (3) Methods of Leadership and Management 1**
Comprehensively reviews advanced leadership and management concepts including motivation, attitudes, communication skills, problem solving, human needs and behavior, and leadership self development. Students continue to refine effective written and oral communications skills and to explore topics such as the basic branches of the Army, and officer and NCO duties. Students conduct classroom and practical exercises in small unit light infantry tactics and are prepared to perform as midlevel leaders in the cadet organization.
**Additional Information:** Departmental Category: Military Science (U.S. Army)

**MILR 2041 (3) Methods of Leadership and Management 2**
Focuses on leadership and management functions in military and corporate environments. Studies various components of Army leadership doctrine to include the four elements of leadership, leadership principles, risk management and planning theory, the be-know-do framework, and the Army leadership evaluation program. Continue to refine communication skills.
**Additional Information:** Departmental Category: Military Science (U.S. Army)

**MILR 3052 (3) Military Operations and Training 1**
Further explores the theory of managing and leading small military units with an emphasis on practical applications at the squad and platoon levels. Students examine various leadership styles and techniques as they relate to advanced small unit tactics. Familiarizes students with a variety of topics such as cartography, land navigation, field craft and weapons systems. Involves multiple, evaluated leadership opportunities in field settings and hands-on experience with actual military equipment. Students are given maximum leadership opportunities in weekly labs.
**Recommended:** Prerequisite instructor consent.
**Additional Information:** Departmental Category: Military Science (U.S. Army)

**MILR 3062 (3) Military Operations and Training 2**
Studies theoretical and practical applications of small unit leadership principles. Focuses on managing personnel and resources, the military decision making process, the operations order and oral communications. Exposes the student to tactical unit leadership in a variety of environments with a focus on preparation for the summer advance camp experience.
**Recommended:** Prerequisite instructor consent.
**Additional Information:** Departmental Category: Military Science (U.S. Army)

**MILR 3090 (1) Military Theory and Tactical Leadership**
Application of military domain knowledge, small until leadership skills and education on various subjects germane to military operations. Examination of military tactics, techniques and procedures to better understand how to successfully accomplish multiple military requirements. Instructor consent required. MSV students do not need to be enrolled in a MILR corequisite.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a corequisite course of MILR 1011 or 1021 or 2031 or 2041 or 3052 or 3062 or 4072 or 4082.
**Additional Information:** Departmental Category: Military Science (U.S. Army)

**MILR 4072 (3) Leadership 1: Adaptive Leadership**
Develops leaders of character that will excel in a complex, ambiguous and dynamic future operating environment: discusses personal growth, effective communication, critical thinking, problem solving and ethical leadership.
**Recommended:** Prerequisite instructor consent.
**Additional Information:** Departmental Category: Military Science (U.S. Army)

**MILR 4082 (3) Leadership 2: Leadership in a Complex World**
Develops leaders of character that will excel in a complex, ambiguous and dynamic future operating environment: develops universal leadership attributes such as critical thinking and problem solving, understanding the contemporary operating environment and improved inter-personal dynamics/team building skills.
**Recommended:** Prerequisite instructor consent.
**Additional Information:** Departmental Category: Military Science (U.S. Army)

**MILR 4840 (1-3) Independent Study**
**Additional Information:** Departmental Category: Military Science (U.S. Army)

# Naval Science (U.S. Navy & U.S. Marine Corps)

## Scholarship Programs

### Scholarships

NROTC offers two-, three- and four-year scholarships for those desiring to commission in the Navy or Marine Corps. Scholarships may be earned while students are enrolled in the college program. Scholarship students receive tuition and fees, a $375 book allowance per semester and a $250 per month subsistence allowance. This subsistence allowance gradually rises to $400 by the student's senior year.

### Advanced Standing

Students who are not awarded a scholarship may be placed in advanced standing. Advanced standing students receive a $350 per month subsistence allowance their junior year and $400 per month subsistence allowance their senior year in the program.

Naval science (Navy option) scholarship students must complete one year of calculus, physics and English as well as one semester of American military history or national security policy, and a cultural course.

## Commissioned Service

Opportunities to commission in the U.S. Navy are presently available in the following unrestricted line (URL) communities: surface, subsurface, aviation, special warfare and special operations.

Opportunities to commission in the U.S. Marine Corps are available in ground and aviation specialties.

Students interested in other programs leading to commissions in either the U.S. Navy or U.S. Marine Corps are encouraged to contact the NROTC unit on campus. All commissioning programs require that the student be working toward, and receive, a college degree.

**The course code for this program is NAVR.**

## Requirements

The number of NROTC credit hours that may count toward degree requirements is determined by the individual colleges. Students should therefore consider their college's policy when formulating their degree plan.

Naval science coursework is offered in the fall and spring semesters only.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| NAVR 1010 | Introduction to Naval Science | 2 |
| NAVR 2020 | Seapower and Maritime Affairs | 3 |
| NAVR 4010 | Leadership and Management | 3 |
| NAVR 4020 | Leadership and Ethics | 3 |
| **U.S. Navy Courses** | | |
| NAVR 3020 | Naval Operations and Seamanship | 3 |
| NAVR 3030 | Naval Engineering Systems | 3 |
| NAVR 3040 | Weapons and Systems Analysis | 3 |
| NAVR 4030 | Navigation | 3 |
| **U.S. Marine Corps Courses** | | |
| NAVR 3101 | Evolution of Warfare | 3 |
| NAVR 3201 | Fundamentals of Maneuver Warfare | 3 |
| **Total Credit Hours** | | **29** |

For additional information, visit the Naval Reserve Officers Training Corps (http://www.colorado.edu/nrotc/) website.

## Faculty

Bodisch, J. Robert
Colonel, Professor; M.A., Webster University; M.A., Naval War College

Cook, Lance
Lieutenant, Assistant Professor

Hinton, J. Kai
Lieutenant, Assistant Professor

Keziah, Brandon W.
Gunnery Sergeant, Assistant Instructor

MacVarish, Brendan F.
Captain, Instructor

Pembleton, Gary
Commander, Executive Officer, Associate Professor

Robbins, M. Mikaela
Lieutenant, Assistant Professor; B.S., U.S. Naval Academy

## Courses

**NAVR 1010 (2) Introduction to Naval Science**
Introduction to the naval profession. Instruction emphasizes the mission, organization and warfare components of the Navy and Marine Corps. Included is an overview of officer and enlisted ranks and rates, training, education, Naval customs and courtesies, military justice, leadership and nomenclature. Exposes the student to the professional competencies required to become a Naval/Marine Corps officer.
**Additional Information:** Departmental Category: Naval Science

**NAVR 1020 (3) Naval Ship Systems**
Naval Ship Systems
**Requisites:** Requires prerequisite course of NAVR 1010 (minimum grade D-).

**NAVR 2020 (3) Seapower and Maritime Affairs**
Surveys international maritime history and provides a review of American maritime history and policy. Examines American naval involvement in regional and global conflicts, evolution in technology and management, the role of the navies in foreign policy, and the influence of seapower on history.
**Requisites:** Requires prerequisite course of NAVR 1010 (minimum grade D-).
**Additional Information:** Departmental Category: Naval Science

**NAVR 3020 (3) Naval Operations and Seamanship**
Examines the Inland and International Rules of the Nautical Road, including court interpretations, principles of relative motion and vector analysis with the maneuvering board, ship handling procedures, weather, communications, tactical operations, and maritime law.
**Requisites:** Requires prerequisite course of NAVR 1010 (minimum grade D-).
**Additional Information:** Departmental Category: Naval Science

**NAVR 3030 (3) Naval Engineering Systems**
Studies in detail ship propulsion and related auxiliary systems. Emphasizes fossil fuel and nuclear steam and gas turbine systems. Stresses design constraints imposed by unique marine environment.
**Requisites:** Requires prerequisite course of NAVR 1010 (minimum grade D-).
**Additional Information:** Departmental Category: Naval Science

**NAVR 3040 (3) Weapons and Systems Analysis**
Introduces theoretical concepts upon which modern naval weapons systems are designed and constructed. Specific areas of study include physics of underwater sound propagation, pulse radar theory, automatic tracking principles, and fundamentals of missile guidance.
**Requisites:** Requires prerequisite course of NAVR 1010 (minimum grade D-).
**Additional Information:** Departmental Category: Naval Science

**NAVR 3101 (3) Evolution of Warfare**
Traces the development of warfare, focusing on the impact of military theorists and technical developments. Assists students to acquire a sense of strategy, develop an understanding of military alternatives, and see the impact of historical precedent on military actions.
**Requisites:** Requires prerequisite course of NAVR 1010 (minimum grade D-).
**Additional Information:** Departmental Category: Naval Science

**NAVR 3201 (3) Fundamentals of Maneuver Warfare**
Prepares future military officers and other leaders for service by studying modern tactical principles, current military developments and other aspects of warfare and their interactions with and influences on maneuver warfare doctrine.
**Requisites:** Requires prerequisite course of NAVR 1010 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Naval Science

**NAVR 4010 (3) Leadership and Management**
Comprehensively studies organizational leadership. Emphasizes motivation, communication, empowerment, and needs of subordinates. Studies the role of professional and personal ethics in organizational leadership.
**Additional Information:** Departmental Category: Naval Science

**NAVR 4020 (3) Leadership and Ethics**
Studies the ethics and laws of armed conflict analyzing the leadership responsibilities of officers both in peace and in war. The curriculum focuses first on various moral, ethical and leadership philosophies followed by extensive use of case studies to reinforce the use of ethical decision-making tools. Defines the responsibilities of junior officers within the context of ethical leadership and decision making.
**Additional Information:** Departmental Category: Naval Science

**NAVR 4021 (3) Leadership and Ethics Online**
Studies the ethics and laws of armed conflict analyzing the leadership responsibilities of officers both in peace and in war. The curriculum focuses first on various moral, ethical and leadership philosophies followed by extensive use of case studies to reinforce the use of ethical decision-making tools. Defines the responsibilities of junior officers within the context of ethical leadership and decision making.

**NAVR 4030 (3) Navigation**
Offers theory and practical application in the art of navigation: charts, publications, piloting, dead reckoning, navigation aids and instruments, time, electronic fixing, global positioning system, and voyage planning.
**Requisites:** Requires prerequisite course of NAVR 1010 (minimum grade D-).
**Additional Information:** Departmental Category: Naval Science

# Undergraduate Residential Programs

## Residential Academic Programs (RAPs)

A number of the residence halls are home to residential academic programs (RAPs), whereby students live in and take special classes in their hall that meet core curriculum and/or other course requirements. All of these programs charge additional $425 fees per academic year. For detailed information about each RAP, see the Residential Academic Programs (https://catalog.colorado.edu/undergraduate/colleges-schools/academic-enrichment-programs/undergraduate-residential-programs/) website.

- CMDI/Communication RAP (https://www.colorado.edu/living/housing/explore-apartment-style-and-residence-hall-living/living-experiences/cmci-communication-and/) offers 200 first- and second-year students a program to explore many different areas of communication, ranging from processes of face-to-face interaction to the impact of media and technology on daily life.
- Creative Minds RAP (https://www.colorado.edu/living/housing/explore-apartment-style-and-residence-hall-living/living-experiences/creative-minds-rap/) (CMRAP) is a living and learning community that unites several arts disciplines and core requirement options in one program. Our mission is to foster the skills students need to develop into creative leaders of tomorrow. Our guiding principles are creativity, curriculum and community.
- Engineering Honors RAP (https://www.colorado.edu/living/housing/explore-apartment-style-and-residence-hall-living/living-experiences/honors-engineering-rap/) provides educational experiences that match the abilities and ambitions of some the very best students at CU.
- Environment and Natural Science RAP (https://www.colorado.edu/bakerrap/) is designed for freshmen and sophomores in the College of Arts and Sciences or Program in Exploratory Studies interested in the natural sciences and environmental studies.
- Global Engineering RAP (https://www.colorado.edu/living/housing/explore-apartment-style-and-residence-hall-living/living-experiences/global-engineering-rap/) prepares engineering students for the new global conditions of the engineering professions through experiencing international culture, mastering a second language and gaining confidence with IT-driven international communication and collaboration.
- Global Studies RAP (https://www.colorado.edu/globalstudiesrap/) promotes the recognition of global interdependence, encourages the study of foreign languages and international affairs and emphasizes the value of international education. This year-long program connects participants with a peer group of students who have similar interests and goals. The staff is knowledgeable about CU Boulder's many international resources, and the faculty incorporate international work into their teaching and research.
- Health Professions RAP (https://www.colorado.edu/hprap/) accommodates approximately 270 first and second-year students. This community is ideal for students interested in exploring coursework and career options in the health professions such as clinical practitioners, researchers or policymakers. Courses offered include a rich mix of science courses well suited for IPHY, MCDB and NRSC majors, and other interested in the life sciences, supplemented by select general education courses.
- Honors RAP (https://www.colorado.edu/hrap/) is the residential component of the Honors Program of the College of Arts and Sciences. It promotes and sustains academic excellence within a lively community setting. First-year students take one, onsite, seminar-style three-credit-hour course each semester. Beyond the classroom, Honors RAP offers a variety of co-curricular and student-led activities that enhance the learning experience. It is open to

approximately 335 first-year and continuing honors-qualified students in the College of Arts and Sciences.

- Leeds Business RAP (https://www.colorado.edu/business/leeds-first-year-experience/leeds-residential-academic-program/) (Leeds RAP) is a targeted community that is comprised exclusively of students who are business majors. Leeds RAP seeks to build individuals who are well-rounded, prepared, engaged and equipped to succeed in 21st century workplaces and take roles as global leaders. Students in the program develop supportive relationships with faculty and staff, including an in-house academic advisor, as well as with peer mentors.
- Pre-Business RAP (https://www.colorado.edu/living/housing/explore-apartment-style-and-residence-hall-living/living-experiences/pre-business-rap/) is a community of first-year students pursuing a business degree, but have not yet been directly admitted into the Leeds School of Business. The program provides a supportive and preparatory path for students to transfer into Leeds their sophomore year.
- Stories and Societies RAP (https://www.colorado.edu/srap/) is a program for first- and second-year students enrolled in the College of Arts and Sciences or Program in Exploratory Studies who have an interest in the study of history, education, and society, or are considering a career in the teaching professions. The program offers small classes taught in Sewall Hall, co-curricular activities that support the RAP's theme and help build community, and personalized attention from faculty and staff dedicated to student success.

# Living and Learning Communities

Living and Learning Communities (LLCs) (https://www.colorado.edu/living/housing/undergraduate-housing/living-experiences/#anchor2) enhance the learning environment by building communities of students connected by their passions for specific topics or themes. Some LLCs offer academic classes, while others build co-curricular activities into the residential experience.

- Black Students and Allies LLC (https://www.colorado.edu/living/housing/undergraduate-housing/living-experiences/identity-based-llcs/black-students-and-allies-llc/) provides a supportive, social and communal space for black-identified students and their community allies. Students gain access to artifacts, critical conversation and educational programming that create an inclusive and productive atmosphere within the residence hall.
- Design Your Path LLC (https://www.colorado.edu/exploratorystudies/design-your-path-llc/) provides opportunities for students within the program in exploratory studies to explore personal, academic and career interests while building community in Farrand Hall. This program strives to empower students to take pride in designing the best path for themselves through a life design model with support from campus offices and academic staff.
- Engineering Connections (https://www.colorado.edu/living/housing/undergraduate-housing/living-experiences/engineering-connections/) is a vibrant, supportive community for first-year students accepted into the College of Engineering and Applied Sciences. It provides enhanced academic, co-curricular, social and wellness opportunities to students living in Williams Village North, Williams Village East and Stearns East.
- The Environmental Design (ENVD) LLC (https://www.colorado.edu/living/housing/undergraduate-housing/living-experiences/environmental-design-llc/) is a unique community where students accepted into the Environmental Design program live together in Willard Hall and participate in First-Year Experience (FYE) programming. Students create meaningful connections with their cohort, engage in social and academic events and gain the tools to continue their design education in confidence beyond the first year.
- Healthy Buffs LLC (https://www.colorado.edu/living/housing/undergraduate-housing/living-experiences/healthy-buffs-llc/) is a connected and caring community that embraces a culture of wellness. This program is designed to connect you with other students living in Stearns West who share a passion for health and wellbeing, provide you with individualized health and wellness services, and help you develop strategies to support you throughout your journey at CU and beyond. Students have access to free yoga and fitness classes, wellness workshops, weekly mindfulness sessions, acupuncture, nutrition counseling and much more.
- Leeds Scholars & Honors LLC (https://www.colorado.edu/living/housing/undergraduate-housing/living-experiences/leeds-scholars-honors-llc/) is an opportunity for high-achieving first-year students at Leeds to build connections with peers, faculty and staff through in-house business courses, workshops and events, deep-dive discussions and informal social gatherings. This community is composed of students in the Leeds Honors and/or Scholars programs who live in Kittredge Central.
- LGBTQIA and Allies LLC (https://www.colorado.edu/living/housing/undergraduate-housing/explore-housing/hallett-living-learning-communities/lgbtqia-and-allies/), part of the Multicultural and Latinx LLC, offers a variety of social and educational activities including leadership opportunities. LGBTQIA and Allies LLC is designed to provide a supportive place for individuals of all sexual identities including gay, lesbian, bisexual, transgender and queer people and their allies. The living area has gender-neutral bathrooms.
- Multicultural and Latinx LLC (https://www.colorado.edu/living/housing/undergraduate-housing/explore-housing/hallett-living-learning-communities/multicultural-and/) is a community that provides a safe space for students to talk and learn more about social justice issues through conferences, events and dialogue. This program partners with the LGBTQIA and Allies Living and Learning Community.
- Music Buffs LLC (https://www.colorado.edu/living/housing/undergraduate-housing/living-experiences/music-buffs-llc/) in Willard Hall is a community that brings together students who are passionate about the art of music and music-making. This community of aspiring music performers, teachers, creators and scholars consists of music majors from all undergraduate degree programs in the CU College of Music, those in the music minor program at CU and those with an interest in musical collaboration and creativity. Students living within our community can express and explore their creative interests and artistic skills while learning and discovering the power of music.
- Service and Social Action LLC (https://www.colorado.edu/living/housing/undergraduate-housing/living-experiences/service-and-social-action-llc/) welcomes first-year students from all colleges and majors. This program seeks to develop leaders and propel them into a life dedicated to equity-based social action through purpose-driven service, education and reflection.
- Transfer Buffs LLC (https://www.colorado.edu/living/housing/undergraduate-housing/living-experiences/transfer-buffs-llc/) offers incoming transfer students the unique opportunity to live on campus and connect with students who have similar experiences. Students living in Weber Hall participate in programming to help them maximize their academic and co-curricular experience at CU Boulder and integrate into the Transfer Buffs and CU Boulder communities. Transfer Peer Mentors provide incoming students

with valuable resources and will facilitate community-building opportunities and events.

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

## Baker

Barlow, Lisa K. (https://experts.colorado.edu/display/fisid_100137/)
Senior Instructor; PhD, University of Colorado Boulder

Bjerke, Maureen Ann (https://experts.colorado.edu/display/fisid_154820/)
Lecturer

Breed, Michael D. (https://experts.colorado.edu/display/fisid_103631/)
Faculty Director; PhD, University of Kansas

Calvin, Inga E.
Lecturer; PhD, University of Colorado Boulder

Chapman, Andrew David
Instructor

Covert, Herbert
Faculty Director; PhD, Duke University

Louie, Donna F. (https://experts.colorado.edu/display/fisid_110827/)
Instructor; PhD, University of Texas Health Science Center at San Antonio

Newberry, Patrick Thaxton (https://experts.colorado.edu/display/fisid_151925/)
Instructor; MA, University of Colorado Boulder

Oliveras, Diana (https://experts.colorado.edu/display/fisid_107967/)
Instructor, Associate Faculty Director; PhD, University of New Mexico

Snyder, Douglas J.
Instructor; PhD, University of Colorado Boulder

Souder, Heidi L.
Instructor; PhD, University of South Florida

## Communication and Society

Ashcraft, Karen Lee (https://experts.colorado.edu/display/fisid_147453/)
Professor; PhD, University of Colorado Boulder

Babicz, Martin Charles (https://experts.colorado.edu/display/fisid_147676/)
Instructor; PhD, University of Colorado Boulder

Chapman, Andrew David
Lecturer

Cheval, Melinda Kiger
Faculty Director

Gale, Kendra L. (https://experts.colorado.edu/display/fisid_125578/)
Instructor; PhD, University of Minnesota Twin Cities

Jamieson, Sara Reed (https://experts.colorado.edu/display/fisid_147773/)
Senior Instructor; PhD, University of New Mexico

Willis, Erin (https://experts.colorado.edu/display/fisid_156068/)
Faculty Director; PhD, University of Missouri–Columbia

## Farrand

Adams, Sharon Mar (https://experts.colorado.edu/display/fisid_139709/)
Instructor

Anderman, Elizabeth (https://experts.colorado.edu/display/fisid_144257/)
Senior Instructor, Associate Faculty Director; PhD, University of Colorado Boulder

Bartlett, Jamie Lynn
Lecturer; PhD, University of Colorado Boulder

Fischer, Kate (https://experts.colorado.edu/display/fisid_155474/)
Lecturer; PhD, University of Colorado Boulder

Fredricksmeyer, Hardy (https://experts.colorado.edu/display/fisid_115446/)
Senior Instructor; PhD, University of Texas at Austin

Gillett, Bernard
Senior Instructor; MA, University of Colorado Boulder

Henningsen, Matthew Scott (https://experts.colorado.edu/display/fisid_156802/)
Lecturer; PhD, Marquette University

King, D. Brett (https://experts.colorado.edu/display/fisid_103815/)
Lecturer; PhD, Colorado State University

Kunce, Catherine (https://experts.colorado.edu/display/fisid_120631/)
Senior Instructor; PhD, University of Denver

McGuire, Vincent X.
Senior Instructor; PhD, University of Colorado Boulder

Norcross, Alastair (https://experts.colorado.edu/display/fisid_144850/)
Faculty Director, Professor; PhD, Syracuse University

Simpson, Michele D. (https://experts.colorado.edu/display/fisid_145311/)
Senior Instructor; JD, Indiana University

Smith, Marshall David (https://experts.colorado.edu/display/fisid_144719/)
Instructor

## Global

Conzelman, Caroline S. (https://experts.colorado.edu/display/fisid_145356/)
Instructor; PhD, University of Colorado Boulder

Kanner, Michael David
Lecturer; PhD, University of Colorado Boulder

Klein, Jennifer Lynn (https://experts.colorado.edu/display/fisid_158332/)
Instructor; PhD, University of California, Santa Barbara

Pieplow, Nathan D. (https://experts.colorado.edu/display/fisid_131512/)
Associate Faculty Director; MEd, University of Oregon

Romanov, Artemi (https://experts.colorado.edu/display/fisid_100659/)
Faculty Director; PhD, St. Petersburg University (Russia)

Toohey, Darin W. (https://experts.colorado.edu/display/fisid_110652/)
Professor; PhD, Harvard University

Wilson, Andrew (https://experts.colorado.edu/individual/fisid_159824/)
Associate Faculty Director; PhD, University of Florida

### Global Engineering

### Health Professions

Brown, Matthew C.
Instructor; PhD, University of Colorado Boulder

Gleeson, Todd T. (https://experts.colorado.edu/display/fisid_105480/)
Professor, Faculty Director; PhD, University of California, Irvine

Gorski, Jessica A. (https://experts.colorado.edu/display/fisid_144240/)
Instructor, Associate Faculty Director; PhD, University of Colorado Boulder

Oliveras, Diana (https://experts.colorado.edu/display/fisid_107967/)
Instructor; PhD, University of New Mexico

Peffer, Melanie (https://experts.colorado.edu/display/fisid_165841/)
Instructor

Vigers, Alison Jane
Instructor, Associate Faculty Director; PhD, University of Colorado Denver

### Honors

Bartlett, Jamie Lynn
Lecturer; PhD, University of Colorado Boulder

Buchwald, Robert (https://experts.colorado.edu/display/fisid_148439/)
Associate Faculty Director, Instructor; PhD, University of Colorado Boulder

Dike, Steven (https://experts.colorado.edu/display/fisid_149880/)
Instructor, Associate Faculty Director; PhD, University of Colorado Boulder

Fischer, Kate (https://experts.colorado.edu/display/fisid_155474/)
Instructor; PhD, University of Colorado Boulder

Miller, Olivia Chadha
Instructor; PhD, SUNY at Binghamton

Sue, Christina Alicia
Faculty Director, Associate Professor; PhD, University of California, Los Angeles

### Libby Arts

Alpern, Tyler J. (https://experts.colorado.edu/display/fisid_115381/)
Senior Instructor; MFA, University of Colorado Boulder

Auvinen, Karen Marie (https://experts.colorado.edu/display/fisid_106065/)
Instructor, Associate Faculty Director; PhD, University of Wisconsin–Milwaukee

Babicz, Martin Charles (https://experts.colorado.edu/display/fisid_147676/)
Instructor; PhD, University of Colorado Boulder

Bernardini, Giulia
Instructor; MA, University of Colorado Boulder

Broersma, Leslee (https://experts.colorado.edu/display/fisid_112749/)
Senior Instructor; MFA, University of Colorado Boulder

Chapman, Andrew David
Instructor

Drybread, Kristen (https://experts.colorado.edu/display/fisid_156523/)
Lecturer

Fischer, Kate (https://experts.colorado.edu/display/fisid_155474/)
Lecturer; PhD, University of Colorado Boulder

Louie, Donna F. (https://experts.colorado.edu/display/fisid_110827/)
Instructor; PhD, University of Texas Health Science Center at San Antonio

Lundy, Tiel Louise (https://experts.colorado.edu/display/fisid_151085/)
Senior Instructor; PhD, University of Denver

Pang, Cecilia J. (https://experts.colorado.edu/display/fisid_129479/)
Faculty Director, Associate Professor; PhD, University of California, Berkeley

Robinson, Janet Schwartzberg
Senior Instructor; MA, University of Colorado Denver

Sharma, Vijaya Raj
Instructor; PhD, University of Colorado Boulder

Stade, Eric (https://experts.colorado.edu/display/fisid_100456/)
Professor; PhD, Columbia University

### Sewall

Auvinen, Karen Marie (https://experts.colorado.edu/display/fisid_106065/)
Lecturer; PhD, University of Wisconsin–Milwaukee

Babicz, Martin Charles (https://experts.colorado.edu/display/fisid_147676/)
Senior Instructor; PhD, University of Colorado Boulder

Barnett, Michael T. (https://experts.colorado.edu/display/fisid_116467/)
Instructor; DMA, University of Colorado Boulder

DeLuca, Laura M. (https://experts.colorado.edu/display/fisid_101414/)
Instructor; PhD, University of Colorado Boulder

Jobin, Nicole V. (https://experts.colorado.edu/display/fisid_103920/)
Senior Instructor; PhD, University of Colorado Boulder

Khosla, Pooja (https://experts.colorado.edu/display/fisid_158916/)
Instructor; PhD, University of Colorado Boulder

Stade, Eric (https://experts.colorado.edu/display/fisid_100456/)
Faculty Director, Professor; PhD, Columbia University

Zerella, Michael (https://experts.colorado.edu/display/fisid_151090/)
Instructor, Associate Faculty Director; PhD, University of Colorado Boulder

# Cross-College Programs

## International Media - Certificate

This undergraduate certificate program is designed exclusively for undergraduate students enrolled in the College of Communication, Media, Design and Information (CMDI), and in the International Affairs major (IAFS) in the College of Arts and Sciences. This certificate allows students majoring in international affairs to explore careers in international reporting, advertising and entertainment, while CMDI majors

will acquire the context and perspective necessary to work in global and international jobs.

# Requirements

The certificate requires 18 to 19 credit hours (depending on the lower-division courses chosen), 15 of which must be upper-division courses.

Students majoring in international affairs are eligible to apply for admission to the certificate program if they have completed 30 credit hours (at least 6 of which must be in their major) with a GPA of 2.75 or better.

For more information, visit the International Media Certificate page of the CMCI website (https://www.colorado.edu/cmci/academics/journalism/international-media-cert/).

## Required Courses

### CMDI Students

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MDST 3201 | Media, Culture and Globalization | 3 |
| JRNL 4411 | International Media and Global Crises | 3 |
| Choose one of the following: | | 3-4 |
| IAFS 1000 | Global Issues and International Affairs | |
| PSCI 2012 | Introduction to Comparative Politics | |
| PSCI 2223 | Introduction to International Relations | |
| GEOG 1962 | Geographies of Global Change | |
| **Electives** | | |
| Choose at least 9 credit hours of courses from List A. | | 9 |
| **Total Credit Hours** | | **18-19** |

### International Affairs Majors

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MDST 3201 | Media, Culture and Globalization | 3 |
| JRNL 4411 | International Media and Global Crises | 3 |
| **Electives** | | |
| Choose 6 credit hours of coursework from List B. | | 6 |
| Choose 6 credit hours of coursework from List A or List B | | 6 |
| **Total Credit Hours** | | **18** |

## Electives

### List A

Courses on this list deal with international issues.

| Code | Title | Credit Hours |
|---|---|---|
| GEOG 3682 | International Development: Economics, Power, and Place | 3 |
| GEOG 4712 | Political Geography | 3 |
| HIST 4126 | History of U.S. Foreign Relations Since 1941 | 3 |
| HIST 4820 | Human Rights: Historical Perspectives | 3 |
| ECON 3403 | International Economics and Policy | 3 |
| ECON 3545 | Environmental Economics | 3 |
| ECON 3784 | Economic Development and Policy | 3 |
| ECON 4784 | Economic Development | 3 |
| PHIL 3190 | War and Morality | 3 |
| PHIL 3260 | Philosophy and the International Order | 3 |
| PSCI 3143 | Current Affairs in International Relations | 3 |
| PSCI 3163 | American Foreign Policy | 3 |
| PSCI 3183 | International Law | 3 |
| PSCI 3193 | International Behavior | 3 |
| PSCI 4012 | Global Development | 3 |
| PSCI 4173 | International Organizations | 3 |
| PSCI 4732 | Critical Thinking in Development | 3 |
| PSCI 4783 | Global Issues | 3 |
| WGST 3500 | Global Gender Issues | 3 |

### List B

Courses on this list deal with communication media.

| Code | Title | Credit Hours |
|---|---|---|
| COMM 3320 | Persuasion in Society | 3 |
| INFO 3502 | Online Communities | 3 |
| INFO 3504 | Digital Identity | 3 |
| JRNL 2000 | Writing for the Media (IAFS students who wish to take advanced skills-based writing/reporting courses must take this course as a prerequisite) | 3 |
| JRNL 3102 | Photojournalism I | 3 |
| JRNL 3241 | History of Journalism | 3 |
| JRNL 3651 | Media Law and Ethics | 3 |
| JRNL 4351 | Reporting Wars, Conflict and Peace | 3 |
| MDST 3321 | Media Industries and Economics | 3 |
| MDST 3401 | Media, Food and Culture | 3 |
| MDST 3711 | Media and Popular Culture | 3 |
| MDST 3791 | Media and the Public | 3 |
| MDST 4211 | Asian Media and Culture | 3 |
| MDST 4331 | Gender, Race, Class, and Sexuality in Popular Culture | 3 |
| MDST 4371 | Media and Religion | 3 |
| MDST 4372 | Islam, Pop Culture and Media | 3 |

# Native American and Indigenous Studies - Certificate

The Center for Native American and Indigenous Studies (CNAIS) offers both a graduate and undergraduate certificate in Native American and Indigenous Studies (NAIS). The certificate program offers a unique interdisciplinary curriculum for CU Boulder students interested in studying the history, cultures, languages, arts, policies and rights of Indigenous peoples from the Americas and around the globe. CNAIS encourages interdisciplinary and intersectional study that develops students' awareness of the diversity and complexity of Indigenous peoples, cultures and nations. It also encourages students to link their academic study of Indigeneity with community outreach and service learning.

A founding principle of CNAIS is to value and expand upon the connections and interdisciplinary nature of Native American & Indigenous scholarly work. The issues facing Native American and Indigenous peoples today require expertise from multiple disciplines and draw from scholarship in a number of fields, including art & art history, anthropology, ethnic studies, environmental studies, gender studies, geography, history, law, linguistics, literature and religion. CU Boulder has recruited an unprecedented number of faculty working in a wide array of areas related to NAIS, and already enjoys a high national and international reputation in several of these areas. In pursuing the NAIS certificate, students join a vibrant and growing community at CU Boulder, including graduate and undergraduate students and more than 40 professors.

For more information, visit the Center for Native American and Indigenous Studies (http://www.colorado.edu/cnais/) website.

# Requirements

Students pursuing this certificate must complete an undergraduate degree in any of the academic areas offered by CU Boulder, and complete a total of 18 credits of acceptable coursework from the certificate program list.

At least 6 of the 12 credit hours of elective courses must be upper division, and students may choose to apply up to 3 credits of independent study/internship toward the credit requirement. Any independent study must be undertaken with a CNAIS core faculty member, and may be done when a student wishes to pursue an individualized course of study not normally offered in the NAIS course offers. Independent study is typically reserved for third- and fourth-year students.

Only nine credits from the student's major or minor may be counted toward the certificate, students must maintain a C average (2.0) or better, and students must earn a grade of C or better in all courses that count toward the certificate.

## Required Courses and Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ETHN 1023 | Introduction to Native American and Indigenous Studies | 3 |
| ENGL 4717 | Native American and Indigenous Studies Capstone Seminar (*or the equivalent ) | 3 |
| **Electives** [1] | | **12** |
| At least three of the four required elective courses must be taken outside the student's major department. | | |
| *Approved Anthropology Courses* | | |
| ANTH 1105 | Exploring a Non-Western Culture: Tibet | |
| ANTH 1120 | Exploring a Non-Western Culture: Pueblo Indians of the Southwest | |
| ANTH 1140 | Exploring a Non-Western Culture: The Maya | |
| ANTH 1141 | Indigenous Imperialism on the Andes: The Inca Realm and its People | |
| ANTH 1145 | Indigenous Imperialism in Pre-Columbian Mexico: The Aztecs | |
| ANTH 1150 | | |
| ANTH 1155 | Exploring Global Cultural Diversity (The Andes ) | |
| ANTH 1170 | Exploring Culture and Gender through Film | |
| ANTH 1200 | Culture and Power (Democracy) | |
| ANTH 2100 | Introduction to Cultural Anthropology | |
| ANTH 3100 | Africa: Peoples and Societies in Change | |
| ANTH 3110 | Ethnography of Mexico and Central America | |
| ANTH 3160 | Peoples of the South Pacific | |
| ANTH 4020 | Explorations in Anthropology | |
| ANTH 4045 | Introduction to Museum Anthropology | |
| ANTH 4210 | Southwestern Archaeology | |
| ANTH 4220 | From Olmec to Aztec: The Archaeology of Mexico | |
| ANTH 4224 | Archaeology of the Maya and Their Neighbors | |
| ANTH 4270 | Plains Archaeology | |
| ANTH 4465 | The Archaeology of Inequality | |
| ANTH 4470 | Collections Research Practicum in Cultural Anthropology | |
| ANTH 4630 | Nomadic Peoples of East Africa | |
| ANTH 4690 | Anthropology of Tibet | |
| ANTH 4740 | Peoples and Cultures of Brazil | |
| ANTH 4800 | Language and Culture | |
| *Approved Art and Art History Courses* | | |
| ARTH 3929 | Special Topics in Art History (Native North American Art) | |
| ARTH 4419 | The Arts of Colonial Mexico and Peru | |
| ARTH 4459 | Precolumbian Art of Mesoamerica | |
| ARTH 4919 | Capstone Seminar: Topics in Art History (Contemporary Indigenous Art) | |
| *Approved Cinema Studies and Moving Image Arts Courses* | | |
| CINE/ETHN 2203 | American Indians in Film | |
| *Approved English Courses* | | |
| ENGL 1800 | American Ethnic Literatures | |
| ENGL 2717 | American Indian Literature | |
| *Approved Ethnic Studies Courses* | | |
| ETHN 2013 | Critical Issues in Native North America | |
| ETHN/CINE 2203 | American Indians in Film | |
| ETHN 2703 | Native American and Indigenous Religious Traditions | |
| ETHN 2713 | American Indian Literature | |
| ETHN 3103 | Selected Topics in American Indian Studies | |
| ETHN 4233 | Native American and Indigenous Environmental Issues | |
| *Approved Geography Courses* | | |
| GEOG 3812 | Mexico, Central America, and the Caribbean | |
| GEOG 3832 | Love & War Geographies: Imperialism, Militarism, and Development in South Asia | |
| GEOG 3862 | Global Africa: Environment, Development, and Culture | |
| GEOG 4812 | Political Ecology & Latin America | |

| | |
|---|---|
| *Approved History Courses* | |
| HIST 1018 | Introduction to Early Latin American History to 1810 |
| HIST 4018 | Aztecs, Incas, and the Spanish Conquest of the Americas |
| HIST 4117 | Colorado History |
| HIST 4118 | History of Mexico to 1821 |
| HIST 4416 | Environmental History of North America |
| *Approved Linguistics Courses* | |
| LING 3220 | American Indigenous Languages in their Social and Cultural Context |
| LING 4800 | Language and Culture |
| *Approved Music Courses* | |
| MUEL 2772 | World Musics: Asia and Oceania |
| MUSC 2772 | World Musics: Asia and Oceania |
| MUSC 4112 | Ethnomusicology |
| MUSC 4142 | American Indian Music |
| *Approved Religious Studies Courses* | |
| RLST 2700 | Native American and Indigenous Religious Traditions |
| **Total Credit Hours** | **18** |

[1] Elective courses not taught by CNAIS core or affiliate faculty must be approved by the CNAIS director.

# Space - Minor

The space minor is part of the larger campus-wide Grand Challenge initiative and is *open to all CU Boulder students* regardless of major. The space minor is designed to provide all students enrolled in the minor with an over-arching background in all aspects of space through the required Pathway to Space (https://www.colorado.edu/p1dfb9ae7d4d/) course. Course topics include:

- Space science and exploration
- Human spaceflight and life sciences
- Aeronautics and near space
- Launch and spacecraft systems
- Climate and environment
- Space business, policy and politics
- Space arts, media and history

Visit the Grand Challenge Space Minor (http://www.colorado.edu/spaceminor/) website for more information.

## Requirements

Completion of 15 credit hours (5 courses) is required for the minor, distributed as indicated in the course list below. There may be restrictions on how many and/or which specific courses/credits can apply towards this minor as well as towards the student's degree program.

Three of the four elective courses must be completed at the CU Boulder campus. One elective course may be transferred from another institution with approval. A grade point average (GPA) of 2.000 or better is required for all courses used to satisfy the requirements for this minor. Each individual course that is counted towards these degree requirements must be passed with a D- or better. Note, however, that a C- or better is required in all prerequisite courses to move on to a subsequent course.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ASEN 1969 | Pathway to Space | 3 |
| **Electives** | | |
| Choose four approved elective courses, including those provided in the following partial list: [1] | | 12 |
| ASEN 3519 | Special Topics (The Politics of Space) | |
| ASEN 4519 | Special Topics (Space: Environment and Effects) | |
| CMCI 3000 | Special Topics in CMDI (Space Crazy! Kids, Media, and Information in the Early Space Age) | |
| COEN 3210 | Climate Change and Engineering | |
| COMM 3620 | Advanced Teamwork and Collaboration | |
| ENVD 4363 | Special Topics: Physical Factors in Environmental Design (How to Build in Space) | |
| FYSM 1000 | First Year Seminar (Astronauts & Astropolitics: Topics in Space Exploration From the Cold War) | |
| RUSS 3221 | | |
| ATLS 4519 | Advanced Special Topics (Studio Space) | |
| CINE 2001 | Space Odysseys: Astrophys/Astronomy via Cinema/Arts | |
| ENGL 1240 | Planetarity | |
| MUEL 3892 | Music and Space | |
| RUSS/ITAL 2271 | | |
| SPAN 3900 | Cosmos Latinos: Hispanic Science Fiction and New Worlds | |
| WRTG 3020 | Topics in Writing (Writing about Space) | |
| **Total Credit Hours** | | **15** |

[1] See full list of approved electives on the Space Minor (http://www.colorado.edu/spaceminor/space-minor-course-list/) website.

# GRADUATE CATALOG

The Graduate School at the University of Colorado Boulder facilitates and enriches the educational experiences of all graduate students, regardless of discipline, ensuring a consistent standard of quality across over 125 master's and doctoral degree programs.

In collaboration with the graduate faculty, the Graduate School is responsible for the planning, implementation and evaluation of graduate programs and policies. These efforts align with the Graduate School's rules and the laws and policies of the Board of Regents. The Graduate School Executive Advisory Council, composed of graduate faculty members, provides guidance to the dean and vice provost for graduate affairs (who reports to the provost) on matters related to Graduate School policies and programs.

Additionally, the Graduate School manages a variety of interdisciplinary centers and programs that span multiple colleges. These include the Center for Humanities and the Arts, the Center for Native American and Indigenous Studies, the Center for Critical Thought and the Center for African & African American Studies.

.

# Academic Calendar & Exams

## Academic Calendar

CU Boulder operates with standard fall and spring semesters of 15 weeks. In addition to a winter session offered in between fall and spring semesters (considered part of spring semester), classes may be offered during special sessions that run for five or seven weeks. Because of their length, special sessions have shortened add, drop and withdrawal deadlines.

The campus also offers a summer term that includes two three-week sessions (Maymester and Augmester), two five-week sessions, an eight-week session and a 10-week session. Summer sessions also have shortened deadlines (add, drop and withdrawal).

For a complete calendar of academic and financial dates and deadlines, visit the Office of the Registrar's academic calendar webpage (http://www.colorado.edu/registrar/students/academic-calendar/). (http://colorado.edu/registrar/)

The University of Colorado Boulder has a legal and moral obligation to accommodate all students who must be absent from classes or miss scheduled exams in order to observe religious holidays; and takes care to not inhibit or penalize these students for exercising their rights to religious observance. For further information, see the university policy on the observance of religious holidays and absences from classes and/or exams (http://www.colorado.edu/policies/observance-religious-holidays-and-absences-classes-andor-exams/).

### Summer 2025

| | |
|---|---|
| May 12 (Mon.) | Classes begin for Session M (Maymester) |
| May 26 (Mon.) | **Memorial Day holiday**; campus closed |
| May 30 (Fri.) | Last day of classes and final exams for Session M (Maymester) |
| June 2 (Mon.) | Classes begin for Sessions A, C and D |
| June 19 (Thurs.) | **Juneteenth holiday**; campus closed |
| July 3 (Thurs.) | Last day of classes and final exams for Session A (first five-week session) |
| July 4 (Fri.) | **Independence Day holiday**; campus closed |
| July 8 (Tues.) | Classes begin for Session B (second five-week session) |
| July 25 (Fri.) | Last day of classes and final exams for Session C (eight-week session) |
| Aug. 4 (Mon.) | Classes begin for Session G (Augmester) |
| Aug. 8 (Fri.) | Last day of classes and final exams for Sessions B and D (second five-week session, 10-week session) |
| Aug. 20 (Weds.) | Last day of classes and final exams for Session G (Augmester) |
| Aug. 20 (Weds.) | Degree conferral date (no campuswide ceremony) |

### Fall 2025

| | |
|---|---|
| Aug. 21 (Thurs.) | Classes begin |
| Sept. 1 (Mon.) | **Labor Day holiday**; campus closed |
| Oct. 9 (Thurs.) | Midterm reading day |
| Nov. 24–28 (Mon.–Fri.) | Fall break; no classes |
| Nov. 27–28 (Thurs.–Fri.) | **Thanksgiving holiday**; campus closed |
| Dec. 5 (Fri.) | Last day of classes |
| Dec. 6–7 (Sat.–Sun.) | End of term reading days |
| Dec. 8–12 (Mon.–Fri.) | Final exams |
| Dec. 12 (Fri.) | Degree conferral date (no campuswide ceremony) |

### Spring 2026

| | |
|---|---|
| Jan. 8 (Thurs.) | Classes begin |
| Jan. 19 (Mon.) | **Martin Luther King Jr. holiday**; campus closed |
| Feb. 26 (Thurs.) | Midterm reading day |
| March 16–20 (Mon.–Fri.) | Spring break (campus closed Friday, March 20) |
| April 24 (Fri.) | Last day of classes |
| April 25–26 (Sat.–Sun.) | End of term reading days |
| April 27–May 1 (Mon.–Fri.) | Final exams |
| May 2 (Sat.) | Degree conferral date (commencement ceremony) |

### Summer 2026

| | |
|---|---|
| May 4 (Mon.) | Classes begin for Session M (Maymester) |
| May 21 (Thurs.) | Last day of classes and final exams for Session M (Maymester) |
| May 25 (Mon.) | **Memorial Day holiday**; campus closed |

| | |
|---|---|
| May 26 (Tues.) | Classes begin for Sessions A, C and D |
| June 19 (Fri.) | **Juneteenth holiday**; campus closed |
| June 26 (Fri.) | Last day of classes and final exams for Session A (first five-week session) |
| Jun 30 (Tues.) | Classes begin for Session B (second five-week session) |
| July 3 (Fri.) | **Independence Day holiday (observed)**; campus closed |
| July 17 (Fri.) | Last day of classes and final exams for Session C (eight-week session) |
| July 27 (Mon.) | Classes begin for Session G (Augmester) |
| July 31 (Fri.) | Last day of classes and final exams for Sessions B and D (second five-week session, 10-week session) |
| Aug. 13 (Thurs.) | Last day of classes and final exams for Session G (Augmester) |
| Aug. 13 (Thurs.) | Degree conferral date (no campuswide ceremony) |

# Final Examinations

It is the policy of the University of Colorado Boulder to adhere to the final examination schedule as published by the Office of the Registrar each semester. Unless notified otherwise in writing during the first week of classes, students enrolled in undergraduate courses should assume that an examination will be given. While it may be appropriate not to give a final in some undergraduate courses, such as independent studies, laboratory courses, seminars, project-based courses and colloquia, final examinations are integral parts of the instructional program and should be given in all other undergraduate courses. Graduating seniors are not exempt from final examinations. Students enrolled in graduate courses should consult with their instructors on whether final examinations will be administered.

1. The final examination in a course should be given as scheduled by the Office of the Registrar and not at other times, even if the instructor and all students in a course agree to such a change. An instructor may allow individual students to take the final examination at an earlier or later time if the instructor is satisfied that an exception is based on good and sufficient reasons and if such an exception is unlikely to materially advantage or disadvantage the interests of other students in the course.
2. Students should consult with their instructors and course syllabi for final examination information for courses that are scheduled at non-standard times and are not included in the published final examination schedule.
3. Final examinations in summer courses and in courses offered during special (variable length) sessions in fall and spring semesters are typically administered on the last regular meeting day of the course. No Common Exams for multiple sections of a single course may be scheduled for special session courses.
4. The week of classes preceding the scheduled final examination period should be used primarily for continued instruction and may include the introduction of new material. For courses in sessions of ten weeks or longer, no examinations may be given during the week of classes preceding the start of the campus's final examination period; however, assignments listed in the syllabus such as papers, lab practicums, presentations, portfolios and projects may be due during that week.
5. Class sessions or graded assignments of any kind, including papers, lab practicums, presentations, portfolios and projects, may not take place or be due on a day designated in the academic calendar as a Reading Day.
6. When students have three or more final examinations on the same day, they are entitled to arrange an alternative examination time for the last exam or exams scheduled on that day. When students have two final examinations scheduled to meet at the same time, they are entitled to arrange an alternative examination time for the course that meets later in the week during the term or, if the two courses meet on the same day during the term, the course that meets later in the day. Students must make arrangements with the instructor of the affected course(s) by the standard deadline to drop a course in that term and are expected to provide supporting written information of these situations to qualify for exceptions.
7. The submission deadline for grades each semester or special session is 96 hours after the conclusion of the final examination, excluding designated university holidays.
8. The Provost (or designee), in consultation with the Senior Vice Chancellor (or designee), may either reschedule or cancel final examinations in response to inclement weather or other emergencies that result in a campus closure during the final examination period. The administration's determination of whether to reschedule or to cancel final examinations is based on the number of exam periods affected by the closure and the timing of the closure.

## Rescheduled Exams

A final examination may be rescheduled within the final examination period. Students who do not participate in a rescheduled final examination are not guaranteed any make-up examination or alternative assignment, and in such cases students will be assigned course grades based on tests, assignments and other graded work completed up to the end of the term.

## Canceled Exams

If a final examination is canceled, course grades will be assigned based on tests, assignments and other graded work completed up to the end of the term. Faculty may also offer a make-up examination and/or allow for an alternative assignment to be submitted after the final examination period. However, such opportunities must be made available to all students enrolled in the course, all final work must be received and graded no later than the end of the first week of the subsequent term (inclusive of summer session), and faculty must then submit change of record information for students whose course grades change due to their work on make-up examinations or alternative assignments.

For information about final exams, including the final exam schedules, visit the Office of the Registrar's Final Exam Schedules (https://www.colorado.edu/registrar/students/calendar/finals/) webpage.

# Academic Integrity

## Why Do We Have a Student Honor Code?

### Mission

The mission of the Honor Code at the University of Colorado Boulder is to secure an environment where academic integrity can flourish.

### Values

The Honor Code recognizes the importance of honesty, trust, fairness, respect, and responsibility and aims to instill these principles as essential features of the University of Colorado Boulder campus. The Honor Code allows all students to have responsibility for, and the ability to attain, appropriate recognition for their academic and personal achievements.

## What is a Violation?

**Academic Misconduct** includes any act in which a student gains or provides, or attempts to gain or provide, an unfair academic advantage over other students. These acts include, but are not limited to the following and also include any attempts to engage in the following:

1. **Cheating:**
   a. Use of prohibited notes, study aids, or other explicitly prohibited course materials;
   b. Allowing another party to do one's work/exam and turning in that work/exam as one's own;
   c. Copying coursework from another student or from an unauthorized source (including but not limited to internet sources);
   d. Collaborating on coursework when prohibited;
   e. Failing to abide by the specific written course instructions including, but not limited to,
      i. the extent artificial intelligence is permitted,
      ii. exams, homework assignments, and syllabi;
   f. Clicker Fraud. Using, or having someone else use, clicker technology improperly in an effort to receive academic credit.
2. **Plagiarism.** This includes, but is not limited to:
   a. Portrayal of another's work or ideas as one's own;
   b. Improper citation of another's work;
   c. Improper citation of one's own previous work;
   d. Use of paper writing services or technology (such as essay bots or other artificial intelligence) whether paid or unpaid.
3. **Resubmission.** Submitting the same or similar work for credit, including, but not limited to, homework more than once without permission from all course faculty involved.
4. **Fabrication.** Falsification or creation of data, research, or resources, or altering graded work without the prior consent of the course faculty.
5. **Lying.** Deliberate falsification with the intent to deceive as it relates to an academic submission.
6. **Bribery.** Providing, offering, or taking rewards in exchange for a grade, an assignment, or in the aiding of Academic Misconduct.
   a. Rewards include, but are not limited to: currency, tangible items, services, or recompense.
7. **Threat.** Acting to intimidate a student, staff, or faculty member for the purpose of affecting a grade or in an effort to prevent the reporting of an Honor Code allegation, or in connection with any other form of Academic Misconduct.
   a. **Retaliation.** Retaliating against or discouraging, directly or through third parties, an individual from participating in the Honor Code process. To be considered retaliation, there must be a causal connection between a materially adverse action and the act of reporting a violation or participating in an Honor Code process. A materially adverse action is one that would dissuade a reasonable person from reporting a violation, and includes, but is not limited to, intimidation, 5 threats, or coercion. A determination of whether an action is materially adverse is a fact-dependent inquiry made on a case-by-case basis by Student Conduct and Conflict Resolution (SCCR) staff.
8. **Unauthorized Access.** Gaining access to, giving access to, or use of, protected academic information including, but not limited to: CU-SIS; a faculty, student, or staff member's computer, files, and/or physical space; and/or secure information on an online server.
9. **Aiding Academic Misconduct.** Facilitating any act which may help a student to gain an unfair academic advantage including, but not limited to, any of the aforementioned acts.
   a. **Sharing course materials,** including but not limited to, personal notes, in an unauthorized online bank or forum, or crowdsourcing site whether for profit or for free, is strongly discouraged and may result in a referral to the Honor Code process.
   b. **Sharing personal authentication credentials/login information** to third party sites is strongly discouraged and may result in a referral to the Honor Code process.

## Resolution Processes

SCCR resolves alleged academic misconduct through the informal resolution process or the formal resolution process. Resolution specialists have the authority and sole discretion to determine the type of resolution process without Honor Code Advisory Board (HCAB) consultation.

### Informal Resolution

This process may generally include, but is not limited to, a meeting with a resolution specialist, completion of the assigned resolution outcomes and/or participation in the CU Restorative Justice process.

During the meeting, if the resolution specialist determines that the informal resolution process may be appropriate, the resolution specialist will offer it as an option to the responding student and address any questions the responding student may have about the process. If the responding student accepts responsibility for the alleged academic misconduct, agrees to, and completes the agreement developed during the meeting, then SCCR will consider the matter to be resolved informally. In some cases, the HCAB will also review the referrals before a final determination is made.

### Formal Resolution

This process generally includes: i. written notice of the factual allegations and alleged academic misconduct; ii. the opportunity to meet with the resolution specialist to address the allegations and provide information to the resolution specialist; iii. the resolution specialist reviewing the allegations and making factual and violation determinations based on preponderance of the evidence; and iv. written notice to the responding student of the resolution specialist's determinations.

The resolution specialist will consider the following in making this determination: i. the allegations in the Resolution Meeting Notice and the student's response to those allegations; ii. all documents and/or information that the resolution specialist finds relevant, including, without limitation, relevant documents presented by the responding student, reporting party, or any other interested party; iii. the oral or written statements of any witnesses with relevant information, as presented by the responding student, any reporting party, or other interested party, as it appears in a referral, and/or as requested by the resolution specialist; and iv. the recommendations of HCAB regarding responsibility and Resolution Outcomes related to the incident or precedent.

Questions regarding academic integrity should be directed to Student Conduct & Conflict Resolution, studentconduct@colorado.edu, 10 UCB Boulder, CO 80309, phone 303-492-5550.

The full Student Honor Code can also be viewed on the Student Conduct & Conflict Resolution (https://www.colorado.edu/sccr/) website.

# Academic Offerings

## Degrees

### Graduate Degrees

The Graduate School of the University of Colorado Boulder offers instruction leading to the following advanced degrees:

- Master of Arts (MA)
- Master of Business Administration (MBA) (through Leeds School of Business)
- Master of Engineering (ME)
- Master of the Environment (MENV)
- Master of Fine Arts (MFA)
- Master of Music (MMus)
- Master of Music Education (MMEd)
- Master of Science (MS)
  - Professional Master of Science in Aerospace Engineering Sciences (MSAES)
  - Professional Master of Science in Civil Engineering (MSCVE)
  - Professional Master of Science in Computer Science (MSCPS)
  - Professional Master of Science in Electrical Engineering (MSEE)
  - Professional Master of Science in Environmental Engineering (MSENV)
  - Professional Master of Science in Mechanical Engineering (MSME)
- Master of Studies in Law (MSL) (through School of Law)
- Doctor of Audiology (AudD)
- Doctor of Musical Arts (DMA)
- Doctor of Philosophy (PhD)
- Juris Doctorate (JD) (through School of Law)

### Bachelor's–Accelerated Master's Degrees

Bachelor's–accelerated master's (BAM) degree programs are offered in several departments. These programs allow a student to receive both a bachelor's and master's degree in a shorter period of time without compromising the academic integrity of either degree.

BAM programs are open only to highly qualified CU Boulder undergraduates. Students are typically admitted during the junior year with an intent application reviewed by their program. BAM students must apply online to graduate with their bachelor's degree for the semester in which degree requirements are complete, and must also apply at that time to be formally admitted to continue with the accelerated master's program. Students wishing to continue studying toward a doctorate must formally apply for admission to the Graduate School.

Students interested in a BAM program should inquire with their program of interest for information regarding admissions and detailed program guidelines and requirements.

Please see below for currently approved BAM degree programs offered, listed by college and school. Or, explore BAM program options in the Programs A-Z section (https://catalog.colorado.edu/programs-a-z/#filter=filter_53) of the catalog.

#### College of Arts and Sciences

- Art and Art History
- Chinese/Asian Languages and Civilizations
- Cinema Studies/Art and Art History
- Classics
- Ecology and Evolutionary Biology
- Ethnic Studies/Education
- French
- German Studies/German
- Integrative Physiology
- Japanese/Asian Languages and Civilizations
- Linguistics/Linguistics or Computational Linguistics, Analytics, Search and Informatics
- Mathematics
- Mathematics/Applied Mathematics
- Philosophy
- Physics
- Religious Studies
- Russian, East European and Eurasian Studies
- Statistics and Data Science/Applied Mathematics
- Theatre

#### Leeds School of Business

- Accounting/Accounting or Accounting Taxation
- Finance/Accounting or Accounting Taxation
- Real Estate

#### School of Education

- Ethnic Studies/Education

#### College of Engineering and Applied Science

- Aerospace Engineering
- Applied Mathematics
- Architectural Engineering/Architectural Engineering or Civil Engineering
- Biomedical Engineering
- Chemical Engineering or Chemical and Biological Engineering/Chemical Engineering or Materials Science and Engineering
- Civil Engineering/Architectural Engineering or Civil Engineering
- Computer Science/Computer Science, Computational Linguistics, Analytics, Search and Informatics, Data Science or Network Engineering
- Electrical Engineering or Electrical and Computer Engineering/Electrical Engineering
- Engineering Physics/Physics
- Environmental Engineering/Civil Engineering, Environmental Engineering, or Mechanical Engineering
- Integrated Design Engineering/Environmental Engineering or Mechanical Engineering
- Mechanical Engineering/Mechanical Engineering or Materials Science and Engineering

#### College of Media, Communication and Information

- Information Science

### Post Baccalaureate-Accelerated Master's Degrees

Post Baccaulaureate Accelerated Master's (PBAM) programs in engineering offer an integrated degree plan for post-bacc students. A list of PBAM programs is below.

### College of Engineering and Applied Science

- Applied Computer Science/Computer Science, Data Science, Network Engineering, or Computational Linguistics, Analytics, Search and Informatics

## Dual Degrees

In an environment where there is a rapidly increasing desire for interdisciplinary and professional skills, receiving two master's degrees in complementary fields can be a real asset. Contact the individual departments for details.

### Combinations within the Graduate School

- Audiology/Speech, Language and Hearing Sciences (both through the Department of SLHS)
- Engineering Management/Aerospace Engineering
- Engineering Management/Computer Science
- Engineering Management/Electrical Engineering
- Engineering Management/Mechanical Engineering
- Music (two areas)
- Religious Studies/Asian Languages/History (any two)

### Combinations with MBA

- Anthropology/MBA
- Art and Art History/MBA
- Business Analytics/MBA
- Computer Science/MBA
- Environmental Studies/MBA
- German Studies/MBA
- Master of the Environment/MBA
- Supply Chain Management/MBA
- Theatre/MBA

### Combinations with Law

- Business Administration/Law
- Environmental Studies/Law
- Juris Doctor/Bachelor of Laws with the University of Alberta faculty of Law, Canada
- Medicine/Law
- Public Administration/Law
- Urban and Regional Planning/Law

## Certificates

Graduate students may pursue formal certificates in a variety of academic or interdisciplinary subjects. Each certificate program has unique requirements. Degree-seeking students who have been verified with completed certificate requirements will have the certificate(s) posted to their academic records at the time of graduation.

Non-degree students who are approved to pursue select certificate programs must be admitted through Continuing Education. Where applicable, students may enroll in graduate certificates in Specialized Programs (https://catalog.colorado.edu/specialized-programs/) as either non-degree or degree-seeking students.

# Academic Records

## Diplomas

A diploma is issued for each different degree type earned at the University of Colorado Boulder. A diploma will list degree, and dependent on the college, a student's major(s). Diplomas will not list any minors earned or a specific track or option. Undergraduate diplomas will list Latin or academic honors earned based on eligible GPA or successful participation in a honors program. Graduate students are not awarded Latin or academic honors based on GPA. Minors and eligible certificates earned will appear on the official transcript. Diplomas are mailed to all graduating students approximately eight weeks after the close of the semester in which degree requirements were completed and the student applied for graduation. Delivery windows are posted to the graduation and diplomas calendar (https://www.colorado.edu/registrar/students/calendar/graduation/) webpage. *Note:* International students must resolve all financial obligations with CU before a diploma is issued.

CU Boulder also offers a certified electronic diploma (CeDiploma) (http://www.colorado.edu/registrar/students/graduation/cediploma/) for students who complete a university-approved degree from Fall 2015 and onwards.

Graduating students with Federal Perkins/NDSL loans must complete a loan exit interview and clear all outstanding financial balances before leaving the university. Failure to do so results in a hold on the student's record. The hold prevents registration for future terms. Students can complete a loan exit interview by contacting Heartland ECSI at 1-888-549-3274 or via the Heartland ECSI (http://www.heartlandecsi.com/)website. Questions may be directed to University Student Loans & Debt Management in the Bursar's Office at 303-492-5571, toll free at 800-925-9844.

Display diplomas or replacement diplomas may be ordered online after graduation. For more information, visit the Office of the Registrar's diplomas (http://www.colorado.edu/registrar/alumni/diplomas/)webpage.

## Enrollment & Degree Certification

Through Buff Portal (https://buffportal.colorado.edu/), students may print an official enrollment certification at no charge. Advanced registration enrollment verifications (https://www.colorado.edu/registrar/students/records/info/verifications/#after_you_039_ve_registered_amp_before_the_first_day_of_classes-1771) are available three weeks prior to the term start, and will remain available until the day before the first day of classes, to students enrolled in at least a half-time enrollment status for an upcoming term. Official certification of enrollment is available after the third week of classes of a semester. This certification may be for car insurance, loan deferments, medical coverage, scholarship purposes, etc. The Office of the Registrar can provide written confirmation of registration, enrollment or degree status upon request by current or former students.

CU Boulder has authorized the National Student Clearinghouse (NSC) to act as its agent for purposes of third party enrollment and degree verification. The NSC verifies degrees and enrollment for students who have not placed a privacy restriction on their academic record. The student's name when enrolled, social security number or student ID, and date of birth will be required for identification purposes for enrollment or degree verification. All third parties should contact the National Student

Clearinghouse by phone or visit its web site for current enrollment and degree verification information, instructions and fees.

University policy determines the *academic* enrollment status and federal regulation determines the *financial aid* enrollment status. CU Boulder is required to report enrollment based on the financial aid enrollment status to the NSC. Please refer to the Office of the Registrar's enrollment status grid on the Check Your Enrollment Status (https://www.colorado.edu/registrar/students/registration/register/status/) webpage to determine your academic/financial aid enrollment status.

Students are considered to generally be in good standing with the university if they are eligible to enroll or enrolled in classes in a given term. This status applies to participation in club sports and other student organizations, unless club or association rules specify different standards for eligibility.

Students may also obtain verification of degree by ordering an official transcript or requesting an official degree certification through the Office of the Registrar.

# Transcripts

## Official Transcripts

Current and former students may order transcripts online (https://exchange.parchment.com/send/adds/?main_page=login&s_id=7i3anAeWu6K3ErXO); no IdentiKey is required. Official transcripts are available in electronic PDF or paper format. Transcripts may be ordered as either a complete academic record of courses taken at all University of Colorado campuses or as a select career (undergraduate, graduate, law or noncredit) for coursework taken after 1988.

In certain circumstances, transcripts can be withheld for ongoing financial obligations to the university or for disciplinary actions.

Official transcripts bear the signature of the registrar and the official seal of the university (not applicable to noncredit transcripts).

## Unofficial Transcripts

Currently enrolled students and alumni who have access to the student portal may view and print unofficial transcripts free of charge through Buff Portal (https://buffportal.colorado.edu/). Unofficial transcripts display the complete academic record of courses taken at the University of Colorado. However, academic institutions and potential employers generally do not accept the unofficial transcript as evidence of a student's career at CU Boulder, as this transcript does not carry the registrar's signature, the seal of the university or other security features. Unofficial transcripts are primarily used for advising and counseling in offices at University of Colorado campuses.

# Educational Record Changes

Students whose degrees have been conferred are not eligible for retroactive changes to their educational record.

# Graduate Course Load

For graduate students, enrollment status depends on a student's level (doctoral or master's), the type of classes they are taking and (for doctoral students) candidacy status. The status is also based on university policy and state and federal regulations. University policy determines the *academic* enrollment status and federal regulation determines the *financial aid* enrollment status. CU Boulder is required to report enrollment based on the financial aid enrollment status to the National Student Clearinghouse.

For academic purposes, full-time status is determined by university policy. For requirements for your academic load and status, visit the Graduate School Rules (Section 8: Full-time Status and Minimum Registration Requirements) (https://www.colorado.edu/graduateschool/faculty-staff/policies-procedures/rules/).

Typically in the fall and spring semesters, full time academic status is one of the following:

- 5 credit hours of graduate coursework.
- 8 credit hours of combined graduate/undergraduate coursework.
- 12 credit hours of undergraduate coursework or a varying number of thesis/dissertation credit hours, depending upon the student's status.

Summer course load requirements vary.

For financial aid full time and half time course-load requirements, graduate students should consult the financial aid load columns of the enrollment status grid (https://www.colorado.edu/registrar/sites/default/files/attached-files/enrollmentstatusgrid.pdf) and the Office of Financial Aid (https://www.colorado.edu/financialaid/aid-graduate-professional-students/) website. Students may also refer to Office of the Registrar's enrollment status (https://www.colorado.edu/registrar/students/registration/register/status/) webpage to determine your academic and financial aid enrollment status.

Graduate students may register for a maximum of 15 credit hours per semester toward a degree during the fall and spring semesters.

# Academic Standards & Advising

# Academic Standards

## Grade Point Average

A student is required to maintain at least a B (3.00) average in all work attempted while enrolled in the Graduate School, and must have at least a 3.00 cumulative average to receive a graduate degree.

## Nonacceptable Grades

1. A student who receives a grade of C+ or below in a course may retake the course under the grade replacement policy (https://www.colorado.edu/registrar/students/degree-planning/grade-replacement/), if eligibility standards are met.
2. Courses in which grades below B- (2.70) are received are not accepted for doctoral programs.
3. Courses in which grades below C (2.00) are received are not accepted for master's degree programs or for the removal of academic deficiencies.
4. Courses taken toward the fulfillment of requirements for graduate degrees may not be taken pass/fail or satisfactory/unsatisfactory.

## Student Ethics

### Academic Dishonesty

The University of Colorado Boulder is dedicated to maintaining the highest standards of intellectual honesty. Commitment to these standards is the responsibility of every student, faculty and staff member. The Honor Code (https://www.colorado.edu/sccr/students/honor-code-and-student-code-conduct/) was designed to uphold CU Boulder's standards of academic integrity and intellectual honesty, as

well as to provide quick resolution of to reports of student academic misconduct. The Honor Code process is supported by the Boulder Faculty Assembly.

All students of the University of Colorado Boulder are subject to the Honor Code for academic matters. Students must sign a statement agreeing to abide by all university policies, including the Honor Code, as a condition of admission to the university. Students who violate may be subject to discipline as set forth by the Honor Code.

**Research Integrity**
All research and scholarly/creative work must comply with requirements regarding research integrity. Allegations of plagiarism, fabrication, falsification, and other forms of research misconduct will be investigated by the Standing Committee on Research Misconduct. The Office of Research Integrity (https://www.colorado.edu/researchinnovation/rcr/research-misconduct/) provides further information and clarification on related issues and processes. Students should also review the university policy (https://www.cu.edu/ope/aps/1007/) on Misconduct in Research, Scholarship, and Creative Activities.

### Academic Standing and Dismissal

Students are subject to academic requirements and standards for adequate progress placed both by the Graduate School and by their graduate program.

A student whose cumulative GPA falls below 3.00 is placed on academic warning. The student generally has two semesters in which to raise the cumulative GPA to 3.00 or above. If the student's cumulative GPA is at or below 2.50, a dean's administrative stop is placed on the student's record, and the student may be withdrawn from coursework for upcoming semesters. If there are extenuating circumstances, the department chair/program director may petition the Dean of the Graduate School showing compelling reasons for the student to be granted a chance to continue.

If a student does not earn a 3.0 GPA in all courses taken in the first of two academic warning semesters, or if after the two-semester academic warning period the student's cumulative GPA is still below 3.00 (or if other conditions placed by the major department or Graduate School are not met) a dean's administrative stop will be placed on the student's record and they may be subject to dismissal.

Students are also subject to academic requirements and standards for adequate progress placed by their graduate program. Based upon Regent Law and Regent Policy, an academic dismissal decision is made by the dean of the Graduate School upon the program's recommendation. Should the student be dismissed from the program, a dean's administrative stop is placed on the student's record and the student is withdrawn from classes for any future semesters.

## Graduate School Advising

Graduate students receive degree-specific advising from their academic department/program. Faculty advisors are assigned to students according to departmental policies.

The Graduate School provides academic student services and fosters connection to campus partners and resources. Staff members offer expert guidance related to Graduate School and campus policies and procedures. Specific areas of expertise include registration requirements and requests, committee and general examination requirements, general academic standards, degree requirements which apply to all students and exceptions to general requirements.

The Graduate Student Services office also assists in the navigation of thesis/dissertation and graduation process, including associated requirements, deadlines and degree conferral. Staff can assist in a number of additional areas at the dean's office level.

For general inquiries, contact Graduate Student Services at gradinfo@colorado.edu or call 303-492-8220.

## Admissions

Graduate School admission is handled by individual academic departments; see the specific college, school and program sections for details. For more information, visit Graduate School Admissions (http://www.colorado.edu/graduateschool/admissions/).

## Application Procedures

Students seeking admission to a CU Boulder master's or doctoral program apply directly to the appropriate department. An applicant for admission must present complete application materials, including:

- The graduate application, available online at Graduate School Admissions (http://www.colorado.edu/graduateschool/admissions/),
- Unofficial transcripts for all academic work completed to date,
- A non-refundable application fee (currently $60 for domestic applicants and $80 for international applicants),
- Three or four letters of recommendation (please check with your program to obtain the required number of recommendations needed) and
- Test scores and other materials as required by specific departments.

A completed application must be submitted by the published deadline for the term for which admission is sought. Most departments have an application deadline that is several months before the start of the desired admission term.

## Admission Requirements

### Regular Degree Students

Qualified students may be recommended for admission to regular degree status by approved programs of the Graduate School provided they meet the following criteria:

- They hold a baccalaureate degree from an accredited college or university or have done work equivalent to that required for such a degree.
- They show promise of ability to pursue advanced study and research, as judged by their scholastic record.
- They have had adequate preparation to enter graduate study in the chosen field.
- They have at least a 2.75 (on a 4.00 scale) undergraduate GPA (for engineering, 3.00). (Note: Applicants who cannot meet criterion 4 may still secure regular admission if they have completed 9 credit hours of relevant graduate coursework with at least a 3.25 average.)
- They meet additional requirements for admission established by the major department.

### Provisional Degree Students

Students who do not meet the requirements for admission as regular degree students may be recommended for provisional degree status by their major department. With the concurrence of the dean of the Graduate School, these students are admitted for a probationary term

of either one or two semesters of full-time study (or the equivalent for part-time students). At the end of the specified probationary period, provisional degree students must be either admitted to regular degree status or dismissed from the graduate program. Provisional students are subject to the same standards of performance required of regular degree students, plus any other requirements imposed by the program faculty as conditions of admission.

Credit hours earned by persons in provisional degree status may count toward a degree at CU Boulder.

To meet the standard terms of provisional admission, the student must generally complete 12 credit hours in two semesters (or equivalent for part-time students) with a 3.00 cumulative GPA. Program faculty may recommend additional or alternative conditions as appropriate.

### Bachelor's–Accelerated Master's Degree Programs

A number of CU Boulder departments offer bachelor's–accelerated master's (BAM) degree programs, which enable CU undergraduate students to pursue undergraduate and graduate programs simultaneously and to receive both degrees in a shorter time period than it would take to pursue them separately.

Highly qualified undergraduate students may be recommended for admission to a BAM degree program at the end of their sophomore year or the beginning of their junior year. Such students are not formally admitted to the Graduate School. Standards for admission as well as eligibility to remain in the program are specified by each department.

### Dual Degree Programs

The Graduate School, in conjunction with the faculty of each department and the deans of schools and colleges where appropriate, approves dual degree programs that combine previously approved graduate degree programs in two areas or departments.

Qualified graduate students may be recommended for admission to an approved dual degree program upon meeting the qualifications of each graduate program and any special qualifications as outlined by each program's approved guidelines. Minimum standards and qualifications for admission and continuation are specified by each department. Students wishing to complete degrees in more than one department that have no approved dual degree program or interdisciplinary major combination must complete all the requirements for both degrees with no shared or overlapping coursework.

### Nondegree Students to Regular Degree Status

Students with nondegree status applying to a graduate degree program should talk to the academic department about specific resident requirements before applying to the program. The maximum amount of work that may be transferred to CU Boulder depends upon the graduate degree sought; individual departments may have more restrictive limits. Learn more about transfer of credit on the Graduate School's admissions page (https://www.colorado.edu/graduateschool/admissions/).

### Former and Suspended Students

Students who were previously admitted to a graduate degree program but who did not complete that degree and who have not been continuously registered at CU Boulder must complete the following steps before being readmitted:

1. Clarify their status with the department to determine their eligibility to return and pursue the same degree.
2. Submit a Graduate Readmit application to the department (departmental approval is required) before enrollment levels are met or deadlines passed for the term in which they expect to return to CU Boulder.

A regular degree student who is dismissed for failure to maintain a 3.00 GPA is eligible to apply for readmission after one year. Approval or rejection of this application rests jointly with the student's major department and the dean of the Graduate School. The final decision will be made by the dean based on the recommendations of the department.

### Students Transferring from Other CU Campuses

Students transferring from another CU campus to CU Boulder must apply to and be accepted by the Boulder campus.

### Students Changing Major Departments

Students who want to change major departments must apply to and be accepted by the new department. When adding a second major in an approved interdisciplinary major combination, students should contact their home department for instructions on this process.

# Credits & Grading

## Grading System

The following grading system is standardized for all colleges and schools of the university. Each instructor is responsible for determining the requirements for a class, determining the grading scale used, and for assigning grades on the basis of those requirements and grading scale by the grade submission deadline each term.

### Standard Grade Points per Hour of Credit

| | |
|---|---|
| **A** | superior/excellent, 4.0 |
| **A-** | 3.7 |
| **B+** | 3.3 |
| **B** | good/better than average, 3.0 |
| **B-** | 2.7 |
| **C+** | 2.3 |
| **C** | competent/average, 2.0 |
| **C-** | 1.7 |
| **D+** | 1.3 |
| **D** | 1.0 |
| **D-** | minimum passing, 0.7 |
| **F** | failing, 0.0 |

### Other Grade Symbols

| | |
|---|---|
| **CR** | Credit. Excluded from GPA. |
| **I** | Incomplete; changed to F if not completed within one year |
| **IP** | In progress; thesis at the graduate level or specified graduate-level courses |
| **NC** | No credit |
| **NR** | Class grades were not reported when final grades were processed |

| | |
|---|---|
| **P** | Passing; effective spring 2020, under pass/fail option, grades of D +, D or D- convert to P. Law School requires a grade of 72 or above to Pass. Excluded from GPA. |
| **P+** | Passing; effective spring 2020, under pass/fail option, grades of C- and above convert to P+. Excluded from GPA. |
| **S** | Satisfactory (effective fall 2022; formerly pass/fail only). Excluded from GPA. |
| **U** | Unsatisfactory (effective fall 2022; formerly pass/fail only). Excluded from GPA. |
| **W** | Withdrew |
| *** | Student is currently enrolled in a class; in progress |

### Incomplete (I) Grades

An incomplete (I) grade indicates that the student did not complete the requirements for the class by the end of the grading period for that semester. Requests for incomplete grades must be initiated by the student and only when, for reasons beyond their control, the student is unable to complete the class requirements within the semester of enrollment. A substantial amount of work (at least two-thirds) must have been satisfactorily completed before approval for such an incomplete grade is given.

If an instructor grants a request for an incomplete, the instructor sets the conditions under which the coursework can be completed and the time limit for its completion or if the class should be retaken. Incomplete grades, along with a last date of attendance (for financial aid purposes) must be submitted by the grading deadline of the term.

If the student does not complete the class requirements within one year from the end of the semester in which the Incomplete was assigned, the I grade is converted to a failing (F) grade.

If an incomplete-graded class is retaken, it must be completed on the Boulder campus or through Boulder Continuing Education coursework, and the student must re-register for the course and pay the appropriate tuition. The initial grade of I is not removed from the transcript if the course is completed within one year of the end of the term of the previous enrollment. When a final grade has been assigned, the transcript states, "Originally graded as Incomplete."

For graduating students, I grades assigned in courses required for a degree must be resolved before degrees may be posted. Unresolved I grades in required coursework will result in graduation being postponed. Students must reapply for graduation in a subsequent term. I grades assigned in courses not required for their degree must be resolved no later than the grading deadline of the term of graduation. If left unresolved, I grades become permanent and subsequent grade changes are not honored.

### Not Reported (NR) and In Progress (IP)

Similar to Incomplete grades, graduating students who have either NR or IP status in courses required for a degree must have them resolved and converted to an official grade before degrees will be posted. Unresolved NR and IP status grades in required coursework will result in graduation being postponed. Students must reapply for graduation in a subsequent term. NR and IP status grades assigned in courses not required for a degree must be resolved by the last regular class day of the term of graduation. If left unresolved, NR and IP grades become permanent and subsequent grade change requests are not honored.

### Grade Changes

Students who believe a grade was assigned in error must request a grade change by the published deadline of their home college or school. However, grade changes for graduating students must be submitted and processed prior to degrees being posted to academic records. Grade changes will not be processed to an academic record with a conferred degree.

It is left to the discretion of the faculty member to determine if a grade change is warranted. This policy does not apply to grading grievances. See Student Appeals, Complaints & Grievances (https://www.colorado.edu/policies/student-appeals-complaints-grievances-brief-guide/).

## Grade Point Average

The overall University of Colorado grade point average (GPA) is computed as follows: the credit hours and credit points are totaled for all courses and across all campuses within the same career (UGRD, GRAD or LAW); then the total credit points are divided by the total credit hours. Courses with grade symbols of P, P+, NC, *** (grade not yet entered), W, I and IP are excluded from calculations. All standard letter grades (A-F) are included in the GPA, including grades of F earned for courses graded on a pass/fail basis. Grades of I that are not completed within one year are converted to F grades and calculated in the GPA at the end of the one-year grace period. Below is an example GPA calculation for a hypothetical semester:

| | |
|---|---|
| Grade Earned: A; | Credit Points per Hour: 4.0; x Credit Hours: 4.0 = Credit Points in Course: 16.0 |
| Grade Earned: A-; | Credit Points per Hour: 3.7; x Credit Hours: 4.0 = Credit Points in Course: 14.8 |
| Grade Earned: B+; | Credit Points per Hour: 3.3; x Credit Hours: 4.0 = Credit Points in Course: 13.2 |
| Grade Earned: P or P+; | Credit Points per Hour: —; x Credit Hours: 3.0 = Credit Points in Course: — (excluded) |
| Grade Earned: F; | Credit Points per Hour: 0; x Credit Hours: 3.0 = Credit Points in Course: 0 |
| | Total of 15 credit hours with 44 credit points, so 44/15 = 2.93 GPA |

For individual GPA calculations related to graduation requirements for a college or school, students should refer to their academic dean's office.

Numeric GPAs displayed on the transcript are carried out to three decimal points and are not rounded up to the nearest whole number.

# Credit Policies

## No Credit

Coursework to be applied toward an advanced degree may not be taken for no credit (NC). Courses taken for no credit cannot be used toward the minimum credit load requirement for full-time or half-time status, and are

not eligible for tuition remission coverage. Graduate students also cannot use the no-credit class(es) towards their TA/RA appointment.

### Pass/Fail

No coursework to be applied toward an advanced degree may be taken pass/fail or satisfactory/unsatisfactory.

### Transfer Credit

Transfer credits from accredited institutions are accepted by CU Boulder only after approval by the department chair/program director and the dean of the Graduate School, and under conditions outlined below. Transfer credit is defined as any credit earned at another accredited institution, credits earned on another campus of the CU system or credits earned as a nondegree student within the CU system. Students seeking a degree from CU Boulder must complete the majority of their coursework while enrolled as degree-seeking students.

With the approval of the Graduate School and at the discretion of the unit, students may transfer up to and including 24 hours from a CU Boulder graduate certificate program, taken as a CU Boulder non-degree student, toward a graduate degree.

The following rules apply to transferring credit to CU Boulder graduate programs:

- The maximum amount of work that may be transferred to CU Boulder depends upon the graduate degree sought (see below; individual departments may have more restrictive limits).
- Work already applied toward a graduate degree received from CU Boulder or another institution cannot be accepted for transfer toward another graduate degree of the same level at CU Boulder. In addition, work completed for a doctoral degree may not be applied toward a subsequent master's degree. Courses applied toward an undergraduate degree may not be transferred to the CU Boulder Graduate School.
- All courses accepted for transfer must be graduate-level courses. A course in which a grade of B- or lower was received will not be accepted for transfer. Transfer coursework that is to be applied to a graduate degree at CU Boulder and was completed more than five years prior to being accepted to the program will be evaluated by the major department as to current relevance and applicability to the degree requirements. At the discretion of the department, a student may be asked to validate transfer credits prior to approval.
- Credit may not be transferred until the student has completed 6 credit hours of graduate coursework as a regular, degree-seeking student at the Boulder campus with a 3.00 GPA. Transferred credits do not reduce the minimum registration requirement, but may reduce the amount of work to be done in formal courses.

**Maximum Transfer Credits Accepted (By Degree)**

| Code | Title | Credit Hours |
|---|---|---|
| Master's (except MFA) | | 9 |
| MFA | | 18 |
| Doctoral | | 21 |

### Graduate Credit for CU Boulder Seniors

With the exception of students enrolled in a bachelor's-accelerated master's (BAM) program, seniors at CU Boulder may earn graduate credit for a limited amount of graduate-level work (up to 9 credit hours), provided such work is completed with a grade of B or above in coursework at CU Boulder, comes within the five-year course time limit, has not been applied toward another degree and is recommended for transfer by the department concerned, and such transfer is approved by the dean of the Graduate School.

## Credit for Prior Learning

CU Boulder recognizes that learning may be acquired outside of traditional learning environments and will consider the award of credit for such learning in one of three ways. These include standardized examinations, individual course challenges, and assessments of learning experiences out of of institutions of higher education.

See the university's Credit for Prior Learning policy or the Office of the Registrar site for more detailed information on requirements, eligibility and procedures.

## Course Challenge

Course challenge is a process by which students may seek to demonstrate knowledge and competencies in a specific CU Boulder course through an approved assessment in order to earn academic credit for that course. Per Colorado law, course challenge is available for GT Pathways courses. For non-GT Pathways CU Boulder undergraduate courses, an academic unit determines if a particular course is suitable for course challenge.

Successful course challenges are recorded as resident credit with a grade of CR (credit earned) within the term the challenge was completed, and are calculated in credit totals, but not in GPAs. Unsuccessful challenge exams are recorded on academic transcripts with a grade of U (Unsuccessful). U grades are not calculated in credit totals or in GPA calculations. CU Boulder assesses a per-credit administrative surcharge for Course Challenges.

## Credit from Learning Experiences Outside of Higher Education

Prior learning may occur in settings outside of institutions of higher learning, such as in the workplace, business or industry, or the community, and CU Boulder academic units may give programmatic credit for prior learning for relevant work-related experience. Prior learning arrangements for specific academic programs must be approved by the respective dean(s), must clearly define expected learning outcomes and must have an associated assessment plan to monitor achievement of the learning objectives.

Earned credit for learning experiences outside of accredited institutions of higher learning is awarded as a block of external Credit for Prior Learning. It is calculated in credit totals, but not in GPAs. CU Boulder may assess a surcharge for CPL for external learning experiences.

## Credit through Standardized Exam

Nationally recognized exams such as CLEP, AP, IB and DANTES allow students to earn college credit by achieving specific scores in select subject areas.

See the Office of Admissions' Credit by Examination page for information about earning credit through standardized exams.

# Grade Replacement

CU Boulder students (excluding Law students) who previously earned a low grade in an eligible course may repeat that course in a later term and be eligible for grade replacement. Grade replacement affords students the opportunity to improve their cumulative GPA.

Grade replacement is applied automatically at the end of each term to eligible courses and students.

Under grade replacement, the grade earned in the most recent prior attempt of a course will still appear on the transcript, but it will be replaced in cumulative GPA and credit totals as long as the latest grade earned is the same or better. If a lower grade is earned in the latest attempt, grade replacement is not applied and the grades from both attempts will be used in computing cumulative and major grade point averages, total credits and academic standing.

When students repeat courses that are not eligible for grade replacement, the grade and credits earned in each attempt are included in student credit and GPA totals and calculations.

Some academic programs have limits on the number of course repeats allowed for specific courses or the number of attempts for degree applicability.

## General Eligibility

### Course Requirements

Only courses offered by and taken through CU Boulder are eligible for grade replacement. To qualify for grade replacement, the course also must:

- Be taken at CU Boulder for a letter grade (i.e., not taken pass/fail, satisfactory/unsatisfactory or for no credit).
- Not be a special topics course or any other course designated in the catalog as repeatable for credit (e.g., independent study, field experience, dissertation hours). *Exceptions*: Topics courses WRTG 1100, WRTG 1150, WRTG 1160, WRTG 1250, WRTG 3020, WRTG 3030, WRTG 3035 and WRTG 3040 are eligible for grade replacement regardless of topic.

### Student Requirements

To quality for grade replacement, students must:

- Be an active student at CU Boulder (law students are not eligible). Students who have graduated cannot use grade replacement for a course taken in a completed academic career.
- Have earned a C- or lower (undergraduate students), or a C+ or lower (graduate students) in the most recent prior attempt of a course.

## Opting Out of Grade Replacement

Students may repeat courses at any point in their academic career without invoking grade replacement by submitting an opt-out request to Office of the Registrar by the last day of classes of the term. In those cases, the grade and credits earned in each attempt are included in student credit and GPA totals and calculations.

# Additional Information

For more information on grade replacement, visit the Office of the Registrar website (https://www.colorado.edu/registrar/students/degree-planning/grade-replacement/) or view the grade replacement policy in full (https://www.colorado.edu/registrar/students/degree-planning/grade-replacement/policy/).

# Degree Requirements

# Master's Degree Requirements

A student enrolled in a master's program must satisfy the degree requirements of both the Graduate School and the major department. The requirements listed below are campus-wide minimum standards of the Graduate School; additional requirements are set forth by the major department.

A graduate student is responsible for becoming informed about and observing all regulations and procedures required by the graduate program pursued. Ignorance of a rule does not constitute a basis for waiving that rule. Any exceptions to the policies stated in this catalog must be approved by the dean of the Graduate School.

## Minimum Registration Requirement

For purposes of deciding full-time registration status, a student must meet one of the following criteria:

### Master's Students

- One who is carrying a minimum of 5 credits of graduate-level coursework (pass/fail or for a grade), 8 credits of combined undergraduate and graduate coursework or 12 hours of undergraduate-level coursework
- At least 1 master's thesis hour
- At least 1 hour of "Master's Candidate for Degree"

Additional full-time and part-time registration requirements may exist for international students or students receiving or deferring financial aid, though degree requirements remain the same. Affected students should consult with International Student and Scholar Services or the Office of Financial Aid for more information.

Master's degree minimum registration requirements can be met only by registering full-time at CU Boulder for at least two semesters, part-time for at least four semesters, or full-time for at least one semester and part-time for at least two semesters.

## Degree Requirements

The minimum requirement for the master's degree is 30 credit hours. A student may complete a Plan I (thesis) option, or a Plan II (coursework) option. At least 24 credit hours must be completed at the 5000 level or above; these 24 credit hours must include a minimum of 4, but not more than 6, thesis credit hours for those students completing a Plan I degree. A maximum of 6 credit hours may be completed at the 3000 or 4000 level at the discretion of the academic department.

Independent study coursework cannot exceed 25 percent (rounded to the nearest whole number) of the coursework required for the master's degree.

## Language Requirement

There is no campuswide foreign language requirement for the master's degree. The decision regarding the foreign language requirement for each graduate degree is the responsibility of the graduate program.

### Admission to Candidacy

To be granted a master's degree, a student must formally apply for admission to candidacy using the process provided by the Graduate School no later than the posted graduation deadlines during the semester in which he or she plans to have the degree conferred.

### Graduation

Students must meet all posted graduation deadlines in order to receive a degree in any given semester.

## Time Limit

Master's degree students have four years (six years for students pursuing an ME) from the semester in which they are admitted and begin coursework to complete all degree requirements. The phrase "all degree requirements" includes the filing of the thesis with the Graduate School if Plan I is followed. Students who fail to complete the degree in this four-year period may be dismissed from their program with the concurrence of the major advisor and/or appropriate departmental personnel. To continue, the student must file a petition for an extension of the time limit with the dean of the Graduate School. Such petitions must be endorsed by the student's major advisor and/or other appropriate departmental personnel and may be granted for up to one year.

Students who have not completed the degree within their time limit, and who have received approval for an extension, must have any coursework completed more than five years prior to the completion of the degree requirements evaluated by their department for relevance and applicability. At the discretion of the department the student may be required to validate these courses as part of the completion of their degree requirements.

Students who need to leave CU Boulder for a period of time may apply for a graduate leave of absence for up to one year. Taking a leave of absence does not extend the student's time limit, but may be used as a reason to request an extension.

Students whose registration at CU Boulder is interrupted by military service may apply to the dean of the Graduate School for an extension.

## Final Examination/Thesis Defense

Each candidate for a master's degree is required to complete a comprehensive final examination/thesis defense after the other requirements for the degree have been substantially completed. In some programs, non-thesis students are instead required to present an approved degree plan which meets the requirements of the field and represents an intellectually coherent graduate education as determined by the major department and will not complete a final examination.

The examination/defense may be given near the end of the student's last semester while the candidate is still taking required courses for the degree, provided satisfactory progress is being made in those courses. The following rules apply to the comprehensive-final examination/thesis defense:

1. A student must be registered on the Boulder campus as a regular degree-seeking student during the semester the examination is passed.

2. Notice of the examination/defense must be filed by the major department in the Graduate School at least two weeks prior to the examination. The examination/defense must be scheduled not later than the posted deadline for the semester in which the degree is to be conferred.

3. The examination/defense is given by a committee composed of three Graduate Faculty members appointed by the department with approval of the dean of the Graduate School. The chair of the committee must have a regular Graduate Faculty appointment. Other committee members must have either a regular or special Graduate Faculty appointment.

4. The examination/defense, which may be oral, written, or both, must cover the thesis (if applicable), which should be essentially complete, other work completed in courses and seminars in the major field, and all work presented for the degree.

5. A student must have an affirmative vote from the majority of the committee members to pass. A student who fails the comprehensive-final examination/thesis defense may attempt it once more after a period of time determined by the examining committee.

## Thesis Requirements

A thesis, which may be research or expository, critical, or creative work, is required of every master's degree candidate pursuing a thesis plan (Plan I).

1. Every thesis presented in partial fulfillment of the requirements for an advanced degree must represent the equivalent of 4 to 6 semester hours of work (9 hours for the CRWR MFA degree.)
2. The thesis must comply in mechanical features with the specifications for theses and dissertations available in the Graduate School.
3. After the thesis defense, the student is responsible for submitting the thesis and Thesis Approval Form (TAF) signature page on or before the posted deadline during the semester in which the master's degree is to be conferred.

The final grade is withheld until the thesis is completed. In progress (IP) grades are assigned during each semester until the defense is successfully completed and the final copy of the thesis is accepted by the examination committee, at which time the final grade for all thesis hours is submitted to the Graduate School

## Graduate Faculty Appointments for Courses and Exams

All courses, 5000 level or above, completed to fulfill graduate degree requirements must be taught by members of the graduate faculty. In addition, any faculty member serving on a master's or doctoral examination/defense committee must hold a current graduate faculty appointment. Membership on the university faculty does not automatically constitute an appointment to the graduate faculty. Contact your departmental graduate program assistant for questions concerning these appointments.

# Doctoral Degree Requirements

The Doctor of Philosophy (PhD), Doctor of Musical Arts (DMA) and Doctor of Audiology (AuD) are the highest academic degrees conferred by CU Boulder. The requirements stated below are campuswide minimum requirements for all candidates for the PhD degree; additional requirements are found in department announcements. Additional requirements for the Doctor of Musical Arts (p. 1821) are available from the College of Music. Additional requirements for the Doctor of Audiology

(p. 1411) are available from the Department of Speech, Language and Hearing Sciences.

A graduate student is responsible for becoming informed about and observing all regulations and procedures required by the graduate program pursued. Ignorance of a rule does not constitute a basis for waiving that rule. Any exceptions to the policies stated in this catalog must be approved by the dean of the Graduate School.

# Admission

If a student is admitted to a master's program and wants to continue on to a doctoral program in the same department, they should consult their home department on the proper procedure.

# Minimum Registration Requirement

For purposes of deciding full-time registration status, a student must meet one of the following criteria:

**PhD students**

- one who is carrying a minimum of 5 credits (pass/fail or for a grade) of graduate-level coursework, 8 credits of combined undergraduate and graduate coursework, or 12 credits of undergraduate-level coursework prior to passing the comprehensive exam
- at least one doctoral dissertation credit prior to passing the comprehensive exam
- a minimum of 5 dissertation hours after passing the comprehensive exam

**DMA students**

- one who is carrying a minimum of 5 credits (pass/fail or for a grade) of graduate-level coursework, 8 credits of combined undergraduate and graduate coursework, or 12 credits of undergraduate-level coursework prior to passing the comprehensive exam
- at least one hour of coursework numbered TMUS 8200-8399 or "precandidate for Doctor of Musical Arts" before the comprehensive examination
- at least one hour of coursework numbered TMUS 8200-8399 or "candidate for Doctor of Musical Arts" after the comprehensive examination

**AuD students**

- one who is carrying a minimum of 5 credits (pass/fail or for a grade) of graduate-level coursework, 8 credits of combined undergraduate and graduate coursework, or 12 credits of undergraduate-level coursework.

Additional full-time and part-time registration requirements may exist for international students or students receiving or deferring financial aid, though degree requirements remain the same. Affected students should consult with International Student and Scholar Services or the Office of Financial Aid for more information.

The minimum registration requirement for doctoral students is full-time registration for six semesters of graduate degree credit beyond the attainment of an acceptable bachelor's degree. Two semesters of minimum registration credit may be allowed for a master's degree from another accredited institution; however, at least four semesters of minimum registration credit, two of which must be consecutive in one academic year, must be earned for work completed at CU Boulder.

# Degree Requirements

The minimum requirements for the PhD or DMA degree are 30 credit hours of coursework at the 5000 level or above. Those students pursuing the PhD shall complete a minimum of 30 credit hours of dissertation work beyond the minimum coursework requirement. The minimum requirements for the AuD degree are 89 credit hours of coursework at the 5000 level or above.

Unless otherwise specified by departmental requirements, all applicable courses taken at the 5000 level or above that were taken for the master's degree at CU Boulder may be applied toward the PhD degree. Coursework taken in pursuit of a doctoral degree cannot be applied toward a subsequent master's degree.

# Preliminary Examination

Each department determines for itself (by examination or other means) that students who wish to study for the doctoral degree are qualified. The means by which each department makes this evaluation are specified in departmental requirements. Students who are thus evaluated are notified immediately of the results.

# Language Requirement

There is no campuswide foreign language requirement for the doctoral degree. The decision regarding the foreign language requirement for each graduate degree is the responsibility of the graduate program.

# Dissertation Credit-Hour Requirement

To complete the requirements for the PhD a student must register for a minimum of 30 dissertation credit hours. A student may not register for more than 10 dissertation credit hours in any one semester, including summer.

# Comprehensive Examination

Before admission to candidacy for the doctoral degree, students must pass a comprehensive examination in the field of concentration and related fields.

The following rules apply to the doctoral comprehensive examination.

1. Students must be registered (P/F or for credit) on the Boulder campus as regular degree-seeking students when they pass the comprehensive examination.
2. Notice of the examination must be filed by the major department with the Graduate School at least two weeks prior to the examination.
3. The examination is conducted by an examining board appointed by the chair of the major department and approved by the Dean of the Graduate School. The board shall consist of the major advisor and additional members as necessary to a minimum of five. The chair must have a regular Graduate Faculty appointment. Other committee members must have regular or special Graduate Faculty appointments. Successful candidates must receive affirmative votes from a majority of the members of their examination board. A candidate who fails the examination may attempt it once more after a period of time determined by the examination board.
4. The examination, which may be oral, written or both, tests mastery of a broad field of knowledge, not merely formal coursework.

## Admission to Candidacy

A student must formally apply for admission to candidacy for the doctoral degree using the process provided by the Graduate School upon passing the comprehensive examination. Before being admitted to candidacy a student must earn at least three semesters toward the minimum registration requirement, and pass the comprehensive examination.

## Graduation

Students must meet all posted graduation deadlines in order to receive a degree in any given semester.

## Continuous Registration Requirement

A PhD student is required to register continuously as a full-time student, for a minimum of five dissertation hours in the fall and spring semesters of each year, beginning with the semester following the passing of the comprehensive examination and extending through the semester in which the dissertation is successfully defended (final examination). A student not being required to maintain full-time status and not using campus facilities may claim off-campus status, which allows registration for three rather than the minimum of five dissertation credit hours. Off-campus status (3 credits of dissertation hours) is considered part-time. All university considerations for part-time status apply.

DMA students who have passed their comprehensive exams must maintain continuous registration by registering for a minimum of one credit hour of DMA dissertation credits (TMUS 8100–8399) or TMUS 8029 in the fall and spring semesters of each year, beginning with the semester following the passing of the comprehensive examination and extending through the semester in which the final examination is passed.

AuD students who have passed their comprehensive exams must maintain continuous registration by registering for four or five hours of graduate-level coursework each semester as required by the audiology program, with five hours being taken during the semester in which the final examination is passed.

Additional full-time and part-time registration requirements may exist for international students or students receiving or deferring financial aid, though degree requirements remain the same. Affected students should consult with International Student and Scholar Services or the Office of Financial Aid for more information.

A student who fails to register continuously for required hours after passing the comprehensive examination must retake and pass the examination, to regain status as a student in good standing in the Graduate School. The department may require that the student validate coursework more than five years old. At its discretion, the department may petition the Dean of the Graduate School for a time limit for completion of all degree requirements of up to one year after the retaking of the comprehensive exam. The department must petition the Dean of the Graduate School to waive the requirement to retake the comprehensive exam.

PhD students must be registered for a minimum of five dissertation hours the semester (including summer semester) in which the dissertation defense is held. DMA students must be registered for a minimum of one credit hour of DMA dissertation credits (TMUS 8100–8399) or TMUS 8029 during the semester in which the final examination is passed. AuD students must be registered full-time for a minimum of five credit hours of graduate-level coursework during the semester in which the final examination is passed.

## Time Limit

Doctoral degree students are expected to complete all degree requirements within six years from the semester in which they are admitted and begin coursework in the doctoral program. The phrase "all degree requirements" includes the filing of the dissertation and all accompanying forms with the Graduate School. Students who fail to complete the degree in this six-year period may be dismissed from their program with the concurrence of the major advisor and/or appropriate departmental personnel. To continue, the student must file a petition for an extension of the time limit with the dean of the Graduate School. Such petitions must be endorsed by the student's major advisor and/or other appropriate departmental personnel and may be granted for up to one year. If the dean of the Graduate School and the department chair/program director cannot agree on whether a student should continue, the Graduate School's executive advisory council makes the final decision.

Students who need to leave CU Boulder for a period of time may apply for a graduate leave of absence for up to one year. Doctoral students who are required to maintain continuous registration may petition for an exception in order to take a leave of absence due to extenuating circumstances. Requests for leave of absence for parental leave do not require a petition. Taking a leave of absence does not extend the student's time limit, but may be used as a reason if applying for an extension.

Students whose registration at CU Boulder is interrupted by military service may apply to the dean of the Graduate School for an extension of time.

## Dissertation Defense/Final Exam

After the PhD dissertation has been accepted for defense by the student's committee, a final examination on the dissertation and related topics is conducted. The following rules apply to the PhD dissertation defense/non-PhD doctoral final examination:

1. PhD students must be registered as full time, regular degree-seeking students at CU Boulder, for a minimum of 5 dissertation hours during the semester in which they pass the final examination. DMA students must be registered, full-time for DMA dissertation credits (courses 8200–8399) or TMUS 8029 during the semester in which they pass the final examination. AuD students must be registered full time with at least 5 hours of graduate level coursework. (Graduate School Rules, 18)

2. Students must notify the Graduate School of their final oral examination at least two weeks before their scheduled examination date. The examination must be scheduled not later than the posted deadline for the semester in which the degree is to be conferred.

3. This examination is wholly or partly oral, the oral part being open to anyone.

4. The examination is conducted by a committee appointed by the chair of the major department and approved by the dean of the Graduate School, which consists of at least five persons, one of whom must be from outside the student's major department. Three of the members must be CU Boulder Graduate Faculty. The chair and outside member of the committee must have regular Graduate Faculty appointments. The other committee members must have either regular or special Graduate Faculty appointments. The outside member must either have a regular

Graduate Faculty appointment in a different department at CU Boulder or hold a special Graduate Faculty appointment with approval to serve as outside member. More than one dissenting vote disqualifies the candidate in the final examination. The chair and all committee members must participate in the examination, with the mode of participation (e.g. in person, remotely) defined by the committee and approved by the department.

5. A student who fails the examination may attempt it once more after a period of time determined by the examining committee.

### Dissertation Requirements

A PhD student must write a dissertation based upon original investigation, showing mature scholarship and critical judgment, as well as familiarity with tools and methods of research. The subject must be approved by the student's major department.

1. Every dissertation presented in partial fulfillment of the requirements for an advanced degree must represent the equivalent of at least 30 credit hours of work.
2. The student is responsible for notifying the Graduate School of the exact title of the dissertation on or before the posted deadlines during the semester in which the doctoral degree is to be conferred.
3. The dissertation must comply in mechanical features with the specifications for theses and dissertations available in the Graduate School.
4. After the dissertation defense, the student is responsible for submitting the dissertation and Thesis Approval Form (TAF) on or before the posted deadline during the semester in which the doctoral degree is to be conferred.

The final grade is withheld until the dissertation is completed. In progress (IP) grades are assigned during each semester until the defense is successfully completed and the final copy of the dissertation is accepted by the examination committee, at which time the final grade for all dissertation credit hours is submitted to the Graduate School.

### Embargo of Theses or Dissertations

Theses and dissertations approved by the departments and the Graduate School are released to ProQuest/UMI and preserved electronically through the University Libraries.

Occasionally, the primary academic advisor, after consultation with the student, may find it necessary to embargo the student's thesis to protect university rights to intellectual property. The university accepts the obligation to protect potentially publishable creative works and potentially patentable subject matter from premature public disclosure so as to preserve entitlement to patent protection while the technology is being evaluated. This embargo should take place only when it is absolutely required and only for the minimum time necessary.

With just cause, the student may request that an embargo be placed on the publication/sale of the thesis for a reasonable amount of time. This request is made upon the electronic submission of the document.

## Graduate Faculty Appointments for Courses and Exams

All courses, 5000 level or above, completed to fulfill graduate degree requirements must be taught by members of the graduate faculty. In addition, any faculty member serving on a master's or doctoral examination/defense committee must hold a current graduate faculty appointment. Membership on the university faculty does not automatically constitute an appointment to the graduate faculty. Contact the departmental graduate program assistant for questions concerning these appointments.

# Distance Education

## Distance Education

The University of Colorado Boulder offers master's degrees, graduate certificates, and individual graduate courses online in several disciplines.

Students may enroll in a single course, in a graduate certificate, or in a full master's degree program at CU Boulder. Students applying for admission to a degree program may enroll in courses as non-degree students before being accepted, but should typically apply for admission before finishing a third course. Courses taken before admission are considered transfer credit. A maximum of nine hours of transfer credit will be accepted toward graduate degree requirements once a student is admitted into that program. With Graduate School and unit approval, a maximum of 24 hours can be transferred toward a graduate degree if the hours were part of a graduate certificate program and were taken as a CU Boulder non-degree student.

For more information, visit the Graduate School website (https://www.colorado.edu/graduateschool/admissions/prepare-apply/program-information-deadlines/) and contact the individual graduate program of interest directly.

# Graduation

## Graduation

Students are eligible to graduate at the close of the term in which they successfully complete all requirements for their degree program. Degrees and certificates are typically conferred at the close of fall semester, spring semester and summer session. Credentials in select programs may be conferred mid-semester.

Students must apply for graduation through Buff Portal by the published deadline for the term in which they complete degree requirements. Instructions for applying and important dates and deadlines are available on the Office of the Registrar's Graduation & Commencement (http://www.colorado.edu/registrar/students/graduation/) webpage. Individual colleges and schools may require additional processes for students completing their degrees.

## Commencement

A general commencement ceremony is held in May for all students who have graduated or anticipate to graduate in a given academic year (fall, spring and summer). This ceremony is open to the public and no tickets are required. Many departments, colleges and schools hold recognition ceremonies in both fall and spring semesters. For dates and details about the ceremony, visit CU Boulder's Commencement (http://www.colorado.edu/commencement/) website.

## Diplomas

Please see the Academic Records (p. 1107) section.

# Health & Wellness

## Health and Wellness Services

Health and Wellness Services is a part of CU Boulder Strategic Resources and Support. As part of Strategic Resources and Support, we are collectively committed to the success and wellbeing of all our students as well as the faculty and staff we serve.

All CU Boulder undergraduate and graduate students have access to a full range of on-campus health and wellness services in addition to a variety of virtual offerings.

To learn more, visit Health and Wellness Services (http://www.colorado.edu/health/).

### Administrative Services

The Administrative Services team oversees all aspects of medical insurance, billing and medical records at CU Boulder. To learn more, visit Administrative Services (https://www.colorado.edu/healthcenter/insurance-billing-medical-records/).

### Counseling and Psychiatric Services

Counseling and Psychiatric Services (CAPS) offers confidential, on-campus short-term mental health and psychiatric services for all fee-paying students. CAPS addresses a variety of concerns such as academics, anxiety, body image, depression, relationships, substance use and more. To learn more, visit CAPS (http://www.colorado.edu/health/counseling/).

### Center for Disability and Access

The Center for Disability and Access is dedicated to providing students with disabilities an equal opportunity to participate in university programs, courses and activities through reasonable accommodations and services. Our office is here to support students, staff and faculty with accommodation requests, implementation, guidance and general information. To learn more, visit the Center for Disability and Access (https://www.colorado.edu/disabilityservices/).

### Health Promotion

Health Promotion provides outreach and education on a variety of health topics to help students make informed decisions about their health and wellbeing. Health Promotion collaborates with student groups and campus departments to provide programs and services that positively influence student health. To learn more, visit Health Promotion (https://www.colorado.edu/health/promotion/).

### Medical Services

Medical Services is the primary healthcare resource for CU Boulder students. Through comprehensive care and education we strive to give students the skills and knowledge they need to develop healthy life-long habits. To learn more, visit Medical Services (https://www.colorado.edu/healthcenter/). (https://www.colorado.edu/healthcenter/)

### Recovery Community

The CU Collegiate Recovery Community (CUCRC) provides community, support and connection for students, faculty and staff in recovery or seeking recovery from a wide range of behaviors. Our mission is to help develop peer-to-peer connections, support resiliency and contribute to their overall wellbeing through a welcoming and supportive community. To learn more, visit Recovery Center (https://www.colorado.edu/recoverycenter/).

### The Office of Victim Assistance

The Office of Victim Assistance (OVA) provides free and confidential information, consultation, support, advocacy and short term counseling services to University of Colorado Boulder students, graduate students, faculty and staff who have experienced a traumatic, disturbing or life-disruptive event. Call 303-492-8855 to connect with an OVA counselor or to receive after-hours support. To learn more, visit The Office of Victim Assistance (https://www.colorado.edu/ova/).

### CU Boulder Student Health Insurance Plan (SHIP)

All students are required to carry a comprehensive medical insurance plan while attending CU Boulder. CU Boulder would like students to have financial protection should they suffer a serious illness or injury during their time here. Our hope is that an insurance plan will help them through these times so that they can continue with their educational endeavors.

**Students may elect health insurance coverage through:**

- Anthem Gold Student Health Insurance Plan (SHIP) - A plan exclusively for CU students.
- Private or personal insurance (an individual health insurance plan through a family member, employer or government-sponsored)

Students must meet this requirement their first semester at CU Boulder and at the beginning of each academic year. Those taking six (6) or more undergraduate credit hours or one (1) or more graduate credit hours are required to complete the health insurance requirement process. Once a student is registered for their semester credits, the student will begin receiving email communications from Academic HealthPlans. These emails explain the insurance requirement and outline the process of enrolling or waiving the Anthem Gold SHIP.

All fee-paying students, regardless of their insurance plan, have full access to the services provided by Health and Wellness Services.

For more information, visit the Health Insurance Requirement (http://www.colorado.edu/health/insurance/health-insurance/)webpage.

*Note*: Plans available through the health insurance marketplace meet CU's health insurance requirement. Colorado students may sign up through the Connect for Health Colorado (http://connectforhealthco.com/)website. Nonresident students may sign up through their home state health exchange or through the national HealthCare.gov (https://www.healthcare.gov/)website.

# New Student & Family Programs

New Student & Family Programs (NSFP) supports new students and families throughout their transition and involvement at the University of Colorado Boulder.

In order to aid in the transition to CU Boulder, all incoming graduate students have the opportunity to participate in Graduate Student Orientation (https://www.colorado.edu/orientation/graduate-students/). This optional program is critical to the graduate experience as it helps new students learn more about CU Boulder while providing an opportunity to connect with program advisors, faculty, current students and student support services. New graduate students should check their CU Boulder email account for more information about engagement opportunities and other important next steps.

New Student & Family Programs also collaborates with campus partners, including the Graduate School, to plan fall and spring welcome events surrounding the first day of classes. Students participate in programs and have opportunities to connect with current students, faculty and staff to create a healthy and positive transition to CU Boulder.

For more information, visit the New Student & Family Programs website.

# Registration & Enrollment

## Registration

Visit the Office of the Registrar's Academic Calendar (http://www.colorado.edu/registrar/students/academic-calendar/) webpage for specific academic and financial dates and deadlines. Students should also consult individual college and school sections of this catalog and their dean's office for additional information on special requirements and deadlines. The following registration policies are intended to serve as general guidelines.

Students who require accommodations because of a disability should visit the Disability Services (http://www.colorado.edu/disabilityservices/) website or call 303-492-8671.

## Confirmation Deposit

All new degree students pay a one-time $200 confirmation deposit when they confirm their intent to enroll at CU Boulder. Students are not permitted to complete the New Student Welcome Experience or register for classes if the university has not received the deposit.

Confirmation deposits are non-refundable except upon graduation from CU Boulder. All refunds are reduced by any outstanding financial obligations. Interest earned from confirmation deposits is used for student financial aid.

Questions regarding the confirmation deposit policy should be directed to the Office of Admissions, 303-492-6301.

## Buff Portal

Student registration and other important information and services are available through Buff Portal (https://buffportal.colorado.edu/). Students access the portal using a secure CU login name and IdentiKey password and Duo Multi-Factor Authentication. For more information and registration instructions, visit the Registration (http://www.colorado.edu/registrar/students/registration/) webpage.

## Registering for Classes

Students enroll in (or register for) classes using CU Boulder Class Search, which may be accessed through Buff Portal. In Buff Portal, students may also check their assigned enrollment dates, view any holds that may prevent registration (see "Holds"), see to-do lists and obtain their advisor's name and contact information.

New incoming students and transfer undergraduate students receive their registration instructions and information as part of the New Student Welcome Experience. Continuing students may consult the academic calendar or view their registration dates in Buff Portal; they are also notified by email each semester of upcoming registration periods.

If a student misses their assigned enrollment date, they must wait until open enrollment to register for classes.

Registration instructions are also available on the Enroll in Classes (http://www.colorado.edu/registrar/students/registration/enroll/) webpage.

## Enrollment Dates

Each term, students are assigned enrollment dates based on the number of credits they have completed. Accessible in Buff Portal, the enrollment assignment indicates the dates and times during which the student may enroll, as well as the maximum number of credits they can take. Students who miss their assigned enrollment window must wait until the open enrollment period to register for classes.

Priority registration has been formally approved for specific populations of students who have unique scheduling needs. Priority registration does not override university or departmental policies, holds, permissions, etc., nor does it guarantee the provision of classes at specific times. Student populations with priority registration, which often occurs within the enrollment period specified for their class (i.e., freshmen, sophomores), may include students with disabilities, military veterans and student athletes.

## Holds

A hold may be placed on a student's record for a number of reasons, including but not limited to financial, advising, scholastic, conduct and health. A hold may prevent a student from registering, receiving a housing assignment, returning to school, or obtaining an official transcript. Students should resolve holds as quickly as possible by contacting the appropriate campus office identified in the hold details in Buff Portal.

## Special Registration

### Intercampus Enrollment Program

CU Boulder students enrolled in at least one Boulder main campus class may be allowed to register for up to two classes totaling no more than six credit hours on another University of Colorado campus.

Classes taken at other CU campuses must be required for graduation or unavailable on the Boulder campus in a given term, or the classes must conflict with another required class in which the student is enrolled.

Boulder students exercising this option pay tuition for their total credit hours at Boulder campus rates. Intercampus Enrollment forms and instructions are available on the Registration Programs (http://www.colorado.edu/registrar/students/registration/registration-programs/) webpage.

Students receiving VA educational benefits are not eligible to receive funding for intercampus enrollment. Contact your campus's veteran and military affairs office for more information.

Intercampus students are registered in host campus classes after continuing home students have had the chance to enroll. Students must adhere to the add/drop deadlines of the host campus when making changes to their intercampus enrollment.

Boulder campus students who wish to take coursework on another campus of the University of Colorado, but not through the Intercampus Enrollment program, may be able to register on that campus independent of Boulder-campus registration. However, they must apply for admission to and follow the registration procedures established by the other campus. Students should check with their dean's office for approval and course applicability to their degree program. Students who want

to complete degrees or certificates at another University of Colorado campus must apply to that program on the non-Boulder campus.

Graduate students should check with the Graduate School for exceptions to the home-campus registration requirement and limitations on credit hours at the host campus. The coursework must be required for their degree program; they must have their dean's permission; they must be enrolled for at least one course on the Boulder campus; and enrollment levels must not have been reached on the other campus. Contact the Office of the Registrar for additional information.

## Late Registration

We recommend students register for classes as soon as their registration period begins. For more information, visit the Add a Class (https://www.colorado.edu/registrar/students/registration/register/add/) webpage. Please note that late registration may prevent the timely review of financial aid eligibility, may result in a graduate program being discontinued, limit the number of open classes and more. As of Spring 2025, there is no longer a late registration fee.

## University Employees and Dependents

CU Boulder offers a tuition assistance benefit to eligible employees and their dependents. For current benefit information, visit Employee Services' Tuition Assistance (https://www.cu.edu/employee-services/employee-tuition-benefit/) website.

## Continuing Education Auditors Program

Community members aged 18 and older, who are not registered students but wish to listen in on regularly scheduled lectures, are eligible to audit courses during the fall, spring and summer semesters. Community members may do so by obtaining auditor status.

The university's primary commitment is to degree-seeking and credit-seeking students. Auditors' course requests will be processed after these groups have registered. Auditors must receive permission and obtain a signature from course instructors to be added to the roster.

Audited courses will not appear on any transcript, formal or informal, as no credit is awarded. Registered auditors receive class instruction, learning management system access and library privileges. Being an auditor at the University of Colorado Boulder does not guarantee eligibility for regular degree or nondegree status.

*Note:* Admitted degree students, either enrolled or suspended, are not permitted to audit courses. If an admitted degree student is interested in participating in a class without receiving credit, the student must enroll in the course and request to take the course as no-credit (https://www.colorado.edu/registrar/students/registration/register/edit/#what_it_is-1719). A course must be offered with the student option grading basis to be eligible for no-credit. Courses taken for no credit are assessed the same tuition rate as courses taken for credit. Contact ceregistration@colorado.edu or call 303-492-5148 for more information.

The Senior Auditors program, formerly offered by the CU Boulder Alumni Association, along with the Community Auditors program previously offered by Continuing Education, have been incorporated into the new Continuing Education Auditors program. Please refer to the Auditors enrollment page (https://ce.colorado.edu/programs/auditors/) (https://ce.colorado.edu/resources/topics/enrollment-auditors/)for information on how to register for courses and current auditor restrictions.

# Dropping & Adding Classes

## Procedures

Students can add or drop classes in Buff Portal. For more information, visit the Enroll in Classes (http://www.colorado.edu/registrar/students/registration/enroll/) webpage.

## Deadlines

For specific drop and add deadlines for both the regular full-semester and special fall and spring sessions, visit the Academic Calendar (http://www.colorado.edu/registrar/students/academic-calendar/) and Special Session Calendars (https://www.colorado.edu/registrar/students/calendar/sessions/) webpages. For summer deadlines, visit the Summer Session Calendars (http://www.colorado.edu/summer/resources/calendars/) webpage.

### Add a Class

- Students may add classes in Buff Portal during designated registration periods each term.
- After this time period, students must contact the instructor or the instructor's department and request to be added to a class. Their request may be denied based on lack of attendance, fire code capacity being met, lack of pre-requisites, etc. If a student is added to a class after their designated registration period, then the university cannot guarantee timely review of the student's financial aid or processing of the tuition and fee bill. Students who are added late and then decide to drop will be subject to the normal tuition adjustment and course withdrawal deadlines.

### Drop a Class

- **Class drop (without a W grade)**: Students may drop individual classes with a refund (if applicable) and no record (no W grades) through the three-week class drop deadline of a regular full-semester fall/spring session and through the equivalent class drop deadline of any special session (dates vary).
- **Class withdrawal**: After the class drop (without a W grade) deadline of a full-semester fall/spring session or the equivalent drop deadline of any special session, students may continue to withdrawal from classes without instructor/advisor approval through the class withdrawal deadline of a full-semester fall/spring session or the equivalent class withdrawal deadline of any special session (dates vary). However, tuition and fees are assessed and grades of W appear on the transcript.
- **Late class withdrawal**: After the 10-week class withdrawal deadline, or equivalent special session class withdrawal deadline, approval via a petition with extenuating circumstances is required. Students should contact their advisor to discuss their options. If approved, tuition and fees are assessed and grades of W appear on the transcript.

Students dropping all of their classes should see the Withdrawal section.

# Withdrawing from the Semester

A withdrawal from a Main Campus semester occurs if the student:

- Never registers for classes in a fall or spring semester
- Drops all classes for a semester
- Submits a withdrawal request to the Office of the Registrar

A student who desires to withdraw from the university and drop all Main Campus classes should visit the Office of the Registrar's Withdraw from the Semester (https://www.colorado.edu/registrar/students/

withdraw/) webpage and review the current term's withdrawal calendar and the withdrawal checklist to understand the potential impacts of withdrawing. Failure to withdraw properly may result in failing grades recorded for every class and liability for the full amount of tuition and fees for that term.

Rules for withdrawing may vary with each college and school. Students anticipating a withdrawal should consult their advisor to understand the potential impacts to their degree requirements.

Withdrawing students (including students applying for a graduate leave of absence) with Federal Perkins/NDSL loans must complete a loan exit interview and clear all outstanding financial balances before leaving the university. Failure to do so results in a hold on the student's record. This hold prevents registration for future terms. Students can complete a loan exit interview by contacting University Student Loans & Debt Management in the Bursar's Office at 303-492-5571, toll free at 800-925-9844 or TTY 303-492-3528.

Undergraduate students who withdraw and then wish to return to the university have two semesters (plus summer) from their last graded semester to return to the university without having to reapply for admission. Graduate students can apply for an approved leave of absence.

Details are available on the Withdraw from the Semester (https://www.colorado.edu/registrar/students/withdraw/) webpage. For more information, contact the Office of the Registrar at 303-492-6970 or withdraw@colorado.edu. For information about tuition and fee obligations for withdrawing students, see either the Undergraduate Tuition and Fee Policies (p. 67) or the Graduate Tuition and Fee Policies (p. 1126) sections.

### Active Duty

Students who are military personnel, fire fighters and police officers called to active duty and/or to help with disasters may request to go on a leave of absence. These students should contact the Office of the Registrar. For more information, visit the Withdraw from the Semester (https://www.colorado.edu/registrar/students/withdraw/) webpage.

### Graduate Leave of Absence

Graduate and MBA students who do not maintain continuous enrollment (summer excluded) *must* apply for a leave of absence or be discontinued from the university. Graduate students who wish to take a leave of absence from the university must submit an application by the published deadline in a given term and get approval from their department and their school, college or program to avoid having to reapply.

Graduate students taking an approved leave of absence are allowed two inactive semesters (plus summer), and are guaranteed a place in their current college or school and in their current major when they return to the university. Students must not have any disciplinary holds and must be in good academic standing with the university. Students registered for the semester in which they plan to begin their leave of absence must formally withdraw. See the section on withdrawal procedures above.

For an application and more information, visit the Leave of Absence (https://www.colorado.edu/registrar/students/withdraw/leave-of-absence/) webpage.

# Student Affairs

# Housing

## Off-Campus Housing

Off-Campus Housing & Neighborhood Relations (a service of CUSG) maintains listings of apartments, houses and rooms for rent in the Boulder area. Currently enrolled students may view listings and connect with potential roommates on Ralphie's List, CU's rental database, on the Off-Campus Housing & Neighborhood Relations (http://offcampushousing.colorado.edu/) website. The office also maintains a detailed list of apartments and property management companies available for download or pickup in the office.

The department has a staff attorney available on Tuesdays and Fridays to advise students about leases, security deposits, maintenance issues and roommate and landlord conflicts. Office assistants will help students locate properties and answer questions about the surrounding neighborhoods.

During the academic year, the office sponsors several off-campus housing fairs where landlords, property managers and related businesses offer their services to students in a trade-show format.

For additional information, visit the Off-Campus Housing & Neighborhood Relations (http://offcampushousing.colorado.edu/) website or call 303-492-7053. Office hours are 9 a.m.–5 p.m., Monday–Friday. Summer hours are 7:30 a.m.–4:30 p.m.

## Graduate & Family Housing

The University of Colorado Children's Center provides childcare for the children of students, staff, faculty and Graduate & Family Housing residents.

Graduate & Family Housing offers an affordable, convenient and comfortable living environment that serves the needs of a diverse population of students at CU Boulder. We are home to residents from over 70 nations and offer a variety of apartment types and sizes, flexible leases and community-building programs and events. To learn more, visit the Housing and Dining (https://living.colorado.edu) website or call, write or email the Graduate & Family Housing Office at the address provided.

Graduate & Family Housing Office
1350 20th Street, #A10
University of Colorado Boulder
Boulder, CO 80302
T: 303-492-6384
graduatefamilyhousing@colorado.edu

# Student Conduct & Colorado Creed

## Student Conduct & Conflict Resolution

### What We Believe

Student Conduct & Conflict Resolution (SCCR) strives to provide students with individualized responses to support community standards and conflict resolution that emphasize accountability and growth by:

- Fostering reflection on the impact of their behaviors;
- Promoting responsible community membership and repairing harm; and
- Cultivating the wellbeing and safety of the CU Boulder community.

### What Is Important to Us

1. The student will understand the impact of their behavior on others.
2. The student will demonstrate ethical development, will comply with institutional policy and will engage in no further violations of policy.
3. The student will gain an understanding of the institutional values reflected in institutional policies.
4. The student will gain a better understanding of the importance of personal integrity.
5. Through SCCR processes, the student will be asked to reflect on their beliefs, ethics and values.
    a. The student will be able to articulate their personal ethics and values, will act in congruence with those ethics and values, and will make decisions that reflect their beliefs.
6. The student will contribute positively to the CU Boulder community and beyond.
7. The student will gain a better understanding of the consequences and potential consequences of their personal actions and will learn the purposes of institutional policies.
8. The student will employ critical thinking in problem solving and ultimately obtain a degree.

## Why Do We Have a Student Code of Conduct? (Authority)

Article 7, Part B, of the Laws of the Regents of the University of Colorado requires each campus to develop a student code of conduct. Student Conduct & Conflict Resolution (SCCR) is authorized to establish and administer this policy. Any questions regarding interpretation of this code or any of its provisions should be directed to the Dean of Students or their designee for final determination.

Questions regarding student behavior should be directed to Student Conduct & Conflict Resolution, studentconduct@colorado.edu, Center for Community, S485, 10 UCB Boulder, CO 80309, phone 303-492-5550.

## When and Where Does the Student Code of Conduct Apply? (Jurisdiction)

1. The Student Code of Conduct applies to:
    a. Student conduct that occurs on, or as it relates to, CU Boulder property or at official functions and CU Boulder sponsored programs conducted away from the campus.
    b. Student conduct that occurs off CU Boulder property is subject to this policy if it:
        i. Adversely affects the health, safety or security of any member of the CU Boulder community, including the student alleged to have violated CU Boulder policy or the mission of CU Boulder; or
        ii. Involves any records or documents of CU Boulder;
        iii. Involves conduct that may be a violation of federal, state or local law, as determined by SCCR.
    c. For this policy's purposes, CU Boulder's mission is broadly defined to include its academic goals and the importance of developing civic responsibility in our students.
2. Recognized Student Organizations and Recognized Social Greek Organizations:
    a. Wherever the Student Code of Conduct refers to "responding student," the same also applies to Recognized Student Organizations (RSOs) and Recognized Social Greek Organizations (RSGOs). RSOs, as described in the Student Organization Handbook (https://www.colorado.edu/involvement/), are general student organizations recognized by the Center for Student Involvement (CSI) and CU Boulder. Recognized Social Greek Organizations are recognized by Fraternity & Sorority Life (FSL) and CU Boulder.
        i. RSOs and RSGOs, as well as their members and other students, may be held collectively and/or individually responsible for violations.
        ii. The RSO and RSGO officers, leaders, signers or individuals currently listed in an official position in the Center for Student Involvement records or Fraternity & Sorority Life records may be held collectively and/or individually responsible for violations when such violations are committed by persons associated with the organization who have received consent or encouragement from the organization's officers or leaders, if those officers or leaders knew, or reasonably should have known, that such violations were being or would be committed.
        iii. The officers or leaders of a student organization may be directed by CU Boulder officials to take action designed to prevent or end violations by the organization or by any persons associated with the organization. Failure to comply with a directive may be considered a violation of the Student Code of Conduct, both by the officers or leaders of the organization and by the organization.
3. Actions taken under a resolution process are separate and apart from any law enforcement or other court process or proceeding, such as a civil lawsuit or criminal prosecution, that may relate to the same underlying factual incident. SCCR's jurisdiction does not depend on whether a responding student is criminally charged through the criminal justice system. A resolution process is not postponed while criminal or civil proceedings are pending unless otherwise determined by the resolution specialist. Dismissal of criminal charges or acquittal in a criminal case does not prevent SCCR from investigating and resolving an incident.
4. The unexcused failure of a responding student to appear and/or respond to a resolution process does not prevent CU Boulder from proceeding with or completing a resolution process.
5. For jurisdictional information related to sexual misconduct (including sexual assault, sexual harassment, intimate partner violence and gender/sex-based stalking), protected class discrimination, harassment and any related retaliation, see Section M of the Student Code of Conduct.
6. For jurisdictional information pertaining to academic misconduct, see Section M of the Student Code of Conduct.
7. Questions or concerns regarding policy and procedures for students charged or convicted of a crime that occurred prior to being admitted should be directed to SCCR.

## Student Resolution Processes

SCCR resolves alleged prohibited conduct through the informal resolution process, the formal resolution process or the restorative justice process. Resolution specialists have the authority and sole discretion to determine the type of resolution process. This decision is primarily based on, but not limited to, the following factors:

- If the responding student admits or otherwise takes responsibility for the alleged prohibited conduct;
- The responding student's prior conduct record;

- The nature and severity of the alleged prohibited conduct;
- The alleged impact and/or harm caused to another person or community;
- Whether the alleged conduct would violate the Student Code of Conduct; and/or
- Any other factors that the resolution specialist finds relevant to the specific allegations.

The formal resolution process is an adjudication of the alleged prohibited conduct, considered an educational and disciplinary process, and may result in resolution outcomes and a disciplinary conduct record. The informal resolution process and restorative justice process are intended as forms of alternative dispute resolution, are voluntary, primarily educational in nature, not an adjudication of the allegations, not considered a disciplinary process and instead will result in a written agreement with the responding student. Because SCCR does not consider the informal resolution process or restorative justice process to be disciplinary processes, they do not result in a disciplinary conduct record or file. Informal resolutions and restorative justice will never result in resolution outcomes such as suspension or expulsion.

The first step in each resolution process is initiated by the resolution specialist issuing a written Resolution Meeting Notice to the responding student, which prompts the responding student to attend a scheduled meeting with the resolution specialist as outlined in the notice.

### Informal Resolution

This process may generally include, but is not limited to, a meeting with a resolution specialist, completion of the assigned resolution outcomes and/or participation in the restorative justice process.

During the meeting, if the resolution specialist determines that the informal resolution process may be appropriate, the resolution specialist will offer it as an option to the responding student and address any questions the responding student may have about the process. If the responding student accepts responsibility for the alleged prohibited conduct and completes educational resolution outcomes assigned by the resolution specialist, then SCCR will consider the matter to be resolved informally.

### Formal Resolution

This process generally includes:

1. Written notice of the factual allegations and alleged violations of the Student Code of Conduct;
2. The opportunity to meet with the resolution specialist to address the allegations and provide information to the resolution specialist;
3. The resolution specialist reviewing the allegations and making factual and violation determinations based on preponderance of the evidence; and
4. Written notice to the responding student of the resolution specialist's determinations.

The resolution specialist will consider the following in making this determination:

1. The allegations in the Resolution Meeting Notice and the responding student's response to those allegations;
2. Any documents or information that the resolution specialist finds relevant, including without limitation, relevant documents presented by the responding student, complainant or any other interested party; and/or
3. The oral or written statements of any witnesses with relevant information, as presented by the responding student, any alleged victim or other interested party, as appears in a report, or as requested by the resolution specialist.

All students residing in Housing & Dining Services facilities are subject to Residential Handbook policies and any policy properly communicated through Housing & Dining Services staff. For more information, visit the Housing & Dining Policies (https://www.colorado.edu/living/housing/policies-forms-and-accommodations/) webpage.

Cases involving sexual misconduct (including sex assault, sexual harassment, sexual exploitation, intimate partner violence and gender/sex-based stalking), protected class discrimination and harassment, and any related retaliation are subject to the Office of Institutional Equity and Compliance (OIEC) process and procedures (https://www.colorado.edu/oiec/policies/). For more information about these policies and procedures, contact the OIEC at (303) 492- 2127 or visit the OIEC (https://www.colorado.edu/oiec/) website.

Excerpts from the Colorado Revised Statutes regarding hazing, ethnic intimidation and riots are also presented. Colorado law prohibits persons convicted of rioting from enrolling in state-supported universities/colleges for 12 months following the date of a conviction.

For information about student classroom and course-related behavior, visit the policies (https://www.colorado.edu/compliance/policies/student-classroom-course-related-behavior/) webpage.

## Colorado Creed

The Colorado Creed, developed by students in 2003, is a social code of conduct and a lifestyle by which students at CU Boulder live. The text of the creed is:

As a member of the Boulder community and the University of Colorado, I agree to:

- Act with honor, integrity and accountability in my interactions with students, faculty, staff and neighbors.
- Respect the rights of others and accept our differences.
- Contribute to the greater good of this community.

I will strive to uphold these principles in all aspects of my collegiate experience and beyond.

For more information, visit the Colorado Creed (http://www.colorado.edu/creed/) website.

## Student Resources

The Division of Student Affairs (http://www.colorado.edu/studentaffairs/) offers many on-campus resources for our students. Visit our offices to learn more.

## Student Life & Involvement

- Center for Inclusion and Social Change (https://www.colorado.edu/cisc/): Explore identity and inclusivity, participate in educational programs, attend events and build community with others.
- Center for Student Involvement (https://www.colorado.edu/involvement/): Be involved! Find your community by connecting with student organizations, campus-wide events and leadership opportunities.

- CU Student Government (https://www.colorado.edu/cusg/): Make a difference! Get involved with your student government representatives, elected by students, for students. CUSG is your voice on campus.
- Environmental Center (https://www.colorado.edu/ecenter/): Help CU Boulder become a global leader in sustainability through recycling, student bus pass, bicycle and educational programs.
- Fraternity & Sorority Life (https://www.colorado.edu/greeks/): Find opportunities for friendship, leadership and growth in CU's vibrant and diverse Greek community.
- Housing & Dining (https://www.colorado.edu/living/): Explore information about on-campus life including residence halls, meal plans and dining options!
- New Student & Family Programs (https://www.colorado.edu/orientation/): The campus resource for new students and families as they begin their journey at CU Boulder. Ask questions and be sure to join for welcome events throughout the year.
- Off-Campus Housing & Neighborhood Relations (https://www.colorado.edu/offcampus/): Explore off-campus rentals on Ralphie's List, register your party and learn about the legal aspects of off-campus living.
- Recreation Services (https://www.colorado.edu/recreation/): Get moving with all that The Rec has to offer, including intramural sports, fitness classes, nutritional services and Outdoor Pursuits.
- Residence Life (https://www.colorado.edu/living/): Explore the opportunities that residence life provides, from on-campus housing and employment to student resources like free tutoring.
- University Memorial Center (https://www.colorado.edu/umc/): Visit the CU Book Store, student services and student organization offices, as well as plenty of entertainment, dining and hangout options.

## Student Support & Development

- Basic Needs Center (https://www.colorado.edu/support/basicneeds/): Get connected to essential resources when you need them most. Access the Buff Pantry and other assistance with food, housing and other on-campus and community services.
- Career Services (https://www.colorado.edu/career/): Become more employable and find meaningful work through learning how to fine-tune your resume, develop your skills, land an internship and make connections with employers.
- Student Conduct & Conflict Resolution (https://www.colorado.edu/sccr/): Get support for resolving conflicts and learn more about the Student Code of Conduct and the Honor Code.
- Student Legal Services (https://www.colorado.edu/studentlegal/): Access low-cost legal advice and education regarding your rights and responsibilities, and how to navigate the legal system.
- Student Support & Case Management (https://www.colorado.edu/studentaffairs/sscm/): Find individual support for students and advocates for their needs in all aspects of campus life.
- Veteran and Military Affairs (https://www.colorado.edu/veterans/): Prospective and current student veterans and veteran dependents: find program information, policies, pay and support services.
- Volunteer Resource Center (https://www.colorado.edu/volunteer/): Explore volunteer and leadership opportunities on campus and throughout the greater Boulder community.

# Student Data Privacy

## Annual Notice to Students

As a CU Boulder student, it's important to understand your rights regarding access to and disclosure of information in your education record. The Family Educational Rights and Privacy Act (https://www.colorado.edu/registrar/students/records/ferpa/) (FERPA) affords you the right to:

- Inspect and review your education record
- Request amendment of your education record
- Consent to disclosure of personally identifiable information in your education record
- File a complaint with the U.S. Department of Education (Family Policy Compliance Office, U.S. Department of Education, 400 Maryland Avenue, SW, Washington, DC 20202)

To review or request an amendment to your record, contact the Office of the Registrar or the university office that maintains the record. This does not apply to grade changes, which are at faculty discretion.

Under FERPA, the university may release education record information if the disclosure is:

- To CU Boulder officials who have a legitimate educational interest (https://www.colorado.edu/registrar/students/records/ferpa/glossary/)
- To officials of another institution at which you seek or intend to enroll
- To authorized representatives of federal, state or local educational authorities
- To connection with financial aid you've applied for or received
- To an organization conducting studies for or on behalf of the university
- To your parents or guardians (if you are a dependent student for tax purposes)
- To an accrediting organization
- To comply with a judicial order or lawfully issued subpoena
- In connection with a health or safety emergency or other exception under FERPA (https://www.colorado.edu/registrar/students/records/ferpa/exceptions/)
- To fulfill a request for data that CU Boulder defines as directory information (https://www.colorado.edu/registrar/students/records/ferpa/directory-info/)

Student data that is *not* directory information may only be released with your documented consent.

To authorize third-party access to your non-directory information, see CU Guest Access (https://www.colorado.edu/registrar/students/records/privacy/guest-access/) and FERPA Consent to Release (https://www.colorado.edu/registrar/students/records/privacy/consent/). You may restrict the release of directory information by placing full privacy (https://www.colorado.edu/registrar/students/records/privacy/full/) on your record.

Questions may be directed to the Office of the Registrar.

# Directory Information

The following items of student information have been designated by the University of Colorado Boulder as public or "directory" information:

- student name[1]
- hometown (city, state)
- campus email address[2]
- dates of attendance
- previous educational institutions attended
- school/college or division of enrollment
- majors, minors and fields of study
- classification level (e.g., first-year, sophomore, etc.)
- university-recognized honors and awards
- degree status (e.g., expected graduation date and/or conferral dates/terms)
- enrollment status
- employment related to student status (e.g., teaching assistant, resident assistant or work-study) and dates for positions held
- participation in officially recognized activities/sports, including height and weight of athletes.
- photos and videos taken or maintained by the university

Directory information shall not be provided to anyone outside of the CU community (except to vendors/organizations with which the university has contracted in order to provide goods or services to students). The university retains the discretion to refuse disclosure of directory information if it believes such disclosure would be an infringement on student privacy rights. In an effort to protect student privacy, CU directories may only contain a student's name, email address, class and major field of study.

1 If a student provides a preferred name, the university uses it when communicating directly with the student and in campus systems, rosters, etc., unless there is a documented business or legal reason to use a student's primary name. When communicating with outside third parties, including parents, the university generally uses a student's primary (legal) name. Students may also select a diploma name (https://www.colorado.edu/registrar/students/graduation/) for graduation and commencement materials.

2 Campus email addresses may not be used for solicitation.

## Withholding Directory Information (Full Privacy)

Students have the right to request full privacy which withholds directory information from being released to inquirers. To request full privacy and restrict the release of directory information, students must bring a photo ID to the Office of the Registrar during business hours to complete a privacy form.

## Student Consent for Release of Non-directory (Confidential) Information

Students may authorize the university to release educational records to parents, spouses or other third parties by granting consent in their student portal. The Privacy Settings (http://www.colorado.edu/registrar/students/records/privacy/) webpage has more information about various options for granting and restricting access to student records.

## Release of Disciplinary Information

Provisions of the Family Educational Rights and Privacy Act of 1974, as amended by the Higher Education Amendments of 1998, govern access to a student's academic transcript or conduct file. The student and/or those university officials who demonstrate a legitimate educational need for disciplinary information may have access to the student's conduct file.

Parent(s) who provide proof that a student is a dependent as defined in Section 152 of the Internal Revenue Code of 1954 (i.e., a copy of the last federal income tax return listing the student as a dependent) may have access to the student's conduct file without written consent of the student. In this case, parents may have access to a conduct file, even if the student has requested otherwise.

In addition, parent(s) may be notified if a student under 21 is found responsible for a violation involving use or possession of alcohol and controlled substances. All other inquiries, including but not limited to inquiries from employers, government agencies, news media, family, friends or police agencies, require a written release from the student before access to university conduct files is granted. Exception: information may be released pursuant to a lawfully issued subpoena and as provided by the Campus Security Act as amended by the Higher Education Amendments of 1992.

The Campus Security Act permits higher education institutions to disclose to alleged victims of any crime of violence (e.g., murder, robbery, aggravated assault, burglary, motor vehicle theft, arson) the results of the conduct proceedings conducted by the institution against an alleged perpetrator with respect to such crime. The Campus Security Act also requires that both the accused and the accuser be informed of campus conduct proceedings involving a sexual assault.

# Student Finances

## Costs

### Confirmation Deposit

All new students (residents, nonresidents and international) must confirm their intent to enroll and pay the $200 confirmation deposit. The deposit is nontransferable, nonrefundable in most cases and must be paid by all students regardless of financial aid awards. Students who have paid the deposit and who decide not to attend CU Boulder forfeit their deposit.

The confirmation deposit is not applied to the tuition bill. It is refunded after graduation or official withdrawal within established dates and guidelines, and after paying any outstanding university obligations.

### Estimated Costs

Costs for students attending CU Boulder vary depending on college, school or program; residency classification, personal needs and individual interests. Visit the Bursar's Office (https://www.colorado.edu/bursar/) website to view cost information. Tuition and fees are approved annually by the Board of Regents in accordance with the level of cash fund appropriations set for the university by the Colorado General Assembly. Next year's rates are usually published on the Bursar's Office website by June 1. Tuition and fees are just one part of the overall cost to attend CU Boulder. The full cost of attendance for an academic year could also include expenses such as housing and food, transportation, books and supplies, and personal expenses. Please visit Understand Your Cost of Attendance (https://www.colorado.edu/understand-your-cost-attendance/) for a full description of costs.

Notes:

- Residency classification (http://www.colorado.edu/registrar/students/state-residency/) for tuition is determined by Colorado law.
- These estimates do not include a one-time new student fee (https://www.colorado.edu/bursar/costs/other-charges/new-student-fee/) of $62-$145 or the Student Health Insurance Plan ($2,420 per semester based on 2024–25 rates). All students attending CU Boulder must have comprehensive health insurance every semester. Students can choose health insurance coverage through an individual plan *or* the plan of a family member, employer or government sponsor *or* CU's Anthem Gold Student Health Insurance Plan (SHIP) (https://www.colorado.edu/health/cu-gold-ship/). Information about selecting or waiving university health insurance coverage (https://www.colorado.edu/health/insurance/faqs/#how_do_i_submit_a_waiver_application_or_confirm_enrollment_in_ship_-291) is on the Health and Wellness Services (https://www.colorado.edu/health/) website. Requirements for exchange students in J-1 status may be different, see International Student and Scholar Services Health Insurance & Immunizations (https://www.colorado.edu/isss/students/new-students/health-insurance-immunizations/) for more information.
- Students planning to attend summer session can visit the Bursar's Office (https://www.colorado.edu/bursar/) website for summer rates.
- Tuition for no-credit (NC) courses (p. 1111) is the same as for courses taken for credit.
- Students simultaneously enrolled in programs leading to two different degrees or two different majors will be assessed tuition for the area of study with the higher tuition rate.

# Bills & Payments

## Online Bills

The university bill includes tuition, fees, student health insurance (see health insurance requirement (https://www.colorado.edu/health/insurance/)) and other direct costs. Costs are billed one semester at a time. Textbooks, digital course materials and supplies up to $1,500 from the CU Book Store can be charged to the student bill. Adjustments made throughout the semester will appear on the student account (e.g. tuition remission, health insurance waiver, dropping or adding courses, etc.).

Bills for fall are available in mid-August. Spring bills are available in mid-January. Emails are sent to students' colorado.edu addresses and to authorized payers when bills are available online. New and unpaid charges are billed each subsequent month. Failure to check email or receive an email notification of the bill does not relieve any student of responsibility for payment by the published deadline. Students can log in to Buff Portal (https://buffportal.colorado.edu) and authorized payers can log in to CUBill&Pay (https://quikpayasp.com/cu/boulder/tuition/authorized.do) at any time to view the bill.

Any student who completes registration agrees to pay CU Boulder according to the payment terms in the Tuition and Fee Agreement and Disclosure (https://www.colorado.edu/bursar/payments/payment-agreement/).

## Authorized Payers

Family members do not automatically have access to view and pay the tuition bill because of federal privacy laws (http://www.colorado.edu/registrar/students/records/ferpa/). If they are helping pay the bill on the student's behalf, students must give them access to CUBill&Pay by authorizing them as payers (https://www.colorado.edu/bursar/billing/#accessbill). Students can authorize payers in Buff Portal (https://buffportal.colorado.edu). Students are ultimately responsible for payment of the bill.

Authorized Payer access is separate and distinct from CU Guest Access (https://www.colorado.edu/registrar/students/records/privacy/guest-access/) and FERPA Consent to Release (https://www.colorado.edu/registrar/students/records/privacy/consent/). If a family member is helping pay tuition and fees on a student's behalf, we recommend giving them authorized payer access and CU Guest Access.

If a third, non-related party is helping pay the bill (e.g., military, countries sponsoring international students), please see 3rd Party Sponsorships (https://www.colorado.edu/bursar/payments/payment-options/3rd-party-sponsorships/).

## Payments

Payment due dates are the 5th of the month. Primary payment deadlines are Sept. 5 for fall semester and Feb. 5 for spring semester. Dates may be subject to change.

### Payment Methods

Payments can be made online from a traditional U.S. checking or savings account via electronic check (eCheck). No fees are associated with this payment method making it the most cost-effective option.

We also accept American Express, Mastercard, Visa and Discover. A nonrefundable 2.85% fee (charged by NelNet Campus Commerce) applies to all credit and debit card transactions. We encourage payment from a checking or savings account to save money and avoid paying the service fee.

We have partnered with Flywire to accept payments from international students worldwide. Students and families can easily and securely make education payments in their own currency, using local payment methods from their home. Flywire offers real-time tracking, 24x7 multilingual support and a best price guarantee on exchange rates.

Learn about other Payment Options (https://www.colorado.edu/bursar/payments/payment-options/) on the Bursar's Office website.

### Payment Plans

Payment plans are available for students and authorized payers to pay tuition and fees in monthly installments over the course of the semester. For more information, visit the Payment Plans (https://www.colorado.edu/bursar/payments/payment-plans/) webpage.

Also see the Policies (p. 1126) section.

# Tuition and Fee Policies

## Add/Drop Tuition Adjustment

Adjustment of tuition and fees is made accordingly based on dates in the Add/Drop Calendar (https://www.colorado.edu/registrar/students/calendar/).

## Bachelor's-Accelerated Master's Degree Programs

Bachelor's–accelerated master's (BAM) degree programs are offered in several departments. The BAM program structure applies to students admitted on July 1, 2019 *or later*. Students admitted to programs before July 1 fall under the concurrent bachelor's/master's degree program structure, and should review the information in the 2018-19 University Catalog's Student Finances section (https://catalog.colorado.edu/archive/2018-19/graduate/student-finances/#policiestext). Students

should work with their program to review the full academic guidelines which apply to their situation.

1. Students are admitted to the BAM program around the junior year with an intent application, and will complete their undergraduate work at undergraduate status. A program-specific number of credits to be used toward the graduate degree can be taken while at undergraduate status.
2. Students must apply to graduate when undergraduate requirements are complete, will receive the bachelor's degree along the way. They must also apply to continue with the accelerated master's program. They will complete the remainder of the master's degree requirements at graduate status.
3. Prior to completing the baccalaureate degree, students are assessed undergraduate tuition rates. Once admitted to the master's program and at graduate status, students are assessed graduate tuition rates. (In-state graduate students are assessed resident graduate tuition, but do not receive COF.)
4. Undergraduate and graduate students are considered for different types and amounts of financial aid, with graduate students primarily being offered student loans (https://www.colorado.edu/financialaid/aid-graduate-professional-students/). Financial aid will automatically adjust when students change to graduate status.

## Credit and Debit Card Service Fee

A nonrefundable 2.85% service fee charged by NelNet Campus Commerce applies to all credit and debit card transactions. To avoid paying this fee, we encourage payment from a U.S. checking or savings account via electronic check (eCheck).

## Appeal Rights

To appeal tuition and mandatory fee charges, students must make a formal request to the Bursar's Office by the last day of finals of the semester immediately following the one being appealed. Appeals will only be considered under extenuating circumstances, such as university error, recent medical condition, immediate family emergency, recent unanticipated financial problems and verified nonattendance. Official documentation must be provided to substantiate the circumstances. Learn more about the process, complete the tuition appeal form and submit the documentation online on the Tuition Appeals webpage (https://www.colorado.edu/bursar/billing/tuition-appeals/). If you disagree with the charges and fail to avail yourself of the appeal process by the deadline, you will have waived your right to appeal the charges.

## Failure to Make Payment

Failure to make the required payment in accordance with the scheduled payment deadline may result in any or all of the actions described below.

A financial hold may be placed on the student record and remain until the balance is paid in full. The hold may prevent students from being able to:

- Adjust their current schedule (drop or add classes).
- Register for future classes.
- Receive a diploma or certification materials.
- Be re-admitted.

A late payment charge is assessed once per semester based on the amount due.

## Balance Due and Late Charges

| Balance Due | Late Charge |
|---|---|
| $10–99.99 | $5 |
| $100–299.99 | $10 |
| $300–499.99 | $20 |
| $500–699.99 | $30 |
| $700–899.99 | $40 |
| $900 and over | $50 |

In addition, finance charges of one percent (1%) per month are assessed on the unpaid principal balance. Finance charges are calculated by applying the periodic rate of one percent (1%) per month (annual percentage rate of twelve percent) to the unpaid principal balance less any payments or credits made.

Past due accounts are referred to the university's Student Debt Management department for collection. Students will have an opportunity to establish a university-approved repayment arrangement. Establishing a repayment arrangement does not result in release of financial holds.

If the balance is not paid or a university-approved repayment agreement does not exist after six months, Colorado law requires the university to place all delinquent accounts with a private collection agency at which time the delinquency is reported to national credit bureaus.

Student accounts referred to an outside collection agency may incur collection agency costs, expenses and fees. Such collection costs, expenses and fees may include percentage-based fees charged to the university by the collection agency, including percentage-based fees of up to 30% of the debt collected. Any collection costs stated above are charged in addition to the principal, fees and interest due on the student's account. Students may be responsible for reasonable attorneys' fees and court costs associated with collecting or enforcing payment on the past due account as allowed under Colorado law. Pursuant to Colorado Revised Statutes § 23-5-115, in the event the student defaults on the amount owed to the university, the university may certify information to the Colorado Department of Revenue as required for the recovery of past due debt.

## Nondegree Students

Nondegree students enrolled in undergraduate courses are assessed tuition at the Arts & Sciences rate or undergraduate Base Rate (effective Fall 2022 and later). Nondegree students enrolled in graduate courses are assessed tuition at the Arts & Sciences graduate rate. Nondegree students in both graduate and undergraduate courses are assessed tuition at the undergraduate rate. See the Continuing Education (https://ce.colorado.edu/resources/topics/tuition-access/) site for further information.

## Returned Payments

A $20 fee is charged for all payments (regardless of the amount) returned due to insufficient funds, closed account, payment stopped, or for other reasons. A $35 fee is charged by NelNet Campus Commerce for returned payment plan payments. In addition, late and finance charges may be assessed and certified funds may be required when payment is made. An additional financial hold may be placed on the student's account and students may be liable for collection costs and attorneys' fees as allowed by Colorado laws.

## Students Registered on More than One Campus

Students registering for courses on more than one campus during a single semester pay tuition and fees to each campus at the rate appropriate to the number of credit hours for which they are registered on that campus. Students may be eligible to use the intercampus enrollment program (https://www.colorado.edu/registrar/students/registration/registration-programs/), in which case they pay the tuition rate of their home campus for the total hours enrolled at all campuses.

## Tuition and Fee Agreement and Disclosure

Any student who completes registration agrees to pay CU Boulder according to the payment terms in the Tuition and Fee Agreement and Disclosure (https://www.colorado.edu/bursar/payments/payment-agreement/).

## Tuition Classification

Students are classified as residents, nonresidents or international nonresidents for tuition purposes on the basis of answers provided on their application for admission and other relevant information. For more information, go to Tuition Classification (http://www.colorado.edu/registrar/students/state-residency/).

## Withdrawal Policy Regarding Tuition and Fees

Students who pay the $200 confirmation deposit and register for classes for any given semester are obligated to pay full tuition and fees for that semester, unless they officially withdraw from the university by published deadlines.

Tuition and fee obligations for students withdrawing from fall or spring semesters:

- Continuing students: Students who withdraw during the full-refund periods will have their confirmation deposit refunded unless there are any outstanding charges.
- New and readmitted students: New, readmitted and new transfer students are not eligible for a refund of the confirmation deposit.

Deadlines to withdraw with no financial penalty vary by session and semester. For the current refund and assessment schedule, visit the Withdraw from the Semester (https://www.colorado.edu/registrar/students/withdraw/) webpage.

For students withdrawing from all full-semester classes after the deadline to drop without a W grade, (the first drop deadline), there are three additional assessment periods:

- For two weeks after the last day to drop without a W grade, students will be charged 40 percent of total tuition (not including the portion of tuition paid by College Opportunity Fund (COF) for in-state undergraduate students) and mandatory fees (CUSG student fees and the athletic fee). COF credit hours are expended and not refunded for withdrawals after the published deadline.
- For two weeks after the 40 percent assessment deadline, students will be charged 60 percent of total tuition (not including the portion of tuition paid by COF for in-state undergraduate students) and mandatory fees (CUSG student fees and the athletic fee).
- After the 60 percent assessment deadline, tuition will not be adjusted. In the case of extenuating circumstances (university error, recent medical condition, immediate family emergency, recent unanticipated financial problems or verification of non-attendance), students may appeal tuition and mandatory fee charges through the Bursar's Office through the last day of finals.

Special session withdrawals only have the 100 percent and 0 percent adjustment periods. See Session Withdrawals (https://www.colorado.edu/registrar/students/withdraw/#ucb-accordion-id--7-content7).

To comply with federal financial aid regulations, financial aid recipients' loan and scholarship awards may be adjusted.

Visit the Withdraw from the Semester (https://www.colorado.edu/registrar/students/withdraw/) webpage for current information. The Board of Regents reserves the right to revise this schedule at any time. Refer to the Summer Session (http://www.colorado.edu/summer/) website for information on the withdrawal policy and refund schedule for summer terms.

Students who do not pay the full amount due to the university at the time of withdrawal must make arrangements for payment with the Bursar's Office. Withdrawals are handled through the Office of the Registrar.

# Funding for Graduate School

### Financial Aid

The first step in applying for financial aid is to submit the Free Application for Federal Student Aid (FAFSA) (https://studentaid.gov/h/apply-for-aid/fafsa/) each academic year. The FAFSA determines your eligibility for grants, loans, work-study and need-based scholarships. For full financial aid consideration your FAFSA must be on file with the financial aid office by March 1. Get details about the financial aid process (https://www.colorado.edu/financialaid/apply-aid/fafsa/). Graduate students are primarily offered student loans, but there may be additional funding available through specific graduate departments.

Colorado residents may be eligible for the Colorado Graduate Grant (https://www.colorado.edu/financialaid/types-aid/grantsassistantships-graduate-students/) program through the Office of Financial Aid.

### Loans

Graduate students may also be eligible for two federal loan programs: Federal Direct Unsubsidized Loans (https://www.colorado.edu/financialaid/types-aid/graduate-loans/direct-loans-graduate-students/) The University of Colorado Boulder participates in the Federal Direct Loan program. The lender is the U.S. Department of Education rather than a bank or other financial institution. Students are automatically considered for a Direct Loan after submitting their FAFSA. Students must enroll at least half-time (3 credit hours).

Federal Graduate PLUS Loans (https://www.colorado.edu/financialaid/types-aid/graduate-loans/federal-graduate-plus-loans/)
The Federal Graduate PLUS Loan is available to students enrolled at least half-time (3 credit hours) in a graduate or professional program and who meet all of the other general eligibility requirements for the federal student aid programs. This loan requires a credit check.

Students can also choose to use private loans (https://www.colorado.edu/financialaid/private-loans/) from banks and other financial institutions.

### Departmental Funding

The majority of graduate student funding is awarded through the departments. The main sources of student support are often in the form of either graduate assistantships or training grants.

### Graduate Assistantships

Departments may fund students with a graduate assistant appointment (e.g. Research Assistants, Teaching Assistants, Graduate Assistants, and Graduate Part-Time Instructors). These appointments provide a monthly salary, tuition coverage, fee remission, dental insurance and partial coverage of the Student Gold Health Insurance. Students should contact their department (https://www.colorado.edu/graduateschool/admissions/prepare-apply/program-information-deadlines/) with any questions regarding the availability of these types of funding.

Students may review the Graduate Student Appointment Information (https://www.colorado.edu/graduateschool/funding/departmental-funding/graduate-student-appointment-information/) available on the Graduate School site for further details on these types of appointments.

### Training Grants

Departments may provide students with funding through training grants, providing graduate students the opportunity to work closely and collaboratively with mentors and other graduate students on specific long-term projects. Primarily science, engineering and social science departments offer this type of grant. The primary focus is on completion of the PhD. Students should consult directly with their home department to find out what opportunities are available in this area.

### Program-Specific Grants

Graduate students may also apply directly for CU Boulder and regional grants. For more information, visit the Graduate Student Awards and Grants (https://www.colorado.edu/graduateschool/funding/awards-grants/) webpage.

### Other Funding Opportunities

Graduate Students are encouraged to seek funding by applying for fellowships. While there are a number of fellowships and grants that are funded through the university, the majority are provided by government agencies, private foundations and corporations. The Graduate School has compiled a partial list of private and national fellowships opportunities (https://www.colorado.edu/graduateschool/funding/national-fellowship-opportunities/) to explore.

# Tuition Classification

## In-State and Out-of-State Tuition Classification

Tuition classification is governed by state law and by judicial decisions that apply to all public institutions of higher education in Colorado. Since tuition classification is governed by state law (https://www.colorado.edu/registrar/students/state-residency/guidelines/), the University of Colorado cannot alter or waive the eligibility criteria for any reason, including financial hardship or academic excellence.

New students are classified as Colorado residents (in-state) or nonresidents (out-of-state) for tuition purposes based on information provided on their admission application and other relevant information. Applicants may be required to submit evidence substantiating their claim of in-state eligibility.

Current nonresident students who believe they have become eligible for a change to resident classification must submit a petition with documentation to have their eligibility reviewed. The petition requirements, deadlines for submission, explanation of Colorado tuition classification statutes, specific legal residency exceptions and Office of the Registrar contact information are available on the Tuition Classification (http://www.colorado.edu/registrar/students/state-residency/) webpage.

- For undergraduate students who are not yet 23 years old when a term begins, classification is based upon the domicile of a biological parent or court-appointed legal guardian.
- In order for a student to qualify for resident classification through their own domicile information, they must be one of the following: at least 23 years old on the first day of the term, or married for at least one year before the first day of the term, or entering the second year of a graduate program.
- There are rare individuals who may qualify for resident classification as an emancipated minor (under the age of 23) if they are able to prove that they are totally financially and residentially independent.

## Basic Requirements for Establishing Colorado Residency

To become eligible for resident classification, a person must establish legal residence in Colorado. Legal residence, or "domicile," is defined as a person's true, fixed, and permanent home and place of habitation. No person may establish domicile in Colorado solely for the purpose of obtaining in-state tuition benefits.

The qualifying person must demonstrate at least 12 consecutive months of Colorado domicile immediately preceding the beginning of the term for which the student is seeking resident classification. Domicile includes both physical presence and evidence of intent to stay, which is demonstrated by establishing legal ties to Colorado.

To be eligible to *begin* the 12-month period to establish Colorado domicile, an individual must be at least one of the following:

- 22 years of age or older
- Married
- A graduate student
- An emancipated student
- The parent of a student under the age of 23

## Unemancipated Minors

Students under age 23 who depend on their parents for support may qualify for in-state tuition if either of their parents, regardless of custody, has been domiciled in Colorado for 12 consecutive months preceding the first day of class in a given semester, even if the student resides elsewhere. In certain circumstances, students may qualify through their parents up to age 23.

## Emancipation

An emancipated minor is an individual under age 23 who demonstrates total financial and residential independence. This means the student's parents and all others have entirely surrendered the right to the student's care, custody and earnings, and make no provision for support of any kind. Emancipation is very rare; undergraduates under age 23 who do not have a parent domiciled in Colorado are highly unlikely to be classified as a Colorado resident student.

Students who provide false information to evade payment of out-of-state tuition or who fail to provide timely notice of their loss of in-state eligibility as an emancipated minor are subject to retroactive assessment of out-of-state tuition, as well as disciplinary and legal actions.

## Evidence of Domicile

Establishing Colorado domicile includes actions that would be expected of any permanent resident. Pursuant to Colorado law, the following are actions that may be considered evidence of domicile:

- Filing a tax return in Colorado and, if applicable, payment of Colorado state income tax.
- Colorado driver's license or Colorado ID card within 120 days of move to Colorado.
- Colorado vehicle registration within 180 days of move to Colorado.
- Voter registration in Colorado.
- Graduation from a Colorado high school.
- Lease or deed showing permanent occupancy of residential real property in Colorado.
- Continued residence in Colorado while not enrolled as a student and during semester breaks.
- Permanent employment or acceptance of future employment in Colorado
- Any other factor particular to the individual that tends to establish the necessary intent to make Colorado a permanent home.

No single factor constitutes proof of domicile. All evidence, both positive and negative, is considered. Not all of the listed items are necessary, however individuals should take action on all factors that are applicable to their circumstances. For more information on all requirements, see the Tuition Classification (http://www.colorado.edu/registrar/students/state-residency/) webpage.

## Domicile Exceptions

Colorado tuition law provides the following rare exceptions to the one-year domicile requirement in certain circumstances:

- Colorado National Guard members
- Members of American Indian Tribes with Historical Ties to Colorado
- Active duty military stationed in Colorado and their dependents
- Honorably discharged members of the U.S. Armed Forces and their dependents
- Returning active-duty military members
- Canadian military stationed in Colorado
- ASSET law qualified students with one year Colorado High School attendance (must have attended a Colorado high school for at least one year preceding the date of graduation; also requires Colorado high school graduation/Colorado GED ***and*** 12 consecutive months of physical presence in Colorado prior to enrolling at the institution)
- Children of new faculty members at Colorado state colleges and universities
- Employees of companies moving to Colorado receiving government economic incentives
- Western Regional Graduate Program enrollees in specific major fields of study
- Olympic athletes training in Colorado
- Others (see Residency Exceptions for Domicile (http://www.colorado.edu/registrar/students/state-residency/domicile-exceptions/) webpage)

Requirements, including spouse and child eligibility, and a list of qualifying tribes are detailed on the Residency Exceptions for Domicile (http://www.colorado.edu/registrar/students/state-residency/domicile-exceptions/) webpage.

# University Policies

## Alcohol and Other Drugs

In order to create the best possible environment for teaching and learning, the University of Colorado Boulder affirms its support for a responsible campus policy that addresses the inappropriate use of alcohol and other drugs.

In compliance with the federal Drug Free Schools and Communities Act, the University of Colorado Boulder prohibits the unlawful manufacture, possession, use or distribution of a controlled substance (illicit drugs and alcohol) of any kind and in any amount. These prohibitions cover any individual's actions that are part of any university activities, including those occurring while on university property or in the conduct of university business away from the campus.

Information on policies, penalties, health effects and resources available to students and staff regarding alcohol and other drugs can be found on the Alcohol & Other Drugs Information (http://www.colorado.edu/aod/) website.

These policies are also described by various university offices in several publications:

- **Campus housing:** See the Residential Handbook (https://www.colorado.edu/living/housing/policies-forms-and-accommodations/#residential_handbook-1317) webpage.
- **Student Code of Conduct:** See the Student Code of Conduct (https://www.colorado.edu/sccr/).
- **Safety:** Annual Security and Fire Safety Report (https://www.colorado.edu/clery/annual-security-fire-safety-report-asfsr/).

Individual and group counseling for students with substance abuse concerns is available through Counseling and Psychiatric Services. For more information, visit the Counseling and Psychiatric Services (https://www.colorado.edu/counseling/services/substance-use-services/) webpage or call 303-492-2277.

### Smoking

For student health and the health of our community, smoking is prohibited in all campus buildings and on all campus grounds.

At this time, the use of smoking products of any sort shall be prohibited on all university-owned and operated campus grounds both indoors and outdoors. This smoking ban does not apply to public rights-of-way (sidewalks, streets) on the perimeter of the campus.

"Smoking," as used in this policy, means smoking any substance, including but not limited to, tobacco, cloves or marijuana. "Smoking products" include, but are not limited to, all cigarette products (cigarettes, bidis, kreteks, e-cigarettes, etc.) and all smoke-producing products (cigars, pipes, hookahs, etc.). University-owned and operated campus grounds include, but are not limited to: all outdoor common and educational areas; all university buildings; university-owned on-campus housing; campus sidewalks; campus parking lots; recreational areas; outdoor stadiums; and university-owned and leased vehicles (regardless of location). In keeping with university policy, the sale, distribution and sampling of all tobacco products and tobacco-related merchandise is prohibited on all university-owned and operated property and at

university-sponsored events. Littering campus with remains of smoking products is prohibited.

This policy applies to all employees, students, visitors, contractors and externally affiliated individuals or companies renting university-owned space on university-owned and operated property campus grounds.

# Campus Safety

## Personal Safety on Campus

While the University of Colorado Boulder is a relatively safe place to be, the campus is not a haven from community problems. Through the joint effort of various organizations on campus, CU is committed to providing ample safety resources for faculty, staff and students.

Specific efforts to promote safety on campus include the provision of adequate lighting, police protection, educational programs and special prevention programs, such as the CU NightRide escort services and laptop and bicycle registration programs.

In compliance with the federal Clery Act, students and employees receive information on campus security policies and programs, including crime statistics, in an Annual Security and Fire Safety Report (https://www.colorado.edu/clery/annual-security-fire-safety-report-asfsr/). This report will be sent to CU Boulder affiliates by Oct. 1 of each year. In any emergency or life-threatening situation, always call 9-1-1.

Members of the university community are encouraged to report any incident of threatening or harmful behavior to the CU Boulder Police by calling 9-1-1 in an emergency or the non-emergency line, 303-492-6666. Visit Don't Ignore It (http://www.colorado.edu/dontignoreit/) for more information about the wide range of campus and community resources and reporting options available.

Additional safety information can be found on the CU Police Department (http://www.colorado.edu/police/) website. For information on crime alerts, trends and safety tips, follow the CU Police Department on Twitter (@ (https://twitter.com/cuboulderpolice/)CUBoulderPolice) and Facebook (CUBoulderPolice (https://www.facebook.com/CUBoulderPolice/)).

# Communication

## Student Email

All CU students receive an email account from the university, which is an official means of sending information to students. Students are responsible for maintaining this CU email address. The official email address can be used by professors to contact students and provide course-related information. Administrative offices, such as the Office of the Registrar, use official email addresses to contact students and provide important information. Students are responsible for frequently checking their official CU email address. For more information on the student email policy, visit the Student E-mail Policy (http://www.colorado.edu/policies/student-e-mail-policy/) webpage, call the IT Service Center at 303-735-HELP or email HELP@colorado.edu. To learn more about student email accounts, visit the Office of Information Technology's Messaging and Collaboration webpage (https://oit.colorado.edu/node/237/).

# Copyright & Fair Use

The University of Colorado Boulder community respects the intellectual property of others, regardless of the medium by which it is transmitted. This is a cornerstone of academic integrity. We prohibit the use of unauthorized distribution of copyrighted material, which is subject to both civil and criminal penalties as well as university procedures.

Distributing copyrighted materials using peer-to-peer or file-sharing programs is illegal and the university uses technological solutions to deter this activity. Still, the university regularly receives notices of copyright violations and is required by law to take action. Common consequences include loss of network access and referral to the Office of Judicial Affairs. Guidance on campus fair use and copyright issues is provided on the University Libraries (http://www.colorado.edu/libraries/copyright-information/) website.

# Diversity & Nondiscrimination

## Commitment to Diversity

The Division of Student Affairs supports and contributes to creating and sustaining a diverse, multicultural, socially just and inclusive campus climate by learning about, recognizing and honoring the diverse backgrounds, histories, identities and life experiences of all our students, faculty and staff. Our goal is to create an environment in which all campus community members can thrive while feeling welcomed, safe and at home.

At the University of Colorado Boulder, we are committed to building a campus community in which diversity is a fundamental value. People are different and the differences among us are what we call diversity—a natural and enriching hallmark of life. Diversity includes, but is not limited to, ethnicity, race, gender, age, class, sexual orientation, religion, disability, veteran status, gender identity/expression, veteran status, political affiliation or political philosophy, and health status. A climate of healthy diversity is one in which people value individual and group differences, respect the perspectives of others and communicate openly.

"Diversity is a key to inclusive excellence in education. A diverse learning environment better prepares all students for the world that awaits them. CU Boulder is committed to enriching the lives of our students, faculty and staff by providing a diverse campus where the exchange of ideas, knowledge and perspectives is an active part of learning."—from the Guidelines for Diversity Planning (https://www.colorado.edu/odece/diversity-plan/).

## Nondiscrimination Statement

The University of Colorado Boulder does not discriminate on the basis of race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy in admission and access to, and treatment and employment in, its educational programs and activities. The university takes affirmative action to increase ethnic, cultural, and gender diversity; to employ qualified disabled individuals; and to provide equal access and opportunity to all students and employees.

# Equity & Compliance

The University of Colorado Boulder is committed to maintaining a positive learning, working, and living environment free from discrimination and harassment. The Office of Institutional Equity and Compliance (OIEC) (http://www.colorado.edu/oiec/) addresses all claims of sexual misconduct, harassment and/or discrimination, or related retaliation by students, staff and faculty under the University of Colorado Sexual Misconduct, Intimate Partner Violence and Stalking Policy, the University of Colorado Boulder Policy on Protected-Class Discrimination and Harassment, and the University of Colorado Policy on Conflict of Interest

in Cases of Amorous Relationships. The university is committed to addressing concerns and taking appropriate action against those found in violation of these policies.

In response to a report, OIEC determines what immediate and long-term support and safety measures are needed to minimize disruptions to education or employment and to help keep the involved parties and the campus safe. OIEC also provides education and assessment to identify areas in need of improvement to foster a more welcoming and inclusive culture.

To learn more about university policy or the role and programs offered by OIEC, please visit the Office of Institutional Equity and Compliance (https://www.colorado.edu/oiec/) website or call 303-492-2127.

# Colleges & Schools

## Arts & Sciences

The College of Arts & Sciences is the liberal arts college at CU Boulder. Its mission is to provide an outstanding liberal arts education for its undergraduates, cutting-edge graduate education and world-class research, scholarship and creative work. In addition to gaining the knowledge and skills of their areas of study, students learn how new information is acquired and can participate in original research and creative work with individual faculty members.

Advanced degrees are offered by nearly every academic department in the college, and the PhD is offered in approximately 30 different disciplines. In addition, an increasing number of departments offer combined bachelor's/master's degrees that can be earned in five years. Graduate training focuses on teaching and research careers as well as on professional careers in the public and private sector.

As the liberal arts college of CU Boulder, the College of Arts and Sciences has several goals in the education of its students:

- Educate students for careers and a productive life. Arts and sciences students gain the most current knowledge and skills in their major fields of study. In addition, they learn how to acquire new skills to contend with—and lead—the changes that will occur in the decades to come. Education for a productive life also requires that students learn how to analyze situations, solve problems and speak and write effectively.
- Provide students with a well-rounded education. Arts and sciences students acquire a broad knowledge and an integrated understanding of art and music, great literary works, philosophy, history and politics, the social world, science and technology. They learn how to critically evaluate and think about morals, ethics and values. The core curriculum and breadth requirements give students a broad, liberal-arts education that develops the whole person, not just the specialist.
- Educate citizens who can think for themselves, understand the rapidly changing world and make wise choices within a democratic system.
- Impart a love of learning so that students can continue to grow throughout life.
- Teach ways of thinking about and approaching new problems. For some students, this will enable them to further advance knowledge and scholarship in the academy. For all students, this is important for enriching their lives.
- Prepare students to help enrich the lives of others. Arts and sciences graduates become lifelong resources for their families, neighbors, friends and coworkers.

The college is also dedicated to outstanding undergraduate education, with nearly 50 undergraduate majors. The environment and advantages of a small liberal arts college are created through "academic neighborhoods" in which students can meet and interact with other students and faculty in small group settings. In addition, more than 60 percent of undergraduate classes are small, with 25 or fewer students.

The strength of the College of Arts and Sciences comes from its outstanding faculty. In addition to being dedicated teachers, they are active scholars in disciplines throughout the arts and humanities, social and behavioral sciences, biological sciences and physical and mathematical sciences. They are the recipients of numerous national awards and honors for their research, scholarship and creative work. Faculty and staff of the College of Arts and Sciences join together to create an intellectual community of students and scholars to discover, critically examine, integrate, preserve and transmit knowledge, wisdom and values.

# Programs of Study

## Anthropology

The Department of Anthropology offers graduate programs leading to the Master of Arts and Doctor of Philosophy degrees with specializations in the subdisciplines of archaeology, biological anthropology and cultural anthropology. Students who acquire an advanced degree are equipped to transmit to others the knowledge, central principles, theories and research methods that have been developed in the discipline of anthropology.

Successful candidates will have a reasonable knowledge of the historical development of general anthropological concepts and theory and of directly relevant concepts and knowledge from related disciplines. In addition, successful candidates for the doctoral degree are expected to carry out and report original anthropological research within a circumscribed area of specialization. They are also expected to be capable of teaching the precepts of their specialty and of guiding future candidates for the doctoral degree through a program of research training.

**Course code for this program is ANTH.**

### Master's Degree

- Anthropology - Master of Arts (MA) (p. 1138)

### Doctoral Degree

- Anthropology - Doctor of Philosophy (PhD) (p. 1140)

### Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Bamforth, Douglas (https://experts.colorado.edu/display/fisid_101027/) Professor; PhD, University of California, Santa Barbara

Bernstein, Robin Miriam (https://experts.colorado.edu/display/fisid_152968/)
Associate Professor; PhD, University of Illinois at Urbana–Champaign

Cameron, Catherine M.
Professor Emerita

Cool, Alison Collier (https://experts.colorado.edu/display/fisid_154599/)
Assistant Professor; PhD, New York University

Covert, Herbert
Professor Emeritus; PhD, Duke University

DeWitte, Sharon
Professor; PhD, Pennsylvania State University

Drybread, Kristen (https://experts.colorado.edu/display/fisid_156523/)
Lecturer

Dufour, Darna L. (https://experts.colorado.edu/display/fisid_100213/)
Professor Emerita; PhD, SUNY at Binghamton

Fischer, Kate (https://experts.colorado.edu/display/fisid_155474/)
Lecturer; PhD, University of Colorado Boulder

Goldfarb, Kathryn Elissa (https://experts.colorado.edu/display/fisid_156471/)
Associate Professor; PhD, University of Chicago

Goldstein, Donna M. (https://experts.colorado.edu/display/fisid_100448/)
Professor; PhD, University of California, Berkeley

Greene, David Lee
Professor Emeritus

Gutierrez, Gerardo (https://experts.colorado.edu/display/fisid_146867/)
Professor; PhD, Pennsylvania State University

Hammons, Christian Stanford (https://experts.colorado.edu/display/fisid_152915/)
Teaching Professor; PhD, University of Southern California

Hosek, Lauren (https://experts.colorado.edu/display/fisid_167102/)
Assistant Professor; PhD, Syracuse University

Jacka, Jerry Keith (https://experts.colorado.edu/display/fisid_156067/)
Associate Professor; PhD, University of Oregon

Jones, Carla Mae (https://experts.colorado.edu/display/fisid_134172/)
Professor; PhD, University of North Carolina, Chapel Hill

Jones, Eric
Associate Professor; PhD, Pennsylvnia State University

Joyce, Arthur A. (https://experts.colorado.edu/display/fisid_115421/)
Professor; PhD, Rutgers University–New Brunswick

Kaschube, Dorothea V.
Professor Emerita

Kurnick, Sarah (https://experts.colorado.edu/display/fisid_155915/)
Associate Professor; PhD, University of Pennsylvania

Leigh, Steven Robert (https://experts.colorado.edu/display/fisid_151706/)
Professor; PhD, Northwestern University

Lekson, Steve
Professor Emeritus

Lyons, Colleen Scanlan (https://experts.colorado.edu/display/fisid_148419/)
Assistant Professor Adjunct; PhD, University of Colorado Boulder

McCabe, J Terrence
Professor; PhD, SUNY at Binghamton

McGilvray, Dennis B.
Professor Emeritus

McGoodwin, James Russell
Professor Emeritus

McGranahan, Carole Ann (https://experts.colorado.edu/display/fisid_122673/)
Professor, Chair; PhD, University of Michigan Ann Arbor

O'Brien, Jonathan (https://experts.colorado.edu/display/fisid_152072/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Ortman, Scott Graham (https://experts.colorado.edu/display/fisid_152978/)
Associate Professor; PhD, Arizona State University

Sauther, Michelle Linda (https://experts.colorado.edu/display/fisid_107236/)
Professor; PhD, Washington University

Shankman, Paul
Professor Emeritus

Shannon, Jennifer A. (https://experts.colorado.edu/display/fisid_147612/)
Associate Professor; PhD, Cornell University

Sponheimer, Matthew James (https://experts.colorado.edu/display/fisid_129957/)
Professor; PhD, Rutgers University New Brunswick

Stevens, Nancy
Professor; PhD, Stonybrook University

Taylor, William T. (https://experts.colorado.edu/display/fisid_165652/)
Assistant Professor, Museum Associate Curator; PhD, University of New Mexico

Van Gerven, Dennis P.
Professor Emeritus

Villanea, Fernando (https://experts.colorado.edu/individual/fisid_168227/)
Assistant Professor; PhD, Washington State University

Walker, Deward E. Jr
Professor Emeritus

# Courses

**ANTH 5000 (3) Quantitative Methods in Anthropology**
Surveys ways of deriving meaning from anthropological data by numerical means, including but not confined to basic statistical procedures.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4000
**Requisites:** Restricted to graduate students only.

**ANTH 5020 (3) Explorations in Anthropology**
Special topics in cultural and physical anthropology, as well as archaeology. Check with the department for semester offerings.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4020
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ANTH 5045 (3) Introduction to Museum Anthropology**
Traces the development of Anthropology and museums in America from late 19th century to present day. Students are encouraged to: explore museum theory and practice; think critically about the history of relations among Native Americans, Anthropology, and museums; consider the legacy of collecting and challenges of representing others; and, examine the interplay of Anthropology, material culture, and colonialism.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4045 and MUSM 5045
**Requisites:** Restricted to graduate students only.

**ANTH 5060 (3) Nutrition and Anthropology**
Overview of the evolution of human diet and ecological and cultural factors shaping modern diets. Introduces fundamentals of nutrition and analysis of nutritional status. Analyzes ecological, social, and cultural factors leading to hunger and undernutrition, as well as biological and behavioral consequences of undernutrition.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4060
**Requisites:** Restricted to graduate students only.

**ANTH 5070 (3) Methods in Biological Anthropology**
Provides laboratory-based research experience in selected areas of biological anthropology. Research designs, methods and applications will be used to develop research skills. Students will read original research papers and carry out a research project of their own design. Area of emphasis within biological anthropology will depend on instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4070
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ANTH 5080 (3) Anthropological Genetics**
Considers data and theory of human genetics. Emphasizes analytical techniques relating to a genetic analysis of individual, family, and populations.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4080
**Requisites:** Restricted to graduate students only.

**ANTH 5110 (3) Human Evolutionary Biology**
Detailed consideration of the fossil evidence for human evolution. Covers the discovery of important fossils and interpretations; descriptive information about the fossils; and data and theory from Pleistocene studies relating to ecology, ecological and behavioral data on modern apes and molecular studies that have bearing on the study of human evolution.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4110

**ANTH 5120 (3) Advanced Biological Anthropology**
Selected topics in physical anthropology emphasizing faculty specialties. Topics may include population genetics and its application to understanding modern human diversity, human population biology, and primate ecology and evolution. Check with department for semester offerings.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4120
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ANTH 5125 (3) Evolution and the Human Life Cycle: A Primate Life History Perspective**
Surveys primate biology, behavior and ecology using a life history approach. Using a comparative approach, explores life history as mammals, as primates and as humans by focusing on evolutionary decisions that occur during different life stages.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4125
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ANTH 5129 (3) Aegean Art and Archaeology**
Detailed study of the cultures of prehistoric Greece, the Cycladic Islands and Crete, their art and archaeology and their history within the broader context of the eastern Mediterranean, from earliest human settlement to the collapse of the Bronze Age at about 1100 B.C.E. Emphasis is on palace states.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4129 and ARTH 4129 and CLAS 4129 and CLAS 5129

**ANTH 5130 (3) Advanced Osteology**
Detailed study of the human skeleton with special attention to health and demographic conditions in prehistoric cultures and the evaluation of physical characteristics and genetic relationships of prehistoric populations.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4130

**ANTH 5135 (3) Skeletons in the Closet: Curation and Care of Human Remains**
This project-based course will examine how human skeletal collections are curated universities, including here at CU Boulder. We will also explore politics and practices of care surrounding human remains, both historically and as new generations inherit responsibility for these collections. We will discuss the roles of marginalization, racism, colonialism, and structural violence in the formation of many of these collections, and possible futures of repatriation, descendant community involvement, respectful use, and purposeful care.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4135
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites ANTH 4130/5130 Advanced Osteology.
**Grading Basis:** Letter Grade

**ANTH 5150 (3) Human Ecology: Biological Aspects**
Discusses role of human populations in local ecosystems, factors affecting population growth, and human adaptability to environmental stress. Detailed consideration of case studies of small-scale societies in different ecosystems.

**ANTH 5160 (3) Early Hominin Paleoecology**
Explores current thinking about the diets, environments and lives of early human ancestors and their close kin. Strong emphasis on the methods used to construct such knowledge.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4160
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ANTH 5170 (3) Primate Evolutionary Biology**
Focuses on the fossil record of primates excluding the Hominini). Special emphasis is placed on delineating the origins of the order Primates, the origins of the primate suborders Strepsirhini and Haplorhini and the adaptations of extinct primates in light of our understanding of the modern primate adaptive radiations.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4170

**ANTH 5210 (3) Southwestern Archaeology**
Explores the prehistory of the American Southwest from the earliest entry of humans into the area to the Spanish entrada. Focuses on important themes in cultural development: the adoption of agricultural strategies, sedentism, population aggregation, population movement, and social complexity.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4210

**ANTH 5220 (3) From Olmec to Aztec: The Archaeology of Mexico**
Examines the archaeology of Mexico from the initial peopling of the Americas to the Spanish conquest of the Aztec empire. Studies origins of complex societies; ancient Mexican cities, states and empires; religion and politics; trade and interaction; ecology and economy; and social organization.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4220
**Requisites:** Restricted to graduate students only.

**ANTH 5224 (3) Archaeology of the Maya and Their Neighbors**
Begins with the environment and describes the earliest inhabitants and the Olmec civilization, then shifts to the earliest Maya and the emergence and collapse of classic Maya civilization. Compares and contrasts the societies of lower Central America.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4224
**Requisites:** Restricted to graduate students only.

**ANTH 5240 (3) Geoarchaeology**
Applies geological principles and instruments to help solve archaeological problems. Focuses on site formation processes, soils, stratigraphy, environments, dating, remote sensing and geophysical exploration. Environmental and ethical considerations are included.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4240
**Requisites:** Restricted to graduate students only.

**ANTH 5245 (3) Ceramics in Archaeology**
Examines how archaeologists use ceramics to reconstruct the past. Topics include: the relationship between form and function; typology and classification; chronology and seriation; compositional analysis; production and exchange; social, cognitive and ideological aspects of style; and ethnoarchaeological studies of pottery use in contemporary societies. Includes two hours of lecture and two-hours of hands-on laboratory practicum per week.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4245

**ANTH 5270 (3) Plains Archaeology**
Archaeological evidence for Native American ways of life on the North American Great Plains from the initial peopling of the region into the 19th century.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4270

**ANTH 5330 (3) Human Ecology: Archaeological Aspects**
Surveys archaeological approaches to ecology, economy and landscape: glaciation, geomorphology and other physical processes creating and affecting sites and regions; environmental reconstruction; theories of human-environment interaction; landscape formation by forager, agricultural and complex societies; and ideologically structured landscapes.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4330
**Requisites:** Restricted to graduate students only.

**ANTH 5345 (3) Archaeological Theory**
Provides an advanced introduction to the history of archaeological theory from the late 19th century to the present. Topics include culture history, cultural evolution, systems ecology, behavioral archaeology, analogy and middle range theory, collective action, ecology, agency, practice, gender, identity, landscape, epistemology, materiality and memory.
**Requisites:** Restricted to graduate students only.

**ANTH 5350 (2-6) Archaeological Field and Laboratory Research**
Students participate in archaeological field research or conduct laboratory analysis of archaeological materials and data. Students work with faculty on archaeological research projects with a field or lab focus, depending on the project undertaken.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4350
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ANTH 5380 (3) Lithic Analysis and Replication**
Uses diversity of approaches to the analysis of ancient stone tools, including fracture mechanics, lithic technology, materials, heat treatment and functional analysis. Percussion and pressure-flaking experiments are performed.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4380
**Requisites:** Restricted to graduate students only.

**ANTH 5390 (3) Research Methods in Archaeology I**
Method and theory of archaeology, emphasizing the interpretation of materials and data and the relationship of archaeology to other disciplines.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4390
**Requisites:** Restricted to graduate students only.

**ANTH 5400 (3) Research Methods in Archaeology 2**
Focuses on the design of research including constructing empirical arguments and testing them, data gathering, site formation processes, field strategies (archival resources, mapping, field survey, surface collecting/recording, excavation and preliminary analysis) and artifact analysis as it relates to research design.

**ANTH 5455 (3) Epistemology in Archaeology**
Examines the logic of scientific inference in general and important issues in inference in archaeology specifically. It focuses on the fundamental problem of arguing from evidence based on the things people left behind to the lives those people led, the fundamental problem in archaeology. We examine general topics to start, including analytic bias, constructing and borrowing theory, and the development of archaeological interpretation over time, using recent and older literature. We then turn to analysis of published case studies and finish with cases from specific research topics the students are working on. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ANTH 5460 (3) Archaeology and Contemporary Society**
Explores the intellectual climate in which archaeology is practiced and how it influences archaeological research and reconstruction, laws, regulations, and ethical issues. Explores public use of and engagement with archaeology.
**Requisites:** Restricted to graduate students only.

**ANTH 5470 (3) Collections Research Practicum in Cultural Anthropology**
Designed as a practicum, introduces students to research and practice in museum anthropology, utilizing the extensive anthropology collections at CU-Boulder Museum. Students will gain skills in primary and secondary research, collections and object research and narrative story development for the exhibition of anthropological material culture.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4470 and MUSM 4912 and MUSM 5912
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade

**ANTH 5500 (3) Cross-Cultural Aspects of Socioeconomic Development**
Examines goals of international agencies that support development in underdeveloped countries. Anthropological perspective is provided for such issues as urban planning, health care and delivery, population control, rural development and land reform.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4500
**Requisites:** Restricted to graduate students only.

**ANTH 5530 (3) Theoretical Foundations of Sociocultural Anthropology**
Critically examines the pivotal schools of 20th century social theory that have shaped modern sociocultural anthropology, including the ideas of cultural evolutionism, Marxism, Durkheim, Weber, Freud, structuralism, postmodernism and contemporary anthropological approaches. Includes primary readings and seminar-style discussion.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4530
**Requisites:** Restricted to graduate students only.

**ANTH 5570 (3) Anthropology of Fishing**
Examines fishing methods, peoples, societies and cultures, emphasizing anthropology's role in shaping fisheries management and development policy.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4570
**Requisites:** Restricted to graduate students only.

**ANTH 5605 (3) Anthropology of Neuroscience**
Examines the connections between the production and social uptake of neuroscientific knowledge, and explores how transformations in neuroscience shape understandings of human nature. Focusing on anthropological, philosophical, and popular literature, this course addresses the following themes through a cultural and anthropological lens: subjectivity and neuroimaging, "disability" and "neurodiversity," child development, gender, "risk" and neoliberal governance, and the production of scientific expertise.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4605
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ANTH 5610 (3) Medical Anthropology**
Examines health, illness, disease and treatment across a diversity of cases, all of which involve political economic inequalities, individual and collective experiences of medical systems and the historical and contemporary treatment of distinct populations. A demanding upper-level cultural anthropology course in the field of Medical Anthropology, a subfield of cultural anthropology, designed for advanced undergraduate students and early graduate students with an emphasis on the intersections of science, medicine and populations.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4610

**ANTH 5630 (3) Nomadic Peoples of East Africa**
Examines the issues of current concern in the study of East African pastoral peoples. First half of the course is devoted to historical perspectives and the second half explores the transition from subsistence to market oriented economies.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4630
**Requisites:** Restricted to graduate students only.

**ANTH 5700 (3) Practicing Anthropology**
Learn ethnographic methods in the classroom and implement these skills in placements with community organizations, where students pursue an applied research project. This course teaches students how to use anthropological theory and methods to investigate social problems, and to consider how ethnographic research techniques can be applied to positively impact society.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4700
**Requisites:** Restricted to Anthropology (ANTH) graduate students only.
**Grading Basis:** Letter Grade

**ANTH 5730 (3) Latin American Politics and Culture through Film and Text**
Introduces students to the political cultures and societies of Latin America. Through historical and ethnographic text and documentary and non-documentary cinema, this course will explore class relations, ideology and resistance from the conquest to the present.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4730

**ANTH 5735 (3) Contemporary Cuban Culture: Race, Gender and Power**
Ground students' understanding of contemporary Cuba within the global context. How do those outside the island imagine Cuba and why? What are the realities? In a world of U.S. dominated globalization, only recently have we relaxed a forceful economical blockade on the island: what does the U.S. mean in the Cuban imaginary, both in the past and present? To attend to global processes as they affect local (Cuban) experience, texts from anthropology, history, policy, literature, film and music will be drawn upon. Students will learn how long-standing patterns regarding race, color, class and gender relations have evolved into the socialist and now the "post-socialist" context.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4735
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ANTH 5745 (3) Science, Technology and Society**
Explores the cultural work of science and technology in contemporary societies. The course will focus on anthropological studies of technoscientific works ranging from high-energy particle physics and marine biology to hackathons and space exploration. Discussion topics include the relationship between science, technology and political power; scientific controversies; paradigm shifts and scientific revolutions; and ideas of objectivity, representation and abstraction.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4745
**Grading Basis:** Letter Grade

**ANTH 5750 (3) Culture and Society in South Asia**
Intensive analysis of major issues in anthropological research on South Asia (India, Pakistan, Bangladesh, Nepal and Sri Lanka), including kinship, gender, marriage, caste system, religion and ritual, ethnic conflict and social change.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4750
**Additional Information:** Departmental Category: Asia Content

**ANTH 5755 (3) Cultures of Expertise: Science, Power and Knowledge**
Examines the expertise as a cultural category. Students will consider the historical and cultural contexts of various forms of expertise and the social roles of experts from car mechanics to civil engineers, doctors and scientists. Students will be given opportunities to reflect analytically on their own experiences with increasingly specialized education as they develop "professional vision" in their chosen fields.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4755
**Grading Basis:** Letter Grade

**ANTH 5760 (3) Ethnography of Southeast Asia and Indonesia**
Introduces the historical, political, and cultural dimensions of Southeast Asia, focusing primarily on Malaysia, the Philippines, Singapore and Indonesia, with some coverage of mainland Southeast Asia.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4760
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Asia Content

**ANTH 5770 (3) Core Course---Archaeology**
Provides a graduate-level overview of analytic issues relevant to all phases of archaeological research and of the diversity of theoretical perspectives within the field as a whole. Course is required for all first-year graduate students in anthropology.
**Requisites:** Restricted to Anthropology (ANTH) graduate students only.

**ANTH 5780 (3) Core Course-Cultural Anthropology**
Provides an intense, graduate-level introduction to the discipline of cultural anthropology, with an emphasis upon critically assessing those methods, theories, and works that have shaped the field from the 19th century to the present time. Required of all first-year graduate students in anthropology.
**Requisites:** Restricted to Anthropology (ANTH) graduate students only.

**ANTH 5785 (3) Advanced Seminar in Cultural Anthropology**
Details the history of theory and practice in contemporary cultural anthropology, considering the development of major theoretical schools of thought and the integration of general social theory within anthropology. Required of masters students in cultural anthropology.
**Requisites:** Restricted to Anthropology (ANTH) graduate students only.

**ANTH 5790 (3) Core Course---Biological Anthropology**
Discusses how biological anthropologists use evidence and concepts from evolutionary theory, human biology, and ecology to understand the evolution, diversification, and adaptation of human populations. Required of all first-year graduate students in anthropology.
**Requisites:** Restricted to Anthropology (ANTH) graduate students only.

**ANTH 5795 (3) Proseminar in Anthropology**
Introduces incoming first-year graduate students to the history and current state of scholarship in anthropology from across the subdisciplines, through introduction to the research of individual faculty in the department. Required of all incoming graduate students.
**Requisites:** Restricted to graduate students only.

**ANTH 5840 (1-6) Guided Study**
Directed individual research based on a specific area of specialization.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**ANTH 5919 (3) Collections Research Practicum: Archaeology**
Focuses on Museum collections management from archaeological sites mainly in the American Southwest and Mongolia. The course involves readings, discussion, and collections analysis and archival documentation. Extra time outside of class is required for the practicum aspect of this course. Each student will need to schedule with the professor an additional 3 hours each week when they will focus on an aspect of their project, to be discussed below under grading criteria. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4919 and MUSM 5919
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**ANTH 5930 (1-6) Anthropology Internship**
Provides academically supervised opportunities graduate students to work in public and private sectors on projects related to students' career goals. Relates classroom theory to practice. Requires at least 48 hours on the job per credit hour and evidence (paper, employer evaluation, work journal) of significant learning.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4930
**Repeatable:** Repeatable for up to 9.00 total credit hours.

**ANTH 6320 (3) Linguistic Anthropology**
Serves as an advanced introduction to the empirical and theoretical foundations of contemporary linguistic anthropology, with special emphasis on the ways in which culture and society emerge semiotically through language and discourse.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 6320
**Requisites:** Restricted to graduate students only.

**ANTH 6500 (3) Issues in Indigenous Languages**
Addresses socio-cultural issues concerning indigenous languages, including human rights, intellectual property, language endangerment and maintenance, identity, linguistic relativity, sense of place.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 6500
**Grading Basis:** Letter Grade

**ANTH 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.

**ANTH 6950 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ANTH 7000 (3) Seminar: Current Research Topics in Cultural Anthropology**
Discusses current research and theoretical issues in the field of cultural anthropology.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ANTH 7010 (3) Seminar: Contemporary Theory in Cultural Anthropology**
Addresses current theoretical perspectives in cultural anthropology and controversies surrounding them. Discusses science, history, interpretation, and postmodernism. Includes the relationship between theory and method as well as the production of ethnography.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ANTH 7015 (3) Kinship: Being and Belonging**
Explores interpersonal relationships as foundational objects of analysis. This course takes a comparative approach to examine both large-scale social movements and intimate practices, examining how the ideologies and practices of relatedness intersect with and are shaped by gender and sexuality, national identity and state building, race and ethnicity, embodiment, ways of understanding signs in the world (semiotics), the law, and economic relationships. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.

**ANTH 7020 (3) Seminar: Biological Anthropology**
In-depth discussion of selected topics in physical anthropology with emphasis on recent research.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ANTH 7030 (3) Seminar: Archaeology**
Intensive examination of selected theoretical or methodological topics in archaeology. Topics vary with current research emphasis.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ANTH 7140 (3) Seminar: Archaeology of Selected Areas**
Considers archaeology of a specified area, either geographical or topical. Areas selected in accordance with current research interests. May be repeated upto 9 total credit hours.
**Repeatable:** Repeatable for up to 9.00 total credit hours.

**ANTH 7200 (3) Bridging Seminar**
Addresses important topics with current theoretical perspectives from at least two anthropological subdisciplines. This provides an interdisciplinary approach across the sub-disciplines of Anthropology: Archaeology, Biological, and Cultural enabling students to better understand and appreciate a holistic approach to anthropological inquiry. Graduate students from other departments may be allowed to take the course if room permits and they have an appropriate background by instructor's permission.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Anthropology (ANTH) graduate students only.
**Grading Basis:** Letter Grade

**ANTH 7300 (3) Seminar: Research Methods in Cultural Anthropology**
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ANTH 7500 (3) Anthropological Ethics**
As the AAA Statement on Ethics notes, ¿Anthropology¿that most humanistic of sciences and scientific of humanities¿is an irreducibly social enterprise.¿ Anthropologists confront an array of ethical issues as they engage in research, requiring a synthesis of both professional and personal ethics. In this course, we will examine our responsibilities to people and animals with whom we work and whose lives we study as well as our obligations to the broader discipline, the public, and the environment. We will also explore the history and origins of our discipline and how these legacies have shaped the ethical landscapes of our field.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ANTH 7600 (3) Human Ecology: Cultural Aspects**
Reviews and critically examines the major theoretical perspectives for understanding the relationship between human social behavior and the environment developed in the social sciences, especially anthropology, over the last 100 years. Formerly ANTH 5600.

**ANTH 7620 (3) Seminar: Ethnography and Cultural Theory**
Explores how ethnographic writing has evolved over the past century to incorporate different forms of cross-cultural representation and to accommodate new theoretical paradigms. Includes ethnographic authority and reflexivity, as well as embedded theories and blurred genres of cultural research.

**ANTH 7840 (1-6) Independent Research**
Research aimed at developing a solution to an originally conceived research problem.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**ANTH 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the graduate school section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.

# Anthropology - Master of Arts (MA)

## Departmental Subdisciplines

Anthropology in the United States is traditionally divided into four subdisciplines: archaeology, biological, cultural and linguistic. CU Boulder offers terminal MA degrees in two subdisciplines: Archaeology and Cultural Anthropology.

### Archaeology

The archaeology subdiscipline provides continuous geographic coverage of ancient societies from the Plains of North America through the Southwest and Mesoamerica to the Intermediate Area. The native societies range from egalitarian hunter-gatherers through middle range societies to city-states and empires. The faculty's theoretical and topical interests include human ecology, ethnoarchaeology, agency and social theory, lithic and ceramic analyses, remote sensing and geophysical applications in archaeology.

Archaeology relates to cultural anthropology in significant ways, since much archaeological theory is derived from cultural theory. Given the vast diachronic interests of archaeology, significant archaeological theory is also derived independently from ethnography. Ethnoarchaeology spans the two subdisciplines, as archaeologists study the material culture of functioning contemporary societies to learn how better to make inferences about past behavior. Both archaeology and cultural anthropology study ethnic and political groups in contact with each other, including topics of ethnohistory, migration, acculturation, trade and tribute, conquest, information sharing, elite emulation and the rise of multiethnic powers.

### Cultural Anthropology

Cultural anthropologists study the cultural patterns and social institutions that shape how people think and behave in human communities across the globe, including their own society. While their findings are frequently comparative or cross-cultural in scope, cultural anthropologists undertake ethnographic studies through intensive participant-observation in particular cultures, subcultures, communities and regions. The insights of cultural anthropology are derived from ethnographic methods, including long-term fieldwork, interviews, participant-observation and other qualitative research techniques. Among the topical interests of the cultural faculty are gender and sexuality, human ecology, environmental anthropology, medical

anthropology, science and technology studies, nationalism and ethnic identity, capitalism and markets, tourism, and history and memory. Areas of regional expertise in the department include Latin America, Native America, Atlantic Canada, South Asia, Southeast Asia, Tibet, East Africa, the Caribbean, Polynesia and Western Europe, as well as their respective diasporas around the world. To learn more about the expertise and current research of the cultural anthropology faculty, please visit the department website (https://www.colorado.edu/anthropology/people/faculty/), where you will find up-to-date and detailed profiles of each faculty member.

## Dual Degree Program - Anthropology (MA/MBA)

Learn more on the dual degree(s) tab (p. 1139).

# Requirements

## Prerequisites

To be considered for admission as a regular degree student, applicants for the terminal MA degree should have a minimum undergraduate grade point average of 3.00 (4.00 = A). Letters of recommendation and evidence of previous anthropologically oriented experience and work are carefully considered. Graduate Record Examination scores for verbal and quantitative aptitude tests are not required.

## Application Requirements

Inquiries about application procedures, processes and administration should be directed to the main departmental office via email at anthgrad@colorado.edu. Students who hope to work with specific faculty members can contact them individually with questions about advising or research expertise. Applications must be completed and submitted no later than December 1 for international students and December 15 for all other applicants.

## Course Requirements

Additional information about other specific areas of specialization and other requirements for the degree may be obtained by consulting the Department of Anthropology Graduate Handbook and referencing the Master's Degree Requirements section. Information can also be obtained by contacting the Department of Anthropology directly anthro@colorado.edu

### Archaeology Subdiscipline

The terminal MA track in archaeology is for students intending to earn only an MA degree who enter the program with BA, BS or non-anthropology MA or PhD degrees. The degree is designed for students who wish to pursue careers outside of academia (e.g., Cultural Resource Management, government service, etc.). The terminal MA is a non-thesis degree, but does require that students take a 3- credit independent research course (ANTH 7840) that will include the completion of a publishable paper and an oral defense of that paper by their MA committee.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Requirements** | | |
| One graduate-level anthropology seminar not in the student's subdiscipline (any non-split-level graduate seminar, including bridging seminars ANTH 7200) | | 3 |
| ANTH 5000 | Quantitative Methods in Anthropology | 3 |
| **Other Required Courses** | | |
| ANTH 5345 | Archaeological Theory | 3 |
| One 5000-level archaeology course that requires analysis of archaeological materials using laboratory methods. Examples include: ANTH 5245, ANTH 5380, ANTH 5919 | | 3 |
| ANTH 5400 | Research Methods in Archaeology 2 (Epistemology, Proposal Writing) | 3 |
| ANTH 5460 | Archaeology and Contemporary Society | 3 |
| ANTH 7840 | Independent Research (Publishable Paper) | 3 |
| Three elective graduate courses chosen with advisor, one of which must be a 7000-level seminar in archaeology | | 9 |
| **Total Credit Hours** | | **30** |

### Biological Anthropology Subdiscipline

Biological anthropology students will apply directly to the PhD program in biological anthropology (p. 1140).

### Cultural Anthropology Subdiscipline

The terminal MA track in cultural anthropology is for students intending to earn only an MA degree and who enter the program with an undergraduate degree or with graduate training in an unrelated area. The terminal MA is a non-thesis degree, but does require that students take ANTH 7840, a 3-credit independent research course (in the semester in which they will complete 30 credits of coursework) that will include the completion and defense of an approximately 30-page paper , which will be evaluated by the student's committee.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Coursework** | | |
| ANTH 5780 | Core Course-Cultural Anthropology (Core 1) | 3 |
| ANTH 5785 | Advanced Seminar in Cultural Anthropology (Core 2) | 3 |
| ANTH 7300 | Seminar: Research Methods in Cultural Anthropology | 3 |
| One graduate-level anthropology seminar not in the student's subdiscipline (any non-split-level graduate seminar, including bridging seminars ANTH 7200). | | 3 |
| ANTH 7840 | Independent Research (30-page paper) | 3 |
| Two additional graduate courses at 5000-level or above, to be selected in consultation with advisor, including ANTH 5840 guided study/directed readings [1] | | 6 |
| Three 7000-level seminars in cultural anthropology. (Examples: ANTH 7000, ANTH 7010, ANTH 7015, ANTH 7600 or ANTH 7620.) | | 9 |
| **Total Credit Hours** | | **30** |

[1] Please note: 6 maximum credit hours for ANTH 5840 guided study/directed readings.

# Dual Degree Program

## Anthropology (MA/MBA)

The MBA/MA in anthropology dual-degree program enables students to earn an MBA and an MA in anthropology simultaneously over three or four years depending on the student's subdiscipline in anthropology. Students in this MBA/MA program pursue careers in managing the business aspects of archaeological projects, working in the growing

field of corporate cultural anthropology and ethnography or museum management.

## Learning Outcomes

By completion of the graduate program, students will be able to:

- Demonstrate a mastery of the theoretical knowledge base, including core concepts, history of anthropological thought and theory.
- Demonstrate proficiency in research design and methods.
- Demonstrate strong critical thinking, analysis, and communication.
- Achieve a high level of professionalization, including a foundation in ethics, effective teaching and strong preparation for the job market.
- Demonstrate an appreciation for and ability to apply intercultural and global perspectives.

# Anthropology - Doctor of Philosophy (PhD)

## Departmental Subdisciplines

Anthropology in the United States is traditionally divided into four subdisciplines: archaeology, biological, cultural and linguistic. Of these, the first three are major curricular options available to graduate students in anthropology at CU Boulder.

### Archaeology

The archaeology subdiscipline provides continuous geographic coverage of ancient societies from the Plains of North America through the Southwest and Mesoamerica to the Intermediate Area. The native societies range from egalitarian hunter-gatherers through middle range societies to city-states and empires. The faculty's theoretical and topical interests include human ecology, ethnoarchaeology, community archaeology, agency and social theory, lithic and ceramic analyses, remote sensing and geophysical applications in archaeology.

Archaeology links with biological anthropology in a number of ways. For instance, archaeologists encountering burials frequently turn to biological anthropologists for analyses of stature, health and other topics. Many archaeologists and biological anthropologists share a deep interest in human ecology, the ways people have adapted to their environments and have affected those environments.

Archaeology also relates to cultural anthropology in significant ways, since much archaeological theory is derived from cultural theory. Given the vast diachronic interests of archaeology, significant archaeological theory is also derived independently from ethnography. Ethnoarchaeology spans the two subdisciplines, as archaeologists study the material culture of functioning contemporary societies to learn how better to make inferences about past behavior. Both archaeology and cultural anthropology study ethnic and political groups in contact with each other, including topics of ethnohistory, migration, acculturation, trade and tribute, conquest, information sharing, elite emulation and the rise of multiethnic powers.

### Biological Anthropology

Biological anthropology encompasses genetics (the study of gene structure, processes and patterns of inheritance), paleoanthropology (the study of human and primate evolution in the fossil record), osteology (the study of the skeleton), paleopathology (the study of evidence of disease and trauma in skeletal and fossil remains), primatology (the study of the behavior and ecology of nonhuman primates) and human biology (biocultural study of biological variation in living human populations).

The biological anthropology faculty at CU have interests and research strengths that cross sub-disciplinary boundaries and foster collaboration with faculty and graduate students in other disciplines and subdisciplines. We share an interest in human ecology, the broad integrative area of anthropology that focuses on the interactions of culture, biology and the environment. We also share an interest in the processes of globalization, which are rapidly changing many aspects of the modern world. As biological anthropologists, we are well positioned to analyze the impact of globalization on the interaction between biology and behavior, and to analyze human and primate adaptations to changing environments and declining biodiversity.

The department offers training in several different aspects of ecology: general ecology, early hominin paleoecology, nutritional, community and evolutionary ecology. Our research foci also include anthropogenic and climatic effects on primate behavior and biology; conservation biology; primate evolution; feeding biology of humans and non-human primates; biogeochemical techniques for studying the diets and habitats of modern and fossil fauna; life history; endocrinology; growth and development; and maternal and infant health.

We carry out research and offer training and research opportunities at a wide range of international sites, including: Beza Mahafaly, Madagascar; Lajuma Research Centre and the Mokopane Conservation Centre, South Africa; The Cradle of Humankind World Heritage Site, South Africa; 12 museums in South Africa, Kenya and Ethiopia; Keneba, The Gambia; Ta Kou Nature Reserve, Kien Luong Karst area and Khau Ca Forest area, Vietnam. Our laboratories offer analytical capabilities and training in a broad range of methods, from measurement of human energy expenditure, to immunoassay and mid-infrared spectroscopy, to plant nutritional analysis. Our field sites offer training and research on primate health, community ecology, plant-animal interactions, forest ecology, nutritional ecology, conservation biology, dental ecology and paleoecology.

Please note that we do not train students specifically in forensics.

### Cultural Anthropology

Cultural anthropologists study the cultural patterns and social institutions that shape how people think and behave in human communities across the globe, including their own society. While their findings are frequently comparative or cross-cultural in scope, cultural anthropologists undertake ethnographic studies through intensive participant-observation in particular cultures, subcultures, communities and regions. The insights of cultural anthropology are derived from ethnographic methods, including long-term fieldwork, interviews, participant-observation and other qualitative research techniques. Among the topical interests of the cultural faculty are gender and sexuality, human ecology, environmental anthropology, medical anthropology, science and technology studies, nationalism and ethnic identity, capitalism and markets, tourism, and history and memory. Areas of regional expertise in the department include Latin America, Native America, Atlantic Canada, South Asia, Southeast Asia, Tibet, East Africa, the Caribbean, Polynesia and Western Europe, as well as their respective diasporas around the world. To learn more about the expertise and current research of the cultural anthropology faculty, please visit the department website, where you will find up-to-date and detailed profiles of each faculty member (https://www.colorado.edu/anthropology/people/faculty/).

# Requirements

## Prerequisites

To be considered for admission to one of the anthropology PhD programs, applicants should have a minimum undergraduate grade point average of 3.00 (4.00 = A) and/or a MA in anthropology or a closely related topic. Letters of recommendation and evidence of previous anthropologically oriented experience and work are carefully considered. Graduate Record Examination scores for verbal and quantitative aptitude tests are not required.

## Admission Requirements

Inquiries about application procedures, processes and administration should be directed to the main departmental office. Students who hope to work with specific faculty members can contact them with questions about advising or research expertise. Applications must be completed and submitted no later than December 1 for international students and December 15 for all other applicants.

Students with no previous graduate work may apply for entrance into the terminal MA program in archaeology or cultural anthropology. Students with no previous graduate work may also apply directly into the PhD program in archaeology, biological anthropology or cultural anthropology. Students who have or will have completed an MA degree in anthropology or an MA or MS in a closely related discipline by the time of their admission may be eligible for transfer credits on a case by case basis.

## Course Requirements

Coursework beyond the MA must include a minimum of 12 credit hours and 30 dissertation credit hours.

### Archaeology Subdiscipline

The PhD track is for students wishing to earn a PhD who enter the program with a BA, BS, or non-anthropology MA or PhD degrees. The degree requires at least 42 credits of coursework with up to 21 transferable from previous graduate work along with 30 credits of dissertation research. Students entering with a BA, BS, or non-anthropology MA or PhD degrees are required to take ANTH 7840 by their third semester, which will include the completion of a publishable paper and an oral defense of that paper by their PhD committee. Students entering with an MA are exempt from ANTH 7840. Students entering with an MA in Anthropology from CU Boulder can transfer up to 30 credits including any of the required courses listed below.

#### Foreign Language Requirement

Students who will require language training for the successful completion of their dissertation research are expected to identify and begin study of that language, preferably in their first year.

#### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| Two graduate-level anthropology courses not in the student's sub-discipline (any non-split-level graduate seminar, including ANTH 7200 Bridging Seminar) | | 6 |
| ANTH 5000 | Quantitative Methods in Anthropology | 3 |
| **Additional Coursework** | | |
| ANTH 5345 | Archaeological Theory | 3 |
| ANTH 5400 | Research Methods in Archaeology 2 | 3 |
| ANTH 5460 | Archaeology and Contemporary Society | 3 |
| One 5000-level archaeology course that requires analysis of archaeological materials using laboratory methods. Examples include: | | 3 |
| ANTH 5245 | Ceramics in Archaeology | |
| ANTH 5380 | Lithic Analysis and Replication | |
| ANTH 5919 | Collections Research Practicum: Archaeology | |
| At least three 7000-level seminars in archaeology. Examples include: | | 9 |
| ANTH 7030 | Seminar: Archaeology | |
| ANTH 7140 | Seminar: Archaeology of Selected Areas | |
| ANTH 7840 | Independent Research (publishable paper) | 3 |
| Other courses determined with advisor (5000 level or above) | | 9 |
| ANTH 8990 | Doctoral Dissertation | 30 |
| **Total Credit Hours** | | **72** |

Any transfer credit or other proposed substitutions for required coursework should be addressed by petition to the Graduate Committee.

#### Recommended Coursework

The faculty strongly recommends students take one or more additional classes beyond the required minimum, particularly classes in regional culture histories, general anthropology and relevant topics in other departments (such as geology and geography). Other classes can include any relevant to a student's program of study, including archaeological area and topical classes, ethnographic theory and area classes, and classes in related departments (such as geology, geography, biology, etc.). Elective classes should be chosen in consultation with each student's advisor.

### Biological Anthropology Subdiscipline

Students entering the PhD program with an MA from another institution must complete one 5000-level graduate class in Biological Anthropology (see Core Requirements in MA section for suggestions) within the first two years. They must also take Quantitative Methods in Anthropology (ANTH 5000) within the first four semesters if they do not have equivalent training on their record.

The Department of Anthropology offers graduate training at the PhD level in the area of biological anthropology. Biological anthropology students holding a bachelor's degree are eligible for direct admission to the PhD program. Students holding a master's degree (or other advanced degree such as MS or MD) are also eligible for the program. Student pathways differ depending on the degree they hold upon admission. Degree plans will be individualized according to students' prior training and professional activities. The goal of the program is to train students to pursue academic and allied careers with an emphasis on research.

The degree requires at least 42 hours of coursework, along with a minimum of 30 hours of dissertation research hours. Applicants holding an advanced degree may transfer up to 21 hours of previous coursework credits, to be determined on a case-by-case basis.

#### Foreign Language Requirement

Students who will require language training for the successful completion of their dissertation research are expected to identify and begin study of that language, preferably in their first year.

**Required Courses and Credits**
**Students with a Bachelor's Degree**

| Code | Title | Credit Hours |
|---|---|---|
| ANTH 5000 | Quantitative Methods in Anthropology | 3 |
| 3-4 designated 5000-level courses. Examples include: | | 12 |
| ANTH 5060 | Nutrition and Anthropology | |
| ANTH 5070 | Methods in Biological Anthropology | |
| ANTH 5120 | Advanced Biological Anthropology | |
| ANTH 5125 | Evolution and the Human Life Cycle: A Primate Life History Perspective | |
| ANTH 5160 | Early Hominin Paleoecology | |
| ANTH 5170 | Primate Evolutionary Biology | |
| Other electives at 5000 level or above, along with 7000-level seminar credits | | 27 |
| ANTH 8990 | Doctoral Dissertation | 30 |
| **Total Credit Hours** | | **72** |

**Students with a Graduate Degree and 21 Hours of Approved Transfer Credit**

| Code | Title | Credit Hours |
|---|---|---|
| ANTH 5000 | Quantitative Methods in Anthropology | 3 |
| 2-3 designated 5000-level courses. Examples include: | | 9 |
| ANTH 5060 | Nutrition and Anthropology | |
| ANTH 5070 | Methods in Biological Anthropology | |
| ANTH 5120 | Advanced Biological Anthropology | |
| ANTH 5125 | Evolution and the Human Life Cycle: A Primate Life History Perspective | |
| ANTH 5160 | Early Hominin Paleoecology | |
| ANTH 5170 | Primate Evolutionary Biology | |
| Other electives at 5000 level or above, along with 7000-level seminar credits | | 9 |
| ANTH 8990 | Doctoral Dissertation | 30 |
| Approved Transfer Credit [1] | | 21 |
| **Total Credit Hours** | | **72** |

[1] Any transfer credit or other proposed substitutions for required coursework should be addressed by petition to the Graduate Committee.

### Cultural Anthropology Subdiscipline

The PhD program in cultural anthropology is open to applicants with undergraduate degrees or graduate degrees. Applicants with an MA in anthropology or an MA or MS in a closely related field who are accepted into the PhD program are eligible for transferring up to 21 coursework credits, to be determined on a case by-case basis.

The PhD degree requires at least 42 credits of coursework along with 30 credits of dissertation research. Students entering the program without previous graduate work in anthropology or a closely related field are required to take an independent study with their advisors in their fourth semester, which will include the completion of an approximately 30-page paper that will be evaluated by their committee. After the successful completion of 30 credits of coursework and a passing evaluation of the fourth-semester paper, students can earn an MA degree as part of their progress in the PhD program.

**Foreign Language Requirement**

Students who will require language training for the successful completion of their dissertation research are expected to identify and begin study of that language, preferably in their first year.

**Required Courses and Credits**

| Code | Title | Credit Hours |
|---|---|---|
| **Requirements** | | |
| ANTH 5780 | Core Course-Cultural Anthropology | 3 |
| ANTH 5785 | Advanced Seminar in Cultural Anthropology | 3 |
| ANTH 7300 | Seminar: Research Methods in Cultural Anthropology | 3 |
| ANTH 7840 | Independent Research | 3 |
| Cross-disciplinary seminar | | 3 |
| One non-split level graduate anthropology seminar not in the student's subdiscipline, or a bridging seminar ANTH 7200 | | |
| Five 7000-level seminars in Cultural Anthropology. Examples include: | | 15 |
| ANTH 7000 | Seminar: Current Research Topics in Cultural Anthropology | |
| ANTH 7010 | Seminar: Contemporary Theory in Cultural Anthropology | |
| ANTH 7015 | Kinship: Being and Belonging | |
| ANTH 7600 | Human Ecology: Cultural Aspects | |
| ANTH 7620 | Seminar: Ethnography and Cultural Theory | |
| Four or more graduate courses at 5000-level or above, to be selected in consultation with advisor, including ANTH 5840 guided study/directed readings [1] | | 12 |
| ANTH 8990 | Doctoral Dissertation | 30 |
| **Total Credit Hours** | | **72** |

[1] A maximum of 6 credit hours for ANTH 5840 Guided Study.

Any transfer credit or other proposed substitutions for required coursework should be addressed by petition to the Graduate Committee. See "Requesting Exceptions" in Department Policies and Procedures section.

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate a mastery of the theoretical knowledge base, including core concepts, history of anthropological thought and theory.
- Demonstrate proficiency in research design and methods.
- Demonstrate strong critical thinking, analysis, and communication.
- Achieve a high level of professionalization, including a foundation in ethics, effective teaching and strong preparation for the job market.
- Demonstrate an appreciation for and ability to apply intercultural and global perspectives.

# Applied Mathematics

The Department of Applied Mathematics in the College of Arts and Sciences offers a range of courses and research opportunities in many areas, including computational mathematics, mathematical biology,

nonlinear phenomena, physical applied mathematics, and probability and statistics. Each of these areas is described below.

**Course codes for this program include APPM and STAT.**

# Computational Mathematics

Computational mathematics encompasses the techniques that allow practitioners to approximate quantities via a computer. These techniques are used to do a wide range of things including simulations of physical phenomena, reducing the cost of product design and providing the basis of machine learning. Some applications include weather forecasting, optimal design of materials and simulating flight paths of rockets. This field continues to grow as computational resources and needs of users change. The fast developments in this area have allowed mathematicians to answer questions and develop insights not possible only 20-30 years ago. Modern computational methods require an in-depth knowledge of a variety of mathematical subjects which include linear algebra, analysis, ordinary and partial differential equations, asymptotic analysis, elements of harmonic analysis and nonlinear equations.

Since computers are invaluable tools for an applied mathematician, students are expected to attain a highly professional level of computer literacy, to program in a language such as Python, know how to maintain a Git repository and understand the basics of parallel computing.

Computational mathematics courses include the study of numerical linear algebra, numerical integration, approximation of functions, optimization, numerical solution of ordinary and partial differential equations, and solution of nonlinear equations. There are two advanced seminars related to this topic: computational mathematics and optimization.

# Mathematical Biosciences

Recent advances in our ability to quantitatively study biological phenomena have provided a tremendous number of exciting opportunities for applied mathematicians. The careful modeling, analysis and simulation of these systems using the standard tools of applied mathematics has led to novel and non-intuitive insights into biology.

Furthermore, a deeper understanding of the inherently complex and multiscale nature of biological systems, in many cases, requires the development of new mathematical tools, techniques and methodologies (a challenge to which applied mathematics is particularly well suited). Research areas in APPM encompass cell migration, ecology, infectious diseases, neuroscience, population genetics and social systems, as well as data-driven methods in biology. For more information, see the Mathematical Biology Group (http://mathbio.colorado.edu/) webpage.

# Mathematical Geosciences

Mathematical geosciences encompass quantitative modeling, analysis and simulation of all aspects of the Earth system. Our faculty's research intersects a broad range of geosciences: from the geodynamo to ocean circulation, from computational methods for seismic imaging to the impacts of weather on epidemiology, from tsunamis to stochastic weather generators. The complex and multiscale nature of geophysical systems, in many cases, requires the development of new mathematical models and simulation strategies, a challenge to which applied mathematics is particularly well suited.

Appropriate coursework includes analysis and computation, probability and statistics, as well as background courses in one of the sciences or engineering fields in which one intends to do research.

# Applied Nonlinear PDEs and Dynamics

The Applied Mathematics Department's research in nonlinear PDEs and dynamics is intrinsically interdisciplinary, i.e., involves the study of mathematical problems with direct physical application. Physically inspired research problems invariably lead to complex nonlinear phenomena so that, in addition to mathematical analysis, their solution requires a deep understanding of the underlying application area, and often requires knowledge and experience in numerical computation. The faculty in Applied Mathematics specializing in this area of research generally work on problems in nonlinear waves, dynamical systems, partial differential equations and applications. Topics of interest include wave motion, solitons and traveling waves, dispersive shock waves, integrable systems, pattern formation, qualitative structure and bifurcation theory, dynamics on networks and transport phenomena. Application areas include numerous areas of physics (fluid dynamics, condensed matter, optics, plasma), biology (neural systems, ecology) and sociology (crime, social networks).

Courses in this field include dynamical systems, nonlinear waves and many advanced seminar courses. Research talks in this field are regularly offered in the Dynamics Seminar and the Nonlinear Waves Seminar.

Suitable background coursework includes analysis, numerical analysis, partial differential equations, mathematical modeling and methods of applied mathematics.

# Physical Applied Mathematics

Physical applied mathematics is a term which generally refers to the study of mathematical problems with direct physical application. This area of research is intrinsically interdisciplinary. In addition to mathematical analysis, it requires a deep understanding of the underlying applications area, and usually requires knowledge and experience in numerical computation.

The department's affiliated faculty have a wide variety of expertise in various areas of application, e.g. atmospheric and fluid dynamics, theoretical physics, plasma physics, genetic structure, etc. The course requirements of the Program are designed to provide students with a foundation for their study (analysis and computation).

The department also requires supplemental courses in one of the science or engineering fields which are needed to begin doing thesis research in physical applied mathematics.

See the Dispersive Hydrodynamics Lab (https://www.colorado.edu/amath/dispersive-hydrodynamics-lab/) page, APPM's own fluid dynamics laboratory.

# Statistics and Data Science

Statistics and data science are the studies of empirical inquiry. Statistical science focuses on the development of data analytic methods that are ubiquitous and applicable in all sciences, as well as the theoretical underpinnings supporting such approaches. Data science focuses on the application of such methods to data problems, including development of implementations and associated studies of computational aspects. Of chief importance is the role of interdisciplinary research to solve scientifically impactful problems, which often motivate the need for new statistical methodology. Faculty members working in statistics and data

science cover a breadth of expertise and domain knowledge including Bayesian computation, epidemiology, statistical climatology, statistics for energy science, signal processing and image analysis, networks, machine learning for physical systems, uncertainty quantification as well as the study of collaborative research.

Appropriate coursework includes statistics, probability, computation and mathematical analysis as well as background courses in one of the sciences or engineering fields in which one intends to do research.

## Stochastic Processes and Applications

The Stochastic Processes and Applications (SPA) research group aims to develop and apply probabilistic tools to model, predict and analyze randomness in real-life phenomena. As such, SPA encompasses various areas of both theoretical and applied probability, including Bayesian networks, computational biology, computational probability, discrete probability, mathematical finance, Markov processes, Markov chain Monte Carlo (MCMC) algorithms, optimal stopping, stochastic control, stochastic differential equations and random graphs.

For more information on courses and research opportunities, visit the Department of Applied Mathematics website (http://www.colorado.edu/amath/).

## Master's Degrees

- Applied Mathematics - Master of Science (MS) (p. 1150)
- Applied Mathematics - Professional Master of Science (MSAM) (p. 1152)

## Doctoral Degree

- Applied Mathematics - Doctor of Philosophy (PhD) (p. 1154)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ablowitz, Mark J. (https://experts.colorado.edu/display/fisid_100691/)
Distinguished Professor; PhD, Massachusetts Institute of Technology

Appelö, Daniel E. (https://experts.colorado.edu/display/fisid_159438/)
Assistant Professor Adjunct; PhD, KTH Royal Institute of Technology (Sweden)

Becker, Stephen R. (https://experts.colorado.edu/display/fisid_154263/)
Associate Professor; PhD, California Institute of Technology

Benim, W. Robert (https://experts.colorado.edu/display/fisid_167716/)
Assistant Teaching Professor

Beylkin, Gregory (https://experts.colorado.edu/display/fisid_100437/)
Professor; PhD, New York University

Bhat, Yermal Sujeet (https://experts.colorado.edu/display/fisid_146506/)
Associate Teaching Professor; PhD, University of Florida

Bortz, David Matthew (https://experts.colorado.edu/display/fisid_143348/)
Professor; PhD, North Carolina State University

Chang, Silva (https://experts.colorado.edu/display/fisid_145582/)
Teaching Professor; MS, Yale University

Chi, Jocelyn T.
Assistant Professor; PhD, North Carolina State University

Corcoran, Jem (https://experts.colorado.edu/display/fisid_118142/)
Associate Professor Emeritus; PhD, Colorado State University

Cox, Rachel (https://experts.colorado.edu/display/fisid_158450/)
Assistant Teaching Professor; MS, University of Colorado Boulder

Curry, James H. (https://experts.colorado.edu/display/fisid_105730/)
Professor; PhD, University of California, Berkeley

Dougherty, Anne Margaret (https://experts.colorado.edu/display/fisid_101349/)
Associate Chair, Teaching Professor; PhD, University of Wisconsin–Madison

Dukic, Vanja (https://experts.colorado.edu/display/fisid_148718/)
Professor; PhD, Brown University

Fornberg, Bengt (https://experts.colorado.edu/display/fisid_108048/)
Professor Emeritus; PhD, University of Uppsala (Sweden)

Gillman, Adrianna (https://experts.colorado.edu/display/fisid_165224/)
Associate Professor; PhD, University of Colorado Boulder

Grooms, Ian G. (https://experts.colorado.edu/display/fisid_155588/)
Associate Professor; PhD, University of Colorado Boulder

Hoefer, Mark (https://experts.colorado.edu/display/fisid_154264/)
Professor; PhD, University of Colorado Boulder

Huang, Yu-Jui (https://experts.colorado.edu/display/fisid_157746/)
Assistant Professor; PhD, University of Michigan Ann Arbor

Kilpatrick, Zachary Peter (https://experts.colorado.edu/display/fisid_155782/)
Associate Professor; PhD, University of Utah

Kish, Jonathan (https://experts.colorado.edu/individual/fisid_153629/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Kleiber, William Paul (https://experts.colorado.edu/display/fisid_151943/)
Associate Professor; PhD, University of Washington

Law, Judith (https://experts.colorado.edu/individual/fisid_167501/)
Assistant Teaching Professor; PhD, The University of Maryland, College Park

Li, Congming
Professor Emeritus

Lindsey, Daniel Seneca (https://experts.colorado.edu/display/fisid_156477/)
Assistant Teaching Professor

Lladser, Manuel E. (https://experts.colorado.edu/display/fisid_134170/)
Associate Professor; PhD, The Ohio State University

Manteuffel, Thomas A.
Professor Emeritus

Martinsson, Per-Gunnar
Visiting Professor

McCormick, Steven
Professor Emeritus

Mcnamara, Rich (https://experts.colorado.edu/display/fisid_167770/)
Lecturer

Meiss, James D. (https://experts.colorado.edu/display/fisid_103702/)
Professor; PhD, University of California, Berkeley

Meyer, Francois Georges (https://experts.colorado.edu/individual/fisid_115559/)
Professor; PhD, INRIA (France)

Mitchell, Colin
Lecturer

Nixon, Sean (https://experts.colorado.edu/display/fisid_167600/)
Instructor

Norris, Jan Adam (https://experts.colorado.edu/display/fisid_101412/)
Teaching Professor; PhD, University of Colorado Boulder

Pruitt, Kris
Associate Teaching Professor

Reichenbach, Matt
Assistant Teaching Professor; PhD, University of Nebraska Lincoln

Restrepo, Juan G. (https://experts.colorado.edu/display/fisid_145811/)
Associate Professor; PhD, University of Maryland, College Park

Rodriguez, Nancy (https://experts.colorado.edu/display/fisid_164028/)
Assistant Professor; PhD, University of California-Los Angeles

Segur, Harvey (https://experts.colorado.edu/display/fisid_102287/)
Professor Emeritus; PhD, University of California, Berkeley

Thaler, Eric R. (https://experts.colorado.edu/display/fisid_155505/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Vance, Eric (https://experts.colorado.edu/display/fisid_158342/)
Associate Professor; PhD, Duke University

Zaharatos, Brian R. (https://experts.colorado.edu/display/fisid_156225/)
Teaching Professor, Faculty Director; PhD, Colorado School of Mines

# Courses

**APPM 5120 (3) Introduction to Operations Research**
Studies linear and nonlinear programming, the simplex method, duality, sensitivity, transportation and network flow problems, some constrained and unconstrained optimization theory, and the Kuhn-Tucker conditions, as time permits.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4120 and MATH 4120 and MATH 5120
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites APPM 3310 OR MATH 2130 OR MATH 2135 or equivalent.

**APPM 5320 (3) Introduction to Dynamics on Networks**
Introduces modern approaches to model and analyze dynamical processes on complex networks. Many dynamical processes such as epidemic propagation, opinion formation, synchronization, and cascading processes take place on complex social or technological networks. This course will introduce the tools to understand the interplay between network structure and the outcome of these dynamical processes. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4320
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APPM 5350 (3) Methods in Applied Mathematics: Fourier Series and Boundary Value Problems**
Department enforced prerequsite courses: APPM 2350 or MATH 2400 and APPM 2360 and a prerequisite or corequisite course: APPM 3310 or MATH 2130 or MATH 2135.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4350
**Requisites:** Restricted to graduate students only.

**APPM 5360 (3) Methods in Applied Mathematics: Complex Variables and Applications**
Introduces methods of complex variables, contour integration and theory of residues. Applications include solving partial differential equations by transform methods, Fourier and Laplace transforms and Reimann-Hilbert boundary-value problems, conformal mapping to ideal fluid flow and/or electrostatics. Department enforced prerequisites: APPM 2350 or MATH 2400 and APPM 2360 and a prerequisite or corequisite course of APPM 3310 or MATH 3130 or MATH 3135.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4360
**Requisites:** Restricted to graduate students only.

**APPM 5370 (3) Computational Neuroscience**
Applies mathematical and computational methods to neuroscience. Techniques from linear algebra, differential equations, introductory dynamical systems, probability, stochastic processes, model validation, and machine learning will be learned and used. Neuroscience topics include neural spiking, network dynamics, probabilistic inference, learning, and plasticity. Will learn how the brain uses computational principles to enact decision making, vision, and memory. Recommended background includes linear algebra, differential equations, probability, and programming. Students will hone programming skills in MATLAB/Python and TensorFlow.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4370
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites APPM 2360 and APPM 3310 and STAT 4000 or equivalent courses.

**APPM 5380 (3) Modeling in Applied Mathematics**
An exposition of a variety of mathematical models arising in the physical and biological sciences. Students' modeling projects are presented in class. Topics may include: GPS navigation, medical imaging, ocean waves, and computerized facial recognition. Department enforced prerequisites: APPM 2350 or MATH 2400 and APPM 2360.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4380
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites APPM 3310 and APPM 4350 and APPM 4650.

**APPM 5390 (3) Modeling in Mathematical Biology**
Investigates how complex systems in biology can be studied using applied mathematics. Examines several case studies which include topics from microbiology, enzyme reaction kinetics, neuroscience, ecology, epidemiology, physiology and bioengineering. Department enforced prerequisites: APPM 2360 and APPM 3310 or MATH 2130 or MATH 2135 or instructor consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4390
**Requisites:** Restricted to graduate students only.

**APPM 5430 (3) Methods in Applied Mathematics: Applications of Complex Variables**
Reviews basic ideas of complex analysis, including solutions of ODEs and PDEs of physical interest via complex analysis; conformal mapping, including Schwarz-Christoffel transformations and generalizations; computational methods; Riemann-Hilbert problems; topics in asymptotic methods. Department enforced prerequisite: APPM 4360 or APPM 5360.
**Requisites:** Restricted to graduate students only.

**APPM 5440 (3) Applied Analysis 1**
Discusses the elements of basic real and complex analysis, Banach spaces, Lp spaces and many relevant inequalities. Includes applications of existence and uniqueness of solutions to various types of ordinary differential equations, partial differential equations, and integral equations. Department enforced prerequisites: APPM 4440 and APPM 4450.
**Requisites:** Restricted to graduate students only.

**APPM 5450 (3) Applied Analysis 2**
Continuation of APPM 5440. Department enforced prerequisite: APPM 5440.
**Requisites:** Restricted to graduate students only.

**APPM 5460 (3) Methods in Applied Mathematics: Dynamical Systems and Differential Equations**
Introduces the theory and applications of dynamical systems through solutions to differential equations. Covers existence and uniqueness theory, local stability properties, qualitative analysis, global phase portraits, perturbation theory and bifurcation theory. Special topics may include Melnikov methods, averaging methods, bifurcations to chaos and Hamiltonian systems. Department enforced prerequisites: APPM 2360 and APPM 3310 and APPM 4440.
**Requisites:** Restricted to graduate students only.

**APPM 5470 (3) Methods of Applied Mathematics: Partial Differential and Integral Equations**
Studies properties and solutions of partial differential equations. Covers methods of characteristics, well-posedness, wave, heat and Laplace equations, Green's functions and related integral equations. Department enforced prerequisites: APPM 4350 or MATH 4470 and APPM 4360 or MATH 3450.
**Requisites:** Restricted to graduate students only.

**APPM 5480 (3) Methods of Applied Mathematics: Approximation Methods**
Covers asymptotic evaluation of integrals (stationary phase and steepest descent), perturbation methods (regular and singular methods, and inner and outer expansions), multiple scale methods and applications to differential and integral equations. Department enforced prerequisite: APPM 5470.
**Requisites:** Restricted to graduate students only.

**APPM 5490 (3) Theory of Machine Learning**
Presents the underlying theory behind machine learning in proofs-based format. Answers fundamental questions about what learning means and what can be learned via formal models of statistical learning theory. Analyzes some important classes of machine learning methods. Specific topics may include the PAC framework, VC-dimension and Rademacher complexity.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites APPM 4440 and CSCI 5622.

**APPM 5510 (3) Data Assimilation in High Dimensional Dynamical Systems**
Develops and analyzes approximate methods of solving the Bayesian inverse problem for high-dimensional dynamical systems. After briefly reviewing mathematical foundations in probability and statistics, the course covers the Kalman filter, particle filters, variational methods and ensemble Kalman filters. The emphasis is on mathematical formulation and analysis of methods.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4510, STAT 4250 and STAT 5250
**Requisites:** Restricted to graduate students only.

**APPM 5515 (3) High-Dimensional Probability for Data Science**
Provides students with an exposition of the most recent methods of high-dimensional probability for the analysis of high dimensional datasets. Applications include randomized algorithms and high-dimensional random models of datasets.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4515
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites APPM 3310 and APPM 3570, or equivalent.

**APPM 5530 (3) Stochastic Analysis for Finance**
Studies mathematical theories and techniques for modeling financial markets. Specific topics include the binomial model, risk neutral pricing, stochastic calculus, connection to partial differential equations and stochastic control theory.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4530, STAT 5230 and STAT 4230
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to that of APPM 3310 and one of APPM 3570, STAT 3100 or MATH 4510; all with minimum grade of C-.

**APPM 5560 (3) Markov Processes, Queues, and Monte Carlo Simulations**
Brief review of conditional probability and expectation followed by a study of Markov chains, both discrete and continuous time, including Poisson point processes. Queuing theory, terminology and single queue systems are studied with some introduction to networks of queues. Uses Monte Carlo simulation of random variables throughout the semester to gain insight into the processes under study.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4560, STAT 4100 and STAT 5100
**Requisites:** Restricted to graduate students only.

**APPM 5565 (3) Random Graphs**
Introduces mathematical techniques, including generating functions, the first- and second-moment method and Chernoff bounds to study the most fundamental properties of the Erdos-Renyl model and other celebrated random graph models such as preferential attachment, fixed degree distribution, and stochastic block models.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4565
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APPM 5600 (3) Numerical Analysis 1**
Solution of nonlinear algebraic equations, interpolation, integration, approximation, and numerical linear algebra. Department enforced prerequisite: APPM 3310 or MATH 2130 and experience with a scientific programming language.
**Requisites:** Restricted to graduate students only.

**APPM 5610 (3) Numerical Analysis 2**
Numerical linear algebra, eigenvalue problems, optimization problems, and ordinary and partial differential equations. Department enforced prerequisite: APPM 5600 or MATH 5600.
**Requisites:** Restricted to graduate students only.

**APPM 5620 (3) Numerical Linear Algebra**
Develops and analyzes methods for the solution of square nonsingular linear systems, linear least squares problems, eigenvalue problems, and rank estimation. Direct and iterative methods are covered, as well as methods for dense and sparse problems. Requires solid background in linear algebra and proficiency with scientific computing.
**Requisites:** Restricted to graduate students only.

**APPM 5650 (3) Randomized Algorithms**
Investigates modern randomized methods that are used in scientific and numerical computing, in particular randomized matrix approximation methods. Other topics may include stochastic gradient methods and variance reduced versions, compressed sensing, and locality sensitive hashing.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5650
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite APPM 4440 or equivalent.

**APPM 5720 (1-3) Open Topics in Applied Mathematics**
Provides a vehicle for the development and presentation of new topics that may be incorporated into the core courses in applied mathematics. Department enforced prerequisite: variable, depending on the topic, see instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4720
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**APPM 6470 (3) Advanced Partial Differential Equations**
Continuation of APPM 5470. Advanced study of the properties and solutions of elliptic, parabolic, and hyperbolic partial differential equations. Topics include the study of Sobolev spaces and variational methods as they relate to PDEs, and other topics as time permits. Department enforced prerequisite: APPM 5470.
**Requisites:** Restricted to graduate students only.

**APPM 6520 (3) Mathematical Statistics**
Emphasizes mathematical theory of statistics. Topics include distribution theory, estimation and testing of hypotheses, multivariate analysis, and nonparametric inference, all with emphasis on theory. Department enforced prerequisite: APPM 5520 or MATH 5520.
**Requisites:** Restricted to graduate students only.

**APPM 6550 (3) Introduction to Stochastic Processes**
Systematic study of Markov chains and some of the simpler Markov processes including renewal theory, limit theorems for Markov chains, branching processes, queuing theory, birth and death processes, and Brownian motion. Applications to physical and biological sciences. Department enforced prerequisite: MATH 4001 or MATH 4510 or APPM 3570 or APPM 4560 or instructor consent.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 6550
**Requisites:** Restricted to graduate students only.

**APPM 6560 (3) Measure-Theoretic Probability**
Introduces a series of fundamental concepts and results in probability theory, using rigorous measure-theoretic language. Provides a solid foundation for further studies and research in probability, stochastic processes, statistics, and data science.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites Undergraduate analysis at the level of APPM 4440.

**APPM 6570 (3) Stochastic Differential Equations**
Devoted to a comprehensive investigation of stochastic differential equations, as well as their important applications in Finance, Physics, and Engineering. Consists of three main topics: stochastic integration, the theory of stochastic differential equations (SDEs), and applications of SDEs.
**Recommended:** Prerequisite APPM 6560 or MATH/APPM 6550.

**APPM 6610 (3) Introduction to Numerical Partial Differential Equations**
Covers finite difference, finite element, finite volume, pseudo-spectral, and spectral methods for elliptic, parabolic, and hyperbolic partial differential equations. Department enforced prerequisite: APPM 5600.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite APPM 5610 or graduate numerical linear algebra.

**APPM 6640 (3) Multigrid Methods**
Develops a fundamental understanding of the principles and techniques of the multigrid methodology, which is a widely used numerical approach for solving many problems in such diverse areas as aerodynamics, astrophysics, chemistry, electromagnetics, hydrology, medical imaging, meteorology/oceanography, quantum mechanics, and statistical physics.
**Requisites:** Restricted to graduate students only.

**APPM 6900 (1-6) Independent Study**
Introduces graduate students to research foci of the Department of Applied Mathematics.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**APPM 6920 (1-3) Professional Internship**
This class provides a structure for Applied Mathematics graduate students to receive academic credit for internships with industry partners that have an academic component to them suitable for graduate-level work. Participation in the program will consist of an internship agreement between a student and an industry partner who will employ the student in a role that supports the academic goals of the internship. Instructor participation will include review of internship agreement, facilitation of mid-term and final assessments of student performance, and support for any academic-related issues that may arise during the internship period.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Applied Mathematics (APPM) graduate students only.
**Grading Basis:** Letter Grade

**APPM 6930 (1-3) Professional Master's Culminating Experience**
Provides an opportunity for an Applied Mathematics Professional Master¿s student to complete their Culminating Experience (CE) project with an advisor. Before enrolling, the student is expected to have an advisor who has agreed to guide a proposed CE project.
**Requisites:** Restricted to Applied Mathematics professional master's degree (AMEN-MSAM) students only.
**Grading Basis:** Letter Grade

**APPM 6940 (1) Master's Candidate for Degree**
**Requisites:** Restricted to graduate students only.

**APPM 6950 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**APPM 7100 (3) Mathematical Methods in Dynamical Systems**
Covers dynamical systems defined by mappings and differential equations. Hamiltonian mechanics, action-angle variables, results from KAM and bifurcation theory, phase plane analysis, Melnikov theory, strange attractors, chaos, etc.
**Requisites:** Requires prerequisite course of APPM 5460 (minimum grade D-). Restricted to graduate students only.

**APPM 7300 (3) Nonlinear Waves and Integrable Equations**
Includes basic results associated with linear dispersive wave systems, first-order nonlinear wave equations, nonlinear dispersive wave equations, solitons, and the methods of the inverse scattering transform. Department enforced prerequisites: APPM 4350 and APPM 4360.
**Requisites:** Restricted to graduate students only.

**APPM 7400 (1-3) Topics in Applied Mathematics**
Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the core courses in applied mathematics.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**APPM 7900 (1-3) Independent Study**
Introduces graduate students to research foci of the Department of Applied Mathematics.
**Requisites:** Restricted to graduate students only.

**APPM 8000 (1) Colloquium in Applied Mathematics**
Introduces graduate students to the major research foci of the Department of Applied Mathematics.
**Requisites:** Restricted to Applied Mathematics (APPM) graduate students only.

**APPM 8100 (1) Seminar in Dynamical Systems**
Introduces advanced topics and research in dynamical systems.
**Requisites:** Restricted to Applied Mathematics (APPM) graduate students only.

**APPM 8300 (1-3) Nonlinear Waves Seminar**
Introduces the core methods in the analysis of nonlinear partial differential and integral equations or systems to graduate students. Provides a vehicle for the development, presentation, and corporative research of new topics in PDE and analysis.
**Requisites:** Requires prerequisite course of APPM 5440 (minimum grade D-). Restricted to Applied Mathematics (APPM) graduate students only.

**APPM 8400 (1) Mathematical Biology Seminar**
Introduces advanced topics and research in mathematical and computational biology. Instructor consent required.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APPM 8500 (1) Statistics, Optimization and Machine Learning Seminar**
Research-level seminar that explores the mathematical foundations of machine learning, in particular how statistics and optimization give rise to well-founded and efficient algorithms.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APPM 8600 (1) Seminar in Computational Mathematics**
Introduces advanced topics and research in computational mathematics.
**Requisites:** Restricted to Applied Mathematics (APPM) graduate students only.

**APPM 8700 (1) Mathematical Geosciences Seminar**
Research-level seminar that explores applications of mathematical and statistical modeling, analysis, and computation in the geosciences. Provides a vehicle for the development, presentation, and dissemination of new topics in the mathematical geosciences. Formerly offered as a special topics course.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APPM 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. No more than 10 credit hours may be taken in any one semester.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**STAT 5000 (3) Statistical Methods and Application I**
Introduces exploratory data analysis, probability theory, statistical inference, and data modeling. Topics include discrete and continuous probability distributions, expectation, laws of large numbers, central limit theorem, statistical parameter estimation, hypothesis testing, and regression analysis. Considerable emphasis on applications in the R programming language.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4000
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites of APPM 1360 or MATH 2300 or equivalent.
**Grading Basis:** Letter Grade

**STAT 5010 (3) Statistical Methods and Applications II**
Expands upon statistical techniques introduced in STAT 4000. Topics include modern regression analysis, analysis of variance (ANOVA), experimental design, nonparametric methods, and an introduction to Bayesian data analysis. Considerable emphasis on application in the R programming language.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4010
**Requisites:** Requires prerequisite STAT 5000 (minimum grade C-)
**Grading Basis:** Letter Grade

**STAT 5100 (3) Markov Processes, Queues, and Monte Carlo Simulations**
Brief review of conditional probability and expectation followed by a study of Markov chains, both discrete and continuous time, including Poisson point processes. Queuing theory, terminology and single queue systems are studied with some introduction to networks of queues. Uses Monte Carlo simulation of random variables throughout the semester to gain insight into the processes under study.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4560, STAT 4100 and APPM 5560
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to that of APPM 3570 or STAT 3100 or MATH 4510, with a minimum grade of C-.

**STAT 5230 (3) Stochastic Analysis for Finance**
Studies mathematical theories and techniques for modeling financial markets. Specific topics include the binomial model, risk neutral pricing, stochastic calculus, connection to partial differential equations and stochastic control theory.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4530, APPM 5530 and STAT 4230
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to that of APPM 3310 and one of APPM 3570, STAT 3100 or MATH 4510; all with minimum grade of C-.

**STAT 5250 (3) Data Assimilation in High Dimensional Dynamical Systems**
Develops and analyzes approximate methods of solving the Bayesian inverse problem for high-dimensional dynamical systems. After briefly reviewing mathematical foundations in probability and statistics, the course covers the Kalman filter, particle filters, variational methods and ensemble Kalman filters. The emphasis is on mathematical formulation and analysis of methods.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4510, STAT 4250 and APPM 5510
**Requisites:** Restricted to Graduate, Graduate Nondegree and non sponsored students only.

**STAT 5310 (3) Statistical Modeling for Data Science**
Introduces students to foundational concepts and techniques for statistical modeling in data science, including modern regression analysis, analysis of variance (ANOVA), experimental design, nonparametric methods, and generalized additive models. Considerable emphasis is placed on both theoretical results and applied data analysis.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites coursework equivalent to (STAT 3100 or MATH 4510 or MATH 5510) and (STAT 4000 or STAT 5000 or STAT 4520 or STAT 5520), and previous programming experience in Python or R.

**STAT 5350 (3) Applied Deep Learning 1**
Introduces students to state-of-the-art deep learning techniques employed in the industry. This course will focus on training neural networks and computer vision, including image classification and transformation, object detection, and facial recognition. Advanced topics will include domain adaptation and learning techniques. There will be an emphasis on reading current literature.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4350
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisiteprobability (equivalent to APPM 3570), statistics (equivalent to STAT 3400), some familiarity with numerical analysis, solid knowledge of Python, and familiarity with TensorFlow and PyTorch is a plus but is not a requirement.

**STAT 5360 (3) Applied Deep Learning 2**
Introduces students to state-of-the-art deep learning techniques employed in the industry. This course will focus on natural language processing, multimodal learning, generative and graph neural networks, speech and music recognition, and reinforcement learning. Students will learn software engineering techniques using Python. There will be an emphasis on reading current literature.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4360
**Requisites:** Requires prerequisite course of STAT 5350 (minimum grade C-). Restricted to graduate students only

**STAT 5400 (3) Advanced Statistical Modeling**
Introduces methods, theory and applications of modern statistical models, from linear to hierarchical linear models, to generalized hierarchical linear models, including hierarchical logistic and hierarchical count regression models. Topics such as estimation, residual diagnostics, goodness of fit, transformations, and various strategies for variable selection and model comparison will be discussed in depth. Examples will be demonstrated using statistical programming language R.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4400
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to one of STAT 3400 or STAT 4010 or STAT 5010 and one of STAT 4520 or STAT 5520 or STAT 5530; all with a minimum grade of C-.
**Grading Basis:** Letter Grade

**STAT 5430 (3) Spatial Statistics**
Introduces the theory of spatial statistics with applications. Topics include basic theory for continuous stochastic processes, spatial prediction and kriging, simulation, geostatistical methods, likelihood and Bayesian approaches, spectral methods and an overview of modern topics such as nonstationary models, hierarchical modeling, multivariate processes, methods for large datasets and connections to splines.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4430
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to one of STAT 3400 or STAT 4010 or STAT 5010 and one of STAT 4520 or STAT 5520 or STAT 5530; all with a minimum grade of C-.

**STAT 5520 (3) Introduction to Mathematical Statistics**
Examines point and confidence interval estimation. Principles of maximum likelihood, sufficiency, and completeness: tests of simple and composite hypotheses, linear models, and multiple regression analysis if time permits. Analyzes various distribution-free methods. Department enforced prerequisite: one semester calculus-based probability course, such as MATH 4510 or APPM 3570.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4520 and MATH 4520 and MATH 5520
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to APPM 3570 or STAT 3100 or MATH 4510; minimum grade of C- for all.

**STAT 5530 (3) Mathematical Statistics**
Covers the theory of estimation, confidence intervals, hypothesis testing, and decision theory. In particular, it covers the material of APPM 5520 in greater depth, especially the topics of optimality and asymptotic approximation. Additional topics include M-estimation, minimax tests, the EM algorithm, and an introduction to Bayesian estimation and empirical likelihood techniques. Recommended Prerequisite is a one-semester calculus-based probability course such as MATH 4510 or APPM 3570.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5520 or MATH 5520 or STAT 4520 or MATH 4520
**Requisites:** Restricted to graduate students only.

**STAT 5540 (3) Introduction to Time Series**
Studies basic properties, trend-based models, seasonal models modeling and forecasting with ARIMA models, spectral analysis and frequency filtration. Department enforced prerequisite: APPM 5520 or MATH 5520.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4540 and MATH 4540 and MATH 5540
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to STAT 4520 or MATH 4520 or STAT 5520 or MATH 5520; minimum grade of C- for all.

**STAT 5600 (3) Methods in Statistical Learning**
Provides an introduction to methods in the field of statistical learning. Topics include a review of multiple regression, assessing model accuracy, classification, resampling methods, model selection and regularization, nonlinear regression, tree-based methods, support vector machines and unsupervised learning. Involves hands-on data analysis using the R programming language.
**Requisites:** Requires prerequisite course of STAT 5010 (minimum grade C-). Restricted to MS-DS students.

**STAT 5610 (3) Statistical Learning**
Consists of applications and methods of statistical learning. Reviews multiple linear regression and then covers classification, regularization, splines, tree-based methods, support vector machines, unsupervised learning and Gaussian process regression.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4610
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to that of STAT 3400 or STAT 4010 or STAT 5010; minimum C- grade for all.

**STAT 5630 (3) Computational Bayesian Statistics**
Introduces Bayesian statistics, normal and non-normal approximation to likelihood and posteriors, the EM algorithm, data augmentation, and Markov Chain Monte Carlo (MCMC) methods. Additionally, introduces more advanced MCMC algorithms and requires significant statistical computing. Examples from a variety of areas, including biostatistics, environmental sciences, and engineering, will be given throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4630
**Requisites:** Requires prerequisite courses of (STAT 5520 or MATH 5520 or STAT 5530) and (APPM 5560 or STAT 5100 or APPM 6550 or MATH 6550) (all minimum grade C-).
**Recommended:** Prerequisite prior programming and basic statistical modeling experience is required.

**STAT 5640 (3) Capstone in Statistics and Data Science**
Course provides senior-level and graduate students the opportunity to apply the knowledge, skills, and abilities developed throughout the Statistics and Data Science major. Working in teams, students undertake a data-driven problem presented by domain experts from government, industry, or academia. The course provides valuable real-world experience for students intending to pursue graduate education or technical careers. Topics include team building, problem solving, research methods, project management, data ethics, and clear communication (oral, written, and visual).
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4640
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite STAT 4400 or STAT 4610.
**Grading Basis:** Letter Grade

**STAT 5650 (3) Randomized Algorithms**
Investigates modern randomized methods that are used in scientific and numerical computing, in particular randomized matrix approximation methods. Other topics may include stochastic gradient methods and variance reduced versions, compressed sensing, and locality sensitive hashing.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5650
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite APPM 4440 or equivalent.

**STAT 5680 (3) Statistical Collaboration**
Educates and trains students to become effective interdisciplinary collaborators by developing the communication and collaboration skills necessary to apply technical statistics and data science skills to help domain experts answer research questions. Topics include structuring effective meetings and projects; communicating statistics to non-statisticians; using peer feedback, self-reflection and video analysis to improve collaboration skills; creating reproducible statistical workflows; working ethically.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4680
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite undergraduate statistics courses equivalent to STAT 4400 (minimum grade C-) or STAT 4010 (minimum grade C-) or Instructor's approval.
**Grading Basis:** Letter Grade

**STAT 5690 (2) Advanced Statistical Collaboration**
Educates and trains students to become advanced interdisciplinary collaborators by developing and refining the communication, collaboration and technical statistics and data science skills necessary to collaborate with domain experts to answer research questions. Students work on multiple projects. Discussions center on technical skills necessary to solve research problems and video analysis to improve communication and collaboration skills.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4690
**Requisites:** Requires prerequisite course of STAT 4680 or STAT 5680 (minimum grade C-). Restricted to graduate students only.
**Grading Basis:** Letter Grade

**STAT 5700 (3) Philosophical and Ethical Issues in Statistics**
Introduces students to philosophical issues that arise in statistical theory and practice. Topics include interpretations of probability, philosophical paradigms in statistics, inductive inference, causality, reproducible, and ethical issues arising in statistics and data analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4700
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to STAT 3400 or STAT 4000 or STAT 4520 or STAT 5000 or STAT 5520 or STAT 5530; minimum grade C- for all.
**Grading Basis:** Letter Grade

**STAT 5720 (1-3) Open Topics in Statistics and Data Science**
Provides a vehicle for the development and presentation of new topics that may be incorporated into the core courses in applied mathematics. Department enforced prerequisite: variable, depending on the topic, see instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4720
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

# Applied Mathematics - Master of Science (MS)

The MS degree is only available to current degree-seeking students at CU Boulder who are in the applied mathematics PhD program, another CU Boulder PhD program or the applied mathematics bachelor's–accelerated master's.

*Those who are not currently attending CU Boulder should apply to the* Applied Mathematics - Professional Master of Science (MSAM) *(p. 1152) program.*

Students should carefully read the program's Requirements (p. 1113) section. For more information, visit the department's Applied Mathematics Graduate Student Supplement (http://www.colorado.edu/amath/prospective-students/graduate/supplement-course-catalog-degree-requirements/).

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s): Applied Mathematics - Bachelor of Science (BS) (p. 859)

# Requirements

## Prerequisites

The MS degree is only available to current degree-seeking students at CU Boulder who are in the applied mathematics PhD program, another CU Boulder PhD program or the applied mathematics Bachelor's–Accelerated Master's.

*Those who are not currently attending CU Boulder should apply to the* Applied Mathematics - Professional Master of Science (MSAM) *(p. 1152) program.*

Prerequisites for graduate study in applied mathematics include three semesters of calculus and a course in differential equations and linear algebra. The overall grade point average for mathematics and applied mathematics must be B or better.

Other strongly recommended courses are:

| Code | Title | Credit Hours |
|---|---|---|
| **Strongly Recommended Prerequisites** | | |
| APPM 3310 | Matrix Methods and Applications | 3 |
| APPM 4350 & APPM 4360 | Methods in Applied Mathematics: Fourier Series and Boundary Value Problems and Methods in Applied Mathematics: Complex Variables and Applications | 6 |
| APPM 4440 | Undergraduate Applied Analysis 1 | 3 |
| APPM 4600 & APPM 4610 | Numerical Methods and Scientific Computing and Numerical Differential Equations | 7 |

## Course Requirements

The department requires a master's degree candidate to complete an approved program of study consisting of at least 30 credits, at least 18 of which must be applied mathematics courses at the 5000 level or above. A grade of C (2.0) or higher must be attained in each course.

Generally, the following courses do not count toward the 30-credit requirement: APPM 5350, APPM 5360, STAT 5000, and APPM 5720.

*Note*: The APPM 5720 course number is used for a variety of courses that are either run for the first time or on an ad hoc basis. When appropriate, the Graduate Committee may decide that a particular version of this course should count towards graduate credits. If a student would like to count credits from APPM 5720 toward an APPM graduate degree, advice should be sought from the chair of the graduate committee on whether this would be permissible.

All master's degree students must complete two year-long, 5000-level course sequences in applied mathematics:

- APPM 5600 & APPM 5610 (required; may be waived for students who obtain a pass on the numerical analysis preliminary exam) AND
- a sequence listed in the "Graduate Courses" section of the Applied Mathematics Graduate Student Supplement (http://www.colorado.edu/amath/prospective-students/graduate/supplement-course-catalog-degree-requirements/) (other sequences require approval from the chair of the graduate committee).

MS candidates must take a yearlong 5000-level graduate sequence outside of applied mathematics in an area where mathematics has significant application. This sequence must be approved by the chair of the graduate committee.

Upon approval by petition to the graduate committee, up to 6 credit hours may be taken in 4000-level courses in other departments, provided members of the graduate faculty teach those courses.

## Degree Plans

There are two courses of action for graduate students who are looking to graduate with a master's degree.

### Plan I: Thesis Option

A student electing to do a thesis must enroll in 4–6 hours of thesis credit, which count toward the required 30 hours, and must take an oral comprehensive exam (also referred to as a defense) on that thesis work. A student can only enroll in a total of 6 thesis hours for the course of the degree program. This exam will be administered by a committee consisting of the faculty advisor, who serves as committee chair, and two other faculty members. Each committee member must hold a current graduate faculty appointment. The chair must have a regular graduate faculty appointment, and the remaining committee members must hold either regular or special membership. At least one committee member must hold a regular (tenure or tenure-track) faculty appointment in Applied Mathematics.

### Plan II: Non-Thesis Option

A student choosing the non-thesis option must pass any one of four PhD preliminary exams. Details are provided in the Applied Mathematics Graduate Student Supplement (http://www.colorado.edu/amath/prospective-students/graduate/supplement-course-catalog-degree-requirements/).

Each MS student electing the non-thesis option must submit a completed MS degree audit form to the graduate chair upon submitting the Candidacy Application for an Advanced Degree.

A student who fails a written preliminary exam may, in a later semester, make one and only one more attempt to satisfy this requirement. In doing so, the student may switch between the thesis and the non-thesis option of the program, or between one preliminary exam area and another. Students who fail two preliminary exams are subject to dismissal from the program.

# Plan(s) of Study

The following plan of study is an example track for students looking to study partial differential equations.

| Year One | | Credit Hours |
|---|---|---|
| APPM 5600 | Numerical Analysis 1 | 3 |
| APPM 5610 | Numerical Analysis 2 | 3 |
| Part 1 Out of Department Sequence | | 3 |
| APPM 5470 | Methods of Applied Mathematics: Partial Differential and Integral Equations | 3 |
| APPM 5620 | Numerical Linear Algebra | 3 |
| APPM 6610 | Introduction to Numerical Partial Differential Equations | 3 |
| | **Credit Hours** | **18** |
| **Year Two** | | |
| APPM 5480 | Methods of Applied Mathematics: Approximation Methods | 3 |
| APPM 5460 | Methods in Applied Mathematics: Dynamical Systems and Differential Equations | 3 |
| APPM 5720 | Open Topics in Applied Mathematics | 1-3 |
| Part 2 Out of Department Sequence | | 3 |
| APPM 6950 | Master's Thesis | 4-6 |
| | **Credit Hours** | **14-18** |
| | **Total Credit Hours** | **32-36** |

# Learning Outcomes

By the completion of our program, students will be able to:

- Utilize technical training in core methods of applied mathematics (including numerical analysis, applied analysis, partial differential equations, statistics or probability) which form the foundation of problem solving in modern research problems.
- Apply skills in interdisciplinary methods, data science and/or scientific computation in ways that focus on solving important problems in applied mathematics and related fields.
- Develop fluency and deep proficiency in a particular area of applied mathematics through written work and oral presentations.
- Become self-directed (independent) learners who can obtain technical skills through their own reading, development and academic exploration. This outcome should be driven by the student first and foremost rather than by a supervisor or mentor.

# Applied Mathematics - Professional Master of Science (MSAM)

CU Boulder's professional master's degree in applied mathematics is designed to give students the technical knowledge and professional skills to be highly successful in careers related to data science, statistics, applied mathematics and engineering.

Coursework culminating in a comprehensive final project offers students strong preparation in mathematics, statistics and computing at the heart of the big data revolution. In addition, students will have access to workshops and courses that help develop valuable professional skills, including communication, collaboration, presentation, organizational and networking skills. As a part of our program, students engage in a hands-on, experiential education, with opportunities for networking with campus faculty and off-campus professionals.

Our internationally recognized faculty have both academic and industrial experience. Many are fellows of professional societies, including the Society for Industrial and Applied Mathematics, the American Mathematical Society, the American Statistical Association and the American Physical Society.

# Specializations

## Statistics and Data Science Specialization

Students in the program will have the option to specialize in Statistics and Data Science or customize their own educational plan. The Statistics and Data Science specialization enables students to develop the foundational tools needed to analyze and interpret data, including complex and high-dimensional datasets. In addition, students will have the opportunity to participate in the department's Laboratory for Interdisciplinary Statistical Analysis (LISA) (https://www.colorado.edu/lab/lisa/). Here, students will gain valuable collaboration skills and foster relationships with faculty and industry professionals.

## Customized Specialization

Students not wishing to specialize in statistics and data science can forge their own path with a customized educational track that capitalizes on the Applied Mathematics Department's numerous strengths, including computational mathematics, mathematical biology, mathematical geosciences, applied nonlinear PDEs and dynamics, and stochastic processes and applications.

For more information, see the department's Professional MS in Applied Mathematics (https://www.colorado.edu/amath/academics/professional-masters-degree/) webpage.

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s): Statistics and Data Science - Bachelor of Arts (BA) (p. 116)

# Requirements

## Prerequisites

The MS in applied mathematics is designed to further the strong math and computer science skills that candidates already demonstrate. Our program works well for those already working and practicing mathematics who wish to extend their knowledge and skill.

Equivalent recommended courses are:

| Code | Title | Credit Hours |
|---|---|---|
| **Equivalent Prerequisites** | | |
| APPM 3310 | Matrix Methods and Applications | 3 |

One of the following:

| | | |
|---|---|---|
| APPM 3570 | Applied Probability | 3 |
| MATH 4510 | Introduction to Probability Theory | 3 |

## Course Requirements

The department requires a master's degree candidate to complete an approved program of study consisting of at least 30 credit hours, at least 18 of which must be applied mathematics or statistics courses at the 5000 level or above. Maintain a GPA of 3.0 or better and earn at least a C grade in each course.

Generally, the following courses do not count toward the 30-credit-hour requirement: APPM 5350, APPM 5360 and APPM 5720.

*Note*: The APPM 5720 course number is used for a variety of courses that are either run for the first time or on an ad hoc basis. When appropriate, the Graduate Committee may decide that a particular version of this course should count towards graduate credits. If a student would like to count credits from APPM 5720 toward an APPM graduate degree, they should speak with their advisor.

MS candidates must take two 5000-level graduate courses (6 credits) outside of applied mathematics in an area where mathematics or statistics has significant application. This sequence must be approved by the student's advisor.

Upon approval by petition to the professional MS Director, up to 6 credit hours may be taken in 4000-level courses in other departments, provided members of the graduate faculty teach those courses.

## Culminating Experience (CE)

Our unique program allows students to complete a Culminating Experience project (CE) instead of a master's thesis. This flexible, student-driven, industry-oriented project allows graduates to obtain deep knowledge and skills working with data that address scientific research issues. The CE project not only develops applicable skills for our master's degree students, but it is also highly regarded by companies, researchers and universities that employ our graduates.

There are two options for completing a CE. Each option must have a written and presentation component. See here (https://www.colorado.edu/amath/sites/default/files/attached-files/ce_deliverables.pdf) for information on the required written and presentation deliverables. Students in the program will propose and discuss a CE option with their advisor before approval is granted. CE projects do not require a final examination with a committee.

### Option I: Project

A CE project is intended to have goals that are different from a traditional master's thesis. In particular, students working on a project are expected to fulfill any of the following three goals: (1) master an important set of mathematical or statistical methods used in industry; (2) gain experience working with a large, high dimensional, or "messy" dataset; or (3) gain exposure to some tools (e.g., SQL and database management) that aren't typically taught in the program but that are useful for future employment.

- Students interested in statistics and data science are encouraged to complete their CE project with LISA. The most natural way to do this would be to produce a written report and presentation of a collaborative project from STAT 5680 Statistical Collaboration or STAT 5690 Advanced Statistical Collaboration.
- Students pursuing areas other than statistics and data science would propose a project to their advisor and if applicable a potential co-advisor in that area of study. If interested, the student and co-advisor would come to an agreement on the work required to meet goals (1)--(3) above. Such projects do not need to meet the criteria of a formal master's thesis.

### Option II: Internship or Fellowship

Students who secure an internship or fellowship related to applied mathematics, statistics or data science while in the program can use their work as part of their CE. Students choosing this CE option should work closely with their advisor to determine successful completion of the CE. With approval from their advisor, students who choose this option can enroll in our CE independent study course APPM 6930 to receive credit for the internship or fellowship.

# Specializations

## Specialization in Statistics and Data Science

Students have the option to specialize in statistics and data science. This specialization gives students the foundational tools for analyzing data, including complex and high dimensional datasets. There are four required courses and many electives coming from the following categories:

- **Probability and statistics theory**: Courses in this category introduce the theory of probability and stochastic processes, and the foundations of statistical inference.
- **Statistical modeling and data science**: Courses in this category provide students with the tools to model and analyze data, perform predictive analyses, and apply theory to solve important scientific problems.
- **Professional development and collaboration kills**: Courses in this category train students to become effective interdisciplinary collaborators. Skills taught in these courses include communicating statistics to non-statisticians, reproducible workflows and ethical decision-making.

For a list of courses that fall within these categories, visit the department website (https://www.colorado.edu/amath/ms-applied-mathematics/degree-specializations/).

Students interested in statistics and data science are encouraged to complete their CE project through the department's Laboratory for Interdisciplinary Statistical Analysis (https://www.colorado.edu/lab/lisa/) (LISA). The most natural way to do this would be to produce a written report and presentation of a collaborative project from STAT 5680 Statistical Collaboration or STAT 5690 Advanced Statistical Collaboration. Students who do not take both STAT 5680 and STAT 5690 will have a deficit of 3 credit hours; such deficits can be filled in by elective coursework as approved by your advisor to reach the 30 credit hours required for the degree.

The table below gives a sample program representing one possible scenario for successfully completing the degree with a statistics and data science specialty. Other scenarios are possible.

| Course | Title | Credit Hours |
|---|---|---|
| **Year One** | | |
| STAT 5000 | Statistical Methods and Application I (encouraged but optional based on background; an approved elective can be taken as an alternative) | 3 |
| STAT 5520 or STAT 5530 | Introduction to Mathematical Statistics or Mathematical Statistics | 3 |
| APPM/STAT Elective | | 3 |

| | | |
|---|---|---|
| STAT 5010 or STAT 5310 | Statistical Methods and Applications II or Statistical Modeling for Data Science | 3 |
| Part 1 Out of Department Sequence | | 3 |
| | **Credit Hours** | **15** |
| **Year Two** | | |
| STAT 5400 | Advanced Statistical Modeling | 3 |
| STAT 5610 | Statistical Learning | 3 |
| Part 2 Out of Department Sequence | | 3 |
| STAT 5630 | Computational Bayesian Statistics | 3 |
| STAT 5680 | Statistical Collaboration | 3 |
| Culminating Experience | | |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **30** |

### Customized Specialization

Students can forge their own path with a customized educational track based on their own interests. Many students choose to capitalize on the department's numerous strengths, including computational mathematics, statistics and data science, physical applied mathematics, mathematical biological and social sciences, and mathematical geosciences. Please see our Specialization Page (https://www.colorado.edu/amath/ms-applied-mathematics/degree-specializations/) for an example customized specialization.

Such specializations should be designed with the MS director within the first year of the program.

## Educational Goals

### Content Knowledge

- Provide students with foundational knowledge in areas of applied mathematics, statistics or data analysis beyond the standard undergraduate curriculum.
  - Statistics and data science specialization: Provide students with foundational knowledge in (1) probability and statistical theory, (2) statistical modeling and data science and (3) professional development and collaboration skills.
  - Customized specialization: Provide students with foundational knowledge in one of the Department of Applied Mathematics' core research areas: computational mathematics, mathematical biology, mathematical geosciences, applied nonlinear PDEs and dynamics, or stochastic processes and applications.
- Provide students with the skills to write efficient, reproducible code in at least one programming language (e.g., R and Python).
- Provide students with the skills to interpret code and output from at least one programming language.

### Professional Skills

- Provide students with a set of industry-sought professional skills, including data analysis, communication, collaboration, presentation, organizational, and networking skills.
- Teach students to utilize their foundational knowledge in applied mathematics, statistics, or data analysis, and their professional skills, to solve real-world science, engineering, social science, or data analysis problems.
- Make available a number of opportunities for students to gain hands-on, real-world experience. Such opportunities include internships, fellowships, and professional collaborations through the Laboratory for Interdisciplinary Statistical Analysis (https://www.colorado.edu/lab/lisa/) (LISA).

# Applied Mathematics - Doctor of Philosophy (PhD)

With internationally recognized faculty and a strong commitment to its graduate program, the Department of Applied Mathematics at CU Boulder strives to provide graduate students a high-quality education and training in applied mathematics while preparing them for careers in industry, laboratories and the academic professions.

The department fosters extensive interaction between students and faculty to provide a tailored educational experience in applied mathematics. Currently, the department has both faculty (https://www.colorado.edu/amath/directory/) and affiliated faculty (https://www.colorado.edu/amath/academics/graduate-students/affiliated-faculty/) from other academic departments and colleges. A PhD student can be advised by core faculty or co-advised by an affiliate involved in applied mathematics which creates a definitively unique learning experience in many areas of physical, biological, computational or engineering sciences. With the breadth of such a diverse faculty, a student can explore their academic and research interests through the investigation of numerous ongoing faculty projects.

Many of our PhD students have had the opportunity to conduct their research at world-class institutes located right here in Boulder such as the National Center for Atmospheric Research, National Institute of Standards and Technology, and the National Oceanic and Atmospheric Administration. Our students have the opportunity to not only work directly with organizations here in Boulder but also the National Renewable Energy Lab and the Laboratory for Atmospheric and Space Physics, along with many other national research laboratories.

The Department of Applied Mathematics offers coursework and research leading to the PhD degree in applied mathematics. The aim of the department is to train graduate students to perform independent research on the methods and applications of applied mathematics. Research areas represented in the department include:

- Computational mathematics
- Mathematical biology
- Mathematical geosciences
- Applied nonlinear PDEs and dynamics
- Statistics and data science
- Stochastic processes and applications

For more information on the department and degree requirements, download the supplement to the catalog (http://www.colorado.edu/amath/prospective-students/graduate/supplement-course-catalog-degree-requirements/) or visit the Applied Mathematics (http://www.colorado.edu/amath/) website.

# PhD with Certificate in Interdisciplinary Quantitative Biology

Applied mathematicians interested in collaborations with bioscientists will need a breadth of knowledge in quantitative bioscience to be successful. The interdisciplinary quantitative biology (IQ biology) graduate certificate (p. 1777) program emphasizes training at the intersection of biochemistry, biology, computer science, engineering,

applied mathematics and physics. The PhD in applied mathematics with a certificate in IQ biology will strengthen this training with additional foundations in numerical and mathematical analysis, probability and statistics, mathematical biology and network analysis.

Candidates interested in this program should apply directly to IQ biology and select applied mathematics as one of their graduate programs of interest. In addition to satisfying the requirements for the PhD in applied mathematics, students in this program must take 12 credit hours in three IQ biology core courses (Quantitative Biology Foundations, Statistics and Computations for Genomes and Meta-Genomes and Forces in Biology), which can serve as the out-of-department sequence for the PhD, as well as three 10-week rotations in labs associated with the IQ biology program.

For more information, visit the BioFrontiers Institute's IQ Biology PhD Program (http://iqbiology.colorado.edu/) website.

# Requirements

## Required Courses and Credits

A minimum of 60 credits is required for the degree, including 30 credits in courses numbered 5000 or above (APPM 5350, APPM 5360, STAT 5000 and APPM 5720 generally do not count toward this requirement) and 30 credits of applied math dissertation credit.

A grade of B- or higher must be attained in each course. PhD students must maintain a grade point average of 3.0 or better each semester.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Core Sequences and Seminars** | | **15** |
| APPM 5440 & APPM 5450 | Applied Analysis 1 and Applied Analysis 2 | |
| APPM 5600 & APPM 5610 | Numerical Analysis 1 and Numerical Analysis 2 | |
| APPM 7400 | Topics in Applied Mathematics (PhD students will take a 1-credit seminar three times, in the following topics: Teaching Excellence, Intro to Research, Graduate Research) | |
| **Third Required Sequence (Student's Choice)** | | **6** |
| Choose between PDEs and Statistics Sequences. Some options are listed below. | | |
| APPM 5470 & APPM 5430 | Methods of Applied Mathematics: Partial Differential and Integral Equations and Methods in Applied Mathematics: Applications of Complex Variables | |
| or APPM 5460 | Methods in Applied Mathematics: Dynamical Systems and Differential Equations | |
| or APPM 5480 | Methods of Applied Mathematics: Approximation Methods | |
| STAT 5530 & STAT 5540 | Mathematical Statistics and Introduction to Time Series | |
| or STAT 5100 | Markov Processes, Queues, and Monte Carlo Simulations | |
| or STAT 5400 | Advanced Statistical Modeling | |
| **Elective(s): any 3-credit APPM class OR any three 1-credit seminars below** | | **3** |
| APPM 8000 | Colloquium in Applied Mathematics | |
| APPM 8100 | Seminar in Dynamical Systems | |
| APPM 8300 | Nonlinear Waves Seminar | |
| APPM 8400 | Mathematical Biology Seminar | |
| APPM 8500 | Statistics, Optimization and Machine Learning Seminar | |
| APPM 8600 | Seminar in Computational Mathematics | |
| **Out-of-department Sequence** | | **6** |
| Choose two courses in an area where your research and mathematics have significant application. Approval of the sequence from the graduate committee chair is required. | | |
| **Dissertation** | | **30** |
| APPM 8990 | Doctoral Dissertation | |
| **Total Credit Hours** | | **60** |

## Exams

### Preliminary Exams

- Doctoral students must take and pass two preliminary exams by August at the end of their first year. Exams are graded pass/fail.
- In January, first-year PhD students can choose to take either Partial Differential Equations or Statistics.
- In May, first-year PhD students can choose to take either Applied Analysis or Numerical Analysis.
- Makeup exams are offered in August. Students may only make up exams in areas they have taken before.
- Students may not take any exam more than twice.

### Comprehensive Exams

The purpose of the comprehensive exam is to ensure that the student has a sufficient grasp of the fundamentals of the chosen thesis area to begin research, the ability to exchange ideas and information with the members of the examining board (thesis committee) and a broad base of knowledge in applied mathematics.

Before the comprehensive exam, the PhD student must submit a 5–10 page thesis proposal, complete with motivation for the topic and references to key papers, to each member of the thesis committee. This proposal should be written in consultation with the chair of the thesis committee.

The exam will consist of a presentation by the student on his/her research proposal for a maximum of one hour in length, followed by a questioning period of up to one additional hour. The presentation portion is open to all faculty and students in the program.

Students will need to be registered in classes for the semester they are going to complete their examination for it to count toward that semester. This includes the summer semester.

- Select committee (see rules on Exam Report) and schedule comprehensive date and location. Then inform Graduate Coordinator (amgradco@colorado.edu).
- Complete Doctoral Comprehensive Exam form (https://www.colorado.edu/graduateschool/content/doctoral-comprehensive-exam/) for committee approval (select comprehensive; at least 3 weeks prior to Comp Date).
- Submit title and abstract to amassist@colorado.edu to post in department (at least 2 weeks prior to comp date) See example (https://www.colorado.edu/amath/sites/default/files/attached-files/comps_or_thesis_announcement_example.pdf) or .tex file.

(https://www.colorado.edu/amath/sites/default/files/attached-files/comps_or_thesis_announcement_template.tex)

- Complete Candidacy application (https://www.colorado.edu/graduateschool/academics/forms-current-students/) to PhD.

### Dissertation Defense

The exam will consist of a presentation by the student on his/her research proposal, followed by a questioning period of up to one additional hour. The presentation portion is open to all faculty and students in the program.

Students will need to be registered in classes for the semester they are going to complete their examination for it to count towards that semester. This includes the summer semester.

- Select committee members (see rules on Exam form) and inform the graduate coordinator.
- Complete Doctoral Exam f (http://www.colorado.edu/GraduateSchool/academics/_docs/docexam-fillable.pdf)orm (https://www.colorado.edu/graduateschool/content/doctoral-final-examination-form/) for committee approval (at *least* 2 weeks prior to Defense Date).
- Submit thesis to Graduate School electronically (https://www.colorado.edu/graduateschool/academics/thesis-dissertation-submission/) (contact graduate coordinator for details).
  - Submit a Thesis Approval Form (https://www.colorado.edu/graduateschool/content/thesis-approval-form/) (TAF) to ensure that the final copy has been accepted by the thesis committee. The TAF must be uploaded as a supplemental file with the thesis in order for the submission to be complete.
- Submit three hard copies of the thesis to the graduate coordinator. Same due date as Graduate School submission date. This version will serve as the archival copy kept by the University Library. These three copies will be bound for students by the department free of charge (one for the student, one for the department and one for the student's advisor).
  - One copy must be printed single-sided, on 8.5" x 11" watermarked paper of at least 25 percent cotton and 20# weight.
  - The other two copies can be printed double-sided, on 8.5" x 11" watermarked paper of at least 25 percent cotton and 20# weight.
- Submit thesis to CU Electronic Scholars Depository (see instructions on the About Institutional Repositories (http://scholar.colorado.edu/about.html) webpage).
- Complete the Survey of Earned Doctorates (contact Graduate Coordinator for details).

## Plan of Study

The track below is a sample curriculum for students who are interested in focusing on partial differential equations.

| Year One | | Credit Hours |
|---|---|---|
| APPM 5600 | Numerical Analysis 1 | 3 |
| APPM 5610 | Numerical Analysis 2 | 3 |
| APPM 5470 | Methods of Applied Mathematics: Partial Differential and Integral Equations | 3 |
| APPM 5460 | Methods in Applied Mathematics: Dynamical Systems and Differential Equations | 3 |
| | **Credit Hours** | **12** |
| **Year Two** | | |
| APPM 5440 | Applied Analysis 1 | 3 |
| APPM 5450 | Applied Analysis 2 | 3 |
| APPM 5480 | Methods of Applied Mathematics: Approximation Methods | 3 |
| APPM 5720 | Open Topics in Applied Mathematics | 1-3 |
| Part 1 of Out of Department Sequence | | 3 |
| | **Credit Hours** | **13-15** |
| **Year Three** | | |
| Part 2 of Out of Department Sequence | | 3 |
| APPM 8000 | Colloquium in Applied Mathematics | 1 |
| APPM 8100 | Seminar in Dynamical Systems | 1 |
| APPM 7400 | Topics in Applied Mathematics | 1-3 |
| APPM 6470 | Advanced Partial Differential Equations | 3 |
| | **Credit Hours** | **9-11** |
| **Year Four** | | |
| APPM 8990 | Doctoral Dissertation | 10 |
| | **Credit Hours** | **10** |
| **Year Five** | | |
| APPM 8990 | Doctoral Dissertation | 10 |
| | **Credit Hours** | **10** |
| **Year Six** | | |
| APPM 8990 | Doctoral Dissertation | 10 |
| | **Credit Hours** | **10** |
| | **Total Credit Hours** | **64-68** |

## Learning Outcomes

By the completion of our program, students will be able to:

- Become self-directed (independent) learners who can obtain research skills through their own reading, development and research exploration. This outcome should be driven by the student first and foremost rather than by a research supervisor or mentor.
- Demonstrate and exercise technical training in core methods of applied mathematics (including numerical analysis, applied analysis, partial differential equations, statistics and probability) which form the foundation of problem solving in modern research problems.
- Demonstrate and exercise skills in interdisciplinary methods, data science and/or scientific computation in ways that focus on solving important problems in applied mathematics and related fields.
- Successfully design and conduct original research that answers questions of interest to the applied mathematics community and that employs appropriate research methods.
- Effectively communicate and present research to academic and public audiences.
- Demonstrate proficiency and expertise in literature for a relevant area of applied mathematics and synthesize competence in written and oral form.

# Art and Art History

The Department of Art and Art History offers three graduate degrees—the MFA in art practices, the MA in art history and the PhD in the Arts of the Americas—as well as the MFA/MBA and MA/MBA dual degrees in collaboration with the Leeds School of Business.

The MA in art history is intended to give students a broad general knowledge of art history in a two-year program. Students who have achieved a distinguished record in this MA program should be well prepared for acceptance into a doctoral program in art history as well as other careers requiring an MA in art history or an equivalent degree.

The MFA in art practices is a rigorous program intended for artists committed to pursuing a professional life in the arts and prepares students for careers as practicing artists and arts professionals, as well as teachers in colleges, universities and art schools. During the two-and-a-half-year program, students focus on one of several fields, including: ceramics, IMAP (photography, digital media, video, integrated arts), painting and drawing, printmaking, sculpture and post-studio practice, and film (in collaboration with the Department of Cinema Studies and Moving Images Arts).

The MFA/MBA and MA/MBA program requires candidates to submit separate applications to the Department of Art and Art History as well as the Leeds School of Business. In addition to the required coursework, MFA and MA students gain additional insights about their respective fields through the Visiting Artist Program and Visiting Scholars Program, both of which invite distinguished artists and scholars to CU for talks, seminars and individual meetings with students.

The PhD in arts of the Americas emphasizes the cross-cultural circulation of visual culture in the Americas from ancient to contemporary times. Our program encourages students to think across subfields (e.g., Pre-Columbian Art, Colonial Latin American Art, Modern and Contemporary Latin American Art, Native North American Art, Modern and Contemporary American Art, etc.) and to situate American visual culture in the fluid circuits of cross-cultural exchange, as well as global intellectual and trade networks. This interdisciplinary approach brings Art History into dialogue with Anthropology, History, Ethnic Studies, Women's and Gender Studies, Religious Studies, and other disciplines in the humanities, social sciences, and natural sciences. Our accelerated PhD program is ideal for students who already have an MA in art history or an equivalent degree, including professionals in the art field seeking an opportunity to advance in their career by earning a PhD.

The faculty are highly active in their respective fields, from publishing important articles and books on historical and contemporary art to exhibiting in galleries and museums to establishing nontraditional artist venues and opportunities. The faculty are also committed teachers and mentors who work closely with graduate students, helping them to realize their individual visions as artists and historians.

Students who are accepted to the MA, MFA, MFA/MBA, MA/MBA and PhD programs join the CU Boulder Graduate School, which serves the community of graduate students, faculty and staff, one of the nation's premier comprehensive research universities. The Graduate School offers guidance on a wide array of academic, social and financial issues, and can assist in navigating the often complex world of graduate education.

Serving as an umbrella organization since 1892, the Graduate School currently oversees 100 graduate and professional programs. The Graduate School works to guarantee a standard of quality and cohesion across all disciplines, ensuring the continuing integrity and value of a CU Boulder graduate degree. The Graduate School also helps make possible the many connections between the campus and outside constituencies, in the state, the nation and the world.

Click here to visit the Department of Art and Art History's Website (http://cuart.colorado.edu/degrees/graduate/).

**Course codes for these programs are ARTF, ARTH and ARTS.**

# Special Programs

## The CU Art Museum

The CU Art Museum is a cultural gateway to CU Boulder, facilitating engagement with larger societal issues through a greater understanding of the arts in a global context. The CU Art Museum is committed to enhancing understanding and appreciation of the visual arts within the academic community and among regional, national and international audiences. It provides access to art of the highest quality through exhibitions, publications and related educational events that reflect diversity, critical thinking and creative research. The museum also facilitates student training in museum practices. As a collecting institution, the CU Art Museum promotes the excellence, preservation, scholarly interpretation, exhibition and growth of its comprehensive permanent collection, which includes artworks from numerous time periods, artistic traditions and cultures. The 25,000-square-foot CU Art Museum contains five galleries, including permanent collection galleries, changing exhibition galleries and a video gallery. The CU Art Museum also includes a collections study center, allowing students, faculty and researchers the opportunity to schedule appointments to view, research and study works in its permanent collection.

## The CU Art Museum's Permanent Collection

The Permanent Collection of the CU Art Museum contains over 8,800 works of art. The collection includes works from numerous time periods and cultures including ancient Greek pottery, Roman Glass, ancient Iranian pottery, Southwestern and South American santos, Southeast Asian pottery, African sculpture, Old Master works on paper, British 18th century prints, 19th and 20th century American prints and paintings, Japanese *ukiyo-e* prints, 19th century photography, Pop art, Minimalist works on paper and modern and contemporary ceramics, sculpture, works on paper, paintings, photography, video and new media art.

## Visiting Scholar Program

This program is organized to explore the discipline of art history—its cultural connections, methodological pursuits and its changing nature—by focusing extensively on the research and insights of individual academic experts. Three to five highly regarded art historians and/or art critics speak at a public lecture, presenting current research and published papers.

## Visiting Artist Program

Artists of national and international reputation interact with graduate and advanced undergraduate students and discuss their studio work at seminar meetings. Artists present a public lecture during their visit, providing continuous input of significant developments and a comprehensive view of contemporary issues in the arts.

## Visual Resources Center (VRC)

The mission of the VRC is to provide and facilitate access to images, imaging and related information resources for teaching and research in the Department of Art and Art History. This includes: 1) a departmental image collection and support for other important image resources; 2) resources, training and support in digital imaging and image presentation software; and 3) equipment for use in creative work, documentation and classrooms within the department. The digital image collection contains works by faculty, MFA thesis recipients, visiting artists and other contemporary and historical works. Digital imaging resources include slide and flatbed scanning stations, with training available in

digitization standards and best practices. VRC equipment includes laptops, data projectors, digital SLR cameras, video cameras, tripods and other equipment for use in the department. The VRC also circulates its collection of DVDs containing lectures and interviews from the department's Visiting Artist Program. Visit the department's Visual Resources Center (https://www.colorado.edu/artandarthistory/vrc/) webpage for more information.

For a full list of departmental resources, visit the department's Resources (https://www.colorado.edu/artandarthistory/resources/) webpage.

## Master's Degrees

- Art History - Master of Arts (MA) (p. 1166)
- Art Practices - Master of Fine Arts (MFA) (p. 1168)

## Doctoral Degree

- Arts of the Americas - Doctor of Philosophy (PhD) (p. 1172)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Alhadeff, Albert (https://experts.colorado.edu/display/fisid_100711/)
Associate Professor; PhD, New York University

Ambrose, Kirk T. (https://experts.colorado.edu/display/fisid_115914/)
Professor; PhD, University of Michigan Ann Arbor

Amerika, Mark (https://experts.colorado.edu/display/fisid_116523/)
Professor; MFA, Brown University

Brown, Marilyn Ruth (https://experts.colorado.edu/display/fisid_143782/)
Professor Emerita; PhD, Yale University

Chamberlin, H. Scott (https://experts.colorado.edu/display/fisid_105456/)
Professor; MFA, New York State College of Ceramics at Alfred University

Chong, Albert (https://experts.colorado.edu/display/fisid_100586/)
Professor; MFA, University of California, San Diego

Christie, Matt
Instructor; MFA, Virginia Commonwealth University

Cline, Clinton C.
Professor Emeritus

Cohen, Brianne Caitlin (https://experts.colorado.edu/display/fisid_159724/)
Assistant Professor; PhD, University of Pittsburgh

Cordova, James M. (https://experts.colorado.edu/display/fisid_146415/)
Associate Professor, Associate Chair; PhD, Tulane University

Day, Robert E.
Professor Emeritus

de Stecher, Annette W. (https://experts.colorado.edu/display/fisid_155095/)
Assistant Professor, Associate Chair; PhD, Carleton University

Dickey, Kimberly (https://experts.colorado.edu/display/fisid_115735/)
Professor; MFA, New York State College of Ceramics at Alfred University

Duresse-Stimilli, Francoise
Associate Professor; MFA, Temple University

Ecker, Robert R.
Professor Emeritus

Farago, Claire Joan (https://experts.colorado.edu/display/fisid_101552/)
Professor Emerita; PhD, University of Virginia

Forsman, Charles S.
Professor Emeritus

Foster, Suzanne R.
Professor Emeritus

Frost, Steven (https://experts.colorado.edu/display/fisid_156502/)
Instructor; MFA, School of Art Institute of Chicago

Geck, Francis J.
Professor Emeritus

Gregorio, Alvin P. (https://experts.colorado.edu/display/fisid_143596/)
Associate Professor; MFA, Claremont Graduate School

Iwamasa, Ken
Professor Emeritus

Kassianidou, Marina (https://experts.colorado.edu/display/fisid_157948/)
Assistant Professor; PhD, Chelsea College of Arts (UK)

Kunkel, Jerry W.
Professor Emeritus

Liotta, Jeanne M. (https://experts.colorado.edu/display/fisid_145808/)
Associate Professor; BFA, New York University

Miller, Kay
Professor Emerita

Minor, Vernon H.
Professor Emeritus

Nauman, Robert (https://experts.colorado.edu/display/fisid_106835/)
Senior Instructor; PhD, University of New Mexico

Potter, Thomas J.
Professor Emeritus

Qualley, Charles A.
Professor Emeritus

Quinn, Jeanne (https://experts.colorado.edu/display/fisid_111658/)
Professor, Chair; MFA, University of Washington

Rivera, George F. Jr. (https://experts.colorado.edu/display/fisid_103055/)
Professor; PhD, SUNY at Buffalo

Roth, Yumi J. (https://experts.colorado.edu/display/fisid_126287/)
Associate Professor; MFA, SUNY College at New Paltz

Sampson, John Franklin
Professor Emeritus

Saxton, Richard W. (https://experts.colorado.edu/display/fisid_144756/)
Associate Professor; MFA, Indiana University Bloomington

Shell, Hanna Rose (https://experts.colorado.edu/display/fisid_163199/)
Associate Professor; PhD, Harvard University

Stevens, Charlene
Associate Professor; MFA, Indiana University Bloomington

Su, Stephanie Wenhui (https://experts.colorado.edu/display/fisid_164186/)
Assistant Professor; PhD, University of Chicago

Sweetman, Alex John (https://experts.colorado.edu/display/fisid_100531/)
Associate Professor; MFA, SUNY at Buffalo

Theodore, Michael (https://experts.colorado.edu/display/fisid_113318/)
Associate Professor; PhD, University of California, San Diego

Tsouhlarakis, Georgianna (https://experts.colorado.edu/display/fisid_165957/)
Assistant Professor; MFA, Yale University

Valdovino, Luis Hector (https://experts.colorado.edu/display/fisid_101863/)
Professor; MFA, University of Illinois at Urbana–Champaign

Vandersall, Amy L.
Professor Emerita

Walker, Melanie (https://experts.colorado.edu/display/fisid_101750/)
Associate Professor; MFA, Florida State University

Wilson, John B.
Professor Emeritus

Wolfe, Lynn Robert
Professor Emeritus

Womack, Mike Fitzgerald (https://experts.colorado.edu/display/fisid_148502/)
Associate Professor, Associate Chair; MFA, Pratt Institute

Woodman, Elizabeth A.
Professor Emerita

Yazzie, Melanie A. (https://experts.colorado.edu/display/fisid_143620/)
Professor; MFA, University of Colorado Boulder

# Courses

## Art Film Studies

**ARTF 5000 (3) Advanced Digital Postproduction**
The world of video changes with blinding speed. This class lays the groundwork to keep up with the changing technology and all the technical details of working in commercial post. We will look at distributed rendering, color grading, film scanning, multi-editor collaboration, live production virtual reality and distribution. Every week students will have a technological challenge and work as a team to solve it. Strong familiarity with Adobe, Avid and DaVinci is recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4000
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5003 (3) Film and Literature**
Explores similarities and differences between literature and film as narrative arts. Studies novels, short stories and plays and films made from them. Examines problems in point of view, manipulation of time, tone, structure, and setting.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4003
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5004 (3) Topics in Film Theory**
Provides topic-centered analyses of controversial areas in film theory. Students read extensive materials in the topic area, analyze and summarize arguments as presented in the literature, write "position" papers and make oral presentations in which they elaborate their own arguments about specific assigned topic, establishing critical dialogue with the primary materials.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4004 and HUMN 4004
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of CINE 3051 (minimum grade D-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5010 (1-3) Topics in Film Production**
Prepares students for advanced cinema production courses. Subject matter varies each semester.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4010
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5013 (3) Film, Photography and Modernism**
Provides interdisciplinary study of film, photography and modernism, focusing on issues such as dystopia, alienation, sexuality, subjectivity and self-referentiality. Photographs by Stieglitz, Strand, Weston, Evans, Cartier-Bresson, Kertesz and Moholy-Nagy. Films by Dziga-Vertov, Eisenstein, Resnais, Antonioni, Bergman, Bunuel and Bertolucci.
**Equivalent - Duplicate Degree Credit Not Granted:** FILM 4013
**Requisites:** Requires prerequisite course of FILM 1502 (minimum grade D-).
**Recommended:** Prerequisite FILM 3051.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5020 (3) Analog Alternatives**
Introduction to small gauge analog moving image formats and technologies with a focus on process and experimentation through hands-on exploration and demonstrations. This process-oriented class will utilize DIY methods and Alternative Process Photography approaches to work creatively with silver based holographic mediums. Students will create moving image works with Super 8mm and 16mm film while exploring the implications and possibilities of working with these mediums within our current digital paradigm.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4020
**Requisites:** Restricted to graduate students only.

**ARTF 5021 (3) Directing/Acting for the Camera**
Offers an intensive workshop that provides students with experience directing dramatic material, acting before a camera, and interpreting or adopting dramatic material for film. No experience in directing or acting required. Attendance, research, and papers required.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4021
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5023 (3) Topics in International Cinema**
Focuses on major international filmmakers who have had a decisive impact on world cinema. Students will learn how directors create their own innovative body of work with specific formal and thematic patterns and will also learn to place such work within multiple frameworks that will cover film history, theory, aesthetics, philosophy and social and cultural analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4023
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade D-). Restricted to graduate students only.
**Recommended:** Prerequisites CINE 3051 and CINE 3061.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5024 (3) Advanced Research Seminar**
Focuses on a specific topic, director, or genre chosen by the professor. Research skills and critical thinking are emphasized. With faculty guidance, students determine individual projects and present them to the class. Class participation is mandatory. Each student submits a thorough and original research paper for a final grade.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4024
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CINE 3051 and CINE 3061.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5040 (3) Advanced Analog Alchemy**
Investigating, developing, and re-interpreting historical approaches and processes involved in the creation of Analog motion picture works. Students will work with Analog mediums in alternative modes and unestablished ways and develop their personal process towards the goal of producing a unique moving image work to be presented in a final analog format for exhibition.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4040
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Art Practices (ARTF) students only.

**ARTF 5043 (1-3) Topics in Cinema Critical Studies**
Prepares students for advanced Cinema Studies critical studies courses. Subject matter varies each semester.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4043
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5105 (3) Advanced Screenwriting**
Introduces professional screenwriting, in the form of a creative writing workshop. Admission by portfolio (see film department). Students write scenes and scripts for short films, feature treatments, etc., and are graded on a final portfolio. Department enforced prerequisite: approved writing sample.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4105
**Recommended:** Prerequisites CINE 3051 and CINE 3061.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5200 (3) Flow Visualization**
Explores techniques for the visualization of the physics of fluid flows including seeding with dyes, particles and bubbles, and shadowgraphy and schlieren. Reviews optics and fluid physics, especially atmospheric clouds. Assignments are student-driven, to individuals and mixed teams of graduates, undergraduates, engineering majors and photography/video majors.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4200, MCEN 4151, MCEN 5151, ATLS 4151 and ATLS 5151
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5211 (3) History of Russian and Soviet Cinema**
Surveys Russian cinema in historical and cultural context from early 20th century to the present. Taught in English. Formerly RUSS 5211.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5211 and REES 4211 and CINE 4211
**Requisites:** Restricted to graduate students only.

**ARTF 5400 (3) Digital Post-Production**
Through projects, discussions, and screenings, this class explores the practices and aesthetics of computer-based moving-image art editing.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4400
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5453 (3) History of Avant-Garde Film**
Traces the history and aesthetics of avant-garde/experimental films in light of similar ideas found in the other arts, particularly painting, poetry, photography and music. Topics covered include Dada and the early avant-garde; surrealism and psychodramas; Brakhage and abstract expressionism; feminist arts and film since the 1980s; the idea of the sublime in painting, music and film; landscape in painting, photography and film; post-modernism and the cinema; queer theory, gender/identity politics and aesthetics of recent films; and specific multiple disciplinary artists such as Andy Warhol, Michael Snow, Helen Levitt and Gunvor Nelson.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4453
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5500 (3) Cinema Production 2**
Advanced exploration of creative cinema production through short production and post-production projects. Course focuses on the tactics and strategies of independent cinema production exploring either documentary, experimental, or narrative genres.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4500
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5604 (3) Colloquium in Film Aesthetics**
Seminar for the serious round table discussion and critique of film as an art form, emphasizing development of appropriate verbal and written language skills for description of film.
**Equivalent - Duplicate Degree Credit Not Granted:** FILM 4604
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5610 (3) Image-makers Graduate Seminar**
Explores advanced graduate studio work in a seminar setting. Focuses on the development of ideas and activities which advance creative image making.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5717 (1-3) Graduate Studio Critique**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5846 (1-3) Graduate Independent Study-Video**
Participate in graduate independent study.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5857 (1-3) Graduate Independent Study**
Participate in graduate independent study.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 6959 (1-6) Master's Thesis**
Preparation, research, writing of critical studies Master's thesis in fulfillment of concurrent BAM in Cinema Studies.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTF 5004 (minimum grade D-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

## Art History

**ARTH 5029 (1) Art History Research Methods**
In this class we will investigate how art scholarship is formed and organized; learn to expertly navigate the vast array of art research resources; and explore advanced techniques for searching both online and offline sources of art information. We will work to develop a critical understanding of our own research processes and reflect on the tools and techniques that lead to both expert research and successful participation in art discourse.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 4029 and LIBR 4029
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art History

**ARTH 5099 (3) Ancient Greek Sculpture**
Understanding that Greek sculpture, like all visual media, was part of the fabric of ancient Greek life and expressed the values of its creators and audience is a valuable way to gain insights into the social, economic, and political world of ancient Greece. This course will examine the work of Greek sculptors from the Archaic to the Hellenistic period. Key stylistic and technical developments, as well as significant works of art, sculptors and workshops will be discussed in detail. Some issues we will consider are the physical, religious and/or socio-historical context of individual freestanding sculptures and how specific sculptural programs illustrate aspects of Greek culture. Iconographic and narrative choices made by artists working in stone, compared to other material, will also be addressed.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 4099, CLAS 4099, and CLAS 5099
**Grading Basis:** Letter Grade

**ARTH 5109 (3) Ancient Italian Painting**
Explores the problems, theories and methods for understanding the iconography, styles, topologies, contexts and techniques of fresco wall painting in ancient Italy from the 6th century B.C.E. to the 4th century C.E. Topics covered include Etruscan tomb paintings, late Republican and early imperial fresco paintings from Rome and Campania and later Roman wall paintings, including the painted images in ancient catacombs. Previous coursework on ancient Italy or the history of pre-modern art is highly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5109 and ARTH 4109 and ARTH 5109
**Additional Information:** Departmental Category: Art History

**ARTH 5119 (3) Roman Sculpture**
Examines ancient Roman sculpture, emphasizing the display, iconography, and production of private and public monuments in the Roman Empire. Explores sculpture as evidence for historical developments, societal and gender attitudes, and state ideologies in the ancient Roman world.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 4119 and CLAS 4119 and CLAS 5119
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art History

**ARTH 5139 (3) Greek Vase Painting**
A comprehensive overview of Greek vase painting, from prehistoric through the fourth century B.C.E. Emphasis is on learning the development of primary decorative styles and on refining skills of visual analysis, scholarly research, critical thinking, oral commentary and written presentation.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 4139 and CLAS 4139 and CLAS 5139
**Additional Information:** Departmental Category: Art History

**ARTH 5159 (3) Hellenistic Art and Archaeology**
Examines art and archaeology from the period following the death of Alexander the Great (late fourth century B.C.E.) to the conquest of Greece by the Romans (middle second century B.C.E.).
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5159
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art History

**ARTH 5169 (3) Topics in Ancient and Classical Art and Archaeology**
In-depth consideration of an aspect of ancient Mediterranean culture. Topics vary and may include ancient wall painting, Greek sculpture, artists and patrons, the ancient Near East, Egyptian art and archaeology, or Etruscan art and archaeology.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4169 and ARTH 4169 and CLAS 5169
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Art History

**ARTH 5229 (3) Ancient Egyptian Art and Archaeology**
Archaeology of ancient Egypt in light of recent excavations; the history of excavations of the different sites; and the art of ancient Egypt through time. Formerly ANTH 5420.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 4229 and CLAS 4229 and CLAS 5229
**Additional Information:** Departmental Category: Art History

**ARTH 5269 (3) Art and Archaeology of the Ancient Near East**
Examines the diverse multicultural civilizations of the Iran-Iraq region and Anatolia from the rise of urbanism in Mesopotamia through the era of the first 'world empire,' Achaemenid Persia. Emphasizes the material record of religious and state institutions of the ancient Near East, especially monuments that illustrate concepts of power and communication. Explores notions of style, symbolism, visual rhetoric, text-image synthesis, patronage, creativity, trade, religion, gender, identity and roles of artists. How do inter-communal relations, cross-cultural exchange, innovation and artistic production, movement and migration, relate to the development and expression of hegemonic power and of empire, and the marginalization of some? What is the role of economics and commerce in these processes? May be repeated twice for credit if the topic is different.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5269 and CLAS 4269 and ARTH 4269
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Art History Departmental Category: Asia Content

**ARTH 5909 (1-3) Graduate Independent Study---Art History**
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art History

**ARTH 5929 (1-3) Special Topics in Art History**
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 4929
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or Art History Concurrent Degree (C-AAAH) or Film Art History Concurrent Degree (C-FILMAAAH) students only.
**Additional Information:** Departmental Category: Art History

**ARTH 5939 (3-6) Art Museum Internship**
Focuses on opportunities at the Denver Art Museum, working with individual curators and master teachers in selected areas, such as audience interpretation, interpretive research files, and public school curriculums. Introduces students to the professional culture and activities of art museums.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 4939
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Art History

**ARTH 5949 (3) Visiting Scholars Seminar**
Brings speakers to campus to work with seminar students, usually four guest scholars per semester, subjects vary. Students read scholar's work and discuss methodological issues. Focuses on the research and insight of scholars who are currently shaping the field and defining research agendas. Required for all MA art history students, open to others.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art History

**ARTH 5959 (3) Introduction to Critical Theory for Visual Studies**
Provides overview for critical theory from Marx to contemporary writers with emphasis on their relevance to visual studies. Addresses issues that underlie a wide range of academic discussion in arts and sciences. Foucault, Derrida, Said, Lacan and other authors will be subject to weekly discussions leading to research papers, presentations, and projects. Class fulfills critical theory requirement for MFA and MA students.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art History

**ARTH 6429 (3) The Black Female Body**
This seminar explores the history and discourses of the Black female body as a contested site of representation and identity in visual culture. We will consider how constructions of womanhood represent Black women as physically and socially other to the ideal woman. We will also examine how Black female artists from across the diaspora grapple with the ways the Black female body vexes the visual field.
**Grading Basis:** Letter Grade

**ARTH 6439 (3) Afro-Atlantic Imaginaries**
This seminar explores the history and visual production of what has come to be known as the Black Atlantic. Our goal will be to think through the histories of slavery and emancipation in this Atlantic world and the way they have shaped our visual culture and politics. Our reading will range widely, including works of history and theory as well as poetry and memoir.
**Grading Basis:** Letter Grade

**ARTH 6559 (3) Power & Visuality After the Conquest**
Examines how artistic production was informed by, and participated in, Latin America¿s colonial experience (16th to 19th centuries). With a critical eye and decolonial approach, students examine the complex strategies and objectives of visual culture in an ethnically/racially diverse colonial setting. Focus on historiography, visual culture, artists, patrons, hybridity, extinction, conquest, conversion, materiality, literacy, and global networks. Emphasis on colonial Mexico and Peru and their Indigenous populations. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.

**ARTH 6779 (3) Visualizing Gender Before and After the Conquest**
Examines issues of gender and power in Pre-Columbian and Colonial Latin American visual culture. Special focus on women¿s social roles and the nature and function of their images in pre-Hispanic and colonial times. Course readings and discussions draw from a variety of art-historical, ethnohistorical, literary, and anthropological sources. The interdisciplinary scope provides an intellectually diverse framework that accounts for historical and contemporary assumptions about art, representation, race/ethnicity, and gender.
**Requisites:** Restricted to graduate students only.

**ARTH 6929 (3) Seminar: Methods/Theories of Art History**
Provides a systematic critical overview of the development of art history as a discipline beginning with 18th century theories of aesthetics and ending with current interdisciplinary models of critical interpretation. Weekly readings, discussions, reports, and written papers constitute the format of this seminar in methodology. Topics vary from semester to semester. Required for MA (art history) students.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or Art History Concurrent Degree (C-AAAH) or Film Art History Concurrent Degree (C-FILMAAAH) students only.
**Additional Information:** Departmental Category: Art History

**ARTH 6939 (3) Graduate Seminar: Open Topics in Art History**
Subjects and topics vary.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or Art History Concurrent Degree (C-AAAH) or Film Art History Concurrent Degree (C-FILMAAAH) students only.
**Additional Information:** Departmental Category: Art History

**ARTH 6949 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art History

**ARTH 6959 (1-6) Master's Thesis**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art History

**ARTH 6969 (1-6) Master's Project (Art History)**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Art History

**ARTH 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 60.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students in the AAAH-PHD program, and who have completed a minimum of 30 credit hours.

## Art Studio and Non-Studio

**ARTS 5004 (3) Land and Environmental Art (Sculpture and Post-Studio Practice)**
Covers land and environmental art, providing an historical survey along with hands on projects in the landscape. Focusing on themes of site, environment, landforms, weather, and earth materials, students will design and realize art projects on the land. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Restricted to graduate students only.

**ARTS 5017 (1-3) Special Topics in Studio Arts**
Introduces timely subjects in studio art courses that cannot be offered on a regular basis. Information on topics in any given semester is available prior to pre-registration in departmental office.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4017
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Seminars/Special Topics

**ARTS 5024 (3) Public Art**
Focuses on the two areas 1) lecture/discussion, both based on political, historical and the aesthetic evolution regarding examples of public art and 2) current practice, in reference to how to use such information to generate new more innovative and original ideas regarding public art and its application. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4024
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Sculpture

**ARTS 5050 (3) Writing Across the Arts: Culture Writing in the 21st c**
In this culture writing class, we¿ll listen in on and contribute to the conversation, touching on many forms of expression, from fine art to pop culture. Art, of course, does not exist solely in a museum or gallery, and we will consider¿both in our reading and in written assignments-- its social context as well as, more personally, art¿s capacity to challenge us, to incite empathy or self-scrutiny, to provoke and inspire.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4050 and AHUM 4050
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ARTS 5060 (3) Art Writing As Practice**
This seminar is designed for visual artists in pre-thesis, supporting them in building a regular writing practice that will allow them to reflect upon and lend critical context to their creative work. Through written prompts, presentations and discussions--as well as looking to the example of artists we count as influences--we'll craft a narrative about our work and where it fits into larger conversations about art, identity, history, and our own times. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4060
**Grading Basis:** Letter Grade

**ARTS 5075 (3) Graduate Ceramics**
Seminar includes group and individual critiques and individual studio visits. Explores different approaches to studio and post studio art practices, research, reading and writing as it relates to your own art practice and contemporary art. May be repeated for up to 18 total credit hours.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to ARTS or ARTH graduate students only.
**Additional Information:** Departmental Category: Ceramics

**ARTS 5087 (3) Selected Topics in Contemporary Art**
Selectively studies significant areas of visual art of the last decade including major critical opinions.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4087
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Seminars/Special Topics

**ARTS 5095 (3) Special Topics in Ceramics**
Designed for graduate students in art practices or art history. Covers many subjects related to contemporary art practice and ceramics. Topics change from semester to semester from the raw material science behind ceramics to the relation between object making and poetic practice, to food and contemporary art explorations, to political and social art movements, to many other relevant subjects for those interested in the arts. May be repeated for up to 9 total credit hours.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4095
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Ceramics

**ARTS 5097 (1-3) Special Topics-Non-Studio**
Introduces timely subjects in the visual arts that cannot be offered on a regular basis. Information concerning the topics offered in any given semester is available prior to preregistration from the fine arts department.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4097
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Seminars/Special Topics

**ARTS 5104 (3) Performance/Installation**
Primarily focuses upon personal imagery as a live situation occurring in either an invented constructed reality or real environment. Work may be individual or group configuration and may also take on the visual linguistic form of a solo performance or of a multimedia presentation.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4104
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Sculpture

**ARTS 5107 (1-3) Special Topics**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Seminars/Special Topics

**ARTS 5117 (3) Graduate Art Seminar**
For students intending to pursue a professional career in Art. Emphasizes the development of a critical overview of their work and interests. For non-ARTS or non-ARTH Grads, permission of instructor required.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Seminars/Special Topics

**ARTS 5118 (3) Visiting Artist Program**
Artists of national and international reputation, interacting with graduate and advanced undergraduate students, discuss their studio work at seminar meetings and at public lectures or events. Provides continuous input of significant developments and a comprehensive view of contemporary issues in the arts.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4118
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Visiting Artist Program

**ARTS 5126 (3) Digital Art 2**
Offers studio experience using personal computer in the generation and processing of imagery in the visual arts.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4126
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Media Arts

**ARTS 5130 (3) Integrated Media**
Encourages experimentation with media and integration of traditional areas of drawing, painting, sculpture and photography. Covers two- and three-dimensional collage/assemblage, correspondence art, artist's books, site-specific, performance, audio and video art.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4130
**Additional Information:** Departmental Category: Integrated Arts

**ARTS 5140 (3) Integrated Arts Studio**
Explores the creative process through a series of conceptually-based studio exercises. Students are encouraged to work across traditional media boundaries as they address themes such as identity, place, spirituality, politics, and consumerism. Includes individual and collaborative studio projects, as well as reading and writing about the course themes.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Integrated Arts

**ARTS 5150 (3) Graduate Integrated Arts**
Investigates the conjunction of interdisciplinary concepts in the creation of art. Looks beyond traditional media to new sources for art-making. a curious intellect, combined with exceptional research skills, will be the basis for original writing and rigorous discussion.
**Repeatable:** Repeatable for up to 18.00 total credit hours.
**Additional Information:** Departmental Category: Integrated Arts

**ARTS 5154 (3) Metalsmithing 1**
Introduces students to the fundamental techniques used in metalsmithing, including cold and hot fabrication techniques, forming and coloring. Through projects, discussions, readings and demonstrations, students will learn how to create, analyze, understand and critique contemporary metalwork. Projects will focus on design and concept development, while enhancing students' technical and problem-solving skills.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4154
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Sculpture

**ARTS 5161 (3) Graduate Photography**
Explores the creative process through lens-based conceptual work with a concentration on individual critique. Students are encouraged to work across traditional media boundaries as they address themes such as identity, place, spirituality, politics, and consumerism. Possibilities include individual and collaborative studio projects, as well as relevant readings and writings. May be repeated for up to 18 total credit hours. For Non-ARTS or Non ARTH Grads, permission of instructor required.
**Repeatable:** Repeatable for up to 18.00 total credit hours.
**Additional Information:** Departmental Category: Photography

**ARTS 5171 (3) New Directions in Photography**
Investigates the use of the photographic image in new, antique, or nonstandard ways including nonsilver, photosculpture, various color processes, photolanguage, photoinstallations, electronic media, performance, filmmaking, electrostatic art (copy machine), photobooks, photocollage, and audio/visual art. Course content changes each semester.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4171
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Photography

**ARTS 5176 (3) New Directions in Digital Art**
Explores the integration of digital art across diverse contexts, including digital narrative, conceptual art, and visual literacy, while engaging with the most cutting-edge tools and technologies in the field. This includes video AI, Virtual Reality, Augmented Reality, and other emerging technologies with open-ended possibilities for future innovations. This course may be repeated for up to 9 total credit hours.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4176
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Media Arts

**ARTS 5202 (3) Graduate Drawing and Painting**
This course is an intense inquiry into contemporary studio practices. Students will be expected to consider and communicate the context (social, political, personal, philosophical, etc.) underpinning studio work as well as the decisions that go into making that work. Specific themes of inquiry will vary by semester, depending on the instructor. Coursework may include readings, group discussions, group and individual critiques, written assignments, and projects. For non-ARTS or non-ARTH Grads, permission of instructor required. May be repeated for up to 18 total credit hours.
**Repeatable:** Repeatable for up to 18.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Painting/Drawing

**ARTS 5222 (3) Drawing & Painting Specialized Investigation**
This course is a concentrated study of a narrow topic (rotating) chosen by a Drawing & Painting faculty member. Experiments in the expanded field of drawing and painting will allow students to study course materials that defy conventional academic course classifications and approaches. This intermittent course is intended to compliment the Drawing & Painting area¿s continuously offered 4000 level courses (Advanced Drawing and Advanced Painting) and 5000 level course (Graduate Painting Seminar). For non-ARTS or non-ARTH Grads, permission of instructor required.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4222
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite if not a graduate student, undergraduates must have completed either Advanced Drawing or Advanced Painting.

**ARTS 5246 (3) Graduate Beginning Video Production**
Presents a studio course on basic single camera video production strategies and concepts. Through class screenings, projects, demonstrations, discussions, and readings, students gain an introductory familiarity with camera, lighting, sound, editing and the organization and planning involved in a video project. Explores a basic theoretical understanding of video as an art form and its relationship to television, film, art, history, culture. For non-ARTS or non-ARTH Grads, permission of instructor required.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4246
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Media Arts

**ARTS 5303 (3-18) Graduate Relief**
Continues the study of the expressive/formal aesthetics of relief processes. Studio practice/investigation of artistic attitudes as exemplified through historical perspectives, traditional/contemporary usages. Students with limited experience in relief processes will be given an overview in those practices.
**Repeatable:** Repeatable for up to 18.00 total credit hours.
**Requisites:** Restricted to Studio Arts or Art History (AASA or AAAH) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Printmaking

**ARTS 5316 (3) History and Theory of Digital Art**
Explores the history and theory of digital art. Discussion topics include the emergence of Internet art, hypertext, new media theory, online exhibitions, web publishing, virtual reality and the networked interface. Includes collaborative and individual projects.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4316
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Media Arts

**ARTS 5346 (3) Graduate Intermediate Video Production**
Continuation of beginning video production. Extends the knowledge of single camera video production strategies and concepts. Expands the concept of montage (editing) and strategies to develop a video project through class screenings, projects, discussions and readings. Furthers theoretical understanding of video as an art form.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4346 and FILM 4340
**Requisites:** Requires prerequisite course of ARTS 4246 or ARTS 5246 (minimum grade D-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Media Arts

**ARTS 5403 (3) Graduate Intaglio**
Intaglio for creative expression with a focus on studio practice. Developing personal visual language/aesthetics. Historical/contemporary awareness, evolving technologies and strategies. An exploration of techniques of intaglio processes, including non-acid and ferric chloride techniques with copper as the main plate being used. Students with limited experience in intaglio processes will be given an overview in those practices.
**Repeatable:** Repeatable for up to 18.00 total credit hours.
**Requisites:** Restricted to Studio Arts or Art History (AASA or AAAH) graduate students only.
**Additional Information:** Departmental Category: Printmaking

**ARTS 5413 (3) Graduate Lithography**
Graduate students are expected to edition Lithographs that are conceptually relevant and technically proficient. Projects are proposed and developed with the instructor. Students with limited experience in aluminum plate or stone lithography will be given an overview in those practices. The development of concepts and personally significant imagery leading to thesis work is required. For non-ARTS or non-ARTH Grads, permission of instructor required. May be repeated for up to 9 total credit hours. Taught with ARTS 3413 and ARTS 4413.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Printmaking

**ARTS 5423 (3) Graduate Screen Printing**
Screen print for creative expression with a focus on studio practice. Developing personal visual language/aesthetics. Focus on the complexities and multi-disciplinary activities of printmaking. Development of concepts leading to thesis work is a focus. Historical/contemporary awareness, evolving technologies/strategies. Students with limited experience in screen print processes will be given an overview in those practices. May be repeated for up to 9 total credit hours.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Printmaking

**ARTS 5433 (3) Graduate Alternative Printmaking**
Continued research into developing a sharper critical response, both aesthetically and conceptually, to their own work, as well as the work of other artists. Various alternative printmaking methods will be introduced and each student is expected to explore and examine these processes through a body of work. Emphasis is put on the interrelationship of processes, materials and ideas/aesthetics.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Printmaking

**ARTS 5444 (6) Art and Environments Field School**
Puts students in touch with various landscapes in Colorado. Takes place off campus each summer. Focuses on site-based approaches to art creation and is designed as an experiential course, meaning that students learn through the experience of place, and then by the process of making. After introductions to each site, students will be responsible for a site interpretation piece utilizing various mediums including photography, drawing, land art and collaboration.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4444
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Sculpture

**ARTS 5453 (3) Graduate Monotype**
Continued research into developing techniques of using a varied grouping of matrixes will be the focus of this class. Students will be expected to develop sharper critical responses both aesthetically and conceptually, to their own work, as well as the work of other artists.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Printmaking

**ARTS 5457 (3) Sound Art Seminar**
Covers the history of sound art from Luigi Russolo and his noise machine during the Futurist Movement to today's experimental music/sound art contributions. Students will listen to sound art works by artists in all areas of sound art, as well as read about theoretical views on sound art.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4457
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Seminars/Special Topics

**ARTS 5500 (3) Art, Design, and Engineering: Thinking and Making**
Examines the aesthetics, design, and engineering of sculpture, installation, and public art. Through research presentations, readings, and field trips, students learn about the process of making art. In addition to classroom learning, students engage in internships with artists and art fabricators. Highlights national and international hybrid art, design, and engineering advanced degree programs and additional art-related internships and job opportunities.
**Requisites:** Restricted to Art History (AAAH) or Engineering and Applied Science (COEN) graduate students only.
**Recommended:** Prerequisite Prior courses or real-life experience in conceptualizing and creating objects, products, or art.
**Grading Basis:** Letter Grade

**ARTS 5504 (3) Graduate Sculpture**
Through readings, discussions, critiques, and one-on-one meetings, Graduate Sculpture will provide a forum for students to explore and develop their work and practice. Additionally, when possible, students will plan a research-based class field excursion in consultation with the faculty teaching the course.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Sculpture

**ARTS 5540 (3) Generative Art**
Attends to the interdisciplinary pursuits of scientists, humanists and anyone interested in creating works of visual art according to step by step procedures as in musical compositions, mathematical formulae, linguistic rules, computer programs, etc. Includes collaborative and individual projects.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Integrated Arts

**ARTS 5641 (3) String Instrument Building**
As a prelude to sculptural art making processes, this course explores a variety of materials, methods and techniques and their application to the making of a musical string instrument, i.e. planning, designing, material selection and a wide variety of woodworking processes. We will also cover theoretical discussions into what is being made.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4641
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Sculpture

**ARTS 5717 (1-3) Graduate Studio Critique**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Seminars/Special Topics

**ARTS 5857 (1-3) Graduate Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Seminars/Special Topics

**ARTS 5901 (1-3) Graduate Independent Study---Photography**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Photography

**ARTS 5934 (3) Art, Design, and Engineering: Thinking and Making**
Examines the aesthetics, design, and engineering of sculpture, installation, and public art. Through research presentations, readings, and field trips, students learn about the process of making art. In addition to classroom learning, students engage in internships with artists and art fabricators. Highlights national and international hybrid art, design, and engineering advanced degree programs and additional art-related internships and job opportunities. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4934 and COEN 4934
**Requisites:** Restricted to Art History (AAAH) or Engineering and Applied Science (COEN) graduate students only.
**Recommended:** Prerequisite Prior courses or real-life experience in conceptualizing and creating objects, products, or art.
**Grading Basis:** Letter Grade

**ARTS 6957 (1-6) Master of Fine Arts Creative Thesis**
**Additional Information:** Departmental Category: Seminars/Special Topics

# Art History - Master of Arts (MA)

The art history program at CU Boulder gives students an interdisciplinary foundation in the history of art to prepare them for careers as scholars, museum professionals and related creative professions in the history of art. Its main objective—through graduate seminars, teaching opportunities, museum internships and scholarly fieldwork—is to foster critical thinking about contemporary and historical forms of art as well as visual and material culture.

Students develop their specialized interests from a combination of individual mentoring and collaborative approaches to intellectual inquiry. The program offers a supportive environment committed to debate and experimentation applicable to a variety of career choices. Graduates typically regard their two years in the art history master's program as a formative period of intellectual growth and professional experience.

Our diverse faculty offers a constantly changing curriculum of seminar topics geared to highlight current research, and a strong foundation in critical historiography and contemporary critical theory. Students in our interdisciplinary program also take advantage of exciting course offerings in cultural anthropology, classics, history, a wide range of literature programs, ethnic studies, gender and women's studies, art practices, and new media.

Our intimate atmosphere offers exceptional opportunities to work with permanent faculty and distinguished art historians from other institutions through our Visiting Scholars program. This longstanding feature of our graduate curriculum brings four to six leading scholars to campus every

year to present their current work in a graduate seminar, public lecture and informal events.

Areas of specialization include: African/Diasporic Visual Studies, medieval art, early modern art, Pre-Columbian art, Colonial Latin American art, Asian art, Native North American art, modern art and architecture, contemporary art and critical theory/museology. When available, ancient art may constitute an area.

For more information please see the department's Art History area (https://www.colorado.edu/artandarthistory/areas-study/art-history/) page and the MA Art History degree page (https://www.colorado.edu/artandarthistory/degrees/ma-art-history/).

# Requirements

## Required Courses and Credits

A minimum of 30 credits must be completed, of which 21 must be completed in residence on the Boulder campus. No more than 8 credits of independent study credit may be applied toward the degree. A limit of 9 credits of transfer credits may be applied toward the degree.

Our program offers two plans. In the research-based MA, students will write a thesis in their last semester. This is typically the track that students will join upon entering the program. However, students may also opt to enroll in or change to the course-based MA plan, which does not require a written thesis. This should be decided in consultation with the student's advisor/mentor and Director of Graduate Studies.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ARTH 6929 | Seminar: Methods/Theories of Art History [1] | 3 |
| ARTH 6959 | Master's Thesis (Art History) | 6 |
| Or 6 credits in ARTH at the 6000 level [2] | | |
| **Electives** | | |
| Students are required to take five 3-credit 5000 or 6000- level art history courses, for a total of 15 credit hours. Students may choose their five courses from four out of the following areas: Medieval Art; African/Diasporic Visual Studies; Early Modern/ Renaissance Art; Pre-Colombian/Colonial Latin American Art; Native North American Art; Asian Art; Modern Art and Architecture; Contemporary Art; Critical Theory/Museology. In consultation with your advisor and when available, Ancient Art may constitute an area. | | 15 |
| At least one 3-credit, 3000-level or above course in a department outside the Department of Art and Art History that supplements the major or minor areas of specialization. | | 3 |
| Additional courses to meet the 30-credit minimum. | | 3 |
| **Total Credit Hours** | | **30** |

1. Must be taken during the first semester, and may be taken twice for up to 6 credits.
2. Students who elect to take the course-based MA plan will be required to take an additional 6 credits in 6000- level art history courses in consultation with their advisor.

## Language Proficiency

All programs in the Department of Art History require proficiency in languages relevant to the field of study. Students should consult with their advisor regarding the language required for their field at the beginning of their first year. All MA students should ideally demonstrate proficiency in one language during their first year of the program. Language exam structure may vary based on the requirements of the faculty member supervising the test.

Generally, a faculty member chooses reading selections from various subjects that are deemed appropriate. With the aid of a dictionary, students are expected to complete a translation of the text presented for testing. The exam is graded by a faculty member. Students do not need to pass a reading language exam if they have previously and satisfactorily completed coursework with a grade of B or higher equal to three consecutive semesters at the undergraduate level, before enrolling in the MA program.

## First-Year Review

During the last two weeks of April, students are evaluated during the first-year review. It focuses on a review of student coursework and performance, on selecting the major and minor areas of study in preparation for the comprehensive exam (see below) and on the selection of a thesis topic, if applicable.

## Comprehensive Exam

This exam is given in October of the second year to measure the graduate student's knowledge of art history at the MA level. It consists of essay questions pertinent to the student's major and minor areas of study. The comprehensive exam consists of two essays: a two-hour essay in the major area and a 90-minute essay in the minor area. Students must pass the comprehensive exam in order to be eligible to register for thesis credit hours. If a student fails a Comprehensive Exam, with the approval of their Advisor and the Director of Graduate Studies they will write a second exam on a question selected by their Advisor.

*All students must pass the comprehensive exam in order to graduate*, including non-thesis course-based students. Students in the course-based MA plan will take 6 additional credits in 6000- level art history courses instead of doing a thesis abstract, written thesis and defense.

## Thesis Abstract ("Pre-Thesis Review")

By the end of the semester preceding the student's thesis semester, the student will prepare an abstract of approximately 3-4 typewritten pages, with attached bibliography, outlining the thesis topic and method of inquiry. The thesis abstract must be approved by the student's pre-thesis review committee in order for the student to register for thesis hours.

## Thesis

This should demonstrate scholarly research and writing in art history, should be based on independent study and analysis and should represent the equivalent of 6 credits. In most cases, the master's thesis is the equivalent of a 30–50 page paper, exclusive of end notes, bibliography and illustrations.

## Thesis Defense

In consultation with the thesis advisor, thesis plan students will select a thesis committee that consists of not less than three members of the art history graduate faculty, including the thesis advisor. The student will then schedule the thesis defense and prepare all necessary paperwork. The thesis must be submitted to all members of the thesis committee at least one week before the thesis defense. Graduate School guidelines ("specifications") must be used to prepare the MA thesis. Upon successful defense, the thesis is submitted to the Graduate School in the electronic form specified by the Graduate School, in accordance with the

Graduate School's deadlines. A hard copy of the signature page, complete with the thesis committee members' signatures, is submitted to, and remains in, the Graduate School.

Non-thesis plan students are not required to complete a final examination with committee members.

### Time Limit

It is designed that the MA program will be completed within two years. Exceptions can be made with the Director of Graduate Studies approval for up to 4 years.

## Recommended Plan of Study

### Thesis Option

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| ARTH 6929 | Seminar: Methods/Theories of Art History | 3 |
| Graduate art history seminar (any ARTH 5000/6000 level course) | | 3 |
| Graduate art history seminar (any ARTH 5000/6000 level course) | | 3 |
| | **Credit Hours** | **9** |
| **Spring Semester** | | |
| Graduate art history seminar (any ARTH 5000/6000 level course) | | 3 |
| Graduate art history seminar (any ARTH 5000/6000 level course) | | 3 |
| Any 3000 level or higher course outside the department | | 3 |
| Fufill language requirement | | |
| First year review | | |
| | **Credit Hours** | **9** |
| **Year Two** | | |
| **Fall Semester** | | |
| Graduate art history seminar (any ARTH 5000/6000 level course) | | 3 |
| Graduate art history seminar (any ARTH 5000/6000 level course) | | 3 |
| Comprensive exam | | |
| Pre-thesis review | | |
| | **Credit Hours** | **6** |
| **Spring Semester** | | |
| ARTH 6959 | Master's Thesis (Art History) | 6 |
| Or 6 credits in ARTH at the 6000 level [1] | | |
| Thesis defense | | |
| | **Credit Hours** | **6** |
| | **Total Credit Hours** | **30** |

[1] If a student chooses to follow the course-based MA track, rather than write a thesis, the student will instead enroll in six credits of 6000- level coursework in art history during their last semester.

No more than 8 credits of independent study credit may be applied toward the MA degree. A limit of 9 credits of transfer credits may be applied toward the MA degree.

## Learning Outcomes

The MA in art history is intended to give students a broad general knowledge of art history in a two-year program. Students who have achieved a distinguished record in this MA program should be well prepared for acceptance into a doctoral program in art history as well as other careers requiring an MA in art history or an equivalent degree.

By the completion of the program, students will be able to:

- Demonstrate knowledge of intellectual histories, theoretical frameworks, methodologies, and methods in art history and related fields.
- Demonstrate the ability to synthesize arguments through academic writing.
- Plan and design an original research project.
- Demonstrate skills in academic writing, and effectively communicate and present research to an academic audience in both written and oral form.
- Carry out original research and create new knowledge that contributes to art history field.

## Dual Degree

### MA/MBA in Art History

To support the university's mission of advancing knowledge across disciplines, and in recognition that business education and training has relevance to many academic fields, the Leeds School of Business and Department of Art and Art History endorse a dual degree program in which both a Master of Business Administration and a Master of Fine Arts (or Master of Arts in art history) is awarded to those students who satisfy the requirements outlined below. This three-year program offers students the opportunity to earn both degrees together in less time than if the degrees were earned sequentially.

Students must apply to and meet the application requirements for each program separately. Admitted students spend their first year in one of the two programs, the second year in the other program and the third year is a combination of the two. MFA students are required to complete 43 credits of MBA coursework and 45 credits of AAH coursework. MA (art history) students are required to complete 43 credits of MBA coursework and 30 credits of art history coursework. Both degrees must be awarded simultaneously.

*Note*: Residents of Western states, including Alaska and Hawaii, may be eligible for in-state tuition for this dual degree program. For more information, visit the "Western Regional Graduate Program" section on the Office of the Registrar's Exceptions to One-Year Domicile (http://www.colorado.edu/registrar/students/state-residency/domicile-exceptions/) webpage.

# Art Practices - Master of Fine Arts (MFA)

The MFA in art practices is a rigorous program intended for artists committed to pursuing a professional life in the arts and prepares students for careers as practicing artists and arts professionals as well as teachers in colleges, universities and art schools. MFA students in the Department of Art and Art History are given private studio spaces and access to many of the department's facilities in the Visual Arts Complex

and are eligible for a variety of awards, assistantships and teaching opportunities.

The MFA is a two-and-a-half or three-year program.

# Tracks

- Ceramic
- Drawing & painting
- Film
- IMAP (Integrated Media Arts Practices)
- Printmaking
- Sculpture and post-studio practice

# Requirements

## Advising

Upon admission, students are assigned a tenured or tenure-track faculty member to serve as an academic advisor in the student's home area.

## Required Courses and Credits

A minimum of 54 credit hours (of which 36 credit hours must be taken in residence on the Boulder campus) of acceptable graduate work must be completed beyond the bachelor's degree.

Procedures for transferring credit from other graduate programs are governed by the regulations of the Graduate School. Transfer credit, not to exceed 18 credit hours for studio arts or 9 credit hours for art history, must first be approved by the student's academic advisor, associate chair and the Graduate School.

Students who wish to change their area of concentration after admission must petition the art practices curriculum committee.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ARTS 5117 | Graduate Art Seminar (Should be taken in the first semester) | 3 |
| ARTS 5118 | Visiting Artist Program (should be taken in the second semester) | 3 |
| ARTS 6957 | Master of Fine Arts Creative Thesis | 6 |
| **Home Area Courses** | | **12** |
| Painting & Drawing: | | |
| ARTS 5202 | Graduate Drawing and Painting | |
| ARTS 5222 | Drawing & Painting Specialized Investigation | |
| Ceramics: | | |
| ARTS 5075 | Graduate Ceramics | |
| ARTS 5095 | Special Topics in Ceramics | |
| Printmaking: | | |
| ARTS 5303 | Graduate Relief | |
| ARTS 5403 | Graduate Intaglio | |
| ARTS 5413 | Graduate Lithography | |
| ARTS 5423 | Graduate Screen Printing | |
| ARTS 5433 | Graduate Alternative Printmaking | |
| ARTS 5453 | Graduate Monotype | |
| ARTS 5097 | Special Topics-Non-Studio | |
| Sculpture & Post-Studio Practice: | | |
| ARTS 5004 | Land and Environmental Art (Sculpture and Post-Studio Practice) | |
| ARTS 5017 | Special Topics in Studio Arts | |
| ARTS 5024 | Public Art | |
| ARTS 5444 | Art and Environments Field School | |
| ARTS 5504 | Graduate Sculpture | |
| Film: | | |
| ARTF 5610 | Image-makers Graduate Seminar | |
| Any ARTF course at the 5000/6000 level | | |
| IMAP (Integrated Media Arts Practices): | | |
| ARTS 5126 | Digital Art 2 | |
| ARTS 5161 | Graduate Photography | |
| ARTS 5171 | New Directions in Photography | |
| ARTS 5176 | New Directions in Digital Art | |
| ARTS 5246 | Graduate Beginning Video Production | |
| **Electives** | | **21** |
| Studio and non-studio; up to 6 credit hours may be taken in an allied field, at the 3000 level and above | | |
| Art History | | 3 |
| Theory Requirement | | 3 |
| Additional course in Art History, Theory or Film | | 3 |
| **Total Credit Hours** | | **54** |

## Degree Requirements

### First-Semester and First-Year Reviews

In consultation with the advisor, the student will establish the membership of his or her committee, consisting of a minimum of three faculty members and one second-year graduate student, and schedule the first-semester review; its purpose is to give feedback to the student with regard to progress toward the degree. At the end of the first year, the committee is convened for a first year review; its purpose is to evaluate the student's progress in the program and to determine if she or he will continue in the program.

### Pre-Thesis Review

At the end of the semester preceding the graduating semester, the pre-thesis review takes place. Its purpose is for the graduate student to present the focus of his or her written thesis and exhibition, to review and evaluate the student's progress in the program, and to determine if the student is ready to register for thesis hours.

### Thesis/Exhibition/Defense

The MFA thesis defense must be conducted while the student's work is on view during the MFA Exhibition. The MFA thesis must be submitted in its final draft form to all the thesis committee members two weeks prior to the scheduled thesis defense. After the defense, two copies of the thesis, with the required signatures on the signature sheet, must be turned into the graduate program coordinator. One of these is cataloged in the Norlin Library and a digital copy is submitted to CU Scholar, Norlin Library's digital repository.

### Time Limit

It is expected that the MFA program be completed within two-and-a-half or three years, depending on the track.

### Graduation

Before registering for thesis hours, ARTS 6957 Master of Fine Arts Creative Thesis, students must have a pre-thesis review with their faculty advisor and thesis committee. Art practices thesis work must take the

form of original creative work of acceptable professional standards. The oral defense exam must be done in conjunction with the thesis exhibition, and the candidate must provide a critical written statement (creative thesis) concerning the work. The candidate's written creative thesis becomes part of Norlin Library's digital repository (https://scholar.colorado.edu/art_mfa/) and digital documentation of thesis work is housed within the department's Visual Resources Center (https://www.colorado.edu/artandarthistory/vrc/) digital image collection.

For further information see MFA guidelines (https://www.colorado.edu/artandarthistory/degrees/mfa-art-practices/#mfa_degree_requirements-193) on the department's website.

# Program Tracks

In addition to the core required courses and credits for all students listed on the Requirements tab, students must fulfill track requirements as listed below.

## Ceramics

Courses as laid out under Master of Fine Arts - Art Practices degree as well as the subplan requirements below:

A 12-credit total of the following options:

| Code | Title | Credit Hours |
|---|---|---|
| ARTS 5075 | Graduate Ceramics | 3 |
| ARTS 5095 | Special Topics in Ceramics | 3 |

Ceramics requires that MFA students enroll inARTS 5075 Graduate Ceramics every semester that it is offered. A total of 12 Area Home credits are required for each track. The Ceramics Subplan is a 2 1/2-year program ending with an MFA thesis exhibition.

## Drawing and Painting

Courses as laid out under Master of Fine Arts - Art Practices degree as well as the subplan requirements below:

A 12-credit total of the following options:

| Code | Title | Credit Hours |
|---|---|---|
| ARTS 5202 | Graduate Drawing and Painting | 3 |
| ARTS 5222 | Drawing & Painting Specialized Investigation | 3 |

Drawing and Painting (D&P) requires that MFA students enroll inARTS#5202#Graduate Drawing & Painting#every semester that it is offered; this includes any extra semesters a student remains in the program. In addition, students are required to take ARTS 5222 Drawing & Painting Specialized Investigation at least once during their program. A total of 12 Area Home credits are required for each track. The D&P Subplan is a 2 1/2-year program ending with an MFA thesis exhibition. Students may petition for an additional semester. Students who do the 3-year program should plan on graduating in the summer semester of their last year.

## Film

Courses as laid out under Master of Fine Arts - Art Practices as well as the subplan requirements below:

A 12-credit total of the following options:

| Code | Title | Credit Hours |
|---|---|---|
| ARTF 5610 | Image-makers Graduate Seminar | 3 |
| Any ARTF course 5000/ 6000 level | | 3 |

Film (CINE) requires that MFA students enroll in ARTF5610 Image-makers Graduate Seminar every semester that it is offered. Any ARTF course at the 5000/6000 level will count towards home area credit. A total of 12 home area credits are required for each track. The Film Subplan is a 3-year program ending with an MFA thesis exhibition. Students should plan on graduating in the summer semester of their last year.

## IMAP

Courses as laid out under Master of Fine Arts - Art Practices as well as the subplan requirements below:

A 12-credit total of the following options:

| Code | Title | Credit Hours |
|---|---|---|
| ARTS 5126 | Digital Art 2 | 3 |
| ARTS 5161 | Graduate Photography | 3 |
| ARTS 5171 | New Directions in Photography | 3 |
| ARTS 5176 | New Directions in Digital Art | 3 |
| ARTS 5246 | Graduate Beginning Video Production | 3 |

IMAP offers several options at the graduate level. Any of the following count towards the home area credit: ARTS 5126 Digital Art 2, ARTS 5161 Graduate Photography, ARTS 5171 New Directions in Photography, ARTS 5176 New Directions in Digital Art, and ARTS 5246 Graduate Beginning Video Production. A total of 12 Area Home credits are required for each track. The IMAP Subplan is a 3-year program ending with an MFA thesis exhibition. Students should plan on graduating in the summer semester of their last year.

## Printmaking

Courses as laid out under Master of Fine Arts - Art Practices degree as well as the subplan requirements below:

A 12-credit total of the following options:

| Code | Title | Credit Hours |
|---|---|---|
| ARTS 5097 | Special Topics-Non-Studio | 3 |
| ARTS 5303 | Graduate Relief | 3 |
| ARTS 5403 | Graduate Intaglio | 3 |
| ARTS 5413 | Graduate Lithography | 3 |
| ARTS 5423 | Graduate Screen Printing | 3 |
| ARTS 5433 | Graduate Alternative Printmaking | 3 |
| ARTS 5453 | Graduate Monotype | 3 |

Printmaking offers several options at the graduate level. Any of the following count towards the home area credit: ARTS 5303 Graduate Relief, ARTS 5403 Graduate Intaglio, ARTS 5413 Graduate Lithography, ARTS 5423 Graduate Screen Printing, ARTS 5433 Graduate Alternative Printmaking, ARTS 5453 Graduate Monotype, and ARTS 5097 Special Topics-Non-Studio. A total of 12 Area Home credits are required for each

track. The Printmaking Subplan is a 2 1/2-year program ending with an MFA thesis exhibition.

### Sculpture and Post-Studio

Courses as laid out under Master of Fine Arts - Art Practices degree as well as the subplan requirements below:

A 12-credit total of the following options:

| Code | Title | Credit Hours |
|---|---|---|
| ARTS 5004 | Land and Environmental Art (Sculpture and Post-Studio Practice) | 3 |
| ARTS 5017 | Special Topics in Studio Arts | 3 |
| ARTS 5024 | Public Art | 3 |
| ARTS 5154 | Metalsmithing 1 | 3 |
| ARTS 5444 | Art and Environments Field School | 6 |
| ARTS 5504 | Graduate Sculpture | 3 |

Sculpture and Post Studio Practice (SPS) requires that MFA students enroll inARTS#5504#Graduate Sculpture#every semester that it is offered. Additionally, SPS strongly recommends that MFA students enroll inARTS#5444#Art and Rural Environments Field School#at least once during their time in the program. A total of 12 Area Home credits are required for each track. The SPS Subplan is a 3-year program ending with an MFA thesis exhibition. Students should plan on graduating in the summer semester of their last year.

## Plan(s) of Study

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| ARTS 5117 | Graduate Art Seminar (must be taken in the first semester. May count towards the theory requirement) | 3 |
| Graduate seminar in home studio (major area) | | 3 |
| Graduate-level elective | | 3 |
| First-semester review | | |
| | **Credit Hours** | **9** |
| **Spring Semester** | | |
| ARTS 5118 | Visiting Artist Program (must be taken in the second semester) | 3 |
| Graduate seminar in home studio (major area) | | 3 |
| Graduate-level elective | | 3 |
| Graduate-level elective | | 3 |
| First year review | | |
| | **Credit Hours** | **12** |
| **Year Two** | | |
| **Fall Semester** | | |
| Graduate seminar in home studio (major area) | | 3 |
| Graduate-level art history seminar (ARTH 5000 or 6000 level course) | | 3 |
| Graduate-level elective | | 3 |
| Graduate-level elective/ or course outside of the department at the 3000 level or above | | 3 |
| | **Credit Hours** | **12** |
| **Spring Semester** | | |
| Graduate seminar in home studio (major area) | | 3 |
| Graduate-level seminar in art history, theory or film (ARTF 5000 level) | | 3 |
| Graduate-level elective | | 3 |
| Graduate-level elective/ or course outside of the department at the 3000 level or above | | 3 |
| Pre-thesis review | | |
| | **Credit Hours** | **12** |
| **Year Three** | | |
| **Fall Semester** | | |
| ARTS 6957 | Master of Fine Arts Creative Thesis | 6 |
| Graduate-level elective | | 3 |
| Thesis defense | | |
| | **Credit Hours** | **9** |
| | **Total Credit Hours** | **54** |

## Learning Outcomes

By the completion of the program, students will be able to:

- Encourage depth and refinement of students' artistic practices.
- Expose students to varied modes of contemporary art practice and thinking through coursework and individual study.
- Prepare students for careers as practicing artists and arts professionals, as well as teachers in colleges, universities and art schools.

## Dual Degree Program

### MBA/MFA in Art Practices

To support the university's mission of advancing knowledge across disciplines and in recognition that business education and training has relevance to many academic fields, the Leeds School of Business (http://leeds.colorado.edu/) and the Department of Art and Art History endorse a dual degree program in which both MBA and MFA degrees are awarded. This opportunity will appeal to students with career aspirations in gallery or museum management, or in starting entrepreneurial ventures combining their business and artistic talents. This three-year program offers students the opportunity to earn both degrees together in less time than if the degrees were earned sequential.

Students must apply to and meet the application requirements for each program separately. Please see the MFA degree requirements page (https://www.colorado.edu/artandarthistory/degrees/mfa-art-practices/#mfa_degree_requirements-193) and MFA application page (https://www.colorado.edu/artandarthistory/apply/mfa-art-practices-application/) for more information on satisfying the MFA application and degree requirements. Admitted students spend their first year in one of the two programs, the second year in the other program, and the third year is a combination of the two. Both degrees must be awarded simultaneously. To learn more, visit the department's MBA/MFA (https://www.colorado.edu/artandarthistory/apply/mamba-or-mfamba/) webpage.

# Arts of the Americas - Doctor of Philosophy (PhD)

The PhD in Arts of the Americas emphasizes the cross-cultural circulation of visual culture in the Americas from ancient to contemporary times. Our program encourages students to think across subfields (e.g., Pre-Columbian Art, Colonial Latin American Art, Modern and Contemporary Latin American Art, Native North American Art, Modern and Contemporary American Art, etc.) and to situate American visual culture in the fluid circuits of cross-cultural exchange, as well as global intellectual and trade networks. This interdisciplinary approach brings art history into dialogue with anthropology, history, ethnic studies, women and gender studies, religious studies, and other disciplines in the humanities, social sciences and natural sciences. Our accelerated PhD program is ideal for students who already have an MA in art history or an equivalent degree, including professionals in the art field seeking an opportunity to advance in their career by earning a PhD.

CU Boulder is uniquely situated as a center for studies in the arts of the Americas due to resources on campus, as well as those in the Boulder–Denver region. On campus, the Center for Native American and Indigenous Studies (CNAIS), the Latin American Studies Center (LASC), and the Center of the American West provide resources, support and a network of scholars and students who are dedicated to interdisciplinary and cultural studies of the Americas. The CU Art Museum and CU Museum of Natural History have rich material resources of the highest caliber to support the new degree program. In addition, a number of academic units on CU Boulder's campus currently provide relevant courses for students in our proposed PhD program, including anthropology, film studies, French and Italian, history, music, sociology, Spanish and Portuguese, ethnic studies, and the program in museum studies. Locally, the Denver Art Museum is a leading, internationally recognized research institution and a major resource for the study and exhibition of the arts of the Americas. Other important regional resources include the Clyfford Still Museum, the Denver Public Library, History Colorado, the Kirkland Museum and the Museo de las Americas.

# Requirements

The PhD program requires 30 hours of coursework at the 5000 level or above.

Furthermore, distribution requirements (of 12 credit hours) must be met during MA or PhD work as follows:

| Code | Title | Credit Hours |
|---|---|---|
| **Distribution Requirements** | | |
| ARTH 6929 | Seminar: Methods/Theories of Art History | 3 |
| Three courses in student's interdisciplinary field of concentration (described below) | | 9 |
| Elective graduate courses in Art History | | 18 |
| **Total Credit Hours** | | **30** |

For the remaining 18 credit hours of coursework, it is recommended that students take art history classes in a wide variety of time periods and cultures. Courses taken toward degree requirements may not be taken pass/fail. All students must complete 30 hours of dissertation credits.

## Interdisciplinary Concentration

All PhD students will develop an interdisciplinary area of concentration, which will consist of at least 9 credits that provide a coherent complement to their primary field of study, and which will be designed by students in close consultation with their advisors and approved by the director of graduate studies for art history. Some examples of interdisciplinary concentrations might include (but are not limited to): critical thought, philosophy, comparative culture studies, gender studies, film studies, history, anthropology, geography, religious studies and environmental studies.

## Language Requirement

Students earning the PhD must demonstrate a high level of proficiency in a language applicable to their primary research area, either through completion of three consecutive undergraduate courses or by passing a language exam. We recommend this be completed by the end of the first year.

In addition, students earning the PhD must demonstrate moderate proficiency in a language applicable to their major or minor field of study by fulfilling one of the following requirements either before or after enrolling at CU Boulder.

- Completing three consecutive undergraduate courses with a grade of B or higher or an equivalent, in discussion with their advisor and Director of Graduate Studies
- Completing a proficiency exam administered at CU
- Presenting other evidence of moderate proficiency to the Director of Graduate Studies for Art History.

Students should consult with the Director of Graduate Studies for Art History at the beginning of their first semester to discuss procedures. The language requirements must be fulfilled before the student advances to candidacy.

## Graduate Program Guidelines

### Qualifying Exam

The qualifying exam equips students to demonstrate critical historiographical knowledge of major, minor and interdisciplinary fields, and to situate their research interests within these fields. Qualifying examinations should be taken no later than the first semester after the completion of all coursework requirements, and any grades of Incomplete must be completed before scheduling the Qualifying Exam. One year before the qualifying exams are taken, the student meets with the major and minor advisors as well as the Director of Graduate Studies. With their guidance, the student will then form an Examination Committee, which will be composed of the major and minor advisors as well as an advisor from the student's interdisciplinary field of concentration (usually a faculty member from another department at CU).

Reading lists: Students will compose reading lists for the major, minor and interdisciplinary fields to be reviewed and approved by each advisor. The reading lists should include the "staple" readings in each field, other important sources that navigate through the major issues in the field, as well as a body of scholarship that pertains to the student's focus of study. Reading lists should include roughly 50 titles (books and articles) for the major field, 30 for the minor field, 30 for the interdisciplinary field and one paragraph (up to 300 words) providing a rationale for the selection of this content. The PhD Reading List and Prospectus Approval Form must be submitted to the Graduate Program Coordinator at least one month before the exam.

Prospectus: For the written portion of the exam, students will write a double-spaced, 20-25 page prospectus (not including the necessary notes, illustrations and bibliography) outlining the major themes and issues of the proposed dissertation. The Prospectus should consist of three parts: 1) the topic, argument, methodology and statement of scholarly contribution; 2) a description of method and of existing relevant scholarship; and 3) a brief chapter-by-chapter summary. The bibliography should contain full citations of all works referenced in the Prospectus and all of these titles should appear on one of the student's Reading Lists.

Students must submit a final draft of their Prospectus to all committee members two weeks prior to the date of the Oral Exam.

Oral Exam: If the examination committee finds the reading lists and prospectus acceptable, then the student will proceed to take a one-hour oral examination with all of the examination committee members present. The oral exam will consist of a one-hour question-and-answer period on the student's prospectus and reading lists, their knowledge of the major, minor and interdisciplinary fields, and their close-reading abilities. All committee members must be present in person or via teleconference for the oral exam. A positive vote from at least two of the committee members is required to pass.

At least two weeks before the date of the oral exam a Doctoral Examination Report Form must be submitted by the Graduate Program Coordinator to the Graduate School for approval. Please see the Graduate Program Coordinator for assistance with this process.

## Advancement to Candidacy

Upon passing the oral exam and pending approval by the Graduate School, the student will advance to PhD Candidacy (D Status). This will allow the student to apply for dissertation fellowships and other internal funding. An unsuccessful qualifying exam may be retaken only once and must be retaken within six months. "Retaken" means that the second exam covers the same material and includes the same committee members as the first.

Following the successful completion of the Qualifying Exam, a Candidacy Application for an Advanced Degree must be endorsed by the Director of Graduate Studies and sent to the Graduate School for approval. The Graduate Program Coordinator will submit this application to the Graduate School on the student's behalf; please consult the Graduate Program Coordinator for more information.

## Forming a Dissertation Committee

The dissertation, which should be a work of viable scholarship, typically takes the form of a monograph. The dissertation is written in close consultation with the Dissertation Committee and Director of Graduate Studies.

The Dissertation Committee consists of five members: at least two Art History faculty members as well as a faculty member from another department of the student's choice. This committee is often but not always drawn from members of the student's Comprehensive Examination Committee. The dissertation should be between 250 and 350 pages long, the length of a scholarly monograph.

## Grant Opportunities

The student is encouraged to apply for grants as soon as they advance to candidacy. General fellowship information is available on the Graduate School (https://www.colorado.edu/graduateschool/funding/) website.

Grants vary in the documents that they require. These may include transcripts, curricula vitae, proposals, budgets, itineraries, autobiographies, statements of progress and letters of reference. No application will ask for all of these, but the list is a fair representation of what the student may be called upon to provide.

The following list identifies grants and fellowships relevant to art history. This will be extremely helpful, but students should not expect it to include every grant for which they should consider applying. Additional resources are available on the websites of other departments and centers, the College Art Association (http://www.collegeart.org/) and more.

### Fellowships & funding for art history graduate students

#### Internal Funding

- Graduate School Student Travel Grant
- Graduate School Dissertation Completion Fellowship
- Arts and Humanities Dissertation Fellowship
- Latin American Studies Center: small grants for graduate students
- Center for Humanities and the Arts (https://www.colorado.edu/cha/)

#### External Funding: Fall [1]

- American Association of University Women Dissertation Fellowship (ABD, DW)
- American Association of University Women International Fellowship (INTL, MULTI)
- Smithsonian Institution Fellowship (ABD, INTL)
- CASVA Predoctoral Fellowship (ABD, INTL, ABROAD, SOME MULTI)
- CLIR/Mellon Fellowship for Dissertation Research in Original Sources (ABD, ABROAD, INTL)
- DADD Year-Long Research Grants in Germany (ABROAD, INTL)
- Dedalus Foundation Dissertation Fellowship (ABD, INTL, N)
- Dolores Zohrab Liebmann Fellowship (MULTI, N)
- Ford Foundation Predoctoral Fellowship (MULTI)
- Ford Foundation Dissertation Fellowship (ABD, DW)
- Fulbright US student Fellowship (ABROAD)
- Getty Foundation Predoctoral Fellowship (DW, ABD, INTL)
- Graham Foundation Carter Manny Award (ABD, ABROAD, INTL, N)
- Kress History of Art Institutional Fellowships (ABD, ABROAD, INTL, N)
- Mellon/ACLS Dissertation Completion Fellowship (ABD, DW, INTL)
- Metropolitan Museum of Art Junior Fellowships (ABD, INTL)
- Smithsonian Fellowship at the Archives of American Art (ABD, INTL)
- SSRC International Dissertation Research Fellowship (ABD, ABROAD, INTL)

#### External Funding: Spring

- Joan and Stanford Alexander Award (ABD, INTL)
- Mellon-CES Dissertation Completion Fellowships in European Studies (ABD, INTL)
- Fulbright-Hays Doctoral Dissertation Research Abroad (ABD, ABROAD)
- Kress Fellowship for Language Study in European Art History (INTL, LANG)
- Schiff Foundation Fellowship (INTL, N)

#### Other Resources

- CU Boulder Graduate Student Funding (https://www.colorado.edu/graduateschool/funding/) webpage

[1] Please note the following:

- ABD: required by start of grant
- DW: dissertation write-up
- INTL: open to international students
- LANG: language training
- MULTI: multi-year or renewable
- N: must be nominated to apply
- ABROAD: international research

### Dissertation Defense

The dissertation defense should take place in the spring semester of the fifth year. Before the start of the spring semester, the student should schedule the dissertation defense (an oral examination and discussion lasting about 90 minutes). The student should deliver copies of the dissertation to their committee members at least one month prior to their defense date. The student must also file a Doctoral Final Examination Form with the Graduate School at least two weeks prior to their defense. Consult the Graduate Program Coordinator for assistance with this process.

All doctoral graduation requirements and forms, including deadlines, can be found on the Graduate School's Graduation Requirements (https://www.colorado.edu/graduateschool/academic-resources/graduation-requirements/) webpage. A satisfactory vote from at least three committee members is required to pass the defense. If unsuccessful, the defense may be retaken only once after completion of changes or additions determined by the committee and must be retaken within six months. "Retaken" means that the second exam covers the same material and includes the same committee members as the first.

### Doctoral Checklist for Graduation

The Doctoral Checklist for Graduation includes the Graduate School's requirements for the doctoral degree. The major department should be consulted about specific additional requirements.

## Recommended Plan of Study

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| ARTH 6929 | Seminar: Methods/Theories of Art History | 3 |
| Graduate art history seminar (any ARTH 5000/6000 level course) | | 3 |
| Graduate art history seminar (any ARTH 5000/6000 level course) | | 3 |
| | **Credit Hours** | **9** |
| **Spring Semester** | | |
| Graduate art history seminar (any ARTH 5000/6000 level course) | | 3 |
| Graduate art history seminar (any ARTH 5000/6000 level course) | | 3 |
| Graduate art history seminar (any ARTH 5000/6000 level course) | | 3 |
| *language requirement must be met | | |
| | **Credit Hours** | **9** |
| **Year Two** | | |
| **Fall Semester** | | |
| Graduate art history seminar (any ARTH 5000/6000 level course) | | 3 |
| Graduate art history seminar (any ARTH 5000/6000 level course) | | 3 |
| Graduate art history seminar (any ARTH 5000/6000 level course) | | 3 |
| *1 comprehensive exam | | |
| *1 exam paper | | |
| | **Credit Hours** | **9** |
| **Spring Semester** | | |
| Graduate art history seminar (any ARTH 5000/6000 level course) | | 3 |
| Dissertation hours | | 5 |
| | **Credit Hours** | **8** |
| **Year Three** | | |
| **Fall Semester** | | |
| Dissertation hours | | 5 |
| | **Credit Hours** | **5** |
| **Spring Semester** | | |
| Dissertation hours | | 5 |
| | **Credit Hours** | **5** |
| **Year Four** | | |
| **Fall Semester** | | |
| Dissertation hours | | 5 |
| | **Credit Hours** | **5** |
| **Spring Semester** | | |
| Dissertation hours | | 5 |
| | **Credit Hours** | **5** |
| **Year Five** | | |
| **Fall Semester** | | |
| Dissertation hours | | 5 |
| *Dissertation defense | | |
| | **Credit Hours** | **5** |
| | **Total Credit Hours** | **60** |

## Learning Outcomes

Graduates from this PhD program will be professionally equipped to make lasting contributions to the emerging dynamic that builds understanding among different sectors of society. One of the unique aspects of the program is its commitment to public education, and the other is its in-depth training in the arts of the Americas conceived as a scholarly field of study culturally, historically and intellectually encompassing the western hemisphere.

By the completion of the program, students will be able to:

- Demonstrate comprehensive knowledge of intellectual histories, theoretical frameworks, methodologies, and methods in art history and related fields.
- Demonstrate the ability to synthesize arguments through academic writing.
- Plan and design a high-level original research program.

- Demonstrate skills in professional academic writing and effectively communicate and present research to academic and public audiences in both written and oral form.
- Carry out original research and create new knowledge that contributes to art history field.

# Asian Languages and Civilizations

The Department of Asian Languages and Civilizations offers the Bachelor's-Accelerated Master's (BAM), MA, Dual MA and PhD graduate degrees with specializations in Chinese or Japanese. Celebrating a history of over 30 years, the department offers small class sizes that allow ALC graduate students the opportunity to work closely with faculty who are noted scholars in their fields.

For more information about the Department of Asian Languages and Civilizations, please visit the department website (https://www.colorado.edu/alc/graduate/admissions/). (https://www.colorado.edu/alc/)

**Course codes for these programs are CHIN and JPNS.**

## Master's Degree

- Asian Languages and Civilizations - Master of Arts (MA) (p. 1179)

## Doctoral Degree

- Asian Languages and Civilizations - Doctor of Philosophy (PhD) (p. 1181)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Alexander, Katherine Laura Bos (https://experts.colorado.edu/display/fisid_157674/)
Assistant Professor; PhD, University of Chicago

Arya, Nidhi (https://experts.colorado.edu/display/fisid_150006/)
Teaching Assistant Professor

Asano, Yukiko (https://experts.colorado.edu/display/fisid_168457/)
Teaching Assistant Professor; PhD, SUNY at Stony Brook

Attwa, Mona Farrag (https://experts.colorado.edu/display/fisid_155976/)
Teaching Associate Professor; MA, American University in Cairo (Egypt)

Brown, Janice Carole (https://experts.colorado.edu/display/fisid_143612/)
Professor; PhD, University of British Columbia (Canada)

Burge, Marjorie (https://experts.colorado.edu/display/fisid_166114/)
Assistant Professor; PhD, University of California, Berkeley

Hsu, Chun-ling
Instructor Emeritus; MEd, University of Wisconsin–River Falls

Kawakami, Kiyomi (https://experts.colorado.edu/display/fisid_163648/)
Teaching Assistant Professor; MA, University of Wisconsin–Madison

Kim, Sangbok (https://experts.colorado.edu/display/fisid_149220/)
Teaching Professor; PhD, University of California, Los Angeles

Kimbrough, Randle Keller (https://experts.colorado.edu/display/fisid_141167/)
Professor, Chair; PhD, Yale University

Kleeman, Faye Yuan (https://experts.colorado.edu/display/fisid_113313/)
Professor Emeritus; PhD, University of California, Berkeley

Kleeman, Terry F. (https://experts.colorado.edu/display/fisid_114181/)
Professor Emeritus; PhD, University of California, Berkeley

Kroll, Paul W.
Professor Emeritus

Li, Yingjie (https://experts.colorado.edu/display/fisid_164322/)
Teaching Associate Professor; PhD, University of Kansas

Matsunaga, Yumiko (https://experts.colorado.edu/display/fisid_149899/)
Teaching Professor of Distinction; PhD, University of Wisconsin–Madison

Maude, Daryl (https://experts.colorado.edu/display/fisid_175537/)
Assistant Professor; PhD, University of California, Berkeley

Richter, Antje (https://experts.colorado.edu/display/fisid_145310/)
Associate Professor; Dr habil, University of Kiel (Germany)

Richter, Matthias Ludwig (https://experts.colorado.edu/display/fisid_144864/)
Associate Professor, Chair; PhD, University of Hamburg (Germany)

Rodd, Laurel Rasplica
Professor Emerita

Schibli, Hisako (https://experts.colorado.edu/display/fisid_148621/)
Teaching Assistant Professor; MA, University of Colorado Boulder; BA, Sophia University (Japan)

Shih, Evelyn Ming Whai (https://experts.colorado.edu/display/fisid_163646/)
Assistant Professor; PhD, University of California, Berkeley

Waddell, Ethan
Assistant Professor; PhD, University of Chicago

## Courses

**CHIN 5010 (3) Sinological Methods**
Provides training in research methods for graduate work in Sinology. Regular exercises require students to use standard bibliographic sources and tools, such as leishu, congshu, specialized dictionaries, dynastic histories, geographical treatises, gazetteers, and private historiography.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CHIN 4042/5042 or instructor consent.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5030 (3) Readings in Pre-Modern Chinese Literary Theory**
Introduces the field of pre-modern Chinese literary theory and its relevance in Chinese intellectual history. Based on the close reading of primary sources, i.e. typically on selected core texts of Chinese literary thought, as well as on the reading of secondary literature. Texts and topics vary from year to year.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5041 (3) Introduction to Classical Chinese**
Develops basic competence in the Classical Chinese, the language in which the foundational texts of Chinese culture are written. Classical Chinese forms the basis for the literary language used in China until the early 20th century. We will begin to read parts of early Chinese philosophical texts, such as Laozi and the Analects of Confucius.
**Equivalent - Duplicate Degree Credit Not Granted:** CHIN 4041
**Requisites:** Restricted to graduate students only.

**CHIN 5042 (3) Readings in Classical Chinese**
Introduces a wide spectrum of texts from pre-modern China: philosophical, historical, ghost stories, and poems (including the Ballad of Mulan). We will read these texts closely, focusing on their linguistic and literary features and on their cultural background.
**Equivalent - Duplicate Degree Credit Not Granted:** CHIN 4042
**Requisites:** Restricted to graduate students only.

**CHIN 5070 (1) Graduate Academic Writing**
Considers the act of academic writing in the fields of East Asian studies both in terms of mechanics and in terms of habits of effective writers themselves, so that students, building upon a base knowledge of the expectations of the academy, develop approaches to help themselves gain the confidence to excel at the writing required of them in graduate school and beyond.
**Requisites:** Restricted to graduate students only.

**CHIN 5130 (3) History of Chinese Literature from the Tenth to the Nineteenth Century**
Survey of Chinese literature from the tenth to the nineteenth century, with readings in primary and secondary sources. Focuses on the major literary works, genres, figures, and movements of the Song through the Qing dynasties.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5210 (3) Ancient Literature**
Studies selected pre-imperial and Han prose texts important in their own time and for the influence they exercised on the later development of Chinese literary history. Focuses on works such as the Lun yu, Mengzi, Zhuangzi, Huainanzi, Shiji, Hanshu, and Lunheng.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CHIN 4042/5042 or instructor consent.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5280 (3) Topics in Ancient Culture**
Examines a specific problem or issue in ancient Chinese literature, e.g., early views of language's relationship to reality, or the commentary tradition and the emergence of allegorical and metaphysical approaches to interpreting texts. Topics vary from year to year.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CHIN 4042/5042 or instructor consent.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5410 (3) Medieval Prose**
Studies works of early medieval (ca. 200-600 AD) and/or late medieval (600-900 AD) prose that played an important role in development of Chinese literature. Writers and topics vary, ranging from surveys of specific genre, literary essays, proto-fiction, or historical writings, to focused studies of major figures Liu Zhiji, Han Yu, or Liu Zongyuan. Knowledge of Classical Chinese at the level of CHIN 4220 is required.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5480 (3) Topics in Medieval Literature**
Examines a specific problem or issue in medieval literature, e.g., the role of encyclopedias and anthologies in literary training, or the place and forms of literary composition at the imperial court. Topics vary from year to year. Knowledge of Classical Chinese at the level of CHIN 4220 is required.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5610 (3) Early Modern Prose**
Studies Song, Ming, and Qing prose texts selected for their inherent literary merit and for their significance in the Chinese literary tradition. Typically focuses on works by major authors such as Ouyang Xiu, Su Shi, and Yuan Hongdao. Texts and selections vary from year to year. Knowledge of Classical Chinese at the level of CHIN 4220 is required.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5630 (3) Early Modern Fiction**
Explores selected vernacular and classical fiction of the Ming and Qing periods. Normally focuses on long novels such as Xiyou ji, Sanguo yanyi, Shuihu zhuan, Jin Ping Mei, as well as short stories by Feng Menglong and Ling Mengchu. Texts and selections vary from year to year.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CHIN 4042/5042 or instructor consent.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5680 (3) Topics in Early Modern Culture**
Examines a specific problem or issue in early modern culture (e.g., the relationships among religion, folklore, and early fiction; the issue of genre and traditional fiction); the role of elite versus popular cultures in the composition of fiction; or the relationship of the state and censorship and the southern philosophical schools to the publication of fiction. Topics vary from year to year.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CHIN 4042/5042 or instructor consent.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5810 (3) Modern Literature**
Examines selected texts in various genres of Chinese literature from the May Fourth period (beginning 1917) to the establishment of the People's Republic of China (1949). Focuses on major and influential works produced in this fertile period of experimentation with Western, modernist types of literature. Texts and selections vary from year to year. Knowledge of Modern Chinese at the level of CHIN 4120 is required.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5820 (3) Contemporary Literature**
Examines selected texts in various genres of Chinese literature from 1949 (the establishment of the People's Republic of China) to the present. Focuses on major works from the very different literary worlds of Taiwan and mainland China. Texts and selections vary from year to year. Knowledge of Modern Chinese at the level of CHIN 4120 is required.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5830 (3) History of Chinese Film**
Examines the development of narrative film in China from the early twentieth century to today, covering the major periods, styles, and themes developed in Chinese cinema. Texts and selections vary from year to year. Knowledge of Modern Chinese at the level of CHIN 4120 is required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5880 (3) Topics in Modern and Contemporary Culture**
Examines a specific topic in 20th century literature, film and media, or cultural history. Topics vary from year to year. Knowledge of Modern Chinese at the level of CHIN 4120 is required. Topics vary from year to year. Knowledge of Modern Chinese at the level of CHIN 4120 is required.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5890 (3) Topics in Chinese Film**
Examines a specific problem or issue in Chinese film, e.g. 5th generation filmmakers, early film, genre (martial arts, melodrama, Hong Kong action, etc.), Taiwan New Cinema, Hollywood crossover. Topics vary from year to year. Knowledge of Modern Chinese at the level of CHIN 4120 is required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5900 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5980 (1) Practical Issues in Chinese Language Pedagogy**
Focuses on practical issues in Chinese language pedagogy for students who will serve as teaching assistants in Chinese language courses. Examines the connection between theory and practice as well as practical methods for teaching Chinese. Equips students with basic Chinese linguistic knowledge. Discusses the use of Communicative Approach in teaching Chinese as a second language. Knowledge of Modern Chinese at the level of CHIN 4120 is required.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 6900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 6950 (1-6) Master's Thesis**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**JPNS 5010 (3) Bibliography and Research Methods**
Introduces research materials on Japan in Japanese and Western languages, including bibliographic tools, style sheets, and library resources. Overview of secondary sources and publication outlets/methods of disseminating research.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 5080 (3) Kanji in Japanese Orthography**
Covers the issues in kanji research from historical, sociolinguistic, linguistic, cognitive perspective and vocabulary acquisition theories in the context of teaching and learning the Japanese language.
**Equivalent - Duplicate Degree Credit Not Granted:** JPNS 4080
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 5150 (3) Japanese Literary Translation**
Explores theories and practice of translation of literary texts as applied to Japanese-English translation; strategies for handling a variety of texts; and professional standards and ethics.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5210 (3) Classical Prose Literature**
Examines selected prose works and authors from the Classical, or Heian, period (784-1185). Texts may include selections from diaries, tale literature, and zuihitsu such as Izumi Shikibu Nikki, Genji Monogatari, and Makura no Soshi. Texts and selections vary from year to year. Knowledge of Classical Japanese at the level of JPNS 4320 is required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5220 (3) Waka, Renga, and Haiku**
Studies the three most important poetic forms in Japanese literary history. Emphasizes the reading and analysis of selected texts and authors that best represent these genres. Readings include selections from the first eight imperial poetry anthologies (hachidaishu), famous renga sequences (Minase Sangin Hyakuin, for example), and the haiku of Basho. Texts and selections vary from year to year. Knowledge of Classical Japanese at the level of JPNS 4320 is required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5270 (3) Readings in Sino-Japanese Texts**
Provides a foundation in glossing (kundoku), interpreting, and translating of Sino-Japanese (kanbun) texts. Cultivates a general understanding of practices surrounding the reading and writing of kanbun in various periods and examines unique elements of kanbun texts as produced within Japan.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite JPNS 5310 or equivalent.

**JPNS 5280 (3) Topics in Classical Japanese Literature**
Studies a specific problem or issue in classical (eighth through twelfth century) Japanese literature, e.g., the development of specifically Japanese theories of literature or the concept of genre in the Japanese tradition. Topics vary from year to year.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5310 (3) Advanced Classical Japanese 1**
Focuses on stylistic, grammatical, and orthographic variations in texts of the classical, medieval, and early modern eras. Knowledge of Classical Japanese at the level of JPNS 4310 is required.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5320 (3) Advanced Classical Japanese 2**
Advanced analysis of stylistic, grammatical, and orthographic variations in texts of the classical, medieval, and early modern eras, including kanbun and hentaigana; translation and explication of texts.
**Requisites:** Requires prerequisite course of JPNS 5310 (minimum grade C). Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5410 (3) Medieval Prose Literature**
Focuses on selected prose works and authors from the medieval, or Kamakura and Muromachi periods (1185-1600). Texts may include selections from a variety of war tales, histories, courtly fiction, diaries, memoirs, short prose narratives (otogi-zoshi), Noh plays, and Buddhist literature such as Heike Monogatari, Towazugatari, Izayoi Nikki, Tsurezuregusa, and Shasekishu. Texts and selections vary from year to year. Knowledge of Classical Japanese at the level of JPNS 4320 is required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5420 (3) Japanese Buddhism and Literature**
Studies selected works from the Japanese literary tradition in which Buddhism plays a significant thematic role. Focuses on texts such as the Nihon Ryoiki, Buddhist poetry (Shakkyo-Ka) from the imperial poetry anthologies, Heike Monogatari, Hojoki, the poetry of Saigyo and Basho, and selected Noh plays. Texts and selections vary from year to year. Knowledge of Classical Japanese at the level of JPNS 4320 is required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5480 (3) Topics in Medieval Literature**
Focuses on a specific problem or issue in medieval literature, e.g., the spread of literary composition beyond the court. Topics vary from year to year.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5620 (3) Early Modern Japanese Literature and Culture**
Examines the literature, arts, drama and culture of Japan's early modern period in the original language, as well as secondary scholarship and methodologies for pursuing work on early modern materials. Genres covered include kana-zoshi, uklyo-zoshi, dangibon, yomihon, sharebon, kibyoshi, ninjobon, kokkelbon, gokan, halkai, senryo, kyoka, joruri, kabuki, and literary thought.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5810 (3) Modern Japanese Literature**
Studies selected texts in Japanese literature from the Meiji Restoration (1868) to the end of the Pacific War. Surveys various literary genres, emphasizing the development of the modern novel as an aspect of Japan's response to Western cultural forms. The unique cultural politics of each of the periods (Meiji,Taisho, and Showa) are illuminated through the filter of both canonical and more marginalized texts. Specific selections vary from year to year.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5820 (3) Contemporary Japanese Literature**
Covers developments in Japanese prose fiction and/or other literary genres from the end of the Pacific War in 1945 to the present.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5830 (3) Readings in Modern and Contemporary Japanese Thought and Culture**
Examines central issues in Japanese culture and society since the Meiji Restoration (1868) through selected readings of the works of major writers in the fields of literature, anthropology, feminism, political science, and religion, among others. Provides a broad context for cultural studies in modern and contemporary Japan by positioning the most important commentators within their historical and social situations.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5920 (3) Topics in Modern Literature and Culture**
Close study of a specific problem or issue in modern or contemporary literature or culture: e.g., transwar literary nationalism.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5980 (1) Practical Issues in Japanese Language Pedagogy**
Focuses on practical issues in Japanese language pedagogy for students who will serve as teaching assistants in Japanese language class. Examines the connection between theory and practice as well as practical methods for teaching Japanese. Discusses how to teach Japanese as a second language in a communicative approach and how to assess student language learning. Knowledge of Modern Japanese at the level of JPNS 4120 is required.
**Equivalent - Duplicate Degree Credit Not Granted:** JPNS 4980
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 6900 (1-6) Japanese Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 6950 (1-6) Master's Thesis**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

# Asian Languages and Civilizations - Master of Arts (MA)

The MA program specialization in Chinese is designed to offer students maximum general exposure to the long sweep of Chinese literary and cultural history, as well as the opportunity to delve into the study of a particular period, field, topic or genre. With four professors covering literature and culture from early China through the medieval era to the early modern period and contemporary China, the program is truly comprehensive in scope. The program focuses especially on preparing students for PhD study and careers in sinology. Since 1991, more than eighty graduates (https://www.colorado.edu/alc/sites/default/files/attached-files/graduate_placement_in_phd_programs.pdf) of the Chinese MA program have gone on to doctoral study here or at other first-rank institutions in the U.S.

The MA program specialization in Japanese offers students the opportunity to engage in advanced-level study of Japanese literature and culture, with the aim of preparing students for doctoral study in Japanese literature as well as providing firm foundational knowledge for those seeking Japan-related professional careers. The program is composed of four professors with specializations in the literatures of classical, medieval, early modern and modern Japan. In recent years graduates of the Japanese MA program have gone on to PhD programs in Japanese literature and Japanese studies at this and numerous other first-rank institutions in the U.S.

For more information, please visit the department website (https://www.colorado.edu/alc/graduate/admissions/).

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s):

- Chinese - Bachelor of Arts (BA) (p. 156)
- Japanese - Bachelor of Arts (BA) (p. 159)

# Requirements

The MA in Asian Languages and Civilizations offers specializations in Chinese or Japanese.

All entering students in the Chinese program must take CHIN 5010 at the earliest opportunity. Students employed as teaching assistants also must take CHIN 5980 or JPNS 5980. Selection of courses beyond these is made in consultation with the director of graduate studies in Chinese or Japanese.

Prospective graduates will be required to present at least 30 hours of approved coursework or, in exceptional cases, 24 hours of coursework plus a thesis. The 24 hours must be completed at the 5000-level or above. Up to six credits from other departments may be completed at the 3000- or 4000-level at the discretion of the department.

Specific requirements for the MA specializations in Chinese and in Japanese, as well as a full list and description of graduate courses (https://www.colorado.edu/alc/courses/) offered, are available on the department website.

## Specialization in Chinese

Typical course sequence for this specialization consists of CHIN 5010, CHIN 5980 and one seminar in the first semester, followed by two seminars each over five subsequent semesters.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CHIN 5010 | Sinological Methods | 3 |
| CHIN 5980 | Practical Issues in Chinese Language Pedagogy (Only for TAs) | 1 |
| **Elective Courses** | | **20-27** |
| Choose 27 credits from the following. (Thesis plan students may choose 20 credits from the following.) | | |
| CHIN 5030 | Readings in Pre-Modern Chinese Literary Theory | |
| CHIN 5070 | Graduate Academic Writing | |
| CHIN 5120 | | |
| CHIN 5130 | History of Chinese Literature from the Tenth to the Nineteenth Century | |
| CHIN 5210 | Ancient Literature | |
| CHIN 5220 | | |
| CHIN 5230 | | |
| CHIN 5280 | Topics in Ancient Culture | |
| CHIN 5410 | Medieval Prose | |
| CHIN 5420 | | |
| CHIN 5430 | | |
| CHIN 5480 | Topics in Medieval Literature | |
| CHIN 5610 | Early Modern Prose | |
| CHIN 5620 | | |
| CHIN 5630 | Early Modern Fiction | |
| CHIN 5680 | Topics in Early Modern Culture | |
| CHIN 5750 | | |
| CHIN 5810 | Modern Literature | |
| CHIN 5820 | Contemporary Literature | |
| CHIN 5830 | History of Chinese Film | |
| CHIN 5880 | Topics in Modern and Contemporary Culture | |
| CHIN 5890 | Topics in Chinese Film | |
| CHIN 5900 | Independent Study | |
| CHIN 6900 | Independent Study | |
| Other appropriate courses approved by faculty advisor | | |
| **Thesis** | | |
| Students pursuing Thesis Plan only | | |
| CHIN 6950 | Master's Thesis | 6 |

## Specialization in Japanese

Typical course sequence for this specialization consists of JPNS 5310, JPNS 5980 and one seminar in the first semester, followed by two seminars each over five subsequent semesters.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| JPNS 5310 | Advanced Classical Japanese 1 (Only if there is no previous Classical Japanese training) | 3 |
| JPNS 5980 | Practical Issues in Japanese Language Pedagogy (Only for TAs) | 1 |
| **Elective Courses** | | **20-27** |
| Choose 27 credits from the following. (Thesis plan students may choose 20 credits from the following.) | | |
| JPNS 5010 | Bibliography and Research Methods | |
| JPNS 5150 | Japanese Literary Translation | |
| JPNS 5210 | Classical Prose Literature | |
| JPNS 5220 | Waka, Renga, and Haiku | |
| JPNS 5280 | Topics in Classical Japanese Literature | |
| JPNS 5310 | Advanced Classical Japanese 1 | |
| JPNS 5320 | Advanced Classical Japanese 2 | |
| JPNS 5410 | Medieval Prose Literature | |
| JPNS 5420 | Japanese Buddhism and Literature | |
| JPNS 5480 | Topics in Medieval Literature | |
| JPNS 5610 | | |
| JPNS 5620 | Early Modern Japanese Literature and Culture | |
| JPNS 5810 | Modern Japanese Literature | |
| JPNS 5820 | Contemporary Japanese Literature | |
| JPNS 5830 | Readings in Modern and Contemporary Japanese Thought and Culture | |

| | | |
|---|---|---|
| JPNS 5900 | Independent Study | |
| JPNS 5920 | Topics in Modern Literature and Culture | |
| JPNS 6900 | Japanese Independent Study | |
| Other appropriate courses approved by faculty advisor | | |
| **Thesis** | | |
| Students pursuing Thesis Plan only | | |
| JPNS 6950 | Japanese Master's Thesis | 6 |

# Learning Outcomes

By the completion of the program, students will be able to:

- Read literary and historical texts in classical Chinese/classical Japanese.
- Demonstrate familiarity with core theoretical frameworks and research methodologies utilized within the discipline.
- Demonstrate knowledge of the canon of Chinese/Japanese literature.
- Demonstrate the ability to synthesize arguments through academic writing.
- Effectively communicate and present research to academic and public audiences in both written and oral form according to the scholarly conventions of our field.

# Dual Degree Programs

## Dual MA in Asian Languages and Civilizations and History or Religious Studies

The Department of Asian Languages and Civilizations participates in a dual master's program with the Departments of History (https://www.colorado.edu/history/graduate-studies/dual-ma/) and Religious Studies (http://www.colorado.edu/rlst/graduate/dual-ma/). Students admitted to the MA programs in these departments may apply to complete a second MA in one of the other programs. Such degrees serve the needs of students who seek a truly interdisciplinary experience among intellectually affiliated departments. Students interested in exploring this option should contact the director of graduate studies in Chinese or Japanese for specific requirements.

# Asian Languages and Civilizations - Doctor of Philosophy (PhD)

The PhD in Asian Languages and Civilizations offers extensive training in the modern and premodern literatures of China and Japan for students seeking to pursue research and teaching careers at the collegiate level.

For more information, please visit the department website (https://www.colorado.edu/alc/graduate/admissions/).

# Requirements

The PhD in Asian Languages and Civilizations offers specializations in Chinese or Japanese with concentrations in literary and/or cultural studies of either the premodern or modern periods.

The PhD requires a minimum of 45 credits in graduate courses numbered 5000 or above in Chinese or Japanese, and 30 credits of dissertation work beyond the required coursework. Selection of courses should be made in consultation with the Director of Graduate Studies in Chinese or Japanese (see the department's Graduate Advising webpage). Academic preparation is expected in both classical and modern language.

Some graduate or advanced undergraduate coursework from related fields may also be included, in accordance with Graduate School rules. Additionally, some coursework completed for the MA degree at CU or other similarly rigorous institutions may count toward the 45 credits required. PhD students may transfer to the department up to 21 hours of acceptable graduate-level credit.

Visit the department's PhD specialization in Chinese and PhD specialization in Japanese webpages for specific requirements, as well as a full list and description of graduate courses (https://www.colorado.edu/alc/courses/) offered.

## Specialization in Chinese

| Code | Title | Credit Hours |
|---|---|---|
| Select 45 credits from the following: | | 45 |
| CHIN 5010 | Sinological Methods | |
| CHIN 5980 | Practical Issues in Chinese Language Pedagogy | |
| CHIN 5030 | Readings in Pre-Modern Chinese Literary Theory | |
| CHIN 5070 | Graduate Academic Writing | |
| CHIN 5120 | | |
| CHIN 5210 | Ancient Literature | |
| CHIN 5220 | | |
| CHIN 5230 | | |
| CHIN 5280 | Topics in Ancient Culture | |
| CHIN 5410 | Medieval Prose | |
| CHIN 5420 | | |
| CHIN 5430 | | |
| CHIN 5480 | Topics in Medieval Literature | |
| CHIN 5610 | Early Modern Prose | |
| CHIN 5620 | | |
| CHIN 5630 | Early Modern Fiction | |
| CHIN 5680 | Topics in Early Modern Culture | |
| CHIN 5750 | | |
| CHIN 5810 | Modern Literature | |
| CHIN 5820 | Contemporary Literature | |
| CHIN 5830 | History of Chinese Film | |
| CHIN 5880 | Topics in Modern and Contemporary Culture | |
| CHIN 5890 | Topics in Chinese Film | |
| CHIN 5900 | Independent Study | |
| CHIN 6900 | Independent Study | |
| Other appropriate courses approved by faculty advisor | | |
| **Dissertation** | | **30** |
| CHIN 8990 | Doctoral Dissertation | |

## Specialization in Japanese

| Code | Title | Credit Hours |
|---|---|---|
| **Select 45 credits from the following:** | | **45** |
| JPNS 5010 | Bibliography and Research Methods | |
| JPNS 5150 | Japanese Literary Translation | |
| JPNS 5210 | Classical Prose Literature | |

| | | |
|---|---|---|
| JPNS 5220 | Waka, Renga, and Haiku | |
| JPNS 5280 | Topics in Classical Japanese Literature | |
| JPNS 5310 | Advanced Classical Japanese 1 | |
| JPNS 5320 | Advanced Classical Japanese 2 | |
| JPNS 5410 | Medieval Prose Literature | |
| JPNS 5420 | Japanese Buddhism and Literature | |
| JPNS 5480 | Topics in Medieval Literature | |
| JPNS 5610 | | |
| JPNS 5620 | Early Modern Japanese Literature and Culture | |
| JPNS 5810 | Modern Japanese Literature | |
| JPNS 5820 | Contemporary Japanese Literature | |
| JPNS 5830 | Readings in Modern and Contemporary Japanese Thought and Culture | |
| JPNS 5900 | Independent Study | |
| JPNS 5920 | Topics in Modern Literature and Culture | |
| JPNS 5980 | Practical Issues in Japanese Language Pedagogy | |
| JPNS 6900 | Japanese Independent Study | |
| Other appropriate courses approved by faculty advisor | | |
| **Dissertation** | | **30** |
| JPNS 8990 | Doctoral Dissertation | |

## Learning Outcomes

By the completion of the program in Chinese/Japanese, students will be able to:

- Read literary and historical texts in classical Chinese/classical Japanese.
- Demonstrate familiarity with core theoretical frameworks and research methodologies utilized within the discipline.
- Demonstrate expertise in the canon of Chinese/Japanese literature and demonstrate the ability to synthesize arguments through academic writing.
- Effectively communicate and present research to academic and public audiences in both written and oral form according to the scholarly conventions of our field.
- Design and conduct high-quality original research that advances knowledge in our field.

# Asian Studies

The Center for Asian Studies (CAS) was established in 1999 to advance knowledge of Asia through undergraduate and graduate education, faculty research, and outreach programs for the broader community. The Center for Asian Studies is pleased to offer the graduate certificate in Asian studies, which draws on graduate coursework in Asia-related topics across multiple departments and schools.

The Center is committed to managing and expanding the study of Asia by providing graduate student fellowships and scholarships such as Foreign Language and Area Studies (FLAS) Fellowships, the Edward G. Seidensticker Japan Summer Research Grant, and the Japanese Studies Scholarship Fund; investing in faculty research and professional development; providing support for bringing additional Asia-related resources to the CU Boulder campus; developing academic exchanges with Asia-based institutions; and engaging the local community with Asia-related programs and events.

The Center also serves as a network and community-building resource for faculty and students across the university. Graduate students can establish connections with the over 100 faculty members doing teaching or research related to Asia by attending CAS events and getting involved with CAS initiatives.

**Course code for this program is ASIA.**

## Certificate

- Asian Studies - Graduate Certificate (p. 1182)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Collins, Lauren (https://experts.colorado.edu/display/fisid_147078/)
Assistant Teaching Professor, Program Director; PhD, University of Denver

Fydenlund, Shae
Teaching Assistant Professor; PhD, University of Colorado Boulder

Hirschberg, Dan (https://experts.colorado.edu/display/fisid_172774/)
Associate Teaching Professor; PhD, Harvard University

Rinaldo, Rachel Ann (https://experts.colorado.edu/display/fisid_156309/)
Faculty Director; PhD, University of Chicago

# Asian Studies - Graduate Certificate

The Center for Asian Studies is pleased to offer the graduate certificate in Asian studies. It enables students with intellectual or professional interest in Asia who are not focused primarily on Asia within their own degree program to acquire an official credential indicating that they have expertise in some aspect of Asian knowledge or practice.

For more information, visit the Center for Asian Studies' Asian Studies Graduate Certificate (http://www.colorado.edu/cas/academics/asian-studies-graduate-certificate/) webpage.

## Requirements

### Admission Requirements

The certificate is available to all graduate students and post-BA students in the professional schools currently enrolled at CU Boulder, and to non-degree-seeking ACCESS students with a bachelor's degree.

#### How to Apply

- Write to the Certificate Director (lauren.collins@colorado.edu)
- Upon acceptance, meet with the Certificate Director to approve a plan for coursework and meeting the language requirement
- Upon completion, submit transcript to the Center for Asian Studies for review by the Certificate Director

### Course Requirements

Students must complete 12 credit hours of approved graduate courses with a grade of B or higher, 3 credits of which may be in an approved undergraduate course, and 9 credits of which must be at or above the 5000 level.

- Specialization allowed in East Asia, South Asia, Central Asia, Southeast Asia or West Asia/Middle East.
- 2 courses in a single discipline or department.
- 2 courses from outside of that discipline or department.
- Thematic courses that have at least 50% Asia content may also be counted, dependent on approval by the Certificate Director.
- Up to 3 credits may be taken as independent study on an Asia-related topic at the 5000 level or higher with approval from the Certificate Director.
- 9 credits must be at or above the 5000 level.
- Two years' college-level proficiency in an Asian language relevant to specialization (does not count toward the certificate credit hours).

*Note*: Students may take 3 credits of independent study on an Asia-related topic at the 5000 level or higher with a CAS Faculty Affiliate from outside of their home department; students may not take both a theory class and an independent study for the certificate.

## Approved Undergraduate Courses

These courses must be outside the student's home department and can be chosen from the upper-division courses (at 3000 or 4000 level) listed as requirements on the Asian Studies - Bachelor of Arts (BA) (https://catalog.colorado.edu/undergraduate/colleges-schools/arts-sciences/programs-study/asian-studies/asian-studies-bachelor-arts-ba/#requirementstext) page under Modern Asian Civilizations and Electives.

## Graduate Courses with a Theory Focus

If a student takes one of these courses, they may not also take an Independent Study course for the certificate; the course must be taught be a CAS Faculty Affiliate and the student must complete written assignments/projects on an Asia-related topic.

| Code | Title | Credit Hours |
|---|---|---|
| **Anthropology** | | |
| ANTH 5020 | Explorations in Anthropology (Approved topics include: Islam; Ethnography of Southeast Asia; Global Cultures: Islam; Global Islam) | |
| ANTH 5760 | Ethnography of Southeast Asia and Indonesia | |
| **Art and Art History** | | |
| ARTH 5169 | Topics in Ancient and Classical Art and Archaeology (Persian Empire) | |
| ARTH 5269 | Art and Archaeology of the Ancient Near East | |
| ARTH 5929 | Special Topics in Art History (when it has an Asia focus) | |
| ARTH 6929 | Seminar: Methods/Theories of Art History (when it has an Asia focus) | |
| ARTH 6939 | Graduate Seminar: Open Topics in Art History (East and West) | |
| **Art and Film Studies** | | |
| ARTF 5023 | Topics in International Cinema (Contemporary Asian Cinema) | |
| **Classics** | | |
| CLAS 5169 | Topics in Ancient and Classical Art and Archaeology (Persian Empire) | |
| CLAS 5269 | Art and Archaeology of the Ancient Near East | |
| **Economics** | | |
| ECON 8413 | International Economics 1 | |
| ECON 8764 | | |
| **History** | | |
| HIST 5053 | | |
| HIST 5339 | Borderlands of the British Empire | |
| HIST 5349 | Decolonization of the British Empire | |
| **School of Law** | | |
| LAWS 6518 | Introduction to Islamic Law & Jurisprudence | |
| **Religious Studies** | | |
| RLST 5820 | Interdisciplinary Seminar on Religion (The Body in Chinese Religion) | |

## Graduate Courses with an Asia Focus

| Code | Title | Credit Hours |
|---|---|---|
| **Anthropology** | | |
| ANTH 5020 | Explorations in Anthropology (Islam; Ethnography of Southeast Asia; Global Cultures: Islam; Global Islams ) | |
| ANTH 5750 | Culture and Society in South Asia | |
| ANTH 5760 | Ethnography of Southeast Asia and Indonesia | |
| **Art & Art History** | | |
| ARTH 5169 | Topics in Ancient and Classical Art and Archaeology (Persian Empire) | |
| ARTH 5269 | Art and Archaeology of the Ancient Near East | |
| **Classics** | | |
| CLAS 5169 | Topics in Ancient and Classical Art and Archaeology (Persian Empire) | |
| CLAS 5269 | Art and Archaeology of the Ancient Near East | |
| **Geography** | | |
| GEOG 5832 | Geography of Tibet | |
| GEOG 5842 | Global Frontiers in Southeast Asia | |
| **History** | | |
| HIST 5129 | Colloquium in Modern Asian History | |
| HIST 5328 | The Modern Middle East, 1600 to the Present | |
| HIST 5538 | History of Modern India | |
| HIST 5548 | Women in Modern India | |
| HIST 5619 | Women in East Asian History | |
| HIST 5628 | Modern China: Collapse of Imperial Brilliance, 1644-1949 | |
| HIST 5638 | Contemporary China: Radicalism and Reform, 1949 to Present | |
| HIST 5658 | Between Beijing and Baghdad: China and Islam | |
| HIST 5728 | Japan's Empire: Birth and Death | |
| HIST 5738 | History of Early Modern Japan (1590-1868) | |

| | |
|---|---|
| HIST 6019 | Readings in World History (The Japanese Empire) |
| HIST 6109 | Readings in Asian History |
| HIST 6349 | |
| HIST 6528 | Reading in South Asian History |
| HIST 7119 | Graduate Research Seminar in Asian History |
| **Music** | |
| EMUS 5467 | World Music Ensemble (Japanese Ensemble; Gamelan Ensemble) |
| **School of Law** | |
| LAWS 6518 | Introduction to Islamic Law & Jurisprudence |
| **Political Science** | |
| PSCI 7012 | Seminar: Comparative Political Systems (when it has an Asia focus ) |
| **Religious Studies** | |
| RLST 5200 | Topics in Hinduism |
| RLST 5280 | Body and Magic in India |
| RLST 5210 | Advanced Readings in Sanskrit |
| RLST 5250 | Topics in Buddhism |
| RLST 5260 | Topics in Judaism (when it has an Asia focus ) |
| RLST 5650 | Islam in the Modern World |
| RLST 5750 | |
| **Theatre & Dance** | |
| THTR 5061 | |

## Graduate Literature Courses

For students with sufficient training in Chinese or Japanese

| Code | Title | Credit Hours |
|---|---|---|
| **Chinese** | | |
| CHIN 5010 | Sinological Methods | |
| CHIN 5030 | Readings in Pre-Modern Chinese Literary Theory | |
| CHIN 5120 | | |
| CHIN 5130 | History of Chinese Literature from the Tenth to the Nineteenth Century | |
| CHIN 5210 | Ancient Literature | |
| CHIN 5220 | | |
| CHIN 5230 | | |
| CHIN 5280 | Topics in Ancient Culture | |
| CHIN 5410 | Medieval Prose | |
| CHIN 5420 | | |
| CHIN 5430 | | |
| CHIN 5480 | Topics in Medieval Literature | |
| CHIN 5610 | Early Modern Prose | |
| CHIN 5620 | | |
| CHIN 5630 | Early Modern Fiction | |
| CHIN 5680 | Topics in Early Modern Culture | |
| CHIN 5750 | | |
| CHIN 5810 | Modern Literature | |
| CHIN 5820 | Contemporary Literature | |
| CHIN 5830 | History of Chinese Film | |
| CHIN 5880 | Topics in Modern and Contemporary Culture | |
| CHIN 5890 | Topics in Chinese Film | |
| **Japanese** | | |
| JPNS 5010 | Bibliography and Research Methods | |
| JPNS 5050 | | |
| JPNS 5080 | Kanji in Japanese Orthography | |
| JPNS 5150 | Japanese Literary Translation | |
| JPNS 5170 | | |
| JPNS 5210 | Classical Prose Literature | |
| JPNS 5220 | Waka, Renga, and Haiku | |
| JPNS 5280 | Topics in Classical Japanese Literature | |
| JPNS 5310 | Advanced Classical Japanese 1 | |
| JPNS 5320 | Advanced Classical Japanese 2 | |
| JPNS 5410 | Medieval Prose Literature | |
| JPNS 5420 | Japanese Buddhism and Literature | |
| JPNS 5480 | Topics in Medieval Literature | |
| JPNS 5610 | | |
| JPNS 5620 | Early Modern Japanese Literature and Culture | |
| JPNS 5810 | Modern Japanese Literature | |
| JPNS 5820 | Contemporary Japanese Literature | |
| JPNS 5830 | Readings in Modern and Contemporary Japanese Thought and Culture | |
| JPNS 5920 | Topics in Modern Literature and Culture | |

# Astrophysical and Planetary Sciences

The curriculum and research in the department emphasizes three major areas: astrophysics, planetary sciences, and solar and space physics.

Those wishing to pursue graduate work in APS leading to candidacy for an advanced degree should carefully read the Doctoral Degree Requirements (p. 1114).

**Course code for this program is ASTR.**

**Doctoral Degree**

- Astrophysical and Planetary Sciences - Doctor of Philosophy (PhD) (p. 1188)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Baker, Daniel N. (https://experts.colorado.edu/display/fisid_103264/)
Distinguished Professor; PhD, University of Iowa

Bally, John (https://experts.colorado.edu/display/fisid_105710/)
Professor Emeritus; PhD, University of Massachusetts at Amherst

Begelman, Mitchell C. (https://experts.colorado.edu/display/fisid_100446/)
Distinguished Professor; PhD, University of Cambridge (England)

Berta-Thompson, Zachory (https://www.colorado.edu/aps/zachory-berta-thompson/)
Assistant Professor; PhD, Harvard University

Blum, Lauren W. (https://experts.colorado.edu/display/fisid_167200/)
Assistant Professor; PhD, University of Colorado Boulder

Brain, David A. (https://experts.colorado.edu/display/fisid_149098/)
Associate Professor, Chair; PhD, University of Colorado Boulder

Brown, Benjamin P. (https://experts.colorado.edu/display/fisid_153758/)
Associate Professor; PhD, University of Colorado Boulder

Burns, Jack O.
Professor Emeritus, Faculty Fellow; PhD, Indiana University Bloomington

Cash, Webster C. Jr. (https://experts.colorado.edu/display/fisid_101759/)
Professor; PhD, University of California, Berkeley

Comerford, Julia M. (https://experts.colorado.edu/display/fisid_151471/)
Professor; PhD, University of California, Berkeley

Cranmer, Steven (https://experts.colorado.edu/display/fisid_155051/)
Associate Professor; PhD, University of Delaware

Curry, Shannon (https://experts.colorado.edu/display/fisid_169552/)
Associate Professor; PhD, University of Michigan

Darling, Jeremiah K. (https://experts.colorado.edu/display/fisid_141767/)
Professor; PhD, Cornell University

Dexter, Jason (https://experts.colorado.edu/display/fisid_164095/)
Assistant Professor; PhD, University of Washington Seattle

Ellingson, Erica (https://experts.colorado.edu/display/fisid_100118/)
Professor Emeritus; PhD, University of Arizona

Ergun, Robert E. (https://experts.colorado.edu/display/fisid_115912/)
Professor; PhD, University of California, Berkeley

Esposito, Larry Wayne (https://experts.colorado.edu/display/fisid_100502/)
Professor; PhD, University of Massachusetts at Amherst

Fleming, Brian (https://experts.colorado.edu/display/fisid_154011/)
Assistant Research Professor; PhD, Johns Hopkins University

France, Kevin Christopher (https://experts.colorado.edu/display/fisid_145201/)
Associate Professor, Associate Chair; PhD, Johns Hopkins University

Green, James C. (https://experts.colorado.edu/display/fisid_102344/)
Professor Emeritus; PhD, University of California, Berkeley

Halverson, Nils W. (https://experts.colorado.edu/display/fisid_134252/)
Professor; PhD, California Institute of Technology

Hamilton, Andrew J.S. (https://experts.colorado.edu/display/fisid_101517/)
Professor, Chair; PhD, University of Virginia

Hayne, Paul (https://experts.colorado.edu/display/fisid_163352/)
Associate Professor; PhD, University of California, Los Angeles

Hindman, Bradley W. (https://experts.colorado.edu/display/fisid_103726/)
Assistant Research Professor, Lecturer; PhD, University of Colorado Boulder

Hornstein, Seth D. (https://experts.colorado.edu/display/fisid_144237/)
Senior Instructor; PhD, University of California, Los Angeles

Kazachenko, Maria (https://experts.colorado.edu/display/fisid_160195/)
Associate Professor; PhD, Montana State University

Keller, John M. (https://experts.colorado.edu/display/fisid_163223/)
Senior Instructor; PhD, University of Arizona

Kowalski, Adam (https://www.colorado.edu/aps/adam-kowalski/)
Associate Professor; PhD, University of Washington

Linsky, Jeffrey
Professor Emeritus

Madigan, Ann-Marie (https://experts.colorado.edu/display/fisid_158298/)
Associate Professor; PhD, Leiden University (Netherlands)

Malaspina, David M. (https://experts.colorado.edu/display/fisid_148393/)
Assistant Professor; PhD, University of Colorado Boulder

Malville, J. McKim
Professor Emeritus

Nelson, Erica Lynn (https://experts.colorado.edu/display/fisid_166298/)
Assistant Professor; PhD, Yale University

Rast, Mark Peter (https://experts.colorado.edu/display/fisid_142997/)
Professor; PhD, University of Colorado Boulder

Reardon, Kevin Patrick (https://experts.colorado.edu/display/fisid_154925/)
Professor Adjunct

Rosario-Franco, Marialis (https://experts.colorado.edu/display/fisid_172547/)
Assistant Teaching Professor; PhD, University of Texas at Arlington

Schneider, Nicholas M. (https://experts.colorado.edu/display/fisid_102620/)
Professor; PhD, University of Arizona

Shull, J Michael
Professor Emeritus; PhD, Princeton University

Snow, Theodore P. Jr
Professor Emeritus

Stocke, John T.
Professor Emeritus; PhD, University of Arizona

Suess, Wren (https://experts.colorado.edu/display/fisid_174290/)
Assistant Professor; PhD, University of California Berkeley

Thomas, Gary E.
Professor Emeritus

Toomre, Juri (https://experts.colorado.edu/display/fisid_100767/)
Professor, Faculty Fellow, Professor Emeritus; PhD, University of Cambridge (England)

# Courses

**ASTR 5110 (3) Atomic and Molecular Processes**
Explores the application of quantum physics and statistical mechanics to problems in astrophysics, space physics and planetary science, with an emphasis on radiative processes and spectroscopy of atoms and molecules.
**Requisites:** Restricted to graduate students only.

**ASTR 5120 (3) Radiative and Dynamical Processes**
An introduction to radiative and dynamical processes aimed at graduate students in astrophysics, space physics and planetary science. Covers transport phenomena, the macroscopic treatment of radiation fields, magnetohydrodynamics and dynamical processes associated with planetary orbits and N-body systems.
**Requisites:** Restricted to graduate students only.

**ASTR 5140 (3) Astrophysical and Space Plasmas**
Teaches magnetohydrodynamics and a few related areas of plasma physics applied to space and astrophysical systems, including planetary magnetospheres and ionospheres, stars, and interstellar gas in galaxies.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5141
**Requisites:** Restricted to Physics (PHYS) or Astronomy (ASTR) graduate students only.

**ASTR 5150 (3) Introductory Plasma Physics**
Includes basic phenomena of ionized gases, static and dynamic shielding, linear waves, instabilities, particles in fields, collisional phenomena, fluid equations, collisionless Boltzman equations, Landau damping, scattering and absorption of radiation in plasmas, elementary nonlinear processes, WKB wave theory, controlled thermonuclear fusion concepts, astrophysical applications and experimental plasma physics (laboratory).
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5150
**Requisites:** Restricted to graduate students only.

**ASTR 5300 (3) Introduction to Magnetospheres**
Introduces solar and stellar winds, and planetary and stellar magnetospheres. Acquaints students with the guiding center theory for particle motion, magnetospheric topology, convection, radiation belts, magnetic storms and substorms, and auroras.
**Requisites:** Restricted to graduate students only.

**ASTR 5330 (3) Cosmochemistry**
Investigates chemical and isotopic data to understand the composition of the solar system: emphasis on the physical conditions in various objects, time scales for change, chemical and nuclear processes leading to change, observational constraints, and various models that attempt to describe the chemical state and history of cosmological objects in general and the early solar system in particular. Department enforced prerequisite: graduate standing in physical science and graduate chemistry or physics or math courses.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 4330 and GEOL 4330 and GEOL 5330
**Requisites:** Restricted to graduate students only.

**ASTR 5400 (3) Introduction to Fluid Dynamics**
Covers equations of fluid motion relevant to planetary atmospheres and oceans and stellar atmospheres; effects of rotation and viscosity; and vorticity dynamics, boundary layers and wave motions. Introduces instability theory, nonlinear equilibration and computational methods in fluid dynamics. Department enforced prerequisite: partial differential equations or equivalent.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5400 and PHYS 5400
**Requisites:** Restricted to graduate students only.

**ASTR 5410 (3) Fluid Instabilities, Waves, and Turbulence**
Involves linear and nonlinear analyses of small-scale waves and instabilities in stratified fluids, with effects of rotation. Studies internal gravity and acoustic waves with terrestrial, planetary and astrophysical applications. Studies thermal and double-diffusive convection, homogeneous and stratified shear flow instabilities. Examines these topics from the onset of small amplitude disturbances to their nonlinear development and equilibration. Department enforced prerequisite: ASTR 5400 or ATOC 5060.
**Requisites:** Restricted to graduate students only.

**ASTR 5540 (3) Mathematical Methods**
Presents an applied mathematics course designed to provide the necessary analytical and numerical background for courses in astrophysics, plasma physics, fluid dynamics, electromagnetism, and radiation transfer. Topics include integration techniques, linear and nonlinear differential equations, WKB and Fourier transform methods, adiabatic invariants, partial differential equations, integral equations, and integrodifferential equations. Draws illustrative examples from the areas of physics listed above.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5540
**Requisites:** Restricted to graduate students only.

**ASTR 5550 (3) Observations, Data Analysis and Statistics**
Introduces multi-wavelength observational techniques,their limitations and effects of various noise sources. Describes basic data handling, error analysis, and statistical tests relevant to modeling. Topics include probability distributions, model-fitting algorithms, confidence intervals, correlations, sampling and convolution. Students derive physical measurements and uncertainties with hands-on analysis of real datasets. Department enforced prerequisite: senior level undergraduate physics or instructor consent will be required.
**Requisites:** Restricted to graduate students only.

**ASTR 5560 (3) Radiative Processes in Planetary Atmospheres**
Application of radiative transfer theory to problems in planetary atmospheres, with primary emphasis on the Earth's atmosphere; principles of atomic and molecular spectroscopy; infrared band representation; absorption and emission of atmospheric gases; radiation flux and flux divergence computations; radiative transfer and fluid motions; additional applications such as the greenhouse effect, inversion methods and climate models. Department enforced prerequisite or corequisite: ASTR 5110.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5560
**Requisites:** Restricted to graduate students only.

**ASTR 5700 (3) Stellar Astrophysics**
Explores stellar interiors, evolution and atmospheres, with the Sun and its heliosphere being used as the closest and best-studied example of a star. Covers energy generation, transport, principles of stellar structure, stellar rotation, pulsation and evolution to supernova and compact object stages. Includes radiation transport in stellar photospheres, chromospheres, coronas, winds. Department enforced prerequisite: senior level undergraduate physics.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ASTR 5120.

**ASTR 5710 (3) High-Energy Astrophysics**
Studies astrophysics of UV, x-ray, gamma-ray and cosmic-ray sources, including fundamentals of radiative and particle processes, neutron stars, black holes, pulsars, quasars, supernovas and their remnants; stellar flares; accretion disks; binary x-ray sources; and other cosmic x-ray sources. Department enforced prerequisite: senior level undergraduate physics.
**Requisites:** Restricted to graduate students only.

**ASTR 5720 (3) Galaxies**
Highlights the classification, structure, content, dynamics, and other observational properties of galaxies, active galaxies, and clusters of galaxies. Discusses Hubble's Law, the cosmic distance scale,and the intergalactic medium. Department enforced prerequisite: senior level undergraduate physics.
**Requisites:** Restricted to graduate students only.

**ASTR 5730 (3) Stellar Atmospheres and Radiative Transfer**
Explores stellar atmospheres: basic stellar atmospheres, spectral line formation, interpretation of stellar spectra and model atmospheres. Examines solar physics: the Sun as a star, solar cycle, chromospheric and coronal structure, energy balance, magnetic field and solar wind. Department enforced prerequisites: ASTR 5110 and undergraduate physics.
**Requisites:** Restricted to graduate students only.

**ASTR 5740 (3) Interstellar Astrophysics**
Highlights structure, dynamics and ecology of the interstellar medium, stressing the physical mechanisms that govern the thermal, ionization and dynamic state of the gas and dust; observations at all wavelengths; star formation; relation to external galaxies. Department enforced prerequisite: ASTR 5110.
**Requisites:** Restricted to graduate students only.

**ASTR 5760 (3) Astrophysical Instrumentation**
Covers the fundamentals underlying the design, construction and use of instrumentation used for astrophysical research ranging from radio-wavelengths to gamma rays. Topics include Fourier transforms and their applications, optical design concepts, incoherent and coherent signal detection, electronics and applications, and signal acquisition and processing. Department enforced prerequisite: senior level undergraduate physics.
**Requisites:** Restricted to graduate students only.

**ASTR 5770 (3) Cosmology**
Studies the smooth universe, including Friedmann-Robertson-Walker metric, Friedmann equations, cosmological parameters, inflation, primordial nucleosynthesis, recombination, and cosmic microwave background. Also studies the lumpy universe, including linear growth of fluctuations, power spectra of CMB and galaxies, dark matter, and large scale flows. Covers galaxy formation and intergalactic medium. Department enforced prerequisite: senior level undergraduate physics or instructor consent will be required.
**Requisites:** Restricted to graduate students only.

**ASTR 5780 (3) Mission Design and Development for Space Sciences**
Brings science and engineering students together to develop the multidisciplinary skills required to create a successful proposal to develop a NASA-funded small space mission. Goals: 1) develop the proposal science objectives based on scientific community priorities and NASA Announcement of Opportunity. 2) Understand how science requirements lead to the design of instrumentation. 3) Understand practical aspects of mission development.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 5440
**Grading Basis:** Letter Grade

**ASTR 5800 (3) Planetary Surfaces and Interiors**
Examines processes operating on the surfaces of solid planets and in their interiors. Emphasizes spacecraft observations, their interpretation, the relationship to similar processes on Earth, the relationship between planetary surfaces and interiors and the integrated geologic histories of the terrestrial planets and satellites.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5800
**Requisites:** Restricted to graduate students only.

**ASTR 5810 (3) Planetary Atmospheres**
Covers the structure, composition, and dynamics of planetary atmospheres. Also includes origin of planetary atmospheres, chemistry and cloud physics, greenhouse effects, climate, and the evolution of planetary atmospheres past and future.
**Requisites:** Restricted to graduate students only.

**ASTR 5820 (3) Origin and Evolution of Planetary Systems**
Considers the origin and evolution of planetary systems, including proto-planetary disks, condensation in the solar nebula, composition of meteorites, planetary accretion, comets, asteroids, planetary rings and extrasolar planets. Applies celestial mechanics to the dynamical evolution of solar system bodies.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5820
**Requisites:** Restricted to graduate students only.

**ASTR 5830 (3) Topics in Planetary Science**
Examines current topics in planetary science, based on recent discoveries, spacecraft observations and other developments. Focuses on a specific topic each time the course is offered, such as Mars, Venus, Galilean satellites, exobiology, comets or extrasolar planets. Department enforced prerequisite: restricted to graduate students in the physical sciences.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5830 and GEOL 5830
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ASTR 5835 (1) Seminar in Planetary Science**
Studies current research on a topic in planetary science. Students and faculty give presentations. Subjects may vary each semester. Department enforced prerequisite: senior level undergraduate physics.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5835 and GEOL 5835
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ASTR 5920 (1-6) Reading and Research in Astrophysical and Planetary Sciences**
Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ASTR 6000 (1) Seminar in Astrophysics**
Studies current research and research literature on an astrophysical topic. Students and faculty give presentations. Subjects vary each semester. May be repeated for a total of 4 credit hours to meet candidacy requirements.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ASTR 6050 (3) Space Instrumentation**
Provides an overview of the relevant space environment and process, the types of instruments flown on recent mission and the science background of the measurement principles.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 6050 and GEOL 6050
**Grading Basis:** Letter Grade

**ASTR 6610 (3) Earth and Planetary Physics 1**
Examines mechanics of deformable materials, with applications to earthquake processes. Introduces seismic wave theory. Other topics include inversion of seismic data for the structure, composition and state of the interior of the Earth.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 6610 and PHYS 6610
**Requisites:** Restricted to graduate students only.

**ASTR 6620 (3) Earth and Planetary Physics 2**
Covers space and surface geodetic techniques as well as potential theory. Other topics are the definition and geophysical interpretation of the geoid and of surface gravity anomalies; isostasy; post-glacial rebound; and tides and the rotation of the Earth.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 6620 and PHYS 6620
**Requisites:** Restricted to graduate students only.

**ASTR 6630 (3) Earth and Planetary Physics 3**
Examines the solar system, emphasizing theories of its origin and meteorites. Highlights distribution of radioactive materials, age dating, heat flow through continents and the ocean floor, internal temperature distribution in the Earth, and mantle convection. Also covers the origin of the oceans and atmosphere.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 6630 and PHYS 6630
**Requisites:** Restricted to graduate students only.

**ASTR 6650 (1-3) Seminar in Geophysics**
Advanced seminar studies in geophysical subjects for graduate students.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 6650 and PHYS 6650
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ASTR 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.

**ASTR 6950 (1-6) Master's Thesis**

**ASTR 7160 (3) Intermediate Plasma Physics**
Topics vary yearly but include nonlinear effects such as wave coupling, quasilinear relaxation, particle trapping, nonlinear Landau damping, collisionless shocks, solutions; nonneutral plasmas; kinetic theory of waves in a magnetized plasma; anisotropy; inhomogeneity; radiation-ponderomotive force, parametric instabilities, stimulated scattering; plasma optics; kinetic theory and fluctuation phenomena.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 7160
**Recommended:** Prerequisite PHYS 5150.

**ASTR 7500 (1-3) Special Topics in Astrophysical and Planetary Sciences**
Acquaints students with current research in astrophysical and planetary sciences. Topics vary each semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ASTR 7920 (1-6) Reading and Research in Astrophysical and Planetary Sciences**
Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ASTR 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.

# Astrophysical and Planetary Sciences - Master of Science (MS)

The master's degree in this field is not available through direct admission and may only be earned under special circumstances. Please contact program for additional information and requirements.

# Astrophysical and Planetary Sciences - Doctor of Philosophy (PhD)

Students pursuing a PhD from the Department of Astrophysical and Planetary Sciences generally specialize in the areas of astrophysics or planetary science.

The department does not offer a terminal, stand-alone master's degree program. Students enrolled in the doctoral program may earn their master's degree as they progress toward their PhD.

The program successfully integrates astrophysics, planetary science, Solar physics and space instrumentation with strong observational and theoretical components. These assets facilitate interaction and collaboration between the disciplines and enable students to explore a wide variety of research areas.

The Sommers--Bausch Observatory, conveniently located on campus, provides excellent hands--on experience with telescopes and observing, while the world--class Fiske Planetarium, supported by our department, offers a unique opportunity for public outreach. These campus resources are complemented by other affiliated research organizations in Boulder.

For more information, visit the department's Prospective Students (http://www.colorado.edu/aps/prospective-students/) webpage.

# Requirements

A minimum of 37 credit hours of coursework (including 4 credit hours of graduate seminars) in courses numbered 5000 or above is required; however, the overall emphasis is on independent study and research. A minimum of 30 credit hours of PhD dissertation credit hours are required.

Students in the PhD program are required to remove any deficiencies identified at the preliminary interview; to pass a comprehensive examination composed of writing a research paper based on a semi-independent research project, then an oral exam on that paper and related topics within the field; and to satisfactorily defend the PhD thesis before a faculty committee.

During the first year of graduate study, students generally obtain a broad background in courses regarded as basic to all three areas in addition to more specialized studies. Many students take graduate-level courses in other departments (e.g., Departments of Physics, Atmospheric and Oceanic Sciences, Geological Sciences, Applied Mathematics, or Aerospace Engineering), depending upon their particular interests or participation in interdisciplinary programs (see below).

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| ASTR 5110 | Atomic and Molecular Processes | 3 |
| ASTR 5540 | Mathematical Methods | 3 |
| ASTR 5400 | Introduction to Fluid Dynamics | 3 |
| ASTR 5550 | Observations, Data Analysis and Statistics | 3 |
| ASTR 5120 | Radiative and Dynamical Processes | 3 |
| **Total Credit Hours** | | **15** |

## Electives: Astrophysics Focus

The department offers a broad range of courses and research in this area, leading to the PhD degree. Graduate-level courses are offered in the following subjects:

| Code | Title | Credit Hours |
|---|---|---|
| ASTR 5140 | Astrophysical and Space Plasmas | 3 |
| ASTR 5700 | Stellar Astrophysics | 3 |
| ASTR 5710 | High-Energy Astrophysics | 3 |
| ASTR 5720 | Galaxies | 3 |
| ASTR 5730 | Stellar Atmospheres and Radiative Transfer | 3 |
| ASTR 5760 | Astrophysical Instrumentation | 3 |
| ASTR 5770 | Cosmology | 3 |
| ASTR 6000 | Seminar in Astrophysics | 1 |

## Electives: Planetary Sciences Focus

As planetary sciences is an interdisciplinary field, students can obtain degrees from the Departments of Astrophysical and Planetary Sciences, Atmospheric and Oceanic Sciences, Geological Sciences, Physics or Aerospace Engineering. Boulder is also home to a division of the Southwest Research Institute, with over 25 planetary scientists, many of whom work with CU students. Research and courses related to the physics and dynamics of the atmospheres of other planets, planetary surfaces and interiors, and other solar system studies are available.

Graduate-level courses related to the physics and dynamics of the Earth's atmosphere are offered in the following subjects:

| Code | Title | Credit Hours |
|---|---|---|
| ASTR 5140 | Astrophysical and Space Plasmas | 3 |
| ASTR 5300 | Introduction to Magnetospheres | 3 |
| ASTR 5330 | Cosmochemistry | 3 |
| ASTR 5410 | Fluid Instabilities, Waves, and Turbulence | 3 |
| ASTR 5800 | Planetary Surfaces and Interiors | 3 |
| ASTR 5810 | Planetary Atmospheres | 3 |
| ASTR 5820 | Origin and Evolution of Planetary Systems | 3 |
| ASTR 5830 | Topics in Planetary Science | 3 |
| ASTR 5835 | Seminar in Planetary Science | 1 |
| ATOC 5050 | Atmospheric Thermodynamics and Dynamics | 3 |
| ATOC 5560 | Radiative Processes in Planetary Atmospheres | 3 |

## Research Opportunities

### Observational and Theoretical Astrophysics

Research in this field is conducted in the following areas:

- Stellar atmospheres, radiative transfer, stellar winds of hot/cool stars
- Formation of stars and planetary systems
- Solar physics
- Interstellar and intergalactic medium
- Cosmology and large-scale structure of the universe; galaxy formation
- Stellar interiors, black holes and neutron stars
- Gravitational physics
- Cosmic X-ray sources, supernovae and their remnants and accretion phenomena, jets and clusters of galaxies
- Galactic evolution, quasars and active galaxies
- Radio and sub-millimeter astronomy, microwave background
- Plasma astrophysics and MHD
- Astrophysical fluid dynamics
- UV, optical, IR, submillimeter, radio and X-ray instrumentation
- Instrument and detector development
- Sounding rocket and balloon astronomy

Research is carried out with the ARC 3.5m Apache Point telescope, the Sloan Digital Sky Survey-V and these national telescopes and laboratories and international collaborators: High Altitude Observatory (HAO) in Boulder (Solar physics); National Optical Astronomical Observatories in Tucson and Chile (optical astronomy); National Radio Astronomy Observatory (NRAO); the Very Large Array (VLA); the Green Bank Telescope (GBT); the Hubble Space Telescope (HST); the Chandra, SWIFT, and XMM X-ray telescopes; the Fermi Gamma-Ray Space Telescope; and the Daniel K. Inouye Solar Telescope (DKIST) through collaboration with National Solar Observatory (NSO). CU Boulder also is involved with the Messenger (Mercury), MAVEN (Mars), JUNO (Jupiter), Cassini (Saturn),

and New Horizons (Pluto) missions, as well as the HST Cosmic Origins Spectrograph.

Locally, APS operates a 24-inch Cassegrain-Coude and two 20-inch Cassegrain telescopes through Sommers-Bausch Observatory. These are available for photographic, photometric, and spectrographic observations, as well as for instrument and detector development. Opportunities for graduate research also are found with the university's Laboratory for Atmospheric and Space Physics (LASP), the Center for Astrophysics and Space Astronomy (CASA), and JILA.

### Theoretical, Observational and Laboratory Atmospheric and Planetary Science

Research in this field is conducted in the following areas:

- Planetary disks, Kuiper Belt objects, extra-solar planets
- Dynamics and chemistry of planetary atmospheres, planetary clouds and planetary climates; evolution of planetary atmospheres; comparison of planetary and terrestrial atmospheres
- Planetary aeronomy, airglow and aurora, UV and IR spectroscopy, noctilucent clouds, structure and composition of planetary atmospheres (Venus, Mars, Jupiter, Saturn, Uranus, Neptune and Pluto), planetary magnetospheres, and cometary physics
- Satellite monitoring of the Earth's atmosphere and environment, including remote sensing of mesospheric ozone, stratospheric trace species, convection, outgoing radiation and magnetospheric dynamics
- Planetary geology, planetary interiors and surfaces, and planetary geophysics

Graduate research opportunities exist with individual faculty members, as well as jointly with academic and research units, such as the Departments of Geological Sciences, Physics, and Aerospace Engineering, as well as the Department of Atmospheric and Oceanic Sciences (ATOC), the National Center for Atmospheric Research (NCAR), the National Oceanic and Atmospheric Administration (NOAA), and the Laboratory for Atmospheric and Space Physics (LASP). The latter is involved in space investigations of the Earth, Sun and planets. Financial support is available in connection with all of the above research activities.

## Learning Outcomes

By the completion of our program, students will be able to:

- Demonstrate mastery of fundamental observational and theoretical foundations of astrophysics and planetary science, and be able to apply techniques to solve quantitative or conceptual problems across the core areas of astrophysics and planetary science.
- Read scientific papers and give a presentation on a scientific concept in astrophysics and planetary science.
- Analyze and evaluate scientific information in order to describe and address a question at the frontier of an astrophysical or planetary science discipline.
- Demonstrate the ability to carry out independent research in astrophysics or planetary science.

# Atmospheric and Oceanic Sciences

The Department of Atmospheric and Oceanic Sciences (ATOC) is an interdisciplinary program that provides an educational and research environment to examine the dynamical, physical and chemical processes in the atmosphere, ocean and land surface, and the manner in which they interact. A major theme is the establishment of a physical basis for understanding, observing and modeling climate and global change.

Graduate students admitted to ATOC are eligible to receive an advanced degree in atmospheric and oceanic sciences. Graduate students outside of ATOC can pursue the graduate certificate in atmospheric and oceanic sciences while earning a graduate degree from another department at CU Boulder, or while taking coursework as a non-degree-seeking student through Continuing Education's ACCESS Program provided they have already earned a bachelor's degree and meet the course prerequisites. In addition, students inside and outside the department may pursue a graduate certificate in oceanography. For more information on graduate certificate programs, see the Graduate School/Interdisciplinary Programs section.

For more information about ATOC programs and application procedures, call the ATOC office at 303-492-6633 or visit the Atmospheric and Oceanic Sciences (http://www.colorado.edu/atoc/) website.

**Course code for this program is ATOC.**

## Master's Degree

- Atmospheric and Oceanic Sciences - Master of Science (MS) (p. 1194)

## Doctoral Degree

- Atmospheric and Oceanic Sciences - Doctor of Philosophy (PhD) (p. 1196)

## Certificates

- Atmospheric and Oceanic Sciences - Graduate Certificate (p. 1196)
- Oceanography - Graduate Certificate (p. 1197)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Brown, Derek Philip (https://experts.colorado.edu/display/fisid_150027/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Cassano, John J. (https://experts.colorado.edu/display/fisid_121781/)
Professor; PhD, University of Wyoming

Friedrich, Katja (https://experts.colorado.edu/display/fisid_133607/)
Professor; PhD, Ludwig-Maximilians-Universität München (Germany)

Han, Weiqing (https://experts.colorado.edu/display/fisid_115493/)
Professor; PhD, Nova University

Jahn Hall, Alexandra (https://experts.colorado.edu/display/fisid_155096/)
Assistant Professor; PhD, McGill University

Karnauskas, Kristopher Benson (https://experts.colorado.edu/display/fisid_155094/)
Associate Professor, Associate Chair; PhD, University of Maryland, College Park

Kay, Jennifer E. (https://experts.colorado.edu/display/fisid_153815/)
Associate Professor; PhD, University of Washington

Keen, Richard A.
Instructor Emeritus

Lemone, Margaret Anne
Professor Adjoint

Li, Jianghanyang (https://experts.colorado.edu/display/fisid_169049/)
Assistant Professor; PhD, Purdue University

Lovenduski, Nicole Suzanne (https://experts.colorado.edu/display/fisid_147557/)
Associate Professor; PhD, University of California, Los Angeles

Moriarty, Julia (https://experts.colorado.edu/display/fisid_165830/)
Assistant Professor; PhD, William & Mary/Virginia Institute of Marine Science

Pilewskie, Peter Andrew (https://experts.colorado.edu/display/fisid_134466/)
Professor; PhD, University of Arizona

Randall, Cora Einterz (https://experts.colorado.edu/display/fisid_102010/)
Distinguished Professor Emeritus; PhD, University of California, Santa Cruz

Sanchez, Sara (https://experts.colorado.edu/display/fisid_167959/)
Assistant Professor; Ph.D., University of California- San Diego

Schmidt, Sebastian (https://experts.colorado.edu/display/fisid_140121/)
Associate Professor; PhD, Leipzig University (Germany)

Toohey, Darin W. (https://experts.colorado.edu/display/fisid_110652/)
Professor; PhD, Harvard University

Toon, Owen Brian (https://experts.colorado.edu/display/fisid_110521/)
Professor; PhD, Cornell University

Wang, Xinyue (https://experts.colorado.edu/display/fisid_173884/)
Assistant Professor; PhD, Purdue University

Weiss, Jeffrey B. (https://experts.colorado.edu/display/fisid_102145/)
Chair, Professor; PhD, University of California, Berkeley

Winters, Andrew (https://experts.colorado.edu/display/fisid_165835/)
Assistant Professor; PhD, University of Wisconsin–Madison

# Courses

**ATOC 5000 (3) Critical Issues in Climate and the Environment**
Discusses current issues such as ozone depletion, global warming and air quality for graduate students in nonscientific fields. Provides the scientific background necessary to understand, follow scientific developments and critically evaluate these issues.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4800 and ENVS 5830
**Requisites:** Restricted to graduate students only.

**ATOC 5050 (3) Atmospheric Thermodynamics and Dynamics**
Covers atmospheric thermodynamics and dynamics and the underlying governing laws and mathematical and physical principles. Topics include atmospheric composition and thermodynamics, conservation laws and atmospheric governing equations, geostrophic balance and balanced flows, vorticity dynamics and boundary layers. ATOC graduate core course.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite one year of calculus-based physics and math through differential equations.

**ATOC 5051 (3) Introduction to Physical Oceanography**
Provides fundamental knowledge of observations,, theory, dynamics and modeling in physical oceanography. Promotes critical thinking and the development of skills for data analysis and interpretation. ATOC graduate core course.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites one year of calculus-based physics and math up through differential equations.

**ATOC 5060 (3) Dynamics of the Atmosphere and Oceans**
Examines large-scale motions in a stratified rotating atmosphere and ocean, and quasi-geostrophic flow, barotropic and baroclinic instabilities, cyclogenesis, global circulations and boundary layer processes. Ageostrophic motions, including Kelvin waves, internal gravity waves and the theory of frontogenesis are also considered. ATOC graduate core course.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ATOC 5050, one year of calculus-based physics and math up through differential equations.

**ATOC 5061 (3) Advanced Ocean Dynamics and Air-Sea Coupled ENSO Mechanisms**
Explores the existing theories of the El Niño and Southern Oscillation (ENSO) ocean-atmosphere coupled mechanisms, theory of the thermocline in a quasi-geostrophic system, and dynamics of the Atlantic Meridional Overturning Circulation (AMOC). Covers physical mechanisms, associated mathematical equations, and numerical model simulations. Discusses their direct research applications in understanding the past, present and future climate variability and change. Offered once per year.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites ATOC 5400, ATOC 5051 or ATOC 5060 and one year of calculus-based physics and math including differential equations.

**ATOC 5151 (3) Atmospheric Chemistry**
Reviews basic kinetics and photochemistry of atmospheric species and stratospheric chemistry with emphasis on processes controlling ozone abundance. Tropospheric chemistry focusing on photochemical smog, acid deposition, oxidation capacity of the atmosphere and global climate change. ATOC graduate core course.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 5151
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite one semester of college-level chemistry.

**ATOC 5152 (3) Advanced Atmospheric Chemistry**
Follows Graduate Atmospheric Chemistry (ATOC 5151) and explores advanced topics in atmospheric chemistry, such as secondary aerosol formation, oxidant formation, the chemistry of global climate change and/or design of advanced laboratory experiments.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 5152
**Recommended:** Prerequisite CHEM 5151 or ATOC 5151.
**Grading Basis:** Letter Grade

**ATOC 5200 (3) Biogeochemical Oceanography**
Provides a large-scale synthesis of the processes impacting ocean biogeochemistry. Transforms theoretical understanding into real-world applications using oceanographic data and models. Topics include: chemical composition, biological nutrient utilization and productivity, air-sea gas exchange, carbonate chemistry, ocean acidification, ocean deoxygenation, iron fertilization, biogeochemical climate feedbacks and more.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4200
**Requisites:** Restricted to graduate students only.

**ATOC 5215 (3) Descriptive Physical Oceanography**
Introduces descriptive and dynamical physical oceanography, focusing on the nature and dynamics of ocean currents and their role in the distribution of heat and other aspects of ocean physics related to the Earth's climate. Dynamical material limited to mathematical descriptions of oceanic physical systems.
**Requisites:** Restricted to graduate students only.

**ATOC 5235 (3) Introduction to Atmospheric Radiative Transfer and Remote Sensing**
Examines fundamentals of radiative transfer and remote sensing with primary emphasis on the Earth's atmosphere; emission, absorption and scattering by molecules and particles; multiple scattering; polarization; radiometry and photometry; principles of inversion theory; extinction- and emission-based passive remote sensing; principles of active remote sensing; lidar and radar; additional applications such as the greenhouse effect and Earth's radiative energy budget. ATOC graduate core course. Department enforced prerequisites: one year of calculus-based physics, and math up through differential equations.
**Requisites:** Restricted to graduate students only.

**ATOC 5300 (3) The Global Carbon Cycle**
Covers the role of the ocean, terrestrial biosphere, and atmosphere in the global carbon cycle. Specific topics include marine carbonate chemistry, biological production, terrestrial fluxes, anthropogenic emissions, and the evolution of the global carbon cycle in a changing climate.
**Requisites:** Restricted to graduate students only.

**ATOC 5400 (3) Introduction to Fluid Dynamics**
Covers equations of fluid motion relevant to planetary atmospheres and oceans and stellar atmospheres; effects of rotation and viscosity; and vorticity dynamics, boundary layers and wave motions. Introduces instability theory, nonlinear equilibration and computational methods in fluid dynamics. Department enforced prerequisite: partial differential equations or equivalent.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 5400 and PHYS 5400
**Requisites:** Restricted to graduate students only.

**ATOC 5500 (1-3) Special Topics in Atmospheric and Oceanic Sciences**
Acquaints students with current research in atmospheres, oceans, and climate. Topics may vary each semester. Students may register for more than one section of this course in the same semester. Formerly ATOC 7500.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ATOC 5540 (3) Mathematical Methods**
Applied mathematics course; provides necessary analytical background for courses in plasma physics,fluid dynamics, electromagnetism, and radiative transfer. Covers integration techniques, linear and nonlinear differential equations, WKB and Fourier transform methods, adiabatic invariants, partial differential equations, integral equations, and integrodifferential equations.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 5540
**Requisites:** Restricted to graduate students only.

**ATOC 5550 (3) Mountain Meteorology**
Investigating main processes that control weather and climate in the western United States and other mountain ranges around the world is the emphasis of this course. Provides an advanced survey of synoptic, mesoscale, and microscale meteorology in complex terrain including orographically modified cyclone evolution, front-mountain interactions, terrain and thermally driven flows, mountain waves, downslope winds, and orographic precipitation.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4550
**Requisites:** Restricted to graduate students only.

**ATOC 5560 (3) Radiative Processes in Planetary Atmospheres**
Application of radiative transfer theory to problems in planetary atmospheres, with primary emphasis on the Earth's atmosphere; principles of atomic and molecular spectroscopy; infrared band representation; absorption and emission of atmospheric gases; radiation flux and flux divergence computations; radiative transfer and fluid motions; additional applications such as the greenhouse effect, inversion methods and climate models. Department enforced prerequisite: ATOC 5235.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 5560
**Requisites:** Restricted to graduate students only.

**ATOC 5600 (3) Physics and Chemistry of Clouds and Aerosols**
Examines the physics and chemistry of clouds and aerosols in the planetary atmospheres, where they impact climate, atmospheric chemistry, remote sensing and weather. Applies basic microphysical, radiative and chemical processes affecting particles to issues in current literature. ATOC graduate core course.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite one semester of college-level chemistry and calculus-based physics and math up through differential equations.

**ATOC 5730 (3) Physical Oceanography and Climate**
Introduces the field of physical oceanography, with emphasis on the ocean's interaction with the global atmosphere. Analysis of the ocean's heat, salt, and momentum budgets, wind-driven and thermohaline circulations, climate cycles including El Nino, and the ocean's role in climate change. Theory complemented by state-of-the-art observations and models. Department recommended prerequisites: ATOC 1060 or ATOC 3070 or ATOC 3600 and one semester of calculus.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4730
**Requisites:** Restricted to graduate students only.

**ATOC 5740 (3) Dynamics of Past Climate Changes: Lessons for the Future**
Studies past changes in the Earth¿s climate and their application to predict future climate changes. Combines theoretical understanding of the climate system, computer models, and records of past changes from geological archives to understand drivers of past and future changes in climate. Emerging and inter-disciplinary area in climate research including paleoclimatology, climate theory, and modelling. Students work individually and in groups to formulate hypotheses that ca be tested using paleoclimate records and model simulations. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4740
**Recommended:** Prerequisites At least two of the following courses - ATOC 5050, ATOC 5051, ATOC 5060, ATOC 5300, ATOC 5730, ATOC 5870, GEOL 5060, GEOL 5305, GEOL 5430, or GEOL 5675.

**ATOC 5750 (3) Desert Meteorology and Climate**
Introduces students to the dynamic causes of deserts in the context of atmospheric processes and land-surface physics. Discusses desert severe weather, desert microclimates, human impacts and desertification, inter-annual variability in aridity (drought), the effects of deserts on global climate and the impact of desert climate on humans.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4750
**Requisites:** Restricted to graduate students only.

**ATOC 5770 (3) Wind Energy Meteorology**
Explores the complex interactions of the atmosphere and wind energy generation. Surveys wind turbine designs. Explores planetary boundary layer dynamics, traditional and novel wind measurement methods, forecasting methods, wind turbine and wind farm wakes, wind farm optimization, sound propagation from wind plants, climate change impacts on wind resources and the impacts of wind plants on local environments.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4770
**Requisites:** Restricted to graduate students only.

**ATOC 5780 (3) Ice Sheets and Climate**
Covers the role of ice sheets in the climate system over a range of time (millions of years ago to the long-term future) scales, and presents the interactions between ice sheets, the ocean, and the atmosphere. Students will be introduced to, and work with, observational and modeling methods and data that conceptualize ice sheet climate and related topics.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4780
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites Basic knowledge of calculus, algebra and programming experience (python, Matlab, or equivalent).

**ATOC 5815 (3) Scientific Programming, Data Analysis and Visualization Laboratory**
Teaches programming in python, as well as analysis skills for accessing, analyzing and visualizing data that are commonly used in the atmospheric and oceanic sciences. Basic data analysis includes curve fitting and re-gridding/aggregation of satellite observations or meteorological data for global climatologies. The course content is primarily conveyed through hands-on code development. A final project, involving the independent analysis and visualization of a scientific data set, integrates skills acquired throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4815
**Requisites:** Restricted to graduate students only.

**ATOC 5830 (3) Topics in Planetary Science**
Examines current topics in planetary science, based on recent discoveries, spacecraft observations and other developments. Focuses on a specific topic each time the course is offered, such as Mars, Venus, Galilean satellites, exobiology, comets or extrasolar planets. Department enforced prerequisite: restricted to graduate students in the physical sciences.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5830 and ASTR 5830
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ATOC 5835 (1) Seminar in Planetary Science**
Studies current research on a topic in planetary science. Students and faculty give presentations. Subjects may vary each semester. Department enforced prerequisite: senior level undergraduate physics.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 5835 and GEOL 5835
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ATOC 5850 (3) Numerical Methods Laboratory**
Teach students how to convert physical descriptions of the earth system into numerical models. Students will learn how to make assumptions to simplify complex systems, how to discretize and code mathematical equations so they can be solved on a computer, and how to assess if the results are reasonable. The course content is primarily conveyed through hands-on code development in python. A final project integrates skills acquired throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4850
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites ATOC 4815 or ATOC 5815, Calculus 1, Calculus 2, Differential Equations, Linear Algebra, and a basic knowledge of/interest in atmospheric, oceanic, climatic, or cryospheric physics.

**ATOC 5860 (3) Objective Data Analysis Laboratory**
Teaches the extraction of information from data using statistical methods via a computer program. The goals of this course are: 1) to learn and apply tools to objectively analyze atmospheric and oceanic data, 2) to critically evaluate research using these tools. The course covers hypothesis testing, compositing, regression, principal component analysis, time series analysis, filtering, and data assimilation. This ¿learning-by-doing¿ course is aimed at advanced graduate students conducting ATOC-related research.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ATOC 4810 or 5810, and familiarity with linear algebra, basic calculus, github and jupyter.

**ATOC 5870 (3) Climate Modeling Laboratory**
Climate models solve equations describing the earth system. This course provides an overview of climate modeling. Standard climate model approaches and experiments are presented, and then used in companion exercises. This course will provide students with real-world experience running a climate model used internationally for climate science and policy.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4870
**Requisites:** Restricted to graduate students only.

**ATOC 5875 (3) Weather Modeling Laboratory**
In this laboratory course, students simulate the atmosphere using a numerical weather prediction model (WRF) and explore the physical and numerical basis of the system of equations that underpin numerical weather prediction models. In addition to developing technical skills with WRF and visualizing its output with python, students explore applications of numerical modeling of the atmosphere, such as land-sea breezes, hurricanes, mesoscale convective systems, and the daily cycle of the boundary layer. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4875
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite Experience with computer science and data visualization and some experience with Unix/Linux is recommended.

**ATOC 5880 (3) Mesoscale Meteorology**
Provides a comprehensive study of the structure, evolution, and dynamics of atmospheric phenomena on the mesoscale, which have horizontal scales ranging from a few to several hundred kilometers. Topics include land/sea breezes, horizontal convective rolls, drylines, deep convective storms, outflow boundaries, tornadoes, mesoscale convective systems, terrain induced airflows, mountain waves and the mesoscale aspects of extratropical cyclones. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4880
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites One year of Calculus, one year of Physics with Calculus, and at least one fundamental ATOC course.

**ATOC 5890 (3) Synoptic Dynamic Meteorology**
Weather conditions at middle latitudes are characterized by complex interactions between air masses, fronts, cyclones, and anticyclones. These interactions are governed by a set of elegant mathematical equations that describe the behavior of the atmosphere. Students will manipulate and apply these equations in real time in order to diagnose the development and evolution of a variety of synoptic-scale weather systems, including fronts, jet streams, and extratropical cyclones. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4890
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ATOC 3050, ATOC 4720, one year of Calculus, and one semester of Physics with Calculus.

**ATOC 5900 (1-6) Independent Study**
Students may register for more than one section of this course in the same semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ATOC 5930 (1-3) Internship**
This course is designed to offer ATOC graduate students with the opportunity to work hands-on in the community and to gain practical knowledge and experience in both research and industry. Participation in the program requires both on-site and academic work.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite Minimum of 3.00 cumulative GPA.

**ATOC 6020 (1) Seminar in Atmospheric and Oceanic Sciences**
Studies an area of current research in the atmospheric and oceanic sciences. Students read selected papers from the literature. Students and faculty give presentations and participate in discussions. May be repeated for a total of 6 credit hours within the degree. May be repeated for a total of 3 credit hours within a semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ATOC 6100 (3) Modeling Weather and Climate**
Discusses background theory and procedures used for modeling climate on a variety of space and time scales. Includes numerical simulation of weather and climate with models in a hierarchy of complexity, assessments of error growth, prediction of circulations and impact of radiative and other influences. Explores various numerical methods, develops core computing skills and considers data handling and visualization. Consists of a combination of lectures and laboratory.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ATOC 5050 or calculus.

**ATOC 6700 (1) Weather Forecasting and Discussion**
Explores the techniques used to make short-term weather forecasts in the mid-latitudes using real-time weather observations, numerical forecast model output and conceptual models of mid-latitude weather phenomena. Students will be required to develop and defend conceptual models of the short-term evolution of the weather and will conduct detailed post-forecast analysis of successful and unsuccessful forecasts.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ATOC 5050.

**ATOC 6800 (3) Scientific Writing**
Writing is the core of how we communicate our scientific findings. Successful science writing tells a compelling story and makes it easy for the reader to understand our results and their implications. In this hand-on class, student use their own research results to work on developing scientific writing skills that will increase the impact of their papers as well as make writing more enjoyable by learning how to approach the writing and editing process. Department enforced requisite: Students need to have their own research results first and at least one main conclusion from it in order to take this class.
**Requisites:** Restricted to graduate students only.

**ATOC 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ATOC 6950 (1-6) Master's Thesis**
**Requisites:** Restricted to graduate students only.

**ATOC 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Requisites:** Restricted to graduate students only.

# Atmospheric and Oceanic Sciences - Master of Science (MS)

The Department of Atmospheric and Oceanic Sciences (ATOC) is an interdisciplinary program that provides an educational and research environment to examine the dynamical, physical and chemical processes in the atmosphere, ocean and land surface, and the manner in which they interact. A major theme is the establishment of a physical basis for understanding, observing and modeling climate and global change.

Students can earn a master's degree with either a thesis or an exam. Students considering master's study in atmospheric and oceanic sciences should carefully read the Master's Degree Requirements (p. 1113) section of this catalog, as well as the department's Prospective

Graduate Students (http://www.colorado.edu/atoc/academics/prospective-graduate-students/) and Current Graduate Students (http://www.colorado.edu/atoc/academics/current-graduate-students/) webpages.

# Requirements

## Course Requirements

Students must complete at least 30 credit hours of coursework, of which 24 must be from courses numbered 5000 or above, and at least 15 must be from ATOC graduate courses, including the four ATOC core courses.

- Up to 6 credit hours of approved 3000- and 4000-level coursework from engineering, math, physics, chemistry or biology may be applied toward the MS degree. No credit will be given toward the MS degree for ATOC coursework below the 5000 level.
- A minimum of 15 credit hours from regular ATOC courses (independent study courses cannot be used to satisfy this requirement).
- All MS students are required to take the following four ATOC core courses or their equivalent.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| ATOC 5050 | Atmospheric Thermodynamics and Dynamics | 3 |
| ATOC 5051 | Introduction to Physical Oceanography | 3 |
| ATOC 5060 | Dynamics of the Atmosphere and Oceans | 3 |
| ATOC 5235 | Introduction to Atmospheric Radiative Transfer and Remote Sensing | 3 |
| **Total Credit Hours** | | **12** |

- Up to 3 credit hours of Independent Study (ATOC 5900), Weather Forecasting and Discussion (ATOC 6700) and/or Seminar in Atmospheric and Oceanic Sciences (ATOC 6020) may be used toward the 30 hours of regular coursework in the degree requirements.
- Up to 9 credit hours may be transferred from another accredited institution and applied toward an MS degree. Transfer credit for ATOC core coursework must be approved by the graduate advisor.
- A student is required to maintain at least a 3.00 (B) average in all work attempted while enrolled in the Graduate School. For the MS, a course mark below C is unsatisfactory and will not be counted toward fulfilling requirements for the degree.

## Degree Plans

The master's degree will be a Master of Science in atmospheric and oceanic sciences. The master's thesis is not constrained by choice of track.

### Plan I: Thesis Option

Students must complete a minimum of 4 (but no more than 6) thesis hours, which can be counted toward the total 30 hours of coursework and the 15 hours of ATOC coursework requirements. Students must successfully complete an MS thesis and oral final examination based on the thesis.

Note: Students planning to pursue a PhD degree may elect to obtain the MS degree, but this is not requirement for advancement to the PhD program.

#### Thesis Guidelines

The MS thesis must consist of original and independent research conducted by the graduate student under the supervision of the research advisor. The thesis topic must be related to the major field, and:

- Represent the equivalent of 4 to 6 credit hours of coursework.
- Receive the approval of the major department at least 30 days before commencement at which the degree is to be conferred.
- Be completed at the time the final examination is held.
- Comply with the University of Colorado Graduate School Thesis and Dissertation Specifications.
- Be filed with the Graduate School by posted deadlines for the semester for which the degree is to be conferred.

#### Thesis Exam Committee

The examination committee for the MS thesis final exam will consist of three graduate faculty members, at least two of whom must be ATOC core faculty members. The examination consists of a 30-minute oral presentation given by the candidate on the thesis subject, followed by a period of questions for the candidate by the committee. The oral presentation is open to anyone who wishes to attend. The full examination typically does not exceed two hours in duration.

Any student with a research advisor outside of ATOC (e.g., an advisor who is from another department or is a full-time employee at NCAR, NOAA, etc.), must also have an academic advisor who is an ATOC core faculty member. The academic advisor should be identified by the student in collaboration with their research advisor as soon as possible, and no later than one month after research begins. Once an ATOC faculty member agrees to act as academic advisor, it is their responsibility to communicate ATOC policies and requirements to the research advisor, and to ensure that the student is meeting all ATOC requirements and making good academic progress toward the degree.

### Plan II: Non-Thesis/Final Exam Option

The requirements for an MS degree non-thesis/final exam option include the following:

- 30 semester hours of coursework, of which 24 must be from courses numbered 5000 or above, and at least 15 must be from ATOC graduate courses, including four of the core ATOC courses.
- Successful completion of a written final examination based on ATOC regular coursework. The ATOC Comprehensive Exam I is typically used to satisfy this requirement.

*Note*: Students planning to pursue a PhD degree may elect to obtain the MS degree, but this is not a requirement for advancement to the PhD program.

## Time Limit

Students are expected to complete all degree requirements within four years of the date of commencing coursework, but normally in two years. Students may petition the Graduate School for extension(s).

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate an advanced understanding of core ATOC topics.
- For thesis option, demonstrate ability to carry out ATOC related research and report results in writing and orally.

# Atmospheric and Oceanic Sciences - Doctor of Philosophy (PhD)

The Department of Atmospheric and Oceanic Sciences (ATOC) is an interdisciplinary program that provides an educational and research environment to examine the dynamical, physical and chemical processes in the atmosphere, ocean and land surface, and the manner in which they interact. A major theme is the establishment of a physical basis for understanding, observing and modeling climate and global change.

ATOC attracts many of the most outstanding graduate students in the field. Our students receive a significant number of fellowships and nationally recognized awards each year, provide excellent instruction to CU Boulder's undergraduates as teaching assistants, and make scientific advances while conducting innovative research. Our graduates go on to successful careers in academia, national research institutes and private industry.

Graduate students, research staff and faculty work together on a wide range of research themes:

- atmospheric & oceanic dynamics
- atmospheric chemistry & physics
- chemical & physical oceanography
- clouds & aerosols
- planetary atmospheres
- radiative transfer & remote sensing
- regional, boundary layer & wind energy meteorology

For more information about programs and application procedures, contact the ATOC office.

# Requirements

## Admission Requirements

### Academic Preparation

An undergraduate degree in mathematics, physics, engineering, chemistry or another natural science is recommended. The general prerequisites expected of incoming graduate students include undergraduate courses in calculus, linear algebra, differential equations and computer programming, as well as one-year sequences of undergraduate calculus-based physics and chemistry. Upper-division undergraduate courses in physics, chemistry, engineering and mathematics are strongly recommended. Undergraduate courses in atmospheric and oceanic sciences are useful, but not expected, as part of the undergraduate background.

## Program Requirements

### Academic Standards

A student is required to maintain a 3.00 (B) average in all work attempted while enrolled in the Graduate School. For the PhD, a course grade of C+ or below is unsatisfactory and will not be counted toward fulfilling requirements for the degree.

### Course Requirements

A total of 36 credit hours of coursework are required, including 18 credit hours in ATOC core courses, as well as a graduate-level course in applied or computational mathematics. In addition, 30 dissertation hours are required. Other specific course requirements are covered in the *ATOC Graduate Handbook*.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| All PhD students are required to take the following four ATOC core courses or their equivalent. | | |
| ATOC 5050 | Atmospheric Thermodynamics and Dynamics | 3 |
| ATOC 5051 | Introduction to Physical Oceanography | 3 |
| ATOC 5060 | Dynamics of the Atmosphere and Oceans | 3 |
| ATOC 5235 | Introduction to Atmospheric Radiative Transfer and Remote Sensing | 3 |
| All PhD students are required to take two courses from the following list of courses or their equivalent. | | 6 |
| ATOC 5061 | Advanced Ocean Dynamics and Air-Sea Coupled ENSO Mechanisms | |
| ATOC 5151 | Atmospheric Chemistry | |
| ATOC 5200 | Biogeochemical Oceanography | |
| ATOC 5600 | Physics and Chemistry of Clouds and Aerosols | |
| ATOC 5500 | Special Topics in Atmospheric and Oceanic Sciences (Boundary Layer Meteorology) | |
| ATOC 5890 | Synoptic Dynamic Meteorology | |
| **Total Credit Hours** | | **18** |

### Examinations

The PhD Comprehensive Examination is conducted in two parts, referred to as "Comps 1" and "Comps 2." The goal of Comps 1 is to demonstrate mastery of foundational ATOC concepts. This can be achieved either by passing the 4 common required core classes (ATOC 5050, ATOC 5051, ATOC 5060 and ATOC 5235) with a defined minimum combination of grades or by taking an exam with a written and oral component to show mastery to reach the minimum grade requirement. Comps 2 is an oral exam based upon a written report of original student research. Successful completion of the Comprehensive Examination is required before a student is admitted into PhD candidacy.

# Learning Outcomes

By the completion of our program, students will be able to:

- Demonstrate an advanced understanding of core ATOC topics.
- Demonstrate expert level knowledge in one specific area of Atmospheric and Oceanic Sciences.
- Design and independently conduct ATOC related original research.
- Effectively disseminate scientific results through oral presentations.
- Effectively disseminate scientific results through scientific writing.

# Atmospheric and Oceanic Sciences - Graduate Certificate

Current CU Boulder graduate students and students with a bachelor's degree who are nondegree ACCESS students may pursue the graduate certificate in atmospheric and oceanic sciences.

For more information about ATOC programs and application procedures, call the ATOC office at 303-492-6633 or visit the department's Certificate in Atmospheric and Oceanic Sciences (http://www.colorado.edu/atoc/

academics/graduate-certificate-programs/certificate-atmospheric-and-oceanic-sciences/) webpage.

# Requirements

## Prerequisites

Students must meet course prerequisites prior to enrollment. Most of the ATOC Graduate Certificate courses require at least one year of calculus and one year of calculus-based physics.

## Program Requirements

Students who wish to obtain the graduate certificate in atmospheric and oceanic sciences (ATOC) must satisfactorily complete 12 credit hours: four ATOC graduate-level courses (those above the 5000 level) or their cross-listed equivalents (e.g., ATOC 5151 or CHEM 5151), provided the cross-listed equivalents are not offered through the student's home department(s). To satisfactorily complete a course, students must earn a grade of B or better.

NOTE: ATOC 5000 Critical Issues in Climate and the Environment cannot be applied toward the graduate certificate in atmospheric and oceanic sciences requirements.

During the final semester of coursework or upon completion of the ATOC Graduate Certificate requirements, students should contact the ATOC Graduate Program Assistant (atocasst@colorado.edu).

# Oceanography - Graduate Certificate

Graduate students can pursue the a graduate certificate while earning a normal graduate degree (MS or PhD) at CU Boulder or while taking coursework as a nondegree seeking student through Continuing Education's ACCESS Program, provided they have already earned a bachelor's degree and meet the course prerequisites.

Graduate certificates are noted on the official CU Boulder transcript.

# Requirements

Students who wish to obtain the graduate certificate in oceanography must complete at least three oceanography core courses (see below) passed with a letter grade of B or better. In addition, students may take an independent study course to replace one of the core courses.

## Required Courses and Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| Complete at least three of the following courses: | | |
| ATOC 5051 | Introduction to Physical Oceanography | |
| ATOC 5060 | Dynamics of the Atmosphere and Oceans | |
| ATOC 5061 | Advanced Ocean Dynamics and Air-Sea Coupled ENSO Mechanisms | |
| ATOC 5200 | Biogeochemical Oceanography | |
| ATOC 5300 | The Global Carbon Cycle | |
| ATOC 5730 | Physical Oceanography and Climate | |
| ASTR/ATOC 5400 | Introduction to Fluid Dynamics | |
| ASTR 5410 | Fluid Instabilities, Waves, and Turbulence | |
| GEOL 5270 | Marine Chemistry and Geochemistry | |
| GEOL 5430 | Paleoceanography and Paleoclimatology | |

For additional information about the ATOC Certificate or the Oceanography Certificate, contact atocasst@colorado.edu.

## Tracks

A few sample tracks satisfying the Certificate in Oceanography requirements:

- Astrophysical and planetary sciences student: ATOC 5051 Introduction to Physical Oceanography, ATOC 5060 Dynamics of the Atmosphere and Oceans, ASTR 5400 Introduction to Fluid Dynamics and GEOL 5270 Marine Chemistry and Geochemistry.
- Applied math hydrodynamicist: ATOC 5051 Introduction to Physical Oceanography, ASTR 5400 Introduction to Fluid Dynamics, ATOC 5060 Dynamics of the Atmosphere and Oceans and ASTR 5410 Fluid Instabilities, Waves, and Turbulence.
- Aerospace engineer remote sensing of the ocean: ATOC 5051 Introduction to Physical Oceanography, ATOC 5730 Physical Oceanography and Climate and ATOC 5061 Advanced Ocean Dynamics and Air-Sea Coupled ENSO Mechanisms.
- Geology paleoceanographer: GEOL 5270 Marine Chemistry and Geochemistry, ATOC 5051 Introduction to Physical Oceanography, GEOL 5430 Paleoceanography and Paleoclimatology and ATOC 5061 Advanced Ocean Dynamics and Air-Sea Coupled ENSO Mechanisms.
- Ocean geographer: ATOC 5730 Physical Oceanography and Climate, GEOL 5270 Marine Chemistry and Geochemistry and ATOC 5051 Introduction to Physical Oceanography.

# Behavioral Genetics

The Institute for Behavioral Genetics (IBG) is an organized research unit of the CU Boulder Graduate School dedicated to conducting and facilitating research on the genetic and environmental bases of individual differences in behavior.

Founded in 1967, IBG is one of the top research facilities in the world for genetic research on behavior. Data collection and analysis are ongoing for several internationally renowned studies including the Colorado Adoption Project, the Colorado Twin Registry, the National Youth Survey Family Study, the Colorado Learning Disabilities Research Center, the National Longitudinal Study of Adolescent Health and the Adolescent Brain and Cognitive Development Study. IBG is home to one of the nation's largest DNA repositories for research on human behavior, as well as housing a wide array of behaviorally and genetically defined lines of selected, recombinant inbred, transgenic and knockout-gene mice. Current research includes studies of aging, neurodegenerative disease, psychopathology, reading and learning disabilities, cognition, substance abuse, behavioral development and evolution.

# Certificate

- Behavioral Genetics - Graduate Certificate (p. 1197)

# Behavioral Genetics - Graduate Certificate

The Institute for Behavioral Genetics (IBG) offers a training program in behavioral genetics. The goal of the program is to train scientists in the study of genetic contributions to individual differences in behavior. This is accomplished by requiring students to obtain strong training in a primary academic discipline, by providing training in the interdisciplinary field of behavioral genetics, and by providing an atmosphere in which

close interactions among scholars with different perspectives may be established.

# Requirements

## Admission Requirements

To train at IBG, students must be admitted to a PhD program at the University of Colorado (Boulder or Denver). To be considered for admission, the Graduate School requires an undergraduate GPA of at least 2.75. Additionally, the most competitive applicants should have verbal and math GREs >85th percentile. Subject GRE scores are not required but will be considered if they have been completed. We carefully consider all components of the application including undergraduate grades, letters of recommendation, previous research experience and GRE scores.

## Required Courses and Credits

Deviations from the IBG certificate requirements may be requested by petition to the student's advisory committee. Specific requests for course substitution, resolution of an ambiguity, etc., should be made by written petition. A petition may be approved by a majority vote of both the advisory committee and the IBG Training Committee. Disapproval of a petition may be changed to approval by a majority vote of the IBG faculty. Students with sufficient backgrounds may also test out of required courses 1–2 (i.e., pass the final exam for the course).

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| PSYC/IPHY 5200 | Physiological Genetics and Genomics | 3 |
| PSYC 5102 | Introduction to Behavioral Genetics | 3 |
| PSYC 5741 | General Statistics 1 [1] | 4 |
| or PSYC 5751 | General Statistics 2 | |
| or IPHY 5800 | Advanced Statistics and Research Methods in Integrative Physiology | |
| GRAD 5000 | Responsible Conduct of Research | 1 |
| PSYC 7102/ IPHY 6010/ EBIO 5800 | Seminar: Behavioral Genetics (Methods Proseminar in BG) | 3 |
| **Electives** | | |
| *Group B Courses* | | *6* |
| Choose two of the following: | | |
| PSYC 5122 | Quantitative Genetics | |
| or EBIO 5800 | Critical Thinking in Biology | |
| IPHY 5720 | Neurophysiology | |
| MCDB 5777 | Molecular Neurobiology | |
| PSYC 5242 | Biometrical Methods in Behavioral Genetics | |
| IPHY 5262 | | |
| or MCDB 5520 | Bioinformatics and Genomics | |
| NRSC 5100 | Introduction to Neuroscience I | |
| or NRSC 5110 | Introduction to Neuroscience II | |
| or NRSC 5132 | Neuropharmacology | |
| NRSC 5110 | Introduction to Neuroscience II | |
| NRSC 5545 | Neurobiology of Addiction NIDA trainees are required to take at least 1 of these courses | |
| PSYC 5761 | Structural Equation Modeling | |
| or EDUC 7396 | Latent Variable and Structural Equation Modeling | |
| PSYC 5541 | Special Topics in Psychology (Statistical Programming in R) | |
| or INFO 5652 | Statistical Programming in R | |
| EBIO 5460 | Special Topics (Genomics) | |
| PSYC 7102 | Seminar: Behavioral Genetics (Multivariate Genomic Methods for Mental Health) NIMH trainees are required to take at least 1 of these courses | |
| PSYC 7102 | Seminar: Behavioral Genetics (Circuits and Genetics of Emotion and Mental Health) NIMH trainees are required to take at least 1 of these courses | |
| *Group C Courses* [2] | | *3* |
| Choose 1 of the following: | | |
| NRSC 5072 | Clinical Neuroscience: A Clinical and Pathological Perspective | |
| NRSC 5092 | Behavioral Neuroendocrinology | |
| IPHY 6010 | Seminar (Aging and Neurodevelopmental Disorders) | |
| NRSC 5032 | Neurobiology of Learning and Memory | |
| PSYC 5175 | Computational Cognitive Neuroscience | |
| PSYC 5433 | Adult Psychopathology | |
| MCDB 5471 | Mechanisms of Gene Regulation in Eukaryotes | |
| EBIO 5800 | Critical Thinking in Biology (Animal Behavior) | |
| BCHM 5631 | Computational Genomics Lab | |
| PSYC 6761 | Topics in Advanced Structural Equations Modeling | |
| PSYC 7102 | Seminar: Behavioral Genetics (Genetics of Substance Use Disorders) NIDA trainees are required to take at least 1 of these courses | |
| PSYC 7102 | Seminar: Behavioral Genetics (Population Genetics in the Modern Genomics Era) | |
| PSYC 7215 | Seminar: Experimental Psychology (Translational Cognitive Neuroscience) | |
| Other approved course on a topic that is relevant to the research interests and training goals of the trainee | | |
| **Total Credit Hours** | | **23** |

[1] Or other graduate-level course in statistics (of at least one semester) approved by the student's advisory committee.

[2] Group C courses are meant to facilitate student research interests and training goals. They can come from the list of courses below or any other course that is relevant to the students research and training goals.

Note: As some courses can only be taught every other year, it is each student's responsibility to take relevant courses when offered. Some equivalent courses may be offered at the Health Sciences Center or other venues. Course substitutions may be requested.

## Teaching Requirements

Each of the students in the IBG Training Program must TA for at least one semester in a course judged by their advisory committee to be relevant to their professional specialty. (As part of their general responsibilities

for the development of the student, advisory committees may sometimes require additional teaching.)

### General Requirements

IBG students are required to conduct their doctoral dissertation research on topics of direct relevance to animal or human behavioral genetics, under the supervision of an IBG faculty member. A training file for each student is maintained in the IBG office for tracking progress toward completion of program requirements. Each student is to assist in updating this file at least once per year.

Specific departmental and Graduate School requirements in addition to those listed here are the responsibility of each student, in consultation with his/her advisory committee.

### Examinations

Each student in the training program must complete the comprehensive/qualifying and dissertation exam requirements of their academic department (e.g. IPHY, PSYC, MCDB). Depending upon the academic program in which the student is enrolled, they may also have additional exam requirements including a dissertation proposal. Students are advised to check their academic department for specific requirements.

### Annual Presentations at IBG Orientation

All continuing students are required to present a poster describing their research activity of the past year at the annual IBG Orientation—held each year in August (the last Friday before the beginning of the fall semester). Students are also expected to present their research at the annual IBG mini-conference held each spring.

### Exit Colloquium

All students are expected to do an exit colloquium at the conclusion of their training program. This presentation should be modeled as a "job talk," not a repeat of the final defense.

# Biochemistry

The Department of Biochemistry is internationally recognized for its research and education and offers a world-class interdisciplinary research environment in a beautiful mountain setting. As part of a commitment to continuing this tradition of excellence, the department provides a graduate program that integrates opportunities for cutting-edge creative research and study across a wide range of areas including:

- Computational biology
- Nucleic acids
- Gene expression
- Cell signaling
- Membranes
- Proteins and enzymology
- Molecular biophysics
- Structural biology
- Systems biology

Graduate students enjoy extensive scientific collaboration with biochemistry faculty, with other departments such as molecular, cellular and developmental biology, chemistry, and physics, and with research institutes and agencies such as the BioFrontiers Institute, Joint Institutes of Laboratory Astrophysics (JILA) and the Renewable and Sustainable Energy Institute.

**Course code for this program is BCHM.**

## Master's Degree

- Biochemistry - Master of Science (MS) (https://catalog.colorado.edu/graduate/colleges-schools/arts-sciences/programs-study/chemistry-biochemistry/biochemistry-master-science-ms/)

## Doctoral Degree

- Biochemistry - Doctor of Philosophy (PhD) (https://catalog.colorado.edu/graduate/colleges-schools/arts-sciences/programs-study/chemistry-biochemistry/biochemistry-doctor-philosophy-phd/)

## Certificate

- Molecular Biophysics - Graduate Certificate (https://catalog.colorado.edu/graduate/colleges-schools/arts-sciences/programs-study/chemistry-biochemistry/molecular-biophysics-graduate-certificate/)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ahn, Natalie (https://experts.colorado.edu/display/fisid_106044/)
Distinguished Professor; PhD, University of California, Berkeley

Aydin, Halil (https://experts.colorado.edu/display/fisid_167398/)
Assistant Professor; PhD, University of Toronto

Batey, Robert T. (https://experts.colorado.edu/display/fisid_122668/)
Professor; PhD, Massachusetts Institute of Technology

Cameron, Jeffrey C. (https://experts.colorado.edu/display/fisid_156473/)
Assistant Professor; PhD, Washington University

Caruthers, Marvin H. (https://experts.colorado.edu/display/fisid_103328/)
Distinguished Professor; PhD, Northwestern University

Cech, Thomas R. (https://experts.colorado.edu/display/fisid_103252/)
Distinguished Professor; PhD, University of California, Berkeley

Falke, Joseph J. (https://experts.colorado.edu/display/fisid_101970/)
Professor; PhD, California Institute of Technology

Goodrich, James (https://experts.colorado.edu/display/fisid_109239/)
Professor, Chair; PhD, Carnegie Mellon University

Khanal, Akhil
Instructor; PhD, University of Delaware

Kuchta, Robert (https://experts.colorado.edu/display/fisid_100844/)
Professor; PhD, Brandeis University

Kugel, Jennifer F. (https://experts.colorado.edu/display/fisid_109472/)
Research Professor; PhD, University of Colorado Boulder

Liu, Xuedong (https://experts.colorado.edu/display/fisid_118458/)
Professor; PhD, University of Wisconsin–Madison

Mchenry, Charles
Professor Emeritus; PhD, University of California, Santa Barbara

Palmer, Amy E. (https://experts.colorado.edu/display/fisid_141901/)
Professor; PhD, Stanford University

Pardi, Arthur
Professor Emeritus; PhD, University of California, Berkeley

Parker, Roy Robert (https://experts.colorado.edu/display/fisid_151440/)
Distinguished Professor; PhD, University of California, San Francisco

Rinn, John (https://experts.colorado.edu/display/fisid_159338/)
Professor; PhD, Yale University

Schnizer-Luger, Karoline (https://experts.colorado.edu/display/fisid_156579/)
Endowed Chair, Professor; PhD, Univ of Basel (Switzerland)

Sousa, Marcelo Carlos (https://experts.colorado.edu/display/fisid_122806/)
Professor; PhD, Univ of Buenos Aires (Argentina)

Spencer, Sabrina Leigh (https://experts.colorado.edu/display/fisid_154911/)
Associate Professor; PhD, Massachusetts Institute of Technology

Stephen, Ricardo Hugh (https://experts.colorado.edu/display/fisid_145994/)
Senior Instructor; PhD, University of Colorado Boulder

Taatjes, Dylan J. (https://experts.colorado.edu/display/fisid_102436/)
Professor; PhD, University of Colorado Boulder

Whiteley, Aaron (https://experts.colorado.edu/display/fisid_166299/)
Assistant Professor; PhD, University of California, Berkeley

Whiteley, Alexandra (https://experts.colorado.edu/display/fisid_166300/)
Assistant Professor; PhD, University of California, San Francisco

Wuttke, Deborah S. (https://experts.colorado.edu/display/fisid_108412/)
Professor, Associate Chair; PhD, California Institute of Technology

# Courses

**BCHM 5312 (3) Quantitative Optical Imaging**
Explores the fundamentals of optical imaging in biology, especially molecular and cellular biology. Covered topics include an introduction to optics and microscopes, fluorescence microscopy and image analysis, and biological applications. MATLAB will be taught at the beginning of the course and used throughout for image processing. Prior experience with MATLAB (or Python) is highly recommended but not required.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5312, MCDB 4312 and BCHM 4312
**Grading Basis:** Letter Grade

**BCHM 5341 (3) Chemical Biology and Drug Design**
Develop knowledge base and skills in the interdisciplinary field of chemical biology, including aspects of chemistry and biology, and integrating both with respect to hierarchical levels of structure (atomic, molecular, cellular). Students will receive training that helps to develop their careers in biotech, pharmaceutical and other research-oriented industries as well as in academia. Department enforced prerequisites: introductory organic chemistry and general biochemistry. Formerly CHEM 5341.
**Requisites:** Restricted to graduate students only.

**BCHM 5400 (4) Core Concepts in Physical Chemistry for Biochemists**
Introduces thermodynamics, kinetics and spectroscopy, emphasizing macromolecule and biochemical applications. Includes thermodynamics, chemical and physical equilibriums, solution chemistry, rates of chemical and biochemical reactions, chemical bonds and principles and selected examples of spectroscopies applied to biological systems. Formerly CHEM 5400.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 4400 CHEM 4511
**Requisites:** Restricted to graduate students only.

**BCHM 5491 (3) Modern Biophysical Methods**
Covers the basic theory of biophysical methods widely employed in biochemistry and biology, including: electrophoresis, mass spec, calorimetry, evanescent waves, plasmon resonance, Xray diffraction, absorbance and fluorescence spectroscopy, magnetic resonance, electron and optical microscopy and single molecule methods. Discusses ways to maximize rigor and reproducibility in biophysical studies. Department enforced prerequisites: undergraduate chemistry (general, organic, physical), biochemistry, physics, calculus.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 4491
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**BCHM 5611 (3) Principles of Biochemistry**
One-semester overview of the main themes of modern biochemistry: biomolecular structure/function, metabolism, biosynthesis, DNA from genome to proteome and cellular signaling. For biology and engineering majors and others wanting an overview of biochemistry.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 4611
**Requisites:** Restricted to graduate students only.

**BCHM 5631 (3) Computational Genomics Lab**
Designed as an inquiry based computational genomics laboratory course. Students will learn fundamental principles of BASH, R, NEXTFLOW, GIT and more by applying these skills to publicly available genomic data. The course aims to mimic a real world genomics research project. Overall this course aims to provide students with key skills needed for future research and career opportunities.
**Requisites:** Restricted to graduate students only.

**BCHM 5661 (3) Advances in Molecular Biophysics**
Discuss recent literature concerning biophysical studies of macromolecular structure and mechanism, including DNA, RNA, proteins, and their interactions.
**Recommended:** Prerequisites one year of physical chemistry or quantum mechanics, one year of biology, graduate standing, or instructor consent.

**BCHM 5720 (4) Metabolic Pathways and Human Disease**
Covers energy metabolism and anabolic/catabolic pathways; metabolism of carbohydrates, lipids, amino acids, and nucleic acids; photosynthesis; special topics on human diseases with pathologies and metabolic pathways. Formerly CHEM 5720.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 4720
**Requisites:** Restricted to graduate students only.

**BCHM 5740 (4) Biochemistry of Gene Transmission, Expression and Regulation**
Covers biosynthesis and function of macromolecules including DNA, RNA and proteins; molecular basis of replication, transcription and translation; biochemistry of subcellular systems; signaling and regulation of gene expression in eukaryotes; and special topics. Formerly CHEM 5740.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 4740
**Requisites:** Restricted to graduate students only.

**BCHM 5751 (3) Current Topics in Biochemical Research**
Lec. Covers current topics in modern biochemical research through lectures, reading recent research articles, critical thinking and class discussion. Topics include protein and nucleic acid structure and function, biomolecular interactions, enzyme function and cellular signaling and regulation. Department consent required. Formerly CHEM 5751.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 4751
**Requisites:** Restricted to graduate students only.

**BCHM 5770 (3) Fundamentals of Biochemistry I**
Introduction to conducting research in Biochemistry, including covering foundational topics in Biochemistry that include concepts such as protein structure and function, experimental approaches to study biochemical processes, and analysis and interpretation of data. Topics will be taught through the perspective of the scientific literature with an emphasis on critical analysis of research. Additional subject areas will include discussions of aspects of conducting biochemical research in academic and industrial settings. Intended for entering Biochemistry graduate students. Formerly CHEM 5770.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**BCHM 5771 (5) Advanced General Biochemistry 1**
Lect. In-depth analysis of DNA structure and replication, RNA synthesis and processing, protein synthesis, enzyme function and mechanism, protein structure, protein dynamics, and physical chemistry of macromolecules. Intended as a comprehensive treatment of areas central to modern biochemistry for entering graduate students. Formerly CHEM 5771.

**BCHM 5772 (1) Quantitative Reasoning in Biochemistry**
An introduction to quantitative reasoning used by Biochemists. Intended for entering Biochemistry graduate students.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**BCHM 5774 (1) Introduction to your Biochemistry PhD**
This course provides an introduction to various aspects of the Biochemistry Ph.D. program. Students will be introduced to various research programs conducted by Biochemistry faculty in preparation to choose a Ph.D. dissertation research laboratory and mentor. Various topics related to successful navigation of the graduate program and career pathways after graduation will be discussed.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**BCHM 5776 (1) Scientific Ethics and Responsible Conduct in Research**
Lect. Advanced discussion of topics in scientific ethics, including requirements for responsible conduct of research, case histories of fraud, research misconduct, ethical misconduct and development of professional values and ethical standards.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5776
**Requisites:** Requires prerequisite course of BCHM 5771 or CHEM 5271 (minimum grade B-). Restricted to graduate students only.

**BCHM 5780 (3) Fundamentals of Biochemistry II**
Analysis of topics in biochemistry including protein structure, methods of structure determination and prediction, protein folding, and protein dynamics. Intended as a comprehensive treatment of areas central to modern biochemistry for entering graduate students. Lectures concurrent with CHEM 5781, covering the same topics except for the requirement of a written research proposal. Formerly CHEM 5780.
**Requisites:** Requires prerequisite course of BCHM 5770 (minimum grade B-). Restricted to graduate students only.

**BCHM 5781 (5) Advanced General Biochemistry 2**
Detailed consideration of contemporary topics in biochemistry. Formerly CHEM 5781.
**Requisites:** Requires prerequisite course of BCHM 5770 or BCHM 5771 (minimum grade B-). Restricted to graduate students only.
**Grading Basis:** Letter Grade

**BCHM 5801 (3) Advanced Signal Transduction and Cell Cycle Regulation**
Lect. Advanced discussion of current research and literature in signal transduction, including ligands, receptors, and intracellular signaling pathways, as well as control on transcription, chromatin structure, DNA replication, mitosis, and cell cycle progression. Formerly CHEM 5801.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CHEM 5771 and CHEM 5781 and MCDB 5210 or MCDB 5220.

**BCHM 5811 (3) Advanced Methods in Protein Sequencing and Analysis**
Lect. Advanced discussion of current methods in protein sequencing, sequence analysis, and posttranslational modifications, emphasizing techniques of mass spectrometry, use of protein databases, sequence alignment and motifs, structure prediction, and modeling of signaling pathways. Department consent required. Formerly CHEM 5811.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CHEM 5771 and CHEM 5781 and MCDB 5210.

**BCHM 5821 (1) Special Topics in Signaling and Cell Regulation**
Lect. Reviews and evaluates literature on subjects of current interest in signal transduction transcription, cell cycle progression, and cell regulation. Primarily for graduate level presentation of special topics by students, faculty, and research staff. Department consent required. Formerly CHEM 5821.
**Repeatable:** Repeatable for up to 5.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 5830 (1) Scientific Communication in Biochemistry**
This course focuses on the development and writing of NIH- and NSF-style grant proposals in the field of Biochemistry and the oral communication of scientific ideas and results before fellow scientists.
**Requisites:** Requires prerequisite courses of BCHM 5770 and BCHM 5772 and BCHM 5781 (all minimum grade C-). Restricted to graduate students only.
**Grading Basis:** Letter Grade

**BCHM 5850 (3) Therapeutic and Diagnostic Nucleic Acids**
A comprehensive course in topics of the application of nucleic acids to the advancement of human health. Topics will include an introduction to the basic principles of pharmacology and drug development, action of small molecule therapeutics based upon nucleosides and nucleotides, antisense oligonucleotides and emerging CRISPR-based therapeutics, gene therapy, application of nucleic acids in commonly used diagnostics and emerging applications of nucleic acids.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 4850
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**BCHM 6601 (1) Biophysics Seminar**
Restricted to and required for all currently funded NIH/CU Biophysics trainees and current NIH/CU Biophysics affiliates. Credit is deferred until presentation of satisfactory seminar. Formerly CHEM 6601.
**Requisites:** Restricted to graduate students only.

**BCHM 6711 (3-6) Advanced Topics in Biochemistry**
Detailed study of current literature relative to one main topic is undertaken each semester. Topics covered on a rotating basis include enzyme kinetics and mechanisms; lipids and lipoproteins; chemistry and enzymology of nucleic acids; biochemistry of nucleic acids in eukaryotic cells; protein chemistry. Presentations include faculty lectures and student reports. Department enforced prerequisite: one year of biochemistry courses. Department consent required. Formerly CHEM 6711.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 6731 (3-6) Advanced Topics in Biochemistry**
Detailed study of current literature relative to one main topic is undertaken each semester. Topics covered on a rotating basis include enzyme kinetics and mechanisms; lipids and lipoproteins; chemistry and enzymology of nucleic acids; biochemistry of nucleic acids in eukaryotic cells; protein chemistry. Presentations include faculty lectures and student reports. Department enforced prerequisite: one year of biochemistry courses. Department consent required. Formerly CHEM 6731.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 6901 (1-6) Research in Biochemistry**
**Repeatable:** Repeatable for up to 15.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 6941 (1) Master's Candidate for Degree**
Students are not admitted for the master's degree but may be transferred to the MS plan if they are unable to meet the demands of the PhD program.
**Requisites:** Restricted to graduate students only.

**BCHM 6951 (1-6) Master's Thesis**
Students are not admitted for the master's degree but may be transferred to the MS plan if they are unable to meet the demands of the PhD program.
**Requisites:** Restricted to graduate students only.

**BCHM 7601 (2) Seminar: Nucleic Acid Chemistry**
Topics in various aspects of current research; emphasizes student readings and presentations. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 7611 (1) Seminar: Structures and Dynamics of Biopolymers in Solution**
Discussion of experimental and theoretical approaches for probing structures and dynamics of proteins, peptides, and nucleic acids; and computations in molecular dynamics simulation, modeling, and geometry. Department consent required. Formerly CHEM 7611.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 7621 (1) Seminar: Biochemistry and Molecular Biology of Signal Transduction**
Discusses and reviews the current literature and experimental results in signal transduction, cell cycle and tumor suppressor gene regulation. Emphasizes the understandings of molecular and biochemical mechanisms of the origin of human tumor cells. Formerly CHEM 7621.
**Requisites:** Restricted to graduate students only.

**BCHM 7651 (2) Seminar: Environmental Biochemistry**
Topics in various aspects of current biochemical and environmental research. Department consent required. Formerly CHEM 7651.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 7661 (1) Structure/Function of Human Mediator Transcription Complexes**
Study of the mechanisms of eukaryotic gene expression with an emphasis on the structure and function of human mediator transcription complexes. Formerly CHEM 7661.
**Requisites:** Restricted to graduate students only.

**BCHM 7671 (1) Seminar: Topics in Designing Probes for Signaling Reactions**
Discussion of advances and developments in biomolecular dynamics, with emphasis on experimental studies via ultrafast laser spectroscopy. The connection of protein dynamics with function will also be considered. Formerly CHEM 7671.
**Requisites:** Restricted to graduate students only.

**BCHM 7691 (1) Seminar: Protein Dynamics and the Mechanism of Sensory Proteins**
Discusses recent results and current literature in the areas of the mechanism of sensory proteins, internal motions of proteins, and protein folding. Department consent required. Formerly CHEM 7691.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 7701 (1) Seminar: Enzyme Mechanisms and Kinetics**
Studies experimental approaches to understand the mechanisms of enzymic catalysis. Techniques include steady-state and pre-steady-state kinetics, isotope trapping and partitioning, inhibition by substrate analogues, and covalent modification of proteins. Department consent required. Formerly CHEM 7701.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 7711 (1) RNA Mediated Inorganic and Organic Reactions**
Discussion of advances and developments in biomolecular dynamics, with emphasis on experimentalstudies via ultrafast laser spectroscopy. The connection of protein dynamics with function will also be considered. Formerly CHEM 7711.
**Requisites:** Restricted to graduate students only.

**BCHM 7741 (1) Seminar: Signal Transduction and Protein Phosphorylation**
Devoted to experimental methods for understanding mechanisms of signal transduction in mammalian cells through pathways involving regulation of protein phosphorylation. Department consent required. Formerly CHEM 7741.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 7751 (1) Seminar: Protein Structure and Folding**
Studies structure and folding of proteins and protein complexes using biophysical methods, including nuclear magnetic resonance (NMR), circular dichroism, and fluorescence spectroscopies. Department consent required. Formerly CHEM 7751.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 7761 (1) Seminar: Eukaryotic Transcriptional Regulation**
Studies the regulation of transcription by RNA Polymerase II from human promoters. Department consent required. Formerly CHEM 7761.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 7781 (1) Seminar: Topics in Structural Biology**
Discussion of advances and developments in structural biology with emphasis on new methods for protein expression, purification and crystallization; and structure solution implementation. Formerly CHEM 7781.
**Requisites:** Restricted to graduate students only.

**BCHM 7791 (1) Seminar: Topics in Ribonucleoprotein Assemblies**
Studies aspects of the biochemical and structural analysis of ribonucleic acid (RNA) and its interactions with proteins and assemblies into functional ribonucleoprotein (RNP) enzymes. Techniques focus on x-ray crystallography, spectroscopic methods, and biochemical probing. Formerly CHEM 7791.
**Requisites:** Restricted to graduate students only.

**BCHM 8991 (1-10) Doctoral Dissertation**
All doctoral students must register for 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.

# Biochemistry - Master of Science (MS)

The master's degree in this field is not available through direct admission and may only be earned under special circumstances. Please contact program for additional information and requirements.

## Requirements

### Language Requirement

The department does not require foreign language proficiency for the master's degree.

### Examinations

Administration of preliminary examinations varies, depending on the student's entering field. Candidates opting for MS Plan I must pass a master's thesis defense examination at the time they complete their work. MS Plan II does not require a final oral examination.

### Course Requirements

There are two methods of obtaining a master's degree from the Department of Biochemistry. Both plans are available only with departmental approval.

#### Plan I: Thesis

This plan requires 30 credit hours, including 15 credit hours of formal coursework, 15 credit hours in research/seminar courses, the completion of a research investigation and the presentation of a thesis.

#### Plan II: Research Report

This plan requires 30 credit hours including 21 credit hours of formal coursework plus 9 credit hours of research/seminar and presentation of a research report, but no thesis.

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate expertise of knowledge in the discipline and demonstrate the ability to synthesize arguments through academic writing.
- Design and conduct high-quality original research in the discipline.
- Effectively communicate and present research to academic or public audiences in both written and oral form.

# Biochemistry - Doctor of Philosophy (PhD)

The Department of Biochemistry is internationally recognized for its research and education and offers a world-class interdisciplinary research environment in a beautiful mountain setting. As part of a commitment to continuing this tradition of excellence, the department provides a graduate program that integrates opportunities for cutting-edge creative research and study across a wide range of areas including:

- Computational biology
- Nucleic acids
- Gene expression
- Cell signaling
- Membranes
- Proteins and enzymology
- Molecular biophysics
- Structural biology
- Systems biology

Graduate students enjoy extensive scientific collaboration with biochemistry faculty, with other departments such as molecular, cellular and developmental biology, chemistry and physics, and with research institutes such as the BioFrontiers Institute, Joint Institutes of Laboratory Physics (JILA) and the Renewable and Sustainable Energy Institute (RASEI).

## Requirements

### Course Requirements

Sixty credit hours of coursework is required, consisting of 30 hours of research in BCHM 8991, at least 15 hours in formal courses and the remainder in other courses, such as lecture and seminar courses, group meeting courses and research in BCHM 6901. All students are required to take a 1-credit course in Scientific Ethics and Responsible Conduct in Research GRAD 5000.

A minimum grade of B- is required in all courses counting for the PhD degree; students must maintain a cumulative GPA of 3.0 in all formal courses and an overall grade point average of 3.0 or they will be placed on academic probation. Students may also be placed on probation if they are not making satisfactory progress in their research. Students on probation will not have a high priority for financial support.

#### Plan of Study

The plan of study varies by student. See the Plan(s) of Study (p. 1204) section for a sample course plan.

### Common Electives

| Code | Title | Credit Hours |
|---|---|---|
| BCHM 5312 | Quantitative Optical Imaging | 3-4 |
| BCHM 5491 | Modern Biophysical Methods | 3 |
| BCHM 5631 | Computational Genomics Lab | 3 |
| BCHM 5801 | Advanced Signal Transduction and Cell Cycle Regulation | 3 |
| BCHM 5850 | Therapeutic and Diagnostic Nucleic Acids | 3 |
| MCDB 5471 | Mechanisms of Gene Regulation in Eukaryotes | 3 |
| MCDB 5520 | Bioinformatics and Genomics | 3 |
| MCDB 5680 | Mechanisms of Aging | 3 |
| MCDB 5811 | Teaching and Learning Biology | 3 |
| EBIO 5460 | Special Topics | 1-5 |
| EBIO 5800 | Critical Thinking in Biology | 3 |
| CSCI 5314 | Dynamic Models in Biology | 3 |

## Research Requirements

During the course of the PhD thesis work, students will arrange annual meetings with a thesis advisory committee composed of their research advisor and two to four other biochemistry faculty. The purpose of these advisory meetings is to ensure the student is making adequate progress on a suitable PhD thesis project. The final annual meeting should be scheduled about one year from the end of the thesis work. For this meeting, the advisory committee will be expanded to five faculty members: the thesis advisor, three biochemistry faculty and one faculty member from another department. This committee will become the examination committee that evaluates the results of a completed research program submitted as a thesis for the final examination as described above.

## Examination Requirements

Each PhD student is required to satisfy a preliminary examination and pass a series of Comprehensive Examinations to be advanced to candidacy. The candidate must then pass a final thesis defense examination to be awarded the PhD degree. Interdisciplinary students should adhere to specific program requirements.

### Preliminary Examinations

The Biochemistry preliminary examination will be conducted at the beginning of the student's third semester. The record of each student, including undergraduate preparation, performance in graduate coursework, TA performance and performance in laboratory rotations will be reviewed, and a recommendation will be made on the qualification of the student to continue in the PhD program. Outcomes may include recommendation for additional coursework, delay in joining a research lab or a recommendation to leave the program. Students who are considering interdivisional work should consult the Biochemistry Graduate Committee for advice on the preliminary examination requirement.

### Comprehensive Examinations

The Comprehensive Examinations are made up of three parts: a Written Examination, an Oral Examination and the evaluation of an original research proposal. The oral examination and the research proposition evaluation shall be conducted by a five member examining board, according to the rules of the Graduate School. The Comprehensive Examinations are considered passed, and the student can advance to Candidacy when the requirements of all parts have been met.

### Final Examination

A doctoral student must write a dissertation based upon original investigation, demonstrating mature scholarship and critical judgment, as well as familiarity with tools and methods of research, conducted under the supervision of a graduate faculty member. The dissertation must fulfill all Graduate School requirements. After the dissertation is completed, an oral final examination on the dissertation and related topics is conducted by the student's doctoral committee.

## Time Limit

All degree requirements must be completed within six years of the date of commencing coursework.

# Plan(s) of Study

Below is a sample course plan for first and second year students. In their third through sixth years, students typically complete dissertation research (BCHM 8991, repeatable for up to 30 credit hours) and finish elective coursework.

| First Year | | Credit Hours |
|---|---|---|
| BCHM 5781 | Advanced General Biochemistry 2 | 5 |
| GRAD 5000 | Responsible Conduct of Research | 1 |
| BCHM 5770 | Fundamentals of Biochemistry I | 3 |
| BCHM 5772 | Quantitative Reasoning in Biochemistry | 1 |
| BCHM 5774 | Introduction to your Biochemistry PhD | 1 |
| BCHM 6901 | Research in Biochemistry (Repeatable for up to 15 credit hours) | 7 |
| | **Credit Hours** | **18** |
| **Second Year** | | |
| Elective courses (2) | Student Choice - check with advisor or grad program director | 6 |
| BCHM 6901 | Research in Biochemistry (Repeatable for up to 15 credit hours) | 6 |
| BCHM 5830 | Scientific Communication in Biochemistry | 1 |
| | **Credit Hours** | **13** |
| | **Total Credit Hours** | **31** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate expertise of knowledge in the discipline and demonstrate the ability to synthesize arguments through academic writing.
- Design and conduct high-quality original research in the discipline.
- Effectively communicate and present research to academic or public audiences in both written and oral form.

# Molecular Biophysics - Graduate Certificate

This program introduces graduate students to the field of biophysics, its methodologies and the state-of-the-art biophysical research efforts being carried out in diverse laboratories and departments on the CU

Boulder campus. It creates interdepartmental connections that provide the breadth of training needed to develop biophysical scholars.

Students must be admitted through the regular admissions process to a PhD program in one of the following departments:

- Biochemistry
- Chemical and Biological Engineering
- Chemistry
- Molecular, Cellular and Developmental Biology
- Physics

They must satisfy all of their home department's requirements to receive a PhD as well as the additional requirements of the certificate program. For more information, visit the program's Molecular Biophysics Training Program: Certificate Option (http://www.colorado.edu/biophysics/certificate/) webpage.

## Requirements

- Participation in one to three laboratory rotations outside the thesis lab, which provide experience with a range of biophysical methods. Subsequently the student joins one of the member laboratories of the training program for thesis work.
- Completion of two courses chosen from the list of approved courses below.
- Annual meeting with a faculty advisory committee that provides helpful feedback on the thesis research.
- Students are expected to take part in a seminar series, which presents internationally renowned speakers and their research. They also are required to participate in supergroup meetings and symposia, which provide forums for them to present their own research in front of their colleagues and advisory committee.

### Approved Course List

| Code | Title | Credit Hours |
|---|---|---|
| APPM 5390 | Modeling in Mathematical Biology | 3 |
| APPM 5720 | Open Topics in Applied Mathematics | 1-3 |
| BCHM 5491 | Modern Biophysical Methods | 3 |
| BCHM 5776 | Scientific Ethics and Responsible Conduct in Research | 1 |
| BCHM 5801 | Advanced Signal Transduction and Cell Cycle Regulation | 3 |
| BCHM 5811 | Advanced Methods in Protein Sequencing and Analysis | 3 |
| BCHM 6601 | Biophysics Seminar | 1 |
| BCHM 6711 | Advanced Topics in Biochemistry | 3-6 |
| CHEM 5321 | Advanced Physical Organic Chemistry | 3 |
| CHEM 5331 | Advanced Spectroscopic Techniques in Organic Chemistry | 3 |
| CHEM 5531 | Statistical Mechanics | 3 |
| CHEM 5541 | Chemical Dynamics | 3 |
| CHEM 5591 | Advanced Molecular Spectroscopy | 3 |
| CHEN 5150 | Biomolecular Kinetics, Transport, and Thermodynamics | 3 |
| CHEN 5210 | Transport Phenomena | 4 |
| CHEN 5805 | Biological Interactions to Biomaterials | 3 |
| CHEN 5900 | Pharmaceutical Biotechnology | 3 |
| CHEN 6820 | Biochemical Engineering Fundamentals | 3 |
| ECEN 5126 | Computational Optical Imaging | 3 |
| MATH 5030 | Intermediate Mathematical Physics 1 | 3 |
| MCDB 5312 | Quantitative Optical Imaging | 3-4 |
| MCDB 5350 | Microbial Diversity and the Biosphere | 3 |
| MCDB 5520 | Bioinformatics and Genomics | 3 |
| MCDB 5550 | Cells, Molecules and Tissues: A Biophysical Approach | 3 |
| MCDB 5560 | Introduction to Biophysics | 3 |
| MCDB 5776 | Scientific Ethics and Responsible Conduct in Research | 1 |
| PHYS 5030 | Intermediate Mathematical Physics 1 | 3 |
| PHYS 5040 | Intermediate Mathematical Physics 2 | 3 |
| PHYS 5250 | Introduction to Quantum Mechanics 1 | 3 |
| PHYS 5260 | Introduction to Quantum Mechanics 2 | 3 |
| PHYS 5550 | Cells, Molecules and Tissues: A Biophysical Approach | 3 |
| PHYS 5560 | Introduction to Biophysics | 3 |
| PHYS 7810 | Special Topics in Physics | 1-3 |

# Chemistry

The Department of Chemistry is internationally recognized for its research and education. As part of a commitment to continuing this tradition of excellence, the department provides a graduate program that integrates opportunities for cutting-edge creative research and study across a wide range of areas including analytical, atmospheric, astrochemistry, biochemistry, biophysical, chemical physics, environmental, organic, materials and nanoscience, and physical chemistry.

Graduate students enjoy extensive scientific collaboration with chemistry faculty; with other departments, such as Physics, Biochemistry, Molecular, Cellular and Developmental Biology; and with research institutes and agencies, such as the Cooperative Institute for Research in Environmental Sciences (CIRES), Joint Institutes of Laboratory Astrophysics (JILA), the National Oceanic and Atmospheric Administration (NOAA), Renewable & Sustainable Energy Institute (RASEI), Laboratory for Atmospheric and Space Physics (LASP) and Materials Science and Engineering (MSE).

**Course code for this program is CHEM.**

# Master's Degree

- Chemistry - Master of Science (MS) (p. 1211)

# Doctoral Degrees

- Chemistry - Doctor of Philosophy (PhD) (p. 1213)
- Chemical Physics - Doctor of Philosophy (PhD) (p. 1211)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Asirvatham, Margaret (https://experts.colorado.edu/display/fisid_103670/)
Senior Instructor Emerita; PhD, Kansas State University

Bierbaum, Veronica (https://experts.colorado.edu/display/fisid_101124/)
Professor Emerita; PhD, University of Pittsburgh

Birks, John
Professor Emeritus

Bouwman, Jordy (https://experts.colorado.edu/display/fisid_167913/)
Assistant Professor; PhD, Leiden University (Netherlands)

Broering, Ellen (https://experts.colorado.edu/individual/fisid_167610/)
Instructor; PhD, University of Georgia

Brown, Steven S. (https://experts.colorado.edu/display/fisid_119987/)
Professor Adjoint; PhD, University of Wisconsin–Madison

Browne, Eleanor Carol (https://experts.colorado.edu/display/fisid_156464/)
Associate Professor; PhD, University of California, Berkeley

Cuk, Tanja (https://experts.colorado.edu/display/fisid_159751/)
Associate Professor; PhD, Stanford University

Damrauer, Niels Harley (https://experts.colorado.edu/display/fisid_129797/)
Professor; PhD, University of California, Berkeley

de Gouw, Joost (https://experts.colorado.edu/display/fisid_105125/)
Professor, Associate Chair; PhD, University of Utrecht (Netherlands)

Dukovic, Gordana (https://experts.colorado.edu/display/fisid_147414/)
Professor; PhD, Columbia University

Eaves, Joel David (https://experts.colorado.edu/display/fisid_147419/)
Professor; PhD, Massachusetts Institute of Technology

George, Steven (https://experts.colorado.edu/display/fisid_103289/)
Professor; PhD, University of California, Berkeley

Gough, Raina V. (https://experts.colorado.edu/display/fisid_149207/)
Instructor; PhD, University of Colorado

Hendrickson, Susan Marie (https://experts.colorado.edu/display/fisid_145101/)
Senior Instructor; PhD, Colorado State University

Hynes, James T.
Distinguished Professor Emeritus; PhD, Princeton University

Jimenez, Ralph (https://experts.colorado.edu/display/fisid_132670/)
Professor Adjoint; PhD, University of Chicago

Jimenez-Palacios, Jose Luis (https://experts.colorado.edu/display/fisid_125580/)
Distinguished Professor; PhD, Massachusetts Institute of Technology

Jonas, David (https://experts.colorado.edu/display/fisid_107145/)
Professor; PhD, Massachusetts Institute of Technology

Kelly, Christine
Instructor Emeritus

Koch, Tad H.
Professor Emeritus; PhD, Iowa State University

Koval, Carl A.
Professor Emeritus; PhD, California Institute of Technology

Lineberger, William Carl
Distinguished Professor Emeritus; PhD, Georgia Institute of Technology

Luca, Oana (https://experts.colorado.edu/display/fisid_157952/)
Assistant Professor; PhD, Yale University

Marder Seth (https://experts.colorado.edu/display/fisid_167617/)
Professor; PhD, University of Wisconsin-Madison

Minton, Timothy K. (https://experts.colorado.edu/display/fisid_167230/)
Professor; PhD, University of California Berkeley

Montoya Castillo, Andres (https://experts.colorado.edu/display/fisid_167156/)
Assistant Professor; PhD, Columbia University In the City of New York

Nesbitt, David J. (https://experts.colorado.edu/display/fisid_100333/)
Professor Adjoint; PhD, University of Colorado

Noble D., Richard
Research Professor; PhD, University of California--Davis

Nozik, Arthur (https://experts.colorado.edu/display/fisid_113395/)
Professor Emeritus; PhD, Yale University

Parson, Rahul Bjorn (https://experts.colorado.edu/display/fisid_156069/)
Professor Emeritus, Associate Chair; PhD, University of California, Berkeley

Parson, Robert (https://experts.colorado.edu/display/fisid_101032/)
Professor Emeritus, Associate Chair; PhD, University of Michigan Ann Arbor

Peters, Kevin
Professor Emeritus; PhD, Yale University

Pierpont, Cortlandt G.
Professor Emeritus; PhD, Brown University

Rumbles, Garry (https://experts.colorado.edu/display/fisid_147479/)
Professor Adjoint; PhD, University of London (England)

Sammakia, Tarek (https://experts.colorado.edu/display/fisid_101597/)
Professor Emeritus, Chair; PhD, Yale University

Sievers, Robert E. (https://experts.colorado.edu/display/fisid_102866/)
Professor Emeritus; PhD, University of Illinois at Urbana–Champaign

Skodje, Rex T. (https://experts.colorado.edu/display/fisid_103448/)
Professor Emeritus; PhD, University of Minnesota Twin Cities

Tolbert, Margaret A. (https://experts.colorado.edu/display/fisid_104976/)
Distinguished Professor; PhD, California Institute of Technology

Vaida, Veronica (https://experts.colorado.edu/display/fisid_100313/)
Professor Emeritus; PhD, Yale University

Volkamer, Rainer (https://experts.colorado.edu/display/fisid_144988/)
Professor; PhD, University of Heidelberg (Germany)

Walba, David M. (https://experts.colorado.edu/display/fisid_105830/)
Professor; PhD, California Institute of Technology

Walczak, Maciej Andrzej (https://experts.colorado.edu/display/fisid_153323/)
Associate Professor; PhD, University of Pittsburgh

Wang, Xiang (https://experts.colorado.edu/display/fisid_145812/)
Associate Professor; PhD, Boston University

Weber, Jorg Mathias (https://experts.colorado.edu/display/fisid_142930/)
Professor; PhD, University of Kaiserslautern (Germany)

Wise, Matthew Eric (https://experts.colorado.edu/display/fisid_143977/)
Senior Instructor, Faculty Director, Associate Chair; PhD, University of Colorado Boulder

Zhang, Wei (https://experts.colorado.edu/display/fisid_146429/)
Professor, Chair; PhD, University of Illinois at Urbana–Champaign

Ziemann, Paul Jeffrey (https://experts.colorado.edu/display/fisid_153281/)
Professor; PhD, Pennsylvania State University

# Courses

**CHEM 5011 (3) Advanced Inorganic Chemistry 1**
Inorganic chemistry based on principles of bonding, structure, reaction mechanisms, and modern synthetic methods. Chemistry and general properties of representative and transition elements and their compounds.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 4011
**Requisites:** Requires prerequisite courses of CHEM 4011 and CHEM 4531 (all minimum grade B-) or graduate standing.

**CHEM 5061 (3) Advanced Inorganic Chemistry 2**
Lectures in physical inorganic chemistry with an emphasis on topics for understanding modern solar energy conversion to electricity and fuels. Includes a description of bonding and properties of coordination compounds in terms of the ligand field and molecular orbital theories. The primary research literature will be used to motivate exploration of relevant themes including spectroscopy, electron transfer, energy transfer, bioenergetic conversion, and small-molecule activation.
**Requisites:** Requires prerequisite course of CHEM 4011 (minimum grade C-) or graduate standing.

**CHEM 5121 (3) Practical Laboratory Skills for Analytical Chemistry**
Practical laboratory skills for research in experimental analytical and atmospheric chemistry (and related fields such as physical chemistry). Short lectures followed by hands-on laboratory practice and discussion. Topics covered include gases and flows; electricity and signals; key environmental measurements; data acquisition and other advanced topics.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CHEM 5131 (3) Computer Programming and Data Analysis for Chemists**
Provides an introduction to computer programming and data analysis skills that are a fundamental part of graduate research. The programming section of the course introduces the coding skills necessary for simulating, analyzing and visualizing data using IGOR Pro and for acquiring data and analyzing data using LabVIEW. Basic concepts in statistics and error analysis are also covered.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CHEM 4511 or CHEM 4171.
**Grading Basis:** Letter Grade

**CHEM 5141 (3) Environmental Water and Soil Chemistry**
Application of basic chemical principles to understanding the processes that determine the chemical composition of oceans, lakes, rivers, soils and sediments. Topics include air-water exchange; acid-base, redox, coordination, precipitation and dissolution, ion exchange and sorption reactions; nutrient chemistry; and the use of simple equilibrium and kinetic models for describing the chemistry of inorganic and organic species in air-water-soil systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 4141
**Requisites:** Restricted to graduate students only.

**CHEM 5151 (3) Atmospheric Chemistry**
Lect. Basic kinetics and photochemistry of atmospheric species. Stratospheric chemistry with emphasis on processes controlling ozone abundance. Tropospheric chemistry focusing on photochemical smog, acid deposition, oxidative capacity of the atmosphere and global climate change.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5151
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite one semester of college-level chemistry.

**CHEM 5152 (3) Advanced Atmospheric Chemistry**
Follows Graduate Atmospheric Chemistry (CHEM 5151) and explores advanced topics in atmospheric chemistry, such as secondary aerosol formation, oxidant formation, the chemistry of global climate change and/or design of advanced laboratory experiments.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5152
**Recommended:** Prerequisite CHEM 5151 or ATOC 5151.

**CHEM 5161 (3) Analytical Atmospheric Spectroscopy**
Optical spectrochemical analysis, atmospheric transmittance, including atomic and molecular spectroscopy, line-by-line spectral databases such as HITRAN, absorption, emission, fluorescence, scattering processes of gases, surface enhancements, aerosols, optical spectroscopic instrument components, and techniques, and their applications to atmospheric, and environmental problems. Department enforced prereq., undergraduate physical chemistry or instructor consent.
**Requisites:** Restricted to graduate students only.

**CHEM 5171 (3) Electroanalytical Chemistry**
Lect. Establishes a background for understanding electrochemical systems through a review of the relevant thermodynamic, kinetic and electronic principles. Compares classical and modern electrochemical methods of analysis. Several special topics are discussed in depth. Department enforced prerequisite: undergraduate physical chemistry or instructor consent.
**Requisites:** Restricted to graduate students only.

**CHEM 5181 (3) Mass Spectrometry, Chromatography, and Computer Programming**
Covers mass spectrometry, including instrumentation, ionization techniques, and interpretation of spectra. Analytical separation methods such as gas and liquid chromatography, ion mobility, and capillary electrophoresis. Introduction to atmospheric chemistry applications. Computer programming (Igor and LabVIEW) and simulation of instrumentation and processes. Department prerequisite: basic computer programming (or willingness to work hard on it), and undergraduate physics, statistics, and physical chemistry.
**Requisites:** Restricted to graduate students only.

**CHEM 5251 (3) Materials Chemistry and Properties**
Lec. Understanding of materials from chemistry perspective including metals, oxides, semiconductors and polymers. Basic description of chemical preparation of materials. Overview of fundamental properties of materials including structural, chemical, mechanical, thermal, electrical, and optical properties. Description of behavior of materials and various applications in modern technology. Discussion of materials characterization methods.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 4251
**Requisites:** Requires prerequisite course of CHEM 4431 or CHEM 4531 (all minimum grade C-) or graduate standing.

**CHEM 5261 (3) Organic Materials: Structures and Functions**
Overview of the preparation and functioning mechanism of novel organic materials that have recently been developed, including conductive polymers, 2-D macrocyclic structures, 3-D molecular cages, molecular machines/muscles/switches, fullerene derivatives and carbon nanotube composites. Emphasizes the use of organic and physical chemistry as tools to develop novel materials and probe their structure-property relationship.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 4261
**Requisites:** Requires prerequisite course of CHEM 4431 or CHEM 4531 (all minimum grade C-) or graduate standing.

**CHEM 5271 (3) Chemistry of Solar Energy**
Chemical principles of conversion of solar energy into electricity and fuels in molecular and semiconductor-based systems. Overview of solid-state electronic structure of materials and interfaces, light-matter interactions, principles of harvesting photoexcited currents and useful chemical species. Description of processes utilized in established and emerging solar energy technologies.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 4271
**Requisites:** Requires prerequisite course of CHEM 4431 or CHEM 4531 (all minimum grade C-) or graduate standing.

**CHEM 5281 (3) Semiconductor Processing and Device Fabrication**
Understanding of semiconductor processing and device fabrication from chemistry perspective. Overview of processing steps used to fabricate inorganic semiconductor devices including deposition, patterning and etching techniques. Description of process integration during device fabrication. Discussion of key issues facing advanced semiconductor fabrication.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CHEM 5311 (3) Advanced Synthetic Organic Chemistry**
Lect. Surveys synthetic transformations emphasizing important functional group transformations and carbon-carbon, bond-forming reactions. Required of all organic chemistry graduate students. Department enforced prerequisite: one year of organic chemistry or graduate standing.

**CHEM 5321 (3) Advanced Physical Organic Chemistry**
Lect. Modern concepts of physical organic chemistry and their use in interpreting data in terms of mechanisms of organic reactions and reactivities of organic compounds. Required of all organic chemistry graduate students.
**Recommended:** Prerequisite One year of organic chemistry, one year of physical chemistry, or graduate standing in chemistry or equivalent.

**CHEM 5331 (3) Advanced Spectroscopic Techniques in Organic Chemistry**
Lect. Advanced spectroscopic techniques for structure and determination in organic chemistry. Emphasizes proton and carbon-13 NMR spectroscopy. Department enforced prerequisites: one year of organic chemistry and one year of physical chemistry or graduate standing.

**CHEM 5501 (3) Advanced Topics in Physical Chemistry**
Covers various topics in physical chemistry focusing on their mathematical and physical background. Topics include the application of classical mechanics and electrodynamics in chemistry, the classical mechanics background for the description of atoms and molecules, the use of vector spaces in wave mechanics and quantum mechanics and the classical description of spectroscopy in terms of interaction of light and matter. Department enforced prerequisites: undergraduate physical chemistry, graduate standing or instructor consent.
**Requisites:** Restricted to graduate students only.

**CHEM 5531 (3) Statistical Mechanics**
Lect. Fundamental concepts of quantum and classical statistical mechanics. Applications to properties ofgases, liquids, solids, spin and polymer systems. Reaction, fluctuation, nucleation and relaxation phenomena. Department enforced prerequisite: undergraduate physical chemistry.
**Requisites:** Restricted to graduate students only.

**CHEM 5541 (3) Chemical Dynamics**
Lect. Discussion of mechanism and rate of chemical reactions from a fundamental point of view. Discusses nature of collision and develops concepts of cross section and rate constant. Theories of elementary bimolecular and decay processes are critically examined. Department enforced prerequisite: undergraduate physical chemistry.
**Requisites:** Restricted to graduate students only.

**CHEM 5555 (4) Theoretical and Computational Chemistry**
Explores computational methods to understand chemical systems. Topics include: atomic and molecular electronic structure calculations, Monte Carlo and molecular dynamics simulations and thermodynamic calculations.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 4555
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CHEM 5571 (3) Surface Science**
Lect. Principles of surface science with emphasis on fundamental surface phenomena, surface techniques and surface chemistry. Basic description of surfaces, adsorbate-surface interactions, surface kinetics and methods of surface analysis. Surface science of heterogeneous catalysis, semiconductor processing, and environmental interfaces. Department enforced prerequisites: undergraduate physical chemistry and graduate standing or instructor consent.
**Requisites:** Restricted to graduate students only.

**CHEM 5581 (3) Introductory Quantum Chemistry**
Lect. Basic principles and techniques of quantum mechanics with applications to questions of chemical interest. Quantum dynamics of atoms, molecules and spin; electronic structure of atoms and molecules. Department enforced prerequisite: two semesters of physical chemistry and graduate standing or instructor consent.
**Requisites:** Restricted to graduate students only.

**CHEM 5591 (3) Advanced Molecular Spectroscopy**
Lect. Rotational, vibrational and electronic spectra of molecules, and their interpretation in terms of the quantum theory of molecular structure. Department enforced prerequisites: two semesters of physical chemistry and graduate standing or instructor consent.
**Requisites:** Restricted to graduate students only.

**CHEM 6001 (1) Seminar: Inorganic Chemistry**
Student, faculty, and guest presentations and discussions of current research in inorganic chemistry and related topics (transition element and main group element compound properties, inorganic compound in biological, industrial, and materials applications). Required of all inorganic chemistry graduate students. Credit deferred until presentation of satisfactory seminar.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 6021 (1-3) Special Topics in Inorganic Chemistry**
Lect. Subjects of current interest in inorganic chemistry. Primarily used for graduate-level presentations of special topics by visiting and resident faculty. Variable class schedule.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 6031 (3) Special Topics in Nanoscience**
Introduces the synthesis, physical properties, and applications of nanometer-scale materials and devices. Includes synthesis of metal and semiconductor nanoparticles and nanowires, optical and electronic properties of nanoscale systems, and applicationsin biotechnology and energy.
**Requisites:** Requires prerequisite course of CHEM 4431 or CHEM 4511 (all minimum grade B-) or graduate standing.

**CHEM 6101 (1) Seminar: Analytical Chemistry**
Student, faculty, and guest presentations and discussions of current research in analytical chemistry. Required of all analytical chemistry graduate students. Credit deferred until presentation of satisfactory seminar.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 6111 (1-3) Special Topics in Analytical Chemistry**
Lect. Subjects of current interest in analytical chemistry. Used for graduate-level presentations of special topics by visiting and resident faculty. Variable class schedule.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 6301 (1-3) Seminar in Organic Chemistry**
Discussions principally concerned with recent literature in organic chemistry. Required of all organic chemistry graduate students.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 6311 (1-3) Special Topics in Synthetic Organic Chemistry**
Lect. Selected topics in synthetic organic chemistry, encompassing both methods and/or total synthesis of complex molecules.
**Requisites:** Requires prerequisite course of CHEM 5311 (minimum grade B-). Restricted to graduate students only.

**CHEM 6321 (1-3) Special Topics in Physical Organic Chemistry**
Lect. Selected topics in physical organic chemistry, which may include photochemistry, carbene chemistry, free radical chemistry, molecular orbital methods, organic materials, or gas phase ion chemistry.
**Requisites:** Requires prerequisite course of CHEM 5321 (minimum grade B-). Restricted to graduate students only.

**CHEM 6401 (1-3) Seminar: Physical Chemistry**
Student, faculty, and guest presentations of current research in physical chemistry. Discussion of research topics related to the subject of weekly physical chemistry/chemical physics seminar and appropriate journal articles.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 6411 (1-3) Advanced Topics in Physical Chemistry**
Lect.
**Requisites:** Restricted to graduate students only.

**CHEM 6801 (0) Departmental Research Seminar**
Lectures by visiting scientists and occasionally by staff members and graduate students on topics of current research. Meets once a week. Required for all graduate students in chemistry.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 6901 (1-6) Research in Chemistry**
**Repeatable:** Repeatable for up to 15.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 6941 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.

**CHEM 6951 (1-6) Master's Thesis**
**Requisites:** Restricted to graduate students only.

**CHEM 7021 (2) Seminar: Structural Inorganic Chemistry**
Current research in the area of structural inorganic chemistry. Concerns topics related to electronic and molecular structure of transition metal complexes. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7101 (2) Seminar: Chromatography and Trace Analysis**
Student and faculty discussions and reports on research advances in chromatography, trace analysis and environmental chemistry. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7111 (2) Seminar: Electrochemistry**
Student and faculty discussions and reports on research advances in electrochemistry. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7131 (1) Seminar in Atmospheric Aerosol Chemistry**
Discusses advances in atmospheric aerosol chemistry, with emphasis on new methods for analysis and their application to laboratory and field studies.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CHEM 5151 and CHEM 5181.

**CHEM 7161 (1) Seminar: Heterogeneous Atmospheric Chemistry**
Topics in atmospheric chemistry emphasizing the structure and reactivity of atmospheric particulates. Presentations on current research and critical evaluations of recent literature. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7201 (1) Seminar: Synthetic and Bioorganic Chemistry**
Seminar in organic and bioorganic chemistry, particularly the synthesis of complex organic molecules and their interactions with biopolymers. Included is the study of the synthesis and biological functions of carbohydrates, peptides, proteins and related molecules. Prereq., instructor consent.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**CHEM 7211 (1) Seminar: Topics in Synthetic Methodology and Natural Product Synthesis**
Discussion of contemporary synthetic organic chemistry with a focus on new methodology and total synthesis of natural products.
**Requisites:** Restricted to graduate students only.

**CHEM 7221 (1) Seminar: Photochemistry and Free Radical Chemistry**
Current research in areas of organic free radical chemistry, photochemistry, and related topics are presented and discussed. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7231 (1) Seminar: Reactive Intermediates**
Application of contemporary ideas of chemical physics to organic molecules. Special attention to structures and bonding in organic ions and radicals. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7241 (1) Seminar: Synthetic Organic Chemistry**
Series of seminars on directed total synthesis. Emphasizes modern synthetic methodology and applications to total synthesis of natural products. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7251 (1) Selected Topics in Chemical Genetics**
Discusses the brief history of the emerging field of chemical genetics, and focuses on the recent development of concepts, techniques, applications, and its impact on both science and human health.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7271 (1) Seminar: Picosecond Dynamics of Reactions**
Includes development and application of picosecond laser spectroscopy to organic and organometallic reactions. Emphasizes relationship between current theoretical developments and experiments. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7281 (1) Seminar: Molecular Self-Assembly**
Discusses current topics and recent advances in molecular self-assembly, with emphasis on new liquid crystal designs and applications.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7291 (1) Seminar: Physical Organic Chemistry**
Modern experimental techniques and theoretical models in physical organic chemistry are discussed in relation to the development of new materials, such as molecular size tinkertoys to the development of novel photochemical systems and their spectroscopies. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7301 (1) Seminar: Synthetic and Mechanistic Chemistry**
Discusses particularly the synthesis of complex organic molecules and the mechanism of reagents used in organic synthesis. Includes a study of transition metal mediated organic reactions. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7311 (1) Selected Topics in Organic Materials**
Current research in the area of organic/materials chemistry. Concerns topics related to organic materials synthesis, carbon nanotube functionalization, artificial photosynthesis, gas storage and catalysis.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7401 (1) Seminar in Photochemical Reaction Control**
Discusses progress towards control of molecular reactivity using light, including synthetic methods for creating control subjects. Emphasizes new methods to achieve coherent control.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7421 (2) Seminar: Negative Ion Chemistry**
Chemistry of negative ions; experimental methods and designs; laser spectroscopy of ions; theoretical methods; reactive dynamics of ions in the gas phase. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7431 (1) Seminar: Topics in Theoretical Chemical Physics**
Seminars presented on a variety of topics in theoretical chemical physics. Molecular collisions and unimolecular dynamics predominantly featured. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7441 (2) Research Seminar: Theoretical Chemistry**
Studies theoretical description of molecular dynamicsas related to rate processes. Focuses on chemical reactions in liquids, absorption-desorption on surfaces, nucleation reactions, and energy flow in molecules. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7461 (1) Seminar: Gas Phase Ion Chemistry**
Studies gas phase ion chemistry relevant to thermochemical measurements and atmospheric, interstellar, and biomedical applications.
**Requisites:** Restricted to graduate students only.

**CHEM 7471 (1) Seminar in Ultrafast Spectroscopy of Proteins**
Discusses advances and developments in biomolecular dynamics, and considers the connection of protein dynamics with function. Emphasizes experimental studies via ultrafast laser spectroscopy.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7481 (2) Seminar: Molecular Spectroscopy and Photochemistry**
Discussion and presentation of current research in spectroscopy and photochemistry of organic as well as organometallic systems. Reviews state of the art techniques available for the theoretical and experimental characterization of excited states. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7491 (1) Seminar: Molecular Vibrational Dynamics**
Topics pertaining to vibrational dynamics of small molecules are discussed, with particular emphasis upon IR laser spectroscopy, van der Waals' clusters, vibrationally induced dipole moments, and predissociation. Discussion of current research and recently published literature. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7501 (1) Seminar: Theoretical Molecular Dynamics**
Variety of topics in theoretical chemical physics, emphasizing dynamics of molecules in dissipative environments or in radiation fields. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7511 (1) Seminar: Reaction Dynamics in Condensed Phases**
Studies elementary steps in chemical reactions and their observation by ultrafast spectroscopy. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7521 (1) Seminar: Atmospheric Kinetics and Photochemistry**
Discusses laboratory studies of degradation mechanisms. Applies these studies to atmospheric phenomena such as global warming and stratospheric ozone loss. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7531 (1) Seminar: Surface Chemistry and Thin Film Growth**
Topics in surface chemistry and thin film growth with focus on atomic layer deposition (ALD) and molecular layer deposition (MLD). Properties of thin films grown using ALD and MLD. Applications of thin films in areas including flexible displays, energy storage and catalysis. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7551 (1) Selected Topics in Ion Spectroscopy**
Treats current topics in the spectrocscopy of ions. Seminar lectures are given by graduate students on their research and on literature topics, and the results of both in-house and external research groups are studied. Additionally, ideas for interesting directions of research and new experiments are proposed and discussed.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 8991 (1-10) Doctoral Dissertation**
All doctoral students must register for 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.

# Chemistry - Master of Science (MS)

The master's degree in this field is not available through direct admission and may only be earned under special circumstances. Please contact program for additional information and requirements.

## Requirements

### Language Requirement

The department does not require foreign language proficiency for the master's degree.

### Examinations

Administration of preliminary examinations varies, depending on students' entering field. Candidates opting for MS Plan I must pass a master's thesis defense examination at the time they complete their work. MS Plan II does not require a final oral examination.

### Required Courses and Credits

There are two methods of obtaining a master's degree from the Department of Chemistry and Biochemistry. Both plans are available only with departmental approval.

#### Plan I: Thesis

This plan requires 30 credits, including 15 credits of formal coursework, 15 credits in research/seminar courses, the completion of a research investigation and the presentation of a thesis.

#### Plan II: Research Report

This plan requires 30 credits, including 21 credits of formal coursework plus 9 credits of research/seminar and presentation of a research report, but no thesis.

## Learning Outcomes

By the completion of the program, student will be able to:

- Demonstrate familiarity with the core theoretical frameworks utilized within the chemistry subdiscipline (PCHEM/ ANYL/ MN /ORG).
- Effectively engage with undergraduate students.
- Effectively communicate and present research to academic audiences in both written and oral form.

# Chemical Physics - Doctor of Philosophy (PhD)

Chemical physics is a discipline at the interface between chemistry and physics. Chemical physics applies physical methods and theory to study molecular and collective properties of matter. The focus is on understanding complex phenomena from gas phase molecular dynamics, to nanoscale, mesoscale and biological phenomena, through model systems and fundamental physical principles.

The chemical physics program allows students to strike a balance between core courses and courses that are better suited to address the

student's specific research goals and interests. Students must consult with the chemical physics graduate advisors in their parent departments, either chemistry or physics, to plan their formal coursework.

This program is administered by an interdepartmental committee. For more information, contact the graduate program manager in either the Department of Chemistry (chemgrad@colorado.edu) or the Department of Physics (Jeanne.nijhowne@colorado.edu).

# Requirements

## Program Admissions

Graduate students in good standing in either the chemistry or physics PhD program may declare their intent to work toward a PhD in chemical physics. The department that originally admitted a student is referred to as their home department. Newly admitted students with an interest in the chemical physics PhD should consult with both their home departmental advisor and their chemical physics graduate advisor for advice on initial course selection. Advanced students must be in good standing in their home department and able to complete the chemical physics PhD within the time limit set by the Graduate School to declare their intent to work toward the chemical physics PhD. Once they have been accepted by the Graduate Advisor in chemical physics to enroll for candidacy in the PhD program in chemical physics, the graduate advisor will notify the graduate secretary in their home department to have their major code changed to CPHY.

Once a student has declared their intent to work toward a PhD in chemical physics, the preliminary examination shall be conducted by the chemical physics graduate advisor. The exam shall review all completed courses, undergraduate and graduate, related to chemical physics. The student must also earn grades of B or better in at least six credit hours of University of Colorado graduate courses that have been approved for the PhD in chemical physics by the graduate advisor. Students must pass the preliminary examination within two semesters of declaring their intent to work toward a PhD in chemical physics. Students are formally admitted to the chemical physics PhD program when they pass the preliminary examination.

## Courses

### General Requirements

Students must complete a program of formal courses (see "Selection of Formal Courses" below) approved by their PhD thesis advisor and the Committee on Chemical Physics. Students must file an approved degree plan of courses already taken, in progress and planned for future semesters with the Graduate School by the end of their fourth semester. The 30 doctoral dissertation credit hours required by the Graduate School may be completed in either CHEM 8991 or PHYS 8990.

A minimum grade of B# is required in all courses counted for the PhD degree. Students must maintain both a cumulative grade point average of 3.0 in their program of formal courses and an overall grade point average of 3.0.

### Selection of Formal Courses

The chemical physics program makes the distinction between formal and graduate level courses. All students will be required to complete an approved program of formal courses that contains at minimum 6 credit hours of formal coursework. Formal courses are graded based on individual coursework. Many graduate level courses are not considered formal courses in the context of the chemical physics PhD requirements, but may be counted toward Graduate School course requirements. Each student's degree plan for coursework must be approved by the student's PhD thesis advisor and a chemical physics graduate advisor. The formal courses shall be chosen to develop the student's competency in classical mechanics, quantum mechanics, thermodynamics and statistical mechanics, electricity and magnetism, chemical kinetics, and in their area of thesis research.

## Transfer of Credit

Up to 10 credit hours of graduate level, formal coursework may be transferred from another school, subject to demonstrated proficiency in the subject(s), approval by the Chair of the Committee on Chemical Physics, and approval by the Graduate School. Forms for this purpose can be obtained from the graduate program manager.

## Formal Application for Admission to Candidacy for the PhD Degree

All students must make formal application for admission to candidacy for the PhD degree by the fourth semester. The required forms can be obtained from the graduate program manager. This Graduate School requirement should be fulfilled even if the student has not completed all the courses required by their degree plan. To satisfy Graduate School requirements, the degree plan may include graduate-level courses that are not approved as formal courses in chemical physics, but the degree plan must include the student's approved program of formal courses in chemical physics. After filling in the form, indicating graduate courses taken and to be taken, it should be approved and signed by the student's PhD thesis advisor and then by the Chair of the Committee on Chemical Physics.

## Examination Requirements

Each student is required to pass a preliminary examination before admission to the program. Each student in the program is required to pass a comprehensive examination to advance to candidacy. After completing all graduate school and course requirements, the candidate must then submit a dissertation and pass a final dissertation defense to be awarded the PhD in chemical physics.

## Language Requirements

### Foreign Language Requirement

The program does not require proficiency in a foreign language for the PhD degree.

### English Language Proficiency

The English language proficiency required for an advanced degree by the Graduate School will be assessed for each student through written coursework and in the oral portion of the comprehensive examination.

## Advancement to Candidacy

Advancement to candidacy for the PhD in chemical physics requires that the student select a PhD thesis advisor, complete a program of courses approved by the PhD thesis advisor and the Committee on Chemical Physics, write a proposal describing their proposed PhD thesis research, and pass a comprehensive examination covering chemical physics and the proposed thesis research. The oral examination should normally be completed by the end of the second year.

The comprehensive examination shall be conducted by a five member Comprehensive Exam Committee (CEC), according to the rules of the Graduate School. The CEC shall consist of graduate faculty from the Department of Chemistry and the Department of Physics; there must be at least one member from each department. One member of the CEC shall be the student's thesis advisor. The membership of the CEC shall be

selected by the student, but must be approved by the PhD thesis advisor, the graduate advisor and the Graduate School.

In order to attempt the oral examination, the student must demonstrate satisfactory progress toward completing their approved program of courses and submit an application for candidacy to the Graduate School at least two weeks in advance of the scheduled oral examination. Students are responsible for arranging the examination date, time and place with their CEC and should notify the chemical physics program chair and their departmental graduate secretary at least two weeks prior to the scheduled date. The candidate must schedule the exam so that all members of the board are available for a full two hours.

One week in advance of the oral examination, the student should submit a written proposal to their CEC that demonstrates suitability of the project for a PhD thesis, adequate background knowledge of chemical physics, the field of research and the relevant literature. The oral examination will assess the student's competence in the core areas of chemical physics: elementary physics and chemistry, quantum mechanics, chemical kinetics, thermodynamics and statistical mechanics, electricity and magnetism, as well as the student's research plans. The research advisor is strongly encouraged to attend the oral examination, but is recused from final discussion and voting on the outcome. Three (out of four) passing votes are needed for the CEC to approve the written proposal and the oral examination. A pass may be conditional or unconditional.

If the student does not pass the oral examination, the committee may recommend additions to the approved program of courses in chemical physics or that the student complete the MS or PhD program in their home department (note that there is no MS degree program in chemical physics). A student who does not pass has the right to attempt the examination once more after a period of time set by the CEC. Advancement to candidacy occurs when all examination requirements and conditions have been met.

### Annual Progress Review

Students in chemical physics must complete the annual progress review required in the third year and beyond.

### Dissertation Defense

This examination is primarily a defense of the candidate's thesis. The examining committee consists of the student's PhD thesis advisor as chair and four other faculty members, at least three of whom must be from the Department of Chemistry and the Department of Physics, with at least one from each department. These committee members are selected by the program chair upon request by and after consultation with the student and must be approved by the Graduate School two weeks in advance.

The student must arrange for one of these other committee members to be the "second reader" of the thesis. The second reader will carefully review the thesis with the candidate. The student is responsible for arranging the date, time and location for the defense, notifying their home department's graduate program manager in time for the appropriate approvals by the Graduate School, and distributing copies of the dissertation to the committee members at least two weeks before the defense.

Failure to meet this latter deadline is a legitimate reason for any thesis committee member to postpone the dissertation defense. A passing defense requires an affirmative vote from at least four out of five committee members. A student who does not pass has the right to attempt to defend the dissertation once more after a period of time set by the examining committee.

### Dissertation Requirements

A doctoral student writes a dissertation based upon their own original investigation. The dissertation must demonstrate mature scholarship, critical judgment and a familiarity with the tools and methods of research.

- Every dissertation presented in partial fulfillment of the requirements for an advanced degree must represent the equivalent of at least 30 credit hours of work.
- The student is responsible for notifying the Graduate School of the exact title of the dissertation on or before the posted deadlines during the semester in which the doctoral degree is to be conferred.
- The dissertation must comply in mechanical features with the specifications for theses and dissertations available in the Graduate School.
- The dissertation must be submitted electronically before the posted deadline in order to graduate in a given semester. It should be submitted to http://www.etdadmin.com/colorado. (http://www.etdadmin.com/colorado/) A signature page with at least two original signatures must also be turned in to the Graduate School office by the end of the business day on or before the dissertation deadline.
- The final grade is withheld until the dissertation is completed. In progress (IP) grades are assigned during each semester until the defense is successfully completed. The final copy of the dissertation is accepted by the examination committee, at which time the final grade for all dissertation hours is submitted to the Graduate School on a final grade card.

## Learning Outcomes

By the completion of the program, student will be able to:

- Demonstrate familiarity with the core theoretical frameworks utilized within the chemistry subdiscipline (PCHEM/ ANYL/ MN /ORG).
- Effectively engage with undergraduate students.
- Effectively communicate and present research to academic audiences in both written and oral form.
- Design and propose high-quality original research.

# Chemistry - Doctor of Philosophy (PhD)

The Department of Chemistry is internationally recognized for its research and education. As part of a commitment to continuing this tradition of excellence, the department provides a graduate program that integrates opportunities for cutting-edge creative research and study across a wide range of areas, including analytical, atmospheric, astrochemistry, biochemistry, biophysical, chemical physics, environmental, organic, materials and nanoscience, and physical chemistry.

Graduate students enjoy extensive scientific collaboration with chemistry faculty; with other departments, such as Physics, Biochemistry, Molecular, Cellular and Developmental Biology; and with research institutes and agencies, such as the Cooperative Institute for Research in Environmental Sciences (CIRES), Joint Institutes of Laboratory Astrophysics (JILA), the National Oceanic and Atmospheric

Administration (NOAA), Renewable & Sustainable Energy Institute (RASEI), Laboratory for Atmospheric and Space Physics (LASP), and Materials Science and Engineering (MSE).

The coursework for this program is tailored to the individual student's research interests and needs. Although course offerings vary each year, approximately 40 graduate-level courses are offered annually, covering topics of important and contemporary interest in all areas of chemistry. Students are also given the chance to familiarize themselves with faculty research by attending seminars by faculty on their research and research group meetings, and by individual meetings with faculty members.

PhD program students complete a number of other requirements, including a Comprehensive Examination, which consists of a original Research Proposition, an Oral Examination, and a research proposal. Most students graduate with their PhD in approximately five to six years.

# Requirements

## Examination Requirements

Each PhD student is required to satisfy divisional preliminary examinations and pass a series of Comprehensive Examinations to be advanced to candidacy. The candidate must then pass a final thesis defense examination to be awarded the PhD degree. Interdisciplinary students should adhere to specific program requirements.

### Preliminary Examinations

The Graduate School requires that the department administer preliminary examinations in order to "satisfy itself (by examination or other means) that students who signify intent to undertake the PhD degree are qualified to do so." The format of the departmental preliminary examination of each student will be a responsibility of the division that admits them. The preliminary examination will be completed before the end of the second semester of study. Students will be required to follow the format of the preliminary examination of the division that admits them. Students who are uncertain of their division or who are considering an interdivisional major should consult the graduate advisor for advice on the preliminary examination requirement.

### Language Requirements

The Graduate School rules state that "a student who is noticeably deficient in the written and/or oral use of the English language cannot obtain an advanced degree from CU Boulder." The department assesses the English language proficiency of each PhD student in the Oral Comprehensive Examination.

The department does not require proficiency in a foreign language for the PhD degree.

### Comprehensive Examinations

The comprehensive examinations are made up of three parts: a thesis research proposition, an oral examination and evaluation of a research proposal. The oral examination and the research proposition evaluation shall be conducted by a five-member examining board, according to the rules of the Graduate School. One member of this board shall be the student's research advisor, and one member shall be from outside the primary field of study of the student. The membership of this board shall be selected by the Graduate Advisor, in consultation with other faculty members as necessary. The comprehensive examinations are considered passed when the requirements of all parts have been met. Students must be registered during the semester that the comprehensive examinations are considered passed.

#### Research Proposition

At least one week before the oral examination date, students will present a short thesis research proposition (approximately five pages) of their thesis research plan to each committee member. This overview will outline clearly the direction of the student's thesis, will provide the committee with some advance idea of the thesis research area and will describe promising research results (if any). Students might be asked at the time of the exam to describe and defend alternate experimental approaches to their research goals.

#### Oral Comprehensive Examination

Students must take the Oral Comprehensive Examination no later than the end of the fourth semester. Master's degree students in this department who wish to continue for a PhD degree must take the Oral Examination no later than the end of the fifth semester even if they have not completed the master's degree.

This examination will include questioning on (i) the student's research, and (ii) general topics. Students are expected to demonstrate a clear understanding of their thesis research and fundamental knowledge in chemistry, and show the ability to think creatively. Students are strongly advised to spend time reviewing material from chemistry and biochemistry courses they have taken as undergraduates and graduates, since this material is often the subject of questioning during the examination.

The oral examination committee consists of three of the five faculty members appointed to the examining board selected by the Graduate Advisor. The student's research advisor, while a member of the examining board, may not be a member of this committee. The decision of this committee shall be determined by a simple majority of the members. The committee shall determine whether the student is capable of (a) PhD degree work, (b) master's degree work, or (c) no advanced degree work. The committee may require that the student repeat the examination, and/or may require the student to take additional courses. The committee may require that the student complete a thesis master's degree before continuing on to the PhD; in this case the committee will decide if it is necessary for the student to repeat the Oral Comprehensive examination at some time during the completion of the master's degree research. The committee may also require that a student complete a master's degree (thesis or coursework MS), and then leave the graduate program. As described in the Graduate School rules, students who fail the examination have the right to request a second attempt; in this case the student should contact the Graduate Scholastic Committee. Students are responsible for arranging the examination date with their committee and should notify the graduate secretary two weeks prior to the scheduled date.

#### Research Proposal

Each student shall submit a research proposal to the two members of the examination board who were not members of the oral examination committee. The proposal may have been submitted as part of a graduate fellowship application, may be written as a part of any graduate course in the department where written proposals are required, or may be written as a part of a group meeting activity. The proposal must obtain the approval of both the members of the research proposition committee. In the event of a dispute between the two members, the proposal will be referred to the full examination board for a decision.

Upon satisfactory completion of all three examination requirements, the five members of the examination board shall recommend the student for advancement to candidacy for the PhD degree.

### Final Examination

This examination is primarily a defense of the candidate's thesis. The examining committee consists of the student's thesis advisor as chair and four other faculty members, at least one of whom is rostered outside of the department. These committee members are selected by the graduate advisor upon request and after consultation with the student. The student must arrange for one of these other committee members to be the "second reader" of the thesis. The second reader will carefully review the thesis with the candidate. The student is responsible for arranging the date of the examination and notifying the Graduate Program Administrator at least two weeks prior to the date, and is responsible for distributing copies of the dissertation to the committee members — after it has been approved by the thesis advisor — at least two weeks before the examination. Failure to meet this latter deadline is a legitimate reason for any thesis committee member to postpone the examination.

## Course Requirements

### General Requirements

Sixty credit hours of courses are required, consisting of 30 hours of research in CHEM 8991, at least 15 hours in formal courses (see next section), and the remainder in other courses, such as summer courses, seminar courses, group meeting courses and research in CHEM 6901.

A minimum grade of B- is required in all courses counting for the PhD degree; students should also be aware that they must maintain a cumulative grade point average of 3.0 in all formal courses and an overall grade point average of 3.0, or they will be placed on academic probation. Students may also be placed on probation if they are not making satisfactory progress in their research. Probationary status must be removed within two semesters or a student will become ineligible to receive a PhD degree from the Department of Chemistry. Students on probation will not have a high priority for financial support.

A degree plan of courses taken and yet to be taken must be filed with the Graduate School by the end of the student's third semester.

### Selection of Formal Courses

All students will be required to take a minimum of 15 credit hours of formal courses. Formal courses are regularly scheduled, examined and graded; courses such as summer courses, seminar courses, group meeting courses and research in CHEM 6901 are not considered formal courses. Each student's program plan for coursework must be approved by the student's research advisor and the departmental graduate advisor. These formal courses must be approved prior to the end of the second semester, and students are encouraged to complete formal course requirements within their first three semesters.

## Transfer of Credit

Up to 10 credit hours of graduate-level, formal coursework may be transferred from another higher education institution, subject to demonstrated proficiency in the subject(s) and written approval by the graduate advisor. Forms for this purpose can be obtained from the Graduate Program Administrator.

## Formal Application of Admission for Candidacy for the PhD Degree

All students must submit a formal application for admission to candidacy for the PhD degree by the end of the third semester on forms that can be obtained from the Graduate Program Administrator. This Graduate School requirement should be fulfilled even though students have not completed all their formal coursework. After filling in the form indicating graduate courses taken and to be taken, it should be approved and signed by the student's research advisor and then the graduate advisor.

PhD students shall have passed their Cumulative Exams and the Oral Comprehensive Examination before they may be admitted to candidacy for the PhD degree. Students should note that the approved research proposal must be filed in order for a student to be advanced to candidacy.

## Research Requirements

The results of a completed research program are submitted as a thesis for the final examination described above. Some students may pursue their PhD research in a laboratory outside of the department (e.g., JILA, NOAA, etc.) with the approval of the graduate advisor. In this case, the student must find a surrogate advisor in the department who agrees to monitor the activity of the student. It is recommended that meetings between the surrogate advisor, student and day-to-day advisor be frequent, perhaps in the form of a group meeting.

## Time Limit

Students should note the time limit specified in the Graduate School rules: "All doctoral students are expected to complete all degree requirements within six years from the date of the start of coursework in the program." Information on extensions is available in the Doctoral Degree Requirements (p. 1116) section.

# Learning Outcomes

By the completion of the program, student will be able to:

- Demonstrate familiarity with the core theoretical frameworks utilized within the chemistry subdiscipline (PCHEM/ ANYL/ MN /ORG).
- Effectively engage with undergraduate students.
- Effectively communicate and present research to academic audiences in both written and oral form.
- Design and propose high-quality original research.

# Classics

The Department of Classics is home to one of the most vibrant programs at the University of Colorado Boulder. Students at every level in the department are challenged to acquire a set of skills in the analysis and presentation of diverse forms of evidence that stand to serve them in their daily, civic and professional lives.

The field of Classics is *multicultural*; it involves the study of the civilizations of ancient Greece and Rome, but also of the many peoples with whom the Greeks and Romans interacted in central and eastern Europe, north Africa, Egypt and the Middle East.

The field of Classics is *interdisciplinary* because faculty and students in the department cross the boundaries of literature, philosophy, material and visual culture, history and religion to study the world of antiquity. Classics also covers *area studies* because of the broad sweep of the Mediterranean basin and the regions that border it that our field encompasses. The department offers courses in language and literature, ancient history, philosophy, and art and archaeology within several programs of study at the undergraduate and graduate levels.

**Course codes for this program are CLAS, GREK and LATN.**

# Master's Degree

- Classics - Master of Arts (MA) (p. 1220)

# Doctoral Degree

- Classics - Doctor of Philosophy (PhD) (p. 1222)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ambrose, Kirk T. (https://experts.colorado.edu/display/fisid_115914/)
Professor; PhD, University of Michigan Ann Arbor

Atnally, Diane L. (https://experts.colorado.edu/display/fisid_113062/)
Associate Professor Emerita; PhD, University of Michigan Ann Arbor

Bailey, Dominic (https://experts.colorado.edu/display/fisid_145110/)
Associate Professor; PhD, University of Cambridge

Cain, Andrew J. (https://experts.colorado.edu/display/fisid_129296/)
Professor, Chair; PhD, Cornell University

Callier, Reina (https://experts.colorado.edu/display/fisid_156049/)
Instructor; PhD, University of Colorado

Dusinberre, Elspeth Rogers Mcin (https://experts.colorado.edu/display/fisid_111649/)
Professor; PhD, University of Michigan Ann Arbor

Elliott, Jacqueline Michelle (https://experts.colorado.edu/display/fisid_140085/)
Associate Professor; PhD, Columbia University

Gibert, John C. (https://experts.colorado.edu/display/fisid_101680/)
Professor; PhD, Harvard University

Herz, Zachary (https://experts.colorado.edu/display/fisid_165410/)
Assistant Professor; PhD, Columbia University; JD, Yale University

Hunt, Peter (https://experts.colorado.edu/display/fisid_115394/)
Professor; PhD, Stanford University

James, Sarah Anne (https://experts.colorado.edu/display/fisid_151713/)
Associate Professor; PhD, University of Texas at Austin

King, Joy K.
Associate Professor Emerita

Köster, Isabel (https://experts.colorado.edu/display/fisid_157946/)
Assistant Professor; PhD, Harvard University

Lansford, Edwin Tyler (https://experts.colorado.edu/display/fisid_147620/)
Senior Instructor; PhD, University of Washington

Lee, Mi-Kyoung (https://experts.colorado.edu/display/fisid_141821/)
Associate Professor; PhD, Harvard University

Michaelis-Cummings, Laura A. (https://experts.colorado.edu/display/fisid_105599/)
Professor; PhD, University of California, Berkeley

Muller-Sievers, Helmut Heinz (https://experts.colorado.edu/display/fisid_147511/)
Professor; PhD, Stanford University

Nakassis, Dimitri (https://experts.colorado.edu/display/fisid_154917/)
Distinguished Professor; PhD, University of Texas at Austin

Newlands, Carole E. (https://experts.colorado.edu/display/fisid_147504/)
Distinguished Professor; PhD, University of California, Berkeley

Pasnau, Robert (https://experts.colorado.edu/display/fisid_115293/)
Professor; PhD, Cornell University

Reitzammer, Laurialan Blake (https://experts.colorado.edu/display/fisid_145810/)
Associate Professor; PhD, University of California, Berkeley

Rupp, Travis (https://experts.colorado.edu/display/fisid_148747/)
Assistant Teaching Professor; MA, University of Colorado Boulder

Schütrumpf, Eckart E.W.
Professor Emeritus

Trnka-Amrhein, Yvona (https://experts.colorado.edu/display/fisid_159294/)
Assistant Professor; PhD, Harvard University

Tzavella-Evjen, Terpsichori H.
Professor Emerita

# Courses

**CLAS 5021 (3) Athens and Greek Democracy**
Studies Greek history from 800 B.C. (the rise of the city-state) to 323 B.C. (the death of Alexander the Great). Emphasizes the development of democracy in Athens. Readings are in the primary sources.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4021 and HIST 4021
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Ancient History

**CLAS 5031 (3) Alexander the Great and the Rise of Macedonia**
Covers Macedonia's rise to dominance in Greece under Philip II and the reign and conquests of Alexander the Great.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4031 and HIST 4031
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Ancient History

**CLAS 5041 (3) Classical Greek Political Thought**
Studies main representatives of political philosophy in antiquity (Plato, Aristotle, Cicero) and of the most important concepts and values of ancient political thought. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4041 and HIST 4041 and PHIL 4210
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Ancient History

**CLAS 5061 (3) Twilight of Antiquity**
Explores the reasons for the fall of the Roman Empire in the western Mediterranean and its survival in the East as Byzantium. Emphasizes Christianity; barbarians; social, economic and cultural differences; contemporary views of Rome; and modern scholarship. No Greek or Latin is required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4061 and HIST 4061 and HIST 5061
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Ancient History

**CLAS 5071 (3) Seminar in Ancient Social History**
Considers topics ranging from demography, disease, family structure, and the organization of daily life to ancient slavery, economics, and law. Focuses either on Persia, Greece, or Rome and includes a particular emphasis on the methodology required to reconstruct an ancient society, especially the interpretation of problematic literary and material evidence and the selective use of comparisons with better known societies. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4071 and HIST 4071
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Ancient History

**CLAS 5081 (3) The Roman Republic**
Studies the Roman Republic from its foundation in 753 B.C. to its conclusion with the career of Augustus. Emphasizes the development of Roman Republican government. Readings are in the primary sources. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4081 and HIST 4081
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Ancient History

**CLAS 5091 (3) The Roman Empire**
Intense survey of Imperial Rome from the Roman revolution to the passing of centralized political authority in the western Mediterranean. Emphasizes life, letters and personalities of the empire. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4091 and HIST 4091
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Ancient History

**CLAS 5099 (3) Ancient Greek Sculpture**
Understanding that Greek sculpture, like all visual media, was part of the fabric of ancient Greek life and expressed the values of its creators and audience is a valuable way to gain insights into the social, economic, and political world of ancient Greece. This course will examine the work of Greek sculptors from the Archaic to the Hellenistic period. Key stylistic and technical developments, as well as significant works of art, sculptors and workshops will be discussed in detail. Some issues we will consider are the physical, religious and/or socio-historical context of individual freestanding sculptures and how specific sculptural programs illustrate aspects of Greek culture. Iconographic and narrative choices made by artists working in stone, compared to other material, will also be addressed.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4099, ARTH 4099 and ARTH 5099
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5101 (3) Greek and Roman Slavery**
Surveys slavery in ancient Greece and Rome beginning with its growth, economics and political effects, moving to the life experiences of slaves, resistance and revolt, and finishing with the ideology of slavery. Focuses throughout on the challenge of understanding classical slavery on the basis of scattered and biased evidence and on the controversies that have surrounded this topic.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4101 and HIST 4101

**CLAS 5109 (3) Ancient Italian Painting**
Explores the problems, theories and methods for understanding the iconography, styles, topologies, contexts and techniques of fresco wall painting in ancient Italy from the 6th century B.C.E. to the 4th century C.E. Topics covered include Etruscan tomb paintings, late Republican and early imperial fresco paintings from Rome and Campania and later Roman wall paintings, including the painted images in ancient catacombs. Previous coursework on ancient Italy or the history of pre-modern art is highly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4109 and ARTH 4109 and ARTH 5109
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5110 (3) Greek and Roman Epic**
Students read in English translation the major epics of Graeco-Roman antiquity such as the Iliad, Odyssey, Argonautica, Aeneid, and Metamorphoses. Topics discussed may include the nature of classical epic, its relation to the novel, and its legacy. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4110 and HUMN 4110
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Literature, Culture, and Thought

**CLAS 5119 (3) Roman Sculpture**
Examines ancient Roman sculpture, emphasizing the display, iconography, and production of private and public monuments in the Roman Empire. Explores sculpture as evidence for historical developments, societal and gender attitudes, and state ideologies in the ancient Roman world.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4119 and ARTH 4119 and ARTH 5119
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5120 (3) Greek and Roman Tragedy**
Intensive study of selected tragedies of Aeschylus, Sophocles, Euripides and Seneca in English translation. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4120 and HUMN 4120
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Literature, Culture, and Thought

**CLAS 5129 (3) Aegean Art and Archaeology**
Detailed study of the cultures of prehistoric Greece, the Cycladic Islands and Crete, their art and archaeology and their history within the broader context of the eastern Mediterranean, from earliest human settlement to the collapse of the Bronze Age at about 1100 B.C.E. Emphasis is on palace states.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4129 and ANTH 4129 and ANTH 5129 and ARTH 4129
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5130 (3) Greek and Roman Comedy**
Studies Aristophanes, Plautus, and Terence in English translation. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4130 and HUMN 4130
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Literature, Culture, and Thought

**CLAS 5139 (3) Greek Vase Painting**
A comprehensive overview of Greek vase painting, from prehistoric through the fourth century B.C.E. Emphasis is on learning the development of primary decorative styles and on refining skills of visual analysis, scholarly research, critical thinking, oral commentary and written presentation.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4139 and ARTH 4139 and ARTH 5139
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5140 (3) The Greek and Roman Novel**
Studies a number of complete Greek and Roman novels from Classical Antiquity and their predecessors and contemporary neighbors in the genres of Greek prose fiction. Ancient texts in English translation.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4140 and HUMN 4131
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Literature, Culture, and Thought

**CLAS 5149 (3) Greek Cities and Sanctuaries**
Examines Greek architecture in context, from the ninth century B.C.E. into the Hellenistic period, considering the use of space, both in religious and in civic settings and using texts as well as material culture. Emphasis is on developing analytical skills.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4149 and ARTH 4149
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5159 (3) Hellenistic Art and Archaeology**
Examines art and archaeology from the period following the death of Alexander the Great (late fourth century B.C.E.) to the conquest of Greece by the Romans (middle second century B.C.E.).
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 5159
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5169 (3) Topics in Ancient and Classical Art and Archaeology**
In-depth consideration of an aspect of ancient Mediterranean culture. Topics vary and may include ancient wall painting, Greek sculpture, artists and patrons, the ancient Near East, Egyptian art and archaeology, or Etruscan art and archaeology.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4169 and ARTH 4169 and ARTH 5169
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5199 (3) Roman Architecture**
Examines the designs, functions and construction methods of ancient Roman towns, temples, baths, houses and civic structures, as well as utilitarian structures including roads and aqueducts. Emphasizes Roman architectural forms and spaces as vehicles for political propaganda and empire consolidation.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4199 and ARTH 4199
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5209 (6) Classical Archaeological Field Methods**
Offers experiential learning in theories and methods of archaeological fieldwork in the western Argolid in Greece. Applies methods for extensive survey, stratigraphic excavation, GIS modeling, ceramic analysis, numismatic analysis, architectural studies, artifact and data processing and documentation. Offered abroad only.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4209 and ARTH 4209
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CLAS 1509 or ARTH 1509 or CLAS 2049 or ARTH 2049.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5229 (3) Ancient Egyptian Art and Archaeology**
Archaeology of ancient Egypt in light of recent excavations; the history of excavations of the different sites; and the art of ancient Egypt through time. Formerly ANTH 5420.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4229 and ARTH 4229 and ARTH 5229
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5269 (3) Art and Archaeology of the Ancient Near East**
Examines the diverse multicultural civilizations of the Iran-Iraq region and Anatolia from the rise of urbanism in Mesopotamia through the era of the first 'world empire,' Achaemenid Persia. Emphasizes the material record of religious and state institutions of the ancient Near East, especially monuments that illustrate concepts of power and communication. Explores notions of style, symbolism, visual rhetoric, text-image synthesis, patronage, creativity, trade, religion, gender, identity and roles of artists. How do inter-communal relations, cross-cultural exchange, innovation and artistic production, movement and migration, relate to the development and expression of hegemonic power and of empire, and the marginalization of some? What is the role of economics and commerce in these processes? May be repeated twice for credit if the topic is different.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 5269 and CLAS 4269 and ARTH 4269
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology Departmental Category: Asia Content

**CLAS 5761 (3) Roman Law**
Studies the constitutional and legal history of ancient Rome; emphasizes basic legal concepts and comparisons with American law. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4761 and HIST 4761 and HIST 5761
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Ancient History

**CLAS 5840 (1-3) Graduate Independent Study**
No Greek or Latin required.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Literature, Culture, and Thought

**CLAS 6119 (1-3) Graduate Independent Study in Classical Art and Archaeology**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 6952 (1-6) Master's Thesis**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Classical Philology

**CLAS 7011 (3) Seminar in Ancient History**
Examines topics in ancient Greek and Roman history at an advanced seminar level.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Ancient History

**CLAS 7012 (3) Graduate Seminar**
Topic specified in online Schedule Planner.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Classical Philology

**CLAS 7109 (3) Graduate Seminar in Ancient and Classical Art and Archaeology**
Topics vary. Emphasis is on gaining expertise in using archaeological reports in tandem with (or contradiction to) textual sources, on reading and using critical theory, on improving analytical skills and discussion, and on honing discussion leadership abilities.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 7840 (1-3) Graduate Independent Study**
No Greek or Latin required.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Literature, Culture, and Thought

**CLAS 8992 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Additional Information:** Departmental Category: Classical Philology

**GREK 5013 (3) Topics in Greek Prose**
Author or topic in ancient Greek specified in the online Schedule Planner (e.g., Thucydides, Herodotus, Plato, Aristotle, Attic Orators).
**Equivalent - Duplicate Degree Credit Not Granted:** GREK 4013
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Greek

**GREK 5023 (3) Topics in Greek Poetry**
Author or topic in ancient Greek specified in the online Schedule Planner (e.g., Homer, Hesiod, lyric poetry, tragedy, comedy).
**Equivalent - Duplicate Degree Credit Not Granted:** GREK 4023
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Greek

**GREK 5093 (3) Survey of Greek Literature**
Greek literary history in ancient Greek from Homer to the Hellenistic age.
**Equivalent - Duplicate Degree Credit Not Granted:** GREK 4093
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Greek

**GREK 6003 (3) Graduate Reading**
Author or topic specified in the online Schedule Planner.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Greek

**GREK 6843 (1-3) Graduate Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Greek

**GREK 7013 (3) Graduate Seminar in Greek Literature**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Greek

**LATN 5014 (3) Topics in Latin Prose**
Author or topic in Latin specified in the online Schedule Planner (e.g., Roman historians, Roman epistolography, Cicero, Roman novel).
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 4014
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Latin

**LATN 5024 (3) Latin Prose Composition**
Reviews grammar and syntax. Introduces Latin prose style and composition. Formerly CLAS 5024.
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 4024
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Latin

**LATN 5044 (3) Topics in Latin Poetry**
Author or topic specified in Latin specified in the online Schedule Planner (e.g., Roman elegy, Neronian poetry, Lucretius, Roman satire).
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 4044
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Latin

**LATN 5084 (3) Survey of Roman Literature Part 2: Imperial**
Covers Imperial Roman literary history from the mid-late Augustan Period to the start of Late Antiquity. Students read principal surviving works of Imperial Roman poetry and prose in the original Latin.
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 4084
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Latin

**LATN 5094 (3) Survey of Roman Literature Part 1: Republican to Augustan**
Introduces Roman literary history from its origins to the 30s BCE. Students read principal surviving works of the Roman Republican poetry and prose in the original Latin.
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 4094
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Latin

**LATN 5404 (3) Special Project: Teaching**
Trains students to prepare classroom-ready materials, which are then tested in the students' own classroom. Required of master's candidates (teaching of Latin option). Formerly CLAS 5404.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Latin

**LATN 5824 (3) Latin Teaching Methods: Open Topics**
Covers specialized topics in Latin pedagogy specified in the online Schedule Planner.
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 4824
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Latin

**LATN 6004 (3) Graduate Reading**
Author or topic specified in the online Schedule Planner. Formerly CLAS 6004.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Latin

**LATN 6844 (1-3) Graduate Independent Study**
Formerly CLAS 6844.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Latin

**LATN 7014 (3) Graduate Seminar in Latin Literature**
Formerly CLAS 7014.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Latin

# Classics - Master of Arts (MA)

Candidates will choose one of the following five concentrations: (1) Greek, (2) Latin, (3) Classical Art and Archaeology, (4) Classical Antiquity or (5) Teaching of Latin.

It is expected that students opting for the teaching of Latin either have achieved accreditation at the secondary level or are planning to do so through the School of Education. The MA degree alone does not satisfy the state requirements for certification.

For more information, visit the department's Graduate Degrees in Classics (http://www.colorado.edu/classics/graduate/graduate-degrees-classics/) webpage.

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s): Classics - Bachelor of Arts (BA) (p. 241).

# Requirements

The degree requirements listed here are subject to change. Students wishing to pursue graduate work in classics should visit the department website (https://www.colorado.edu/classics/graduate/) for the most up-to-date degree requirements.

Students must complete 30 credit hours of graduate (5000 level or above) coursework, at least 21 of which must be taken at CU Boulder. At least 24 credit hours of coursework must be taken in Classics; courses outside the department must be approved by the Associate Chair for Graduate Studies. Students may earn the MA degree in classics through coursework alone; a thesis is optional.

All graduate students must follow the Graduate School's requirements for graduation (see the Graduation Requirements (http://www.colorado.edu/graduateschool/academics/graduation-requirements/) webpage).

Students will meet with the Associate Chair for Graduate Studies at least twice a year to guarantee that they are on track to meet these requirements.

## Electives

The following is a comprehensive list of classics graduate courses, any of which can serve as electives depending on concentration.

| Code | Title | Credit Hours |
|---|---|---|
| **Greek Language and Literature Courses** | | |
| GREK 5013 | Topics in Greek Prose | 3 |
| GREK 5023 | Topics in Greek Poetry | 3 |
| GREK 5093 | Survey of Greek Literature | 3 |
| GREK 6003 | Graduate Reading | 3 |
| GREK 6843 | Graduate Independent Study | 1-3 |
| GREK 7013 | Graduate Seminar in Greek Literature | 3 |
| **Latin Language and Literature Courses** | | |
| LATN 5014 | Topics in Latin Prose | 3 |
| LATN 5024 | Latin Prose Composition | 3 |
| LATN 5044 | Topics in Latin Poetry | 3 |
| LATN 5084 | Survey of Roman Literature Part 2: Imperial | 3 |
| LATN 5094 | Survey of Roman Literature Part 1: Republican to Augustan | 3 |
| LATN 5824 | Latin Teaching Methods: Open Topics | 3 |
| LATN 6004 | Graduate Reading | 3 |
| LATN 6844 | Graduate Independent Study | 1-3 |
| LATN 7014 | Graduate Seminar in Latin Literature | 3 |
| **Literature and History Courses** | | |
| CLAS 5110 | Greek and Roman Epic | 3 |
| CLAS 5120 | Greek and Roman Tragedy | 3 |
| CLAS 5130 | Greek and Roman Comedy | 3 |
| CLAS 5140 | The Greek and Roman Novel | 3 |
| CLAS 5840 | Graduate Independent Study | 1-3 |
| CLAS 7840 | Graduate Independent Study | 1-3 |
| CLAS 5021 | Athens and Greek Democracy | 3 |
| CLAS 5031 | Alexander the Great and the Rise of Macedonia | 3 |
| CLAS 5041 | Classical Greek Political Thought | 3 |
| CLAS 5061 | Twilight of Antiquity | 3 |
| CLAS 5071 | Seminar in Ancient Social History | 3 |
| CLAS 5081 | The Roman Republic | 3 |

| | | |
|---|---|---|
| CLAS 5091 | The Roman Empire | 3 |
| CLAS 5101 | Greek and Roman Slavery | 3 |
| CLAS 5761 | Roman Law | 3 |
| CLAS 7011 | Seminar in Ancient History | 3 |
| CLAS 7012 | Graduate Seminar | 3 |
| **Archaeology Courses** | | |
| CLAS 5099 | Ancient Greek Sculpture | 3 |
| CLAS 5109 | Ancient Italian Painting | 3 |
| CLAS 5119 | Roman Sculpture | 3 |
| CLAS 5129 | Aegean Art and Archaeology | 3 |
| CLAS 5139 | Greek Vase Painting | 3 |
| CLAS 5149 | Greek Cities and Sanctuaries | 3 |
| CLAS 5159 | Hellenistic Art and Archaeology | 3 |
| CLAS 5169 | Topics in Ancient and Classical Art and Archaeology | 3 |
| CLAS 5199 | Roman Architecture | 3 |
| CLAS 5209 | Classical Archaeological Field Methods | 6 |
| CLAS 5229 | Ancient Egyptian Art and Archaeology | 3 |
| CLAS 5269 | Art and Archaeology of the Ancient Near East | 3 |
| CLAS 6119 | Graduate Independent Study in Classical Art and Archaeology | 1-3 |
| CLAS 7109 | Graduate Seminar in Ancient and Classical Art and Archaeology | 3 |

## Concentrations

Students may earn an MA in classics with a concentration in one of the following options below.

### Greek or Latin

**Plan I**

- A minimum of 30 hours of 5000-level credit or above (including thesis), to be distributed as follows:
  - 18 hours in Greek and/or Latin.
  - 6-9 hours of student's choice (including classes outside of the department, in consultation with the graduate advisor).
  - 4-6 hours of thesis credit.
- *Thesis* (to be completed during 4th semester of graduate study)
- *Comprehensive Examination* (upon submission of thesis): 4 hour written examination, consisting of translation and analysis of texts in the major language. This will be followed by a one-hour oral examination based upon the thesis. The translation examination will consist of two out of three prose passages and two out of three verse passages for a total of c. 100 lines. All passages will be drawn from the relevant (Greek or Latin) MA reading list. Students may fail the exam once.

**Plan II**

For many students Plan II will be more in line with their educational goals. They are encouraged to discuss this option with the ACGS. The requirements differ from Plan I in eliminating the 4-6 thesis hours and requiring instead 21 hours of Greek and/or Latin (5000-level or above) and 9 hours of the student's choice. The written portion of the Comprehensive Examination is the same as in Plan I; the oral portion of the exam covers the range of Greek or Latin literature represented by the reading list and tests the candidate's general knowledge of the primary sources and literary history.

### Classical Antiquity

**Plan I**

- A minimum of 30 hours of 5000-level credit or above (including thesis), to be distributed as follows:
  - 6 hours of Ancient History and/or Classical Archaeology
  - 6 hours of Greek and/or Latin
  - 12-15 hours of student's choice
  - 4-6 hours of thesis credit
- *Thesis* (to be completed during 4th semester of graduate study)
- *Comprehensive Examination* (upon submission of thesis): 3 hours of written examination on two of the following special fields: a) Greek history, b) Roman history, c) Roman art and archaeology, d) Greek art and archaeology, e) Greek religion and mythology, f) Roman religion and mythology, g) philosophy and political theory, h) Greek translation, or i) Latin translation, and one-hour oral examination based upon the thesis. The special field examinations of 90 minutes each are based on reading lists published in the Graduate Handbook and on the department's website. The examination committee serves in an advisory capacity, in addition to setting and grading the written examinations. Students electing Greek or Roman archaeology as a special field must pass a thirty-minute slide identification exam before taking the Comprehensive Examination.

**Plan II**

For many students Plan II will be more in line with their educational goals. They are encouraged to discuss this option with the ACGS. The requirements differ from Plan I in substituting 3-6 additional hours of ancient history or classical archaeology for the 4-6 thesis hours of Plan I. The written portion of the Comprehensive Examination is the same as in Plan I (as above); the oral exam will focus on coursework and the reading lists. Language courses may, with the approval of the Associate Chair for Graduate Studies, be substituted for other courses in fulfilling the requirements for this degree.

### Classical Art and Archaeology

**Plan I**

- A minimum of 30 hours of 5000-level credit or above (including thesis), to be distributed as follows:
  - 6 hours of Greek and/or Latin
  - 15 credit hours of ancient, classical, and/or medieval art and archaeology.
  - 3-6 hours of student's choice
  - 4-6 hours of thesis credit
- *Thesis* (to be completed during 4th semester of graduate study)
- *Slide Identification Exam*: A one-hour slide identification exam must be passed in advance of the Comprehensive Examination.
- *Comprehensive Examination* (upon submission of thesis): Candidates must pass written and oral examinations in the field of Mediterranean archaeology. The three-hour written exam will be based on candidates' coursework and the reading lists. The oral exam will explore further aspects of candidates' understanding of theories, methods and material culture, based primarily on the thesis.

**Plan II**

- For many students Plan II will be more in line with their educational goals. They are encouraged to discuss this option with the ACGS. The requirements differ from Plan I in substituting 3-6 additional hours of ancient, classical, and/or medieval art and archaeology or graduate-level language for the 4-6 thesis hours of Plan I. The Slide Identification Exam and the Comprehensive Examinations are the same as in Plan I (as above), except that the oral examination

focuses on understanding of theories, methods and material culture gained through coursework and the reading lists rather than a thesis.

The faculty strongly recommend that students planning to apply for PhD programs in classical archaeology attain graduate-level proficiency in both Greek and Latin. Language courses may, with the approval of the Associate Chair for Graduate Studies, be substituted for other courses in fulfilling the requirements for this degree.

### Teaching of Latin
**Plan II only**

Note: Students entering the MA in classics with a concentration in the teaching of Latin program who have not yet received teaching certification at the secondary level are encouraged to do so through the School of Education (https://www.colorado.edu/education/). Classes in the program can be taken concurrently with classes in the School of Education. Generally, it takes three years to fulfill the requirements of both qualifications, if they are embarked upon concurrently. The MA in classics alone does not satisfy the state's requirements for certification. Many students elect to pursue certification after completing the degree. Students should contact the Office of Student Services in the School of Education for further information about teaching certification. For information about licensure through the School of Education, see the Secondary Latin Teacher Licensure Program Form (https://www.colorado.edu/classics/sites/default/files/attached-files/pba_edlt_9.27.2016.pdf).

- A minimum of 30 hours of 5000-level credit or above, to be distributed as follows:
  - 12 hours of Latin
  - 3 hours of workshop in Latin Teaching Methods.
  - 3 hours of Roman History
  - 9 hours of student's choice
  - 3 hours of Special Teaching Project covering the planning, teaching, and evaluation of a sequence of approximately 10 to 15 lessons.
- *Special Teaching Project* (to be completed during the 4th semester of graduate study). This may be extended if the student is pursuing teaching certification concurrently.
- *Comprehensive Examination* (upon submission of Special Project): A three hour written Latin translation examination, and a one-hour oral comprehensive examination on teaching methods and the special project.

## Learning Outcomes

By the completion of the program, student will be able to:

- Demonstrate proficiency in core methods, including philological, literary, historical, art historical, and/or archaeological approaches as relevant to their subfield.
- Demonstrate disciplinary skills, including proficiency in Greek and Latin at the appropriate level as well as reading and interpreting a variety of primary texts and/or material/visual evidence with attention to literary, historical, and/or archaeological context.
- Demonstrate skill in interdisciplinary approaches.
- Design and conduct original research.
- Demonstrate the ability to synthesize arguments in academic writing.
- Demonstrate knowledge and expertise in the scholarship relevant to their subfield.
- Communicate their research to academic and/or non-academic audiences.

# Classics - Doctor of Philosophy (PhD)

The PhD in classical languages and literatures is founded on mastery of Greek and Latin, develops the student's ability to pursue independent scholarly research through seminars and advanced work on special topics, and culminates with the dissertation.

Students take courses and seminars on major ancient authors and genres, Greek and/or Latin prose composition and such special topics as literary criticism, epigraphy, paleography and numismatics.

For more information, visit the department's Doctor of Philosophy in Classics (http://www.colorado.edu/classics/graduate/graduate-degrees-classics/phd/) webpage.

## Requirements

Candidates for the PhD in classics must meet the following requirements:

1. A minimum of 42 credit hours of coursework at the 5000 level or above (excluding thesis and accelerated courses). Coursework completed in the MA program at the University of Colorado, or up to 21 credit hours of graduate credit transferred from another institution, may be applied toward this requirement. Courses should be distributed as follows:
   a. Four 7000-level graduate seminars (at least one each in Greek and Latin).
   b. Two courses in ancient history and/or classical archaeology.
   c. One course in either Greek or Latin prose composition.
   d. Two courses in special fields such as epigraphy, law, linguistics, literary theory, medieval studies, palaeography, papyrology, philosophy or religion, as approved by the associate chair for graduate studies.
2. A minimum of 30 credit hours of doctoral dissertation with no more than 10 of these credit hours in any one semester. No more than 10 dissertation credit hours may be taken preceding the semester of taking the oral comprehensive examination. Up to 10 credit hours may be taken during the semester in which the student passes the comprehensive examination.
3. A reading knowledge of German and one other modern foreign language (normally Italian or French). Proficiency is tested by a one-hour written translation test using a dictionary. Students may take a foreign language exam at any time by arrangement with the associate chair for graduate studies. Students are encouraged to pass both modern language exams before the end of the second semester in the PhD program.
4. **Preliminary Examinations in Greek and Latin.** Two written examinations of four hours each, each consisting of translation and analysis of texts. The translation portion of each exam will consist of two out of three prose passages and two out of three verse passages for a total of about 100 lines. All passages will be drawn from the PhD reading list. Each written examination will be followed by a one-hour oral examination that covers the range of Greek or Latin literature represented by the reading list and tests the candidate's general knowledge of the primary sources and literary history. There will be two administrations of each exam per year, in the fall and spring. Students are encouraged to pass both exams by the end of the second semester in the PhD program (or the second semester beyond the MA).

5. **Comprehensive Examination.** Two written examinations of three hours each on two topics or authors, chosen in consultation with faculty members selected by the student and approved by the graduate committee, to be chosen from the following broad areas: language and literature, ancient history, archaeology, philosophy or religion. In selecting the topics for these examinations, students are required to demonstrate balance in the fields of Greek and Roman culture, as determined by the graduate committee. The written comprehensive examinations will be administered twice per year, typically during the last two weeks of the term. Successful completion of the written examination is followed by a two-hour oral exam on Greek and Roman culture within the area of the student's chosen specialization, which should coincide with the student's intended dissertation topic. Students are encouraged to complete these exams by the end of their fourth semester in the PhD program.
6. **Dissertation Prospectus.** To be approved as described in the PhD requirements, preferably by the end of the fifth semester in the PhD program.
7. **Dissertation.** To be completed by the end of the tenth semester in the PhD program.
8. **Final Examination (upon submission of dissertation).** Two hours of oral defense of the dissertation.

## Classics Graduate Courses

The following is a comprehensive list of classics graduate courses which may be used to meet the requirements for the PhD in classics.

| Code | Title | Credit Hours |
|---|---|---|
| **Greek Language and Literature Courses** | | |
| GREK 5013 | Topics in Greek Prose | 3 |
| GREK 5023 | Topics in Greek Poetry | 3 |
| GREK 5093 | Survey of Greek Literature | 3 |
| GREK 6003 | Graduate Reading | 3 |
| GREK 6843 | Graduate Independent Study | 1-3 |
| GREK 7013 | Graduate Seminar in Greek Literature | 3 |
| **Latin Language and Literature Courses** | | |
| LATN 5014 | Topics in Latin Prose | 3 |
| LATN 5024 | Latin Prose Composition | 3 |
| LATN 5044 | Topics in Latin Poetry | 3 |
| LATN 5084 | Survey of Roman Literature Part 2: Imperial | 3 |
| LATN 5094 | Survey of Roman Literature Part 1: Republican to Augustan | 3 |
| LATN 5824 | Latin Teaching Methods: Open Topics | 3 |
| LATN 6004 | Graduate Reading | 3 |
| LATN 6844 | Graduate Independent Study | 1-3 |
| LATN 7014 | Graduate Seminar in Latin Literature | 3 |
| **Literature and History Courses** | | |
| CLAS 5110 | Greek and Roman Epic | 3 |
| CLAS 5120 | Greek and Roman Tragedy | 3 |
| CLAS 5130 | Greek and Roman Comedy | 3 |
| CLAS 5140 | The Greek and Roman Novel | 3 |
| CLAS 5840 | Graduate Independent Study | 1-3 |
| CLAS 7840 | Graduate Independent Study | 1-3 |
| CLAS 5021 | Athens and Greek Democracy | 3 |
| CLAS 5031 | Alexander the Great and the Rise of Macedonia | 3 |
| CLAS 5041 | Classical Greek Political Thought | 3 |
| CLAS 5061 | Twilight of Antiquity | 3 |
| CLAS 5071 | Seminar in Ancient Social History | 3 |
| CLAS 5081 | The Roman Republic | 3 |
| CLAS 5091 | The Roman Empire | 3 |
| CLAS 5101 | Greek and Roman Slavery | 3 |
| CLAS 5761 | Roman Law | 3 |
| CLAS 7011 | Seminar in Ancient History | 3 |
| CLAS 7012 | Graduate Seminar | 3 |
| **Archaeology Courses** | | |
| CLAS 5099 | Ancient Greek Sculpture | 3 |
| CLAS 5109 | Ancient Italian Painting | 3 |
| CLAS 5119 | Roman Sculpture | 3 |
| CLAS 5129 | Aegean Art and Archaeology | 3 |
| CLAS 5139 | Greek Vase Painting | 3 |
| CLAS 5149 | Greek Cities and Sanctuaries | 3 |
| CLAS 5159 | Hellenistic Art and Archaeology | 3 |
| CLAS 5169 | Topics in Ancient and Classical Art and Archaeology | 3 |
| CLAS 5199 | Roman Architecture | 3 |
| CLAS 5209 | Classical Archaeological Field Methods | 6 |
| CLAS 5229 | Ancient Egyptian Art and Archaeology | 3 |
| CLAS 5269 | Art and Archaeology of the Ancient Near East | 3 |
| CLAS 6119 | Graduate Independent Study in Classical Art and Archaeology | 1-3 |
| CLAS 7109 | Graduate Seminar in Ancient and Classical Art and Archaeology | 3 |

# Learning Outcomes

By the completion of the program, student will be able to:

- Demonstrate proficiency in core methods, including philological, literary, historical, art historical and/or archaeological approaches as relevant to their subfield.
- Demonstrate disciplinary skills, including proficiency in Greek and Latin at the appropriate level as well as reading and interpreting a variety of primary texts and/or material/visual evidence with attention to literary, historical and/or archaeological context.
- Demonstrate skill in interdisciplinary approaches.
- Design and conduct original research.
- Demonstrate the ability to synthesize arguments in academic writing.
- Demonstrate knowledge and expertise in the scholarship relevant to their subfield.
- Communicate their research to academic and/or non-academic audiences.

# Cognitive Science

Cognitive Science is the study of human knowledge, of which one aspect is the study of how knowledge is acquired, stored, and represented in the mind, including the mind's underlying biological mechanisms. Another aspect of Cognitive Science concerns how knowledge is understood, remembered, communicated, and used in the performance of activities,

including the acquisition and application of skills and information. This latter aspect provides the practical applications of cognitive science, and thereby ensures a demand for graduates in both academic and industrial markets. Training for graduates in cognitive science prepares students admirably for many of the fields that are targeted as the major growth fields of the 21st century: telecommunications, information processing, medical analysis, data retrieval, education and multimedia services.

The Institute of Cognitive Science (ICS) currently offers two graduate certificate programs: one has a general science focus, the other focuses on human language technology. The cognitive science academic certificate programs are interdisciplinary programs for graduate students in the following departments (see the undergraduate Cognitive Science (p. 242) page for certification at the undergraduate level):

- Psychology & Neuroscience
- Philosophy
- Linguistics
- Education
- Speech, Language and Hearing Sciences
- Computer Science
- Architecture, Planning and Design (Denver Campus)
- Information Science
- Integrative Physiology

For more information, visit the Institute of Cognitive Science (https://www.colorado.edu/ics/graduate-programs/) website or call Alba Tuninetti at 303-735-3602.

## Doctoral Degree

- Cognitive Science - Doctor of Philosophy (PhD) (p. 1224)

## Certificates

- Cognitive Science - Graduate Certificate (p. 1329)
- Human Language Technology - Graduate Certificate (p. 1331)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Banich, Marie (https://experts.colorado.edu/display/fisid_120646/)
Professor; PhD, University of Chicago

Bidwell, Cinnamon (https://experts.colorado.edu/display/fisid_155117/)
Assistant Professor; PhD, University of Colorado Boulder

Carter Carston, Ronald McKell (https://experts.colorado.edu/display/fisid_154921/)
Assistant Professor; PhD, California Institute of Technology

Cordes, Dietmar (https://experts.colorado.edu/display/fisid_155229/)
Associate Professor Adjunct

D'Mello, Sidney (https://experts.colorado.edu/display/fisid_159117/)
Professor; PhD, University of Memphis

Kim, Albert E. (https://experts.colorado.edu/display/fisid_143740/)
Associate Professor; PhD, University of Pennsylvania

Martin, James H. (https://experts.colorado.edu/display/fisid_100495/)
Professor; PhD, University of California, Berkeley

Mozer, Michael C. (https://experts.colorado.edu/display/fisid_105922/)
Professor; PhD, University of California, San Diego

Penuel, William Richard (https://experts.colorado.edu/display/fisid_149719/)
Distinguished Professor; PhD, Clark University

Sumner, Tamara (https://experts.colorado.edu/display/fisid_105742/)
Professor, Institute Director; PhD, University of Colorado Boulder

Van Vuuren, Sarel (https://experts.colorado.edu/display/fisid_124159/)
Associate Research Professor; PhD, Oregon Graduate Institute of Science Technology

Ward, Wayne Hinson (https://experts.colorado.edu/display/fisid_114680/)
Research Professor; PhD, University of Colorado Boulder

Yaeger, Barbara Jean
Assistant Research Professor; PhD, Oakland University

# Cognitive Science - Doctor of Philosophy (PhD)

*The doctoral program in cognitive science is a second major that students earn in conjunction with a PhD in another discipline offered by a participating department.*

The Institute of Cognitive Science Academic Program includes a combined PhD degree between cognitive science and a core discipline, as well as a combined PhD plan of study tailored for students interested in cognitive neuroscience. These programs are administered by CU Boulder's Institute of Cognitive Science (ICS).

Graduate students in cognitive science are admitted to graduate programs in participating departments that have ICS faculty, and must meet the requirements for admission and degree completion in their home department.

Students wishing to attain a degree or certificate in cognitive science must formally apply to the director of academic programs of ICS. To be admitted, they must be a student affiliate of ICS, which requires being a graduate student in good standing in a member department, and they must be sponsored by an ICS faculty fellow. Students who enter the Graduate School without a master's degree may be admitted to the program upon completion of their first year of study; students with a master's degree may be admitted during their first year.

The degree and certificate programs in cognitive science require students to demonstrate acceptable performance in interdisciplinary coursework and courses outside their home department. The courses must be offered by the following departments: Computer Science; Education; Integrative Physiology; Linguistics; Philosophy; Information Science; Psychology and Neuroscience; Speech, Language, Hearing Sciences; Architecture and Planning; or a department in which there is an ICS faculty fellow.

Details about requirements for the degree and certificate programs can be obtained through the director of academic programs for ICS or by contacting the ICS main office.

# Requirements

## Combined PhD Requirements

Students must complete 30 credit hours of cognitive science courses, including 9 credit hours of required core courses and 21 credit hours of elective courses.

For more program information, visit the institute's Cognitive Science Combined PhD (http://www.colorado.edu/ics/graduate-programs/cognitive-science-combined-phd/) webpage.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Core Cognitive Science Courses** | | |
| PSYC 6200/ CSCI 6402/ EDUC 6504/ LING 6200/ PHIL 6310 | Issues and Methods in Cognitive Science | 3 |
| PSYC/LING 7775/CSCI 7772/ EDUC 7775/SLHS 7775/PHIL 7810 | Topics in Cognitive Science (two semesters, 1 credit per semester) | 2 |
| PSYC 7415/ CSCI 7412/ EDUC 6506/ LING 7415/PHIL 7415 | Cognitive Science Research Applications Seminar 1 | 2 |
| PSYC 7425/ CSCI 7422/ EDUC 6516/ LING 7425/PHIL 7425 | Cognitive Science Research Applications Seminar 2 | 2 |
| **Elective Cognitive Science Courses** | | |
| Twelve credit hours of courses outside the home department, including courses in at least two different departments outside the home department. Each course must be at least 2 credits. | | 12 |
| Two interdisciplinary courses from the list of ICS-approved interdisciplinary courses during the semester the course was taken. | | 6 |
| Additional elective courses to complete the 30-credit-hour requirement. | | 3 |
| **Total Credit Hours** | | **30** |

For a list of available elective courses, visit the institute's Course Catalog (http://www.colorado.edu/ics/graduate-programs/course-catalog/) webpage.

### Interdisciplinary Thesis

The original contributions of the dissertation research should exploit state-of-the-art methods from the perspective of at least two disciplines. Students are encouraged to have their doctoral research co-supervised by two ICS fellows representing different disciplines.

### Dissertation

Students must complete 30 hours of dissertation research.

## Triple PhD Requirements

Students must complete 28–34 credit hours, including 11–14 credit hours of required core courses, 6–9 credit hours of depth courses and at least 11 credit hours of courses in a related discipline specialization. For a list of specific available courses, visit the institute's Course Catalog (http://www.colorado.edu/ics/graduate-programs/course-catalog/) webpage.

For more information, visit the institute's Cognitive Neuroscience Combined PhD (http://www.colorado.edu/ics/graduate-programs/cognitive-neuroscience-combined-phd/) webpage.

### Comprehensive Examination

In accordance with the graduate school requirements, students will be required to take a comprehensive exam, which they must pass in order to advance to doctoral candidacy status. Successful completion (grade of B- or better) of the Introduction to Neuroscience I (NRSC 5100) and Introduction to Neuroscience II (NRSC 5110) courses will fulfill the neuroscience component of the comprehensive exam.

In addition, the student must pass a comprehensive exam in their area of specialization. The format of this specialty comprehensive exam will be determined by the student's advisor and will be appropriate for the advisor's department/program of affiliation, but must also be interdisciplinary in nature to fulfill the cognitive science component of the comprehensive exam.

### Thesis

All cognitive neuroscience PhD students will be required to complete a doctoral thesis with a primary cognitive neuroscience focus. The thesis/dissertation will represent original state-of-the art research of quality suitable for publication in a reputable scientific journal. The student's thesis advisor must be a participating faculty member of the cognitive neuroscience faculty. In addition, the student's thesis committee must include at least one additional neuroscience faculty member and one cognitive science faculty member from outside the student's area of specialization. In accordance with the requirements of the Graduate School, the student's committee must be comprised of a minimum of five faculty members that have graduate faculty appointments. The committee will be formed by the student's advisor, upon approval of the slate of members by the academic directors of the neuroscience and cognitive science combined PhD programs.

# Learning Outcomes

By the completion of the program, student will be able to:

# Dual Degree Program

## Cognitive Science Combined PhD

Graduate students in good standing in one of the following participating academic units may apply to earn a combined PhD with cognitive science:

- Psychology and Neuroscience
- Philosophy
- Computer Science
- Linguistics
- Speech, Language, and Hearing Sciences
- Education
- Integrative Physiology
- Architecture and Planning
- Information Science

Earning such a degree can significantly enhance a student's academic knowledge and career choices. Review the course requirements,

application for admission and program completion checklist for further information.

For more information, visit the institute's Cognitive Science Combined PhD (http://www.colorado.edu/ics/graduate-programs/cognitive-science-combined-phd/) webpage.

# Triple Degree Program

## Cognitive Neuroscience Combined PhD

Graduate students in good standing in one of the following participating academic units may apply to earn a combined PhD with cognitive science, neuroscience and their core discipline:

- Psychology and Neuroscience
- Philosophy
- Computer Science
- Linguistics
- Speech, Language and Hearing Sciences
- Education
- Architecture and Planning

Students interested in the combined PhD with cognitive science and neuroscience must meet course and thesis requirements. The student's thesis advisor must be a participating faculty member of the cognitive neuroscience faculty. To enroll in this triple degree, you must enroll in the neuroscience program and the cognitive science program.

For more information, visit the institute's Cognitive Neuroscience Combined PhD (http://www.colorado.edu/ics/graduate-programs/cognitive-neuroscience-combined-phd/) webpage.

# Ecology and Evolutionary Biology

The EBIO graduate program provides advanced training in a wide variety of biological disciplines ranging from biogeochemistry to community ecology to evolutionary genetics. The goal of the EBIO graduate program is to produce scientists, educators and citizens who are equipped with skills to build careers that advance knowledge about life on Earth. Graduates of the EBIO program are well-positioned to pursue a wide range of careers that include academia, science education, wildlife biology, conservation biology, resource management, environmental consulting and environmental law.

Our disciplinary strengths include behavior, ecology, genetics, morphology and systematics. Roughly half of the faculty focus on the adaptation and functioning of organisms in the context of environment, while the other half study higher levels of organization, including populations, communities and ecosystems. Our research programs have relevance for global change, conservation biology, and revealing fundamental mechanisms underlying the structural and functional adaptations of organisms.

Please contact ebiograd@colorado.edu for additional information.

**Course code for this program is EBIO.**

# Master's Degree

- Ecology and Evolutionary Biology - Master of Arts (MA) (p. 1231)

# Doctoral Degree

- Ecology and Evolutionary Biology - Doctor of Philosophy (PhD) (p. 1232)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Adams, William (https://experts.colorado.edu/display/fisid_103612/)
Professor; PhD, Australian National University

Armstrong, David M.
Professor Emeritus

Barger, Nichole Nannette (https://experts.colorado.edu/display/fisid_131398/)
Associate Professor, Associate Chair; PhD, Colorado State University

Basey, John M. (https://experts.colorado.edu/display/fisid_105539/)
Senior Instructor; PhD, University of Nevada, Reno

Bekoff, Marc
Professor Emeritus

Bilinski, Teresa (https://experts.colorado.edu/display/fisid_166076/)
Instructor; PhD, University of Colorado Boulder

Bock, Carl L.E. (https://experts.colorado.edu/display/fisid_105580/)
Professor Emeritus; PhD, University of California-Berkeley

Bock, Jane H. (https://experts.colorado.edu/display/fisid_101979/)
Professor Emerita; PhD, University of California-Berkeley

Bonde, Erik K.
Professor Emeritus

Bowers, M. Deane
Professor, Chair; PhD, University of Massachusetts Amherst

Bowman, William D. (https://experts.colorado.edu/display/fisid_105191/)
Associate Chair, Professor; PhD, Duke University

Breed, Michael D. (https://experts.colorado.edu/display/fisid_103631/)
Professor; PhD, University of Kansas

Buchwald, Robert (https://experts.colorado.edu/display/fisid_148439/)
Instructor; PhD, University of Colorado Boulder

Carpenter, J. Harrison (https://experts.colorado.edu/display/fisid_115915/)
Senior Instructor; MS, Michigan Technological University

Clauset, Aaron (https://experts.colorado.edu/display/fisid_147554/)
Associate Professor; PhD, University of New Mexico

Corwin, Lisa A. (https://experts.colorado.edu/display/fisid_157940/)
Assistant Professor; PhD, University of California, Davis

Crumpacker, David W.
Professor Emeritus

Cundiff, Milford F. (https://experts.colorado.edu/display/fisid_105396/)
Associate Professor Emeritus; PhD, University of Colorado Boulder

Davies, Kendi F. (https://experts.colorado.edu/display/fisid_142304/)
Associate Professor; PhD, Australian National Univ (Australia)

Dee, Laura (https://experts.colorado.edu/display/fisid_166130/)
Assistant Professor; PhD, University of California, Santa Barbara

Demmig-Adams, Barbara (https://experts.colorado.edu/display/fisid_105649/)
Professor; Dr habil, University of Wurzburg (Germany)

Emery, Nancy Christine (https://experts.colorado.edu/display/fisid_156291/)
Assistant Professor; PhD, University of California, Davis

Evans, Luke M. (https://experts.colorado.edu/display/fisid_156753/)
Assistant Professor; PhD, Northern Arizona University

Fierer, Noah (https://experts.colorado.edu/display/fisid_142240/)
Professor; PhD, University of California, Santa Barbara

Flaxman, Samuel M. (https://experts.colorado.edu/display/fisid_145698/)
Associate Professor; PhD, Cornell University

Johnson, Pieter T.J. (https://experts.colorado.edu/display/fisid_143590/)
Professor; PhD, University of Wisconsin–Madison

Kane, Nolan Coburn (https://experts.colorado.edu/display/fisid_151238/)
Associate Professor; PhD, Indiana University Bloomington

Kelly, Caitlin (https://experts.colorado.edu/display/fisid_155528/)
Instructor; PhD, University of Colorado Boulder

Kociolek, John Patrick (https://experts.colorado.edu/display/fisid_145728/)
Professor; PhD, University of Michigan

Lewis, William M. Jr. (https://experts.colorado.edu/display/fisid_102314/)
Professor; PhD, Indiana University Bloomington

Li, Jingchun (https://experts.colorado.edu/display/fisid_157561/)
Assistant Professor; PhD, University of Michigan

Linhart, Yan B.
Professor Emeritus

Lynch, Carol B.
Professor Emeritus

Martin, Andrew (https://experts.colorado.edu/display/fisid_113238/)
Professor, Chair; PhD, University of Hawaii at Manoa

Mayer, Stephanie Susan (https://experts.colorado.edu/display/fisid_114948/)
Senior Instructor; PhD, University of California, Berkeley

McAdam, Andrew Graham (https://experts.colorado.edu/display/fisid_166624/)
Associate Professor; PhD, University of Alberta (Canada)

McCain, Christy (https://experts.colorado.edu/display/fisid_145010/)
Associate Professor; PhD, University of Kansas

McKenzie, Valerie J. (https://experts.colorado.edu/display/fisid_142951/)
Associate Professor, Associate Chair; PhD, University of California, Santa Barbara

Medeiros, Daniel Meulemans (https://experts.colorado.edu/display/fisid_145697/)
Associate Professor; PhD, California Institute of Technology

Melbourne, Brett Andrew (https://experts.colorado.edu/display/fisid_144966/)
Associate Professor; PhD, Australian National University

Mitton, Jeffry B. (https://experts.colorado.edu/display/fisid_101058/)
Professor; PhD, SUNY at Stony Brook

Monson, Russell K.
Professor Emeritus

Nichols, Harvey
Professor Emeritus

Quandt, Catherine Alisha (https://experts.colorado.edu/display/fisid_159414/)
Assistant Professor; PhD, Oregon State University

Resasco, Julian (https://experts.colorado.edu/display/fisid_153799/)
Assistant Professor; PhD, University of Florida

Safran, Rebecca J. (https://experts.colorado.edu/display/fisid_145518/)
Professor; PhD, Cornell University

Schmidt, Steve (https://experts.colorado.edu/display/fisid_103713/)
Professor; PhD, Cornell University

Seastedt, Timothy
Professor, Associate Chair; PhD, University of Georgia

Smith, Stacey Dewitt (https://experts.colorado.edu/display/fisid_153407/)
Associate Professor; PhD, University of Wisconsin–Madison

Stock, David W. (https://experts.colorado.edu/display/fisid_113762/)
Associate Professor; PhD, University of Illinois at Urbana–Champaign

Suding, Katharine Nash (https://experts.colorado.edu/display/fisid_116718/)
Distinguished Professor; PhD, University of Michigan Ann Arbor

Sweeney, Derek Michael (https://experts.colorado.edu/display/fisid_131083/)
Instructor; MA, University of Colorado Boulder

Taylor, Scott (https://experts.colorado.edu/display/fisid_156318/)
Assistant Professor; PhD, Queen's University (Canada)

Tripp, Erin Anne (https://experts.colorado.edu/display/fisid_152313/)
Associate Professor; PhD, Duke University

Turetsky, Merritt (https://experts.colorado.edu/display/fisid_165975/)
Professor; PhD, University of Alberta (Canada)

Wessman, Carol A. (https://experts.colorado.edu/display/fisid_100909/)
Professor Emerita; PhD, University of Wisconsin–Madison

Windell, John T.
Professor Emeritus

Winston, Paul W.
Professor Emeritus

# Courses

**EBIO 5000 (1) EBIO Colloquia**
All first year EBIO graduate students are required to attend the EBIO Colloquia Series. Speakers from around the world and within the department cover topics in all areas of biology.
**Grading Basis:** Letter Grade

**EBIO 5030 (3) Limnology**
Examines the ecology of inland waters, including a detailed consideration of physical, chemical and biological properties of freshwater ecosystems: origins and major characteristics of lakes and streams, survey of chemical and nutrient cycles in freshwater habitats and survey of biotic composition of freshwater environments. Important themes in modern freshwater ecology are considered, including energy flow, trophic structure, eutrophication and management of freshwater ecosystems.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4030
**Requisites:** Restricted to graduate students only.

**EBIO 5040 (3) Speciation**
The process by which new species arise is fundamental to understanding life¿s diversity, with implications for how we define and protect species. In this class, we will explore models of adaptive and non-adaptive speciation and how we test, find evidence for, and distinguish among these. Each class will include both a short lecture and discussion. Students will be able to choose and work on independent projects on any area of speciation research.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4040
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites EBIO 1220 and EBIO 3080.

**EBIO 5050 (4) Fish Biology**
Explores the tremendous diversity of this group, which includes eyeless catfish named after Satan and cast out of underground aquifers by artesian wells, loaches that cling to rocks in mountain torrents with fin-derived suction cups, lungfish in mud cocoons that metabolize their own muscles while waiting for the rains to return, degenerate male anglerfish that parasitize their mates in the blackness of ocean depths, and flying fish that glide above the surface of the open sea to escape the slashing bills of sailfish below. Lectures will cover form and function, evolution, the fossil record, reproduction and development, genetics, behavior, ecology, distribution, and conservation of fishes. The laboratory will stress fish identification, anatomy, and development.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4050
**Requisites:** Restricted to graduate students only.

**EBIO 5060 (3) Landscape Ecology**
Studies distributional patterns of communities and ecosystems, ecological processes that affect those patterns, and changes in pattern and process over time. Consideration of spatial and temporal scales in ecological analyses is required to understand and predict response to broad-scale environmental change.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4060
**Requisites:** Restricted to graduate students only.

**EBIO 5080 (4) Freshwater Phycology**
Algae are a non-monophyletic group of organisms that play critical roles in ecosystem structure and function. They have a long history of being used in a variety of ways by the human species, but are increasingly being applied to modern issues of understanding water quality and climate change, engineering at the nano scale and in the production of renewable biofuels.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4080
**Requisites:** Restricted to graduate students only.

**EBIO 5100 (3) Advanced Ecology**
Emphasizes specific aspects of ecology based on specialties of faculty. One or more courses are offered most semesters. Topics have included dynamics of mountain ecosystems, tundra ecology, ethnoecology, population dynamics, tropical and insular biology, ecology of fishes, quantitative plant ecology, and arctic and alpine environments. May use animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4100
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EBIO 5120 (2-4) Advanced Ecology**
Emphasizes specific aspects of ecology based on specialties of faculty. One or more courses are offered most semesters. Topics have included dynamics of mountain ecosystems, tundra ecology, ethnoecology, population dynamics, tropical and insular biology, ecology of fishes, quantitative plant ecology and arctic and alpine environments. May use animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4120
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**EBIO 5150 (1-2) Techniques in Ecology**
Emphasizes application of modern ecological techniques, such as stream biology, aquatic biology, environmental measurement and control, and techniques in geoecology.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4150
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**EBIO 5155 (4) Ecosystem Ecology**
Integrates information from physics (energetics), chemistry (element properties) and biology (evolutionary traits, photosynthetic pathways) to understand the structure and functioning of ecosystems. Provides an analysis of biotic community responses and feedbacks to environmental change drivers. Strong focus on water, nutrient cycling and carbon dynamics of diverse terrestrial and aquatic landscapes.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4155, ENVS 5155 and ENVS 4155
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**EBIO 5190 (1) Diversity and Inclusion**
Topics have included: implicit bias, privilege, inclusive pedagogy, inclusive hiring practices, inclusive mentoring, barriers facing undergraduate students, barriers facing graduate students, fairness of the GRE.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**EBIO 5240 (3) Advanced Topics in Animal Behavior**
Covers special areas of ethology such as sociobiology, animal communication, cognitive ethology, human ethology, moral and ethical issues.
**Recommended:** Prerequisite EBIO 3240.

**EBIO 5270 (3) Population Genetics**
Provides an in-depth introduction to population genetics. Lectures, discussions and labs will focus on exploring how evolutionary processes shape genetic variation through time and space and how population-level evolutionary processes can be inferred from patterns of genetic variation. While learning basic population genetic theory we will investigate current topics in the field and work with simulated and real data.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4270
**Grading Basis:** Letter Grade

**EBIO 5290 (4) Phylogenetics and Comparative Biology**
Reviews the principles and methodology of phylogenetic inference using molecular data. Emphasizes the application of comparative approaches to hypothesis testing in evolution, ecology and medicine and provides a broad foundation in both theory and practice of phylogenetics.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4290
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**EBIO 5320 (3) Current Topics in Evolutionary Biology**
Examines six major themes on contemporary evolutionary research: population genetics, natural selection and adaptation, molecular evolution, evolution and development, phylogenetic systematics, and macroevolution. Emphasizes recent primary literature and sophisticated mastery.
**Requisites:** Restricted to graduate students only.

**EBIO 5340 (4) Conservation Biology and Practice in Brazil's Atlantic Forest**
Field Studies. Examines the application of conservation principles in the Atlantic Forest of Brazil, a 'biodiversity-in-crisis' setting. Explores successful conservation strategies integrated with efforts to alleviate socioeconomic issues. Three-week Maymester, Study Abroad Global Seminar.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4340 and ENVS 4340 and ENVS 5340
**Recommended:** Prerequisite EBIO 2040 or ENVS 2000 or 2000/higher-level course in ANTH, EBIO, ENVS, EVEN, GEOG, IAFS or other discipline related to ecology or sustainability.
**Grading Basis:** Letter Grade

**EBIO 5360 (3) Lifestyle Medicine**
Student will self-select a semester-long personalized project for researching and learning about a topic they are passionate about in the context of the impact of environment and lifestyle on human health and wellbeing. Students will have continuous access to one-on-one instructor support and feedback, and credit will be given for completion of specific milestones throughout the semester.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4360

**EBIO 5370 (3) Genetically Engineered Organisms**
Explores the genetic engineering of microorganisms, fungi, plants, animals, coral reefs, and humans from the many demonstrated and anticipated benefits to the various concerns that have been raised by the explosive growth of research in this area. The course will be largely student-driven, in that each student will pursue different areas to research and present to the class. Students are encouraged to pursue a topic about which an interest and/or passion can be developed! Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4370

**EBIO 5410 (4) Biological Statistics**
Lect. and lab. Offers a demanding, problems-oriented methods course in statistical inference procedures, assumptions, limitations, and applications emphasizing techniques appropriate to realistic biological problems. Includes data file management using interactive computing techniques.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4410
**Requisites:** Restricted to graduate students only.

**EBIO 5420 (3) Computational Biology**
Covers a wide range of techniques for simulating biological systems, developing computer programs and scripts to interact with data and making research shareable and reproducible.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4420
**Grading Basis:** Letter Grade

**EBIO 5440 (4) Animal Developmental Diversity**
Surveys development in a range of vertebrate and invertebrate systems to reconstruct the common bilatorian ancestor, and elucidate the developmental genetic changes underlying animal diversification. Lab focuses on vertebrate embryos and explores key methods in evolutionary developmental biology including in situ hybridization, embryo microinjection, and transgenesis.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4440 and MCDB 4441 and MCDB 5441
**Requisites:** Restricted to graduate students only.

**EBIO 5460 (1-5) Special Topics**
Familiarizes students with specialized areas of biology.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4460
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EBIO 5500 (4) Plant Biodiversity and Evolution**
Surveys plant types emphasizing diagnostic features of plants in general and major taxa in particular. Focuses on identity, morphology, anatomy, reproduction, ecology, geography, evolution, fossil record, and economic use of taxa.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4500

**EBIO 5510 (4) Plant Anatomy and Development**
Lect. and lab. Introduces structures of seed plants, especially angiosperms, and developmental history of these structures. Studies cell types, and their location and function in plant tissues and organs. The laboratory provides an opportunity to examine plant tissues and to prepare tissues for examination by the light microscope. Stresses role of plant structures in the living plant.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4510

**EBIO 5511 (3) Microbial Ecology**
Aims to gain an understanding of the critical roles that microbes play in the biosphere, and why they play those roles. We start with with fundamental concepts (e.g. microbial physiology and evolution) and build up to an understanding of how the biosphere functions (e.g. biogeochemistry and nutrient dynamics at the ocean-sediment interface) by reading both current and classical literature in the field.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4511

**EBIO 5520 (4) Flowering Plant Diversity**
Emphasizes the morphology, evolution, classification, phylogeny, natural history, identification, and economic importance of plants, with a focus on flowering plants (angiosperms). Because flowering plants are dominant and keystone features of both our natural and developed world, capacity to understand them from an evolutionary and ecological perspective is an important skill for anyone interested in field biology, ecology, evolution, environmental resource management, or simply in being a good steward to the land and to your society.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4520 and MUSM 5520
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**EBIO 5560 (4) The Lichen Biome**
Focuses on lichens as biologically diverse hubs of interactions, and will cover numerous dimensions of diversity within the symbiosis (algae, bacteria, and ecological and evolutionary relationships therein) and beyond it (diversity of lichen symbioses in nature, their functions, and conservation).
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4560
**Requisites:** Restricted to graduate students only.

**EBIO 5600 (4) Evolutionary Ecology**
Evaluates how interactions within species, among species and between species and the environment evolve over time. Emphasizes the development of scientific skills, including ecological, genetic and statistical tools for testing hypotheses in evolutionary ecology. Lab activities include research projects that quantify natural selection, gene flow and phenotypic plasticity in natural systems, and a semester-long class experiment examining plant dispersal.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4600
**Grading Basis:** Letter Grade

**EBIO 5620 (4) Mycology: the Biology of Fungi**
A broad taxonomic and biological survey of fungi. This is an upper division lecture, field, and lab-based course designed for biology majors interested in microbial science. Field and Laboratory components include two lab practicals in which students identify macro- and micro-fungi, preparation of a fungal specimen collection, and the use of light microscopy for identification and visualization of fungal structures.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4620
**Recommended:** Prerequisite graduate students with background in General Biology (equivalent of EBIO 1210, EBIO 1230, EBIO 1220, EBIO 1240), Ecology (equivalent of EBIO 2040), Evolution (equivalent of EBIO 3080) and Genetics (equivalent of EBIO 2070).
**Grading Basis:** Letter Grade

**EBIO 5660 (4) Insect Biology**
Lect. and lab. Introduction to evolution, ecology, physiology, and behavior of insects. Emphasizes how insects have solved problems, such as maintaining water balance or finding food, that are shared by all animals but for which there may be unique solutions among the insects. Agricultural and human health problems relative to entomology are discussed. Uses animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4660
**Requisites:** Restricted to graduate students only.

**EBIO 5700 (3) Quantitative Genetics**
Explores how the differences at the DNA level impact variability within and among individuals, and how that variation is shaped by interactions with environments. Quantitative genetics covers a range of topics, but in this course we will focus on the methods and approaches to investigate complex traits, those influenced by many genes and environmental factors, emphasizing the evolutionary forces that shape variation. We will analyze real genetic data (human, plant, mouse, etc.), and prepare our findings as written manuscripts or oral presentations. Some familiarity with basic genetic principles is assumed. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4700
**Requisites:** Restricted to graduate students only.

**EBIO 5740 (3) Biology of Amphibians and Reptiles**
Comparative morphology, taxonomy, ecology, behavior and geographic distribution of amphibians and reptiles. Uses animals and animal tissue.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4740

**EBIO 5750 (4) Ornithology**
Lect., lab, and field trips. Presents origin, evolution, ecology, physical and behavioral characteristics and taxonomy of orders and families of birds of North America; field work with local species emphasizing avian ecology. Uses animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4750

**EBIO 5760 (4) Mammalogy**
Lect., lab, and field studies. Discusses origin, evolution and adaptation, geographic distribution, ecology and taxonomy of mammals; field and laboratory study of Coloradan species. Uses animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4760 and MUSM 5760
**Requisites:** Restricted to graduate students only.

**EBIO 5800 (3) Critical Thinking in Biology**
Lect. and discussion. Explores controversial issues, historical themes, or emerging developments in biology. Consult the EBIO Undergraduate Advising Center for current listings.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4800
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite minimum of 14 hours of EBIO course work.

**EBIO 5820 (1) Graduate Writing Seminar**
Enhances writing proficiency, using graduate writing projects to implement the course concepts. Offers understanding of conventions and strategies used in scientific writing to prepare students for academic and professional communication. Department enforced requisite, basic proficiency in English as a written language.
**Requisites:** Restricted to graduate students only.

**EBIO 5840 (1-6) Independent Study (Master's Level)**
Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EBIO 6000 (1) Seminar: Introduction to Biological Research**
Discusses areas of biological research represented in EBIO. Required of all first-year graduate students in EBIO.
**Requisites:** Restricted to graduate students only.

**EBIO 6100 (1-3) Seminar in Environmental Biology**
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 6120
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EBIO 6120 (1-3) Seminar in Environmental Biology**
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 6100
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**EBIO 6200 (1-3) Seminar in Population Biology**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EBIO 6210 (1-3) Seminar in Population Biology**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**EBIO 6300 (1-3) Seminar in Organismic Biology**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EBIO 6840 (1-7) Independent Research (Master's Level)**
Instructor consent required.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EBIO 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree. Instructor consent required.
**Requisites:** Restricted to graduate students only.

**EBIO 6950 (1-6) Master's Thesis**
Instructor consent required.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EBIO 7840 (1-6) Independent Study (Doctoral Level)**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EBIO 8840 (1-6) Independent Research (Doctoral Level)**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EBIO 8990 (1-10) Doctoral Dissertation**
Instructor consent required.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.

# Ecology and Evolutionary Biology - Master of Arts (MA)

The EBIO department offers programs leading to the Master of Arts (MA) degree in a wide variety of biological disciplines, ranging from biogeochemistry to community ecology to evolutionary genetics and others. Modern laboratory facilities for graduate study are located in the Ramaley building. In addition, the department has strong ties with the University Museum, the Institute of Arctic and Alpine Research (INSTAAR), the Institute of Behavioral Genetics (IBG), the Cooperative Institute for Research in Environmental Sciences (CIRES), the Environmental Studies Program (ENVS) and the Departments of Integrative Physiology, Geology, Geography, Anthropology and Molecular, Cellular and Developmental Biology. INSTAAR operates the Mountain Research Station, an alpine field laboratory 25 miles from campus. Graduate student support is available in the form of fellowships, part-time instructorships, teaching assistantships, research assistantships and research grants.

Admission information is provided on the EBIO website (http://www.colorado.edu/ebio/graduate/ma-phd-programs/#MASTERS). International student applications are due by Dec. 1, and U.S. domestic applications by Dec. 31 for consideration for admission during the subsequent academic year. A completed domestic application includes a statement of intent, three letters of recommendation, official transcripts and scores on the GRE General Test. Applicants are encouraged to communicate with potential faculty sponsors well before the application deadline. Applications for spring semester admission are not accepted. Students are required to have a bachelor's degree in biology or an equivalent.

## Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s): Ecology and Evolutionary Biology - Bachelor of Arts (BA) (p. 256).

## Requirements

### Degree Plans

#### Plan I: Thesis Option

The EBIO MA I program (with thesis) is intended to be a two year course of study that prepares students for admission to PhD programs, teaching positions or a variety of forms of employment as professional biologists. MA I students' studies are focused on a research project culminating in a thesis. Prospective students are urged to consult with faculty advisors to determine whether application for the MA I or PhD program is more appropriate. Applications for the MA I program are considered on a competitive basis; the department only admits students for whom financial support is available. Thirty credit hours of coursework are required for the degree, at least 24 of which must be at the 5000 level or above, including 4–6 hours of thesis credit. The thesis topic is presented to the thesis committee as a written research proposal in the second semester of the program, and the committee administers in the third semester an examination on general knowledge in ecology and/or evolutionary biology. The final examination consists of the thesis defense, which should be scheduled during the second year for full-time students.

#### Plan II: Non-Thesis Option

A non-thesis master's degree is offered through the EBIO department's MA II program for students interested in furthering their knowledge of ecology and/or evolutionary biology but not in graduate training beyond the MA. This program is suitable for secondary school teachers and others whose career choices do not require a research thesis. Applicants are required to attain sponsorship from a faculty member prior to submitting application materials. Applicants are considered on a competitive basis; financial support is not guaranteed for MA II students. Thirty credit hours of coursework are required for the degree, at least 24 of which must be at the 5000 level or above, including 4 credit hours of independent research leading to a paper to be presented to the faculty sponsor. An examination on general knowledge in ecology and/or evolutionary biology is administered by the advisory committee in the third semester, and this committee may also require a final oral examination.

## Learning Outcomes

By the completion of the program, students will be able to:

# Ecology and Evolutionary Biology - Doctor of Philosophy (PhD)

The EBIO department offers a Doctor of Philosophy (PhD) degree in a wide variety of biological disciplines, ranging from biogeochemistry to community ecology to evolutionary genetics and others.

The PhD is a research degree, involving the production of a major piece of original research (the dissertation). The program is intended to be a five-year course of study that produces graduates who subsequently teach and conduct research at colleges or universities or hold research or leadership positions at other private or government institutions

Students are expected to form a dissertation committee of five faculty members (including one from outside EBIO) after beginning their studies. This committee aids the student in designing a research program and choosing relevant coursework. In addition to the final examination upon completion of the dissertation, the dissertation committee administers an examination (typically in the third semester) on general knowledge in ecology and/or evolutionary biology and a comprehensive examination (typically in the fifth semester) on a written research proposal submitted by the student.

Modern laboratory facilities for graduate study are located in the Ramaley Biology building. In addition, the department has strong ties with the University Museum, the Institute of Arctic and Alpine Research (INSTAAR), the Institute of Behavioral Genetics (IBG), the Cooperative Institute for Research in Environmental Sciences (CIRES), the Environmental Studies Program (ENVS) and the departments of Integrative Physiology, Geology, Geography, Anthropology and Molecular, Cellular and Developmental Biology. INSTAAR operates the Mountain Research Station, an alpine field laboratory 25 miles from campus. Graduate student support is available in the form of fellowships, part-time instructorships, teaching assistantships, research assistantships and research grants.

## Requirements

### Admissions

International student applications are due by Dec. 1, and U.S. domestic applications are due by Dec. 31 for consideration for admission during the subsequent academic year. A completed domestic application includes a statement of intent, three letters of recommendation, official transcripts and scores on the GRE General Test.

### Course Requirements

A total of 30 credit hours of coursework must be taken, although independent study credit may be included in this total. In addition, a total of 30 credit hours of dissertation must also be taken. PhD students are required to teach for at least one academic year, typically as a teaching assistant for one of the many laboratory courses offered by the department.

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate expertise, critical thinking, and integration of foundational knowledge in ecology, evolution, quantitative reasoning and science writing.
- Develop and conduct independent, hypothesis-driven ethical science, including proposal-writing, study design, data collection, analyses, data and material deposition and archiving, writing and publishing.
- Effectively communicate and present research through oral presentations, posters, diverse media outlets, outreach opportunities and other venues to reach myriad audiences.
- Demonstrate pedagogical skills in teaching and mentoring undergraduate and graduate students.

# Economics

Our PhD program focuses on a solid core curriculum in economic theory and econometrics. Beyond this, we offer a number of specialized fields of study: econometrics, economic development, economic history, industrial organization, international trade and finance, labor and human resources, natural resources and environmental economics and public economics.

**Course code for this program is ECON.**

## Master's Degree

- Economics - Master of Arts (MA) (p. 1236)

## Doctoral Degree

- Economics - Doctor of Philosophy (PhD) (p. 1237)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Antman, Francisca Marie (https://experts.colorado.edu/display/fisid_144606/)
Professor; PhD, Stanford University

Avila, Sara (https://experts.colorado.edu/display/fisid_165935/)
Instructor; PhD, National University of Mexico

Barham, Tania C.J. (https://experts.colorado.edu/display/fisid_140077/)
Associate Professor; PhD, University of California, Berkeley

Bhatia, Alpna (https://experts.colorado.edu/display/fisid_143993/)
Instructor; PhD, University of Colorado Boulder

Boileau, Martin (https://experts.colorado.edu/display/fisid_113872/)
Professor, Chair; PhD, Queen's University (Canada)

Bottan, Daria (https://experts.colorado.edu/display/fisid_168423/)
Senior Instructor; PhD, LUISS Guido Carli (Italy)

Cadena, Brian C. (https://experts.colorado.edu/display/fisid_145740/)
Associate Professor; PhD, University of Michigan Ann Arbor

Carballo, Jeronimo Rafael (https://experts.colorado.edu/display/fisid_155949/)
Associate Professor; PhD, University of Maryland, College Park

Carlos, Ann M. (https://experts.colorado.edu/display/fisid_105534/)
Professor Emerita

Chen, Yongmin (https://experts.colorado.edu/display/fisid_108989/)
Professor, Endowed Chair; PhD, Boston University

De Bartolome, Charles A.M. (https://experts.colorado.edu/display/fisid_101302/)
Professor Emeritus; PhD, University of Pennsylvania

Flores, Nicholas E. (https://experts.colorado.edu/display/fisid_107603/)
Professor; PhD, University of California, San Diego

Gebhardt, Karen (https://experts.colorado.edu/display/fisid_159742/)
Senior Instructor; PhD, Colorado State University

Graves, Philip E. (https://experts.colorado.edu/display/fisid_102050/)
Professor Emeritus; PhD, Northwestern University

Greenwood, Michael J. (https://experts.colorado.edu/display/fisid_102361/)
Professor Emeritus; Ph.D., Northwestern University

Howe, Charles W.
Professor Emeritus

Hsiao, Frank S.T.
Professor Emeritus

Hughes, Jonathan Edward (https://experts.colorado.edu/display/fisid_147335/)
Associate Professor, Associate Chair; PhD, University of California, Davis

Iyigun, Fevzi Murat (https://experts.colorado.edu/display/fisid_118373/)
Professor; PhD, Brown University

Jaworski, Taylor Allen (https://experts.colorado.edu/display/fisid_159798/)
Associate Professor; PhD, University of Arizona

Kaempher, William H.
Professor Emeritus

Kaffine, Daniel Thomas (https://experts.colorado.edu/display/fisid_153280/)
Professor; PhD, University of California, Santa Barbara

Keller, Wolfgang (https://experts.colorado.edu/display/fisid_141891/)
Professor; PhD, Yale University

Kim, Jin-Hyuk (https://experts.colorado.edu/display/fisid_149615/)
Associate Professor; PhD, Cornell University

Kimball, Miles (https://experts.colorado.edu/display/fisid_157993/)
Endowed Chair, Professor; PhD, Harvard University

Klein, Jennifer Lynn (https://experts.colorado.edu/display/fisid_158332/)
Instructor; PhD, University of California, Santa Barbara

Lillydahl, Jane
Professor Emerita

Liu, Xiaodong (https://experts.colorado.edu/display/fisid_144508/)
Professor; PhD, The Ohio State University

Mansfield, Richard (https://experts.colorado.edu/display/fisid_157743/)
Assistant Professor; PhD, Yale University

Markusen, James R. (https://experts.colorado.edu/display/fisid_103187/)
Professor Emeritus, Distinguished Professor; PhD, Boston College

Martins-Filho, Carlos B. (https://experts.colorado.edu/display/fisid_147510/)
Professor; PhD, University of Tennessee, Knoxville

Maskus, Keith E. (https://experts.colorado.edu/display/fisid_103414/)
Professor Emeritus, Distinguished Professor; PhD, University of Michigan Ann Arbor

McCloskey, Adam (https://experts.colorado.edu/display/fisid_163644/)
Associate Professor; MA, Boston University

McKinnish-Harllee, Terra (https://experts.colorado.edu/display/fisid_115558/)
Professor; PhD, Carnegie Mellon University

McNown, Robert F.
Professor Emeritus

Mertens, William G. (https://experts.colorado.edu/display/fisid_105762/)
Senior Instructor; PhD, University of Colorado Boulder

Morey, Edward R.
Professor Emeritus

Nigai, Sergey K. (https://experts.colorado.edu/display/fisid_159293/)
Assistant Professor; PhD, ETH Zurich

Peri, Alessandro (https://experts.colorado.edu/display/fisid_157820/)
Assistant Professor; PhD, Universidad Carlos III de Madrid

Poulson, Barry
Professor Emeritus

Savage, Scott James (https://experts.colorado.edu/display/fisid_121239/)
Professor; PhD, Curtin University of Technology (Western Australia)

Shiue, Carol Hua (https://experts.colorado.edu/display/fisid_141892/)
Professor; PhD, Yale University

Song, Yangwei (https://experts.colorado.edu/display/fisid_167159/)
Assistant Professor; PhD, University of Rochester

Swanson, Shawn (https://experts.colorado.edu/display/fisid_168257/)
Instructor; PhD, University of Colorado Boulder

Valkovci, Mark
Lecturer; PhD, University of Colorado Boulder

Waldman, Donald M.
Professor Emeritus

Weber, Stephanie
Assistant Professor; PhD, Yale University

Zax, Jeffrey S. (https://experts.colorado.edu/display/fisid_100898/)
Professor, Associate Chair; PhD, Harvard University

# Courses

**ECON 7010 (3) Microeconomic Theory 1**
This course applies mathematical methods and optimization theory to study the foundation of modern microeconomic theory. The topics covered include theory of demand, theory of the firm, choice under uncertainty, equilibrium under alternative market structures, and welfare economics. Instructor consent required.
**Additional Information:** Departmental Category: Theory and History of Economic Thought

**ECON 7020 (3) Macroeconomic Theory 1**
This course applies the mathematical methods of continuous-time and discrete-time dynamic optimization theory and dynamical systems to study the foundation of modern macroeconomic theory. The topics covered include economic growth, the business cycle, and the determinants of consumption and investment. Instructor consent required.
**Additional Information:** Departmental Category: Theory and History of Economic Thought

**ECON 7030 (3) Microeconomic Theory 2**
Continuation of ECON 7010. Develops mathematical foundations of game theory and models of asymmetric information. Analyzes classical game-theoretic settings using analytical optimization techniques with emphasis on methodology, equilibrium concepts, theory of adverse selection and moral hazard, and principal-agent framework. Instructor consent required.
**Additional Information:** Departmental Category: Theory and History of Economic Thought

**ECON 7040 (3) Macroeconomic Theory 2**
Continuation of ECON 7020. Develops the mathematical foundations of dynamic optimization and applies numerical methods to study dynamic and stochastic general equilibrium macroeconomic models. Topics covered include the business cycle, real and nominal rigidities, search and matching frictions, and financial frictions. Instructor consent required.
**Additional Information:** Departmental Category: Theory and History of Economic Thought

**ECON 7818 (3) Introduction to Probability and Asymptotic Theory**
Introduces fundamental concepts and results from probability and asymptotic theory needed for a rigorous study of the limiting behavior of estimators and test statistics that emerge from the study of statistical/econometric models. Topics include the construction of probability measures, abstract integration, conditional expectation, stochastic convergence, laws of large numbers and central limit theorems. Instructor consent required.
**Additional Information:** Departmental Category: Quantitative Economics

**ECON 7828 (3) Econometrics**
An introduction to estimation and inference for linear and nonlinear parametric models of regression, including least squares, method of moments and maximum likelihood estimation. Instructor consent required.
**Additional Information:** Departmental Category: Quantitative Economics

**ECON 8010 (3) Economics of Risk and Time**
Develops the mathematical tools necessary to analyze optimal decision-making by individual households and firms over time and in the face of risk. This is a building block for general equilibrium models, statistical models of behavior and theoretical analyses of economic policy.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Theory and History of Economic Thought

**ECON 8015 (3) Behavioral Economics**
Behavioral economics is the intersection of economics with psychology. Topics may include: (1) the effects of cognitive limitations on economic decisions, (2) the effects of internal conflict, (3) nonmarket goods, including internal mental states, such as happiness, (4) survey research, including survey design and the survey measurement of preference parameters from hypothetical choices, (5) theoretical modeling of nonstandard preferences and imperfect decision-making, and (6) welfare-theoretic consequences of nonstandard preferences and imperfect decision-making.

**ECON 8020 (3) Business Cycle Theory and Monetary and Fiscal Policy**
Develops key skills for understanding monetary, fiscal and financial stability policy: (a) deep mathematical analysis of business cycle models, including the mechanisms within models, their comparative statics and comparative dynamics, and the difference parameter values make to the behavior of business cycle models, (b) comparing model predictions to statistical data analyses, and (c) understanding real-world policy debates.
**Requisites:** Restricted to graduate students only.

**ECON 8030 (3) Advanced Economic Theory**
This course introduces students to recent advances in economic theory. Topics include foundations of price theory, pass-through, price discrimination, differential pricing, non-linear pricing, vertical price control, imperfect information, platform markets, and consumer search. The course will focus on developing the intuition and skills to formulate research questions and to build/analyze economic models. Formerly ECON 7050.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Theory and History of Economic Thought

**ECON 8209 (3) Economics Research Methods Workshop 1**
Assists students starting their doctoral thesis by discussing methodology and evaluation of economic research. Presents and discusses student research proposals.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Independent Study and Other Courses

**ECON 8211 (3) Public Economics 1**
This course studies the theory of public economics. It presents the fundamental principles of public goods, externalities, public choice, excess burden, optimal taxation, and tax incidence. Emphasis will be placed on optimization and the development of mathematical models required for public policy analysis. The course can be taken independently or in conjunction with 8221 to make a two-semester sequence in public economics.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Public Economics

**ECON 8219 (3) Economics Research Methods Workshop 2**
Continuation of ECON 8209. Assists students starting their doctoral thesis by discussing relevant economic research. Presents and discusses research papers.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Independent Study and Other Courses

**ECON 8221 (3) Public Economics 2**
This course introduces the fundamental quantitative and econometric methods required for research in public economics. It explores advanced topics in public economics such as decentralization, state and local government, program analysis, cost/benefit analysis, taxation, international tax issues, political economy issues, and market failure. The course can be taken independently or in conjunction with 8211 to make a two-semester sequence in public economics.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Public Economics

**ECON 8413 (3) International Economics 1**
This course introduces students to the theories of international trade using an optimization approach. We discuss core trade theories and their empirical applications. We also explore recent advances that focus on the firm's decision to export and investigate the role of heterogeneity in firm productivity on patterns of trade. The course can be taken independently or in conjunction with 8433 to make a two-semester sequence in international economics.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: International Trade and Finance

**ECON 8423 (3) International Macroeconomics**
Explores recent advances in international macroeconomics and international finance. The course focuses on the application of the mathematical tools and quantitative analysis of dynamic macroeconomics to examine the role of international ¿nancial markets for the behavior of the current account, the international transmission of the business cycle, and the determination of exchange rates.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: International Trade and Finance

**ECON 8433 (3) International Economics 2**
Explores advanced quantitative topics in international economics. The course focuses on statistical analysis and structural estimation of several classes of models in international trade. The models are calibrated to the data and solutions are obtained using tools from optimization theory. The students are introduced to quantitative evaluation of trade policy instruments and welfare analysis. The course can be taken independently or in conjunction with 8413 to make a two-semester sequence in international economics.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: International Trade and Finance

**ECON 8534 (3) History of Economic Growth - US**
This course covers topics in the economic history of the United States. The course focuses on applying the tools of modern empirical economics to understand the growth of the American economy. This includes using applied econometrics and quantitative models to analyze income growth and inequality, demographic change, industrialization, international trade, capital and labor mobility, infrastructure, and technological change. The course can be taken independently or in conjunction with 8554 to make a two-semester sequence in economic history.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Economic History

**ECON 8535 (3) Environmental Economics 1**
Considers the allocation of society's scarce environmental resources and government attempts to achieve more ef¿cient and equitable allocations. It is a course in applied welfare economics with an emphasis on market failure and valuation. Incorporates static and dynamic optimization techniques to formally model environmental and resource outcomes and policy instrument choice. The course can be taken independently or in conjunction with 8545 to make a two-semester sequence in environmental economics.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Natural Resources and Environmental Economics

**ECON 8545 (3) Environmental Economics 2**
Provides advanced study of current research in environmental economics and explores opportunities for new research. Instruction in empirical research including experimental design, numerical analysis, econometric and statistical approaches. Theoretical analysis of economic problems including optimization, cost/benefit analysis and economic modeling of current environmental policies. The course can be taken independently or in conjunction with 8535 to make a two-semester sequence in environmental economics.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Natural Resources and Environmental Economics

**ECON 8554 (3) History of Economic Growth - World**
Examines economic growth over the long run. Topics include the industrial revolution, the demographic transition, the great divergence, the importance of institutional change, the impacts of trade & technology diffusion, and trends in inequality & social mobility. The course highlights the use of economic modeling, the creation of new datasets, and the implementation of empirical analysis for hypothesis testing. The course can be taken independently or in conjunction with 8534 to make a two-semester sequence in economic history. Formerly ECON 8764.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Economic History Departmental Category: Asia Content

**ECON 8676 (3) Labor Economics 1**
This course focuses on 1) deriving testable and quantifiable hypotheses from mathematical economic models relating to prominent policy-relevant issues in the labor market; 2) ascertaining the statistical patterns that permit identification of the parameters that govern these models; and 3) forming estimators that permit statistical inference of these parameters. The models considered are drawn from a variety of labor market contexts: static and dynamic labor supply and demand decisions, human capital investment decisions, spatial equilibrium in labor markets, and worker-firm matching with heterogeneous workers and firms.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Labor and Human Resources

**ECON 8686 (3) Labor Economics 2**
This course focuses on using state-of-the-art econometric techniques, often identified by natural experiments, to 1) quantify causal effects predicted by economic models of the labor market and 2) evaluate the causal impact of labor market policies. Topics include the economics of immigration, the minimum wage, the economics of discrimination, and information constraints and bounded rationality in human capital investment. As a final project, students gather data and perform initial statistical analysis to determine whether a proposed data analysis strategy will successfully lead to a credible answer to a novel causal question in labor economics.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Labor and Human Resources

**ECON 8747 (3) Industrial Organization 1**
This course studies the theory of industrial organization. Topics include research method in industrial organization, monopoly, oligopoly competition, vertical organization, markets with search and switching costs, online platforms, and innovation economics. Emphasis will be placed on the development of mathematical models for industry and policy analysis. The course can be taken independently or in conjunction with 8757 to make a two-semester sequence in industrial organization.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Industrial Organization

**ECON 8757 (3) Industrial Organization 2**
This course introduces the fundamental quantitative and econometric methods required for empirical research in industrial organization. The emphasis is on using theory to construct testable hypotheses and specifying empirical models for estimating structural parameters. Topics include differentiated products, market power, collusion, merger analysis and regulation. The course can be taken independently or in conjunction with 8747 to make a two-semester sequence in industrial organization.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Industrial Organization

**ECON 8774 (3) Economic Development 1**
Focuses on microeconomic issues surrounding economic development from a largely empirical perspective, emphasizing applied econometric techniques. Topics covered in the two sections will vary to keep up with the current research but this course will cover a variety of papers covering different research design and program evaluation methods on topical areas including, but not limited to, human capital development and long-run effects, environment and health, labor markets and migration, social capital and networks, micro-credit, and women's empowerment. The course can be taken independently or in conjunction with 8784 to make a two-semester sequence in economic development.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Economic Development

**ECON 8784 (3) Economic Development 2**
Focuses on microeconomic issues surrounding economic development from a largely empirical perspective, emphasizing applied econometric techniques. Topics covered in the two sections will vary to keep up with the current research but this course will cover a variety of papers covering different research design and program evaluation methods on topical areas including, but not limited to, distribution of resources within households, environmental and natural resources, as well as migration and gender issues relevant for developing countries. The course can be taken independently or in conjunction with 8774 to make a two-semester sequence in economic development.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Economic Development

**ECON 8828 (3) Econometric Theory 1**
Estimation and inference for micro-econometric models. Topics may include semi- and non-parametric econometric/statistical models; Bayesian estimation and inference; models for high dimensional data; simulation-based estimation methods. The course can be taken independently or in conjunction with 8838 to make a two-semester sequence in econometric theory.
**Requisites:** Requires prerequisite courses of ECON 7818 and ECON 7828 (all min grade B-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Quantitative Economics

**ECON 8838 (3) Econometric Theory 2**
Estimation and inference for models for dependent data. Topics may include linear and non-linear time series, spatial and network models. The course can be taken independently or in conjunction with 8828 to make a two-semester sequence in econometric theory.
**Requisites:** Requires prerequisite courses of ECON 7818 and ECON 7828 (all min grade B-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Quantitative Economics

**ECON 8848 (3) Applied Microeconometrics**
Presents a "user's guide" to conducting empirical research and program evaluation in applied microeconomics. Begins with a primer on an industry-standard econometric software package and a review of linear regression as a statistical technique for summarizing conditional mean relationships in data. Discusses multiple advanced econometric techniques as alternative research strategies including matching methods, difference-in-differences, panel data methods, IV, and regression discontinuity. Concludes with a research project requiring a replication and extension of an existing published paper that uses one or more of these statistical techniques.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Quantitative Economics

**ECON 8858 (3) Computational and Structural Estimation Methods**
Presents a ¿user¿s guide¿ to conducting quantitative research in computational economics. Teaches students to construct a variety of applied economic models, obtain parameter values through calibration or structural estimation techniques, and employs the resulting models to conduct policy simulations.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Quantitative Economics

**ECON 8909 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Independent Study and Other Courses

**ECON 8999 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Independent Study and Other Courses

# Economics - Master of Arts (MA)

The master's degree in this field is not available through direct admission and may only be earned under special circumstances. Please contact program for additional information and requirements.

# Economics - Doctor of Philosophy (PhD)

Our PhD program focuses on a solid core curriculum in economic theory and econometrics. Beyond this, we offer a number of specialized fields of study: econometrics, economic development, economic history, industrial organization, international trade and finance, labor and human resources, natural resources and environmental economics and public economics.

# Requirements

## Admission Requirements

An applicant for admission as a regular degree student must:

- Hold a baccalaureate degree from a college or university of recognized standing, or have done work equivalent to that required for such a degree and equivalent to the degree given at this university. The undergraduate GPA must be at least 2.75 (2.00=C).
- Have completed intermediate microeconomic and macroeconomic theory courses, 6 credit hours of calculus at the university level or equivalent, and statistics.
- Submit Graduate Record Examination (GRE) scores for aptitude (verbal and quantitative). International applicants whose native language is not English must also submit a TOEFL score with a speaking component, even if they have attended college in an English-speaking country.
- Arrange for the submission of three letters of recommendation.

Graduate study in economics is quantitative and analytical. Students should be comfortable with basic calculus (derivatives and integration), linear algebra, matrix algebra and basic statistics.

The university deadline for international applications is Dec. 1 for the following fall semester. The department encourages international applicants to comply with this deadline. Late applications may be considered; however, they may be at a disadvantage with respect to the award of financial aid. Domestic applicants who wish to be considered for financial assistance should apply by Jan. 15. Students must begin the program in a fall semester.

## Degree Requirements

Students are expected to complete all requirements for the PhD degree within five years of entering the program (the maximum time allowed by the Graduate School is six years). The schedule of required courses is centered on this expectation. Failure to make timely and satisfactory progress toward the degree may result in loss of financial assistance or dismissal from the program.

### Course Requirements

1. Prior to beginning the program, students must demonstrate an acceptable degree of competence in differential and integral calculus and optimization techniques. (This requirement is in addition to the six credit hours of calculus required to apply to the program.) Such competence is normally demonstrated by taking *ECON 7800* (an intensive, three-week preparatory course offered immediately prior to each fall semester) and passing its final examination with a grade of B- or better. Students who fail this examination must enter into extensive consultation with the director of graduate studies (DGS). Other methods by which the required competence may be demonstrated:
   - obtain written approval from the DGS to waive the requirement for *ECON 7800* due to sufficient mathematical preparation in prior studies, or
   - pass the final examination in *ECON 7800* at a level of B- without taking the course.
2. There are six core courses in the PhD program: ECON 7010, ECON 7020, ECON 7030, ECON 7040, ECON 7818 and ECON 7828. Course requirements beyond the core courses include:
   - Six elective courses at the 8000 level. Basic fields are econometrics, economic development, economic history, industrial organization, international trade and finance, labor and human resources, natural resources and environmental economics and public economics. Ordinarily, a student would take two elective courses in a basic field of specialization in preparation for a dissertation.
   - 6 credit hours in a research colloquium.
   - At least 30 credit hours of dissertation.
3. At least four of the core courses must be taken on the Boulder campus. Courses transferred for credit must be approved by the DGS. After entry into the PhD program, all remaining courses must be taken on the Boulder campus.
4. All courses for PhD credit taken on the Boulder campus must be passed with a grade of B- or better. A student who receives a grade of C+ or lower in a core course must retake that course the following academic year.
5. No more than 12 credit hours (exclusive of dissertation credit hours) from a single faculty member may be counted toward PhD requirements. Independent study is allowed only to satisfy elective requirements. No more than 6 credit hours of independent study may be applied to the PhD degree and no more than 3 credit hours of independent study may be taken from a single faculty member. In consultation with the DGS, students may choose to take up to two graduate offerings in other departments as elective courses.
6. See the Plan of Study tab for course recommendations.

### Preliminary Examinations

Written preliminary examinations in microeconomic theory, macroeconomic theory and econometrics must be taken in the examination period following the successful completion of core courses in these areas. Under most circumstances this period would be in August prior to the second year. An examination attempted and failed must be taken again and passed in the next examination period. A second failure results in dismissal from the program, subject to appeal to the GCRC under extraordinary circumstances. In no case are attempts beyond the third granted.

Students who have failed any of the core courses are ineligible to take the preliminary examination in the area of failure. These students must retake the failed course(s) in the following year and attempt the relevant preliminary examination in the first scheduled examination period after they pass.

Students who fail to pass all three preliminary examinations within two-and-one-half years of beginning the PhD program must exit the program.

### MA Degree

An MA degree will be awarded to students who have successfully completed all core courses in the PhD program, completed 30 hours of graduate credit with a 3.00 GPA and performed satisfactorily within two attempts on at least two out of three preliminary examinations.

### Third-Year Research Colloquium

Third-year students are expected to register for 3 credit hours per semester in the research colloquium, which will meet weekly under the direction of a faculty member. The purpose of the colloquium is to provide students the opportunity and guidance to complete the required third-year paper and to facilitate progress toward the dissertation stage.

### Comprehensive Examination

Students must take an oral comprehensive examination before admission to PhD candidacy. This examination may occur either at the time of the student's research presentation in ECON 8219 or at a later date, and will encompass the materials in the presentation and all relevant coursework completed by the candidate. Students who fail this comprehensive examination will be given a second chance during the following semester. For those students for whom the presentation in ECON 8219 does not serve as the oral comprehensive examination, a separate oral examination must be scheduled before admission to candidacy. Students who do not pass this exam by the end of their fifth year must exit the program.

### Admission to Candidacy and Dissertation Requirements

Students are formally admitted to candidacy for the PhD degree after completing all course requirements and all preliminary and comprehensive examinations and after earning four semesters of residency (see the Doctoral Degree Requirements (p. 1114) section of this catalog for details). After admission to candidacy, students must register each fall and spring semester for dissertation credit (ECON 8999) until attaining the degree; the accumulated credit for the thesis must total at least 30 credit hours to attain the degree. A student must prepare a written dissertation and successfully pass an oral examination before a dissertation committee and other interested persons on its content before receiving the degree. The minimum residence requirement for the PhD degree is six semesters of scholarly work beyond the bachelor's degree.

### Administration: Examining Committees for Examinations

Examining committees for preliminary examinations consist of three members of the economics department who teach in the relevant area. Examining committees for comprehensive examinations consist of at least three members of the economics department.

### Preliminary Examinations

1. Written examinations are numbered so that insofar as possible the identity of the student is unknown. Each faculty member grades independently and writes no comments in the examination booklet. A meeting of the graders is called by the chair of the examination committee and the committee grade is submitted to the graduate program manager. The possible grades include "High Pass," "Pass" and "Fail."
2. In cases where there is a question of pass or fail on any exam, if two of the members of the examination committee vote affirmatively, a grade of pass will be recorded; if two of the members of the grading committee vote negatively, a grade of fail will be recorded. If the vote of the grading committee is tied and the third member is absent (but will be available within seven days), the decision to pass or to fail is to be made by the reconvened grading committee. If fewer than two members of the grading committee are present and voting, or if the vote of the grading committee is tied and the third member is not available within seven days, the decision to pass or fail will be made by the Graduate Curriculum and Review Committee; in such circumstances the grade is reported as pass or fail, based on a majority vote.
3. When examination results are reported, a student who failed should have an opportunity to discuss their performance with a member of the examining committee.

### Dissertation Guidelines

1. In the spring term of the academic year following the research colloquium, each student must submit a written dissertation proposal and conduct an oral defense of that proposal before his or her basic committee. A dissertation proposal form must be signed by each member of the basic committee and submitted to the graduate program manager. The basic committee consists of the student's faculty supervisor and three other faculty members from the department. An acceptable proposal must include a statement of purpose and a justification for the importance of the work; a full literature review and a statement of how this research will contribute to the literature; and a detailed description of the methodologies to be used and of the data bases, if appropriate.
2. Normally students are expected to complete their dissertation by the end of their fifth academic year. The graduate program manager provides details on submission of the dissertation and arrangements for the oral defense. The final defense is conducted before a basic committee of four faculty members from the department plus one outside member. After the defense, minor changes are agreed upon between candidate and supervisor before the final dissertation is submitted.

## Plan of Study

| | | |
|---|---|---|
| **First Year** | | |
| **Fall Semester** | | **Credit Hours** |
| ECON 7010 | Microeconomic Theory 1 | 3 |
| ECON 7020 | Macroeconomic Theory 1 | 3 |
| ECON 7818 | Introduction to Probability and Asymptotic Theory | 3 |
| | **Credit Hours** | **9** |
| **Spring Semester** | | |
| ECON 7030 | Microeconomic Theory 2 | 3 |
| ECON 7040 | Macroeconomic Theory 2 | 3 |
| ECON 7828 | Econometrics | 3 |
| | **Credit Hours** | **9** |
| **Second Year** | | |
| **Fall Semester** | | |
| Elective course | | 3 |
| Elective course | | 3 |
| | **Credit Hours** | **6** |
| **Spring Semester** | | |
| Elective course | | 3 |
| Elective course | | 3 |
| Elective course | | 3 |
| | **Credit Hours** | **9** |
| **Third Year** | | |
| **Fall Semester** | | |
| ECON 8209 | Economics Research Methods Workshop 1 | 3 |
| Remaining elective course(s) | | 3 |

| | | |
|---|---|---|
| Dissertation research, if practicable | | |
| | **Credit Hours** | **6** |
| **Spring Semester** | | |
| ECON 8219 | Economics Research Methods Workshop 2 | 3 |
| Dissertation research | | 6 |
| Remaining elective course(s), if applicable | | |
| | **Credit Hours** | **9** |
| **Fourth Year** | | |
| **Fall Semester** | | |
| Relevant dissertation credit hours | | 6 |
| | **Credit Hours** | **6** |
| **Spring Semester** | | |
| Relevant dissertation credit hours | | 6 |
| | **Credit Hours** | **6** |
| **Fifth Year** | | |
| **Fall Semester** | | |
| Relevant dissertation credit hours | | 6 |
| | **Credit Hours** | **6** |
| **Spring Semester** | | |
| Relevant dissertation credit hours | | 6 |
| | **Credit Hours** | **6** |
| | **Total Credit Hours** | **72** |

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate a mastery of knowledge in the core theoretical disciplines of econometrics, macroeconomics and microeconomics.
- Demonstrate a mastery of knowledge in applied and theoretical field disciplines of economics.
- Demonstrate a proficiency with multiple research methodologies, including theoretical and empirical methods.
- Design and conduct high-quality original research in economics.
- Effectively communicate and present research to academic and public audiences in both written and oral form.

# English

The English Department offers a Master of Arts degree (MA) in literature, a Master of Fine Arts degree (MFA) in creative writing and a Doctor of Philosophy degree (PhD) in literature.

For more information, visit the department's Graduate Studies (https://www.colorado.edu/english/current-students/graduates/) webpage.

**Course code for this program is ENGL.**

## Master's Degrees

- Creative Writing - Master of Fine Arts (MFA) (p. 1243)
- English - Master of Arts (MA) (p. 1245)

## Doctoral Degree

- English - Doctor of Philosophy (PhD) (p. 1247)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Beechy, Tiffany R. (https://experts.colorado.edu/display/fisid_149775/)
Professor; PhD, University of Oregon

Bickman, Martin (https://experts.colorado.edu/display/fisid_100230/)
Professor; PhD, University of Pennsylvania

Brylowe, Thora (https://experts.colorado.edu/display/fisid_156063/)
Associate Professor; PhD, Carnegie Mellon University

Carr, Julia Alice (https://experts.colorado.edu/display/fisid_143349/)
Professor; PhD, University of California, Berkeley

Cox, Jeffrey N. (https://experts.colorado.edu/display/fisid_113253/)
Distinguished Professor; PhD, University of Virginia

Deagman Simonetta, Rachael Nicole (https://experts.colorado.edu/display/fisid_154125/)
Associate Teaching Professor; PhD, Duke University

DeShell, Jeffrey (https://experts.colorado.edu/display/fisid_118482/)
Professor; PhD, SUNY at Buffalo

Douglas, Marcia B. (https://experts.colorado.edu/display/fisid_122696/)
Professor, Associate Chair; PhD, SUNY at Binghamton

Eggert, Katherine (https://experts.colorado.edu/display/fisid_103618/)
Professor; PhD, University of California, Berkeley

Garrity, Jane Marie (https://experts.colorado.edu/display/fisid_105467/)
Associate Professor; PhD, University of California, Berkeley

Gladstone, Jason Daniel (https://experts.colorado.edu/display/fisid_154914/)
Assistant Professor; PhD, Johns Hopkins University

Glimp, David R. (https://experts.colorado.edu/display/fisid_143616/)
Associate Professor; PhD, Johns Hopkins University

Goodman, Nan (https://experts.colorado.edu/display/fisid_100633/)
Professor of Distinction; PhD, Harvard University

Green, Jeremy F. (https://experts.colorado.edu/display/fisid_113077/)
Associate Professor; PhD, University of Cambridge (England)

Gries, Laurie Ellen (https://experts.colorado.edu/display/fisid_155951/)
Associate Professor; PhD, Syracuse University

Harrington, Emily Marie (https://experts.colorado.edu/display/fisid_154601/)
Associate Professor, Associate Chair; PhD, University of Michigan Ann Arbor

Hasan, Raza Ali (https://experts.colorado.edu/display/fisid_146167/)
Associate Teaching Professor; MFA, Syracuse University

Heydt-Stevenson, Jillian (https://experts.colorado.edu/display/fisid_111683/)
Professor; PhD, University of Colorado Boulder

Higashida, Cheryl A. (https://experts.colorado.edu/display/fisid_126280/)
Associate Professor; PhD, Cornell University

Hurley, Kelly K. (https://experts.colorado.edu/display/fisid_105553/)
Associate Professor; PhD, Stanford University

Jacobs, Karen S. (https://experts.colorado.edu/display/fisid_100280/)
Associate Professor; PhD, University of California, Berkeley

Jones, Stephen Graham (https://experts.colorado.edu/display/fisid_146498/)
Distinguished Professor, Endowed Chair; PhD, Florida State University

Klages, Mary K. (https://experts.colorado.edu/display/fisid_101897/)
Associate Professor; PhD, Stanford University

Kocher, Ruth Ellen (https://experts.colorado.edu/display/fisid_143618/)
Distinguished Professor; PhD, Arizona State University

Kuskin, William (https://experts.colorado.edu/display/fisid_143742/)
Chair, Professor; PhD, University of Wisconsin–Madison

Labio, Catherine (https://experts.colorado.edu/display/fisid_147608/)
Associate Professor; PhD, New York University

Lamos, Steven Joseph (https://experts.colorado.edu/display/fisid_141169/)
Associate Professor; PhD, University of Illinois at Urbana–Champaign

Little, Katherine C. (https://experts.colorado.edu/display/fisid_149872/)
Professor; PhD, Duke University

Mattar, Karim (https://experts.colorado.edu/display/fisid_153056/)
Associate Professor; DPhil, Oxford Univ (England)

Mitchell, Dianne (https://experts.colorado.edu/display/fisid_165827/)
Assistant Professor; PhD, University of Pennsylvania

Mohabir, Rajiv (https://experts.colorado.edu/display/fisid_173865/)
Assistant Professor; PhD, University of Hawai'i Manoa

Nugent, Teresa L. (https://experts.colorado.edu/display/fisid_101477/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Rios, Gabriela (https://experts.colorado.edu/individual/fisid_167679/)
Assistant Professor; PhD, Texas AM University

Rivera, John-Michael (https://experts.colorado.edu/display/fisid_118393/)
Professor, Dean; PhD, University of Texas at Austin

Robertson, Benjamin John (https://experts.colorado.edu/display/fisid_146500/)
Assistant Professor; PhD, SUNY at Buffalo

Saxby, Justin
Assistant Teaching Professor

Shade-Johnson, Jaquetta
Assistant Professor; PhD, Michigan State University

Shanmugaraj, Nisha (https://experts.colorado.edu/display/fisid_173859/)
Assistant Professor; PhD, Carnegie Mellon University

Sheffield, Elisabeth Ann (https://experts.colorado.edu/display/fisid_123500/)
Professor; PhD, SUNY at Buffalo

Stevenson, John A. (https://experts.colorado.edu/display/fisid_101656/)
Professor; PhD, University of Virginia

Windell, Maria A. (https://experts.colorado.edu/display/fisid_154605/)
Associate Professor; PhD, University of Virginia

Winkiel, Laura Ann (https://experts.colorado.edu/display/fisid_145813/)
Associate Professor, Associate Chair; PhD, University of Notre Dame

Wood, Rachel
Assistant Teaching Professor

Wright, Nicole M. (https://experts.colorado.edu/display/fisid_153060/)
Associate Professor; PhD, Yale University

## Courses

**ENGL 5000 (3) Introduction to Applied Shakespeare**
Provides an introduction to the life, work and world of William Shakespeare to prepare students for the Applied Shakespeare Professional Masters Certificate two-week intensive. Students will gain a background in the social, cultural and political context of Renaissance theater, will be introduced to the conventions of Shakespearean drama and will explore key concerns impacting our understanding of Shakespeare's works. Department consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5003 (3) Old English 1: Introduction to Old English**
Introduces students to Old English, the ancient ancestor of Modern English (as Latin is the ancestor of Spanish and Italian, distinct from both). Course will focus on reading knowledge through grammar study and translation, and to a lesser extent on pronunciation. Provides basic parsing and translation skills and an introduction to the history, culture, and literature of early medieval Britain. Provides an introduction to grammar and to the history of the English language.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 4003

**ENGL 5013 (3) Old English 2: Intermediate Old English**
Continues to develop skills in Old English reading and translation. Focuses on shorter canonical texts in verse and prose. Students will produce idiomatic translations for every class, write a midterm exam based on those translations, and write either a final exam or a final paper. Students will also memorize and present a short section of verse in the original language. Graduate students will read and present on secondary scholarship and produce original research.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 4013

**ENGL 5019 (3) Survey of Contemporary Literary and Cultural Theory**
Introduces a variety of critical and theoretical practices informing contemporary literary and cultural studies.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5023 (3) Old English 3: Beowulf**
Continues to develop students' proficiency in Old English through the translation and literary study of the heroic poem _Beowulf_. Students will produce idiomatic translations for every class, write a midterm exam based on those translations, and write either a final exam or a final paper. Students will also memorize and present a short section of the poem. Graduate students will read and present on secondary scholarship and produce original research. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 4023

**ENGL 5029 (3) British Literature and Culture Before 1800**
Introduces graduate level study of medieval and/or early modern writing and/or the long eighteenth century. Topics will vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5059 (3) British Literature and Culture After 1800**
Introduces graduate level study of Romantic, Victorian, Modern, and/or Postmodern writing. Topics will vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5109 (3) Literature and Culture of the United States**
Introduces graduate level study of writing of early and/or nineteenth-century and/or twentieth-century American literature. Emphasizes a wide range of genres, forms, historical background, and secondary criticism. Topics will vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5139 (3) Global Literature and Culture**
Introduces graduate level study of recent writing in English from around the world. Emphasizes a wide range of genres, forms, new media, and secondary criticism. Cultivates research skills necessary for advanced graduate study. Topics will vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5169 (3) Multicultural/Postcolonial Studies**
Introduces graduate level study of ethnic American and/or postcolonial writing in English, including relevant theoretical discourse. Emphasizes a wide range of genres, forms, historical background, and secondary criticism. Cultivates research skills necessary for advanced graduate study. Topics will vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5199 (3) Studies in Special Topics**
Introduces graduate level study of writing of the United States from its inception to the present. Emphasizes a wide range of genres, forms, historical background, and secondary criticism. Topics will vary.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5229 (3) Poetry Workshop**
Designed to give students time and impetus to generate poetry and discussion of it in an atmosphere at once supportive and critically serious. Enrollment requires admission to the Creative Writing Graduate Program or the instructor's approval of an application manuscript.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to English Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5239 (3) Fiction Workshop**
Designed to give students time and impetus to generate fiction and discussion of it in an atmosphere at once supportive and critically serious. Enrollment requires admission to the Creative Writing Graduate Program or the instructor's approval of an application manuscript.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to English Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5259 (3) Nonfiction Workshop**
Designed to give students time and impetus to generate nonfiction and discussion of it in an atmosphere at once supportive and critically serious. Enrollment requires admission to the Creative Writing Graduate Program or the instructor's approval of an application manuscript.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5269 (3) Publishing Workshop**
Provides practical experience in the editorial, design, and business procedures of desktop publishing.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5279 (3) Studies in Poetry**
Addresses contemporary poetry, and/or literary works important for contemporary poetry.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5299 (3) Studies in Fiction**
Addresses contemporary fiction, and/or literary works important for contemporary fiction. May be repeated for up to 6 total credit hours.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5309 (3) Playwriting**
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5319 (3) Studies in Literary Movements**
Studies styles, trends, innovations and major writers in significant literary movements, particularly those after 1900, such as modernism and postmodernism.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5459 (3) Introduction to the Profession**
Introduces purposes, methods and techniques of professional scholarship in English. Provides an overview of the discipline, including traditional areas of research and recent developments. Teaches students how to use research, bibliographic, and reference tools to prepare papers for conferences and publication. Required of all MA students in English.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5529 (3) Studies in Special Topics 1**
Studies special topics that focus on a theme, genre, or theoretical issue not limited to a specific period or national tradition. Topics vary each semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5549 (3) Studies in Special Topics 2**
Studies special topics that focus on a theme, genre, or theoretical issue not limited to a specific period or national tradition. Topics vary each semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5559 (3) Studies in Special Topics 3**
Studies special topics that focus on a theme, genre, or theoretical issue not limited to a specific period or national tradition. Topics vary each semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5849 (1-6) Independent Study (Graduate Level 1)**
Independent investigation of topics of specific interest to individual students. Students wishing to enroll in independent study must petition the Associate Chair for Graduate Studies prior to the beginning of the semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 6949 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 6959 (1-9) Master's Thesis**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 7019 (3) Advanced British Literature and Culture Before 1800**
Studies special topics in medieval and/or early modern writing and/or the long 18th century. Topics will vary.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 7059 (3) Advanced British Literature and Culture After 1800**
Studies special topics in Romantic and/or Victorian, and/or modern and/or postmodern writing. Topics will vary.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 7119 (3) Advanced Literature and Culture of the United States**
Studies special topics in writing of the United States.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 7149 (3) Advanced Global Literature and Culture**
Studies special topics in recent writing in English from around the world.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 7179 (3) Advanced Multicultural/Postcolonial Studies**
Studies special topics in ethnic American and/or postcolonial writing in English, including relevant theoretical discourses. Topics will vary.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 7489 (3) Advanced Special Topics**
Studies special topics in theory, culture, and literature of any period. Topics will vary.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 7849 (1-3) Independent Study (Graduate Level 2)**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 8999 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Courses

# Creative Writing - Master of Fine Arts (MFA)

The MFA in creative writing is a three-year degree program that values literary study, innovation and writing that tests the limits of conventional forms.

The program challenges students to write in a variety of genres and to study literature from the point of view of a working writer. Recent graduates have become not only published authors of fiction, nonfiction, poetry, plays and screenplays, but also journalists, editors, publishers and college-level and secondary-level teachers.

The degree program culminates in the submission and oral defense of a creative thesis in poetry or fiction. Students may develop custom programs in nonfiction and scriptwriting with available faculty with secondary interests in those genres.

## Requirements

### Required Coursework

| Code | Title | Credit Hours |
|---|---|---|
| **Literature Courses** | | |
| Choose four: | | 12 |
| ENGL 5019 | Survey of Contemporary Literary and Cultural Theory | |
| ENGL 5029 | British Literature and Culture Before 1800 | |
| ENGL 5059 | British Literature and Culture After 1800 | |
| ENGL 5109 | Literature and Culture of the United States | |
| ENGL 5139 | Global Literature and Culture | |
| ENGL 5169 | Multicultural/Postcolonial Studies | |
| ENGL 5199 | Studies in Special Topics | |
| ENGL 5279 | Studies in Poetry | |
| ENGL 5299 | Studies in Fiction | |
| ENGL 5319 | Studies in Literary Movements | |
| ENGL 5849 | Independent Study (Graduate Level 1) | |
| ENGL 7019 | Advanced British Literature and Culture Before 1800 | |
| ENGL 7059 | Advanced British Literature and Culture After 1800 | |
| ENGL 7119 | Advanced Literature and Culture of the United States | |
| ENGL 7149 | Advanced Global Literature and Culture | |
| ENGL 7489 | Advanced Special Topics | |
| EDUC 5135 | Story and Memoir | |
| ETHN 6841 | Advanced Directed Readings in Ethnic Studies | |
| IAWP 6100 | Theory and Practice of Doing | |
| IAWP 6700 | Special Topics | |
| REES 5431 | Dostoevsky | |
| REES 5861 | Absurd and Supernatural in Russian Literature | |
| **Graduate Creative Writing Workshops** | | |
| Choose four: [1] | | 12 |
| ENGL 5229 | Poetry Workshop | |
| ENGL 5239 | Fiction Workshop | |
| ENGL 5259 | Nonfiction Workshop | |
| ENGL 5269 | Publishing Workshop | |
| ENGL 5849 | Independent Study (Graduate Level 1) | |
| **"Studies In" Courses** | | |
| Choose two: | | 6 |
| ENGL 5199 | Studies in Special Topics | |
| ENGL 5279 | Studies in Poetry | |
| ENGL 5299 | Studies in Fiction | |
| ENGL 5319 | Studies in Literary Movements | |
| ENGL 5529 | Studies in Special Topics 1 | |
| ENGL 5549 | Studies in Special Topics 2 | |
| ENGL 5559 | Studies in Special Topics 3 | |
| ENGL 5849 | Independent Study (Graduate Level 1) | |
| **Elective Courses** | | |
| Choose two: | | 6 |
| ENGL 5000 | Introduction to Applied Shakespeare | |
| ENGL 5003 | Old English 1: Introduction to Old English | |
| ENGL 5013 | Old English 2: Intermediate Old English | |
| ENGL 5019 | Survey of Contemporary Literary and Cultural Theory | |
| ENGL 5023 | Old English 3: Beowulf | |
| ENGL 5029 | British Literature and Culture Before 1800 | |
| ENGL 5059 | British Literature and Culture After 1800 | |
| ENGL 5109 | Literature and Culture of the United States | |
| ENGL 5139 | Global Literature and Culture | |
| ENGL 5199 | Studies in Special Topics | |
| ENGL 5229 | Poetry Workshop | |
| ENGL 5239 | Fiction Workshop | |
| ENGL 5259 | Nonfiction Workshop | |
| ENGL 5269 | Publishing Workshop | |
| ENGL 5279 | Studies in Poetry | |
| ENGL 5299 | Studies in Fiction | |
| ENGL 5309 | Playwriting | |
| ENGL 5319 | Studies in Literary Movements | |
| ENGL 5529 | Studies in Special Topics 1 | |
| ENGL 5549 | Studies in Special Topics 2 | |
| ENGL 5849 | Independent Study (Graduate Level 1) | |
| ENGL 7019 | Advanced British Literature and Culture Before 1800 | |
| ENGL 7059 | Advanced British Literature and Culture After 1800 | |
| ENGL 7119 | Advanced Literature and Culture of the United States | |
| ENGL 7149 | Advanced Global Literature and Culture | |

| | | |
|---|---|---|
| ENGL 7179 | Advanced Multicultural/Postcolonial Studies | |
| ENGL 7489 | Advanced Special Topics | |
| ARTF 5010 | Topics in Film Production | |
| CMDP 7300 | Theories of the Avant-Garde | |
| COMM 5435 | Readings in Community and Social Interaction | |
| DNCE 5001 | Graduate Technique | |
| ETHN 6000 | Foundations of Critical Ethnic Studies | |
| GRMN 5030 | Foundations of Critical Theory | |
| IAWP 6000 | Introduction to Practice-Based Research | |
| IAWP 6100 | Theory and Practice of Doing | |
| IAWP 6700 | Special Topics | |
| MUSC 5832 | Studies in American Music | |
| THDN 5051 | Topics in Performance Studies | |
| WGST 6190 | Feminist Methodology | |
| WRTG 5050 | Graduate Studies in Writing and Rhetoric | |
| **Thesis** | | |
| ENGL 6959 | Master's Thesis | 9 |
| **Total Credit Hours** | | **45** |

[1] Each workshop is repeatable up to 12 credits with the exception of the publishing workshop, ENGL 5269, which may only be taken once for workshop credit.

## Language Requirement

Students earning the creative writing MFA must complete a foreign language requirement, either before or after enrolling at CU Boulder, prior to the semester in which they intend to graduate. The language requirement can be met in one of the following ways:

- Complete a fourth-semester (second-semester sophomore) college language course with a grade of C or better. Completion of only freshman-level language courses does not qualify as evidence of competence.
- Take the foreign language proficiency exam administered each semester by the English department. In some cases, students may be asked to make independent arrangements for such an exam.
- Present other evidence of competency in a foreign language to the associate chair for graduate studies. In most cases, this evidence consists of native or near-native command of a language; a written exam may be administered to confirm such fluency.

## Thesis

### General Requirements

All students must complete a thesis as part of the degree requirements. The thesis should be a book of poetry, short stories, literary/creative nonfiction or a substantial portion of a novel, play or screenplay. It may also be a combination of these genres. The thesis should be at least 70 pages in length, though most students write between 70 and 150 pages. The bulk of work used in a thesis should have been written while the student was enrolled in the creative writing MFA program, and it should be in a form acceptable to the committee. The thesis must include an abstract (1 to 3 pages) that states the writer's aims and explains how the thesis reflects those aims.

Students take a total of 9 thesis hours in one or more semesters. The student should select a committee of three faculty (the advisor, who is a faculty member in the Creative Writing Department, one other creative writing faculty member and a faculty member in literary studies) during the semester prior to that in which they will defend the thesis. A rough draft of the thesis should be made available to the advisor prior to the thesis defense so that problems may be discussed at an early enough date to enable the student to work on them. The advisor will work with the student to advise them on manuscript length, suggestions for improvement and general compilation. The advisor and the student will also agree on a reading list about which the student may be questioned at the defense.

See the index in the Graduate Student Handbook (https://www.colorado.edu/english/current-students/graduates/forms-additional-information/) for the MFA-CRWR Thesis Action Item Checklist, which includes deadlines and a suggested schedule.

A thesis defense must take place before the semester's deadline for completing defenses (see the Graduate School's website (https://www.colorado.edu/graduateschool/academic-resources/graduation-requirements/) for a list of semester deadlines). A student must give their completed thesis to their entire committee and file a Master's Examination Report at least two weeks in advance of the defense. The defense is an oral examination of the thesis that lasts about an hour. All committee members must be present in person or via teleconference. A positive vote from at least two of the committee members is required to pass. A student who fails the defense may not reattempt it for at least three months, and not until any work prescribed by the committee has been completed. The student may retake the examination only once; the second exam covers the same material and includes the same committee members as the first.

### Thesis Submission and Format

The final draft of the MFA thesis must be submitted to the Graduate School by the applicable deadline and must comply with the Graduate School's specifications for theses and dissertations as described on the Graduate School's Master Graduation Information - Thesis Plan (http://www.colorado.edu/graduateschool/academic-resources/graduation-requirements/master-graduation-information-thesis-plan/) webpage. Students must include all stipulated parts of the thesis (e.g., title page, signature page, abstract, table of contents, bibliography) and are encouraged to ask the Graduate School to check the format of the thesis before they submit the final copy (gradinfo@colorado.edu).

### Candidacy and Diploma Applications for MFA

Students must submit their Candidacy Application for an Advanced Degree (https://portal.prod.cu.edu/psc/epprod/UCB3/ENTP/s/WEBLIB_CU_EFORM.ISCRIPT1.FieldFormula.IScript_Populate_eForm/?form=UCB_Registrar_Candidacy_for_Advanced_Degree) by the stipulated deadline, which is generally the third or fourth week of classes in the semester in which the student plans to graduate. The candidacy application confirms that all degree requirements will have been completed by the end of the semester. Return all forms to the graduate program assistant for signatures and submission to the Graduate School.

All students planning to graduate must apply online to graduate. This step must be completed regardless of whether the student plans to attend the commencement ceremony. See the Graduation (p. 1117) section for more information.

## Time Limit

MFA students have four years from the semester in which they are admitted and begin coursework to complete all degree requirements. To continue past four years, students must file a petition for an extension of

the time limit with the dean of the Graduate School. Such petitions must first be submitted for endorsement to the English Department's associate chair for creative writing. Extensions may be granted for up to one year.

## Learning Outcomes

By the completion of the program, students will be able to:

- Utilize their understanding of the techniques of poetry (including but not limited to metaphor, symbolism, prosody, voice, allegory, tone, form and structure) to craft poems, chapbooks and/or poetry collections as they move towards professionalization and developing a body of work. (Poetry specialization)
- Utilize their understanding of the techniques of prose (including but not limited to point of view, plot development, character development, genre, setting, tone, style, structure and voice) to craft short stories, novellas and/or novels as they move towards professionalization and developing a body of work. (Prose specialization)

# English - Master of Arts (MA)

The MA in English program is a two-year degree program focused on giving students a broad understanding of American, British and global Anglophone literature, and the current themes and methodologies in criticism and theory.

## Requirements

The degree requirements listed here are subject to change. Students wishing to pursue graduate work in English literature should visit the department's Graduate Studies (https://www.colorado.edu/english/current-students/graduates/) webpage for the most up-to-date degree requirements.

### Program Requirements

Students must complete 30 credit hours of coursework (10 courses), at least 21 of which must be taken at CU Boulder. All courses must be at the 5000 level or above. Subject to approval by the Associate Chair for Graduate Studies, up to 6 hours of coursework may be taken in departments other than English. Students may earn the MA degree in English through coursework alone; a thesis is optional.

All graduate students must follow the Graduate School's requirements for graduation (see the Graduation Requirements (http://www.colorado.edu/graduateschool/academics/graduation-requirements/) webpage).

Students will meet with the graduate program assistant at least once a year to guarantee that they are on track to meet these requirements. If a student is enrolled in a certificate program, some of these categories may be met by taking courses in other departments that are required for the certificate (with approval from the associate chair for graduate studies).

### Distribution Requirement

The courses required for the MA should be distributed as follows:

- Two courses before 1800 (courses should survey a broad range of literature from two different periods prior to 1800).
- Two courses after 1800 (courses should survey a broad range of literature from two different periods after 1800).
- One multicultural and/or postcolonial course (may overlap with req. 1 or 2).
- One poetry intensive course (may overlap with req. 1 or 2).

## Degree Plans

### Plan I: Thesis Option

Courses in the following fields are required. A requirement may be waived if a student has taken an equivalent graduate course at another institution; waivers must be approved by the associate chair for graduate studies.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ENGL 5019 | Survey of Contemporary Literary and Cultural Theory | 3 |
| ENGL 5459 | Introduction to the Profession | 3 |
| or ENGL 5529 | Studies in Special Topics 1 | |
| **Distribution Requirements** | | |
| ENGL 5029 | British Literature and Culture Before 1800 (6 total credits required) | 6 |
| ENGL 5059 | British Literature and Culture After 1800 (6 total credits required) | 6 |
| ENGL 5169 | Multicultural/Postcolonial Studies | 3 |
| Poetry Intensive [1] | | 0 |
| **Elective Courses** | | **3** |
| ENGL 5000 | Introduction to Applied Shakespeare | |
| ENGL 5003 | Old English 1: Introduction to Old English | |
| ENGL 5013 | Old English 2: Intermediate Old English | |
| ENGL 5023 | Old English 3: Beowulf | |
| ENGL 5109 | Literature and Culture of the United States | |
| ENGL 5139 | Global Literature and Culture | |
| ENGL 5199 | Studies in Special Topics | |
| ENGL 5259 | Nonfiction Workshop | |
| ENGL 5269 | Publishing Workshop | |
| ENGL 5279 | Studies in Poetry | |
| ENGL 5299 | Studies in Fiction | |
| ENGL 5309 | Playwriting | |
| ENGL 5319 | Studies in Literary Movements | |
| ENGL 5529 | Studies in Special Topics 1 | |
| ENGL 5549 | Studies in Special Topics 2 | |
| ENGL 5559 | Studies in Special Topics 3 | |
| ENGL 5849 | Independent Study (Graduate Level 1) | |
| ENGL 7019 | Advanced British Literature and Culture Before 1800 | |
| ENGL 7059 | Advanced British Literature and Culture After 1800 | |
| ENGL 7119 | Advanced Literature and Culture of the United States | |
| ENGL 7149 | Advanced Global Literature and Culture | |
| ENGL 7179 | Advanced Multicultural/Postcolonial Studies | |
| ENGL 7489 | Advanced Special Topics | |
| GRMN 5030 | Foundations of Critical Theory | |
| IAWP 6100 | Theory and Practice of Doing | |
| WRTG 5050 | Graduate Studies in Writing and Rhetoric | |
| **Thesis** | | |

| | | |
|---|---|---|
| ENGL 6959 | Master's Thesis | 6 |
| **Total Credit Hours** | | **30** |

[1] Students must take one Poetry Intensive course. The course may overlap with ENGL 5029 or ENGL 5059. The course topic each semester will determine whether or not a course will be counted as a Poetry Intensive.

A master's thesis is 50–75 pages in length, and represents an original work of literary analysis that is supported by extensive research into primary and secondary sources. It includes an abstract of 250–350 words and a bibliography, exclusive of the page length for the body of the thesis.

A master's thesis is *optional* for the MA in English; however, there are several benefits to writing a thesis:

- The student continues to develop their skills as a writer and take pleasure in literature.
- The student has have the opportunity to work directly with a faculty member of their choice in an area of the student's choosing.
- If the student plans to apply to doctoral programs in English, they can use part of their thesis as a writing sample. Since the student completes a thesis at the end of their degree program, this capstone project may reflect their current strengths as a writer better than their earlier seminar papers. Students who apply to PhD programs can also use a seminar paper or the paper revised in the professionalization seminar as their writing sample.

**The decision to write a thesis must be made by the end of the student's first year of study**. After deciding to write a thesis, the student will put together a three-person committee that includes: 1) their thesis director, who must be a member of the graduate faculty of the English Department, and 2) two other members of the graduate faculty, one of whom may be from another department. The student must establish their committee early in the thesis-writing process so committee members can work with the student to guide and develop their thesis.

It takes two semesters (each with three credits) to research and write an MA thesis. During each of these two semesters, the student's thesis hours replace elective courses necessary to complete the degree.
At least two weeks before the thesis defense, the student must give their completed thesis to their committee members and file a Master's Examination Report with the Graduate School. See the graduate program assistant for help with this process.

See the index in the Graduate Student Handbook (https://www.colorado.edu/english/current-students/graduates/forms-additional-information/) for the MA in English Thesis Action Item Checklist, which includes deadlines and a suggested schedule.

The thesis defense is an oral examination that lasts about an hour. All committee members must be present in person or via teleconference. A positive vote from at least two of the committee members is required to pass. A student who fails the defense may not reattempt it for at least three months, and not until any work prescribed by the committee has been completed. The student may retake the examination only once, and the second exam must cover the same material and include the same committee members as the first.

## Plan II: Non-Thesis Option

Courses in the following fields are required. A requirement may be waived if a student has taken an equivalent graduate course at another institution; waivers must be approved by the associate chair for graduate studies.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ENGL 5019 | Survey of Contemporary Literary and Cultural Theory | 3 |
| ENGL 5459 | Introduction to the Profession | 3 |
| or ENGL 5529 | Studies in Special Topics 1 | |
| **Distribution Requirements** | | |
| ENGL 5029 | British Literature and Culture Before 1800 (6 total credits required) | 6 |
| ENGL 5059 | British Literature and Culture After 1800 (6 total credits required) | 6 |
| ENGL 5169 | Multicultural/Postcolonial Studies | 3 |
| Poetry Intensive [1] | | 0 |
| **Elective Courses** | | **9** |
| ENGL 5000 | Introduction to Applied Shakespeare | |
| or ENGL 5003 | Old English 1: Introduction to Old English | |
| or ENGL 5013 | Old English 2: Intermediate Old English | |
| or ENGL 5023 | Old English 3: Beowulf | |
| or ENGL 5109 | Literature and Culture of the United States | |
| or ENGL 5139 | Global Literature and Culture | |
| or ENGL 5199 | Studies in Special Topics | |
| or ENGL 5259 | Nonfiction Workshop | |
| or ENGL 5269 | Publishing Workshop | |
| or ENGL 5279 | Studies in Poetry | |
| or ENGL 5299 | Studies in Fiction | |
| or ENGL 5309 | Playwriting | |
| or ENGL 5319 | Studies in Literary Movements | |
| or ENGL 5529 | Studies in Special Topics 1 | |
| or ENGL 5549 | Studies in Special Topics 2 | |
| or ENGL 5559 | Studies in Special Topics 3 | |
| or ENGL 5849 | Independent Study (Graduate Level 1) | |
| or ENGL 7019 | Advanced British Literature and Culture Before 1800 | |
| or ENGL 7059 | Advanced British Literature and Culture After 1800 | |
| or ENGL 7119 | Advanced Literature and Culture of the United States | |
| or ENGL 7149 | Advanced Global Literature and Culture | |
| or ENGL 7179 | Advanced Multicultural/Postcolonial Studies | |
| or ENGL 7489 | Advanced Special Topics | |
| or GRMN 5030 | Foundations of Critical Theory | |
| or IAWP 6100 | Theory and Practice of Doing | |
| or WRTG 5050 | Graduate Studies in Writing and Rhetoric | |
| **Total Credit Hours** | | **30** |

[1] Students must take one Poetry Intensive course. The course may overlap with ENGL 5029 or ENGL 5059. The course topic each semester will determine whether or not a course will be counted as a Poetry Intensive.

### Language Requirement

Students earning the MA in English must complete a foreign language requirement demonstrating proficiency in one foreign language, prior to the semester in which they intend to graduate. There are three options for fulfilling this requirement:

1. Take a language proficiency exam in the language of the student's choice.
2. Take two semesters of a 2000-level language course for credit and complete them with a grade of B or better (courses would be in excess of the 30 credit hours required for the degree). Summer language intensive programs at other universities can be substituted for the 2000-level course with the approval of the associate chair for graduate studies.
3. Transfer in two language courses taken at another college or university. In order to qualify, the courses must:
   a. have been taken within the last three years,
   b. be equivalent to a 2000-level language course at CU Boulder, and
   c. be passed with a grade of B or better.

Language exams are administered at least once each semester by the English department. For uncommon languages, students may be asked to make independent arrangements for their exam. The language exam consists of translating a text written in a foreign language into written English using English-language sentence structure. The text is at the reading and comprehension level of a fourth-semester student of the chosen language. Students are given two hours to complete the translation, and the exam is open book, open computer.

### Advancement to Candidacy

Students must submit their Candidacy Application for an Advanced Degree (https://portal.prod.cu.edu/psc/epprod/UCB3/ENTP/s/WEBLIB_CU_EFORM.ISCRIPT1.FieldFormula.IScript_Populate_eForm/?form=UCB_Registrar_Candidacy_for_Advanced_Degree) by the stipulated deadline, which is generally the third or fourth week of classes in the semester in which the student plans to graduate. The candidacy application confirms that all degree requirements will have been completed by the end of the semester. Return all forms to the graduate program assistant for signatures and submission to the Graduate School.

All students planning to graduate must apply online to graduate. This step must be completed regardless of whether the student plans to attend the commencement ceremony. See the Graduation (https://www.colorado.edu/graduateschool/academic-resources/graduation-requirements/) section for more information.

### Time Limit

MA students have four years from the semester in which they are admitted and begin coursework to complete all degree requirements. To continue past four years, the student must file a petition for an extension of the time limit with the dean of the Graduate School. Such petitions must first be submitted for endorsement to the associate chair for graduate studies. Extensions may be granted for up to one year.

## Learning Outcomes

By the completion of the program, students will be able to:

# English - Doctor of Philosophy (PhD)

Students pursuing a PhD in English delve deeply into language and literature, exploring answers to important literary and cultural questions. Doctoral students may choose a concentration in any area of English-language literature and pursue focused study and original scholarship in their area of specialization.

The PhD program is a five-year curriculum, including five years of funding, that comprises a language requirement and three basic components:

- coursework
- A qualifying examination
- A dissertation

For more information, visit the English Department (http://www.colorado.edu/english/) website.

## Requirements

### Admission

The PhD program offers rigorous training in critical analysis and research for professional placement. Applicants must hold either an MA or BA degree. Those with a BA who apply directly to the PhD program may also be considered for the MA program.

### Program Requirements

The degree requirements listed here are subject to change. Students wishing to pursue graduate work in English literature should visit the department's Graduate Studies (https://www.colorado.edu/english/current-students/graduates/) webpage for the most up-to-date degree requirements.

#### Years 1 & 2: Coursework

Coursework prepares PhD students to write a successful dissertation and to teach effectively in their area of specialty. Students should enroll in graduate seminars serving those ends in English or related fields. The sole requirement for coursework for the PhD is that students take a minimum of 30 credits of graduate study. All courses must be at the 5000 level or above. Students should plan their coursework in close consultation with their director, the graduate program assistant or the associate chair for graduate studies. The student's first and second years in the PhD program are usually dedicated to coursework.

Students with a master's degree can transfer up to 15 credit hours of coursework from their master's toward the 30 credit hours of coursework required for the PhD.

Sometime during the student's first year of study, they should identify a faculty member to become their director. The student and director should inform the graduate program assistant of their agreement to work together. By the student's third semester of study, they and their director should begin working on plans for the student's comprehensive exam (e.g., prospectus topics and possible texts for the reading lists).

See the index in the Graduate Student Handbook (https://www.colorado.edu/english/current-students/graduates/forms-additional-information/) for the PhD-Literature Action Item Checklist, which includes deadlines and a suggested schedule for years 1–5.

##### Language Requirement

Students earning the PhD in literature must complete a foreign language requirement demonstrating proficiency in one foreign language, prior to attempting the Comprehensive Examination. There are three options for fulfilling this requirement:

1. Take a language proficiency exam in the language of the student's choice.

2. Take two semesters of a 2000-level language course for credit and complete them with a grade of B or better (courses would be in excess of the 30 credit hours required for the degree). Summer language intensive programs at other universities can be substituted for the 2000-level course with the approval of the associate chair for graduate studies.
3. Transfer in two language courses taken at another college or university. In order to qualify, the courses must:
   a. have been taken within the last three years,
   b. be equivalent to a 2000-level language course at CU Boulder, and
   c. be passed with a grade of B or better.

Language exams are administered at least once each semester by the English department. For uncommon languages, students may be asked to make independent arrangements for their exam. The language exam consists of translating a text written in a foreign language into written English using English-language sentence structure. The text is at the reading and comprehension level of a fourth-semester student of the chosen language. Students are given two hours to complete the translation, and the exam is open book, open computer.

## Year 3: Comprehensive Examination

The comprehensive examination is a two-hour oral exam. The exam will be conducted by the student's director and the rest of the examining committee. The student will be tested on the reading lists and the dissertation prospectus. Typically, one hour of the exam is devoted to the prospectus and one to the reading lists. The order will be decided by the student's examining committee prior to the exam.

### Examining Committee

With the support of their dissertation director, the student should ask faculty to be part of their examining committee no later than one semester in advance of the term in which they plan to take the examination. The student's examining committee will consist of five members: the student's director, two English faculty members, a faculty member from another department of the student's choice, and the associate chair for graduate studies. If the associate chair for graduate studies is already a regular member of the student's committee, another English faculty member will serve in their place. The director and examining committee will work with the student to finalize the reading lists and prospectus. Both the director and examining committee should play an active role in helping the student write the prospectus and prepare for the comprehensive exam.

If the student's area of interest benefits from working with a particular instructor who is rostered in the English department, the student can petition the Graduate Committee to authorize that instructor to substitute for a faculty member of the examining committee. The instructor must also be approved by the Graduate School (see the graduate program assistant for details).

### Reading Lists

The two reading lists cover the following topics:

- **field**, or the broad context (e.g., historical, thematic, generic, technological) pertinent to the student's dissertation project; and
- **methods/texts**, literary and critical work germane to the project.

Each reading list should comprise between 25 and 40 titles and a paragraph (up to 300 words) providing a rationale for this content. The reading lists should be approved by the student's director and examination committee, and the PhD Reading List and Prospectus Approval Form should be submitted to the graduate program assistant at least one month before the exam.

### Prospectus

The prospectus presents the student's proposed dissertation project in 25 pages or less, plus notes and bibliography. Twenty-five pages is the maximum length limit; anything longer will be returned for editing. The prospectus should consist of three parts:

1. the topic, argument and statement of scholarly contribution;
2. a description of the student's method and of existing relevant scholarship; and
3. a brief chapter-by-chapter summary.

The bibliography should contain full citations of all works referenced in the prospectus, and all of these titles should appear on one of the student's reading lists. The student must submit a final draft of their prospectus to all committee members two weeks prior to the date of the comprehensive exam.

### Comprehensive Exam

The comprehensive exam will consist of a one-hour Q&A on the student's prospectus and a one-hour Q&A on the student's lists, knowledge of their field and close-reading abilities. All committee members must be present in person or via teleconference for the comprehensive examination. A positive vote from at least three of the committee members is required to pass. Upon passing the comprehensive exam and pending approval by the Graduate School, the student will advance to PhD candidacy (D status). This will allow the student to apply for dissertation fellowships and other internal funding. An unsuccessful comprehensive exam may be retaken only once, and must be retaken within six months. The second exam must cover the same material and include the same committee members as the first.

Any grades of incomplete (I) must be completed before the student schedules the comprehensive exam.

At least two weeks before taking the exam, the student must submit the Candidacy Application for an Advanced Degree (https://portal.prod.cu.edu/psc/epprod/UCB3/ENTP/s/WEBLIB_CU_EFORM.ISCRIPT1.FieldFormula.IScript_Populate_eForm/?form=UCB_Registrar_Candidacy_for_Advanced_Degree) and the Doctoral Examination Report (https://www.colorado.edu/english/sites/default/files/attached-files/doctoral_examination_report.pdf) to the graduate program assistant, who will submit them to the Graduate School for approval.

## Years 4 & 5: Dissertation

The dissertation, which should be work of professionally viable scholarship, will typically take the form of a monograph. It may contain such elements as practice-based research, curatorial or internet exhibition, fieldwork, etc. In some instances, it can combine critical and creative elements. The dissertation is written in close consultation with the student's director and dissertation committee.

The dissertation committee consists of five members: the student's director, three English faculty members, and a faculty member from another department of the student's choice. This committee is often but not always drawn from members of the student's comprehensive examination committee.

The dissertation should be at least 150 pages long, the length of a scholarly monograph.

The first chapter of the dissertation project is due to the student's director and dissertation committee no later than one semester after passing the comprehensive exam. The candidate and full committee will then meet to discuss it and create a clear itinerary for completing the dissertation. Failure either to schedule and pass the comprehensive exam or to submit the first chapter of the dissertation within the semester following the exam will result in withdrawal of teaching support and suspension from the PhD program.

**Dissertation Defense**
The dissertation defense should take place in the spring semester of the fifth year. Before the start of the spring semester, the student should schedule a dissertation defense: an oral examination and discussion lasting about 90 minutes. The student should deliver copies of their dissertation to their committee members at least one month prior to the defense date. The student must also file a Doctoral Examination Report (https://www.colorado.edu/english/sites/default/files/attached-files/doctoral_examination_report.pdf) and a Doctoral Dissertation Defense Leaflet (https://www.colorado.edu/english/sites/default/files/attached-files/doctoral_defense_leaflet.pdf) with the Graduate School at least two weeks prior to the defense. All doctoral graduation requirements and forms, including deadlines, can be found on the Graduate School's Current Students (http://www.colorado.edu/graduateschool/current-students/) webpage.

A satisfactory vote from at least four committee members is required to pass the defense. If unsuccessful, the student may retake the defense once after completion of changes or additions determined by the committee. The second exam must cover the same material and include the same committee members as the first.

**Dissertation Submission & Format**
The student must submit a final copy of their dissertation to the Graduate School by the applicable deadline for that semester, and must comply with the Graduate School's specifications for dissertations. For detailed instructions and to download an example of a formatted dissertation, go to the Graduate School's Thesis and Dissertation Specifications (http://www.colorado.edu/graduateschool/thesis-and-dissertation-specifications/) webpage. Students must include all stipulated parts of the thesis (e.g., title page, signature page, abstract, table of contents, bibliography) and are encouraged to ask the Graduate School to check the format of the thesis before they submit the final copy (gradinfo@colorado.edu).

**Dissertation Hours**
A PhD student must complete at least 30 dissertation hours to receive the degree. Dissertation hours may be taken in any semester, including before the student passes the comprehensive examination (at least 1 dissertation hour must be taken prior to passing the comprehensive exam). However, no more than 10 dissertation hours taken before the semester in which the comprehensive examination is passed will count toward the 30 dissertation hours required for the degree.

Beginning the semester after the student passes the comprehensive examination and extending through the semester in which the dissertation is successfully defended, a PhD student is required to register continuously as a full-time student for a minimum of 5 dissertation hours in the spring and fall semester of each year. A PhD student must be registered for a minimum of 5 dissertation hours in the semester (including summer semester, if applicable) in which the dissertation defense is held. A PhD student who fails to register continuously after passing the comprehensive examination must retake and pass the examination to regain status as a student in good standing in the Graduate School.

A PhD student who does not have to maintain full-time status and does not have to use campus facilities may claim off-campus status, which allows for registration of 3 credits rather than the full-time 5 dissertation credits. Off-campus status is considered part-time. Students should check with the Office of Financial Aid to see how part-time status will impact them, including the ability to receive new student loans.

**Annual Reports**
PhD students in their second year or beyond are required to submit an annual report on the progress of their PhD work by Oct. 31 of each year. These reports should be no more than one page in length and should describe both the student's dissertation project and the steps taken to advance it (e.g., courses, research, prospectus). The report must be signed by the student's director (or by the associate chair for graduate studies if the student doesn't yet have a director) prior to its submission. Students who don't have a current report on file cannot be considered in good standing. Reports should be submitted via email to the graduate program assistant.

### Time Limit
PhD students are expected to complete all degree requirements within five years from the semester in which they are admitted and begin coursework in the doctoral program. To continue beyond five years, the student must file a petition for an extension of the time limit with the dean of the Graduate School. The dissertation director and the English department's associate chair for graduate studies must endorse such petitions. Extensions may be granted for up to one year. For additional time, the student must file another petition for extension. There is no guarantee of department funding after the fifth year.

## Learning Outcomes
By the completion of the program, students will be able to:

- Engage critically in cross-disciplinary, methodological, and theoretical approaches to literary and/or cultural studies, in both written and verbal forms. These approaches include questions of race, gender, class and sexuality.
- Demonstrate proficiency in a foreign or computer language.
- Demonstrate ability to understand, develop insights into and communicate clearly about the texts, contexts and methodological frameworks relevant to their dissertation research.
- Conduct original research in their chosen field(s).
- Communicate effectively the content and significance of their research in both oral and written forms, the latter being a lengthy written work that, in total, comprises at least 150 manuscript pages.
- Demonstrate thoughtful, well-researched pedagogical skills, including lesson planning, curriculum development, assessment and the teaching of writing and literary analysis.

# Environmental Studies

Meeting the environmental challenges of the 21st century requires research, education and training that spans traditional disciplinary boundaries and emphasizes the interconnections of social and natural sciences, policy and the ethics and other social underpinnings of decision making. With numerous focal areas and connections to research centers both in and out of the academic world, ENVS provides the resources and

experiences needed by students seeking to contribute to environmental research and problem solving.

The Department of Environmental Studies awards three graduate degrees: MS, MENV and PhD. In addition to research-based MS and PhD programs, we also offer three dual degrees: an MS/MBA in collaboration with the CU Business School, and an MS/Juris Doctor and PhD/Juris Doctor in collaboration with the CU Law School.

The program is flexibly structured, giving students the opportunity to pursue diverse areas of interest, especially those that do not fall neatly within disciplinary boundaries. Opportunities for interdisciplinary graduate studies and original research leading to the MS and PhD degrees are available with a variety of emphases, including sciences, policy and values, and theory. Particular programs of study are limited only by course offerings and faculty expertise.

For updated information, visit the department's Graduate Students (https://www.colorado.edu/envs/graduate-studies-0/) webpage.

**Course codes for this program are ENVS, ENVM and OREC.**

# Master's Degrees

- Environmental Studies - Master of Science (MS) (p. 1255)
- Environmental Studies - Masters of the Environment (MENV) (p. 1253)
- Outdoor Recreation Economy - Master of Science (MS) (p. 1257)

# Doctoral Degree

- Environmental Studies - Doctor of Philosophy (PhD) (p. 1261)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Bailey, Karen (https://experts.colorado.edu/display/fisid_164881/)
Assistant Professor; PhD, University of Florida

Boykoff, Maxwell Thomas (https://experts.colorado.edu/display/fisid_147562/)
Professor, Faculty Director; PhD, University of California, Santa Cruz

Brooks, Cassandra (https://experts.colorado.edu/display/fisid_159275/)
Assistant Professor; PhD, Stanford University

Burgess, Matthew (https://experts.colorado.edu/display/fisid_164178/)
Assistant Professor; PhD, University of Minnesota

Carrico, Amanda R. (https://experts.colorado.edu/display/fisid_153054/)
Associate Professor; PhD, Vanderbilt University

Ciplet, David (https://experts.colorado.edu/display/fisid_156064/)
Assistant Professor; PhD, Brown University

Dilling, Lisa
Professor, Associate Faculty Director; PhD, University of California, Santa Barbara

Doak, Daniel Forest (https://experts.colorado.edu/display/fisid_151963/)
Endowed Chair, Associate Faculty Director, Professor; PhD, University of Washington

Hale, Benjamin Slater (https://experts.colorado.edu/display/fisid_141456/)
Associate Professor; PhD, SUNY at Stony Brook

Hartter, Joel N. (https://experts.colorado.edu/display/fisid_154043/)
Faculty Director, Professor; PhD, University of Florida

Lambert, Joanna E. (https://experts.colorado.edu/display/fisid_156206/)
Professor; PhD, University of Illinois at Urbana–Champaign

Litt, Jill S. (https://experts.colorado.edu/display/fisid_140636/)
Professor; PhD, Johns Hopkins University

Miller, Dale Lee (https://experts.colorado.edu/display/fisid_115748/)
Senior Instructor; MA, University of Colorado Denver

Miller, Steve (https://experts.colorado.edu/display/fisid_166148/)
Assistant Professor; PhD, University of California, Santa Barbara

Neff, Jason C. (https://experts.colorado.edu/display/fisid_117652/)
Professor; PhD, Stanford University

Newton, Peter (https://experts.colorado.edu/display/fisid_154466/)
Assistant Professor; PhD, University of East Anglia (England)

Pielke, Roger A. Jr. (https://experts.colorado.edu/display/fisid_104166/)
Professor; PhD, University of Colorado Boulder

Vodehnal, Carrie (https://experts.colorado.edu/display/fisid_158066/)
Instructor; PhD, Washington University in Saint Louis

Wessman, Carol A. (https://experts.colorado.edu/display/fisid_100909/)
Professor Emerita; PhD, University of Wisconsin–Madison

White, James (https://experts.colorado.edu/display/fisid_102726/)
Professor; PhD, Columbia University

York, Jeffrey Glenn (https://experts.colorado.edu/display/fisid_148387/)
Associate Professor; PhD, University of Virginia

## Courses

**ENVS 5000 (3) Policy, Science, and the Environment**
Introduction to methodologies of the policy sciences with emphasis on applications to environmental issues; role of science in decision making; professional roles and responsibilities as a policy analyst.
**Requisites:** Restricted to Environmental Studies (ENVS) graduate students only.

**ENVS 5003 (3) Conceptual Foundations of Environmental Studies**
Addresses basic theoretical questions underlying common methods employed by those conducting research in environmental science, values, and policy. The course provides a broad overview of the conceptual background relevant to work and research in environmental studies, with an emphasis on understanding many debates that have informed and challenged disciplinary research and, in so doing, shaped the interdisciplinary field of environmental studies.
**Requisites:** Restricted to Environmental Studies (ENVS) graduate students only.
**Grading Basis:** Letter Grade

**ENVS 5004 (3) Research Design in Environmental Studies**
Offers a conceptual understanding of the diverse methodological traditions used in empirical environmental research, when and why methods are deployed, and their relative strengths and weaknesses. Designed for students pursuing interdisciplinary environmental careers or those looking for a broad foundation prior to specializing. Emphasizes foundational research skills of developing a research question, scientific writing, interdisciplinary collaborations, and science communication. Formerly offered as a special topics course.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 5050 (3) Theories of the Policy Process**
Examines the public policy process, including the influences and actors that shape policy outcomes. Focuses on the major theories, frameworks, and models of policy change, along with emerging scholarship that challenges, refines, and advances the theory.
**Requisites:** Restricted to graduate students only.

**ENVS 5100 (1-3) Special Topics in Environmental Studies**
A variety of topics not currently offered in curriculum; offered depending on instructor availability and student demand.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ENVS 5110 (1-3) Topics in Environmental Social Science and Humanities**
Covers various topics in the social sciences and humanities in environmental studies.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to Arts and Sciences, Journalism, Law or Business Graduate Students only.

**ENVS 5120 (1-3) Topics in Quantitative Methods**
Covers a wide range of quantitative methods used in policy research and their applications. Topics may include decision-making under uncertainty, fundamentals of microeconomics, mathematics of economic efficiency, cost-benefit analysis, system optimization, budgeting, fundamentals or probability, risk assessment, risk perception, risk communication, and decision analysis. Includes practical exercises, as well as readings and discussion, of various strengths and weaknesses of the different methods.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ENVS 5135 (3) Dogs, Wolves, and Humans**
Humans have a closer and longer history with ancestral and domestic dogs than any other animal species. Ironically, the closest living relative of dogs (wolves) remain one of the world¿s most persecuted species ¿ an issue that rages today throughout the United States, including Colorado. This class centers on the biology of domestication, evolution of behavior, canid paleontology and genetics, wolf conservation, and the evolutionary, social, and cultural significance of wolves and dogs to humans.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 4135
**Recommended:** Prerequisite ANTH 2010 or EBIO 1030 or EBIO 1210 or EBIO 1220 or EBIO 2040 or ENVS 2000.

**ENVS 5155 (4) Ecosystem Ecology**
Integrates information from physics (energetics), chemistry (element properties) and biology (evolutionary traits, photosynthetic pathways) to understand the structure and functioning of ecosystems. Provides an analysis of biotic community responses and feedbacks to environmental change drivers. Strong focus on water, nutrient cycling and carbon dynamics of diverse terrestrial and aquatic landscapes.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4155, EBIO 5155 and ENVS 4155
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 5240 (3) Environmental Philosophy**
A survey of the major philosophical issues in environmental studies, comprising key issues in environmental ethics, in environmental political philosophy and in the philosophy of biology and ecology.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5240
**Requisites:** Restricted to Environmental Studies (ENVS) graduate students only.

**ENVS 5340 (4) Conservation Biology and Practice in Brazil's Atlantic Forest**
Field Studies. Examines the application of conservation principles in the Atlantic Forest of Brazil, a 'biodiversity-in-crisis' setting. Explores successful conservation strategies integrated with efforts to alleviate socioeconomic issues. Three-week Maymester, Study Abroad Global Seminar.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 4340, EBIO 4340 and EBIO 5340
**Recommended:** Prerequisites EBIO 2040 or ENVS 2000 or 2000/higher-level course in ANTH, EBIO, ENVS, EVEN, GEOG, IAFS or other discipline related to ecology or sustainability.
**Grading Basis:** Letter Grade

**ENVS 5510 (1) Environmental Studies Colloquia Series**
All first year ENVS graduate students are required to attend the ENVS Colloquia Series. Speakers from around the world and within the department cover topics in all areas of Environmental Studies.
**Repeatable:** Repeatable for up to 2.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Environmental Studies (ENVS) graduate students only.
**Grading Basis:** Pass/Fail

**ENVS 5520 (1-3) Seminar in Environmental Studies**
Addresses current topics in Environmental Studies. Provides forum for students to critically evaluate the primary literature on a particular theme.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 5701 (3) Policy, Politics and Management: Foundations**
Examines concepts related to policy and regulatory processes, institutions and management of the environment and natural resources. Explores environmental laws at the international, national, state and local levels as well as how the processes and institutions at various levels of government help shape laws and their implementation. Focuses on policy tools including property rights, regulation, voluntary compliance and market-based mechanisms.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 5702 (3) Environmental Governance: Actors and Institutions**
Provides an examination of environmental governance issues across scales, from local to global. Focuses on foundational theory while critically examining empirical case studies of success and failure in managing common pool resources. Emphasizes understanding the role of diverse actors and institutions in driving environmental outcomes. Students will obtain practical tools and skills towards facilitating environmental sustainability of natural resources across scales.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 5740 (3) Context-Sensitive Research Methods**
Prepares students to conduct research on topics where data is not obvious or not easily available. Encompasses variations in context and setting as part of data observations. Methods include interviewing protocols, interpretive methods, cluster analyses, case study methodologies and textual analyses.
**Equivalent - Duplicate Degree Credit Not Granted:** PSCI 7116
**Requisites:** Restricted to graduate students only.

**ENVS 5750 (3) Climate Politics and Science-Policy**
Explores, understands and critically analyzes influences and trends in climate politics and science-policy. Course participants will gain an improved understanding of the myriad factors, pressures and processes that are involved in contemporary climate politics undergirding explicit policy proposals. Course participants will more capably identify consequential spaces of decision-making, recognize tractable places for change and fashion constructive strategies for their own research by way of best available evidence from work done in these areas. Overall, our attention to these course themes, concepts and case studies will help us to more capably understand, analyze and engage in the high-stakes 21st century arena of climate politics and science-policy. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVM 5750, GEOG 5750 and SOCY 5750
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 5760 (2) Inclusive Pedagogy**
Classroom instructors have a critical role in promoting student success through inclusive teaching approaches. This graduate seminar will prepare graduate students in key areas of inclusive teaching. Students will explore questions like: How can you foster a class climate that supports a sense of belonging for all students? How can clear and transparent learning outcomes promote student success for all students? How can course assignments and teaching strategies contribute to inclusive teaching? Students will also examine the literature on inclusive teaching and create a teaching statement that integrates aspects of inclusivity.
**Grading Basis:** Letter Grade

**ENVS 5810 (3) Water Resources and Environmental Sustainability**
Assesses impacts of climate variability and regional growth on western U.S. water resources, and examines successes and failures of different management strategies, as well as ways that science is used and misused in support of water management.
**Requisites:** Restricted to Arts and Sciences, Journalism, Law or Business Graduate Students only.

**ENVS 5820 (3) Energy Policy in the 21st Century**
Examines energy policy and the problem of sustainability through a variety of disciplinary and topical perspectives: historical, political, behavioral, techno-economic and legal. A critical approach is applied to arguments about energy policy processes, systems and desired outcomes, with special emphasis on the role of renewable and sustainable energy in the changing global system.
**Requisites:** Restricted to graduate students only.

**ENVS 5830 (3) Critical Issues in Climate and the Environment**
Discusses current issues such as ozone depletion, global warming and air quality for graduate students in nonscientific fields. Provides the scientific background necessary to understand, follow scientific developments and critically evaluate these issues.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4800 and ATOC 5000

**ENVS 5840 (3) Global Biogeochemical Cycles**
Focuses on the cycling of elements at the global scale with a particular emphasis on human modification of biogeochemical cycles. Major biogeochemical cycles, their past dynamics, present changes and potential future scenarios will be addressed. Ecosystem to global-scale model of the earth system will be discussed, along with global-scale measurements of element fluxes from satellites, aircraft and measurement networks.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5305
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite general chemistry, some organic chemistry.

**ENVS 5909 (1-3) Independent Study**
Only 3 hours of independent study can be used towards degree requirements.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**ENVS 5930 (2) Internship**
Provides academically supervised opportunities for environmental studies majors to work in public and private organizations on projects related to the students' research and career goals, and to relate classroom theory to practice.

**ENVS 6007 (3) Foundations of Environmental Sociology**
Provides overview of environmental sociological theory and research including topics such as: public environmental perception, concern, and knowledge; environmentalism as a social movement; environmental justice; energy, technology, and risk; human dimensions of environmental change; and natural hazards and disasters.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 6007

**ENVS 6201 (3) Qualitative Research Methods for Environmental Studies**
Introduces students to research design, data collection and analysis methods. Exploration of the rationale underlying the use of various methods, the skills needed to employ qualitative method and the process of designing a research protocol will provide graduate students with a sound foundation to begin their own thesis research.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 6222 (2-3) Environmental Decision-Making**
Explores the foundational issues that underlie agency decision-making, including environmental ethics, cost-benefit analysis, risk assessment, constitutional law and administrative law. Compares and contrasts National Environmental Policy Act and the National Historic Preservation Act and the Endangered Species Act.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 7222
**Grading Basis:** Letter Grade

**ENVS 6301 (3) Environmental and Energy Economics**
Introduces non-economists to the study of energy markets, environmental externalities, economic regulation and public policy. This applied course uses examples from electricity generation, renewable energy, manufacturing, transportation and other energy intensive industries. A variety of policy instruments will be studies, including: technology standards, subsidies, environmental mandates, rate-based policies, emissions taxes and cap-and-trade systems.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 6302 (3) Sustainable Landscapes, Sustainable Livelihoods**
Examines rural transformation and the adoption of recreation economies in communities across the U.S. West in response to burgeoning recreation industry and interest in public lands. Students will evaluate different approaches for developing and managing recreation economies in small towns that consider diverse social, cultural, economic, and environmental constraints as well as opportunities in a time of rapid change. Project-based course. Students learn techniques to gather and synthesize data that support solution development.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVM 6302
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 6303 (3) Transportation and Sustainable Cities**
Examines the problem of organizing transportation systems from a variety of perspectives and explores how transportation decisions get made at a variety of scales, from local to national. Covers some of the dramatic changes coming from technological innovation in arenas like vehicle electrification, autonomous vehicles and the potential shift from individual vehicle ownership to shared mobility.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 6304 (3) Introduction to Food Systems Internationally**
Introduces students to contemporary food system challenges a the global scale, the course will first identify key historic and projected trends, to set the scene for the remainder of this specialization. Second it will draw on international case studies to explore some of the institutional, technological and market responses to food system challenges across the globe.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 6305 (3) Reducing the Environmental Impact of Food Systems: Evidence-Based Solutions**
Explores the evidence and ideas underlying some of the most important contemporary food system debates. We will ask: in enhancing the environmental sustainability of food systems, what do the data tell us about the roles that can be played by genetically engineered food, organic agriculture, local food systems, changes to animal agriculture, and reductions in food waste? Students will draw on peer-reviewed research to address the science, policy, and ethical dimensions of these topics.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.

**ENVS 6950 (1-6) Master's Thesis**

**ENVS 7118 (3) Foundations of Environmental Justice**
Examines environmental justice movements, policies, institutions, objectives, and scholarship. Identifies factors that contribute to environmental inequality, and efforts to reduce it. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** COMM 7118, GEOG 7118 and PSCI 7118
**Requisites:** Restricted to graduate students only.

**ENVS 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

# Environment - Master of the Environment (MENV)

The Master of the Environment (MENV) Graduate Program at the University of Colorado Boulder is an innovative, interdisciplinary professional master's degree that equips students with the knowledge, skills and experience necessary to address the complex environmental challenges of the 21st century. This 21-month, immersive, cohort-based graduate program develops students into leaders in a wide range of careers in conservation, consulting, energy, natural resources, planning, policy, sustainability and more.

The MENV program focuses on application and problem solving, and the curriculum is comprised of four components:

- One core course
- Required specialization courses in one of five specializations
- Electives
- Four Capstone courses, including the MENV Capstone Project

Throughout the program, students develop and hone their skills and leadership capacities through experiential learning, theory and foundational knowledge building, professional development opportunities, career mentoring and capstone project in lieu of a thesis.

Students become conversant in the language, knowledge, theory, techniques and methodologies of various disciplines while developing general analytical skills, problem-solving abilities and the adaptability that is indispensable to professional and career success.

MENV provides a foundation of multidisciplinary knowledge and communication and analytical skills that enable students to address increasingly complex sustainability challenges in a wide range of professional careers.

In addition, the MENV program values a diversity of backgrounds, experiences and perspectives, and is deeply committed to diversifying our student body, faculty and staff; improving the equity of our systems; and creating an inclusive culture in the program, on CU Boulder's campus and in the environmental sector at-large.

For more information, visit the Master of the Environment (http://www.colorado.edu/menv/) website.

# Requirements

## Application Requirements

To be considered for the MENV program, students must have a four-year bachelor's degree from an accredited U.S. institution or the international equivalent. We recommend a minimum of one year of professional experience or applicable training prior to applying. The MENV program selects students who we believe will achieve academic and professional success while adding value to the graduate community. The MENV program selects talented and diverse candidates through a holistic review of the application materials. Decisions are based on academic and professional backgrounds, as well as individuals' potential to contribute both inside and outside of the classroom.

## Program Requirements

Students must complete at least 48 credit hours of coursework during the 21-month program, to include:

- Core course
- Required specialization courses in one of five specializations
- Electives
- Four Capstone Courses, including MENV Capstone Project

### Courses

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| ENVM 5018 | The Scientific Basis of Environmental Change | 3 |
| ENVM 6001 | Capstone Innovation Lab 1 | 1 |
| ENVM 6002 | Capstone Innovation Lab 2 | 2 |
| ENVM 6003 | Capstone Project | 5 |
| ENVM 6004 | Capstone Leadership Lab | 1 |
| **Specialization Coures** | | **12** |
| **Elective Courses** | | **24** |
| **Total Credit Hours** | | **48** |

### Capstone Project

All MENV students complete a twelve-month capstone project. These projects provide students with hands-on experiences embedded within an external sponsoring organization while also providing client organizations with specific solutions to identified environmental, sustainability and business challenges. Deliverables might include management plans, models, analyses, prototypes or proof-of-concept projects.

# Program Tracks

## Environmental & Natural Resources Policy (https://www.colorado.edu/menv/academics/specializations/environmental-natural-resources-policy/)

Students learn how to identify and apply the best processes and tools to solve environmental and natural resource problems using a combination of theory, case studies, and practice.

| Code | Title | Credit Hours |
|---|---|---|
| ENVM 5013 | Environmental Governance: Actors and Institutions | 3 |
| ENVM 5014 | Foundations of Environmental Policy and Management | 3 |
| ENVM 5016 | Science, Politics, and Policy | 3 |
| ENVM 6100 | Special Topics for Master of the Environment Program (Environmental Justice in Law and Practice) | 3 |

## Renewable & Sustainable Energy (https://www.colorado.edu/menv/academics/specializations/renewable-sustainable-energy/)

This specialization track is intended for those interested in careers in the clean energy transition, from renewable energy and e-mobility development, to energy and sustainability consulting, to climate action planning.

Students must take a total of four RSE courses (12 credits), including two required classes and two other RSE courses.

| Code | Title | Credit Hours |
|---|---|---|
| **Required** | | |
| ENVM 5006 | Sustainable Energy Policy | 3 |
| ENVM 5007 | Energy Systems and Technologies | 3 |
| **Optional** | | |
| Choose two: | | 6 |
| ENVM 5027 | Microgrids and Distributed Energy Resources | |
| ENVM 5042 | Renewable Energy Development & Project Finance | |
| ENVM 5062 | Zero Carbon Buildings | |
| ENVM 5072 | Energy Markets, Transactions and Policy | |
| **Total Credit Hours** | | **12** |

## Sustainable Food Systems (https://www.colorado.edu/menv/academics/specializations/sustainable-food-systems/)

The Sustainable Food Systems specialization track will train students to approach key food system challenges critically and innovatively.

| Code | Title | Credit Hours |
|---|---|---|
| **Required** | | |
| ENVM 5029 | Food & Agriculture Policy in the United States | 3 |
| ENVM 5038 | Nourishing Humanity within Planetary Boundaries - Intro to Food Systems | 3 |
| ENVM 5043 | Benefit Cost Analysis | 1 |
| ENVM 5044 | Life Cycle Assessment - Bringing Objectivity into Subjective Conversations | 1 |
| ENVM 5045 | Introduction to Monitoring & Evaluation | 1 |
| **Optional** | | |
| ENVM 5028 | Supply Chain Management for Food and Fiber | 3 |
| ENVM 5051 | Humans, Environment, and Justice | 3 |
| ENVM 5063 | Agroecology | 3 |
| ENVM 5068 | Qualitative Methods for Sustainability | 3 |

| | | |
|---|---|---|
| ENVM 5079 | The Science and Practice of Sustainable Agriculture | 3 |

### Sustainability in the Outdoor Industry (https://www.colorado.edu/menv/academics/specializations/sustainability-outdoor-industry/)

The SOI Specialization prepares its students to successfully engage with and be future leaders in the outdoor recreation industry. We view the outdoor recreation industry holistically, encompassing the intersection of outdoor recreation businesses, public lands policy and resilient communities. Students will receive foundational understanding in each of these areas and will develop the necessary skills and knowledge to bring about innovative, sustainable and equitable solutions to the challenges and opportunities facing the outdoor recreation industry today.

| Code | Title | Credit Hours |
|---|---|---|
| **SOI Required Courses** | | |
| ENVM 5064 | Introduction to Sustainability in the Outdoor Industry | 3 |
| ENVM 5065 | Community Economic Development and the ORE | 3 |
| ENVM 5066 | Environmental Stewardship: Practice and Law | 3 |
| ENVM 5078 | Sustainable Business Practice | 3 |
| **SOI Elective Options** | | |
| ENVM 5067 | Building Community Capacity | 3 |
| ENVM 5074 | Conservation Management: Policies, Leadership and Best Practices | 3 |
| ENVM 5076 | Entrepreneurship and Applied Project Management | 3 |
| ENVM 5077 | Circular Economy and Sustainability | 3 |

### Urban Resilience & Sustainability (https://www.colorado.edu/menv/academics/specializations/urban-resilience-sustainability/)

The Urban Resilience and Sustainability (URS) specialization prepares students for careers as resilience and sustainability leaders, designing, implementing and leading resilience and sustainability policies, programs and plans for communities and companies.

| Code | Title | Credit Hours |
|---|---|---|
| Students will choose four courses: | | |
| ENVM 5012 | Water, Climate, and Sustainable Cities | 3 |
| ENVM 5026 | Sustainable Land Use and Development: Principles and Practices | 3 |
| ENVM 5030 | Planning for Resilient Futures | 3 |
| ENVM 5041 | Sustainability & Resilience in Practice | 3 |
| ENVM 5050 | Social Innovation and Sustainable Cities | 3 |
| ENVM 5052 | Transportation, Mobility & Sustainable Cities | 3 |
| **URS Elective Options** | | |
| ENVM 5040 | MENV Clinic | 3 |
| URS students are also required to take two electives from other MENV specializations. | | |
| ENVM 6100 | Special Topics for Master of the Environment Program (Climate Action Planning for Cities) | 3 |

## Learning Outcomes

By the completion of the program, students will be able to:

- Understand and analyze the systems, frameworks and concepts that contribute to and determine sustainability (i.e., environmental, economic and societal) outcomes.
- Identify the opportunities, levers and solutions that different stakeholders can implement to strategically drive positive change.
- Engage critically with different viewpoints and values to develop a deeper, more nuanced understanding of the tradeoffs implicit in sustainability decision-making.
- Demonstrate the professional skills and knowledge required to drive change and impact in sustainability and related fields through real-world projects and applications.
- Work collaboratively and effectively within teams and with external stakeholders.
- Students will communicate effectively to a variety of audiences through different mediums.

# Environmental Studies - Master of Science (MS)

The ENVS Master of Science program provides advanced training in a setting that prioritizes cross-disciplinary perspectives and problem-oriented scholarship. Our goal is to deliver the knowledge and skills needed to confront 21st century environmental challenges. MS students complete coursework that spans the natural and social sciences, values and ethics, and policy. Students gain specialized research skills by writing and defending an original master's thesis.

For additional information and resources for ENVS graduate students, visit the Environmental Studies Program website (https://www.colorado.edu/envs/graduate-studies/policies-and-guidance-documents/).

## Requirements

To earn an MS in Environmental Studies, students must complete 30 hours of coursework and successfully defend an original master's thesis in front of a committee of three faculty members for the MSI option. For the MSII option, the student must write an original research paper and defend the content of this paper before 3 faculty members.

### Required Courses

In addition to the courses recommended by their guidance committee, students in both degree options will complete the following required courses:

- ENVS 5000 Policy, Science, and the Environment
- ENVS 5003 Conceptual Foundations of Environmental Studies
- ENVS 5004 Research Design in Environmental Studies

## Plan(s) of Study

The Master of Science program provides advanced training in a setting that prioritizes cross-disciplinary perspectives and problem-oriented scholarship. Our goal is to deliver the knowledge and skills needed to

confront 21st century environmental challenges. MS students complete coursework that can span the natural and social sciences, values and ethics. Students gain specialized research skills by writing and defending an original master's thesis.

To earn an MS in Environmental Studies, students must complete 30 hours of coursework and successfully defend an original master's thesis or research paper in front of a committee of three faculty members. The master's degree must be completed within four years. Most students complete the MS degree with two and a half years. In option I, students must complete a Masters' thesis that presents original research. In option II, the student writes a research paper and defends it, but does not present original research. The major milestones are as follows.

### Guidance Committee Meeting

During the first six weeks of a student's first semester, a guidance committee of at least three faculty members will examine a student's past academic and professional record and recommend a program of coursework for that student.

## Degree Plans

### Plan I: Thesis Option

#### Thesis Proposal Meeting

Students must assemble a thesis committee of three faculty members and propose an original research project that will form the basis of the student's thesis. The thesis proposal meeting is typically held at the end of the student's first academic year.

#### Thesis Defense Meeting

The student will present the findings from their thesis project and respond to questions from the committee. The thesis defense meeting is typically held at the end of the student's fourth semester.

### Plan II: Non-Thesis Option

#### Independent Research Paper

The student will write a paper (i) describing either their own research conducted during the course of their graduate career in ENVS, or (ii) reviewing a related topic of interest to them. The student must obtain approval for the topic of this paper from all three faculty members on their advisory committee and the Associate Graduate Chair for ENVS. The paper should cover the conceptual background of their topic and also detail work done by the student while a graduate student or alternatively present a clear plan of analysis for how the topic could be addressed. While this paper should meet high scholarly standards, it is not expected to be as long or comprehensive as a research MS thesis.

#### Final Oral Exam

The student must schedule two hours for this exam, which is conducted by their three member advisory committee that meets Graduate School examination committee requirements. This exam will consist of questions pertaining to the independent research paper, including content of the paper and background ideas and theory. The exam may also cover coursework.

## Dual Degree Programs

### MS/MBA in Environmental Studies and Leeds School of Business

The ENVS Masters of Science program provides advanced training in a setting that prioritizes cross-disciplinary perspectives and problem-oriented scholarship. Our goal is to deliver the knowledge and skills needed to confront 21st century environmental challenges, this includes skills in business management and entrepreneurship. For these reasons, the Leeds School of Business and the Environment Studies Program collaborate to offer a dual MS/MBA degree program.

This dual degree program requires 36 credit hours of graduate coursework in environmental studies and 43 credit hours of MBA coursework (with 12 credit hours of environmental studies coursework applying toward the required 55 credit hours for the MBA). The MBA program will be considered the student's primary program. For more information, visit the Business School's MS/MBA (https://www.colorado.edu/business/mba/full-time-mba-program/curriculum/dual-degrees/) webpage.

### MS/JD or PhD/JD in Environmental Studies and Colorado Law

Those who wish to pursue advanced degrees across these fields have the option of two dual degree programs: MS/JD and PhD/JD. Students will complete coursework in the core areas of the law, the natural and social sciences, values and ethics, and policy. Graduates of the dual degree program in law and environmental studies have the skills to impact future policies in government, industry and nonprofits or to pursue research-focused careers.

This dual degree is offered in conjunction with the Law School. The Law School will grant credit for acceptable performance in graduate-level environmental studies courses toward the JD degree for up to 9 (for MS students) or 12 (for PhD students) credit hours of the required 89 credit hours for the JD degree. Environmental studies will grant up to 9 (for MS students) or 12 (for PhD students) credit hours of acceptable performance in law courses. The JD program will be considered the student's primary program. For more information, visit the Law School's MS/Juris Doctor and PhD/Juris Doctor (https://www.colorado.edu/law/academics/degrees/dual-degrees-and-certifications/) webpage.

## Internship Options for MS/MBA & MS/JD Students

Students pursuing one of the dual degree programs complete 36 graduate credit hours, including a 2-credit Internship for which a substantial internship report is written. A thesis is not required; however, dual degree students may opt to complete one.

Students who opt for this degree plan must complete the candidacy application (https://portal.prod.cu.edu/psc/epprod/UCB3/ENTP/s/WEBLIB_CU_EFORM.ISCRIPT1.FieldFormula.IScript_Populate_eForm/?form=UCB_Registrar_Candidacy_for_Advanced_Degree) by the posted Graduate School deadline. These forms require the signatures of the student's advisor and graduate director. Copies of the forms must be filed with the graduate coordinator. Both degrees must be completed simultaneously.

## Learning Outcomes

Among the knowledge and skills that we seek to provide to every student are:

- The ability to evaluate environmental policy goals in the context of competing societal objectives.
- Fundamental knowledge of the relevant environmental sciences to be intelligent users of scientific information.

- The ability to integrate knowledge from multiple disciplines in the context of complex environmental issues.
- An understanding of the local, state and federal decision processes that shape environmental issues.
- Familiarity with international governance and decision-making frameworks.
- The ability to think critically, creatively and holistically about environmental issues.
- The ability to work in interdisciplinary teams.
- Skill in communication with diverse audiences.

# Outdoor Recreation Economy - Master of Science (MS)

The Master of Science in Outdoor Recreation Economy (MORE) is an interdisciplinary, applied master's degree that prepares professionals to become creative, thoughtful leaders across the outdoor recreation economy sector. The program leverages University of Colorado Boulder's academic excellence and experience in professional graduate education, as well as the State of Colorado's deep connection with the outdoor recreation economy. The program is industry responsive, creates widespread access and provides innovative, fully online learning opportunities.

The program provides skills and knowledge to students and learners from a variety of backgrounds who are interested in the outdoor industry, community building, making the outdoors more inclusive, and the public lands and natural resources policy sectors. The scope of the MORE curriculum addresses five key overlapping areas:

1. Outdoor recreation industry: Wholesalers, manufacturers, tour operators and guides provide hardware and services for people to take advantage of open spaces and recreate. Increasingly, the outdoor industry can motivate consumer spending toward sustainability and public lands stewardship. Students who complete this focus will receive a background in sustainability, resilience, outdoor recreation and business fundamentals.
2. Public lands policy: Policies and regulations that govern access and sustainable use are imperative for the appropriate use, conservation and enjoyment of public lands. Students who complete this focus will emerge with knowledge and practical experience in these areas, ready to address the new policy challenges facing public lands.
3. Building resilient communities through the outdoor recreation economy: How can communities ensure that development is not something that just happens to them, but rather is something that is instigated from within? How can communities ensure that development builds upon community strengths and assets and reflects the needs and wants of all its members? What skills, knowledge and tools do communities need to have at their disposal to inspire action and take charge of their future and become more livable, resilient and sustainable? Students who complete this focus will gain the knowledge and skills to advance in the important role that outdoor recreation can play to support communities in building their capacity for change and taking proactive steps to improve their economic prospects and quality of life.
4. Sustainable leadership: Businesses in the outdoor recreation economy that develop sustainable, innovative products, services and inclusive practices are positioned to lead the next generation of leaders and enthusiasts in a dynamic and fast-growing sector in the economy. Students gain the knowledge and skills necessary to successfully integrate purpose-driven leadership, business acumen, inclusivity and sustainability into outdoor recreation industry operations and entrepreneurial ventures.
5. Inclusivity in the outdoor recreation: Starting with a safe space for deep learning, honest exploration and open dialogue, this certificate focuses on developing a more welcoming and inclusive outdoor recreation economy and expanding access to the outdoors to everyone. Students who complete this focus will gain tools, resources, strategies and best practices to effectively lead the transition to a more equitable outdoor industry.

In addition to knowledge specific to outdoor recreation, sustainable leadership, public lands policy, inclusivity in the outdoors and resilient communities, students will gain career-relevant skills in project management, communication and systems thinking. The knowledge and skills gained in the MORE program will immediately prepare students to advance in their current careers or gain employment in the outdoor industry.

For more information, visit the Master of Science in Outdoor Recreation Economy (https://www.colorado.edu/program/ore/) website.

# Requirements

## Admissions Requirements

Admission to the Master of Outdoor Recreation Economy degree will conform to the requirements set by the Graduate School. No coursework may be transferred into this program.

## Required Courses and Credits

The master's degree requires a minimum of 30 credit hours of graduate-level coursework, with a minimum cumulative GPA of 3.0. To earn their degree, students must complete the foundational (Introduction to the ORE) certificate and ***one*** of the following:

- Two additional certificates (with a 4 credit project course relevant to both certificates).
- One additional certificate (with a 4 credit project course) and four elective courses.

Each certificate has a distinct curriculum and courses may not be double counted toward more than one certificate. Students may take the certificates in any order; however, it is recommended that students new to the outdoor recreation economy start with the Introduction certificate, which provides foundational knowledge in the areas of policy, sustainability, inclusivity and community development.

For this degree, students are not required to complete a thesis, capstone project or final examination. A synchronous (remote, live) project course is required to complete each certificate. This project course represents a culmination of the certificate where students apply the concepts, knowledge and skills gained in the subject courses. Project courses aim to develop and implement innovative strategies, processes and solutions on an experiential outdoor recreation project.

### Courses

| Code | Title | Credit Hours |
|---|---|---|
| OREC 5000 | Introduction to the Outdoor Recreation Economy | 2 |
| OREC 5001 | Sustainability Practices within the Outdoor Recreation Economy | 2 |

| | | |
|---|---|---|
| OREC 5002 | Leading Sustainable Change in the Outdoor Recreation Economy | 2 |
| OREC 5003 | Outdoor Recreation Project Tools and Skills | 2 |
| OREC 5004 | Environmental Justice and Stewardship | 2 |
| OREC 5005 | Issues in Public Lands | 2 |
| OREC 5006 | Issues in Natural Resources Management | 2 |
| OREC 5008 | Strategies for Resilient Outdoor Recreation Economy Communities | 2 |
| OREC 5010 | Tools for Resilient Outdoor Recreation Economy Communities | 2 |
| OREC 5012 | Strategic Leadership in the Outdoor Recreation Economy | 2 |
| OREC 5013 | Circular Economy and Integration of Sustainable Business Practices | 2 |
| OREC 5015 | Building an Outdoor Recreation Enterprise | 2 |
| OREC 5016 | Foundations of Environmental Law and Culture | 2 |
| OREC 5017 | Environmental Movements, Alliances, and Legal Change | 2 |
| OREC 5018 | Community and Place Matters | 2 |
| OREC 5019 | Building Community Capacity and Readiness for the Outdoor Recreation Economy | 2 |
| OREC 5020 | The Business of Outdoor Recreation | 2 |
| OREC 6100 | Special Topics for Outdoor Recreation Economy | 2 |
| OREC 5021 | Foundations of Inclusivity in the Outdoor Recreation Economy | 2 |
| OREC 5022 | Cultivating Belonging and Accountability in the Outdoor Recreation Economy | 2 |
| OREC 5023 | Inclusive Leadership and Conscious Change in the Outdoor Recreation Economy | 2 |
| OREC 5024 | Social Justice and Equity in the Outdoor Recreation Economy | 2 |
| OREC 5030 | Concepts and Practice in the Outdoor Recreation Economy: Project Course | 4 |

## Plan(s) of Study

The Master of Outdoor Recreation Economy (MORE) degree pathway offers flexibility to support working professionals. This degree program is offered entirely online and is composed of stackable certificates, each worth 10 credit hours. To earn the MORE degree, candidates complete three certificates, for a total of 30 credit hours, or two certificates and four elective courses.

The MORE degree offers a foundational (Introduction) certificate taken by all students (which includes a 2 credit project) and a range of additional topic-focused certificates. Students must complete either two additional certificates (with a 4 credit project relevant to both certificates) or one additional certificate (with a 4 credit project) and four elective courses. Each certificate consists of four asynchronous subject courses and one synchronous (live, remote) project course related to the relevant content areas, skills, tools and leadership practices of the sector. Students may complete certificates in parallel or sequentially. In addition, students may finish certificates as they are able, and may stack the certificates to complete the degree. Students may also elect to continue and complete additional certificates.

Visit each certificate's catalog page to learn more:

- Introduction to the Outdoor Recreation Economy - Graduate Certificate (p. 1259)
- Public Lands and Natural Resources Policy - Graduate Certificate (p. 1260)
- Building Resilient Communities through the Outdoor Recreation Economy - Graduate Certificate (p. 1258)
- Leading a Sustainable Business in the Outdoor Recreation Industry - Graduate Certificate (p. 1260)
- Inclusivity and Belonging in the Outdoor Recreation Economy - Graduate Certificate (p. 1259)

## Learning Outcomes

By the completion of the program, students will be able to:

- Understand and apply various economic, legal, political, environmental, socio-cultural, ethical and inclusive perspectives to the outdoor recreation economy.
- Develop foundational knowledge and apply skills in inclusive leadership, critical analysis, project management, stakeholder engagement, shared goal development and communication.
- Complete a project that successfully integrates coursework concepts and delivers solutions to problems and opportunities in the outdoor recreation economy space.

# Building Resilient Communities through the Outdoor Recreation Economy - Graduate Certificate

How can communities ensure that outdoor recreation-focused development is not something that happens to them, but rather is something that builds upon community strengths and assets and reflects the needs and wants of its members? What skills, knowledge and tools do communities need to have at their disposal to inspire action and take charge of their future and become more livable, resilient and sustainable? This certificate addresses these questions by examining how communities can build their capacity for change through the outdoor recreation economy and take proactive steps to improve their economic prospects and quality of life. Examples of the many and varied strategies and tools for outdoor recreation development, alongside the various benefits and challenges associated with its implementation, are also examined. Focus is given to community-led and focused economic development, sustainable destination management best practices and the important role that outdoor recreation can play in addressing equity and quality of life issues within marginalized and disadvantaged communities, all of which are central to the creation of resilient and engaged communities.

## Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Subject Courses (Asynchronous)** | | |
| OREC 5018 | Community and Place Matters | 2 |

| | | |
|---|---|---|
| OREC 5008 | Strategies for Resilient Outdoor Recreation Economy Communities | 2 |
| OREC 5010 | Tools for Resilient Outdoor Recreation Economy Communities | 2 |
| OREC 5019 | Building Community Capacity and Readiness for the Outdoor Recreation Economy | 2 |
| **Project Course (Synchronous)** | | |
| OREC 5011 | Outdoor Recreation Economy Community Economic Development Project | 2 |
| Students must complete the four subject courses before enrolling in the project course. | | |

## Learning Outcomes

By the completion of the program, students will be able to:

- Recognize the importance of community and place and their role in building resilient communities.
- Critically evaluate and apply theoretical concepts to real-world examples of building resilient communities through outdoor recreation.
- Communicate the importance of the outdoor recreation economy in the building of sustainable and resilient communities.
- Assess the various strategies through which outdoor recreation can contribute to community economic development and building resilience.
- Assist communities in identifying and implementing appropriate tools to develop the outdoor recreation economy.
- Build community capacity to assist with the implementation of sustainable and resilient outdoor recreation-based community economic development.
- Lead representative, inclusive and meaningful stakeholder participation and engagement processes.
- Communicate and engage with community, industry and government leaders in a professional manner.

# Inclusivity and Belonging in the Outdoor Recreation Economy - Graduate Certificate

The Inclusivity in the ORE graduate certificate focuses on developing a more welcoming and inclusive outdoor recreation economy and expanding access to the outdoors to everyone by offering students tools and strategies to effectively lead the transition to a more equitable outdoor industry. Students enrolled in the certificate will learn global best practices in inclusivity through coursework, resources and access to thought leaders who are guiding global organizations to a more diverse and inclusive future. The certificate has the intention to create a safe space for deep learning, honest exploration, and open dialogue.

## Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Subject Course (Asynchronous)** | | |
| OREC 5021 | Foundations of Inclusivity in the Outdoor Recreation Economy | 2 |
| OREC 5022 | Cultivating Belonging and Accountability in the Outdoor Recreation Economy | 2 |
| OREC 5023 | Inclusive Leadership and Conscious Change in the Outdoor Recreation Economy | 2 |
| OREC 5024 | Social Justice and Equity in the Outdoor Recreation Economy | 2 |
| **Project Course** | | |
| OREC 5025 | Inclusivity and Belonging in the Outdoor Recreation Economy Project Course | 2 |
| **Total Credit Hours** | | **10** |

## Learning Outcomes

By the completion of the program, students will be able to:

- Communicate the importance of diversity, equity, inclusion and access within the outdoor recreation economy.
- Identify opportunities for increasing access and inclusion within the outdoor recreation economy.
- Lead outdoor industry organizations in developing diverse and inclusive recruiting and hiring practices.
- Recognize and champion the outdoor recreation economy's role in addressing issues of diversity, equity, inclusivity and outdoor access in all communities.
- Play a leadership role in creating a natural environment where all people feel not only welcome but encouraged to become active participants as outdoor enthusiasts, industry professionals and stewards dedicated to the protection of the land.

# Introduction to the Outdoor Recreation Economy - Graduate Certificate

In the Master of Outdoor Recreation Economy (p. 1257) (MORE) graduate degree program, the outdoor recreation economy is viewed holistically. It links public lands, the communities that sit alongside them and the outdoor recreation industry.

This certificate explores the interaction between these nodes of the outdoor recreation economy and lays the foundation for the MORE degree program. Courses in the certificate introduce public lands and natural resources policy, challenges and opportunities for community economic development, and inclusive leadership skills for the outdoor recreation industry. This certificate is required for attainment of the MORE degree.

## Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Subject Courses (Asynchronous)** | | |
| OREC 5000 | Introduction to the Outdoor Recreation Economy | 2 |
| OREC 5001 | Sustainability Practices within the Outdoor Recreation Economy | 2 |
| OREC 5016 | Foundations of Environmental Law and Culture | 2 |
| OREC 5002 | Leading Sustainable Change in the Outdoor Recreation Economy | 2 |

| | | |
|---|---|---|
| **Project Course (Synchronous)** | | |
| OREC 5003 | Outdoor Recreation Project Tools and Skills | 2 |
| While students may take the Introduction certificate courses in any order, it is recommended to complete the four subject courses before enrolling in the project course. | | |

## Learning Outcomes

By the completion of the program, students will be able to:

- Be versed in major topics related to the outdoor recreation economy.
- Understand different approaches – economic, legal, political, environmental, sociocultural, ethical and inclusivity – to analyze trends, challenges and opportunities in the outdoor recreation economy space.
- Identify connections between stakeholders in the outdoor recreation economy.
- Have an understanding of career pathways in the outdoor recreation economy.
- Evaluate sustainability practices across the outdoor recreation economy.
- Gain skills relevant to the outdoor recreation economy, such as project planning, critical analysis and communication.

# Leading a Sustainable Business in the Outdoor Recreation Industry - Graduate Certificate

The outdoor recreation industry sector includes outdoor recreation product manufacturers, supply chains, retailers, lodging and transportation services, guides and resort operators, among a host of others. Demand for advanced outdoor technical apparel, footwear and equipment drives innovation and entrepreneurism. It creates jobs for highly skilled workers in diverse fields such as technology, product design, manufacturing, sustainability and global commerce. In addition to product and service innovation, the sector needs a talent pipeline that understands policy, community economic development and sustainability. Many parts of the industry are committing more resources to social responsibility, community support and environmental sustainability—but do not have the talent sophistication to effectively integrate these objectives.

This certificate provides the knowledge and tools to better integrate sustainability into outdoor recreation industry operations.

## Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Subject Courses (Asynchronous)** | | |
| OREC 5012 | Strategic Leadership in the Outdoor Recreation Economy | 2 |
| OREC 5013 | Circular Economy and Integration of Sustainable Business Practices | 2 |
| OREC 5015 | Building an Outdoor Recreation Enterprise | 2 |
| OREC 5020 | The Business of Outdoor Recreation | 2 |
| **Project Course (Synchronous)** | | |
| OREC 5014 | Outdoor Recreation Business Project | 2 |
| Students must complete the four subject courses before enrolling in the project course. | | |

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate knowledge in leadership, business, corporate social responsibility, community engagement and environmental sustainability.
- Develop the ability to meet the workforce needs of an increasingly diverse, complex and global outdoor recreation industry.
- Gain knowledge to apply entrepreneurial concepts to the creation of an outdoor recreation venture.
- Critically examine and implement industry best practices in the development of an outdoor industry venture.
- Identify and communicate with relevant outdoor recreation stakeholder groups.
- Develop and implement strategies to take advantage of opportunities within the Outdoor Recreation Economy.
- Understand the operational life-cycles of a variety of outdoor recreation businesses.
- Analyze current and future consumer trends within the outdoor recreation industry.
- Understand the principles and ideas behind a circular economy.

# Public Lands and Natural Resources Policy - Graduate Certificate

With over 640 million acres of land in the United States owned by the federal government, and significant holdings by both state and local governments, public lands are a venue ripe for opportunity and conflict.

This certificate examines critical and emerging issues on public lands and natural resources management across the U.S. Following an overview of the structure of public lands management, including federal land management designations, agencies and major laws and policies relevant to public lands management, the certificate transitions into issue-based discussions of challenges facing public lands management as well as potential opportunities for resolution. The certificate also explores the role of federal, state, tribal, and local government, business, non-governmental organizations, and the general public in the environmental policy process.

## Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Subject Courses (Asynchronous)** | | |
| OREC 5004 | Environmental Justice and Stewardship | 2 |
| OREC 5005 | Issues in Public Lands | 2 |
| OREC 5006 | Issues in Natural Resources Management | 2 |
| OREC 5017 | Environmental Movements, Alliances, and Legal Change | 2 |
| **Project Course (Synchronous)** | | |
| OREC 5007 | Public Lands and Natural Resources Policy Project | 2 |

Students must complete the four subject courses before enrolling in the project course.

## Learning Outcomes

Upon completing the program, students will be able to:

- Summarize significant public lands and natural resources policy as well as how public lands and natural resources are managed.
- Describe the roles that government, businesses, non-governmental organizations and interested parties play in crafting and influencing public lands and natural resources policy.
- Explain the importance of policy processes in addressing conflicts over natural resources and public lands conflicts.
- Analyze the role of environmental movements in shaping policy related to public lands and natural resource management.
- Examine how environmental justice frameworks intersect with the outdoor recreation economy.

# Environmental Studies - Doctor of Philosophy (PhD)

The doctoral program in ENVS gives students the opportunity to pursue a research-based degree situated in a program that prioritizes cross-disciplinary perspectives and problem-oriented scholarship. PhD students are trained to become independent researchers, usually working closely with one or more faculty advisors and committee members. PhD students complete coursework that spans the natural and social sciences, values and ethics, and policy. Students develop an independent line of research through their dissertation project and other collaborations over the course of their graduate career. Students within the program conduct research in a variety of environmental fields, usually working closely with one or more faculty advisors and committee members.

While a student's research project shapes much of their graduate career, coursework, colloquia and other activities are also key parts of the graduate experience. This is particularly important in ENVS as all these endeavors provide the breadth of knowledge that is key for those seeking to contribute to environmental research and management.

For more information, visit the program's PhD webpage. (https://www.colorado.edu/envs/graduate-studies/graduate-programs/phd-program/) View the department website for additional graduate student resources (https://www.colorado.edu/envs/graduate-studies/policies-and-guidance-documents/).

### Degree Requirements

To earn a PhD in Environmental Studies, students must complete 30 hours of coursework plus an additional 30 hours of dissertation credit hours. Major milestones are outlined below.

### Guidance Committee Meeting

During the first six weeks of a new student's first semester, a guidance committee of at least three faculty members will examine a student's past course record (from undergraduate and past graduate work) and devise a program of coursework for that student.

### Required Coursework

In addition to the courses recommended by their guidance committee, students will complete the following required courses:

- ENVS 5000 Policy, Science, and the Environment
- ENVS 5003 Conceptual Foundations of Environmental Studies
- ENVS 5004 Research Design in Environmental Studies

### Preliminary Examination

This written exam tests a student's understanding of material from the ENVS core classes, as well as the breadth and depth of their knowledge in their chosen fields of inquiry. The preliminary exam is typically taken in the student's fourth or fifth semester.

### Prospectus Defense

The prospectus defense is designed to evaluate a student's dissertation research plan. At the prospectus defense meeting, the committee also will review the student's completion of coursework assigned in previous committee meetings. The prospectus defense should be scheduled in the student's fifth or sixth semester.

### Dissertation Defense

A doctoral student writes a dissertation based upon original investigation and showing mature scholarship and critical judgment as well as familiarity with tools and methods of research. The defense consists of both a public presentation and a closed door meeting with the committee.

## Learning Outcomes

By the completion of the program, students will be able to:

- The ability to evaluate policy goals in the context of competing societal objectives.
- Fundamental knowledge of the relevant environmental sciences to be intelligent users of scientific information.
- The ability to integrate knowledge from multiple disciplines in the context of complex environmental issues.
- An understanding of the local, state, and federal decision processes that shape environmental issues.
- The ability to think critically, creatively, and holistically about environmental issues.
- The ability to work in interdisciplinary teams.
- Skill in communication with diverse audiences.

## Dual Degree Program

### PhD/JD in Environmental Studies and Colorado Law

In today's politically influenced world, it is especially important to understand both the sciences necessary to protect and improve the environment as well as environmental laws and policies. This dual degree brings together the social, economic and political realities that will so dramatically affect the future of our natural world. This program seeks to ensure that environmental studies will have its due impact on the formation of future policies and will not remain on the sidelines as crucial new decisions are being made.

Graduates of the dual degree program in law and environmental studies are well prepared to work in government, in industry or with special programs. Students should review the requirements to complete a JD degree as outlined by the School of Law. (https://www.colorado.edu/law/academics/degrees/dual-degrees-and-certifications/)

For more information visit the Environmental Studies programs Dual Degree webpage. (https://www.colorado.edu/envs/graduate-studies/graduate-programs/dual-degrees-msjd-and-phdjd/)

### Degree Requirements

A student enrolled in the dual degree program may commence studies under the program in either school. However, a student is required by the Law School to take the first year of the JD curriculum as a unit exclusively in the Law School. To complete the PhD portion of the degree, students must complete 32 hours of coursework (including the required courses listed above) plus an additional 30 hours of dissertation credit hours. Students must complete both degrees simultaneously.

# Ethnic Studies

The Department of Ethnic Studies at the University of Colorado Boulder is dedicated to centering the epistemologies, histories and lived experiences of marginalized communities of color and Indigenous nations in order to challenge and critique all forms of oppression and to advance emancipatory, self-determining futures for all people. Ethnic Studies is an interdisciplinary field that is built upon four core disciplinary pillars of scholarship: Africana studies, Native American & Indigenous studies, Asian American studies and Chicanx/Latinx studies. Our department stresses the unique contributions and perspectives of each pillar, while training our students to think and research across them in transdisciplinary, intersectional and critical ways. We draw upon our strengths in engaged scholarship and culturally-sustaining pedagogy to examine how race and the interrelated categories of culture, ethnicity, indigeneity, gender, class, sexuality, religion, dis/ability and legal status impact the past and present lives of people locally, regionally and globally.

**Course code for this program is ETHN.**

## Doctoral Degree

- Critical Ethnic Studies - Doctor of Philosophy (PhD) (p. 1265)

## Certificate

- Critical Ethnic Studies - Graduate Certificate (p. 1266)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Aldama, Arturo James (https://experts.colorado.edu/display/fisid_130739/)
Associate Professor, Chair; PhD, University of California, Berkeley

Belknap, Joanne Elizabeth (https://experts.colorado.edu/display/fisid_113617/)
Professor Emerita; PhD, Michigan State University

Browsh, Jared Bahir (https://experts.colorado.edu/display/fisid_163451/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Carroll, Clinton R. (https://experts.colorado.edu/display/fisid_154726/)
Associate Professor, Associate Chair; PhD, University of California, Berkeley

Dupris, Joseph
Visiting Assistant Professor; Ph.D., University of Arizona

Ho, Jennifer (https://experts.colorado.edu/display/fisid_165744/)
Professor; PhD, Boston University

King, William M.
Professor Emeritus

Lawson, Angelica Marie (https://experts.colorado.edu/display/fisid_154727/)
Assistant Professor; PhD, University of Arizona

Maeda, Daryl Joji (https://experts.colorado.edu/display/fisid_141460/)
Professor; PhD, University of Michigan Ann Arbor

Nyeck, S.N. (https://experts.colorado.edu/display/fisid_169704/)
Associate Professor; Ph.D., University of California-Los Angeles

O'Neal, Shawn Trenell (https://experts.colorado.edu/display/fisid_165586/)
Teaching Assistant Professor; M.A., University of Colorado Denver

Ordaz, Jessica (https://experts.colorado.edu/display/fisid_159142/)
Assistant Professor; PhD, University of California, Davis

Rabaka, Reiland (https://experts.colorado.edu/display/fisid_141463/)
Professor; PhD, Temple University

Rios, Gabriela (https://experts.colorado.edu/individual/fisid_167679/)
Assistant Professor; PhD, Texas AM University

Sepúlveda, Enrique (https://experts.colorado.edu/display/fisid_159858/)
Assistant Professor; PhD, University of California, Davis

Sohi, Seema (https://experts.colorado.edu/display/fisid_144616/)
Associate Professor; PhD, University of Washington

Upadhyay, Nishant (https://experts.colorado.edu/display/fisid_166101/)
Assistant Professor; PhD, York University

Villanueva, Nicholas (https://experts.colorado.edu/display/fisid_158252/)
Assistant Professor, Associate Chair; PhD, Vanderbilt University

Walker, Deward E. Jr
Professor Emeritus

## Courses

**ETHN 5001 (3) Screening Race, Class & Gender in the U.S. and the Global Borderland**
Engaging with the ways in which race, class, gender and sexual oppression intersect, this class examines several film productions by and about diasporic and subaltern subjects (especially children and women) in the U.S./Mexico borderlands, and the urban ethnic metropoles of the global borderlands.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4001 and CINE 4001
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Crosscultural/Comparative Studies

**ETHN 5009 (3) Chicana/os and Education**
Chicana/o and Mexican-origin communities make up the largest and oldest of U.S. Latinx peoples. In many urban school districts across the country they make up the majority of the school enrollment; yet they are grossly underrepresented in higher education. This course will examine the socio-historical, cultural, and political contexts that have shaped the educational experiences of Chicana/os in the U.S. including issues of race, language learning and identity formation as they intersect with nation building. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4009
**Requisites:** Restricted to graduate students only.

**ETHN 5102 (3) Special Topics in Africana Studies**
Variable topic that allows intensive coverage of a subject, theme, or issue in African American studies.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4102
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Africana Studies

**ETHN 5106 (3) Special Topics in Chicana and Chicano Studies**
Examines a particular topic, theme, issue or problem concerning Chicana and Chicano studies.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4106
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chicana/o Studies

**ETHN 5116 (3) Spoken Word Latinx Poetics and Poetry**
This is a writing intensive workshop in contemporary poetry writing and Chicana/o and Latina/o poetics-specifically, Nuyorican and Afro-Latino (the Nuyorican Poets Cafe). The purpose of the course is dual-fold: 1) students will be encouraged and empowered to express and develop their poetic voice; 2) students will be challenged to develop and refine their poetic craft. Examines primarily Chicana and Latino specific poetic expression that reflects the cultural mestizaje of Chicano/a and Latina/o peoples.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4116
**Recommended:** Requisite 6 credits in any ETHN class.
**Additional Information:** Departmental Category: Chicana/o Studies

**ETHN 5233 (3) Native American and Indigenous Environmental Issues**
Explores the unique knowledges, practices and perspectives of Native American and Indigenous peoples with regard to environmental issues, and how they both contrast with and complement dominant ways of knowing. Views central themes of Land, Plants, Animals, and Air/Water through political-ecological lenses. Critically assesses historical and contemporary Indigenous environmental matters in the contexts of colonial histories and tribal sovereignty.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4233
**Recommended:** Prerequisite ETHN 1023 or ETHN 2013.
**Additional Information:** Departmental Category: American Indian Studies

**ETHN 5272 (3) W.E.B. Du Bois Seminar**
Analyzes the life and thought of W.E.B. Du Bois for its contributions to interdisciplinary and intersectional studies. Emphasis will be placed on the innovative interdisciplinary and intersectional nature of Du Bois's epistemology and research methodology, as well as his participation in radical political and social movements.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4272
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Africana Studies

**ETHN 5306 (3) The Chicana and Chicano and U.S. Social Systems**
Gives special attention to ways U.S. institutions (i.e., legal, economic, educational, governmental and social agencies) affect Chicanas and Chicanos. Discusses internal colonialism, institutional racism, assimilation and acculturation, and identity.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4306
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chicana/o Studies

**ETHN 5353 (3) Indigenous Traditions and Law: A Global Perspective**
Explores intersections of indigenous religions and law through historical and contemporary case studies. American Indian and Hawaiian contexts will be featured, as well as the study of the United Nations Declaration on the Rights of Indigenous Peoples and its recent implementation in places as diverse as Bolivia, Norway and Nagaland. Theoretical issues in the academic study of religion and ethnic studies will be emphasized.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4353 and RLST 4353 and RLST 5353
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 5552 (3) The Harlem Renaissance: Fr Black Wmn's Club Mvmnt to Hip Hop**
Offers an interdisciplinary and intersectional overview of the origins and evolution of the Harlem Renaissance. Explores classic texts, music and works of art emerging from the Harlem Renaissance and related events and movements of its epoch: the Black Women's Club Movement, New Negro Movement, Pan-African Movement, Lost Generation, Jazz Age, World War I and World War II.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4552 and HUMN 4552
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Africana Studies

**ETHN 5553 (3) Indigenous Representations in the United States**
Examines the relationship and negotiation of culture/status/place through representation(s) within and concerning Indigenous peoples/ communities. Focuses on U.S. representational forms in popular experiences e.g., literature, film, media and the roots of those representations via legal and medical definitions. This investigation and analysis is supplemented with focus on gender as well as contextualization through global Indigenous portrayals.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4553
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: American Indian Studies

**ETHN 5632 (3) Frantz Fanon Seminar**
Analyzes the life and thought of Frantz Fanon for its contributions to interdisciplinary and intersectional studies. Emphasis will be placed on the innovative interdisciplinary and intersectional nature of Fanon's psychology, sociology and philosophical anthropology, as well as his participation in African and Caribbean anti-colonial movements.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4632
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Africana Studies

**ETHN 5714 (3) Sport for Social Justice**
Takes a look at the nuanced and controversial relationship between sport and peace. Although sport is heralded as a powerful tool for social good, drawing attention to causes such as conflict resolution, HIV prevention, environmental initiatives and improved international relationships, it also continues to reflect and reproduce social inequalities in ways commonly overlooked.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4714
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 5951 (3) Senior/Graduate Seminar in Ethnic Studies**
Capstone experience in Ethnic Studies. Includes an independent research project and public presentation.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4951
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 6000 (3) Foundations of Critical Ethnic Studies**
Examines theories of race, ethnicity, gender, sexuality, colonialism and globalization, especially from the perspectives of communities most impacted by these categories and processes. This is the introductory course for graduate work in Critical Ethnic Studies.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 6001 (3) Research Methods in Critical Ethnic Studies**
Examines various humanistic and social science research methodologies and applies critical frameworks (including feminist, queer, Indigenous and decolonial theories) to research through an intersectional lens committed to analyzing race, class, gender and sexuality as interconnected, knowledge-producing systems of power. Examines how Ethnic Studies scholars can engage with social justice projects by producing knowledge in cutting edge ways.
**Requisites:** Requires prerequisite course of ETHN 6000 (minimum grade C). Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 6002 (1) Professionalization Seminar in Comparative Ethnic Studies**
Provides graduate students with professionalization skills, including how to prepare a national fellowship application, how to give a successful job talk, how to publish refereed journals and book volumes and how to approach the academic job market.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to Ethnic Studies (ETHN) graduate students only.
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 6011 (3) Race and Sexuality Studies**
Examines primary texts in queer studies and queer theory while challenging colonial heteronormative and homonormative studies that exclude queers of color and their life experiences. Readings include works by Gloria Anzaldua, Jose Munoz, Audre Lorde, David Eng, Judith Butler, Judith Halberstam, and Michel Foucault. Topics such as queer borderlands, citizenship, racialized and transgender identities will be interrogated.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 6014 (3) Gender, Race, Class, and Crime**
Examines crime and the criminal legal system practices through the lens of intersecting oppressions, particularly racism, sexism, heterosexism and classism.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 7014
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 6100 (3) Race and Citizenship in U.S. History and Culture**
Examines how the cultural and legal bounds of U.S. citizenship have been linked to race, gender, labor, class, and sexuality. Analyzes the experiences of racialized and gendered groups to explore the racial formations, exclusions and contradictions inherent with the institution of citizenship.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 6101 (1-6) Topics: Specialized Comparative Studies**
Focuses on a variety of advanced interdisciplinary studies. Themes include: Race and Sports, Critical Whiteness Studies, Race and Masculinity, Applied Community Engagement, Black Women in the Diaspora, US/Mexico Border Cultures, Criminalization and Latinas/os, Race, Violence and Film, and Cuba and Tourism.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Requisite ETHN coursework.
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 6103 (3) Indigenous Thought and Theory: Foundations in NAIS**
Introduces the theoretical landscapes of Native American and Indigenous Studies. Explores debates, methodologies and concerns that ground the field and provides critical engagement with Indigenous communities and knowledges. Teaches standards for evaluating scholarly sources based on criteria derived from the most outstanding recent scholarship in the field. Requires writing and thinking critically about issues of concern for global indigenous communities.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: American Indian Studies

**ETHN 6110 (3) Adv Tpcs: Chicana/o Studies: US/Mexico Borderlands**
Examines complex histories, cultural practices and liminal, 3rd spaces of the US and Mexico borderlands; racial and gender identities; community formations. Considers a range of autobiographic testimony narratives, films, social and legal studies, and theories of subjectivity that engage with the politics of representation vis a vis the criminalization of Chicana/o and ethnic youth, immigrants and those perceived to be immigrants.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 6110
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Chicana/o Studies

**ETHN 6301 (3) Decolonial/Postcolonial Theory**
Offers an overview of the origins and evolution of Decolonial/Postcolonial Theory. Critically compares and contrasts decolonial discourse with postcolonial theory. Exposes students to the ways in which decolonial and postcolonial theory conceptually interconnect via Cultural Studies, Critical Race Studies and Ethnic Studies-derived discourses such as racial colonialism, the critique of European imperialism, transnationalism feminism, Indigeneity/Indigenous Studies, Diaspora Studies and Subaltern Studies.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 6501 (3) Critical Race Theory: Soc Scnc Explrtn/Intrvntn into Crit Race St**
Offers an overview of the origins and evolution of Critical Race Theory (CRT). Critically compares and contrasts legal and extralegal social science approaches to CRT. Exposes students to the ways in which CRT and Critical Ethnic Studies conceptually interconnects via CRT-derived discourses such as Critical Race Feminism, Critical White Studies, TribalCrit, LatCrit, AsianCrit, DesiCriti, QueerCrit and Decolonial/ Postcolonial Critical Race Theory.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 6841 (1-6) Advanced Directed Readings in Ethnic Studies**
This is a graduate level directed readings course designed to expand student knowledge in a particular area of concentration with a broad interdisciplinary and comparative framework. These areas of concentration include work in Africana, American Indian, Asian American, Chicana and Chicano and Transnational/Hemispheric ethnic studies.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for a minimum of 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

# Critical Ethnic Studies - Doctor of Philosophy (PhD)

The PhD program in critical ethnic studies offers an innovative path to provide students with broad training to enable them to research and analyze the intersectional and relational workings of race, ethnicity, culture, indigeneity, gender, class, sexuality, religion, dis/ability and legal status in local, regional and global contexts. It provides flexibility for students to pursue their individual research interests, while ensuring that they are grounded in both the foundational and cutting-edge theories in ethnic studies.

The department is dedicated to interrogating the relational nature of race and its attendant categories, particularly gender and sexuality, using frameworks that account for the increasingly global ways that these categories are constructed, resisted and inhabited. However, we believe that rigorous critical as well as relational analyses can only grow out of deep groundings in the particular areas of Africana, Asian American, Chicanx/Latinx and Native American/Indigenous studies. Methodologically and theoretically, our faculty members possess training and expertise in interdisciplinary fields, including ethnic studies; women, gender and sexuality studies; environmental studies; critical sports studies; critical and intersectional criminology; cultural studies; literary and film studies; border studies; and American studies; as well as traditional disciplines, including anthropology, history, education, religious studies and sociology.

## Requirements

Doctoral students are expected to demonstrate an ability to independently carry out original field research, acquire original data, make appropriate analyses and prepare reports of publishable caliber. Students must demonstrate proficiency in a broad subject of learning and the ability to critically evaluate work in ethnic studies. The PhD program is comprised of three basic components: coursework, a comprehensive examination and the dissertation.

A master's degree in ethnic studies or a cognate field (e.g., American studies, English, history, sociology, women's and gender studies, or other related disciplines and interdisciplinary fields) from an accredited university is required for admission into the PhD program.

### Transfer of Credit

Students will be permitted to transfer a maximum of 9 credit hours. The Associate Chair of Graduate Studies (ACGS) will examine the academic transcripts of admitted students to determine transfer credits where appropriate. Students must submit a syllabus for each course to be considered for transfer, and follow the steps listed in the department's Graduate Student Handbook.

### Required Courses and Credits

Students must complete 60 credit hours, with a minimum of 30 credit hours of graduate-level coursework (including any transferred graduate credit from the completed master's degree referenced above). At least 18 of the 30 credit hours of graduate-level coursework must come from the Department of Ethnic Studies.

All doctoral students are required to complete the fall and spring sequence, ETHN 6000/ETHN 6001: Foundations in Comparative Ethnic Studies and Methods in Comparative Ethnic Studies (6 credits total, 3 per semester). The introductory, two-semester course will prepare doctoral students for interdisciplinary studies on race, ethnicity, gender, class, indigeneity, sexuality and culture. The first semester will be a theoretical introduction and the second semester will examine research methodologies and application of theories to research.

In addition to the two introductory courses, students will be required to enroll in a 1-credit professionalization seminar (ETHN 6002), which is a two-semester course offered by the Ethnic Studies Department that meets once a month during the academic year.

The remaining required credit hours of graduate-level coursework will be selected in consultation with the student's advisor from among ETHN graduate offerings, graduate courses in other units and approved transfer credit up to 9 credit hours.

### Areas of Specialty

The department encourages, but does not require, that students complete a minimum of 9 credits of graduate-level coursework in an area of specialty. Depending on their research interests, students will create an area of study which may include, but is not limited to: Native American & Indigenous studies, Africana studies, Asian American studies, Chicanx/Latinx studies and criminology. Thematic subfields allow students to develop a thematic framework (e.g. "Decolonial Theory," "Diaspora and Labor Migration" or "Borderlands") in which they will specialize. Students will work in consultation with their advisor to develop an area of specialty, which will be highly individualized to suit students' particular research interests.

### Dissertation Credits

In addition to the 30 credit hours of graduate-level coursework, students must complete a minimum of 30 dissertation credits in total: 5–10 during comprehensive examination preparation and 5–10 per semester when defending the prospectus and writing the dissertation. Students must be registered for a minimum of five dissertation hours the semester (including summer semester) in which the comprehensive exam/dissertation defense is held. Students are not permitted to register for more than 10 credit hours of dissertation credit per semester, per Graduate School rules.

### Language Requirement

The department encourages, but does not require, non-English language proficiency, especially for students conducting research in contexts that extend beyond their existing abilities. Proficiency will be demonstrated by passing (with a grade of C or better) the fourth semester of a non-English language course, earning a passing score on the Graduate School Foreign Language Test (GSFLT), or by an alternative mode of assessment agreed to by the Graduate Committee. Credits earned for language proficiency will not apply toward the doctoral degree. The goals of the language requirement are to ensure that doctoral scholars can research materials in other languages besides English. The department will work with the Graduate School to ensure that the language requirements are in parity with other interdisciplinary doctoral programs at CU Boulder.

## Continuous Registration

A PhD student is required to register continuously as a full-time, regular degree-seeking student at CU Boulder for a minimum of five credit hours in the fall and spring semesters of each year. Students must be registered for a minimum of 5 dissertation hours per semester beginning with the semester following the passing of the comprehensive examination and extending through the semester in which the dissertation is successfully defended (final examination). A student who fails to register continuously after passing the comprehensive examination must retake and pass the examination to regain status as a student in good standing in the Graduate School.

For additional details, visit the department's PhD Program (http://www.colorado.edu/ethnicstudies/grad/phd_program.html) webpage and download the Graduate Student Handbook.

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate expertise in one or more of the core areas of Critical Ethnic Studies, including knowledge of intersectional, interdisciplinary and liberation-oriented theoretical frameworks integral to the discipline.
- Demonstrate proficiency in diverse research methodologies illustrating the unique multi-method and multi-disciplinarity of Critical Ethnic Studies.
- Design, conduct and synthesize original research in their core area/areas.
- Effectively communicate research (motivation, methodology and results) to academic and public audiences and forums in written, oral and other creative formats.
- Conduct meaningful pedagogical engagement with students and community stakeholders.

# Critical Ethnic Studies - Graduate Certificate

The 12-credit graduate certificate in critical ethnic studies is an interdisciplinary course of study designed to complement the MA or PhD curriculum required by the student's home department within CU Boulder. The Department of Ethnic Studies (DES) offers the certificate to provide specialized training in Africana studies, Asian American studies, Chicanx/Latinx studies, Native American and Indigenous studies, decolonial feminist studies, comparative ethnic studies, race and sexuality studies, and transnational/hemispheric ethnic studies to students pursuing degrees in various disciplines on the CU Boulder campus.

# Requirements

## Application Requirements

Students must submit an unofficial transcript and a two-page statement of purpose describing how their graduate interests will be enhanced by our course offerings and mentoring (in the statement of purpose, please identify classes already taken in DES).

To participate in the ethnic studies certificate program, applicants must maintain good academic standing with their home unit within the Graduate School. Their home unit must also indicate its support for the student enrolling in the certificate program.

Materials should be sent to grad.ethnst@colorado.edu.

## Program Requirements

A total of 12 credit hours of graduate-level coursework is required for this certificate, nine of which must be from courses in the Department of Ethnic Studies (ETHN 6000 and two electives). Certificate program students must maintain a minimum GPA of 3.3.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Course** | | |
| ETHN 6000 | Foundations of Critical Ethnic Studies | 3 |
| **Electives** | | |
| Choose three graduate-level electives, at least two of which are from the Department of Ethnic Studies. Approved elective courses include: | | 9 |
| ETHN 5001 | Screening Race, Class & Gender in the U.S. and the Global Borderland | |
| ETHN 5009 | Chicana/os and Education | |
| ETHN 5102 | Special Topics in Africana Studies | |
| ETHN 5106 | Special Topics in Chicana and Chicano Studies | |

| | |
|---|---|
| ETHN 5272 | W.E.B. Du Bois Seminar |
| ETHN 5306 | The Chicana and Chicano and U.S. Social Systems |
| ETHN 5353 | Indigenous Traditions and Law: A Global Perspective |
| ETHN 5552 | The Harlem Renaissance: Fr Black Wmn's Club Mvmnt to Hip Hop |
| ETHN 5553 | Indigenous Representations in the United States |
| ETHN 5632 | Frantz Fanon Seminar |
| ETHN 5714 | Sport for Social Justice |
| ETHN 5951 | Senior/Graduate Seminar in Ethnic Studies |
| ETHN 6001 | Research Methods in Critical Ethnic Studies |
| ETHN 6011 | Race and Sexuality Studies |
| ETHN 6014 | Gender, Race, Class, and Crime |
| ETHN 6100 | Race and Citizenship in U.S. History and Culture |
| ETHN 6101 | Topics: Specialized Comparative Studies |
| ETHN 6103 | Indigenous Thought and Theory: Foundations in NAIS |
| ETHN 6110 | Adv Tpcs: Chicana/o Studies: US/Mexico Borderlands |
| ETHN 6301 | Decolonial/Postcolonial Theory |
| ETHN 6501 | Critical Race Theory: Soc Scnc Explrtn/ Intrvntn into Crit Race St |
| ETHN 6841 | Advanced Directed Readings in Ethnic Studies |
| **Total Credit Hours** | **12** |

# French and Italian

The Department of French and Italian at the University of Colorado Boulder enjoys a national reputation, and is the only PhD granting department in the Rocky Mountain region. The department offers comprehensive coverage of all areas of French and Francophone literature, and has an outstanding record of placing its MA and PhD recipients in desirable positions of employment. The graduate program typically counts an enrollment of 10 to 15 students, drawn from both the U.S. and several foreign countries, pursuing interests ranging from the Middle Ages to 21st-century literary and cultural studies.

## Graduate Study in French

The Department of French and Italian at the University of Colorado Boulder offer master's and doctoral French graduate programs. Students wishing to pursue graduate work in French leading to candidacy for an advanced degree should read the Degree Requirements (p. 1113) sections carefully.

## Master's Degree

- French - Master of Arts (MA) (p. 1269)

## Doctoral Degree

- French - Doctor of Philosophy (PhD) (p. 1270)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ardizzoni, Michela (https://experts.colorado.edu/display/fisid_145152/)
Associate Professor, Associate Chair; PhD, Indiana University Bloomington

Bloomfield, Elisabeth Marie Arnould (https://experts.colorado.edu/display/fisid_125576/)
Associate Professor; PhD, University of California, San Diego

Braider, Christopher (https://experts.colorado.edu/display/fisid_100300/)
Professor of Distinction Emeritus; PhD, Trinity College, Dublin

Burba, Audrey (https://experts.colorado.edu/display/fisid_158272/)
Assistant Teaching Professor; PhD, Emory University

Craven, Priscilla (https://experts.colorado.edu/display/fisid_108033/)
Teaching Professor of Distinction, Senior Instructor; MA, University of Colorado Boulder

Frey, Julia B.
Professor Emerita

Kilbane, Aimee (https://experts.colorado.edu/display/fisid_153823/)
Assistant Teaching Professor; PhD, University of California, Santa Barbara

Magnanini, Suzanne M. (https://experts.colorado.edu/display/fisid_118145/)
Associate Professor, Chair; PhD, University of Chicago

Mortimer, Mildred
Professor Emeritus

Motte, Warren F. Jr. (https://experts.colorado.edu/display/fisid_100001/)
Distinguished Professor; PhD, University of Pennsylvania

Murphy, Kieran Marcellin (https://experts.colorado.edu/display/fisid_152976/)
Associate Professor; PhD, University of California, Santa Barbara

Samuelson, Charlie (https://experts.colorado.edu/display/fisid_163645/)
Assistant Professor; PhD, Princeton University

Saurini, Susanna (https://experts.colorado.edu/display/fisid_148725/)
Associate Teaching Professor; MA, University of L'Aquila

Seno, Cosetta (https://experts.colorado.edu/display/fisid_144515/)
Associate Professor; PhD, University of California, Berkeley

Torriani, Chiara (https://experts.colorado.edu/display/fisid_132725/)
Associate Teaching Professor; PhD, Universita Statale Di Milano

Valente-Quinn, Brian Dennis (https://experts.colorado.edu/display/fisid_155973/)
Associate Professor; PhD, University of California, Los Angeles

Van Nelson, Loredana Alina (https://experts.colorado.edu/display/fisid_142722/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Vandermarliere, Sandrine (https://experts.colorado.edu/display/fisid_143482/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Vasile, Olga (https://experts.colorado.edu/display/fisid_156596/)
Assistant Teaching Professor; MA, University of Notre Dame

Yamashita, Masano (https://experts.colorado.edu/display/fisid_147343/)
Associate Professor, Associate Chair; PhD, New York University

# Courses

No Italian courses are offered at the graduate level.

**FREN 5110 (3) French Special Topics**
Different topics are offered and, in a number of cases, cross-listed with other departments.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5120 (3) French Special Topics**
Different topics are offered and, in a number of cases, cross-listed with other departments.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5170 (3) Francophone African Literature**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5180 (3) Postcolonial Theory and the Francophone World**
Explores the major theories and reach of postcolonial thought throughout the Francophone world. Examines the theoretical interventions and contributions of the anti-colonial movement as well as current engagements with decolonial and performance theory. Provides students with a critical background to facilitate advanced graduate research in the humanities. Second part of a two-semester series of graduate seminars on critical theory offered by the Department of French and Italian. Formerly offered as a special topics course.
**Requisites:** Restricted to graduate students only.

**FREN 5250 (3) Medieval and Renaissance Readings**
Through close readings of masterpieces of French medieval and Renaissance literature in conjunction with contemporary criticism and theory, explores the contexts of medieval and Renaissance France. Readings in French. May be taught in English to accommodate students in other programs.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5310 (3) 17th Century French Tragedy and Poetry**
Close readings of tragedies by (among others) Corneille and Racine, placed in the context of baroque and neoclassical political and artistic culture as illustrated by philosophy, painting, and science. Drawing on recent criticism and theory, explores heroic drama's role as a symptom and agent of early modern French social and intellectual history. Readings in French, but may be taught in English.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5320 (3) 17th Century French Prose**
Close readings of major works by, e.g., Descartes, Pascal, La Fayette, La Rochefoucauld, and La Bruyere. Themes include 17th century theories of self, early modern epistemology, notions of honnetete and the critical analysis of human motives and behavior, the emerging novel, and the critique of heroic idealism and of the monarchic absolutism of the Sun King, Louis XIV. Readings in French, but may be taught in English.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5330 (3) Moliere and 17th Century French Comedy**
Close readings of the comedies in context with the works of, e.g., Corneille, Rotrou, Cyrano, Boileau, and La Fontaine. Themes include Moliere and the institution of literary authorship, comedy's role as social critique, the deconstruction of the early modern subject, and the cultural politics of the scandals surrounding L'ecole des femmes and Tartuffe. Readings in French, but may be taught in English.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5350 (3) French Enlightenment**
Focuses on the uses of literature to address the revolutionary philosophical, scientific, religious, and/or sociopolitical questions of the day. Explores Diderot and d'alembert's Encyclopedie, Voltaire and Diderot's philosophical tales and dialogues, Rousseau's Discours, and other writings. Discusses the development of specific literary forms to promote the ideas and goals of the philosophers to reach a changing and diverse readership and to fight censorship.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5360 (3) 18th Century French Literature**
Focuses on the study of a specific literary genre (e.g., theatre, the novel) or on the global production of a major author (e.g., Voltaire, Diderot, Rousseau). Discussion stresses both the uniqueness of the genre/writer and their significance as representatives of the century's changing society and culture.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5420 (3) 19th Century French Literature**
A survey of principal works and movements, intended as an introductory course.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5430 (3) Topics in 19th Century French Prose, Poetry, and Theatre**
Topics vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5440 (3) Literary Ludics**
Taught in French and English. Focuses on literary structures proposed by author to reader as games. Considers critical texts, both practical and theoretical, with a view toward defining the relation between criticism and its objects.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5445 (3) Literary Theory, Part I**
Covers Western literary theory from Plato to Latour as the first part of a two-semester literary theory course investigating the Western tradition from the Greeks on to post-colonial and empire studies. This initial course follows the history of criticism and its philosophical underpinning up to 20th century trends but does not cover cultural and post-colonial studies. Taught in English.
**Requisites:** Restricted to graduate students only.

**FREN 5450 (3) Proust and Modernity**
Introduces Proust's masterwork "In Search of Lost Time" in its English translation. The class offers an overview of the work's structure, themes and context. Particular attention is given to Proust's role as a major theoretician of modernity in philosophy, literature and visual arts. Formerly offered as a special topics course.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**FREN 5470 (3) 20th Century French Theatre and Poetry**
Close readings of plays from the turn of the century to the contemporary period introduce the principal themes and techniques of modernist and postmodernist French theatre. Students are encouraged to consider problems commonly evoked by these texts and to compare the positions that each text takes on such problems as the status and uses of language, the function and limits of the theatre and the dialectic of appearance and reality.
**Equivalent - Duplicate Degree Credit Not Granted:** FREN 4470
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5770 (2-3) Methods of Teaching French as a Foreign Language**
Familiarizes students with current methodology and techniques in foreign language teaching.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 6840 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**FREN 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

# French - Master of Arts (MA)

The MA program in French offers students the opportunity to pursue their interest in literature, culture, and pedagogy, working with faculty members who produce distinguished scholarship in a broad variety of fields. Students are encouraged to take courses in many of those fields and to become acquainted with a diversity of critical and theoretical approaches. The program consists of coursework and a comprehensive examination.

## Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s): French - Bachelor of Arts (BA) (p. 319).

## Requirements

### Admission Requirements

Prerequisites for admission to the French MA studies:

- A strong background in French and/or BA in French or equivalent.
- Good pronunciation in French as evidenced by a recording submitted with the application.
- Students are required to submit a statement of purpose and one paper of their choice done for an undergraduate French course.
- Recommendations from three professors with whom the student has worked.

### Course Requirements

Degree requirements are subject to change. Students wishing to pursue graduate work in French should visit the department's MA Guidelines (http://www.colorado.edu/frenchitalian/graduate/ma-guidelines/) for the most up-to-date degree requirements.

The following summary of minimum requirements is expressed in terms of courses. Each course represents a graduate seminar carrying 2 or 3 credit hours. Additional coursework may be required by the Associate Chair for Graduate Studies.

Students and their administrators are equally responsible for making certain that their graduate curriculum satisfies all graduation requirements, both those of the department and those of the Graduate School. Every student should accordingly become thoroughly familiar with the Master's Degree Requirements (p. 1113) section of this catalog.

Master's students are not normally permitted to take independent study courses. However, in exceptional circumstances, and with the approval of the Associate Chair for Graduate Studies, they may register for one and at the very most two such courses.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| *French and Francophone Literature and Culture Courses* | | |
| At least eight courses at the 5000 level or above in French literature and culture. Students are encouraged to enroll in courses spanning diverse historical periods of French and Francophone literary and cultural studies, contingent upon the range of courses available in the curriculum. Options include: | | 24 |
| FREN 5110 | French Special Topics | |
| FREN 5120 | French Special Topics | |
| FREN 5170 | Francophone African Literature | |
| FREN 5250 | Medieval and Renaissance Readings | |
| FREN 5310 | 17th Century French Tragedy and Poetry | |
| FREN 5320 | 17th Century French Prose | |

| | | |
|---|---|---|
| FREN 5330 | Moliere and 17th Century French Comedy | |
| FREN 5350 | French Enlightenment | |
| FREN 5360 | 18th Century French Literature | |
| FREN 5420 | 19th Century French Literature | |
| FREN 5430 | Topics in 19th Century French Prose, Poetry, and Theatre | |
| FREN 5440 | Literary Ludics | |
| FREN 5445 | Literary Theory, Part I | |
| FREN 5450 | Proust and Modernity | |
| FREN 5470 | 20th Century French Theatre and Poetry | |
| *Related Field Courses* | | |
| Up to three courses at the 4000 level or above in a related field (e.g., English, Spanish, Classics, Linguistics, Film Studies, History, Fine Arts, Education) to be determined in consultation with the Associate Chair for Graduate Studies. [1] | | 6 |
| *Additional Coursework* | | |
| FREN 5770 | Methods of Teaching French as a Foreign Language | 3 |
| **Total Credit Hours** | | **33** |

[1] Students planning to apply for the doctoral program should remember that PhD candidates are encouraged to take three courses in a related field at the 5000 level or above. Courses in a related field at the 4000 level will normally not count toward this total.

### Language Requirement

All MA candidates must acquire a reading knowledge of a language other than French and English. The language should be related to the student's academic program. The requirement may be fulfilled by taking a translation exam offered by the department in the language in question or by passing coursework either at CU or prior to arrival on campus equivalent to a fourth semester (2120 at CU) college course.

Early in their first semester in the MA program, each student should meet individually with the Associate Chair for Graduate Studies to discuss their overall plan of study, including the ways in which they will satisfy the language requirement.

### MA Comprehensive Examination

This examination will be based on a reading list in literature, culture, and theory prepared by the Graduate Faculty. It will be administered by an Examination Committee composed of the Associate Chair for Graduate Studies and two other members of the Graduate Faculty, appointed by the Chair. The examination will consist of two essays of three hours each, based on questions formulated by the Examination Committee, and a one-hour oral examination designed to test the student's overall knowledge of the reading list. Normally the two essays will be written within a six-day period, and the one-hour oral exam will normally follow within two weeks. One of the essays can be written in English. The Comprehensive Examination must be taken during the fourth semester of the MA program.

## Two-Year Plan of Study

The MA degree is intended to be completed in two years. The normal pattern of courses would be as follows:

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| Two seminars | | 6 |
| FREN 5770 | Methods of Teaching French as a Foreign Language | 3 |
| | **Credit Hours** | **9** |
| **Spring Semester** | | |
| Three seminars | | 9 |
| | **Credit Hours** | **9** |
| **Year Two** | | |
| **Fall Semester** | | |
| Three seminars | | 9 |
| | **Credit Hours** | **9** |
| **Spring Semester** | | |
| Two seminars | | 6 |
| | **Credit Hours** | **6** |
| | **Total Credit Hours** | **33** |

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate advanced proficiency in the French language across speaking, listening, reading, and writing. Evidence: Successful completion of the MA comprehensive exam.
- Exhibit comprehensive knowledge of French and Francophone literatures, cultures and civilizations from various historical periods. Evidence: Successful completion of the MA comprehensive exam.
- Critically analyze and interpret literary and cultural texts using appropriate theoretical frameworks and methodologies. Evidence: Student GPA, which is based on seminar research papers and oral presentations.
- Demonstrate the ability to teach French language and Francophone cultures effectively at introductory educational levels. This outcome only applies to students admitted to a TA/GPTI position. Evidence: Teaching evaluations from students and supervisor.

# French - Doctor of Philosophy (PhD)

The Department of French and Italian at CU Boulder enjoys a national reputation and is the only PhD-granting department in the Rocky Mountain region. The department offers courses that cover the historical and geographic range of French and Francophone literature and has an outstanding record of placing its PhD recipients in desirable positions of employment. Our students pursue interests ranging from the Middle Ages to 21st-century literary and cultural studies.

## Requirements

### Prerequisites

Doctoral candidates should possess excellence in reading, speaking, writing and understanding spoken French; general knowledge of French literature and civilization; and a sound reading knowledge of one modern language other than English and French.

## Program Requirements

The PhD program in French literature consists of coursework, a comprehensive examination, a doctoral dissertation and an oral defense of the doctoral dissertation.

Degree requirements are subject to change. Students should visit the department's PhD Guidelines (http://www.colorado.edu/frenchitalian/graduate/phd-guidelines/) webpage for the most up-to-date degree requirements.

### Required Courses and Credits

The following summary of minimum requirements is expressed in terms of courses. Additional coursework may be required by the Associate Chair for Graduate Studies.

Students and their administrators are equally responsible for making certain that their graduate curriculum satisfies all graduation requirements, both those of the department and those of the Graduate School. Every student should accordingly become thoroughly familiar with the Doctoral Degree Requirements (p. 1114) section of this catalog.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| A total of fifteen courses at the 5000 level or above consisting of: | | 45 |
| | At least eleven courses at the 5000 level and above in French literature and culture. | |
| | Up to four courses at the 5000 level or above in a related field (e.g., comparative literature, English, Spanish, classics, linguistics, philosophy, film studies, history, fine arts, education) to be determined in consultation with the Associate Chair for Graduate Studies. | |
| **Total Credit Hours** | | **45** |

Students must also have 30 hours of Dissertation Guidance (Graduate School requirement).

Provided that such courses are taught, students are encouraged to take courses at the 5000 level or above covering many of the major periods of French literature: Middle Ages, 16th, 17th, 18th, 19th, 20th, 21st centuries, Francophone literature and cultures.

PhD students are normally allowed to take two independent studies courses, subject to the approval of the Associate Chair for Graduate Studies. However, they may not take more than two (including any taken at the master's level) except in exceptional circumstances and with the approval of the Associate Chair for Graduate Studies.

PhD students are normally allowed to take up to four courses at the 5000 level or above outside of the department. In exceptional circumstances and with the approval of the Associate Chair of Graduate Studies, a student may request to take a fifth course outside of the department and only ten courses within the department.

PhD students who completed their MA at CU Boulder can apply up to ten courses at the 5000 level or above (30 credit hours of coursework) toward their PhD degree within the above parameters. They must take at least five courses during the first two years of candidacy.

Students entering the PhD program with an MA in French or equivalent from another university can apply up to five of their previous MA courses (15 credit hours of graduate-level coursework) toward the fifteen-course requirement within the above parameters. They must take ten courses during the first two years of candidacy.

Students entering the PhD program without an MA in French must consult with the Associate Chair for Graduate Studies.

### Language Requirement

A sound reading knowledge of one modern language other than English and French is required. Such reading knowledge must be certified by the student passing a reading examination in the language or by passing coursework either at CU or prior to arrival on campus equivalent to a fourth semester (2120 at CU) college course. The examination normally consists of a timed translation of a literary text or a text dealing with literature (e.g., literary criticism). A dictionary is permitted. This language should be relevant to the student's academic program.

### Examination/PhD Comprehensive Examination

As students are finishing their required coursework, they should have a clear sense of how their courses and ideas are coalescing around a given general field and a specific problem within that field. Courses taken outside the department, as well as work in the related field, should fit into this pattern. As this specification of interest toward the area of the dissertation takes place, the student should constitute a Doctoral Committee consisting of five graduate faculty members (one of whom must come from outside the student's department) who will guide the student's work. One of these faculty members will serve as the Director and take responsibility for co-coordinating the work of this ad hoc Doctoral Committee. Once the Doctoral Committee is formed and approved by the Graduate School, the student will begin to prepare for the PhD Comprehensive Examination. Working in consultation with the Director and other members of the Doctoral Committee, the student will formulate a dissertation topic. The student will prepare a list of primary texts pertaining to that topic, and a further list of secondary materials composed of critical and theoretical texts intended to inform the student's approach to the dissertation topic. Those two lists will be circulated to the Doctoral Committee before the Comprehensive Examination. The examination itself will consist of one substantial essay followed by an oral examination. The essay will focus on the dissertation topic. The student will have two weeks to write the essay. Once that essay is written, the Doctoral Committee will conduct the oral part of the examination as a discussion of material covered in the essay, material on the two reading lists, as well as matters pertaining to the general direction of the dissertation and the approach that the student propose to take therein. Normally the Comprehensive Examination should be taken at the end of the student's second year in the PhD program (for students continuing from CU's MA program) or at the end of the third year in the program (for students entering from other MA programs). In both cases, that allows the student a full year of independent study after the conclusion of course requirements. Upon successful completion of the PhD exams, students normally spend the next two years writing a dissertation.

### PhD Dissertation

The PhD dissertation must be based upon original scholarship and demonstrate mature scholarship and critical judgment as well as familiarity with the tools and methods of research. It should make a worthwhile contribution to knowledge in the student's special field. Students are advised to familiarize themselves thoroughly with the various Graduate School rules governing the format and deadlines for the dissertation. The dissertation is normally written in English, but it is also possible to write in French; the language of the dissertation should be approved by the student's committee.

### Oral Defense of the Dissertation

After the dissertation has been accepted, a final oral examination on the dissertation and related topics will be held. The examination will be conducted by a five-member committee, appointed by the dean of the Graduate School, which will consist of representatives of areas in which the student has worked. At least one member of the committee will be from outside the student's field of study. The committee should be approved by the Graduate School at least two weeks prior to the oral defense. More than one negative vote will disqualify the candidate in the oral defense.

# Plans of Study

## Typical Five-Year PhD Structure for Students Who Hold an MA in French from CU Boulder

*Apply nine to ten courses (27-30 credit hours) at the 5000 level or above from MA studies.

| | |
|---|---|
| **Year One** | |
| **Fall Semester** | **Credit Hours** |
| Two seminars | 6 |
| **Credit Hours** | **6** |
| **Spring Semester** | |
| Two seminars | 6 |
| **Credit Hours** | **6** |
| **Year Two** | |
| **Fall Semester** | |
| Two seminars | 6 |
| Apply up to 15 credit hours from MA | 12-15 |
| **Credit Hours** | **18-21** |
| **Spring Semester** | |
| Apply up to 15 credit hours from MA | 15 |
| PhD comprehensive exam | |
| 5 dissertation hours | 5 |
| **Credit Hours** | **20** |
| **Year Three** | |
| **Fall Semester** | |
| 5 dissertation hours | 5 |
| **Credit Hours** | **5** |
| **Spring Semester** | |
| 5 dissertation hours | 5 |
| **Credit Hours** | **5** |
| **Year Four** | |
| **Fall Semester** | |
| 5 dissertation hours | 5 |
| **Credit Hours** | **5** |
| **Spring Semester** | |
| 5 dissertation hours | 5 |
| **Credit Hours** | **5** |
| **Year Five** | |
| **Fall Semester** | |
| 5 dissertation hours | 5 |
| **Credit Hours** | **5** |
| **Spring Semester** | |
| 1 dissertation hours | 1 |
| Submission of dissertation prospectus | |
| **Credit Hours** | **1** |
| **Total Credit Hours** | **76-79** |

## Typical Five-Year PhD Structure for Students Who Hold an MA in French from Another Institution

*Transfer five courses (15 credit hours) at the 5000 level or above from MA studies.

| | |
|---|---|
| **Year One** | |
| **Fall Semester** | **Credit Hours** |
| Three seminars | 9 |
| **Credit Hours** | **9** |
| **Spring Semester** | |
| Two seminars | 6 |
| Transfer up to 15 credit hours | 15 |
| **Credit Hours** | **21** |
| **Year Two** | |
| **Fall Semester** | |
| Three seminars | 9 |
| **Credit Hours** | **9** |
| **Spring Semester** | |
| Two seminars | 6 |
| **Credit Hours** | **6** |
| **Year Three** | |
| **Fall Semester** | |
| 5 dissertation hours | 5 |
| **Credit Hours** | **5** |
| **Spring Semester** | |
| 5 dissertation hours | 5 |
| PhD comprehensive exam | |
| **Credit Hours** | **5** |
| **Year Four** | |
| **Fall Semester** | |
| 5 dissertation hours | 5 |
| **Credit Hours** | **5** |
| **Spring Semester** | |
| 5 dissertation hours | 5 |
| **Credit Hours** | **5** |
| **Year Five** | |
| **Fall Semester** | |
| 5 dissertation hours | 5 |
| **Credit Hours** | **5** |

| | |
|---|---|
| **Spring Semester** | |
| 5 dissertation hours | 5 |
| Submission and oral defense of dissertation | |
| **Credit Hours** | **5** |
| **Total Credit Hours** | **75** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate advanced proficiency in the French language across speaking, listening, reading and writing. Evidence: Successful completion and defense of the doctoral comprehensive exam and dissertation.
- Exhibit comprehensive and specialized knowledge of French and Francophone literatures, cultures and civilizations, including expertise in specific research areas. Evidence: Successful completion and defense of the doctoral dissertation.
- Conduct original, self-directed research that contributes significantly to the field of French and Francophone Studies. Evidence: Successful completion and defense of the doctoral dissertation.
- Communicate research findings effectively to scholarly and general audiences in oral and written forms. Evidence: Completion of course requirements. Successful completion PhD Comprehensive Examination. Successful completion and defense of the doctoral dissertation.
- Demonstrate the ability to teach French language and Francophone cultures effectively at various educational levels. This outcome only applies to students admitted to a TA/GPTI position. Evidence: Teaching evaluations from students and supervisor.

# Geography

The Geography Department offers theoretical and applied work in human geography, environment and society geography, physical geography, and geographic information science. Each subfield covers a broad range of topics. Human geography includes political, cultural, development, feminist, population, and urban geography. Environment and society geography includes political ecology, natural hazards, and conservation practice. Physical geography includes climatology, geomorphology, hydrology, and biogeography. Geographic information science includes spatial analysis using GIS, remote sensing, and cartography. The Department also offers regionally focused courses on mountain geography and geographies of China, Latin America, Africa, Middle East and South Asia. To complement its curriculum, the Department also offers internship opportunities for geography majors.

Students wishing to pursue graduate work in geography leading to candidacy for advanced degrees should read carefully the requirements for advanced degrees in the Graduate School section. Additional information should be obtained from the Department of Geography.

**The course code for this program is GEOG.**

# Master's Degree

- Geography - Master of Arts (MA) (p. 1278)

# Doctoral Degree

- Geography - Doctor of Philosophy (PhD) (p. 1279)

# Certificates

- Development Studies - Graduate Certificate (p. 1280)
- Hydrologic Sciences - Graduate Certificate (https://catalog.colorado.edu/graduate/colleges-schools/arts-sciences/programs-study/geological-sciences/hydrologic-sciences-graduate-certificate/)
- Population Studies - Graduate Certificate (p. 1281)

# Interdisciplinary Program

- Earth Data Analytics - Foundations - Graduate Certificate (p. 1773)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Abdalati, Waleed (https://experts.colorado.edu/display/fisid_145800/)
Professor; PhD, University of Colorado Boulder

Balch, Jennifer Kakareka (https://experts.colorado.edu/display/fisid_154464/)
Associate Professor; PhD, Yale University

Barnard, Holly Rene (https://experts.colorado.edu/display/fisid_147417/)
Associate Professor, Associate Chair; PhD, Oregon State University

Blanken, Peter David (https://experts.colorado.edu/display/fisid_114026/)
Professor; PhD, University of British Columbia (Canada)

Boykoff, Maxwell Thomas (https://experts.colorado.edu/display/fisid_147562/)
Associate Professor Adjunct; PhD, University of California, Santa Cruz

Bryan, Joseph Henry (https://experts.colorado.edu/display/fisid_145802/)
Associate Chair, Associate Professor; PhD, University of California, Berkeley

Buttenfield, Barbara P. (https://experts.colorado.edu/display/fisid_107860/)
Professor Emerita; PhD, University of Washington

Caine, T. Nelson (https://experts.colorado.edu/display/fisid_104285/)
Professor Emeritus; PhD, Australian National University

Cao, Guofeng (https://experts.colorado.edu/display/fisid_167522/)
Assistant Professor; PhD, University of California Santa Barbara

Carroll, Clinton R. (https://experts.colorado.edu/display/fisid_154726/)
Assistant Professor Adjunct; PhD, University of California, Berkeley

Finlay, Jessica
Assistant Professor; PhD, University of Minnesota, Minneapolis

Fluri, Jennifer L. (https://experts.colorado.edu/display/fisid_154033/)
Chair, Professor; PhD, Pennsylvania State University

Goldman, Mara Jill (https://experts.colorado.edu/display/fisid_143542/)
Associate Professor; PhD, University of Wisconsin—Madison

Harrison, Jill Lindsey (https://experts.colorado.edu/display/fisid_149614/)
Associate Professor; PhD, University of California, Santa Cruz

Isaacs, Rachel (https://experts.colorado.edu/display/fisid_164240/)
Teaching Assistant Professor; PhD, Pennsylvania State University

Karimzadeh, Morteza (https://experts.colorado.edu/display/fisid_166081/)
Assistant Professor; PhD, Pennsylvania State University

Leyk, Stefan (https://experts.colorado.edu/display/fisid_145192/)
Professor, Associate Chair; PhD, University of Zurich (Switzerland)

Lininger, Katherine (https://experts.colorado.edu/display/fisid_163643/)
Assistant Professor; PhD, Colorado State University

Mohan, Taneesha
Teaching Assistant Professor; Ph.D., London School of Economics and Political Science

Molotch, Noah Paul (https://experts.colorado.edu/display/fisid_139374/)
Associate Professor; PhD, University of Arizona

Musselman, N. Keith (https://experts.colorado.edu/display/fisid_151215/)
Assistant Professor; Ph.D, University of California- Los Angeles

O'Loughlin, John (https://experts.colorado.edu/display/fisid_101339/)
Professor; PhD, Pennsylvania State University

Oakes, Tim (https://experts.colorado.edu/display/fisid_109269/)
Professor; PhD, University of Washington

Pitlick, John
Professor Emeritus

Reid, Colleen (https://experts.colorado.edu/display/fisid_157951/)
Assistant Professor; PhD, University of California, Berkeley

Rogers, Andrei
Professor Emeritus

Schlosser, Sarah (https://experts.colorado.edu/display/fisid_159679/)
Teaching Associate Professor; MA, University of South Florida

Schoennagel, Tania (https://experts.colorado.edu/display/fisid_139625/)
Assistant Professor Adjunct

Serreze, Mark (https://experts.colorado.edu/display/fisid_106334/)
Distinguished Professor; PhD, University of Colorado Boulder

Travis, William R. (https://experts.colorado.edu/display/fisid_101777/)
Associate Professor; PhD, Clark University

Truelove, Yaffa Elane (https://experts.colorado.edu/display/fisid_159271/)
Assistant Professor; PhD, University of Cambridge (England)

Veblen, Thomas T. (https://experts.colorado.edu/display/fisid_105842/)
Distinguished Professor Emeritus; PhD, University of California, Berkeley

Yeh, Emily Ting (https://experts.colorado.edu/display/fisid_130119/)
Professor; PhD, University of California, Berkeley

# Courses

**GEOG 5003 (4) Elements of Geographic Information Systems**
Discusses incorporating GIS methods into graduate thesis or dissertation research. Reviews basic mapping concepts (scale and projections), acquiring different types of spatial data (raster and vector), building an error-free database, making simple queries, overlays, charts, and maps. Intended for students who want to learn GIS but lack background skills in computing or cartography.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite some experience with Mac or Windows.
**Additional Information:** Departmental Category: GIScience

**GEOG 5023 (4) Advanced Quantitative Methods for Spatial Data**
Reviews fundamental statistical and quantitative modeling techniques and introduces more advanced statistical techniques widely used in geography today. Emphasizes geographic examples and spatial problems teaching hands-on skills in statistical programming. Topics covered include generalized linear models, spatial autocorrelation, spatial regression methods, and working with complex datasets.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4023
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Methods

**GEOG 5043 (4) Advanced Geovisualization and Web Mapping**
Advanced technical course in web-based cartography and geovisualization stressing the important role digital cartography plays in cyberspace and society. Focuses on principles of effective cartographic design in multimedia and hypertext environments. Labs are organized around hands-on active learning projects demonstrating skills in geovisualization and cartographic practice.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4043
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Methods

**GEOG 5093 (4) Remote Sensing of the Environment**
Covers acquisition and interpretation of environmental data by remote sensing. Discusses theory and sensors as well as manual and computerized interpretation methods. Stresses infrared and microwave portions of the spectrum.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4093 and GEOL 4093 and GEOL 5093
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Methods

**GEOG 5100 (1-4) Special Topics: Geography**
Covers various topics outside of the normal curriculum; offered intermittently depending on student demand and availability of faculty.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**GEOG 5103 (4) Geographic Information Science: Spatial Analytics**
Explores advanced topics in geospatial databases, spatial analytics and geoprocessing in a Geographic Information System (GIS). Emphasizes how geographic concepts are linked to methodological frameworks for recording, transforming, storing/retrieving, analyzing, and processing geographic data as well as various forms of uncertainty. Exercises demonstrate the application of GIS-based methods to real world scenarios in interdisciplinary settings.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4103
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: GIScience

**GEOG 5113 (3) Seminar: Geographic Information Systems**
Focuses on the current research topics in geographical information systems and selected areas of application. Includes major journal articles related to each topic. Students complete and present a seminar paper.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite GEOG 4103 or GEOG 5103 or instructor consent required.
**Additional Information:** Departmental Category: GIScience

**GEOG 5152 (3) History and Theory of Geography**
History of ideas and institutions that have shaped contemporary geographic inquiry. Examines the evolving relations among human geography, physical geography, environment-society relations, and geographic information processing. Designed to situate graduate student research within major subfields and intellectual currents of geography.
**Requisites:** Restricted to Geography (GEOG) graduate students only.

**GEOG 5161 (3) Research Design in Geography**
The human section reads and discusses contemporary research philosophies and methodologies in human geography. Practices the development of research proposals and presentation of research ideas and results. The physical section reads and discusses contemporary research philosophies and methodologies in physical geography (climatology, geomorphology, biogeography, and soils geography). Practices the development of research proposals and presentation of research ideas.
**Requisites:** Restricted to Geography (GEOG) graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5203 (4) Geographic Information Science: Spatial Modeling**
Focuses on the use and development of advanced models for human and environmental applications in a geospatial environment integrating raster and vector data models. Covers terrain and hydrologic modeling, geostatistical modeling, dasymetric modeling, as well as multi-criteria modeling. Group projects critically design, implement and test spatial models to develop independent skillsets in a chosen problem setting.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4203
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite GEOG 4103 or GEOG 5103 or working knowledge of GIS software or instructor consent required.
**Additional Information:** Departmental Category: Methods

**GEOG 5211 (3) Seminar: Physical Climatology**
Involves a research seminar concerned with problems of mass and energy exchange in the Earth-atmosphere system. Selects topics from such areas as air quality, bioclimatology, hydrology, climate change, and the climates of urban, agricultural, and natural environments.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5221 (3) Synoptic and Dynamic Climatology**
Examines global climates from the standpoint of synoptic and dynamic climatology.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5241 (1-3) Topics in Physical Geography**
Presents recent research topics that vary from year to year. Consult the online Schedule Planner for specific topics.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5251 (3-4) River Systems and Landforms**
Rivers integrate the landscape, carrying water, sediment, and organic matter. Rivers also shape the landscape, eroding and depositing material. This course covers the physical (geomorphic) processes in river systems and the landforms that they create. Topics covered include drainage basin processes, river hydraulics, sediment transport, channel forms and patterns, interactions between ecological and geomorphic processes in rivers, and river restoration and management. The course will combine lectures, discussions, in-class activities, and field trips.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4251
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5271 (3) The Arctic Climate System**
Understanding the climate of the Arctic requires a synthetic, system oriented approach. The course focuses on the intimate linkages between the atmosphere, ocean and land that give the Arctic region its unique character, link the Arctic to the larger global climate system, and promote understanding the rapid changes occurring in the Arctic.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4271
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5292 (3) Migration, Immigrant Adaptation, and Development**
historical and current patterns of migration with an emphasis in international movement. Looks at leading migration theories related to both origin- and destination-based explanations while critically looking at the role of development as a potential cause and consequence of population movement. Finally, covers some aspects of immigrants' social and economic adaptation to their host society.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4292
**Requisites:** Restricted to graduate students only.

**GEOG 5303 (4) Geographic Information Science: Spatial Programming**
Focuses on the extension of geographic information systems (GIS) through programming as well as on the development of algorithms for spatial analysis and information extraction in vector and raster data using open source tools. Covers concepts, principles and techniques of programming and solving spatial problems in natural and social science settings. Group projects will foster skillsets in implementing solutions to complex spatial problems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4303
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite GEOG 4203/5203.
**Additional Information:** Departmental Category: GIScience

**GEOG 5321 (3-4) Snow Hydrology**
Offers a multidisciplinary and quantitative analysis of physico-chemical processes that operate in seasonally snow-covered areas, from the micro- to global-scale: snow accumulation, metamorphism, ablation, chemical properties, biological aspects, electromagnetic properties, remote sensing, GIS and quantitative methods.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4321
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5331 (3-4) Mountain Climatology**
Surveys and analyzes climatic characteristics of mountain environments worldwide.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4331
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5371 (3) Forest Geography: Principles and Dynamics**
Surveys principles of forest geography and ecology. Includes both individual tree responses to environmental factors and species interactions within communities. Emphasizes forest dynamics and their relation to management problems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4371
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5391 (3) Seminar: Biogeography**
Considers in detail current research themes in biogeography. Includes intensive reading of current research literature and preparation of research papers. Topics vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5401 (3) Soils Geography**
Discusses chemical and physical properties of soils, soil development, distributions and management relevant to understanding plant-soil relationships in natural and human-altered landscapes.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4401
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5403 (3) Geographic Information Science: Space Time Analytics**
Focuses on understanding processes (human, natural, social or physical) through data driven analysis of patterns in spatio-temporal data. Covers a wide range of topics relevant to space time data, including pattern analysis, modeling and visualization as well as time geography and various contemporary issues in space time analytics. Utilizes a hands-on, flipped classroom approach with in-class development of technical skills.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4403
**Requisites:** Restricted to graduate students only.

**GEOG 5463 (3) Earth Analytics Data Science Bootcamp**
Learn key skills to automate data processing and visualization workflows that support both repeatable analysis and collaborative project approaches using scientific programming, version control and project management tools. Covers working with heterogeneous, large spatio-temporal data derived from space, airborne and ground based sensors and other sources. Gain applied experience through group projects that address real world problems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4463
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**GEOG 5501 (3) Water Issues in the American West**
Water scarcity is a perpetual issue facing communities in the western Unites States. This course critically evaluates water use, emphasizing problems associated with geographic maldistribution, appropriations, irrigation, industry, pollution and regional development. Interprets and analyzes hydroclimatic data, surface and groundwater.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4501
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Environment-Society Geography

**GEOG 5503 (3) Geographic Information Science: Project Management**
Managing a geospatial project encompasses problem identification, project design, analysis and supporting team dynamics. The class mixes lectures and class exercises with student-selected projects and works through all stages of a project from articulating an initial idea to project planning and scoping, building a work plan, timeline and budget, executing the work plan and evaluating a project's progress.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4503
**Requisites:** Requires prerequisite course of GEOG 5103 (minimum grade C-).

**GEOG 5563 (3) Earth Analytics**
Introduce students to major unanswered questions in Earth science and to the analytical tools, including data management, analysis and visualization, necessary to explore 'big data' from a suite of sensors. Aligns with Earth Lab, a new initiative of the University's Grand Challenge (http://www.colorado.edu/grandchallenges/) to use our expertise in space-based observation to address our world's most pressing problem. Comparable programming course work may be substituted for GEOG 5463 with instructor approval.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4563
**Requisites:** Requires prerequisite course of GEOG 5463 (min grade B-) Restricted to graduate students only.
**Grading Basis:** Letter Grade

**GEOG 5603 (3) GIS in the Social and Natural Sciences**
Introduces Geographic Information Systems and their underlying principles through interactive lectures and lab exercises. Students get basic skills for working in a GIS environment and learn how to handle and manage geospatial data, create maps and conduct geospatial analysis focusing on project tasks typically encountered in the social and natural sciences.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4603

**GEOG 5622 (3) City Life**
Analyzes social, behavioral, political and demographic factors that influence development and maintenance of communities in contemporary urban environments, with primary emphasis on U.S. cities.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4622
**Requisites:** Restricted to graduate students only.

**GEOG 5632 (3) Development Geography**
Provides an overview of development policy and practice, surveying foundational works in Development Studies as well as critical interventions. Required for Graduate Certificate in Development Studies.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4632
**Requisites:** Restricted to graduate students only.

**GEOG 5642 (3) Seminar: Urban Geography**
Surveys current research topics in urban geography. Emphasizes definition of possible student thesis topics.
**Requisites:** Restricted to graduate students only.

**GEOG 5652 (3) Introduction to Social Theory**
Surveys theoretical paradigms in the social sciences. Includes canonical works from the history of the social sciences as well as contemporary theorists. Appropriate for beginning to advanced graduate students doing qualitative research.
**Requisites:** Restricted to graduate students only.

**GEOG 5662 (3) Seminar: Topics in Economic Geography**
Covers selected topics emphasizing faculty specialties. Topics vary with instructor. Check with department for semester offerings.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**GEOG 5663 (1-3) Earth Analytics Applications**
Develop expertise in finding, organizing, managing and processing large, heterogeneous, spatio-temporal data to address a real-world problem. Students will work collaboratively on semi-guided science project. Students gain critical skills required to understand data structures, utilize APIs, extract insight from data and understand how uncertainty propagates. Culminates with a formal presentation of project results.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires prerequisite course of GEOG 5463 and GEOG 5563 (min grade B-) Restricted to graduate students only.
**Grading Basis:** Letter Grade

**GEOG 5692 (3) Climate Change and Health**
Climate change is one of the great societal challenges of our times and it not only threatens the physical environment but also threatens human health. The course will explore the ways that climate change is affecting public health now and is projected to affect health in the future. We will also explore the public health implications, positive and negative, of efforts to respond to climate change through mitigation and adaptation. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4692
**Requisites:** Restricted to graduate students only.

**GEOG 5712 (3) Political Geography**
Systematic study of relations between geography and politics, especially as background for better understanding of international affairs. Includes topics such as frontiers and boundaries, power analysis, geopolitics, international political economy, and strategic concepts.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4712
**Requisites:** Restricted to graduate students only.

**GEOG 5722 (3) Field Methods in Human Geography**
Examines research methods associated with field work in human geography. Prepares students for fieldwork by focusing on geographic and interdisciplinary field work techniques; interpretation of field data; discussion of the politics, ethics and gender, race, class and cross-cultural issues related to field work.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4722
**Requisites:** Restricted to graduate students only.

**GEOG 5732 (3) Population Geography**
Emphasizes spatial aspects of population characteristics including fertility, mortality, migration, distribution and composition. Includes both theoretical and empirical considerations, in addition to field work and computer simulations.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4732
**Requisites:** Restricted to graduate students only.

**GEOG 5750 (3) Climate Politics and Science-Policy**
Explores, understands and critically analyzes influences and trends in climate politics and science-policy. Course participants will gain an improved understanding of the myriad factors, pressures and processes that are involved in contemporary climate politics under-girding explicit policy proposals. Course participants will more capably identify consequential spaces of decision-making, recognize tractable places for change and fashion constructive strategies for their own research by way of best available evidence from work done in these areas. Overall, our attention to these course themes, concepts and case studies will help us to more capably understand, analyze and engage in the high-stakes 21st century arena of climate politics and science-policy. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVM 5750, ENVS 5750 and SOCY 5750
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**GEOG 5782 (3) Sustainable Development: Critique**
Investigates historical and contemporary theories and critiques of development and their implications for geographic theory and method. Focuses on the role of representation in evaluating case studies and examining the potential for a sustainable development.
**Requisites:** Restricted to graduate students only.

**GEOG 5832 (3) Geography of Tibet**
Rigorously examines contemporary Tibetan society, culture and nature from a geographical perspective. Uses readings on contemporary Tibet as an entry point into scholarly research about nationalism, representation, diaspora, landscape and place, sustainable development, natural resource management, identity and environmentalism.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4832
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Asia Content

**GEOG 5840 (1-3) Graduate Independent Study**
Offers independent research for master's students only. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**GEOG 5842 (3) Global Frontiers in Southeast Asia**
Uses the theme of the global frontier to examine and compare three key moments in the modern history of Southeast Asia: the colonial encounter, the rise of the modern territorial state, and the age of contemporary globalization. Examines case studies from earlier eras to analyze emerging global frontiers at the junction of state territoriality and transnational economic expansion.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4842 and ASIA 4842
**Requisites:** Restricted to graduate students only.

**GEOG 5852 (3) Health and Medical Geography**
Examines geographical patterns of health and disease with an emphasis on global health issues. Focuses on three major approaches to medical geographic research: ecological approaches, which systematically analyze relationships between people and their environments; social approaches, including political economy and socio-behavioral approaches; and spatial approaches, which employ maps and spatial analysis to identify patterns of health and disease. Elective course for Public Health Certificate.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4852
**Requisites:** Restricted to graduate students only.

**GEOG 5930 (3) Advanced Internship**
Provides an academically supervised opportunity for graduate-level geography majors to work in public and private organizations on advanced projects related to geographic theory and their career goals. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**GEOG 5961 (3) Theories of Climate and Climate Variability**
Critically reviews current theories of climatic variability based on analysis of the different physical processes affecting climate.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 6180 (1-3) Seminar: Geographic Problems**
Applies research methods to selected problems. Topics vary with instructor.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**GEOG 6211 (1-3) Readings in Climatology**
Discusses selected topics in current climatological literature. Specific themes vary.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 6402 (3) Seminar: Political Ecology**
Critically examines the politics of human-environment relationships across cultures and societies. Focuses on environmental degradation, change and management from the perspectives including political economy, cultural politics, STS and post structural theory.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**GEOG 6712 (3) Seminar: Political Geography**
Considers in detail history and methodology of the field, including an analysis of selected systematic topics such as frontiers and boundaries, international rivers, conflicting claims to territory, and electoral geography.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**GEOG 6732 (3) Formal Population Geography: Analysis and Forecasting**
In-depth introduction to formal demography. In addition to learning the basic demographic tools used nowadays in fertility, marriage, mortality, migration and forecasting/projections, it also looks at some potential links between formal and statistical demographic work that would enable the student to apply some of the methods learnt in an econometric or multivariate setting.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite GEOG 5023.

**GEOG 6742 (3) Seminar: Cultural Geography**
Explores various geographic topics emphasizing the concept of culture. Emergence of several points of view in the development of cultural geography.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**GEOG 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.

**GEOG 6950 (1-6) Master's Thesis**
Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**GEOG 7118 (3) Foundations of Environmental Justice**
Examines environmental justice movements, policies, institutions, objectives, and scholarship. Identifies factors that contribute to environmental inequality, and efforts to reduce it. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** COMM 7118, ENVS 7118 and PSCI 7118
**Requisites:** Restricted to graduate students only.

**GEOG 7840 (1-3) Graduate Independent Study**
Offers independent research for doctoral students only. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**GEOG 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section. Instructor consent required.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.

# Geography - Master of Arts (MA)

The basic purpose of the graduate program in the Department of Geography is to train scholars and professionals to produce and disseminate knowledge and to make outstanding contributions in the public and private sectors.

Students wishing to pursue graduate work in geography leading to candidacy for advanced degrees should read the Master's Degree Requirements (p. 1113) section carefully.

## Requirements

### Prerequisites

For admission without deficiency and to meet the department mandatory requirements for a knowledge of basic geography, all entering graduate students are required to possess the knowledge presented in freshman-level introductory courses in physical and human geography.

### General Requirements

The minimum requirements for an MA in geography may be fulfilled by completing 30 credit hours of graduate work (5000 level or above), including 4 to 6 credit hours of thesis work. Master's students may, with the written approval of their advisor, use a maximum of 6 hours of 3000- or 4000-level coursework to reach the required 30 hours.

Students are encouraged to have some background in college math and computer skills. Students are also required to have proficiency in basic statistics. This requirement may be met by having taken an undergraduate course in statistics.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| GEOG 5152 | History and Theory of Geography | 3 |

| | | |
|---|---|---|
| GEOG 5161 | Research Design in Geography | 3 |
| GEOG 5023 | Advanced Quantitative Methods for Spatial Data | 4 |
| or GEOG 5722 | Field Methods in Human Geography | |
| GEOG 6950 | Master's Thesis | 4-6 |
| **Electives** | | |
| Select at least 14 additional hours of coursework at the 5000 level or above to meet the 30-credit minimum. | | 16-14 |
| **Total Credit Hours** | | **30** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate familiarity with the history of core foundational knowledge and with core theoretical frameworks utilized within the discipline.
- Demonstrate a working knowledge of and the appropriate application of qualitative and quantitative methods specific to the student's area of research.
- Demonstrate the ability to effectively communicate their research, in both written and oral forms, to the academic community.

# Geography - Doctor of Philosophy (PhD)

The basic purpose of the graduate program in the Department of Geography is to train scholars and professionals to produce and disseminate knowledge and to make outstanding contributions in the public and private sectors.

Students wishing to pursue graduate work in geography leading to candidacy for advanced degrees should read the Doctoral Degree Requirements (p. 1114) section carefully.

# Requirements

## Prerequisites

For admission without deficiency and to meet the department mandatory requirements for a knowledge of basic geography, all entering graduate students are required to possess the knowledge presented in freshman-level introductory courses in physical and human geography.

Students may acquire this knowledge in any way they choose: by formally taking the introductory courses, by auditing the courses, by reading the textbooks themselves or by other means. This knowledge will enable the student to perform at the level expected in the PhD program's required core classes.

## General Requirements

The PhD degree is not conferred merely upon the satisfactory completion of a course of study. The candidate must also demonstrate proficiency in some broad subject of learning, and be able to critically evaluate work in the field, show the ability to work independently in the chosen field and make an original contribution of significance to the advancement of knowledge.

The minimum requirements are 30 credit hours of coursework numbered 5000 or above and 30 credit hours of dissertation. Ordinarily the number of coursework hours and dissertation hours will be greater than 30 each. At least 20 of these hours must be taken at the University of Colorado; up to 10 credit hours from another institution may be transferred upon approval.

A 3.00 (B) average or higher must be maintained in all coursework.

Six semesters of residence are required, of which four must be at the University of Colorado. With department approval, students with a University of Colorado master's degree in geography may apply all credit hours from 5000-level courses or above (except thesis credits) to the PhD requirements.

## Language Requirement

The department's minimum language requirement is a demonstration of proficiency in one foreign language. Ways in which this requirement may be satisfied are determined by the student's Advisory Committee and may include timed translation, publication in the language and/or coursework. If more than the minimum proficiency is needed for library and/or field research, the choice and number of languages, as well as the required level of skill and methods of testing these skills, are determined and approved by the student's Advisory Committee. The language requirement must be satisfied before the comprehensive exam is taken.

## Preliminary Exam

The Graduate School requires that all students in the doctoral program successfully pass a preliminary exam. In geography, this requirement is met by obtaining a grade of B or better in each of the three required courses:

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| GEOG 5152 | History and Theory of Geography | 3 |
| GEOG 5161 | Research Design in Geography | 3 |
| GEOG 5023 | Advanced Quantitative Methods for Spatial Data | 4 |
| or GEOG 5722 | Field Methods in Human Geography | |

Following completion of the preliminary exam requirement, students undertake preparation for comprehensive exams.

## Comprehensive Exams

Following successful completion of the preliminary exam, doctoral students must pass a comprehensive exam for advancement to candidacy for the doctoral degree. The comprehensive exam consists of two parts, including an exam on three subfields of geography with written and oral components, and completion of a written dissertation proposal and oral defense. Working together, the student and an Advisory Committee of three to five faculty set the subfield topics. The student creates a reading list for each subfield, and usually spends a semester reading and preparing for the subfields exam. The Advisory Committee sets the subfields exam questions and evaluates the written and oral responses, as well as the proposal defense. Upon successful completion of the comprehensive exam, a student can turn full attention to dissertation research and writing.

## Dissertation

In addition to the minimum of 30 hours of coursework required for the doctorate, a student must register for a total of at least 30 hours of dissertation credit, with a maximum of 10 hours in any one semester. Coursework and work on the dissertation may proceed concurrently

throughout the PhD program, but at no time shall a doctoral student register for more than 15 hours of 5000-level courses and above.

Following successful completion of comprehensives and admission to candidacy, students must register continuously. Students admitted to candidacy for degree will register for and be charged for a minimum of five dissertation hours each semester. Students may also register for classes in addition to the five dissertation hours.

After admission to candidacy, those not making use of campus facilities may register for three dissertation hours (part-time status). Continuous registration during the academic year will be required until completion of the dissertation defense. It is expected that the student and advisor will consult each semester as to the number of hours for which the student will register, consistent with the classifications described above.

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate a familiarity of the history of core foundational knowledge and familiarity of core theoretical frameworks utilized within the discipline.
- Demonstrate a working knowledge and the appropriate application of qualitative and quantitative methods specific to the student's area of research.
- Demonstrate, in both written and oral formats, a thorough understanding of three subjects relevant to their dissertation, based on questions provided by their advisory committee.
- Develop a research proposal that demonstrates their ability to develop high-quality research based on novel research questions coupled with the application of appropriate methodologies.
- Demonstrate the ability to effectively communicate their research, in both written and oral forms, to the academic community.

# Development Studies - Graduate Certificate

The Department of Geography offers a graduate certificate in development studies. Development studies is a well-established, interdisciplinary field of research with institutional centers at a number of major universities and several scholarly journals dedicated to its study. The certificate provides training in development studies to graduate students through a structured yet flexible program built around courses taught by CU faculty in a number of social science departments.

Because development issues such as agrarian change, labor migration, new social movements, industrial growth, urban planning and natural resource use cut across disciplinary divides, the study of development demands interdisciplinary approaches.

For more information, visit the department's Graduate Certificate in Development Studies (https://www.colorado.edu/geography/graduate-certificate-development-studies/) webpage.

# Requirements

## Admission Requirements

Currently enrolled graduate students at CU and nondegree ACCESS students with bachelor's degrees may pursue the development studies certificate by completing the four required courses with a grade of B or higher.

For more information, please contact the certificate director, Jennifer Fluri (Jennifer.Fluri@colorado.edu) or visit the department website (https://www.colorado.edu/geography/graduate-certificate-development-studies/).

## Required Courses and Credits

The certificate requires the completion of 12 credits (four courses), at least two but not more than three of which should be taken in the Department of Geography.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Requirement** | | |
| All students must take the core Geography class in development: | | |
| GEOG 5632 | Development Geography | 3 |
| **Geography Seminar Requirement** | | **3** |
| All students must take one additional Geography seminar from among the following: | | |
| GEOG 5662 | Seminar: Topics in Economic Geography | |
| GEOG 6402 | Seminar: Political Ecology | |
| GEOG 5732 | Population Geography | |
| GEOG 5292 | Migration, Immigrant Adaptation, and Development | |
| **Additional Seminar Requirements** | | **6** |
| In addition, students should complete 2 additional seminars from the following list, at least one of which should be outside of Geography: | | |
| GEOG 5662 | Seminar: Topics in Economic Geography | |
| GEOG 6402 | Seminar: Political Ecology | |
| GEOG 5732 | Population Geography | |
| GEOG 5292 | Migration, Immigrant Adaptation, and Development | |
| GEOG 5100 | Special Topics: Geography (with approval from the certificate program director) | |
| HIST 6019 | Readings in World History | |
| HIST 5628 | Modern China: Collapse of Imperial Brilliance, 1644-1949 | |
| HIST 5129 | Colloquium in Modern Asian History | |
| ANTH 7000 | Seminar: Current Research Topics in Cultural Anthropology [1] | |
| ANTH 7600 | Human Ecology: Cultural Aspects | |
| ANTH 5020 | Explorations in Anthropology (Conservation and Indigenous Peoples) | |
| ANTH 5500 | Cross-Cultural Aspects of Socioeconomic Development | |
| MDST 6211 | Communication and International Development | |
| SOCY 6016 | Topics in Sex and Gender (Gender in Globalization) | |
| SOCY 6007 | Foundations of Environmental Sociology | |
| SOCY 6017 | Inequality, Democracy, and the Environment | |
| SOCY 7017 | Population and Environment | |
| SOCY 6012 | Population Issues, Problems, and Policies | |

| | |
|---|---|
| ENVS 6305 | Reducing the Environmental Impact of Food Systems: Evidence-Based Solutions |
| ENVS 6304 | Introduction to Food Systems Internationally |
| PSCI 7132 | Comparative Political Economy |
| PSCI 7073 | Seminar: Global Political Economy |
| PSCI 7032 | Seminar: Latin American Politics |
| PSCI 7022 | Seminar in Political and Economic Development |
| PSCI 7206 | Public Policy and the Governance of Natural Resources |
| WGST 6090 | Feminist Theories |
| WGST 6190 | Feminist Methodology |
| WGST 6290 | Special Topics in Gender and Sexuality Studies (only certain topics apply) [2] |
| **Total Credit Hours** | **12** |

[1] One of the following sections: Section 2 Human Ecology; Section 3 Space, Place and Capitalism; Section 5 National and Cultural Citizenship; Section 9 Ethnographies of Globalization or Ethnographies of Latin America; Section 12 Modernity; Section 13 Anthropology of Neoliberalism

[2] One of the following sections: Gender – Global Perspective; Global Gender Issues; Gender and Global Human Rights

# Plan(s) of Study

For more information, visit the department's Graduate Certificate in Development Studies (https://www.colorado.edu/geography/graduate-certificate-development-studies/) webpage.

# Population Studies - Graduate Certificate

Offered through the Population Program of the Institute of Behavioral Science (IBS), the graduate certificate in population studies recognizes master's and doctoral degree students for interdisciplinary work in issues related to population dynamics and its components, composition, distribution and change. The population program, which is international in scope and has an applied and policy-oriented focus, fosters research on population trends and patterns and provides training in population analysis. Students who are earning graduate degrees through the departments of geography, sociology or economics and are interested in majoring in population studies are eligible to petition for admission to the program.

Questions about the certificate program in population studies should be directed to cupc@colorado.edu

# Requirements

## Admission Requirements

All graduate degrees are awarded through departments and, therefore, graduate students wishing to pursue the Graduate Certificate in Population Studies must be first admitted into a departmental program. As certificates are only conferred with a degree, students must also make sure they satisfy all departmental degree requirements. For more information, please consult departmental staff.

## Course Requirements

In addition, the graduate certificate in population studies requires 9-12 credits, dependent upon status as MA, MS or PhD student. The required courses include:

- Two required core courses that focus on population studies theory, methods and issues.
- *For MA or MS students*: an additional two courses with substantial population studies content (list below). One course must be outside the student's home discipline.
- *For PhD students*: an additional three courses with substantial population studies content (list below). Two courses must be outside the student's home discipline.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| SOCY 6012 | Population Issues, Problems, and Policies | 3 |
| GEOG 6732 | Formal Population Geography: Analysis and Forecasting | 3 |
| **Other Potential Courses** [1] | | **6-9** |
| ECON 8686 | Labor Economics 2 | |
| ECON 8784 | Economic Development 2 | |
| ECON 8764 | | |
| GEOG 5292 | Migration, Immigrant Adaptation, and Development | |
| GEOG 5622 | City Life | |
| GEOG 5642 | Seminar: Urban Geography | |
| GEOG 5662 | Seminar: Topics in Economic Geography | |
| GEOG 5852 | Health and Medical Geography | |
| IPHY 5800 | Advanced Statistics and Research Methods in Integrative Physiology | |
| PSCI 7021 | Latinos and U.S. Politics | |
| PSCI 7022 | Seminar in Political and Economic Development | |
| PSCI 7062 | The Politics of Ethnicity | |
| PSCI 7181 | Immigration Law and Immigrants' Rights | |
| PSCI 7203 | Political Economy of International Migration and Policy | |
| SOCY 7002 | Social Disparities in Health | |
| SOCY 7006 | Sociology of Sex and Gender | |
| SOCY 7012 | The Social Demography of Race | |
| SOCY 7014 | Gender, Race, Class, and Crime | |
| SOCY 7017 | Population and Environment | |

[1] For courses not included in this list, please check with the Director of the certificate program to assure sufficient demographic content.

## Extracurricular Requirements

In addition to coursework, the graduate certificate on population studies requires participation in extracurricular offerings relevant to population studies. For MA or MS students, 10 hours of participation in extracurricular activities are required. For PhD students, 15 hours of participation in extracurricular activities are required. Such offerings can include:

- Attendance at the bi-weekly Population & Health workshop in IBS.
- Attendance at CUPC research presentations in IBS, typically one-hour sessions; check IBS website for schedule.
- Participation in methodological short courses and workshops, typically ranging from 4–40 hours.
- ICPSR offers summer workshops in Boulder each year; check their schedule.
- IBS Center for Research and Computing Services offers these on occasion; check IBS events.
- Annual conference on "Integrating Genetics and Social Sciences" (IGSS) typically held in the Fall; check IBS events or contact Jason.Boardman@colorado.edu.
- Annual Migration-Climate-Health workshops typically held in May; check IBS events or contact Lori.Hunter@colorado.edu.
- IBS' graduate student Professionalization Seminars ("ProSem"); check IBS events or contact Stefanie.Mollborn@colorado.edu.
- CARTSS dissertation writing workshop; check IBS events or contact Carew.Boulding@colorado.edu.
- Many institutions outside of CU offer workshops as well. For example, check websites for Stanford, Berkeley.

Students should alert the Certificate Director (Lori.Hunter@colorado.edu) of their intention to participate in such events for certificate credit. For more information, see the center's Graduate Certificate Program in Population Studies (https://behavioralscience.colorado.edu/unit/population/graduate-certificate-in-population-studies/) webpage.

## Plan(s) of Study

For more information, see the center's Graduate Certificate Program in Population Studies (https://www.colorado.edu/ibs/cupc/grad_cert.html) webpage.

# Geological Sciences

With one of the most successful graduate programs in the nation, the Department of Geological Sciences has enjoyed a reputation of excellence for more than 100 years. Our doctoral program is ranked among the top 10 percent of U.S. geology programs by the National Research Council, and CU Boulder is ranked as one of the top three universities in the world for geosciences by *U.S. News and World Report*.

Graduate students have an opportunity to work with over 30 tenured and tenure-track faculty who support a wide range of interdisciplinary research programs in such areas as: cosmochemistry and planetary geology; Earth science education; economic and energy resources; geobiology and astrobiology; geochemistry; geochronology and thermochronology; geodynamics, geophysics, and remote sensing; geomorphology and cryosphere; global change; hydrology; natural hazards; paleoclimate and paleoceanography; paleontology and paleobiology; petrology and mineralogy; sedimentology and stratigraphy; and structure and tectonics.

The graduate degrees offered include Master of Science (MS) and Doctor of Philosophy (PhD).

Students interested in graduate work in the geological sciences should carefully read the detailed information regarding admission, registration and degree requirements on the Geological Sciences (http://www.cugeology.org/) website.

## Professional Licensure

The State of Colorado does not require individuals working in Geology or the Geological Sciences to obtain Professional Geology Licensure, however many states require professional geologists to pass the ASBOG Fundamentals of Geology (FG) and/or Practice of Geology (PG) examinations. Information regarding ASBOG examination specifications can be found on the ASBOG (https://www.asbog.org/) website.

Students planning to seek professional licensure or certification for employment in a state other than Colorado, are strongly recommended to contact the appropriate licensing entity in the state in which they are, or plan to be, located in order to seek information and guidance regarding licensure or certification requirements and how the education received at CU Boulder may assist the student in their efforts to gain licensure in that state.

**Course code for this program is GEOL.**

## Master's Degree

- Geology - Master of Science (MS) (p. 1290)

## Doctoral Degrees

- Geology - Doctor of Philosophy (PhD) (p. 1290)
- Geophysics - Doctor of Philosophy (PhD) (p. 1291)

## Certificates

- Geophysics - Graduate Certificate (p. 1292)
- Hydrologic Sciences - Graduate Certificate (https://catalog.colorado.edu/graduate/colleges-schools/arts-sciences/programs-study/geological-sciences/hydrologic-sciences-graduate-certificate/)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Abbott, Lon D. (https://experts.colorado.edu/display/fisid_145044/)
Teaching Professor of Distinction; PhD, University of California, Santa Cruz

Anderson, Robert S. (https://experts.colorado.edu/display/fisid_130117/)
Distinguished Professor; PhD, University of Washington

Anderson, Suzanne Prestrud (https://experts.colorado.edu/display/fisid_131099/)
Professor; PhD, University of California, Berkeley

Arthurs, Leilani A. (https://experts.colorado.edu/display/fisid_145087/)
Associate Professor; PhD, University of Notre Dame

Chin, Karen (https://experts.colorado.edu/display/fisid_122666/)
Professor; PhD, University of California, Santa Barbara

Clark, Alisha (https://experts.colorado.edu/display/fisid_164457/)
Assistant Professor; PhD, University of California-Davis

Crow, Carolyn Alicia (https://experts.colorado.edu/display/fisid_163334/)
Assistant Professor; PhD, University of California-Los Angeles

Eberle, Jaelyn J. (https://experts.colorado.edu/display/fisid_126544/)
Professor; PhD, University of Wyoming

Farmer, G. Lang (https://experts.colorado.edu/display/fisid_100498/)
Professor; PhD, University of California, Los Angeles

Flowers, Rebecca M. (https://experts.colorado.edu/display/fisid_144054/)
Professor; PhD, Massachusetts Institute of Technology

Ge, Shemin (https://experts.colorado.edu/display/fisid_101387/)
Distinguished Professor, Chair; PhD, Johns Hopkins University

Hynek, Brian Michael (https://experts.colorado.edu/display/fisid_130622/)
Professor; PhD, Washington University

Jones, Craig H. (https://experts.colorado.edu/display/fisid_105590/)
Professor; PhD, Massachusetts Institute of Technology

Kopf, Sebastian H. (https://experts.colorado.edu/display/fisid_155295/)
Assistant Professor; PhD, California Institute of Technology

Mahan, Kevin H. (https://experts.colorado.edu/display/fisid_143975/)
Professor; PhD, University of Massachusetts at Amherst

Marchitto, Thomas (https://experts.colorado.edu/display/fisid_128241/)
Professor, Associate Chair; PhD, Massachusetts Institute of Technology

Markle, Bradley R. (https://experts.colorado.edu/individual/fisid_167413/)
Assistant Professor; PhD, University of Washington

Mueller, Karl Jules (https://experts.colorado.edu/display/fisid_107629/)
Professor; PhD, University of Wyoming

Overeem, Irina (https://experts.colorado.edu/display/fisid_125258/)
Associate Professor; PhD, Delft University of Technology (Netherlands)

Rahman, Shaily (https://experts.colorado.edu/display/fisid_168587/)
Assistant Professor; PhD, SUNY at Stony Brook

Schulte-Pelkum, Vera (https://experts.colorado.edu/display/fisid_126623/)
Associate Research Professor, Lecturer; PhD, University of California-San Diego

Sepulveda Arellano, Julio Cesar (https://experts.colorado.edu/display/fisid_154923/)
Associate Professor; PhD, University of Bremen (Germany)

Sheehan, Anne (https://experts.colorado.edu/display/fisid_103645/)
Chair, Professor; PhD, Massachusetts Institute of Technology

Simpson, Carl (https://experts.colorado.edu/display/fisid_159652/)
Assistant Professor; PhD, University of Chicago

Tilton, Eric (https://experts.colorado.edu/display/fisid_126548/)
Professor, Associate Chair; PhD, University of California, Santa Cruz

Snell, Kathryn Elaine (https://experts.colorado.edu/display/fisid_155298/)
Associate Professor; PhD, University of California, Santa Cruz

Stempien, Jennifer (https://experts.colorado.edu/individual/fisid_143751/)
Associate Teaching Professor; PhD, Virginia Polytechnic Institute and State University

Templeton, Alexis S. (https://experts.colorado.edu/display/fisid_141202/)
Professor; PhD, Stanford University

Tiampo, Kristy F. (https://experts.colorado.edu/display/fisid_155908/)
Professor; PhD, University of Colorado Boulder

Trower, Lizzy (https://experts.colorado.edu/display/fisid_159463/)
Assistant Professor; PhD, Stanford University

Tucker, Gregory E. (https://experts.colorado.edu/display/fisid_130605/)
Professor; PhD, Pennsylvania State University

Wing, Boswell A. (https://experts.colorado.edu/display/fisid_158302/)
Associate Professor; PhD, Johns Hopkins University

# Courses

**GEOL 5001 (3) Physics and Chemistry of the Solid Earth**
Reviews the physical and chemical characteristics of the solid earth, from the core to the crust, and the processes that govern behavior through the earth. Lectures are supplemented with readings from the recent literature. Topics include convection, phase transitions, melt generation, forces of plate tectonics, origin of continents and lithosphere, continental tectonics, and earthquakes.
**Requisites:** Restricted to graduate students only.
**Recommended:** Requisite a course in basic chemistry and a course in physics.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5002 (3) Physics, Chemistry, and Biology of Sedimentary Systems**
Reading and discussion of current issues and themes in the stratigraphic sciences, including stratigraphic and facies analysis, spatial heterogeneity and self-organization, numerical modeling; origin, evolution, mass extinctions, and megatrajectories of life; and paleooceanographic and paleoclimatic signals in sedimentary rocks. Goal is to diversify students' understanding of the role of physics, chemistry, and biology in attacking research problems in sedimentary systems.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5003 (2) Graduate Writing Seminar**
Aims at improving graduate student writing, editing, and reviewing skills, while meeting student writing goals. Includes discussion of materials about effective writing, and peer-editing of text that students are producing for their graduate research endeavors.

**GEOL 5021 (4) Petrology: Evolution of Crustal and Mantle Rocks**
Origin, physical, and chemical properties of igneous and metamorphic rocks. This course develops a thermodynamic framework for the interpretation of geologic processes from observed mineral assemblages and rock textures. Laboratory component emphasizes the study of rocks in thin section and hand samples to understand earth processes in the mantle and crust.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4021
**Requisites:** Restricted to graduate students only.

**GEOL 5042 (3) Computational Tools in Geosciences**
Scientific research and teaching in geological sciences and related disciplines relies increasingly on computational tools. This class aims to introduce graduate students in the geological, geophysical and biogeochemical sciences to a wide range of commonly used concepts and open source data tools to empower them to find the right tool for their computational needs in research and teaching. Previously offered as a special topics course.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisite Prior experience with at least one programming language is recommended.

**GEOL 5060 (4) Oceanography**
Examines the ocean as a system influencing the Earth's surficial processes and climate. Composition and properties of seawater, ocean circulation, waves, tides, coastal-, shallow-, and deep-water processes, biogeochemical cycles, deep sea sediments. Laboratory emphasizes the use of oceanographic data.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4060
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5080 (1-3) Advanced Hydrogeology and Modeling Concepts**
Introduces advanced groundwater flow and modeling concepts, equations for steady state and transient flow, saturated and unsaturated flow, finite difference method, application of modeling in geologic processes, radial flow and aquifer parameters, infiltration and groundwater recharge, model calibration, verification and prediction. Department enforced prerequisite: MATH 2300 or Fortran.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5093 (4) Remote Sensing of the Environment**
Covers acquisition and interpretation of environmental data by remote sensing. Discusses theory and sensors as well as manual and computerized interpretation methods. Stresses infrared and microwave portions of the spectrum.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4093 and GEOG 4093 and GEOG 5093
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5101 (1) Introduction to Geological Sciences Faculty I**
Welcomes and introduces all new graduate students to the Department of Geological Sciences. Faculty discuss their research and their academic trajectories. The week¿s geology colloquium is discussed. Tutorials from staff introduce how the university works, what funding opportunities exist, and how and when to apply for such funding.
**Grading Basis:** Letter Grade

**GEOL 5102 (1) Introduction to Geological Sciences Faculty II**
Continues to introduce all new graduate students to the Department of Geological Sciences. Faculty discuss their research and their academic trajectories. The week¿s geology colloquium is discussed. In addition, students craft reports on their intended research.
**Grading Basis:** Letter Grade

**GEOL 5110 (3) Geomechanics**
Introduces fundamental physical processes important to the transport of heat and mass in the Earth and on Earth's surface. Provides practice with quantitative treatment of geological problems. Solutions for each problem are derived from first principles, including conservation and flux laws. Emphasizes heat conduction and viscous fluid flow. Department enforced prerequisite: restricted to graduate students only and a course in calculus.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5111 (3) Rheology: Fracture and Flow of Rocks**
Focuses on the elastic and plastic deformation of planetary materials (e.g. rocks and minerals, melts, tectonic plates, etc.). Topic include stress and strain, failure criterion, fracture propagation, creep (dislocation and diffusion), and deformation of multiphase materials. Prior coursework in basic chemistry, physics, mineralogy/petrology, and structure/geology is recommended.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**GEOL 5120 (3) Advanced Structural Geology and Tectonics**
Provides valuable exposure to theory and applications related to deformation (rheology) of solid Earth materials as well as the structural and geophysical characteristics of the world's major orogenic belts. The processes that will be covered span a wide range of Earth's depths, from compaction in sedimentary rocks and flow of ice/salt near Earth's surface to cataclastic mechanisms in fault rocks to plastic flow of deep crust and mantle rock. The course will involve lectures, some in-class and take home problem sets, some local field exercises and field data analysis, classic and modern paper discussions, and a research term project (written and oral presentation).
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4120
**Recommended:** Prerequisite GEOL 3120.
**Grading Basis:** Letter Grade

**GEOL 5123 (3) Teaching and Learning in Post-Secondary Science Education**
Introduces the science of learning and research-based instructional strategies. Open to students in any STEM discipline considering a career that involves college-level teaching. Students apply research on learning and teaching to the development of instructional materials for a target course they envision teaching at the college level in the future.
**Recommended:** Prerequisite at least one semester teaching/TAing undergraduate courses (waived with instructor approval).

**GEOL 5125 (3) Communicating Earth Science with the Public**
Introduces research on science communication and discusses examples drawn from geoscience. Students apply research on science communication to conceptualizing how to communicate about their specific geoscience research to the public in different contexts. Students should be familiar enough with their area of graduate research in geoscience to apply different models of science communication to it.
**Requisites:** Restricted to graduate students only.

**GEOL 5150 (2) Planetary Field Geology**
Provides an overview of the geology, age and origins of the solid (rocky) planets, dwarf planets and moons of our solar system and the processes that form them from comparative studies from comparative geology. Includes modules on volcanism, rifting, aeolian processes, fluvial erosion, impacts, climate change and paleontology.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4150
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5185 (3) Geomicrobiology**
Examines how microbial and chemical processes interact on the Earth¿s surface today and have shaped the planet throughout its history. Emphasis will be placed on how the life styles and chemical ingenuity of microorganisms drive key biogeochemical processes including weathering and transformations of carbon, oxygen, sulfur, iron and nitrogen. Towards this goal, major geologic and evolutionary events will be examined through the lens of microbial diversity, metabolic energetics, microbe-mineral interactions, and molecular biomarkers.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4185, ENVS 4185, and MCDB 4185
**Grading Basis:** Letter Grade

**GEOL 5215 (2) Geochronology and Thermochronology**
Constraining the timing of events and rates of processes is fundamental to earth science research. The field of geochronology and thermochronology is rapidly evolving. Cutting-edge aspects of geochronologic methods and emerging techniques will be especially emphasized. Lectures will emphasize the principles and assumptions of each technique. Seminar discussions will focus on recent papers that demonstrate state-of-the-art applications to diverse problems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4215
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5216 (1) Geochronology Reading and Discussion Seminar**
The goals of this reading and discussion seminar are to: 1) learn key aspects of a selected geochronology topic, 2) read, critically evaluate, and discuss peer-reviewed scientific papers that include geochronology data, methods, and interpretations, and 3) set up a framework and appropriate environment in which participants will discuss the ¿next steps¿ to address the big problems associated with each theme. This course will focus on a different geochronology theme each time that it is offered. A theme will be selected based on conversations among interested participants. At the beginning of the semester, weekly discussion topics and associated papers will be chosen to systematically work through concepts associated with that theme. Previously offered as a special topics course.
**Repeatable:** Repeatable for up to 5.00 total credit hours.

**GEOL 5253 (3) Stable Isotope Fractionation in Biogeochemical Processes**
Investigates the origins of stable isotope fractionation in geochemical systems with special emphasis on the role of biological catalysts as key drivers of isotopic effects during biogeochemical transformations. The class will cover a wide range of topics relevant to isotope fractionation including partition functions, diffusional, enzymatic and equilibrium isotope effects, open and closed system behavior, Rayleigh distillation, reservoir effects, enzymatic catalysis, physiological drivers and signal preservation.
**Recommended:** Prerequisites MATH 1300 or APPM 1350.

**GEOL 5270 (3) Marine Chemistry and Geochemistry**
Examines the chemical, biological, geological and physical processes affecting (and affected by) the chemistry of the oceans. Topics include: chemical separation in seawater; the marine carbon cycle and its long-term control on atmospheric CO2; the large-scale interdependence of nutrient distributions and biological productivity, chemical tracers of ocean circulation; the chemistry of marine sediments, including early diagenesis.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4270
**Recommended:** Prerequisites introductory chemistry, introductory geology, introductory oceanography.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5280 (3) Aqueous and Environmental Geochemistry**
Explores the fundamentals of low-temperature geochemistry to investigate element speciation and chemical behavior in waters, soils and sediments. Topics include water-rock interaction and weathering, mineral dissolution and precipitation reactions, aqueous complexation, mineral surface chemistry, kinetics, element cycles, and redox biogeochemistry. Includes exposure to spectroscopic tools, computer simulations and microbial geochemistry. Department enforced prerequisite: GEOL 3320 or 2 year of college chemistry.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5305 (3) Global Biogeochemical Cycles**
Focuses on the cycling of elements at the global scale with a particular emphasis on human modification of biogeochemical cycles. Major biogeochemical cycles, their past dynamics, present changes and potential future scenarios will be addressed. Ecosystem to global-scale model of the earth system will be discussed along with global scale measurements of element fluxes from satellites, aircraft and measurement networks. Department enforced prerequisite: restricted to graduate students only, general chemistry and some organic chemistry.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 5840
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5330 (3) Cosmochemistry**
Investigates chemical and isotopic data to understand the composition of the solar system: emphasis on the physical conditions in various objects, time scales for change, chemical and nuclear processes leading to change, observational constraints, and various models that attempt to describe the chemical state and history of cosmological objects in general and the early solar system in particular. Department enforced prerequisite: graduate standing in physical science and graduate chemistry or physics or math courses.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4330 and ASTR 4330 and ASTR 5330
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5341 (3) The Cryosphere: Earth's Icy Environments**
Serves as an advanced introductory course in to the cryosphere. The course covers the nature of ice and the icy component of the Earth System, and how changing ice affects society. The course will not cover sea ice. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4341
**Requisites:** Restricted to graduate students only.

**GEOL 5380 (3) Fundamentals of Stable Isotope Geochemistry**
This course teaches students the fundamental principles of stable isotope fractionation during physical and biological processes, and the application of these behaviors to a wide range of important geologic questions. The course will use classic case studies from the geologic record to illustrate these principles.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4380
**Requisites:** Restricted to graduate students only.

**GEOL 5420 (3) Quaternary Dating Methods**
Features in-depth survey of standard and experimental dating methods that provide absolute ages for events of the last two million years of Earth history. Includes theory and application of radiocarbon, uranium series, amino acid, thermo-luminescence, fission track, potassium/argon, hydration, light stable isotopes, and other radioactive techniques.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5430 (3) Paleoceanography and Paleoclimatology**
Examines scientific tools, data, and theories related to the dramatically varied past climate of the Earth. Focus will be on marine records of climate change and ocean circulation, but ice cores and other continental archives will also be discussed. Course covers the Cenozoic Era (66 Ma to present), but with particular emphasis on the Quaternary ice age cycles.
**Recommended:** Prerequisites Introductory geology and introductory oceanography or atmospheric science.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5432 (3) Active Tectonics**
Considers the physical processes that drive coseismic and interseismic strain in the upper crust on Earth. It is focused on recognition and interpretation of surface strain produced by active faulting, folding and flexure at a range of timescales. This includes defining how coseismic strain cycles act to build geologic structures while considering methods of analysis with rapidly emerging remotely sensed and geochronologic datasets to quantify strain rates for seismic hazard assessment. Previous coursework in structural geology, geomorphology and remote sensing is recommended.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade

**GEOL 5474 (4) Vertebrate Paleontology**
Discusses the history and evolution of the vertebrates, including the phylogenetic relationships and evolutionary patterns of the major groups. Lab focuses on comparative vertebrate osteology and fossil representation of major groups.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4474 and MUSM 5474
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5555 (3) Topics in Macroevolution**
Macroevolution extends beyond the limits of microevolution by including processes that encompass many species, in both recent and fossils organisms. Some of the topics include evolutionary novelty and innovation, developmental evolution, disparity and diversity dynamics, and extinction. We will survey case studies, methods, and the current literature.
**Repeatable:** Repeatable for up to 9.00 total credit hours.

**GEOL 5611 (3) Organic Geochemistry**
Explores the ¿biomarker concept¿ as a tool to elucidate microbial, biogeochemical, and climatic processes in natural systems through three fundamental goals: a) characterization and classification of organic molecules in complex, natural mixtures; b) biosynthesis, transport, transformation, preservation and destruction of organic matter in nature; c) application of lipid biomarkers and their stable isotope composition to study biological, biogeochemical, and climatic processes in modern and ancient systems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4611
**Recommended:** Prerequisites CHEM 1113 or equivalent from undergraduate degree and GEOL 5270 or GEOL 5280 or GEOL 5305 or GEOL 5675.

**GEOL 5612 (3) Techniques in Organic Geochemistry**
Explores the techniques in analytical chemistry and organic geochemistry for the study of lipid biomarkers in the environment, which include the following topics: a) Extraction of environmental samples and separation of lipid classes; b) Analysis of apolar lipids using gas chromatography-mass spectrometry (GC-MS); c) Determine the stable isotope composition of lipids using GC-isotope ratio-MS (GC-IR-MS); d) Analysis of polar lipids using high performance liquid chromatography-MS (HPLC-MS). Requires previous coursework in general chemistry and Organic Geochemistry.
**Recommended:** Prerequisites Introductory or advanced courses in organic chemistry, biochemistry, biogeochemistry, geochemistry, geomicrobiology, paleoclimate, or geology.

**GEOL 5660 (3) Sedimentology & Geobiology of Carbonates**
Carbonate sedimentary rocks are a significant component of the geobiological rock record, capturing a history of organisms and the environments they inhabit. This course will focus on how carbonate sediments are formed, deposited, and lithified and what influences the preservation and alteration of textural and geochemical signals. We will cover facies identification, interpreting depositional environment, and carbonate geochemistry, with a particular emphasis on recent advances and unanswered questions at the intersection of carbonates and geobiology, including the role of microbial carbonate precipitation and/or dissolution in the formation and degradation of stromatolites, carbonate mud, ooids, etc.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4660
**Recommended:** Prerequisite prior coursework in Sedimentology.

**GEOL 5670 (3) Isotope Geology**
Introduces principles of stable and radiogenic isotope systematics in inorganic and organic geochemistry. Emphasizes application of isotope data to problems in igneous, metamorphic and sedimentary petrology, geobiochemistry, and petroleum genesis.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4670
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5675 (3) Stable Isotopes in Paleoclimate and Paleoecology**
Explores the use of stable isotope geochemistry for research questions in paleoclimatology and paleoecology. Covers physical and biological drivers of isotopic fractionation, systematics and applications of light elements such as carbon, nitrogen, oxygen, hydrogen, sulfur and boron and some less traditional isotopic systems. Applications include marine and terrestrial paleoclimate proxies and some uses for ecology and paleoecology.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4675
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5690 (3) Tectonic History of the Western United States**
Provides students with the practical tools needed to make tectonic interpretations through study of the geologic history of the western United States and the geodynamic models used in interpreting that history. Paleomagnetism, geobarametry, geothermometry, geodynamic modeling, and elements of structural geology and stratigraphy are topics considered in this class.
**Requisites:** Requires prerequisite courses of GEOL 3120 and PHYS 1110 (all minimum grade D-).
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5700 (1-4) Geological Topics Seminar**
Offers seminar studies in geological subjects of special current interest. Primarily for graduate students, as departmental staff and facilities permit.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5701 (2) Super-Problems in Quatrnary Climate**
Investigates major problems in the study and understanding of Quaternary climate variation, in seminar format. Each year one major topic will be addressed, such as: the physics and chemistry of the Ice Age ocean circulation; the theory and mechanics of glacial/interglacial atmospheric C02 change; the origins of the 20, 40, and 100 kyr orbital (Milankovitch) climate cycles.
**Recommended:** Prerequisites Introductory geology and climatology, oceanography, paleoclimatology, or paleoceanography.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5702 (1-3) Geomorphology Seminar**
Explores the dynamics and forms of the earth's surface through critical reading and discussion of both classical and modern literature.
**Repeatable:** Repeatable for up to 10.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5703 (1) Seminar in Tectonics**
Focuses on a wide variety of topics related to crust, mantle and whole earth tectonics. Published papers from recent peer-reviewed literature are read and discussed. The format and specific topics will vary each semester (e.g., a relatively focused theme or open format) and will in part be determined by the makeup of enrolled students. Department enforced prerequisite: restricted to graduate students only.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5704 (1) Carbonates Seminar**
Focuses broadly on the topic of carbonates, including sedimentology, geochemistry, and geobiology of carbonates. Each semester will have a distinct theme under these sub-topics. Students will be responsible for leading discussion on individual readings and will be able to provide input on both the theme and the individual reading selections. Upper-level GEOL majors can register with instructor approval.
**Repeatable:** Repeatable for up to 10.00 total credit hours.

**GEOL 5705 (1-3) Seminar in Paleoclimate**
Investigates major problems in the study and understanding of past climate variations as preserved in the geologic record. Course format is a seminar-style critical reading and discussion of journal articles in paleoclimatology and paleoceanography. Topical focus varies from year to year. Prior coursework in geology, climate science, and/or paleoclimate is recommended.
**Repeatable:** Repeatable for up to 9.00 total credit hours.

**GEOL 5711 (1-3) Igneous and Metamorphic Field Geology**
Applies field techniques to interpretation of igneous and metamorphic rocks. Field exercises and lectures focus on collecting data required to map igneous and metamorphic rock units. Department enforced prerequisites: restricted to graduate students only and GEOL 2001 or GEOL 2700 and GEOL 3020.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5712 (1-3) Structural Field Geology**
Methods of field study of structure of rocks, including observations, data collection and interpretation to understand geometry of deformation and causative processes and kinematics. Field projects are mapped using different scales, air photos, topographic maps and compass and tape. Department enforced prerequisites: GEOL 2001 or GEOL 2700 and GEOL 3020.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5714 (2) Field Geophysics**
Applies geophysical field techniques and data interpretation to studying geological and engineering problems. Fieldwork includes seismic, gravity, magnetic and electrical measurements. Department enforced prerequisite: restricted to graduate students only and GEOL 2001 or GEOL 2700 and MATH 1300 and PHYS 1110.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5715 (1-3) Field Techniques in Surficial Geology and Geohydrology**
Introduces various field techniques and data analysis methods in hydrogeologic studies for students in geology, environmental studies, geography and civil engineering. Exercises include mapping ground water levels, conducting slug and pumping tests, measuring steam flows, interpreting aquifer parameters from geophysical measurements and using field data for water budget analysis. Department prerequisite: GEOL 2001 or GEOL 2700.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5716 (1-3) Environmental Field Geochemistry**
Develops basic field skills in the most commonly performed tasks required for the environmental characterization of solid and aqueous wastes. Media of study include soils, stream sediments, surface waters, ground waters and atmospheric particulates. Department enforced prerequisites: GEOL 2001 or GEOL 2700 and CHEM 1011 and CHEM 1031 or CHEM 1113 or CHEM 1133 and GEOL 3320.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5717 (2) Field Seminar in Geology and Tectonics**
Studies geologic features in and around Colorado to gain an overview of the geologic and tectonic evolution of the western U.S. Department enforced prerequisites: restricted to graduate students only and GEOL 2001 or GEOL 2700 and at least one of the following: GEOL 3120 or GEOL 3320 or GEOL 3430.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5719 (2) Field Analysis and Tectonics of Crystalline Rocks**
Introduces basic and advanced mapping tools and concepts for structural and tectonic analysis of solid-state and magmatic deformation, metamorphism, and fluid flow in igneous and metamorphic rocks. Includes some digital mapping concepts using smartpad and smartphone applications, and computer-based analysis of structure data. Includes multi-day mapping projects in the Front Range, and in western Colorado, southern Wyoming, or northern New Mexico. Also includes introductions to Precambrian tectonic history of western North America and mineral resources of Colorado.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4719
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**GEOL 5721 (2) Classics and Frontiers in Hydrology**
The first part of this course studies classic papers in hydrology that include development of fundamental concepts and governing principles governing water flow in subsurface. It will also include benchmark papers that define critical advances in hydrology. The second part of this course focuses on latest research front that spans from theoretical and modeling studies to measuring and monitoring technologies.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**GEOL 5725 (1-4) Field Based Special Topics in Geoscience**
Explores selected geological subjects of special interest in a field setting.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4725
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5747 (3) Unconventional Resources**
To introduce the concepts, principles, methods, and techniques of unconventional reservoirs. Unconventional reservoirs can be defined informally as those reservoirs that need artificial stimulation to produce. Accumulations in conventional traps are due to buoyancy. Seven common kinds of unconventional reservoirs: tight-gas sandstones, shale gas, shale oil, coal-bed methane, heavy-oil sands, oil shale, gas hydrates. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4747

**GEOL 5755 (2) Field Geobiology**
Provides students technical fieldwork skills in the interdisciplinary field of geobiology, spanning modern environments and to ancient environments in preserved in rock record, and spanning techniques from geochemistry, environmental microbiology, and sedimentology. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4755
**Repeatable:** Repeatable for up to 8.00 total credit hours.

**GEOL 5775 (3) Introduction to Numerical Modeling in Geoscience**
Numerical models play an essential role across the geosciences, with applications that include hypothesis exploration, data interpretation, and prediction. This course provides a hands-on introduction to numerical modeling. Students learn scientific programming and modeling concepts by iterating through a series of model-development assignments in Python and Matlab. Applications span a range of topics in the geosciences, with emphasis on physical processes that involve mass, energy, and/or momentum transport.

**GEOL 5800 (3) Planetary Surfaces and Interiors**
Examines processes operating on the surfaces of solid planets and in their interiors. Emphasizes spacecraft observations, their interpretation, the relationship to similar processes on Earth, the relationship between planetary surfaces and interiors and the integrated geologic histories of the terrestrial planets and satellites.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 5800
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5820 (3) Origin and Evolution of Planetary Systems**
Considers the origin and evolution of planetary systems, including proto-planetary disks, condensation in the solar nebula, composition of meteorites, planetary accretion, comets, asteroids, planetary rings and extrasolar planets. Applies celestial mechanics to the dynamical evolution of solar system bodies.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 5820
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5830 (3) Topics in Planetary Science**
Examines current topics in planetary science, based on recent discoveries, spacecraft observations and other developments. Focuses on a specific topic each time the course is offered, such as Mars, Venus, Galilean satellites, exobiology, comets or extrasolar planets. Department enforced prerequisite: restricted to graduate students in the physical sciences.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5830 and ASTR 5830
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5833 (3) Teaching and Learning Earth Systems**
Learn and develop pedagogically effective strategies for teaching and understanding Earth Science concepts. Particular emphasis is placed on understanding the importance of geoscience habits of mind (i.e. spatial/temporal reasoning, multiple working hypotheses, geographic context). The course focuses upon inquiry and evaluation of evidence, the importance of background knowledge and misconceptions and developing effective discourse within and outside the classroom.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4833 and GEOL 4833 and EDUC 5833
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**GEOL 5835 (1) Seminar in Planetary Science**
Studies current research on a topic in planetary science. Students and faculty give presentations. Subjects may vary each semester. Department enforced prerequisite: senior level undergraduate physics.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5835 and ASTR 5835
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5840 (1-3) Independent Study-Quaternary Geology**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5841 (1-3) Independent Study-Economic Geology**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5842 (1-3) Independent Study-Petrology**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5843 (1-3) Independent Study-Sedimentology**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5844 (1-3) Independent Study-Structure/Tectonics**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5845 (1-3) Independent Study-Geochemistry**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5846 (1-3) Independent Study-Geophysics**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5847 (1-3) Independent Study-Hydrology**
.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5849 (1-3) Independent Study-Paleontology**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5851 (1-3) Independent Study-Sediment Petrology**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5852 (1-3) Independent Study--GIS Applications in Quaternary Geosciences**
Leads students through quantitative spatial analysis of environmental and paleoclimatic problems. Each student will develop a project from start to finish, with emphasis on raster GIS for building large empirical databases that bear on process and variability.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5862 (1-4) Geology Independent Study**
Students may not enroll in this course without completing the Independent Study Contract.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4862
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**GEOL 5910 (3) Geothermodynamics**
Provides a solid foundation in chemical thermodynamic concepts and calculations as applied to geochemistry and geobiology.

**GEOL 6050 (3) Space Instrumentation**
Provides an overview of the relevant space environment and process, the types of instruments flown on recent mission and the science background of the measurement principles.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 6050 and ASEN 6050
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6060 (4) Petroleum Geology of Turbidite Systems**
Covers the exploration and production aspects of petroleum submarine fans and turbidite systems.
**Requisites:** Requires prerequisite course of GEOL 6330 (minimum grade B).
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6310 (3) Sedimentary Petrology**
Covers interpretation of depositional and diagenetic history of sedimentary rocks as determined from thin-section studies. Department enforced prerequisites: GEOL 3010 and GEOL 3020 and GEOL 3430 or equivalents.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6330 (4) Applied Sequence Stratigraphy and Basin Analysis**
Develops skills in the stratigraphic interpretation of seismic reflection data, recognition of sequence stratigraphy in well logs and outcrop and their applications to basin analysis in petroleum exploration. Department enforced prerequisite: restricted to graduate students only and introductory undergraduate physics and sedimentology/stratigraphy.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6610 (3) Earth and Planetary Physics 1**
Examines mechanics of deformable materials, with applications to earthquake processes. Introduces seismic wave theory. Other topics include inversion of seismic data for the structure, composition and state of the interior of the Earth.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 6610 and PHYS 6610
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6620 (3) Earth and Planetary Physics 2**
Covers space and surface geodetic techniques as well as potential theory. Other topics are the definition and geophysical interpretation of the geoid and of surface gravity anomalies; isostasy; post-glacial rebound; and tides and the rotation of the Earth.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 6620 and PHYS 6620
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6630 (3) Earth and Planetary Physics 3**
Examines the solar system, emphasizing theories of its origin and meteorites. Highlights distribution of radioactive materials, age dating, heat flow through continents and the ocean floor, internal temperature distribution in the Earth, and mantle convection. Also covers the origin of the oceans and atmosphere.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 6630 and PHYS 6630
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6650 (1-3) Seminar in Geophysics**
Advanced seminar studies in geophysical subjects for graduate students.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 6650 and PHYS 6650
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6655 (3) InSAR Processing and Interpretation**
Understand the concepts and applications of interferometric synthetic aperture radar (InSAR) and differential InSAR, to include an introduction to physical geodesy and satellite techniques.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 6655
**Grading Basis:** Letter Grade

**GEOL 6670 (2) Geophysical Inverse Theory**
Principles of geophysical inverse theory as applied to problems in the Earth sciences, including topography, Earth structure and earthquake locations. Department enforced prerequisites: a course in calculus and a course in computer programming (any language).
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 6670
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6950 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6960 (1-3) Plan II Master's Research**
The Plan II program requires at least 3 credit hours of GEOL 6960 (Plan II Master¿s Research) under the supervision of the advisory committee.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Course

# Geology - Master of Science (MS)

Geological Sciences is a research-oriented department affiliated with a number of research institutes and research centers, including the Cooperative Institute for Research in Environmental Sciences (CIRES), the Institute of Arctic and Alpine Research (INSTAAR), the Laboratory for Atmospheric and Space Physics (LASP), the Museum of Natural History, the Center for Astrobiology and the Energy and Minerals Applied Research Center (EMARC). Related areas of study include geography, astrophysical and planetary sciences, atmospheric and oceanic sciences, chemistry, physics, geophysics, microbiology, ecology and evolutionary biology. The GEOL program also participates in certificate programs in geophysics (https://www.colorado.edu/geophysics/geophysics-graduate-certificate/), oceanography (https://www.colorado.edu/atoc/certificate/) and hydrological sciences (https://www.colorado.edu/program/hydrosciences/). Degree programs for incoming graduate students are individually designed according to research efforts of the faculty. It is highly recommended that students locate a faculty member whose research interests most closely match their own.

For additional details, visit the Geological Sciences website (https://www.colorado.edu/geologicalsciences/academic/graduate-degree-programs/).

## Requirements

### Admission Requirements

Students applying for admission are evaluated holistically, including their undergraduate preparation, personal statement, research interests and letters of recommendation. The Graduate Record Examination (GRE) is not required. Each student acquires a primary advisor and an advisory committee that provides guidance throughout the degree program.

### Prerequisites

### Program Requirements

Candidates for the master's degree in geological sciences must complete at least 30 hours of graduate credits either with a thesis (Plan I) or without a thesis (Plan II). The only specifically required classroom courses are GEOL 5101 Introduction to Geological Sciences Faculty I and GEOL 5102 Introduction to Geological Sciences Faculty II (1 credit each).

A maximum of 6 credit hours may be completed at the 3000- or 4000-level to count toward the 30 hours. A maximum of 9 graduate-level credits may be transferred from another university. Both types of substitution are at the discretion of the student's principal advisor and the department's Associate Chair for graduate studies

Students interested in graduate work in the geological sciences should carefully read the detailed information regarding admission, registration and degree requirements on the department's Information for Prospective Graduate Students (https://www.colorado.edu/geologicalsciences/academic/prospective-graduate-students/) webpage.

#### Plan I: Thesis Option

Students must complete a minimum of 4, but no more than 6, credit hours of Master's Thesis (GEOL 6950) as part of the 30 credit hour requirement.

#### Plan II: Non-thesis Option

The Department of Geological Sciences typically does not admit students into a Plan II (non-thesis) master's program, but Plan I or PhD candidates occasionally transfer into this option. Students must complete 3 credit hours of Plan II Master's Research (GEOL 6960) under the supervision of the student's advisory committee, as part of the 30 credit hour requirement.

## Learning Outcomes

By the completion of the program, students will be able to:

# Geology - Doctor of Philosophy (PhD)

Geological sciences is a research-oriented department affiliated with a number of research institutes and research centers, including the Cooperative Institute for Research in Environmental Sciences (CIRES), the Institute of Arctic and Alpine Research (INSTAAR), the Laboratory for Atmospheric and Space Physics (LASP), the Museum of Natural History, the Center for Astrobiology and the Energy and Minerals Applied Research Center (EMARC). Related areas of study include geography, astrophysical and planetary sciences, atmospheric and oceanic sciences, chemistry, physics, geophysics, microbiology, ecology and evolutionary biology. The GEOL program also participates in certificate programs in geophysics (https://www.colorado.edu/geophysics/geophysics-graduate-certificate/) and oceanography (https://www.colorado.edu/atoc/certificate/) and a subplan in hydrological sciences (https://www.colorado.edu/program/hydrosciences/). Degree programs for incoming graduate students are individually designed according to research efforts of the faculty. It is highly recommended that students locate a faculty member whose research interests most closely match their own.

For additional details, visit the department's Graduate Degree Programs (https://www.colorado.edu/geologicalsciences/academic/graduate-degree-programs/) webpage.

# Requirements

## Admission & Prerequisites

Students applying for admission are evaluated holistically, including their undergraduate preparation, personal statement, research interests and letters of recommendation. The Graduate Record Examination is not required. Each student acquires a primary advisor and an advisory committee that provides guidance throughout the degree program.

Entering students normally have completed at least 24 credit hours of basic courses in geological sciences and two semesters each of chemistry, physics and calculus. In some cases, undergraduate preparation in other fields of science, mathematics or engineering may substitute for part of the 24 hours in geological sciences.

## Program Requirements

Candidates for the doctoral degree must complete at least 30 credit hours in coursework numbered 5000 or above, of which at least 20 must be taken at CU Boulder. The only specifically required courses are GEOL 5101 and GEOL 5102, Introduction to Geological Sciences Faculty (1 credit each). In addition to coursework, candidates must take a total of at least 30 credit hours of doctoral dissertation (GEOL 8990), with not more than 10 of these taken before the semester during which the comprehensive examination is passed, and not more than 10 taken in any one semester.

Students interested in graduate work in the geological sciences should carefully read the detailed information regarding admission, registration, and degree requirements on the department's Information for Prospective Graduate Students (https://www.colorado.edu/geologicalsciences/academic/prospective-graduate-students/) webpage.

# Learning Outcomes

By the completion of the program, students will be able to:

# Geophysics - Doctor of Philosophy (PhD)

The interdisciplinary doctoral program in geophysics encourages students with a variety of undergraduate backgrounds to pursue graduate study in the physics of the Earth, with special emphasis on the interior of the planet. Students specialize in one of the subfields of geophysics while gaining a broad, general background in the discipline and in-depth education in the relevant aspects of the parent fields of geology, physics and engineering.

Students enter the program by applying for admission to one of the following departments:

- Aerospace engineering sciences
- Astrophysical and planetary sciences
- Civil, environmental and architectural engineering
- Electrical and computer engineering
- Geography
- Geological sciences
- Mechanical engineering
- Physics

Upon satisfactory performance on the doctoral preliminary examination given by the home department, the student may formally apply for admission to the geophysics doctoral program.

The program is administered by the geophysics graduate program committee, which includes representatives from each of the participating departments. The comprehensive examination and the dissertation defense are directed by this committee, with a faculty member of the home department normally chairing these procedures.

For more information, visit the Geophysics Studies Program (http://www.colorado.edu/geophysics/) website.

# Requirements

Candidates for the doctoral degree must complete at least 30 credit hours in coursework numbered 5000 or above, of which at least 20 must be taken at CU Boulder.

In addition to coursework, candidates must take a total of at least 30 credit hours of doctoral dissertation, with not more than 10 of these taken in any one semester and not more than 10 dissertation credit hours taken before the semester during which the comprehensive examination is passed.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ASTR/GEOL/PHYS 6610 | Earth and Planetary Physics 1 (Seismology) | 3 |
| ASTR/GEOL/PHYS 6620 | Earth and Planetary Physics 2 (Geodesy) | 3 |
| ASTR/GEOL/PHYS 6630 | Earth and Planetary Physics 3 (Geodynamics) | 3 |
| ASTR/GEOL/PHYS 6650 | Seminar in Geophysics | 1-3 |
| One semester of graduate-level applied mathematics from the following: | | 3 |
| PHYS/MATH 5030 | Intermediate Mathematical Physics 1 | |
| APPM 5350 | Methods in Applied Mathematics: Fourier Series and Boundary Value Problems | |
| ASTR 5540 | Mathematical Methods | |
| MCEN 5020 | Methods of Engineering Analysis 1 | |
| **Dissertation** | | |
| GEOL 8990 | Doctoral Dissertation [1] | 30 |
| **Electives** | | |
| Additional courses compatible with the student's research interests to complete the 60-credit minimum. | | 17-15 |
| **Total Credit Hours** | | **60** |

[1] Or equivalent in home department.

For a list of approved elective courses, visit the Geophysics PhD Program (https://www.colorado.edu/geophysics/academics/geophysics-phd-program/) webpage.

# Learning Outcomes

By the completion of the program, students will be able to:

- Digest, synthesize and critically evaluate geophysical literature and the research of others.
- Identify interesting tractable questions and articulate testable hypotheses in the realm of geophysical science.
- Design and conduct rigorous scientific research in geophysics, including adapting plans and navigating challenges where necessary.
- Communicate knowledge and its significance effectively to a variety of audiences.

# Geophysics - Graduate Certificate

The geophysics graduate certificate offers a coherent curriculum in geophysics that can complement and supplement a student's regular degree program and encourages multi-disciplinary education in the area of geophysics. The geophysics certificate program allows students to obtain recognition for their accomplishments in geophysics without having to switch into the geophysics degree program.

## Requirements

### Admission Requirements

A student wishing to be considered for a certificate in geophysics must be pursuing a graduate degree in one of the participating graduate departments (ASEN, APS, CEAE, ECEN, GEOG, GEOL, MCEN, PHYS). Students from outside the participating departments can apply for entry to the geophysics certificate program by submitting a letter addressed to the Geophysics Graduate Program Committee.

A student must have a course background that includes mathematics through three semesters of calculus and four undergraduate science or engineering courses.

### Program Requirements

All students must take at least three geophysics core courses and the Seminar in Geophysics. At least one of the three geophysics core courses must be from the earth and planetary physics (EPP) series, and another must be from outside the student's home department. Most geophysics core courses are offered once every two years.

Completion with a grade of B or better of a total of three geophysics core courses (at least one from the EPP sequence) and one credit hour for the Seminar in Geophysics.

A certificate in geophysics will be awarded upon the student's completion of degree requirements in their home department. Upon request from a student, the program director and the student's advisor will determine whether a student has met the requirements for the certificate and will generate a letter to the appropriate department head and dean. The certificate is not intended as a substitute for a degree and will be awarded only upon completion of a graduate degree.

#### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Seminar** | | |
| ASTR/GEOL/PHYS 6650 | Seminar in Geophysics | 1 |
| **Core Courses** | | |
| Choose at least three of the following: | | 9 |
| ASTR/GEOL/PHYS 6610 | Earth and Planetary Physics 1 | |
| ASTR/GEOL/PHYS 6620 | Earth and Planetary Physics 2 | |
| ASTR/GEOL/PHYS 6630 | Earth and Planetary Physics 3 | |
| ASTR/GEOL/PHYS 6650 | Seminar in Geophysics | |
| APPM 7300 | Nonlinear Waves and Integrable Equations | |
| ASEN 5050 | Space Flight Dynamics | |
| ASEN 5090 | Introduction to Global Navigation Satellite Systems | |
| ASEN 5245 | Radar and Remote Sensing | |
| ASEN 5307 | Engineering Data Analysis Methods | |
| ASEN 5335 | Aerospace Environment | |
| ASEN 6055 | Data Assimilation and Inverse Methods for Earth & Geospace Observations | |
| ASEN 6090 | Advanced Global Navigation Satellite Systems: Software and Applications | |
| ASTR 5140/ PHYS 5141 | Astrophysical and Space Plasmas | |
| ASTR/PHYS 5150 | Introductory Plasma Physics | |
| ASTR 5300 | Introduction to Magnetospheres | |
| ASTR 5400 | Introduction to Fluid Dynamics | |
| ASTR/GEOL 5800 | Planetary Surfaces and Interiors | |
| ASTR/ATOC/GEOL 5820 | Origin and Evolution of Planetary Systems | |
| CVEN 5131 | Continuum Mechanics and Elasticity | |
| CVEN 5718 | Mechanics and Dynamics of Glaciers | |
| CVEN 5768 | Introduction to Rock Mechanics | |
| CVEN 6595 | Earthquake Engineering | |
| GEOL 5093 | Remote Sensing of the Environment | |
| GEOL 5110 | Geomechanics | |
| GEOL 5690 | Tectonic History of the Western United States | |
| GEOL 5714 | Field Geophysics | |
| GEOL/PHYS 6670 | Geophysical Inverse Theory | |
| MCEN 5023 | Solid Mechanics 1 | |
| **Total Credit Hours** | | **10** |

# Germanic and Slavic Languages and Literatures

As a department of foreign languages, literatures and cultural studies, the Department of Germanic and Slavic Languages and Literatures prepares students for life and careers in an increasingly global world. Our programs in German, Russian, East European and Eurasian and Nordic Studies enable students to combine their language training with interdisciplinary study of the regions where their language is spoken. The cultural legacies of the Germanic and Slavic countries continue to shape fields such as literature, art, music, film, philosophy and political science.

**Course codes for these programs are GRMN, GSLL, RUSS, REES, SCAN and SWED.**

## Master's Degrees

- German Studies - Master of Arts (MA) (p. 1298)
- Russian, East European and Eurasian Studies - Master of Arts (MA) (https://catalog.colorado.edu/graduate/colleges-schools/arts-sciences/programs-study/germanic-slavic-languages-literatures/russian-studies-master-arts-ma/)

## Doctoral Degree

- German Studies - Doctor of Philosophy (PhD) (p. 1302)

## Certificate

- Critical Theory - Graduate Certificate (p. 1304)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Gerwig, Inger-Johanne
Senior Instructor Emerita

Greaney, Patrick F. (https://experts.colorado.edu/display/fisid_122807/)
Professor; PhD, Johns Hopkins University

Grove, Vicki Jean (https://experts.colorado.edu/display/fisid_103689/)
Teaching Professor of Distinction; PhD, University of Colorado Boulder

Hintz, Saskia Barbara (https://experts.colorado.edu/display/fisid_144506/)
Teaching Professor of Distinction; PhD, New York University

Hoecker, Arne (https://experts.colorado.edu/display/fisid_152973/)
Associate Professor; PhD, Johns Hopkins University

Jany, Berit (https://experts.colorado.edu/display/fisid_154411/)
Teaching Professor; PhD, The Ohio State University

Kostoglodova, Elena Yurievna (https://experts.colorado.edu/display/fisid_100976/)
Teaching Associate Professor Emerita ; PhD, University of Colorado Boulder

Merritt, Adrienne (https://experts.colorado.edu/display/fisid_168762/)
Assistant Professor; PhD, University of California, Berkeley

Muller-Sievers, Helmut Heinz (https://experts.colorado.edu/display/fisid_147511/)
Professor; PhD, Stanford University

Nordvig, Mathias (https://experts.colorado.edu/individual/fisid_156587/)
Associate Teaching Professor; PhD, University of Aarhus (Denmark)

Osipova, Anastasiya (https://experts.colorado.edu/individual/fisid_167066/)
Assistant Professor; PhD, New York University

Osterman, Laura Olson (https://experts.colorado.edu/display/fisid_109800/)
Professor, Associate Chair; PhD, Yale University

Plagmann, Natalia (https://experts.colorado.edu/display/fisid_168526/)
Teaching Assistant Professor; PhD, Princeton University

Plank, D. L.
Professor Emeritus

Raggio, Avedan (https://experts.colorado.edu/display/fisid_154482/)
Teaching Assistant Professor; MA, University of Colorado Boulder

Romanov, Artemi (https://experts.colorado.edu/display/fisid_100659/)
Professor; PhD, St. Petersburg University (Russia)

Salys, Rimgaila
Professor Emerita

Schindler, Patricia A.
Senior Instructor Emerita

Schmiesing, Ann C. (https://experts.colorado.edu/display/fisid_106248/)
Professor; PhD, University of Cambridge (England)

Siergiejczyk-Nicoll, Galina (https://experts.colorado.edu/display/fisid_148167/)
Teaching Assistant Professor; PhD, University of Colorado Boulder

Stimilli, David (https://experts.colorado.edu/individual/fisid_134650/)
Associate Professor Emeritus; PhD, Yale University

Stone, Lauren Shizuko (https://experts.colorado.edu/display/fisid_154888/)
Assistant Professor; PhD, New York University

Weber, Beverly Marie (https://experts.colorado.edu/display/fisid_144523/)
Chair, Professor; PhD, University of Massachusetts Amherst

## Courses

**GRMN 5010 (3) Theory and Practice of German Studies**
Provides a graduate-level introduction to German Studies, with emphasis on theoretical approaches and current trends in German Studies. Special attention will be given to developing the tools necessary for advanced criticism: close-reading skills, mastery of critical terminology, and training in a range of theoretical approaches. The main goals of this course are (1) to introduce students to critical approaches to literature/art/film and recent theoretical trends in German literary and cultural studies, (2) to give students the opportunity to deepen interpretive skills through close reading and discussion of representative texts, and (3) to encourage students to explore theoretical approaches to literary and cultural material.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5020 (3) Applied Linguistics and Foreign Language Teaching Methodology**
Required of all graduate teaching assistants, this course provides a knowledge of the aspects of German linguistics that are important for teaching German and a survey of foreign language teaching methods and second language acquisition research.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5030 (3) Foundations of Critical Theory**
An introductory study of nineteenth-century German philosophy (especially Kant, Hegel, and Marx). Required course for the graduate certificate in Critical Theory.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5051 (3) Critical Theory of the Frankfurt School**
Serves as an introduction to the "Frankfurt School" and Critical Theory with particular emphasis upon rationality, social psychology, cultural criticism, and aesthetics. Through close readings of key texts by members of the school (Horkheimer, Benjamin, Adorno, Habermas) we will work toward a critical understanding of the analytical tools they developed and consider their validity. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 4051
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Courses Taught in English
Departmental Category: German Graduate Courses

**GRMN 5210 (3) Seminar: The Age of Enlightenment**
Examines the influence of the emerging middle class on the transformation of aesthetic and societal values. Major works of theory, philosophy, literature, and criticism by Lessing, Herder, Kant, J. E. Schlegel, and others. Examines major literary and cultural influences from France and Great Britain.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5220 (3) Seminar: Topics in the Age of Goethe**
Examines various aspects of German-speaking society from the 1770s to 1830s. Topics may include Sturm und Drang as social commentary; romantic theory in the wake of the French Revolution; romantic nationalism; the Faust theme; Weimar as a cultural center; and others.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5231 (3) The Invention of Sexuality**
Traces the development of various concepts of sexuality, from ideas inherited from antiquity to the modern ¿invention¿ of ¿homosexuality¿ by German and Austrian sexologists and psychoanalysts, up to and including contemporary queer critiques. Students will also gain an understanding of how cultural beliefs and biases about queer sexualities are rooted in both the history of science and changing/persisting gendered norms. Explores the intersecting philosophical, literary, and ideological underpinnings of process(es) of marginalization of both women and queer sexualit(ies). Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 4231
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5301 (3) Gender, Race, and Immigration in Germany and Europe**
Introduces students to debates surrounding migration and race in contemporary Germany with comparisons to other European contexts. Emphasis on reading texts in context using tools of cultural studies, integrating analyses of gender, race, nation, and sexuality. Texts may include film, literature, television, social media, news media, political posters, etc. Topics include: race and racisms, Black and women of color feminisms, Roma feminisms, Muslim feminisms, notions of integration and citizenship, and more. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 4301 and WGST 4301
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5310 (3) Seminar: Topics in the 19th Century**
Examines the transformation of realism from Buechner to Gerhart Hauptmann. Topics may include literary responses to the Restoration; intellectuals and the Revolution of 1848; philosophy and literature; theatrical representations of woman, family, and gender; and others.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5320 (3) Seminar: The German Novel from 1901--1956**
Beginning with T. Mann's Buddenbrooks, charts the rise of the German novel in the early 20th century and examines such topics as Wilhelminian society; intellectuals and World War I; dehumanization and alienation; national socialism and literary exile; and others. Authors include T. Mann, H. Hesse, R. Rilke, F. Kafka, A. Seghers, and A. Zweig.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5330 (3) Seminar: German Intellectuals and Society Between the Wars**
Examines the period of social crisis and the intellectual responses to the collapse of the prewar order. Gives attention to the antidemocratic thought of Spengler, Juenger, Stefan George and his circle, to the emergence of existentialism with Scheler and Heidegger, and to the search for a new political humanism as evidenced by the work of Thomas Mann.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5410 (3) Seminar: Topics in Early 20th Century German Society**
Focuses on major issues, events, movements, and figures prior to World War II. Topics may include the ontology of lyric poetry; Berlin in the 1920s; exiles, their communities, and their writings; women writers from Andreas-Salome to Anna Seghers; topics in German film; and others.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5420 (3) Seminar: Topics in Contemporary German-speaking Societies**
Analyzes artistic and literary engagement with major discussions and debates in contemporary German-speaking societies. Course also provides an introduction to theoretical approaches relevant to the topic. See specific topic description for more details.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5504 (3) Goethe's Faust**
Systematic study of the Faust motif in Western literature, with major emphasis on Faust I and II by Goethe and Thomas Mann's Doctor Faustus. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 4504 and HUMN 4504
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5510 (3) Seminar: Open Topics in German Civilization**
Focuses on cultural issues that cross lines of literary periodization. Topics may include the theater as social criticism from Lessing to Handke; forms of German protest from Luther to Thomas Mann; nihilism from Bonaventura to Thomas Bernhard; topics in German film; and others.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5520 (3) Seminar: Current Issues in German Literature and Media**
Examines issues pervading contemporary German literature and media, such as concerns of youth, xenophobia, stereotyping as it affects women and men in their relations, work experience, feminism, problems connected with the reunification, and other issues.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 6900 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 7010 (1-3) Writing Colloquium**
Prepares students for the qualifying examination paper and dissertation, and equips students with the skills needed to transform seminar papers into publishable work. Includes sessions on dissertation writing, publishing journal articles, preparing a reading list, and conducting archival research. Required for students in the German Studies PhD program. Cannot be satisfied through transfer credit.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to German Studies PhD students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: German

**GRMN 7900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 7930 (1-6) Internship**
Provides an academically supervised opportunity for doctoral students to earn credit while working for public or private organizations. Students supplement their work experience through directed readings and assignments. Students interested in applying for an internship must complete the Arts & Sciences Internship Application at http://advising.colorado.edu/sites/default/files/Internshipcredit.pdf. 1-6 hours;
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to German Studies graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements of the degree. For detailed information regarding doctoral dissertation credit, refer to Graduate School rules.
**Repeatable:** Repeatable for up to 100.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GSLL 5900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Germanic and Slavic Courses

**REES 5110 (3) Slavic Culture and Society**
Examines important ideologies and myths in Slavic societies, with emphasis on contemporary movements and their reinterpretation of history. Acquaints students with major tools for study of cultures of Eastern Europe and the post-Soviet states: research methods, bibliography, transliteration, critical thinking and writing skills. Required for Russian MA. Taught in English. Formerly RUSS 5110.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5120 (3) Russia after Communism: Post-Soviet Politics and Culture**
Explores the process of the re-invention and re-shaping of Russian national identity after the collapse of Communism. Topics will include the formation of a neoconservative and neo-imperialist agenda (as demonstrated by the Ukraine crisis), the growth of anti-Western attitudes, and the anti-Putin protest movement. Taught in English. Formerly RUSS 5120.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4120
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5210 (3) Topics in Russian, East European and Eurasian Culture**
Selected topics in Russian, East European and Eurasian culture. No knowledge of Russian required. Taught in English. Formerly RUSS 5210.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4210
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5211 (3) History of Russian and Soviet Cinema**
Surveys Russian cinema in historical and cultural context from early 20th century to the present. Taught in English. Formerly RUSS 5211.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5211 and REES 4211 and CINE 4211
**Requisites:** Restricted to graduate students only.

**REES 5221 (3) Stalinism: Culture and Society**
Examines Soviet society and culture of the Stalin period (1929-1953). The Great Terror, Communist ideology, commercial practices, political intrigues and show trials, as well as many other aspects of Stalinism will be discussed. Course materials include historical studies, documents, memoirs, diaries, novels and films of or about the period. Taught in English. Formerly RUSS 5221.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4221

**REES 5251 (3) Russian and Soviet Queer Culture**
Explores the contributions to Russian/Soviet literature, film, and the performing arts by such LGBTQ cultural icons as Nikolai Gogol, Marina Tsvetaeva, Sergei Eisenstein, and Pyotr Tchaikovsky. The course also surveys the history of social and legal restrictions on non-heteronormative behaviors in Russia from the medieval period to the present, with an emphasis on the emergence of LGBT rights activism and the reactionary rise of homophobia as a tool of nationalist politics in Putin¿s Russia. Taught in English. Formerly RUSS 5251.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4251

**REES 5301 (3) American-Russian Cultural Relations**
Surveys the development of American-Russian cultural relations from the second half of the 18th century to the present. Examines the character and significance of Russian-American relations in social, intellectual, artistic, and other spheres from a comparative perspective. Taught in English. Formerly RUSS 5301.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4301
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5321 (3) Mythological Russia and Ukraine**
Examines folklore, popular culture, and everyday life in contemporary Russia and Ukraine to reveal beliefs, ideals, and ideologies. Subjects include witchcraft, shamanism, healing, death, remembrance, nostalgia, collective memory, obscenity. Students will learn to analyze artifacts, photographs, interviews, memoirs, songs, stories, and rituals. Taught in English. Formerly RUSS 5321.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4321
**Recommended:** Prerequisite prior experience with folklore or Russian studies.

**REES 5352 (3) Russian Novel: Theory and Practice**
Examines the Russian novel and its evolution as well as Western and Russian theories of the novel as they engage and reflect upon the claims of modernity. Taught in English. Formerly RUSS 5352.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5431 (3) Dostoevsky**
Focuses on close reading of major novels and other works by Dostoevsky, one of the most important psychological novelists in modern literature, a profound religious thinker and the greatest crime novelist in the world. Taught in English. Formerly RUSS 5431.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4431
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5441 (3) Tolstoy**
Examines the development of Tolstoy's thought and literary style through study of one of his novels and short works from different periods of Tolstoy's writing. Taught in English. Formerly RUSS 5441.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4441
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5451 (3) Chekhov**
Analyzes the life and creative works of the author of some of the funniest and some of the gloomiest stories in Russian literature. Examines Chekhov's major plays that laid the foundation for modernist theatre. Taught in English. Formerly RUSS 5451.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4451
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5471 (3) Women in 20th-21st Century Russian, East European and Eurasian Cultures**
Examines issues facing women in 20th-21st century Russia, based on study of current events, history, literature, posters and film. Studies images of women as Amazons and rebels, salon hostesses and poets, New Soviet Women and women in combat, prostitutes and mothers. Taught in English. Formerly RUSS 5471.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4471 and WGST 4471
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5481 (3) Rogues to Revolutionaries: Russian Rebels, Past and Present**
Explores the tradition of dissent and opposition in Russian culture, from the medieval period to present, approaching forms of rebellion (religious, political, social, aesthetic) in historical context. This survey in intellectual history will trace this phenomenon across historical documents, literary texts, film, and the fine and performing arts, pairing these primary materials with readings in Russian history. Taught in English. Formerly RUSS 5481.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4481 IAFS 3621
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5821 (3) 20th Century Russian Literature and Art**
Interdisciplinary course emphasizing the influence of literature and art in 20th century Russian literature. Follows the changing cultural landscape from the time when Russia was in the vanguard of modern European literature to the period of Stalinism. Taught in English. Formerly RUSS 5821.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4821 AND HUMN 4821
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5830 (3) Topics in Literature and History**
Taught in English. Formerly RUSS 5830.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5831 (3) Contemporary Russian Literature**
Acquaints students with the most representative works of Russian writers after the collapse of the Soviet regime. Examines the relationships between ideological concepts and aesthetics, and the treatment of moral and social issues in recent literary works. All readings are in English. Taught in English. Formerly RUSS 5831.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4831
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5851 (3) Critical Thinking: Russian Film and Society**
Through structured discussions, selected readings and written assignments, examines topics in Russian film from socio-historical and cultural studies perspectives. Taught in English. Formerly RUSS 5851.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4851
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5861 (3) Absurd and Supernatural in Russian Literature**
Studies themes of grotesque, bizarre, surreal, absurd, supernatural and fantastic in Russian short stories and novels of the 19th and 20th centuries. Discusses works by Pushkin, Gogol, Dostoevsky, Kharms, Bulgakov, Sinyavsky, Petrushevskaya and Pelevin within the contexts of Russian folklore, Freud and Jung's interpretations of jokes and dreams, and Romanticism. Taught in English. Formerly RUSS 5861.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4861
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5871 (3) Understanding Ukraine: Culture, Diversity, Conflict**
Introduces students to Ukraine¿s cultural diversity and orients them in the history of the country at the heart of contemporary world politics. This course will provide students with a necessary historical frame for understanding current and war-time cultural debates about Ukraine¿s contested heritage and future. Taught in English. Degree credit not granted for IAFS 3622.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4871
**Requisites:** Restricted to graduate students only.

**REES 5900 (1-6) Independent Study**
See department for registration information. Department enforced requisite: graduate standing. Formerly RUSS 5900.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Russian

**REES 6940 (1-3) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree. Formerly RUSS 6940.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian

**REES 6950 (1-6) Master's Thesis**
Formerly RUSS 6950.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian

**RUSS 5010 (4) Advanced Russian Seminar**
Review of all aspects of Russian grammar, with a focus on difficulties, vocabulary for communication at an advanced level and contextual usage. Includes intensive writing and editing of compositions on a variety of topics, reading of authentic Russian texts, interactive work with Russian media and fluent conversation in Russian that moves beyond functional proficiency.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4010
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian

**RUSS 5020 (4) Advanced Russian Seminar 2**
Review of all aspects of Russian grammar, with a focus on difficulties, vocabulary for communication at an advanced level and contextual usage. Includes intensive writing and editing of compositions on a variety of topics, reading of authentic Russian texts, interactive work with Russian media and fluent conversation in Russian that moves beyond functional proficiency.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4020
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian

**RUSS 5050 (4) Professional Russian**
Introduces graduate and advanced undergraduate students to various stylistic registers of Russian (business, politics, the Internet, TV, etc.). Develops new vocabulary and idiomatics, with a special focus on fluency of speech and written communication skills. Along with language training, the course offers an immersion into the world of contemporary Russian media, politics and culture. Taught in Russian.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4050
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Additional Information:** Departmental Category: Russian

**RUSS 5220 (3) Topics in Russian, East European and Eurasian Culture (in Russian)**
Selected topics in Russian culture and society. Taught all or partly in Russian. Formerly RUSS 5220.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4220
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**RUSS 5230 (3) Russian Cultural Idioms**
Analyzes Russian cultural discourse through Russian idioms. Taught in Russian. Formerly GSLL 5230.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4230
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian

**RUSS 5841 (3) History of Modern Russian Drama**
Examines Russian plays of the 20th and 21st centuries (from Chekhov to contemporary authors) in the context of the Western dramatic theory. Surveys most influential directorial styles from Stanislavsky's "method" to contemporary verbatim theatre. All readings are in English. Taught in English. Formerly GSLL 5841.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4841
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**RUSS 5850 (4) Russian Film and Society**
Examines topics in Russian film and TV series from sociohistorial and cultural perspectives, while simultaneously developing students' auditing, comprehension, and speaking skills in Russian language. Critical thinking and analytical approaches will be key to working through the course's material. Screenings, discussions, and written assignments are in Russian.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4850
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Recommended:** Prerequisites RUSS 2020 or equivalent.
**Additional Information:** Departmental Category: Russian

# German Studies - Master of Arts (MA)

The department offers an interdisciplinary MA in German studies, focusing on German-speaking central European society from the Enlightenment to the present. In addition to expertise in German literature, the faculty's interdisciplinary strengths include film, art and design, gender studies, queer studies, Black European studies, migration studies, comparative literature, philosophy, language pedagogy and translation. To get a better idea of the department's areas of specialization, prospective students are encouraged to consult the list of recent graduate seminars and the profiles of the graduate faculty and expanded graduate faculty. The faculty works closely with students to design their own course of study. Most German MA students receive a teaching assistantship and tuition waiver. The graduate associate chair of German welcomes email inquiries about the program. For contact information and more general information on the MA in German studies, please visit the program's website (https://www.colorado.edu/gsll/german-program/).

Students wishing to pursue the interdisciplinary master's in German studies should read the requirements tab (p. 1298) of this catalog carefully.

# Education Abroad

## Universities of Göttingen and Regensburg

One year (10 months) of study, from mid-October to the end of July.

- Number of positions: One at each university.
- Benefits: Matriculation plus a monthly stipend for living expenses and housing in a dorm.
- Note: German citizens are not eligible for the Regensburg exchange program but are eligible for the Göttingen exchange program.

For more information on graduate exchange programs in Germany, visit the department webpage (https://www.colorado.edu/gsll/cu-graduate-exchange-programs-germany/).

For more information on any Education Abroad programs, scholarships and application information, contact Education Abroad, UCB 123, Boulder, CO 80309, (303) 492-7741 or visit the Education Abroad (http://abroad.colorado.edu/?FuseAction=Abroad.ViewLink&Parent_ID=0&Link_ID=6E1E909F-9011-F4D1-DA01962CC1E53067) website.

# Requirements

## Program Requirements

Students who apply to the MA program but do not have approximately a B2 (or approximately seventh semester) level of German proficiency will have opportunities to achieve such proficiency while at CU.

The master's degree requires either 24 credit hours of approved coursework and a master's thesis (6 credit hours) or 30 credit hours of coursework without thesis and reading knowledge of one foreign language in addition to German and English.

All German MA students must take Theory and Practice of German Studies (GRMN 5010). All German teaching assistants must also take Applied Linguistics and Foreign Language Teaching Methodology (GRMN 5020). For specific requirements, visit the department's German MA (http://www.colorado.edu/gsll/german/graduate/ma/) webpage.

## Degree Plans

### Plan I: Thesis Option (Standard Option)

The thesis option requires 30 credit hours, including 24 hours of coursework and 6 thesis hours. A maximum of 6 credit hours may be completed at the 3000 or 4000 level at the discretion of the associate chair of graduate studies. A maximum of 6 hours of independent study coursework may be taken with the approval of the associate chair of graduate studies.

| Code | Title | Credit Hours |
|---|---|---|
| **Core/Required Courses** | | |
| GRMN 5010 | Theory and Practice of German Studies | 3 |

| | | |
|---|---|---|
| GRMN 5020 | Applied Linguistics and Foreign Language Teaching Methodology | 3 |
| GRMN 6900 | Master's Thesis | 6 |
| **Elective Courses** | | |
| GRMN 5030 | Foundations of Critical Theory | |
| GRMN 5051 | Critical Theory of the Frankfurt School | |
| GRMN 5210 | Seminar: The Age of Enlightenment | |
| GRMN 5220 | Seminar: Topics in the Age of Goethe | |
| GRMN 5231 | The Invention of Sexuality | |
| GRMN 5301 | Gender, Race, and Immigration in Germany and Europe | |
| GRMN 5310 | Seminar: Topics in the 19th Century | |
| GRMN 5320 | Seminar: The German Novel from 1901--1956 | |
| GRMN 5330 | Seminar: German Intellectuals and Society Between the Wars | |
| GRMN 5410 | Seminar: Topics in Early 20th Century German Society | |
| GRMN 5420 | Seminar: Topics in Contemporary German-speaking Societies | |
| GRMN 5510 | Seminar: Open Topics in German Civilization | |
| GRMN 5504 | Goethe's Faust | |
| GRMN 5520 | Seminar: Current Issues in German Literature and Media | |
| GRMN 5900 | Independent Study | |
| **Second Foreign Language** | | |
| Students must have reading knowledge of a second foreign language to complete the degree. This requirement may be fulfilled by two college-level semesters of a foreign language, an approved study abroad program, or a course in reading knowledge of a foreign language. Courses used to fulfill the second foreign language requirement may be taken pass/fail. Courses below will fulfill the second foreign language requirement. | | |
| ARAB 1020 | Beginning Arabic 2 | |
| CHIN 1020 | Beginning Chinese 2 | |
| DANE 1020 | Beginning Danish II-DILS | |
| FREN 1020 | Beginning French 2 | |
| FREN 1050 | Beginning French Review | |
| HEBR 1020 | Beginning Modern Hebrew, Second Semester | |
| HIND 1020 | Beginning Hindi 2 | |
| INDO 1120 | Beginning Indonesian 2 - DILS | |
| ITAL 1020 | Beginning Italian 2 | |
| ITAL 1050 | Fast-Track Italian | |
| JPNS 1020 | Beginning Japanese 2 | |
| KREN 1020 | Beginning Korean 2 | |
| LATN 1024 | Beginning Latin 2 | |
| PORT 1020 | Beginning Portuguese 2 | |
| RUSS 1020 | Beginning Russian 2 | |
| RUSS 1050 | Intensive Beginning Russian | |
| SNSK 1020 | Introductory Sanskrit 2 | |
| SPAN 1020 | Beginning Spanish 2 | |
| SPAN 1150 | Intensive First Year Spanish | |
| SWED 1020 | Beginning Swedish 2 | |
| SWED 1120 | Beginning Swedish 2 - DILS | |
| TBTN 1020 | Beginning Colloquial Tibetan 2 | |
| YIDD 1020 | Beginning Yiddish 2 | |

## Plan II: Non-Thesis Option

The non-thesis option requires 30 credit hours of coursework. A maximum of 6 credit hours may be completed at the 3000 or 4000 level at the discretion of the associate chair of graduate studies. A maximum of 6 hours of independent study coursework may be taken with the approval of the associate chair of graduate studies.

| Code | Title | Credit Hours |
|---|---|---|
| **Core/Required Courses** | | |
| GRMN 5010 | Theory and Practice of German Studies | 3 |
| GRMN 5020 | Applied Linguistics and Foreign Language Teaching Methodology | 3 |
| **Elective Courses** | | |
| GRMN 5030 | Foundations of Critical Theory | |
| GRMN 5051 | Critical Theory of the Frankfurt School | |
| GRMN 5210 | Seminar: The Age of Enlightenment | |
| GRMN 5220 | Seminar: Topics in the Age of Goethe | |
| GRMN 5231 | The Invention of Sexuality | |
| GRMN 5310 | Seminar: Topics in the 19th Century | |
| GRMN 5301 | Gender, Race, and Immigration in Germany and Europe | |
| GRMN 5320 | Seminar: The German Novel from 1901--1956 | |
| GRMN 5330 | Seminar: German Intellectuals and Society Between the Wars | |
| GRMN 5410 | Seminar: Topics in Early 20th Century German Society | |
| GRMN 5420 | Seminar: Topics in Contemporary German-speaking Societies | |
| GRMN 5504 | Goethe's Faust | |
| GRMN 5510 | Seminar: Open Topics in German Civilization | |
| GRMN 5520 | Seminar: Current Issues in German Literature and Media | |
| GRMN 5900 | Independent Study | |
| **Second Foreign Language** | | |
| Students must have reading knowledge of a second foreign language to complete the degree. This requirement may be fulfilled by two college-level semesters of a foreign language, an approved study abroad program, or a course in reading knowledge of a foreign language. Courses used to fulfill the second foreign language requirement may be taken pass/fail. Courses below will fulfill the second foreign language requirement. | | |
| ARAB 1020 | Beginning Arabic 2 | |
| CHIN 1020 | Beginning Chinese 2 | |
| DANE 1020 | Beginning Danish II-DILS | |
| FREN 1020 | Beginning French 2 | |
| FREN 1050 | Beginning French Review | |

| | |
|---|---|
| HEBR 1020 | Beginning Modern Hebrew, Second Semester |
| HIND 1020 | Beginning Hindi 2 |
| INDO 1120 | Beginning Indonesian 2 - DILS |
| ITAL 1020 | Beginning Italian 2 |
| ITAL 1050 | Fast-Track Italian |
| JPNS 1020 | Beginning Japanese 2 |
| KREN 1020 | Beginning Korean 2 |
| LATN 1024 | Beginning Latin 2 |
| PORT 1020 | Beginning Portuguese 2 |
| RUSS 1050 | Intensive Beginning Russian |
| RUSS 1020 | Beginning Russian 2 |
| SNSK 1020 | Introductory Sanskrit 2 |
| SPAN 1020 | Beginning Spanish 2 |
| SPAN 1150 | Intensive First Year Spanish |
| SWED 1020 | Beginning Swedish 2 |
| SWED 1120 | Beginning Swedish 2 - DILS |
| TBTN 1020 | Beginning Colloquial Tibetan 2 |
| YIDD 1020 | Beginning Yiddish 2 |

## Learning Outcomes

By the completion of the program, students will be able:

- Critically reflect on key concepts of media, history, and cultures of German-speaking societies from transnational or global perspectives.
- Conduct research and engage in critical analysis in the area of study, leveraging German language skills and to be able to express that research in ways accessible to intended readership or audience, such as the broader scholarly and/or public community.
- Expand historical understanding
- Cultivate intercultural competency.
- Demonstrate the ability to engage critically and comparatively with diverse perspectives and positionalities within German-speaking societies.
- Develop specialized competency in at least one subject area of German Studies (e.g. a period or movement in literature, film or other medium; a topic; a historical period or political movement; a pedagogical concern in second language acquisition, etc.).
- Develop specialized competency in at least one theoretical or methodological approach within German studies (e.g. literary or film analysis, feminist or queer approaches, theories of translation, etc.).

## Dual Degree Program

### MBA/MA in German Studies

To support the university's mission of advancing knowledge across disciplines, the Leeds School of Business and the Department of Germanic and Slavic Languages and Literatures offer a dual degree, Master of Business Administration and Master of Arts in German studies. In most cases, students should be able to complete the dual degree in three years with a total of 70 credit hours.

Prospective students must apply to and meet the application and admission requirements for each program separately. See the Department of Germanic and Slavic Languages and Literatures (http://www.colorado.edu/gsll/german/graduate/) website to apply to the German studies MA program, and the Leeds School of Business (http://www.colorado.edu/business/mba/) website to apply to the MBA program.

# Russian, East European and Eurasian Studies - Master of Arts (MA)

The department offers an interdisciplinary professional MA in Russian, East European and Eurasian Studies (REEES) focusing on Russian language proficiency as well as Russian, East European and Eurasian cultures. The MA program is strongly interdisciplinary and students can pursue connections between Russian, East European and Eurasian history, politics and culture from the 19th through the 21st centuries. The faculty's strengths include literature, cinema, folklore, literary/cultural theory, cultural studies, gender and sexuality studies, minority studies, nationalism, environmental humanities, sociolinguistics and pedagogy.

The faculty works closely with students to design their own course of study. Some REEES MA students receive a teaching assistantship and tuition waiver.

For contact information and more general information on the MA in Russian, East European and Eurasian studies, visit the REEES Program (http://www.colorado.edu/gsll/russian-program/) website or email gsll_assist@colorado.edu.

## Requirements

### Course Requirements

REEES MA students may take up to 12 credit hours in an outside area. Students frequently choose business, political science, geography, women and gender studies, education, history, linguistics, film studies, Jewish studies, religious studies, fine arts, and theater and dance, but students may pursue other options. All outside area courses must be approved by the Director of REEES Graduate Studies.

Upon approval of the Director of REEES Graduate Studies, students may take up to six credit hours of 3000- or 4000-level courses toward their MA degree.

Students interested in independent study should check with a faculty member who may sponsor the independent study, and then obtain an informational sheet and an Independent Study Contract from the department. Once the contract is approved by the chair, a staff member will enroll the student in the course. MA students may not take more than a total of 7 hours of independent study.

Transfer credit from accredited institutions is accepted by CU Boulder only after approval by the Director of REEES Graduate Studies and the Graduate School. Transfer credit is defined as any credit earned at another accredited institution, credits earned on another campus of the CU system or credits earned as a nondegree student within the CU system. MA students are allowed a maximum of 9 hours of transfer credit.

All students must pass the Russian language proficiency exam, consisting of written and oral components, during their final semester. Educated native Russian speakers are exempt from the language proficiency exam.

# Degree Plans

## Plan I: Thesis Option

Students must complete at least 30 credit hours, including 24 hours of coursework and 6 thesis hours. Students must submit a thesis and pass a one-hour oral defense.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | **14** |
| RUSS 5010 | Advanced Russian Seminar [1] | |
| RUSS 5020 | Advanced Russian Seminar 2 [1] | |
| REES 5110 | Slavic Culture and Society | |
| REES 5120 | Russia after Communism: Post-Soviet Politics and Culture | |
| **Thesis** | | **6** |
| REES 6950 | Master's Thesis | |
| **Electives** | | **10** |
| Complete additional courses to fulfill the 30-credit minimum. Options include: | | |
| RUSS 5050 | Professional Russian [2] | |
| REES 5210 | Topics in Russian, East European and Eurasian Culture | |
| REES 5211 | History of Russian and Soviet Cinema | |
| RUSS 5220 | Topics in Russian, East European and Eurasian Culture (in Russian) | |
| REES 5221 | Stalinism: Culture and Society | |
| RUSS 5230 | Russian Cultural Idioms [2] | |
| REES 5251 | Russian and Soviet Queer Culture | |
| REES 5301 | American-Russian Cultural Relations | |
| REES 5321 | Mythological Russia and Ukraine | |
| REES 5352 | Russian Novel: Theory and Practice | |
| REES 5431 | Dostoevsky | |
| REES 5441 | Tolstoy | |
| REES 5451 | Chekhov | |
| REES 5471 | Women in 20th-21st Century Russian, East European and Eurasian Cultures | |
| REES 5481 | Rogues to Revolutionaries: Russian Rebels, Past and Present | |
| REES 5821 | 20th Century Russian Literature and Art | |
| REES 5830 | Topics in Literature and History | |
| REES 5831 | Contemporary Russian Literature | |
| RUSS 5841 | History of Modern Russian Drama | |
| REES 5851 | Critical Thinking: Russian Film and Society | |
| RUSS 5850 | Russian Film and Society | |
| REES 5861 | Absurd and Supernatural in Russian Literature | |
| REES 5871 | Understanding Ukraine: Culture, Diversity, Conflict | |
| REES 5900 | Independent Study | |
| **Total Credit Hours** | | **30** |

[1] Native speakers are exempt from RUSS 5010 and RUSS 5020, and should contact the Director of REEES Graduate Studies for alternate coursework. For details, please see Russian, East European and Eurasian Studies MA Handbook (https://www.colorado.edu/gsll/russian/graduate/russian-ma-handbook/).

[2] These courses are strongly recommended for non-native speakers.

## Plan II: Non-Thesis Option

Students must complete at least 30 credit hours of coursework, then pass a written MA final exam and a one-hour oral defense.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | **14** |
| RUSS 5010 | Advanced Russian Seminar [1] | |
| RUSS 5020 | Advanced Russian Seminar 2 [1] | |
| REES 5110 | Slavic Culture and Society | |
| REES 5120 | Russia after Communism: Post-Soviet Politics and Culture | |
| **Electives** | | **16** |
| Complete additional courses to fulfill the 30-credit minimum. Options include: | | |
| RUSS 5050 | Professional Russian [2] | |
| REES 5210 | Topics in Russian, East European and Eurasian Culture | |
| REES 5211 | History of Russian and Soviet Cinema | |
| REES 5221 | Stalinism: Culture and Society | |
| RUSS 5220 | Topics in Russian, East European and Eurasian Culture (in Russian) | |
| RUSS 5230 | Russian Cultural Idioms [2] | |
| REES 5251 | Russian and Soviet Queer Culture | |
| REES 5301 | American-Russian Cultural Relations | |
| REES 5321 | Mythological Russia and Ukraine | |
| REES 5352 | Russian Novel: Theory and Practice | |
| REES 5431 | Dostoevsky | |
| REES 5441 | Tolstoy | |
| REES 5451 | Chekhov | |
| REES 5471 | Women in 20th-21st Century Russian, East European and Eurasian Cultures | |
| REES 5481 | Rogues to Revolutionaries: Russian Rebels, Past and Present | |
| REES 5821 | 20th Century Russian Literature and Art | |
| REES 5830 | Topics in Literature and History | |
| REES 5831 | Contemporary Russian Literature | |
| RUSS 5841 | History of Modern Russian Drama | |
| REES 5851 | Critical Thinking: Russian Film and Society | |
| RUSS 5850 | Russian Film and Society | |
| REES 5861 | Absurd and Supernatural in Russian Literature | |
| REES 5871 | Understanding Ukraine: Culture, Diversity, Conflict | |
| REES 5900 | Independent Study | |
| **Total Credit Hours** | | **30** |

[1] Native speakers are exempt from RUSS 5010 and RUSS 5020, and should contact the Director of REEES Graduate Studies for alternate coursework. For details, please see Russian, East European and Eurasian Studies MA Handbook (https://www.colorado.edu/gsll/russian/graduate/russian-ma-handbook/).

[2] These courses are strongly recommended for non-native speakers.

# Learning Outcomes

By the completion of the program, students will be able:

- Demonstrate an advanced level of understanding of and critical engagement with historical periodization and major cultural shifts in the region.
- Demonstrate awareness of and engagement with important and relevant current and past academic scholarship in Russian, East European and Eurasian studies.
- Formulate independent research questions, utilize advanced research methodologies and apply critical thinking in order to analyze complex regional issues, works of literature and arts, develop original scholarship and contribute to academic discussions.
- Recognize cultural, linguistic, ethnic and religious diversity of the countries on the territories of Eastern Europe, the former Russian Empire and the Soviet Union and to be able to apply this knowledge to a critical and comparative interpretation of their cultural and political life.
- Develop proficiency in Russian language or other regional languages, written and spoken, to the level of advanced low on the ACTFL scale, in order to enable culturally appropriate communication, professional communication, self-expression and creativity.

# German Studies - Doctor of Philosophy (PhD)

The German PhD offers intensive mentorship and a vibrant intellectual exchange between students and faculty. Graduate students work closely with leading scholars with strengths in film, gender studies, queer studies, Black European studies, migration studies, art and design, comparative literature, philosophy, language pedagogy and translation. PhD students are encouraged to conduct interdisciplinary research in German studies and a secondary concentration (i.e. international affairs, gender studies, art history, etc.). To see the wide range of subjects covered in the German program, consult the research and publication profiles of the faculty and graduate students.

Students participate in student-centered colloquia, regular speaker-events and workshops, and have opportunities to teach German courses as well as courses taught in English under close mentorship. The graduate associate chair of German welcomes email inquiries about the program. For contact information and more general information on the PhD in German studies, please visit the program's website (https://www.colorado.edu/gsll/german-program/). A timeline for the German Studies PhD (https://www.colorado.edu/gsll/timeline-german-studies-phd/) can be found on our German Program webpage.

# Requirements

## Academic Preparation

If a student has gaps in their academic preparation, the department may require them to take additional courses.

## Course Requirements

The PhD program requires 30 hours of coursework at the 5000 level or above. Students who have completed an MA degree may be able to apply up to 21 hours toward this requirement.

In addition to coursework, students must take a total of at least 30 credit hours of doctoral dissertation, with not more than 10 of these taken in any one semester and not more than 10 dissertation credit hours taken before the semester during which the comprehensive examination is passed. Students must be enrolled in a minimum of five dissertation hours during the semester in which they defend their dissertation (including summer session, if the defense is held over the summer).

Transfer credit from accredited institutions may be accepted by CU Boulder after approval by the graduate associate chair and the graduate school. PhD students are allowed a maximum of 21 hours of transfer credit. Thesis hours may not be transferred. All courses accepted for transfer credit must be graduate-level courses and must have a grade of B or above. Coursework completed more than five years prior to acceptance to the PhD program will be evaluated by the department with regard to current relevance and applicability to the degree requirements. Credit may not be transferred until the student has completed at least six credits of CU graduate-level coursework as a degree-seeking student on the CU Boulder campus with a 3.0 GPA. Thesis hours do not count toward the required 30 hours and cannot be used as transfer credit.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | **6** |
| GRMN 5010 | Theory and Practice of German Studies | |
| GRMN 5020 | Applied Linguistics and Foreign Language Teaching Methodology | |
| **One course with significant pre-20th century content courses such as:** | | **6** |
| GRMN 5030 | Foundations of Critical Theory | |
| GRMN 5210 | Seminar: The Age of Enlightenment | |
| GRMN 5220 | Seminar: Topics in the Age of Goethe | |
| GRMN 5310 | Seminar: Topics in the 19th Century | |
| GRMN 5504 | Goethe's Faust | |
| GRMN 5510 | Seminar: Open Topics in German Civilization | |
| **Electives** | | |
| At least 6 credit hours in an interdisciplinary area of concentration. [1] | | 6 |
| Additional courses to meet 30-credit minimum. | | 12 |
| **Total Credit Hours** | | **30** |

[1] Students design this concentration in close consultation with their faculty mentor and comprehensive examination and dissertation advisor, and with the approval of the graduate associate chair. Examples of interdisciplinary concentrations include (but are not limited to): critical thought, political science, philosophy, history, comparative literature, gender studies, film studies, Russian, East European and Eurasian studies, Jewish studies, women's studies, geography, environmental studies, economics and international affairs.

### Secondary concentration

As a German studies PhD student, you will develop an interdisciplinary area of concentration. This secondary field will consist of at least 6 credit hours. You will design this concentration in close consultation with your faculty mentor and comprehensive examination and dissertation advisor, and with the approval of the graduate associate chair. Some examples of interdisciplinary concentrations might include (but are not limited to): critical thought; gender studies; film studies; Russian, East European and Eurasian studies; gender studies, queer studies, Black European studies, international affairs, Jewish studies, or environmental studies.

### Language Requirement

In addition to demonstrating a high level of proficiency in German, you must demonstrate moderate proficiency in an additional foreign language. You can do this by fulfilling one of the following requirements either before or after enrolling at CU Boulder:

- completing a fourth-semester (second-semester sophomore) college language course with a grade of "pass,"
- completing a proficiency exam administered at CU, or
- presenting other evidence of moderate proficiency to the graduate associate chair.

Students should consult with the graduate associate chair at the beginning of their first semester to discuss procedures. This requirement must be fulfilled before or during the semester in which the student advances to candidacy.

### Comprehensive PhD Examination

The comprehensive exam tests a student's knowledge in areas of specialization appropriate for their anticipated dissertation topic. The exam takes place in the second or third year, depending on whether the student entered the program with a BA or MA and, if the latter, how many coursework credits were applied from the MA. Students take the exam in the spring semester. The exam is based on a reading list the student assembles in close consultation with the members of their committee. It consists of a take-home written exam followed by a two-hour-long oral examination that concentrates on the written exam, but may also address texts and topics on the reading list that are not covered in the written exam. The composition of the comprehensive exam committee follows the guidelines of the prospectus & dissertation committee composition below.

For more information, visit the department's Comprehensive Examination, Prospectus & Dissertation (http://www.colorado.edu/gsll/comprehensive-examination-and-dissertation/) webpage.

### Prospectus & Dissertation Committee

After successful completion of the comprehensive examinations, the student forms a dissertation committee and prepares a dissertation prospectus, to be followed by its defense a week later. The dissertation committee should be finalized and a dissertation prospectus submitted no later than the end of the fifth week of the semester following the successful completion of the comprehensive examination.

For more information, visit the department's Comprehensive Examination, Prospectus & Dissertation (http://www.colorado.edu/gsll/comprehensive-examination-and-dissertation/) webpage.

### Dissertation

The student formally begins to write their dissertation after successfully completing the comprehensive exam and defending the dissertation prospectus. The student should work closely with their dissertation advisor and committee members while writing the dissertation. In particular, students are advised to submit draft copies of each chapter to all members of their committee. Any subsequent changes to the student's "timeline for completion" need to be circulated to the committee for approval. A final draft must be submitted to the committee members at least three weeks before the defense.

Students are required to register continuously for a minimum of five dissertation hours in the fall and spring semesters of each year, beginning with the semester following the passing of the comprehensive exam and extending through the semester in which the student successfully defends their dissertation.

A student who fails to register continuously for dissertation credit hours after passing the comprehensive exam must retake and pass the exam, and validate any coursework more than five years old, to regain status as a student in good standing with the graduate school.

For more information, visit the department's Comprehensive Examination, Prospectus & Dissertation (http://www.colorado.edu/gsll/comprehensive-examination-and-dissertation/) webpage.

## Recommended Coursework and Practical Experience

### Internships

Students are strongly encouraged to complete at least one internship during their doctoral studies. Three hours of internship credit can count toward the 30 required hours of coursework for the PhD. GSLL graduate students have completed internships with businesses, local government, nonprofit agencies and schools, and at locations including Colorado, Germany and Washington, DC. Internship offerings vary by semester. To enroll in a graduate internship, see the associate chair for graduate studies.

### Graduate Exchange Opportunities

Students are recommended to spend one academic year abroad during their doctoral studies, on either a CU graduate exchange or an exchange funded by an agency such as the German Academic Exchange Service (DAAD) or the Fulbright Commission. For more information concerning DAAD, Fulbright and other grants, see the department's Scholarships & Awards (http://www.colorado.edu/gsll/scholarships-awards/) webpage.

In partnership with CU's Office of International Education, GSLL offers funded graduate exchanges at the University of Göttingen and the University of Regensburg. These exchanges offer matriculation at the host institution for one academic year (10 months), plus a monthly stipend for living expenses. One position is offered per year at each institution. To qualify for an exchange, the student must demonstrate fluency in German and evidence of superior academic work.

Students interested in either program should notify the graduate associate chair by December 1 for study abroad the following academic year and formally apply by February 15.

### Graduate Certificate Programs

Students are also encouraged to consider completing a graduate certificate program at CU. GSLL offers a critical theory graduate certificate (p. 1304). Other graduate certificates include the women and gender studies graduate certificate (p. 1435) and the comparative ethnic studies graduate certificate (https://catalog.colorado.edu/graduate/colleges-schools/arts-sciences/programs-study/ethnic-studies/comparative-ethnic-studies-graduate-certificate/).

# Learning Outcomes

By the completion of the program, students will be able to:

- Critically reflect on key concepts of media, history and cultures of German-speaking societies from transnational or global perspectives.
- Conduct research and engage in critical analysis in the area of study, leveraging German language skills and expressing that research in ways accessible to intended readership or audience, such as the broader scholarly and/or public community.
- Demonstrate historical understanding.
- Demonstrate intercultural competency.
- Demonstrate the ability to engage critically and comparatively with diverse perspectives and positionalities within German-speaking societies.
- Demonstrate teaching skills for college-level second language courses and lower-division undergraduate culture courses, including lesson plan design, classroom management and assessment.
- Demonstrate experience with developing undergraduate German culture syllabi for college-level teaching.
- Demonstrate specialized competency in at least one subject area of German Studies (e.g. a period or movement in literature, film or other medium, a topic, a historical period or political movement, a pedagogical concern in second language acquisition, etc.).
- Demonstrate specialized competency in at least one theoretical or methodological approach within German Studies (e.g. literary or film analysis, feminist or queer approaches, theories of translation, etc.).

# Critical Theory - Graduate Certificate

This certificate offers students a background in philosophical foundations of critical theory. Drawing on disciplines such as philosophy, psychoanalysis, Marxism, literary criticism and sociology, critical theory develops analytical tools for describing and evaluating modern society and cultural production.

# Requirements

## Procedures

To complete the certificate program a student must:

1. Enroll in the certificate program by emailing the Certificate Director (https://www.colorado.edu/gsll/contact-us/) and the Graduate Program Assistant, Sara Bredengerd (gsll_assist@colorado.edu).
2. Once a student has completed the requirements for the certificate, they should complete the Certificate Completion Worksheet (https://www.colorado.edu/gsll/critical-theory-completion-worksheet/) and submit it to the Graduate Program Assistant, Sara Bredengerd (gsll_assist@colorado.edu). (gsll@colorado.edu) *Note*: Worksheet should be submitted the semester the student competes the certificate requirements (or any semester thereafter); certificate is awarded when the student completes their graduate program. Once the director has approved the worksheet, and once student completes their graduate program, the certificate will be added to the student's transcript.

### Graduate Certificate Forms and Links

- Certificate Elective Courses List (https://www.colorado.edu/gsll/graduate-certificate-program-critical-theory-elective-courses/)
- Affiliated Faculty List (https://www.colorado.edu/gsll/affiliated-faculty/)
- Certificate Completion Worksheet (https://www.colorado.edu/gsll/critical-theory-completion-worksheet/)

For more information contact the Certificate Director (https://www.colorado.edu/gsll/contact-us/) or the Graduate Program Assistant, Sara Bredengerd (gsll_assist@colorado.edu), (303) 492-7404.

## Required Courses and Credits

A total of 12 credit hours are required for completion of the certificate. Of those, 6 credits are earned through a two-course core sequence designed to provide the intellectual history and philosophical foundations for contemporary research directions in critical theory. Students must also take two electives in theory. These courses may be from the list below, and students can also request that the director approve other theory courses.

Students must obtain a grade of B or above in each course taken toward the certificate.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| Students are required to take the following 2 core graduate courses. Although they may be taken in any order, we encourage students to take them in order when possible. Neither of these courses may be taken as an independent study. | | |
| GRMN 5030 | Foundations of Critical Theory | 3 |
| GRMN 5051 | Critical Theory of the Frankfurt School | 3 |
| **Electives** | | |
| Select two additional elective courses in theory from the list below. Students may also submit a request to the director to recognize courses not listed by submitting a copy of the current syllabus. (Except under extraordinary circumstance, independent study courses do not count toward the graduate certificate.) | | 6 |
| ANTH 5785 | Advanced Seminar in Cultural Anthropology | |
| ANTH 7010 | Seminar: Contemporary Theory in Cultural Anthropology | |
| ANTH 7620 | Seminar: Ethnography and Cultural Theory | |
| ARTF 5004 | Topics in Film Theory | |
| ARTF 5604 | Colloquium in Film Aesthetics | |
| ARTH 6929 | Seminar: Methods/Theories of Art History | |
| COMM 6010 | Communication Research and Theory | |
| COMM 6320 | Rhetorical Theory | |
| COMM 6360 | Social and Cultural Theory | |
| ENGL 5019 | Survey of Contemporary Literary and Cultural Theory | |
| ENGL 7489 | Advanced Special Topics | |
| ENVS 5240 | Environmental Philosophy | |
| ETHN 6103 | Indigenous Thought and Theory: Foundations in NAIS | |
| FREN 5445 | Literary Theory, Part I | |
| GEOG 5100 | Special Topics: Geography | |
| GEOG 5632 | Development Geography | |

| | |
|---|---|
| GEOG 6742 | Seminar: Cultural Geography |
| HIST 6540 | Readings in Cultural History and Theory |
| LING 6320 | Linguistic Anthropology |
| LING 7350 | Language and Gender in Cultural Perspective |
| LING 7420 | Syntactic Theory |
| MDST 6051 | Media Theories |
| MDST 6071 | Critical Theories of Media and Culture |
| MDST 7011 | Proseminar in Media Communication Theory 1 |
| MDST 7021 | Proseminar in Media and Communication Theory 2 |
| PHIL 5110 | Contemporary Moral Theory |
| PHIL 5200 | Contemporary Political Philosophy |
| PHIL 5240 | Seminar in Environmental Philosophy |
| PHIL 5300 | Philosophy of Mind |
| PHIL 5490 | Philosophy of Language |
| PSCI 7004 | Seminar: Political Theory |
| SOCY 5201 | Graduate Seminar in Sociological Theory |
| SOCY 7036 | Feminist Theory |
| SPAN 5130 | Seminar: Critical Approaches to Iberian & Latin American Literatures and Cultures |
| WGST 6090 | Feminist Theories |
| WGST 6796 | Queer Theories |
| **Total Credit Hours** | **12** |

# History

At CU Boulder, history graduate students are trained in the central principles and research methods that characterize the discipline of history through class instruction and professional development seminars. They also gain a thorough grounding in their particular geographical area of study as well as an ability to situate that area of study in a larger global context.

All history graduate students focus their studies in two equally weighted fields:

- A regional/national field (i.e., American/U.S. history, European history or Asian history); and
- A global/thematic field, for which students are required to take a variety of courses that examine global and transnational history through specific thematic lenses.

For the purposes of the comprehensive examination (portfolio), students are expected to work with their faculty advisors to craft subfields of emphasis within both the regional/national and global/thematic fields.

For more information, visit the department's Graduate Students (https://www.colorado.edu/history/graduate-program/) webpage.

**Course code for this program is HIST.**

## Master's Degree

- History - Master of Arts (MA) (p. 1313)

## Doctoral Degree

- History - Doctor of Philosophy (PhD) (p. 1314)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Anderson, Fred W. (https://experts.colorado.edu/display/fisid_104273/)
Professor Emeritus; PhD, Harvard University

Anderson, Virginia D. (https://experts.colorado.edu/display/fisid_100365/)
Professor Emerita; PhD, Harvard University

Andrews, Thomas G. (https://experts.colorado.edu/display/fisid_149881/)
Professor; PhD, University of Wisconsin–Madison

Babicz, Martin Charles (https://experts.colorado.edu/display/fisid_147676/)
Teaching Associate Professor; PhD, University of Colorado Boulder

Buffington, Robert Marshall (https://experts.colorado.edu/display/fisid_144975/)
Professor Emeritus; PhD, University of Arizona

Carlos, Ann M. (https://experts.colorado.edu/display/fisid_105534/)
Professor Emerita

Catlos, Brian Aivars (https://experts.colorado.edu/display/fisid_147829/)
Professor; PhD, University of Toronto

Chambers, Lee Virginia (https://experts.colorado.edu/display/fisid_106130/)
Professor Emerita; PhD, University of Michigan Ann Arbor

Chester, Lucy P. (https://experts.colorado.edu/display/fisid_126541/)
Associate Professor; PhD, Yale University

Ciarlo, David Michael (https://experts.colorado.edu/display/fisid_149618/)
Associate Professor; PhD, University of Wisconsin–Madison

Dauverd, Celine (https://experts.colorado.edu/display/fisid_145804/)
Associate Professor; PhD, University of California, Los Angeles

Desautels-Stein, Justin Jacob (https://experts.colorado.edu/display/fisid_147370/)
Associate Professor; LLM, Harvard University; JD, University of North Carolina, Chapel Hill

Dike, Steven (https://experts.colorado.edu/display/fisid_149880/)
Instructor; PhD, University of Colorado Boulder

Engel, Barbara A. (https://experts.colorado.edu/display/fisid_100574/)
Distinguished Professor Emerita

Fenn, Elizabeth Anne (https://experts.colorado.edu/display/fisid_149896/)
Distinguished Professor Emerita; PhD, Yale University

Ferry, Robert J. (https://experts.colorado.edu/display/fisid_104214/)
Associate Professor Emeritus; PhD, University of Minnesota Twin Cities

Gautam, Sanjay Kumar (https://experts.colorado.edu/display/fisid_140614/)
Associate Professor; PhD, University of Chicago

Gerber, Matthew Dean (https://experts.colorado.edu/display/fisid_129799/)
Associate Professor; PhD, University of California, Berkeley

Gross, David L. (https://experts.colorado.edu/display/fisid_103329/)
Professor Emeritus; Ph.D., University of Wisconsin-Madison

Gutmann, Myron (https://experts.colorado.edu/display/fisid_154905/)
Professor Emeritus; PhD, Princeton University

Hammer, Paul E.J. (https://experts.colorado.edu/display/fisid_146581/)
Professor; PhD, University of Cambridge (England)

Hanna, Martha (https://experts.colorado.edu/display/fisid_104557/)
Professor Emerita; PhD, Georgetown University

Hohlfelder, Robert
Professor Emeritus

Hulden, Vilja Paivikki (https://experts.colorado.edu/display/fisid_154910/)
Assistant Teaching Professor; PhD, University of Arizona

Hunt, Peter (https://experts.colorado.edu/display/fisid_115394/)
Professor; PhD, Stanford University

Hutchinson, Erin M (https://experts.colorado.edu/individual/fisid_167154/)
Assistant Professor; PhD, Harvard University

Jankowski, James P.
Professor Emeritus

Jaworski, Taylor Allen (https://experts.colorado.edu/display/fisid_159798/)
Associate Professor; PhD, University of Arizona

Kadia, Miriam L. Kingsberg (https://experts.colorado.edu/display/fisid_147112/)
Professor; PhD, University of California, Berkeley

Kalisman, Hilary Falb (https://experts.colorado.edu/display/fisid_164096/)
Assistant Professor; PhD, University of California, Berkeley

Kent, Susan K. (https://experts.colorado.edu/display/fisid_100080/)
Professor Emerita; PhD, Brandeis University

Kim, Kwangmin (https://experts.colorado.edu/display/fisid_147160/)
Associate Professor; PhD, University of California, Berkeley

Lawrence-Sanders, Ashleigh (https://experts.colorado.edu/display/fisid_169099/)
Assistant Professor; PhD, Rutgers University

Lim, Sungyun A. (https://experts.colorado.edu/display/fisid_148726/)
Associate Professor, Associate Chair; PhD, University of California, Berkeley

Limerick, Patricia N. (https://experts.colorado.edu/display/fisid_105459/)
Professor; PhD, Yale University

Lindquist, Thea L. (https://experts.colorado.edu/display/fisid_122803/)
Professor; PhD, University of Wisconsin–Madison

Little, Katherine C. (https://experts.colorado.edu/display/fisid_149872/)
Professor; PhD, Duke University

Lovejoy, Henry Barrett (https://experts.colorado.edu/display/fisid_157679/)
Associate Professor; PhD, University of California-Los Angeles

Maeda, Daryl Joji (https://experts.colorado.edu/display/fisid_141460/)
Professor; PhD, University of Michigan Ann Arbor

Main, Gloria L.
Professor Emerita

Mann, Ralph
Professor Emeritus

McGranahan, Carole Ann (https://experts.colorado.edu/display/fisid_122673/)
Associate Professor; PhD, University of Michigan Ann Arbor

McIntosh, Marjorie K.
Distinguished Professor Emerita

Mendoza Gutierrez, Natalie (https://experts.colorado.edu/display/fisid_159677/)
Assistant Professor; PhD, University of California, Berkeley

Mukherjee, Mithi (https://experts.colorado.edu/display/fisid_123112/)
Associate Professor; PhD, University of Chicago

Ngo Nyeck, Sybille
Assistant Professor; PhD, University of California, Los Angelos

Ordaz, Jessica (https://experts.colorado.edu/display/fisid_159142/)
Assistant Professor; PhD, University of California, Davis

Osborne, Myles Gregory (https://experts.colorado.edu/display/fisid_145809/)
Associate Professor; PhD, Harvard University

Paradis, David (https://experts.colorado.edu/display/fisid_126959/)
Teaching Professor of Distinction, Associate Teaching Professor; PhD, Emory University

Pegelow Kaplan, Thomas (https://experts.colorado.edu/display/fisid_172194/)
Professor, Chair; Ph.D., University of North Carolina Chapel Hill

Phillips, George H.
Professor Emeritus

Pittenger, Mark A. (https://experts.colorado.edu/display/fisid_102007/)
Professor Emeritus; PhD, University of Michigan Ann Arbor

Ruestow, Edward G.
Professor Emeritus

Shell, Hanna Rose (https://experts.colorado.edu/display/fisid_163199/)
Associate Professor; PhD, Harvard University

Shiue, Carol Hua (https://experts.colorado.edu/display/fisid_141892/)
Professor; PhD, Yale University

Silleras-Fernández, Núria (https://experts.colorado.edu/display/fisid_147213/)
Associate Professor; PhD, Universitat Autònoma de Barcelona (Spain)

Sohi, Seema (https://experts.colorado.edu/display/fisid_144616/)
Associate Professor; PhD, University of Washington

Spires, David N.
Senior Instructor Emeritus

Stanford-McIntyre, Sarah (https://experts.colorado.edu/display/fisid_163315/)
Assistant Professor; PhD, University of Wyoming

Sutter, Paul Shriver (https://experts.colorado.edu/display/fisid_147513/)
Professor; PhD, University of Kansas

Wei, William (https://experts.colorado.edu/display/fisid_100864/)
Professor; PhD, University of Michigan Ann Arbor

Weston, Timothy B. (https://experts.colorado.edu/display/fisid_107605/)
Associate Professor; PhD, University of California, Berkeley

Willis, John Matthew (https://experts.colorado.edu/display/fisid_140095/)
Associate Professor; PhD, New York University

Wood, Peter H. (https://experts.colorado.edu/display/fisid_151977/)
Professor Adjunct

Wood, Tony (https://experts.colorado.edu/display/fisid_172396/)
Assistant Professor; Ph.D., New York University

Yonemoto, Marcia A. (https://experts.colorado.edu/display/fisid_107199/)
Professor, Chair; PhD, University of California, Berkeley

Young, Phoebe S.K. (https://experts.colorado.edu/display/fisid_147429/)
Professor; PhD, University of California, San Diego

Zeiler, Thomas W. (https://experts.colorado.edu/display/fisid_101692/)
Professor; PhD, University of Massachusetts at Amherst

# Courses

**HIST 5000 (3) Historical Methods: Introduction to the Professional Study of History**
Introduces purposes, materials, and techniques of historical scholarship. Theory, practice, and criticism.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

**HIST 5012 (3) Graduate Colloquium in European History**
Acquaints students with key works in the literature of European history, and addresses matters of method and interpretation. Department enforced requisite: admission to the graduate program in history.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Modern

**HIST 5061 (3) Twilight of Antiquity**
Explores the reasons for the fall of the Roman Empire in the western Mediterranean and its survival in the East as Byzantium. Emphasizes Christianity; barbarians; social, economic and cultural differences; contemporary views of Rome; and modern scholarship. No Greek or Latin is required.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4061 and CLAS 4061 and CLAS 5061
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Ancient and Medieval

**HIST 5106 (3) Graduate Colloquium in United States History**
Students gain an acquaintance with major works in the field and discuss current issues of interpretation and methodology.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 5116 (3) History of U.S. Foreign Relations, 1865-1940**
Traces the rise of the United States to world power. Explores the interactions of expansionist and isolationist impulses with politics, ideology, culture and economics, with a focus on the Spanish American War and the acquisition of empire, World War I and the coming of World War II. Instructor's permission required for non-history graduate students.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4116
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 5125 (3) Early American History to 1763**
Explores the colonial era of American history from the pre-Columbian period to the end of the Seven Years' War. Topics include pre-contact Native societies, exploration, European settlement and Native American responses, labor system and the rise of slavery, imperial wars, and the developments in religion, society, politics and culture.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4125
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Chronological Periods

**HIST 5126 (3) History of U.S. Foreign Relations Since 1941**
Traces the development of the United States as a superpower. Details American power and diplomacy in World War II and the rise of the national security state in the Cold War. Explores the Korean, Vietnam and Persian Gulf Wars, and the era of modern-day globalization.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4126
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 5128 (3) The History of Modern Mexico Since 1821**
Centers on the Mexican search for political consolidation and stability through the 19th, 20th and 21st centuries. Focuses on the Mexican Revolution (1910-1940) and the post revolutionary rule of the Institutional Revolutionary Party. Examines the War on Drugs and the causes of Mexican migration to the United States.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4128
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions

**HIST 5129 (3) Colloquium in Modern Asian History**
Introduces major topics and themes in Asian history. Analyzes readings relating to topics such as imperialism, cultural agency, gender, race, nationalism, decolonization, and revolution.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 5205 (3) The Colonial Wars and the Coming of American Independence, 1739-1776**
Investigates imperial warfare and its effects during the late colonial period, concentrating on the French and Indian War (1754-1763), the disruption of Anglo-American relations and the origins of the War of American Independence (1775-1783).
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4205
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Chronological Periods

**HIST 5215 (3) The Revolutionary War and the Making of the American Republic, 1775-1801**
Investigates the Revolutionary War and its impact on the creation of American political institutions, as well as its cultural, social and economic effects, from the Battles of Lexington and Concord through the inauguration of Thomas Jefferson.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4215
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Chronological Periods

**HIST 5222 (3) War and the European State, 1618-1793**
Studies the development of the European states in response to international power struggles in the 17th and 18th centuries (up to the French Revolution).
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4222
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Modern

**HIST 5223 (3) The French Revolution and Napoleon**
Traces the origins, course, and consequences of the most important modern revolution, the French Revolution of 1789. While seeking to explain how a liberal movement for progressive change soon degenerated into the factional bloodbath of the Terror, will also examine the revolution's global impact and how three decades or revolutionary warfare lead to the rise and fall of Napoleon Bonaparte.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4223
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Specific Countries

**HIST 5235 (3) Jacksonian America**
Focuses on the social and cultural history of the Jacksonian Era. Issues include the transformation of the market economy, slavery, moral reform, Indian removal, changes in ideas about men's and women's natures and roles, western expansion, and political culture.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4235
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Chronological Periods

**HIST 5303 (3) Venice and Florence during the Renaissance**
Comparative urban study of Florence and Venice from 13th through 16th centuries. Principal subjects are the distinctive economies of the cities, political developments, Renaissance humanism, patronage of the arts, and foreign policy.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4303
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Specific Countries

**HIST 5328 (3) The Modern Middle East, 1600 to the Present**
Primarily from 1800 to the present. Attention divided equally between the region's political history and international relations and its patterns of economic, social and cultural modernization in the main countries.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4328
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 5339 (3) Borderlands of the British Empire**
Examines the development of the borderlands of the British empire through imperial expansion, consolidation, and early decolonization. Focuses on the 19th and early 20th centuries. Topics include domination, resistance and negotiation in areas such as India, Afghanistan, the Palestine Mandate. Aims for students to acquire skills in comparative history and to develop a better understanding of the roots of contemporary conflicts.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4339
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 5343 (3) Spain and Portugal during the Golden Age**
Surveys the history of Spain and Portugal from the late medieval period through early modern period. Explores the thought, art, politics and socio-economic milieu of the Golden Age. Topics include attitudes toward minorities, the Inquisition, the Age of Exploration and the establishment of colonial empires in Asia and the Americas, court culture and architecture, religious conflicts and literary production. Formerly HIST 5064.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4343
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Topical

**HIST 5349 (3) Decolonization of the British Empire**
Examines the end of the British Empire. Focuses on connections between imperial territories, such as networks of anticolonial activists and links between British decision makers. Students will acquire research skills and develop a better understanding of the roots of contemporary conflict. Prior coursework in British imperial history and excellent writing skills are required.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4349
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Comparable and General

**HIST 5358 (3) Childhood in Modern Israel/Palestine**
Examines topics relating to History, Jewish Studies and Israel/Palestine studies. Analyzes the history of modern childhood in Israel and Palestine from the 19th century to the present. Themes include agency, work, life cycle and culpability. Topics range from collective parenting on Israeli Kibbutzim, growing up in Ottoman Palestine, to the legal status of stone-throwing Palestinian children. Sources include memoirs, literature, films, monographs and articles.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4358 and HIST 4358 and JWST 5358
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite HIST/JWST 4338 History of Modern Israel/Palestine, this course would give students relevant background on the history of the region, but is not required.

**HIST 5378 (3) Jews in and of the Middle East**
Examines the modern history and culture of Jewish communities in the Middle East and North Africa; Jews' and Muslims' encounters with empire, westernization and nationalism; representations of Sephardi and Eastern Jews; Jewish-Muslim relations in Europe and the U.S.; and contact and conflict between Jews and Muslims in (and about) Israel/Palestine. Sources include memoirs, newspapers and films.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4378, JWST 4378, and JWST 5378
**Requisites:** Restricted to graduate students only.

**HIST 5448 (3) Wars of Liberation in Southeast Asia**
Uses the contemporary nations of Indonesia, Myanmar, and Singapore as case studies to examine the making and unmaking of European and Japanese colonialism in Southeast Asia in the years surrounding World War II. In what ways did different communities understand and narrate imperialism and independence? How can we understand wars of liberation as local, regional, and global experiences, with legacies for today?
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4448 and ASIA 4448
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Asia Content

**HIST 5538 (3) History of Modern India**
Examines the history of India from the British conquest of India in the late 18th century to independence in 1947. Emphasizes the impact of British rule on the political, economic and social development of modern India.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4538
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite 6 hours of any history coursework.
**Additional Information:** Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 5548 (3) Women in Modern India**
Examines the history of women and gender in India from the late 18th century to the present. Explores topics such as the changing legal status of women in the colonial and postcolonial period, marriage, domesticity and patriarchy, and women's education and participation in anti-colonial and postcolonial politics, women, work and the environment, violence against women, and women and globalization.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4548
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 5554 (3) Researching European Jewish Life**
This upper-level hybrid class is a research and learning initiative of CU Boulder¿s History Department with the Department of History, Philosophy, and Jewish Studies at the Open University of Israel and the Center for Research in Antisemitism at the Technical University of Berlin, Germany. It revolves around an in-person research seminar in Europe. Topics will vary, beginning with a focus on egodocuments in the study of twentieth-century German Jewish life.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4554 and HIST 4554
**Requisites:** Restricted to graduate students only.

**HIST 5618 (3) From Genghis Khan to the Opium War: Early Modern China**
Examines political, social, and cultural history of China from the Song Dynasty (960-1279) to the opium War (1839-1842). Topics covered include the development of imperial political institution and gentry society, Conquest Dynasties, Neo-Confucianism, China's "medieval economic revolution", Chinese world order in East Asia, Qing multiethnic empire, Chinese overseas migration, and the coming of the West.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4618
**Requisites:** Restricted to graduate students only.

**HIST 5619 (3) Women in East Asian History**
Considers major issues in the history of women in East Asia (China, Korea, Japan) in the 17th through 20th centuries. Focuses on gender roles in Asian family, state, and cultural systems. Topic varies in any given semester.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4619 and WGST 4619
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 5628 (3) Modern China: Collapse of Imperial Brilliance, 1644-1949**
Examines the brilliance of the Qing dynasty, its collapse in 1911, and the bloody and chaotic several decades that followed, up to the 1949 Communist Revolution. Focuses on such topics a Qing imperialism in Central Asia, global capitalism and Western imperialism in China, the opium trade, domestic violence, nationalism, concepts of modernity, competing revolutionary movements, and WW II in Asia.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4628
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 5638 (3) Contemporary China: Radicalism and Reform, 1949 to Present**
Examines the dramatic, often tragic, and globally transformative history of China under the Chinese Communist Party. Focuses on such topics as political, social, and cultural revolution, nationalism, Maoism, the Great Leap Forward, Red Guards and the Great Proletarian Cultural Revolution, the Deng Xiaoping era, relations with Taiwan, the 1989 Tiananmen Massacre, and China's rise as a world power.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4638
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions

**HIST 5658 (3) Between Beijing and Baghdad: China and Islam**
Traces how "Muslims in China" transformed themselves into "Chinese Muslims" while at once accommodating and conflicting with Chinese states and people throughout history until the present time.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4658
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 5728 (3) Japan¿s Empire: Birth and Death**
Begins with early modern Japan, proceeds through the era of rapid modernization after the Meiji Restoration in the mid-19th century, and concludes with Japan's gradual descent into prolonged war, first with China and then in the Pacific.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4728
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 5738 (3) History of Early Modern Japan (1590-1868)**
Covers the history of early modern Japan (1590-1868). Explores the political, social, cultural and economic context of Japan's history from the era of Warring States through the rise and fall of the Tokugawa military government (Shogunate).
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4738
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 5761 (3) Roman Law**
Studies the constitutional and legal history of ancient Rome; emphasizes basic legal concepts and comparisons with American law. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4761 and CLAS 4761 and CLAS 5761
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Ancient and Medieval

**HIST 5840 (1-3) Independent Study**
Course content determined by consent of faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

**HIST 5841 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Ancient and Medieval

**HIST 5842 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Modern

**HIST 5843 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Specific Countries

**HIST 5844 (1-3) Independent Study-Europe/Topical**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Topical

**HIST 5845 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Chronological Periods

**HIST 5846 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 5847 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 2

**HIST 5848 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions

**HIST 5849 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Comparable and General

**HIST 6000 (3) Teaching History in the University**
Introduces graduate students to basic pedagogy with special attention to discipline-specific methods, practices, and challenges in teaching history at the college level. In touching upon and integrating the several stages of teaching in a graduate student¿s career and after, this course provides a solid foundation for students to continue their pedagogical development as their instructional experience and skills become more advanced.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**HIST 6012 (3) Readings in Modern European History**
Graduate Readings in Modern European History will explore a facet of Modern European History in depth. Topic will very by instructor.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to History (HIST) graduate students only.
**Additional Information:** Departmental Category: Europe: Modern

**HIST 6019 (3) Readings in World History**
Explores various topics and methods in history and historical writing concerning world areas (areas other than the U.S. and Europe). Geared toward graduate students in History, but students from other disciplines with graduate standing may enroll with instructor consent. Topic and content of course will vary depending on instructor.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 6020 (3) Modern Empires: Readings in Imperial History**
Introduces major topics and themes in imperial history. Reviews central theories of modern colonial empire, ranging from economic and political motivations for expansion, to the cultural and social impact of empire, to post-colonialism.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Methodological, Comparative, and Global
Departmental Category: Asia Content

**HIST 6028 (3) Readings in Modern Latin American History**
Examines major themes and topics in the social, political and economic history of Latin America. Possible topics include nationalism and state-building, neocolonialism, revolution and reaction, race, and gender.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite HIST 5128.
**Additional Information:** Departmental Category: World Areas: Specific Regions

**HIST 6109 (3) Readings in Asian History**
Explores a specific theme in Asian History in depth. Topic may vary each semester.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 6116 (3) Readings in American Diplomatic History**
**Requisites:** Restricted to graduate students only.
**Recommended:** Requisite undergraduate work in American history.
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 6123 (3) Readings in English History Since 1688**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Specific Countries

**HIST 6317 (3) Readings in the American West**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 2

**HIST 6326 (3) Readings in United States Intellectual History**
Examines the history of ideas and the social history of intellectuals in American society during the 19th and 20th centuries. Stresses social and political dimensions and the changing cultural and institutional contexts of intellectual discourse.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to History (HIST) graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 6410 (3) Readings in Environmental History**
Offers historical perspective on the complex and interdependent relationship between human social and cultural institutions and the natural world. Considers interdisciplinary methodologies incorporating history, biology, geography, law, and other disciplines. Formerly HIST 6417.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 6420 (3) Memory and History in Transnational Perspective**
Engages in debates about historical methods and how the past is represented. Central topics will include memory and the forces of nationalism and war; commemoration and monuments; the role of memory in the construction of race and ethnicity; personal past and cultural remembrance; and the relationships between academic, public, and popular histories.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

**HIST 6427 (3) Readings in African American History**
Introduces classic and recent scholarship, and critical issues in African American history, from slavery to the present.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 2

**HIST 6528 (3) Reading in South Asian History**
Introduces major topics and themes in South Asian history. Reviews central theories relating to topics such as religion, nationalism, law, gender, colonialism, and literature.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 6540 (3) Readings in Cultural History and Theory**
Introduces standard works and recent developments in cultural history. Explores structuralism and post-structuralism, semiotics, social construction, relativism, hegemony, and the idea of postmodernity in the uses of culture as an historical category.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 6756 (3) Race and Nationalism**
Focuses on analytical, ideological, cultural, and political tensions between understandings of race and nationalism. Readings are interdisciplinary, but students identify and analyze tensions between race and nationalism at particular historical moments.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 6790 (3) Readings in Digital History**
Re-conceptualizes topics surrounding traditional theories, methods, and practices of writing history in the digital age. Topics revolve around collating big data, curating digital exhibits, copyright and image preparation for digital/print publications, website development/design, cartography, sustainability and preservation, among other themes. Lab work provides conceptual and technical recommendations required to conceive, launch, and preserve online digital history projects.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

**HIST 6800 (3) Readings in Global History**
Explores various topics, regions, and methods in history and historical writing by utilizing a global/thematic approach. Geared toward graduate students in History, but students from other disciplines with graduate standing may enroll with instructor consent. Topic and content of course will vary depending on instructor.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

**HIST 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

**HIST 6950 (1-6) Master's Thesis**
Registration intended for students working on a master's thesis.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

**HIST 7000 (3) Seminar in Historical Research and Writing**
Discusses methods of historical research, writing, and revision. Along with common reading discussion, students will produce a research paper based on original historical research. Fulfills research seminar (7000-level) requirements for students of all fields.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**HIST 7119 (3) Graduate Research Seminar in Asian History**
Prepares students for research in historical documents in Asian languages in order to write a substantial original research paper based on primary and secondary source materials.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Requisite background in Asian history.
**Additional Information:** Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 7252 (3) Seminar: Early Modern Europe, 16th to 18th Centuries**
Introduces graduate students to various research approaches and methods in early modern European historiography and requires them to produce a substantial and original research paper using both primary and secondary sources. Specific topics will vary.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Modern

**HIST 7257 (3) Seminar: History of the American Frontier**
**Requisites:** Restricted to History (HIST) graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 2

**HIST 7415 (3) Graduate Seminar in Modern United States History**
Introduces students to various research approaches and methods in modern U.S. historiography and requires them to produce a substantial and original research paper using both primary and secondary sources.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Chronological Periods

**HIST 7800 (3) Research Seminar in Global History**
Discusses various topics, themes and methods which inform the field of Global History. Readings and research papers will explore transnational and global historical interactions, including the exchange of ideas, peoples, commodities, and cultural practices. Geared toward graduate students in History, but students from other disciplines with graduate standing may enroll with instructor consent. Topic and content of course will vary depending on instructor.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to History (HIST) graduate students only.

**HIST 7840 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

**HIST 7841 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Ancient and Medieval

**HIST 7842 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Modern

**HIST 7843 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Specific Countries

**HIST 7844 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Topical

**HIST 7845 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Chronological Periods

**HIST 7846 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 7847 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 2

**HIST 7848 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions

**HIST 7849 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Comparable and General

**HIST 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

# History - Master of Arts (MA)

Historians study the past, in all of its complexity, to better understand our contemporary world and the forces that created it. Historians analyze change over time, and they use archival and other primary-source evidence to build interpretations that explain change and put it into context. In seeking to understand historical subjects on their own terms, and by appreciating the diverse perspectives of past actors, students of history develop empathy even as they rigorously engage with the ethical dimensions of past human decisions and actions. When students understand the past, they recognize their power to shape the present and the future.

History faculty conduct research and teach courses in a wide range of eras—from ancient to modern times—and across most major world areas including Africa and the Middle East, South and East Asia, Europe and the Americas. History faculty also pursue multiple methodologies and approaches, including cultural, diplomatic, demographic, economic, environmental, ethnic, gender, intellectual, legal, political, religious, social and transnational history.

At CU Boulder, history graduate students are trained in the central principles and research methods that characterize the discipline of history through class instruction and professional development seminars. They also gain a thorough grounding in their particular geographical area of study as well as an ability to situate that area of study in a larger global context.

All MA students focus their studies in two equally weighted fields:

- A regional/national field (i.e., American/U.S. history, European history or Asian history)
- A global/thematic field, for which students are required to take a variety of courses that examine global and transnational history through specific thematic lenses

For the purposes of the comprehensive examination (portfolio), students are expected to work with their faculty advisors to craft subfields of emphasis within both the regional/national and global/thematic fields.

Students wishing to pursue graduate work in history leading to candidacy for an advanced degree should carefully read the master's degree requirements (p. 1113) section carefully. For more information, visit the department's graduate students webpage.

## Requirements

### Admission Requirements

A Graduate Record Examination (GRE) score is no longer required for admission to the program.

### Prerequisites

As general preparation for graduate work in history, a broad liberal arts education, as well as a major in history, are desirable, though not specifically required. Candidates for graduate degrees may be required to pursue such fundamental courses in history as the department deems necessary to provide a suitable historical background.

### Degree Requirements

The following are special departmental requirements. For more information, visit the department's Graduate Students (https://www.colorado.edu/history/graduate-program/) webpage.

Most MA coursework will be at the 5000, 6000 and 7000 levels. With the approval of a student's academic advisor and the endorsement of the department's director of graduate studies, a maximum of 6 credit hours of upper-division (4000-level) undergraduate history coursework may be counted toward the MA degree. All courses completed at CU Boulder must be taken in the Department of History, except for courses recommended by the advisor and approved by the director of graduate studies.

All MA students must complete the following:

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| HIST 5000 | Historical Methods: Introduction to the Professional Study of History | 3 |
| A two-semester regional/national field colloquium sequence. | | 6 |
| HIST 5106 | Graduate Colloquium in United States History ("To 1865" and "Since 1865") | |
| HIST 5012 | Graduate Colloquium in European History ("To 1789" and "Since 1789") | |
| HIST 5129 | Colloquium in Modern Asian History ("South Asia" and "East Asia") | |

## Degree Plans

### Plan I: Thesis Option

Thesis-track MA students must complete a total of 24 credit hours of coursework, plus 6 credit hours of MA thesis credit (HIST 6950). Of those, a minimum of 12 credit hours must come in each of a student's two fields, regional/national and global/thematic. A thesis must be successfully defended before a faculty committee as the final requirement for the degree.

### Plan II: Non-Thesis Option

Non-thesis track MA students must complete 30 credit hours of coursework, including a minimum of three hours of 7000-level research seminar. Students must complete 12 credit hours in each of their two fields (regional/national and global/thematic). A final examination must be passed in the field of study before the degree is granted.

## Language Requirement

For students working in fields of history that require the use of foreign languages, their advisory committees may require a demonstration of language proficiency.

# Learning Outcomes

By the completion of the program, students will be able to:

- Identify, understand and synthesize key historical debates in multiple fields (portfolio option only).
- Produce an intellectual agenda that outlines their trajectory in their coursework and articulates their thematic, historiographic and methodological interests (portfolio option only).
- Design a research plan that aims to make original historiographical contribution (thesis option only).
- Conduct research in primary historical sources to make original historical findings (thesis option only).
- Write original historical research papers (both portfolio and thesis options).

For more information about the department's Learning Outcomes philosophy, visit the department website (https://www.colorado.edu/history/about/history-teaching-learning-project/student-learning-objectives/).

# Dual Degree Programs

## Dual MA in History and Asian Languages and Civilizations or Religious Studies

The Department of History participates in a dual master's program with the Departments of Asian Languages and Civilizations and Religious Studies. Students interested in exploring this option should contact the graduate director of the department for specific requirements.

# History - Doctor of Philosophy (PhD)

Historians study the past, in all of its complexity, to better understand our contemporary world and the forces that created it. Historians analyze change over time, and they use archival and other primary-source evidence to build interpretations that explain change and put it into context. In seeking to understand historical subjects on their own terms, and by appreciating the diverse perspectives of past actors, students of history develop empathy even as they rigorously engage with the ethical dimensions of past human decisions and actions. When students understand the past, they recognize their power to shape the present and the future.

History faculty conduct research and teach courses in a wide range of eras—from ancient to modern times—and across most major world areas including Africa and the Middle East, South and East Asia, Europe and the Americas. History faculty also pursue multiple methodologies and approaches, including cultural, diplomatic, demographic, economic, environmental, ethnic, gender, intellectual, legal, political, religious, social and transnational history.

At CU Boulder, history graduate students are trained in the central principles and research methods that characterize the discipline of history through class instruction and professional development seminars. They also gain a thorough grounding in their particular geographical area of study as well as an ability to situate that area of study in a larger global context.

All PhD students focus their studies in two equally weighted fields:

- A regional/national field (i.e., American/U.S. history, European history or Asian history)
- A global/thematic field, for which students are required to take a variety of courses that examine global and transnational history through specific thematic lenses

For the purposes of the comprehensive examination (portfolio), students are expected to work with their faculty advisors to craft subfields of emphasis within both the regional/national and global/thematic fields.

Students wishing to pursue graduate work in history leading to candidacy for an advanced degree should read the Doctoral Degree Requirements (p. 1114) section carefully. For more information, visit the department's Graduate Students (https://www.colorado.edu/history/graduate-program/) webpage.

# Requirements

## Admission

A Graduate Record Examination (GRE) score is no longer required for admission into the History graduate program.

## Prerequisites

Students who wish to work toward the PhD degree in history must indicate acquaintance with the fundamental tools of historical scholarship and the ability to do original work with historical primary sources. The PhD program does not require the completion of a master's degree, but directly admits those qualified applicants, who have been recommended by the graduate admissions committee.

## Degree Requirements

A total of 45 post-baccalaureate credit hours (39 coursework hours plus 6 portfolio hours) before advancing to candidacy, at least 36 of which must be taken at this university, and a dissertation are required for the degree. A minimum of one foreign language is required; however, students must be able to use those languages essential to research and advanced study in their respective fields. In addition, as required by the Graduate School, those students pursuing a PhD should complete a minimum of 30 credit hours of dissertation work beyond the minimum coursework requirement. The total number of required hours including required coursework, elective coursework, portfolio and dissertation, is 69 hours.

After completion of the coursework requirements, each candidate for the PhD degree must assemble and defend a PhD portfolio before proceeding to the dissertation stage of the program. The dissertation must be an original contribution to the discipline. An oral defense of the dissertation must be successfully completed in order for the degree to be conferred.

Visit the History Graduate Studies website (https://www.colorado.edu/history/graduate-studies/) for a more detailed explanation of our program.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| HIST 5000 | Historical Methods: Introduction to the Professional Study of History | 3 |
| Students must take a two-semester regional/national colloquium in their research field from those listed below: | | 6 |
| HIST 5106 | Graduate Colloquium in United States History (U.S. to 1865 & U.S. since 1865) | |
| HIST 5012 | Graduate Colloquium in European History (Europe to 1789 & Europe since 1789) | |
| HIST 5129 | Colloquium in Modern Asian History (China, Northeast Asia, or South Asia) | |
| One additional colloquium course (5000-level) in a field outside of one's own national/regional field. (The additional colloquium course will ordinarily count toward the student's required global/thematic course hours.) | | 3 |
| At least 6 hours of coursework at the 7000 level. 7000-level research seminars may fill required hours for either the "regional/national" or the "global/thematic" field, depending on the subject area(s) of the course(s). | | 6 |
| Additional graduate-level courses to meet the 39 course credit hour minimum. Out of the total required coursework credit hours, a minimum of 18 credit hours must come in each of a student's two fields: regional/national and global/thematic. Courses are chosen in consultation with the student's faculty advisor. | | 21 |
| 6 portfolio hours plus 24 additional dissertation hours | | 30 |
| HIST 8990 | Doctoral Dissertation | |
| **Total Credit Hours** | | **69** |

## Residence

At least three years of graduate study, two of which must be spent in residence, are required for the PhD degree.

# Learning Outcomes

By the completion of the program, students will be able to:

- Identify, understand and synthesize key historical debates in multiple fields.
- Teach undergraduate-level historical courses.
- Design a research plan that aims to make original historiographical contribution.
- Conduct research in primary historical sources to make original historical findings.
- Write original historical research papers.

For the department's learning outcomes philosophy, visit the department website (https://www.colorado.edu/history/about/history-teaching-learning-project/student-learning-objectives/).

# Integrative Physiology

The Department of Integrative Physiology offers a variety of graduate study opportunities that range from a coursework-only master's degree option to MS and PhD research-intensive options. To facilitate maximal flexibility in the design of a student's program, the Department has established a minimum number of required courses that must be completed by all graduate students and the remainder of the program can be individualized to meet the long-term goals of the student.

A graduate degree in integrative physiology provides opportunities for careers in academia, industry, and the health professions. The placement list of PhD and MS graduates (https://www.colorado.edu/iphy/graduate/placement-recent-phd-and-ms-graduates/) indicates some of the jobs and educational programs that our graduate students have found after completion of the PhD or MS degree.

**Course code for this program is IPHY.**

# Master's Degree

- Integrative Physiology - Master of Science (MS) (p. 1319)

# Doctoral Degree

- Integrative Physiology - Doctor of Philosophy (PhD) (p. 1319)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Angiolillo, Albert
Assistant Teaching Professor; MS, University of Colorado Boulder

Bekoff, Anne (https://experts.colorado.edu/display/fisid_100613/)
Professor Emeritus; PhD, Washington University

Boyko, Marie (https://experts.colorado.edu/display/fisid_100073/)
Senior Instructor Emeritus; MA, University of Colorado Boulder

Broussard, Josiane
Associate Professor Adjunct

Brunt, Vienna E (https://experts.colorado.edu/display/fisid_158297/)
Assistant Professor Adjunct; PhD, University of Oregon

Bustamante, Heidi Margarita (https://experts.colorado.edu/display/fisid_146491/)
Associate Teaching Professor; MS, University of Colorado Boulder

Byrnes, William (https://experts.colorado.edu/display/fisid_100643/)
Associate Professor Emeritus; PhD, University of Wisconsin–Madison

Carey, Cynthia
Professor Emerita

Casagrand, Janet L. (https://experts.colorado.edu/display/fisid_100934/)
Associate Teaching Professor; PhD, Case Western Reserve University

Chonchol, Michel
Professor Adjunct; MD, Universidad Central de Venezuela, Caracas

Clayton, S. Zachary
Assistant Professor Adjunct

Depner, Christopher
Assistant Professor Adjunct; PhD, Oregon State University

DeSouza, Christopher A. (https://experts.colorado.edu/display/fisid_107460/)
Distinguished Professor; PhD, University of Maryland, College Park

Eaton, Robert
Professor Emeritus

Ehringer, Marissa A. (https://experts.colorado.edu/display/fisid_126595/)
Professor, Chair; PhD, University of Colorado Denver

Enoka, Roger M. (https://experts.colorado.edu/display/fisid_110122/)
Professor; PhD, University of Washington

Fleshner, Monika R. (https://experts.colorado.edu/display/fisid_103304/)
Professor; PhD, University of Colorado Boulder

Floriano, Maureen (https://experts.colorado.edu/display/fisid_169506/)
Assistant Teaching Professor; PhD, Case Western Reserve University

Foley, Teresa E. (https://experts.colorado.edu/display/fisid_147351/)
Teaching Professor of Distinction; PhD, University of Colorado Boulder

Fowler, John S.
Professor Emeritus

Gleeson, Todd T. (https://experts.colorado.edu/display/fisid_105480/)
Professor Emeritus; PhD, University of California, Irvine

Grabowski, Alena Marie (https://experts.colorado.edu/display/fisid_149727/)
Associate Professor; PhD, University of Colorado Boulder

Harsh, John R. (https://experts.colorado.edu/display/fisid_155406/)
Professor Adjunct

Heisler, Ruth E. (https://experts.colorado.edu/display/fisid_103195/)
Teaching Professor of Distinction; MA, University of Colorado Boulder

Hobbs, Steven L. (https://experts.colorado.edu/display/fisid_143724/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Hoeffer, Charles Albert (https://experts.colorado.edu/display/fisid_153384/)
Associate Professor; PhD, University of Arizona

Johnson, Thomas E. (https://experts.colorado.edu/display/fisid_104242/)
Professor Emeritus; PhD, University of Washington

Kim, Sewan (https://experts.colorado.edu/display/fisid_174402/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Kram, Rodger (https://experts.colorado.edu/display/fisid_118476/)
Associate Professor Emeritus; Ph.D. , Harvard University

Link, Christopher D. (https://experts.colorado.edu/display/fisid_109073/)
Associate Professor; PhD, University of Massachusetts at Amherst

Lowry, Christopher (https://experts.colorado.edu/display/fisid_143371/)
Professor; PhD, Oregon State University

Lynch, G. Robert
Professor Emeritus

Maldonado, Tammy A. (https://experts.colorado.edu/individual/fisid_104105/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Mazzeo, Robert (https://experts.colorado.edu/display/fisid_101031/)
Associate Professor Emeritus; PhD, University of California, Berkeley

McQueen, Matthew B. (https://experts.colorado.edu/display/fisid_143785/)
Professor Adjoint; DSc, Harvard University

Moore, Russell (https://experts.colorado.edu/display/fisid_105756/)
Professor; PhD, Washington State University

Norris, David O.
Professor Emeritus

Nowak, Kristen
Associate Professor Adjoint

Olm, Matthew R. (https://experts.colorado.edu/display/fisid_174400/)
Assistant Professor; PhD, University of California, Berkeley

Opp, Mark R. (https://experts.colorado.edu/display/fisid_158898/)
Professor; PhD, Washington State University

Robichaux, Waldean
Professor Emeritus

Rossman, J. Matthew (https://experts.colorado.edu/display/fisid_156619/)
Assistant Research Professor; PhD, University of Utah

Rowe, K. Rachel (https://experts.colorado.edu/display/fisid_168365/)
Assistant Professor; PhD, University of Kentucky

Saul, Leif J. (https://experts.colorado.edu/display/fisid_116130/)
Associate Teaching Professor; PhD, University of California, Berkeley

Schaetzel, Amanda E. (https://experts.colorado.edu/display/fisid_154385/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Seals, Douglas R. (https://experts.colorado.edu/display/fisid_103375/)
Distinguished Professor; PhD, University of Wisconsin–Madison

Shearston, Jenni
Assistant Professor; PhD, Oregon State University

Sherwood, David
Associate Professor Emeritus

Shi, Jia (https://experts.colorado.edu/display/fisid_143673/)
Associate Teaching Professor; PhD, Boston University

Stitzel, Jerry A. (https://experts.colorado.edu/display/fisid_102954/)
Professor; PhD, Johns Hopkins University

Stob, Nicole R. (https://experts.colorado.edu/individual/fisid_134529/)
Assistant Teaching Professor; PhD, Colorado State University

Tan, Andrew Q. (https://experts.colorado.edu/display/fisid_167426/)
Assistant Teaching Professor; PhD, Northwestern University

Tsai, Pei-San (https://experts.colorado.edu/display/fisid_115292/)
Professor; PhD, University of California, Berkeley

Wright Jr., Kenneth P. (https://experts.colorado.edu/display/fisid_125586/)
Distinguished Professor; PhD, Bowling Green State University

# Courses

**IPHY 5060 (4) Cell Physiology**
Focuses on the molecular machines and cellular sub-compartments that allow cells to renew, replicate, and function in the context of multicellular organisms. Students must enroll in lecture and recitation sections.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4060
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 5100 (2) Colloquium in Integrative Physiology**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 5200 (3) Physiological Genetics and Genomics**
Covers fundamental concepts in molecular genetics/genomics with physiological applications. Topics include structure and function of nucleic acids, genome structure, genetic and genomic research tools, methods for identifying disease-causing mutations, regulation of gene expression, pharmacogenetics, gene therapy and ethical issues in modern genomics. First course of a 3-course series recommended for IBG students. Includes a recitation section.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4200 and PSYC 5200
**Requisites:** Restricted to Integrative Physiology (IPHY or C-IPHY) or Psychology (PSYC) graduate students only.

**IPHY 5300 (3) Statistical Genetics for Complex Traits**
Focuses on the methods of mapping complex disease genes in both population and family-based samples. Topics include both linkage and association analyses of qualitative and quantitative phenotypes.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 5440 (4) Endocrinology**
Introduces mammalian endocrine system. Provides a thorough analysis of chemical communication by hormones and related bioregulators with emphasis on the major endocrine systems such as the thyroid, gonad, pituitary and the brain. Department enforced prerequisites: one year of general biology (lecture + lab) and one year of general chemistry (lecture + lab).
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4440
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 5540 (5) Biomechanics**
Applies the principles of physics and physiology to analyze the movement of humans and other animals. Assesses the mechanical properties of muscles, tendons, ligaments and bones. Quantitatively analyzes forces, torque, mechanical energy, power impulses and momentum associated with human movement.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4540
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.
**Recommended:** Prerequisite one semester of physiology and one semester of general physics (lecture + lab).

**IPHY 5580 (3) Sleep Physiology**
Describes the physiology, neurobiology, physiology and functions neurobiology of sleep and circadian rhythms; explains the impact of sleep, sleep deprivation, and circadian rhythms, as well as sleep and circadian disruptions and disorders on immune, endocrine, thermoregulatory, cardiovascular, respiratory, and and neural systems; systems, as well as examines changes in sleep and circadian rhythms across the the life span. The integrative nature of sleep and circadian rhythms in normal physiological and cognitive functions and their importance in health and disease processes will be emphasized. Department enforced prerequisite: statistics equivalent.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4580
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 5600 (3) Immunology**
Studies the immune system, a multi-cellular system that functions to protect us from disease. Introduces concepts associated with the development and function of individual cells of the immune system (T-cells, B-cells, neutrophils, dendritic cells, macrophages), as well as their integrative roles in physiology and host defense.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4600
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.
**Recommended:** Prerequisites one year of general biology (lecture + lab) and one year of general chemistry (lecture + lab); IPHY 3470.

**IPHY 5650 (5) Exercise Physiology**
Examines physiological and biochemical adjustments that occur in the body with acute and chronic exercise. Topics center on physiological mechanisms pertaining to metabolic, cardiovascular, and hormonal alterations, the role of exercise in health and disease, soreness and fatigue, immune function, as well as exercise during varied environmental conditions.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4650
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.
**Recommended:** Prerequisite one semester of physiology and one semester of physiology lab.

**IPHY 5720 (4) Neurophysiology**
Explores the function of the nervous system, including how the properties of neurons influence nervous system activity, how the nervous system controls the activity of muscles and how the sensory effects of muscle activity influence the function of the nervous system. Department enforced prerequisites: one year of general biology (lecture + lab) and one year of general chemistry (lecture + lab), IPHY 2800 (or equivalent); IPHY 3410.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4720
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.
**Grading Basis:** Letter Grade

**IPHY 5740 (3) Theory of Motor Skill Learning**
Offers a critical analysis of motor learning theories, including Adam's closed loop theory, Schmidt's schema theory and the influence of contextual interference on learning and performance. Also covers feedback and practice organization. Projects and presentations required.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4740
**Requisites:** Restricted to Integrative Physiology (IPHY or C-IPHY) or Psychology (PSYC) graduate students only.

**IPHY 5780 (3) Sleep, Circadian Rhythms, and Health**
Examines the history of the fields of sleep and circadian rhythms; lifespan development of sleep and rhythms; observational, physiological, and clinical measures of sleep; screening for sleep and circadian disorders; associations between poor sleep and circadian misalignment and health; and evidenced-based sleep and circadian interventions/preventions in healthy and clinical samples. Dept. enforced requisite: one year of biology (lecture and lab); statistics course.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4780

**IPHY 5800 (4) Advanced Statistics and Research Methods in Integrative Physiology**
Introduces advanced statistical techniques important for analyzing data rising in biomedical research, including physiology. StatistIcal reasoning will be emphasized through problem solving and applications using statistical software packages.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.
**Recommended:** Prerequisite IPHY 2800.

**IPHY 5840 (1-6) Graduate Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 5880 (3) Advanced Data Analysis in Biomedical Research**
Provides advanced training on statistics and scientific reasoning in laboratory and clinical research. Conceptual foundations of classical and modern statistical techniques is reviewed. Multiple class projects consist of written reports on statistical analysis of data representative of the student's field of interest. The use of statistical packages, primarily R, is required.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4880
**Requisites:** Requires prerequisite course of IPHY 5800 (minimum grade B).
**Grading Basis:** Letter Grade

**IPHY 5900 (3) Data Literacy in Biomedical Research**
Provides a platform to develop a deeper understanding of quantitative biomedical research, current trends, challenges, and limitations. The course complements graduate statistical training by introducing topics relevant to open science and data literacy, including reproducibility, data privacy challenges, and the importance of good data management. Challenges in advanced statistical data evaluation and analysis in biomedical research settings will be discussed.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.
**Recommended:** Prerequisite IPHY 5800.
**Grading Basis:** Letter Grade

**IPHY 6010 (1-3) Seminar**
Presents special topics in integrative physiology.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 6660 (3) Locomotion Energetics and Biomechanics**
Critiques and discusses both classic and cutting edge scientific research in the area of terrestrial locomotion.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.
**Recommended:** Prerequisites IPHY 4540 and IPHY 4650.

**IPHY 6680 (3) Matlab for Physiological and Biomechanical Research**
Introduces Matlab programming skills needed to write and modify programs for data acquisition and analysis, statistics, plotting, and simulation.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 6830 (3) Professional Skills for the Research Scientist**
Discusses grant and manuscript writing, scientific presentations, peer-review, setting up/directing a research laboratory, research ethics, mentoring and other professional skills.
**Requisites:** Restricted to Intergrative Physiology (IPHY) doctoral students only.

**IPHY 6840 (1-3) Research Project**
Involves a scholarly investigation of a selected topic using literature and/or experimental techniques. Advisor required.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 6950 (1-6) Master's Thesis**
Must have 4 credit hours and may be repeated up to 6 total credits.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Requisites:** Restricted to Intergrative Physiology (IPHY) doctoral students only.

# Integrative Physiology - Master of Science (MS)

Physiology is the field of biology that deals with function in living organisms. The academic foundation of the department is the knowledge of how humans and animals function at the level of genes, cells, organs and systems. A graduate degree in the Department of Integrative Physiology at the University of Colorado Boulder provides opportunities for careers in academia, industry and the health professions.

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s): Integrative Physiology - Bachelor of Arts (BA) (https://www.colorado.edu/iphy/graduate/bachelors-accelerated-masters-degree-program/)

# Requirements

## Admission Requirements

Entering graduate students must have an undergraduate preparation equivalent to the basic core curriculum requirements in integrative physiology or departmental approval of their academic preparation for graduate study.

All graduate applicants must have an introductory course in statistics or research design. In addition, students should have the knowledge base that would be obtained by completing human physiology or comparative animal physiology lecture and lab courses.

### Deficiencies

Deficiencies in any area of the undergraduate major may be met by completing approved coursework in the subject at CU Boulder or at other institutions. All entering graduate students with deficiencies must satisfy all deficiencies within the first year of graduate study.

## Course Requirements

Master's candidates entering the graduate program must complete 30 credits to graduate. They may select one of three options:

- Coursework only plan: 30 required credits to graduate
- Research project plan: 3 research project hours as part of the 30 required credits to graduate
- Thesis plan: 4 to 6 thesis hours as part of the 30 required credits to graduate

It is possible, however, to change from one option to another during the program of study.

Students must have a minimum cumulative grade point average of 3.0 in all graduate work taken, and must perform satisfactorily on the comprehensive exam.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| IPHY 5100 | Colloquium in Integrative Physiology | 2 |
| IPHY 5800 | Advanced Statistics and Research Methods in Integrative Physiology | 4 |
| **Degree Plan Option** | | |
| Select the coursework-only (0 credits), research project (3 credits) or thesis (4-6 credits) option. | | 0-6 |
| IPHY 6840 | Research Project | |
| IPHY 6950 | Master's Thesis | |
| **Electives** | | |
| Elective coursework to fulfill the 30-credit minimum. | | 18-24 |
| **Total Credit Hours** | | **30** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate advanced knowledge in fundamental principles of physiology.
- Apply principles of physiology and appropriate analytical approaches.
- Communicate scientific knowledge effectively.

# Integrative Physiology - Doctor of Philosophy (PhD)

The objectives of the doctoral program in the Department of Integrative Physiology at the University of Colorado Boulder are to:

- Provide an academic foundation for understanding how humans and other animals function at the level of genes, cells, tissues, organs and systems.
- Develop the professional skills required to become a research scientist.

# Requirements

## Admission Requirements

To obtain materials for application and for any additional information, visit the Integrative Physiology (https://www.colorado.edu/iphy/graduate-program/) website.

Entering graduate students must have an undergraduate preparation equivalent to the basic core curriculum requirements in Integrative

Physiology or departmental approval of their academic preparation for graduate study.

All graduate applicants must have an introductory course in statistics or research design. In addition, students should have the knowledge base that would be obtained by completing human physiology or comparative animal physiology lecture and lab courses.

### Deficiencies

If the undergraduate preparation of a prospective graduate student is not adequate, the student may be allowed to pursue graduate study with the understanding that identified deficiencies will be completed. The graduate admissions committee will determine the nature and extent of these deficiencies.

Deficiencies in any area of the undergraduate major may be met by completing approved coursework in the subject at CU Boulder or at other institutions. All entering graduate students with deficiencies must satisfy all deficiencies within the first year of graduate study.

## Required Courses and Semester Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| IPHY 5100 | Colloquium in Integrative Physiology (2 academic-year semesters) | 4 |
| IPHY 5800 | Advanced Statistics and Research Methods in Integrative Physiology | 4 |
| IPHY 6830 | Professional Skills for the Research Scientist | 3 |
| **Electives** | | |
| Elective coursework | | 19 |
| **Dissertation** | | |
| IPHY 8990 | Doctoral Dissertation | 30 |
| **Total Credit Hours** | | **60** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate expert knowledge in both fundamental principles of physiology and in the student's area of specialization.
- Use the scientific method in physiology: form scientific hypotheses and theoretical models, design and conduct rigorous research protocols and apply appropriate analytical approaches.
- Communicate findings of scientific investigations effectively, both orally and in writing.

# Jewish Studies

The program in Jewish Studies, which is open to all students of all backgrounds, Jewish and non-Jewish, explores Jewish culture, history, religion, society, and thought from a broad, interdisciplinary perspective, training graduate students for diverse career paths.

With a faculty of engaged scholars and teachers working in fields across the humanities, arts, and social sciences, the Program supports the research, teaching, and professional development of graduate students pursuing a master's or doctoral degree in a diverse and growing array of departments, including history, religious studies, English, Germanic and Slavic languages and literature, linguistics, art and art history, and critical media practices. Students receive intensive mentoring through the graduate colloquium, and/or to complete a graduate certificate.

**Course code for this program is JWST.**

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Boyd, Samuel L. (https://experts.colorado.edu/display/fisid_155484/)
Associate Professor; PhD, University of Chicago

Goodman, Nan (https://experts.colorado.edu/display/fisid_100633/)
Professor; PhD, Harvard University

Kalisman, Hilary Falb (https://experts.colorado.edu/display/fisid_164096/)
Endowed/Named Professor; PhD, University of California, Berkeley

Malin, Jonathan (https://experts.colorado.edu/display/fisid_151714/)
Associate Professor; PhD, University of Chicago

Mehta, Samira (https://experts.colorado.edu/display/fisid_165972/)
Assistant Professor, Director, Associate Faculty Director; PhD, Emory University; MDiv, Harvard University

Rivlin, Eyal Ofer (https://experts.colorado.edu/display/fisid_151100/)
Teaching Associate Professor, Endowed/Named Professor; MA, Naropa Institute

Wartell, Rebecca (https://experts.colorado.edu/display/fisid_164288/)
Teaching Assistant Professor; PhD, Monash University

Weber, Beverly Marie (https://experts.colorado.edu/display/fisid_144523/)
Professor; PhD, University of Massachusetts Amherst

# Certificate

- Jewish Studies - Graduate Certificate (p. 1321)

# Courses

**JWST 5200 (3) Religion and Reproductive Politics in the United States**
Focuses primarily on how Protestant, Catholic, and Jewish conversations about sexuality and reproduction have shaped access and attitudes towards reproductive health in the US over the course of the twentieth and twenty-first centuries.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4200, JWST 4200, WGST 5200

**JWST 5348 (3) Graduate Topics in Jewish History**
Covers topics in Jewish history from biblical beginnings to present day. Topics vary each semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**JWST 5358 (3) Childhood in Modern Israel/Palestine**
Examines topics relating to History, Jewish Studies and Israel/Palestine studies. Analyzes the history of modern childhood in Israel and Palestine from the 19th century to the present. Themes include agency, work, life cycle and culpability. Topics range from collective parenting on Israeli Kibbutzim, growing up in Ottoman Palestine, to the legal status of stone-throwing Palestinian children. Sources include memoirs, literature, films, monographs and articles.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4358 and HIST 4358 and HIST 5358
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite HIST/JWST 4338 History of Modern Israel/Palestine, this course would give students relevant background on the history of the region, but is not required.

**JWST 5378 (3) Jews in and of the Middle East**
Examines the modern history and culture of Jewish communities in the Middle East and North Africa; Jews' and Muslims' encounters with empire, westernization and nationalism; representations of Sephardi and Eastern Jews; Jewish-Muslim relations in Europe and the U.S.; and contact and conflict between Jews and Muslims in (and about) Israel/Palestine. Sources include memoirs, newspapers and films.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4378, JWST 4378, and HIST 5378
**Requisites:** Restricted to graduate students only.

**JWST 5800 (3) Ethics, Medicine and the Holocaust: Legacies in Health and Society**
Engages the disturbing fact that German health care professionals actively participated in the architecture and machinery of the Third Reich; explores the implications of these facts for contemporary health care ethics; expands beyond the Holocaust to consider the ramifications for our understanding of the problem of evil in general.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4800
**Grading Basis:** Letter Grade

**JWST 5900 (1-6) Graduate Independent Study in Jewish Studies**
Working with a faculty member in Jewish Studies on an independent study research project provides graduate students with an opportunity to learn outside the formal classroom structure with individual direction from Jewish Studies faculty on a topic of mutual interest not offered in regularly scheduled classes. (Independent study may not be used to substitute for a regular course not being offered in a given term).
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

# Jewish Studies - Graduate Certificate

This certificate program allows graduate students across campus who are interested in Jewish studies to explore Jewish culture, history, society and thought in a number of disciplines. Jewish studies also provides intensive mentoring of graduate research and writing projects through the Jewish Studies Graduate Student Colloquium.

# Requirements

## Admission Requirements

This graduate certificate is open to all currently matriculated graduate students. Students may apply for the graduate certificate at any point in their graduate career at CU. For more information, view the Jewish Studies website (https://www.colorado.edu/jewishstudies/certificate/).

## Course Requirements

Successful completion of 3 graduate courses (9 credit hours) with a grade of B or higher from Jewish Studies' list of approved graduate courses, issued every semester, which comprises graduate courses crosslisted in the Program in Jewish Studies as well as approved courses taught by faculty in the Program in Jewish Studies. If you think a course is missing from this list, please contact the Director of Graduate Studies.

Students may petition the graduate studies committee to have a maximum of one graduate level course (including independent study courses) from outside this list, if that course contains significant Jewish Studies content and the student's completed work for that course is related to Jewish Studies.

| Code | Title | Credit Hours |
|---|---|---|
| **Approved Courses** | | |
| JWST 5200 | Religion and Reproductive Politics in the United States | 3 |
| JWST 5348 | Graduate Topics in Jewish History (Modern Childhood in Israel/Palestine) | 3 |
| JWST 5800 | Ethics, Medicine and the Holocaust: Legacies in Health and Society | 3 |
| JWST 5378 | Jews in and of the Middle East | 3 |
| JWST 5900 | Graduate Independent Study in Jewish Studies | 1-6 |
| ENGL 5109 | Literature and Culture of the United States (Jewish American Literature) | 3 |
| GRMN 5410 | Seminar. Topics in Early 20th Century German Society (Ruins of Modernity) | 3 |
| GRMN 5520 | Seminar. Current Issues in German Literature and Media (Depending on Semester Syllabus ) | 3 |
| HIST 6012 | Readings in Modern European History (depending on the semester syllabus) | 3 |
| HIST 6800 | Readings in Global History (Global History of Genocide - depending on the semester syllabus) | 3 |
| HIST 6800 | Readings in Global History (Microhistory - depending on the semester syllabus) | 3 |
| RLST 5170 | God and Politics | 3 |
| RLST 5180 | Is God Dead? | 3 |
| RLST 5190 | Love and Desire | 3 |
| RLST 5260 | Topics in Judaism | 3 |
| RLST 5820 | Interdisciplinary Seminar on Religion (Mediterranean Religious Society) | 3 |
| RLST 5820 | Interdisciplinary Seminar on Religion (Medieval Spain: Religion, Culture and Ethnicity) | 3 |

## Colloquium

The certificate requires two semesters of participation in the Program in Jewish Studies Graduate Student Colloquium, which meets three times per semester. Participation will be defined as attendance at two colloquium sessions in a given semester and presentation of a work in progress during that semester.

# Linguistics

Linguistics is the study of all aspects of human language: how languages make it possible for us to construe another person's ideas and feelings; how and why languages are similar and different; how we develop different styles and dialects; what will be required for computers to understand and produce spoken language; and how languages are used in everyday communication as well as in formal settings. Linguists try to figure out what it is that speakers know and do by observing the structure of languages, the way children learn language, slips of the tongue, conversations, storytelling, the acoustics of sound waves and the way people's brains react when they hear speech or read. Linguists also reconstruct prehistoric languages, and try to deduce the principles behind their evolution into the thousands of languages of the world today.

## Purpose of the MA Program

The goal of the MA program in linguistics is to provide students with sufficient knowledge of linguistics to enable them to work in industry and organizations where knowledge of linguistics helps in problem solving. The program also helps students determine in a relatively short time whether they want to make research in linguistics a lifelong career and prepares students who decide to do so to apply to the PhD program at CU or at other institutions.

The main component of the MA program is 30 credits of coursework (at least 24 of them in linguistics). Students may also choose to write an MA thesis. Students on both the thesis plan and non-thesis plan must take and pass the comprehensive exam in the fourth semester of study in order to receive the MA degree. Starting July 2024, students will have the option to either write an MA thesis or take the comprehensive exam in order to complete the MA degree requirements. By meeting additional requirements, MA students may also obtain the MA with a certificate in cognitive science, human language technology, teaching English to speakers of other languages (TESOL), Native American and Indigenous Studies, or culture, language and social practice (CLASP).

## Purpose of the MS Program

The program is intended to provide students with a solid background in both theoretical linguistics and computer science. Graduates of the program will be specialists in the application of computers to the processing of natural languages, such as English, Chinese, Arabic and Urdu. The field of computational linguistics, also known as text analytics, natural language processing and informatics, is burgeoning and has become critical to the success of mainstream global businesses who compete for employees qualified to address these needs. The interdisciplinary nature of CLASIC is a significant market strength, because success in this developing field of natural language processing requires a strong background in both linguistics and computer science. The training will prepare students for careers in predictive text messaging, search engines, question-answering, interactive virtual agents and machine translation.

CLASIC students will complete a two-year degree (32 credits of approved graduate study in linguistics and computer science), including a 2-credit capstone project that will run in conjunction with an internship or CU based research project. As part of the capstone, students will be evaluated by their employer or industry project manager. Students will prepare a technical report on the completed project that the program directors and project leader will jointly evaluate. For more information, visit the department's Computational Linguistics (CLASIC) MS (https://www.colorado.edu/linguistics/current-students/graduates/computational-linguistics-clasic-ms/) webpage.

## Purpose of the PhD Program

The goal of the linguistics doctoral program is to prepare graduates to design and conduct original, empirically based research within a theoretical framework. Doctoral students prepare for careers in academic research and teaching or applied work in industry or other organizations. We encourage doctoral students to begin engaging in research projects early, as these will contribute to developing the research program that will lead to the thesis project. Early projects not only lead to preliminary exam topics and/or publishable papers, but also enable students to pilot methods that will be usable for the dissertation project. Early projects may be extensions of coursework and may involve a faculty advisor other than the thesis advisor.

Doctoral students complete a core of required courses that provide a firm foundation in linguistic theory and methods. These courses are supplemented by advanced courses and individual work related to an area of specialization in a field where this department offers research strengths (e.g., description of Native American and Indigenous languages, sociolinguistics, interaction and grammar, computational linguistics, psycholinguistics, first-language acquisition, phonetics, laboratory phonology, functionally-oriented syntax). Doctoral students may obtain a certificate in cognitive science, human language technology, teaching English to speakers of other languages (TESOL), Native American and Indigenous Studies, or culture, language and social practice (CLASP). Additionally, students may apply to pursue a joint PhD in linguistics and cognitive science.

**Course codes for this program are LING and ESLG.**

# Master's Degrees

- Computational Linguistics, Analytics, Search and Informatics - Master of Science (MS) (p. 1769)
- Linguistics - Master of Arts (MA) (p. 1328)

# Doctoral Degree

- Linguistics - Doctor of Philosophy (PhD) (p. 1327)

# Certificates

- Cognitive Science - Graduate Certificate (p. 1329)
- Culture, Language and Social Practice (CLASP) - Graduate Certificate (p. 1329)
- Human Language Technology - Graduate Certificate (p. 1331)
- Native American and Indigenous Studies Certificate (NAIS) - Graduate Certificate (p. 1778)
- Teaching English to Speakers of Other Languages (TESOL) - Graduate Certificate (p. 1331)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Bell, Alan
Professor Emeritus

Brown, Susan Windisch
Assistant Professor Adjunct; PhD, University of Colorado Boulder

Calder, Jeremy (https://experts.colorado.edu/display/fisid_159936/)
Assistant Professor; PhD, Stanford University

Cowell, James Andrew (https://experts.colorado.edu/display/fisid_107090/)
Professor; PhD, University of California, Berkeley

Farrelly, Raichle (https://experts.colorado.edu/display/fisid_166033/)
Senior Instructor, Lecturer; PhD, University of Utah

Fox, Barbara (https://experts.colorado.edu/display/fisid_106066/)
Professor; PhD, University of California, Los Angeles

Frajzyngier, Zygmunt (https://experts.colorado.edu/display/fisid_104000/)
Professor; PhD, University of Warsaw (Poland)

Gutiérrez Lorenzo, Ambrocio (https://experts.colorado.edu/display/fisid_168627/)
Assistant Professor; PhD, University of Texas, Austin

Hall, Kira (https://experts.colorado.edu/display/fisid_123111/)
Professor, Associate Chair; PhD, University of California, Berkeley

Haynie, Hannah (https://experts.colorado.edu/display/fisid_166099/)
Assistant Professor; PhD, University of California, Berkeley

Hodges, Adam
Assistant Professor Adjunct; PhD, University of Colorado

Hulden, Mans (https://experts.colorado.edu/display/fisid_154602/)
Associate Professor; PhD, University of Arizona

Menn, Lise
Professor Emerita

Michaelis-Cummings, Laura A. (https://experts.colorado.edu/display/fisid_105599/)
Professor, Chair; PhD, University of California, Berkeley

Narasimhan, Bhuvaneswari (https://experts.colorado.edu/display/fisid_144863/)
Associate Professor; PhD, Boston University

Palmer, Martha
Professor; PhD, University of Edinburgh (Scotland)

Raymond, Chase Wesley (https://experts.colorado.edu/display/fisid_158278/)
Associate Professor; PhD, University of California, Los Angeles

Rood, David
Professor Emeritus

Scarborough, Rebecca (https://experts.colorado.edu/display/fisid_143741/)
Associate Professor, Associate Chair; PhD, University of California, Los Angeles

Shay, Erin J.
Assistant Professor Adjunct; PhD, University of Colorado

Taylor, Allan R.
Professor Emeritus

Thomas-Ruzic, Maria L.
Senior Instructor Emerita

# Courses

**LING 5030 (3) Linguistic Phonetics**
Introduces practical and theoretical aspects of phonetics. Provides training in recognition and production of speech sounds, and instruction on fundamentals of articulatory, acoustic, and auditory phonetics.
**Requisites:** Restricted to graduate students only.

**LING 5140 (2) CLASIC Capstone**
In this capstone to the Computational Linguistics, Analytics, Search and Informatics (CLASIC) professional master¿s program, we will review each student¿s internship project and prepare presentations and technical reports based on those internships. Students will present their work on the annual Industry Day or at an Advisory Board meeting to industry representatives. They will also submit a paper to a relevant conference or workshop. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5140
**Requisites:** Restricted to students in the Computational Linguistics, Analytics, Search and Informatics (CLSI) program only.
**Recommended:** It is recommended that this course be taken after the CLASIC internship has been completed.

**LING 5200 (3) Introduction to Computational Corpus Linguistics**
This course is an introduction to the use of corpora for linguistic analysis and natural language processing. A major focus is the development of computational skills, preparing the student for CSCI 5832 (Natural Language Processing). Previous completion of LING 1200 or CSCI 1300 highly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4200
**Requisites:** Restricted to graduate students only.

**LING 5300 (3) Research in Psycholinguistics**
Explores research topics and methods in psycholinguistics selected from areas such as language production and comprehension, language and cognition, and language acquisition.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite at least one graduate-level course in LING, PSYC or CSCI.

**LING 5410 (3) Phonology**
Studies sound systems of language. Introduces both principles of organization of sound systems and major kinds of phonological structures found worldwide. Provides extensive practice in applying phonological principles to data analysis.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 5030.

**LING 5420 (3) Morphology and Syntax**
Introduces principles of word formation and sentence structure. Covers major morphological and syntactic structures found in the world's languages, and methods for describing grammatical structures, and includes practice in analyzing data from a variety of languages.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4420
**Requisites:** Restricted to graduate students only.

**LING 5430 (3) Semantics and Pragmatics**
Explores fundamental concepts of semantics and pragmatics, including theories of communication and meaning, representation, conversational implications, speech acts, and discourse structure.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 5420.

**LING 5570 (3) Introduction to Diachronic Linguistics**
Familiarizes students with terminology, methods, and theories dealing with phenomena of language change through time.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 5410.

**LING 5610 (3) Pedagogical Grammar for Teachers of English to Speakers of Other Languages**
Provides an introduction to the study of English grammar from the perspective of the nonnative learner and user of English. The focus is on understanding the form, meaning, and use of grammatical constructions and on how to teach these constructions in an ESL/EFL context.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4610
**Requisites:** Restricted to graduate students only.

**LING 5620 (3) Teaching Second Language (L2) Oral Skills and Communication**
Provides teaching and learning principles and practices for developing nonnative speakers' oral English proficiency and intercultural communication skills. Examines the sound system of American English (including prosody), listening and pronunciation, lexical considerations, and discourse functions and grammar, and how these contribute to speaking fluency, accuracy and communicative effectiveness. Focuses on teaching applications and includes one-on-one sessions with English learners.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4620
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 3100 or LING 5030 and LING 5410.
**Grading Basis:** Letter Grade

**LING 5622 (3) Statistical Analysis for Linguistics**
Aims to acquaint students with the fundamentals of quantitative analysis in linguistics and provide a practical introduction to the R statistical computing environment. Topics that will be covered include examining and manipulating data, tests for independence, regression modeling, mixed models, measures of association, and data visualization. It is suitable for students with no prior experience with statistics or statistical software packages.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4622

**LING 5630 (3) TESOL and Second Language Acquisition: Principles and Practices**
Provides an overview of methods and materials for teaching English as an additional language, along with opportunities for students to observe, discuss and analyze these in relation to language teaching principles, linguistic considerations, and global and local contexts. Aimed primarily at the teaching of English to nonnative speaking adults, the course also addresses second and foreign language teaching generally.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4630
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 5610 or LING 5620.
**Grading Basis:** Letter Grade

**LING 5640 (3) Teaching Language Skills: Focus on Social Justice**
Introduces the underlying theories and classroom practices for teaching second language reading, writing, listening and speaking. The course highlights the nature of literacy and oral language development, beginning language skills (phonemic awareness, phonics, pronunciation), and meaning-focused language instruction. This unique iteration of the course, designed for CU Boulder¿s Global Seminar program takes a theme-based and project-based approach, contextualizing the study of language teaching around an exploration of social justice issues that are pressing both in Armenia and globally.
**Equivalent - Duplicate Degree Credit Not Granted:** 4640
**Grading Basis:** Letter Grade

**LING 5650 (3) Language Teaching Materials Design**
This course introduces the role of English as an international language and its impact on languages, cultures, and communities around the world. Students evaluate approaches to teaching English against the backdrop of sociopolitical and historical factors. This course utilizes a project-based approach to study language teaching in a Zapotec speech community. The project involves co-creating language teaching materials for use by Zapotec speakers in efforts to maintain and revitalize the Zapotec language among young learners.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4650
**Requisites:** Restricted to graduate students only.

**LING 5700 (3) Conversation Analysis and Interactional Linguistics**
Provides an introduction to the theories and methods of Conversation Analysis (CA) and Interactional Linguistics (IL), which aim to uncover the procedural infrastructure of language use in social interaction. The course emphasizes hands-on experience in analyzing naturally-occurring interactional data. Topics may include: turn-taking, sequence and preference organization, repair, reference, epistemics, and identity.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4700
**Grading Basis:** Letter Grade

**LING 5800 (3) Open Topics in Linguistics**
Various topics not normally covered in the curriculum. Offered intermittently depending on student demand and availability of instructors. Contact the department office for information.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**LING 5832 (3) Natural Language Processing**
Explores the field of natural language processing as it is concerned with the theoretical and practical issues that arise in getting computers to perform useful and interesting tasks with natural language. Covers the problems of understanding complex language phenomena and building practical programs.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5832
**Requisites:** Restricted to graduate students only.

**LING 5900 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**LING 5910 (3) TESOL Practicum**
Provides observation and supervised teaching experiences in classroom and other contexts involving the teaching of English to speakers of other languages, especially adults and young adult learners in settings outside K-12. Meetings provide opportunities to debrief and to consult on teaching practice; help students connect theory, methods and practice; and support a professional teaching portfolio process.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4910
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of LING 4630 or LING 5630 (minimum grade C). Restricted to graduate students only.
**Recommended:** Prerequisite LING 4610 or LING 5610.

**LING 5920 (3) Speakers and the Structure of their Languages**
This is a summer intensive course that introduces various areas of Linguistics (specifically phonology, morphology, and syntax) at the same time that highlights the importance of language documentation, description and revitalization. The target language for Summer 2024 is Zapotec. 50% of this course is designed so that students can get a basic knowledge of an indigenous language as a second language and be able to interact with the community of speakers.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4920

**LING 6200 (3) Issues and Methods in Cognitive Science**
Interdisciplinary introduction to cognitive science, examining ideas from cognitive psychology, philosophy, education, and linguistics via computational modeling and psychological experimentation. Includes philosophy of mind; learning; categorization; vision and mental imagery; consciousness; problem solving; decision making, and game-theory; language processing; connectionism. No background in computer science will be presumed.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 6402 and EDUC 6504 and PHIL 6310 and PSYC 6200 and SLHS 6402
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite at least one course at the 3000-level or higher in CSCI, LING, PHIL, or PSYC.

**LING 6300 (3) Topics in Language Use**
Discusses current issues and research in a selected area related to language use and function. Sample topics include conversational interaction, language policy, language content, and sociolinguistic variation.
**Requisites:** Restricted to graduate students only.

**LING 6310 (3) Sociolinguistic Analysis**
Serves as an advanced introduction to the empirical and theoretical foundations of contemporary sociolinguistic analysis, with special emphasis on linguistic variation, diversity and change.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**LING 6320 (3) Linguistic Anthropology**
Serves as an advanced introduction to the empirical and theoretical foundations of contemporary linguistic anthropology, with special emphasis on the ways in which culture and society emerge semiotically through language and discourse.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 6320
**Requisites:** Restricted to graduate students only.

**LING 6450 (3) Syntactic Analysis**
Introduces the major constructs used by formal theories of syntax to capture the relationship between meaning and syntactic form and uses data from diverse languages to explore the universality of these constructs.
**Requisites:** Restricted to graduate students only.

**LING 6500 (3) Issues in Indigenous Languages**
Addresses socio-cultural issues concerning indigenous languages, including human rights, intellectual property, language endangerment and maintenance, identity, linguistic relativity, sense of place.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 6500
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**LING 6510 (3) Language Structures**
Surveys the structure of one or more languages, emphasizing understanding how parts of the language interact. Designed to supplement courses in which parts of languages are used to illustrate theoretical claims.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites LING 5410 and LING 5420.

**LING 6520 (3) Topics in Comparative Linguistics**
Students compare and contrast selected structures of languages treated from a typological, genetic, or a real perspective. No special prior knowledge of the subject language is required.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites LING 5410 and LING 5420 and LING 5570.

**LING 6560 (3) Language Acquisition**
Theories and research methods in first-language acquisition of phonology, morphology, syntax, semantics, and pragmatics.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites LING 5410 and LING 5420 and LING 5430.

**LING 6632 (3) Machine Learning and Linguistics**
Is an introduction to machine learning, with a focus on linguistic applications. It is oriented toward students who want to understand the basics of machine learning and apply well-known techniques to address problems related to language and linguistics. The main goal is to achieve a practical grasp of the fundamental and most successful concepts in machine learning and to be equipped with techniques to apply this knowledge in linguistic domains. The course is also intended to provide a perspective on natural language acquisition and learning¿namely, insight into what types of language acquisition problems are truly difficult, and what types of learning problems can be solved by fairly straightforward pattern recognition techniques.

**LING 6861 (1-2) Interdisciplinary Training in the Social Sciences Methods Course**
This is a new course number for a series of interdisciplinary graduate methods seminars created as part of the new Interdisciplinary Training in the Social Sciences program, which is co-funded by the Graduate School and the College of Arts and Sciences. These courses, which have rotating topics, train graduate students in qualitative and quantitative methods. CARTSS/IBS will arrange three one-credit advanced methods mini-courses each Spring semester. The mini-courses will be taught weekly (two hours per week) for five weeks. The courses will change each spring; topics include a wide variety of advanced statistical analysis methods, machine learning for social sciences, text analysis, experimental techniques, network analysis, survey design, interview protocols, etc. Open to all interested graduate students, with programming provided jointly by the Institute of Behavioral Science (IBS) and the Center to Advance Research and Teaching in the Social Sciences (CARTSS).
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 6861
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**LING 6930 (1) Professional Internship**
Provides a structure for CLASIC graduate students to receive academic credit for internships with industry partners that have an academic component to them suitable for graduate-level work. Participation in the program will consist of an internship agreement between a student and an industry partner who will employ the student in a role that supports the academic goals of the internship. Instructor participation will include facilitation of final assessments of student performance as well as support for any academic-related issues that may arise during the internship period. May be taken during any term following initial enrollment and participation in CLASIC graduate program courses.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**LING 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.

**LING 6950 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**LING 7030 (3) Phonetic Theory and Analysis**
Provides students with the practical skills and the conceptual framework to do independent research in phonetics (or in other areas relying on phonetic data). Introduces current and traditional issues in phonetic research (both experimental and theoretical) and gives training in analytical methods.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites LING 5030 and LING 5410.

**LING 7100 (3) Field Methods 1**
Introduces the process of discovering structure of a language from data obtained directly from its speakers. Emphasizes effectiveness in the field context, rapid recognition of structural features,and preliminary formulation using computational tools.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites LING 5410 and LING 5420.

**LING 7310 (3) Social Semiotic Theory**
Introduces students to semiotics, the study of the use and interpretation of signs. Engages with key topics and concepts in the study of semiotic theory¿e.g., indexicality, iconicity, enregisterment, embodiment, agency¿ and how these topics bear on research in sociolinguistics and linguistic anthropology.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 6310 or LING 6320.

**LING 7350 (3) Language and Gender in Cultural Perspective**
Examines organizations of language and gender in a variety of societies and cultures from the perspectives of sociolinguistics, linguistic anthropology, and socially-oriented discourse analysis.
**Requisites:** Restricted to graduate students only.

**LING 7410 (3) Phonological Theory**
Provides an introduction to phonetic and morphophonological representations, with a focus on distinctive features; segments; prosodic structures; morphological structures; phonological processes and their interaction; naturalness conditions.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 5410.

**LING 7415 (2) Cognitive Science Research Applications Seminar 1**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7412 and EDUC 6506 and PSYC 7415 and PHIL 7415 and SLHS 7418
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite EDUC 6505.

**LING 7420 (3) Syntactic Theory**
Covers various topics in syntactic theory.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 5420.

**LING 7425 (2) Cognitive Science Research Applications Seminar 2**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7422 and EDUC 6516 and PSYC 7425 and PHIL 7425 and SLHS 7428
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 7415 or PSYC 7415 or CSCI 7412 or EDUC 6506.

**LING 7430 (3) Semantic Theory**
Explores current developments in the theory of linguistic semantics. Potential topics include truth-conditional and set-theoretic theories of meaning; cognitive semantics; semantic typology; social semiotics; the syntax-semantics interface; and the interaction between meaning conventions and conventions of usage.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 5430.

**LING 7565 (3) Computational Phonology and Morphology**
Surveys of the main approaches and central questions related to computational modeling and learning of morphology and phonology. We consider questions related to learnability of phonology/morphology, machine learning implementations, and linguist-driven grammar modeling.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7565
**Recommended:** Prerequisites LING 5410 and LING 5420.

**LING 7570 (3) Advanced Diachronic Linguistics**
Presents theories of language change. Discusses mechanisms of language change, its trajectories over linguistic categories and items and its relation to theories of grammar and of language variation.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites LING 5410 and LING 5420 and LING 5570.

**LING 7575 (3) Computational Lexical Semantics**
Computational semantics has recently been upended by the advent of language models trained on vast amounts of text. These have proven to be very effective as a starting point for building robust downstream applications, although their ability to appropriately take context and world knowledge into account is still open to question. At the same time, rich representational schemes such as Abstract Meaning Representation (AMR) have been improving performance on numerous semantic tasks, including information extraction, question-answering, co-reference, and entailment. This class will explore the theory and practice behind these two advances, examine their respective strengths and weaknesses, and brainstorm about ways of combining them.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7575
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 5430 Semantics and Pragmatics, LING 5832 Natural Language Processing (cross-listed as CSCI 5832) are recommended.
**Grading Basis:** Letter Grade

**LING 7585 (3) Computational Models of Discourse and Dialogue**
This course is an introduction to computational models, corpora, and processing methods for discourse and dialogue. The course will introduce students to the foundational concepts and approaches, building a base from which students can go on to do research in these areas.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7585
**Recommended:** Prerequisite LING 5832 Natural Language Processing.
**Grading Basis:** Letter Grade

**LING 7775 (1) Topics in Cognitive Science**
Reading of interdisciplinary innovative theories and methodologies of cognitive science. Students participate in the ICS Distinguished Speakers series that hosts internationally recognized cognitive scientists who share and discuss their current research. Session discussions include analysis of leading edge and controversial new approaches in cognitive science.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7772 and EDUC 7775 and PHIL 7810 and PSYC 7775 and SLHS 7775
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**LING 7800 (3) Open Topics in Linguistics**
Various topics not normally covered in the curriculum; offered intermittently depending on student demand and availability of instructors. Contact the department office for information.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**LING 7900 (1-5) Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**LING 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.

# Linguistics - Doctor of Philosophy (PhD)

The goal of the linguistics doctoral program is to prepare graduates to design and conduct original, empirically based research within a theoretical framework. Doctoral students prepare for careers in academic research and teaching or applied work in industry or other organizations.

We encourage doctoral students to begin engaging in research projects early, as this engagement contributes to the development of the research program that will lead to the thesis project. Early projects may also lead to preliminary exam topics and/or publishable papers, and importantly, they may enable students to pilot the methods they'll use for the dissertation project. Projects may be extensions of coursework and may involve a faculty advisor other than the thesis advisor.

Students should select a specialization and begin their own research as early as possible. The department offers specializations in:

- Sociolinguistics
- Phonetics
- Semantics
- Syntax
- Morphology
- Laboratory phonology
- Conversation analysis
- Historical linguistics
- Typological comparison
- Native American and Indigenous linguistics
- Linguistic anthropology
- Psycholinguistics
- Corpus linguistics
- Language development
- Cognitive linguistics
- Computational modeling of language knowledge

Students wishing to pursue graduate work in linguistics should carefully read the Doctoral Degree Requirements (p. 1114) section of this catalog and the detailed degree requirements available from the department office.

# Requirements

## Admission Requirements

Applicants should hold a recognized baccalaureate degree. They should have considerable knowledge of a language other than their native language. This knowledge may have been gained by formal study or by

use of the language in a country, community or institution where it is the usual means of communication. The department may require formal study of a foreign language by graduate students whose proficiency in this area is less than the equivalent of the college junior level. GRE scores are optional. TOEFL or IELTS scores are normally required from foreign applicants.

To be admitted to the PhD program, students must have completed coursework equivalent to 4 of the following:

| Code | Title | Credit Hours |
|---|---|---|
| LING 5030 | Linguistic Phonetics | 3 |
| LING 5410 | Phonology | 3 |
| LING 5420 | Morphology and Syntax | 3 |
| LING 5430 | Semantics and Pragmatics | 3 |
| LING 5570 | Introduction to Diachronic Linguistics | 3 |

### Degree Requirements

Thirty credit hours of coursework are normally required for the PhD. Four linguistics courses are required at the 6000 level or above, and the remaining six courses may include up to three courses in other departments appropriate to the specialization.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| Both of the following courses must be taken: | | |
| LING 6450 | Syntactic Analysis | 3 |
| LING 7100 | Field Methods 1 | 3 |
| Select two of the following linguistics courses: | | 6 |
| LING 7030 | Phonetic Theory and Analysis | |
| LING 7310 | Social Semiotic Theory | |
| LING 7410 | Phonological Theory | |
| LING 7420 | Syntactic Theory | |
| LING 7430 | Semantic Theory | |
| LING 7570 | Advanced Diachronic Linguistics | |
| **Electives** | | |
| Select six courses appropriate to the specialization, up to three of which can be from other departments. | | 18 |
| **Total Credit Hours** | | **30** |

#### Language Requirement

All PhD students must demonstrate the ability to read linguistic literature in a language other than English.

#### Preliminary Examination

As a PhD preliminary examination, students submit a data-based research paper early in the second year in the PhD program.

#### Comprehensive Examination

The university comprehensive examination requirement is completed in two steps: the completion of a synthesis paper followed by the defense of a dissertation prospectus.

#### Doctoral Thesis Credits

To complete the requirements for the PhD degree, a student must register for a minimum of 30 dissertation credit hours. These are distinct from the 30 credit hours of coursework that are required for the PhD. A student may not register for more than 10 dissertation credit hours in any one semester. A minimum of 5 credits must be taken each semester following passing of the comprehensive exam.

## Learning Outcomes

By the completion of the program, students will be able to:

# Linguistics - Master of Arts (MA)

The goal of this master's program is to provide students with sufficient knowledge of linguistics to enable them to work in industry and organizations, where knowledge of linguistics helps in problem solving. The program also helps students determine in a relatively short time whether they want to make research in linguistics a lifelong career, and prepares students who decide to do so to apply to the PhD program at CU (p. 1327) or at other institutions.

Students wishing to pursue graduate work in linguistics should carefully read the master's degree requirements (p. 1113) section of this catalog, as well as the detailed degree requirements available on the departmental website (https://www.colorado.edu/linguistics/current-students/graduates/masters-program/).

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated Bachelor's degree(s): Linguistics - Bachelor of Arts (BA) (p. 472)

# Requirements

## Admission Requirements

Applicants should hold a recognized baccalaureate degree, and should have considerable knowledge of a language other than their native language. This knowledge may have been gained by formal study or by use of the language in a country, community or institution where it is the usual means of communication. The department may require formal study of a foreign language by graduate students whose proficiency in this area is less than the equivalent of the college junior level.

GRE scores are optional. TOEFL or IELTS scores are normally required from international applicants.

## Degree Requirements

The master's degree calls for a minimum of three semesters of study, though most students require four semesters. Courses are normally taken at the 5000 level or above.

Students have the option to either pursue a non-thesis plan or a thesis plan. Non-thesis plan students must pass the comprehensive written examination. Thesis plan students must and write and defend a formal written master's thesis, which they must submit through the Graduate School. The comprehensive exam or thesis defense meets the final examination requirement.

## Degree Plans

### Plan I: Thesis Option

Students in this plan must complete a total of 30 credit hours, at least 24 of which must be in linguistics, including 4–6 thesis credit hours.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| LING 5030 | Linguistic Phonetics | 3 |
| LING 5410 | Phonology | 3 |
| LING 5420 | Morphology and Syntax | 3 |
| LING 5430 | Semantics and Pragmatics | 3 |
| LING 5570 | Introduction to Diachronic Linguistics | 3 |
| **Electives** | | |
| Additional courses to fulfill the 30-credit minimum. | | 9-11 |
| **Thesis** | | |
| LING 6950 | Master's Thesis | 4-6 |
| **Total Credit Hours** | | **30** |

### Plan II: Non-Thesis

Students in this plan must complete a total of 30 credit hours of coursework, at least 24 of which must be in linguistics.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| LING 5030 | Linguistic Phonetics | 3 |
| LING 5410 | Phonology | 3 |
| LING 5420 | Morphology and Syntax | 3 |
| LING 5430 | Semantics and Pragmatics | 3 |
| LING 5570 | Introduction to Diachronic Linguistics | 3 |
| **Electives** | | |
| Additional courses to fulfill the 30-credit minimum. | | 15 |
| **Total Credit Hours** | | **30** |

## Learning Outcomes

By the completion of the program, students will be able to:

# Cognitive Science - Graduate Certificate

Tailored to the individual student's area of interest, the cognitive science curriculum for this certificate is designed to provide broad as well as in-depth training in the cognitive sciences.

Graduate students in good standing in one of the following participating academic units may apply to earn a graduate certificate in cognitive science:

- Psychology and Neuroscience
- Philosophy
- Computer Science
- Linguistics
- Speech, Language, and Hearing Sciences
- Education
- Integrative Physiology
- Architecture and Planning
- Information Science

Earning such a certificate can significantly enhance a student's academic knowledge and career choices.

To learn more about the certificate, visit the ICS website (https://www.colorado.edu/ics/graduate-programs/cognitive-science-graduate-certificate/).

## Requirements

The graduate certificate consists of course requirements only.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| PSYC 6200/ CSCI 6402/ EDUC 6504/ LING 6200/ PHIL 6310 | Issues and Methods in Cognitive Science | 3 |
| PSYC/LING 7775/CSCI 7772/ EDUC 7775/SLHS 7775/PHIL 7810 | Topics in Cognitive Science (2 semesters, 1 credit per semester) | 2 |
| **Electives** | | |
| Three cognitive science courses of 2 credit hours or more | | 6 |
| One interdisciplinary course | | 2-3 |
| Additional courses to complete the credit-hour requirement from at least two different departments outside of the student's home department | | |

To learn more about the program, visit the department's Cognitive Science Graduate Certificate (https://www.colorado.edu/ics/graduate-programs/cognitive-science-graduate-certificate/) webpage.

# Culture, Language and Social Practice - Graduate Certificate

CU Boulder is home to the Graduate Certificate in Culture, Language and Social Practice (CLASP). This program provides an interdisciplinary forum on language and society for CU students and faculty. This is facilitated through regular colloquia on the subject of language and society, as well as the diverse course offerings in the CLASP graduate certificate program.

The CLASP program brings cohesion to empirical and theoretical research currently conducted on campus in varied analytic traditions that focus on the study of culture, language and social practice. These traditions include sociolinguistics, linguistic anthropology, literacy, bilingualism, second language acquisition, language endangerment and revitalization, narrative studies, symbolic interactionism, language variation and change, ethnography of speaking and diverse forms of discourse analysis, such as conversation analysis, critical discourse analysis, interactional sociolinguistics and multimodal discourse analysis.

The program currently has over twenty affiliated faculty members from a variety of schools and departments, among them anthropology, communication, education, French and Italian, German and Slavic,

linguistics, political science, Spanish and Portuguese, sociology and speech, language and hearing science.

For more information on the application process and program requirements, visit the CLASP. Culture, Language & Social Practice (http://www.colorado.edu/clasp/) website.

# Requirements

Twelve credit hours of graduate-level coursework are required for the graduate certificate in culture, language and social practice. Three credit hours must come from the list of approved core courses (Group A); six credit hours must come from the list of elective courses (Group B); and the three remaining credit hours must come from a course in either social theory or research methods (Group C), subject to approval by the CLASP curriculum committee. The course chosen to fulfill the Group C requirement, while not necessarily language-related, should be a methodological or theoretical course that informs the student's research interests in the relationship between language and society. *At least one of the three selected courses from Lists A and B must be from* ***outside*** *the student's home department.*

A student may opt to substitute a CU Boulder MA thesis on the subject of culture, language and social practice for one of the Group B courses, if approved by the curriculum committee, which is constituted by the CLASP faculty advisor and CLASP director. An independent study may also be substituted for a formal course, if approved by the committee.

A number of new and unlisted seminars on the subject of language and society are taught within individual departments each year. Students should check with the CLASP program director each semester for a list of additional courses that fulfill the requirements. Students wanting to substitute an unapproved course for one of the courses listed below must receive approval from the CLASP curriculum committee.

The acquisition of a CLASP certificate is dependent on the successful completion of all courses in the academic curriculum with a grade of B or higher.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Group A: Core Courses** | | |
| Students will choose one core course from the list below. | | 3 |
| ANTH/LING 6320 | Linguistic Anthropology | |
| COMM 6410 | Discourse Analysis | |
| COMM 6445 | Intercultural Communication | |
| COMM 6460 | Ethnography of Communication | |
| LING 5700 | Conversation Analysis and Interactional Linguistics | |
| LING 6310 | Sociolinguistic Analysis | |
| LING 6320 | Linguistic Anthropology | |
| EDUC 5615 | Language Acquisition for Bilingual Learners | |
| EDUC 5635 | Education and Sociolinguistics | |
| SPAN 5450 | Introduction to Hispanic Linguistics | |
| **Group B: Elective Courses** | | |
| Students will choose two elective courses. Recently offered courses that fulfill this requirement include: [1] | | 6 |
| ANTH 6320 | Linguistic Anthropology | |
| COMM 5210 | Readings in Communication Theory | |
| COMM 5435 | Readings in Community and Social Interaction | |
| COMM 6410 | Discourse Analysis | |
| COMM 6445 | Intercultural Communication | |
| COMM 6460 | Ethnography of Communication | |
| EDUC 5425 | Introduction to Bilingual/Multicultural Education | |
| EDUC 5455 | Literacy for Linguistically Different Learners | |
| EDUC 5615 | Language Acquisition for Bilingual Learners | |
| EDUC 5635 | Education and Sociolinguistics | |
| EDUC 5465 | Introduction to ELD/Bilingual and Special Education | |
| EDUC 5635 | Education and Sociolinguistics | |
| EDUC 8615 | Designing for Linguistic Diversity in Education Research | |
| LING 6310 | Sociolinguistic Analysis | |
| LING 6320 | Linguistic Anthropology | |
| LING 7350 | Language and Gender in Cultural Perspective | |
| SPAN 5450 | Introduction to Hispanic Linguistics | |
| **Group C: Courses in Social Theory and Research Methods** | | |
| Choose one course in either social theory or research methods that is appropriate for research goals, in consultation with their CLASP faculty advisor. [2] | | 3 |
| Examples of social theory courses include: | | |
| ANTH 5530 | Theoretical Foundations of Sociocultural Anthropology | |
| ANTH 5605 | Anthropology of Neuroscience | |
| ANTH 5610 | Medical Anthropology | |
| ANTH 5730 | Latin American Politics and Culture through Film and Text | |
| ANTH 5745 | Science, Technology and Society | |
| ANTH 5755 | Cultures of Expertise: Science, Power and Knowledge | |
| ANTH 5780 | Core Course-Cultural Anthropology | |
| ANTH 5785 | Advanced Seminar in Cultural Anthropology | |
| ANTH 7010 | Seminar: Contemporary Theory in Cultural Anthropology | |
| ANTH 7620 | Seminar: Ethnography and Cultural Theory | |
| COMM 6360 | Social and Cultural Theory | |
| EDUC 5075 | Sociology of Education | |
| EDUC 6325 | Anthropology of Education | |
| GEOG 6742 | Seminar: Cultural Geography | |
| HIST 6330 | | |
| PSCI 7004 | Seminar: Political Theory | |
| SOCY 5201 | Graduate Seminar in Sociological Theory | |
| SOCY 6041 | Cultural Sociology | |
| SOCY 7006 | Sociology of Sex and Gender | |
| SOCY 7036 | Feminist Theory | |

| | |
|---|---|
| SOCY 7131 | Seminar in Social Psychology |
| WGST 5000 | |
| WGST 5001 | Advanced Topics in Gender ad Sexuality Studies (AH) |
| WGST 5002 | Advanced Topics in Gender and Sexuality Studies (SS) |
| WGST 5400 | Critical Inquiries in Transgender Studies |
| WGST 6090 | Feminist Theories |
| WGST 6290 | Special Topics in Gender and Sexuality Studies |
| WGST 6796 | Queer Theories |
| Examples of seminars in methods include: | |
| ANTH 7000 | Seminar: Current Research Topics in Cultural Anthropology |
| ANTH 7300 | Seminar: Research Methods in Cultural Anthropology |
| COMM 6030 | Qualitative Research Methods |
| COMM 6455 | Community-based Research Methods |
| EDUC 7346 | Ethnographic Methods in Educational Research |
| EDUC 8250 | Qualitative Research Methods in Education |
| EDUC 8260 | Qualitative Methods II |
| SOCY 5111 | Statistics 1: Introduction to Social Statistics |
| SOCY 6111 | Stats 2: Statistic Analysis |
| SOCY 6121 | Qualitative Methods |
| SOCY 7026 | Feminist Research Methods |
| SOCY 7121 | Qualitative Analysis |
| WGST 6190 | Feminist Methodology |
| **Total Credit Hours** | **12** |

[1] The courses listed in this category have been offered at CU Boulder in the recent past. They are not necessarily offered on a regular basis, and they often have rotating faculty members and are subject to change. Students may also substitute an approved independent study with a CLASP faculty member as one of the required electives.

[2] This is a working list of possible courses offered in these areas at CU Boulder, as listed in the catalog. Note that these are not CLASP-approved courses. Unlike the courses specified in Categories A and B, these courses are listed as suggestions only, to provide examples of the kinds of seminars that might be used to fulfill this requirement. Because many of these courses are taught by revolving faculty members who are not CLASP-affiliated, the course content is subject to change from semester to semester. In addition, some of these seminars have prerequisites or limit student enrollment on the basis of disciplinary background.

# Human Language Technology - Graduate Certificate

The explosive growth of the web and the vast improvements in computing power in the last decade have led to a strong need for education and research in human language technology. Human language technology is an interdisciplinary field that includes the following key technological and scientific areas:

- Computer speech recognition and understanding
- Natural language understanding and generation
- Text-based information retrieval
- Web-based dialog agents

CU Boulder's interdisciplinary certificate in human language technology, offered jointly by the Institute of Cognitive Science; the Department of Computer Science; the Department of Linguistics; and the Department of Speech, Language and Hearing Sciences, provides a rich and broad background for students interested in computational tools for human language processing.

To learn more about the certificate, visit the Institute of Cognitive Science (https://www.colorado.edu/ics/graduate-programs/human-language-technology-certificate/) website.

## Required Courses and Credits

The curriculum for the certificate consists of *five* different courses, as shown in the course table below. Three of these five required courses must be taken at the graduate level.

| Code | Title | Credit Hours |
|---|---|---|
| **Programming** | | |
| One semester of programming required (waived for those with programming background). | | |
| CSCI 1300 | Computer Science 1: Starting Computing | 4 |
| **Core Courses** | | |
| Choose three core courses from the list below; at least two must be outside the student's home department and college. | | 9 |
| *Speech and Language Technologies* | | |
| CSCI 5832 | Natural Language Processing | |
| CSCI 6302 | Speech Recognition and Synthesis | |
| *Human Communication* | | |
| SLHS 2010 | Science of Human Communication | |
| LING 5030 | Linguistic Phonetics | |
| LING 5420 | Morphology and Syntax | |
| LING 7800 | Open Topics in Linguistics | |
| **Optional Course** | | |
| Choose one from the optional course list (or two if programming was waived). Extra courses from the core list (beyond the required three) can also be counted as optional courses. [1] | | 3 |
| **Total Credit Hours** | | **16** |

[1] For a full list of core and optional courses, visit the ICS website (https://www.colorado.edu/ics/graduate-programs/human-language-technology-certificate/).

# Teaching English to Speakers of Other Languages - Graduate Certificate

The graduate certificate in Teaching English to Speakers of Other Languages (TESOL) is a 14-15 credit post-baccalaureate program. It is designed for individuals who wish to gain, or continue to develop, the professional knowledge, skills and dispositions that qualify them to

teach learners of English as an additional language in the U.S. and/or abroad. This graduate certificate prepares teacher candidates to teach young learners, adolescents and adults in a number of contexts, domestic and abroad, including community-based programs, private language institutes, intensive English programs and after school programs.

Coursework prepares students with foundational knowledge in the structure of the English language including the grammar, phonological systems and concepts related to sociopragmatics, semantics and morphology. Required linguistics (TESOL) courses prepare students to design activities and lesson plans that target specific learning objectives fostering the development of English language learners' macro- and micro-language skills (macro: listening, speaking, reading, writing; micro: fluency, pronunciation, vocabulary, comprehension). Field placements (praxis) allow for students to develop their identities as reflective practitioners as they make connections between theory and classroom practice.

# Requirements

## Admission Requirements

Students interested in the graduate certificate should complete the application form on the Department of Linguistics (https://www.colorado.edu/linguistics/graduate-certificate-tesol/) website. This is an in-house form that the department uses to admit and track students in the program. Interested post-baccalaureate degree and non-degree students students may contact the Academic Program Director Dr. Rai Farrelly (Raichle.Farrelly@colorado.edu?subject=TESOL%20BA%20Certificate) with any questions. The Director will also advise students on their course plans and successful certificate completion.

*Note:* Non-matriculated students will need to enroll through Continuing Education (https://ce.colorado.edu/) (CE) to acquire a student ID and an Identikey, which provides access to course enrollment, a student email account, tuition bill and more. Learn more about enrollment options for graduate certificate programs at the Department of Linguistics (https://www.colorado.edu/linguistics/graduate-certificate-tesol/) website.

## Required Courses and Credits

To earn the certificate, students must meet the following course requirements and receive a grade of B- or better in all certificate courses.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Linguistics Courses with a TESOL Focus** | | |
| LING 5630 | TESOL and Second Language Acquisition: Principles and Practices | 3 |
| LING 5610 | Pedagogical Grammar for Teachers of English to Speakers of Other Languages | 3 |
| LING 5620 | Teaching Second Language (L2) Oral Skills and Communication | 3 |
| **Required Education Course** | | |
| EDUC 5615 | Language Acquisition for Bilingual Learners | 3 |
| **Elective Course** | | |
| Choose one: | | 2-3 |
| COMM 6445 | Intercultural Communication | |
| EDUC 5425 | Introduction to Bilingual/Multicultural Education | |
| EDUC 5445 | Curriculum for Multicultural Education | |
| EDUC 5455 | Literacy for Linguistically Different Learners | |
| LGTC 5010 | Second Language Acquisition and Language Education (Summer, online) [1] | |
| LGTC 5031 | Emerging Technology for Language Learning (Language Technology Tools in Practice - Fall, online) [1] | |
| LGTC 5031 | Emerging Technology for Language Learning (Emerging Technology for Language Teaching - Spring, online) [1] | |
| LGTC 5035 | Online and Blended Language Instruction (Fall, online) [1] | |
| LING 5910 | TESOL Practicum | |
| **Total Credit Hours** | | **14-15** |

[1] LGTC courses are shorter, 2-credit courses taught online. Students pursuing the graduate certificate alongside the MA in Linguistics will be one credit short by taking an LGTC course as an elective.

# Mathematics

## PhD Program

The Department of Mathematics offers coursework and research leading to the PhD degree in mathematics. The department has a diversified graduate faculty with current areas of research in algebra, classical analysis, differential equations, geometry, harmonic analysis, logic and foundations, number theory, probability and stochastic processes and topology. For more information, see the Department of Mathematics (https://www.colorado.edu/math/) website.

## MA/MS Program

Students may obtain an MA/MS degree as either an undergraduate student through the bachelor's-accelerated master's (p. 483) degree program or as a graduate student.

As a rule, graduate students are admitted to the PhD program in mathematics and earn an MA or MS when they complete their PhD comprehensive exam. Students may choose to leave the program with MA/MS degree. Under certain circumstances, students can be admitted to the graduate program for a terminal MA/MS degree, in which case the prerequisites are the same as for the doctoral program.

**Course code for this program is MATH.**

## Master's Degree

- Mathematics - Master of Arts (MA) (p. 1338)

## Doctoral Degree

- Mathematics - Doctor of Philosophy (PhD) (p. 1339)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Baggett, Lawrence W.
Professor Emeritus; PhD, University of Washington Seattle

Beaudry, Agnès (https://experts.colorado.edu/display/fisid_157677/)
Associate Professor; PhD, Northwestern University

Black, John (https://experts.colorado.edu/display/fisid_126540/)
Associate Professor; PhD, University of California, Davis

Bronstein, Albert (https://experts.colorado.edu/display/fisid_154916/)
Teaching Assistant Professor; PhD, University of Kentucky

Brown, Gordon E.
Professor Emeritus

Casalaina-Martin, Sebastian Ben (https://experts.colorado.edu/display/fisid_145845/)
Professor, Chair; PhD, Columbia University

Clelland, Jeanne Nielsen (https://experts.colorado.edu/display/fisid_113103/)
Professor; PhD, Duke University

Czubak, Magdalena (https://experts.colorado.edu/display/fisid_157955/)
Associate Professor; PhD, University of Texas at Austin

Deeley, Robin J. (https://www.colorado.edu/math/robin-deeley/)
Associate Professor; PhD, University of Victoria (Canada)

Elliott, Peter D. (https://experts.colorado.edu/display/fisid_105048/)
Professor Emeritus; PhD, University of Cambridge (England)

Englander, Janos (https://experts.colorado.edu/display/fisid_147333/)
Professor; PhD, Technion – Israel Institute of Technology

Farsi, Carla Emilia (https://experts.colorado.edu/display/fisid_101437/)
Professor; PhD, University of Maryland, College Park

Fox, Jeffrey S. (https://experts.colorado.edu/display/fisid_105586/)
Professor; PhD, University of California, Berkeley

Goodrich, Robert K.
Professor Emeritus

Gorokhovsky, Alexander (https://experts.colorado.edu/display/fisid_126279/)
Professor; PhD, The Ohio State University

Grant, David R. (https://experts.colorado.edu/display/fisid_100868/)
Professor; PhD, Massachusetts Institute of Technology

Green, Richard Mutegeki (https://experts.colorado.edu/display/fisid_129800/)
Professor; MA, Oxford University (England)

Grochow, Joshua A. (https://experts.colorado.edu/display/fisid_158240/)
Assistant Professor; PhD, University of Chicago

Grulke, Boo (https://experts.colorado.edu/display/fisid_144824/)
Teaching Assistant Professor; DEd, University of Florida

Gustafson, Karl E. (https://experts.colorado.edu/display/fisid_104877/)
Professor Emeritus; PhD, University of Maryland, College Park

Holley, Richard A.
Professor Emeritus

Ih, Su-Ion (https://experts.colorado.edu/display/fisid_141091/)
Associate Professor; PhD, Brown University

Jesudason, Judith Packer (https://experts.colorado.edu/display/fisid_100338/)
Professor; PhD, Harvard University

Kearnes, Keith (https://experts.colorado.edu/display/fisid_118457/)
Professor; PhD, University of California, Berkeley

Kuznetsov, Sergei Eugenievitch (https://experts.colorado.edu/display/fisid_113246/)
Associate Professor, Associate Chair; DSc, Vilnius State University (Lithuania)

Luh, Kyle (https://experts.colorado.edu/display/fisid_166949/)
Assistant Professor; PhD, Yale University

Lundell, Albert T.
Professor Emeritus

Macrae, Robert Eugene
Professor Emeritus

Malitz, Jerome I.
Professor Emeritus

Manley, Kevin W. (https://experts.colorado.edu/display/fisid_142342/)
Teaching Associate Professor; PhD, University of Colorado Boulder

Mayr, Peter (https://experts.colorado.edu/display/fisid_155858/)
Associate Professor; PhD, Johannes Kepler Universität Linz (Austria)

Monk, James Donald
Professor Emeritus

Mycielski, Jan
Professor Emeritus

O'Rourke, Sean Daniel (https://experts.colorado.edu/display/fisid_154418/)
Associate Professor; PhD, University of California, Davis

Orosz Hunziker, Flor (https://experts.colorado.edu/display/fisid_167648/)
Assistant Professor; PhD, Yale University

Pflaum, Markus Josef (https://experts.colorado.edu/display/fisid_144979/)
Professor; Dr habil, Humboldt University of Berlin (Germany)

Ramsay, Arlan
Professor Emeritus

Rearick, David F.
Professor Emeritus

Roberson, Lee Forrest (https://experts.colorado.edu/display/fisid_158380/)
Teaching Assistant Professor; PhD, University of Northern Colorado

Schmidt, Wolfgang
Professor Emeritus

Stade, Eric (https://experts.colorado.edu/display/fisid_100456/)
Professor; PhD, Columbia University

Stalvey, Harrison Edward (https://experts.colorado.edu/display/fisid_158325/)
Teaching Assistant Professor; PhD, Georgia State University

Stange, Katherine E. (https://experts.colorado.edu/display/fisid_151508/)
Associate Professor; PhD, Brown University

Szendrei, Agnes Erzsebet (https://experts.colorado.edu/display/fisid_130160/)
Professor Emerita; DSc, Hungarian Academy of Sciences (Hungary)

Thiem, Franz Nathaniel (https://experts.colorado.edu/display/fisid_144618/)
Professor, Associate Chair; PhD, University of Wisconsin–Madison

Timmer, Joseph (https://experts.colorado.edu/display/fisid_156565/)
Teaching Associate Professor; PhD, University of Southern California

Varanasi, Mahesh K. (https://experts.colorado.edu/display/fisid_103090/)
Professor; PhD, Rice University

Walter, Martin E. (https://experts.colorado.edu/display/fisid_105263/)
Professor Emeritus; PhD, University of California, Irvine

Webb, David C. (https://experts.colorado.edu/display/fisid_141204/)
Associate Professor; PhD, University of Wisconsin–Madison

Wise, Jonathan (https://experts.colorado.edu/display/fisid_151516/)
Associate Professor; PhD, Brown University

Wolkowisky, Jay H.
Professor Emeritus

# Courses

**MATH 5000 (3) Foundations of Mathematics**
Focuses on a complete deductive framework for mathematics and applies it to various areas. Presents Goedel's famous incompleteness theorem about the inherent limitations of mathematical systems. Uses idealized computers to investigate the capabilities and limitations of human and machine computation. Department enforced prerequisites: MATH 2130 and MATH 3140.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4000
**Requisites:** Restricted to graduate students only.

**MATH 5001 (3) Analysis 2**
Provides a rigorous treatment of infinite series, sequences of functions and an additional topic chosen by the instructor (for example, multivariable analysis, the Lebesgue integral or Fourier analysis).
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4001
**Requisites:** Restricted to graduate students only.

**MATH 5030 (3) Intermediate Mathematical Physics 1**
Surveys classical mathematical physics, starting with complex variable theory and finite dimensional vector spaces. Discusses topics in ordinary and partial differential equations, the special functions, boundary value problems, potential theory, and Fourier analysis. Department enforced prerequisite: MATH 4001. Instructor consent required for undergraduates.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5030
**Requisites:** Restricted to graduate students only.

**MATH 5040 (3) Intermediate Mathematical Physics 2**
Surveys classical mathematical physics, starting with complex variable theory and finite dimensional vector spaces. Discusses topics in ordinary and partial differential equations, the special functions, boundary value problems, potential theory and Fourier analysis. Department enforced prerequisite: MATH 5030.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5040
**Requisites:** Restricted to graduate students only.

**MATH 5120 (3) Introduction to Operations Research**
Studies linear and nonlinear programming, the simplex method, duality, sensitivity, transportation and network flow problems, some constrained and unconstrained optimization theory, and the Kuhn-Tucker conditions, as time permits.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4120 and MATH 4120 and APPM 5120
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites APPM 3310 OR MATH 2130 OR MATH 2135 or equivalent.

**MATH 5140 (3) Abstract Algebra 2**
Explores some topic that builds on material in MATH 3140. Possible topics include (but are not limited to) Galois theory, representation theory, advanced linear algebra or commutative algebra. Department enforced prerequisite: MATH 3140.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4140
**Requisites:** Restricted to graduate students only.

**MATH 5150 (3) Linear Algebra**
Highlights vector spaces, linear transformations, eigenvalues and eigenvectors, and canonical forms. Department enforced prerequisite: MATH 2130 or MATH 2135. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 5200 (3) Introduction to Topology**
Introduces the basic concepts of point set topology. Includes topological spaces, metric spaces, homeomorphisms, connectedness and compactness.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4200

**MATH 5230 (3) Differential Geometry of Curves and Surfaces**
Introduces the modern differential geometry of plane curves, space curves, and surfaces in 3-dimensional space. Topics include the Frenet frame, curvature and torsion for space curves; Gauss and mean curvature for surfaces; Gauss and Codazzi equations, and the Gauss-Bonnet theorem.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4230
**Requisites:** Restricted to graduate students only.

**MATH 5240 (3) Hilbert Spaces and the Mathematics of Quantum Mechanics**
Provides an introduction to Hilbert spaces and their application in quantum mechanics. The primary goal is to prove and understand the so-called spectral theorem, which is crucial for the formulation of quantum mechanics. In addition, some examples from physics will be discussed, such as the quantum harmonic oscillator and the spectrum of the hydrogen atom.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4240
**Requisites:** Restricted to graduate students only.

**MATH 5330 (3) Fourier Analysis**
The notion of Fourier analysis, via series and integrals, of periodic and nonperiodic phenomena is central to many areas of mathematics. Develops the Fourier theory in depth and considers such special topics and applications as wavelets, Fast Fourier Transforms, seismology, digital signal processing, differential equations, and Fourier optics. Department enforced prerequisite: MATH 4001.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4330
**Requisites:** Restricted to graduate students only.

**MATH 5430 (3) Ordinary Differential Equations**
Introduces theory and applications of ordinary differential equations, including existence and uniqueness theorems, qualitative behavior, series solutions, and numerical methods, for scalar equations and systems. Department enforced prerequisites: MATH 2130 and MATH 3001. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 5440 (3) Mathematics of Coding and Cryptography**
Gives an introduction, with proofs, to the algebra and number theory used in coding and cryptography. Basic problems of coding and cryptography are discussed; prepares students for the more advanced ECEN 5682.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4440
**Requisites:** Restricted to graduate students only.

**MATH 5470 (3) Partial Differential Equations**
Studies initial boundary and eigenvalue problems for the wave, heat and potential equations. Solution by separation of variables, Green's function, and variational methods. Department enforced prerequisite: MATH 3430 or MATH 5430. Instructor consent required for undergraduates.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4470
**Requisites:** Restricted to graduate students only.

**MATH 5510 (3) Introduction to Probability Theory**
Studies axioms, combinatorial analysis, independence and conditional probability, discrete and absolutely continuous distributions, expectation and distribution of functions of random variables, laws of large numbers, central limit theorems, and simple Markov chains if time permits.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4510
**Requisites:** Restricted to graduate students only.

**MATH 5520 (3) Introduction to Mathematical Statistics**
Examines point and confidence interval estimation. Principles of maximum likelihood, sufficiency, and completeness: tests of simple and composite hypotheses, linear models, and multiple regression analysis if time permits. Analyzes various distribution-free methods. Department enforced prerequisite: one semester calculus-based probability course, such as MATH 4510 or APPM 3570.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4520 and MATH 4520 and STAT 5520
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to APPM 3570 or STAT 3100 or MATH 4510; minimum grade of C- for all.

**MATH 5540 (3) Introduction to Time Series**
Studies basic properties, trend-based models, seasonal models modeling and forecasting with ARIMA models, spectral analysis and frequency filtration. Department enforced prerequisite: APPM 5520 or MATH 5520.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4540 and MATH 4540 and STAT 5540
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to STAT 4520 or MATH 4520 or STAT 5520 or MATH 5520; minimum grade of C- for all.

**MATH 5600 (3) Numerical Analysis 1**
Solution of nonlinear algebraic equations, interpolation, approximation theory and numerical integration. Department enforced prerequisites: MATH 2130 or MATH 2135 or APPM 3310 and experience with a scientific programming language. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 5610 (3) Numerical Analysis 2**
Solution of linear systems, eigenvalue problems, optimization problems, and ordinary and partial differential equations. Department enforced prerequisite: MATH 5600 or APPM 5600. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 5730 (3) Set Theory**
Studies in detail the theory of cardinal and ordinal numbers, definition by recursion, the statement of the continuum hypothesis, simple cardinal arithmetic and other topics chosen by the instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4730

**MATH 5810 (1-3) Special Topics in Mathematics**
Covers various topics not normally covered in the curriculum. Offered intermittently depending on student demand and availability of instructors.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4810
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**MATH 5820 (3) History of Mathematical Ideas**
Examines the evolution of a few mathematical concepts (e.g., number, geometric continuum, or proof), with an emphasis on the controversies surrounding these concepts. Begins with Ancient Greek mathematics and traces the development of mathematical concepts through the middle ages into the present.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4820
**Requisites:** Restricted to graduate students only.
**Recommended:** Requisite completion of upper division Written Communication requirement.

**MATH 5905 (1) Mathematics Teacher Training**
Designed to train students to become effective teachers. Students teach a mathematics course, meeting weekly with faculty to discuss problems particular to the teaching of mathematics. Department enforced prerequisite: current employment as a teaching assistant.
**Requisites:** Restricted to graduate students only.

**MATH 6000 (3) Model Theory**
Proves the compactness theorem, showing the essential finiteness of logical implication. Proves many basic properties of theories, showing how the syntactic form of statements influences their behavior w.r.t., different models. Finally, studies properties of elements that cannot be stated by a single formula (the type of the element) and shows it can be used to characterize certain models.
**Requisites:** Restricted to graduate students only.

**MATH 6010 (3) Computability Theory**
Studies the computable and uncomputable. Shows that there are undecidable problems and from there builds up the theory of sets of natural numbers under Turing reducibility. Studies Turing reducibility, the arithmetical hierarchy, oracle constructions and end with the finite injury priority method. Department enforced prerequisite: MATH 6000.
**Requisites:** Restricted to graduate students only.

**MATH 6020 (3) Category Theory**
Studies categories, functors, natural transformations, adjoints, and universal constructions. Special topics may include monads and their algebras, abelian categories, Kan extensions, or sheaves in geometry and logic. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6110 (3) Introduction to Number Theory**
Examines divisibility properties of integers, congruences, diophantine equations, arithmetic functions, quadratic residues, distribution of primes and algebraic number fields. Department enforced prerequisite: MATH 3140. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6130 (3) Algebra 1**
Studies group theory and ring theory. Department enforced prerequisite: MATH 3140. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6140 (3) Algebra 2**
Studies modules, fields and Galois theory. Department enforced prerequisite: MATH 6130. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6150 (3) Commutative Algebra**
Introduces topics used in number theory and algebraic geometry, including radicals of ideals, exact sequences of modules, tensor products, Ext, Tor, localization, primary decomposition of ideals and Noetherian rings. Department enforced prerequisite: MATH 6140. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6170 (3) Algebraic Geometry**
Introduces algebraic geometry, including affine and projective varieties, rational maps and morphisms and differentials and divisors. Additional topics might include Bezout's Theorem, the Riemann-Roch Theorem, elliptic curves, and sheaves and schemes. Department enforced prerequisite: MATH 6140. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6175 (3) Algebraic Geometry 2**
Continuation of MATH 6170. Develops algebraic geometry using schemes. Topics include coherent and quasicoherent sheaves, sheaf cohomology, Serre duality, lifting criteria, smoothness, base change theorems, algebraic curves and surfaces, and additional topics at the discretion of the instructor. Instructor consent required for undergraduates. Department enforced prerequisite: MATH 6170.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites MATH 6150 or MATH 6290.

**MATH 6180 (3) Algebraic Number Theory**
Introduces number fields and completions, norms, discriminants and differents, finiteness of the ideal class group, Dirichlet's unit theorem, decomposition of prime ideals in extension fields, decomposition and ramification groups. Department enforced prerequisites: MATH 6110 and MATH 6140. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6190 (3) Analytic Number Theory**
Acquaints students with the Riemann Zeta-function and its meromorphic continuation, characters and Dirichlet series, Dirichlet's theorem on primes in arithmetic progressions, zero-free regions of the zeta function and the prime number theorem. Department enforced prerequisites: MATH 6110 and MATH 6350. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6210 (3) Introduction to Topology 1**
Introduces elements of point-set topology and algebraic topology, including the fundamental group and elements of homology. Department enforced prerequisites: MATH 2130 and MATH 3140 and MATH 4001. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6220 (3) Introduction to Topology 2**
Continuation of MATH 6210. Department enforced prerequisite: MATH 6210. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6230 (3) Introduction to Differential Geometry 1**
Introduces topological and differential manifolds, vector bundles, differential forms, de Rham cohomology, integration, Riemannian metrics, connections and curvature. Department enforced prerequisites: MATH 2130 and MATH 4001. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6240 (3) Introduction to Differential Geometry 2**
Continuation of MATH 6230. Department enforced prerequisite: MATH 6230. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6250 (3) Theory of Rings**
Studies semi-simple Artinian rings, the Jacobson radical, group rings, representations of finite groups, central simple algebras, division rings and the Brauer group. Department enforced prerequisites: MATH 6130 and MATH 6140. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6260 (3) Geometry of Quantum Fields and Strings**
Focuses on differential geometric techniques in quantum field and string theories. Topics include: spinors, Dirac operators, index theorem, anomalies, geometry of superspace, supersymmetric quantum mechanics and field theory and nonperturbative aspects in field and string theories. Department enforced prerequisites: MATH 6230 and MATH 6240 and PHYS 5250 and PHYS 7280. Instructor consent required for undergraduates.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 6260
**Requisites:** Restricted to graduate students only.

**MATH 6270 (3) Theory of Groups**
Studies nilpotent and solvable groups, simple linear groups, multiply transitive groups, extensions and cohomology, representations and character theory, and the transfer and its applications. Department enforced prerequisites: MATH 6130 and MATH 6140. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6280 (3) Advanced Algebraic Topology**
Covers homotopy theory, spectral sequences, vector bundles, characteristic classes, K-theory and applications to geometry and physics. Department enforced prerequisite: MATH 6220. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6290 (3) Homological Algebra**
Studies categories and functors, abelian categories, chain complexes, derived functors, Tor and Ext, homological dimension, group homology and cohomology. If time permits, the instructor may choose to cover additional topics such as spectral sequences or Lie algebra homology and cohomology. Department enforced prerequisites: MATH 6130 and MATH 6140.
**Requisites:** Restricted to graduate students only.

**MATH 6310 (3) Introduction to Real Analysis 1**
Develops the theory of Lebesgue measure and the Lebesgue integral on the line, emphasizing the various notions of convergence and the standard convergence theorems. Applications are made to the classical L^p spaces. Department enforced prerequisite: MATH 4001. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6320 (3) Introduction to Real Analysis 2**
Covers general metric spaces, the Baire Category Theorem, and general measure theory, including the Radon-Nikodym and Fubini theorems. Presents the general theory of differentiation on the real line and the Fundamental Theorem of Lebesgue Calculus. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite MATH 6310.

**MATH 6350 (3) Functions of a Complex Variable 1**
Focuses on complex numbers and the complex plane. Includes Cauchy-Riemann equations, complex integration, Cauchy integral theory, infinite series and products, and residue theory. Department enforced prerequisite: MATH 4001. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6360 (3) Functions of a Complex Variable 2**
Focuses on conformal mapping, analytic continuation, singularities and elementary special functions. Department enforced prerequisite: MATH 6350. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6534 (3) Topics in Mathematical Probability**
Offers selected topics in probability such as sums of independent random variables, notions of convergence, characteristic functions, Central Limit Theorem, random walk, conditioning and martingales, Markov chains and Brownian motion. Department enforced prerequisite: MATH 6310. Instructor consent required for undergraduates
**Requisites:** Restricted to graduate students only.

**MATH 6550 (3) Introduction to Stochastic Processes**
Systematic study of Markov chains and some of the simpler Markov processes, including renewal theory, limit theorems for Markov chains, branching processes, queuing theory, birth and death processes, and Brownian motion. Applications to physical and biological sciences. Department enforced prerequisite: MATH 4001 or MATH 4510 or APPM 3570 or APPM 4560. Instructor consent required for undergraduates.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 6550
**Requisites:** Restricted to graduate students only.

**MATH 6730 (3) Set Theory**
Presents cardinal and ordinal arithmetic, and basic combinatorial concepts, including stationary sets, generalization of Ramsey's theorem, and ultrafilters, consisting of the axiom of choice and the generalized continuum hypothesis. Department enforced prerequisites: MATH 4000 or MATH 5000 and MATH 4730 or MATH 5730. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6740 (3) Forcing**
Presents independence of the axiom of choice and the continuum hypothesis, Souslin's hypothesis and other applications of the method of forcing. Introduces the theory of large cardinals. Department enforced prerequisite: MATH 6730. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6900 (1-3) Independent Study**
Instructor consent required for undergraduates.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**MATH 6940 (1) Master's Candidate for Degree**
This course is for students preparing for the no-thesis option for a master's degree. The content is set by the students' advisors.
**Requisites:** Restricted to graduate students only.

**MATH 6950 (1-6) Master's Thesis**

**MATH 8114 (3) Topics in Number Theory**
May include the theory of automorphic forms, elliptic curves, or any of a variety of advanced topics in analytic and algebraic number theory. Department enforced prerequisite: MATH 6110. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 8174 (3) Topics in Algebra I**
Department enforced prerequisites: MATH 6130 and MATH 6140. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 8210 (3) Topics in Topology**
Presents specialized topics in topology such as stable homotopy theory, derived algebraic geometry, Weil cohomology theories, cobordism and topological field theories, theory of stratified spaces, index theory, mixed Hodge modules, topological data analysis. Department enforced prerequisite: MATH 6210 or MATH 5200. Instructor consent required for undergraduates.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**MATH 8234 (3) Topics in Differential Geometry**
Presents advanced topics in Differential Geometry, such as index theory, partial differential equations on manifolds, exterior differential systems, and Cartan's methods.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of MATH 6230 and MATH 6310 (minimum grade D-). Restricted to graduate students only. Instructor consent required for undergraduates.

**MATH 8250 (3) Mathematical Theory of Relativity 1**
Focuses on Maxwell equations, Lorentz force, Minkowski space-time, Lorentz, Poincare, and conformal groups,metric manifolds, covariant differentiation, Einstein space-time, cosmologies, and unified field theories. Instructor consent required.
**Requisites:** Restricted to graduate students only.

**MATH 8304 (3) Topics in Analysis 1**
Presents advanced topics in analysis including Lie groups, Banach algebras, operator theory, ergodic theory, representation theory, etc. Department enforced prerequisites: MATH 8330 and MATH 8340. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 8330 (3) Functional Analysis 1**
Introduces such topics as Banach spaces (Hahn-Banach theorem, open mapping theorem, etc.), operator theory (compact operators and integral equations and spectral theorem for bounded self-adjoint operators) and Banach algebras (the Gelfand theory). Department enforced prerequisites: MATH 6310 and MATH 6320. Instructor consent required for undergraduates. See also MATH 8340.
**Requisites:** Restricted to graduate students only.

**MATH 8340 (3) Functional Analysis 2**
Introduces such topics as Banach spaces (Hahn-Banach theorem, open mapping theorem, etc.), operator theory (compact operators and integral equations and spectral theorem for bounded self-adjoint operators) and Banach algebras (the Gelfand theory). Department enforced prerequisite: MATH 8330. Instructor consent required for undergraduates. See also MATH 8330.
**Requisites:** Restricted to graduate students only.

**MATH 8370 (3) Harmonic Analysis 1**
Examines trigonometric series, periodic functions, diophantine approximation and Fourier series. Also covers Bohr and Stepanoff almost periodic functions, positive definite functions and the L^1 and L^2 theory of the Fourier integral. Applications to group theory and differential equations. Department enforced prerequisites: MATH 5150 and MATH 6320. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 8714 (3) Topics in Logic 1 and 2**
**Requisites:** Restricted to graduate students only.

**MATH 8815 (1-3) Ulam Seminar**
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**MATH 8900 (1-3) Independent Study**
Instructor consent required for undergraduates.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**MATH 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School portion of the catalog.
**Requisites:** Restricted to graduate students only.

# Mathematics - Master of Arts (MA)

## MA/MS Program

Students may obtain an MA/MS degree as either an undergraduate student through the Bachelor's–Accelerated Master's (BAM) degree program or as a graduate student.

As a rule, graduate students are admitted to the PhD program in Mathematics and earn an MA or MS when they complete their PhD comprehensive exam. Students may choose to leave the program with MA/MS degree. Under certain circumstances, students can be admitted to the graduate program for a terminal MA/MS degree, in which case the prerequisites are the same as for the doctoral program.

## Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s): Mathematics - Bachelor of Arts (BA) (p. 483).

# Requirements

## Admission Requirements

Applicants must have demonstrated mathematical maturity and accomplishment roughly at the level of a successful mathematics major at CU Boulder. Applicants must also demonstrate mathematical potential: success in courses in advanced calculus and abstract algebra help demonstrate this potential. General and mathematics GRE subject scores are required for PhD students.

## Degree Requirements

Students must complete 30 hours of approved credit. At least 24 credit hours must be completed at the 5000 level or above. A maximum of six credit hours may be completed at the 3000 or 4000 level if approved by the department. Students must take two 2-semester sequences. For fulfillment of all course requirements, mathematics courses must be numbered 5000 or higher excluding MATH 5820.

For the MS degree in applied mathematics, 6–12 credit hours must be in an approved minor program outside the mathematics department, and at least 18 credit hours must be approved inside the mathematics department.

Students should read carefully the materials describing the university requirements in the Graduate School section. The student is responsible for satisfying these requirements at the proper time.

### Examinations

To earn an MA degree, a student must pass a master's examination based on the particular program of the student.

### Thesis

For the MA degree in mathematics, students can pursue a thesis option, which requires 4–6 credit hours of thesis work, and a thesis defense.

# Plan of Study

Thirty hours of approved graduate credit are required, and two courses that are two-semester sequences in mathematics should be included in these 30 hours. Students develop their plan of study with their faculty advisor. This is an example plan for students interested in studying algebra.

| Year One | | Credit Hours |
|---|---|---|
| MATH 5440 | Mathematics of Coding and Cryptography | 3 |
| MATH 6130 | Algebra 1 | 3 |
| MATH 6140 | Algebra 2 | 3 |
| MATH 6000 | Model Theory | 3 |
| MATH 6020 | Category Theory | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **15** |

| Year Two | | Credit Hours |
|---|---|---|
| MATH 6150 | Commutative Algebra | 3 |
| MATH 6170 | Algebraic Geometry | 3 |
| MATH 6180 | Algebraic Number Theory | 3 |
| MATH 6210 | Introduction to Topology 1 | 3 |

| | | |
|---|---|---|
| MATH 6250 | Theory of Rings | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **15** |

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate ability to explain mathematical concepts effectively.
- Engage in an independent mathematical project.
- Solve problems and communicate solutions in rigorous mathematical language.

# Mathematics - Doctor of Philosophy (PhD)

The Department of Mathematics offers coursework and research leading to the PhD degree in mathematics. The department has a diversified graduate faculty with current areas of research in algebra, classical analysis, differential equations, geometry, harmonic analysis, logic and foundations, number theory, probability and stochastic processes, and topology.

For more information, visit the Department of Mathematics (http://www.colorado.edu/math/) website.

## Requirements

### Admission Requirements

Applicants must have demonstrated mathematical maturity and accomplishment roughly at the level of a successful mathematics major at CU Boulder. Applicants must also demonstrate mathematical potential: success in courses in advanced calculus and abstract algebra help demonstrate this potential. General and mathematics GRE subject scores are required for PhD students.

### Degree Requirements

Students must complete at least 30 credit hours of approved graduate coursework and 30 credit hours of thesis work.

Before being admitted to candidacy for the PhD degree in mathematics, a student must take two graduate courses each in algebra, real analysis and geometry/topology en route to passing two out of three preliminary exams in these fields. In addition, the student must take a course in complex analysis. The student must then pass a comprehensive exam.

Students should read the Doctoral Degree Requirements (p. 1114) section carefully. The student is responsible for satisfying these requirements at the proper time.

## Plan(s) of Study

Below is a sample course plan for first and second year students. In their third year onward, students typically complete dissertation research take elective coursework.

| Year One | | Credit Hours |
|---|---|---|
| MATH 6130 | Algebra 1 | 3 |
| MATH 6140 | Algebra 2 | 3 |
| MATH 6310 | Introduction to Real Analysis 1 | 3 |
| MATH 6320 | Introduction to Real Analysis 2 | 3 |
| MATH 5905 | Mathematics Teacher Training | 1 |
| ELECTIVE MATH CLAS | Student Choice - check with faculty mentor or grad program director | 3 |
| | **Credit Hours** | **16** |
| | **Total Credit Hours** | **16** |

| Year Two | | Credit Hours |
|---|---|---|
| MATH 6210 | Introduction to Topology 1 | 3 |
| MATH 6230 | Introduction to Differential Geometry 1 | 3 |
| MATH 6350 | Functions of a Complex Variable 1 | 3 |
| MATH 5905 | Mathematics Teacher Training | 1 |
| ELECTIVE MATH CLASS (2) | | 6 |
| | **Credit Hours** | **16** |
| | **Total Credit Hours** | **16** |

## Learning Outcomes

By the completion of the program, students will be able to:

- Have a mastery of fundamental knowledge in Mathematics (Algebra, Analysis, Geometry, Topology).
- Solve problems and communicate solutions in rigorous mathematical language.
- Explain mathematical concepts effectively.
- Conduct independent research.

# Molecular, Cellular and Developmental Biology

In view of the strong research orientation of the fields involved, the department does not accept applications from students seeking the MA as a terminal degree. The master of arts degree, either with a thesis (Plan I) or without (Plan II), is awarded under special circumstances.

**Course code for this program is MCDB.**

**Doctoral Degree**

- Molecular, Cellular and Developmental Biology - Doctor of Philosophy (PhD) (p. 1343)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Abbott, Lois A.
Senior Instructor Emerita

Anseth, Kristi S. (https://experts.colorado.edu/display/fisid_103471/)
Distinguished Professor; PhD, University of Colorado Boulder

Arnoult, Nausica Christine (https://experts.colorado.edu/display/fisid_164094/)
Assistant Professor; PhD, Pierre and Marie Curie University (France)

Betterton, Meredith D. (https://experts.colorado.edu/display/fisid_125396/)
Professor; PhD, Harvard University

Blumenthal, Thomas (https://experts.colorado.edu/display/fisid_143346/)
Professor, Visiting Professor; PhD, Johns Hopkins University

Boswell, Robert E. (https://experts.colorado.edu/display/fisid_100196/)
Professor; PhD, University of Colorado Boulder

Brumbaugh, Justin J. (https://experts.colorado.edu/display/fisid_164025/)
Assistant Professor; PhD, University of Wisconsin-Madison

Cech, Thomas R. (https://experts.colorado.edu/display/fisid_103252/)
Distinguished Professor; PhD, University of California, Berkeley

Chen, Zhe
Assistant Research Professor; PhD, University of Colorado Boulder

Copley, Shelley (https://experts.colorado.edu/display/fisid_104067/)
Professor; PhD, Harvard University

DeDecker, Brian S. (https://experts.colorado.edu/display/fisid_143934/)
Senior Instructor; PhD, Yale University

Detweiler, Corrella Scott (https://experts.colorado.edu/display/fisid_128240/)
Professor; PhD, University of California, San Francisco

Donaldson, Zoe (https://experts.colorado.edu/display/fisid_157087/)
Assistant Professor; PhD, Emory University

Dowell, Robin D. (https://experts.colorado.edu/display/fisid_147779/)
Associate Professor; DSc, Washington University

Dubin, Mark W.
Professor Emeritus

Espinosa, Joaquin Maximiliano (https://experts.colorado.edu/display/fisid_134378/)
Visiting Associate Professor; PhD, Univ of Buenos Aires (Argentina)

Fillman, Christy L. (https://experts.colorado.edu/display/fisid_145115/)
Senior Instructor; PhD, University of Colorado Boulder

Garcea, Robert L. (https://experts.colorado.edu/display/fisid_146103/)
Professor; MD, University of California, San Francisco

Gold, Lawrence (https://experts.colorado.edu/display/fisid_100581/)
Professor; PhD, University of Connecticut

Guild, Nancy Ann (https://experts.colorado.edu/individual/fisid_111361/)
Professor Attendant Rank; PhD, University of Colorado

Han, Min (https://experts.colorado.edu/display/fisid_105512/)
Distinguished Professor; PhD, University of California, Los Angeles

Harvey, Pamela Ann (https://experts.colorado.edu/display/fisid_148012/)
Senior Instructor; PhD, Tufts University

Hoenger, Andreas (https://experts.colorado.edu/display/fisid_142883/)
Professor; PhD, Universität Basel (Switzerland)

Jones, Kevin Robert (https://experts.colorado.edu/display/fisid_102094/)
Associate Professor; PhD, University of California, Berkeley

Junge, Harald Jobst
Assistant Professor; PhD, Philipps-Universität Marburg (Germany)

Klymkowsky, Michael W. (https://experts.colorado.edu/display/fisid_101226/)
Professor; PhD, California Institute of Technology

Knight, Jennifer Kirsten (https://experts.colorado.edu/display/fisid_101933/)
Associate Professor; PhD, University of Michigan Ann Arbor

Kralj, Joel M.
Assistant Professor; PhD, Boston University

Krauter, Kenneth S. (https://experts.colorado.edu/display/fisid_107978/)
Professor, Associate Chair; PhD, Yeshiva University

Kuempel, Peter L.
Professor Emeritus

Leinwand, Leslie Anne (https://experts.colorado.edu/display/fisid_107104/)
Distinguished Professor, Faculty Director; PhD, Yale University

Martin, Jennifer Mary (https://experts.colorado.edu/display/fisid_110125/)
Senior Instructor; PhD, University of Washington

Mastronarde, David N.
Professor Attendant Rank; PhD, University of Colorado

McConkey, Edwin H.
Professor Emeritus

McIntosh, J. Richard
Distinguished Professor Emeritus

Niswander, Lee (https://experts.colorado.edu/display/fisid_160024/)
Chair, Professor; PhD, Case Western Reserve University

Odorizzi, Charles Gregory (https://experts.colorado.edu/display/fisid_118429/)
Professor; PhD, University of California, San Diego

Old, William (https://experts.colorado.edu/display/fisid_103039/)
Assistant Professor; PhD, University of Colorado Boulder

Olwin, Bradley Bruce (https://experts.colorado.edu/display/fisid_109888/)
Professor, Associate Chair; PhD, University of Washington

Orth, James D. (https://experts.colorado.edu/display/fisid_152017/)
Assistant Research Professor, Instructor; PhD, Mayo Graduate School of Medicine

Pace, Norman R.
Distinguished Professor Emeritus

Park, Soyeon (https://experts.colorado.edu/display/fisid_151944/)
Assistant Professor; PhD, Mayo Graduate School of Medicine

Parker, Roy Robert (https://experts.colorado.edu/display/fisid_151440/)
Distinguished Professor; PhD, University of California, San Francisco

Perkins, Thomas T. (https://experts.colorado.edu/display/fisid_124578/)
Professor Adjoint; PhD, Stanford University

Runner, Meredith
Professor Emeritus

Sawyer, Sara Lea (https://experts.colorado.edu/display/fisid_155218/)
Professor; PhD, Cornell University

Shen, Jingshi (https://experts.colorado.edu/display/fisid_146414/)
Professor; PhD, Columbia University

Singh, Ravinder (https://experts.colorado.edu/display/fisid_112067/)
Associate Professor; PhD, Baylor College of Medicine

Staehelin, L. Andrew
Professor Emeritus

Stowell, Michael (https://experts.colorado.edu/display/fisid_124136/)
Associate Professor; PhD, California Institute of Technology

Su, Tin Tin (https://experts.colorado.edu/display/fisid_113847/)
Professor, Chair; PhD, Carnegie Mellon University

Sueoka, Noboru
Professor Emeritus

Van Blerkom, Jonathan (https://experts.colorado.edu/display/fisid_100545/)
Research Professor; PhD, University of Colorado Boulder

Vigers, Alison Jane
Instructor; PhD, University of Colorado Denver

Voeltz, Gia Kaarina (https://experts.colorado.edu/display/fisid_143587/)
Professor; PhD, Yale University

Weaver, Benjamin
Assistant Professor; PhD, University of Kansas

Wood, William B. III
Distinguished Professor Emeritus

Xue, Ding (https://experts.colorado.edu/display/fisid_112336/)
Professor; PhD, Columbia University

Yarus, Michael J.
Professor Emeritus

# Courses

**MCDB 5201 (1) Graduate Lab in Molecular Evolution**
Ever wonder what functional clues might reside in the DNA sequence of your favorite gene? In this course, graduate students will learn the fundamentals of phylogenetics with an emphasis on evolutionary models that infer selective pressures in protein-coding DNA sequences (genes). During the course, students will be working on their favorite gene and using it as a case study for applying all of the concepts that we will cover. By the end of the course they will have generated a publication-quality summary figure, along with appropriate supplemental figures, of the selective pressures shaping their favorite gene. Additionally, they will learn how to design and execute an experimental approach based off of findings from the evolutionary analysis.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**MCDB 5210 (3) Cell Structure and Function (Lecture and Discussion)**

**MCDB 5220 (3) Graduate Core 2**
**Requisites:** Restricted to graduate students only.

**MCDB 5230 (3) Graduate Core 1**
**Requisites:** Restricted to graduate students only.

**MCDB 5250 (3) Topics in Developmental Genetics (Methods and Logic)**
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**MCDB 5301 (3) Immunology**
Emphasizes cellular and molecular mechanisms by which organisms protect themselves from pathogens and the experimental basis for our understanding of these processes. Discusses development, function, and misfunction of t-cells, b-cells and other components of the immune system, focusing on the human immune system.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4300
**Requisites:** Restricted to Biological Sciences (MCDB) graduate students only.

**MCDB 5310 (3) Microbial Genetics and Physiology**
Examines the physiology and genetics of bacteria, Archaea and viruses. Particular emphasis will be on metabolism, regulation of gene expression and protein function, mechanisms of interactions with and manipulation of the environment, and evolution in response to environmental pressures.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4310

**MCDB 5312 (3) Quantitative Optical Imaging**
Explores the fundamentals of optical imaging in biology, especially molecular and cellular biology. Covered topics include an introduction to optics and microscopes, fluorescence microscopy and image analysis, and biological applications. MATLAB will be taught at the beginning of the course and used throughout for image processing. Prior experience with MATLAB (or Python) is highly recommended but not required.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 5312, MCDB 4312 and BCHM 4312
**Grading Basis:** Letter Grade

**MCDB 5350 (3) Microbial Diversity and the Biosphere**
Provides a molecular phylogeny-based perspective on microbial diversity and the interactions between organisms that result in the biosphere. Provides overview of recent methods and findings in microbial ecology, as well as computer-based workshop in molecular phylogeny.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4350
**Requisites:** Restricted to graduate students only.

**MCDB 5361 (3) Evolution and Development**
Relates how recent discoveries in the molecular mechanisms of development are shaping our understanding of animal evolution. Reviews basic principles of molecular developmental biology and applies these concepts to critically discuss current research in the field of Evo-Devo (evolution and development).
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4361

**MCDB 5425 (3) Topics in Membrane Biology: Cell Biology, Physiology and Disease**
Students will apply their knowledge of basic biology to exploring several of the most exciting topics in biomedicine including protein folding and stress responses, nutrient sensing and balance and signal transduction across membranes. Emphasis will be placed upon human physiology and associated human diseases including Alzheimer's disease, diabetes and cardiovascular disease.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4425
**Requisites:** Restricted to graduate students only.

**MCDB 5426 (3) Cell Signaling and Developmental Regulation**
Introduces several cell signaling processes and their biological functions. Students read and analyze original research articles to learn the thinking processes of scientific research. Writing assignments and oral presentations are required.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4426

**MCDB 5441 (4) Animal Developmental Diversity**
Surveys development in a range of vertebrate and invertebrate systems to reconstruct the common bilatorian ancestor, and elucidate the developmental genetic changes underlying animal diversification. Lab focuses on vertebrate embryos and explores key methods in evolutionary developmental biology including in situ hybridization, embryo microinjection, and transgenesis.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4441 and EBIO 4440 and EBIO 5440
**Requisites:** Restricted to graduate students only.

**MCDB 5471 (3) Mechanisms of Gene Regulation in Eukaryotes**
Focuses on manifestations of regulated gene expression. Studies gene regulation at multiple steps, including transcription, RNA processing and translation. Is based on critical analysis of primary research papers. Written assignments and oral presentations are required.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4471

**MCDB 5520 (3) Bioinformatics and Genomics**
Computational and experimental methods in bioinformatics and genomics, and how these methods provide insights into protein structure and function, molecular evolution, biological diversity, cell biology and human disease. Topics include database searching, multiple sequence alignment, molecular phylogeny, microarrays, proteomics and pharmacogenomics.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4520
**Requisites:** Restricted to graduate students only.

**MCDB 5521 (1) Bioinformatics and Genomics Laboratory**
Provides experience with, and exposure to, computational and experimental methods in bioinformatics and genomics. Meets once a week. Students are expected to read original research papers, discuss findings, plan and execute data analysis in selected areas.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4521
**Grading Basis:** Letter Grade

**MCDB 5550 (3) Cells, Molecules and Tissues: A Biophysical Approach**
Focuses on the biophysics governing the structure/function of enzymes, cells, extracellular matrix and tissue. Synthesizes ideas from molecular biology, physics, and biochemistry, emphasizing how low Reynolds number physics, not Newtonian physics, is relevant to life inside a cell.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4550 and PHYS 4550 and PHYS 5550

**MCDB 5560 (3) Introduction to Biophysics**
Covers an introduction to the physics of living systems. Focuses on how living systems are able to generate order, with both physical principles and biological examples. Covers the development of quantitative models for biological systems, including estimates. Taught from a physics perspective, with biology background introduced as needed.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4560 and PHYS 4560 and PHYS 5560
**Grading Basis:** Letter Grade

**MCDB 5615 (3) Biology of Stem Cells**
Stem cells have received considerable notice in both the scientific and social arena. Examines the stem cell concept by a critical examination of the primary scientific literature. Topics will include pluripotency and plasticity, environment, technology, self-renewal, transdifferentiation, molecular signature, epigenetic programming and stem cell versus cancer cell. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4615
**Requisites:** Restricted to graduate students only.

**MCDB 5650 (2) Teaching and Learning in Undergraduate Science Courses**
Discusses recent research on how students learn and applications to the teaching of undergraduate science courses. Conducted as an interactive workshop, in which active-engagement in learning approaches are modeled and experienced by participants. Open to undergraduate and graduate students. May be used to fulfill the pedagogical training requirement for undergraduate Learning Assistants in upper division science courses. Post-doctoral and faculty auditors are welcome to participate as regular auditors.

**MCDB 5651 (3) Developmental Biology**
Explores the development of invertebrate and vertebrate organisms, emphasizing cellular, molecular and genetic mechanisms. Focuses on conceptual understanding and experimental approaches to topics such as embryology, developmental control of gene expression in eukaryotic cells, mechanisms of differentiation and morphogenesis and developmental genetics.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4650
**Requisites:** Restricted to graduate students only.

**MCDB 5680 (3) Mechanisms of Aging**
Studies aging as a developmental process emphasizing genetic, cellular and molecular mechanisms.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4680
**Requisites:** Restricted to graduate students only.

**MCDB 5750 (3) Animal Virology**
Encompasses the structure and replication of both lytic and transforming animal viruses. Emphasizes diversity of naturally occurring genomic structures and the resulting strategies of infection as well as the impact of viral epidemics on society. Includes critical analysis of primary research papers. Fulfills MCDB scientific reasoning requirement. Course has additional graduate student level requirements.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4750
**Requisites:** Restricted to graduate students only.

**MCDB 5776 (1) Scientific Ethics and Responsible Conduct in Research**
Lect. Advanced discussion of topics in scientific ethics, including requirements for responsible conduct of research, case histories of fraud, research misconduct, ethical misconduct and development of professional values and ethical standards.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 5776
**Requisites:** Requires a corequisite course of MCDB 5230 or BCHM 5771.

**MCDB 5777 (3) Molecular Neurobiology**
Introduces the functional anatomy of the nervous system and explores current knowledge regarding the molecular and genetic basis of the development and function of the nervous system. Studies recent insights into the molecular basis of neurodegenerative diseases, in the last portion of the course.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4777

**MCDB 5811 (3) Teaching and Learning Biology**
Provides an introduction to recent research into student learning on the conceptual foundations of modern biology, together with pedagogical methods associated with effective instruction and its valuation. Students will be involved in active research into conceptual and practical issues involved in biology education, methods to discover student preconceptions, and the design, testing and evaluation of various instructional interventions.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4811 and EDUC 4811 and EDUC 6811
**Requisites:** Restricted to graduate students only.

**MCDB 6000 (3) Introduction to Laboratory Methods**
Introduces methodology and techniques used in biological research. Designed as a tutorial between a few students and one faculty member. Students are expected to read original research papers, discuss findings, and to plan and execute experiments in selected areas.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Biological Sciences (MCDB) graduate students only.

**MCDB 6440 (1-3) Special Topics in MCD Biology**
Acquaints students with various topics not normally covered in the curriculum. Offered intermittently or upon student demand, and often presented by visiting professors.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**MCDB 6441 (1) Faculty Res Seminar**
Acquaints students with various topics not normally covered in the curriculum. Offered intermittently or upon student demand, and often presented by visiting professors.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**MCDB 6442 (2) Scientific Communication**
Acquaints students with various topics not normally covered in the curriculum. Offered intermittently or upon student demand, and often presented by visiting professors.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**MCDB 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.

**MCDB 6950 (1-6) Master's Thesis**
Students seeking a master's degree should consult a departmental advisor. Plan I or Plan II is offered.

**MCDB 7840 (1-6) Graduate Independent Study**
An independent study contract is required.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**MCDB 7910 (2) Seminar Practicum**
Designed for graduate students to give oral presentations on their thesis research, field questions, respond to critiques, and present background information. Students attend weekly seminar speaker presentations to gain knowledge on specialized research.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**MCDB 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.

# Molecular, Cellular and Developmental Biology - Master of Arts (MA)

The master's degree in this field is not available through direct admission and may only be earned under special circumstances. Please contact program for additional information and requirements.

# Molecular, Cellular and Developmental Biology - Doctor of Philosophy (PhD)

## Areas of Study

Opportunities for graduate study and original research leading to the PhD degree are available in a variety of areas. The department does not offer a terminal, stand-alone master's degree program. Students enrolled in the doctoral program may earn their master's degree if they decide to leave the program after completing 30 hours of graduate coursework and the PhD oral and written comprehensive examination.

### Molecular Biology

Includes gene regulation, virology, nucleic acid-protein interactions, chromosome structure and function, chromosome replication, microbial diversity, human genome structure, RNA structure and catalysis.

### Cell Biology

Includes cytoskeleton, biophysical cytology, vacuole assembly, analysis of yeast spindle pole bodies and vertebrate centrosomes, synthesis and secretion of glycoproteins and polysaccharides, defense responses in plants and 3-D high resolution reconstruction, biogenesis of mitochondria and chloroplasts, energy metabolism, assembly of membrane protein complexes, cell cycle regulation and checkpoints and signal transduction.

### Developmental Biology

Covers mechanisms and regulation of morphogenesis and cell growth, genetic control of development, molecular genetics of embryogenesis, sex determination, ras proteins and vulval development and programmed cell death in nematodes, molecular genetics of *Drosophila* neurobiology, developmental genetics of *Drosophila* and *Caenorhabditis*, neural development in mice, transgenic mice and muscle development and function.

### Genetics

Includes genetics of human disease, complex traits, mouse development and invertebrate development.

## Requirements

### Admission Requirements

The graduate program of the Department of Molecular, Cellular and Developmental Biology is sufficiently flexible to accommodate students with a wide range of training. Students with bachelor's degrees in any of the biological, biochemical or physical sciences are encouraged to apply.

## Degree Requirements

A minimum of 30 credit hours of courses numbered 5000 and above, plus 30 credit hours of doctoral thesis, are required. Specific courses depend on the student background and field of specialization.

The faculty of the department offers a variety of courses to help graduate students acquire knowledge in the various areas of study. Further, students are required to work in four different laboratories to broaden their education and to help them identify the field of greatest interest for their thesis work.

### Advisory Committee

An advisory committee, appointed upon entrance, develops an appropriate curriculum based in part on the student's background. A written preliminary exam consists of a series of courses and exams administered during the first year.

### Qualifying Exam

A comprehensive qualifying exam administered at the beginning of the spring semester of the second year includes a written research proposal and an oral defense of the proposal that emphasizes breadth and depth of knowledge as well as an ability to communicate and synthesize facts into a coherent scientific argument.

### Thesis

The principal elements in graduate training are defining a thesis problem, investigating this problem with a coherent piece of research that constitutes a substantial contribution to knowledge, and writing a report on this work in the form of peer-reviewed journal articles and a thesis submitted to a departmental committee for approval. Thesis research must result in at least one peer-reviewed research article with the candidate as first or co-first author. After completion of the thesis, each candidate for the PhD degree is required to take a final oral examination on the thesis and related topics, and to present a public seminar.

### Teaching

Generally, each candidate for the PhD degree does two semesters of apprentice teaching. This obligation is usually met during the student's first year of graduate study.

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate a broad knowledge of theory and research across several sub-disciplines.
- Demonstrate in-depth knowledge of one area of expertise.
- Follow ethical guidelines for working in the field.
- Effectively communicate and present research results to professional audiences orally and in writing.
- Make an original and substantial research contribution to the field.

The graduate program in Molecular, Cellular, and Developmental Biology (MCDB) is designed to provide students with diverse opportunities for acquiring a strong foundation in areas of modern biology and applying it toward the generation of new knowledge through research.

**PhD Learning Outcomes**

- Demonstrate a broad knowledge of theory and research across several sub-disciplines.
- Demonstrate in-depth knowledge of one area of expertise.
- Learn and follow ethical guidelines for working in the field.
- Effectively communicate and present research results to professional audiences via writing and speaking.
- Make an original and substantial research contribution to the field.

**Assessment Plan**

- Pass core course and written exams, or equivalent from other programs.
- Complete a written research proposal and pass comprehensive oral exam in second year.
- Take the Responsible Conduct of Research course at least once during the PhD course of studies.
- Meet with your Thesis Committee at least annually starting in third year.
- Present dissertation research to the department at least annually.
- Defend thesis.

**Annual Assessment Report**

Thesis committee worksheets (1-2 per student per year)

# Museum and Field Studies

Graduate training in anthropology, art history, history, botany, entomology, paleontology and zoology is provided under the direction of museum faculty in cooperation with cognate departments and the Museum and Field Studies Program. Areas of study include, but are not limited to:

- Anthropological interpretation
- Diatom taxonomy, systematics and ecology
- Southwestern archaeology and ethnology
- Plant taxonomy, evolution and phytogeography
- Vertebrate paleontology and Cenozoic mammals
- Biology of aquatic invertebrates
- Systematics and population biology of insects of the Rocky Mountain Region
- Plant–insect interactions
- Mammalogy

Museum assistantships include support from the Walker Van Riper fund and research support from the Collie and William Henry Burt museum funds. Other financial assistance is available to selected students. Students interested in working toward advanced degrees under the direction of museum faculty may use the contact information above.

**Course code for this program is MUSM.**

## Master's Degree

- Museum and Field Studies - Master of Science (MS) (p. 1347)

## Certificate

- Museology - Graduate Certificate (p. 1349)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Bowers, M. Deane
Professor; PhD, University of Massachusetts Amherst

Chin, Karen (https://experts.colorado.edu/display/fisid_122666/)
Professor; PhD, University of California, Santa Barbara

Eberle, Jaelyn J. (https://experts.colorado.edu/display/fisid_126544/)
Professor, Faculty Director; PhD, University of Wyoming

Fladd, Samantha G. (https://experts.colorado.edu/display/fisid_165651/)
Assistant Professor; PhD, University of Arizona

Kociolek, John Patrick (https://experts.colorado.edu/display/fisid_145728/)
Faculty Director, Professor; PhD, University of Michigan

Li, Jingchun (https://experts.colorado.edu/display/fisid_157561/)
Assistant Professor; PhD, University of Michigan

McCain, Christy (https://experts.colorado.edu/display/fisid_145010/)
Associate Professor; PhD, University of Kansas

Shannon, Jennifer A. (https://experts.colorado.edu/display/fisid_147612/)
Associate Professor; PhD, Cornell University

Simpson, Carl (https://experts.colorado.edu/display/fisid_159652/)
Assistant Professor; PhD, University of Chicago

Taylor, William T. (https://experts.colorado.edu/display/fisid_165652/)
Assistant Professor; PhD, University of New Mexico

Tripp, Erin Anne (https://experts.colorado.edu/display/fisid_152313/)
Associate Professor; PhD, Duke University

# Courses

**MUSM 5011 (4) Introduction to Museum Studies**
Provides background in history and literature of museums, their objectives and methods, laboratory exercises in curatorship, exhibition theory, and administration.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 5021 (2-4) Selected Museum Topics**
Provides framework for student projects on varied museum topics (e.g., ethics of collecting, data management, the museum's role in the community). Student projects include case study analysis, interviewing, and original presentations. Topics vary each semester. Department consent required.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 5030 (3) Museum Education**
Survey of the theory and practice of education in museums and informal learning centers. Topics include current trends in the field, learning theories, teaching methodologies, program development, museum/school relationships, the role of education in exhibit development, and being a critically reflective practitioner.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 5031 (3) Museums and the Public: Exhibit Development**
Covers elements of exhibition development and design, up to production and evaluation of exhibit prototypes. The team approach is emphasized. Department enforced prerequisite: restricted to graduate students.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 5041 (3) Museum Administration**
Covers theory of organizations and how it applies to museums. Application of small business management and nonprofit organizations. Review museum organizational charts and staffing. Evolution of marketing and development in a museum context are reviewed. Budget process and annual financial reporting are discussed, and there is an emphasis on evaluating financial statements. Department enforced prerequisite: restricted to graduate students.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 5045 (3) Introduction to Museum Anthropology**
Traces the development of Anthropology and museums in America from late 19th century to present day. Students are encouraged to: explore museum theory and practice; think critically about the history of relations among Native Americans, Anthropology, and museums; consider the legacy of collecting and challenges of representing others; and, examine the interplay of Anthropology, material culture, and colonialism.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4045 and ANTH 5045
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Anthropology

**MUSM 5051 (3) Museum Collections Management**
Deals specifically with curation and data management. Topics include acquisition practices and problems; organization, management, use and preventive conservation of collections; computer data management of collections.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 5061 (3) Introduction to Scientific Illustration**
Intended for students with little to no art background. Focus is on the accurate rendering of scientific subjects for publication and for public display. Course begins with basic drawing skills and sharpening of visual perception. Students progress to be able to produce realistic renderings of subjects. Students are exposed to a variety of black and white and color techniques and the standards for presenting illustrations for a variety of audiences. Course concludes with computer illustration tools and techniques.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 5474 (4) Vertebrate Paleontology**
Discusses the history and evolution of the vertebrates, including the phylogenetic relationships and evolutionary patterns of the major groups. Lab focuses on comparative vertebrate osteology and fossil representation of major groups.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4474 and GEOL 5474
**Additional Information:** Departmental Category: Geology

**MUSM 5484 (3) Museum Field Methods in Geology**
Paleontological and paleoecological field techniques including collecting; recording of geographic, stratigraphic and quarry information; preservation; interpretation, including applicable readings. Designed for individuals who have some background in geology but little or no prior field experience. Offered summer only.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 4484
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Geology

**MUSM 5520 (4) Flowering Plant Diversity**
Emphasizes the morphology, evolution, classification, phylogeny, natural history, identification, and economic importance of plants, with a focus on flowering plants (angiosperms). Because flowering plants are dominant and keystone features of both our natural and developed world, capacity to understand them from an evolutionary and ecological perspective is an important skill for anyone interested in field biology, ecology, evolution, environmental resource management, or simply in being a good steward to the land and to your society.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4520 and EBIO 5520
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**MUSM 5760 (4) Mammalogy**
Lect., lab, and field studies. Discusses origin, evolution and adaptation, geographic distribution, ecology and taxonomy of mammals; field and laboratory study of Coloradan species. Uses animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4760 and EBIO 5760
**Additional Information:** Departmental Category: Zoology

**MUSM 5795 (3) Field Methods in Zoology and Botany**
Class covers research and field methods for biological disciplines associated with natural history museums: vertebrates, invertebrates and plants. Emphasis is on field research techniques: observations, sampling, collection and preservation methods and comparisons among elevation zones. Includes 5 field labs, 2 weekend trips, 5 lab practica, experience with several taxonomic experts and individual research projects.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 4795 and ENVS 4795
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Zoology

**MUSM 5900 (1-6) Independent Study**
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 4900
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Independent Study

**MUSM 5912 (3) Collections Research Practicum in Cultural Anthropology**
Designed as a practicum, introduces students to research and practice in museum anthropology, utilizing the extensive anthropology collections at CU-Boulder Museum. Students will gain skills in primary and secondary research, collections and object research and narrative story development for the exhibition of anthropological material culture.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 4912 and ANTH 4470 and ANTH 5470
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Anthropology

**MUSM 5913 (3) Museum Practicum in Botany**
Students take part in curatorial procedures of the botany section of the museum: specimen preparation, labeling, identification, cataloguing, conservation and collection management. Enrollment is limited therefore students should make arrangements during the previous semester.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 4913
**Recommended:** Prerequisite MUSM 5011.
**Additional Information:** Departmental Category: Botany

**MUSM 5914 (3) Museum Practicum in Geology**
Students take part in curatorial procedures of the geology section of the museum: field collection, specimen preparation, cataloguing, collection management and a survey of current laws as they apply to specimens. Enrollment is limited therefore students should make arrangements during the previous semester.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 4914
**Recommended:** Prerequisite MUSM 5011.
**Additional Information:** Departmental Category: Geology

**MUSM 5915 (1-3) Museum Practicum in Zoology**
Students take part in basic curatorial procedures of the zoology section of the museum: relaxing, fixing, positioning, preserving, cataloguing, storing and shipping. Also introduces students to the animal kingdom.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 4915
**Additional Information:** Departmental Category: Zoology

**MUSM 5916 (1-3) Museum Practicum in Entomology**
Students take part in curatorial procedures of the entomology section of the museum: field collection, specimen preparation, labeling, identification, rearing techniques and exhibit preparation. Enrollment is limited, students should make arrangements during previous semester.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 4916
**Recommended:** Prerequisite MUSM 5011.
**Additional Information:** Departmental Category: Entomology

**MUSM 5917 (1-3) Museum Practicum in Techniques**
Students participate in museum public education functions that may include researching, planning, developing, and producing exhibits, traveling trunks, booklets, and other materials. May involve writing labels, molding and casting, conservation, and restoration.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 4917
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Museology

**MUSM 5918 (3) Museum Practicum in Advanced Collections Management**
Provides a hands-on environment for exploring issues in museum collections management. Through lecture, resource procurement, in-class activities and out-of-class projects, students will gain practical and professional experience in areas of policy, procedure, best practices, museum storage planning and legal issues.
**Recommended:** Prerequisite MUSM 5051.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 5919 (3) Collections Research Practicum: Archaeology**
Focuses on Museum collections management from archaeological sites mainly in the American Southwest and Mongolia. The course involves readings, discussion, and collections analysis and archival documentation. Extra time outside of class is required for the practicum aspect of this course. Each student will need to schedule with the professor an additional 3 hours each week when they will focus on an aspect of their project, to be discussed below under grading criteria. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4919 and ANTH 5919
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**MUSM 6110 (1-3) Advanced Seminar in Museum Issues**
Offers a weekly seminar for museum and field study students that addresses one new topic each semester relevant to museum operations such as archival administration, museums, multiculturalism, repatriation and others. Department enforced prerequisite: MUSM 5011.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 6930 (2-4) Museum Internship**
Provides experience in museums of different sizes, audiences, and subjects, including history, natural history, art, and children's museums. Each student is supervised individually by a faculty member as well as the appropriate person in the cooperating museum.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 6940 (1-4) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 6950 (1-6) Master's Thesis**
A thesis, which may be of a research, expository, critical or creative type, is required of every master's degree candidate under the thesis option. Department enforced prerequisites: MUSM 5011 and MUSM 5051 and one of the following: MUSM 5030 or MUSM 5031 or MUSM 5041.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 6960 (1-4) Master's Project or Paper**
A project or paper in the student's discipline and related to some aspect of museum studies is required of every master's degree candidate under the non-thesis-option plan. Department enforced prerequisites: MUSM 5011 and MUSM 5051. Students in collections/field track also need MUSM 5030 or MUSM 5031 or MUSM 5041.
**Additional Information:** Departmental Category: Museum Studies

# Museum and Field Studies - Master of Science (MS)

The interdisciplinary museum and field studies program is administered by the University of Colorado Museum of Natural History, in conjunction with the departments of anthropology; history; art history; ecology and evolutionary biology; and geological sciences; as well as other departments. The program provides a strong background in a chosen field as well as theoretical and practical grounding in museology.

Internships are offered at a variety of museums in the region, including natural history, history and art museums. Students completing the MS are trained as collection managers, curatorial assistants, registrars, museum educators, exhibit technicians and administrators.

# Program Tracks

Three tracks are available: a collections/field track, a public/administration track and an art history track.

## Collections/Field Track

This track offers training for students interested in the curatorial and research aspects of museum work, such as floristic or faunistic studies of the past and present, material culture of the past and present and biological inventory. The curriculum gives students academic training as well as experience in all areas of museum work. Field experience is offered through the curatorial and field practica.

## Public/Administration Track

This track offers education for students interested in the public aspects of the museum such as program development and evaluation, exhibition planning and design, education and the organization and management of museums. The curriculum offers both academic training in a discipline and hands-on experience with all aspects of the public museum.

## Art History Track

The art history track in the MFS program is open to applicants who hold a BA degree in the liberal arts, preferably with a major in art history. This track addresses issues specific to the research and curation of artworks. The curriculum provides students with academic training in art history and offers students firsthand museum experience in curatorial and collections work through exhibitions practica and collections research.

# Requirements

## Admission Requirements

Students must meet all university requirements for admission to graduate school and have a baccalaureate degree and at least a B (3.00) grade-point average in previous academic work. The baccalaureate degree should be in anthropology, biology, geology, geography, history (including archival studies), classics, fine arts or education, although other majors will be considered. Acceptance to the program is decided by the admissions committee of the University Museum in consultation with the student's department. The student must be accepted by an advisor in his or her discipline. Applicants accepted for graduate work by museum faculty must be admitted to the Graduate School.

## Course Requirements

The degree in museum and field studies is a two-year program requiring a total of 30 credit hours, plus 150 hours of internship. Depending on the track and plan, students complete from 9 to 15 credit hours in a department and from 13 to 22 credit hours in museology courses. View the Program Tracks (p. 1348) tab for more information.

## Internship

A museum internship of 150 hours is required.

## Committee

A committee of at least three graduate faculty will be selected during the first semester in residence, by consultation between the student, the student's advisor, and the director of the MFS program. At least one member of the committee must be a tenured or tenure-track member of the museum faculty. The committee will serve as program advisors for the comprehensive exam and as the defense committee for the thesis or project. A student and advisor may apply for an exception in writing, which must be approved by the MFS program director.

## Degree Plans

Students may choose either the thesis or non-thesis plan.

### Plan I: Thesis Option

This plan requires the completion and successful defense of a thesis.

### Plan II: Non-Thesis Option

This plan requires the completion of a project and paper.

# Program Tracks

## Collections/Field Track

### Thesis Plan Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MUSM 5011 | Introduction to Museum Studies | 4 |
| MUSM 5051 | Museum Collections Management | 3 |
| MUSM 6110 | Advanced Seminar in Museum Issues | 3 |
| At least one of the following: | | 3 |
| MUSM 5030 | Museum Education | |
| MUSM 5031 | Museums and the Public: Exhibit Development | |
| MUSM 5041 | Museum Administration | |
| **Further course work** | | **17** |
| 5000+: Cognate Hours [1] | | |
| MUSM 6950 | Master's Thesis in Museum and Field Studies | |
| **Total Credit Hours** | | **30** |

[1] Cognate (or specialty) hours may include 5000+ level courses, practicum, independent study, field methods courses, and up to six hours of 3000- or 4000-level classes, if appropriate. Cognate hours may be taken in more than one department or school. Some Museum courses may count as cognate hours with advisor approval.

### Project Plan Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MUSM 5011 | Introduction to Museum Studies | 4 |
| MUSM 5051 | Museum Collections Management | 3 |
| MUSM 6110 | Advanced Seminar in Museum Issues | 3 |
| At least one of the following: | | 3 |
| MUSM 5030 | Museum Education | |
| MUSM 5031 | Museums and the Public: Exhibit Development | |
| MUSM 5041 | Museum Administration | |
| **Further course work** | | **17** |
| 5000+: Cognate Hours [1] | | |
| MUSM 6960 | Master's Project or Paper in Museum and Field Studies | |
| **Total Credit Hours** | | **30** |

[1] Cognate (or specialty) hours may include 5000+ level courses, practicum, independent study, field methods courses, and up to six hours of 3000- or 4000-level classes, if appropriate. Cognate hours may be taken in more than one department or school. Some Museum courses may count as cognate hours with advisor approval.

## Public/Administration Track

### Thesis Plan Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MUSM 5011 | Introduction to Museum Studies | 4 |
| MUSM 5051 | Museum Collections Management | 3 |
| MUSM 6110 | Advanced Seminar in Museum Issues | 3 |
| At least two of the following: | | 6 |
| MUSM 5030 | Museum Education | |
| MUSM 5031 | Museums and the Public: Exhibit Development | |
| MUSM 5041 | Museum Administration | |
| **Further course work** | | **14** |
| 5000+: Cognate Hours [1] | | |
| MUSM 6950 | Master's Thesis in Museum and Field Studies | |
| **Total Credit Hours** | | **30** |

[1] Cognate (or specialty) hours may include 5000+ level courses, practicum, independent study, field methods courses, and up to six hours of 3000- or 4000-level classes, if appropriate. Cognate hours may be taken in more than one department or school. Some Museum courses may count as cognate hours with advisor approval.

### Project Plan Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MUSM 5011 | Introduction to Museum Studies | 4 |
| MUSM 5051 | Museum Collections Management | 3 |
| MUSM 6110 | Advanced Seminar in Museum Issues | 3 |
| At least two of the following: | | 6 |
| MUSM 5030 | Museum Education | |
| MUSM 5031 | Museums and the Public: Exhibit Development | |
| MUSM 5041 | Museum Administration | |
| **Further course work** | | **14** |
| 5000+: Cognate Hours [1] | | |
| MUSM 6960 | Master's Project or Paper in Museum and Field Studies | |
| **Total Credit Hours** | | **30** |

[1] Cognate (or specialty) hours may include 5000+ level courses, practicum, independent study, field methods courses, and up to six hours of 3000- or 4000-level classes, if appropriate. Cognate hours may be taken in more than one department or school. Some Museum courses may count as cognate hours with advisor approval.

## Art History Track

### Thesis Plan Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MUSM 5011 | Introduction to Museum Studies | 4 |
| MUSM 5051 | Museum Collections Management | 3 |
| ARTH 6929 | Seminar: Methods/Theories of Art History | 3 |
| At least one of the following: | | 3 |
| MUSM 5030 | Museum Education | |
| MUSM 5031 | Museums and the Public: Exhibit Development | |
| MUSM 5041 | Museum Administration | |
| **Further course work** | | **17** |
| 5000+: Cognate Hours [1] | | |
| MUSM 6950 | Master's Thesis in Museum and Field Studies | |
| **Total Credit Hours** | | **30** |

[1] Cognate (or specialty) hours may include 5000+ level courses, practicum, independent study, field methods courses, and up to six hours of 3000- or 4000-level classes, if appropriate. Cognate hours may be taken in more than one department or school. Some Museum courses may count as cognate hours with advisor approval.

### Project Plan Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MUSM 5011 | Introduction to Museum Studies | 4 |
| MUSM 5051 | Museum Collections Management | 3 |
| ARTH 6929 | Seminar: Methods/Theories of Art History | 3 |
| At least one of the following: | | 3 |
| MUSM 5030 | Museum Education | |
| MUSM 5031 | Museums and the Public: Exhibit Development | |
| MUSM 5041 | Museum Administration | |
| **Further course work** | | **17** |
| 5000+: Cognate Hours [1] | | |
| MUSM 6960 | Master's Project or Paper in Museum and Field Studies | |
| **Total Credit Hours** | | **30** |

[1] Cognate (or specialty) hours may include 5000+ level courses, practicum, independent study, field methods courses, and up to six hours of 3000- or 4000-level classes, if appropriate. Cognate hours may be taken in more than one department or school. Some Museum courses may count as cognate hours with advisor approval.

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate a firm grounding in museum history, ethics and theory.
- Communicate the value of museums in and to society.
- Comprehend emerging ideas and challenges for today's museum professionals, including ethical and best practices in research, collections, exhibitions and programs.
- Demonstrate competency in knowledge, skills and practice related to their focus area (focus areas include: anthropology, art history, botany, entomology, museum administration, paleontology and zoology.).
- Collaborate productively and ethically with others in a team with varying knowledge and perspectives towards common goals.
- Design and execute an original project based on best practices and be able to reason through problems as well as derive and implement solutions.

# Museology - Graduate Certificate

Providing professional museum training for CU Boulder graduate students and for museum professionals who seek to upgrade their skills and credentials, the Professional Certificate in Museology serves a range of disciplines in the arts and sciences, education and engineering, as well as the Colorado museum community.

# CU Graduate Students

The Museum and Field Studies program offers a Graduate Professional Certificate in Museology for graduate students. This program provides professional training and certification for students at the University of Colorado Boulder whose primary enrollment is in a graduate program in another museum-related discipline (e.g., anthropology, art, art history, biology, business administration, education, geological sciences, history, etc.). For graduate students in other university departments, the coursework in a cognate discipline is provided by MA/MS or PhD programs in their home department.

# Museum Professionals

Additionally, the professional certificate program is open to museum professionals in Colorado and the surrounding Rocky Mountain region. The program provides an avenue for early and mid-career museum staff to upgrade their skills and credentials in order to better meet the challenges and opportunities that museum work affords in the 21st century. For museum professionals, additional disciplinary work is available as appropriate upper division undergraduate or graduate coursework taken as electives under the nondegree study plan available in the ACCESS program through Continuing Education.

# Requirements

The Professional Certificate in Museology requires a minimum of 12 credit hours and a 75-hour internship that may be waived if comparable professional experience is demonstrated.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MUSM 5011 | Introduction to Museum Studies | 4 |
| **Electives** | | **8** |
| Select three of the following five courses: | | |
| MUSM 5030 | Museum Education | |

| | |
|---|---|
| MUSM 5031 | Museums and the Public: Exhibit Development |
| MUSM 5041 | Museum Administration |
| MUSM 5051 | Museum Collections Management |
| MUSM 6110 | Advanced Seminar in Museum Issues |
| **Total Credit Hours** | **12** |

# Philosophy

Applicants for admission to the Graduate School for work toward a master's or doctoral degree in philosophy are expected to have had 18 or more credit hours in undergraduate courses in the subject.

Students in the master's and doctoral programs must satisfy a variety of requirements, including the completion of coursework. The Department of Philosophy has a diversified faculty that can supervise the writing of master's theses and doctoral dissertations on a wide range of topics.

The Department makes available teaching assistantships and then graduate part-time instructorships to doctoral students, and assists with job placement. Teaching assistantships are available to several master's students each semester as well.

An overview (https://www.colorado.edu/philosophy/graduate/overview/) and descriptions of both degree programs (PhD (https://www.colorado.edu/philosophy/graduate/phd-program/) and MA (https://www.colorado.edu/philosophy/graduate/ma-program/)) are available from the Department of Philosophy. Students wishing to pursue graduate work in philosophy should note master's (p. 1113) and doctoral (p. 1114) degree requirements, and consult the Graduate (https://www.colorado.edu/philosophy/graduate/) portion of the Department's website.

**Course code for this program is PHIL.**

## Master's Degree

- Philosophy - Master of Arts (MA) (p. 1354)

## Doctoral Degree

- Philosophy - Doctor of Philosophy (PhD) (p. 1356)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Bailey, Dominic (https://experts.colorado.edu/display/fisid_145110/)
Associate Professor; PhD, University of Cambridge

Boonin, David (https://experts.colorado.edu/display/fisid_113100/)
Professor; PhD, University of Pittsburgh

Bredeson, Garrett (https://experts.colorado.edu/display/fisid_154933/)
Assistant Teaching Professor, Associate Chair; PhD, Vanderbilt University

Cleland, Carol (https://experts.colorado.edu/display/fisid_105674/)
Professor; PhD, Brown University

Demarest, Heather (https://experts.colorado.edu/display/fisid_159052/)
Assistant Professor; PhD, Rutgers University

Fileva, Iskra (https://experts.colorado.edu/display/fisid_154600/)
Associate Professor, Associate Chair; PhD, Boston University

Heathwood, Chris (https://experts.colorado.edu/display/fisid_141144/)
Professor; PhD, University of Massachusetts at Amherst

Huemer, Michael (https://experts.colorado.edu/display/fisid_113081/)
Professor; PhD, Rutgers University–Newark

Jacobson, Daniel (https://experts.colorado.edu/individual/fisid_167068/)
Professor; PhD, University of Michigan

Kaufman, Dan (https://experts.colorado.edu/display/fisid_134174/)
Associate Professor; PhD, University of Massachusetts at Amherst

Kopeikin, Zak (https://experts.colorado.edu/display/fisid_167727/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Lee, Mi-Kyoung (https://experts.colorado.edu/display/fisid_141821/)
Associate Professor; PhD, Harvard University

Norcross, Alastair (https://experts.colorado.edu/display/fisid_144850/)
Professor; PhD, Syracuse University

Pasnau, Robert (https://experts.colorado.edu/display/fisid_115293/)
Professor; PhD, Cornell University

Potter, Jason (https://experts.colorado.edu/display/fisid_103972/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Rupert, Robert (https://experts.colorado.edu/display/fisid_139802/)
Professor, Chair; PhD, University of Illinois at Chicago

Saucedo, Raul (https://experts.colorado.edu/display/fisid_153759/)
Assistant Professor; PhD, Cornell University

Shear, Ted (https://experts.colorado.edu/display/fisid_166781/)
Assistant Teaching Professor; PhD, University of California-Davis

Sridharan, Vishnu
Assistant Professor; PhD, University of Southern California

Staffel, Julia (https://experts.colorado.edu/display/fisid_163744/)
Associate Professor; PhD, University of Southern California

Steup, Matthias (https://experts.colorado.edu/display/fisid_157766/)
Professor; PhD, Brown University

Talbot, Brian (https://experts.colorado.edu/display/fisid_147617/)
Associate Professor; PhD, University of Southern California

Wingo, Ajume (https://experts.colorado.edu/display/fisid_144391/)
Associate Professor; PhD, University of Wisconsin–Madison

Youkey, David (https://experts.colorado.edu/display/fisid_105211/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

## Courses

**PHIL 5010 (3) Single Philosopher**
Discusses the work of a single historical figure in philosophy with the aim of reaching a broad and deep understanding of the philosopher's thought.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4010
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 5020 (3) Topics in the History of Philosophy**
Examines a specific philosophical problem over an extended historical period.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 5030 (1) Greek Philosophical Texts**
Selected readings in classical philosophy, in the original language, with a focus on achieving fluency in reading philosophical Greek.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite of GREK 1013 and GREK 1023 or the equivalent.

**PHIL 5040 (1) Latin Philosophical Texts**
Selected readings in classical and medieval philosophy, in the original language, with a focus on achieving fluency in reading philosophical Latin.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.

**PHIL 5100 (3) Values Proseminar**
Covers seminal classic texts and/or fundamental topics in analytic ethics and social/political philosophy, including its history.
**Requisites:** Restricted to Philosophy graduate students only.

**PHIL 5110 (3) Contemporary Moral Theory**
Provides an in-depth look at some recent work in moral theory, usually organized around a single topic. Topics vary from year to year. Previous topics include: consequentialism and its critics, virtue theory, deontological ethics, moral psychology, well-being, and metaethics.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4110
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 5120 (3) Philosophy and Animals**
Examines the moral status of nonhuman animals, and its implications for the common use of animals as food and experimental subjects for humans.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5120
**Requisites:** Restricted to graduate students only.

**PHIL 5150 (3) Topics in Applied Ethics**
Discusses advanced work in applied normative philosophy. Topics vary from semester to semester and may focus on one or two specific areas (e.g., race, procreative ethics, military ethics, sports ethics) or take a broader approach that includes issues from across a wider range of subjects.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4150
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 5200 (3) Contemporary Political Philosophy**
Provides a survey of recent approaches to political philosophy: liberalism (Rawls, Dworkin); libertarianism (Nozick); communitarianism (Sandel, Macintyre); feminism (Jaggar). Topics and readings vary with the instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4200
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 5230 (3) Bioethics and Public Policy**
Examines public policy implications of contemporary biological, genetic, biomedical, and behavioral science in light of ethics and human values. Considers theoretical and practical grounds for moral assessment of scientific research and possible applications of technology.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 5240 (3) Seminar in Environmental Philosophy**
Philosophical examination of several different approaches to environmental problems: economic, juridical, political and ecological. Discusses specific environmental problems, focusing on their moral dimensions, e.g., wilderness preservation, animal rights and land use and urban planning.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 5240
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 5260 (3) Philosophy of Law**
Considers philosophical topics concerning law and the U.S. legal system. Topics that may be considered include the nature of law, relations between law and morality, justifications of punishment, the moral duty to obey the law, and law and liberty.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4260
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 5290 (1-3) Topics in Values and Social Policy**
Deals with topics in the area of philosophy and public policy and is often interdisciplinary in focus. Topics vary from one semester to another.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 5300 (3) Philosophy of Mind**
Discusses topics in the philosophy of mind, including the mind-body problem, consciousness, intentionality, rationality, mental causation, and the nature of mental states.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4300
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 5340 (3) Epistemology**
Studies some of the main topics of theory of knowledge, such as evidence, justification, prediction, explanation, skepticism, and concept acquisition.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4340

**PHIL 5360 (3) Metaphysics**
Traditional and contemporary theories of the basic categories of reality and the human relationship to it, including universals, substance, identity, change, mind and body, free will, and modality.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4360
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 5370 (3) Free Will and Determinism**
Explores the full range of questions relating to the problem of free will and determinism. Topics may include; the scientific evidence for determinism, hard versus soft determinism, arguments for and against the compatibility of free will and determinism, moral responsibility and the principle of alternate possibilities, hierarchical motivation, the deep self, reactive attitudes, the intelligibility question for libertarianism, divine foreknowledge.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4370

**PHIL 5400 (3) Philosophy of Science**
Advances students' knowledge of topics in philosophy of science and develops students' ability to think and write clearly about science. Topics may include scientific methodology; distinguishing science from pseudoscience; characterizing experimental and historical sciences; interpretations of special and general relativity; interpretations of quantum mechanics; the nature of biological species; approaches to defining life; criteria for identifying alien life; artificial intelligence; neuroscience and consciousness; fundamental physical properties and laws of nature; chance and probability; and causation.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4400
**Requisites:** Restricted to graduate students only.

**PHIL 5440 (3) Topics in Logic**
Provides for offering courses in a variety of topics in logic, including, but not limited to, mathematical logic, philosophical issues in logic, probability theory, decision theory, and inductive logic.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4440
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 5450 (3) History and Philosophy of Physics**
Discusses the epistemic question of what characterizes good physics research as well as the metaphysical question of what our best physics research tells us about the world. Topics may include case studies of physics experiments, theory choice, and scientific methodology in physics, as well as foundational metaphysical questions in statistical mechanics, quantum mechanics, special and general relativity, chance and probability, and the laws of nature.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4450 and PHYS 5450 and PHYS 5450
**Requisites:** Restricted to graduate students only.

**PHIL 5460 (3) Modal Logic**
Introduces the most philosophically relevant kind of logic that builds on PHIL 2440. Modal logic is the logic of the concepts of necessity, possibility and contingency. A variety of systems of sentential modal logic will be covered, along with the standard system of first-order modal logic.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4460
**Requisites:** Restricted to graduate students only.

**PHIL 5470 (3) Probability and Rational Choice**
Examines issues in four related areas: probability theory (e.g. the interpretation of probability, the raven paradox and the principle of indifference), decision theory (e.g., the Newcomb problem, the toxin puzzle and Pascal's wager), game theory (e.g., Prisoner's dilemma, tragedy of the commons and Schelling points) and social choice theory (e.g., Arrow's theorem). Familiarity with symbolic logic is strongly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4470
**Requisites:** Restricted to graduate students only.

**PHIL 5480 (3) Formal Methods in Philosophy**
Introduces formal methods used in contemporary philosophy beyond classical first-order logic. Specific topics may vary. Examples: extensions of and alternatives to first-order logic (including propositional and quantified modal logic and higher-order and plural logic), alternatives to classical logic (including many-valued and intuitionistic systems), generalized and substitutional quantifiers, the lambda calculus, indicative and subjunctive conditionals, probability theory, inductive logic, and decision theory.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4480
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 5490 (3) Philosophy of Language**
Examines theories and problems regarding the nature of language and its relation to reality. Concepts discussed include sense, reference, conventions, intentions, and their relation to science and social life. Relevant literature includes readings in Frege, Russell, Quine, Putnam, Kripke, and Chomsky.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4490
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 5550 (3) Metaphysics and Epistemology Proseminar**
Covers seminal classic texts and/or fundamental topics in analytic metaphysics and epistemology.
**Requisites:** Restricted to Philosophy graduate students only.

**PHIL 5600 (3) Philosophy of Religion**
Studies topics falling under philosophy of religion, such as proofs for God's existence, religious language, mysticism, psychology of religion, modern theological movements, miracles, and study of individual theologians.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 5700 (3) Aesthetics**
Analyzes the principal topics of aesthetics, including such issues as formal structure of aesthetics, the nature of critical judgments, and the status of the work of art.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 5800 (3) Open Topics in Philosophy**
Variety of new courses at the 5000 level. See current departmental announcements for specific content.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 5810 (1-3) Special Topics in Philosophy**
Instructor meets regularly with three or more students to discuss special topics in philosophy.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 5840 (1-3) Graduate Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 6000 (3-4) Seminar in the History of Philosophy**
Studies advanced topics in the history of philosophy. Content varies by semester, but may extend to any period in the history of philosophy, from the Presocratics into the modern era.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 6100 (3) Seminar in Ethics**
Intensive study of selected topics in ethical theory.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 6200 (3) Seminar in Social and Political Philosophy**
Provides an in-depth look at some particular topic in social and political philosophy, such as rights, political freedom, political obligation, or democracy.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 6300 (3) Seminar in Philosophy of Mind**
Intensive study of selected topics in philosophy of mind.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 6310 (3) Issues and Methods in Cognitive Science**
Interdisciplinary introduction to cognitive science, examining ideas from cognitive psychology, philosophy, education, and linguistics via computational modeling and psychological experimentation. Includes philosophy of mind; learning; categorization; vision and mental imagery; consciousness; problem solving; decision making, and game-theory; language processing; connectionism. No background in computer science will be presumed.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 6402 and EDUC 6504 and LING 6200 and PSYC 6200 and SLHS 6402
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite at least one course at the 3000-level or higher in CSCI, LING, PHIL, or PSYC.

**PHIL 6340 (3) Seminar in Epistemology**
Intensive study of selected topics in epistemology.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 6380 (3) Seminar in Metaphysics**
Intensive study of selected topics in metaphysics.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 6400 (3) Seminar in Philosophy of Science**
Topics connected with development of nature of science: the structure of scientific theories, the testing of hypotheses, the theory of decisions in science and the basic conceptions and models of abstraction in the history of science.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 6490 (3) Seminar in Philosophy of Language**
Studies some of the main topics in the philosophy of language, such as meaning and theories of meaning, translation, speech acts, rules of language, reference, relevance of psycholinguistics, language and thought, and language and ontology.
**Repeatable:** Repeatable for up to 15.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to Philosophy graduate students only.

**PHIL 6950 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to Philosophy graduate students only.

**PHIL 7415 (2) Cognitive Science Research Applications Seminar 1**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7412 and EDUC 6506 and LING 7415 and PSYC 7415 and SLHS 7418
**Requisites:** Requires prerequisite course CSCI 6402 or EDUC 6504 or LING 6200 or PHIL 6310 or PSYC 6200 (minimum grade D-).

**PHIL 7425 (2) Cognitive Science Research Applications Seminar 2**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7422 and EDUC 6516 and LING 7425 and PSYC 7425 and SLHS 7428
**Requisites:** Requires prerequisite course CSCI 6402 or EDUC 6504 or LING 6200 or PHIL 6310 or PSYC 6200 (minimum grade D-).
**Recommended:** Prerequisite EDUC 6505 or PHIL 6310.

**PHIL 7810 (1) Topics in Cognitive Science**
Reading of interdisciplinary innovative theories and methodologies of cognitive science. Students participate in the ICS Distinguished Speakers series that hosts internationally recognized cognitive scientists who share and discuss their current research. Session discussions include analysis of leading edge and controversial new approaches in cognitive science.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7772 and EDUC 7775 and LING 7775 and PSYC 7775 and SLHS 7775
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to Philosophy graduate students only.

# Philosophy - Master of Arts (MA)

The MA in Philosophy is intended to provide students with:

- A solid foundation in all the core areas of philosophy, including its history, in preparation for more advanced and specialized work at the doctoral level.
- Philosophical training for those who intend to go on to work in interdisciplinary areas bordering with philosophy, such as cognitive science or applied ethics and public policy.
- An opportunity for those who wish to explore more advanced study of philosophy for personal enrichment and satisfaction.
- The education needed for teaching philosophy at the secondary-school level or at a community college.

We offer to MA students not only an outstanding education in philosophy but also all the benefits of being in a large, active, collegial department, with numerous colloquia, conferences, workshops and reading groups in many areas of philosophy. MA students enroll in the same classes as PhD students and are treated as full members of the graduate program.

Master's degree students do not typically receive guaranteed departmental funding, but in recent years most master's students have received teaching assistantships (TA-ships) in some of their semesters in the program. (TA-ships come with both a stipend and a tuition waiver.) MA students are encouraged to apply through the university for financial aid and university scholarships (for more information, see our Funding (https://www.colorado.edu/philosophy/graduate/funding/) page).

All domestic graduate students qualify for in-state tuition (https://www.colorado.edu/bursar/costs/) after just one year of residency in Colorado (https://www.colorado.edu/registrar/students/state-residency/adult/). Applicants admitted to the MA program who are not residents of Colorado or of any of the Western states might consider petitioning to defer their enrollment for one year, during which time they can establish residency in Colorado, in order to avoid paying out-of-state tuition.

The Department of Philosophy at the University of Colorado Boulder is a member of the Western Regional Graduate Program (http://wiche.edu/wrgp/) (WRGP), which means that students from the Western states (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington and Wyoming) can enroll in our MA program at in-state Colorado tuition rates (http://bursar.colorado.edu/tuition-fees/tuition-and-fees-rate-sheets/). Students need not demonstrate financial need to take advantage of this benefit. To be considered for the WRGP tuition rate, students simply apply directly to our program and identify themselves as WICHE WRGP applicants. WRGP students must fulfill all of our usual requirements for admission, meet all admission deadlines, and be selected for admission.

Students in the master's program must satisfy a variety of requirements, including the completion of coursework. The department has a diversified faculty that can supervise the writing of master's theses on a wide range of topics. There is also a popular non-thesis option for the MA.

Students considering both our PhD and MA program should apply to the PhD program. Applicants not accepted to the PhD will automatically be considered for the MA program. Those interested only in the terminal MA program should apply just to that program. Students applying to the MA program can expect to hear about admission some time in late March to early April.

Students wishing to pursue a master's degree in philosophy should note the Graduate School requirements in the master's degree requirements (p. 1113) section and consult the MA Program page (https://www.colorado.edu/philosophy/graduate/ma-program/) and the Graduate Admissions page (https://www.colorado.edu/philosophy/graduate/graduate-admissions/) of the Philosophy Department's website.

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree, Philosophy - Bachelor of Arts (BA) (p. 512) and the Bachelor's–Accelerated Master's Program page (https://www.colorado.edu/philosophy/undergraduate/bachelors-accelerated-masters-program/) on the Philosophy Department's website.

# Requirements

## Degree Plans

### Plan I: Thesis Option

The MA requires:

- 30 hours of approved graduate study at the 5000 level or above (philosophy courses taken below the 5000 level may be taken as PHIL 5810, with approval)
- demonstrated proficiency in the core areas of philosophy
- a successful thesis defense.

Four to six hours of the 30 credit hours must be thesis hours; the remaining 24 to 26 hours are for coursework credit hours (typically eight courses). At least 18 hours must be philosophy courses (PHIL 6940 and PHIL 6950 do not count).

No more than 9 hours of credit may be transferred into the program from other graduate programs. Students who enter the MA program already holding an MA degree may not transfer into the program any credits that applied toward the MA degree already held.

Students must demonstrate competence in the core areas of philosophy by passing, with a grade of B or better, one graduate or upper-division course in each of the following three areas: history of philosophy, metaphysics and epistemology, and values.

**Required Courses and Credit Hours**

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| PHIL 6950 | Master's Thesis | 4-6 |
| **Electives** | | |
| One course on the history of philosophy. Course topic must cover a philosopher or subject in ancient (5th century BC through Augustine) or early modern philosophy (17th to 18th century; roughly Decartes to Kant). | | 3 |
| PHIL 5010 | Single Philosopher | |
| PHIL 5020 | Topics in the History of Philosophy | |
| PHIL 6000 | Seminar in the History of Philosophy | |
| One course in metaphysics and epistemology: | | 3 |

| | | |
|---|---|---|
| PHIL 5300 | Philosophy of Mind | |
| PHIL 5340 | Epistemology | |
| PHIL 5360 | Metaphysics | |
| PHIL 5370 | Free Will and Determinism | |
| PHIL 5400 | Philosophy of Science | |
| PHIL 5490 | Philosophy of Language | |
| PHIL 5550 | Metaphysics and Epistemology Proseminar | |
| PHIL 6300 | Seminar in Philosophy of Mind | |
| PHIL 6340 | Seminar in Epistemology | |
| PHIL 6380 | Seminar in Metaphysics | |
| PHIL 6400 | Seminar in Philosophy of Science | |
| PHIL 6490 | Seminar in Philosophy of Language | |
| One course in values: | | 3 |
| PHIL 5100 | Values Proseminar | |
| PHIL 5110 | Contemporary Moral Theory | |
| PHIL 5120 | Philosophy and Animals | |
| PHIL 5150 | Topics in Applied Ethics | |
| PHIL 5200 | Contemporary Political Philosophy | |
| PHIL 5230 | Bioethics and Public Policy | |
| PHIL 5240 | Seminar in Environmental Philosophy | |
| PHIL 5260 | Philosophy of Law | |
| PHIL 5290 | Topics in Values and Social Policy | |
| PHIL 5470 | Probability and Rational Choice | |
| PHIL 5700 | Aesthetics | |
| PHIL 6100 | Seminar in Ethics | |
| PHIL 6200 | Seminar in Social and Political Philosophy | |
| Other course as approved by the graduate director. | | |
| Other electives to fulfull the 30-credit minimum: | | 15 |
| PHIL 5030 | Greek Philosophical Texts | |
| PHIL 5040 | Latin Philosophical Texts | |
| PHIL 5440 | Topics in Logic | |
| PHIL 5450 | History and Philosophy of Physics | |
| PHIL 5460 | Modal Logic | |
| PHIL 5600 | Philosophy of Religion | |
| PHIL 5810 | Special Topics in Philosophy (no more than 9 hours may be counted toward the 30-hour requirement) | |
| PHIL 5840 | Graduate Independent Study (no more than 6 hours may be counted toward the 30-hour requirement) | |
| PHIL 6310 | Issues and Methods in Cognitive Science | |
| PHIL 7415 | Cognitive Science Research Applications Seminar 1 | |
| PHIL 7810 | Topics in Cognitive Science | |
| Students must demonstrate competence in logic by earning a grade of B– or better in PHIL 2440 (Symbolic Logic), or an equivalent course, or in some more advanced logic course. Students may satisfy this requirement either by taking all the examinations in PHIL 2440 and averaging at least a B– or by earning at least a B– on the comprehensive final examination offered in that course each semester. Students may be exempted from this requirement by the Director of Graduate Studies if they have done suitable work in formal logic at other institutions, or in other departments at CU Boulder. | | |
| **Total Credit Hours** | | **28-30** |

### Thesis and Oral Defense

Each student must prepare a thesis plan acceptable to the chair of his or her thesis committee and proceed to write the thesis, working as closely as necessary with the chair. At the appropriate time, the committee will convene to hold a final oral defense of the thesis. A copy of the thesis must be furnished to each committee member at least two weeks prior to the scheduled date of the defense.

## Plan II: Non-Thesis Option

The department will award a non-thesis MA to any student who has completed 33 credits of graduate-level coursework with a B+ average or better. Twenty-four hours of coursework must be in philosophy.

The student must also meet the standard logic requirement and take three credits in each of our three general areas: history of philosophy (ancient or modern, specifically); metaphysics and epistemology; and values.

Standard restrictions on the number of credits earned from special topics and from independent study apply.

### Required Courses and Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **Electives** | | |
| One course on the history of philosophy. Course topic must cover a philosopher or subject in ancient (5th century BC through Augustine) or early modern philosophy (17th to 18th century; roughly Decartes to Kant). | | 3 |
| PHIL 5010 | Single Philosopher | |
| PHIL 5020 | Topics in the History of Philosophy | |
| PHIL 6000 | Seminar in the History of Philosophy | |
| One course in metaphysics and epistemology: | | 3 |
| PHIL 5300 | Philosophy of Mind | |
| PHIL 5340 | Epistemology | |
| PHIL 5360 | Metaphysics | |
| PHIL 5370 | Free Will and Determinism | |
| PHIL 5400 | Philosophy of Science | |
| PHIL 5490 | Philosophy of Language | |
| PHIL 5550 | Metaphysics and Epistemology Proseminar | |
| PHIL 6300 | Seminar in Philosophy of Mind | |
| PHIL 6340 | Seminar in Epistemology | |
| PHIL 6380 | Seminar in Metaphysics | |
| PHIL 6400 | Seminar in Philosophy of Science | |
| PHIL 6490 | Seminar in Philosophy of Language | |
| One course in values: | | 3 |

| | | |
|---|---|---|
| PHIL 5100 | Values Proseminar | |
| PHIL 5110 | Contemporary Moral Theory | |
| PHIL 5120 | Philosophy and Animals | |
| PHIL 5150 | Topics in Applied Ethics | |
| PHIL 5200 | Contemporary Political Philosophy | |
| PHIL 5230 | Bioethics and Public Policy | |
| PHIL 5240 | Seminar in Environmental Philosophy | |
| PHIL 5260 | Philosophy of Law | |
| PHIL 5290 | Topics in Values and Social Policy | |
| PHIL 5470 | Probability and Rational Choice | |
| PHIL 5700 | Aesthetics | |
| PHIL 6100 | Seminar in Ethics | |
| PHIL 6200 | Seminar in Social and Political Philosophy | |
| Other course as approved by the graduate director. | | |
| Other electives to fulfill the 33-credit minimum: | | 24 |
| PHIL 5030 | Greek Philosophical Texts | |
| PHIL 5040 | Latin Philosophical Texts | |
| PHIL 5440 | Topics in Logic | |
| PHIL 5450 | History and Philosophy of Physics | |
| PHIL 5460 | Modal Logic | |
| PHIL 5600 | Philosophy of Religion | |
| PHIL 5800 | Open Topics in Philosophy | |
| PHIL 5810 | Special Topics in Philosophy (no more than 9 hours may be counted toward the 30-hour requirement) | |
| PHIL 5840 | Graduate Independent Study (no more than 6 hours may be counted toward the 30-hour requirement) | |
| PHIL 6310 | Issues and Methods in Cognitive Science | |
| PHIL 7415 | Cognitive Science Research Applications Seminar 1 | |
| PHIL 7425 | Cognitive Science Research Applications Seminar 2 | |
| PHIL 7810 | Topics in Cognitive Science | |
| Students must demonstrate competence in logic by earning a grade of B– or better in PHIL 2440 (Symbolic Logic), or an equivalent course, or in some more advanced logic course. Students may satisfy this requirement either by taking all the examinations in PHIL 2440 and averaging at least a B– or by earning at least a B– on the comprehensive final examination offered in that course each semester. Students may be exempted from this requirement by the Director of Graduate Studies if they have done suitable work in formal logic at other institutions, or in other departments at CU Boulder. | | |
| **Total Credit Hours** | | **33** |

# Plan(s) of Study

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| PHIL 5100 | Values Proseminar | 3 |
| PHIL 6000 | Seminar in the History of Philosophy | 3-4 |
| PHIL 6380 | Seminar in Metaphysics | 3 |
| | **Credit Hours** | **9-10** |
| **Spring Semester** | | |
| PHIL 5550 | Metaphysics and Epistemology Proseminar | 3 |
| PHIL 6100 | Seminar in Ethics | 3 |
| PHIL 5020 | Topics in the History of Philosophy | 3 |
| | **Credit Hours** | **9** |
| **Year Two** | | |
| **Fall Semester** | | |
| PHIL 6950 | Master's Thesis | 1-6 |
| PHIL 6340 | Seminar in Epistemology | 3 |
| | **Credit Hours** | **4-9** |
| **Spring Semester** | | |
| PHIL 6940 | Master's Candidate for Degree | 1 |
| PHIL 6200 | Seminar in Social and Political Philosophy | 3 |
| | **Credit Hours** | **4** |
| | **Total Credit Hours** | **26-32** |

# Learning Outcomes

By the completion of the program, students will be able to:

# Philosophy - Doctor of Philosophy (PhD)

The PhD program in philosophy consists of approximately 2 ½ years of coursework and 2 ½–3 ½ years of work on a dissertation, with five years of guaranteed funding and a sixth year of funding usually possible if needed. We are both a research and a teaching department. Teaching appointments are not only the principal means of supporting graduate students but are also the way that we train graduate students for a career of teaching as well as doing research in philosophy.

Applicants for admission to the Graduate School for work toward a doctoral degree in philosophy are expected to have had 18 or more credit hours in undergraduate courses in the subject.

Students in the doctoral program must satisfy a variety of requirements, including the completion of coursework. The department has a diversified faculty that can supervise the writing of doctoral dissertations on a wide range of topics. The department makes available teaching assistantships and then graduate part-time instructorships to its doctoral students, and assists with job placement.

Students wishing to pursue doctoral work in philosophy should note the doctoral degree requirements (p. 1114) and consult the PhD program portion (https://www.colorado.edu/philosophy/graduate/phd-program/) and the Graduate Admissions portion (https://www.colorado.edu/philosophy/graduate/graduate-admissions/) of the Department of Philosophy website.

# Requirements

- *Coursework*: Students must take a minimum of 45 hours of approved graduate study, in addition to the 30 hours of dissertation credit hours required by the Graduate School.

- *Distribution requirements*: 27 hours must be devoted to satisfying specific distribution requirements.
- *Language and technical requirement*: Students must satisfy any language and/or technical requirements that the department judges to be necessary given the area of the dissertation.
- *Logic*: Students must demonstrate proficiency in propositional and first-order logic
- *Diagnostic paper*: Students must submit a diagnostic paper, generally at the beginning of the third semester of graduate study.
- *Qualifying papers*: Students must submit a qualifying paper, generally at the beginning of the fifth semester of graduate study. Students may advance in the program only if the qualifying paper is judged acceptable by the examining committee and approved by the department.
- *Prospectus and oral examination*: After passing the qualifying paper, students must assemble a prospectus committee of five faculty members, including a Chair/Advisor and (typically) an outside member. Students must submit a written prospectus to this committee, who, after judging the prospectus acceptable, will conduct an oral exam on the prospectus and related topics.
- *Dissertation and oral defense*: Students must write a dissertation that is acceptable to the dissertation committee, and defend the dissertation in a public, oral defense at a time deemed appropriate by the committee.
- Students are expected to make reasonable progress toward the PhD, and will be evaluated by the department in this regard each spring.

For detailed requirements, consult the PhD section (https://www.colorado.edu/philosophy/graduate/phd-program/) of the department's website and especially the Official PhD Requirements and Additional Program Information (https://www.colorado.edu/philosophy/phdreqs/) (PDF).

## Recommended Plan of Study

Ideally, PhD students in their first two years will take and complete three courses per semester, for a total of 12 courses (36 credit hours) by the end of the second year. The minimum number of courses PhD students can take to make good progress in the first two years of the program is five courses per year.

At the beginning of the third semester in the program, students turn in a diagnostic paper and will receive feedback from three faculty members.

At the beginning of the fifth semester in the program, students turn in the qualifying paper, which will be evaluated anonymously; this is a qualifying event that the student must pass in order to be considered for advancement to candidacy in the PhD program.

In the fifth semester, students continue to take courses in order to complete the required 45 credit hours (typically 15 courses). Ideally, students should have completed coursework by the end of their fifth semester and should then begin work on the prospectus.

Ideally, students will submit and defend their prospectus sometime in their sixth semester. Students are eligible to sign up for up to 10 dissertation hours before they pass their prospectus exam. The remainder of the required 30 dissertation hours are used in the fourth and fifth (and possibly sixth) years in the program while completing the dissertation.

## Learning Outcomes

By the completion of the program, students will be able to:

# Physics

Graduate study and opportunities for basic research are offered in experimental and theoretical physics in the following subfields: atomic and molecular physics, biophysics, chemical physics, condensed matter physics, elementary particle physics, geophysics, laser and optical physics, nuclear physics, physics education research, plasma and space physics, quantum information science and renewable energy.

Doctoral programs in chemical physics and geophysics are offered jointly with the Department of Chemistry and with the other departments that participate in the interdepartmental geophysics program.

**Course code for this program is PHYS.**

## Master's Degree

- Physics - Master of Science (MS) (p. 1364)

## Doctoral Degree

- Physics - Doctor of Philosophy (PhD) (p. 1365)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Anderson, Dana Z. (https://experts.colorado.edu/display/fisid_102371/)
Professor; PhD, University of Arizona

Ashby, Neil
Professor Emeritus; PhD, Harvard University

Aumentado, Jose
Lecturer; PhD, Northwestern University

Baker, Daniel N. (https://experts.colorado.edu/display/fisid_103264/)
Distinguished Professor; PhD, University of Iowa

Bartlett, David
Professor Emeritus; PhD, Columbia University

Beale, Paul D. (https://experts.colorado.edu/display/fisid_101602/)
Professor; PhD, Cornell University

Becker, Andreas (https://experts.colorado.edu/display/fisid_146675/)
Distinguished Professor; Dr habil, Universite Laval (Canada)

Berry, Joseph (https://experts.colorado.edu/display/fisid_131839/)
Associate Professor; PhD, Pennsylvania State University

Betterton, Meredith D. (https://experts.colorado.edu/display/fisid_125396/)
Professor; PhD, Harvard University

Bohn, John (https://experts.colorado.edu/display/fisid_111716/)
Research Professor; PhD, University of Chicago

Bolton, Daniel Ryan (https://experts.colorado.edu/display/fisid_155168/)
Associate Teaching Professor; PhD, University of Washington

Calkins, Michael Andrew (https://experts.colorado.edu/display/fisid_149720/)
Associate Professor; PhD, University of California, Los Angeles

Cao, Gang (https://experts.colorado.edu/display/fisid_157991/)
Professor; PhD, Temple University

Cary, John R. (https://experts.colorado.edu/display/fisid_105901/)
Professor; PhD, University of California, Berkeley

Chou, Chin-Wen
Lecturer; PhD, California Insitutute of Technology

Clark, Noel A. (https://experts.colorado.edu/display/fisid_101947/)
Professor; PhD, Massachusetts Institute of Technology

Coddington, Jan
Lecturer; PhD, University of Colorado Boulder

Cooper, John
Professor Emeritus; PhD, University of London

Cornell, Eric (https://experts.colorado.edu/display/fisid_100112/)
Professor Adjoint; PhD, Massachusetts Institute of Technology

Cumalat, John P. (https://experts.colorado.edu/display/fisid_105582/)
Professor; PhD, University of California, Santa Barbara

De Alwis, Senarath P. (https://experts.colorado.edu/display/fisid_103029/)
Professor Emeritus; PhD, University of Cambridge (England)

Deca, Jan (https://experts.colorado.edu/display/fisid_155664/)
Lecturer; PhD, KU Leuven (Belgium)

Degrand, Thomas A. (https://experts.colorado.edu/display/fisid_102740/)
Professor; PhD, Massachusetts Institute of Technology

Dennis, Tasshi
Lecturer; PhD, Rice University

Dessau, Daniel S. (https://experts.colorado.edu/display/fisid_107532/)
Professor; PhD, Stanford University

DeWolfe, Oliver M. (https://experts.colorado.edu/display/fisid_142992/)
Professor; PhD, Massachusetts Institute of Technology

Diddams, Scott A. (https://experts.colorado.edu/display/fisid_148274/)
Professor; PhD, University of New Mexico

Dincao, Jose Paulo (https://experts.colorado.edu/display/fisid_143731/)
Assistant Research Professor; PhD, Univ of Sao Paulo (Brazil)

Donley, Elizabeth
Lecturer; PhD, Swiss Federal Institute of Technology

Dreitlein, Joseph
Professor Emeritus; PhD, Washington University

Dubson, Michael A. (https://experts.colorado.edu/display/fisid_102266/)
Teaching Professor of Distinction, Associate Chair; PhD, Cornell University

Figueroa, Nuris (https://experts.colorado.edu/display/fisid_167396/)
Assistant Professor; PhD, Sorbonne University (France)

Finkelstein, Noah D. (https://experts.colorado.edu/display/fisid_129919/)
Professor; PhD, Princeton University

Ford, William T. (https://experts.colorado.edu/display/fisid_102175/)
Professor Emeritus; PhD, Princeton University

Franklin, Allan D. (https://experts.colorado.edu/display/fisid_100660/)
Professor Emeritus; PhD, Cornell University

Gallagher, Michael (https://experts.colorado.edu/display/fisid_151214/)
Lecturer; PhD, University of Colorado

Gao, Xun (https://experts.colorado.edu/display/fisid_174294/)
Assistant Professor; PhD, Tsinghua University (China)

Glancy, Scott
Lecturer; PhD, University of Notre Dame

Glaser, Matthew A.
Professor Attendant Rank; PhD, University of Colorado Boulder

Goldman, Martin V. (https://experts.colorado.edu/display/fisid_100567/)
Professor Emeritus; PhD, Harvard University

Gopinath, Juliet T. (https://experts.colorado.edu/display/fisid_147075/)
Professor; PhD, Massachusetts Institute of Technology

Gorokhovsky, Vladimir
Lecturer; PhD, Russian Academy of Sciences

Gurarie, Victor Vladimir (https://experts.colorado.edu/display/fisid_129918/)
Professor; PhD, Princeton University

Gyenis, Andras (https://experts.colorado.edu/display/fisid_167223/)
Assistant Professor; PhD, Princeton University

Hall, John L. (https://experts.colorado.edu/display/fisid_103891/)
Professor Adjoint; PhD, Carnegie Institute of Technology

Halverson, Nils W. (https://experts.colorado.edu/display/fisid_134252/)
Professor; PhD, California Institute of Technology

Hamilton, Andrew J.S. (https://experts.colorado.edu/display/fisid_101517/)
Professor; PhD, University of Virginia

Hasenfratz, Anna (https://experts.colorado.edu/display/fisid_102393/)
Professor; PhD, Lorand Eotvos University, Budapest (Hungary)

Hermann, Allen M.
Professor Emeritus; PhD, Texas AM University

Hermele, Michael Aaron (https://experts.colorado.edu/display/fisid_143370/)
Professor; PhD, University of California, Santa Barbara

Hodby, Eleanor R. (https://experts.colorado.edu/display/fisid_128058/)
Senior Instructor, Faculty Fellow, Associate Teaching Professor; PhD, Oxford University

Holland, Murray John (https://experts.colorado.edu/display/fisid_105126/)
Professor; PhD, Oxford University (England)

Horanyi, Mihaly (https://experts.colorado.edu/display/fisid_102420/)
Professor; PhD, Eötvös Loránd University (Hungary)

Hough, Loren Evan (https://experts.colorado.edu/display/fisid_144904/)
Associate Professor; PhD, University of Colorado Boulder

Hume, David
Lecturer; PhD, University of Colorado Boulder

Hussein, Mahmoud I. (https://experts.colorado.edu/display/fisid_144300/)
Professor; PhD, University of Michigan Ann Arbor

Kapteyn, Henry C. (https://experts.colorado.edu/display/fisid_115334/)
Professor; PhD, University of California, Berkeley

Kaufman, Adam Micah (https://experts.colorado.edu/display/fisid_159513/)
Associate Professor Adjoint; PhD, University of Colorado Boulder

Kempf, Sascha (https://experts.colorado.edu/display/fisid_149628/)
Associate Professor; Dr habil, Technische Universität Braunschweig (Germany)

Kinney, Edward R. (https://experts.colorado.edu/display/fisid_101717/)
Professor; PhD, Massachusetts Institute of Technology

Kitching, John
Lecturer; PhD, California Institute of Techology

Knill, Emanuel
Lecturer; PhD, University of Colorado Boulder

Kunz, P. Dale
Professor Emeritus; PhD, University of Washington

Lee, Minhyea (https://experts.colorado.edu/display/fisid_145209/)
Associate Professor; PhD, University of Chicago

Lehnert, Konrad W. (https://experts.colorado.edu/display/fisid_139785/)
Professor Adjoint; PhD, University of California at Santa Barbara

Leibfried, Dietrich
Lecturer; PhD, Max-Planck Institute for Quantum Optics (Germany)

Levine, Judah (https://experts.colorado.edu/display/fisid_100654/)
Professor Adjoint; PhD, New York University

Lewandowski, Heather Jean (https://experts.colorado.edu/display/fisid_111815/)
Professor, Associate Chair; PhD, University of Colorado Boulder

Litos, Michael (https://experts.colorado.edu/display/fisid_158137/)
Assistant Professor; PhD, Boston University

Lucas, Andrew James (https://experts.colorado.edu/display/fisid_164180/)
Assistant Professor; PhD, Harvard University

Ludlow, Andrew
Lecturer; PhD, University of Colorado Boulder

MacLennan, Joseph E. (https://experts.colorado.edu/display/fisid_104854/)
Professor Attendant Rank, Lecturer; PhD, University of Colorado Boulder

Marino, Alysia Diane (https://experts.colorado.edu/display/fisid_146427/)
Professor; PhD, University of California, Berkeley

Mascarenhas, Angelo
Lecturer; PhD, University of Pittsburgh

McGehee, Michael D. (https://experts.colorado.edu/display/fisid_163453/)
Professor; PhD, University of California, Santa Barbara

Miller, Stanley
Professor Emeritus; PhD, University of California, Berkeley

Munsat, Tobin Leo (https://experts.colorado.edu/display/fisid_134251/)
Professor, Chair; PhD, Princeton University

Murnane, Margaret (https://experts.colorado.edu/display/fisid_115333/)
Distinguished Professor; PhD, University of California, Berkeley

Nagle, James L. (https://experts.colorado.edu/display/fisid_126784/)
Professor; PhD, Yale University

Nam, SaeWoo
Lecturer; PhD, Stanford University

Nandkishore, Rahul Mahajan (https://experts.colorado.edu/display/fisid_156417/)
Associate Professor; PhD, Massachusetts Institute of Technology

Neil, Ethan (https://experts.colorado.edu/display/fisid_153411/)
Associate Professor; PhD, Yale University

Nesbitt, David J. (https://experts.colorado.edu/display/fisid_100333/)
Professor Adjoint; PhD, University of Colorado

Newbury, Nathan
Lecturer; PhD, Princeton University

Papp, Scott
Lecturer; PhD, University of Colorado Boulder

Parker, Scott E. (https://experts.colorado.edu/display/fisid_109685/)
Professor; PhD, University of California, Berkeley

Peleg, Orit (https://experts.colorado.edu/display/fisid_159998/)
Associate Professor; PhD, ETH Zürich (Switzerland)

Pereira Da Costa, Hugo
Lecturer; PhD, Service de Physique Nucleaire du CEA (France)

Perepelitsa, Dennis V. (https://experts.colorado.edu/display/fisid_158294/)
Associate Professor; PhD, Columbia University in the City of New York

Perkins, Katherine K. (https://experts.colorado.edu/display/fisid_124217/)
Professor Attendant Rank; PhD, Harvard University

Perkins, Thomas T. (https://experts.colorado.edu/display/fisid_124578/)
Professor Adjunct; PhD, Stanford University

Peterson, R. Jerome
Professor Emeritus; PhD, University of Washington

Piestun, Rafael (https://experts.colorado.edu/display/fisid_118538/)
Professor; PhD, Israel Instit of Tech (Israel)

Pollock, Steven J. (https://experts.colorado.edu/display/fisid_101392/)
Professor; PhD, Stanford University

Price, John C. (https://experts.colorado.edu/display/fisid_101129/)
Professor Emeritus; PhD, Stanford University

Radzihovsky, Leo (https://experts.colorado.edu/display/fisid_107484/)
Professor; PhD, Harvard University

Rankin, Patricia (https://experts.colorado.edu/display/fisid_105939/)
Professor Emerita; PhD, University of London (England)

Raschke, Markus B. (https://experts.colorado.edu/display/fisid_148716/)
Professor; PhD, Technische Universität München (Germany)

Regal, Cindy Anne (https://experts.colorado.edu/display/fisid_144184/)
Professor; PhD, University of Colorado Boulder

Rey, Ana Maria (https://experts.colorado.edu/display/fisid_146407/)
Professor Adjoint; PhD, University of Maryland College Park Campus

Reznik, Dmitry (https://experts.colorado.edu/display/fisid_147659/)
Professor; PhD, University of Illinois at Urbana–Champaign

Ritzwoller, Michael H. (https://experts.colorado.edu/display/fisid_102264/)
Professor; PhD, University of California, San Diego

Robertson, Scott H.
Professor Emeritus; PhD, Cornell University

Rogers, Charles (https://experts.colorado.edu/display/fisid_101331/)
Professor; PhD, Cornell University

Romatschke, Paul (https://experts.colorado.edu/display/fisid_149870/)
Professor; PhD, Technical Univ of Vienna (Austria)

Schibli, Thomas Richard (https://experts.colorado.edu/display/fisid_143464/)
Professor; PhD, Univ of Karlsruhe (Germany)

Shaheen, Sean Eric (https://experts.colorado.edu/display/fisid_153664/)
Professor; PhD, University of Arizona

Shalm, Lynden Krister (https://experts.colorado.edu/display/fisid_152367/)
Lecturer; PhD, University of Toronto

Shepard, James R.
Professor Emeritus; PhD, University of Colorado Boulder

Shi, Yuan (https://experts.colorado.edu/display/fisid_172193/)
Assistant Professor; PhD, Princeton University

Simmonds, Raymond
Lecturer; PhD, University of California, Berkeley

Slichter, Daniel
Lecturer; PhD, University of California, Berkeley

Smalyukh, Ivan (https://experts.colorado.edu/display/fisid_144757/)
Professor; PhD, Kent State University

Stenson, Kevin M. (https://experts.colorado.edu/display/fisid_128676/)
Professor, Associate Chair; PhD, University of Wisconsin–Madison

Sun, Shuo (https://experts.colorado.edu/display/fisid_165715/)
Assistant Professor; PhD, University of Maryland College Park Campus

Taylor, John
Professor Emeritus; PhD, University of California, Berkeley

Teufel, John D.
Lecturer; PhD, Yale University

Thompson, James Karl (https://experts.colorado.edu/display/fisid_144585/)
Professor Adjoint; PhD, Massachusetts Institute of Technology

Toney, Michael (https://experts.colorado.edu/individual/fisid_167235/)
Professor; PhD, University of Washington

Ullom, Joel
Lecturer; PhD, Harvard University

Ulmer, Keith A. (https://experts.colorado.edu/display/fisid_144871/)
Associate Professor; PhD, University of Colorado Boulder

Uzdensky, Dmitri Anatoljevich (https://experts.colorado.edu/display/fisid_147430/)
Professor; PhD, Princeton University

Van Schilfgaarde, Mark
Lecturer; PhD, Stanford University

Wagner, Stephen R. (https://experts.colorado.edu/display/fisid_139773/)
Professor Attendant Rank; PhD, Johns Hopkins University

Wang, Xu (https://experts.colorado.edu/display/fisid_141619/)
Lecturer; PhD, University of Wisconsin-Madison

Washburn, Brian R.
Lecturer; PhD, Georgia Institute of Technology

West, Colin G. (https://experts.colorado.edu/display/fisid_163336/)
Associate Teaching Professor; PhD, Stony Brook University

Wilcox, Bethany R. (https://experts.colorado.edu/display/fisid_156075/)
Assistant Professor; PhD, University of Colorado Boulder

Wilkerson, Donald (https://experts.colorado.edu/display/fisid_104406/)
Associate Teaching Professor; MA, University of Colorado Boulder

Wilson, Andrew
Lecturer; PhD, University of Otago (New Zealand)

Wineland, David J. (https://experts.colorado.edu/display/fisid_119931/)
Professor Adjoint; PhD, Harvard University

Ye, Jun (https://experts.colorado.edu/display/fisid_106154/)
Professor Adjoint; PhD, University of Colorado Boulder

Zabow, Gary
Lecturer; PhD, Harvard University

Zhong, Shijie (https://experts.colorado.edu/display/fisid_118396/)
Professor; PhD, University of Michigan Ann Arbor

Zimmerman, Eric (https://experts.colorado.edu/display/fisid_122809/)
Professor; PhD, University of Chicago

# Courses

**PHYS 5030 (3) Intermediate Mathematical Physics 1**
This course and its continuation, PHYS 5040, form a survey of classical mathematical physics. Studies complex variable theory and finite vector spaces, and includes topics in ordinary and partial differential equations, boundary value problems, potential theory, and Fourier analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5030
**Requisites:** Restricted to graduate students only.

**PHYS 5040 (3) Intermediate Mathematical Physics 2**
Continuation of PHYS 5030. Includes group theory, special functions, integral transforms, integral equations and calculus of variations.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5040
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite PHYS 5030.

**PHYS 5070 (3) Introduction to Computational Physics**
Surveys methods and practices in programming and scientific computing for the study of physics, using the Python programming language. Core material will include data analysis and visualization, numerical solution of differential equations, working with large-scale remote computers, and general software skills such as debugging, version control, and collaborative tools. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.

**PHYS 5130 (3) Biological Electron Microscopy: Principles and Recent Advances**
Covers basic mechanisms for imaging and recent advances used in current biological research, elements of electron optics, image optimization, resolution, radiation damage, various imaging modes (TEM, HVEM, Sem, Stem, Stm), specimen quantitation and reconstruction (stereo and 3-D), microanalysis and electron diffraction. Specimen preparation treated only incidentally.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 4130

**PHYS 5141 (3) Astrophysical and Space Plasmas**
Covers magnetohydrodynamics and a few related areas of plasma physics applied to space and astrophysical systems, including planetary magnetospheres and ionospheres, stars, and interstellar gas in galaxies.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 5140
**Requisites:** Restricted to Physics (PHYS) or Astronomy (ASTR) graduate students only.

**PHYS 5150 (3) Introductory Plasma Physics**
Includes basic phenomena of ionized gases, static and dynamic shielding, linear waves, instabilities, particles in fields, collisional phenomena, fluid equations, collisionless Boltzman equations, Landau damping, scattering and absorption of radiation in plasmas, elementary nonlinear processes, WKB wave theory, controlled thermonuclear fusion concepts, astrophysical applications and experimental plasma physics (laboratory). Department enforced prerequisite: PHYS 3310. Instructor consent required for undergraduates.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 5150
**Requisites:** Restricted to graduate students only.

**PHYS 5160 (3) Fundamentals of Optics and Lasers**
Covers the basic physic of lasers. Topics include basics of optical resonators and gaussian beam propagation, stimulated emission, laser threshold conditions, laser linewidth, q-switching and mode locking of lasers, tuning of Cw lasers, and specifics of various common lasers.
**Requisites:** Restricted to graduate students only.

**PHYS 5210 (3) Theoretical Mechanics**
Variational principles, Lagrange's equations, Hamilton's equations, motion of rigid body, relativistic mechanics, transformation theory, continuum mechanics, small oscillations, Hamilton-Jacobi theory.
**Requisites:** Restricted to graduate students only.

**PHYS 5250 (3) Introduction to Quantum Mechanics 1**
Quantum phenomena, Ehrenfest theorem and relation to classical physics, applications to one-dimensional problems, operator techniques, angular momentum and its representations, bound states and hydrogen atom, and Stern-Gerlack experiment and spin and spinor wave function. Department enforced prerequisite: advanced undergraduate quantum mechanics course.
**Requisites:** Restricted to graduate students only.

**PHYS 5260 (3) Introduction to Quantum Mechanics 2**
Symmetries and conservation laws, identical particle systems, approximation techniques (including time-dependent and time-independent perturbation theories and variational techniques) and their applications, scattering theory, radiative transitions, and helium atom.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite PHYS 5250.

**PHYS 5400 (3) Introduction to Fluid Dynamics**
Covers equations of fluid motion relevant to planetary atmospheres and oceans and stellar atmospheres; effects of rotation and viscosity; and vorticity dynamics, boundary layers and wave motions. Introduces instability theory, nonlinear equilibration and computational methods in fluid dynamics. Department enforced prerequisite: partial differential equations or equivalent.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5400 and ASTR 5400
**Requisites:** Restricted to graduate students only.

**PHYS 5430 (3) Advanced Laboratory**
Two lectures, one lab per week. Experiments introduce students to realities of the experimental physics so they gain a better understanding of theory and an appreciation of the vast amount of experimental work done in the physical sciences today. Department enforced prerequisites: PHYS 3330 and PHYS 3220 and PHYS 3320. Department enforced corequisites: PHYS 4410.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 4430
**Requisites:** Restricted to graduate students only.

**PHYS 5450 (3) History and Philosophy of Physics**
Discusses the epistemic question of what characterizes good physics research as well as the metaphysical question of what our best physics research tells us about the world. Topics may include case studies of physics experiments, theory choice, and scientific methodology in physics, as well as foundational metaphysical questions in statistical mechanics, quantum mechanics, special and general relativity, chance and probability, and the laws of nature.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4450 and PHIL 5450 and PHIL 5450
**Requisites:** Restricted to graduate students only.

**PHYS 5460 (3) Teaching and Learning Physics**
Learn how people understand key concepts in physics. Through examination of physics content, pedagogy and problems, through teaching, and through research in physics education, students will explore the meaning and means of teaching physics. Students will gain a deeper understanding of how education research is done and how people learn. Useful for all students, especially for those interested in physics, teaching, and education research.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 4460 and EDUC 4460 and EDUC 5460
**Requisites:** Restricted to graduate students only.

**PHYS 5550 (3) Cells, Molecules and Tissues: A Biophysical Approach**
Focuses on the biophysics governing the structure/function of enzymes, cells, extracellular matrix and tissue. Synthesizes ideas from molecular biology, physics, and biochemistry, emphasizing how low Reynolds number physics, not Newtonian physics, is relevant to life inside a cell.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 4550 and MCDB 4550 and MCDB 5500

**PHYS 5560 (3) Introduction to Biophysics**
Covers an introduction to the physics of living systems. Focuses on how living systems are able to generate order, with both physical principles and biological examples. Covers the development of quantitative models for biological systems, including estimates. Taught from a physics perspective, with biology background introduced as needed.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 4560 and MCDB 4560 and MCDB 5560
**Grading Basis:** Letter Grade

**PHYS 5606 (3) Optics Laboratory**
Consists of 13 optics experiments that introduce the techniques and devices essential to modern optics, including characterization of sources, photodetectors, modulators, use of interferometers, spectrometers and holograms, and experimentation of fiber optics and Fourier optics.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5606
**Recommended:** Prerequisite undergraduate optics course such as PHYS 4510.

**PHYS 5730 (3) Particle Physics**
Introduces the properties of elementary particles, phenomenology of particle interactions, particle detector, particle accelerators, scattering cross sections, decay rates, electron-positron annihilation, lepton scattering and hadron structure, quantum chromodynamics, electroweak interactions, symmetries and symmetry breaking.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites undergraduate courses in quantum mechanics and electricity and magnetism.

**PHYS 5770 (3) Gravitational Theory (Theory of General Relativity)**
Presents Einstein's relativistic theory of gravitation from geometric viewpoint; gives applications to astrophysical problems (gravitational waves, stellar collapse, etc.). Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites PHYS 3220 and PHYS 3320.

**PHYS 5840 (1-3) Selected Topics for Graduate Independent Study**
Subject matter to be arranged.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**PHYS 5970 (3) Seminar on Physical Methods in Biology**
Covers basic mechanisms and applications of physical methods used in current biological research, microprobe analysis, Eels, elementary electron and x-ray crystallography, biomedical imaging (NMR, MRI, Pet, Cat), Fourier analysis, synchrotron radiation, Exafs, neutron scattering and novel ultramicroscopy techniques. Includes lectures, student presentations, occasional demonstrations. Emphasis depends on student interest.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 4970
**Requisites:** Restricted to graduate students only.

**PHYS 6260 (3) Geometry of Quantum Fields and Strings**
Focuses on differential geometric techniques in quantum field and string theories. Topics include: spinors, Dirac operators, index theorem, anomalies, geometry of superspace, supersymmetric quantum mechanics and field theory and nonperturbative aspects in field and string theories.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 6260
**Recommended:** Prerequisites MATH 6230 and PHYS 5250 and MATH 6240 and PHYS 7280.

**PHYS 6610 (3) Earth and Planetary Physics 1**
Examines mechanics of deformable materials, with applications to earthquake processes. Introduces seismic wave theory. Other topics include inversion of seismic data for the structure, composition and state of the interior of the Earth.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 6610 and ASTR 6610
**Requisites:** Restricted to graduate students only.

**PHYS 6620 (3) Earth and Planetary Physics 2**
Covers space and surface geodetic techniques as well as potential theory. Other topics are the definition and geophysical interpretation of the geoid and of surface gravity anomalies; isostasy; post-glacial rebound; and tides and the rotation of the Earth.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 6620 and ASTR 6620
**Requisites:** Restricted to graduate students only.

**PHYS 6630 (3) Earth and Planetary Physics 3**
Examines the solar system, emphasizing theories of its origin and meteorites. Highlights distribution of radioactive materials, age dating, heat flow through continents and the ocean floor, internal temperature distribution in the Earth, and mantle convection. Also covers the origin of the oceans and atmosphere.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 6630 and ASTR 6630
**Requisites:** Restricted to graduate students only.

**PHYS 6650 (1-3) Seminar in Geophysics**
Advanced seminar studies in geophysical subjects for graduate students.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 6650 and GEOL 6650
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHYS 6655 (3) InSAR Processing and Interpretation**
Understand the concepts and applications of interferometric synthetic aperture radar (InSAR) and differential InSAR, to include an introduction to physical geodesy and satellite techniques.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 6655
**Grading Basis:** Letter Grade

**PHYS 6670 (2) Geophysical Inverse Theory**
Principles of geophysical inverse theory as applied to problems in the Earth sciences, including topography, Earth structure and earthquake locations.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 6670
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites a course in calculus and a course in computer programming (any language).

**PHYS 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.

**PHYS 6950 (1-6) Master's Thesis**
Approved problem in theoretical or experimental physics under the direction of staff members. Intended to introduce the student to procedures in research and development work. Work of an original nature expected.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHYS 7160 (3) Intermediate Plasma Physics**
Continuation of PHYS 5150. Topics vary yearly but include nonlinear effects such as wave coupling, quasilinear relaxation, particle trapping, nonlinear Landau damping, collisionless shocks, solutions; nonneutral plasmas; kinetic theory of waves in a magnetized plasma; anisotropy; inhomogeneity; radiation- ponderomotive force, parametric instabilities, stimulated scattering; plasma optics; kinetic theory and fluctuation phenomena.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 7160
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite PHYS 5150.

**PHYS 7230 (3) Statistical Mechanics**
Classical and quantum statistical theory, including study of both equilibrium and nonequilibrium systems. Topics covered include kinetic theory, degenerate gases, macrocanonical and grand canonical ensembles, and irreversible processes. Department enforced prerequisite: advanced undergraduate quantum mechanics course.
**Requisites:** Restricted to graduate students only.

**PHYS 7240 (3) Advanced Statistical Mechanics**
Introduces current research topics in statistical mechanics. Topics vary from year to year and may include phase transitions, critical phenomena, nonequilibrium phenomena, dense fluids, dynamical systems, plasma physics, or quantum statistical mechanics.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite PHYS 7230.

**PHYS 7250 (3) Quantum Many Body Theory**
Theory of quantum many body systems, including methods based on Green's functions, Feynman diagrams, and coherent state path integral with applications to interacting quantum gases, superconductivity and superfluidity, quantum phase transitions, quantum magnetism, quantum motion in the presence of disorder, and topological states of matter.
**Requisites:** Restricted to graduate students only.

**PHYS 7270 (3) Introduction to Quantum Mechanics 3**
Radiation theory; relativistic wave equations with simple applications; introduction to field theory and second quantization.
**Requisites:** Restricted to graduate students only.

**PHYS 7280 (3) Advanced Quantum Theory**
Quantum theory of fields, elementary particles, symmetry laws, and topics of special interest.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite PHYS 7270 or instructor consent required.

**PHYS 7310 (3) Electromagnetic Theory 1**
Sophisticated approach to electrostatics, boundary value problems, magnetostatics, applications of Maxwell's equations to electromagnetic wave propagation, wave guides, and resonant cavities and magnetohydrodynamics.
**Requisites:** Restricted to graduate students only.

**PHYS 7320 (3) Electromagnetic Theory 2**
Continuation of PHYS 7310. Topics include relativistic particle dynamics; radiation by moving charges; multiple fields; radiation damping and self-fields of a particle; collisions between charged particles and energy loss; radiative processes; and classical field theory.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite PHYS 7310.

**PHYS 7430 (3) Soften Condensed Matter Physics**
Introduces the science of liquid crystals, polymers, biological membranes, biopolymers, block copolymers, molecular monolayers, colloids, nanoparicle suspensions, emulsions, foals, gels, elastomers and other soft materials. Topics vary from semester to semester and is geared toward graduate students with diverse preparation backgrounds, including students from the Department of Physics, as well as other science and engineering departments.
**Requisites:** Restricted to graduate students only.

**PHYS 7440 (3) Theory of the Solid State**
Stresses application to the solid state of physical concepts basic to much of modern physics, single-particle approximation, and the energy-band description of electron states in solids, pseudopotential theory applied to ordered and disordered systems, dynamical behavior of electrons in solids, lattice dynamics, Hartree-Fock and random-phase approximation in solids, many-body aspects of magnetism, and superconductivity.
**Requisites:** Restricted to graduate students only.

**PHYS 7450 (3) Theory of Solid State 2**
Second semester of condensed matter physics, covers topics in soft condensed matter physics, liquid crystals, semiconductors, Quantum Hall effect, Fractional Quantum Hall effect, superconductivity and other topics at the discretion of the instructor.
**Requisites:** Restricted to graduate students only.

**PHYS 7550 (3) Atomic and Molecular Spectra**
Covers theory of atomic structure and spectra, including coupling of angular momenta, tensor operators, energy levels, fine and hyperfine structure, transition probabilities, Zeeman and Stark effects. Molecular spectra: electronic, vibrational, and rotational states. Rotation matrices, symmetric top.
**Requisites:** Restricted to graduate students only.

**PHYS 7560 (3) Quantum Optics**
Covers quantum optical and atomic systems including topics such as: coherent and squeezed states, theory of optical coherence, atom-radiation interaction, optical Bloch equations, open quantum systems, dynamics on the Bloch sphere, resonance fluorescence, beam-splitters and interferometry, entanglement and quantum information.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites PHYS 3220 and PHYS 4410.

**PHYS 7570 (3) Quantum Information and Computing**
Covers the foundations of quantum information and computing. Includes bits and qubits, entanglement, quantum algorithms, and quantum error correction. More advanced topics selected from: Quantum Shannon theory, quantum communication and networks, quantum-enhanced measurements, and quantum simulation. Department enforced prerequisite: PHYS 5250.
**Requisites:** Restricted to graduate students only.

**PHYS 7650 (3) Nonlinear and Nano-Optics**
Covers the field of ultrafast optics including both experimental and theoretical aspects. Topics include: description of ultrashort optical pulses, propagation of pulses including dispersion and nonlinearity, their integration, measurement and manipulation and their use in applications including spectroscopy.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites PHYS 4510 or PHYS 5160.

**PHYS 7660 (3) Ultrafast Optics**
Covers the field of ultrafast optics including both experimental and theoretical aspects. Topics include description of ultrashort optical pulses, propagation of pulses including dispersion and nonlinearity, their generation, measurement and manipulation and their use in applications including spectroscopy. Department enforced prerequisite: PHYS 5160, or PHYS 4510, or ECEN 5645.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**PHYS 7730 (3) Theory of Elementary Particles**
Systematics of elementary particles, leptons, quarks,gauge bosons, symmetries and symmetry breaking, scattering cross sections, decay rates, electron-positron annihilation, lepton scattering and hadron structure, quantum chromodynamics, electroweak interactions, gauge theories.
**Requisites:** Restricted to graduate students only.

**PHYS 7810 (1-3) Special Topics in Physics**
Various topics not normally covered in the curriculum; offered intermittently depending on student demand and availability of instructors.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHYS 7820 (3) Topics in Scientific Writing**
Teaches strategies used in scientific writing with emphasis on problem statement, audience analysis and principles of sound argument; reviews and reinforces essential writing skills, stressing the need for careful and strategic revision; provides experience in writing academic and professional communications; presentation skills and proposal writing. Most appropriate for students beginning to write journal articles, Comps II paper, or dissertation chapter.
**Requisites:** Restricted to graduate students only.

**PHYS 7830 (1) Plasma Seminar**
One credit 'journal club' style course covering current and significant historical advances in plasma physics research. Each week the class is assigned a journal article to read in advance of the meeting and one student is selected (on a rotating basis) to present a synopsis and lead a round-table discussion. Cannot be used for minimum credit hour requirements of graduate program. See also PHYS 7810 and PHYS 7820. May be repeated for a total of 7 credit hours.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**PHYS 7840 (1-3) Selected Topics for Graduate Independent Study**
Subject matter to be arranged.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**PHYS 7850 (1-3) Selected Topics for Graduate Independent Study**
Subject matter to be arranged. May be repeated for a total of 7 credit hours.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**PHYS 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.

# Physics - Master of Science (MS)

Students may obtain a master's degree as either an undergraduate student through the bachelor's–accelerated master's degree program or as a graduate student.

The master's degree in this field is not available through direct admission and may only be earned under special circumstances. Please contact program for additional information and requirements.

In certain circumstances, students can be admitted to the graduate program for a terminal master's degree, in which case the prerequisites are the same as for the doctoral program.

## Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degrees:

- Physics - Bachelor of Arts (BA) (p. 527)
- Engineering Physics - Bachelor of Science (BSEP) (p. 997)

## Requirements

### Qualifying Examination

The Graduate Record Examination (GRE) aptitude tests and advanced test in physics are normally used in place of a qualifying examination, and this examination is normally taken before the time of entry into the Graduate School.

### Course Requirements

There are two separate plans for obtaining the master's degree, both of which require a total of 30 credit hours with a grade of B- or better at the 5000 level or above (up to 6 credit hours may be at the 3000 or 4000 level if approved by the physics graduate chair). All but 3 credit hours must be in physics (more credit hours may be allowed with permission of the physics graduate chair). A minimum of a B average (GPA of 3.0) must be maintained.

## Degree Plans

### Plan I: Thesis Option

This plan requires 4–6 thesis credit hours and completion of five of the following courses with a grade of B- or better.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| Select five of the following courses: | | 15 |
| PHYS 5250 | Introduction to Quantum Mechanics 1 | |
| PHYS 5260 | Introduction to Quantum Mechanics 2 | |
| PHYS 7310 | Electromagnetic Theory 1 | |
| PHYS 7320 | Electromagnetic Theory 2 | |
| PHYS 5210 | Theoretical Mechanics | |
| PHYS 7230 | Statistical Mechanics | |
| **Total Credit Hours** | | **15** |

The student must write a thesis and present a talk to a three-member faculty committee.

### Plan II: Non-Thesis Option

This plan requires completion of five of the following courses with a grade of B- or better.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| Select five of the following courses: | | 15 |
| PHYS 5250 | Introduction to Quantum Mechanics 1 | |
| PHYS 5260 | Introduction to Quantum Mechanics 2 | |
| PHYS 7310 | Electromagnetic Theory 1 | |
| PHYS 7320 | Electromagnetic Theory 2 | |
| PHYS 5210 | Theoretical Mechanics | |
| PHYS 7230 | Statistical Mechanics | |
| **Total Credit Hours** | | **15** |

The student must pass the comprehensive exam II, which is a three-section examination that includes a formal research review paper and a formal presentation, followed by a question and answer oral session.

# Physics - Doctor of Philosophy (PhD)

Graduate study and opportunities for basic research are offered in experimental and theoretical physics in the following subfields: atomic and molecular physics, biophysics, chemical physics, condensed matter physics, elementary particle physics, geophysics, laser and optical physics, nuclear physics, physics education research, plasma and space physics, quantum information science and renewable energy.

Doctoral programs in chemical physics (https://catalog.colorado.edu/graduate/colleges-schools/arts-sciences/programs-study/chemistry-biochemistry/chemical-physics-doctor-philosophy-phd/) and geophysics (p. 1291) are offered jointly with the Department of Chemistry and with the other departments that participate in the interdepartmental geophysics program.

# Requirements

## Prerequisites

Entering graduate students must have a thorough undergraduate preparation in physics, equivalent to an undergraduate physics major at a recognized college or university. This preparation includes courses in general physics, analytical mechanics, electricity and magnetism, thermodynamics, quantum mechanics, atomic physics and mathematics through differential equations and complex variables.

Students wishing to pursue graduate work in physics leading to candidacy for an advanced degree should carefully read the Doctoral Degree Requirements (p. 1114) section of this catalog.

## Qualifying Examination

The Graduate Record Examination aptitude tests and advanced test in physics are normally used in place of a qualifying examination, and this examination is normally taken before the time of entry into the Graduate School.

## Course Requirements

To earn a PhD, candidates must complete 30 credit hours of graduate courses and 30 hours of dissertation credit. At least 27 of the 30 credit hours of coursework must be physics courses at the 5000 level or above; exceptions may be granted with the discretion of the associate chair of graduate studies. All courses, required or otherwise, must be passed with a grade of B- or better, and a course may be repeated only once.

## Comprehensive Examination

The comprehensive examination is divided into three parts. Part I consists of passing any five of the following six courses with a B- or better.

| Code | Title | Credit Hours |
|---|---|---|
| PHYS 5210 | Theoretical Mechanics | 3 |
| PHYS 7230 | Statistical Mechanics | 3 |
| PHYS 5250 & PHYS 5260 | Introduction to Quantum Mechanics 1 and Introduction to Quantum Mechanics 2 | 6 |
| PHYS 7310 & PHYS 7320 | Electromagnetic Theory 1 and Electromagnetic Theory 2 | 6 |

The associate chair may waive courses for students with graduate-level equivalents. Students who are enrolled in Applied Physics Tracks have different course requirements than listed above. See the Applied Physics Tracks Requirements page (https://www.colorado.edu/physics/academics/graduate-students/graduate-program-requirements-phd/graduate-tracks-applied-physics-and/) on the Department of Physics website for more information. Part II is a three-section examination that includes a formal research review paper and a formal presentation, followed by a question-and-answer oral session. Part III consists of a thesis prospectus presented to the thesis committee.

Part II of the comprehensive examination must be taken after successful completion of Part I, but no later than the student's sixth enrolled regular semester. Part III must be completed prior to the completion of the student's fourth year. Parts II and III of the comprehensive examination may be taken a second time, no more than one semester after the first attempt.

### Language Requirement

The department has no requirement in foreign languages.

## Learning Outcomes

By the completion of the program, students will be able to:

# Political Science

The Department of Political Science offers instruction and research in the art and science of politics. Work within the department is organized around six basic fields: American government and politics, comparative politics, international relations, public policy, political theory and empirical theory and methodology. The department's mission is to understand the political world and to equip students and their community with the skills for a lifetime of inquiry and engagement.

**Course code for this program is PSCI.**

## Master's Degree

- Political Science - Master of Arts (MA) (p. 1373)

## Doctoral Degree

- Political Science - Doctor of Philosophy (PhD) (p. 1373)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Adler, Edward Scott (https://experts.colorado.edu/display/fisid_108903/)
Professor; PhD, Columbia University

Aydin, Aysegul (https://experts.colorado.edu/display/fisid_143789/)
Associate Professor; PhD, SUNY at Binghamton

Baird, Vanessa Anne (https://experts.colorado.edu/display/fisid_115297/)
Associate Professor; PhD, University of Houston-University Park

Bateson, Regina
Assistant Professor; PhD, Yale University

Bayard de Volo, Lorraine M. (https://experts.colorado.edu/display/fisid_143611/)
Professor; PhD, University of Michigan Ann Arbor

Beard, Steven (https://experts.colorado.edu/display/fisid_168279/)
Teaching Assistant Professor

Beer, Francis A. (https://experts.colorado.edu/display/fisid_100703/)
Professor Emeritus; PhD, University of California Berkeley

Bickers, Kenneth Norman (https://experts.colorado.edu/display/fisid_130482/)
Chair, Professor; PhD, University of Wisconsin—Madison

Billica, Nancy (https://experts.colorado.edu/display/fisid_114455/)
Instructor; PhD, Harvard University

Boulding, Carew Elizabeth (https://experts.colorado.edu/display/fisid_144417/)
Professor; PhD, University of California, San Diego

Brown, Hank
Professor Emeritus

Brunner, Ronald D.
Professor Emeritus

Cohen, Grant
Lecturer; PhD, University of Miami

Costain, Anne N. (https://experts.colorado.edu/display/fisid_101427/)
Professor Emerita

Costain, Douglas
Senior Instructor Emeritus

Derderyan, Svet (https://experts.colorado.edu/display/fisid_158226/)
Instructor; PhD, University of North Carolina

Donavan, Janet Lynn (https://experts.colorado.edu/display/fisid_145270/)
Teaching Professor, Associate Chair; PhD, University of Wisconsin–Madison

Eckart, Dennis R.
Professor Emeritus

Ferguson, Michaele L. (https://experts.colorado.edu/display/fisid_129299/)
Associate Professor; PhD, Harvard University

Fitzgerald, Jennifer L. (https://experts.colorado.edu/display/fisid_140086/)
Professor, Chair, Faculty Fellow; PhD, Brown University

Greenberg, Edward S. (https://experts.colorado.edu/display/fisid_106090/)
Professor Emeritus; Ph.D., University of Wisconsin- Madison

Jorde, Christopher
Teaching Assistant Professor; PhD, University of Colorado Boulder

Jupille, Joseph H. (https://experts.colorado.edu/display/fisid_140088/)
Professor; PhD, University of Washington

Krutz, Glen
Professor; , Texas AM University

Landgrave, Michelangelo
Assistant Professor

Mapel, David Reed
Professor Emeritus

Martinez, Marayna
Assistant Professor; PhD, Duke University

McIver, John P.
Professor Emeritus

Palmer, Alexandra
Assistant Teaching Professor; PhD, University of Colorado Boulder

Parinandi, Srinivas C. (https://experts.colorado.edu/display/fisid_155589/)
Assistant Professor; PhD, University of Michigan Ann Arbor

Park, Clara (https://experts.colorado.edu/display/fisid_163545/)
Assistant Professor; PhD, University of California, Berkeley

Philips, Andrew Q. (https://experts.colorado.edu/display/fisid_159155/)
Associate Professor; PhD, Texas A&M University

Safran, William
Professor Emeritus

Scarritt, James R.
Professor Emeritus

Shannon, Megan L. (https://experts.colorado.edu/display/fisid_154265/)
Associate Professor; PhD, University of Iowa

Shepherd Macklin, JulieMarie Anjali (https://experts.colorado.edu/display/fisid_153034/)
Instructor; PhD, University of Colorado Boulder

Shin, Adrian (https://experts.colorado.edu/display/fisid_158138/)
Assistant Professor; PhD, University of Michigan Ann Arbor

Sokhey, Anand Edward (https://experts.colorado.edu/display/fisid_147113/)
Professor; PhD, The Ohio State University

Sokhey, Sarah Wilson (https://experts.colorado.edu/display/fisid_147614/)
Associate Professor; PhD, The Ohio State University

Strayhorn, Joshua Aaron (https://experts.colorado.edu/display/fisid_152584/)
Associate Professor; PhD, Emory University

Tir, Jaroslav (https://experts.colorado.edu/display/fisid_149842/)
Professor; PhD, University of Illinois at Urbana–Champaign

Vanderheiden, Steven Jon (https://experts.colorado.edu/display/fisid_144759/)
Professor; PhD, University of Wisconsin–Madison

# Courses

**PSCI 6851 (2) Interdisciplinary Social Science Professional Socialization**
Trains graduate students and provides professional socialization in interdisciplinary social science research. Open to all interested students, with programming provided by the Institute of Behavioral Science. Sessions include IBS-housed colloquia and workshops in professional socialization, technological tools, interdisciplinary research, ethics, grant writing, etc. Students workshop and submit a research paper.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 6831 and SOCY 6851
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PSCI 6948 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General

**PSCI 7002 (3) Seminar in West European Politics**
Examines West European politics in terms of general theories of comparative politics, including institutional, behavioral and political economy approaches.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Comparative

**PSCI 7004 (3) Seminar: Political Theory**
Allows for intensive research in and presentation of selected topics. Introduces students to the broad context within which political ideas arise. Deals with classical and modern thought.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Political Theory

**PSCI 7008 (1) Teaching Political Science**
Designed to prepare graduate student teachers in the essentials of political science teaching and provide a background in theories of political science teaching and practical skills development in discipline-specific education.
**Requisites:** Restricted to Political Science (PSCI) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General

**PSCI 7011 (3) Seminar: American Politics**
Core field seminar for students of American politics. Course work emphasizes the diversity of contemporary research on American political history, political institutions, and political behavior.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7012 (3) Seminar: Comparative Political Systems**
Discusses current literature on comparative politics including theoretical and methodological issues.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Comparative

**PSCI 7013 (3) Seminar: International Relations**
Reviews salient literature on international relations, and subsequent presentation and critical discussion of analytical studies. Allows students wide latitude in substantive and methodological approaches. Emphasizes changing trends and efforts to understand the bases for cooperation and conflict.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International Relations

**PSCI 7021 (3) Latinos and U.S. Politics**
Examines in depth the theoretical and empirical literature assessing the political situation and activities of Latinos (Mexican Americans, Puerto Ricans, Cuban Americans, and others) in the U.S. Stresses original research.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7022 (3) Seminar in Political and Economic Development**
Covers domestic political and economic development in Latin America, Africa, and Asia, as well as interactions with the global economy. Includes defining, explaining, and prescribing policies for successful development, and comparing the experiences of developing and industrialized countries.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Comparative

**PSCI 7024 (3) Seminar: Selected Political Theories**
Familiarizes students with selected political philosophies or theories in classical or modern political thought.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Political Theory

**PSCI 7028 (1) Teaching Political Science 2**
Second course designed to train graduate teachers in the essentials of political science teaching and provide a background in theories of political science teaching and practical skills development in discipline specific education.
**Requisites:** Requires prerequisite course of PSCI 7008 (minimum grade D-). Restricted to Political Science (PSCI) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General

**PSCI 7031 (3) Seminar: Political Attitudes and Behavior**
Provides an intensive examination of topics in political attitudes and behavior such as political participation, ideology, voting, and elite behavior. Reviews methodology of behavioral research and introduces ICPSR data archive and computer-based research.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7032 (3) Seminar: Latin American Politics**
Stresses intensive study of the political process in Latin America with special emphasis on democratization.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Comparative

**PSCI 7043 (3) Seminar: Problems of International Institutions**
Investigates the choices that political actors make in forming international institutions, the power of institutions, the limits of institutional power, and the dysfunction of institutions. Explores the challenges that institutions face in addressing global problems such as human rights and international violence. Also analyzes the methods used to understand the influence of institutions.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International Relations

**PSCI 7046 (3) Seminar: Urban Public Policy**
Focuses on formulation, revision, and outcomes of public policy in American urban communities. Also uses some comparative Canadian and European literature.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Public Policy

**PSCI 7051 (3) Seminar: The United States Congress**
Comprehensively examines literature and selected research topics concerning the United States Congress.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7052 (3) Democracy & Authoritarianism**
Examine differences between democracies and authoritarian regimes; the choices and the consequences of democratic institutions in authoritarian regimes; and the causes of authoritarian survival and demise and the subsequent political choice.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite PSCI 7012.
**Additional Information:** Departmental Category: Comparative

**PSCI 7053 (3) War and Peace**
Explores the conditions that promote conflict between countries, focusing on broad and systemic explanations of war and peace. Investigates classical as well as current behavioral approaches to understanding why countries fight.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International Relations

**PSCI 7055 (3) Introductory Game Theory**
Develops competence in engaging formal theories of politics and in constructing and solving basic game-theoretic models of political behavior.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7056 (3) Readings in Public Policy**
Explores diverse approaches to policy choice, change, and learning processes. Overviews literature on policy determinants and typologies, policy subsystems, innovation and diffusion, agenda setting, implementation, problem definition and social construction, policy design, institutional analysis, and policy and democratic values.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Public Policy

**PSCI 7062 (3) The Politics of Ethnicity**
Explores the political aspects of pluralism, ethnonationalism, separatism, and related phenomena. Examines theories of ethnic mobilization, conflict,and accommodation in the context of political development and nation building. Includes cross-polity comparisons and case studies of multiethnic societies in the developed and developing world.
**Requisites:** Restricted to graduate students only.
**Recommended:** Requisite at least one course in comparative politics.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Comparative

**PSCI 7071 (3) Seminar: An Introduction to the Rule of Law**
Introduces students to debates about the role of institutions, particularly but not exclusively legal institutions, in placing limits on the state and fostering the rule of law. What is law? Why do courts exist and what is their role in the state? What institutions are necessary to establish the rule of law? Why are institutions successful in some contexts and not others? Considers these questions by surveying classic and current research from American and comparative politics literatures on topics such as judicial independence, credible commitments, separation of powers and constitutional design.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7073 (3) Seminar: Global Political Economy**
Introduces graduate students to concepts, theories, and data used to study the global system from a political-economic framework. Examines world systems analysis, regime change theory, and dependency theory with respect to operation of the exchange and power relationship within the contemporary world system.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International Relations

**PSCI 7075 (3) Scope and Methods of Political Science**
Introduces students to research design, with a subsequent focus on professional development. Students learn about different styles of research, central methodological points surrounding (and differentiating) these styles, and standards for evaluating research, regardless of approach or content.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7085 (4) Introduction to Political Science Data Analysis**
Provides intensive experience with quantitative techniques commonly employed in political science research, covering basic inferential and descriptive statistics through multiple regression. Students undertake substantive research projects, requiring lab instruction in the use of the computer in quantitative applications of political science research.
**Requisites:** Restricted to Political Science (PSCI) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7091 (3) Politics of Social Movements**
Examines theoretical and empirical research on American social movements. Emphasizes the role of movements as political actors and their ability to bring about changes in public policy and national political institutions.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7095 (3) Advanced Political Data Analysis**
Provides advanced training in the statistical modeling of political relationships. Focuses on the properties and assumptions of the ordinary least squares regression model, building on material covered in PSCI 7085: Introduction to Political Science Data Analysis.
**Requisites:** Requires prerequisite course of PSCI 7085 (minimum grade B-). Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7108 (3) Special Topics**
Various topics not normally offered in the curriculum. Topics vary each semester.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General

**PSCI 7111 (3) Seminar: American Political Institutions**
Intensive examination of the structure and rules of different political institutions in the United States. Explores both the changing approaches to the study of American political institutions as well as many ofthe major research topics on the presidency, Congress, the judiciary, and the bureaucracy.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7114 (3) Survey of Historical and Contemporary Political Theory**
Examines major texts of Western political thought from the ancients through the 21st century. Introduces students to major schools of contemporary political theory, while situating these in their larger political context. Professionalizes students through presentations and research projects. Texts vary each semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Requisite some previous coursework in political theory or philosophy.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Political Theory

**PSCI 7115 (3) Qualitative Methods**
Develop proficiency in constructing research designs with qualitative methods. The goal is to understand and be able to justify research designs involving relatively small numbers of observations as good political science given the fact that such designs may limit our ability to generalize.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7116 (3) Context-Sensitive Research Methods**
Prepares students to conduct research on topics where data is not obvious or not easily available. Encompasses variations in context and setting as part of data observations. Methods include interviewing protocols, interpretive methods, cluster analyses, case study methodologies and textual analyses.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 5740
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Public Policy

**PSCI 7118 (3) Foundations of Environmental Justice**
Examines environmental justice movements, policies, institutions, objectives, and scholarship. Identifies factors that contribute to environmental inequality, and efforts to reduce it. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** COMM 7118, ENVS 7118 and GEOG 7118
**Requisites:** Restricted to graduate students only.

**PSCI 7123 (3) Civil Conflict**
Surveys historical, theoretical, and empirical analyses of violent conflict behavior, including the causes and consequences of civil war, protests, insurgency, terrorism, revolution, and intervention.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International Relations

**PSCI 7124 (3) Contemporary Democratic Theory**
Surveys major schools of contemporary democratic theory and introduces students to current scholarly debates about democracy and democratic politics. Professionalizes students through class presentations and research projects. Specific controversies and texts vary each semester.
**Requisites:** Restricted to graduate students only.
**Recommended:** Requisite some previous coursework in political theory or philosophy.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Political Theory

**PSCI 7126 (3) Introduction to Public Policy**
Designed for graduate students specializing in the field of public policy in the political science program. Surveys a wide variety of approaches to the analysis and understanding of public policy. The course is not a survey of any particular set of substantiative policy areas but instead is intended as an examination of the enduring puzzles that analysts of public policy commonly confront, the kinds of research methodologies that they employ, and a selection of the techniques that they bring to bear on their research questions.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Public Policy

**PSCI 7131 (3) Political Psychology**
Focuses on the psychological roots of political behavior, including the origins of political beliefs, political decision-making processes, and the psychology of group interactions.
**Requisites:** Restricted to Political Science (PSCI) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7132 (3) Comparative Political Economy**
Explores the relationship between economics and politics in developed and developing countries. Gives students an historical overview of 20th century economic trends and covers scholarly approaches totopics such as political and economic institutions, economic ideas and interests, the political causes of growth and equality, globalization and the welfare state, and varieties of capitalism.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite PSCI 7012.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Comparative

**PSCI 7136 (3) Public Policy and Behavioral Science**
Public policy is usually designed with the assumption that we make optimal choices based on our own best interests. Findings from the behavioral sciences, however, challenge this traditional view and reveal that a wide array of factors influence our decisions. In this course, we will explore the gaps between how we assume individuals to behave and how people actually behave. With better knowledge of what motivates human behavior, we will examine and discuss how policy might be better designed and executed to improve outcomes in society.
**Requisites:** Restricted to graduate students only.

**PSCI 7143 (3) Strategic Choice of Political Conflict**
Explores the conditions under which political actors go to war, and the conditions under which they broker peace. Approaches political conflict from the perspective of strategic choice. Conflict is not an accident, but is the deliberate result of decisions by actors. Actors choose conflict when bargaining obstacles prevent them from reaching a peaceful agreement.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**PSCI 7145 (3) Advanced Game Theory**
Covers more advanced applications of game theory in political science. Equips students with the skills to design and solve models at a reasonably high level of complexity and generality, and to understand how to effectively make use of such models in their research.
**Requisites:** Requires prerequisite course of PSCI 7055 (minimum grade B-). Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7151 (3) American Subnational Politics and Government**
Provides a comprehensive overview of the issues and literature concerning American "Subnational" politics. Considers three bodies of literature: American federalism and intergovernmental relations, state politics, and urban/local politics. Also examines a number of policy issues.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7155 (3) Maximum Likelihood Estimation and Generalized Linear Models**
Introduces maximum likelihood estimation and extends the linear model to several "generalized linear models." Provides students with the skills to analyze and understand a broad class of outcome variables and data structures such as dichotomous outcomes, counts, ordered and unordered categorical outcomes and bounded variables. Also examines several special topics such as multilevel models, causal inference and missing data.
**Requisites:** Requires prerequisite courses of PSCI 7075 and PSCI 7085 and PSCI 7095 (all minimum grade B-). Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7165 (3) Experimental Methods**
Focuses on the design, implementation, and analysis of experiments in political science, including lab experiments, survey experiments, and field experiments.
**Requisites:** Restricted to Political Science (PSCI) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7171 (3) Seminar: Law and Democratic Governance**
Explores cutting-edge debates in election law. Studies different perspectives on the current controversies in the field, in addition to select opportunities to engage scholars directly about their work. Develops students' understanding of the law of democracy, exposing students to some of the best scholarship, and improving students' ability to evaluate and critique legal scholarship.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 8205
**Recommended:** Prerequisite PSCI 7011.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7172 (3) Comparative Political Institutions**
Institutional theory has burgeoned across the social sciences in the last three decades. This course aims to raise awareness and understanding of institutional theory in comparative politics, as compared to alternative approaches such as political economy, political behavior, etc., and to help students develop skills to communicate this awareness and understanding to other professional political scientists.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Comparative

**PSCI 7173 (3) The Politics of International Factor Flows**
Focuses on the second dimension of international trade: the politics of international factor flows. Economic globalization can be defined as the freer flow of (1) goods and services (i.e., international trade) and (2) factors of production (e.g., capital and labor) across national borders. Links these topics in International Political Economy to broader theories of International Relations, namely Institutionalism and Liberalism.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International Relations

**PSCI 7175 (3) Dissertation Seminar**
Help students make progress towards (1) in the short term: focusing in on a dissertation topic, crafting a dissertation prospectus, and identifying potential funding sources; and (2) in the long term: sending papers out for review, developing a package for the job market, and understanding the academic job market and the tenure process.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7181 (3) Immigration Law and Immigrants' Rights**
Addresses four broad questions: Who is a citizen of the United States? Who else can come to this country? When and why can noncitizens be forced to leave? Who has the authority to answer these questions? These questions prompt us to examine the history of U.S. immigration, the constitutional-statutory-regulatory framework that governs immigration and citizenship law and the federal agencies that administer it. Also addresses contemporary challenges to, and assertions of, immigrants' rights.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 7615
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7183 (3) International Cooperation**
Investigates the origins, forms and consequences of international cooperation. The course covers both theoretical material related to international cooperation and various related global issue areas; security, economy, environment and social welfare. For each issue area, the key theoretical debates, empirical findings, as well as central challenges and parameters that constrain international cooperation will be investigated.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International Relations

**PSCI 7185 (3) Political Network Analysis**
Explores all aspects of political network analysis including disciplinary background, theories and concepts, approaches and applications, data basics and measurement, and techniques of analysis. Data assignments use software such as UCINET and R. Introduces visualization software including NetDraw, NetworkX and Cytoscape.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7191 (3) Law and Politics Colloquium: Race in America**
A co-taught colloquium that exposes students to highly prominent scholars conducting research on current topics at the intersection of race, social science and the law, including racial profiling, hate crime and affirmative action. Students will complete a final paper satisfying the CU Law seminar requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 8645
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7203 (3) Political Economy of International Migration and Policy**
Provides an overview of the seminal and cutting edge research on the political economy of international migration including both immigration and emigration. Covers a diverse set of international migration issues, including public attitudes toward immigration, special interest politics of immigration policy making and the dynamics between political institutions and international migration.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International Relations

**PSCI 7206 (3) Public Policy and the Governance of Natural Resources**
Addresses a basic empirical puzzle in comparative environmental policy: why are some governmental organizations able to create relatively functional governance arrangements for natural resources management, while many others fail to do so? More specifically, we will seek to understand the particular contextual conditions that make successful governance transformations more likely.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Public Policy

**PSCI 7222 (3) Comparative Political Behavior**
Provides an introduction to research on behavioral processes and outcomes using readings mainly from the sub-fields of American Politics and Comparative Politics. Geographic emphasis leans toward advanced democracies because this is how behavioral research has generally developed but will also explore works by developing country experts. The main goals are to help students become familiar with the existing literature and to help them explore several key debates in the field.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Comparative

**PSCI 7255 (3) Time Series and Pooled Time Series**
Time series models¿models which take advantage of variation over time in a single unit¿and pooled time series (sometimes called cross-sectional time series or time series cross-sectional) models¿which utilize variation across both time and spatial units¿are very common in political science. While these models offer substantial leverage over important social science problems that use purely cross-sectional data, there are a number of pitfalls that are necessary to avoid during estimation.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite students should have a background in advanced regression statistics (such as PSCI 7085, PSCI 7095 and PSCI 7155).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7306 (3) Program Evaluation**
Focuses on applying the tools of causal inference and program evaluation to various policy issues. The course materials explore whether programs meet their desired goals. There are a number of ways in which the ¿effectiveness¿ of a program can be defined and measured. Empirical applications based on real-world data will be drawn from a wide range of policy areas, including education, welfare, unemployment, discrimination, health, immigration, the environment, and economic development. Previously offered as a special topics course.
**Grading Basis:** Letter Grade

**PSCI 7901 (1-3) Independent Study**
Not a free option; must be approved by the student's advisor and program chair. Does not count as seminar. Not more than 6 hours of independent study may be credited toward PhD degree in political science. Special independent study approval agreement form must be completed by student and signed by faculty advisor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7902 (1-3) Independent Study**
Not a free option; must be approved by the student's advisor and program chair. Does not count as seminar. Not more than 6 hours of independent study may be credited toward PhD degree in political science. Special independent study approval agreement form must be completed by student and signed by faculty advisor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Comparative

**PSCI 7903 (1-3) Independent Study**
Not a free option; must be approved by the student's advisor and program chair. Does not count as seminar. Not more than 6 hours of independent study may be credited toward PhD degree in political science. Special independent study approval agreement form must be completed by student and signed by faculty advisor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International Relations

**PSCI 7904 (1-3) Independent Study**
Not a free option; must be approved by the student's advisor and program chair. Does not count as seminar. Not more than 6 hours of independent study may be credited toward PhD degree in political science. Special independent study approval agreement form must be completed by student and signed by faculty advisor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Political Theory

**PSCI 7905 (1-3) Independent Study**
Not a free option; must be approved by the student's advisor and program chair. Does not count as seminar. Not more than 6 hours of independent study may be credited toward PhD degree in political science. Special independent study approval agreement form must be completed by student and signed by faculty advisor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7906 (1-3) Independent Study**
Not a free option; must be approved by the student's advisor and program chair. Does not count as seminar. Not more than 6 hours of independent study may be credited toward PhD degree in political science. Special independent study approval agreement form must be completed by student and signed by faculty advisor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Public Policy

**PSCI 7908 (1-3) Independent Study**
Not a free option; must be approved by the student's advisor and program chair. Does not count as seminar. Not more than 6 hours of independent study may be credited toward PhD degree in political science. Special independent study approval agreement form must be completed by student and signed by faculty advisor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General

**PSCI 8901 (1-3) Graduate Research Topic**
Provides an opportunity for independent research in a topic of special interest. Arrangements are made to suit the needs of each particular student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 8902 (1-3) Graduate Research Topic**
Provides an opportunity for independent research in a topic of special interest. Arrangements are made to suit the needs of each particular student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Comparative

**PSCI 8903 (1-3) Graduate Research Topic**
Provides an opportunity for independent research in a topic of special interest. Arrangements are made to suit the needs of each particular student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International Relations

**PSCI 8904 (1-3) Graduate Research Topic**
Provides an opportunity for independent research in a topic of special interest. Arrangements are made to suit the needs of each particular student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Political Theory

**PSCI 8905 (1-3) Graduate Research Topic**
Provides an opportunity for independent research in a topic of special interest. Arrangements are made to suit the needs of each particular student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 8906 (1-3) Graduate Research Topic**
Provides an opportunity for independent research in a topic of special interest. Arrangements are made to suit the needs of each particular student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Public Policy

**PSCI 8908 (1-3) Graduate Research Topic**
Provides an opportunity for independent research in a topic of special interest. Arrangements are made to suit the needs of each particular student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General

**PSCI 8991 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 99.00 total credit hours.
**Additional Information:** Departmental Category: American

**PSCI 8992 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 99.00 total credit hours.
**Additional Information:** Departmental Category: Comparative

**PSCI 8993 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 99.00 total credit hours.
**Additional Information:** Departmental Category: International Relations

**PSCI 8994 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 99.00 total credit hours.
**Additional Information:** Departmental Category: Political Theory

**PSCI 8995 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 99.00 total credit hours.
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 8996 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 99.00 total credit hours.
**Additional Information:** Departmental Category: Public Policy

# Political Science - Master of Arts (MA)

The master's degree in this field is not available through direct admission and may only be earned under special circumstances. Please contact program for additional information and requirements.

# Political Science - Doctor of Philosophy (PhD)

The Department of Political Science at CU Boulder offers instruction and research in the art and science of politics and has a long tradition of excellence in training graduate students. A diverse faculty of nearly 30

professors trains graduate students to conduct original research in six areas of political science:

- American government and politics
- comparative politics
- international relations
- political theory
- public policy
- empirical theory and methodology

Admission is highly competitive, with approximately 10–12 new students enrolled each fall. This ensures a high faculty-to-student ratio and close mentoring opportunities. In addition, the department holds an outstanding placement record.

The department does not accept applications for a terminal MA in political science. Students in the PhD program earn an MA in political science after the completion of a successful qualifying paper and defense at the end of the second year in the program.

# Requirements

The Department of Political Science PhD program includes coursework in six fields of study, a qualifying research paper and oral defense, comprehensive written and oral examinations, doctoral prospectus defense, final dissertation defense, and a minimum of 30 dissertation credit hours.

Students take a wide range of courses and demonstrate mastery of two different fields, the major (first field) and the minor (second field). Students take a minimum of three seminars in each field and at least three courses outside of their major and minor fields.

Students complete a minimum of 42 credit hours of coursework with a B average or better. Of these 42 credit hours, 39 must be at the 7000 level or higher and 35 credit hours must be taken in the Political Science Department.

Students take additional coursework with the consideration that they will fulfill all requirements needed to complete the program. During the first semester in residence, students are required to take three introductory courses:

- PSCI 7008 Teaching Political Science
- PSCI 7075 Scope and Methods of Political Science
- PSCI 7085 Introduction to Political Science Data Analysis

In addition, there are five majors with required core seminar coursework.

- American Politics Major - PSCI 7011 is required.
- Comparative Politics Major - PSCI 7012 is required.
- International Relations Major - PSCI 7XX3 is required (please identify an appropriate graduate seminar in consultation with your advisor).
- Political Theory Major - PSCI 7004 is required.
- Public Policy Major - PSCI 7126 is required.

As a condition of funding, all students appointed as graduate student assistants are required to enroll in a minimum of 9 credit hours per semester for their first five semesters or until they have passed comprehensive exams.

Students wishing to pursue graduate work toward the degree should carefully read the Doctoral Degree Requirements (p. 1114) section and review the courses listed in this catalog. Requirements for the political science graduate program are clarified in more detail on the department's PhD Requirements and Handbook (http://www.colorado.edu/polisci/graduate/phd/) webpage.

## Time Limit

Full-time students are expected to complete all requirements for the PhD degree within five years of entering the program. The maximum time allowed by the Graduate School is six years from the semester of admission.

# Learning Outcomes

By the completion of the program, students will be able to:

- (Research Competence and Original Contribution) Demonstrate the ability to independently design, conduct and present original research that makes a meaningful contribution to and advances knowledge within the field of political science. Explanation: Students will engage in independent scientific thinking, designing and employing advanced research questions and methods to develop innovative studies that engage with current debates in political science. This includes mastery of research design, data collection and analysis, aiming for original research that is publication-ready or presents substantial academic value.
- (Communication, Engagement and Dissemination of Research) Communicate research findings clearly and professionally to both academic and non-academic audiences through multiple mediums, including written papers, oral presentations and poster sessions. Participate actively in the political science research community through conferences, publications and professional development activities. Explanation: Students will develop effective communication skills necessary to share their research in various settings, ranging from conferences to academic journals to classroom-based communication. This outcome emphasizes both written work as well as verbal presentation. Students will also engage with the broader academic community, contributing to scholarly discourse through venues such as publications, talks and conferences.
- (Theoretical Mastery and Breadth in Political Science) Acquire and apply in-depth knowledge of core political science theories and concepts, while also demonstrating expertise in one or more sub-fields within the discipline. Apply critical and analytical thinking in the evaluation of political phenomena, drawing upon both theoretical and empirical evidence. Explanation: Students will master key political science theories and concepts, demonstrating a comprehensive understanding of the discipline. Students should be able to cover a wide swath of the field, but also demonstrate in-depth expertise in their main field. Students should critically engage with the literature as well as applying theoretical frameworks to real-world problems and be able to evaluate political issues and theories from multiple perspectives.
- (Pedagogical Expertise) Demonstrate the ability to teach undergraduate political science courses, utilizing evidence-based pedagogical strategies that foster student engagement and learning. Explanation: Students will be prepared to teach at the undergraduate level, designing and delivering high-quality, evidence-based instruction that reflects both subject\ knowledge and effective teaching methods.

# Psychology and Neuroscience

The Department of Psychology and Neuroscience at the University of Colorado Boulder offers a PhD degree with five subplans:

- Behavioral, psychiatric and statistical genetics
- Behavioral neuroscience
- Clinical psychology
- Cognitive psychology/cognitive neuroscience
- Social psychology

For detailed information about each field of study, visit the department's Graduate Program Subplans (https://www.colorado.edu/psych-neuro/graduate-programs/graduate-program-areas/) webpage.

Note: The department does not offer a terminal master's degree program.

**Course codes for this program are PSYC and NRSC.**

## Master's Degree

- Psychology - Master of Arts (MA) (p. 1383)

## Doctoral Degrees

- Neuroscience - Doctor of Philosophy (PhD) (p. 1383)
- Psychology - Doctor of Philosophy (PhD) (p. 1384)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Allen, David (https://experts.colorado.edu/display/fisid_114466/)
Teaching Associate Professor; PhD, University of California, Los Angeles

Alpern, Herbert P.
Professor Emeritus

Arch, Joanna (https://experts.colorado.edu/display/fisid_147415/)
Professor; PhD, University of California, Los Angeles

Bachtell, Ryan (https://experts.colorado.edu/display/fisid_146084/)
Associate Professor; PhD, Oregon Health Science University

Banich, Marie (https://experts.colorado.edu/display/fisid_120646/)
Professor; PhD, University of Chicago

Baratta, Michael V. (https://experts.colorado.edu/display/fisid_149599/)
Assistant Professor; PhD, University of Colorado Boulder

Barth, Daniel
Professor Emeritus

Benoit, Roland
Associate Professor; PhD, University College London

Bidwell, Cinnamon (https://experts.colorado.edu/display/fisid_155117/)
Associate Professor; PhD, University of Colorado Boulder

Blair, Irene (https://experts.colorado.edu/display/fisid_107261/)
Professor; PhD, Yale University

Blechman, Elaine A.
Professor Emerita

Bourne, Lyle E. Jr.
Professor Emeritus

Bryan, Angela (https://experts.colorado.edu/display/fisid_115216/)
Professor; PhD, Arizona State University

Campeau, Serge (https://experts.colorado.edu/display/fisid_115395/)
Professor; PhD, Yale University

Cartwright, Desmond S.
Professor Emeritus

Collins, Allan C.
Professor Emeritus

Colunga, Eliana (https://experts.colorado.edu/display/fisid_129477/)
Associate Professor; PhD, Indiana University Bloomington

Correll, Joshua (https://experts.colorado.edu/display/fisid_151728/)
Professor; PhD, University of Colorado Boulder

Cowell, Rosie
Associate Professor; PhD, University of Oxford

Cummings, Andrew (https://experts.colorado.edu/display/fisid_174362/)
Teaching Assistant Professor; PhD, University of Nevada Las Vegas

Curran, Timothy (https://experts.colorado.edu/display/fisid_118454/)
Professor Emeritus; PhD, University of Oregon

Curtis, Ryan (https://experts.colorado.edu/display/fisid_164483/)
Teaching Associate Professor; PhD, University of Maryland College Park Campus

Day, Heidi E.W. (https://experts.colorado.edu/display/fisid_116632/)
Teaching Professor of Distinction; PhD, University of Cambridge

Derricks, Veronica
Assistant Professor; PhD, University of Michigan

Dimidjian, Sona (https://experts.colorado.edu/display/fisid_140084/)
Professor; PhD, University of Washington

Donaldson, Zoe (https://experts.colorado.edu/display/fisid_157087/)
Associate Professor; PhD, Emory University

Friedman, Naomi P. (https://experts.colorado.edu/display/fisid_109519/)
Associate Professor; PhD, University of Colorado Boulder

Grotzinger, Andrew (https://experts.colorado.edu/display/fisid_167222/)
Assistant Professor; PhD, University of Texas at Austin

Gruber, June L. (https://experts.colorado.edu/display/fisid_153634/)
Professor; PhD, University of California, Berkeley

Harvey, Lewis Orvis (https://experts.colorado.edu/display/fisid_101173/)
Professor Emeritus

Healy, Alice F. (https://experts.colorado.edu/display/fisid_100418/)
Distinguished Professor Emeritus; PhD, The Rockefeller University

Hernandez, Theresa D. (https://experts.colorado.edu/display/fisid_102953/)
Professor; PhD, University of Texas at Austin

Hewitt, John K. (https://experts.colorado.edu/display/fisid_101035/)
Professor; PhD, University of London

Hill, Karl G. (https://experts.colorado.edu/individual/fisid_159803/)
Professor; PhD, Brandeis University

Hiura, Lisa (https://experts.colorado.edu/display/fisid_167644/)
Assistant Professor; PhD, Cornell University

Huber, David
Professor; PhD, University of Indiana

Huibregtse Ketels, Brooke (https://experts.colorado.edu/display/fisid_159929/)
Teaching Assistant Professor; PhD, University of Colorado Boulder

Ito, Tiffany (https://experts.colorado.edu/display/fisid_113066/)
Professor; PhD, University of Southern California

Jessor, Richard
Professor Emeritus

Jones, Matthew (https://experts.colorado.edu/display/fisid_144611/)
Professor; PhD, University of Michigan Ann Arbor

Judd, Charles M.
Distinguished Professor Emeritus

Kaiser, Roselinde H. (https://experts.colorado.edu/display/fisid_164070/)
Associate Professor; PhD, University of Colorado Boulder

Kandra Hughes, Kelly
Teaching Assistant Professor; PhD, University of North Carolina at Chapel Hill

Kaufmann, Vyga G. (https://experts.colorado.edu/display/fisid_151089/)
Teaching Assistant Professor; PhD, University of Colorado Boulder

Keller, Matthew C. (https://experts.colorado.edu/display/fisid_144507/)
Professor; PhD, University of Michigan Ann Arbor

Kilimnik, Chelsea (https://experts.colorado.edu/display/fisid_169111/)
Assistant Professor; PhD, University of Texas at Austin

Kim, Albert E. (https://experts.colorado.edu/display/fisid_143740/)
Associate Professor; PhD, University of Pennsylvania

King, D. Brett (https://experts.colorado.edu/display/fisid_103815/)
Teaching Professor of Distinction; PhD, Colorado State University

Kintsch, Walter
Professor Emeritus

Knight, Erik (https://experts.colorado.edu/individual/fisid_167412/)
Assistant Professor; PhD, University of Oregon

Kodish, Tamar
Assistant Professor; PhD, University of California Los Angeles

Maier, Steven F.
Distinguished Professor; PhD, University of Pennsylvania

McClelland, Gary H.
Professor Emeritus

Miyake, Akira (https://experts.colorado.edu/display/fisid_107321/)
Professor; PhD, Carnegie Mellon University

Molas, Susanna
Assistant Professor; PhD, Pompeu Fabra University

Olson, Richard
Professor Emeritus

Park, Bernadette (https://experts.colorado.edu/display/fisid_103732/)
Professor Emeritus; PhD, Northwestern University

Pedersen, Eric (https://experts.colorado.edu/display/fisid_159278/)
Assistant Professor; PhD, University of Miami

Pierotti, Chelsea (https://experts.colorado.edu/individual/fisid_155551/)
Teaching Assistant Professor; PhD, University of Northern Colorado

Pietri, Evava
Associate Professor; PhD, Ohio State University

Pittman Wagers, Tina (https://experts.colorado.edu/display/fisid_117148/)
Emerita Teaching Professor of Distinction; PsyD, University of Denver

Polson, Peter G.
Professor Emeritus

Ramirez, Albert
Associate Professor Emeritus

Reynolds, Chandra
Professor; PhD, University of Southern California

Rhee, Soo H. (https://experts.colorado.edu/display/fisid_123401/)
Associate Professor; PhD, Emory University

Richardson, Emily (https://experts.colorado.edu/display/fisid_115007/)
Clinical Associate Professor; PhD, University of Iowa

Root, David H. (https://experts.colorado.edu/display/fisid_159444/)
Assistant Professor; PhD, Rutgers University

Rudy, Jerry W.
Professor Emeritus; PhD, University of Virginia

Saddoris, Michael Paul (https://experts.colorado.edu/display/fisid_152979/)
Associate Professor; PhD, Johns Hopkins University

Schell, Emily
Teaching Assistant Professor; PhD, Stanford University

Smutzler, Natalie (https://experts.colorado.edu/individual/fisid_113933/)
Teaching Associate Professor; PhD, Indiana University Bloomington

Spencer, Robert L. (https://experts.colorado.edu/display/fisid_104362/)
Professor; PhD, University of Arizona

Stallings, Michael C. (https://experts.colorado.edu/display/fisid_108745/)
Professor; PhD, University of Southern California

Stratford, Jennifer M. (https://experts.colorado.edu/display/fisid_157880/)
Teaching Associate Professor; PhD, Florida State University

Stubblefield, Elizabeth
Teaching Assistant Professor; PhD, University of Colorado Anschutz Medical Campus

Taylor, Ronald G.
Professor Emeritus

Van Boven, Leaf D. (https://experts.colorado.edu/display/fisid_126291/)
Professor; PhD, Cornell University

Watkins, Linda R. (https://experts.colorado.edu/display/fisid_101513/)
Distinguished Professor; PhD, Virginia Commonwealth University

Wehner, Jeanne M.
Professor Emerita

Wertheimer, Michael
Professor Emeritus

Whisman, Mark (https://experts.colorado.edu/display/fisid_113391/)
Professor; PhD, University of Washington

Willcutt, Erik G. (https://experts.colorado.edu/display/fisid_113861/)
Professor; PhD, University of Denver

Wilson, James R.
Professor Emeritus

Yuan, Lei (https://experts.colorado.edu/individual/fisid_167699/)
Assistant Professor; PhD, Northwestern University

# Courses

## Neuroscience

**NRSC 5015 (3) Affective Neuroscience**
Experiencing and learning from affect--emotional value--is a fundamental part of the human experience. When people started thinking of brains as computers, research on emotion fell by the wayside. Recently however, this has changed, and there is an explosion of work on the brain mechanisms of affective value. Covers recent advances in understanding the emotional brain.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 4015
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.

**NRSC 5032 (3) Neurobiology of Learning and Memory**
Provides a comprehensive treatment of how the brain acquires, stores, and retrieves memories. To do this we will consider (a) the methods used to address these issues, (b) what we know about how brain systems are organized to support memories of different types,and (c) the synaptic mechanisms that are involved.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 4032
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Biological

**NRSC 5072 (3) Clinical Neuroscience: A Clinical and Pathological Perspective**
Provides a review of the anatomy and physiology of the nervous system and then explores how alterations in these systems can result in neurologic or psychiatric disorders. Emphasizes pathological neuroanatomy, neurophysiology and neuropharmacology, which is essential for understanding problems related to health and disease.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 4072
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Biological

**NRSC 5082 (3) Neural Circuits of Learning and Decision Making**
Provides an in-depth survey of the neural mechanisms of learning, motivated behavior and decision making. Analysis will focus on the interaction of neural circuits underlying these processes with particular attention to the cellular, molecular and information-processing aspects of identified pathways and considered into the context learning-based and neuroeconomic models of choice.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 4082
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Grading Basis:** Letter Grade

**NRSC 5092 (3-4) Behavioral Neuroendocrinology**
Provides an introduction to neuroendocrinology with a focus on the interaction between hormones and brain function. In addition to attending and meeting all the requirements for the lecture portion of the course, graduate students meet for an additional hour each week to discuss in depth behavioral neuroendocrinology relevant research articles.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 4092
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Biological

**NRSC 5100 (3-4) Introduction to Neuroscience I**
This first course in the year-long sequence of introduction to neuroscience provides an intensive introduction to the principles of neuroscience, covering detailed neuroanatomy, physiology, neurophysiology, neurochemical and developmental characteristics of the central nervous system. Structure-function relationships in sensory and motor systems are then explored with neuroanatomical and electrophysiological perspectives. Students enrolled in the Behavioral Neuroscience Program should enroll in this course for 4 credits. All other students should enroll in this course for 3 credits.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students and students in the interdepartmental neuroscience program.

**NRSC 5110 (3-4) Introduction to Neuroscience II**
Provides an intensive interdisciplinary introduction to the principles of neuroscience. It is a sequel to NRSC 5100. Provides a detailed overview of neurochemistry, neurodevelopment, neuromotor control, neurogenetics, and cognitive neuroscience. Open to undergraduates with instructor permission. Students enrolled in the Behavioral Neuroscience Program should enroll in this course for 4 credits. All other students should enroll in this course for 3 credits.
**Requisites:** Requires a prerequisite course of NRSC 5100 or NRSC 4052 or PSYC 4052 (minimum grade C-). Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students and students in the interdepartmental neuroscience program.

**NRSC 5132 (3) Neuropharmacology**
Study of drug action within the central nervous system. This course is designed to provide a fundamental understanding of the neurobiological and neurochemical mechanisms of drug action. Topics covered include the following: 1) principles of pharmacology; 2) brain neurotransmitter systems; 3) biochemical basis of psychiatric disorders and their pharmacological treatment.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 4132
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Biological

**NRSC 5262 (3) Mammalian Neuroanatomy**
Provides a detailed overview of peripheral and central nervous system connectional neuroanatomy targeted at delineating functional sensory, motor and motivational systems and the control of behavior and cognition. Emphasizes histological, anatomical and functional techniques employed in investigations of the nervous system. Formerly PSYC 5262.
**Requisites:** Requires a prerequisite course of NRSC 2100 or NRSC 5100 or NRSC 4052 or PSYC 4052 (minimum grade C-). Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Biological

**NRSC 5545 (3) Neurobiology of Addiction**
Covers an intensive survey and synthesis of recent findings contributing to our understanding of the neurobiological basis of addiction. Analysis of both drug and behavioral addictions will be made at the molecular, cellular and neurocircuitry levels and synthesized into models utilizing common themes between various addictions and contributing pathologies.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 4545
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.

**NRSC 5911 (3) Teaching of Neuroscience**
Offers a rich experience for students to develop and organize curriculum to complement the Neuroscience core courses. Offers a valuable teaching experience utilizing computational modeling to simulate experimental results. Any Neuroscience curriculum course, such as Intro to Neuroscience I or II, Neuropharmacology, Neurobiology of Learning and Memory or Behavioral Neuroscience may be appropriate.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.

**NRSC 6000 (1-3) Introduction to Laboratory Methods**
Introduces methodology and techniques used in biological research. Designed as a tutorial between a few students and one faculty member. Students are expected to read original research papers, discuss findings, and to gain training in techniques necessary to plan and execute experiments in selected areas. These include but are not limited to, for example, surgical approaches, behavioral techniques, molecular biology approaches, and imaging.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Behavioral Neuroscience program graduate students.
**Grading Basis:** Letter Grade

**NRSC 6100 (2) Advances in Neuroscience Seminar**
Designed for beginning graduate students interested in neuroscience. Students read, discuss, and evaluate the primary literature on a number of current topics in neuroscience as well as attend the seminar program in neuroscience.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.

**NRSC 6602 (1-3) Behavioral Neuroscience Professional Skills Development**
Enrolled graduate students in the behavioral neuroscience program will be asked to prepare, present and receive feedback on scientific presentations of their own research or from review of a current research project.
**Repeatable:** Repeatable for up to 14.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Grading Basis:** Letter Grade

**NRSC 7102 (1-3) Topics in Neuroscience**
Advanced seminar dealing with different specialized topics in neuroscience. Instructor consent required for students outside of the department.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of NRSC 5110 (minimum grade D-). Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.

**NRSC 7152 (3) Special Topics in Neuroscience V**
Advanced seminar dealing with several different specialized topics in Neuroscience.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.

## Psychology

**PSYC 5052 (4) Behavioral Neuroscience**
This advanced course the anatomy and physiology of the central nervous system in detail, and applies that understanding to the visual, auditory, and sensorimotor systems, demonstrating how the anatomy and physiology of the nervous system can be used to explain behavior. The laboratory uses live animals and computer simulations.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 4052 and NRSC 4052 and NRSC 5052
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Biological

**PSYC 5082 (2-3) Seminar: Biological Psychology**
Special topics concerning biological bases of behavior.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires a prerequisite course of PSYC 4052 (minimum grade D-). Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Biological

**PSYC 5102 (3) Introduction to Behavioral Genetics**
Provides introduction to basic principles of genetics in the study of behavior, methods used to examine the influences of genes and environment on behavior and interpretation of studies using these methods.
**Requisites:** Restricted to Behavioral, Psychiatric and Statistical Genetics PhD students.
**Additional Information:** Departmental Category: Biological

**PSYC 5112 (2-3) Concepts in Behavioral Genetics**
Examines selected topics in greater detail than is possible in the graduate introductory course in behavioral genetics (PSYC 5102). Topics covered may include inheritance of behavioral characteristics from perspectives of pharmacogenetics, transmission genetics, biochemical genetics, and evolutionary genetics, as well as scientific integrity and the responsible conduct of behavioral genetic research.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Behavioral, Psychiatric and Statistical Genetics PhD students.
**Additional Information:** Departmental Category: Biological

**PSYC 5122 (3) Quantitative Genetics**
Surveys principles of genetics of quantitative characteristics. Topics include gene frequencies, effects of mutation, migration, and selection. Also looks at correlations among relatives, heritability, inbreeding, crossbreeding, and selective breeding.
**Requisites:** Restricted to Behavioral, Psychiatric and Statistical Genetics PhD students.
**Additional Information:** Departmental Category: Biological

**PSYC 5131 (3) Affective Science**
Core graduate course on affective science and fulfills APA Cognitive and Affective Aspects of Behavior Requirement. Introduces students to a diverse array of theoretical and empirical issues related to the study of human emotion. Evolutionary theories of emotions; cognitive and behavioral aspects of emotion; neurobiological mechanisms; development of emotion; and psychopathology and emotion.
**Requisites:** Restricted to Clinical Psychology PhD students.
**Additional Information:** Departmental Category: General

**PSYC 5145 (4) Advanced Cognitive Psychology**
Advanced course in human cognitive processes. Covers key aspects of cognition, such as perception, attention, learning, memory, language and thinking. Discusses major theories and ideas in terms of the research they have inspired. Emphasis varies with instructor. One lab per week and a research project is required.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 4145
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Experimental

**PSYC 5175 (4) Computational Cognitive Neuroscience**
Introduction to cognitive neuroscience (how the brain gives rise to thought) using computer simulations based on the neural networks of the brain. Covers a full range of cognitive phenomena including perception and attention, learning and memory, language, and higher-level cognition based on both large-scale cortical neuroanatomy and detailed properties of cortical neural networks. One lab per week.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 4175
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Experimental

**PSYC 5200 (3) Physiological Genetics and Genomics**
Covers fundamental concepts in molecular genetics/genomics with physiological applications. Topics include structure and function of nucleic acids, genome structure, genetic and genomic research tools, methods for identifying disease-causing mutations, regulation of gene expression, pharmacogenetics, gene therapy and ethical issues in modern genomics. First course of a 3-course series recommended for IBG students. Includes a recitation section.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4200 and IPHY 5200
**Requisites:** Restricted to Integrative Physiology (IPHY or C-IPHY) or Psychology (PSYC) graduate students only.
**Additional Information:** Departmental Category: General

**PSYC 5232 (2) Molecular Genetics and Physiology**
Covers fundamental mechanisms of gene action, including genome structure and regulation of gene expression. Discusses molecular techniques used to examine human genetic diseases. Emphasizes genetic diseases with behavioral, neurologic, and physiologic abnormalities.
**Requisites:** Requires a prerequisite course of PSYC 5200 or IPHY 5200 (minimum grade D-). Restricted to Behavioral, Psychiatric and Statistical Genetics PhD students. Restricted to graduate students only.
**Additional Information:** Departmental Category: Biological

**PSYC 5242 (3) Biometrical Methods in Behavioral Genetics**
Studies development of structural models appropriate to behavioral genetics and the estimation procedures necessary for their application.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Biological

**PSYC 5423 (3) Research Problems in Clinical Psychology**
Provides an overview of fundamental research methods relevant to clinical psychology, including literature synthesis, hypothesis formulation and study design, measure selection, and data analysis. Students will gain specific experience writing scientific papers and funding proposals.
**Requisites:** Restricted to Clinical Psychology PhD students.
**Additional Information:** Departmental Category: Clinical

**PSYC 5433 (3) Adult Psychopathology**
Intensively surveys major theories, research findings, and behavioral characteristics associated with deviant reaction patterns.
**Requisites:** Restricted to Clinical Psychology PhD students.
**Additional Information:** Departmental Category: Clinical

**PSYC 5453 (3) Developmental Psychopathology**
Examines the development of psychopathology across the lifespan, including etiological influences, neurobiological correlates, symptom presentation, and clinical diagnosis and intervention.
**Requisites:** Restricted to Clinical Psychology PhD students.
**Additional Information:** Departmental Category: Clinical

**PSYC 5541 (1-6) Special Topics in Psychology**
Studies and analyzes special interest topics from the broad and diversified field of psychology. Particular section content is determined by instructor. Instructor consent required for students outside of the department.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: General

**PSYC 5606 (3) Proseminar: Social-Personality Psychology**
Provides a thorough introduction to methods and theories in social psychology concerned with topics such as the self, social cognition, judgment and decision making, attitude formation and change, small group processes, inter-group relations, health and social psychology, and others.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Social Psychology PhD students.
**Additional Information:** Departmental Category: Social

**PSYC 5656 (3) Advanced Graduate Research Methods**
Provides training in the philosophical roots of empirical research, inference of causality, internal and external validity and reliability. These topics will be covered as they relate to a range of research designs including passive observational, experimental, quasi-experimental, meta-analytic and longitudinal. Additional topics include statistical inference and research ethics.
**Requisites:** Restricted to Social Psychology PhD students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Social

**PSYC 5665 (2) Perception and Attention Proseminar**
Required proseminar for students in the Cognitive Psychology Ph.D. program. Provides an introduction to current thinking about sensory and perceptual processing, object recognition and attention. Students will read peer-reviewed journal articles and make class presentations on appropriate topics, including methods of data collection and analysis.
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Experimental

**PSYC 5685 (2-3) Research Methods Proseminar**
Main topic is research methods in cognitive psychology, with an emphasis on experimental methods. Skills and knowledge will be gained that are necessary to A) critically evaluate existing research and B) design, conduct, analyze and write up experimental studies. Required for graduate students in Cognitive Psychology.
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Experimental

**PSYC 5695 (2) Memory Proseminar**
Provides beginning Ph.D. students with a basic introduction to (primarily human) memory research. One of the six required proseminar for students in the Cognitive Psychology Ph.D. program. Includes consideration of experimental, theoretical, behavioral and cognitive neuroscience perspectives on memory. Instructor consent required for students outside of the department.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Experimental

**PSYC 5741 (4) General Statistics 1**
is part 1 of the 2-semester course sequence, PSYC 5741 and PSYC 5751. This course surveys probability and statistics in psychology, using the general linear model as a basic "recipe" for data analysis. After introducing a few powerful concepts that enable a range of questions to be asked, the course focuses on building and interpreting models using standard regression software. Restricted to Psychology and Neuroscience (PSYC & NRSC) graduate students. Instructor consent required for students outside of the department.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: General

**PSYC 5751 (4) General Statistics 2**
is part 2 of the 2-semester course sequence, PSYC 5741 and PSYC 5751. This course surveys probability and statistics in psychology, using the general linear model as a basic "recipe" for data analysis. After introducing a few powerful concepts that enable a range of questions to be asked, the course focuses on building and interpreting models using standard regression software.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: General

**PSYC 5761 (3) Structural Equation Modeling**
Provides training in the use of structural equation modeling, a class of analytic techniques that include the estimation of unobserved, or latent, constructs and an estimation of relationships among latent constructs.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Recommended:** Prerequisite successful completion of graduate level statistics.
**Additional Information:** Departmental Category: General

**PSYC 5771 (3) Bayesian Data Analysis**
This course is a practical introduction to using Bayesian methods to analyze data in R. After we develop our general Bayesian approach, with an emphasis on simulation rather than calculus, we will focus on applications from regression basics to advanced multilevel models. Students outside of the department may contact the instructor for permission to enroll.
**Requisites:** Requires prerequisite courses of PSYC 5741 and PSYC 5751 (min grade C-). Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.

**PSYC 5815 (2) Language Proseminar**
Introduction to research on human language. A required proseminar for Cognitive Psychology Ph.D. students. Covers research at the cognitive, neural, and computational levels. Addresses phenomena at the levels of phonology, grammar, and meaning. Emphasizes interrelationships between language and other domains of cognition (perception, memory, executive function).
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Experimental

**PSYC 5825 (2) Executive Function Proseminar**
Provides beginning Ph.D. students with an introduction to the study of executive functions. Required proseminar for students in the Cognitive Psychology Ph.D. program. Includes consideration of working memory, inhibition, multi-tasking, monitoring, selection, lifespan changes and social/clinical applications at the cognitive, neural and computational levels.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Experimental

**PSYC 5835 (2) Thinking Proseminar**
Provides beginning Ph.D. students with a basic introduction to research on complex human cognition, including reasoning, problem solving, decision making, analogy, concept learning and knowledge representation. Includes consideration of theoretical, behavioral and cognitive neuroscience perspectives. One of six proseminar modules required of students in the Cognitive Psychology Ph.D. program.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Experimental

**PSYC 6200 (3) Issues and Methods in Cognitive Science**
Interdisciplinary introduction to cognitive science, examining ideas from cognitive psychology, philosophy, education, and linguistics via computational modeling and psychological experimentation. Includes philosophy of mind; learning; categorization; vision and mental imagery; consciousness; problem solving; decision making, and game-theory; language processing; connectionism. No background in computer science will be presumed.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 6402 and EDUC 6504 and LING 6200 and PHIL 6310 and SLHS 6402
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General

**PSYC 6603 (1) Professional Issues in Clinical Psychology**
Covers a range of topics important for professional development in clinical psychology, including preparation and delivery of research presentations, preparation of grant proposals/manuscripts and practicum experience (i.e., interviewing and assessment, treatment planning, intervention and documentation). Intended to prepare students for careers as research scientists and clinicians. Instructor consent required.
**Repeatable:** Repeatable for up to 10.00 total credit hours.
**Requisites:** Restricted to Clinical Psychology PhD students.
**Additional Information:** Departmental Category: Clinical

**PSYC 6605 (1) Cognitive Psychology Research Update**
Provides summaries of current research by graduate students and faculty members in the Cognitive Psychology program in the Department of Psychology and Neuroscience. Professional Development issues relevant to cognitive psychologists will also be discussed. Graduate students in all programs and advanced undergraduates welcome with instructor consent.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Psychology (PSYC) and Neuroscience (NRSC) PhD Students only.

**PSYC 6606 (1) Professional Issues in Social Psychology**
Covers a range of topics important for professional development in social psychology, including preparation and delivery of research presentations, preparation of grant proposals and manuscripts, and peer review of manuscripts. Intended to prepare students for careers as research scientists.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Social Psychology PhD students.
**Additional Information:** Departmental Category: Social

**PSYC 6761 (3) Topics in Advanced Structural Equations Modeling**
Covers topics in advanced structural equation modeling, including modeling with nonlinear observed variables, latent variable interactions, longitudinal models, mixture models and transition analysis. Other topics will be covered by request.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Recommended:** Prerequisite PSYC 5761.
**Additional Information:** Departmental Category: General

**PSYC 6831 (2) Interdisciplinary Social Science Professional Socialization**
Trains graduate students and provides professional socialization in interdisciplinary social science research. Open to all interested students, with programming provided by the Institute of Behavioral Science. Sessions include IBS-housed colloquia and workshops in professional socialization, technological tools, interdisciplinary research, ethics, grant writing, etc. Students workshop and submit a research paper.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 6851 and PSCI 6851
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PSYC 6841 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General

**PSYC 6911 (1-3) Research Practicum**
Department consent required to enroll.
**Repeatable:** Repeatable for up to 18.00 total credit hours.
**Additional Information:** Departmental Category: General

**PSYC 6941 (1-3) Master's Candidate for Degree**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Pass/Fail

**PSYC 6951 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General

**PSYC 7012 (1-3) Research in Behavioral Genetics**
Individual research projects.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Behavioral, Psychiatric and Statistical Genetics PhD students.
**Additional Information:** Departmental Category: Biological

**PSYC 7102 (2-3) Seminar: Behavioral Genetics**
Intensive study of selected topics in behavioral genetics. Emphasizes recent research. Attention to both human and animal studies. Instructor consent required for students outside of the Behavioral, Psychiatric, and Statistical Genetics program.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Behavioral, Psychiatric and Statistical Genetics PhD students.
**Additional Information:** Departmental Category: Biological

**PSYC 7215 (3) Seminar: Experimental Psychology**
Advanced seminar dealing with different specialized topics, at the discretion of the instructor, in different years. Topics chosen are within the broad range of experimental psychology.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Experimental

**PSYC 7291 (3) Multivariate Analysis**
Familiarizes students with scientific concepts, matrix theory, and computer techniques of multivariate analyses for psychological research. Topics include cluster and factor analysis, multiple regression, and discriminant functions. Emphasizes research technology rather than mathematical theory.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: General

**PSYC 7315 (2) Advanced Research Seminar on Human Memory**
Addresses topics in the experimental psychology of human memory. Specific content varies from semester to semester. Both theoretical issues and contemporary empirical work will be reviewed. Each student will be required to engage in laboratory work outside of class, which will include an original experiment.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Experimental

**PSYC 7415 (2) Cognitive Science Research Applications Seminar 1**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7412 and EDUC 6506 and LING 7415 and PHIL 7415 and SLHS 7418
**Requisites:** Requires a prerequisite course of CSCI 6402 or EDUC 6504 or LING 6200 or PHIL 6310 or PSYC 6200 (minimum grade B). Restricted to graduate students only.
**Recommended:** Prerequisite EDUC 6505.
**Additional Information:** Departmental Category: Experimental

**PSYC 7425 (2) Cognitive Science Research Applications Seminar 2**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7422 and EDUC 6516 and LING 7425 and PHIL 7425 and SLHS 7428
**Requisites:** Requires a prerequisite course of LING 7415 or PSYC 7415 or CSCI 7412 or EDUC 6506 (minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: Experimental

**PSYC 7536 (1-3) Personality and Social Psychology**
Selected topics in the area of social-personality psychology. Students may register for more than one section of this course within the term and/or within their graduate career. These seminars may be on one of the following topics: stereotyping and prejudice, social neuroscience, person perception, social psychology and the self, health and social psychology, race and ethnic identity, or social cognition.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Social Psychology PhD students.
**Additional Information:** Departmental Category: Social

**PSYC 7663 (1) Intellectual Assessment Laboratory**
Practice administration of common intellectual and neuropsychological tests.
**Requisites:** Requires corequisite courses of PSYC 7683.
**Additional Information:** Departmental Category: Clinical

**PSYC 7673 (3) Adult Psychotherapy**
Provides an intensive introduction to the science and practice of psychological treatments for adult psychopathology. Will focus on selected treatments and address the relevant theoretical and empirical base for each approach and the specific principles and procedures utilized. Aim of course is for students to acquire both a scientific and applied knowledge of evidence-based practice in clinical psychology, with a focus on intervention for adult mental disorders. Instructor consent required for students outside of the Clinical Psychology program.
**Requisites:** Restricted to Clinical Psychology PhD students.
**Additional Information:** Departmental Category: Clinical

**PSYC 7683 (1-3) Intellectual Assessment, with Practicum, in Clinical Psychology**
Focuses on administering and interpreting objective test commonly used in clinical psychology practice. Includes case study approach and direct clinical experience.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Clinical

**PSYC 7693 (3) Personality and Psychopathology Measurement**
Covers theory and basic applications of psychological assessment, with an emphasis on measurement theory and the assessment of psychopathology and personality.
**Requisites:** Restricted to Clinical Psychology PhD students.
**Additional Information:** Departmental Category: Clinical

**PSYC 7703 (1-3) Seminar: Clinical Psychology**
Selected topics in the area of clinical psychology. Instructor consent required for students outside of the Clinical Psychology program.
**Repeatable:** Repeatable for up to 21.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Clinical Psychology PhD students.
**Additional Information:** Departmental Category: Clinical

**PSYC 7713 (1-3) Practicum in Clinical Psychology**
Provides direct clinical experience for clinical graduate students only.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Clinical Psychology PhD students.
**Additional Information:** Departmental Category: Clinical

**PSYC 7723 (1) Clinical Psychology Internship**
Students will enroll in this clinical psychology internship course while they are completing the required 1-year internship.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Clinical Psychology PhD students.

**PSYC 7775 (1) Topics in Cognitive Science**
Reading of interdisciplinary innovative theories and methodologies of cognitive science. Students participate in the LCS Distinguished Speakers series that hosts internationally recognized cognitive scientists who share and discuss their current research. Session discussions include analysis of leading edge and controversial new approaches in cognitive science. Restricted to students enrolled in LCS Cognitive Science Academic Programs.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7772 and EDUC 7775 and LING 7775 and PHIL 7810 and SLHS 7775
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Additional Information:** Departmental Category: Experimental

**PSYC 7793 (1-3) Child Assessment Practicum**
Allows students who have already learned adult assessment measures to broaden their knowledge and skills in order to complete psychoeducational evaluations with children. The course covers the background of common childhood disorders, general testing strategies with children, and specific test administration.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to Clinical Psychology PhD students.
**Recommended:** Prerequisite PSYC 7683.
**Additional Information:** Departmental Category: Developmental

**PSYC 8991 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: General

# Psychology - Master of Arts (MA)

The master's degree in this field is not available through direct admission and may only be earned under special circumstances. Please contact program for additional information and requirements.

# Neuroscience - Doctor of Philosophy (PhD)

*The doctoral program in neuroscience is a second major that students earn in conjunction with a PhD in another discipline offered by a participating department.*

The neuroscience community at CU Boulder is made up of over 80 faculty and research associates rostered in 13 departments and institutes. Neuroscience activities on the campus are coordinated by the Center for Neuroscience.

The graduate PhD program in neuroscience is an interdepartmental program currently consisting of eight tracks to a PhD:

- Behavioral, Psychiatric and Statistical Genetics (Integrative Physiology, Psychology & Neuroscience)
- Behavioral Neuroscience (Psychology & Neuroscience)
- Clinical Neuroscience (Psychology & Neuroscience)
- Cognitive Neuroscience (Psychology & Neuroscience)
- Social Neuroscience (Psychology & Neuroscience)
- Integrative Physiological Neuroscience (Integrative Physiology)
- Molecular, Cellular and Developmental Neuroscience (Molecular, Cellular and Developmental Biology)
- Speech, Language and Hearing Neurosciences (Speech, Language and Hearing Sciences)

The neuroscience curriculum includes a year-long intensive core course, graduate seminar courses linked to an invited speaker series and wide-ranging neuroscience courses offered by many departments and institutes across campus.

Interested students are encouraged to visit the Center for Neuroscience (https://www.colorado.edu/neuroscience/) website, which provides detailed information on the program, application process, courses, faculty and current trainees.

# Requirements

## Admission Requirements

Students apply for admission to one of the participating departments, which determines whether to admit the student to CU Boulder and provide financial support. Once in residence, students enter the neuroscience PhD program while still maintaining their "home" in the department to which they were admitted. They receive a PhD that lists both their home department and neuroscience. All students are admitted with the expectation that they will work toward the PhD degree. Many students receive a Master of Arts degree in the course of working toward the PhD. Students who receive the PhD degree must demonstrate that they are proficient in some broad subject of learning and that they can critically evaluate work in this field; furthermore, they must show the ability to work independently in their chosen field and must make an original contribution of significance to the advancement of knowledge.

## Required Courses and Semester Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **Required Neuroscience Core Courses** | | |
| NRSC 5100 | Introduction to Neuroscience I | 3 |
| NRSC 5110 | Introduction to Neuroscience II | 3 |

| | | |
|---|---|---|
| NRSC 6100 | Advances in Neuroscience Seminar (three semesters, 2 credits per semester) | 6 |
| **Required Fundamentals of Neuroscience Depth Courses** | | |
| Choose a minimum of 3 additional neuroscience-related courses (2-3 credit hours per course). [1] | | 7-9 |
| **Neuroscience-Related Discipline Specialization** | | |
| Choose a sequence of courses that provides an advanced graduate-level specialization in a discipline that contributes to the field of neuroscience. | | 11 |
| **Total Credit Hours** | | **30-32** |

[1] For a list of approved neuroscience courses, visit the Neuroscience PhD Program (https://www.colorado.edu/neuroscience/graduate-education-neuroscience/) webpage.

Before admission to candidacy for the PhD degree, the student must pass a comprehensive examination in the field of concentration and related fields. This examination tests the student mastery of a broad field of knowledge, not merely the formal coursework completed.

A variety of advanced research seminars are taught on a regular basis. Students are required to be enrolled in at least one substantive course in the department each semester until the comprehensive examinations have been successfully completed. Upon completing the comprehensives, students engage in the dissertation research, culminating in a public oral defense.

Potential applicants are encouraged to visit the Center for Neuroscience website, which provides detailed information on the program, application process, courses, faculty and current trainees.

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate broad mastery (breadth) of knowledge in neuroscience.
- Demonstrate depth of knowledge in one of the following neuroscience subdisciplines: behavioral, cognitive, social or clinical neuroscience; integrative physiology; molecular, cellular and developmental biology; behavioral, psychiatric and statistical genetics; speech, language and hearing sciences.
- Demonstrate proficiency in their ability to independently perform empirical research with multiple neuroscience techniques.
- Communicate scholarly knowledge in neuroscience through effective writing (peer-reviewed manuscripts, grant proposals, reviews and opinions).
- Communicate knowledge in neuroscience through effective oral presentation.
- Prepare and demonstrate awareness of relevant career options, job search networks and interview skills for neuroscience-related job markets.

# Psychology - Doctor of Philosophy (PhD)

The Department of Psychology and Neuroscience at the University of Colorado Boulder offers a PhD degree with five subplans:

- Behavioral, Psychiatric and Statistical Genetics
- Behavioral Neuroscience
- Clinical Psychology
- Cognitive Psychology/Cognitive Neuroscience
- Social Psychology

For detailed information about each field of study, visit the department's Graduate Program Subplans (http://www.colorado.edu/psych-neuro/graduate-programs/graduate-program-areas/) webpage.

*Note*: The department does not offer a terminal master's degree program.

## Requirements

Students are admitted into one of five doctoral subplans in psychology and neuroscience. Throughout the course of study, students must demonstrate that they are proficient in a broad subject of learning and that they can critically evaluate work in their chosen field. Students must also show the ability to work independently in their research domain and must make an original contribution of significance to the advancement of knowledge.

In the first year of graduate study, there is a first-year research requirement that starts the student on an active program of research. First-year graduate students typically enroll in a two-semester graduate statistical sequence and introductory coursework. The student also must enroll in a sequence of courses designed to give exposure to a breadth of research topics and methods. In later years, a variety of advanced research seminars are taught to provide students with a depth of knowledge within their areas of interest.

Students may choose to complete a master's degree (MA) as they work toward the PhD based on research and coursework completed within their first 2-3 years. Before admission to candidacy for the PhD degree, the student must pass a comprehensive examination in the field of concentration and related fields. This examination tests the student's mastery of a broad field of knowledge, not merely the formal coursework completed. Upon completing the comprehensives, students engage in the dissertation research, culminating in a public oral defense.

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate comprehensive knowledge of major theories, research findings and methodological approaches in at least one of the following content areas within psychology and neuroscience: (a) behavioral neuroscience, (b) behavioral, psychiatric and statistical genetics, (c) clinical psychology, (d) cognitive psychology and cognitive neuroscience and (e) social psychology. (Broad Disciplinary Knowledge)
- Synthesize and critically evaluate the scientific literature and research findings to develop compelling questions related to their primary area of specialization. (Scientific Inquiry and Critical Evaluation Skills)
- Design, conduct and interpret original research that contributes significantly to the advancement of knowledge in their area of specialization. (Independent Research Proficiency)
- Apply statistical and analytical methods to address complex research questions in psychological and neuroscientific research. (Quantitative Expertise)
- Demonstrate effective oral and written communication of their research findings. (Scientific Communication)

# Religious Studies

The curriculum in the Department of Religious Studies at CU Boulder trains students in the scholarly understanding and interpretation of the complex phenomenon we call religion through careful study of history, texts, rituals, narrative, art and media. The program offers the skills to approach the comparative study of religion with the option of gaining deeper knowledge in Islam, Hinduism, Buddhism, Judaism, Christianity, religions in America, religions in the Mediterranean, religions in Asia and several indigenous traditions. We also allow students to develop expertise in thematic areas such as religion and the body; ritual studies; religion and the environment; ethics, politics and law; religion, gender and sexuality; and ancient and medieval religions.

The graduate degree in religious studies emphasizes the application of various theoretical and methodological approaches to the study of religion; the understanding of religious practices and traditions with attention to historical context and present-day impact; and the development of media literacy, critical thinking, effective oral and written communication, and research skills in our increasingly globalized and religiously diverse world.

In addition, students with a degree in religious studies are expected to achieve basic religious literacy: the ability to communicate and analyze practical information regarding religious diversity as educated citizens of a pluralistic society and thereby to effectively understand and participate in public debates and discussions about religion.

**Course codes for this program are RLST and SNSK.**

## Master's Degree

- Religious Studies - Master of Arts (MA) (p. 1387)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ali, Aun Hasan (https://experts.colorado.edu/display/fisid_155948/)
Assistant Professor; PhD, McGill University

Biernacki, Loriliai (https://experts.colorado.edu/display/fisid_115294/)
Professor; PhD, University of Pennsylvania

Boyd, Samuel L. (https://experts.colorado.edu/display/fisid_155484/)
Associate Professor, Associate Chair; PhD, University of Chicago

Catlos, Brian Aivars (https://experts.colorado.edu/display/fisid_147829/)
Professor; PhD, University of Toronto

Chernus, Ira R. (https://experts.colorado.edu/display/fisid_101043/)
Professor Emeritus; Ph.D, Temple University

Denny, Frederick M.
Professor Emeritus

Gayley, Antonia Hollis (https://experts.colorado.edu/display/fisid_144505/)
Associate Professor, Associate Chair; PhD, Harvard University

Gill, Sam D. (https://experts.colorado.edu/display/fisid_103595/)
Professor Emeritus; PhD, University of Chicago

Kleeman, Terry F. (https://experts.colorado.edu/display/fisid_114181/)
Professor; PhD, University of California, Berkeley

Ross-Bryant, Lynn
Professor Emerita

Sacks, Elias R. (https://experts.colorado.edu/display/fisid_151425/)
Associate Professor; PhD, Princeton University

Taylor, Rodney L.
Professor Emeritus

Whitehead, Deborah Faith (https://experts.colorado.edu/display/fisid_144239/)
Associate Professor, Chair; ThD, Harvard University

## Courses

**RLST 5030 (3) Religions in America**
Studies various religious movements in the U.S. and other parts of the Americas. Includes American religion and religions, religion and nationalism, revitalization and religion and Asian religions in America.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4030
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**RLST 5050 (3) Topics in Christian Studies**
Studies a particular topic in Christian theology and culture such as early Christianity, medieval Christianity, Christianity in the United States, women and Christianity, liberation theologies, Christianity and literature, and modern Christian thought.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4050
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite 6 hours of RLST courses at any level or instructor consent.

**RLST 5170 (3) God and Politics**
Explores the relationship between religion and politics. Examining traditions such as Judaism and Christianity, this course considers diverse ways in which ancient, medieval and modern sources have imagined the role of religion in civic life. Some topics include the status of religious minorities, the nature of religious freedom and contemporary debates surrounding issues such as torture, sexuality and climate change.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4170 and JWST 4170
**Requisites:** Restricted to graduate students only.

**RLST 5180 (3) Is God Dead?**
Explores debates about the following questions: does it make sense to believe in God? Should believing or not believing in God make a difference for how individuals behave? Examining ancient and modern views on the existence and nature of a higher power, this course considers topics including evil and suffering, religion and science and religion's role in politics.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4180 and JWST 4180
**Requisites:** Restricted to graduate students only.

**RLST 5190 (3) Love and Desire**
Explores debates about the following questions: what and whom should humans and gods love, and what role should passions play in religion? Examining traditions such as Judaism and Christianity, this course considers diverse views on topics including religion and sexuality, the promise and perils of loving gods and humans, and the relationship between love, politics, and violence.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4190 and JWST 4190
**Requisites:** Restricted to graduate students only.

**RLST 5200 (3) Topics in Hinduism**
Examines in depth central themes, schools of thought and movements in Hinduism, such as myth and ritual, renunciation, Vedanta, Tantra and Yoga.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4200
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite 6 hours of RLST courses at any level or instructor consent.
**Additional Information:** Departmental Category: Asia Content

**RLST 5210 (3) Advanced Readings in Sanskrit**
Requires at least two years of prior Sanskrit training. Students will read texts in the original. Class time is devoted to parsing out difficult grammatical structures, discussing the philosophical import of the readings and addressing the historical contexts that assist in interpreting the texts. The topic varies according to student interest.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of SNSK 2120 (minimum grade C-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Asia Content

**RLST 5250 (3) Topics in Buddhism**
Examines in depth central themes, schools of thought and movements in Buddhism, such as Theravada in Southeast Asia, Mahayana and Tantrayana thought, Zen and Buddhism in America.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4250
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Asia Content

**RLST 5260 (3) Topics in Judaism**
Examines in depth central themes, schools of thought, and movements in Judaism, along with other traditions, across a range of historical periods.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4260 and JWST 4260
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**RLST 5280 (3) Body and Magic in India**
Addresses ideas of the body and its use and functions within magic, particularly in Tantric traditions. Uses classical Hinduism and Tantra as a point of departure, focusing on subtle bodies and Tantric bodies and will also supplement this with writing about the body and its connection to mind in contemporary Western thought addressing the mind-body problem.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4280
**Requisites:** Restricted to graduate students only.

**RLST 5300 (3) Topics in Native American Religions**
Examines a topic (varies at different offerings) focusing on religions of peoples indigenous to the Americas. May consider mythology; shamanism and medicine; trickster, clown and fool; crisis cult movements.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4300
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite 3 additional credit hours of RLST course work or instructor consent.

**RLST 5350 (3) Native American Religions: Regional Studies**
Studies religion(s) of a single native North American tribe or geographic region within context of history and culture of the tribe.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite 6 additional credit hours of RLST course work or instructor consent.

**RLST 5353 (3) Indigenous Traditions and Law: A Global Perspective**
Explores intersections of indigenous religions and law through historical and contemporary case studies. American Indian and Hawaiian contexts will be featured, as well as the study of the United Nations Declaration on the Rights of Indigenous Peoples and its recent implementation in places as diverse as Bolivia, Norway and Nagaland. Theoretical issues in the academic study of religion and ethnic studies will be emphasized.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4353 and ETHN 4353 and ETHN 5353
**Requisites:** Restricted to graduate students only.

**RLST 5610 (3) Topics in Islam**
A detailed exploration of diverse intellectual approaches to central questions in Islamic traditions. Department consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4610
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Grading Basis:** Letter Grade

**RLST 5650 (3) Islam in the Modern World**
Globally surveys Islam, covering religion and politics; Islam and the West; the Islamic revival and its varied forms in Iran, Indonesia, Libya and Pakistan; development and change; the status of women; media and academic stereotyping.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4650
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite 6 credit hours of religious studies at any level or instructor consent.
**Additional Information:** Departmental Category: Asia Content

**RLST 5780 (3) New Religions of East Asia**
Explores the new religious movements of modern China, Japan, and Korea, which have arisen over the last century due to the influence of the West and in response to the pressures of modernization. Previous coursework in religious studies or Asian languages and civilizations is recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4780
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**RLST 5820 (3) Interdisciplinary Seminar on Religion**
Variable topics in religion, drawing from a variety of disciplines and methodologies as they shed light on specific traditions and issues.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4820
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**RLST 5840 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**RLST 5850 (3) Gender in Hagiography**
Explores gendered ideals of sainthood in medieval hagiographic literature. We draw primarily from the lives of female mystics in Buddhist and Christian sources and also examine the construction of mendicant masculinities. Reading from an array of primary sources, we query the category of mysticism and ask why visionary experience has so often been gendered female.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4850 and WGST 4850
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**RLST 6110 (3) Adv Tpcs: Chicana/o Studies: US/Mexico Borderlands**
Examines complex histories, cultural practices and liminal, 3rd spaces of the US and Mexico borderlands; racial and gender identities; community formations. Considers a range of autobiographic testimony narratives, films, social and legal studies, and theories of subjectivity that engage with the politics of representation vis a vis the criminalization of Chicana/o and ethnic youth, immigrants and those perceived to be immigrants.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 6110
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**RLST 6830 (3) Introduction to the Academic Study of Religion**
Introduction to the graduate academic study of religion through the exploration of contemporary models and issues that demonstrate the nature and future of the field. Students prepares a profile of intended area of research.
**Requisites:** Restricted to graduate students only.

**RLST 6840 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**RLST 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.

**RLST 6945 (1-4) Portfolio: Non-Thesis Option**
Course work finished or in the last semester.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**RLST 6950 (1-4) Master's Thesis**
**Requisites:** Restricted to graduate students only.

# Religious Studies - Master of Arts (MA)

The curriculum in the Department of Religious Studies at CU Boulder trains students in the scholarly understanding and interpretation of the complex phenomenon we call religion through careful study of history, texts, rituals, narrative, art and media. The program offers the skills to approach the comparative study of religion with the option of gaining deeper knowledge in Islam, Hinduism, Buddhism, Judaism, Christianity, religions in America, religions in the Mediterranean, religions in Asia, and several indigenous traditions. We also allow students to develop expertise in thematic areas such as religion and the body; ritual studies; religion and the environment; ethics, politics and law; religion, gender and sexuality; and ancient and medieval religions.

The graduate degree in religious studies emphasizes the application of various theoretical and methodological approaches to the study of religion; the understanding of religious practices and traditions with attention to historical context and present-day impact; and the development of media literacy, critical thinking, effective oral and written communication, and research skills in our increasingly globalized and religiously diverse world.

In addition, students with a degree in religious studies are expected to achieve basic religious literacy: the ability to communicate and analyze practical information regarding religious diversity as educated citizens of a pluralistic society and thereby to effectively understand and participate in public debates and discussions about religion.

# Requirements

## Course Requirements

The student must successfully complete 30 credit hours of academic work, at least 27 of which must be completed at the 5000 level or above. Up to 6 credit hours of coursework may be taken outside the department or transferred from another accredited institution, consistent with the student's special needs and interests and with the advisor's approval. Independent study credit hours shall not exceed 6 credit hours.

A graduate degree represents the mastery of a significant body of knowledge and interpretation within an academic discipline. A degree is not granted merely because a student completes a specific number of courses. The student is expected to acquire both breadth and depth in religious studies.

A student who has not completed at least 12 credit hours, or the equivalent, of undergraduate academic coursework directly related to the study of religion will be required to do remedial work to make up this deficit before beginning graduate study or, with the director of graduate studies' permission, after beginning the program. This can be done by attaining a grade of B or better in an appropriate 2000- or 3000-level course taken within the first year. Remedial courses may not be counted toward the degree.

Courses for each term must be approved by the student's faculty advisor and be in compliance with the requirements of the Graduate School where necessary. In order to register for any given term, the student must have the course of study for that term approved in writing by the advisor on the student's Record of Progress Toward the MA Degree Form. No changes can be made to registration without the advisor's approval.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| RLST 6830 | Introduction to the Academic Study of Religion | 3 |
| RLST 6945 | Portfolio: Non-Thesis Option | 3-6 |

| | | |
|---|---|---|
| or RLST 6950 | Portfolio: Thesis Option | |
| Electives | | 24-21 |
| **Total Credit Hours** | | **30** |

## Residency Requirement

All students must fulfill the residency requirement. In general this can be fulfilled by either two full-time semesters or four part-time semesters of study. A full-time program is defined as 5 credit hours of coursework at the 5000 level or higher, 8 credit hours of total coursework or at least one credit hour of thesis research.

## Degree Plans

In the second year of graduate study, students will select either the MA portfolio option or the MA portfolio with thesis option.

### Plan I: Portfolio with Research Paper

Students selecting the portfolio with research paper option will take a 3-credit portfolio preparation course on secondary scholarship in a specific field (theoretical topic, geographic area or religious tradition) that will culminate with a portfolio defense. The portfolio defense, to be completed in accordance with the deadline set by the graduate school each semester, will involve a three-member committee, and will be overseen by the advisor.

### Plan II: Portfolio with Thesis

Students selecting the portfolio with thesis option will take 6 credits of thesis coursework over two semesters (RLST 6950). The first semester of RLST 6950 (3 credit hours) will result in a thesis prospectus with the thesis committee. After successfully completing the prospectus defense, the student will enroll in the second semester of RLST 6950 (3 credit hours), which will result in the full portfolio defense, which includes defending the thesis.

# Plans of Study

## Plan I: Portfolio

| Course | Title | Credit Hours |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | |
| One seminar | | 3 |
| RLST 6830 | Introduction to the Academic Study of Religion | 3 |
| | **Credit Hours** | **6** |
| **Spring Semester** | | |
| Three Seminars | | 9 |
| | **Credit Hours** | **9** |
| **Year Two** | | |
| **Fall Semester** | | |
| Three Seminars | | 9 |
| | **Credit Hours** | **9** |
| **Spring Semester** | | |
| One Seminar | | 3 |
| RLST 6945 | Portfolio: Non-Thesis Option | 3 |
| | **Credit Hours** | **6** |
| | **Total Credit Hours** | **30** |

## Plan II: Portfolio with Thesis

| Course | Title | Credit Hours |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | |
| One Seminar | | 3 |
| RLST 6830 | Introduction to the Academic Study of Religion | 3 |
| | **Credit Hours** | **6** |
| **Spring Semester** | | |
| Three Seminars | | 9 |
| | **Credit Hours** | **9** |
| **Year Two** | | |
| **Fall Semester** | | |
| Two Seminars | | 6 |
| RLST 6950 | Master's Thesis | 3 |
| | **Credit Hours** | **9** |
| **Spring Semester** | | |
| One Seminar | | 3 |
| RLST 6950 | Master's Thesis | 3 |
| | **Credit Hours** | **6** |
| | **Total Credit Hours** | **30** |

(Note: Students who have not already established Colorado residency at the time they begin the program may wish to consider taking 12 credits during their first year and 18 credits during their second year.)

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate mastery of knowledge about the historical and global diversity of religious ideas, practices and dimensions of cultures and demonstrate ability to synthesize arguments through academic writing.
- Design and conduct high quality original research in a religious tradition and/or topic of developing expertise in the academic study of religion.
- Effectively communicate and present research to academic and public audiences in both written and oral form.

# Dual Degree Programs

The Department of Religious Studies also participates in a dual master's degree program with the Departments of History and Asian Languages and Civilizations. Students interested in exploring this option should contact the graduate director of the department for specific requirements.

For more information visit the department's Dual MA (https://www.colorado.edu/rlst/graduate/dual-ma/) webpage.

# Sociology

The graduate program in the Department of Sociology at CU Boulder seeks to train creative and productive scholars and teachers. The department maintains a strong emphasis in the theories and methods of the discipline while specializing in the following areas:

- Criminology
- Cultural sociology
- Environment, hazards and disasters
- Gender and sexuality
- Health and medicine
- Life course, aging and youth
- Political economy
- Population
- Race and ethnicity
- Social psychology and emotions

The department offers a PhD program focusing on teaching, researching and training in theory and methods. It does not, however, offer a separate MA program. More information about program specifics can be found in the Graduate Handbook (http://www.colorado.edu/sociology/students/graduate-students/resources/).

Graduate students will meet with faculty advisors during their time at CU Boulder to foster social integration at the university as well as research interests. Financial support is given to students serving as teaching assistants (TAs). A teaching assistantship is a fulfilling position that allows students to further their understanding of a specific area of study while gaining knowledge in instructing at the university level.

Additionally, advanced graduate students are encouraged to teach their own courses as graduate part-time instructors (GPTIs). The department encourages graduate students to pursue opportunities for funded research wherever possible and supports the efforts of other university units in which students may seek financial support for their research, such as the Institute of Behavioral Science. Aside from teaching and research, CU Boulder offers a wide array of courses for graduate students taught by a diverse and well-regarded faculty.

**Course code for this program is SOCY.**

# Master's Degree

- Sociology - Master of Arts (MA) (p. 1393)

# Doctoral Degree

- Sociology - Doctor of Philosophy (PhD) (p. 1393)

# Certificate

- Social Innovation - Graduate Certificate (p. 1781)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Adler, Patricia A.
Professor Emerita

Bailey Mollborn, Stefanie Faun (https://experts.colorado.edu/display/fisid_142921/)
Professor; PhD, Stanford University

Bartos, Otomar J.
Professor Emeritus

Boardman, Jason D. (https://experts.colorado.edu/display/fisid_125577/)
Professor; PhD, University of Texas at Austin

Brown, Matthew C.
Instructor; PhD, University of Colorado Boulder

Cook-Martin, David (https://experts.colorado.edu/display/fisid_165342/)
Professor; PhD, University of California-Los Angeles

Desan, Mathieu (https://experts.colorado.edu/display/fisid_157678/)
Assistant Professor; PhD, University of Michigan

Downey, Liam C. (https://experts.colorado.edu/display/fisid_129297/)
Assistant Professor; PhD, University of Arizona

Downton, James V.
Professor Emeritus

Elliott, Delbert S.
Professor Emeritus

Gimenez, Martha E.
Professor Emerita

Grant, Don Sherman II (https://experts.colorado.edu/display/fisid_154039/)
Professor; PhD, Ohio State University

Hubbard, Eleanor
Professor Emerita

Hunter, Lori Mae (https://experts.colorado.edu/display/fisid_118372/)
Professor; PhD, Brown University

Irvine, Leslie Jane (https://experts.colorado.edu/display/fisid_113150/)
Professor; PhD, SUNY at Stony Brook

Jacobs, Janet L. (https://experts.colorado.edu/display/fisid_100744/)
Professor; PhD, University of Colorado Boulder

Kjolseth, J. Rolf
Professor Emeritus

Masters, Ryan Kelly (https://experts.colorado.edu/display/fisid_152730/)
Associate Professor; PhD, University of Texas at Austin

Mayer, Thomas
Professor Emeritus

Menken, Jane A. (https://experts.colorado.edu/display/fisid_112411/)
Distinguished Professor; PhD, Princeton University

Mileti, Dennis S.
Professor Emeritus

Pampel, Fred
Professor Emeritus

Patterson, Laura R. (https://experts.colorado.edu/display/fisid_146606/)
Instructor; PhD, University of Colorado Boulder

Pedersen-Gallegos, Liane G.
Instructor; PhD, University of Colorado Boulder

Peek, Lori (https://experts.colorado.edu/display/fisid_158492/)
Professor; PhD, University of Colorado Boulder

Pinto, Leonard J.
Professor Emeritus

Platter, Adele
Professor Emerita

Pyrooz, David C. (https://experts.colorado.edu/display/fisid_155784/)
Associate Professor; PhD, Arizona State University

Radelet, Michael L. (https://experts.colorado.edu/display/fisid_121802/)
Professor; PhD, Purdue University

Regoli, Robert M.
Professor Emeritus

Rinaldo, Rachel Ann (https://experts.colorado.edu/display/fisid_156309/)
Associate Professor; PhD, University of Chicago

Riosmena, Fernando (https://experts.colorado.edu/display/fisid_144419/)
Associate Professor; PhD, University of Pennsylvania

Rogers, Richard G. (https://experts.colorado.edu/display/fisid_106129/)
Professor; PhD, University of Texas at Austin

Steen, Sara
Associate Professor; PhD, University of Washington

Stevenson, Amanda Jean (https://experts.colorado.edu/display/fisid_157687/)
Assistant Professor; PhD, University of Texas at Austin

Stewart, Amanda (https://experts.colorado.edu/display/fisid_167417/)
Instructor; PhD, University of Illinois at Chicago

Sue, Christina Alicia
Associate Professor, Associate Chair; PhD, University of California, Los Angeles

Thomas, Kyle (https://experts.colorado.edu/display/fisid_165253/)
Assistant Professor; PhD, University of Maryland College Park Campus

Tierney, Kathleen Jane (https://experts.colorado.edu/individual/fisid_125978/)
Professor Emerita; PhD, Ohio State University

Wadsworth, Thomas Pearson (https://experts.colorado.edu/display/fisid_144382/)
Associate Professor, Chair; PhD, University of Washington

Walden, Glenda D. (https://experts.colorado.edu/display/fisid_105898/)
Senior Instructor; PhD, University of Colorado Boulder

Wanderer, Jules J.
Professor Emeritus

# Courses

**SOCY 5031 (3) Research Design**
Principles and practice of quantitative sociological research, including the nature of scientific explanation, the relationship between theory and research, research design, measurement issues, sampling, questionnaire construction, and statistical analyses. A key aspect of the course will be developing a quantitative research proposal that addresses a key empirical sociological question.
**Additional Information:** Departmental Category: General Sociology

**SOCY 5037 (3) Hazards, Disasters and Society**
Explores the societal dimensions of hazards and disasters, emphasizing disaster theory and research, and key issues in the sociological study of disasters, social vulnerability, and the impacts of disasters in the U.S. and worldwide.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4037
**Additional Information:** Departmental Category: Environment and Society

**SOCY 5071 (3) Social Inequalities and Social Change**
Provides a sociological perspective on social inequalities in the United States, such as those pertaining to social class, race, ethnicity, sex, gender, sexuality, and age. Examines current data of patterns and trends of such inequalities, reviews scholarship on their roots, and critically evaluates social change efforts to redress them.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4071
**Additional Information:** Departmental Category: General Sociology

**SOCY 5111 (3) Statistics 1: Introduction to Social Statistics**
Introduces statistical analysis in the social sciences. Introduces basic techniques of inferential statistics and several bivariate statistical techniques including t-test for the difference in means, chi-square independence, analysis of variance (ANOVA), correlation, and simple regression (OLS). Prepares students for the required course on multivariate regression techniques (Data 2).
**Requisites:** Restricted to Sociology (SOCY) graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 5160 (3) Designing Social Innovations**
One of the goals of higher education is to nurture innovative thinking and prepare professionals to solve society¿s most complex and pressing problems. Towards that end, this course reviews academic and practitioner literatures on the processes involved in designing social innovations.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4160
**Requisites:** Restricted to graduate students only.

**SOCY 5181 (3) Logics of Qualitative Inquiry**
A required first-year seminar that introduces the logics of qualitative inquiry in sociology. Introduces the history of qualitative epistemology. Considers the logic of common qualitative methodologies and qualitative research representations. Engages with the logics of inquiry in classic and more recent well regarded qualitative sociological works.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Sociology

**SOCY 5201 (3) Graduate Seminar in Sociological Theory**
Examines theoretical approaches to core issues and problems in sociology, including the nature of society, the relationship between society and the individual, the role of culture and social structure, the sources of social power, and the conceptual structure of sociological knowledge itself.
**Requisites:** Restricted to Sociology (SOCY) graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 5202 (3) Graduate Seminar in Contemporary Theory**
Examines selected sociological theories considered contemporary, including but not limited to cultural sociology, feminist theory, postcolonial thought, actor-network theory, microsociology, field theory, and poststructuralism. Discusses the formation of a sociological canon and the challenge of categorizing theory. Considers the process of theorizing as an acquired skill. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**SOCY 5350 (3) Comparison, Narrative, Meaning, and Method in Historical Sociology**
Examines the comparative, narrative, and interpretive methods historical sociologists use when investigating temporally unfolding social processes occurring in the recent or distant past. Through an introduction to the methodological literature and a close reading of exemplary historical research, students will learn to (a) critically evaluate historical sociological research and (b) design methodologically sophisticated historical research projects that address questions that most interest them, potentially incorporating ethnographic and/or quantitative methods into their research designs. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.

**SOCY 5611 (3) Teaching in Sociology**
Learn how to teach sociology more effectively while developing a new content area and a clearer sense of the field. Choose a content area within sociology as the basis for planning a course and developing and practicing different teaching techniques. Department enforced prerequisite: enrollment in the Sociology graduate program.
**Additional Information:** Departmental Category: General Sociology

**SOCY 5750 (3) Climate Politics and Science-Policy**
Explores, understands and critically analyzes influences and trends in climate politics and science-policy. Course participants will gain an improved understanding of the myriad factors, pressures and processes that are involved in contemporary climate politics undergirding explicit policy proposals. Course participants will more capably identify consequential spaces of decision-making, recognize tractable places for change and fashion constructive strategies for their own research by way of best available evidence from work done in these areas. Overall, our attention to these course themes, concepts and case studies will help us to more capably understand, analyze and engage in the high-stakes 21st century arena of climate politics and science-policy. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVM 5750, GEOG 5750 and ENVS 5750
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**SOCY 5839 (3) Logics of Social Inquiry**
How do we make knowledge about the social world? This question encompasses at least two other sets of questions: epistemological questions about how we come to know things, and practical questions about how we go about answering questions once formulated. To develop a sociological imagination around these inquiries, this course exposes first-year sociology graduate students to different types of inquiries sociologists make and discusses the underlying logics of those inquiries. This course is not a survey of research methods, nor is it designed to train students in particular methods ¿ although students will learn about a range of approaches ¿ from ethnographic to survey to experimental. Instead, the course will expose students to different logics of discovery, the menu of sociological techniques, and how to assess the fit between question and method.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**SOCY 5841 (1-6) Independent Study in Sociology**
Graduate variable credit. Instructor consent required.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General Sociology

**SOCY 5937 (1-6) Graduate Research Internship in Environmental Sociology**
Offers the opportunity for sociology graduate students specializing in environmental sociology to work with local governmental or non-profit organizations on research assignments. The research topic, academic reading list, and expectations for the final project will be developed collaboratively with a faculty sponsor and organizational representative.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Environment and Society

**SOCY 6004 (3) Topics in Criminology**
Variety of courses in criminology to be taught by visiting lecturers. See current departmental announcements for specific content.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Deviance and Criminology

**SOCY 6007 (3) Foundations of Environmental Sociology**
Provides overview of environmental sociological theory and research including topics such as: public environmental perception, concern, and knowledge; environmentalism as a social movement; environmental justice; energy, technology, and risk; human dimensions of environmental change; and natural hazards and disasters.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 6007
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Environment and Society

**SOCY 6012 (3) Population Issues, Problems, and Policies**
Presents contemporary perspectives on relations between population and society. Focuses on mortality, fertility, and migration, the major demographic areas, with reviews of specific demographic phenomena and controversies.
**Additional Information:** Departmental Category: Population and Health Issue

**SOCY 6016 (3) Topics in Sex and Gender**
Covers diverse specializations of faculty in the area of sex and gender. See current departmental announcements or online Schedule Planner for specific content.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Sex and Gender

**SOCY 6017 (3) Inequality, Democracy, and the Environment**
Focuses on the structural forces affecting environmental degradation and environmental behavior by examining the relationships between a) inequality and democratic decision making and b) undemocratic economic and political decision making, U.S. and corporate food and energy policy; and global environmental degradation. Focus will also be placed on the role that global inequality plays in fostering environmental degradation.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Environment and Society

**SOCY 6041 (3) Cultural Sociology**
Explores "the cultural turn" in sociology and related disciplines. Reviews basic themes in cultural studies: distinguishing "cultural" and "social"; narrative as catalyst between symbols and practices; cultural production processes; self as embodied; culture and power; methods and epistemological issues. Students present their own projects in class and as research papers.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 6111 (3) Stats 2: Statistic Analysis**
Introduces students to mainstream multivariate regression techniques used in the social sciences. The majority of the course focuses on the Ordinary Least Square model and on the extension of this model to nominal, ordinal and count dependent variables. Students analyze data of their choosing with statistical software packages including SPSS, SAS, and STATA. Department prerequisite: SOCY 5111 or equivalent.
**Requisites:** Restricted to Sociology (SOCY) graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 6121 (3) Qualitative Methods**
Training in the systematic observation of people in situations, finding them where they are, staying with them in a role acceptable to them that allows intimate observations of behavior. Students report their findings in ways useful to social science but not harmful to those observed.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 6821 (1-2) Graduate Sociology Forum 1**
Introduces first-year graduate students to the full range of substantive topics, research programs, and other projects in which graduate sociology faculty are engaged. Provides a forum in which issues of the discipline are presented and discussed. Features weekly presentations by graduate sociology faculty.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 6831 (1) Graduate Professional Seminar**
Offers guidance and instruction on topics related to advanced graduate study and academic life beyond graduation. Discussions will include writing journal articles; creating a vitae; writing dissertations; applying for grants and other sources of funding; the academic job search; and what to expect as a junior faculty member.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 6841 (1-6) Guided Research in Sociology**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 6851 (2) Interdisciplinary Social Science Professional Socialization**
Trains graduate students and provides professional socialization in interdisciplinary social science research. Open to all interested students, with programming provided by the Institute of Behavioral Science. Sessions include IBS-housed colloquia and workshops in professional socialization, technological tools, interdisciplinary research, ethics, grant writing, etc. Students workshop and submit a research paper.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 6831 and PSCI 6851
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 6861 (1-2) Interdisciplinary Training in the Social Sciences Methods Course**
This is a new course number for a series of interdisciplinary graduate methods seminars created as part of the new Interdisciplinary Training in the Social Sciences program, which is co-funded by the Graduate School and the College of Arts and Sciences. These courses, which have rotating topics, train graduate students in qualitative and quantitative methods. CARTSS/IBS will arrange three one-credit advanced methods mini-courses each Spring semester. The mini-courses will be taught weekly (two hours per week) for five weeks. The courses will change each spring; topics include a wide variety of advanced statistical analysis methods, machine learning for social sciences, text analysis, experimental techniques, network analysis, survey design, interview protocols, etc. Open to all interested graduate students, with programming provided jointly by the Institute of Behavioral Science (IBS) and the Center to Advance Research and Teaching in the Social Sciences (CARTSS).
**Equivalent - Duplicate Degree Credit Not Granted:** LING 6861
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**SOCY 6941 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: General Sociology

**SOCY 6951 (1-6) Master's Thesis**
**Additional Information:** Departmental Category: General Sociology

**SOCY 7002 (3) Social Disparities in Health**
Presents social disparities in health in their social context. Includes the sociology of health behavior; links between health status and social statuses including gender, race, ethnicity, and socioeconomic status; fundamental causes and other explanations for social disparities in health; environment and health; health insurance disparities; the physician-patient interaction and its consequences.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Population and Health Issue

**SOCY 7004 (3) Criminological Theory**
Examines the major criminological theories of the 18th through 21st centuries in Europe, Australia, and the U.S. Emphasizes the historical contexts and paradigms of knowledge influencing these theories.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Deviance and Criminology

**SOCY 7006 (3) Sociology of Sex and Gender**
Theoretical and empirical examination of sex stratification, sex role differentiation, and sex differences in socialization, personality, institutions, and culture.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Sex and Gender

**SOCY 7007 (3) Political Sociology**
This course is a graduate-level introduction to the field of political sociology, with a particular concentration on the Weberian, Marxist, and other critical traditions. The course deals with the relationship between state and society, the nature of power, the role of ideology, and the mechanisms of social transformation.

**SOCY 7008 (3) Race and Ethnicity**
The study of race and ethnicity is a core component of sociology. The field has two central concerns that are understanding the nature and persistence of racial/ethnic categories and documenting how these categories relate to systems of social stratification as well as political and economic dynamics. This graduate-level seminar will examine the major theoretical, substantive, and methodological issues surrounding these core concerns from a sociological perspective.

**SOCY 7012 (3) The Social Demography of Race**
Introduction to relevant, timely research within sociological and social demographic research on race and ethnicity. Specific areas will include conceptual/measurement issues; population size, growth, and migration; health and mortality; marriage, family, and fertility; socioeconomic context; and policy considerations. Course content will be structured around current empirical pieces in sociology literature with emphasis on methodological approach in analyses.
**Additional Information:** Departmental Category: Population and Health Issue

**SOCY 7014 (3) Gender, Race, Class, and Crime**
Examines crime and the criminal legal system practices through the lens of intersecting oppressions, particularly racism, sexism, heterosexism and classism.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 6014
**Additional Information:** Departmental Category: Deviance and Criminology

**SOCY 7017 (3) Population and Environment**
Reviews research on human-environment interactions, with a focus on ways in which demographic processes influence, and are influenced by, the environmental context. Specific topics include conceptual and analytical frameworks; methodologies; intervening factors shaping human dimensions of environmental change; and regionally-focused research.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Environment and Society

**SOCY 7024 (3) Punishment and Social Control**
Exploration of sociological perspectives on the criminal justice process. Considers organization of criminal law responses, including enforcing and sentencing. Race, class, gender, and age differences in treatment and sentencing are analyzed.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Deviance and Criminology

**SOCY 7026 (3) Feminist Research Methods**
Epistemological and methodological issues generated by feminist research and students' own projects.
**Additional Information:** Departmental Category: Sex and Gender

**SOCY 7034 (3) Capital Punishment in the United States**
Surveys the history and current status of capital punishment in the United States, with a critical examination of arguments both for and against the death penalty.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Deviance and Criminology

**SOCY 7036 (3) Feminist Theory**
Examines the main schools of feminist thought and their impact upon sociological theories. Also examines current feminist theoretical debates and their relevance to feminist sociology.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Sex and Gender

**SOCY 7111 (3) Data III--Advanced Data Analysis**
Denotes third graduate course in sequence of quantitative methods. Following basic inferential statistics (SOCY 5111) and multivariate regression analysis (SOCY 6111), students study advanced statistical techniques such as event history analysis, multilevel modeling, structural equation modeling, and latent class analysis.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires a prerequisite course of SOCY 6111 (minimum grade D-). Restricted to graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 7121 (3) Qualitative Analysis**
Drawing on data gathered through participation, observation and in-depth interviewing, students focus on developing theoretical analyses and exploring classical and post-modern ethnographic writing formats. Students present and revise their papers as well as review journal articles. Department enforced prerequisite: SOCY 6121.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 7131 (3) Seminar in Social Psychology**
Studies the individual in social context. Focuses on theoretical perspectives and substantive issues specific to sociological and social psychology, including socialization, the self, social roles, language, deviance, gender, collective behavior, group processes, attitudes and behavior, social norms,and conformity.
**Additional Information:** Departmental Category: General Sociology

**SOCY 7141 (3) Third-year Paper Seminar**
Guides graduate students through the creation of the required third-year paper and helps establish productive writing habits. Includes assigned readings, discussion, peer review, and specific tasks related to scholarly writing. Students will revise and defend the paper during the semester following the seminar. Department enforced prereqs., SOCY 5111 and SOCY 5201.
**Requisites:** Restricted to Sociology (SOCY) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Sociology

**SOCY 7171 (3) Special Topics**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 8991 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Additional Information:** Departmental Category: General Sociology

# Sociology - Master of Arts (MA)

The master's degree in this field is not available through direct admission and may only be earned under special circumstances. Please contact program for additional information and requirements.

# Sociology - Doctor of Philosophy (PhD)

Our program offers solid training in the foundational theories and methods of the discipline and allows students the flexibility to pursue

interests in a variety of specialty areas. The Department of Sociology at CU Boulder is a well-respected center for teaching and research. Here students can work with award-winning faculty members who have been recognized for their research, teaching and service.

The Department of Sociology strives to maintain a diverse mix of graduate students, promote respect for and opportunities to learn from others with a broad range of backgrounds and experiences, and otherwise promote inclusive excellence. By providing a variety of perspectives, a diverse student body enhances students' educational experiences and strengthens our research and outreach endeavors.

We have strengths in the following areas:

- criminology
- cultural sociology
- environment, hazards and disasters
- gender and sexuality
- health and medicine
- life course, aging and youth
- political economy
- population
- race and ethnicity
- social psychology and emotions

# Community

The department views the recruitment and retention of an inclusive and diverse student body as an essential component of a successful graduate program. Besides enhancing the quality of our program by bringing a larger diversity of experience to it, recruitment and retention of students from many different backgrounds and experiences will increase the diversity in the profession of sociology overall. Our department is committed to improving the diversity of the student body and the graduate program experience.

Students are encouraged to become involved in CU Boulder's United Government of Graduate Students (UGGS) (http://www.colorado.edu/uggs/about-uggs/). UGGS is committed to enhancing the graduate student experience by interacting with the university administration on matters such as financial aid, etc. UGGS has worked with the Graduate School to develop the Graduate Student Bill of Rights and Responsibilities (http://www.colorado.edu/uggs/sites/default/files/attached-files/Graduate%20Student%20Bill%20of%20Rights%20and%20Responsibilities.pdf).

# Requirements

Students must complete a total of 45 credit hours of coursework before taking the specialty area comprehensive exam. At least 24 hours must be in the Department of Sociology on the Boulder campus. All courses taken within the Department of Sociology must be numbered 5000 or above to qualify for graduate credit.

All first-year coursework must be completed with at least a 3.50 GPA and no grade lower than a B to continue into the second year.

At the end of the first and second years, faculty members teaching required courses, faculty mentors/advisors and faculty supervising teaching assistants conduct a review of students' progress.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| SOCY 5031 | Research Design | 3 |
| SOCY 5111 | Statistics 1: Introduction to Social Statistics | 3 |
| SOCY 5181 | Logics of Qualitative Inquiry | 3 |
| SOCY 5201 | Graduate Seminar in Sociological Theory | 3 |
| SOCY 5202 | Graduate Seminar in Contemporary Theory | 3 |
| SOCY 6111 | Stats 2: Statistic Analysis | 3 |
| **Electives** | | |
| A second theory seminar of the student's choice. | | 3 |
| Two 1-credit-hour graduate forums: | | 2 |
| SOCY 6821 | Graduate Sociology Forum 1 | |

## Master's Degree

The Department of Sociology does not have a master's degree program; however, students who are unable to meet the requirements for the doctoral degree may pursue an MA with Graduate Committee approval. In addition, PhD students may obtain the MA in the process of completing the doctoral degree. The department does not allow extra time for the completion of the MA degree while pursuing the PhD.

All MA students are required to complete a minimum of 30 credit hours of graduate coursework. These 30 credit hours must include at least 6 credit hours in at least two seminars in the student's major fields. Students may take a maximum of 6 credit hours of independent study. Independent study may not be substituted for regular seminars. In addition, all students must take courses from at least four faculty members. Finally, all MA students must designate a master's advisory committee that consists of at least three regularly appointed graduate faculty members from the Department of Sociology.

For the MA degree, a student must complete 30 credit hours of coursework at the 5000 level or above, including 4–6 thesis credit hours and the required Theory and Methods sequence with a B or higher in addition to the preparation of a written thesis and a successful oral defense of the thesis. Students must register for thesis credit hours in the semester of thesis defense.

## Dissertation

Students must prepare a written dissertation proposal and orally defend it before the dissertation committee, and complete dissertation research and defend by the end of the sixth program year.

# Recommended Plan of Study

Students enter the program in a cohort of approximately 12 students. Students typically focus on required courses during the first year. Graduate students are expected to take two or three seminars each semester. We encourage students to work with their faculty advisors to determine the course load for the first year based on prior coursework, etc. Beyond the first year, we recommend that students take three courses each semester.

Each incoming student will be assigned an individual faculty advisor who will help guide the student through the first year of the program. Under the first-year advising system, students are encouraged to work with their

first-year advisors to explore the program, the research specialties of the department and their own developing research interests while getting to know faculty members. Once a student has had an opportunity to meet and work with a variety of faculty, decisions regarding long-term advisors should be made. Beginning in year two of the program, graduate students are expected to seek their own faculty advisors.

Students in their first year are required to attend the graduate forum (SOCY 6821). Students will meet bimonthly throughout the academic year with the forum leader. The primary purposes of the forum are to introduce faculty and their research to the first-year cohort and to provide a communal forum for the cohort to discuss issues of concern with the forum leader.

The department offers an ongoing professionalization seminar ("prosem") led by a group of elected graduate students.

During the first two years, a student's coursework will focus on theory and methods. In the third and fourth years, the student will work with their advisor to develop a specialty area. Upon successful completion of the specialty comprehensive exam, the student will be admitted to candidacy and begin their dissertation research.

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate mastery of core sociological knowledge and knowledge of several sub-fields within sociology.
- Demonstrate proficiency in research design, primary or secondary data collection, and empirical data analysis.
- Demonstrate independent scientific thinking and advance knowledge within the discipline of sociology.
- Demonstrate effective oral and written communication skills reflective of presenting, publishing and writing standards in sociology and the broader social sciences.
- Understand career practices, including, for example, ethical issues with regard to human subjects research, teaching and related professional standards and responsibilities.

# Spanish and Portuguese

Ranked as a top graduate program in the nation by the National Research Council, the Department of Spanish and Portuguese offers MA degrees in Peninsular and Latin American Literature as well as Hispanic Linguistics. It also offers PhD degrees in Peninsular and Latin American Literatures, and Medieval and Early Modern Hispanic Literatures.

All students are eligible for graduate teaching assistantships. These appointments include a monthly stipend and tuition remission, and they cover all student health insurance premiums. Grants and fellowships (summer, research and travel) are also available by application.

**Course codes for this program are SPAN and PORT.**

## Master's Degree

- Spanish - Master of Arts (MA) (p. 1399)

## Doctoral Degree

- Spanish - Doctor of Philosophy (PhD) (p. 1401)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Abdala-Mesa, Yohainna
Assistant Teaching Professor; PhD, Université de Toulouse II Le Mirail (France)

Becher, Anne Helen (https://experts.colorado.edu/display/fisid_110035/)
Associate Teaching Professor; MA, University of Colorado Boulder

Brown, Esther Lynn (https://experts.colorado.edu/display/fisid_129298/)
Professor, Chair; PhD, University of New Mexico

Dabove, Juan Pablo (https://experts.colorado.edu/display/fisid_125397/)
Professor; PhD, University of Pittsburgh

Elmore, Peter Michael (https://experts.colorado.edu/display/fisid_103089/)
Professor; PhD, University of Texas at Austin

Elmore, Vivian
Assistant Teaching Professor; BA, Pontificia Universidad Católica (Perú)

Hallstead, Susan Rita (https://experts.colorado.edu/display/fisid_125579/)
Associate Teaching Professor; PhD, University of Pittsburgh

Herland, Emmy (https://experts.colorado.edu/display/fisid_168686/)
Assistant Teaching Professor; PhD, University of Washington

Herrero-Senés, Juan (https://experts.colorado.edu/display/fisid_147159/)
Associate Professor, Associate Chair; PhD, Universitat Pompeu Fabra (Spain)

Kennedy, John
Assistant Professor; PhD, Cornell University

Krauel, Javier (https://experts.colorado.edu/display/fisid_143248/)
Associate Professor; PhD, Duke University

Long, Mary K. (https://experts.colorado.edu/display/fisid_109994/)
Teaching Professor; PhD, Princeton University

Malcolm, Karen L. (https://experts.colorado.edu/display/fisid_108575/)
Assistant Teaching Professor; MA, University of Nebraska-Lincoln

Martuscelli, Tania A. (https://experts.colorado.edu/display/fisid_148379/)
Associate Professor; PhD, University of Massachusetts at Amherst

Ortega Guzmán, Élika (https://experts.colorado.edu/display/fisid_165171/)
Assistant Professor; PhD, University of Western Ontario

Piras, Maria Cristina
Assistant Teaching Professor; M.A, University of Colorado Boulder

Prieto, Andrés Ignacio (https://experts.colorado.edu/display/fisid_143948/)
Professor; PhD, University of Connecticut

Quan, Tracy (https://experts.colorado.edu/display/fisid_167169/)
Assistant Professor; PhD, University of California-Davis

Rivas Rodríguez, José Javier (https://experts.colorado.edu/display/fisid_144516/)
Professor, Associate Chair; PhD, Universidade de Santiago De Compostela (Spain)

Schincariol, Marcelo Tadeu (https://experts.colorado.edu/display/fisid_148724/)
Associate Teaching Professor; PhD, Universidade Estadual de Campinas (Brazil)

Silleras-Fernández, Núria (https://experts.colorado.edu/display/fisid_147213/)
Professor; PhD, Universitat Autònoma de Barcelona (Spain)

Vargas, Edgar (https://experts.colorado.edu/display/fisid_174781/)
Assistant Teaching Professor; PhD, University of Houston

# Courses

## Portuguese

**PORT 5110 (3) Brazilian Literature**
Focuses on Brazilian literature through the lenses of literary and cultural studies. May address fiction, poetry and/or the relationship between literature and film. In addition to reading literary texts, students read academic essays.
**Equivalent - Duplicate Degree Credit Not Granted:** PORT 4110
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Portuguese

**PORT 5150 (3) Literature of the Portuguese Speaking World**
Examines major works of Portuguese literature and/or Portuguese-speaking African literature through the lenses of cultural and literary studies. May address fiction, poetry, and/or the relationship between literature and cinema.
**Equivalent - Duplicate Degree Credit Not Granted:** PORT 4150
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Portuguese

## Spanish

**SPAN 5120 (3) Seminar: Spanish Literature and/or Spanish American Literature**
Selected topics in Spanish and/or Spanish American literature.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7120
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5130 (3) Seminar: Critical Approaches to Iberian & Latin American Literatures and Cultures**
An introductory study of theoretical approaches and critical analyses related to Iberian and Latin American literatures and cultures, with an emphasis on contemporary trends.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7130
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5140 (3) Seminar: Spanish Literature, Medieval Period**
Studies medieval works, authors and themes, with consideration of principal influences from other literatures. Reading in Old Spanish.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7140
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Spanish

**SPAN 5200 (3) Seminar: Spanish Literature, Renaissance and Baroque**
Treats various topics, as needs and resources dictate. Special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include Renaissance poetry in Spain, Cervantes, Don Quixote and Novelas ejemplares, picaresque novel and the Spanish comedia of the 17th century.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7200
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5210 (3) Seminar: Spanish Literature, 18th and/or 19th Centuries**
Treats various topics as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include romantic prose, poetry and theatre, realism and naturalism (prose narrative), 19th century poetry and 19th century theatre.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7210
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5220 (3) Seminar: Spanish Literature, 20th and/or 21st Centuries**
Treats various topics, as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include the generation of 1898, poetry of the 20th century, theatre of the 20th century, pre-Civil War novel, and post-Civil War novel.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7220
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5300 (3) Seminar: Spanish American Literature, Colonial Period and/or 19th Century**
Treats various topics, as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include pre-Columbian literature, colonial prose and narrative, colonial poetry, romantic novel, the realist and naturalist novel and short story, 19th-century poetry, and gaucho literature.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7300
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5320 (3) Seminar: Spanish American Literature, 20th and/or 21st Centuries**
Treats various topics, as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include modernism, theatre, the essay, the regional novel, the novel of the Mexican Revolution, the modern novel, contemporary theatre, and contemporary poetry.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7320
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5400 (3) Seminar: Spanish Phonology**
Topics within Spanish phonology are treated as needs and resources dictate. Gives special attention to different schools and contemporary theoretical developments. Representative topics might include generative phonology applied to Spanish, Spanish phonology for college teaching and different schools of Spanish phonology.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7400
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5410 (3) Seminar: Spanish Syntax**
Treats topics within Spanish syntax, each requiring a semester's study, as needs and resources dictate. Gives special attention to different schools and contemporary theoretical developments. Representative topics may include generative/transformational grammar applied to Spanish, fundamental problems in Spanish syntax and different schools of Spanish syntax.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7410
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5430 (3) Seminar: Hispanic Linguistics**
Studies a major topic from an area such as phonology, syntax, history of the Spanish language, Hispanic linguistics and literature, or applied Hispanic linguistics.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7430
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5440 (3) Seminar: Trends in Hispanic Linguistics**
Provides an overview of major trends and issues in Hispanic linguistics, including phonology, syntax, dialectology, sociolinguistics, discourse analysis, text linguistics, semiotics, history of the Spanish language, language acquisition and applied linguistics.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7440
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5450 (3) Introduction to Hispanic Linguistics**
Introduces students to the main areas of inquiry within the field of Hispanic linguistics. Topics to be covered include speech and language, phonetics and phonology, morphology and syntax, semantics, linguistic change and variation and Spanish spoken in the United States.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 4450
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5650 (3) Methods of Teaching Spanish**
Familiarizes students with current methodology and techniques in foreign language teaching. Peer-teaching coupled with opportunity to teach mini-lessons provide students with actual teaching experience in the foreign language classroom.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 4650
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 6840 (3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Spanish (SPAN) graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to Spanish (SPAN) graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 6950 (1-6) Master's Thesis**
**Requisites:** Restricted to Spanish (SPAN) graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7120 (3) Seminar: Spanish Literature and/or Spanish American Literature**
Selected topics in Spanish and/or Spanish American literature.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5120
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7130 (3) Seminar: Critical Approaches to Iberian and Latin American Literatures and Cultures**
An introductory study of theoretical approaches and critical analyses related to Iberian and Latin American literatures and cultures, with an emphasis on contemporary trends.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5130
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7140 (3) Seminar: Spanish Literature, Medieval Period**
Studies medieval works, authors and themes, with consideration of principal influences from other literatures. Reading in Old Spanish.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5140
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Spanish

**SPAN 7200 (3) Seminar: Spanish Literature, Renaissance and Baroque**
Treats various topics, as needs and resources dictate. Special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include Renaissance poetry in Spain, Cervantes, Don Quixote and Novelas ejemplares, picaresque novel and the Spanish comedia of the 17th century.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5200
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7210 (3) Seminar: Spanish Literature, 18th and/or 19th Centuries**
Treats various topics as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include romantic prose, poetry and theatre, realism and naturalism (prose narrative), 19th century poetry and 19th century theatre.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5210
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7220 (3) Seminar: Spanish Literature, 20th and/or 21st Centuries**
Treats various topics, as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include the generation of 1898, poetry of the 20th century, theatre of the 20th century, pre-Civil War novel, and post-Civil War novel.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5220
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7300 (3) Seminar: Spanish American Literature, Colonial Period and/or 19th Century**
Treats various topics, as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include pre-Columbian literature, colonial prose and narrative, colonial poetry, romantic novel, the realist and naturalist novel and short story, 19th-century poetry, and gaucho literature.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5300
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7320 (3) Seminar: Spanish American Literature, 20th and/or 21st Centuries**
Treats various topics, as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include modernism, theatre, the essay, the regional novel, the novel of the Mexican Revolution, the modern novel, contemporary theatre, and contemporary poetry.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5320
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7400 (3) Seminar: Spanish Phonology**
Topics within Spanish phonology are treated as needs and resources dictate. Gives special attention to different schools and contemporary theoretical developments. Representative topics might include generative phonology applied to Spanish, Spanish phonology for college teaching and different schools of Spanish phonology.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5400
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7410 (3) Seminar: Spanish Syntax**
Treats topics within Spanish syntax, each requiring a semester's study, as needs and resources dictate. Gives special attention to different schools and contemporary theoretical developments. Representative topics may include generative/transformational grammar applied to Spanish, fundamental problems in Spanish syntax and different schools of Spanish syntax.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5410
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7430 (3) Seminar: Hispanic Linguistics**
Studies a major topic from an area such as phonology, syntax, history of the Spanish language, Hispanic linguistics and literature, or applied Hispanic linguistics.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5430
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7440 (3) Seminar: Trends in Hispanic Linguistics**
Provides an overview of major trends and issues in Hispanic linguistics, including phonology, syntax, dialectology, sociolinguistics, discourse analysis, text linguistics, semiotics, history of the Spanish language, language acquisition and applied linguistics.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5440
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 8840 (3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Spanish (SPAN) graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to Spanish (SPAN) graduate students only.
**Additional Information:** Departmental Category: Spanish

# Spanish - Master of Arts (MA)

Students wishing to pursue graduate work in Spanish leading to candidacy for advanced degree should carefully read the Master's Degree Requirements (p. 1113) section of this catalog.

# Areas of Concentration

## Peninsular/Spanish American Literature Concentration

Our MA in Peninsular and Latin American literatures is designed to give the student a broad overview of the cultural productions of the Latin American and Peninsular worlds. MA students are required to take 30 hours of graduate coursework.

## Hispanic Linguistics Concentration

Our MA in Hispanic linguistics is an interdisciplinary program that provides students with a solid foundation in linguistics through the coursework taken in the Departments of Spanish and Portuguese, Linguistics, Communication, Anthropology and the School of Education. Students have the unique opportunity to work closely in collaboration with faculty to develop their areas of concentration and graduate as specialists in a wide range of topics (e.g., history of the Spanish language, Spanish in the United States, sociolinguistics, etc.)

All MA students in the Hispanic linguistics option are required to take 30 hours of graduate coursework. They are required to have their course selections in linguistics approved by their advisor and the Associate Chair of Graduate Studies, but they are encouraged to develop an interdepartmental and interdisciplinary course of study. Graduate seminars offered in linguistics, sociology, psychology, anthropology and education could serve as important complements to linguistics courses taken in our department.

## Spanish & Portuguese Studies Concentration

Our MA in Spanish and Portuguese studies is designed to give the student a broad overview of the cultural productions of the Latin American and Peninsular worlds, with an emphasis on Lusophone culture. MA students are required to take PORT 2350 in their first semester of study (or place in upper Portuguese language level) and 30 hours of graduate coursework, of which 27 hours must be taken within the department. Students who are proficient in Portuguese but not in Spanish are required to take SPAN 1150 or SPAN 2150 in addition to 30 hours of graduate coursework. Graduate students in this subplan are required to have Portuguese as the main area for their MA Comprehensive Exams.

## Teaching Spanish Concentration

The MA in Spanish with an emphasis in teaching Spanish offers students a broad base in literature, linguistics and language pedagogy and education, and its 31 hours of coursework are almost evenly divided between these three areas. Six of the credits in the pedagogy and education area may be taken outside of the Department. If students wish to earn a teaching license, they can apply to and concurrently enroll in the Post-Baccalaureate Secondary Spanish Teaching Licensure program, completing remaining coursework and the student teaching semester after graduation with the MA. Upon completion, students will be prepared to teach and design Spanish language curricula at the secondary and post-secondary levels, as well as pursue further study and research in the fields of applied linguistics, second language acquisition or education.

# Requirements

## General Course Requirements

The MA in Spanish is offered in two areas of concentration: one with an emphasis on literature and one with an emphasis on linguistics.

All MA students are required to complete at least 30 hours of graduate coursework, at least 25 of which must be completed at CU Boulder. MA students may transfer to the department a maximum of 6 credit hours of acceptable graduate-level courses and may take no more than 6 credit hours of independent study courses.

Courses taken as part of the MA program must be offered by our department or by others upon having been approved by the student's MA supervisory committee (or the Associate Chair of Graduate Studies if the committee has not yet been formed). In addition, MA students may not take more than 9 hours of graduate coursework in any given semester.

No graduate course in the department may be taken pass/fail by a graduate student in our program. This rule also applies to those courses taken in the Department of Linguistics by our MA students.

Students who are failing a course will not be allowed to drop the course, except under special circumstances. To do so, approval must be secured from the course instructor, the Associate Chair of Graduate Studies and the department Chair.

## Language Requirement

Students must demonstrate, as early as possible and before taking the comprehensive examination, a communication knowledge (as defined by the Graduate School) of a foreign language other than Spanish. They also must be able to speak, read and write English well.

## Concentration Requirements

### Peninsular/Spanish American Literature Concentration

The emphasis in Peninsular and Latin American Literatures is designed to give the student a broad overview of the cultural productions of the Latin American and Peninsular worlds. MA Students are required to take 30 hours of graduate coursework, of which 27 hours must be taken within the department.

All MA students in the Peninsular/Latin American Literature Option are required to take:

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| SPAN 5130 | Seminar: Critical Approaches to Iberian & Latin American Literatures and Cultures | 3 |
| SPAN 4980 | Methods Language Learn/Pedagogy | 1 |
| In addition, students in the Peninsular and Spanish American Literature Option are required to take a minimum of six graduate credit hours in each of the 3 following subject areas: | | |
| *1. Medieval/Early Modern/Colonial Literature* | | *6* |
| SPAN 5120 | Seminar: Spanish Literature and/or Spanish American Literature | |
| SPAN 5140 | Seminar: Spanish Literature, Medieval Period | |
| SPAN 5200 | Seminar: Spanish Literature, Renaissance and Baroque | |

| | | |
|---|---|---|
| SPAN 5300 | Seminar: Spanish American Literature, Colonial Period and/or 19th Century | |
| *2. Modern and Contemporary Peninsular Literature* | | *6* |
| SPAN 5120 | Seminar: Spanish Literature and/or Spanish American Literature | |
| SPAN 5210 | Seminar: Spanish Literature, 18th and/or 19th Centuries | |
| SPAN 5220 | Seminar: Spanish Literature, 20th and/or 21st Centuries | |
| *3. Modern and Contemporary Spanish American Literature* | | *6* |
| SPAN 5120 | Seminar: Spanish Literature and/or Spanish American Literature | |
| SPAN 5300 | Seminar: Spanish American Literature, Colonial Period and/or 19th Century | |
| SPAN 5320 | Seminar: Spanish American Literature, 20th and/or 21st Centuries | |
| One Hispanic linguistics course: | | 3 |
| SPAN 5400 | Seminar: Spanish Phonology | |
| SPAN 5410 | Seminar: Spanish Syntax | |
| SPAN 5430 | Seminar: Hispanic Linguistics | |
| SPAN 5440 | Seminar: Trends in Hispanic Linguistics | |
| SPAN 5450 | Introduction to Hispanic Linguistics | |
| **Electives** | | **3** |
| Any other graduate seminar offered by the department of Spanish and Portuguese: | | |
| SPAN 5120 | Seminar: Spanish Literature and/or Spanish American Literature | |
| SPAN 5200 | Seminar: Spanish Literature, Renaissance and Baroque | |
| SPAN 5220 | Seminar: Spanish Literature, 20th and/or 21st Centuries | |
| SPAN 5320 | Seminar: Spanish American Literature, 20th and/or 21st Centuries | |
| SPAN 5650 | Methods of Teaching Spanish | |
| PORT 5110 | Brazilian Literature | |
| PORT 5150 | Literature of the Portuguese Speaking World | |
| Additional 5000-level course(s), inside or outside the department, to fulfill the 30-credit minimum. | | 2 |
| **Total Credit Hours** | | **30** |

## Hispanic Linguistics Concentration

MA students in the Hispanic linguistics option are required to have their course selections in linguistics approved by their advisor and the Associate Chair of Graduate Studies, but they are encouraged to develop an interdepartmental and interdisciplinary course of study. Graduate seminars offered in linguistics, sociology, psychology, anthropology and education can serve as important complements to linguistics courses taken in our department.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| LING 2000 | Introduction to Linguistics [1] | 3 |
| SPAN 4980 | Methods Language Learn/Pedagogy | 1 |
| **Electives** | | |
| One Spanish graduate-level literature seminar. | | 3 |
| Additional courses to fulfill the 30-credit minimum. | | 23 |
| **Total Credit Hours** | | **30** |

[1] Required for students who did not take a similar course as part of their previous course of study. Students who must take LING 2000 are required to do so during their first semester in the program.

## Spanish & Portuguese Studies Concentration

MA students in the Spanish and Portuguese studies track are required to take PORT 2350 in their first semester of study (or place in upper Portuguese language level), and 30 hours of graduate coursework, of which 27 hours must be taken within the department. Graduate students in this subplan are required to have Portuguese as the main area for their MA comprehensive exams.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| SPAN 5130 | Seminar: Critical Approaches to Iberian & Latin American Literatures and Cultures | 3 |
| SPAN 4980 | Methods Language Learn/Pedagogy | 1 |
| **Electives** | | |
| *One Hispanic Linguistics course* | | *3* |
| SPAN 5400 | Seminar: Spanish Phonology | |
| SPAN 5410 | Seminar: Spanish Syntax | |
| SPAN 5430 | Seminar: Hispanic Linguistics | |
| SPAN 5440 | Seminar: Trends in Hispanic Linguistics | |
| SPAN 5450 | Introduction to Hispanic Linguistics | |
| In addition, students in the Peninsular and Spanish American Literature Option are required to take a minimum of six graduate credit hours in each of the following subject areas: | | 18 |
| *Medieval/Early Modern/Colonial Literature* | | |
| SPAN 5120 | Seminar: Spanish Literature and/or Spanish American Literature | |
| SPAN 5140 | Seminar: Spanish Literature, Medieval Period | |
| SPAN 5200 | Seminar: Spanish Literature, Renaissance and Baroque | |
| SPAN 5300 | Seminar: Spanish American Literature, Colonial Period and/or 19th Century | |
| *Modern and Contemporary Peninsular Literature* | | |
| PORT 5150 | Literature of the Portuguese Speaking World | |
| SPAN 5120 | Seminar: Spanish Literature and/or Spanish American Literature | |
| SPAN 5220 | Seminar: Spanish Literature, 20th and/or 21st Centuries | |
| *Modern and Contemporary Latin American Literature* | | |
| PORT 5110 | Brazilian Literature | |
| SPAN 5120 | Seminar: Spanish Literature and/or Spanish American Literature | |
| SPAN 5300 | Seminar: Spanish American Literature, Colonial Period and/or 19th Century | |
| SPAN 5320 | Seminar: Spanish American Literature, 20th and/or 21st Centuries | |

| | |
|---|---|
| Additional graduate courses to fulfill the 30-credit minimum | 6 |
| **Total Credit Hours** | **31** |

### Teaching Spanish Concentration

MA students in the Spanish teaching concentration are required to complete a minimum of 30 graduate credit hours, of which at least 25 must be taken in the department. All students are required to have their course selections approved by their advisor and the Associate Chair for Graduate Studies.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| SPAN 4650/5650 | Methods of Teaching Spanish [1] | 3 |
| SPAN 4980 | Methods Language Learn/Pedagogy | 1 |
| Spanish graduate-level literature seminars | | 9 |
| Spanish graduate-level linguistics seminars | | 9 |
| Graduate-level linguistics or literature electives in the Department | | 3 |
| Education-related electives inside or outside of the Department | | 6 |
| **Total Credit Hours** | | **31** |

[1] Candidates enrolled in this course will complete a special teaching project covering the planning, teaching and evaluation of a unit consisting of 10 to 15 lessons.

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate proficiency in Spanish and/or Portuguese sufficient to conduct academic research, teach language and culture courses and engage in professional communication in these languages.
- Exhibit a general understanding of key theoretical frameworks and methodologies in Hispanic and Lusophone literary, cultural and linguistic studies, with the ability to critically analyze texts and media across different genres, registers, periods and regions.
- Demonstrate effective teaching skills, including the ability to design units and lesson plans, conduct classes, assess student learning and adapt their pedagogy to various educational settings and levels, from introductory to advanced coursework in Spanish and/or Portuguese language and culture.
- Develop a professional identity, adhering to ethical research and teaching practices.
- Effectively engage with academic and non-academic audiences.
- Meet qualifications needed to succeed in a PhD program or on career paths such as teaching grades 1-12, publishing, translation and work for or with international organizations.

# Spanish - Doctor of Philosophy (PhD)

Unique among other departments in the country, the Spanish and Portuguese Department at CU Boulder offers two distinct tracks to our PhD students:

- Medieval and early modern Hispanic literatures
- Peninsular and Latin American literatures

Both PhD programs offer students a rigorous yet flexible plan of studies designed to deepen their knowledge of Peninsular and Latin American literatures and cultures.

Our faculty is actively engaged in research and publication in a variety of topics covering the whole range of peninsular and Latin American literatures and cultures, from the role of women's leadership in the Peninsular Middle Ages to cultural histories of banditry in Latin America, from Cervantes to the work of contemporary authors like Roberto Bolaño.

Students work closely with CU Boulder faculty members and are encouraged to pursue their own research interests.

Students wishing to pursue graduate work in Spanish leading to candidacy for advanced degree should carefully read the PhD Degree Requirements (https://www.colorado.edu/spanish/graduate-programs/graduate-student-resources/graduate-manual/doctor-philosophy/)website.

# Requirements

## Residence Requirement

PhD students must complete a minimum of one academic year in residence on the Boulder campus (excluding summer) within the four years immediately preceding the date on which they present themselves for the PhD comprehensive examination.

## Areas of Concentration

The PhD in Spanish is offered in three literary periods of concentration:

- Medieval/Early Modern/Colonial Literature
- Modern and Contemporary Peninsular Literature
- Modern and Contemporary Spanish-American Literature

For further information on these options, contact the department.

## Course Requirements

Prior to taking the PhD comprehensive exams, students must complete a minimum of 36 credit hours in graduate seminars in Spanish and/or related fields numbered 5000 or above. Students can take as many as 9 graduate credit hours outside the department. The student's advisor and the Associate Chair of Graduate Studies, in consultation with the Chair of the department, must approve credit hours in excess of 9, provided that the student formally requests it and gives a compelling reason for the standard limit to be overridden. Approval of the MA degree must also be presented for the PhD. Each advisor, in consultation with the student, will determine which courses will be acceptable.

All PhD students must take at least 30 credit hours of graduate coursework at CU Boulder. PhD students may transfer to the department a maximum of 6 hours of acceptable graduate-level credit. Transfer of credits will be considered only at the moment of admission into the program, not later on. Students may take no more than 3 credit hours of independent study courses. Additional independent study has to be approved by the graduate committee, which makes a recommendation to the Associate Chair of Graduate Studies or the Chair of the department. Under no circumstances can independent study coursework exceed 25 percent of the coursework required for the PhD degree.

Doctoral students can only take up to 12 credits in course load that are not regular graduate seminars in the Spanish and Portuguese Department. These 12 credits are a combination of credits taken outside of the Spanish and Portuguese Department and independent studies

offered by a faculty member of the Spanish and Portuguese Department. If a student decides to take one independent study with their advisor, then the student is allowed to take 9 credits outside the department; this is the recommended situation. If a student takes two independent studies, then they can only take 6 credits outside the department, and so on. No more than 9 credit hours can be used in independent studies, and no more than 9 credit hours can be taken outside the department.

PhD students who did not take a teaching methodology seminar, a literary theory seminar, or a Hispanic linguistics seminar as part of their MA program must do so as part of their PhD program. Those students who did not take a minimum of 3 graduate credit hours in each of the seven subject areas as part of their MA program, must make up coursework in these areas as part of the PhD program. The Associate Chair of Graduate Studies makes the decision regarding this additional work during the student's first semester in the program. If this additional work is not completed the semester prior to the PhD exam, students will not be able to take their comprehensive exams.

### Language Requirement

Students must demonstrate, as early as possible before taking the PhD Comprehensive Examination, communication knowledge in Portuguese and one other modern language (subject to the approval of the student's PhD Supervisory Committee). English and Spanish are not part of this language requirement. Communication knowledge is defined as the achievement of the current minimal acceptable score of the Graduate School Foreign Language Test or completion of a fourth-semester college-level course with a grade of B or higher. A fourth-semester college level of Latin (with a grade of B or higher) will also fulfill part of this requirement. Successful completion of PORT 2350 with a B or higher will satisfy the language requirement in Portuguese.

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate proficiency in Spanish and/or Portuguese sufficient to conduct academic research, teach language and culture courses and engage in professional communication in these languages.
- Exhibit an in-depth understanding of key theoretical frameworks and methodologies in Hispanic and Lusophone literary and cultural studies, with the ability to critically analyze texts and media across different genres, periods and regions.
- Produce original, publishable research that contributes significantly to the field of Spanish and/or Portuguese studies, showcasing the ability to identify, design and execute complex research projects that advance scholarship in their areas of expertise.
- Demonstrate effective teaching skills, including the ability to design syllabi, conduct classes, assess student learning and adapt their pedagogy to various educational settings and levels, from introductory to advanced coursework in Spanish and/or Portuguese language and culture.
- Integrate interdisciplinary approaches, drawing from related fields such as history, linguistics, anthropology and film studies, to enhance their research and teaching and to address complex cultural and social phenomena within the Hispanic and Lusophone worlds.
- Develop a professional identity, adhering to ethical research and teaching practices.
- Effectively engage with academic and non-academic audiences.
- Meet the qualifications to succeed in academia or on career paths, such as teaching grades 1-12, publishing, translation and working for or with international organizations.

# Speech, Language and Hearing Sciences

The graduate curriculum in speech, language and hearing sciences (SLHS) leads to either a master's or a doctoral degree including clinical degrees and research degrees. The clinical-training programs in speech-language pathology and audiology are accredited by the Council on Academic Accreditation (CAA) and the Colorado State Department of Education.

Prospective students should read the Master's Degree (p. 1113) or Doctoral Degree Requirements (p. 1114) sections of this catalog.

**Course code for this program is SLHS.**

## Accreditation

Degree programs in Speech-Language Pathology (SLP) and Audiology are designed to provide a theoretically and clinically rich learning experience for students planning to work as audiologists or speech-language pathologists in medical, educational and private practice settings. States have varied requirements for practitioners of speech-language pathology and audiology (e.g. additional externship hours, earning the Certificate of Clinical Competence (https://www.asha.org/certification/), etc.). Students are reminded to contact the applicable licensing board in the state where they are planning on looking for employment. Information is also available on the university's Accreditation & State Authorization (https://www.colorado.edu/accreditation/professional-licensure-programs-degrees/) website.

The MA education program in speech-language pathology and the Doctor of Audiology (AuD) education program in audiology at CU Boulder is accredited by the Council on Academic Accreditation in Audiology and Speech-Language Pathology of the American Speech-Language-Hearing Association. (Address: 2200 Research Boulevard, #310, Rockville, MD 20850. Phone: 800-498-2071 or 301-296-5700)

## Master's Degree

- Speech, Language and Hearing Sciences - Master of Arts (MA) (p. 1409)

## Doctoral Degrees

- Audiology - Doctor of Audiology (AuD) (p. 1411)
- Speech, Language and Hearing Sciences - Doctor of Philosophy (PhD) (p. 1412)

## Certificate

- Speech-Language Pathology Assistant - Graduate Certificate (p. 1413)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Arehart, Kathryn H. (https://experts.colorado.edu/display/fisid_105561/)
Professor; PhD, University of Washington

Baiduc, Rachael (https://experts.colorado.edu/display/fisid_157676/)
Associate Professor; PhD, University of Washington

Brennan, Christine (https://experts.colorado.edu/display/fisid_155861/)
Assistant Professor; PhD, Northwestern University

Fredrickson, Tammy L. (https://experts.colorado.edu/display/fisid_148888/)
Clinical Associate Professor; PhD, University of Colorado Boulder

Hawkins, Paige
Assistant Teaching Professor; MA, Gallaudet University

Hilger, Allison (https://experts.colorado.edu/individual/fisid_167224/)
Assistant Professor; PhD, Northwestern University

Kan, Pui Fong (https://experts.colorado.edu/display/fisid_145806/)
Professor; PhD, University of Minnesota Twin Cities

Kleiber, Holly (https://experts.colorado.edu/display/fisid_164035/)
Clinical Assistant Professor; MS, University of Washington

Lewon, Jennifer (https://experts.colorado.edu/display/fisid_147362/)
Clinical Associate Professor; MA, Northern Arizona University

Macias, Pamela
Assistant Teaching Professor; MA,

McCorkle-Geng, Audra
Assistant Teaching Professor; MA, University of Northern Colorado

Meyers-Denman, Christina Nicole (https://experts.colorado.edu/display/fisid_155857/)
Assistant Professor; PhD, University of Arizona

Pontis, Lauren
Clinical Assistant Professor; AuD, University of Colorado Boulder

Ramsberger, Gail (https://experts.colorado.edu/display/fisid_100943/)
Associate Professor; ScD, Boston University

Riseman, Christina (https://experts.colorado.edu/display/fisid_164336/)
Clinical Assistant Professor; MA, University of Colorado Boulder

Sharma, Anu (https://experts.colorado.edu/display/fisid_143814/)
Professor, Associate Chair; PhD, Northwestern University

Tennant, Sherri
Clinical Assistant Professor; MS, University of Wisconsin Madison

Tucker, Kathryn
Clinical Assistant Professor; MA, University of Colorado Boulder

Werner, LJ (https://experts.colorado.edu/display/fisid_154952/)
Scholar in Residence; MA, University of Colorado Denver

Yun, Donghyeon
Assistant Professor; PhD, Indiana University

# Courses

**SLHS 5012 (3) Evidence-based Practice and Research Methods**
Focuses on the knowledge of research methods and the application of research principles into clinical practice. In particular, covers quantitative research methods that are in speech-language pathology clinical settings. Will cover (1) clinical practice and research methods in speech, language and hearing sciences; (2) single-subject designs in clinical settings; (3) introduction to data collection, data organization and data analysis; (4) interpretation and presentation of clinical data. Formerly SLHS 5000.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5032 (3) Competencies and Strategies for the SLPA**
This course includes content regarding roles and responsibilities of the SLPA, Codes of Ethics and ethical issues, standard health precautions and infection control, health and safety policy and procedures, confidentiality (FERPA & HIPAA), culture of public schools, service delivery models, screening protocols, intervention processes and procedures, data collection and documentation, assistive technology, special populations and cultural-linguistic diversity, reflective practice and continuing professional growth. Students must be accepted in the SLPA certification program to enroll in this course.
**Requisites:** Requires a prerequisite course of SLHS 4918 (minimum grade D-).
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5112 (2) Clinical Practice I**
Provides entering graduate students a framework for beginning their clinical education and building the relationship of theory and research to current clinical practice in speech-language pathology. Key topics for exploration include contemporary professional issues, licensure, professionalism, ethics and ethical conduct, scope of practice, competency development, teaming and collaboration, accountability and multicultural issues. Formerly SLHS 5110.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5122 (1) Clinical Practice II: Assessment and Treatment Planning**
Explores critical elements associated with assessment and treatment planning in speech-language pathology. Topic areas include assessment style, interviewing, test selection and techniques of test administration. Diagnosis and treatment planning section includes differential diagnoses, ethics of diagnoses, goal writing and treatment rationale.
**Requisites:** Requires a prerequisite course of SLHS 5112 (minimum grade B). Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5132 (3) Clinical Practice II: Clinical Practice in Varied Work Settings**
Explores knowledge and skills specific to working in public school, medical, and private practice settings. Coursework will address required data collection, reporting, and accountability for specific work settings; aspects of billing, coding, and reimbursement where applicable; working effectively on interdisciplinary teams; supervision of support personnel; aspects of diversity, equity, and inclusion including cultural humility, responsiveness, and competence; overview of education and healthcare landscapes with implications for service delivery; service delivery models; and implementation of federal and state regulations and rules in different clinical settings.

**SLHS 5242 (3) Language Disorders in School Age Children**
Addresses the nature, assessment, and treatment of developmental language disorders in school age children.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite undergraduate background in SLHS.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5252 (3) Acquired Language Disorders in Adults**
Introduces the neural bases and medical etiologies of acquired language disorders in adults, explores the ways in which normal language processing may become disordered, and studies current methods of evaluation and treatment design.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Recommended:** Prerequisite undergraduate background in SLHS.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5262 (3) Dysphagia**
Provides students with background in the anatomical, physiological, and neurological bases of swallowing function and disorders across the lifespan. Etiological factors are presented, as well as various assessment tools and principles of treatment of swallowing disorders in children and adults.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5272 (1) Augmentative Alternative Communication: Theory and Use**
Provides an overview of the application of current technology to alternative/augmentative communication. Emphasizes assessment and intervention with nonverbal children and adults with need for alternative/augmentative communication systems. Presents various technological devices and systems. Addresses system selection, programming, development and integration of use in environmental contexts.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5282 (3) Acquired Cognitive Disorders**
Explores the theoretical and clinical management of acquired cognitive disorders that impact communication. Includes basic functional neuroanatomy.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5292 (3) Neurogenic Speech Disorders in Adults**
Presents the neural bases of normal and disordered speech motor control, teaches assessment and treatment of motor speech disorders in adults, and applies motor control research to clinical problems.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5302 (3) Speech Sound Disorders in Children**
Provides overview of phonological development, perception, and production. Presents factors related to articulation and focuses on critical evaluation of traditional and phonological based assessment and intervention procedures. Includes coverage of phonological awareness, metaphonological skills as related to literacy, as well as treatments and principles specific to children with motor speech disorders.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5312 (2) Aging and Communication**
Examines normal age-related changes to communication systems. Anatomic and physiological changes to the mechanisms of speech production, audition and the brain will be included, with a focus on the functional impacts of such changes for speech production and perception, cognition, language and social communication.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Grading Basis:** Letter Grade

**SLHS 5322 (2) Complex Medical Speech-Language Pathology Cases**
Expands upon the basic knowledge learned in SLHS 5252 (acquired language disorders), 5332 (voice disorders), 5282 (acquired cognitive disorders), 5262 (dysphagia), 5292 (neurogenic speech disorders) and 5362 (fluency disorders). Students will explore clinical management options for complex medical cases created by factors such as multiple and/or rare diagnoses, medical complications, socioeconomic factors and behavioral or personality issues.
**Requisites:** Requires prerequisite courses SLHS 5252 and SLHS 5332 and SLHS 5282 (all minimum grade B). Requires corequisite course SLHS 5292. Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5332 (3) Voice and Resonance Disorders**
Examines the anatomical and physiological bases for normal and disordered laryngeal and velopharyngeal function including functional, organic, and neurogenic voice disorders, and velopharyngeal insufficiency and incompetence. Emphasis on evidence-based assessment and treatment of individuals with voice and resonance disorders, including special populations.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5342 (2) Counseling in Speech-Language Pathology**
Designed to demonstrate the principles of counseling for individuals with communication disorders and their families throughout the client's lifespan. Counseling systems and techniques for specific communication disorders will be included. The course will focus on the basic theory of counseling and how counseling sills can be used in the treatment of various communication disorders. Provides an introduction to the basic counseling skills necessary to help speech-language pathologists achieve the greatest success possible when working with individuals exhibiting communication disorders.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5352 (3) Bilinguals with Communication Disorders**
Covers current empirical research regarding the linguistic and cognitive system of bilinguals with and without communication disorders. Address cross-cultural and cross-linguistic issues in selection and implementation of assessment and intervention procedures. Discuss various intervention strategies for working with bilinguals and their families.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5362 (3) Fluency Disorders**
Exploration of the nature, differential diagnosis and treatment of fluency disorders across the life-span. Students will develop the requisite skills and knowledge base to provide prevention, consultation, assessment and intervention for fluency disorders. Research bearing on affective, behavioral and cognitive components of stuttering will be reviewed, along with recent data on the neural bases of the disorder. A broad range of treatment approaches will be discussed and demonstrated.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5372 (1) Cleft and Resonance: Fundamentals for Evaluation and Treatment**
Provides an overview of fundamental awareness and knowledge of the etiology, development and treatment of children with cleft lip and palate and other disorders of resonance. It covers general parameters of care for speech language pathologists across various age groups (birth, toddler, preschool, and school age) with this population. Students will learn the methods for identifying and treating compensatory mis-articulation patterns and abnormal resonance patterns and the aspects of multidisciplinary team care for families and individuals with cleft lip and palate.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5555 (3) Advanced Topics in Social Communication: Autism Spectrum Disorders**
Students will acquire knowledge and skills in the appropriate selection, application and evaluation of interventions for children, adolescents and adults with autism spectrum disorders (ASD) and their families. Evaluation and diagnosis, including development of the IFSP and IEP, will be addressed.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5576 (3) Neuroanatomy and Neurophysiology of Communication**
Provides an introduction to the neuroanatomy and neurophysiology that collectively give rise to human communication including speech perception and production. We will consider how speech, language and hearing are represented in and controlled by the central nervous system and how neuropathologies affect processes of communication.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 5602 (3) Communication Challenges in Children: Birth to Six**
Emphasizes nature and profile of language and communication disorders affecting infants and young children. Facilitates integration of clinical and theoretical perspectives with specific approaches for family-centered assessment and intervention principles, models and techniques.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5612 (3) Language Learning Disabilities**
Expands upon the nature of Language Disorders in SLHS 5242 (School Age Language Disorders) including language-based difficulties in reading, written language and mathematical achievement, as well as deficits in executive functioning. Students will explore clinical management options through studies of intervention methods as well as through clinical case examples. Specifically, we will examine adaptive instruction and evidence-based intervention.
**Requisites:** Requires a prerequisite course of SLHS 5242 (minimum grade B).
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5622 (2) Advanced Topics in Learning Disabilities**
Expands upon the nature of Language Learning Disabilities learned in SLHS 5612 (Learning Disabilities) and SLHS 5242 (School Age Language Disorders) including language-based difficulties in reading, written language and mathematical achievement, as well as deficits in executive functioning. Students will explore clinical management options through studies of intervention methods as well as through clinical case examples. Specifically, we will examine adaptive instruction and evidence-based intervention.
**Requisites:** Requires prerequisite courses of SLHS 5242 and SLHS 5612 (all minimum grade B).
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5674 (2) Signals, Systems, and Calibration in Audiology**
Provides in-depth study of instrumentation used by audiologists for hearing aid evaluation and fitting, signal generation and modification, and signal measurement and calibration.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 5848 (1-4) Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Practica

**SLHS 5849 (1-4) Independent Study 1, M.A.**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**SLHS 5859 (1-4) Independent Study 2, M.A.**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**SLHS 5898 (1-4) Practicum 1: Speech-Language-Learning Diagnosis, Assessment, and Intervention**
Offers on-campus and off-campus supervised clinical practice in diagnosis, assessment, and intervention of speech-language-hearing disorders in children and adults.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practica

**SLHS 5918 (1-3) Audiology Clinical Practicum: Lab**
Provides clinical training in the on site Speech, Language and Hearing Center in skills including audiology identification, evaluation and management for adults and children with hearing loss.
**Repeatable:** Repeatable for up to 16.00 total credit hours.
**Requisites:** Restricted to Speech, Language, and Hearing Sciences (SLHS) OR Audiology (AUDD) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practica

**SLHS 5928 (1-4) Audiology Clinical Practicum: Level 1**
Provides clinical training in an off-campus educational audiology facility in identification, evaluation and management for adults and children with hearing loss. Schedule is variable with a minimum requirement of 16 hours on rotation per week.
**Repeatable:** Repeatable for up to 15.00 total credit hours.
**Requisites:** Requires a prerequisite course of SLHS 5918 (minimum grade B). Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.

**SLHS 5930 (4) Speech Language Pathology Assistant Internship**
Placement for 15-18 hours per week for a total of 180 clock hours including a minimum of 50% supervised provision of 80 hours of direct intervention (in-person/virtual) with students on caseload. SLPA interns will complete tasks for mentor/supervisor including file reviews, scheduling, research of evidence-based practices, materials preparation, observation of intervention and IEP meetings, and provide other assistance as specified by mentor and within the scope of practice of an SLPA (Asha, 2013). Competency development and professional growth will be documented through midterm formal conferences and final semester ratings of specific competencies and completion of internship assignments. Students must be accepted into the SLPA certificate program to enroll in this course.
**Requisites:** Requires a prerequisite course of SLHS 4918 (minimum grade D-).
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5938 (1-4) Audiology Clinic Practicum: Level 2 Educational**
Provides clinical training in an off campus educational audiology facility in identification, evaluation and management for adults and children with hearing loss. Schedule is variable with a minimum requirement of 16 hours on rotation per week.
**Repeatable:** Repeatable for up to 15.00 total credit hours.
**Requisites:** Requires prerequisite courses of SLHS 5918 and SLHS 6544 and SLHS 6614 (all minimum grade B). Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practica

**SLHS 5948 (1-4) Audiology Clinic Practicum: Level 2 Medical**
Provides clinical training in an off campus medical audiology facility in identification, evaluation and management for adults and children with hearing loss. Schedule is variable with a minimum requirement of 16 hours on rotation per week.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of SLHS 5918 and SLHS 6544 and SLHS 6614 (all minimum grade B). Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 6000 (1-4) Advanced Topics in Speech, Language and Hearing Sciences**
Studies selected topics related to the theory and management of communication disorders, and theoretical/scientific information related to speech, language, and hearing.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 6006 (3) Advanced Hearing Science**
Provides advanced study in hearing science, including physical, physiological, and psychological acoustics of both normal and impaired auditory systems. Department enforced prerequisite: graduate standing in SLHS; undergraduate course work in biology or anatomy.
**Additional Information:** Departmental Category: Didactic: Speech-Hearing Science

**SLHS 6100 (3) Research Methods Proseminar in Communication Sciences and Disorders**
This proseminar introduces foundational research principles and methods in speech, language, and hearing sciences, covering quantitative and qualitative designs, data collection, analysis, and ethics. Students will learn to critically evaluate research and apply methods to human communication science areas, including speech-language development, linguistics, communication behaviors, disabilities, multilingualism, and hearing loss. The course prepares students for advanced research and dissertation work in communication sciences.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**SLHS 6150 (3) Scientific Writing in Speech, Language, and Hearing Science**
This doctoral-level pro-seminar is designed to develop and refine scientific writing skills specific to the field of Speech, Language, and Hearing Science (SLHS). The course emphasizes the process of writing clear, concise, and well-structured scientific manuscripts, including research articles, grant proposals, and reviews. Students will practice writing and revising various sections of research papers and receive feedback through peer review and instructor guidance. Special attention is given to writing for specialized audiences in SLHS and addressing the challenges of communicating complex scientific information effectively.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**SLHS 6402 (3) Issues and Methods in Cognitive Science**
Interdisciplinary introduction to cognitive science, examining ideas from cognitive psychology, philosophy, education, and linguistics via computational modeling and psychological experimentation. Includes philosophy of mind; learning; categorization; vision and mental imagery; consciousness; problem solving; decision making, and game-theory; language processing; connectionism. No background in Computer Science will be presumed.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 6402 and EDUC 6504 and LING 6200 and PHIL 6310 and PSYC 6200
**Requisites:** Restricted to graduate students only.

**SLHS 6504 (1) Professional Ethics in Audiology**
Overview of ethics and ethical issues in the profession of audiology. Topics to be discussed include code of ethics by professions, approaches to analyzing ethical dilemmas, ethics in relationships with manufacturers, and ethical considerations inteaching, clinical practice and research.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite undergraduate background in SLHS.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 6514 (1) Professional Issues in Audiology**
Overview of professional issues related to the profession of audiology. Topics to be discussed include certification, licensure, professional associations, infection control, practice management, federal regulations related to audiology, professional communications and professional relationships.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Recommended:** Prerequisite undergraduate background in SLHS.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 6544 (3) Auditory Processes: Adult Assessment**
Advanced study on the current science surrounding hearing assessment of adults across the age span. Includes theoretical foundations and clinical applications.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 6554 (3) Auditory Processes: Child Assessment**
Provides advanced study in hearing assessment and management of children across the age span. Topics include epidemiological, medical, audiological, developmental, and habilitative aspects of normal and impaired hearing in children.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Recommended:** Prerequisite undergraduate background in SLHS.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 6564 (3) Auditory Processes: Neurodiagnostics**
Provides advanced study in the neural bases of hearing. Includes theoretical foundations and clinical assessment of neurological functioning in auditory systems with both normal and impaired function.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 6614 (3) Fundamentals of Amplification**
Discusses theoretical and clinical issues regarding the design, fitting, and evaluation of amplification technology for individuals with hearing loss. Includes the use of behavioral, psychological, electroacoustic, and physiological (real ear) measures in the selection and evaluation of digital and analog hearing aid technology.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 6642 (3) Development and Intervention in Childhood Hearing Loss**
Reviews development and intervention with children who are deaf and hard-of-hearing, birth through school age. Focuses on speech, auditory training, language, literacy and cognitive development. Formerly SLHS 6640.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 6650 (3) Counseling and Multicultural Issues in SLHS**
Explores counseling theories and techniques following the diagnosis of a communication disorder across the life span. Considers issues related to grieving and mourning, parenting, disability, cultural customs, attachment, and relationships. Covers professional ethics and ethical responsibilities.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 6670 (3) Aging and Hearing Loss**
The course will address research and evidence-based practice regarding hearing loss in adults across the age span. Topics will include aural rehabilitation, co-morbidities associated with hearing loss (e.g., cognition and dementia; mental health; sensory-perceptual-motor skills; other health/medical conditions), and impacts of hearing loss on functioning, disability, health, and health services.
**Requisites:** Requires a prerequisite course of SLHS 6544 (minimum grade B). Restricted to graduate students only.
**Recommended:** Prerequisites SLHS 7418 and SLHS 7540.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 6918 (7) Practicum 2: Medical-Clinical Internship**
Gives an off-campus experience in a clinical or medical setting that provides in-depth practice in management of communication disorders of children and adults.
**Repeatable:** Repeatable for up to 14.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Practica

**SLHS 6928 (7) Practicum 2: Public School Internship**
Provides an off-campus supervised experience providing extended and in-depth practice involving school-age children in a school classroom.
**Repeatable:** Repeatable for up to 14.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Practica

**SLHS 6938 (1-10) Audiology Clinic Externship Educational**
Provides students with full time off campus experience in an educational audiology facility offering in-depth and advanced procedures for identification, evaluation and management of hearing loss in adults and children.
**Repeatable:** Repeatable for up to 21.00 total credit hours.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Practica

**SLHS 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 6948 (1-10) Audiology Clinic Externship: Medical**
Provides students with full time off campus experience in a medical audiology facility offering in-depth and advanced procedures for identification, evaluation and management of hearing loss in adults and children.
**Repeatable:** Repeatable for up to 21.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 6950 (1-7) Master's Thesis**
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 7000 (3) Research Designs in Human Communication Sciences and Disorders**
Offers an advanced seminar in research designs for human behavior: efficacy, ethnographic, single-subject, quasi-experimental, and experimental designs. Designed to familiarize students with terminologies and research designs frequently used in speech-language-hearing areas.
**Recommended:** Prerequisite basic statistics.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 7200 (3) Business, Management and Ethics in Audiology**
Focuses on the business aspects of managing an audiology practice. Addresses developing a business plan, contracting for services, legal issues, financial reporting, budgeting, pricing, billing and reimbursement, regulatory issues, marketing, personnel management, risk abatement, and business ethics.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Recommended:** Prerequisite good standing in the SLHS graduate program or instructor consent will be required.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 7418 (2) Cognitive Science Research Applications Seminar 1**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7412 and EDUC 6506 and LING 7415 and PHIL 7415 and PSYC 7415
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite EDUC 6505.

**SLHS 7428 (2) Cognitive Science Research Applications Seminar 2**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7422 and EDUC 6516 and LING 7425 and PHIL 7425 and PSYC 7425
**Requisites:** Restricted to graduate students only.

**SLHS 7450 (3) Audiology Capstone Project**
Provides an individualized project for AUD, completed prior to initiation of final clinical year. May be in the form of research-based investigation, an evidence-based position paper, a clinical protocol based on peer-reviewed literature, a grant proposal, or another format approved by AUD committee. Project requires approved proposal by AUD committee andfocused study supervised by capstone advisor.
**Requisites:** Restricted to Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 7520 (3) Auditory Processes: Medical and Genetic Bases**
Discusses current developments in epidemiology, pathogenesis, and symptomatology of hearing loss. Investigates the genetic bases of hearing loss and deafness. Incorporates clinical decision theory in assessment and intervention. Explores cross-disciplinary topics from genetics, radiology, pharmacology, pathology, and otology.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 7530 (3) Auditory Processes: Theory and Application in the School Environment**
Focuses on application of routine audiological practices such as screening, assessment, rehabilitation, and instrumentation to children in educational settings. Emphasizes federal education regulations and pertinent case law.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 7540 (3) Auditory Processes: Physiology, Assessment, and Management of the Vestibular System**
Emphasizes current research on physiology of the vestibular system, including both structure and function. Considers the etiology of both peripheraland central pathologies of the vestibular system. Discusses ways to assess function of the vestibular system as well as theoretical and practical considerations of vestibular rehabilitation.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 7550 (3) Prevention of Hearing Loss from a Public Health Perspective**
Discusses the prevention of hearing loss from public health perspectives. Includes the effects of noise and other damaging agents on the auditory physiology. Discusses prevention, screening, identification, and management of occupational and recreational hearing loss. Considers noise measurement and monitoring. Addresses local, national and global initiatives and legislation regarding hearing health.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 7614 (3) Implantable Devices: Technology and Clinical Application**
Examines technological aspects and clinical applications of implantable prostheses such as cochlear implants, brainstem implants, hybrid cochlear implants, Baha devices and middle ear implants. Topics will include: history of implantable devices, anatomy and histopathology of the inner ear, speech processing in implants, mapping devices, candidacy criteria, behavioral and electrophysiologic techniques for assessment and outcomes in implanted children and adults.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Recommended:** Prerequisite good standing in the SLHS graduate program or instructor consent will be required.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 7640 (3) Communication Processes and Hearing Loss: Birth through Six**
Provides in-depth study of current research literature and its implications for clinical practice regardingdevelopment of communication processes in the firstsix years of life and impact of hearing loss. Investigates development of language, auditory perception, speech production, social-emotional abilities, and cognition.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 7714 (3) Advanced Topics in Amplification**
Discusses advanced issues in the design and fitting of hearing aid technology, including advanced signal processing, outcomes assessment, evidence-based practice and specialized fitting protocols for pediatric and geriatric populations. Current research is integrated with clinical cased studies to guide the development of evidence-based practice in hearing aid fittings.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 7775 (1) Topics in Cognitive Science**
Reading of interdisciplinary innovative theories and methodologies of cognitive science. Students participate in the ICS Distinguished Speakers series that hosts internationally recognized cognitive scientists who share and discuss their current research. Session discussions include analysis of leading edge and controversial new approaches in cognitive science.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7772 and EDUC 7775 and LING 7775 and PHIL 7810 and PSYC 7775
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 7800 (1) Seminars in Audiology: Advanced Topics**
Graduate seminar exploring advanced topics in the field of audiology as they relate to diagnosis and (re)habilitation. Topics will include novel clinical issues and topics including tinnitus, intraoperative monitoring, pharmacology, hyperacusis/misophonia, auditory processing. Discussion of the evidence-based literature surrounding these advanced topics will be central to this seminar.
**Requisites:** Requires prerequisite course of SLHS 6544 (minimum grade B). Restricted to graduate students only.
**Grading Basis:** Letter Grade

**SLHS 7849 (1-4) Independent Study 1, PhD**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**SLHS 7859 (1-4) Independent Study 2, PhD**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**SLHS 7918 (3) Practicum 3: Clinical Supervision**
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Practica

**SLHS 8918 (3) Practicum 3: Classroom Instruction**
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Practica

**SLHS 8928 (3) Practicum 3: Research Coordination**
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Practica

**SLHS 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: All-Department

# Speech, Language and Hearing Sciences - Master of Arts (MA)

## Focus Areas

There are two areas of focus available at the MA level:

- MA leading to professional certification in speech-language pathology
- Research

### Professional Certification Focus

The master's degree program leading to professional certification in speech-language pathology (MA-SLP (https://www.colorado.edu/slhs/graduate/masters-degree-leading-asha-certification-speech-language-

pathology/)) is designed to provide a theoretically and clinically rich path for students planning to work as speech-language pathologists in medical, educational, and private practice settings. Students in the MA-SLP program are provided with a strong foundation of theoretical and clinical knowledge through their coursework and clinical experiences.

Students completing the MA-SLP program obtain a Master of Arts degree from the University of Colorado and are eligible to receive the Certificate of Clinical Competence in speech-language pathology from the American Speech-Language-Hearing Association (http://www.asha.org/) (ASHA) upon successful completion of the clinical fellowship year and the national PRAXIS examination and thus meet educational requirements for Speech-Language Pathology licensure in all states. However, students should also contact the applicable licensing board in the state where they are planning on looking for employment. Students can also apply for Colorado State Licensure to work in the public schools.

# Requirements

## Professional Certification Focus

The master's program with a professional certification focus (MA-SLP) is a two-year (24-month) program that culminates in one or two internships and either successful passage of the comprehensive exam or completion of a thesis. The program consists of an initial summer intensive session beginning in early August and ends in late July two years later. Students are enrolled for August intensive, fall year 1, spring year 1, summer year 1, fall year 2, spring year 2, and summer year 2.

Within departmental and ASHA guidelines, master's students with a focus in speech-language pathology complete a core set of seminars and clinical assignments that assure at least minimal competence in the full scope of practice for speech-language pathologists. In addition, students complete at least one of three electives that provide the opportunity to develop greater knowledge and skills in areas of specific interest. Clinical assignments are initiated in the on-site Speech, Language and Hearing Center; later, student input is obtained in making off-campus clinical assignments in educational and medical settings.

Students with an undergraduate degree in speech-language pathology and audiology can expect to complete the program in two calendar years (see the MA-SLP (https://www.colorado.edu/slhs/graduate/masters-degree-leading-asha-certification-speech-language-pathology/) webpage). Those without such a background are required to make up undergraduate deficiencies, which normally require at least an additional 18 credit hours of courses in speech, language and hearing sciences and related disciplines.

Students must meet standards for both academic and clinical competence, as well as professional conduct. Full-time graduate study is required.

### Prerequisites

In addition to meeting the Graduate School and SLHS requirements, students in the MA-SLP program must meet ASHA requirements for clinical certification. MA-SLP students must complete all undergraduate course prerequisites, which can be found on our website (https://www.colorado.edu/slhs/graduate/masters-degree-leading-asha-certification-speech-language-pathology/). Students may complete the prerequisites prior to applying to the graduate program, either as part of their undergraduate degree program, or following completion of the undergraduate degree in any other major. Students may also apply to enter the MA-SLP program and complete the prerequisites during the first year of their graduate study as a 3-year track student (the prerequisites will not count as credits in the MA-SLP program). Please note that all prerequisite coursework must be approved by the CAA Program Director.

## Research Focus

The research focus is designed for students who are not seeking clinical certification.

Working with an advisor, students design a plan of study with coursework from SLHS and other departments. A master's thesis is required. The non-clinical master's degree in SLHS requires 30 credit hours of graduate coursework, with four to six credit hours devoted to the master's thesis. For more information, visit the Thesis Option (http://www.colorado.edu/slhs/thesis-option/) webpage.

At least 24 hours must be completed at the 5000 level or above. A maximum of 6 credit hours may be completed at the 3000 or 4000 level at the discretion of the academic department. Students may be able to transfer up to 9 credit hours of graduate credit towards this degree. The non-clinical master's degree requires close work with a faculty member of your choosing. Students interested in pursuing this degree option are encouraged to talk with SLHS faculty members who share their interests before applying (see the Meet Us (http://www.colorado.edu/slhs/meet-us/) webpage).

# Sample Two-Year Plan of Study

Below is a sample curriculum for the MA-SLP program. MA-SLP students must take 3 credit hours of elective classes. Students will take either the comprehensive exam in the fall of the second year or pursue a thesis option. The department recommends students take the PRAXIS exam by mid-April of the second year. Due to the length of time of the two internships in spring of year two, most MA-SLP students officially graduate in the summer term.

| **Year One** | | |
|---|---|---|
| **August Intensive** | | **Credit Hours** |
| SLHS 5112 | Clinical Practice I | 2 |
| SLHS 5342 | Counseling in Speech-Language Pathology | 2 |
| | **Credit Hours** | **4** |
| **Fall Semester** | | |
| SLHS 5012 | Evidence-based Practice and Research Methods | 3 |
| SLHS 5252 | Acquired Language Disorders in Adults | 3 |
| SLHS 5362 | Fluency Disorders | 3 |
| SLHS 5576 | Neuroanatomy and Neurophysiology of Communication | 3 |
| SLHS 5602 | Communication Challenges in Children: Birth to Six | 3 |
| SLHS 5898 | Practicum 1: Speech-Language-Learning Diagnosis, Assessment, and Intervention | 1-4 |
| | **Credit Hours** | **16-19** |
| **Spring Semester** | | |
| SLHS 5242 | Language Disorders in School Age Children | 3 |
| SLHS 5272 | Augmentative Alternative Communication: Theory and Use | 1 |
| SLHS 5282 | Acquired Cognitive Disorders | 3 |
| SLHS 5302 | Speech Sound Disorders in Children | 3 |

| | | |
|---|---|---|
| SLHS 5332 | Voice and Resonance Disorders | 2 |
| SLHS 5898 | Practicum 1: Speech-Language-Learning Diagnosis, Assessment, and Intervention | 1-4 |
| | **Credit Hours** | **13-16** |
| **Summer** | | |
| SLHS 5262 | Dysphagia | 3 |
| SLHS 5898 | Practicum 1: Speech-Language-Learning Diagnosis, Assessment, and Intervention | 1-4 |
| SLHS 6000 | Advanced Topics in Speech, Language and Hearing Sciences (Optional elective) | 1-4 |
| | **Credit Hours** | **5-11** |
| **Year Two** | | |
| **Fall Semester** | | |
| SLHS 5132 | Clinical Practice II: Clinical Practice in Varied Work Settings | 1 |
| SLHS 5142 | | 1 |
| SLHS 5292 | Neurogenic Speech Disorders in Adults | 3 |
| SLHS 5372 | Cleft and Resonance: Fundamentals for Evaluation and Treatment | 1 |
| SLHS 5555 | Advanced Topics in Social Communication: Autism Spectrum Disorders | 3 |
| SLHS 5898 | Practicum 1: Speech-Language-Learning Diagnosis, Assessment, and Intervention | 1-4 |
| SLHS 5352 | Bilinguals with Communication Disorders (Optional elective) | 3 |
| SLHS 6642 | Development and Intervention in Childhood Hearing Loss (Optional elective) | 3 |
| SLHS 6000 | Advanced Topics in Speech, Language and Hearing Sciences (Optional elective) | 1-4 |
| | **Credit Hours** | **17-23** |
| **Spring Semester** | | |
| SLHS 6918 | Practicum 2: Medical-Clinical Internship | 7 |
| SLHS 6928 | Practicum 2: Public School Internship | 7 |
| | **Credit Hours** | **14** |
| | **Total Credit Hours** | **69-87** |

# Learning Outcomes

By the completion of the program, students will be able to:

# Audiology - Doctor of Audiology (AuD)

The AuD is the entry-level degree in clinical audiology (https://www.colorado.edu/slhs/graduate/doctorate-audiology/) that emphasizes both clinical competency development and evidence-based practice. Students in the AuD program complete a four-year curriculum that includes academic coursework, clinical practicum and a capstone project. Students take advanced seminars in hearing science, clinical audiology and research methods.

Students have the opportunity to pursue clinical research in both laboratory and clinical settings, with faculty in a wide range of areas including electrophysiology, psychological acoustics, physiological acoustics, diagnostic evaluation and intervention procedures for newborns through geriatrics, advanced amplification, speech perception in noise, assistive technologies, cochlear implants, vestibular assessment techniques and aural habilitation and rehabilitation of individuals with hearing loss. Furthermore, students undertake clinical practica to develop competency across the scope of practice consistent with national clinical certification and/or licensure in audiology. Successful completion of the AuD at CU Boulder meets the requirements for certification in audiology by the American Speech-Language-Hearing Association (ASHA). Currently, the AuD meet the educational requirements for licensure as an audiologist in every state.

Students will have the opportunity to complete clinical rotations in several different settings including full use of laboratories and suites in the Department of Speech, Language & Hearing Sciences. Clinical rotations occur at sites such as University of Colorado Hospital (UCH) in Denver and the UCH outpatient Boulder clinic, Children's Hospital Colorado, local school districts and other clinical settings throughout the metro Boulder and Denver area. Students complete fourth-year externships in clinical settings both in Colorado as well as across the United States.

# Requirements

## Prerequisite Coursework

The AuD faculty recommends that students have undergraduate coursework in speech-language-hearing sciences including content knowledge in audiological evaluation and rehabilitation, hearing and speech science, language development, phonetics, and speech and language disorders. A strong foundation in college algebra and pre-calculus is also expected. A *college-level* course in statistics is required.

Students who matriculate in the AuD program are required to document their background content knowledge and to address any missing competencies. See the department's Doctorate of Audiology (https://www.colorado.edu/slhs/graduate/doctorate-audiology/) webpage for a list of prerequisites and a sample course schedule.

## Course Requirements

The AuD program requires a total of 89 credits. Below is a list of sample courses that fulfill this requirement.

| Code | Title | Credit Hours |
|---|---|---|
| SLHS 5576 | Neuroanatomy and Neurophysiology of Communication | 3 |
| SLHS 5674 | Signals, Systems, and Calibration in Audiology | 2 |
| SLHS 5918 | Audiology Clinical Practicum: Lab | 1-3 |
| SLHS 5928 | Audiology Clinical Practicum: Level 1 | 1-4 |
| SLHS 5938 | Audiology Clinic Practicum: Level 2 Educational | 1-4 |
| SLHS 5948 | Audiology Clinic Practicum: Level 2 Medical | 1-4 |
| SLHS 6006 | Advanced Hearing Science | 3 |
| SLHS 6544 | Auditory Processes: Adult Assessment | 3 |
| SLHS 6554 | Auditory Processes: Child Assessment | 3 |
| SLHS 6564 | Auditory Processes: Neurodiagnostics | 3 |
| SLHS 6614 | Fundamentals of Amplification | 3 |
| SLHS 6650 | Counseling and Multicultural Issues in SLHS | 3 |

| | | |
|---|---|---|
| SLHS 6670 | Aging and Hearing Loss | 3 |
| SLHS 6938 | Audiology Clinic Externship Educational | 1-10 |
| SLHS 6948 | Audiology Clinic Externship: Medical | 1-10 |
| SLHS 7000 | Research Designs in Human Communication Sciences and Disorders | 3 |
| SLHS 7200 | Business, Management and Ethics in Audiology | 3 |
| SLHS 7450 | Audiology Capstone Project | 3 |
| SLHS 7520 | Auditory Processes: Medical and Genetic Bases | 3 |
| SLHS 7530 | Auditory Processes: Theory and Application in the School Environment | 3 |
| SLHS 7540 | Auditory Processes: Physiology, Assessment, and Management of the Vestibular System | 3 |
| SLHS 7550 | Prevention of Hearing Loss from a Public Health Perspective | 3 |
| SLHS 7614 | Implantable Devices: Technology and Clinical Application | 3 |
| SLHS 7640 | Communication Processes and Hearing Loss: Birth through Six | 3 |
| SLHS 7714 | Advanced Topics in Amplification | 3 |

# Dual Degree Program

## AuD/PhD in Audiology and Speech, Language and Hearing Science

The department offers students the opportunity to pursue an integrated program of study leading to dual doctorate degrees in the fields of audiology and hearing science. The PhD/AuD dual degree program (https://www.colorado.edu/slhs/graduate/audphd-dual-degree/) trains students in both clinical research and clinical practice in audiology. Students in the program gain training that will prepare them to become independent scholars, teach in higher education, conduct research, become certified clinical audiologists and gain leadership skills. The dual degree program allows students to pursue both their clinical training and their research training in a rigorous, intensive and streamlined program.

# Learning Outcomes

By the completion of the program, students will be able to:

# Speech, Language and Hearing Sciences - Doctor of Philosophy (PhD)

The PhD program is grounded in research. supervisory, administrative, instructional and research activities acquaint students with problems and concepts at a higher level of professional activity and responsibility. Students in the PhD program gain the knowledge and skills that will prepare them to become independent scholars, teach in higher education, conduct research and become leaders within the discipline.

Wide latitude prevails in planning individual PhD programs. It is expected that students have some professional or research experience before entering the program and that they have specific academic or professional goals in mind. PhD students must take a four-course sequence in statistics, four core courses within Speech, Language and Hearing Sciences (SLHS), complete the preliminary and comprehensive examinations and successfully defend a dissertation research project. Beyond that, student degree plans are individually designed through the joint efforts of the student and an advisory committee.

# Requirements

The student will select an advisory committee during the first semester of his or her program. Then the student will develop a plan of study in conjunction with the advisory committee during the first year of doctoral study. The plan of study will detail the student's goals, coursework to be completed to meet those goals and departmental and Graduate School requirements, and a proposed schedule for completion of doctoral work. The plan of study will become the student's blueprint for their doctoral work. The advisory committee must approve the plan of study, which may be amended later with the committee approval.

Departmental and Graduate School requirements for doctoral students are intended to allow maximum flexibility in developing a plan of study. All students take three SLHS doctoral seminars, at least 12 credit hours in statistics and research tools, and additional coursework in their own research area. There is no foreign language requirement. The Graduate School specifies that not more than 25 percent of coursework can be taken through independent study.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Coursework** | | |
| Three doctoral-level SLHS seminars. | | 9 |
| At least 15 credit hours in the student's major content area. | | 15 |
| One teaching practicum: | | 3 |
| SLHS 8918 | Practicum 3: Classroom Instruction | |
| One research practicum. | | 3 |
| Two courses each in statistics and research tools. | | 12-15 |
| Thirty hours of doctoral dissertation credit. | | 30 |
| SLHS 8990 | Doctoral Dissertation | |
| **Total Credit Hours** | | **72-75** |

Upon approval of the advisory committee, a maximum of 21 credit hours of coursework may be transferred to fulfill the above requirements. This should be accomplished by the end of the first semester of doctoral study. Requests must be made to the Graduate School on a form, which they provide; an official transcript must accompany the request.

In order to continue in the program, a grade point average of 3.50 or better on coursework every semester will be required as well as continued recommendation of the SLHS faculty advisory committee. Grades below B will not count toward a doctoral degree.

The minimum registration requirement for doctoral students is six semesters beyond the attainment of an acceptable bachelor's degree. Two semesters of minimum registration credit may be allowed for a master's degree from an accredited institution; however, at least four semesters of minimum registration credit, two of which must be consecutive in one academic year, must be earned for work taken at CU Boulder.

# Dual Degree Programs

Students may pursue a dual PhD with neuroscience (p. 1383) or cognitive science (p. 1224). In addition, the department offers students the opportunity to pursue an integrated program of study leading to dual doctorate degrees in the field of audiology and speech, language

and hearing science. The PhD/AuD dual degree program trains students in clinical research and clinical practice in audiology. The dual degree program allows students to pursue both their clinical training and their research training in a rigorous, intensive and streamlined program. Students may apply to both programs simultaneously, or may apply to the PhD portion after having been accepted into the AuD portion or may apply to the AuD portion after having been accepted into the PhD portion.

For more information, visit the department's Graduate Coursework (http://www.colorado.edu/slhs/graduate-coursework/) webpage.

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate proficiency in core methods.
- Demonstrate expertise in the research literature in the field.
- Successfully design and conduct original research.
- Effectively communicate research.

# Speech-Language Pathology Assistant - Graduate Certificate

Speech-Language Pathology Assistants (SLPAs) work directly with students with communication challenges in public school settings under the supervision of a fully qualified and nationally certified speech-language pathologist (MA-SLP, CCC). SLPAs have a significant role in enhancing the quality of services for children and adolescents that need support for speech, communication, reading and writing. This certificate program provides the opportunity to meet the requirements for SLPA authorization in the state of Colorado only, through the Colorado Department of Education, to work in Colorado public schools. The education provided in the Speech-Language Pathology Assistant (SLPA) Certificate program is not guaranteed to always meet educational requirements for authorization in other states as each state has variable criteria for practice. Students are encouraged to contact the appropriate state licensing board in the state they wish to practice to determine applicability. Successful completion of the SLPA certification program through SLHS can also apply towards ASHA National SLPA Certification requirements, given successful completion of the ASHA SLPA national certification exam.

Candidates develop the knowledge and skills to work under the supervision of a certified SLP in the public school setting with ages birth–21. This certificate is appropriate for individuals with a BA in speech, language and hearing sciences (SLHS); those completing a BA in SLHS (enrolled in their last semester of senior year at CU); or individuals with a BA in another field, who have completed or are completing equivalent leveling coursework (24 hours) through an approved SLHS department. See coursework required as listed under the "Apply" section of the department website (http://www.colorado.edu/slhs/online/slpa-certificate-program/requirements-admission/).

The Colorado Department of Education currently provides a legislated statewide credential for SLPAs who meet qualifications to provide intervention services and supports, under the supervision of a qualified MA CCC-SLP provider. For additional information, please search for SLPA authorization on the Colorado Department of Education website (http://www.cde.state.co.us/cdeprof/checklist-initialspeechlanguage/). Acquisition of this SLPA license in Colorado does not necessarily transfer to all other states and it is recommended students inquire if applicable credentials exist in other states in which they intend to seek employment as an SLPA.

This certification program at CU Boulder was developed as a BA Plus program to address shortages of qualified personnel and extend the intensity of services to special education students, especially in high-need districts and rural areas in Colorado where there is an ongoing paucity of qualified professional related service providers. This was made possible through ongoing collaboration with the Colorado Department of Education, BOCES Boards throughout Colorado, and our university and district school partners. Many interested students complete the program as part of their residency in Colorado as they complete their BA to gain additional experience in speech-language pathology prior to applying for a MA degree. Others in rural or high needs areas see this online opportunity to continue their education and work as an SLPA as they prepare to move on to graduate school through distance learning programs as they work close to home without moving. Out of state BA students also apply to the program as an opportunity to continue their education as courses are offered remotely with onsite internships experience in their own state.

At this time, this program may not meet the educational requirements for SLPA certification or licensure in states other than Colorado. Students residing outside of Colorado are encouraged to consult the speech-language pathology and audiology board (https://www.colorado.edu/slhs/sites/default/files/attached-files/state_slp_aud_boards.pdf) in their state prior to applying or enrolling in the program. Out-of-state students are considered only if they can arrange a local internship in a public school setting with an MA-SLP, CCC.

## Requirements

### Admission Requirements

The program is competitive and requires complete applications in electronic format. Preference for in-state students and especially qualified students in rural areas is given. A specific number of seats are reserved for Colorado students who qualify and are sponsored by BOCES to participate in the program. Out-of-state students are considered only if they can arrange a local internship in a public school setting in their own state with a MA CCC-SLP.

Required GPA of 3.0 or above.

#### Education Requirements

Completion of one option below:

- Last semester SLHS senior (students may be enrolled in a maximum of two required prerequisite courses concurrently with the SLPA program, although enrollment in only one is preferred).
- BA in SLHS.
- BA in a field other than SLHS with completion of 24 credits of "leveling" prerequisite coursework in SLHS.

#### Prerequisites or "Leveling" Coursework

The courses listed below are offered by the SLHS department at CU Boulder. Equivalent courses from other universities will also meet these requirements, if approved by the program director. These requirements are consistent with the Colorado Department of Education SLPA Authorization (http://www.cde.state.co.us/).

| Code | Title | Credit Hours |
|---|---|---|
| LING 3100 | Language Sound Structures | 3 |
| or SLHS 3006 | Phonetics | |
| SLHS 3106 | Hearing Science | 3 |
| SLHS 3116 | Anatomy, Physiology, and Science of Speech | 3 |
| SLHS 4502 | Language Disorders Across the Lifespan | 3 |
| SLHS 4512 | Speech Disorders Across the Lifespan | 3 |
| SLHS 4560 | Language Development | 3 |
| SLHS 4704 | Audiological Evaluation | 3 |
| SLHS 4714 | Audiological Rehabilitation | 3 |
| SLHS 4918 | Introduction to Clinical Practice (Requires documentation of 25 hours of observation of ASHA-certified SLPs) | 2 |

### Required Courses and Credits

Students will register for two courses to be taken in the semester for which they have been admitted. These courses are as follows:

| Code | Title | Credit Hours |
|---|---|---|
| SLHS 5032 | Competencies and Strategies for the SLPA | 3 |
| SLHS 5930 | Speech Language Pathology Assistant Internship [1] | 4 |

[1] Placement hours must be under the 50 percent supervision of an MA CCC-SLP.

# Theatre & Dance

The Department of Theatre & Dance is a community of students, scholars, artists and artisans who regard the collaborative and creative process as the core of education. We engage with that process at all levels of our work as we pursue excellence and understanding. From the root of process stems practice, and that practice bears the fruit of experience. The Department of Theatre & Dance guides that fruition, offering students an expanse of opportunities to encounter the art forms of theatre, dance and experience design, their making and meaning. We strongly value the ampersand in Theatre & Dance and seek to make connections across communities. We aim to make change, make art and to make a difference, together.

We honor a global diversity of ways of making and of knowing. European colonialism and U.S. imperialism have long worked to diminish and eliminate knowledge that differed from a European worldview. As a U.S.-based institution, we recognize that the only way we can truly see beyond the limitations of our own perspectives is to listen and learn from people with experiences that are different from our own throughout the world. Our diversity efforts are therefore grounded on establishing long-lasting relationships with scholars and artists who have worked and continue to work outside of the United States, and to attract graduate students that can help us continue to learn from these perspectives.

The CU Boulder graduate studies in Theatre & Dance is designed to accommodate a variety of students, from the practicing professional to the recent BA/BFA graduate. Our approach is to develop students' creativity, pedagogical and scholarly skills in equal measure. We combine traditional studies with opportunities for practical training. Ambitious seasonal programs of theatre productions and dance concerts feature student performers, designers, directors and choreographers. Guest artists of national and international fame regularly participate in curricular, performance and extracurricular activities.

The performing arts at CU Boulder embrace many conventional and emerging modalities of presentation: proscenium stages, film, devised work, online social platforms, digital arenas, interactive installations, community collaboration, process-based work, performance activism that is both affective and effective and new creations of bold imaginarians.

Our primary hope is to enable a deepening of your artistic and scholarly voice, to put what is distinctive about you in conversation with the world. Each of the above programs is designed to suit international expectations in skill acquisition and capacity. We differ from other colleges in our extensive efforts to support and enrich each student's individual interests and distinct gifts. For this reason, the number of annual admissions is limited to allow for highly personalized mentorship.

Students interested in theatre and performance studies, dance and experience design are urged to consult with an advisor in the appropriate field to obtain both advice and the most current information concerning program opportunities and expectations.

**Course codes for this department are THTR, DNCE, TDXD and THDN.**

## Departmental Requirements

Students wishing to pursue graduate work in theatre & performance studies, dance, and experience design should carefully read both requirements for advanced degrees in the Graduate School section and the individual degree handbooks published on the Theatre & Dance (http://www.colorado.edu/theatredance/) website. Students should note that departmental requirements are sometimes more comprehensive than those minimums established by the Graduate School.

## Prerequisites

Applicants are admitted to the graduate programs in theatre & performance studies, dance and experience design on the basis of their academic records and recommendations.

## Advising

Every student is assigned a faculty advisor and will have a meeting with their advisor upon entering the program. Topics discussed in the meeting and other available information are employed to design the best possible course of study for the student.

All candidates for a degree have the responsibility of making certain that the appropriate persons or committees have been appointed to supervise the various steps in their graduate programs. Detailed instructions can be found in the handbook for each degree, available from the department website.

## Master's Degrees

- Dance - Master of Fine Arts (MFA) (p. 1422)
- Theatre and Performance Studies - Master of Arts (MA) (p. 1426)

## Doctoral Degree

- Theatre and Performance Studies - Doctor of Philosophy (PhD) (p. 1429)

# Certificates

- Applied Shakespeare - Graduate Certificate (p. 1431)
- Hip-Hop Studies - Graduate Certificate (p. 1431)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Bashore, Kate (https://experts.colorado.edu/display/fisid_168644/)
Assistant Teaching Professor; MFA, University of Tennessee - Knoxville

Bergner, Bruce Alan (https://experts.colorado.edu/display/fisid_113315/)
Associate Professor; MFA, University of Illinois at Chicago

Cloud, Anya (https://experts.colorado.edu/individual/fisid_167400/)
Assistant Professor; MFA, University of California San Diego

Cobin, Martin T.
Professor Emeritus

Devin, Richard
Professor Emeritus

Ellsworth, Michelle (https://experts.colorado.edu/display/fisid_112060/)
Distinguished Professor, Chair, Endowed Chair; MFA, University of Colorado Boulder

Feeler, Jordan (https://experts.colorado.edu/display/fisid_166032/)
Instructor; BFA, Webster University

Gerland, Oliver W. (https://experts.colorado.edu/display/fisid_101092/)
Associate Professor; PhD, Stanford University

Haig, Robin
Senior Instructor Emerita

Harris, Lorenzo R. (https://experts.colorado.edu/display/fisid_147634/)
Artist in Residence

Henry, Markas (https://experts.colorado.edu/display/fisid_134379/)
Associate Professor; MFA, University of Connecticut

Irey, Charlotte York
Professor Emerita

Lessley, Merrill J.
Professor Emeritus

Manno, Jesse J. (https://experts.colorado.edu/display/fisid_120813/)
Senior Instructor; BA, University of Colorado Boulder

Meneghini-Stalker, Tamara L. (https://experts.colorado.edu/display/fisid_146090/)
Associate Professor; MFA, Northern Illinois University

Nichols, Lynn (https://experts.colorado.edu/display/fisid_103654/)
Senior Instructor Emeritus; PhD, University of Colorado Boulder

Osnes, Mary Beth (https://experts.colorado.edu/display/fisid_102607/)
Professor; PhD, University of Colorado Boulder

Pang, Cecilia J. (https://experts.colorado.edu/display/fisid_129479/)
Professor; PhD, University of California, Berkeley

Persons, Charles Howard (https://experts.colorado.edu/display/fisid_145012/)
Associate Professor; MFA, Columbia University

Potts, Margaret Lee
Associate Professor Emerita

Randall, Erika Anne (https://experts.colorado.edu/display/fisid_144755/)
Professor; MFA, The Ohio State University

Rich, Kevin M. (https://experts.colorado.edu/display/fisid_157950/)
Associate Professor; MFA, Yale School of Drama

Shannon, Robert J.
Senior Instructor Emeritus

Southall, Lawrence (https://experts.colorado.edu/display/fisid_143027/)
Instructor; MFA, University of Colorado Boulder

Sowah, Nii Armah (https://experts.colorado.edu/display/fisid_115125/)
Senior Instructor; MA, Lesley College

Spanier, Nancy L.
Professor Emerita

Spencer, Jonathan (https://experts.colorado.edu/display/fisid_164209/)
Teaching Professor; MFA, Ohio University

Stark, Theodore (https://experts.colorado.edu/display/fisid_118462/)
Teaching Professor; MFA, Boston University

Symons, James M.
Professor Emeritus

Wilkins, Helanius J. (https://experts.colorado.edu/display/fisid_155486/)
Assistant Professor, Associate Chair; MFA, George Washington University

Williams, Letitia S.
Senior Instructor Emerita

Yang, Daniel
Professor Emeritus

# Courses

## Dance

**DNCE 5001 (1-2) Graduate Technique**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Major Technique

**DNCE 5012 (1) Concert Production**
Meets with DNCE 4012.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Production

**DNCE 5014 (2) Inside the Groove: Developing Rhythmic Skills for Graduates**
Enhances rhythmic acuity through intensive rhythmic drills, analytical listening, drumming, notating and creating rhythm-based performance work. Course material explores non-Western rhythmic paradigms, irregular meters, mixed meters, poly-meter, polyrhythms, etc., and how to communicate clearly with a live accompanist in technique class. Meets with DNCE 3014.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Music

**DNCE 5015 (3) Movement Analysis**
Introduces Rudolf Laban's theories of movement and exposes several body therapies to heighten students' awareness of movement as a multifaceted (neuromuscular/spatial/dynamic) event. Emphasizes refinement of movement, observation skills, and improvement of performance. Meets with DNCE 4015.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Movement Awareness Injury Prevent for the Dancer

**DNCE 5016 (3) Creative Dance for Children**
Methods course for prospective teachers of creative dance for children. Lectures, readings and laboratory experiences are followed by observation and teaching in primary grades.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 4016 (with addition of readings and a paper)
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Pedagogy

**DNCE 5017 (3) Dancing Histories: Sex, Gender and Race in U.S. Concert Dance**
Traces the evolution of American concert dance through roots in select dance forms, including dances of the African Diaspora, Ballet, Social Dance, Jazz, Modern, and Folklorico. Studies specific dance artists against the backdrop of social, political, economic, and environmental issues.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 4017, with addition of graduate papers and/or a project
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Dance and Cultural Studies

**DNCE 5023 (2) Performance Improvisation Techniques**
Explores movement and vocal improvisational techniques to enhance creative, interdisciplinary, collaborative and performance skills. Helps individuals expand their definition of performance, discover and access the diversity of the human instrument and employ improvisation to create personal and social commentary.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 4023 (with the addition of written analysis and creative assignments)
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Creative Process

**DNCE 5024 (2) SOUND Choices: Enhancing the Music/Dance Relationship**
Examines how musical choices can profoundly affect audiences, dancers, and the creative process. Surveys historic and contemporary music styles and influential artists through guided listening and experimentation. Deepens understanding of music, including vocabulary, technology, collaboration skills, ethics, and copyright issues. Meets with DNCE 3024.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Music

**DNCE 5036 (3) Dance Teaching Practices: Inclusive Approaches to Instruction**
Examines legal, practical, pedagogical and philosophical issues in current dance education. Goals and content of professional and recreational dance training are considered and strategies for effective teaching practice are discussed. All genres of dance may be utilized depending on the specialities of participants.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Pedagogy

**DNCE 5038 (1-3) Dance Repertory**
Learning and performing dances from the repertory of current faculty members, artists-in-residence and upon occasion from the repertory of historic modern dancers. Graduate students are required to keep a log of the learning process involved in repertory to document and analyze each work in terms of stylistic differences, musical/sound accompaniment and trends. Dance majors may repeat up to 9 total credit hours with different instructors. Enrollment by audition only.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 4038
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Performance

**DNCE 5047 (3) Hip-Hop Dance History**
Addresses the origin and evolution of American Hip-Hop dance rooted in a theoretical structure that springs from the elemental nature of the African Diaspora. Emphasis placed on the social, political, and economic environment in which it was fashioned. Pioneers, innovators, terminology, and styles will be identified. Course includes lectures, readings, audio/video analysis and discussion. Meets with DNCE 4047.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Dance and Cultural Studies

**DNCE 5048 (3) Performance and Community Engagement**
Engages students in the power of performance for effecting positive social change. Students research collaboratively to create performances and workshop experiences to intentionally author the future they want. Readings provide theoretical foundations that serve as the basis for creative work. Students engage in creative explorations. Open to all forms of performance.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Performance

**DNCE 5052 (1-3) Studio Concert**
Provides the opportunity for choreographic and performative synthesis and experimentation via the execution of a project related to the student's major area of creative research. Project must be approved by the student's first reader.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Production

**DNCE 5053 (3) Advanced Dance Composition**
Meets wtih DNCE 4053.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Creative Process

**DNCE 5056 (2) Graduate Teaching Seminar**
Examines practical, pedagogical, philosophical, and legal issues in current dance education. The goals and content of professional and recreational dance training are considered and strategies for effective teaching practice are discussed. Provides practice in practical application of theoretical material. All genres of dance may be utilized.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Pedagogy

**DNCE 5064 (2) Music and Dance Seminar: Collaboration**
Investigates music in relation to dance performance, choreography, and teaching. Topics may include: a survey of musical styles and composers; direct experimentation with composition and recording techniques; enhancement of rhythmic versatility; work with accompanist/composers; and/or improvement of analytical listening and writing skills.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Music

**DNCE 5101 (1) Intermediate Graduate Ballet**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Major Technique

**DNCE 5128 (1) Ballet Repertory**
Develops understanding of the ballet canon through practice of major solos from Romantic, Classical, and Neo-Classical ballets. For the advanced classical ballet student. Enrollment by audition only. Meets with DNCE 4128.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Performance

**DNCE 5261 (1) Advanced Jazz Dance Technique**
Refines advanced students' approach to the nuances and virtuosity of the jazz idiom. Emphasis is placed on efficient use of alignment, complex polyrhythmic explorations and improvisations, and dynamic performance style. Class moves quickly through material and demands a high level of proficiency. Enrollment by audition only. Meets with DNCE 4261.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Major Technique

**DNCE 5301 (2) Graduate Hip-Hop Technique 1**
Introduces students to Hip-Hop dance as a culturally significant form. Students learn history, the social and political forces at work and the fundamental techniques (Campbell Locking, Popping, Breaking etiquette/ movements, Hip-Hop Party Dance and House). Intellectual challenge is offered through the lens of critical race theory and historical context. Training addresses flexibility, sequencing, coordination and performance skills.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Major Technique

**DNCE 5331 (2) Graduate Hip-Hop Technique 2**
Students deepen their understanding of Hi-Hop history through fundamental movement techniques, specifically, House, and study the social/political forces at work. Focuses on increasing dancers' capacity for variation, sequencing, musicality and free-styling in Hip-Hop dance. Enrollment by audition only. Meets with DNCE 3301.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**DNCE 5339 (1-3) Hip-hop Practicum**
Design and implement an experiential, action¿based learning project that connects to local innovators in the Boulder/Denver Hip-hop community who are engaged in one of Hip-hop culture¿s five elements: mcing, djing, breaking/street dance, graffiti, knowledge. Projects might range from creating a piece of graffiti with a local crew to organizing an academic panel or workshop with a Hip-hop pioneer.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**DNCE 5411 (2) Aerial Dance Technique**
Study of basic technique skills in aerial dance on single point, low-flying trapeze. Additional skills include choreographic techniques, improvisation, and an historical overview of aerial dance. Through the theoretical readings and discussion, this course defines the place of aerial dance in the lineage of modern dance and addresses aesthetics, philosophical approaches to teaching, and safety issues.
**Requisites:** Restricted to graduate students only.

**DNCE 5501 (2) Graduate African Dance**
Explores the technique, styles and rhythms of regional and national cultures of Africa by introducing signature attributes common to different countries' dance traditions. Features discussions of the musical traditions, histories, cosmologies, philosophies and aesthetics to contextualize and increase familiarity. Areas of concentration may vary by each semester (e.g. Ghana, Guinea, Intermediate).
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Major Technique

**DNCE 5601 (2) Alexander Technique for Graduate Students**
Studies how human reaction, coordination, and movement play a role in all activities. Graduate students will explore direct application to dance training, performance, choreography, and teaching. Through in-depth class discussions, movement exploration, and individualized hands-on lessons, actors and dancers gain an understanding of the technique and its benefits to performance. Meets with DNCE 3601.
**Requisites:** Restricted to Dance (DNCE) or Theatre (THTR) graduate students only.
**Additional Information:** Departmental Category: Major Technique

**DNCE 5701 (2) Contact Improvisation 2**
Moves into rigorous exploration of weight sharing principles. Emphasis will be placed on ease and efficiency in partnering, and integrating this work into choreography and performance. Meets with DNCE 4701.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Major Technique

**DNCE 5849 (1-3) Independent Study**
Involves creative or scholarly investigation of an area of interest to the student not addressed in the curriculum. Work must be arranged with and advised by a faculty member.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**DNCE 5901 (1-3) Graduate Technique Practicum**
Offers special courses in the technique series. Course may meet at the same time with an undergraduate studio course and includes the practical movement experience with an additional scholarly study of specially chosen issues in dance.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Major Technique

**DNCE 5909 (1-4) Special Topics**
Explores topics and research in relation to areas such as technology, environment, teaching methods, performance, world dance, arts in society, and/or criticism that the normal sequence of offerings may not allow.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 2909 and DNCE 4909
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**DNCE 5919 (1-3) Dance Practicum**
Project in dance under supervision of senior faculty.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 4919
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**DNCE 6016 (2) Teaching Lab-Contemporary Dance**
Provides opportunity to apply principles and skills introduced in DNCE 5056. Participating students share the responsibility for teaching a lab class that meets twice a week. Focuses on development, analysis and evaluation of teaching skills.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Pedagogy

**DNCE 6017 (3) Cultural Collisions and Ethics in Dance and Movement Performance**
Explores the inevitable transformation of traditions in dance/movement performance, using hip-hop and transnational fusion as foundation studies. As students expand their application of ethical inquiry, we will investigate what responsibility artists have as ambassadors in a digital culture. Films, readings and discussions will address personal integrity, ethics, industry practices, values and distortions imparted by history and socialization.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Dance and Cultural Studies

**DNCE 6047 (3) Dance Studies**
Studies current dance trends, mostly in the United States, with particular attention paid to dance's intersection with philosophy, theory, technology, politics, current events and the other arts.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Dance and Cultural Studies

**DNCE 6056 (2) Professional Development**
Examines current trends and issues in dance education and the professional dance world. Explores curriculum development, administration, and job opportunities along with other topics such as grant writing, community engagement, dance advocacy, and working as an independent artist.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Pedagogy

**DNCE 6073 (3) Choreography**
Covers in-depth practical and theoretical approaches to dance composition for graduate students; solo and group forms; and analysis of historical and contemporary dance works.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Creative Process

**DNCE 6101 (1) Advanced Graduate Ballet**
Open only to graduate dance majors.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Major Technique

**DNCE 6849 (1-3) Independent Study**
Involves creative or scholarly investigation of an area of interest to the student not addressed in the curriculum. Work must be arranged with and advised by a faculty member.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**DNCE 6919 (1-3) Directed Studies**
Explores advanced topics in dance not regularly covered in the curriculum of the graduate program.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**DNCE 6949 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**DNCE 6959 (1-6) Master's Thesis**
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**DNCE 6969 (1-6) The Graduate Project**
Provides the opportunity for synthesizing the graduate experience through the execution of a project related to the student's major area of interest. Project must be approved by the graduate faculty advisor.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Independent Study

## Experience Design

**TDXD 5005 (3) Design Theory**
Interrogates the principals, theories and philosophies that scaffold successful and innovative design with specific application to the design of immersive and interactive experiences and across a range of commercial, performative and cultural contexts. Activities will clarify how the philosophies of design support the core story-telling and interactive elements of experience designs.
**Requisites:** Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Design: Technique

**TDXD 5105 (3) Collaboratory in Experience Design 1**
Addresses philosophies of storytelling through experience and the general concepts and aesthetics of Experience Design. The first in a two-part series, this course lays foundational principles focusing on the components of a live experience and how space, narrative and interaction affect the design from early conceptualization through implementation.
**Requisites:** Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Design: Process

**TDXD 5500 (3) Experience Design Atelier 1: Design Evolution and Expression**
Introduces students to various techniques for graphically representing design ideas using drawing and illustration techniques in order to augment and deepen the diverse skill sets of students in the class. The first in three-part sequence on graphic representation and expressive practices, students will learn how to work out design ideas through sketching, drawing, creating storyboards and collages.
**Requisites:** Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Design: Technique

**TDXD 5700 (3) Experience Design Atelier 2: Introduction to Design Graphics**
Introduces students to advanced techniques for representing design ideas in graphic form including commonly used software applications (Sketchup, Vectorworks, AutoCAD), scale modeling, mechanical drawing and rendering. The second in a three-part class sequence on graphic representation and expressive practices, this atelier will offer a range of exercises tailored to the skill level of individual students.
**Requisites:** Requires a prerequisite course of TDXD 5500 (minimum grade B-). Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Design: Technique

**TDXD 5805 (3) Professional Portfolio 1**
Focuses on selecting, organizing and developing a plan for presenting material that will eventually culminate in the completion of a competitive professional portfolio, a vital tool for gaining employment in the Experience Design industry. The first of a two-part credited final project, students begin the process to prepare their professional portfolio under the guidance of faculty and industry professionals.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Dsgn: Documentation

**TDXD 6105 (3) Collaboratory in Experience Design 2**
Introduces students to professional models of working in the Experience Design industry. The second in a two-part class sequence, students work collaboratively on industry case studies focusing on entertainment, education and cultural destination genres with input from outside professionals in the field.
**Requisites:** Requires a prerequisite course of TDXD 5105 (minimum grade B-). Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Design: Process

**TDXD 6210 (3) Storytelling for XD**
Explores multi-modal, expressive strategies for experimental storytelling and investigates the diverse languages of live experience. Students complete projects using varying modes of conveyance including physical and spatial action, filmic approaches, digital media and alternative methods. Students will discuss current trends in expressive methods and the nature of story.
**Requisites:** Restricted to Experience Design (TDXD) MFA students only.

**TDXD 6500 (3) Experience Design Atelier 3: Packaging the Design Presentation**
Investigates strategies for visually communication and "selling" design ideas in a compelling and well composed visual/aural presentation. The third in a three-part sequence on graphic representation and expressive practices, this class culminates I a final, comprehensive design project portfolio that follows current professional standards.
**Requisites:** Requires a prerequisite course of TDXD 5700 (minimum grade B-). Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Design: Technique

**TDXD 6555 (3) Experience Design Technology**
Explores established and cutting-edge technologies employed in visual, auditory, and interactive elements of designed environments and experiences. Develops an understanding of the function of these areas, the ways in which they facilitate a complete experience and examines new directions of experimentation in these fields. Elicits research, analysis, and development of new concepts in response to current practices and design problems.
**Requisites:** Restricted to Experience Design (TDXD) MFA students only.

**TDXD 6805 (3) Professional Portfolio 2**
Through editing materials collected in TDXD 5805, students will complete adaptable versions (hard copy, digital, web-based and presentations) of their professional portfolios. In this second of a two-part credited project, a committee comprised of faculty and industry professionals guide the completion of XD portfolios.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires a prerequisite course of TDXD 5805 (minimum grade B-). Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Dsgn: Documentation

**TDXD 6849 (3-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**TDXD 6901 (3) XD Implementation and Engineering**
Explores the realities and challenges of implementing themed entertainment design. Within the framework of project based case studies and a real work project, this course analyzes aspects of construction management, client management and approvals, scheduling, budgeting, value engineering, architecture and design.
**Requisites:** Restricted to Experience Design (TDXD MFA) students only.

**TDXD 6910 (3-6) The Experience Design Center**
Offers Experience Design students an opportunity to engage in and complete projects posed by industry professionals or non-profit partners seeking assistance with experiential projects in a professional, practicing lab/studio setting. The XD Center, house in a campus "maker-space," accepts design challenges and assignments that provide a realistic field experience for students.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Experience Design (TDXD) MFA students only.

## Theatre

**THTR 5011 (3) Seminar: Theory and Criticism**
Studies theories and criticisms of drama and theatrical performances from Plato to post-modernism.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: History/Dramaturgy/Directing

**THTR 5025 (3) Costume Patterning and Construction**
Includes techniques for the patterning and construction of contemporary and period costumes. Hands-on format covers techniques, materials and equipment particular to theatrical production. Grad section grading will include additional documentation components, beyond those in the undergrad section of the course.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4025
**Requisites:** Requires prerequisite courses of THTR 1105 and THTR 1115 (all minimum grade C-). Restricted to graduate students.
**Additional Information:** Departmental Category: Theatre Design and Technology

**THTR 5033 (3) Advanced Movement for the Stage**
Explores a wide range of physical actor training methods and practices that support the fundamentals of mask training and mask performance for the actor. Students will experience each mask by gaining an understanding of its historical and performative relevance and directly bring into play the authentic life required of the specific mask. Department consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4033
**Requisites:** Restricted to graduate students only.

**THTR 5039 (3) Musical Theatre Repertory**
Developed around the learning of complete scenes, songs and dances that are representative of the major periods and styles within musical comedy from the 1920s to the present. Emphasizes in-class performance. Admission by audition.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4039
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 5046 (3) Costume Crafts**
Covers basic and advanced techniques in casting/molding, mask making, dyeing, painting, jewelry making, ventilating and wig style and millinery via a series of projects. Culminates in a final project encompassing all techniques. Instruction consent required. Formerly THTR 5045.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4046
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite THTR 1115 (minimum grade C-).

**THTR 5049 (3) Topics in Theatre Studies**
Provides an opportunity for an in-depth study of a particular topic in theatre (e.g., a historical period, a region, a group or artist, a theorist, a concept). Topic specified in the Online Schedule Planner.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 5065 (3) Theatrical Tailoring**
Explores classic and theatrical tailoring techniques and theories through the construction of classical men's wear: trousers, vest/waistcoats and coats. Student work with hand and machine sewing techniques, patterning skills and appropriate tailoring materials. Period of exploration will vary by semester. Grad section grading will include additional documentation components, beyond those in the undergrad section of the course.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite THTR 1115.

**THTR 5067 (3) Teaching Shakespeare**
Provides students with pedagogies, lesson plans and exercises for making Shakespeare accessible for students of all ages and across multiple content. This online course may be taken as a standalone, 3-credit course or as part of the Graduate Certificate in Applied Shakespeare.

**THTR 5071 (3) Advanced Directing**
Advanced study of theory and practice of stage directing through examination of the work of leading directors, analysis of texts and classroom exercises. Instructor consent required.
**Additional Information:** Departmental Category: History/Dramaturgy/Directing

**THTR 5085 (3) Theatre Management**
Concentrates on theory and practice of management aspects of the performing arts, emphasizing theatre and dance. Includes marketing, budgeting, house and stage management, audience development, grant writing, unions and season development. Includes practical experience.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4085
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Theatre Design and Technology

**THTR 5105 (3) Theatre Make-Up Design**
Explores theatrical make-up styles and techniques from initial research through paper design to final make-up. Ranging from period styles to Byzantine mosaic, to clowns, to special effects (old age, wounds, stages of healing, zombies, etc.) Techniques include ombre blending, removing eyebrows, shrinking and enlarging features, creating 3D appliances and applying silicone and foam prosthetics.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4105
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 5113 (3) Comedy Matters**
Examines the role of comedy in performance within various cultures through readings, viewings and a participatory exploration. We will analyze comedy within various societies to understand the underlying ideals and values. Throughout this investigation we will seek to understand what makes something comedic, why, for whom, for what purpose, when and under what circumstances.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4113
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Performance

**THTR 5125 (3) Watercolor Illustration and Rendering Techniques**
Gain fluency in established techniques and styles of master illustrators and painters. Famous illustrations are technically analyzed and copied in this exploration of intent, process, technique and style. Other mediums incorporated include pastels, color pencils, pen and ink and gouache. Painting supplies must be supplied by the student.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4125
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Theatre Design and Technology

**THTR 5143 (3) Shakespeare in Community**
Surveys a growing field of arts practitioners who are intersecting Applied Theatre, Shakespeare and community in meaningful ways, including Shakespeare in Prisons, Shakespeare with Veterans and Shakespeare for Inclusive Audiences. Students will explore a variety of methodologies for teaching and practicing Shakespeare and create original work using Shakespeare as a lens for examining a particular theme, topic or social issue.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4143
**Requisites:** Restricted to graduate students only.

**THTR 5175 (3) Conceptualization**
Fosters the student's creative and collaborative skills by introducing a variety of strategies and scenarios for conceiving live, theatrical productions, events and experiences. A project based curriculum offers several individual and team exercises in visualizing, documenting and communicating ideas for live performances, including their overall scope, aesthetic, style, audience relationship and mode of presentation.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4175
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 5213 (3) Improvisation I: Thinking On Your Feet**
Provides students with an introduction to several forms of improvisation, including short form, long-form, playback theatre and clown. A useful course for anyone interested in improving confidence with public speaking, communication and/or performance. Attendance and participation are mandatory.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Performance

**THTR 5849 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 6003 (1-3) Production Research and Practicum: Acting**
Allows students to undertake an acting project, normally within the major theatre season, that requires detailed preparatory research, testing of ideas, and public presentation. Students work under faculty supervision and prepare a written report and evaluation of the research, rehearsal, and performance process.
**Requisites:** Restricted to graduate students only.
**Recommended:** advanced studies in acting and advisor approval.
**Additional Information:** Departmental Category: Performance

**THTR 6005 (1-3) Production Research and Practicum: Designing**
Allows students to undertake a design project, normally within the theatre season, that requires detailed preparatory research, testing of ideas, and public presentation of theories and concepts in practice. Students work under faculty supervision, and prepare a documented written report and evaluation of the research, design, and realization process, as well as fully rendered designs and/or plots. Projects may be in costumes, lights, or scenery.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Theatre Design and Technology

**THTR 6011 (3) Theatre and Performance Histories 1**
Studies the various histories of theatre and performance globally before colonialism, in context of contemporary work and the implications of this work through critical and scholarly responses to these performances.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: History/Dramaturgy/Directing
Departmental Category: Asia Content

**THTR 6041 (3) Theatre and Performance Histories 2**
Studies global histories of theatre and performance from colonization to the present, with particular attention paid to critical and theoretical responses to work from the period.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: History/Dramaturgy/Directing

**THTR 6051 (1-3) Production Research and Practicum: Directing**
Advanced study of theory and practice of stage directing through examination of the work of leading directors, analysis of texts and classroom exercise. Instructor consent required.
**Additional Information:** Departmental Category: History/Dramaturgy/Directing

**THTR 6091 (1-3) Production Research and Practicum: Dramaturgy**
Students undertake a dramaturgical project, normally within the major season, requiring detailed preparatory research, testing of ideas, and public presentation of theories and concepts in practice. Students work under faculty supervision and prepare a documented written report of their project.
**Requisites:** Restricted to graduate students only.
**Recommended:** advanced course work in dramatic literature and advisor approval.
**Additional Information:** Departmental Category: History/Dramaturgy/Directing

**THTR 6849 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 6949 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 6959 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 7004 (3-6) Colorado Shakespeare Festival Summer Immersion**
Immersive summer intensive designed to provide an in-depth study of Shakespeare with the Colorado Shakespeare Festival (CSF). Students learn from and engage with CSF company members and faculty from English and Theatre & Dance departments in a small group, experiential setting. Students attend plays, rehearsals and lectures, and explore acting, directing and pedagogy.
**Additional Information:** Departmental Category: Shakespearean Production

**THTR 8999 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Additional Information:** Departmental Category: Special Courses in Theatre

## Theatre & Dance

**THDN 5010 (3) Introduction to Performance Studies**
Introduces students to performance studies by surveying foundational concepts and recent scholarship in the field and by examining theoretical and methodological questions raised by performance practices. This interdisciplinary course provides students with the necessary vocabulary and research skills to continue to navigate the field of performance studies and the many academic fields it intersects with. Formerly THTR 5010.
**Requisites:** Restricted to graduate students only.

**THDN 5051 (3) Topics in Performance Studies**
Provides an opportunity for an in-depth study of a particular topic in performance studies (e.g., a historical period, a region, a practitioner, a theorist, a concept). Topic specified in the Online Schedule Planner.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: History/Dramaturgy/Directing

**THDN 5099 (3) Live Performance: Critical Curation**
Examines live arts curation and engages in both practical and theoretical investigations. Course observes how approach to curation requires changes in production practices as well as models of spectatorship. The course culminates in a student-directed creation of an original, team-based curatorial project. This course counts toward the Dance Seminar requirement.
**Recommended:** Prerequisite THTR 5010.
**Grading Basis:** Letter Grade

**THDN 6001 (1-3) Applied Performance Practicum**
Allows students to undertake an applied performance project with faculty guidance. This project may use performance as a tool towards achieving a community objective, to advance a social justice issue, or to contribute to the well-being or empowerment of community members. This practicum may include: needs assessment, preparatory research, design of project, workshop or public implementation/performance/installation/action, and assessment. Recommended: advisor approval. Additional Information: Departmental Category: Graduate Theatre and Performance Studies and Graduate Dance, as well as undergraduate Theatre & Dance.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.

**THDN 6009 (2) Research and Teaching in Theatre, Dance and Performance Studies**
Provides an overview of resources, methodologies, and strategies for graduate teaching in the fields of theatre, dance, and performance studies. Students will be exposed to library and other resources available to them in the department and in the university, and will develop a research proposal for a project they plan to develop during their graduate studies.
**Requisites:** Restricted to THTR MA, THTR PhD or DNCE MFA students

# Dance - Master of Fine Arts (MFA)

## Curriculum

The primary core MFA curriculum focuses on the development of the individual artistic voice in performance, choreography, teaching, research and writing. The presentation of new creative work is bolstered, augmented and enriched by the study of theory, history and many diverse artists of all dance genres and movement disciplines. The program is designed to be responsive to individual areas of interest and to ensure effective preparation for careers in academics, not-for-profit organizations, and the professional arenas.

Students are encouraged to think outside of the box in terms of course choices, creative pursuits and scholarly activities. A considerable number of the required credits consists of student-selected courses and electives, allowing for a great deal of freedom and individualized study. It is critical that a student work closely with their advisor in selecting courses in the dance curriculum, courses outside of the department and creating independent studies that will support the student's goals and secondary area of emphasis.

The Graduate School requires a minimum of 30 credits at the 5000 or 6000 level for a Masters Degree. The 50 or 60-credit requirement for the MFA in dance degree exceeds the Graduate School requirement for two reasons:

- This approach acknowledges the importance of physical practice along with theoretical exploration and formally recognizes the necessity of both types of work in students' degree requirements.
- The MFA is considered a "terminal degree" in the field of choreography and teaching. Our program is designed to meet academic standards commensurate with our Academic Review and Planning Advisory Committee (https://www.colorado.edu/facultyaffairs/academic-review-and-planning-advisory-committee-arpac/) certification and national licensing.

**Choose your own adventure -- flexibility with elective credits**

- With 42 credit hours of core coursework, that leaves 18 credit hours for electives.
- The 18 elective credits may be used in a variety of ways that support the MFA Candidate's research. Choices may include but are not limited to: additional creative practice, movement and seminars both inside and outside the dance program.
- Flexibility in designing your program is possible and should be carefully discussed and planned with your advisor.
- Your secondary emphasis will be crafted using elective credit hours.

### Performance and Production

All MFA students are expected to present choreographic work each semester, either as part of course-related events or in other departmentally produced events. It is expected that you will seek not only to deepen your established artistic practices, but also assiduously expand your artistic self into less familiar movement, choreographic, aesthetic and expressive modes. Evaluation of your artistic output will be based on articulateness, sophistication, theatrical and conceptual completeness and on the extent to which you have deeply sought discovery, reconsideration and analysis of your art-making methods. We hope this encourages you to savor the rhythm of creative cycles in your life, and enduringly keeps you inspired to discover your own art-making from new vantage points.

You are urged to seek a variety of performance opportunities with fellow students, faculty and guest artists. Produced performances are presented multiple times each year and informal showings occur regularly during the year. Extensive work with off-campus groups is often extremely difficult to schedule and tends to distract and overwhelm students with multi-tasking and juggling of priorities (see "performance opportunities" for off-campus procedures approval). We intend to support your primary effort of completing your graduate studies on a timely basis with as little debt as possible.

Every year, the dance program produces multiple concerts on their main season with CU Presents (CU campus office responsible for ticketing/marketing).

There are also less formal choreographer showcases and non-major showings for showing work. The full production schedule necessitates early planning, team communication and reliable management of department resources and personnel. Our aim is to support the full creativity of our students while balancing the many needs of the department.

## Modified MFA Program for Professionals

Those students entering our program with significant professional backgrounds including teaching, choreography and/or performance may be able to request a modified degree plan. For such students, an interview with the Director of Dance and the Director of Graduate Studies for Dance during the application/audition process is necessary. The interview will help determine if there is a good match between the student's goals and the MFA program.

The goal of the modified program for professionals is to provide flexibility in the pursuit of individual goals and the fortification of specific educational gaps. In close consultation with the faculty and graduate advisor, the student will be able to propose and develop new areas of research and creative work. All modifications to the MFA program must receive the approval of program directors and the CU Boulder Graduate School. The number of required credits and semesters will be determined based on the individual's exceptional professional experiences.

## Teaching Requirement

Graduate Part-Time Teaching Instructors (GPTI), Teaching Assistants (TA), Graduate Assistants (GA) and Research Assistant (RA)

The department is committed to providing full funding for all our admitted MFA students.

This funding comes through appointments that include: teaching assistants (TA), graduate assistants (GA), research assistants (RA) and graduate part-time instructors (GPTI). The percentage of these appointments vary, but do not exceed 50% (or 20 hours of work per week). These assignments are awarded and evaluated for one semester at a time. Although we cannot guarantee "full" funding, we have taken the initiative to reduce cohort sizes which allows us to consistently provide appointments that cover tuition, medical insurance and salary.

The availability of appointments is driven by the department's enrollment and curricular needs. We do our best to offer our students a variety of teaching and professional experiences, but we cannot always guarantee MFA candidates' first choice.

### Types of Appointments

Graduate Part-Time Teaching Instructors (GPTI)- Teaches undergrad classes.

Graduate Assistants (GAs) serve in roles that assist the functioning of the department's production season. These roles provide professional training while providing an essential service to the department.

GA positions include (varies based on availability): dance events coordinator, assistant director of dance production, video archivist and communications.

Research Assistants (RAs) assist a faculty member or department on a substantial research or production project. The department prioritizes instructional needs of the department as a first priority before identifying research appointments.

Teaching Assistants (TAs) serve as class assistants under the guidance of a particular instructor who assists and encourages the TA to develop excellence in teaching. TAs are not placed in overall charge of courses. Selection of TAs is based on teaching experience, previous experience (including coursework) in history and the contemporary arts, the ability to guide recitations and grade written work. TAs must attend all lectures.

## Requirements

### Admission Requirements

Applicants are expected to show a high level of proficiency in dance performance, pedagogy and choreography. All applicants must submit the Teaching Application (https://www.colorado.edu/theatredance/dance/graduates/graduate-assistantships-teaching-application/) portion of the application. Funding (https://www.colorado.edu/theatredance/financial-information/) for the MFA is contingent upon teaching within our program.

The deadline for all applications is December 1. Select applicants will be invited to an initial Zoom interview in January. The faculty will then invite a small number of applicants for an in-person campus audition in February. International students may request to audition in digital format. The dance program does not accept applications or transfer requests for spring semester admission.

The specific audition dates and detailed information about the on-campus audition can be found on the department's Dance MFA Application (https://www.colorado.edu/theatredance/dance/graduates/mfa-dance-application/) webpage.

Graduate Record Exam (GRE) scores are not required for the MFA in dance application.

## Prerequisites

- Hold a baccalaureate degree in dance or equivalent dance proficiency, and experience with a degree in another field.
- Have an undergraduate GPA of at least 2.75 and meet the Graduate School's minimum Admission Requirements (https://www.colorado.edu/graduateschool/admissions/prepare-apply/).
- Demonstrate a deep commitment to the field of dance with proficiency in practice, performance, choreography and teaching.

## Program Requirements

### Required Courses and Credits

The three-year program requires a minimum of 60 credit hours, at least 50 of which must be completed on campus at CU Boulder. At this time there is no low-residency option for the MFA program. The curriculum focuses on performance, choreography, scholarship, pedagogy and a secondary area of specialization. Grades lower than a B- cannot be applied towards graduation; a 3.0 GPA is needed to graduate.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| THDN 6009 | Research and Teaching in Theatre, Dance and Performance Studies | 2 |
| DNCE 5001 | Graduate Technique | 6 (2 credits taken 3X) |
| DNCE 5901 | Somatic Applications to Dance | 2 |
| Varied Additional Technique Classes (DNCE) | | 4 |
| DNCE 5012 | Concert Production [1] | 1 |
| DNCE 5053 | Advanced Dance Composition [1] | 3 |
| DNCE 5056 | Graduate Teaching Seminar | 2 |
| DNCE 5064 | Music and Dance Seminar: Collaboration | 2 |
| DNCE 6073 | Choreography (taken twice with different instructors) [1] | 6 (3 credits taken 2X) |
| DNCE 6969 | The Graduate Project | 8 |
| The following courses will fulfill the Seminar in Dance requirement | | |
| DNCE 6047 | Seminar: Dance | 3 |
| THDN 5010 | Introduction to Performance Studies | |
| DNCE 6017 | Cultural Collisions and Ethics in Dance and Movement Performance | 3 |
| THTR 5049 | Topics in Theatre Studies | 3 |
| THDN 5051 | Topics in Performance Studies | 3 |
| THDN 5099 | Live Performance: Critical Curation | |
| THTR 6011 | Theatre and Performance Histories 1 | 3 |
| **Electives With 42 credit hours of core coursework, that leaves 18 credit hours for electives (including independent studies). Your secondary emphasis will be crafted using elective credit hours.Common electives in the Theatre and Dance Department include: [2]** | | |
| DNCE 5048 | Performance and Community Engagement | |
| THTR 5071 | Advanced Directing | |
| THTR 5213 | Improvisation I: Thinking On Your Feet | |
| THTR 5033 | Advanced Movement for the Stage | |
| THTR 5025 | Costume Patterning and Construction | |
| THTR 5113 | Comedy Matters | |
| THTR 5065 | Theatrical Tailoring | |
| THTR 5105 | Theatre Make-Up Design | |
| THTR 5175 | Conceptualization | |
| THTR 5125 | Watercolor Illustration and Rendering Techniques | |
| THTR 5085 | Theatre Management | |
| Secondary Emphasis | | 9-6 |
| Additional Electives | | 12-9 |
| **Total Credit Hours** | | **60-66** |

1. Students must complete Advanced Composition, both Choreography courses, and Concert Production prior to the semester in which their choreographic/creative project is presented.
2. Students who do the Aerial Dance or Somatic Secondary Emphases will complete fewer credit hours of electives.

### MFA Project and Project Paper

The culmination of graduate study is the MFA Project and Project Paper. The MFA Project is based on creative work: a choreographic/creative project usually presented in a live performance or digital format, followed by a paper and an oral defense of the project and paper. We celebrate many varieties of creative projects and we offer the support and imaginative expertise of an outstanding production team.

### Graduate Comprehensive Portfolio

Prior to graduation, MFA candidates submit a collection of scholarly, pedagogical and creative work. The portfolio is intended to document and synthesize the graduate's personal practice, philosophies, choreography and academic investigations. It includes creative and pedagogical statements, scholarly essays, a CV and digital documentation of teaching, performance and choreography.

# Plan(s) of Study

Please contact with your GPA or advisor for specific need for a semester, before registering for any class.

# Secondary Emphasis

We wholeheartedly assert that a liberal arts education cultivates a healthy balance of critical thinking, creativity and communal excellence. In this spirit, MFA candidates choose at least one secondary area of study to give variety and dimension to their training.

## Secondary Emphases Within Our Campus

Students may choose an emphasis that can be fulfilled by courses taken within the department and/or in other campus departments. Secondary emphases vary between two and five courses, depending on the choice of subject. The university setting is particularly well-suited to broad educational goals, given the wide assortment of subjects available at the CU Boulder campus. We encourage students to search far and wide through the course catalog to discover courses and areas of study that are particularly suited to their individual interests and goals.

Students may also choose to complete a graduate certificate as their secondary emphasis. The most common certificates earned by MFA students are:

- Women & Gender Studies Certificate (https://www.colorado.edu/wgst/graduates/)
- Hip-hop Studies Certificate (https://www.colorado.edu/theatredance/dance/hip-hop-studies-certificate/)
- Critical Ethnic Studies Certificate (https://www.colorado.edu/ethnicstudies/graduate/graduate-certificate/)
- Emergent Technologies and Media Arts Practices (https://www.colorado.edu/cmci/dcmp/cert-etmap/)
- Critical Theory Certificate (p. 1304)
- Digital Humanities Certificate (https://www.colorado.edu/crdds/dhgc/)
- Arts Administration Certificate (https://www.colorado.edu/music/academics/graduate-advising/graduate-certificate-arts-administration/)

## Aerial Dance Emphasis

The aerial dance emphasis is available to students who have a serious interest in aerial dance and its application to dance training, performance and/or teacher training. Students can work towards the completion of the Professional Training Program at Frequent Flyers Aerial Dance Studio (http://www.frequentflyers.org/)® (located in Boulder) while simultaneously pursuing their MFA degree. The Professional Training Program must be successfully completed before the MFA degree will be awarded. Before a student is eligible to begin work in the aerial dance emphasis, they must be officially accepted by Frequent Flyers® Professional Training Program and have been approved by the Director of Graduate Studies for Dance to follow the aerial dance emphasis.

The aerial emphases is sponsored by the program, but requires students to take off-campus training. Because of this, the number of CU Boulder credit hours required for the MFA is reduced from 60 to 50 credit hours.

### Somatic Emphasis

The somatic emphasis is social justice oriented. It is intended for students with a strong devotion to intersectional practice-based research. Designed as a connective tissue within the MFA in Dance, the somatic emphasis fosters the artist-citizen to be accountable, embodied and aware through dancing, dance making, performance, critical discourse, collaboration, wellness and activism. Students are supported in accumulating broad experiential knowing through diverse somatic approaches.

We prioritize the development of skills and strategies toward cultivating radical aliveness. How we inhabit our living bodies/minds, and relate to others, impacts our identities, our communities, and the structures we participate in. We consider how somatic decolonizing will deepen collective movements toward justice, equity, diversity, inclusivity, and responsive global citizenship.

The MFA in dance honors the complexity of somatic lineages and practices. We place value on knowing the global roots of somatics and strongly assert that Eurocentric certified somatic systems are not the only traditions to hold valuable somatic knowledge. Our program supports innovative research into somatic practices of every origin. We aim for a collaborative re-imagining of the potential applications for culturally informed and politically engaged somatic practice; depth of inquiry, integration of theory and practice, and queering of perspectives is encouraged. This emphasis calls for investment in the power of our anatomical, energetic, cultural bodies/minds in the face of converging crises, shifting human demographics, emerging realities and potential futures.

The somatic emphasis consists of an individualized course of study worth 12 credits. The specific course of study will be developed by each student in collaboration with Dance faculty Anya Cloud.

Course of study will be developed from the following:

- Graduate level Dance courses in somatics
- One approved course in anatomy, physiology and/or kinesiology
- Peer-to-peer somatic lab practice
- Cumulative somatic research documentation and bibliography
- Intensive off-campus somatic training[1]
- One approved course outside of the department from the following areas: Ethnic Studies, Women and Gender Studies, LGBTQ Studies, Disability Studies, Native American and Indigenous Studies, Peace and Conflict Studies, Environmental Justice and Eco-Social Justice, or a related and relevant course approved by faculty

[1] Students can apply for CU Boulder grant funding (https://www.colorado.edu/graduateschool/funding/awards-grants/) to pursue off-campus somatic training. MFA in Dance grant options are listed within the MFA Handbook (https://www.colorado.edu/theatredance/graduate-student-resources/). Current local partners include the Renée Crown Wellness Institute at CU Boulder and community practitioners of Feldenkrais®, Alexander Technique, Body-Mind Centering®, Gyrotonic®/Gyrokinesis®, and Pilates. Current international remote partner includes a practitioner of Kung Fu.

Students must declare the somatic emphasis by the end of the first year. Given the nature of the Somatic Emphasis, the number of CU Boulder credit hours required for the MFA with a Somatic Emphasis is reduced from 60 to 50 credit hours. All requirements must be successfully completed before the MFA degree will be awarded. The Dance faculty advisor for the somatic emphasis is Anya Cloud.

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate a clear and individuated artistic voice.
- Demonstrate preparation and empowerment for fulfilling their chosen career paths, both in their graduate studies and in the professional world.
- Investigate traditional and innovative approaches to movement invention, choreography and performance.
- Demonstrate somatic awareness and fluency in dance technique, including but not limited to improvisation, jazz, African Caribbean, aerial, hip-hop, Transnational fusion, north and west African dance, ballet and contemporary.
- Actively engage in dance research, with particular attention to discovering relationships between scholarship and creative work.
- Examine and practice pedagogical goals and strategies from aesthetic, cultural and anatomical perspectives.
- Present choreography/creative work on a regular basis and perform in the creative work of faculty, peers and guest artists working in a variety of aesthetic and technical styles.

# Theatre and Performance Studies - Master of Arts (MA)

Our Master of Arts in Theatre & Performance Studies is committed to performance as research as integral to the study of the history, theory and practice of theatre and performance from around the world. We approach performance simultaneously as an object of study, a way of knowing and a methodological tool and are invested in the ways in which it can help us better understand—and challenge—the complicated legacies of our own academic disciplines and artistic practices. Our courses place dramatic texts, performance traditions and applied performance from throughout history in conversation with contemporary performance. We ask: How might this performance work today? What challenges does it present to the contemporary scholar, maker or facilitator? What role do gender race and/or coloniality play in this work? Why is it relevant today?

We offer two tracks in our MA in Theatre & Performance Studies, the thesis and the non-thesis track. The thesis track prepares students to pursue a PhD, requiring students to write and defend a substantial research document demonstrating mature critical thought and based on independent study and investigation.

The non-thesis track allows students to further their interests through coursework, and requires written and oral exams. Students in this track will complete a culminating project that will serve as a unifying goal for their MA experience. This project might be a creative project, a research study, a management project, an engaged performance experience or beyond.

MA students who are accepted into the PhD program complete their PhD in an additional three years.

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s): Theatre - Bachelor of Arts (BA) (p. 621)

# Requirements

## Prerequisites

Applicants must have a bachelor's degree and an undergraduate GPA of at least 2.75. While a bachelor's degree in theatre is not a requirement, theatre experience is highly desirable.

## Program Requirements

### Required Courses and Credits

Students must earn 30 credit hours, at least 24 of which must be at the 5000 level or above. A maximum of 6 credit hours may be completed at the 3000 or 4000 level at the discretion of the student's academic advisor. Theatre courses below the 5000 level cannot be counted toward the degree. Courses in which grades below B- are received are not accepted for master's degree programs.

The degree is normally completed in four semesters (excluding summers).

Students must declare either the thesis or non-thesis option by the start of their third semester. Those choosing the thesis option will apply 4–6 thesis credit hours toward the 30-credit-hour requirement.

### Elective Coursework

MA students are encouraged to take elective courses offered by theatre graduate faculty members in their area of research (e.g., performing voices of women, performance studies, directing, performance and community engagement), as well as graduate dance courses (e.g., graduate dance technique, advanced dance composition, African dance). When approved by the student's advisor, MA students are encouraged to take courses in other departments. Electives are determined by students and their advisors, consistent with Graduate School and departmental requirements. All coursework applying towards the degree must be taught by members of the graduate faculty holding current graduate faculty appointments.

#### Graduate Independent Study

Independent study is used for projects, research and educational opportunities both in and outside of the department. It may not be used as an avenue for taking undergraduate courses in the major department or replicating existing graduate classes. Independent study coursework cannot exceed 25 percent of the coursework required for the master's degree.

#### Production Research and Practicum Courses

These courses in acting, directing, design and dramaturgy may be taken for 1–3 credits. A limit of 3 credits in each category may apply toward the degree. All courses are supervised by members of the graduate faculty; regular meetings with the instructor of record are required.

Guidelines for flexible credit are:

- one credit hour for successfully completing the project;
- two credit hours for completing the project and submitting a written record of it (e.g., an actor's journal, a director's regiebuch);
- three credits hours for doing all of the above and writing a pertinent 15 to 25 page research paper, with the topic to be determined in consultation with the advisor.

## MA Degree Tracks

The MA program in Theatre & Performance Studies has two tracks: a thesis option and non-thesis option. Students must declare either track by the start of their third semester.

### Track I: Thesis Option

This track prepares students to pursue a PhD degree at CU or elsewhere. Students must write a thesis, a substantial research document demonstrating mature critical thought based on independent study and investigation. Students must demonstrate proficiency in three areas: academic coursework, the thesis and the final exam (oral).

Students in the thesis track take two one-hour oral examinations back-to-back (i.e. on the same day) after the majority of coursework for the degree has been completed and the master's thesis is "essentially" complete. The first oral exam covers coursework. The second oral examination covers the thesis.

**Required Courses and Credits for the Thesis Track**

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| THDN 5010 | Introduction to Performance Studies | 3 |
| THTR 5011 | Seminar: Theory and Criticism | 3 |
| THDN 6009 | Research and Teaching in Theatre, Dance and Performance Studies | 2 |
| THTR 6011 | Theatre and Performance Histories 1 | 3 |
| THTR 6041 | Theatre and Performance Histories 2 | 3 |
| **Thesis Work** | | |
| THTR 6959 | Master's Thesis (taken in fourth semester for thesis completion) [1] | 4 |
| **Electives** | | **12** |
| Any graduate-level THTR course | | |
| Any THDN, TDXD or DNCE course at the 3000 level or above [2] | | |
| Courses from other departments at the 3000 level or above, if approved by the student's advisor [2] | | |
| **Total Credit Hours** | | **30** |

1. Students may take 4–6 thesis hours. The number of electives is adjusted accordingly.
2. A maximum of 6 credit hours may be completed at the 3000 or 4000 level at the discretion of the student's academic advisor.

### Track II: Non-Thesis Option

Students who do not plan to pursue a PhD can elect the non-thesis track, which requires a two-part comprehensive exam, comprised of a take home written exam and a 1.5-hour oral exam. The written and oral exams will be comprehensive, covering all coursework presented for the degree. The exam will take place near the end of the last semester of coursework.

Students in this track will complete a culminating project that will serve as a unifying goal for their MA experience. This project might be a creative project, a research study, a management project, an engaged performance experience or beyond. To complete the non-thesis track, students must demonstrate proficiency in two areas: academic coursework and the final exam (written and oral).

**Required Courses and Credits for Non-Thesis Track**

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| THDN 5010 | Introduction to Performance Studies | 3 |
| THTR 5011 | Seminar: Theory and Criticism | 3 |
| THDN 6009 | Research and Teaching in Theatre, Dance and Performance Studies | 2 |
| THTR 6011 | Theatre and Performance Histories 1 | 3 |
| THTR 6041 | Theatre and Performance Histories 2 | 3 |
| **Final Project** | | |
| THTR 6849 | Independent Study | 3 |
| **Electives** | | **13** |
| Any graduate-level THTR course | | |
| Any THDN, TDXD or DNCE course at the 3000 level or above [1] | | |
| Courses from other departments at the 3000 level or above, if approved by the student's advisor [1] | | |
| **Total Credit Hours** | | **30** |

1. A maximum of 6 credit hours may be completed at the 3000 or 4000 level at the discretion of the student's academic advisor.

# Plan(s) of Study

## Thesis Track

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| THDN 6009 | Research and Teaching in Theatre, Dance and Performance Studies | 2 |
| THDN 5010 or THTR 5011 | Introduction to Performance Studies (5010 & 5011 are available alternating semesters) or Seminar: Theory and Criticism | 3 |
| On-Stage Studies Seminar or Electives | | 3 |
| | **Credit Hours** | **8** |
| **Spring Semester** | | |
| On-Stage Studies Seminar and/or Electives | | 7 |
| | **Credit Hours** | **7** |

**Year Two**

| **Fall Semester** | | |
|---|---|---|
| THTR 5011 or THDN 5010 | Seminar: Theory and Criticism (5010 & 5011 are available alternating fall semesters) or Introduction to Performance Studies | 3 |
| On-Stage Studies Seminar or Electives | | 5 |
| | **Credit Hours** | **8** |
| **Spring Semester** | | |
| On-Stage Studies Seminar or Electives | | 3 |
| THTR 6959 | Master's Thesis | 4 |
| | **Credit Hours** | **7** |
| | **Total Credit Hours** | **30** |

## Non-Thesis Track

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| THDN 5010 or THTR 5011 | Introduction to Performance Studies (5010 & 5011 are available alternating semesters) or Seminar: Theory and Criticism | 3 |
| THDN 6009 | Research and Teaching in Theatre, Dance and Performance Studies | 2 |
| On-Stage Studies Seminar or Electives | | 3 |
| | **Credit Hours** | **8** |
| **Spring Semester** | | |
| On-Stage Studies Seminar and/or Electives | | 7 |
| | **Credit Hours** | **7** |

| | | |
|---|---|---|
| **Year Two** | | |
| **Fall Semester** | | |
| THTR 5011<br>or THDN 5010 | Seminar: Theory and Criticism (5010 & 5011 are available alternating fall semesters)<br>or Introduction to Performance Studies | 3 |
| On-Stage Studies Seminar and/or Electives | | 4 |
| | **Credit Hours** | **7** |
| **Spring Semester** | | |
| On-Stage Studies Seminar and/or Electives | | 5 |
| THTR 6849 | Independent Study (Culminating Project) | 3 |
| | **Credit Hours** | **8** |
| | **Total Credit Hours** | **30** |

# Dual Degree Program

## MA/MBA in Theatre and Performance Studies

The Department of Theatre & Dance, in conjunction with the Leeds School of Business, offers students the ability to earn an MBA and an MA in Theatre & Performance Studies through a three-year dual degree program. The dual MA/MBA offers students the opportunity to earn both degrees together in less time than if the degrees were earned sequentially. An MBA degree in combination with an MA degree in Theatre & Performance Studies will provide students with a set of business tools to complement their artistic talents and expand their career options.

Students in the MA/MBA dual degree program pursue careers in a wide variety of fields and jobs in the world of the performing arts. Types of organizations include theatre companies, dance companies, opera companies, symphonies, arts councils, performing arts complexes, civic auditoriums, not-for-profit organizations and arts presenters.

### Application Process

Students may apply either to the Department of Theatre & Dance for the MA degree program or to the Leeds School of Business for the MBA degree program. Having been accepted, they will subsequently apply to the other degree program.

Alternatively, students may apply for both programs simultaneously, in which case students must apply to each program separately and meet the admissions standards for each program separately.

NOTE: Residents of U.S. Western states, including Alaska and Hawaii, may be eligible for in-state tuition for this dual degree program, provided the student applies and is accepted to both programs in the same admissions cycle. For more information, visit the Western Regional Graduate Program (http://wiche.edu/wrgp/) webpage.

### Program Requirements

The MA/MBA is a dual degree program, and its curriculum is best conceived that way. A minimum of 67 approved credit hours must be completed to earn both degrees. Dual degree students will be required to complete 43 hours of MBA coursework and 24 hours of theatre/dance coursework. The dual degree agreement allows students to count 18 credit hours of courses towards both degrees.

First-year students in the MA/MBA in Theatre & Performance Studies take courses exclusively in either the Leeds School of Business or the Department of Theatre & Dance. In the second year, courses are taken exclusively in the other program. The third year offers students the opportunity to take both MBA and theatre/dance elective courses.

Because of the two-year cohort model at Leeds School of Business, students are advised to start their coursework in the Department of Theatre & Dance. This is the case even if the student was admitted to both programs simultaneously.

Coursework for the MBA portion of the Dual MA/MBA in Theatre & Performance Studies (p. 1490) can be found on the Leeds School of Business catalog page. The MBA requires 55 credit hours. MA/MBA students will complete 43 credit hours of business courses. Twelve credit hours from the student's coursework for the MA will count toward the MBA.

The MA in Theatre & Performance Studies requires 30 credit hours, 24 of which must be at the 5000 level or above. Six credit hours from the student's work in the Leeds School of Business will count toward the MA in Theatre & Performance Studies. Students are encouraged to explore classes outside the Department of Theatre & Dance for some of their electives, as approved by their advisor.

All coursework applying towards the degree must be taught by members of the graduate faculty holding current graduate faculty appointments. Theatre courses below the 5000 level cannot be counted toward the degree.

Courses in which grades below B are received are not accepted for the MA in Theatre & Performance Studies.

Students in the MA/MBA will choose between the thesis track and the non-thesis track. Those choosing the thesis track will take 4–6 master's thesis credit hours and the number of electives in THTR or DNCE will be adjusted accordingly.

### MA Coursework Requirements for the MA/MBA in Theatre & Performance Studies

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| THDN 6009 | Research and Teaching in Theatre, Dance and Performance Studies | 2 |
| THTR 5011<br>or THDN 5010<br>or DNCE 6047 | Seminar: Theory and Criticism<br>Introduction to Performance Studies<br>Dance Studies | 3 |
| Select two of the following: | | 6 |
| THTR 6011 | Theatre and Performance Histories 1 | |
| THTR 6021 | | |
| THTR 6031 | | |
| THTR 6041 | Theatre and Performance Histories 2 | |
| THTR 6111 | | |
| DNCE 4037 | Contemporary Concert Dance: Shifting Perspectives in Performance | |
| DNCE 5017 | Dancing Histories: Sex, Gender and Race in U.S. Concert Dance | |
| DNCE 5048 | Performance and Community Engagement | |
| THTR 5085<br>or DNCE 6056 | Theatre Management<br>Professional Development | 3 |
| THTR 4061 | Directing (depending on experience) | 3 |

| | | |
|---|---|---|
| or THTR 5071 | Advanced Directing | |
| **Electives in THTR or DNCE** [1] | | **7** |
| Any THTR graduate level course | | |
| Any THDN, TDXD or DNCE course at the 3000-level or above [2] | | |
| Courses from other departments at the 3000-level or above, if approved by the student's advisor [2] | | |
| Six hours of coursework taken in the Leeds School of Business | | 6 |
| **Total Credit Hours** | | **30** |

1. Students who elect the thesis plan will take 4–6 master's thesis credit hours. The number of electives will be adjusted accordingly.
2. A maximum of 6 credit hours may be completed at the 3000 or 4000 level at the discretion of the student's academic advisor.

# Learning Outcomes

The goal of the MA, MA/MBA, BAM Degrees in Theatre & Performance Studies is to cultivate rigorous study, creative practice and ethical teaching of theatre and performance within a vibrant culture of inquiry and innovation that is grounded in histories, builds towards equity, and expands with possibilities.

By the completion of the program, students will be able to:

- Understand and critically analyze theory, practice, literature, histories, ethical implications and innovation within the expansive fields of theatre and performance studies.
- Creatively engage theory, practice, literature, histories, ethical implications and innovation within the expansive fields of theatre and performance studies (creative engagement could be realized through scholarship, dramaturgy, performance, design, direction, facilitation, co-creation and beyond).
- Develop individual strategies for teaching theory, practice, literature, histories, ethical implications and innovation within our expansive fields of theatre and performance studies.
- Practice positive qualities as future professional colleagues.
- Employ methods, strategies and approaches for dismantling structural inequality and building more inclusive, accessible and equitable ways to research, create and teach.
- Synthesize comprehensive knowledge of the field of theatre and performance studies, and contribute new knowledge of sufficient breath and relevance to our field and beyond.

We use the indicators below to measure the extent to which a student has reached the above learning objectives.

- Coursework
- Research and creative work
- Professional and outward-facing development
- For non-thesis track: completion of culminating project and exam
- For thesis track: completion of thesis and exam

# Theatre and Performance Studies - Doctor of Philosophy (PhD)

The PhD in Theatre & Performance Studies is primarily designed for those who intend to be scholars working in an academic environment.

Our PhD in Theatre & Performances Studies is committed to performance as research as integral to the study of the history, theory and practice of theatre and performance from around the world. We approach performance simultaneously as an object of study, a way of knowing and a methodological tool, and are invested in the ways in which it can help us better understand—and challenge—the complicated legacies of our own academic disciplines and artistic practices. Our courses place dramatic texts, performance traditions, and applied performance from throughout history in conversation with contemporary performance. We ask: How might this performance work today? What challenges does it present to the contemporary scholar, maker or facilitator? What role do gender, race and/or coloniality play in this work? Why is it relevant today?

The program is designed to be completed in four years for students entering with a master's degree. The first through fourth semesters focus on coursework, the fifth semester is spent preparing for and taking the comprehensive examination and writing the dissertation prospectus and the sixth through eighth semesters are spent writing and defending the dissertation. It is possible for a student entering the PhD program with a master's degree to finish in three years.

# Requirements

## Prerequisites

Applicants to the PhD in Theatre & Performance Studies must have a master's degree in any subject. Students who apply to the PhD but will not have earned a master's degree prior to the start of the program will instead be considered for the MA in Theatre & Performance Studies.

## Program Overview

To complete the program, students must:

1. Demonstrate proficiency in academic coursework.
2. Demonstrate reading competency in at least one foreign language equivalent to the completion of a second-semester college-level course.
3. Pass a comprehensive exam.
4. Prepare and successfully defend a dissertation.

Doctoral students in theatre complete 30 credit hours of coursework beyond the master's degree at the 5000 level or above. When approved by the student's advisor, credit hours from other departments on campus may count, provided the course is taught by a member of the graduate faculty in that department. In addition to the 30 credit hours of coursework, 30 dissertation credit hours (THTR 8999) are required.

## Required Courses

The PhD program is based upon a core of required courses which emphasize the interrelatedness of theory, history and practice.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| THDN 5010 | Introduction to Performance Studies | 3 |
| THTR 5011 | Seminar: Theory and Criticism | 3 |
| THDN 6009 | Research and Teaching in Theatre, Dance and Performance Studies | 2 |
| Select three of the following: | | 9 |
| THTR 6011 | Theatre and Performance Histories 1 | |
| THTR 6021 | | |
| THTR 6031 | | |

| | | |
|---|---|---|
| THTR 6041 | Theatre and Performance Histories 2 | |
| THTR 6111 | | |
| **Electives** | | |
| Additional courses to meet the 30-credit mininum. | | 13 |
| **Dissertation** | | **30** |
| THTR 8999 | Doctoral Dissertation | |
| **Total Credit Hours** | | **60** |

### Elective Coursework

PhD students are encouraged to take elective courses offered by theatre graduate faculty members in their area of research (e.g., performing voices of women, performance studies, directing, performance and community engagement), as well as graduate dance courses (e.g., graduate dance technique, advanced dance composition, African dance). When approved by the student's advisor, PhD students are encouraged to take courses in other departments, especially as they relate to the anticipated dissertation topic. Electives are determined by students and their advisors, consistent with Graduate School and departmental requirements.

### Graduate Independent Study

Independent study is used for projects, research and educational opportunities both in and outside of the department. It may not be used as an avenue for taking undergraduate courses in the major department or replicating existing graduate classes. Although there is no limit to the number of independent study credit hours a doctoral student may take, they should be held to a minimum.

### Production Research and Practicum Courses

These courses in acting, directing, design and dramaturgy may be taken for 1–3 credit hours. A limit of 3 credit hours in each category may apply toward the degree. All courses are supervised by members of the graduate faculty; regular meetings with the instructor of record are required.

Guidelines for flexible credit hours are:

- one credit hour for successfully completing the project
- two credit hours for completing the project and submitting a written record of it (e.g., an actor's journal, a director's regiebuch)
- three credit hours for doing all of the above and writing a pertinent 15 to 25 page research paper, with the topic to be determined in consultation with the advisor

### Language Requirement

Reading competency in a foreign language is an important skill for a scholar. It allows the student to consider a dissertation topic beyond the limits of English-speaking theatre, thereby significantly broadening their research and publishing possibilities. Doctoral students are required to demonstrate proficiency in a foreign language equivalent to the completion of a second-semester college-level course before taking the comprehensive exam. This requirement may be fulfilled by coursework taken within five years previous to the exam or by testing.

## Dissertation

The PhD program culminates in the dissertation, a research document that makes a significant and original contribution to the field of theatre studies. The dissertation will be defended before a committee of five members.

# Plan(s) of Study

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| THDN 6009 | Research and Teaching in Theatre, Dance and Performance Studies | 2 |
| THDN 5010<br>or THTR 5011 | Introduction to Performance Studies (5010 & 5011 are available alternating semesters)<br>or Seminar: Theory and Criticism | 3 |
| On-Stage-Studies Seminar or Electives | | 3 |
| | **Credit Hours** | **8** |
| **Spring Semester** | | |
| On-Stage-Studies Seminar and/or Electives | | 8 |
| | **Credit Hours** | **8** |
| **Year Two** | | |
| **Fall Semester** | | |
| THTR 5011<br>or THDN 5010 | Seminar: Theory and Criticism (5010 & 5011 are available alternating semesters)<br>or Introduction to Performance Studies | 3 |
| On-Stage-Studies Seminar and/or Electives | | 4 |
| | **Credit Hours** | **7** |
| **Spring Semester** | | |
| On-Stage-Studies Seminar and/or Electives | | 7 |
| | **Credit Hours** | **7** |
| **Year Three** | | |
| **Fall Semester** | | |
| THTR 8999 | Doctoral Dissertation | 8 |
| | **Credit Hours** | **8** |
| **Spring Semester** | | |
| THTR 8999 | Doctoral Dissertation | 8 |
| | **Credit Hours** | **8** |
| **Year Four** | | |
| **Fall Semester** | | |
| THTR 8999 | Doctoral Dissertation | 7 |
| | **Credit Hours** | **7** |
| **Spring Semester** | | |
| THTR 8999 | Doctoral Dissertation | 7 |
| | **Credit Hours** | **7** |
| | **Total Credit Hours** | **60** |

# Learning Outcomes

## Goal of the PhD Degree in Theatre & Performance Studies

To cultivate rigorous study, creative practice, and ethical teaching of theatre and performance within a vibrant culture of inquiry and innovation that is grounded in histories, builds towards equity, and expands with possibilities.

Measurable learning objectives based on these goals include:

- To know and critically analyze theory, practice, literature, histories, ethical implications and innovation within our expansive fields of theatre and performance studies.
- To creatively engage theory, practice, literature, histories, ethical implications and innovation within our expansive fields of theatre and performance studies (creative engagement could be realized through scholarship, dramaturgy, performance, design, direction, facilitation, co-creation and beyond).
- To develop individual strategies for teaching theory, practice, literature, histories, ethical implications and innovation within our expansive fields of theatre and performance studies.
- To learn and practice positive qualities as future professional colleagues.
- To learn methods, strategies and approaches for dismantling structural inequality and building more inclusive, accessible and equitable ways to research, create and teach.
- To demonstrate the ability to synthesize comprehensive knowledge of the field of theatre and performance studies, and contribute new knowledge of sufficient breath and relevance to our field and beyond.

### Indicators for Reaching Learning Objectives

We use the indicators below to measure the extent to which a student has reached the above learning objectives.

- Coursework
- Research and creative work
- Professional and outward-facing development
- Completion of comprehensive examination and dissertation
- Assessment of teaching

# Applied Shakespeare - Graduate Certificate

By participating in this unique, cross-disciplinary graduate certificate program that combines courses from the Department of Theatre & Dance and the Department of English, students get to know the Bard and his plays as never before.

Students experience a vital mix of performance and scholarship by taking two online-learning courses and then visiting campus for a one-week summer intensive during the Colorado Shakespeare Festival (CSF) to learn from the nationally recognized CSF company members and CU faculty in small experiential groups.

The summer intensive includes acting, directing, stage combat, Elizabethan culture, rehearsal visits, play attendance, classes on how to teach Shakespeare and more. The certificate requirements conclude with a final capstone project. For more information, visit the program page. (https://www.colorado.edu/graduateschool/admissions/where-begin/program-information-deadlines/certificate-programs/applied-shakespeare/)

## Requirements

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| ENGL 5000 | Introduction to Applied Shakespeare | 3 |
| THTR 5067 | Teaching Shakespeare | 3 |
| THTR 5143 | Shakespeare in Community | 3 |
| THTR 7004 | Colorado Shakespeare Festival Summer Immersion | 3 |
| **Total Credit Hours** | | **12** |

Within one month of completing the two-week summer intensive, students must submit their final paper.

# Hip-Hop Studies - Graduate Certificate

This consolidated certificate program in Hip-hop Studies for matriculated graduate students is designed to expose students to the richness, complexity and vitality of Hip-hop—as theory and practice.

Hip-hop, which arose in youth communities of color in the 1970s amid political abandonment and economic devastation, has become the most important cultural movement of the last-half century. Practiced in nearly every corner of the globe, it is now one of the most important through-lines in human culture. To understand hip-hop is to understand the world in which we live. Inclusive excellence is the bedrock of hip-hop; membership in its community is not defined by subscription to a particular place or race but rather to its unique ethos, which privileges virtuosic innovation as much as historic and self knowledge.

Hip-hop is fundamentally an interdisciplinary form. It does not live in one field alone. Rather, it is a dialogue that occurs across dance, music, visual and verbal arts, as well as history and theory. While the Graduate Certificate in Hip-Hop Studies is housed in the Department of Theatre & Dance, courses are available in other departments, such as history, sociology, English and ethnic studies. Organized in this way, with offerings from several campus departments, the consolidated certificate program is the best way to give students a sense of the richness, complexity and vitality of hip-hop.

Importantly, the certificate's community-based practicum ensures the students in the program will know hip-hop as a lived culture, not merely an object to be consumed inside the halls of academia. This active learning component will integrate students into the local Boulder/Denver communities that are shaping the future of hip-hop's forms. It ensures students will know themselves as ethnographers, as well as theorists, and know hip-hop as an ever-evolving, potent and urgent tool of self-expression.

The certificate in Hip-hop Studies is designed to be an enriching, interdisciplinary supplement to other areas of study. It provides a broad base, which can serve as an entry point to more focused study and practice. While offering rich and rewarding experiences, the graduate certificate is not a professional endorsement from Rennie Harris or Larry Southall of the student's skills. Rather, it develops students' appreciation and respect for one of the most important American cultural forms to have emerged in the last half-century.

## Requirements

### Prerequisites

All currently matriculated graduate students at CU Boulder are eligible for admission to the certificate program. Students must submit a Statement of Interest which will be reviewed and approved by the Hip-hop Studies Directors, Rennie Harris and Larry Southall.

### Program Requirements

To obtain this certificate, students will be required to complete eleven graduate-level credit hours:

- Two movement-based courses (4 credits)
- One community-based practicum (1 credit)
- Two elective courses that develop the critical thinking skills required for understanding Hip-hop's impact and socio-historical development (6 credits)

This broad menu of options, which upholds both theoretical engagement and embodied practice with equal importance, will equip students with the skills necessary to engage with Hip-hop as praxis.

Courses will be offered on a regular basis in the departments of Theatre & Dance, Ethnic Studies and English. Additionally, other departments may offer courses that are relevant to the certificate. Students may petition to have these and other Special Topics courses approved by their Hip-hop Studies advisor.

In order to earn the certificate, students must earn a grade of B in each course and meet the graduate school's overall GPA requirement.

| Code | Title | Credit Hours |
|---|---|---|
| **Movement Courses** [1] | | **4** |
| Choose from: | | |
| DNCE 5001 | Graduate Technique (Hip-hop section) | |
| DNCE 5038 | Dance Repertory (Hip-hop section) | |
| DNCE 5301 | Graduate Hip-Hop Technique 1 | |
| DNCE 5331 | Graduate Hip-Hop Technique 2 | |
| **Community-Based Practicum** | | |
| DNCE 5339 | Hip-hop Practicum | 1 |
| **Lecture Courses** [1] | | **6** |
| Choose from: | | |
| ENGL 5019 | Survey of Contemporary Literary and Cultural Theory (Certain sub-topics) | |
| DNCE 5047 | Hip-Hop Dance History | |
| DNCE 5048 | Performance and Community Engagement | |
| ETHN 5102 | Special Topics in Africana Studies | |
| ENGL 5169 | Multicultural/Postcolonial Studies (Certain sub-topics) | |
| ETHN 6100 | Race and Citizenship in U.S. History and Culture | |
| ETHN 6301 | Decolonial/Postcolonial Theory | |
| ETHN 6501 | Critical Race Theory: Soc Scnc Explrtn/ Intrvntn into Crit Race St | |
| **Total Credit Hours** | | **11** |

[1] Students may petition their Hip-hop Studies advisor to have other courses approved. All courses for the certificate must be graduate level (5000 or above). Independent Study is not accepted.

# Women and Gender Studies

The Department of Women and Gender Studies offers two graduate programs: a Master of Arts in Gender and Sexuality Studies and a graduate certificate in Women and Gender Studies. Our graduate programs engage students in an interdisciplinary education using a variety of theoretical and methodological approaches across the humanities and the social sciences to examine gender and sexuality through intersectional, decolonial, transnational, and social transformation frameworks. Our faculty's dedication to teaching and mentorship ensures that students receive a transformative education, providing preparation for work in academia and for careers in a wide range of related fields.

**Course code for this program is WGST.**

## Master's Degree

- Gender and Sexuality Studies - Master of Arts (MA) (p. 1433)

## Certificate

- Women and Gender Studies - Graduate Certificate (p. 1435)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Bayard de Volo, Lorraine M. (https://experts.colorado.edu/display/fisid_143611/)
Professor; PhD, University of Michigan Ann Arbor

Buffington, Robert Marshall (https://experts.colorado.edu/display/fisid_144975/)
Professor Emeritus; PhD, University of Arizona

David, Emmanuel A. (https://experts.colorado.edu/display/fisid_146542/)
Associate Professor, Associate Chair; PhD, University of Colorado Boulder

Gómez, Leila Gabriela (https://experts.colorado.edu/display/fisid_133563/)
Professor; PhD, Johns Hopkins University

Jacobs, Janet L. (https://experts.colorado.edu/display/fisid_100744/)
Professor; PhD, University of Colorado Boulder

Mehta, Samira (https://experts.colorado.edu/display/fisid_165972/)
Associate Professor; PhD, Emory University; MDiv, Harvard University

Misri, Deepti (https://experts.colorado.edu/display/fisid_146428/)
Associate Professor; PhD, University of Illinois at Urbana–Champaign

Montoya, Celeste (https://experts.colorado.edu/display/fisid_144862/)
Associate Professor; PhD, Washington University

Moore, A. Nathan (https://experts.colorado.edu/display/fisid_171850/)
Assistant Professor; Ph.D., University of Texas at Austin

Pois, Anne Marie
Senior Instructor Emerita

Potter, Hillary A. (https://experts.colorado.edu/display/fisid_124938/)
Associate Professor; PhD, University of Colorado Boulder

Ranjbar, A. Marie (https://experts.colorado.edu/display/fisid_165964/)
Assistant Professor; PhD, Pennsylvania State University

Soares, Kristie (https://experts.colorado.edu/display/fisid_147081/)
Assistant Professor; PhD, University of California, Santa Barbara

Wyrod, Robert (https://experts.colorado.edu/display/fisid_156319/)
Associate Professor; PhD, University of Chicago

## Courses

**WGST 5001 (3) Advanced Topics in Gender ad Sexuality Studies (AH)**
Provides and advanced interdisciplinary course organized around a specific issue in the social sciences relating to gender and sexuality.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4001
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite WGST 2000 or WGST 2600.

**WGST 5002 (3) Advanced Topics in Gender and Sexuality Studies (SS)**
Provides an advanced interdisciplinary course organized around a specific issue in the arts and humanities relating to gender and sexuality.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 5002
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite WGST 2000 or WGST 2600.

**WGST 5200 (3) Religion and Reproductive Politics in the United States**
Focuses primarily on how Protestant, Catholic, and Jewish conversations about sexuality and reproduction have shaped access and attitudes towards reproductive health in the US over the course of the twentieth and twenty-first centuries.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4200, JWST 4200, JWST 5200

**WGST 5400 (3) Critical Inquiries in Transgender Studies**
Examines theories, methods and debates in the emerging field of transgender studies. Drawing on interdisciplinary perspectives, examines transgender identities, communities and political movements in different historical and cultural contexts. Focuses on crosscutting issues that shape transgender subjectivities, with special attention given to how transgender movements negotiate race, class, sexuality, labor, culture and nation.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4400 and LGBT 4400 and LGBT 5400
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: LGBT Studies

**WGST 6090 (3) Feminist Theories**
Explores how feminist theorists have understood gender and how it interrelates to our understandings of race, ethnicity, sexuality, embodiment and knowledge. Meets the requirements for the WGST certificate.
**Requisites:** Restricted to graduate students only.

**WGST 6190 (3) Feminist Methodology**
Explores feminist methodology across a range of disciplines. Themes include experience and interpretation, the social position of the researcher, language and argument structure, knowledge and power, bias and objectivity, and the ethics and politics of research. Meets the requirements for the WGST certificate.
**Requisites:** Restricted to graduate students only.

**WGST 6290 (3) Special Topics in Gender and Sexuality Studies**
Offers interdisciplinary feminist perspectives on different special topics such as gender and war, gender and globalization, women's social movements, gender and citizenship, gender and collective memory, and cultural representations of gender and sexuality. Meets the requirements for the WGST certificate.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**WGST 6796 (3) Queer Theories**
Explores key concepts and debates in the field of queer theory with an interdisciplinary focus on crosscutting issues (aesthetic, cultural, legal, medical, political and social) that shape queer subjectivities, practices and relations.
**Requisites:** Restricted to graduate students only.

**WGST 6840 (1-3) Independent Study in Gender and Sexuality Studies**
Provides course credit for an independent directed research project or advanced reading program on an area of concentration within gender and sexuality studies. Requires an independent study agreement form completed by the student in collaboration with a WGST faculty advisor and signed by the faculty advisor. Requires approval by WGST graduate studies director.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**WGST 6949 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to Master of Arts in Gender and Sexuality Studies graduate students only. (GSXS-MA)

**WGST 6959 (1-6) Master's Thesis in Gender and Sexuality Studies**
Registration intended for students conducting a project of original research that culminates in a master¿s level thesis and oral defense. Required of every master¿s degree candidate under the thesis plan of study option.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Master of Arts in Gender and Sexuality Studies graduate students only. (GSXS-MA)

**WGST 6969 (1-6) Master¿s Practicum in Gender and Sexuality Studies**
Registration intended for students conducting paid or unpaid work at an agency, organization, or project relevant to gender and sexuality studies that culminates in a paper detailing and analyzing the work achieved and an oral defense. Required of every master¿s degree candidate under the practicum plan of study option.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Master of Arts in Gender and Sexuality Studies graduate students only. (GSXS-MA)

# Gender and Sexuality Studies - Master of Arts (MA)

The University of Colorado Boulder Department of Women and Gender Studies' Master of Arts in Gender and Sexuality Studies is a post-baccalaureate degree program that provides students an interdisciplinary education using a variety of theoretical and methodological approaches across the humanities and the social sciences to examine women, gender and sexuality in an international context. In this graduate program students choose to complete the program on a master's thesis or a practicum plan of study.

## Requirements

### Program Requirements

Students must successfully complete 30 credit hours of academic coursework, at least 27 of which must be at the 5000 level or above. No more than 3 credits (one course) may be taken at the 4000 undergraduate level upon approval of the director of graduate studies. Up to 9 credit hours of graduate coursework may be transferred from another accredited institution, in alignment with the program requirements and

upon approval by the director of graduate studies. Independent study credit hours shall not exceed 6 credit hours.

Students choose from a thesis option or a practicum option, which must be declared by the end of the second semester in the program. Either degree plan may be completed within four semesters.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| WGST 6090 | Feminist Theories | 3 |
| WGST 6190 | Feminist Methodology | 3 |
| WGST 6796 | Queer Theories | 3 |
| Electives or Independent Study (WGST) | | 6 |
| Electives (WGST or approved electives from other departments) | | 9 |
| WGST 6959 | Master's Thesis in Gender and Sexuality Studies | 6 |
| or WGST 6969 | Master's Practicum in Gender and Sexuality Studies | |
| **Total Credit Hours** | | **30** |

### Elective Coursework

Fifteen credit hours (typically five courses) are taken as electives. A minimum of 6 credit hours (two courses) of the electives must be taken within the Department of Women and Gender Studies. A maximum of 6 credit hours (two courses) may be taken as Independent Studies with faculty in Women and Gender Studies (following approval by the director of graduate studies).

Elective offerings include:

- WGST 5200 Religion and Reproductive Politics in the United States
- WGST 5400 Critical Inquiries in Transgender Studies
- WGST 6290 Special Topics in Gender and Sexuality Studies. Future topics may include: Indigenous feminisms; transnational feminisms; gender, sex, race and power in geography; gender, race and dis/ability; Black queer diaspora studies, feminisms and carcerality.

### Degree Plans

By the end of the second semester of graduate study in the program, students will select either the thesis option or the practicum option. Six credit hours must be taken as thesis hours or practicum hours depending on the student's plan of study.

**Plan I: Thesis Option** – The thesis option is a project of original research that culminates in a master's level paper that is defended by the student to their faculty committee. The thesis must comply with the Graduate School's technical specifications for theses.

**Plan II: Practicum Option** (i.e., non-thesis option with final examination requirement) – The practicum option requires students to complete 150 to 180 hours of paid or unpaid work at an agency, organization or project relevant to gender and sexuality studies, which culminates in a comprehensive oral examination administered by committee on the theoretical underpinnings of the practicum, and a paper detailing and analyzing the work achieved. This practicum provides students with the opportunity to integrate scholarly feminist analysis of gender and sexuality issues with a work setting that addresses those issues.

### Transfer Credit

After completion of six credit hours with a GPA of 3.0 or higher, students may request the transfer of a maximum of nine graduate studies credits toward the elective credits if the transfer courses align with the requirements of the MA in gender and sexuality studies. Courses must have been taken at an accredited institution with a grade of B or better. Courses may not have been used toward a bachelor's degree or toward a completed graduate degree.

# Plans of Study

## Plan I: Thesis Option

| Year One | | |
|---|---|---|
| **Fall Semester** | | **Credit Hours** |
| WGST 6090 | Feminist Theories | 3 |
| Elective | | 3 |
| | **Credit Hours** | **6** |
| **Spring Semester** | | |
| WGST 6190 | Feminist Methodology | 3 |
| WGST 6796 | Queer Theories | 3 |
| Elective | | 3 |
| | **Credit Hours** | **9** |
| **Year Two** | | |
| **Fall Semester** | | |
| Electives | | 6 |
| WGST 6959 | Master's Thesis in Gender and Sexuality Studies | 3 |
| | **Credit Hours** | **9** |
| **Spring Semester** | | |
| Elective | | 3 |
| WGST 6959 | Master's Thesis in Gender and Sexuality Studies | 3 |
| | **Credit Hours** | **6** |
| | **Total Credit Hours** | **30** |

## Plan II: Practicum Option

| Year One | | |
|---|---|---|
| **Fall Semester** | | **Credit Hours** |
| WGST 6090 | Feminist Theories | 3 |
| Elective | | 3 |
| | **Credit Hours** | **6** |
| **Spring Semester** | | |
| WGST 6190 | Feminist Methodology | 3 |
| WGST 6796 | Queer Theories | 3 |
| Elective | | 3 |
| | **Credit Hours** | **9** |
| **Year Two** | | |
| **Fall Semester** | | |
| Electives | | 6 |
| WGST 6969 | Master's Practicum in Gender and Sexuality Studies | 3 |
| | **Credit Hours** | **9** |
| **Spring Semester** | | |
| Elective | | 3 |

| | | |
|---|---|---|
| WGST 6969 | Master's Practicum in Gender and Sexuality Studies | 3 |
| | **Credit Hours** | **6** |
| | **Total Credit Hours** | **30** |

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate expertise of knowledge in the discipline and demonstrate the ability to synthesize knowledge through academic writing.
- Effectively communicate and present research to academic and public audiences in both written and oral form.
- Design and conduct original research in the discipline (Thesis Option).
- Apply discipline specific knowledge to work in related fields (Practicum Option).

# Women and Gender Studies - Graduate Certificate

The graduate certificate in women and gender studies is designed to complement a CU Boulder graduate disciplinary degree program —providing graduate students the opportunity to engage a variety of scholarly and methodological approaches to the study of gender and sexuality.

Students wishing to take part in the women and gender studies certificate program must be currently enrolled in a graduate disciplinary degree or professional degree program at CU Boulder. Students are encouraged to apply for the graduate certificate early in their course of graduate studies; students enrolled in the program will get priority if placed on a waitlist for a graduate-level women and gender studies course.

## Requirements

Students must complete 9 credit hours of coursework in women and gender studies and one additional 3 credit hour course to be approved by the women and gender studies graduate director, for a total of 12 credit hours.

The minimum acceptable grade for courses submitted for the graduate certificate is a B. Minimum GPA for all courses submitted for the graduate certificate is a cumulative 3.0.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| At least three of the following four courses: | | 9 |
| WGST 6090 | Feminist Theories | |
| WGST 6190 | Feminist Methodology | |
| WGST 6796 | Queer Theories | |
| WGST 6290 | Special Topics in Gender and Sexuality Studies | |
| **Electives** | | |
| One additional 3-credit course approved by the women and gender studies graduate director. This course should focus on issues related to women, gender and/or sexuality; take an interdisciplinary approach; and ideally be taken either outside of the student's home department or as an additional course in women and gender studies. | | 3 |
| **Total Credit Hours** | | **12** |

None of the three required women and gender studies courses may be taken as independent study.

Independent study courses taken with faculty not affiliated with the Department of Women and Gender Studies will not count for the graduate certificate. Independent study courses taken with department faculty members may count only in exceptional circumstances as determined by the graduate committee.

For more details, including application instructions, visit the WGST Graduate Certificate (http://www.colorado.edu/wgst/graduates/) webpage or email wgst@colorado.edu.

# Business

The new innovation economy requires—and rewards—richer knowledge, sharper skills and a global mindset. Ultimately, the edge belongs to those who are principled leaders who bring inspiration and purpose to their work and in this way drive value for society.

Within this climate, the Leeds School of Business offers an innovative agenda designed to leverage our unique assets: the intellectual capital of Leeds faculty, our innovative and best-in-class curriculum, our focus on the "whole student" experience, our strong network of alumni and industry partners and our firm commitment to student support.

Accredited by the Association to Advance Collegiate Schools of Business (AACSB-International), Leeds awards four types of degrees: Bachelor of Science (BS), Master of Science (MS), Master of Business Administration (MBA) and Doctor of Philosophy (PhD). Undergraduate students can specialize in accounting, finance, management and entrepreneurship, business analytics, marketing, and real estate. Leeds further offers certificates in a variety of areas to provide opportunities for students to explore additional areas of interest and distinction.

World-class faculty provide the foundation for breakthrough thinking—creating knowledge from research, disseminating knowledge through teaching and applying knowledge in collaboration with the business community. Faculty discoveries are frequently published in prestigious academic journals and discussed in media outlets such as the *The Wall Street Journal*, *The New York Times*, CNBC and more. The cutting-edge research we produce enhances the school's reputation for innovation.

From orientation to graduation, Leeds faculty and staff guide students to discover and optimize their potential. Through an array of targeted services, students create an individualized journey that maximizes the impact of their experience and leads to future opportunities. Ethics and social responsibility are hallmarks of a Leeds education, and the school's commitment to professional development is unrivaled.

Leeds alumni and industry partners collaborate to offer a meaningful level of engagement with students and faculty. Alumni provide the support and resources that ensure graduates are poised for maximum impact. Corporate partners infuse relevance to Leeds' curriculum innovation, supporting new programs and providing the school access

to professional talent. Both communities are the backbone of one of the largest mentoring programs in the world.

Leeds joins the University of Colorado and the Boulder community to generate extraordinary opportunities for students. Cross-campus collaborations with fields like engineering and science link Leeds faculty and students with more resources to put innovation into action. Our location in Boulder provides inspiration with its physical beauty as well as the intellectual energy of a thriving start-up community and high concentrations of advanced technology and socially responsible industries.

Together, these assets make Leeds uniquely qualified to deliver on our mission of educating principled, innovative leaders who drive value.

### Graduation Recognition Ceremony

Every May, the Office of the Dean and the Leeds Business Student Government sponsor a recognition ceremony honoring the graduating class, in addition to the university-wide commencement. Graduates and their families are invited to attend.

## Facilities & Research

The Leeds School of Business houses resources for the specific needs of business students:

- Burridge Center for Finance
- Business Research Division
- Career Development
- Center for Education on Social Responsibility
- Center for Research on Consumer Financial Decision Making
- Michael A. Klump Center for Real Estate
- Office of Diversity Affairs
- Robert H. and Beverly A. Deming Center for Entrepreneurship
- Smart classrooms
- Student lounges
- Undergraduate Student Services
- Graduate Student Services
- William M. White Business Library and Information Commons

### The William M. White Business Library and Information Commons

The White Business Library (http://www.colorado.edu/libraries/libraries/william-m-white-business-library/) and Information Commons provide students with a wealth of information pertaining to the business world. Students have access to the business and other libraries via the university libraries online catalog. Many databases are accessible through the wireless network and off campus. These databases contain a myriad of full-text magazines and journals; business periodical indexes; corporate annual, 10-K and proxy reports of all the public companies in the United States; short profiles of both American and international companies; demographic and business statistics; industry and market information; and investment reports written by Wall Street analysts. Over 50 computers provide access to the databases and the internet, and technology-outfitted team rooms are available for group study. Knowledgeable librarians are always available to help navigate the search for information. The Information Commons is open 24 hours, seven days per week and contains 30 of the 50 computers with a full suite of software. These are accessible to students, faculty and staff of the university. In addition, Leeds has 25 technology equipped team rooms. These rooms support group study and project work, and are available for reservation through University of Colorado Scheduling (https://vems1.colorado.edu/).

The White Business Library is part of the University of Colorado library system, which includes more than two million volumes, more than five million microforms and more than 24,000 periodicals and serials. The system is also a full depository for United States government, international and state documents.

All classrooms in the Leeds School of Business are equipped up to campus "smart" classroom technology standards. Technologies in a typical Leeds classroom include: a desktop computer loaded with Microsoft Office Suite applications, video projection system, ceiling speakers for audio, DVD/VCR, iClicker base station, campus cable and both wired and wireless Internet connections. All classrooms have the flexibility to support a personal laptop with connectivity in place to integrate with the video projection and sound system.

### Business Research Division

Established in 1915, the Business Research Division is one of the earliest organized state service-oriented bureaus in the country.

The Business Research Division conducts business, economic and market research that contributes to the efficient use of Colorado's resources and increases interest in and awareness of the Leeds School of Business. It also is the umbrella organization for the Rocky Mountain Trade Adjustment Assistance (TAA) Center (RMTAAC). Through its annual Colorado Business Economic Outlook Forum, held in December, the division has established a base of knowledge that adds value to its work in other areas. In addition to providing businesses, government and nonprofits with information to help them make better-informed business and policy decisions, the division specializes in economic and fiscal analysis, market research and custom research projects. It also prepares a Colorado leading economic indicator series, the *Leeds Business Confidence Index*. Research results are distributed through presentations and reports; a quarterly newsletter, the *Colorado Business Review*; and the division's website.

Funding for center activities comes from the Leeds School of Business, the university, state agencies, the federal government, state and local business firms and from the sale of research products and services.

RMTAAC is one of 11 centers across the nation funded by the U.S. Department of Commerce to manage the Trade Adjustment Assistance for Firms Program, which helps import-impacted U.S. firms develop and implement business recovery strategies to strengthen their competitiveness in the global marketplace. The TAA for Firms Program is a cost-sharing federal grant program that pays a portion of professional consultant expenses or industry-specific expert services for projects that improve a firm's competitiveness, thereby increasing sales and creating U.S. jobs. Benefits of the program include up to $75,000 in grant funds and 50/50 cost sharing for strategic projects.

## Academic Centers

In addition to the Business Research Division, the school has five centers linking academic programs and the business community—the endowed Robert H. and Beverly A. Deming Center for Entrepreneurship, the Michael A. Klump Center for Real Estate, the Burridge Center for Finance, the Center for Education on Social Responsibility (CESR) and the Center for Business Integration.

## The Robert H. and Beverly A. Deming Center for Entrepreneurship

As part of the Leeds School of Business, the Deming Center for Entrepreneurship's mission is to inspire and empower students, community, alumni, faculty and staff through entrepreneurship education and partnership with the community. The Deming Center does this in part by educating, engaging and partnering and focusing on student experience.

### Cutting-Edge Curriculum

Our progressive curriculum and interdisciplinary programs include:

- courses in entrepreneurial finance, marketing and business planning,
- interdisciplinary programs in engineering, business, law and environmental studies,
- undergraduate business minor (p. 680) with a certificate of entrepreneurship for students across campus,
- undergraduate certificate of entrepreneurship (p. 682) for Leeds students,
- High Growth Ventures Pathway, and
- world-renowned PhD program (p. 1493) in entrepreneurship.

The Deming Center supports the entrepreneurial curriculum and advances the Leeds School's leadership agenda through our collaborative initiatives across campus and in the business community in these key areas:

- **Education**. Our entrepreneurship students have access to a world class entrepreneurship faculty. The faculty are involved in collecting, curating and making available the latest research and thinking on entrepreneurship in the world. These faculty are inspiring and directing new research and thought leadership in entrepreneurship and constantly working with thought leaders to develop and stay ahead of the latest trends and tools for entrepreneurship education.
- **Real-world experience**. Our entrepreneurship students are challenged to turn accepted thinking on its head—in the classroom, in real-world industry projects, and by the business innovators serving as student mentors and advisors. The center helps connect students with projects, advisors and internships that challenge them to use their new skills creatively.
- **Student experience**. Staff and faculty at Deming are focused on delivering an outstanding student experience. Deming promotes the development of entrepreneurial thinkers and doers. Entrepreneurial thinkers and doers are optimistic, resilient, resourceful, persistent, calculated risk-takers, efficient, creative problem solvers and effective workers. These are teachable skills any student is capable of learning.
- **The community**. Boulder is consistently named one of the best places in the country to launch a startup. The center connects students to industry leaders via the Deming Network—an active group of world-class entrepreneurs and innovators who are accessible and hands-on. CU Boulder is also a top research university. Across campus, the Deming Center helps students access opportunities in technology transfer and the engineering, law, biofrontiers and environmental science programs

## Michael A. Klump Center for Real Estate

The Michael A. Klump Center for Real Estate, founded in 1995, is supported by an industry council with the goal of advancing academic excellence in real estate education and scholarship. The center oversees the school's real estate teaching programs and advises the faculty in designing an integrated curriculum at both the graduate and undergraduate levels. Coursework is drawn from the law school, the colleges of architecture and engineering, construction management and others.

The center creates real-world experiences for students by providing project coursework and being a resource for securing internships, mentors and jobs. It also provides support for faculty teaching and research activities in real estate and, through the Real Estate Foundation, assists the university with its real estate portfolio.

## Burridge Center for Finance

The Burridge Center for Finance is dedicated to encouraging and supporting the creation and dissemination of new knowledge about the world financial markets with an emphasis on the U.S. financial markets by:

- facilitating the exchange of ideas and knowledge between professional investment managers, finance scholars, policy makers and the investing public,
- identifying critical research issues in the theory and practice of security analysis and valuation, and
- encouraging and supporting rigorous qualitative and quantitative research on topics relevant and useful to money managers, valuation experts and finance academics.

## Center for Ethics and Social Responsibility (CESR)

CESR's goal is to help students become outstanding business leaders of tomorrow by preparing them to meet the ethical challenges posed by a highly competitive, globally-connected business world. Accordingly, CESR oversees the infusion of values and social responsibility discussions throughout the undergraduate and graduate curricula at the Leeds School of Business. As part of the central mission at Leeds, CESR creates pedagogies that are national models and plays a leadership role carrying out the school's commitment to developing leaders of conscience. Although the Center's primary focus is on excellence in curriculum development and delivery, CESR also undertakes a broad spectrum of initiatives including a certificate program, student organizations, conferences and other extracurricular offerings as well as providing funding and administrative support for faculty research.

### Courses

CESR is directly responsible for course development, staffing and coordination of the Business requisite introduction course World of Business, and collaborates on the design and delivery of the requisite business core courses; Business Law and Business Ethics & Social Responsibility. CESR also offers leading edge electives such as CESR 4000, CESR 4005, CESR 4850, and CESR 4828.

### Certificate and Graduate Pathways

CESR offers specialized recognition for students at the undergraduate and graduate levels. Undergraduates wishing to focus on CESR-related topics may earn the certificate in social responsibility and ethics (p. 686) (SRE). At the MBA level, MBAs can participate in CESR-designed co-curricular pathways in Natural & Organics, Clean Energy, and ESG Integration and Sustainability.

### CESR Co-Curricular Activities

ESR routinely hosts events aimed at our students, our local business community and educators and industry leaders throughout the academic year. Guest speakers change each semester, but recurring events are included here:

- **CESR Business Ethics Case Competition (BECC).** The CESR BECC is an interactive way to deepen the Leeds undergraduate students' understanding of the importance of creating ethical as well as profitable business cultures. Teams are provided with a business case in the weeks leading up to the competition which they will have to analyze, create recommendations for course of action and present their solutions to a panel of professional judges. Cash prizes are awarded to the top three teams.
- **Student Center for Social Entrepreneurship**. CESR provides faculty sponsorship for SCSE, the student branch of Social Entrepreneurship for Equitable Development, an interdisciplinary, inter-generational campus group that is involved in researching, teaching and generating student involvement in the areas of social entrepreneurship and sustainable community development.
- **Net Impact Club**. CESR is home to a graduate chapter of Net Impact, an international nonprofit organization whose mission is to use the power of business to create a more socially and environmentally sustainable world.
- **New Venture Challenge Social Impact Track**. CESR developed and continues to support the Social Impact Track of the **CU New Venture Challenge**, a campus-wide initiative connecting students and faculty with teammates in a broad range of disciplines and with mentors from the business community. The goal is to provide knowledge and experience making entrepreneurship accessible to anyone on the CU Boulder campus with the enthusiasm and creativity required to start a new business.

## Career Opportunities

Leeds School of Business graduates are prepared for positions in the following fields:

- Accounting—public, private, nonprofit and governmental
- Banking and other financial institutions
- Consulting
- Corporate financial management
- Entrepreneurship and small business management
- Financial analysis
- Human resources management
- Information systems
- International business
- Investment management
- Management consulting and organization management
- Marketing and sales management
- Nonprofit management
- Operations management
- Real estate
- Retailing
- Taxation
- Technology management
- Transportation
- Venture capital

Other graduates hold positions in fields as diverse as business journalism, public relations, city planning, chamber of commerce and trade association management, college administration and government. The entrepreneurial area of application prepares students to start their own business ventures to take positions in emerging growth companies and the venture capital industry.

# Programs & Leadership

## Professional Mentorship Program

The Professional Mentorship Program (PMP) is a unique program that offers one-on-one professional mentoring to current undergraduate students. The program's mission is to enhance business education at the Leeds School by offering hands-on learning, professional skills development, leadership opportunities and a sense of connection and community among current students, Leeds alumni and corporate partners. PMP mentors prepare and inspire our students to become the next generation of strong business leaders.

This two-year program matches students with executives or high-level business professionals who align by industry, geographic location or functional area. To ensure a quality experience for both students and mentors, the PMP provides workshops, training and additional support for participants throughout the program.

### Program Benefits

Through this program, students gain an additional level of advising and career counseling from a business professional. Through the mentoring relationships, students can explore choice of majors, potential for graduate school, work-life balance and effective networking and job search strategies.

Other potential benefits of being involved in the PMP include:

- advice and assistance on academic questions, career options, life beyond college and more,
- access to the PMP network and networking opportunities and the opportunity to start building the student's own professional network,
- opportunities to practice and strengthen professional communication and presentation skills,
- help in defining personal and professional goals, and the strategies to achieve them,
- unique internship and job opportunities, and
- development of a life-long friend and connection in the business world.

### Contact Information

Website: leedsmentoring.colorado.edu/about (http://leedsmentoring.colorado.edu/about/)
Email: leedspmp@colorado.edu
Office: Koelbel 201
Phone: 303-492-5881

## Study Abroad

Study abroad programs are available for students interested in international business or in cultural experiences abroad. The college-sponsored London Seminar in International Finance and Business is a five-week-long program held each summer in the financial district of London and is open to juniors, seniors and graduate students.

## Student Organizations

Listed below are undergraduate organizations that promote professional interests and provide recognition of scholastic attainment:

- Alpha Kappa Psi
- Athletic Business Club

- CU Fashion Club
- Beta Alpha Psi
- Collegiate DECA
- CESR Fellows
- CU Energy Club
- CU Finance Club
- CU American Marketing Association
- CU Investment Club
- CU Society for Human Resources Management
- Delta Sigma Pi
- International Business Club
- Leeds Ambassadors
- Leeds Association of Information Systems
- Leeds Council (Undergraduate Student Government)
- Multicultural Business Student Alliance
- Music Industry Club
- Real Estate Club
- Women in Business Club

### Leeds School of Business Student Government

Leeds Council is the governing body of the Leeds School of Business that strives to serve, support and represent the student body. The council also works to make Leeds a better business school through social, academic and professional programming. The council is made up of five primary committees and an executive board that control a significant portion of the Leeds student fees.

Two members of Leeds Council also serve as representatives on University of Colorado Student Government (CUSG) to voice the interests of business students at the main campus.

## Career Opportunities

Leeds School of Business graduates are prepared for positions in the following fields:

- Accounting—public, private, nonprofit and governmental
- Banking and other financial institutions
- Consulting
- Corporate financial management
- Entrepreneurship and small business management
- Financial analysis
- Human resources management
- Information systems
- International business
- Investment management
- Management consulting and organization management
- Marketing and sales management
- Nonprofit management
- Operations management
- Real estate
- Retailing
- Taxation
- Technology management
- Transportation
- Venture capital

Other graduates hold positions in fields as diverse as business journalism, public relations, city planning, chamber of commerce and trade association management, college administration and government. The entrepreneurial area of application prepares students to start their own business ventures to take positions in emerging growth companies and the venture capital industry.

## Programs of Study

The new innovation economy requires—and rewards—richer knowledge, sharper skills and a global mindset. Ultimately, the edge belongs to those who are principled leaders who bring inspiration and purpose to their work and in this way drive value for society.

Within this climate, the Leeds School of Business offers an innovative agenda designed to leverage our unique assets: the intellectual capital of Leeds faculty, our innovative and best-in-class curriculum, our focus on the "whole student" experience, our strong network of alumni and industry partners and our firm commitment to student support.

World-class faculty provide the foundation for breakthrough thinking—creating knowledge from research, disseminating knowledge through teaching and applying knowledge in collaboration with the business community. Faculty discoveries are frequently published in prestigious academic journals and discussed in media outlets such as the *Wall St. Journal*, the *New York Times*, CNBC and more. The cutting-edge research we produce enhances the school's reputation for innovation.

From orientation to graduation, Leeds faculty and staff guide students to discover and optimize their potential. Through an array of targeted services, students create an individualized journey that maximizes the impact of their experience and leads to future opportunities. Ethics and social responsibility are hallmarks of a Leeds education, and the school's commitment to professional development is unrivaled.

Leeds alumni and industry partners collaborate to offer a meaningful level of engagement with students and faculty. Alumni provide the support and resources that ensure graduates are poised for maximum impact. Corporate partners infuse relevance to Leeds' curriculum innovation, supporting new programs and providing the school access to professional talent. Both communities are the backbone of one of the largest mentoring programs in the world.

Leeds joins the University of Colorado and the Boulder community to generate extraordinary opportunities for students. Cross-campus collaborations with fields like engineering and science link Leeds faculty and students with more resources to put innovation into action. Our location in Boulder provides inspiration with its physical beauty as well as the intellectual energy of a thriving start-up community and high concentrations of advanced technology and socially responsible industries.

Together, these assets make Leeds uniquely qualified to deliver on our mission of educating principled, innovative leaders who drive value.

## Master's Degrees

- Accounting - Master of Science (MS) (p. 1494)
- Business Analytics - Master of Science (MS) (p. 1495)
- Finance - Master of Science (MS) (p. 1496)

- Marketing Analytics - Master of Science (MS) (p. 1498)
- Real Estate - Master of Sciences (MS) (https://catalog.colorado.edu/graduate/colleges-schools/business/programs-study/real-estate-master-science-ms/)
- Supply Chain Analytics - Master of Science (MS) (https://catalog.colorado.edu/graduate/colleges-schools/business/programs-study/supply-chain-management-master-science-ms/)
- Taxation - Master of Science (MS) (p. 1502)

# Certificates

- Business Analytic Methods - Graduate Certificate (p. 1503)
- Healthcare Analytics - Graduate Certificate (p. 1503)
- Marketing Analytics - Graduate Certificate (p. 1504)
- Supply Chain Analytics - Graduate Certificate (p. 1505)
- Supply Chain Foundations - Graduate Certificate (p. 1506)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Adams, Heather L. (https://experts.colorado.edu/display/fisid_143714/)
Associate Chair, Faculty Director, Senior Instructor; PhD, University of Maryland, College Park

Alston, Eric Christopher (https://experts.colorado.edu/display/fisid_158159/)
Scholar in Residence; JD, University of Chicago

André, Quentin (https://experts.colorado.edu/display/fisid_166737/)
Assistant Professor; PhD, INSEAD (France)

Appenzeller, William
Professor Emeritus

Auslander, Bonnie (https://experts.colorado.edu/display/fisid_158273/)
Instructor; MFA, University of Massachusetts

Balkin, David B. (https://experts.colorado.edu/display/fisid_105481/)
Professor; PhD, University of Minnesota Twin Cities

Ballantine, John T. Jr. (https://experts.colorado.edu/display/fisid_102703/)
Senior Instructor; JD, University of Colorado Boulder

Bangs, F. Kendrick
Professor Emeritus

Banks, Cynthia (https://experts.colorado.edu/display/fisid_158245/)
Instructor, Faculty Director; MS, University of Colorado Denver

Bei, Xiaoshu (https://experts.colorado.edu/display/fisid_165170/)
Assistant Professor; PhD, Duke University

Bennett, Douglas P. (https://experts.colorado.edu/display/fisid_149983/)
Instructor; JD, George Washington University

Bercovitz, Janet (https://experts.colorado.edu/display/fisid_159339/)
Professor; PhD, University of California, Berkeley

Bernstein, Asaf (https://experts.colorado.edu/display/fisid_157738/)
Assistant Professor; BS, Harvey Mudd College

Bernthal, Wilmar F.
Professor Emeritus

Bhagat, Sanjai (https://experts.colorado.edu/display/fisid_100789/)
Professor; PhD, University of Washington

Biegelsen, Casey (https://experts.colorado.edu/display/fisid_166072/)
Instructor; MBA, University of Colorado Boulder

Billings, Stephen B. (https://experts.colorado.edu/display/fisid_157918/)
Associate Professor, Faculty Director; PhD, University of Colorado Boulder

Bone, Jennifer Emerling (https://experts.colorado.edu/display/fisid_158206/)
Instructor, Associate Chair; PhD, University of Colorado Boulder

Boss, Russel Wayne (https://experts.colorado.edu/display/fisid_105260/)
Professor, Chair; PhD, University of Georgia

Brown, Daniel (https://experts.colorado.edu/display/fisid_152029/)
Senior Instructor; D.Phil, Oxford University

Buchman, Thomas A. (https://experts.colorado.edu/display/fisid_101677/)
Professor Emeritus; PhD, University of Illinois at Urbana-Champaign

Buffa, Andrea (https://experts.colorado.edu/display/fisid_167152/)
Assistant Professor; PhD, London Business School

Bumbaca, Frederico (https://experts.colorado.edu/display/fisid_163475/)
Assistant Professor; PhD, University of California, Irvine

Campbell, Kimberly D. (https://experts.colorado.edu/display/fisid_158160/)
Instructor; PhD, Howard University

Campbell, Margaret Catherine
Professor Emerita; PhD, Stanford University

Carbone, Christopher (https://experts.colorado.edu/display/fisid_158166/)
Instructor; MFA, University of Baltimore

Carson, Visda (https://experts.colorado.edu/display/fisid_158296/)
Instructor; MBA, University of Colorado, Leeds School of Business

Cateora, Phillip R.
Professor Emeritus

Chari, Mukund (https://experts.colorado.edu/display/fisid_159141/)
Assistant Professor; PhD, University of Washington

Christoff, Lorna Colleen (https://experts.colorado.edu/display/fisid_146614/)
Instructor; JD, University of Denver

Cookson, John Anthony (https://experts.colorado.edu/display/fisid_152874/)
Associate Professor, Faculty Director; PhD, University of Chicago

Correll, Mark R.
Professor Emeritus

Cropanzano, Russell Salvador (https://experts.colorado.edu/display/fisid_151710/)
Professor, Chair, Endowed/Named Professor; PhD, Purdue University

Cunningham, Cory (https://experts.colorado.edu/individual/fisid_158270/)
Instructor; PhD, University of Oklahoma

Darnell, Jerome C.
Professor Emeritus

Davies, Shaun William (https://experts.colorado.edu/display/fisid_152995/)
Assistant Professor; PhD, University of California, Los Angeles

Demaree, John D.
Professor Emeritus

Donchez, Robert M. (https://experts.colorado.edu/display/fisid_101267/)
Senior Instructor, Faculty Director; MBA, Fordham University

Donohew, Zachary (https://experts.colorado.edu/display/fisid_164033/)
Scholar in Residence

Drake, David Francis (https://experts.colorado.edu/display/fisid_163641/)
Assistant Professor; PhD, INSEAD (France)

Eargle, David (https://experts.colorado.edu/display/fisid_159053/)
Assistant Professor; PhD, University of Pittsburgh

Edwards, Emily (https://experts.colorado.edu/display/fisid_153378/)
Senior Instructor, Associate Chair; MBA, University of Colorado Denver

Engel, Steven
Professor Emeritus

Ertimur, Yonca (https://experts.colorado.edu/display/fisid_151585/)
Professor, Associate Dean; PhD, New York University

Fernbach, Philip M. (https://experts.colorado.edu/display/fisid_149786/)
Associate Professor, Faculty Director; PhD, Brown University

Fisher, Christina Marie (https://experts.colorado.edu/display/fisid_158798/)
Instructor; MS, University of Delaware

Frederick, David M.
Professor Emeritus: Leeds School of Business

Gallagher, Emily Anne (https://experts.colorado.edu/display/fisid_163544/)
Assistant Professor; PhD, Paris School of Economics

Garcia, Diego (https://experts.colorado.edu/display/fisid_156036/)
Professor, Endowed Chair; PhD, University of California, Berkeley

Garnand, John J.
Professor Emeritus

Gasta, Mark (https://experts.colorado.edu/display/fisid_165314/)
Instructor; PhD, Pepperdine University

Gladstone, Joe (https://experts.colorado.edu/display/fisid_166596/)
Assistant Professor; PhD, University of Cambridge (England)

Glover, Fred W.
Professor Emeritus

Goeldner, Charles R.
Professor Emeritus

Gordon, Kenneth R.
Professor Emeritus

Gross, David Michael (https://experts.colorado.edu/display/fisid_109026/)
Senior Instructor, Faculty Director, Associate Chair; PhD, University of Colorado Boulder

Gwozdz, Ronald Scott (https://experts.colorado.edu/display/fisid_144830/)
Instructor; MBA, University of Colorado Boulder

Hawk, Ashton Lewis (https://experts.colorado.edu/display/fisid_157915/)
Assistant Professor; PhD, New York University

He, Chuan (https://experts.colorado.edu/display/fisid_124857/)
Associate Professor; PhD, Washington University

Hekman, David R. (https://experts.colorado.edu/display/fisid_151359/)
Associate Professor; PhD, University of Washington

Higgins, Brian Edmund (https://experts.colorado.edu/display/fisid_156515/)
Instructor; JD, University of Denver

Ikenberry, David L. (https://experts.colorado.edu/display/fisid_149340/)
Professor; PhD, University of Illinois at Urbana-Champaign

Jackson, Betty R.
Professor Emerita

Jedamus, Paul E.
Professor Emeritus

Jennings, Tracy M. (https://experts.colorado.edu/display/fisid_128765/)
Senior Instructor, Faculty Director; PhD, University of Denver

Jensen, Howard G.
Professor Emeritus

Johnson, Stefanie Kathleen (https://experts.colorado.edu/display/fisid_153813/)
Associate Professor, Faculty Fellow; PhD, Rice University

Kennedy, Heather (https://experts.colorado.edu/display/fisid_157932/)
Instructor, Scholar in Residence; MA, University of Texas at Austin

Khoshsokhan, Sina (https://experts.colorado.edu/display/fisid_167155/)
Assistant Professor; PhD, Boston University

Koberg, Christine S.
Associate Professor Emerita

Koc, Ozlem (https://experts.colorado.edu/display/fisid_158324/)
Instructor; PhD, Georgia State University

Kolb, Burton A.
Professor Emeritus

Kornish, Laura Joyce (https://experts.colorado.edu/display/fisid_139966/)
Professor, Associate Dean; PhD, Stanford University

Kozar, Kenneth A.
Professor Emeritus

Kwaramba, Marcia (https://experts.colorado.edu/display/fisid_164299/)
Scholar in Residence; PhD, Monash University (Australia)

Lacerenza, Christina Noelle (https://experts.colorado.edu/display/fisid_159797/)
Assistant Professor; PhD, Rice University

Laguna, Manuel (https://experts.colorado.edu/display/fisid_102975/)
Professor, Faculty Director, Endowed/Named Professor; PhD, University of Texas at Austin

Larsen, Kai Rune (https://experts.colorado.edu/display/fisid_118160/)
Associate Professor, Faculty Director; PhD, SUNY at Albany

Laurion, Henry R. (https://experts.colorado.edu/display/fisid_163642/)
Assistant Professor; PhD, University of California, Berkeley

Lawrence, Stephen R. (https://experts.colorado.edu/display/fisid_102032/)
Associate Professor; PhD, Carnegie Mellon University

Leach, Chris (https://experts.colorado.edu/display/fisid_105152/)
Professor, Endowed/Named Professor; PhD, Cornell University

Lee, Jintae (https://experts.colorado.edu/display/fisid_115390/)
Associate Professor Emeritus; PhD, Massachusetts Institute of Technology

Lewis, Barry L.
Professor Emeritus

Lewis, Mary Beth (https://experts.colorado.edu/display/fisid_153829/)
Senior Instructor Emerita; MBA, University of Pittsburgh

Lewis, Ryan C. (https://experts.colorado.edu/display/fisid_157865/)
Assistant Professor; PhD, London Business School (England)

Lichtenstein, Donald (https://experts.colorado.edu/display/fisid_101701/)
Professor, Chair; PhD, University of South Carolina

Lionberger, Erin Leigh (https://experts.colorado.edu/display/fisid_167647/)
Instructor; MS, South Dakota State University

Liu, Liu (https://experts.colorado.edu/display/fisid_163568/)
Assistant Professor; PhD, New York University

Lord, Kimberly E.
Lecturer

Lynch, John G. (https://experts.colorado.edu/display/fisid_147448/)
Faculty Director, Professor, Associate Dean, Endowed/Named Professor, Distinguished Professor; PhD, University of Illinois at Chicago

Macaluso, Gregg Richard (https://experts.colorado.edu/display/fisid_123302/)
Instructor Emeritus; MS, University of California, Irvine

Macfee, Raymond D. Jr.
Professor Emeritus

Maciszewski, Michael (https://experts.colorado.edu/display/fisid_153223/)
Instructor; JD, University of Denver

Marshall, Nathan Thomas (https://experts.colorado.edu/display/fisid_156034/)
Assistant Professor; PhD, Indiana University Bloomington

Matusik, Sharon Marie Frances (https://experts.colorado.edu/display/fisid_133564/)
Professor, Dean; PhD, University of Washington

Maxwell, Christopher (https://experts.colorado.edu/display/fisid_164956/)
Instructor; BS, Colorado State University

McGraw, Albert Peter (https://experts.colorado.edu/display/fisid_133262/)
Professor; PhD, Ohio State University

McMahon, Kevin Christopher (https://experts.colorado.edu/display/fisid_143892/)
Senior Instructor; MBA, Indiana University

McNown, Robert F.
Professor Emeritus

Melicher, Ronald W. (https://experts.colorado.edu/individual/deptid_10255/)
Professor Emeritus: Leeds School of Business

Merrell, Jeffery C. (https://experts.colorado.edu/individual/fisid_156158/)
Senior Instructor; PhD, University of Colorado Boulder

Meyer, G. Dale
Professor Emeritus

Mohr, Pete J. (https://experts.colorado.edu/display/fisid_155498/)
Senior Instructor; MS, Colorado State University

Montealegre, Jose Ramiro (https://experts.colorado.edu/display/fisid_100072/)
Professor; DBA, Harvard University

Moon, Katie Seoyeon (https://experts.colorado.edu/display/fisid_157680/)
Assistant Professor; PhD, University of Maryland

Morley, Susan (https://experts.colorado.edu/display/fisid_116716/)
Senior Instructor; JD, University of Colorado Boulder

Moyen, Nathalie (https://experts.colorado.edu/display/fisid_113873/)
Professor, Chair; PhD, University of British Columbia (Canada)

Mueller, Erick Michael (https://experts.colorado.edu/display/fisid_140940/)
Senior Instructor, Faculty Director; MBA, University of Colorado Boulder

Neil, Josh (https://experts.colorado.edu/display/fisid_152068/)
Senior Instructor, Faculty Director; MS, Oklahoma State University

Nelson, James E.
Professor Emeritus

Nelson, Thomas Cavett (https://experts.colorado.edu/display/fisid_116011/)
Senior Instructor Emeritus; PhD, University of Colorado Boulder

Nunziato, Joshua (https://experts.colorado.edu/display/fisid_164373/)
Instructor; PhD, Villanova University

Oest, Donald G. (https://experts.colorado.edu/display/fisid_146623/)
Senior Instructor; MBA, Fairleigh Dickinson University

Palmer, Michael
Professor Emeritus

Papuzza, Antonio (https://experts.colorado.edu/display/fisid_145295/)
Senior Instructor; PhD, University of Florence (Italy)

Packer, Richard C. (https://experts.colorado.edu/display/fisid_166139/)
Lecturer

Parkin, Don
Professor Emeritus

Ravishankar, G. Ravi (https://experts.colorado.edu/display/fisid_144567/)
Scholar in Residence, Faculty Director; MBA, Massachusetts Institute of Technology

Reinholtz, Nicholas S. (https://experts.colorado.edu/display/fisid_155180/)
Assistant Professor; PhD, Columbia University

Reznicek, Birdie C. (https://experts.colorado.edu/display/fisid_149091/)
Instructor, Associate Chair; MBA, Northwestern University

Richey, Clyde W.
Professor Emeritus

Ringgenberg, Ralph G.
Professor Emeritus

Rock, Steven Karl (https://experts.colorado.edu/display/fisid_113689/)
Associate Professor, Chair; PhD, Pennsylvania State University

Rodgers, Timothy (https://experts.colorado.edu/display/fisid_155460/)
Instructor; PhD, University of California, Santa Cruz

Rogers, Jonathan Lawrence (https://experts.colorado.edu/display/fisid_153009/)
Professor, Endowed/Named Professor; PhD, University of Pennsylvania

Rosse, Joseph G.
Professor Emeritus: Leeds School of Business

Schattke, Rudolph
Professor Emeritus

Schaub, Kevin D. (https://experts.colorado.edu/display/fisid_144142/)
Senior Instructor, Faculty Director; MBA, University of Colorado Boulder

Schonberger, Bryce (https://experts.colorado.edu/display/fisid_167332/)
Assistant Professor; PhD, University of Southern California

Sears, Curtis R. (https://experts.colorado.edu/display/fisid_145482/)
Senior Instructor, Faculty Fellow, Endowed/Named Professor; JD, University of Colorado Boulder

Selto, Frank
Professor Emeritus

Seward, Lori Elizabeth (https://experts.colorado.edu/display/fisid_113934/)
Senior Instructor, Faculty Director; PhD, Virginia Polytechnic Institute and State University

Shriver, Scott Kennedy (https://experts.colorado.edu/display/fisid_158937/)
Assistant Professor; PhD, Stanford University

Shukri, Salma Tariq (https://experts.colorado.edu/display/fisid_158219/)
Instructor; PhD, University of Denver

Smith, Julie Scher (https://experts.colorado.edu/display/fisid_166064/)
Instructor; MBA, University of Chicago

Sorenson, Ralph Z.
Professor Emeritus

Spinetto, Richard D.
Professor Emeritus

Stanton, William J.
Professor Emeritus

Starn, Harry Mohr (https://experts.colorado.edu/display/fisid_160803/)
Senior Instructor, Faculty Director; MS, University of Colorado Boulder

Stephan, Andrew Perry (https://experts.colorado.edu/display/fisid_159297/)
Assistant Professor; PhD, Northwestern University

Stephenson, Craig A. (https://experts.colorado.edu/display/fisid_144851/)
Senior Instructor; PhD, University of Arizona

Stutzer, Michael J. (https://experts.colorado.edu/display/fisid_126711/)
Professor Emeritus; PhD, University of Minnesota Twin Cities

Taylor, Robert H.
Professor Emeritus

Thibodeau, Thomas G. (https://experts.colorado.edu/display/fisid_134750/)
Professor Emeritus; PhD, SUNY at Stony Brook

Tice, Frances M. (https://experts.colorado.edu/display/fisid_156018/)
Assistant Professor; PhD, Texas A&M University

Tong, Wenfeng (https://experts.colorado.edu/display/fisid_144520/)
Professor, Chair; PhD, The Ohio State University

Tracy, John A.
Professor Emeritus

Urrea, Gloria (https://experts.colorado.edu/display/fisid_165311/)
Assistant Professor; PhD, Università della Svizzera italiana, Switzerland

Van Wesep, Edward D. (https://experts.colorado.edu/display/fisid_154573/)
Associate Professor; PhD, Stanford University

Vargo, Christopher (https://experts.colorado.edu/display/fisid_158320/)
Associate Professor; PhD, University of North Carolina

Volpone, Sabrina D. (https://experts.colorado.edu/display/fisid_158941/)
Associate Professor; PhD, Temple University

Vossen, Thomas Wilhelmus (https://experts.colorado.edu/display/fisid_126642/)
Associate Professor; PhD, University of Maryland, College Park

Wang, Clare (https://experts.colorado.edu/display/fisid_165260/)
Associate Professor, Faculty Director; PhD, University of Pennsylvania, The Wharton School

Wang, Yanwen
Assistant Professor; PhD, Emory University

Wang, Zhiyi (https://experts.colorado.edu/display/fisid_167339/)
Assistant Professor; PhD, National University of Singapore (Singapore)

Waters, Brian Todd (https://experts.colorado.edu/display/fisid_155846/)
Assistant Professor; PhD, University of California, Los Angeles

Wenger, Paula (https://experts.colorado.edu/display/fisid_113621/)
Senior Instructor; MA, Miami University–Oxford

Werner, Walter Bradley (https://experts.colorado.edu/display/fisid_158225/)
Instructor, Faculty Director; MBA, University of Chicago

Williams, Lawrence Edwin Jr. (https://experts.colorado.edu/display/fisid_145743/)
Associate Professor; PhD, Yale University

Winn, Daryl
Professor Emeritus

Wobbekind, Richard (https://experts.colorado.edu/display/fisid_100997/)
Associate Dean, Lecturer; PhD, University of Colorado Boulder

Yao, Xin
Assistant Professor; PhD, University of Washington

Yilmaz, Ovunc (https://experts.colorado.edu/display/fisid_167064/)
Assistant Professor; PhD, University of South Carolina - Colombia

York, Jeffrey Glenn (https://experts.colorado.edu/display/fisid_148387/)
Associate Professor, Chair, Faculty Director; PhD, University of Virginia

Zechman, Sarah Louise Center (https://experts.colorado.edu/display/fisid_156016/)
Professor, Chair, Faculty Fellow; PhD, University of Pennsylvania

Zender, Jaime (https://experts.colorado.edu/display/fisid_122563/)
Professor, Endowed/Named Professor, Chair; PhD, Yale University

Zhang, Dan (https://experts.colorado.edu/display/fisid_149619/)
Professor, Faculty Director; PhD, University of Minnesota Twin Cities

Zhang, Huanan (https://experts.colorado.edu/display/fisid_167063/)
Assistant Professor; PhD, University of Michigan Ann Arbor

Zhang, Rui (https://experts.colorado.edu/display/fisid_157866/)
Assistant Professor; PhD, University of Maryland

Zhang, Xingtan (https://experts.colorado.edu/display/fisid_159295/)
Assistant Professor; PhD, University of Pennsylvania

Zikmund, Noah
Senior Instructor; MBA, University of Tulsa

# Courses

For business administration (BADM) courses, see the Business Administration (p. 1468) section.

## Accounting

**ACCT 5100 (3) Oil and Gas Accounting**
This course introduces students to the oil and gas industry and its unique accounting and finance issues. The course will introduce oil and gas terminology, analyze the components of an income statement, present book and tax accounting differences and enable you to prepare an economic purchase evaluation for oil and gas producing assets. We will review, discuss and debate current issues relating to the energy industry. Previously offered as a special topics course.
**Recommended:** ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.
**Grading Basis:** Letter Grade

**ACCT 5120 (3) Business Analytics**
Teaches cutting-edge tools and approaches to the analysis of data, including "big data" for effective decision-making. Creates data connoisseurs through hands-on exposure to exploratory and predictive analytics. Application areas covered include Web Marketing, the Internet of Things, Biometric Monitoring, as well as data integration and analysis for online marketing, human resources and operations.
**Requisites:** Restricted to MS Accounting (ACCT-MS) and MS Taxation (ACTX-MS) students
**Grading Basis:** Letter Grade

**ACCT 5240 (3) Advanced Financial Accounting**
Examines advanced financial accounting theory and practice, emphasizing U.S. and international accounting for business combinations, consolidated financial statements, and accounting for partnerships, not-for-profits and governments.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 4240
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.

**ACCT 5250 (3) Financial Statement Analysis**
Focuses on the use of U.S. and international accounting information by decision-makers external to the firm. Considers judgments made by investors, security analysts, bank lending officers, and auditors. Emphasizes impact of changes to financial statement elements, equity valuation and profitability analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 4250
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.

**ACCT 5450 (3) Income Taxation of Business Entities**
Provides an overview of the taxation of business entities. Examines the tax consequences of forming and operating regular corporations, partnerships, limited liability companies, and S corporations.
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.

**ACCT 5540 (3) Accounting Information Systems**
Considers the interaction of accountants with information systems and the role of accounting information systems in business processes. Focuses on the tools used by accountants and provides an understanding of accounting as an information system.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 4540
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.

**ACCT 5550 (3) Data Analytics for Accounting**
Exploration of key components of Data Analytics that are of particular utility to accountants. This course has 2 primary elements to it: (1) Describe the Analytics process using an established data analytics model called the IMPACT cycle, and (2) Illustrate the process in audit, managerial accounting, and financial reporting.
**Requisites:** Requires prerequisite or corequisite course of ACCT 4620 or ACCT 5620 (minimum grade D-). Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.
**Grading Basis:** Letter Grade

**ACCT 5620 (3) Auditing and Assurance Services**
Emphasizes the value of assurance services, including the market for financial-statement audits, and the audit decision process, from obtaining a client through planning and testing, to issuance of the audit report. Focuses on making judgments and decisions under conditions of uncertainty and continually evaluating the substance of business transactions over their form.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 4620
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.

**ACCT 5820 (3) Topics in Business**
Offered irregularly to provide opportunity for investigation of new frontiers in accounting.
**Equivalent - Duplicate Degree Credit Not Granted:** MSBX 5820
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.
**Grading Basis:** Letter Grade

**ACCT 5827 (3) Integrated Reporting for Socially Responsible Strategies**
Explores the growing global trend of companies to measure, disclose and report for socially responsible initiatives. Integrated reporting combines financial, environmental, social and governance information into a single report. Current practices in sustainability and integrated reporting in the US and across the world will be examined through case studies, guest speakers, current literature and projects. Can be taken concurrently with ACCT 3220.
**Equivalent - Duplicate Degree Credit Not Granted:** MBAX 6827
**Requisites:** Restricted to students with one of the following plans: ACCT-MS, ACTX-MS; or subplan: C-ACCT, C-ACCTACTX, C-FNCEACCT, C-FNCEACTX

**ACCT 6000 (1-3) Academic Internship in Accounting**
Offers students the opportunity to gain professional work experience in an accounting or tax position while still in school. Provides academically relevant work experience that complements students' studies and enhances their career potential. Includes lectures and a course paper. Students may not preregister for this course, and they must contact the Director of the concurrent degree program in accounting for approval. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with one of the following plans: ACCT-MS, ACTX-MS; or subplan: C-ACCT, C-ACCTACTX, C-FNCEACCT, C-FNCEACTX

**ACCT 6250 (3) Financial Statement Analysis**
Focuses on the use of accounting information by decision makers external to the firm. Considers judgments made by security analysts, bank lending officers and auditors. Emphasizes impact of changes to financial statement elements, profitability analysis and equity valuation.
**Equivalent - Duplicate Degree Credit Not Granted:** MBAX 6710
**Requisites:** Requires prerequisite course of ACCT 5250 or MBAC 6020 (minimum grade D-).

**ACCT 6260 (3) Seminar: Managerial Accounting**
Explores cost management, especially as related to organizational decision making, planning, and control. Emphasizes case analysis and applications.
**Requisites:** Requires prerequisite course of MBAC 6020 (minumum grade D-).

**ACCT 6290 (3) Textual Analysis in Business**
This course will discuss basic ideas around natural language processing (NLP) in research in different "dismal science" disciplines, from Economics to Psychology and Political Science, with a bent/focus on financial markets and accounting statements. The course is meant for graduate students as an introductory course on textual analysis, with an emphasis on methods and applications in Finance and Accounting. The language of choice for the course will be R. The course will be multilingual in that both the faculty and students can use other languages than R (python/perl/C).
**Equivalent - Duplicate Degree Credit Not Granted:** MSBX 6290
**Recommended:** restricted to ACCT-MS and ACTX-MS students.
**Grading Basis:** Letter Grade

**ACCT 6350 (3) Current Issues in Professional Accounting--Accounting Ethics**
Examines the nature of accounting theory and practice from perspectives of economics, law, globalization, accounting, ethics, and moral reasoning. Also explores issues including implications of institutional factors, such as Sarbanes-Oxley, SEC, FASB, IFRS, and capital markets. Counts as senior seminar for Concurrent degree students.
**Requisites:** Restricted to Accounting, Taxation, Finance/Accounting, or Accounting/Taxation students only.

**ACCT 6420 (3) Research and Writing in Income Taxation**
Provides a working knowledge of online tax research methodology. Examines the sources of tax authority in researching a tax question. Develops legal writing skills using the CREAC form of writing.
**Requisites:** Requires a prerequisite course of ACCT 5450 (minimum grade D-). Restricted to MS-ACTX or C-ACCTACTX or C-FNCEACTX students only.

**ACCT 6430 (3) Taxation of Partnerships**
Studies federal income taxation of pass-through entities such as those used by most small businesses in the U.S. Includes creation, operation, distributions, sale of interests and liquidation.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 6167
**Requisites:** Requires prerequisite course of ACCT 5450 (min grade D-). Restricted to MS-ACCT or MS-ACTX or C-ACCTACTX or C-FNCEACTX students only.

**ACCT 6450 (3) Taxation of Corporations**
Studies federal income taxation related to taxable corporations, the entities through which a large part of the economic activity in the U.S. is conducted. Includes creation, operation, distributions, sale of interests and liquidation.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 6157
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-ACCTACTX or C-FNCEACTX students only. Requires prerequisite course of ACCT 5450 (min grade D-).

**ACCT 6620 (3) Advanced Auditing: Business Risk and Decision Analysis**
Explores contemporary issues, historical developments, and selected topics pertinent to business assurance services by independent accountants. Emphasizes improving both the decision behavior of decision makers and the quality of information, or its context, for decision makers.
**Requisites:** Requires a prereq course of ACCT 5620 (min grade C). Restricted to Acct, Fnce/Acct, Infor Syst/Acct, Syst/Acct Concurrent Degree students or Acct, Acct/Tax or Busn Admin (BUAD) graduate students only.

**ACCT 6700 (4) Income Taxation**
Emphasizes the fundamentals of the federal income tax system and examines its impact on the individual.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 6007
**Requisites:** Restricted to Accounting, Taxation, Fin Acct Tax-Concurrent Degree or Acct Acct Tax-Concurrent Degree students only.

**ACCT 6780 (3) US International Taxation**
This course will provide an overview of the United States federal income taxation of persons engaged in international transactions.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 7617
**Requisites:** Restricted to students with one of the following plans: ACTX-MS; or subplan: C-ACCTACTX, C-FNCEACTX
**Recommended:** Prerequisite ACCT 5450.
**Grading Basis:** Letter Grade

**ACCT 6900 (1-6) Independent Study**
Prior department consent required of instructor under whose direction study is taken. Departmental form required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Accounting, Taxation, Fin Acct Tax-Concurrent Degree or Acct Acct Tax-Concurrent Degree students only.

**ACCT 6940 (1-6) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree. Departmental form required.
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 6950 (1-4) Master's Thesis**
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 7300 (3) Doctoral Seminar: Introduction to Accounting Research**
Discusses the nature of scientific investigation and how accounting theory relates to theories in economics and finance. Introduces students to major areas of accounting research and research methods. Provides students with instruction and experience in evaluating and critiquing research papers as well as generating original and viable research ideas.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 7320 (3) Doctoral Seminar: Accounting and Capital Markets I**
Focuses on research evaluating the usefulness of accounting information for valuing equity securities. The seminar builds a foundation for conducting accounting-related capital markets research.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 7330 (3) Doctoral Seminar: Accounting and Capital Markets 2**
Focuses on how managers strategically communicate with capital market participants (e.g., investors and equity analysts). Students develop an understanding of how information enhances the efficiency of stock markets, why managers voluntarily disclose information, and how market participants react to strategic disclosure.
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 7340 (3) Doctoral Seminar: Managerial Accounting Research**
Survey of managerial accounting research, emphasizing a variety of methodologies including economics-based archival empirical and experimental approaches. Topics include: management performance measurement; management incentives; non-financial performance measures; management control systems; cost behavior and cost structure; intra-firm transfer pricing; inter-firm relations and knowledge sharing; risk preferences; risk taking and risk sharing; strategic performance measurement; agency theory; and budgetary slack and performance.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequsite course of ACCT 6710 (minimum grade D-). Restricted to graduate students only.

**ACCT 7800 (3) Doctoral Seminar: Accounting Theory**
Follows the evolution of game-theoretical analytical research and application of analytical methods to topics including: accounting-based valuation, discretionary disclosure, stewardship role of accounting, insider trading and imperfect capital market models, signaling through accounting choice, deferred tax accounting, audit sampling, auditor rotation, and low balling. Describes implications of analytical results for primarily economics-based empirical research designs.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 7830 (3) Doctoral Seminar: Accounting Research**
Designed to assist the doctoral student in integrating courses and fields of study in order to be able to apply knowledge and skills to problems in accounting. Special attention given to the development of thesis topics.

**ACCT 8820 (1-6) Graduate Seminar**
Provides opportunity for investigation of new frontiers in accounting through an experimental seminar. Department enforced prereq.: varies
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ACCT 8900 (1-3) Independent Study**
Instructor consent required and departmental form (taught as doctoral seminar).
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 8990 (1-10) Doctoral Dissertation**
**Requisites:** Restricted to Business (BUSN) graduate students only.

## Business Environment & Policy

**BPOL 6950 (1-6) Master's Thesis**
**Requisites:** Restricted to graduate students only.

**BPOL 7500 (1-3) Doctoral Seminar: Special Topics in Strategic Management**
Focuses on the theoretical foundations and methodological challenges of conducting research in strategy and management. The course provides an introduction to the unique characteristics of strategic management and the strategic decisions that firms make. It offers an overview of the theoretical foundations of, and contemporary empirical research in, this area. The course exposes students to fundamental issues of strategy (e.g., how firms differ, what determines their scope, how they compete and organize themselves, etc.) and examines these topics in contemporary competitive and organizational contexts. The course provides an introduction to complex issues that empirical research needs to contend with as a consequence, such as causality, multiple levels of analysis, heterogeneity of firms, multiple decision makers, uncertainty, and temporal considerations for firms¿ decisions. It covers key theoretical traditions from the disciplines as well as theoretical perspectives developed within the field itself. In
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**BPOL 7510 (1.5) Strategy I**
This 1.5 credit course in a sequence focuses on the theoretical foundations and methodological challenges of conducting research in competitive strategy. Topics include what is strategy, the locus of competitive advantage and the persistence of performance, IO foundations of strategy, the resource-based view, the knowledge-based view, firm capabilities, and organizational learning. It offers an overview of the theoretical foundations of, and contemporary empirical research in, this area. It covers key theoretical traditions from the disciplines as well as theoretical perspectives developed within the field itself. In addition to reviewing this broad literature, the course seeks to identify research gaps and promising areas for future research. May be repeated for up to 3 total credit hours.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Business Administration (BUAD) graduate students only.

**BPOL 7520 (1.5) Strategy II**
This 1.5 credit course in a sequence focuses on the theoretical foundations and methodological challenges of conducting research in corporate strategy. Topics include the overall plan for a diversified company, boundaries of the firm, expansion modes including alliances and M&A, and international expansion. It offers an overview of the theoretical foundations of, and contemporary empirical research in, this area. It covers key theoretical traditions from the disciplines as well as theoretical perspectives developed within the field itself. In addition to reviewing this broad literature, the course seeks to identify research gaps and promising areas for future research. May be repeated for up to 3 total credit hours.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Business Administration (BUAD) graduate students only.

**BPOL 7530 (1-3) Doctoral Seminar: Special Topics in Innovation**
Focuses on the management of innovation and technology in organizations. The course provides an introduction to the theoretical foundations of, and contemporary empirical research in, this area. The examination of the literature is organized around several broad topics including the nature and timing of technological innovations, the manner in which technological innovations alter the competitive landscape, the links between organizational structure and innovation, the role of alliances and collaboration in supporting innovation activities, innovation, intellectual property and markets for technology, and issues of knowledge search and recombination. In addition to reviewing this broad literature, the course will also seek to identify gaps and promising areas for future research.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequsite course of BPOL 7500 (minimum grade D-). Restricted to Business Administration (BUAD) graduate students only.

**BPOL 7540 (1.5) Innovation I**
This 1.5 credit course in the sequence focuses on the management of innovation and technology in organizations. The course provides an introduction to the theoretical foundations of, and contemporary empirical research in, this area. The examination of the literature is organized around several broad topics. This course covers the foundational literature on the economics and management of innovation, including the nature and timing of technological innovations, the manner in which technological innovations alter the competitive landscape, the links between organizational structure and innovation, the evolving landscape of digital innovation. In addition to reviewing this broad literature, the course will also seek to identify gaps and promising areas for future research. May be repeated for up to 3 total credit hours.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Business Administration (BUAD) graduate students only.

**BPOL 7550 (1.5) Innovation II**
This 1.5 credit course in the sequence focuses on the management of innovation and technology in organizations. The course provides an introduction to the theoretical foundations of, and contemporary empirical research in, this area. The examination of the literature is organized around several broad topics. This course covers the role of collaboration in supporting innovation activities, intellectual property rights and markets for technology, issues of knowledge search and recombination, and the latest development in digital innovation and organizational forms. In addition to reviewing this broad literature, the course will also seek to identify gaps and promising areas for future research. May be repeated for up to 3 total credit hours.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Business Administration (BUAD) graduate students only.

**BPOL 7560 (1-3) Doctoral Seminar - Special Topics in Entrepreneurship**
Provides an introduction to the theoretical foundations of, and empirical research on, entrepreneurship. Our initial examination of the literature is organized around several broad topics associated with the identification, evaluation, and exploitation of opportunities and the creation of new organizations. Special topics in entrepreneurship that highlight recent advances in the field will also be addressed. The course will focus on the main questions that currently define the field and attempt to critically examine how, using a range of theoretical lens and methodologies, researchers have approached these questions.
**Requisites:** Requires prerequsite courses of BPOL 7500 and BPOL 7530 (all minimum grade D-).

**BPOL 7570 (1.5) Entrepreneurship I**
This 1.5 credit course in a sequence focuses on the theoretical foundations and methodological challenges of conducting research in entrepreneurship. Topics include the identification, evaluation, and exploitation of opportunities and the creation of new organizations. It provides an introduction to the theoretical foundations of, and empirical research on, entrepreneurship. The course will focus on the main questions that currently define the field and attempt to critically examine how, using a range of theoretical lens and methodologies, researchers have approached these questions. May be repeated for up to 3 total credit hours.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Business Administration (BUAD) graduate students only.

**BPOL 7580 (1.5) Entrepreneurship II**
This 1.5 credit course in a sequence focuses on the theoretical foundations and methodological challenges of conducting research in entrepreneurship. Topics include strategic entrepreneurship, innovation and entrepreneurship, social entrepreneurship, environmental entrepreneurship and other special topics in entrepreneurship that highlight recent advances in the field. In addition to reviewing this broad literature, the course seeks to identify research gaps and promising areas for future research. May be repeated for up to 3 total credit hours.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Business Administration (BUAD) graduate students only.

**BPOL 8900 (1-3) Independent Study**
Requires consent of instructor under whose direction study is taken. Departmental form required.

**BPOL 8990 (1-10) Doctoral Dissertation**

## Business Law

**BSLW 5120 (3) Advanced Business Law**
Covers sales and lease transactions, negotiable instruments, creditor rights and bankruptcy, secured transactions, agency, business organizations, protection of property, and other advanced topics in legal and regulatory environments. This course and BCOR 3000 cover the business law topics tested on the CPA exam.
**Equivalent - Duplicate Degree Credit Not Granted:** BSLW 4120
**Requisites:** Restricted to concurrent degree subplans of Accounting (C-ACCT), Finance and Accounting (C-FNCEACCT), Accounting and Acct Tax (C-ACCTACTX), Fin Acct Tax (C-FNCEACTX), or Accounting (ACCT) and Taxation (ACTX) graduate students only.

**BSLW 6900 (1-6) Independent Study**
**Requisites:** Restricted to Business (BUSN) graduate students only.

## MBA Core

**MBAC 6001 (1.5) Foundations of Teamwork**
Focuses on teamwork effectiveness and collaboration. Students will understand what affects team outcomes, how to maximize a team¿s effectiveness and how to create a company environment that fosters collaboration and teamwork as they develop their own teamwork skills while learning to develop the skills of their employees' and colleagues'.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6002 (3) Social, Moral and Economic Foundations for Business**
Examines historical context for the rise of modern business institutions and market economies, and interrelationships in various business objectives. Connects how different economic approaches address the allocation of existing and future scarce resources, and how individual economic freedom relates to various societal objectives. Explores concepts of core business relevance including intellectual property, the role of ethics in the production of commercial information, and the value of diverse information sets in decision-making.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6003 (1.5) Foundations of Leadership**
Focuses on leadership theories and concepts, including individual and organizational elements in different leadership situations. Explores leadership principles, values, and ethical boundaries, why leaders lose their way and how to avoid derailment. Engages students in developing a leadership brand.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6004 (1.5) Social, Moral and Economic Foundations for Business**
Examines historical context for the rise of modern business institutions and market economies, and interrelationships in various business objectives. Connects how different economic approaches address the allocation of existing and future scarce resources, and how individual economic freedom relates to various societal objectives. Explores concepts of core business relevance including intellectual property, the role of ethics in the production of commercial information, and the value of diverse information sets in decision-making.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6010 (3) Managerial Economics**
Studies the elements of the business firm's fundamental problem---how to maximize profits. Develops for each element managerial theory based upon introductory and intermediate-level microeconomics. Analyzes various applications and misapplications of relevant concept, primarily through case studies. Differential calculus and statistics are used throughout the course. Students can take MBAC 6010 or take MBAC 6011 plus MBAC 6012. Credit can not be given for all.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6011 (1.5) Managerial Economics 1**
Studies the elements of the business firm's fundamental problem---how to maximize profits. Develops for each element managerial theory based upon introductory and intermediate-level microeconomics. Analyzes various applications and misapplications of the relevant concept, primarily through case studies. Differential calculus and statistics are used throughout the course. Students can take MBAC 6010 or take MBAC 6011 plus MBAC 6012. Credit can not be given for all.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6012 (1.5) Managerial Economics 2**
Develops a basic understanding of the macro economy and its relationship to an individual business or industry. This objective will be accomplished by understanding macroeconomic concepts and data sources, developing a basic model, understanding relevant policy instruments and integrating this information into the world economy. Students can take MBAC 6010 or take MBAC 6011 plus MBAC 6012. Credit can not be given for all.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6020 (3) Financial Accounting**
Introduces the financial reporting system used by business organizations to convey information about their economic affairs. Develops an understanding of financial reports and what they tell about a business enterprise. Focuses on how alternative accounting measurement rules represent different economic events in financial reports.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6031 (1.5) Quantitative Methods 1**
Covers foundations for statistical reasoning and statistical applications in business. Topics include data collection, descriptive stats and data visualization, probability, discrete probability distributions, continuous probability distributions, sampling distributions and estimation.
**Requisites:** Restricted to MBA (MBAD) and Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6032 (1.5) Quantitative Methods 2**
Second in a series of two courses covering foundations for statistical reasoning and statistical applications in business. Topics include hypothesis testing, one and two sample hypothesis tests, single regression analysis, multiple regression analysis.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6050 (3) Strategy**
Analyzes how firms can attain and sustain competitive advantage in today's competitive environment. Focuses on industry dynamics, competitive positioning, firm capabilities, and corporate innovation. Introduces a set of tools for assisting managers in solving complex, real-world business problems in strategy development. Integrates MBA learning in functional areas, and emphasizes the fit between competitive analysis and the role of management and organization.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6051 (3) Operations Management**
Develops an understanding of processes and the alignment of a process with the organization¿s operating priorities. Examines how interconnected processes relate to managing supply and demand and stakeholder incentives. Explores services, highlighting the differences and similarities between product and service businesses and considers ¿c-suite¿-level challenges such as managing firm growth, alignment of the operating system with strategic priorities, and mitigating uncertainty through optionality.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6052 (3) Capstone Projects**
Provides students with an opportunity to focus on a specific project which would have a positive strategic impact on the company for which they work. For those who have entrepreneurial aspirations, this project could result in a business plan for a new venture. Final deliverable should address marketing, financial, operational, and management implications and strategic impact.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6060 (3) Corporate Finance**
Analyzes the implications of modern finance theory for the major decisions faced by corporate financial managers. Develops the basic skills necessary to apply financial concepts to the various problems faced by a firm. Includes capital budgeting, capital structure, long term financing, short term financial management, and financial planning topics.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6081 (3) Data and Decisions**
Employers need managers who can integrate business knowledge and insight with the vast amount of data available using modern analytical tools. Students will access data from multiple sources, manipulate the data so it is ready for analysis, perform multiple regression analyses, validate the models they develop, and use the results to inform decisions. Goes beyond Excel spreadsheets to expose students to tools such as R and Tableau.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6090 (3) Marketing Management**
Provides a solid foundation of marketing knowledge by focusing on principles of marketing. Introduces the role that marketing cases play in advancing understanding and skill development in the field of marketing. Case discussions illustrate concepts discussed, and case studies are used to introduce the marketing decision making process. Emphasizes the international nature of marketing, as well as the importance of analysis and the understanding of the economic, demographic, political-legal-regulatory, sociocultural, technological, and natural environments.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6096 (1.5) Managerial Communications**
Tailored instruction, grounded in communication and business theory, that leads to improved business writing, public speaking, team presentations, team dynamics, interpersonal communication, and emotional intelligence with a focus on persuasion, audience analysis, and risk management.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6098 (1) Professional Development I**
Professional Development I and II will introduce students to a range of skills to help them be successful in the professional work environment, including presentation development, constructive feedback loops, and personal presentation in team-based sessions. It will also offer a survey of the career management process and provide students with the tools and life-long skills to execute a strategic career management plan.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Additional Information:** Departmental Category: MBA: Core Courses

## MBA Advanced Electives

**MBAX 6000 (3) Socially Responsible Enterprise**
Prepares future managers for confronting the truly difficult situations that arise when deploying economic resources, altering the physical environment, and making decisions that affect the lives of investors, employees, community members and other stakeholders. Case-based challenges will be examined in a broad range of contexts, and essential ethical concepts will be explored by drawing on theories from ethics, sociology, economics, political science and philosophy.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6097 (1-1.5) Professional Development Internship**
Experiential compliment to MBAC 6098 to focus on Professional Presentation, Network Development, and/or Executive Exposure.
**Repeatable:** Repeatable for up to 3.50 total credit hours.
**Requisites:** Restricted to Master of Business Admin (MBAD) or MBA with Dual Degree programs. Minimum of 27 credit hours required.
**Recommended:** Prerequisite MBAC 6098.
**Grading Basis:** Letter Grade

**MBAX 6100 (1.5) Entrepreneurship**
Examines the environments of entrepreneurial firms from start-up to development of ventures. Allows students to assess their fit with entrepreneurial firms. Key element is learning the process of determining the difference between ideas and commercializable opportunities through feasibility analysis and plans.
**Requisites:** Requires prerequisite course of MBAC 6020 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6101 (1.5) Entrepreneurship**
Examines the environments of entrepreneurial firms from start-up to development of ventures; allows students to assess their "fit" with entrepreneurial firms. A key element is learning the process of determining the difference between ideas and commercializable opportunities through feasibility analysis and plans.
**Requisites:** Requires prerequisite courses of MBAC 6010, MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6110 (3) Entrepreneurial Finance**
Addresses a variety of topics including financial valuation, various sources of funds, structures and legal issues in arranging financing, the private and public venture capital markets, and preparation for, and execution of, an initial public securities offering.
**Requisites:** Requires prerequisite course of MBAC 6020 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6111 (3) Entrepreneurial Finance**
Addresses a variety of topics including financial valuation, various sources of funds, structures and legal issues in arranging financing, the private and public venture capital markets, and preparation for, and execution of, an initial public securities offering.
**Requisites:** Requires prerequisite courses MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to MBA (MBAD) and Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6130 (3) Sustainable Venturing**
Focuses on environmentally sustainable business ventures as well as issues associated with starting and operating a business that solves natural environmental challenges while achieving profitability. Includes a number of case studies, topical discussions, talks by environmental entrepreneurs, and an applied or library research project.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6140 (3) Social Entrepreneurship in the US and Global Economies**
Social entrepreneurs adopt business approaches to solving global, social and environmental problems that have not been effectively addressed by government, business or traditional nonprofits. The course provides a framework for student teams to assist social entrepreneurs in developing countries, helping them achieve their social mission while operating sustainably and with measurable impact.
**Requisites:** Requires prerequisite courses of MBAC 6060 and 6090 (all minimum grade C). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Recommended:** Prerequisite MBAX 6170.
**Additional Information:** Departmental Category: MBA: Social Responsibility

**MBAX 6155 (1.5) Entrepreneurship Through Acquisition**
Explores entrepreneurship through acquisition (ETA) of a company, rather than starting one from scratch. Readings and class discussions will include how to purchase a business, finance an acquisition, and operate and grow a business. Also, sourcing and identifying acquisition opportunities, strategic, operational, legal, and financial due diligence, valuation, tax considerations, raising capital, structuring and closing transactions, post-closing integration, managing and exiting the acquisition, and prototypes for pursuing including search fund and fundless deal sponsor models.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6160 (1.5-3) Entrepreneurship: High Growth Companies**
Explores the initial decisions that set a foundation for business growth, the pros and cons of alternative growth strategies, organizational scaling tactics, and the keys to realizing value. Studying ¿adolescent¿ firms that are past the initial start-up stage but haven't evolved into mature businesses, we will focus on key choices founders face in scaling their businesses, investigating growth-related stumbling blocks and discussing alternative strategies that may be used to overcome these obstacles.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.

**MBAX 6170 (1.5) New Venture Creation**
This course content is relevant to the student who wants the entrepreneurial toolkit, start a new venture, is interested in working in the startup world, would like to effectively evaluate the probability of success for a new venture and/or develop a methodology for entrepreneurial thinking that provides benefits for big and small ventures. The final deliverable is a professional pitch to a group of seasoned investors and the submission of a complete business plan.
**Requisites:** Requires prerequisite course of MBAC 6020 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6171 (1.5) New Venture Creation**
This course content is relevant to the student who wants the entrepreneurial toolkit, start a new venture, is interested in working in the startup world, would like to effectively evaluate the probability of success for a new venture and/or develop a methodology for entrepreneurial thinking that provides benefits for big and small ventures. The final deliverable is a professional pitch to a group of seasoned investors and the submission of a complete business plan.
**Requisites:** Requires prerequisite courses of MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6180 (3) New Venture Launch**
Translate an existing product, service, or opportunity into a real, functioning venture. Each venture will undertake typical business functions (legal, raising money, web presence, selling, innovation, marketing, managing cash, and managing operations) with minimal resources. The course will rely heavily on outside experts and speakers who have personal experience being or working directly with entrepreneurs and/or investors. The course is a natural capstone to other courses in the entrepreneurship curriculum.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Recommended:** Prerequisite completion of MBAX 6170 is strongly recommended prior to enrolling in MBAX 6180.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6190 (3) Projects in Entrepreneurial Companies**
Limited to 12 students per section, each student is matched with an entrepreneurial company to complete a project that is key to company strategy. Students experience total company environment from the top management level through attending management meetings and interacting with cross-functional managers and employees. E-mail and face-to-face meetings result in discussing opportunities and issues resulting from experiences in companies.
**Requisites:** Requires prerequsite course of MBAX 6100 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Recommended:** Prerequisite completion of MBAX 6110 or 6111 is strongly recommended prior to enrolling in MBAX 6190.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6195 (1-3) Special Topics in Entrepreneurship**
Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the standard MBA curriculum.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.

**MBAX 6210 (3) Applied Financial Management**
Analyzes the financial condition, planning, and control of current assets, current liabilities, and long-term financial arrangements. Topics include financial planning, managing working capital, short- and long-term financing, capital budgeting, valuation, and capital structure policies. Case studies are emphasized.
**Requisites:** Requires prereqs MBAC 6060, MSBC 5060, or MSBC 5610 (min grade D-).Restricted to Master of Business Admin (MBAD), MBA w Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Profl MBA Program (PMBA), MS Finance (FNCE-MS) MS Real Estate (REAL-MS) mjrs onl
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6211 (3) Applied Financial Management**
Focuses on how to apply key concepts in finance to real-world situations. Topics include valuation, capital structure, highly leveraged transactions, and financial distress and bankruptcy. Heavy emphasis on how to perform various kinds of valuations. Mixture of lectures and case discussions.
**Requisites:** Requires prerequsite course of MBAC 6060 (minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6215 (3) Principles of Wealth Management**
In-depth exploration of wealth management concepts, strategies and practices. Students gain understanding of how to effectively manage and grow wealth for individuals and families, considering various financial instruments, risk factors and ethical considerations. Topics include behavioral finance, portfolio creation, performance and risk measures, risk fac-tors, the use of traditional and alternative asset classes; use of financial products and alternative investments including cash, equities, fixed income, mutual funds, ETFs, VC funds, etc. Will discuss tax planning.
**Requisites:** Requires prerequisite course of MBAC 6060 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6220 (3) Investment Management and Analysis**
Covers managing investment portfolios, blending economic theory and evidence with practitioner experience. Topics include understanding risk and return relationships, diversification, portfolio management, various asset classes, popular valuation models (capital asset, arbitrage pricing, and option pricing), aspects of fixed income and performance assessment.
**Requisites:** Requires prerequisite course of MBAC 6060 or MSBC 5060 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6221 (1.5-3) Investment Management & Analysis**
Covers managing investment portfolios by blending academic theories and evidence with practitioner experience. Topics include risk and return relationships, securities, value theory (capital asset, arbitrage, and option pricing), portfolios, and performance evaluations.
**Requisites:** Requires prerequisite courses of MBAC 6010, MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6230 (3) International Financial Management**
Examines the financial procedures, policies, and risks faced by firms conducting business internationally. Topics include examining the international finance environment, managing foreign exchange risk exposure, managing international working capital, conducting analysis, and developing an understanding of international financial markets.
**Requisites:** Requires prerequisite course of MBAC 6060 or MSBC 5060 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6250 (3) Derivative Securities**
Derivatives, like options, futures, forwards, and swaps, encompass all aspects of finance. Topics cover the characteristics, valuation, and trading strategies associated with derivatives as well as their use in risk management.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Recommended:** Prerequisite for MBAD students, prerequisite course of MBAC 6060; for FNCE-MS majors, prerequisite MSBC 5060 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6260 (3) Fixed Income Investing**
Fixed income securities are those that nominally promise a fixed stream of payments. They include government and corporate long and short term debt issues that far exceed the amount of corporate stock issues, as well as long term personal debt (i.e.,home mortgages). Develops practical analytical tools for describing risk and return in fixed income securities, the markets where they are traded, and their purchase and management by financial intermediaries. This course will utilize the Bloomberg Lab to provide students with real world fixed income security analysis.
**Requisites:** Requires prerequisite course of MBAC 6060 or MSBC 5060 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6270 (3) Applied Derivatives**
Covers applications of financial derivatives and a range of topics, from market risk management to liquidity and counter party risk management in contemporary finance. Specifically, the course examines the pricing and use of financial derivatives, including options, forwards, futures, swaps and credit derivatives in risk management.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade

**MBAX 6280 (1.5) Entrepreneurship Valuation and Investment Seminar**
First section in series of three: Provides a premier experiential learning experience in early stage investing. Students will develop an understanding of the mechanics of early stage investing, will learn how to evaluate, select and recommend investments and manage the portfolio, put in practice managerial skills, negotiation, financial analysis, presentation skills, mastering/negotiating legal terms, and to incorporate uncertainty into projecting cash flows.
**Requisites:** Requires prerequisite courses of MBAC 6060 and 6090 (minimum grade C). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6281 (1.5) Entrepreneurship Valuation and Investment Seminar2**
Second section in series of three: Provides a premier experiential learning experience in early stage investing. Students will develop an understanding of the mechanics of early stage investing, will learn how to evaluate, select and recommend investments and manage the portfolio, put in practice managerial skills, negotiation, financial analysis, presentation skills, mastering/negotiating legal terms, and to incorporate uncertainty into projecting cash flows.
**Requisites:** Requires prerequisite courses of MBAC 6060 and 6090 (minimum grade C). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Recommended:** Prerequisite MBAX 6280.

**MBAX 6295 (1.5-3) Topics in Finance**
Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the standard MBA curriculum.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade

**MBAX 6310 (3) Marketing Strategy**
Marketing strategy has developed into an increasingly critical managerial activity as businesses recognizethe importance of creating customer value and being customer oriented. Discusses key elements of successful marketing strategy including market/customer analysis and competitor analysis, and identifies strategic approaches managers may adopt to succeed in today's highly competitive and rapidly changing business environment.
**Requisites:** Requires prereq course of MBAC 6090 (min grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Prog (PMBA) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6311 (3) Marketing Strategy**
Marketing strategy is a critical managerial activity that recognizes the importance of a strong market focus and the delivery of superior customer value as bases for long term financial success. This course examines key elements of successful marketing strategy including optimal market definition, strong segmentation and positioning approaches, high levels of customer satisfaction, and effective management of critical exchange relationships.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Marketing

**MBAX 6330 (3) Market Intelligence**
Market Intelligence is a decision-oriented course geared toward gathering, analyzing, and interpreting data about markets and customers. Students learn how to: define the marketing problem and determine what information is needed to make the decision; acquire trustworthy and relevant data and judge its quality; analyze the data and acquire the necessary knowledge to make certain classic types of marketing decisions.
**Requisites:** Restricted to MA of BusinAdmin (MBAD), MBA w/ Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Prof MBA (PMBA), MS Supply Chain Manag (SCMN-MS) or MS Busin Analytics (BUAN-MS) or Mktg Analytics cert (MKAG). Prereq MBAC 6090 or MSBX 5410, min grade D-.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6331 (3) Market Intelligence**
Market Intelligence is a marketing decision-oriented course geared toward gathering, analyzing, and interpreting data about markets and customers for both products and services. It is for managers as users of market information across marketing management, consulting, general management, and entrepreneurship to address problems of market selection, segmentation, positioning, new products, customer value and retention, pricing, communication, channel, etc.
**Requisites:** Requires prerequisite courses of MBAC 6010, MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Marketing

**MBAX 6350 (3) Digital Marketing**
Covers a variety of ways an organization uses online presence to support its goals. The main approaches covered are search engine optimization (SEO); online advertising, especially search ads (also called search engine marketing, SEM); and social media. SEO is setting up your website so that the right people can find you. Emphasis placed on selecting keywords and tracking responses to changes to a website. SEM refers to paid ("sponsored") ads on search engines. We will focus on AdWords.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Real Estate (REAL-MS), MS Supply Chain Management (SCMN-MS) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6351 (3) Digital Marketing**
Covers a variety of ways an organization uses online presence to support its goals. The main approaches covered are search engine optimization (SEO); online advertising, especially search ads (also called search engine marketing, SEM); and social media. SEO is setting up your website so that the right people can find you. Emphasis placed on selecting keywords and tracking responses to changes to a website. SEM refers to paid ("sponsored") ads on search engines. We will focus on AdWords.
**Requisites:** Requires prerequisite course of MBAC 6090 (minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Marketing

**MBAX 6360 (3) New Product Development**
Provides a better understanding of the new-product development process, highlighting the inherent risks and strategies for overcoming them. Using a combination of lectures, cases, and a project, this course examines the process of designing, testing, and launching new products. Emphasizes the interplay between creativity and analytical marketing research throughout the development process. Also covers branding issues, such as brand extensions and their impact on brand equity.
**Requisites:** Requires prereq course of MBAC 6090 (min grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Prog (PMBA) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6361 (1.5) New Product Development**
Provides students with a better understanding of the new-product development process, highlighting the inherent risks and different strategies for overcoming them. Using a combination of lectures, cases, and a project, this course will examine the process of designing, testing and launching new products.
**Requisites:** Requires prerequisite courses of MBAC 6010, MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Marketing

**MBAX 6365 (3) Practical Product Management**
This course will give students practical experience and tools required to successfully manage a product or product line for an established company or a new business. This course will cover the role of the Product Manager, explore market research to understand unsolved market needs, and teach students how to convert market needs to specifications, develop product business cases and establish funding priorities, culminating in the completion of a full product strategy and plan.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6368 (1.5) Consumer Packaged Goods Marketing Applied to the Natural & Organic Industry**
Explores the world of consumer packaged goods (CPG) and brand management skills needed to successfully launch and manage products in a retail environment, applied to the natural and organic product industry. The course will be split into three parts: 1) CPG and Brand Management principles and techniques, 2) shopper insights to manage CPG products at retail, 3) brand and retail management principles applied to the Natural & Organic industry.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6370 (2-3) Customer Analytics**
Provides a deep understanding of customer centricity and its implications for the firm; state-of-the art methods for calculating customer lifetime value and customer equity; analytical and empirical skills that are needed to judge the appropriateness, performance, and value of different statistical techniques that can be used to address a issue around customer acquisition, development, and retention. Students will be introduced to R programming in this course.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6380 (3) Consumer Decision-Making: Behavioral Economics, Psychology, and Experimental Design**
Consumer behavior often defies economic rationality. Behavioral economics attempts to integrate the quirks of human psychology into economic models; judgment and decision-making investigates how people solve economic problems. This course will introduce major theories, findings and ideas from these disciplines, and foundational concepts of experiment design that provide insight into consumer decision-making, with the goal of preparing future managers, analysts, consultants, and advisors to incorporate such insights into marketing and business strategies.
**Requisites:** Requires prerequisite course of MBAC 6090 (min grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6381 (3) Consumer Decision-Making: Behavioral Economics, Psychology, and Experimental Design**
Consumer behavior often defies economic rationality. Behavioral economics attempts to integrate the quirks of human psychology into economic models; judgment and decision-making investigates how people solve economic problems. This course will introduce major theories, findings and ideas from these disciplines, and foundational concepts of experiment design that provide insight into consumer decision-making, with the goal of preparing future managers, analysts, consultants, and advisors to incorporate such insights into marketing and business strategies.
**Requisites:** Requires prerequisite course of MBAC 6090 (minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6395 (1-3) Special Topics in Marketing**
Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the standard MBA curriculum.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6410 (3) Process Analytics**
Covers the concepts and tools to design and manage business processes. Emphasizes modeling and analysis, information technology support for process activities, and management of process flows. Graphical simulation software is used to create dynamic models of business processes and predict the effect of changes. Prepares students for a strong management or consulting career path in business processes.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) or Business Analytics (BUAN) majors or SCAG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Systems

**MBAX 6420 (3) IT and Business Strategy**
Although some companies are very successful in discovering and cultivating innovative technology-enabled business strategies, many fail in the process. Combines theories and frameworks with practical approaches to provide students with the skills required to help companies identify business opportunities, find appropriate information related technologies, and lead adoptions efforts to success.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Systems

**MBAX 6421 (3) IT & Business Strategy**
Although some companies are very successful in discovering and cultivating innovative technology-enabled business strategies, many fail in the process. This course combines theories and frameworks with practical approaches to provide students with the skills required to help companies identify business opportunities, find appropriate information related technologies, and lead adoption efforts to success.
**Requisites:** Requires prerequisite courses MBAC 6020, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6440 (3) Project Management**
Acquaints students with multidisciplinary aspects of project management, including the relationship between schedule, cost and performance. The course uses a hands-on project where the student interacts with a real customer, providing an opportunity to utilize the qualitative and quantitative tools taught in the classroom. At the conclusion of the course, the student may be eligible to apply for a project management certification from Project Management Institute based on previous work experience.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Real Estate (REAL-MS), MS Supply Chain Management (SCMN-MS) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6441 (3) Project Management**
Acquaints the student with multidisciplinary aspects of project management, including the relationship between scope, schedule, cost and performance. Uses a hands-on project from your own company, providing an opportunity to utilize the qualitative and quantitative tools taught in the classroom. During the course students will earn hours toward project management certification from the Project Management Institute.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors with 12 credit hours completed.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6450 (3) International Operations Management**
Takes a broad comprehensive perspective on managing and operating in a rapidly growing global economy. Explores regional and national approaches to international operations including trade practices; penetration strategies; financial, marketing, services, and manufacturing operations; ethical and sustainability issues; and global competitive strategy. Compares global business practices in Asia, South America, Europe, and Africa.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) majors or SCFG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6451 (3) International Business and Strategy**
Takes a broad comprehensive perspective on managing and operating in a rapidly growing global economy. Explores regional and national approaches to international operations including global trade practices; legal and political issues; US trade laws; finance and accounting risks; global supply chain management, cultural challenges; global marketing, and global strategies. Upon completing of the course, you will have a broad foundational understanding of important contemporary issues and challenges of international business.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6460 (3) Supply Chain Management**
Explores the key issues related to the design and management of supply chains. Covers the efficient integration of suppliers, production facilities, warehouses and stores so that the right products in the right quantity reach customers at the right time. Focuses on the minimization of the total supply chain cost subject to service requirements imposed by a variety of industries.
**Equivalent - Duplicate Degree Credit Not Granted:** MSBC 5460
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Recommended:** Prerequisite MBAC 6080.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Systems

**MBAX 6500 (3) Management of Organizational Change**
Explores ways to improve organizations to meet demands of changing environments. Emphasizes theoretical framework and models of organization change, barriers to implementing change and ways to overcome them, and the roles of the change agent and/or consultant.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6530 (1.5) Negotiating and Conflict Management**
Explores and builds skills for conflict management and negotiation problems faced by managers (e.g., dealing with subordinates, peers, superiors, or clients). Content is relevant to all MBA students, especially those interested in management, accounting, entrepreneurship, finance, and marketing.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6531 (1.5) Negotiating and Conflict Management**
Practice the art and science of successful negotiations. Provides students high interaction with businesses and entrepreneurs.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6540 (3) Consulting Skills**
Provides an integrative, hands-on exercise in managing change. Develops skills in contracting, collecting, and analyzing data, developing action plans, and preparing reports. Teams practice these skills by conducting an organizational diagnosis, consulting project within an organization.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6550 (3) Management of Technology and Innovation**
Examines a variety of issues common to management of technology, such as technology strategies, methods of technology transfer, selecting technology standards, managing the research and development process, and encouraging and rewarding innovation.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6560 (1.5) Executive Leadership**
Examines organizational leadership from the executive perspective, including private and public sector firms, and non-profits. Studies how executives lead change and innovation, interact with the top management team, and deal with the board of directors Topics include governance of the firm, strategies for enhancing executive influence, assessing and understanding diverse leadership styles, and the ethics and responsibilities of an executive. Formerly MBAX 6890.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6561 (1.5) Executive Leadership**
Provides an opportunity to examine leadership from the executive perspective in organizations including private and public sector firms and non-profits. Topics covered include how executives lead change and innovation in organizations, interact with the top management team, deal with the board of directors, leadership issues involved with governance of the firm and strategies for enhancing executive influence.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6565 (1.5) Inclusive Leadership**
This course focuses on how to lead to increase inclusion and maximize the benefits that diversity can bring. Women and minorities comprise only 25% and 27% of executives, respectively. Only 5% of CEOs are women. Thirteen percent of the population ¿ but fewer than 1% of Fortune 500 CEOs ¿ are Black. The data show irrefutable evidence that diversity increases innovation, market share, return on assets, and stock prices.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6570 (3) Topics in Sustainable Business**
Provides a comprehensive overview of the core concepts, strategies and practices of sustainable business, emphasizing innovative business practices and entrepreneurial opportunities created by the sustainability "movement". The topic of sustainability will be approached from the unique perspectives of seven core disciplines of business administration: economics, strategy, ethics, organizational behavior, operations, finance and accounting, and marketing.
**Requisites:** Requires prerequisite courses of MBAC 6011, MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to MBAD, DMBA, JMBA, PMBA, SCMN or BUAN majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Social Responsibility

**MBAX 6595 (1-3) Special Topics in Organizational Behavior**
Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the standard MBA curriculum.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6600 (3) Real Estate Principles**
The course covers a broad range of real estate principles including legal concepts, regulation and land use, valuation, financing methods and sources, and investment analysis. It provides a foundation for all other real estate courses in the MBA program.
**Requisites:** Restricted to Master of Business Admin (MBAD) students who have completed fewer than 24 credits; or MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Real Estate

**MBAX 6610 (3) Real Estate Finance and Investment Analysis**
Objectives of the course are to 1) conduct income property investment analysis; 2) to develop the technical competence necessary to structure real estate transactions; and 3) to understand the financial assets securitized by real estate. Students will analyze income properties using Excel and ARGUS-DCR. Techniques for structuring real estate transactions examined in this course include lender participations, sale-leasebacks, joint ventures, and real estate syndications.
**Requisites:** Requires prerequisite course of MBAX 6600 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Real Estate

**MBAX 6620 (3) Real Estate Project Competition**
Examines real estate market behavior beginning with an overview of residential and commercial property markets. Examines various theories of land price determination and uses these models to understand how the private market allocates land to competing residential, office, retail, industrial/warehouse, hotel and other end users. Examines how factors influencing the demand for real estate interact with the factors influencing the supply of real estate to determine market rents and how the flow of future expected income is capitalized to yield the market price of property. The course will also examine the roles that local, state and federal governments have in real estate market outcomes.
**Requisites:** Restricted to MS Real Estate majors (REAL-MS) or restricted to Master of Bus Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Profl MBA Prog (PMBA) with prerequisite courses MBAX 6600, 6610 and 6640 (all min grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Real Estate

**MBAX 6630 (3) Real Estate Economics**
Examines real estate market operations and discusses alternative methodologies for estimating real estate values. Examines various theories of land price determination and uses these models to understand how the private market allocates land to competing residential, office, retail, industrial/warehouse, hotel, and other end users. Examines how factors influencing the demand for real estate interact with the supply of real estate to determine market rents and how the flow of future expected income is capitalized to yield the market price of the asset.
**Requisites:** Restricted to MS Real Estate majors (REAL-MS) or restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Real Estate

**MBAX 6640 (3) Real Estate Law and Practice**
Examines the legal issues associated with developing, acquiring, transferring, and leasing real property. Topics include real estate contracts, land use and development agreements, vehicles for owning real estate, real estate covenants, conditions and restrictions, loan transactions, negotiating real estate contracts, commercial leases and real estate taxation. Material for this course will consist of assigned articles and real estate cases. Formerly MBAX 6855.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), or MS Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Real Estate

**MBAX 6650 (3) Real Estate Case Studies**
Requires students to analyze numerous real estate investment opportunities utilizing case study methodology. Cases will include analyses of various end uses (e.g. apartments, condominiums, office, retail, mixed use, industrial, and hotel) from both the purchaser and seller perspective. The cases include situations such as investing in existing properties, whether to make substantial rehabilitations, and how to put together a new development. Cases are primarily based in Colorado, although some are in other areas of US and international. Class discussion is designed to mimic a company¿s investment committee and requires students to both present and defend their positions.
**Requisites:** Requires prerequisite of MBAX 6630 or 6640 and MBAC 6610 or MSBC 5610 (all minimum grade D-). Restricted to MBA (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA (PMBA) or MS Real Estate (REAL-MS) students only.
**Grading Basis:** Letter Grade

**MBAX 6695 (1-3) Special Topics in Real Estate**
Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the standard MBA curriculum.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to MBA (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA (PMBA) or MS Real Estate (REAL-MS) students only.
**Grading Basis:** Letter Grade

**MBAX 6710 (3) Financial Statement Analysis**
Focuses on the use of accounting information by decision makers external to the firm. Considers judgments made by security analysts, bank lending officers and auditors. Emphasizes impact of changes to financial statement elements, profitability analysis and equity valuation.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 6250
**Requisites:** Requires prerequisite course of MBAC 6020 or MSBC 5020 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS majors only.
**Additional Information:** Departmental Category: MBA: Accounting

**MBAX 6720 (3) ESG Reporting and Analysis**
This course introduces students to the current state of corporate sustainability reporting through the lens of accounting and reporting concepts. The course has three basic elements. We will cover (1) data and measurement issues associated with corporate sustainability reporting, largely at the conceptual level, (2) current disclosure frameworks and the evolving regulatory landscape, and (3) other topics including ESG assurance, ESG ratings and the role of ESG information in sustainable investing.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Recommended:** Prerequisite MBAC 6020 Financial Accounting (MBA) or MSBC 5020 Financial Accounting (MS).
**Grading Basis:** Letter Grade

**MBAX 6761 (2) Managerial Accounting, Planning and Control**
Introduces managerial accounting, which includes the concepts, models, and systems that provide this information and control. The course will familiarize participants with the terminology and basic concepts of managerial accounting, touching on topics ranging from development and use of cost information for decision-making to management control systems.
**Requisites:** Requires prerequsite course of MBAC 6020 (minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Accounting

**MBAX 6801 (1.5-3) Global Perspectives Seminar**
Provides students with an in-depth perspective about a specific country or region outside the United States. The course can focus on a different region or country each time it is offered. If demand for this type of experience is strong, multiple sections of the course could be offered in a given semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6802 (3) Pricing Strategy and Tactics**
Pricing provides the means to capture value. The course covers theories, analytical tools and conceptual frameworks needed for devising price strategy as part of the value proposition for products and services. It draws upon principles from economics, marketing and psychology. Primary and secondary data based analysis is used to understand price response and competitive pricing. Substantive topics include customized pricing, price negotiations, bidding and auctions, price discounting, trade promotion, bundling, behavioral pricing, among others.
**Requisites:** Requires prerequisite courses of MBAC 6011, MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to MBAD, DMBA, JMBA, PMBA, SCMN or BUAN majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6806 (1.5-3) Global Perspectives**
Contrasting operations in US and a country or region outside the United States, students will study what changes US companies have made to successfully operate in foreign markets and how US companies have influenced foreign business operations. Reviews the history and present state of the inter-dependency between the domestic and international business environments. Culminates in a week-long trip to the country/region of study. Provides students with an in-depth perspective about a specific country or region outside the United States. The course can focus on a different region or country each time it is offered.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) majors only.
**Grading Basis:** Letter Grade

**MBAX 6815 (3) Sustainable Real Estate**
Explores techniques, processes, tools, and capabilities required to manage growth and land use change in the light of shifts beginning to transform the way we approach land use and real estate development.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Finance (FNCE-MS), or MS Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Real Estate

**MBAX 6827 (3) Integrated Reporting for Socially Responsible Strategies**
Explores the growing global trend of companies to measure, disclose and report for socially responsible initiatives. Integrated reporting combines financial, environmental, social and governance information into a single report. Current practices in sustainability and integrated reporting in the US and across the world will be examined through case studies, guest speakers, current literature and projects.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 5827
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6843 (3) Supply Chain and Operations Analytics**
Analyzes key issues related to the design and management of operations and supply chains using quantitative tools such as linear, integer, and non-linear programming, regression, and statistical analysis. Covers important topics such as forecasting, aggregate planning, inventory theory, transportation, risk pooling, production control and scheduling, and facilities location, among others. Uses mathematical modeling, spreadsheet analysis, case studies, and pedagogical simulations to deliver material.
**Requisites:** Restricted to Master of Busn Admin (MBAD), MBA w Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) Profl MBA Prog (PMBA), Business Analytics (BUAN-MS) or Supply Chain Mgmt (SCMN-MS) majors or SCAG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Operations and Production Management

**MBAX 6930 (3) Commercializing Sustainable Energy Technologies**
Addresses the opportunities and problems of commercializing new renewable energy technologies. Focuses on energy markets, opportunity identification, life cycle analysis, policy economics, project financing and economic analysis as they relate to bringing renewable energy technologies to market.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVM 5005
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), or MS Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade

**MBAX 6966 (1-3) Independent Study-Real Estate**
Independent study in the field of real estate.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Additional Information:** Departmental Category: MBA: Real Estate

## MS Business Core

**MSBC 5015 (1.5) Managerial Economics**
Studies the elements of the business firm's fundamental problem: how to maximize profits. Develops for each element managerial theory based upon introductory and intermediate level microeconomics. Analyzes various applications and misapplications of relevant concept, primarily through case studies. Differential calculus and statistics are used throughout the course.
**Requisites:** Restricted to Finance (FNCE-MS) or Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5020 (1.5) Financial Accounting**
Introduces the financial reporting system used by business organizations to convey information about their economic affairs. Develops an understanding of financial reports and what they tell about a business enterprise. Focuses on how alternative accounting measurement rules represent different economic events in financial reports.
**Requisites:** Restricted to Finance (FNCE-MS) or Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5031 (3) Quantitative Methods in Finance**
Covers foundations for statistical reasoning and statistical applications in business. Topics include graduate level treatment of descriptive statistics, probability, probability distributions, sampling theory and sampling distributions and statistical inference (estimation and hypothesis testing) applied to the field of finance. Provides an introduction to topics such as regression analysis, analysis of variance, time series forecasting, decision analysis, index numbers, and nonparametric methods.
**Grading Basis:** Letter Grade

**MSBC 5032 (3) Real Estate Data Analysis**
Covers foundations for statistical reasoning and statistical applications in business. Topics include graduate level treatment of descriptive statistics, probability, probability distributions, sampling theory and sampling distributions and statistical inference (estimation and hypothesis testing) applied to real estate. Provides an introduction to topics such as regression analysis, analysis of variance, time series forecasting, decision analysis, index numbers, and nonparametric methods.
**Requisites:** Restricted to REAL-MS students only.
**Grading Basis:** Letter Grade

**MSBC 5060 (3) Corporate Finance**
Analyzes the implications of modern finance theory for the major decisions faced by corporate financial managers. Develops the basic skills necessary to apply financial concepts to the various problems faced by a firm. Includes capital budgeting, capital structure, long term financing, short term financial management and financial planning topics.
**Requisites:** Restricted to Finance (FNCE-MS) or Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5070 (3) Survey of Business Analytics**
Designed as an introduction to Business Analytics, which considers the extensive use of data, methods and fact-based management to support and improve decision making. Business intelligence focuses on data handling, queries and reports to generate information associated with products, services and customers, business analytics uses data and models to explain business performance and how it can be improved. The class will be built on heavy hands-on coding; it will introduce and subsequently involve extensive use of Python.
**Requisites:** Restricted to MS Business Analytics (BUAN-MS) majors or MKAG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5180 (3) Machine Learning in Python**
This course exposes the students to commonly used platforms for statistical and predictive analytics. The class will go into depth of analytics using Python. Students will learn to analyze large datasets, including textual analytics such as twitter-stream analysis. The class will focus on predictive analytics.
**Requisites:** Restricted to Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade

**MSBC 5220 (3) Investment Management & Analysis**
Covers managing investment portfolios by blending academic theories and evidence with practitioner experience. Topics include risk and return relationships, securities, value theory (capital asset, arbitrage, and option pricing), portfolios, and performance evaluations.
**Requisites:** Restricted to Finance (FNCE-MS) or Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade

**MSBC 5235 (1.5) Finance Industry Academy**
This course provides finance industry perspectives, professional development, and information about finance industry careers for students in the MS finance program. The course complements the foundational material found in the rest of the MS finance curriculum with perspectives on how the MS finance skillset translates into varied careers in the finance industry. The course will draw heavily upon the finance industry perspective, the Burridge Center for Finance, and career resources at the Leeds school.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade

**MSBC 5460 (3) Supply Chain Strategy**
Introduces students to the fundamental principles underlying supply chains, and focuses on the integration with both operations and logistics.
**Equivalent - Duplicate Degree Credit Not Granted:** MBAX 6460
**Requisites:** Restricted to Supply Chain Management (SCMN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5480 (3) SCMN Experiential Projects**
Provides an opportunity to execute a project for a company, integrating course work knowledge in an applied capstone experience. Allows first hand exposure to the business analytics as both an observer and creator of the business analytics process. Students work closely with an area client company to solve an important business analytics problem under the close supervision of the instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Supply Chain Management (SCMN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5490 (3) BUAN Experiential Projects**
Provides an opportunity to execute a project for a company, integrating course work knowledge in an applied capstone experience. Allows first hand exposure to the business analytics as both an observer and creator of the business analytics process. Students work closely with an area client company to solve an important business analytics problem under the close supervision of the instructor.
**Requisites:** Restricted to Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5600 (1.5) Real Estate Principles**
The course provides students with an introduction to the foundational terms, concepts, principles, and formulas fundamental to the business of real estate. It establishes the foundation for other real estate courses. Course content includes legal concepts including property rights and title, mortgage loan types, calculations and decisions, an introduction to time value of money and income capitalization, and real estate investment valuation and decision making utilizing the most common income valuation methods. Instruction and course format are traditional lecture and conversational.
**Requisites:** Restricted to REAL-MS students only.
**Grading Basis:** Letter Grade

**MSBC 5610 (3) Real Estate Finance and Investment**
The primary objectives of this course are to: (1) describe, analyze, and compare the features of residential mortgage loans, commercial mortgage loans, and commercial leases; (2) conduct income property investment analyses and develop the technical competence necessary to structure basic real estate transactions; (3) understand the operations and valuations of private equity funds and real estate investment trusts (REITs), and how real estate is securitized and sold to everyday investors.
**Requisites:** Restricted to REAL-MS students only.
**Grading Basis:** Letter Grade

**MSBC 5635 (1.5) Real Estate Industry Academy**
Provides real estate industry perspectives about substantive topics and current events and trends, professional skills development, information and advice regarding real estate industry jobs and careers. By equipping students with the skills, knowledge, and networks necessary to pursue a career in real estate, the course complements the foundational material found in the rest of the MSRE curriculum. The course will draw heavily upon the expertise of our industry partners, CUREC, and career resources at Leeds.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to REAL-MS students only.
**Grading Basis:** Letter Grade

**MSBC 5680 (3) Optimization Modeling**
Focuses on formulating decision problems as mathematical models and employing computational tools to solve them. Microsoft Excel is used as the main modeling platform but the course will also cover advanced tools, such as modeling languages. Optimization modeling will be illustrated in problems associated with operations, marketing, management, and finance. Integrates topics from decision analysis and operations management as they relate to modeling management decisions.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Supply Chain Management (SCMN-MS) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade

## MS Business Electives

**MSBX 5080 (3) Decision Modeling and Applications**
Integrates topics from decision analysis and operations management as they relate to modeling management decisions. Field projects involve the university, local companies, and/or government agencies.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Supply Chain Management (SCMN-MS) or MS Business Analytics (BUAN-MS) majors only.

**MSBX 5205 (3) Financial Strategy and Decision Modeling**
Develops functional frameworks for analyzing and assessing uncertainty in real and financial assets and evaluating financial decisions under diverse scenarios. This course covers various methods of mapping uncertainty including binomial decision tree models, linear programming models and Monte-Carlo simulations. Further topics include tax consequences of these decisions.
**Requisites:** Restricted to Masters of Finance (FNCE-MS) and Masters of Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5225 (3) Advanced Portfolio Management**
Covers the management and construction of investment portfolios. Topics include performance and risk measures, identification of risk factors and the use of traditional and alternative assets classes including real estate, mutual funds, ETFs, venture capital funds, private equity funds and hedge funds. Additional topics include tax consequences of investment decisions and cash management.
**Equivalent - Duplicate Degree Credit Not Granted:** FNCE 4831
**Requisites:** Restricted to Master of Finance (FNCE-MS), Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5260 (3) Fixed Income Investing**
Fixed income securities are those that nominally promise a fixed stream of payments. They include government and corporate long and short term debt issues that far exceed the amount of corporate stock issues, as well as long term personal debt (i.e.,home mortgages). Develops practical analytical tools for describing risk and return in fixed income securities, the markets where they are traded, and their purchase and management by financial intermediaries. This course will utilize the Bloomberg Lab to provide students with real world fixed income security analysis.
**Requisites:** Requires prereqs MBAC 6060, MSBC 5060, or MSBC 5610 (min grade D-).Restricted to Master of Business Admin (MBAD), MBA w Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Profl MBA Program (PMBA), MS Finance (FNCE-MS) MS Real Estate (REAL-MS) mjrs onl
**Grading Basis:** Letter Grade

**MSBX 5270 (3) Applied Derivatives**
Covers applications of financial derivatives and a range of topics, from market risk management to liquidity and counter party risk management in contemporary finance. Specifically, the course examines the pricing and use of financial derivatives, including options, forwards, futures, swaps and credit derivatives in risk management.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade

**MSBX 5280 (3) Sustainable Finance**
Course materials draw from finance, economics, and law studies that analyze the theoretical and actual impact of ESG forces on firm outcomes. The course will be divided into two primary topics, namely (1) sustainable capital allocation (i.e. how firms manage their capital budgeting choices given ESG goals & the influence/role of activist investors in those decisions); (2) sustainable financing (i.e., how firms raise capital given ESG goals & the influence/role of passive socially responsible investing).
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade

**MSBX 5310 (3) Customer Analytics**
Provides a deep understanding of how to use data on customer behavior and preferences to inform managerial decision making. Introduces methods for causal inference, modeling consumer demand, and modeling firm decisions. Applications include long-run customer management decisions (customer acquisition and retention) and short-run marketing mix (product, price, promotion and distribution) decisions. The R programming language is used for course examples and assignments. Students are assumed to have a working knowledge of R and linear regression techniques.
**Requisites:** Restricted to Supply Chain Management (SCMN-MS) or Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5311 (2) Customer Analytics**
Provides a deep understanding of customer centricity and its implications for the firm; state-of-the art methods for calculating customer lifetime value and customer equity; analytical and empirical skills that are needed to judge the appropriateness, performance, and value of different statistical techniques that can be used to address a issue around customer acquisition, development, and retention. Students will use their knowledge of R programming in this course.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MSBX 5320 (3) Digital Advertising**
Covers both traditional and emerging digital advertising methods, the popular platforms used to execute ads, and the leading analytic tools that can be used to assess advertising performance. Core advertising platforms covered include search, display, social media, native advertising, sponsored content and mobile. This class focuses on best practices and Key Performance Indicators that go with each advertising platform. Department consent required.
**Requisites:** Restricted to MS Business Analytics (BUAN-MS) majors or MKAG-CERG students only.
**Grading Basis:** Letter Grade

**MSBX 5405 (3) Structured Data Modeling and Analysis**
Explores both the functional and technical environment for the creation, storage and use of the most prevalent source and type of data for business analysis, ERP and related structured data. Students will learn how to access and leverage information via SQL for analysis, aggregation to visualization, create dashboards, and be source for business intelligence.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA w/ Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Supply Chain Management (SCMN-MS) or MS Business Analytics (BUAN-MS) majors BAMG-CERG, SCAG-CERG students only
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5410 (3) Fundamentals of Data Analytics**
Exposes the students to commonly used platforms for statistical and predictive analytics. The class will go into depth of analytics using R before demonstrating the same concepts using SPSS and SAS. Students will learn to analyze large datasets, including textual analytics such as twitter-stream analysis using R.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA (PMBA), MS Supply Chain Management (SCMN-MS), MS Business Analytics (BUAN-MS) or (SCAG-CERG) or (BAMG-CERG) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5415 (3) Advanced Data Analytics**
Explores the capabilities and challenges of data-driven business decision making and prepares students to lead in analytics-driven organizations. Introduces a set of common predictive and prescriptive analytics tools. Students apply the analytics tools to important decisions based on practical data sets from various companies. Analytics software packages are used extensively in the course.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA (PMBA), MS Supply Chain Management (SCMN-MS), MS Business Analytics (BUAN-MS) or (SCAG-CERG) or (BAMG-CERG) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5420 (3) Unstructured and Distributed Data Modeling and Analysis**
Moves the student beyond structured data and sources into business scenarios where data is semi-structured to unstructured such as those from social and web applications. Specific topics include introduction to SQL-on-Hadoop, NoSQL and related distributed processing technologies. Students will learn practical application and mechanisms for getting this sort of data ready for analytics.
**Requisites:** Requires prereq course MSBX 5405 (min grade D-). Restricted to Master of Business Admn (MBAD), MBA w/ Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Profl MBA Program (PMBA) Supply Chain Mgmnt (SCMN) or Business Analytcs (BUAN) or BAMG-CERG mjrs onl
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5425 (3) Natural Language Processing for Healthcare Analytics**
Practitioners of natural language processing (NLP) use methods from math, science, engineering and linguistics to teach computers to understand human language. Because much biomedical information is stored as text, there are many possible applications of NLP in health sciences. This course offers an introduction to NLP for the health sciences. Students will gain a conceptual and hands-on introduction to fundamental tools, concepts and problems from NLP by exploring applications in healthcare, population health and biomedicine.
**Requisites:** Requires prerequisite courses of MSBC 5070 and MSBC 5180 (minimum grade D-).
**Recommended:** Prerequisite Python 3.
**Grading Basis:** Letter Grade

**MSBX 5430 (3) Advanced Statistical Analysis**
Introduces advanced multivariate regression analysis and residual diagnostics, logistic regression, analysis of variance (ANOVA and MANOVA), time series models, and analysis of categorical variables. R, an open source programming language for statistical computing and graphics, will be used. It is assumed students have mastery of introductory statistics topics including descriptive tools, inference, and ordinary least squares regression.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5435 (1.5-3) Planning and Production**
At the core of GDP and productivity is the science of planning new products of services in design, bringing them to market then producing and replicating it in reliable, dependable, scalable fashion. The course takes an in-depth look at the mechanisms for supporting new product/process design in a scaled, often world-wide supply chain. (MRP, Six Sigma, Modeling Software, Heuristic Model use).
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) majors or SCFG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5440 (3) Decision Analysis**
Covers both behavioral/psychological aspects and analytical approaches to making decisions with multiple objectives. The focus for the course is learning to frame decisions that involve multiple stakeholders with multiple objectives and then learning the various techniques used to evaluate the choices. Influence diagrams, decision heuristics using spreadsheets, and decision trees will all be explored with user-friendly decision tree software.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Supply Chain Management (SCMN-MS) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5450 (3) Transportation and Logistics**
Examines critical elements of distribution and logistics management, including physical distribution, supply chain echelon planning, warehouse (transportation note) selection and location, material handling, inventory quantity and location and other topics.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) majors or SCFG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5470 (1.5-3) Procurement and Contracting**
Examines principles and concepts of the acquisition process from commercial and governmental perspectives, focusing on the procurement process, including planning, source selection, solicitation writing, negotiations and oral discussions, contract preparation and administration.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) majors or SCFG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5605 (3) Real Estate Investment and Risk Management**
This course empowers students with the knowledge and tools needed to understand, evaluate, and manage real estate investment risk and to recognize and capitalize upon potential real estate investment opportunities. We begin by exploring the types of risk investors face in residential real estate, mortgages, and investment properties and how to quantify those risks. With that foundation, we then delve into the history of such risks (e.g., the Great Depression, Great Recession, etc.) and regulations intended to address them. Finally, we explore current topics which are increasingly important in real estate (e.g., climate change, technology, ¿) including the risks and/or opportunities these challenges may present.
**Requisites:** Requires prerequisite course MBAX 6610 or MSBC 5610 (min grade D-). Restricted to Master's students in Real Estate (REAL), Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Profl MBA Program (PMBA) majors onl
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5615 (1.5-3) Real Estate Modeling**
Real Estate Modeling and Analysis is a graduate level course which will teach students skills necessary to model Real Estate proformas to aid in valuation of acquisition and development of commercial real estate assets. The course will engage three software programs: Excel, Argus [¿Commercial Real Estate Software¿] and CoStar [¿largest commercial real estate information and analytics provider¿].
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), or MS Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade

**MSBX 5680 (3) Real Estate Technology**
Course objectives are: (1) to understand economic forces that bridge technology, entrepreneurship and real estate; (2) to investigate short-, medium-, and lung-run effects of technology on residential and commercial real estate; (3) to communicate this information to Leeds School of Business students; and (4) to give current students the technology skills necessary to immediately add value for their potential employers.
**Requisites:** Restricted to Master's students in Real Estate (REAL), Master of Business Admin (MBAD), MBA with DUAL Degree (DMA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only, or business majors with 80 completed units.

**MSBX 5820 (1-3) Special Topics in Accounting**
Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the standard graduate business curriculum.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 5820
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade

**MSBX 6290 (3) Textual Analysis in Business**
This course will discuss basic ideas around natural language processing (NLP) in research in different "dismal science" disciplines, from Economics to Psychology and Political Science, with a bent/focus on financial markets and accounting statements. The course is meant for graduate students as an introductory course on textual analysis, with an emphasis on methods and applications in Finance and Accounting. The language of choice for the course will be R. The course will be multilingual in that both the faculty and students can use other languages than R (python/perl/C).
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 6290
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Recommended:** Prerequisite MBAC 6060 or MSBC 5060 (minimum grade D-).
**Grading Basis:** Letter Grade

# Business Administration

The Leeds School of Business holds accreditation by the Association to Advance Collegiate Schools of Business (AACSB-International). The Leeds School of Business offers programs leading to the following degrees:

- Master of Business Administration (MBA)
  - Traditional, full-time program
  - Programs for working professionals (Evening MBA, Hybrid MBA, Executive MBA)
- Master of Science (MS) in the following fields:
  - Accounting
  - Business Analytics (tracks in healthcare analytics and decision science)
  - Marketing Analytics
  - Finance (tracks in corporate finance, investment management and sustainable finance)
  - Real Estate
  - Supply Chain Analytics
  - Taxation
- Doctor of Philosophy (PhD)

These programs are open to qualified individuals who hold a bachelor's degree from a regionally accredited college or university, or a recognized international university, without regard to their undergraduate major.

Dual degree options available in the full-time traditional MBA program include the following, contingent upon independent admission to both degree programs:

- MBA/JD (p. 1885)
- MBA/MD (https://medschool.cuanschutz.edu/education/md-admissions/about-cu-school-of-medicine/joint-degree-programs/)
- MBA/MA in Anthropology (p. 1138)
- MBA/MFA in Art Practices (p. 1168)
- MBA/MFA in Dance (p. 1422)
- MBA/MS in Environmental Studies (p. 1255)
- MBA/Masters of the Environment (https://www.colorado.edu/menv/)
- MBA/MA in German Studies (p. 1298)
- MBA/MA in Theatre (p. 1426)
- MBA/MS STEM (Business Analytics (https://www.colorado.edu/business/ms-programs/masters-program-business-analytics/) or Supply Chain Management (https://www.colorado.edu/business/ms-programs/masters-program-supply-chain-analytics/))

## Master's Degrees

- Business Administration - Master of Business Administration (MBA) (p. 1486)
- Accounting - Master of Science (MS) (p. 1494)
- Business Analytics - Master of Science (MS) (p. 1495)
- Finance - Master of Science (MS) (p. 1496)
- Real Estate - Master of Science (MS) (p. 1499)
- Supply Chain Management - Master of Science (MS) (https://catalog.colorado.edu/graduate/colleges-schools/business/programs-study/supply-chain-management-master-science-ms/)
- Taxation - Master of Science (MS) (p. 1502)

## Doctoral Degree

- Business Administration - Doctor of Philosophy (PhD) (p. 1493)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Adams, Heather L. (https://experts.colorado.edu/display/fisid_143714/)
Associate Chair, Faculty Director, Senior Instructor; PhD, University of Maryland, College Park

Alston, Eric Christopher (https://experts.colorado.edu/display/fisid_158159/)
Scholar in Residence; JD, University of Chicago

André, Quentin (https://experts.colorado.edu/display/fisid_166737/)
Assistant Professor; PhD, INSEAD (France)

Appenzeller, William
Professor Emeritus

Auslander, Bonnie (https://experts.colorado.edu/display/fisid_158273/)
Instructor; MFA, University of Massachusetts

Balkin, David B. (https://experts.colorado.edu/display/fisid_105481/)
Professor; PhD, University of Minnesota Twin Cities

Ballantine, John T. Jr. (https://experts.colorado.edu/display/fisid_102703/)
Senior Instructor; JD, University of Colorado Boulder

Bangs, F. Kendrick
Professor Emeritus

Banks, Cynthia (https://experts.colorado.edu/display/fisid_158245/)
Instructor, Faculty Director; MS, University of Colorado Denver

Bei, Xiaoshu (https://experts.colorado.edu/display/fisid_165170/)
Assistant Professor; PhD, Duke University

Bennett, Douglas P. (https://experts.colorado.edu/display/fisid_149983/)
Instructor; JD, George Washington University

Bercovitz, Janet (https://experts.colorado.edu/display/fisid_159339/)
Professor; PhD, University of California, Berkeley

Bernstein, Asaf (https://experts.colorado.edu/display/fisid_157738/)
Assistant Professor; BS, Harvey Mudd College

Bernthal, Wilmar F.
Professor Emeritus

Bhagat, Sanjai (https://experts.colorado.edu/display/fisid_100789/)
Professor; PhD, University of Washington

Biegelsen, Casey (https://experts.colorado.edu/display/fisid_166072/)
Instructor; MBA, University of Colorado Boulder

Billings, Stephen B. (https://experts.colorado.edu/display/fisid_157918/)
Associate Professor, Faculty Director; PhD, University of Colorado Boulder

Bone, Jennifer Emerling (https://experts.colorado.edu/display/fisid_158206/)
Instructor, Associate Chair; PhD, University of Colorado Boulder

Boss, Russel Wayne (https://experts.colorado.edu/display/fisid_105260/)
Professor, Chair; PhD, University of Georgia

Brown, Daniel (https://experts.colorado.edu/display/fisid_152029/)
Senior Instructor; D.Phil, Oxford University

Buchman, Thomas A. (https://experts.colorado.edu/display/fisid_101677/)
Professor Emeritus; PhD, University of Illinois at Urbana-Champaign

Buffa, Andrea (https://experts.colorado.edu/display/fisid_167152/)
Assistant Professor; PhD, London Business School

Bumbaca, Frederico (https://experts.colorado.edu/display/fisid_163475/)
Assistant Professor; PhD, University of California, Irvine

Campbell, Kimberly D. (https://experts.colorado.edu/display/fisid_158160/)
Instructor; PhD, Howard University

Campbell, Margaret Catherine
Professor Emerita; PhD, Stanford University

Carbone, Christopher (https://experts.colorado.edu/display/fisid_158166/)
Instructor; MFA, University of Baltimore

Carson, Visda (https://experts.colorado.edu/display/fisid_158296/)
Instructor; MBA, University of Colorado, Leeds School of Business

Cateora, Phillip R.
Professor Emeritus

Chari, Mukund (https://experts.colorado.edu/display/fisid_159141/)
Assistant Professor; PhD, University of Washington

Christoff, Lorna Colleen (https://experts.colorado.edu/display/fisid_146614/)
Instructor; JD, University of Denver

Cookson, John Anthony (https://experts.colorado.edu/display/fisid_152874/)
Associate Professor, Faculty Director; PhD, University of Chicago

Correll, Mark R.
Professor Emeritus

Cropanzano, Russell Salvador (https://experts.colorado.edu/display/fisid_151710/)
Professor, Chair, Endowed/Named Professor; PhD, Purdue University

Cunningham, Cory (https://experts.colorado.edu/individual/fisid_158270/)
Instructor; PhD, University of Oklahoma

Darnell, Jerome C.
Professor Emeritus

Davies, Shaun William (https://experts.colorado.edu/display/fisid_152995/)
Assistant Professor; PhD, University of California, Los Angeles

Demaree, John D.
Professor Emeritus

Donchez, Robert M. (https://experts.colorado.edu/display/fisid_101267/)
Senior Instructor, Faculty Director; MBA, Fordham University

Donohew, Zachary (https://experts.colorado.edu/display/fisid_164033/)
Scholar in Residence

Drake, David Francis (https://experts.colorado.edu/display/fisid_163641/)
Assistant Professor; PhD, INSEAD (France)

Eargle, David (https://experts.colorado.edu/display/fisid_159053/)
Assistant Professor; PhD, University of Pittsburgh

Edwards, Emily (https://experts.colorado.edu/display/fisid_153378/)
Senior Instructor, Associate Chair; MBA, University of Colorado Denver

Engel, Steven
Professor Emeritus

Ertimur, Yonca (https://experts.colorado.edu/display/fisid_151585/)
Professor, Associate Dean; PhD, New York University

Fernbach, Philip M. (https://experts.colorado.edu/display/fisid_149786/)
Associate Professor, Faculty Director; PhD, Brown University

Fisher, Christina Marie (https://experts.colorado.edu/display/fisid_158798/)
Instructor; MS, University of Delaware

Frederick, David M.
Professor Emeritus: Leeds School of Business

Gallagher, Emily Anne (https://experts.colorado.edu/display/fisid_163544/)
Assistant Professor; PhD, Paris School of Economics

Garcia, Diego (https://experts.colorado.edu/display/fisid_156036/)
Professor, Endowed Chair; PhD, University of California, Berkeley

Garnand, John J.
Professor Emeritus

Gasta, Mark (https://experts.colorado.edu/display/fisid_165314/)
Instructor; PhD, Pepperdine University

Gladstone, Joe (https://experts.colorado.edu/display/fisid_166596/)
Assistant Professor; PhD, University of Cambridge (England)

Glover, Fred W.
Professor Emeritus

Goeldner, Charles R.
Professor Emeritus

Gordon, Kenneth R.
Professor Emeritus

Gross, David Michael (https://experts.colorado.edu/display/fisid_109026/)
Senior Instructor, Faculty Director, Associate Chair; PhD, University of Colorado Boulder

Gwozdz, Ronald Scott (https://experts.colorado.edu/display/fisid_144830/)
Instructor; MBA, University of Colorado Boulder

Hawk, Ashton Lewis (https://experts.colorado.edu/display/fisid_157915/)
Assistant Professor; PhD, New York University

He, Chuan (https://experts.colorado.edu/display/fisid_124857/)
Associate Professor; PhD, Washington University

Hekman, David R. (https://experts.colorado.edu/display/fisid_151359/)
Associate Professor; PhD, University of Washington

Higgins, Brian Edmund (https://experts.colorado.edu/display/fisid_156515/)
Instructor; JD, University of Denver

Ikenberry, David L. (https://experts.colorado.edu/display/fisid_149340/)
Professor; PhD, University of Illinois at Urbana-Champaign

Jackson, Betty R.
Professor Emerita

Jedamus, Paul E.
Professor Emeritus

Jennings, Tracy M. (https://experts.colorado.edu/display/fisid_128765/)
Senior Instructor, Faculty Director; PhD, University of Denver

Jensen, Howard G.
Professor Emeritus

Johnson, Stefanie Kathleen (https://experts.colorado.edu/display/fisid_153813/)
Associate Professor, Faculty Fellow; PhD, Rice University

Kennedy, Heather (https://experts.colorado.edu/display/fisid_157932/)
Instructor, Scholar in Residence; MA, University of Texas at Austin

Khoshsokhan, Sina (https://experts.colorado.edu/display/fisid_167155/)
Assistant Professor; PhD, Boston University

Koberg, Christine S.
Associate Professor Emerita

Koc, Ozlem (https://experts.colorado.edu/display/fisid_158324/)
Instructor; PhD, Georgia State University

Kolb, Burton A.
Professor Emeritus

Kornish, Laura Joyce (https://experts.colorado.edu/display/fisid_139966/)
Professor, Associate Dean; PhD, Stanford University

Kozar, Kenneth A.
Professor Emeritus

Kwaramba, Marcia (https://experts.colorado.edu/display/fisid_164299/)
Scholar in Residence; PhD, Monash University (Australia)

Lacerenza, Christina Noelle (https://experts.colorado.edu/display/fisid_159797/)
Assistant Professor; PhD, Rice University

Laguna, Manuel (https://experts.colorado.edu/display/fisid_102975/)
Professor, Faculty Director, Endowed/Named Professor; PhD, University of Texas at Austin

Larsen, Kai Rune (https://experts.colorado.edu/display/fisid_118160/)
Associate Professor, Faculty Director; PhD, SUNY at Albany

Laurion, Henry R. (https://experts.colorado.edu/display/fisid_163642/)
Assistant Professor; PhD, University of California, Berkeley

Lawrence, Stephen R. (https://experts.colorado.edu/display/fisid_102032/)
Associate Professor; PhD, Carnegie Mellon University

Leach, Chris (https://experts.colorado.edu/display/fisid_105152/)
Professor, Endowed/Named Professor; PhD, Cornell University

Lee, Jintae (https://experts.colorado.edu/display/fisid_115390/)
Associate Professor Emeritus; PhD, Massachusetts Institute of Technology

Lewis, Barry L.
Professor Emeritus

Lewis, Mary Beth (https://experts.colorado.edu/display/fisid_153829/)
Senior Instructor Emerita; MBA, University of Pittsburgh

Lewis, Ryan C. (https://experts.colorado.edu/display/fisid_157865/)
Assistant Professor; PhD, London Business School (England)

Lichtenstein, Donald (https://experts.colorado.edu/display/fisid_101701/)
Professor, Chair; PhD, University of South Carolina

Lionberger, Erin Leigh (https://experts.colorado.edu/display/fisid_167647/)
Instructor; MS, South Dakota State University

Liu, Liu (https://experts.colorado.edu/display/fisid_163568/)
Assistant Professor; PhD, New York University

Lord, Kimberly E.
Lecturer

Lynch, John G. (https://experts.colorado.edu/display/fisid_147448/)
Faculty Director, Professor, Associate Dean, Endowed/Named Professor, Distinguished Professor; PhD, University of Illinois at Chicago

Macaluso, Gregg Richard (https://experts.colorado.edu/display/fisid_123302/)
Instructor Emeritus; MS, University of California, Irvine

Macfee, Raymond D. Jr.
Professor Emeritus

Maciszewski, Michael (https://experts.colorado.edu/display/fisid_153223/)
Instructor; JD, University of Denver

Marshall, Nathan Thomas (https://experts.colorado.edu/display/fisid_156034/)
Assistant Professor; PhD, Indiana University Bloomington

Matusik, Sharon Marie Frances (https://experts.colorado.edu/display/fisid_133564/)
Professor, Dean; PhD, University of Washington

Maxwell, Christopher (https://experts.colorado.edu/display/fisid_164956/)
Instructor; BS, Colorado State University

McGraw, Albert Peter (https://experts.colorado.edu/display/fisid_133262/)
Professor; PhD, Ohio State University

McMahon, Kevin Christopher (https://experts.colorado.edu/display/fisid_143892/)
Senior Instructor; MBA, Indiana University

McNown, Robert F.
Professor Emeritus

Melicher, Ronald W. (https://experts.colorado.edu/individual/deptid_10255/)
Professor Emeritus: Leeds School of Business

Merrell, Jeffery C. (https://experts.colorado.edu/individual/fisid_156158/)
Senior Instructor; PhD, University of Colorado Boulder

Meyer, G. Dale
Professor Emeritus

Mohr, Pete J. (https://experts.colorado.edu/display/fisid_155498/)
Senior Instructor; MS, Colorado State University

Montealegre, Jose Ramiro (https://experts.colorado.edu/display/fisid_100072/)
Professor; DBA, Harvard University

Moon, Katie Seoyeon (https://experts.colorado.edu/display/fisid_157680/)
Assistant Professor; PhD, University of Maryland

Morley, Susan (https://experts.colorado.edu/display/fisid_116716/)
Senior Instructor; JD, University of Colorado Boulder

Moyen, Nathalie (https://experts.colorado.edu/display/fisid_113873/)
Professor, Chair; PhD, University of British Columbia (Canada)

Mueller, Erick Michael (https://experts.colorado.edu/display/fisid_140940/)
Senior Instructor, Faculty Director; MBA, University of Colorado Boulder

Neil, Josh (https://experts.colorado.edu/display/fisid_152068/)
Senior Instructor, Faculty Director; MS, Oklahoma State University

Nelson, James E.
Professor Emeritus

Nelson, Thomas Cavett (https://experts.colorado.edu/display/fisid_116011/)
Senior Instructor Emeritus; PhD, University of Colorado Boulder

Nunziato, Joshua (https://experts.colorado.edu/display/fisid_164373/)
Instructor; PhD, Villanova University

Oest, Donald G. (https://experts.colorado.edu/display/fisid_146623/)
Senior Instructor; MBA, Fairleigh Dickinson University

Palmer, Michael
Professor Emeritus

Papuzza, Antonio (https://experts.colorado.edu/display/fisid_145295/)
Senior Instructor; PhD, University of Florence (Italy)

Packer, Richard C. (https://experts.colorado.edu/display/fisid_166139/)
Lecturer

Parkin, Don
Professor Emeritus

Ravishankar, G. Ravi (https://experts.colorado.edu/display/fisid_144567/)
Scholar in Residence, Faculty Director; MBA, Massachusetts Institute of Technology

Reinholtz, Nicholas S. (https://experts.colorado.edu/display/fisid_155180/)
Assistant Professor; PhD, Columbia University

Reznicek, Birdie C. (https://experts.colorado.edu/display/fisid_149091/)
Instructor, Associate Chair; MBA, Northwestern University

Richey, Clyde W.
Professor Emeritus

Ringgenberg, Ralph G.
Professor Emeritus

Rock, Steven Karl (https://experts.colorado.edu/display/fisid_113689/)
Associate Professor, Chair; PhD, Pennsylvania State University

Rodgers, Timothy (https://experts.colorado.edu/display/fisid_155460/)
Instructor; PhD, University of California, Santa Cruz

Rogers, Jonathan Lawrence (https://experts.colorado.edu/display/fisid_153009/)
Professor, Endowed/Named Professor; PhD, University of Pennsylvania

Rosse, Joseph G.
Professor Emeritus: Leeds School of Business

Schattke, Rudolph
Professor Emeritus

Schaub, Kevin D. (https://experts.colorado.edu/display/fisid_144142/)
Senior Instructor, Faculty Director; MBA, University of Colorado Boulder

Schonberger, Bryce (https://experts.colorado.edu/display/fisid_167332/)
Assistant Professor; PhD, University of Southern California

Sears, Curtis R. (https://experts.colorado.edu/display/fisid_145482/)
Senior Instructor, Faculty Fellow, Endowed/Named Professor; JD, University of Colorado Boulder

Selto, Frank
Professor Emeritus

Seward, Lori Elizabeth (https://experts.colorado.edu/display/fisid_113934/)
Senior Instructor, Faculty Director; PhD, Virginia Polytechnic Institute and State University

Shriver, Scott Kennedy (https://experts.colorado.edu/display/fisid_158937/)
Assistant Professor; PhD, Stanford University

Shukri, Salma Tariq (https://experts.colorado.edu/display/fisid_158219/)
Instructor; PhD, University of Denver

Smith, Julie Scher (https://experts.colorado.edu/display/fisid_166064/)
Instructor; MBA, University of Chicago

Sorenson, Ralph Z.
Professor Emeritus

Spinetto, Richard D.
Professor Emeritus

Stanton, William J.
Professor Emeritus

Starn, Harry Mohr (https://experts.colorado.edu/display/fisid_160803/)
Senior Instructor, Faculty Director; MS, University of Colorado Boulder

Stephan, Andrew Perry (https://experts.colorado.edu/display/fisid_159297/)
Assistant Professor; PhD, Northwestern University

Stephenson, Craig A. (https://experts.colorado.edu/display/fisid_144851/)
Senior Instructor; PhD, University of Arizona

Stutzer, Michael J. (https://experts.colorado.edu/display/fisid_126711/)
Professor Emeritus; PhD, University of Minnesota Twin Cities

Taylor, Robert H.
Professor Emeritus

Thibodeau, Thomas G. (https://experts.colorado.edu/display/fisid_134750/)
Professor Emeritus; PhD, SUNY at Stony Brook

Tice, Frances M. (https://experts.colorado.edu/display/fisid_156018/)
Assistant Professor; PhD, Texas A&M University

Tong, Wenfeng (https://experts.colorado.edu/display/fisid_144520/)
Professor, Chair; PhD, The Ohio State University

Tracy, John A.
Professor Emeritus

Urrea, Gloria (https://experts.colorado.edu/display/fisid_165311/)
Assistant Professor; PhD, Università della Svizzera italiana, Switzerland

Van Wesep, Edward D. (https://experts.colorado.edu/display/fisid_154573/)
Associate Professor; PhD, Stanford University

Vargo, Christopher (https://experts.colorado.edu/display/fisid_158320/)
Associate Professor; PhD, University of North Carolina

Volpone, Sabrina D. (https://experts.colorado.edu/display/fisid_158941/)
Associate Professor; PhD, Temple University

Vossen, Thomas Wilhelmus (https://experts.colorado.edu/display/fisid_126642/)
Associate Professor; PhD, University of Maryland, College Park

Wang, Clare (https://experts.colorado.edu/display/fisid_165260/)
Associate Professor, Faculty Director; PhD, University of Pennsylvania, The Wharton School

Wang, Yanwen
Assistant Professor; PhD, Emory University

Wang, Zhiyi (https://experts.colorado.edu/display/fisid_167339/)
Assistant Professor; PhD, National University of Singapore (Singapore)

Waters, Brian Todd (https://experts.colorado.edu/display/fisid_155846/)
Assistant Professor; PhD, University of California, Los Angeles

Wenger, Paula (https://experts.colorado.edu/display/fisid_113621/)
Senior Instructor; MA, Miami University–Oxford

Werner, Walter Bradley (https://experts.colorado.edu/display/fisid_158225/)
Instructor, Faculty Director; MBA, University of Chicago

Williams, Lawrence Edwin Jr. (https://experts.colorado.edu/display/fisid_145743/)
Associate Professor; PhD, Yale University

Winn, Daryl
Professor Emeritus

Wobbekind, Richard (https://experts.colorado.edu/display/fisid_100997/)
Associate Dean, Lecturer; PhD, University of Colorado Boulder

Yao, Xin
Assistant Professor; PhD, University of Washington

Yilmaz, Ovunc (https://experts.colorado.edu/display/fisid_167064/)
Assistant Professor; PhD, University of South Carolina - Colombia

York, Jeffrey Glenn (https://experts.colorado.edu/display/fisid_148387/)
Associate Professor, Chair, Faculty Director; PhD, University of Virginia

Zechman, Sarah Louise Center (https://experts.colorado.edu/display/fisid_156016/)
Professor, Chair, Faculty Fellow; PhD, University of Pennsylvania

Zender, Jaime (https://experts.colorado.edu/display/fisid_122563/)
Professor, Endowed/Named Professor, Chair; PhD, Yale University

Zhang, Dan (https://experts.colorado.edu/display/fisid_149619/)
Professor, Faculty Director; PhD, University of Minnesota Twin Cities

Zhang, Huanan (https://experts.colorado.edu/display/fisid_167063/)
Assistant Professor; PhD, University of Michigan Ann Arbor

Zhang, Rui (https://experts.colorado.edu/display/fisid_157866/)
Assistant Professor; PhD, University of Maryland

Zhang, Xingtan (https://experts.colorado.edu/display/fisid_159295/)
Assistant Professor; PhD, University of Pennsylvania

Zikmund, Noah
Senior Instructor; MBA, University of Tulsa

# Courses

**ACCT 5100 (3) Oil and Gas Accounting**
This course introduces students to the oil and gas industry and its unique accounting and finance issues. The course will introduce oil and gas terminology, analyze the components of an income statement, present book and tax accounting differences and enable you to prepare an economic purchase evaluation for oil and gas producing assets. We will review, discuss and debate current issues relating to the energy industry. Previously offered as a special topics course.
**Recommended:** ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.
**Grading Basis:** Letter Grade

**ACCT 5120 (3) Business Analytics**
Teaches cutting-edge tools and approaches to the analysis of data, including "big data" for effective decision-making. Creates data connoisseurs through hands-on exposure to exploratory and predictive analytics. Application areas covered include Web Marketing, the Internet of Things, Biometric Monitoring, as well as data integration and analysis for online marketing, human resources and operations.
**Requisites:** Restricted to MS Accounting (ACCT-MS) and MS Taxation (ACTX-MS) students
**Grading Basis:** Letter Grade

**ACCT 5240 (3) Advanced Financial Accounting**
Examines advanced financial accounting theory and practice, emphasizing U.S. and international accounting for business combinations, consolidated financial statements, and accounting for partnerships, not-for-profits and governments.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 4240
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.

**ACCT 5250 (3) Financial Statement Analysis**
Focuses on the use of U.S. and international accounting information by decision-makers external to the firm. Considers judgments made by investors, security analysts, bank lending officers, and auditors. Emphasizes impact of changes to financial statement elements, equity valuation and profitability analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 4250
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.

**ACCT 5450 (3) Income Taxation of Business Entities**
Provides an overview of the taxation of business entities. Examines the tax consequences of forming and operating regular corporations, partnerships, limited liability companies, and S corporations.
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.

**ACCT 5540 (3) Accounting Information Systems**
Considers the interaction of accountants with information systems and the role of accounting information systems in business processes. Focuses on the tools used by accountants and provides an understanding of accounting as an information system.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 4540
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.

**ACCT 5550 (3) Data Analytics for Accounting**
Exploration of key components of Data Analytics that are of particular utility to accountants. This course has 2 primary elements to it: (1) Describe the Analytics process using an established data analytics model called the IMPACT cycle, and (2) Illustrate the process in audit, managerial accounting, and financial reporting.
**Requisites:** Requires prerequisite or corequisite course of ACCT 4620 or ACCT 5620 (minimum grade D-). Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.
**Grading Basis:** Letter Grade

**ACCT 5620 (3) Auditing and Assurance Services**
Emphasizes the value of assurance services, including the market for financial-statement audits, and the audit decision process, from obtaining a client through planning and testing, to issuance of the audit report. Focuses on making judgments and decisions under conditions of uncertainty and continually evaluating the substance of business transactions over their form.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 4620
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.

**ACCT 5820 (3) Topics in Business**
Offered irregularly to provide opportunity for investigation of new frontiers in accounting.
**Equivalent - Duplicate Degree Credit Not Granted:** MSBX 5820
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.
**Grading Basis:** Letter Grade

**ACCT 5827 (3) Integrated Reporting for Socially Responsible Strategies**
Explores the growing global trend of companies to measure, disclose and report for socially responsible initiatives. Integrated reporting combines financial, environmental, social and governance information into a single report. Current practices in sustainability and integrated reporting in the US and across the world will be examined through case studies, guest speakers, current literature and projects. Can be taken concurrently with ACCT 3220.
**Equivalent - Duplicate Degree Credit Not Granted:** MBAX 6827
**Requisites:** Restricted to students with one of the following plans: ACCT-MS, ACTX-MS; or subplan: C-ACCT, C-ACCTACTX, C-FNCEACCT, C-FNCEACTX

**ACCT 6000 (1-3) Academic Internship in Accounting**
Offers students the opportunity to gain professional work experience in an accounting or tax position while still in school. Provides academically relevant work experience that complements students' studies and enhances their career potential. Includes lectures and a course paper. Students may not preregister for this course, and they must contact the Director of the concurrent degree program in accounting for approval. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with one of the following plans: ACCT-MS, ACTX-MS; or subplan: C-ACCT, C-ACCTACTX, C-FNCEACCT, C-FNCEACTX

**ACCT 6250 (3) Financial Statement Analysis**
Focuses on the use of accounting information by decision makers external to the firm. Considers judgments made by security analysts, bank lending officers and auditors. Emphasizes impact of changes to financial statement elements, profitability analysis and equity valuation.
**Equivalent - Duplicate Degree Credit Not Granted:** MBAX 6710
**Requisites:** Requires prerequisite course of ACCT 5250 or MBAC 6020 (minimum grade D-).

**ACCT 6260 (3) Seminar: Managerial Accounting**
Explores cost management, especially as related to organizational decision making, planning, and control. Emphasizes case analysis and applications.
**Requisites:** Requires prerequisite course of MBAC 6020 (minumum grade D-).

**ACCT 6290 (3) Textual Analysis in Business**
This course will discuss basic ideas around natural language processing (NLP) in research in different "dismal science" disciplines, from Economics to Psychology and Political Science, with a bent/focus on financial markets and accounting statements. The course is meant for graduate students as an introductory course on textual analysis, with an emphasis on methods and applications in Finance and Accounting. The language of choice for the course will be R. The course will be multilingual in that both the faculty and students can use other languages than R (python/perl/C).
**Equivalent - Duplicate Degree Credit Not Granted:** MSBX 6290
**Recommended:** restricted to ACCT-MS and ACTX-MS students.
**Grading Basis:** Letter Grade

**ACCT 6350 (3) Current Issues in Professional Accounting--Accounting Ethics**
Examines the nature of accounting theory and practice from perspectives of economics, law, globalization, accounting, ethics, and moral reasoning. Also explores issues including implications of institutional factors, such as Sarbanes-Oxley, SEC, FASB, IFRS, and capital markets. Counts as senior seminar for Concurrent degree students.
**Requisites:** Restricted to Accounting, Taxation, Finance/Accounting, or Accounting/Taxation students only.

**ACCT 6420 (3) Research and Writing in Income Taxation**
Provides a working knowledge of online tax research methodology. Examines the sources of tax authority in researching a tax question. Develops legal writing skills using the CREAC form of writing.
**Requisites:** Requires a prerequisite course of ACCT 5450 (minimum grade D-). Restricted to MS-ACTX or C-ACCTACTX or C-FNCEACTX students only.

**ACCT 6430 (3) Taxation of Partnerships**
Studies federal income taxation of pass-through entities such as those used by most small businesses in the U.S. Includes creation, operation, distributions, sale of interests and liquidation.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 6167
**Requisites:** Requires prerequisite course of ACCT 5450 (min grade D-). Restricted to MS-ACCT or MS-ACTX or C-ACCTACTX or C-FNCEACTX students only.

**ACCT 6450 (3) Taxation of Corporations**
Studies federal income taxation related to taxable corporations, the entities through which a large part of the economic activity in the U.S. is conducted. Includes creation, operation, distributions, sale of interests and liquidation.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 6157
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-ACCTACTX or C-FNCEACTX students only. Requires prerequisite course of ACCT 5450 (min grade D-).

**ACCT 6620 (3) Advanced Auditing: Business Risk and Decision Analysis**
Explores contemporary issues, historical developments, and selected topics pertinent to business assurance services by independent accountants. Emphasizes improving both the decision behavior of decision makers and the quality of information, or its context, for decision makers.
**Requisites:** Requires a prereq course of ACCT 5620 (min grade C). Restricted to Acct, Fnce/Acct, Infor Syst/Acct, Syst/Acct Concurrent Degree students or Acct, Acct/Tax or Busn Admin (BUAD) graduate students only.

**ACCT 6700 (4) Income Taxation**
Emphasizes the fundamentals of the federal income tax system and examines its impact on the individual.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 6007
**Requisites:** Restricted to Accounting, Taxation, Fin Acct Tax-Concurrent Degree or Acct Acct Tax-Concurrent Degree students only.

**ACCT 6780 (3) US International Taxation**
This course will provide an overview of the United States federal income taxation of persons engaged in international transactions.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 7617
**Requisites:** Restricted to students with one of the following plans: ACTX-MS; or subplan: C-ACCTACTX, C-FNCEACTX
**Recommended:** Prerequisite ACCT 5450.
**Grading Basis:** Letter Grade

**ACCT 6900 (1-6) Independent Study**
Prior department consent required of instructor under whose direction study is taken. Departmental form required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Accounting, Taxation, Fin Acct Tax-Concurrent Degree or Acct Acct Tax-Concurrent Degree students only.

**ACCT 6940 (1-6) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree. Departmental form required.
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 6950 (1-4) Master's Thesis**
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 7300 (3) Doctoral Seminar: Introduction to Accounting Research**
Discusses the nature of scientific investigation and how accounting theory relates to theories in economics and finance. Introduces students to major areas of accounting research and research methods. Provides students with instruction and experience in evaluating and critiquing research papers as well as generating original and viable research ideas.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 7320 (3) Doctoral Seminar: Accounting and Capital Markets I**
Focuses on research evaluating the usefulness of accounting information for valuing equity securities. The seminar builds a foundation for conducting accounting-related capital markets research.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 7330 (3) Doctoral Seminar: Accounting and Capital Markets 2**
Focuses on how managers strategically communicate with capital market participants (e.g., investors and equity analysts). Students develop an understanding of how information enhances the efficiency of stock markets, why managers voluntarily disclose information, and how market participants react to strategic disclosure.
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 7340 (3) Doctoral Seminar: Managerial Accounting Research**
Survey of managerial accounting research, emphasizing a variety of methodologies including economics-based archival empirical and experimental approaches. Topics include: management performance measurement; management incentives; non-financial performance measures; management control systems; cost behavior and cost structure; intra-firm transfer pricing; inter-firm relations and knowledge sharing; risk preferences; risk taking and risk sharing; strategic performance measurement; agency theory; and budgetary slack and performance.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequsite course of ACCT 6710 (minimum grade D-). Restricted to graduate students only.

**ACCT 7800 (3) Doctoral Seminar: Accounting Theory**
Follows the evolution of game-theoretical analytical research and application of analytical methods to topics including: accounting-based valuation, discretionary disclosure, stewardship role of accounting, insider trading and imperfect capital market models, signaling through accounting choice, deferred tax accounting, audit sampling, auditor rotation, and low balling. Describes implications of analytical results for primarily economics-based empirical research designs.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 7830 (3) Doctoral Seminar: Accounting Research**
Designed to assist the doctoral student in integrating courses and fields of study in order to be able to apply knowledge and skills to problems in accounting. Special attention given to the development of thesis topics.

**ACCT 8820 (1-6) Graduate Seminar**
Provides opportunity for investigation of new frontiers in accounting through an experimental seminar. Department enforced prereq.: varies
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ACCT 8900 (1-3) Independent Study**
Instructor consent required and departmental form (taught as doctoral seminar).
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 8990 (1-10) Doctoral Dissertation**
**Requisites:** Restricted to Business (BUSN) graduate students only.

**BADM 6820 (1-3) Topics in Business Administration**
Offered irregularly to provide opportunity to investigate new topics in business administration.

**BADM 6940 (3) Land Use Law**
Examines Federal, state and local regulations governing land use in the U.S. and surveys the basic principles of urban planning and public finance. Describes basic tools governments use to control land use: Euclidean zoning, nuisance law, police power, eminent domain and takings, Planned Urban Developments, historic preservation, wetlands and flood zones, airports, endangered species, view restrictions, and environmental law.
**Requisites:** Restricted to Master of Business Administration (MBAD), MBA with dual degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA (PMBA) or MS Real Estate (REAL-MS) students only.
**Grading Basis:** Letter Grade

**BSLW 5120 (3) Advanced Business Law**
Covers sales and lease transactions, negotiable instruments, creditor rights and bankruptcy, secured transactions, agency, business organizations, protection of property, and other advanced topics in legal and regulatory environments. This course and BCOR 3000 cover the business law topics tested on the CPA exam.
**Equivalent - Duplicate Degree Credit Not Granted:** BSLW 4120
**Requisites:** Restricted to concurrent degree subplans of Accounting (C-ACCT), Finance and Accounting (C-FNCEACCT), Accounting and Acct Tax (C-ACCTACTX), Fin Acct Tax (C-FNCEACTX), or Accounting (ACCT) and Taxation (ACTX) graduate students only.

**BSLW 6900 (1-6) Independent Study**
**Requisites:** Restricted to Business (BUSN) graduate students only.

**MBAC 6001 (1.5) Foundations of Teamwork**
Focuses on teamwork effectiveness and collaboration. Students will understand what affects team outcomes, how to maximize a team¿s effectiveness and how to create a company environment that fosters collaboration and teamwork as they develop their own teamwork skills while learning to develop the skills of their employees' and colleagues'.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6002 (3) Social, Moral and Economic Foundations for Business**
Examines historical context for the rise of modern business institutions and market economies, and interrelationships in various business objectives. Connects how different economic approaches address the allocation of existing and future scarce resources, and how individual economic freedom relates to various societal objectives. Explores concepts of core business relevance including intellectual property, the role of ethics in the production of commercial information, and the value of diverse information sets in decision-making.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6003 (1.5) Foundations of Leadership**
Focuses on leadership theories and concepts, including individual and organizational elements in different leadership situations. Explores leadership principles, values, and ethical boundaries, why leaders lose their way and how to avoid derailment. Engages students in developing a leadership brand.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6004 (1.5) Social, Moral and Economic Foundations for Business**
Examines historical context for the rise of modern business institutions and market economies, and interrelationships in various business objectives. Connects how different economic approaches address the allocation of existing and future scarce resources, and how individual economic freedom relates to various societal objectives. Explores concepts of core business relevance including intellectual property, the role of ethics in the production of commercial information, and the value of diverse information sets in decision-making.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6010 (3) Managerial Economics**
Studies the elements of the business firm's fundamental problem---how to maximize profits. Develops for each element managerial theory based upon introductory and intermediate-level microeconomics. Analyzes various applications and misapplications of relevant concept, primarily through case studies. Differential calculus and statistics are used throughout the course. Students can take MBAC 6010 or take MBAC 6011 plus MBAC 6012. Credit can not be given for all.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6011 (1.5) Managerial Economics 1**
Studies the elements of the business firm's fundamental problem---how to maximize profits. Develops for each element managerial theory based upon introductory and intermediate-level microeconomics. Analyzes various applications and misapplications of the relevant concept, primarily through case studies. Differential calculus and statistics are used throughout the course. Students can take MBAC 6010 or take MBAC 6011 plus MBAC 6012. Credit can not be given for all.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6012 (1.5) Managerial Economics 2**
Develops a basic understanding of the macro economy and its relationship to an individual business or industry. This objective will be accomplished by understanding macroeconomic concepts and data sources, developing a basic model, understanding relevant policy instruments and integrating this information into the world economy. Students can take MBAC 6010 or take MBAC 6011 plus MBAC 6012. Credit can not be given for all.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6020 (3) Financial Accounting**
Introduces the financial reporting system used by business organizations to convey information about their economic affairs. Develops an understanding of financial reports and what they tell about a business enterprise. Focuses on how alternative accounting measurement rules represent different economic events in financial reports.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6031 (1.5) Quantitative Methods 1**
Covers foundations for statistical reasoning and statistical applications in business. Topics include data collection, descriptive stats and data visualization, probability, discrete probability distributions, continuous probability distributions, sampling distributions and estimation.
**Requisites:** Restricted to MBA (MBAD) and Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6032 (1.5) Quantitative Methods 2**
Second in a series of two courses covering foundations for statistical reasoning and statistical applications in business. Topics include hypothesis testing, one and two sample hypothesis tests, single regression analysis, multiple regression analysis.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6050 (3) Strategy**
Analyzes how firms can attain and sustain competitive advantage in today's competitive environment. Focuses on industry dynamics, competitive positioning, firm capabilities, and corporate innovation. Introduces a set of tools for assisting managers in solving complex, real-world business problems in strategy development. Integrates MBA learning in functional areas, and emphasizes the fit between competitive analysis and the role of management and organization.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6051 (3) Operations Management**
Develops an understanding of processes and the alignment of a process with the organization¿s operating priorities. Examines how interconnected processes relate to managing supply and demand and stakeholder incentives. Explores services, highlighting the differences and similarities between product and service businesses and considers ¿c-suite¿-level challenges such as managing firm growth, alignment of the operating system with strategic priorities, and mitigating uncertainty through optionality.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6052 (3) Capstone Projects**
Provides students with an opportunity to focus on a specific project which would have a positive strategic impact on the company for which they work. For those who have entrepreneurial aspirations, this project could result in a business plan for a new venture. Final deliverable should address marketing, financial, operational, and management implications and strategic impact.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6060 (3) Corporate Finance**
Analyzes the implications of modern finance theory for the major decisions faced by corporate financial managers. Develops the basic skills necessary to apply financial concepts to the various problems faced by a firm. Includes capital budgeting, capital structure, long term financing, short term financial management, and financial planning topics.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6081 (3) Data and Decisions**
Employers need managers who can integrate business knowledge and insight with the vast amount of data available using modern analytical tools. Students will access data from multiple sources, manipulate the data so it is ready for analysis, perform multiple regression analyses, validate the models they develop, and use the results to inform decisions. Goes beyond Excel spreadsheets to expose students to tools such as R and Tableau.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6090 (3) Marketing Management**
Provides a solid foundation of marketing knowledge by focusing on principles of marketing. Introduces the role that marketing cases play in advancing understanding and skill development in the field of marketing. Case discussions illustrate concepts discussed, and case studies are used to introduce the marketing decision making process. Emphasizes the international nature of marketing, as well as the importance of analysis and the understanding of the economic, demographic, political-legal-regulatory, sociocultural, technological, and natural environments.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6096 (1.5) Managerial Communications**
Tailored instruction, grounded in communication and business theory, that leads to improved business writing, public speaking, team presentations, team dynamics, interpersonal communication, and emotional intelligence with a focus on persuasion, audience analysis, and risk management.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6098 (1) Professional Development I**
Professional Development I and II will introduce students to a range of skills to help them be successful in the professional work environment, including presentation development, constructive feedback loops, and personal presentation in team-based sessions. It will also offer a survey of the career management process and provide students with the tools and life-long skills to execute a strategic career management plan.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAX 6000 (3) Socially Responsible Enterprise**
Prepares future managers for confronting the truly difficult situations that arise when deploying economic resources, altering the physical environment, and making decisions that affect the lives of investors, employees, community members and other stakeholders. Case-based challenges will be examined in a broad range of contexts, and essential ethical concepts will be explored by drawing on theories from ethics, sociology, economics, political science and philosophy.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6097 (1-1.5) Professional Development Internship**
Experiential compliment to MBAC 6098 to focus on Professional Presentation, Network Development, and/or Executive Exposure.
**Repeatable:** Repeatable for up to 3.50 total credit hours.
**Requisites:** Restricted to Master of Business Admin (MBAD) or MBA with Dual Degree programs. Minimum of 27 credit hours required.
**Recommended:** Prerequisite MBAC 6098.
**Grading Basis:** Letter Grade

**MBAX 6100 (1.5) Entrepreneurship**
Examines the environments of entrepreneurial firms from start-up to development of ventures. Allows students to assess their fit with entrepreneurial firms. Key element is learning the process of determining the difference between ideas and commercializable opportunities through feasibility analysis and plans.
**Requisites:** Requires prerequisite course of MBAC 6020 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6101 (1.5) Entrepreneurship**
Examines the environments of entrepreneurial firms from start-up to development of ventures; allows students to assess their "fit" with entrepreneurial firms. A key element is learning the process of determining the difference between ideas and commercializable opportunities through feasibility analysis and plans.
**Requisites:** Requires prerequisite courses of MBAC 6010, MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6110 (3) Entrepreneurial Finance**
Addresses a variety of topics including financial valuation, various sources of funds, structures and legal issues in arranging financing, the private and public venture capital markets, and preparation for, and execution of, an initial public securities offering.
**Requisites:** Requires prerequisite course of MBAC 6020 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6111 (3) Entrepreneurial Finance**
Addresses a variety of topics including financial valuation, various sources of funds, structures and legal issues in arranging financing, the private and public venture capital markets, and preparation for, and execution of, an initial public securities offering.
**Requisites:** Requires prerequisite courses MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to MBA (MBAD) and Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6130 (3) Sustainable Venturing**
Focuses on environmentally sustainable business ventures as well as issues associated with starting and operating a business that solves natural environmental challenges while achieving profitability. Includes a number of case studies, topical discussions, talks by environmental entrepreneurs, and an applied or library research project.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6140 (3) Social Entrepreneurship in the US and Global Economies**
Social entrepreneurs adopt business approaches to solving global, social and environmental problems that have not been effectively addressed by government, business or traditional nonprofits. The course provides a framework for student teams to assist social entrepreneurs in developing countries, helping them achieve their social mission while operating sustainably and with measurable impact.
**Requisites:** Requires prerequisite courses of MBAC 6060 and 6090 (all minimum grade C). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Recommended:** Prerequisite MBAX 6170.
**Additional Information:** Departmental Category: MBA: Social Responsibility

**MBAX 6155 (1.5) Entrepreneurship Through Acquisition**
Explores entrepreneurship through acquisition (ETA) of a company, rather than starting one from scratch. Readings and class discussions will include how to purchase a business, finance an acquisition, and operate and grow a business. Also, sourcing and identifying acquisition opportunities, strategic, operational, legal, and financial due diligence, valuation, tax considerations, raising capital, structuring and closing transactions, post-closing integration, managing and exiting the acquisition, and prototypes for pursuing including search fund and fundless deal sponsor models.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6160 (1.5-3) Entrepreneurship: High Growth Companies**
Explores the initial decisions that set a foundation for business growth, the pros and cons of alternative growth strategies, organizational scaling tactics, and the keys to realizing value. Studying ¿adolescent¿ firms that are past the initial start-up stage but haven't evolved into mature businesses, we will focus on key choices founders face in scaling their businesses, investigating growth-related stumbling blocks and discussing alternative strategies that may be used to overcome these obstacles.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.

**MBAX 6170 (1.5) New Venture Creation**
This course content is relevant to the student who wants the entrepreneurial toolkit, start a new venture, is interested in working in the startup world, would like to effectively evaluate the probability of success for a new venture and/or develop a methodology for entrepreneurial thinking that provides benefits for big and small ventures. The final deliverable is a professional pitch to a group of seasoned investors and the submission of a complete business plan.
**Requisites:** Requires prerequisite course of MBAC 6020 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6171 (1.5) New Venture Creation**
This course content is relevant to the student who wants the entrepreneurial toolkit, start a new venture, is interested in working in the startup world, would like to effectively evaluate the probability of success for a new venture and/or develop a methodology for entrepreneurial thinking that provides benefits for big and small ventures. The final deliverable is a professional pitch to a group of seasoned investors and the submission of a complete business plan.
**Requisites:** Requires prerequisite courses of MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6180 (3) New Venture Launch**
Translate an existing product, service, or opportunity into a real, functioning venture. Each venture will undertake typical business functions (legal, raising money, web presence, selling, innovation, marketing, managing cash, and managing operations) with minimal resources. The course will rely heavily on outside experts and speakers who have personal experience being or working directly with entrepreneurs and/or investors. The course is a natural capstone to other courses in the entrepreneurship curriculum.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Recommended:** Prerequisite completion of MBAX 6170 is strongly recommended prior to enrolling in MBAX 6180.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6190 (3) Projects in Entrepreneurial Companies**
Limited to 12 students per section, each student is matched with an entrepreneurial company to complete a project that is key to company strategy. Students experience total company environment from the top management level through attending management meetings and interacting with cross-functional managers and employees. E-mail and face-to-face meetings result in discussing opportunities and issues resulting from experiences in companies.
**Requisites:** Requires prerequsite course of MBAX 6100 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Recommended:** Prerequisite completion of MBAX 6110 or 6111 is strongly recommended prior to enrolling in MBAX 6190.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6195 (1-3) Special Topics in Entrepreneurship**
Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the standard MBA curriculum.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.

**MBAX 6210 (3) Applied Financial Management**
Analyzes the financial condition, planning, and control of current assets, current liabilities, and long-term financial arrangements. Topics include financial planning, managing working capital, short- and long-term financing, capital budgeting, valuation, and capital structure policies. Case studies are emphasized.
**Requisites:** Requires prereqs MBAC 6060, MSBC 5060, or MSBC 5610 (min grade D-).Restricted to Master of Business Admin (MBAD), MBA w Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Profl MBA Program (PMBA), MS Finance (FNCE-MS) MS Real Estate (REAL-MS) mjrs onl
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6211 (3) Applied Financial Management**
Focuses on how to apply key concepts in finance to real-world situations. Topics include valuation, capital structure, highly leveraged transactions, and financial distress and bankruptcy. Heavy emphasis on how to perform various kinds of valuations. Mixture of lectures and case discussions.
**Requisites:** Requires prerequsite course of MBAC 6060 (minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6215 (3) Principles of Wealth Management**
In-depth exploration of wealth management concepts, strategies and practices. Students gain understanding of how to effectively manage and grow wealth for individuals and families, considering various financial instruments, risk factors and ethical considerations. Topics include behavioral finance, portfolio creation, performance and risk measures, risk fac-tors, the use of traditional and alternative asset classes; use of financial products and alternative investments including cash, equities, fixed income, mutual funds, ETFs, VC funds, etc. Will discuss tax planning.
**Requisites:** Requires prerequisite course of MBAC 6060 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6220 (3) Investment Management and Analysis**
Covers managing investment portfolios, blending economic theory and evidence with practitioner experience. Topics include understanding risk and return relationships, diversification, portfolio management, various asset classes, popular valuation models (capital asset, arbitrage pricing, and option pricing), aspects of fixed income and performance assessment.
**Requisites:** Requires prerequisite course of MBAC 6060 or MSBC 5060 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6221 (1.5-3) Investment Management & Analysis**
Covers managing investment portfolios by blending academic theories and evidence with practitioner experience. Topics include risk and return relationships, securities, value theory (capital asset, arbitrage, and option pricing), portfolios, and performance evaluations.
**Requisites:** Requires prerequisite courses of MBAC 6010, MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6230 (3) International Financial Management**
Examines the financial procedures, policies, and risks faced by firms conducting business internationally. Topics include examining the international finance environment, managing foreign exchange risk exposure, managing international working capital, conducting analysis, and developing an understanding of international financial markets.
**Requisites:** Requires prerequisite course of MBAC 6060 or MSBC 5060 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6250 (3) Derivative Securities**
Derivatives, like options, futures, forwards, and swaps, encompass all aspects of finance. Topics cover the characteristics, valuation, and trading strategies associated with derivatives as well as their use in risk management.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Recommended:** Prerequisite for MBAD students, prerequisite course of MBAC 6060; for FNCE-MS majors, prerequisite MSBC 5060 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6260 (3) Fixed Income Investing**
Fixed income securities are those that nominally promise a fixed stream of payments. They include government and corporate long and short term debt issues that far exceed the amount of corporate stock issues, as well as long term personal debt (i.e.,home mortgages). Develops practical analytical tools for describing risk and return in fixed income securities, the markets where they are traded, and their purchase and management by financial intermediaries. This course will utilize the Bloomberg Lab to provide students with real world fixed income security analysis.
**Requisites:** Requires prerequisite course of MBAC 6060 or MSBC 5060 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6270 (3) Applied Derivatives**
Covers applications of financial derivatives and a range of topics, from market risk management to liquidity and counter party risk management in contemporary finance. Specifically, the course examines the pricing and use of financial derivatives, including options, forwards, futures, swaps and credit derivatives in risk management.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade

**MBAX 6280 (1.5) Entrepreneurship Valuation and Investment Seminar**
First section in series of three: Provides a premier experiential learning experience in early stage investing. Students will develop an understanding of the mechanics of early stage investing, will learn how to evaluate, select and recommend investments and manage the portfolio, put in practice managerial skills, negotiation, financial analysis, presentation skills, mastering/negotiating legal terms, and to incorporate uncertainty into projecting cash flows.
**Requisites:** Requires prerequisite courses of MBAC 6060 and 6090 (minimum grade C). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6281 (1.5) Entrepreneurship Valuation and Investment Seminar2**
Second section in series of three: Provides a premier experiential learning experience in early stage investing. Students will develop an understanding of the mechanics of early stage investing, will learn how to evaluate, select and recommend investments and manage the portfolio, put in practice managerial skills, negotiation, financial analysis, presentation skills, mastering/negotiating legal terms, and to incorporate uncertainty into projecting cash flows.
**Requisites:** Requires prerequisite courses of MBAC 6060 and 6090 (minimum grade C). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Recommended:** Prerequisite MBAX 6280.

**MBAX 6295 (1.5-3) Topics in Finance**
Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the standard MBA curriculum.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade

**MBAX 6310 (3) Marketing Strategy**
Marketing strategy has developed into an increasingly critical managerial activity as businesses recognizethe importance of creating customer value and being customer oriented. Discusses key elements of successful marketing strategy including market/customer analysis and competitor analysis, and identifies strategic approaches managers may adopt to succeed in today's highly competitive and rapidly changing business environment.
**Requisites:** Requires prereq course of MBAC 6090 (min grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Prog (PMBA) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6311 (3) Marketing Strategy**
Marketing strategy is a critical managerial activity that recognizes the importance of a strong market focus and the delivery of superior customer value as bases for long term financial success. This course examines key elements of successful marketing strategy including optimal market definition, strong segmentation and positioning approaches, high levels of customer satisfaction, and effective management of critical exchange relationships.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Marketing

**MBAX 6330 (3) Market Intelligence**
Market Intelligence is a decision-oriented course geared toward gathering, analyzing, and interpreting data about markets and customers. Students learn how to: define the marketing problem and determine what information is needed to make the decision; acquire trustworthy and relevant data and judge its quality; analyze the data and acquire the necessary knowledge to make certain classic types of marketing decisions.
**Requisites:** Restricted to MA of BusinAdmin (MBAD), MBA w/ Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Prof MBA (PMBA), MS Supply Chain Manag (SCMN-MS) or MS Busin Analytics (BUAN-MS) or Mktg Analytics cert (MKAG). Prereq MBAC 6090 or MSBX 5410, min grade D-.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6331 (3) Market Intelligence**
Market Intelligence is a marketing decision-oriented course geared toward gathering, analyzing, and interpreting data about markets and customers for both products and services. It is for managers as users of market information across marketing management, consulting, general management, and entrepreneurship to address problems of market selection, segmentation, positioning, new products, customer value and retention, pricing, communication, channel, etc.
**Requisites:** Requires prerequisite courses of MBAC 6010, MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Marketing

**MBAX 6350 (3) Digital Marketing**
Covers a variety of ways an organization uses online presence to support its goals. The main approaches covered are search engine optimization (SEO); online advertising, especially search ads (also called search engine marketing, SEM); and social media. SEO is setting up your website so that the right people can find you. Emphasis placed on selecting keywords and tracking responses to changes to a website. SEM refers to paid ("sponsored") ads on search engines. We will focus on AdWords.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Real Estate (REAL-MS), MS Supply Chain Management (SCMN-MS) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6351 (3) Digital Marketing**
Covers a variety of ways an organization uses online presence to support its goals. The main approaches covered are search engine optimization (SEO); online advertising, especially search ads (also called search engine marketing, SEM); and social media. SEO is setting up your website so that the right people can find you. Emphasis placed on selecting keywords and tracking responses to changes to a website. SEM refers to paid ("sponsored") ads on search engines. We will focus on AdWords.
**Requisites:** Requires prerequisite course of MBAC 6090 (minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Marketing

**MBAX 6360 (3) New Product Development**
Provides a better understanding of the new-product development process, highlighting the inherent risks and strategies for overcoming them. Using a combination of lectures, cases, and a project, this course examines the process of designing, testing, and launching new products. Emphasizes the interplay between creativity and analytical marketing research throughout the development process. Also covers branding issues, such as brand extensions and their impact on brand equity.
**Requisites:** Requires prereq course of MBAC 6090 (min grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Prog (PMBA) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6361 (1.5) New Product Development**
Provides students with a better understanding of the new-product development process, highlighting the inherent risks and different strategies for overcoming them. Using a combination of lectures, cases, and a project, this course will examine the process of designing, testing and launching new products.
**Requisites:** Requires prerequisite courses of MBAC 6010, MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Marketing

**MBAX 6365 (3) Practical Product Management**
This course will give students practical experience and tools required to successfully manage a product or product line for an established company or a new business. This course will cover the role of the Product Manager, explore market research to understand unsolved market needs, and teach students how to convert market needs to specifications, develop product business cases and establish funding priorities, culminating in the completion of a full product strategy and plan.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6368 (1.5) Consumer Packaged Goods Marketing Applied to the Natural & Organic Industry**
Explores the world of consumer packaged goods (CPG) and brand management skills needed to successfully launch and manage products in a retail environment, applied to the natural and organic product industry. The course will be split into three parts: 1) CPG and Brand Management principles and techniques, 2) shopper insights to manage CPG products at retail, 3) brand and retail management principles applied to the Natural & Organic industry.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6370 (2-3) Customer Analytics**
Provides a deep understanding of customer centricity and its implications for the firm; state-of-the art methods for calculating customer lifetime value and customer equity; analytical and empirical skills that are needed to judge the appropriateness, performance, and value of different statistical techniques that can be used to address a issue around customer acquisition, development, and retention. Students will be introduced to R programming in this course.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6380 (3) Consumer Decision-Making: Behavioral Economics, Psychology, and Experimental Design**
Consumer behavior often defies economic rationality. Behavioral economics attempts to integrate the quirks of human psychology into economic models; judgment and decision-making investigates how people solve economic problems. This course will introduce major theories, findings and ideas from these disciplines, and foundational concepts of experiment design that provide insight into consumer decision-making, with the goal of preparing future managers, analysts, consultants, and advisors to incorporate such insights into marketing and business strategies.
**Requisites:** Requires prerequisite course of MBAC 6090 (min grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6381 (3) Consumer Decision-Making: Behavioral Economics, Psychology, and Experimental Design**
Consumer behavior often defies economic rationality. Behavioral economics attempts to integrate the quirks of human psychology into economic models; judgment and decision-making investigates how people solve economic problems. This course will introduce major theories, findings and ideas from these disciplines, and foundational concepts of experiment design that provide insight into consumer decision-making, with the goal of preparing future managers, analysts, consultants, and advisors to incorporate such insights into marketing and business strategies.
**Requisites:** Requires prerequisite course of MBAC 6090 (minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6395 (1-3) Special Topics in Marketing**
Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the standard MBA curriculum.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6410 (3) Process Analytics**
Covers the concepts and tools to design and manage business processes. Emphasizes modeling and analysis, information technology support for process activities, and management of process flows. Graphical simulation software is used to create dynamic models of business processes and predict the effect of changes. Prepares students for a strong management or consulting career path in business processes.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) or Business Analytics (BUAN) majors or SCAG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Systems

**MBAX 6420 (3) IT and Business Strategy**
Although some companies are very successful in discovering and cultivating innovative technology-enabled business strategies, many fail in the process. Combines theories and frameworks with practical approaches to provide students with the skills required to help companies identify business opportunities, find appropriate information related technologies, and lead adoptions efforts to success.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Systems

**MBAX 6421 (3) IT & Business Strategy**
Although some companies are very successful in discovering and cultivating innovative technology-enabled business strategies, many fail in the process. This course combines theories and frameworks with practical approaches to provide students with the skills required to help companies identify business opportunities, find appropriate information related technologies, and lead adoption efforts to success.
**Requisites:** Requires prerequisite courses MBAC 6020, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6440 (3) Project Management**
Acquaints students with multidisciplinary aspects of project management, including the relationship between schedule, cost and performance. The course uses a hands-on project where the student interacts with a real customer, providing an opportunity to utilize the qualitative and quantitative tools taught in the classroom. At the conclusion of the course, the student may be eligible to apply for a project management certification from Project Management Institute based on previous work experience.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Real Estate (REAL-MS), MS Supply Chain Management (SCMN-MS) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6441 (3) Project Management**
Acquaints the student with multidisciplinary aspects of project management, including the relationship between scope, schedule, cost and performance. Uses a hands-on project from your own company, providing an opportunity to utilize the qualitative and quantitative tools taught in the classroom. During the course students will earn hours toward project management certification from the Project Management Institute.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors with 12 credit hours completed.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6450 (3) International Operations Management**
Takes a broad comprehensive perspective on managing and operating in a rapidly growing global economy. Explores regional and national approaches to international operations including trade practices; penetration strategies; financial, marketing, services, and manufacturing operations; ethical and sustainability issues; and global competitive strategy. Compares global business practices in Asia, South America, Europe, and Africa.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) majors or SCFG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6451 (3) International Business and Strategy**
Takes a broad comprehensive perspective on managing and operating in a rapidly growing global economy. Explores regional and national approaches to international operations including global trade practices; legal and political issues; US trade laws; finance and accounting risks; global supply chain management, cultural challenges; global marketing, and global strategies. Upon completing of the course, you will have a broad foundational understanding of important contemporary issues and challenges of international business.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6460 (3) Supply Chain Management**
Explores the key issues related to the design and management of supply chains. Covers the efficient integration of suppliers, production facilities, warehouses and stores so that the right products in the right quantity reach customers at the right time. Focuses on the minimization of the total supply chain cost subject to service requirements imposed by a variety of industries.
**Equivalent - Duplicate Degree Credit Not Granted:** MSBC 5460
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Recommended:** Prerequisite MBAC 6080.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Systems

**MBAX 6500 (3) Management of Organizational Change**
Explores ways to improve organizations to meet demands of changing environments. Emphasizes theoretical framework and models of organization change, barriers to implementing change and ways to overcome them, and the roles of the change agent and/or consultant.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6530 (1.5) Negotiating and Conflict Management**
Explores and builds skills for conflict management and negotiation problems faced by managers (e.g., dealing with subordinates, peers, superiors, or clients). Content is relevant to all MBA students, especially those interested in management, accounting, entrepreneurship, finance, and marketing.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6531 (1.5) Negotiating and Conflict Management**
Practice the art and science of successful negotiations. Provides students high interaction with businesses and entrepreneurs.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6540 (3) Consulting Skills**
Provides an integrative, hands-on exercise in managing change. Develops skills in contracting, collecting, and analyzing data, developing action plans, and preparing reports. Teams practice these skills by conducting an organizational diagnosis, consulting project within an organization.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6550 (3) Management of Technology and Innovation**
Examines a variety of issues common to management of technology, such as technology strategies, methods of technology transfer, selecting technology standards, managing the research and development process, and encouraging and rewarding innovation.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6560 (1.5) Executive Leadership**
Examines organizational leadership from the executive perspective, including private and public sector firms, and non-profits. Studies how executives lead change and innovation, interact with the top management team, and deal with the board of directors Topics include governance of the firm, strategies for enhancing executive influence, assessing and understanding diverse leadership styles, and the ethics and responsibilities of an executive. Formerly MBAX 6890.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6561 (1.5) Executive Leadership**
Provides an opportunity to examine leadership from the executive perspective in organizations including private and public sector firms and non-profits. Topics covered include how executives lead change and innovation in organizations, interact with the top management team, deal with the board of directors, leadership issues involved with governance of the firm and strategies for enhancing executive influence.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6565 (1.5) Inclusive Leadership**
This course focuses on how to lead to increase inclusion and maximize the benefits that diversity can bring. Women and minorities comprise only 25% and 27% of executives, respectively. Only 5% of CEOs are women. Thirteen percent of the population ¿ but fewer than 1% of Fortune 500 CEOs ¿ are Black. The data show irrefutable evidence that diversity increases innovation, market share, return on assets, and stock prices.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6570 (3) Topics in Sustainable Business**
Provides a comprehensive overview of the core concepts, strategies and practices of sustainable business, emphasizing innovative business practices and entrepreneurial opportunities created by the sustainability "movement". The topic of sustainability will be approached from the unique perspectives of seven core disciplines of business administration: economics, strategy, ethics, organizational behavior, operations, finance and accounting, and marketing.
**Requisites:** Requires prerequisite courses of MBAC 6011, MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to MBAD, DMBA, JMBA, PMBA, SCMN or BUAN majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Social Responsibility

**MBAX 6595 (1-3) Special Topics in Organizational Behavior**
Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the standard MBA curriculum.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6600 (3) Real Estate Principles**
The course covers a broad range of real estate principles including legal concepts, regulation and land use, valuation, financing methods and sources, and investment analysis. It provides a foundation for all other real estate courses in the MBA program.
**Requisites:** Restricted to Master of Business Admin (MBAD) students who have completed fewer than 24 credits; or MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Real Estate

**MBAX 6610 (3) Real Estate Finance and Investment Analysis**
Objectives of the course are to 1) conduct income property investment analysis; 2) to develop the technical competence necessary to structure real estate transactions; and 3) to understand the financial assets securitized by real estate. Students will analyze income properties using Excel and ARGUS-DCR. Techniques for structuring real estate transactions examined in this course include lender participations, sale-leasebacks, joint ventures, and real estate syndications.
**Requisites:** Requires prerequisite course of MBAX 6600 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Real Estate

**MBAX 6620 (3) Real Estate Project Competition**
Examines real estate market behavior beginning with an overview of residential and commercial property markets. Examines various theories of land price determination and uses these models to understand how the private market allocates land to competing residential, office, retail, industrial/warehouse, hotel and other end users. Examines how factors influencing the demand for real estate interact with the factors influencing the supply of real estate to determine market rents and how the flow of future expected income is capitalized to yield the market price of property. The course will also examine the roles that local, state and federal governments have in real estate market outcomes.
**Requisites:** Restricted to MS Real Estate majors (REAL-MS) or restricted to Master of Bus Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Profl MBA Prog (PMBA) with prerequisite courses MBAX 6600, 6610 and 6640 (all min grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Real Estate

**MBAX 6630 (3) Real Estate Economics**
Examines real estate market operations and discusses alternative methodologies for estimating real estate values. Examines various theories of land price determination and uses these models to understand how the private market allocates land to competing residential, office, retail, industrial/warehouse, hotel, and other end users. Examines how factors influencing the demand for real estate interact with the supply of real estate to determine market rents and how the flow of future expected income is capitalized to yield the market price of the asset.
**Requisites:** Restricted to MS Real Estate majors (REAL-MS) or restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Real Estate

**MBAX 6640 (3) Real Estate Law and Practice**
Examines the legal issues associated with developing, acquiring, transferring, and leasing real property. Topics include real estate contracts, land use and development agreements, vehicles for owning real estate, real estate covenants, conditions and restrictions, loan transactions, negotiating real estate contracts, commercial leases and real estate taxation. Material for this course will consist of assigned articles and real estate cases. Formerly MBAX 6855.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), or MS Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Real Estate

**MBAX 6650 (3) Real Estate Case Studies**
Requires students to analyze numerous real estate investment opportunities utilizing case study methodology. Cases will include analyses of various end uses (e.g. apartments, condominiums, office, retail, mixed use, industrial, and hotel) from both the purchaser and seller perspective. The cases include situations such as investing in existing properties, whether to make substantial rehabilitations, and how to put together a new development. Cases are primarily based in Colorado, although some are in other areas of US and international. Class discussion is designed to mimic a company¿s investment committee and requires students to both present and defend their positions.
**Requisites:** Requires prerequisite of MBAX 6630 or 6640 and MBAC 6610 or MSBC 5610 (all minimum grade D-). Restricted to MBA (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA (PMBA) or MS Real Estate (REAL-MS) students only.
**Grading Basis:** Letter Grade

**MBAX 6695 (1-3) Special Topics in Real Estate**
Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the standard MBA curriculum.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to MBA (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA (PMBA) or MS Real Estate (REAL-MS) students only.
**Grading Basis:** Letter Grade

**MBAX 6710 (3) Financial Statement Analysis**
Focuses on the use of accounting information by decision makers external to the firm. Considers judgments made by security analysts, bank lending officers and auditors. Emphasizes impact of changes to financial statement elements, profitability analysis and equity valuation.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 6250
**Requisites:** Requires prerequisite course of MBAC 6020 or MSBC 5020 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS majors only.
**Additional Information:** Departmental Category: MBA: Accounting

**MBAX 6720 (3) ESG Reporting and Analysis**
This course introduces students to the current state of corporate sustainability reporting through the lens of accounting and reporting concepts. The course has three basic elements. We will cover (1) data and measurement issues associated with corporate sustainability reporting, largely at the conceptual level, (2) current disclosure frameworks and the evolving regulatory landscape, and (3) other topics including ESG assurance, ESG ratings and the role of ESG information in sustainable investing.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Recommended:** Prerequisite MBAC 6020 Financial Accounting (MBA) or MSBC 5020 Financial Accounting (MS).
**Grading Basis:** Letter Grade

**MBAX 6761 (2) Managerial Accounting, Planning and Control**
Introduces managerial accounting, which includes the concepts, models, and systems that provide this information and control. The course will familiarize participants with the terminology and basic concepts of managerial accounting, touching on topics ranging from development and use of cost information for decision-making to management control systems.
**Requisites:** Requires prerequsite course of MBAC 6020 (minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Accounting

**MBAX 6801 (1.5-3) Global Perspectives Seminar**
Provides students with an in-depth perspective about a specific country or region outside the United States. The course can focus on a different region or country each time it is offered. If demand for this type of experience is strong, multiple sections of the course could be offered in a given semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6802 (3) Pricing Strategy and Tactics**
Pricing provides the means to capture value. The course covers theories, analytical tools and conceptual frameworks needed for devising price strategy as part of the value proposition for products and services. It draws upon principles from economics, marketing and psychology. Primary and secondary data based analysis is used to understand price response and competitive pricing. Substantive topics include customized pricing, price negotiations, bidding and auctions, price discounting, trade promotion, bundling, behavioral pricing, among others.
**Requisites:** Requires prerequisite courses of MBAC 6011, MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to MBAD, DMBA, JMBA, PMBA, SCMN or BUAN majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6806 (1.5-3) Global Perspectives**
Contrasting operations in US and a country or region outside the United States, students will study what changes US companies have made to successfully operate in foreign markets and how US companies have influenced foreign business operations. Reviews the history and present state of the inter-dependency between the domestic and international business environments. Culminates in a week-long trip to the country/region of study. Provides students with an in-depth perspective about a specific country or region outside the United States. The course can focus on a different region or country each time it is offered.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) majors only.
**Grading Basis:** Letter Grade

**MBAX 6815 (3) Sustainable Real Estate**
Explores techniques, processes, tools, and capabilities required to manage growth and land use change in the light of shifts beginning to transform the way we approach land use and real estate development.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Finance (FNCE-MS), or MS Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Real Estate

**MBAX 6827 (3) Integrated Reporting for Socially Responsible Strategies**
Explores the growing global trend of companies to measure, disclose and report for socially responsible initiatives. Integrated reporting combines financial, environmental, social and governance information into a single report. Current practices in sustainability and integrated reporting in the US and across the world will be examined through case studies, guest speakers, current literature and projects.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 5827
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6843 (3) Supply Chain and Operations Analytics**
Analyzes key issues related to the design and management of operations and supply chains using quantitative tools such as linear, integer, and non-linear programming, regression, and statistical analysis. Covers important topics such as forecasting, aggregate planning, inventory theory, transportation, risk pooling, production control and scheduling, and facilities location, among others. Uses mathematical modeling, spreadsheet analysis, case studies, and pedagogical simulations to deliver material.
**Requisites:** Restricted to Master of Busn Admin (MBAD), MBA w Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) Profl MBA Prog (PMBA), Business Analytics (BUAN-MS) or Supply Chain Mgmt (SCMN-MS) majors or SCAG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Operations and Production Management

**MBAX 6930 (3) Commercializing Sustainable Energy Technologies**
Addresses the opportunities and problems of commercializing new renewable energy technologies. Focuses on energy markets, opportunity identification, life cycle analysis, policy economics, project financing and economic analysis as they relate to bringing renewable energy technologies to market.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVM 5005
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), or MS Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade

**MBAX 6966 (1-3) Independent Study-Real Estate**
Independent study in the field of real estate.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Additional Information:** Departmental Category: MBA: Real Estate

**MSBC 5015 (1.5) Managerial Economics**
Studies the elements of the business firm's fundamental problem: how to maximize profits. Develops for each element managerial theory based upon introductory and intermediate level microeconomics. Analyzes various applications and misapplications of relevant concept, primarily through case studies. Differential calculus and statistics are used throughout the course.
**Requisites:** Restricted to Finance (FNCE-MS) or Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5020 (1.5) Financial Accounting**
Introduces the financial reporting system used by business organizations to convey information about their economic affairs. Develops an understanding of financial reports and what they tell about a business enterprise. Focuses on how alternative accounting measurement rules represent different economic events in financial reports.
**Requisites:** Restricted to Finance (FNCE-MS) or Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5031 (3) Quantitative Methods in Finance**
Covers foundations for statistical reasoning and statistical applications in business. Topics include graduate level treatment of descriptive statistics, probability, probability distributions, sampling theory and sampling distributions and statistical inference (estimation and hypothesis testing) applied to the field of finance. Provides an introduction to topics such as regression analysis, analysis of variance, time series forecasting, decision analysis, index numbers, and nonparametric methods.
**Grading Basis:** Letter Grade

**MSBC 5032 (3) Real Estate Data Analysis**
Covers foundations for statistical reasoning and statistical applications in business. Topics include graduate level treatment of descriptive statistics, probability, probability distributions, sampling theory and sampling distributions and statistical inference (estimation and hypothesis testing) applied to real estate. Provides an introduction to topics such as regression analysis, analysis of variance, time series forecasting, decision analysis, index numbers, and nonparametric methods.
**Requisites:** Restricted to REAL-MS students only.
**Grading Basis:** Letter Grade

**MSBC 5060 (3) Corporate Finance**
Analyzes the implications of modern finance theory for the major decisions faced by corporate financial managers. Develops the basic skills necessary to apply financial concepts to the various problems faced by a firm. Includes capital budgeting, capital structure, long term financing, short term financial management and financial planning topics.
**Requisites:** Restricted to Finance (FNCE-MS) or Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5070 (3) Survey of Business Analytics**
Designed as an introduction to Business Analytics, which considers the extensive use of data, methods and fact-based management to support and improve decision making. Business intelligence focuses on data handling, queries and reports to generate information associated with products, services and customers, business analytics uses data and models to explain business performance and how it can be improved. The class will be built on heavy hands-on coding; it will introduce and subsequently involve extensive use of Python.
**Requisites:** Restricted to MS Business Analytics (BUAN-MS) majors or MKAG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5180 (3) Machine Learning in Python**
This course exposes the students to commonly used platforms for statistical and predictive analytics. The class will go into depth of analytics using Python. Students will learn to analyze large datasets, including textual analytics such as twitter-stream analysis. The class will focus on predictive analytics.
**Requisites:** Restricted to Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade

**MSBC 5220 (3) Investment Management & Analysis**
Covers managing investment portfolios by blending academic theories and evidence with practitioner experience. Topics include risk and return relationships, securities, value theory (capital asset, arbitrage, and option pricing), portfolios, and performance evaluations.
**Requisites:** Restricted to Finance (FNCE-MS) or Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade

**MSBC 5235 (1.5) Finance Industry Academy**
This course provides finance industry perspectives, professional development, and information about finance industry careers for students in the MS finance program. The course complements the foundational material found in the rest of the MS finance curriculum with perspectives on how the MS finance skillset translates into varied careers in the finance industry. The course will draw heavily upon the finance industry perspective, the Burridge Center for Finance, and career resources at the Leeds school.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade

**MSBC 5460 (3) Supply Chain Strategy**
Introduces students to the fundamental principles underlying supply chains, and focuses on the integration with both operations and logistics.
**Equivalent - Duplicate Degree Credit Not Granted:** MBAX 6460
**Requisites:** Restricted to Supply Chain Management (SCMN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5480 (3) SCMN Experiential Projects**
Provides an opportunity to execute a project for a company, integrating course work knowledge in an applied capstone experience. Allows first hand exposure to the business analytics as both an observer and creator of the business analytics process. Students work closely with an area client company to solve an important business analytics problem under the close supervision of the instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Supply Chain Management (SCMN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5490 (3) BUAN Experiential Projects**
Provides an opportunity to execute a project for a company, integrating course work knowledge in an applied capstone experience. Allows first hand exposure to the business analytics as both an observer and creator of the business analytics process. Students work closely with an area client company to solve an important business analytics problem under the close supervision of the instructor.
**Requisites:** Restricted to Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5600 (1.5) Real Estate Principles**
The course provides students with an introduction to the foundational terms, concepts, principles, and formulas fundamental to the business of real estate. It establishes the foundation for other real estate courses. Course content includes legal concepts including property rights and title, mortgage loan types, calculations and decisions, an introduction to time value of money and income capitalization, and real estate investment valuation and decision making utilizing the most common income valuation methods. Instruction and course format are traditional lecture and conversational.
**Requisites:** Restricted to REAL-MS students only.
**Grading Basis:** Letter Grade

**MSBC 5610 (3) Real Estate Finance and Investment**
The primary objectives of this course are to: (1) describe, analyze, and compare the features of residential mortgage loans, commercial mortgage loans, and commercial leases; (2) conduct income property investment analyses and develop the technical competence necessary to structure basic real estate transactions; (3) understand the operations and valuations of private equity funds and real estate investment trusts (REITs), and how real estate is securitized and sold to everyday investors.
**Requisites:** Restricted to REAL-MS students only.
**Grading Basis:** Letter Grade

**MSBC 5635 (1.5) Real Estate Industry Academy**
Provides real estate industry perspectives about substantive topics and current events and trends, professional skills development, information and advice regarding real estate industry jobs and careers. By equipping students with the skills, knowledge, and networks necessary to pursue a career in real estate, the course complements the foundational material found in the rest of the MSRE curriculum. The course will draw heavily upon the expertise of our industry partners, CUREC, and career resources at Leeds.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to REAL-MS students only.
**Grading Basis:** Letter Grade

**MSBC 5680 (3) Optimization Modeling**
Focuses on formulating decision problems as mathematical models and employing computational tools to solve them. Microsoft Excel is used as the main modeling platform but the course will also cover advanced tools, such as modeling languages. Optimization modeling will be illustrated in problems associated with operations, marketing, management, and finance. Integrates topics from decision analysis and operations management as they relate to modeling management decisions.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Supply Chain Management (SCMN-MS) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade

**MSBX 5080 (3) Decision Modeling and Applications**
Integrates topics from decision analysis and operations management as they relate to modeling management decisions. Field projects involve the university, local companies, and/or government agencies.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Supply Chain Management (SCMN-MS) or MS Business Analytics (BUAN-MS) majors only.

**MSBX 5205 (3) Financial Strategy and Decision Modeling**
Develops functional frameworks for analyzing and assessing uncertainty in real and financial assets and evaluating financial decisions under diverse scenarios. This course covers various methods of mapping uncertainty including binomial decision tree models, linear programming models and Monte-Carlo simulations. Further topics include tax consequences of these decisions.
**Requisites:** Restricted to Masters of Finance (FNCE-MS) and Masters of Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5225 (3) Advanced Portfolio Management**
Covers the management and construction of investment portfolios. Topics include performance and risk measures, identification of risk factors and the use of traditional and alternative assets classes including real estate, mutual funds, ETFs, venture capital funds, private equity funds and hedge funds. Additional topics include tax consequences of investment decisions and cash management.
**Equivalent - Duplicate Degree Credit Not Granted:** FNCE 4831
**Requisites:** Restricted to Master of Finance (FNCE-MS), Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5260 (3) Fixed Income Investing**
Fixed income securities are those that nominally promise a fixed stream of payments. They include government and corporate long and short term debt issues that far exceed the amount of corporate stock issues, as well as long term personal debt (i.e.,home mortgages). Develops practical analytical tools for describing risk and return in fixed income securities, the markets where they are traded, and their purchase and management by financial intermediaries. This course will utilize the Bloomberg Lab to provide students with real world fixed income security analysis.
**Requisites:** Requires prereqs MBAC 6060, MSBC 5060, or MSBC 5610 (min grade D-).Restricted to Master of Business Admin (MBAD), MBA w Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Profl MBA Program (PMBA), MS Finance (FNCE-MS) MS Real Estate (REAL-MS) mjrs onl
**Grading Basis:** Letter Grade

**MSBX 5270 (3) Applied Derivatives**
Covers applications of financial derivatives and a range of topics, from market risk management to liquidity and counter party risk management in contemporary finance. Specifically, the course examines the pricing and use of financial derivatives, including options, forwards, futures, swaps and credit derivatives in risk management.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade

**MSBX 5280 (3) Sustainable Finance**
Course materials draw from finance, economics, and law studies that analyze the theoretical and actual impact of ESG forces on firm outcomes. The course will be divided into two primary topics, namely (1) sustainable capital allocation (i.e. how firms manage their capital budgeting choices given ESG goals & the influence/role of activist investors in those decisions); (2) sustainable financing (i.e., how firms raise capital given ESG goals & the influence/role of passive socially responsible investing).
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade

**MSBX 5310 (3) Customer Analytics**
Provides a deep understanding of how to use data on customer behavior and preferences to inform managerial decision making. Introduces methods for causal inference, modeling consumer demand, and modeling firm decisions. Applications include long-run customer management decisions (customer acquisition and retention) and short-run marketing mix (product, price, promotion and distribution) decisions. The R programming language is used for course examples and assignments. Students are assumed to have a working knowledge of R and linear regression techniques.
**Requisites:** Restricted to Supply Chain Management (SCMN-MS) or Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5311 (2) Customer Analytics**
Provides a deep understanding of customer centricity and its implications for the firm; state-of-the art methods for calculating customer lifetime value and customer equity; analytical and empirical skills that are needed to judge the appropriateness, performance, and value of different statistical techniques that can be used to address a issue around customer acquisition, development, and retention. Students will use their knowledge of R programming in this course.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MSBX 5320 (3) Digital Advertising**
Covers both traditional and emerging digital advertising methods, the popular platforms used to execute ads, and the leading analytic tools that can be used to assess advertising performance. Core advertising platforms covered include search, display, social media, native advertising, sponsored content and mobile. This class focuses on best practices and Key Performance Indicators that go with each advertising platform. Department consent required.
**Requisites:** Restricted to MS Business Analytics (BUAN-MS) majors or MKAG-CERG students only.
**Grading Basis:** Letter Grade

**MSBX 5405 (3) Structured Data Modeling and Analysis**
Explores both the functional and technical environment for the creation, storage and use of the most prevalent source and type of data for business analysis, ERP and related structured data. Students will learn how to access and leverage information via SQL for analysis, aggregation to visualization, create dashboards, and be source for business intelligence.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA w/ Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Supply Chain Management (SCMN-MS) or MS Business Analytics (BUAN-MS) majors BAMG-CERG, SCAG-CERG students only
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5410 (3) Fundamentals of Data Analytics**
Exposes the students to commonly used platforms for statistical and predictive analytics. The class will go into depth of analytics using R before demonstrating the same concepts using SPSS and SAS. Students will learn to analyze large datasets, including textual analytics such as twitter-stream analysis using R.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA (PMBA), MS Supply Chain Management (SCMN-MS), MS Business Analytics (BUAN-MS) or (SCAG-CERG) or (BAMG-CERG) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5415 (3) Advanced Data Analytics**
Explores the capabilities and challenges of data-driven business decision making and prepares students to lead in analytics-driven organizations. Introduces a set of common predictive and prescriptive analytics tools. Students apply the analytics tools to important decisions based on practical data sets from various companies. Analytics software packages are used extensively in the course.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA (PMBA), MS Supply Chain Management (SCMN-MS), MS Business Analytics (BUAN-MS) or (SCAG-CERG) or (BAMG-CERG) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5420 (3) Unstructured and Distributed Data Modeling and Analysis**
Moves the student beyond structured data and sources into business scenarios where data is semi-structured to unstructured such as those from social and web applications. Specific topics include introduction to SQL-on-Hadoop, NoSQL and related distributed processing technologies. Students will learn practical application and mechanisms for getting this sort of data ready for analytics.
**Requisites:** Requires prereq course MSBX 5405 (min grade D-). Restricted to Master of Business Admn (MBAD), MBA w/ Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Profl MBA Program (PMBA) Supply Chain Mgmnt (SCMN) or Business Analytcs (BUAN) or BAMG-CERG mjrs onl
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5425 (3) Natural Language Processing for Healthcare Analytics**
Practitioners of natural language processing (NLP) use methods from math, science, engineering and linguistics to teach computers to understand human language. Because much biomedical information is stored as text, there are many possible applications of NLP in health sciences. This course offers an introduction to NLP for the health sciences. Students will gain a conceptual and hands-on introduction to fundamental tools, concepts and problems from NLP by exploring applications in healthcare, population health and biomedicine.
**Requisites:** Requires prerequisite courses of MSBC 5070 and MSBC 5180 (minimum grade D-).
**Recommended:** Prerequisite Python 3.
**Grading Basis:** Letter Grade

**MSBX 5430 (3) Advanced Statistical Analysis**
Introduces advanced multivariate regression analysis and residual diagnostics, logistic regression, analysis of variance (ANOVA and MANOVA), time series models, and analysis of categorical variables. R, an open source programming language for statistical computing and graphics, will be used. It is assumed students have mastery of introductory statistics topics including descriptive tools, inference, and ordinary least squares regression.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5435 (1.5-3) Planning and Production**
At the core of GDP and productivity is the science of planning new products of services in design, bringing them to market then producing and replicating it in reliable, dependable, scalable fashion. The course takes an in-depth look at the mechanisms for supporting new product/process design in a scaled, often world-wide supply chain. (MRP, Six Sigma, Modeling Software, Heuristic Model use).
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) majors or SCFG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5440 (3) Decision Analysis**
Covers both behavioral/psychological aspects and analytical approaches to making decisions with multiple objectives. The focus for the course is learning to frame decisions that involve multiple stakeholders with multiple objectives and then learning the various techniques used to evaluate the choices. Influence diagrams, decision heuristics using spreadsheets, and decision trees will all be explored with user-friendly decision tree software.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Supply Chain Management (SCMN-MS) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5450 (3) Transportation and Logistics**
Examines critical elements of distribution and logistics management, including physical distribution, supply chain echelon planning, warehouse (transportation note) selection and location, material handling, inventory quantity and location and other topics.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) majors or SCFG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5470 (1.5-3) Procurement and Contracting**
Examines principles and concepts of the acquisition process from commercial and governmental perspectives, focusing on the procurement process, including planning, source selection, solicitation writing, negotiations and oral discussions, contract preparation and administration.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) majors or SCFG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5605 (3) Real Estate Investment and Risk Management**
This course empowers students with the knowledge and tools needed to understand, evaluate, and manage real estate investment risk and to recognize and capitalize upon potential real estate investment opportunities. We begin by exploring the types of risk investors face in residential real estate, mortgages, and investment properties and how to quantify those risks. With that foundation, we then delve into the history of such risks (e.g., the Great Depression, Great Recession, etc.) and regulations intended to address them. Finally, we explore current topics which are increasingly important in real estate (e.g., climate change, technology, ¿) including the risks and/or opportunities these challenges may present.
**Requisites:** Requires prerequisite course MBAX 6610 or MSBC 5610 (min grade D-). Restricted to Master's students in Real Estate (REAL), Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Profl MBA Program (PMBA) majors onl
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5615 (1.5-3) Real Estate Modeling**
Real Estate Modeling and Analysis is a graduate level course which will teach students skills necessary to model Real Estate proformas to aid in valuation of acquisition and development of commercial real estate assets. The course will engage three software programs: Excel, Argus [¿Commercial Real Estate Software¿] and CoStar [¿largest commercial real estate information and analytics provider¿].
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), or MS Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade

**MSBX 5680 (3) Real Estate Technology**
Course objectives are: (1) to understand economic forces that bridge technology, entrepreneurship and real estate; (2) to investigate short-, medium-, and lung-run effects of technology on residential and commercial real estate; (3) to communicate this information to Leeds School of Business students; and (4) to give current students the technology skills necessary to immediately add value for their potential employers.
**Requisites:** Restricted to Master's students in Real Estate (REAL), Master of Business Admin (MBAD), MBA with DUAL Degree (DMA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only, or business majors with 80 completed units.

**MSBX 5820 (1-3) Special Topics in Accounting**
Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the standard graduate business curriculum.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 5820
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade

**MSBX 6290 (3) Textual Analysis in Business**
This course will discuss basic ideas around natural language processing (NLP) in research in different "dismal science" disciplines, from Economics to Psychology and Political Science, with a bent/focus on financial markets and accounting statements. The course is meant for graduate students as an introductory course on textual analysis, with an emphasis on methods and applications in Finance and Accounting. The language of choice for the course will be R. The course will be multilingual in that both the faculty and students can use other languages than R (python/perl/C).
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 6290
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Recommended:** Prerequisite MBAC 6060 or MSBC 5060 (minimum grade D-).
**Grading Basis:** Letter Grade

# Business Administration - Master of Business Administration (MBA)

The breadth of training that master of business administration graduates receive prepares them to become high-level managers and lead in a challenging and evolving business environment.

The MBA program is rigorous and comprehensive, and demands student commitment. The curriculum develops a set of broad-based, integrative skills. Core courses provide a solid foundation in both business management and analytical disciplines, a foundation that fosters continued career growth. In addition to core courses stressing key functional areas of business, students can choose electives specific to a chosen area of concentration.

The case study method and student projects are used broadly throughout all courses, and common areas of study such as ethics, technology, communications and international issues are integrated throughout much of the curriculum. Students learn about management theory and its practical applications in “real-world” situations. Lectures, seminars, team teaching, team projects and guest lectures are various approaches taken by the faculty to generate new ideas and encourage student input.

# Diversity

The Leeds School of Business encourages qualified individuals to apply regardless of gender, race, religion, national origin, age, physical limitation or sexual orientation.

# Requirements

## Full-Time MBA

During the first semester of study, MBA students should meet with a member of the student services team for the MBA program to review degree requirements.

Students entering the MBA program take a prescribed sequence of core classes before beginning elective coursework. A total of 55 credit hours is needed to graduate. Students entering the MBA program are expected to complete the degree in two years. Transferred coursework is not accepted into the MBA program.

MBA students may enroll in up to 6 credit hours of elective graduate coursework from CU Boulder programs other than the Leeds School of Business with explicit approval from the MBA Programs office prior to enrollment. All remaining 18 credit hours of electives must be taken within the MBA program. MBA academic internship credits will decrement the total number of non-Leeds elective credits available. Students may not take courses outside the University of Colorado Boulder and count them toward the degree. Students should contact individual departments for course listings and registration requirements for non-business courses.

All courses applied toward the 55 credit hours must be taken for a grade. Courses in which a C- or below is received are not accepted for credit toward the 55 credit hours and may have to be retaken. In this case, both grades are factored into the GPA. To withdraw from an elective course and receive a grade of W, a student must be earning a passing grade in that course. Students normally are not permitted to withdraw from courses after the sixth week of the semester. Students in the MBA program may not withdraw from specified MBAC lockstep coursework. An "I" is an incomplete grade. Use of the "I" is at the discretion of the course instructor and/or the dean. Students must ask for an incomplete grade. An "I" is given only when students, for reasons beyond their control, have been unable to complete course requirements. A substantial amount of work must have been satisfactorily completed before approval for such a grade is given.

Co-curricular activities are a critical counterpart to the classroom experience and enrich the value of the degree. Case competitions, student leadership positions, clubs, networking opportunities, guest speakers, small-group meetings with business leaders and professional mentoring all add to the immersive nature of the full-time program. Summer internship opportunities allow students to apply those core skills and develop new insights to help focus their choice of elective courses.

### Full-Time Required Courses

| Code | Title | Credit Hours |
|---|---|---|
| MBAC 6001 | Foundations of Teamwork | 1.5 |
| MBAC 6002 | Social, Moral and Economic Foundations for Business | 3 |
| MBAC 6003 | Foundations of Leadership | 1.5 |
| MBAC 6011 | Managerial Economics 1 | 1.5 |
| MBAC 6012 | Managerial Economics 2 | 1.5 |
| MBAC 6020 | Financial Accounting | 3 |
| MBAC 6031 | Quantitative Methods 1 | 1.5 |
| MBAC 6050 | Strategy | 3 |
| MBAC 6051 | Operations Management | 3 |
| MBAC 6060 | Corporate Finance | 3 |
| MBAC 6081 | Data and Decisions | 3 |
| MBAC 6090 | Marketing Management | 3 |
| MBAC 6096 | Managerial Communications | 1.5 |
| MBAC 6098 | Professional Development I | 1 |

### Full-Time MBA Elective Courses

Students complete a total of 24 elective credits that count toward the 55 total credits needed for graduation. Electives are typically offered only once each academic year. This list is subject to change. Offerings each year will vary depending on faculty availability.

| Code | Title | Credit Hours |
|---|---|---|
| **Entreprenuership** | | |
| MBAX 6100 | Entrepreneurship | |
| MBAX 6110 | Entrepreneurial Finance | |
| MBAX 6140 | Social Entrepreneurship in the US and Global Economies | |
| MBAX 6160 | Entrepreneurship: High Growth Companies | |
| MBAX 6170 | New Venture Creation | |
| MBAX 6180 | New Venture Launch | |
| MBAX 6190 | Projects in Entrepreneurial Companies | |
| MBAX 6195 | Special Topics in Entrepreneurship | |
| MBAX 6280 | Entrepreneurship Valuation and Investment Seminar | |
| MBAX 6281 | Entrepreneurship Valuation and Investment Seminar2 | |
| **Finance** | | |
| MBAX 6110 | Entrepreneurial Finance | |
| MBAX 6210 | Applied Financial Management | |
| MBAX 6215 | Principles of Wealth Management | |
| MBAX 6220 | Investment Management and Analysis | |
| MBAX 6250 | Derivative Securities | |
| MBAX 6260 | Fixed Income Investing | |
| MBAX 6270 | Applied Derivatives | |
| MBAX 6710 | Financial Statement Analysis | |
| MSBX 6290 | Textual Analysis in Business | |
| MSBX 5280 | Sustainable Finance | |
| MSBX 5205 | Financial Strategy and Decision Modeling | |
| MSBX 5225 | Advanced Portfolio Management | |
| **Marketing** | | |
| MSBX 5310 | Customer Analytics | |
| MBAX 6310 | Marketing Strategy | |
| MBAX 6330 | Market Intelligence | |
| MBAX 6350 | Digital Marketing | |
| MBAX 6360 | New Product Development | |
| MBAX 6368 | Consumer Packaged Goods Marketing Applied to the Natural & Organic Industry | |
| MBAX 6380 | Consumer Decision-Making: Behavioral Economics, Psychology, and Experimental Design | |
| **Organizational Leadership & Information Analytics** | | |
| MBAX 6420 | IT and Business Strategy | |

| | |
|---|---|
| MBAX 6500 | Management of Organizational Change |
| MBAX 6530 | Negotiating and Conflict Management |
| MBAX 6540 | Consulting Skills |
| MBAX 6560 | Executive Leadership |
| MBAX 6565 | Inclusive Leadership |
| MBAX 6595 | Special Topics in Organizational Behavior |
| MBAX 6801 | Global Perspectives Seminar |
| MBAX 6097 | Professional Development Internship |
| **Real Estate** | |
| MBAX 6600 | Real Estate Principles |
| MBAX 6610 | Real Estate Finance and Investment Analysis |
| MBAX 6620 | Real Estate Project Competition |
| MBAX 6630 | Real Estate Economics |
| MBAX 6640 | Real Estate Law and Practice |
| MBAX 6650 | Real Estate Case Studies |
| MBAX 6815 | Sustainable Real Estate |
| MSBX 5605 | Real Estate Investment and Risk Management |
| MSBX 5615 | Real Estate Modeling |
| **Social Responsibility & Sustainability** [1] | |
| MBAX 6000 | Socially Responsible Enterprise |
| MBAX 6130 | Sustainable Venturing |
| MBAX 6720 | ESG Reporting and Analysis |
| MBAX 6930 | Commercializing Sustainable Energy Technologies |
| **Strategy, Systems, & Operations** | |
| MBAX 6410 | Process Analytics |
| MBAX 6440 | Project Management |
| MBAX 6450 | International Operations Management |
| MBAX 6460 | Supply Chain Management |
| MBAX 6843 | Supply Chain and Operations Analytics |
| MSBX 5415 | Advanced Data Analytics |
| MSBX 5420 | Unstructured and Distributed Data Modeling and Analysis |
| MSBX 5435 | Planning and Production |
| MSBX 5450 | Transportation and Logistics |
| MSBX 5470 | Procurement and Contracting |
| MSBC 5680 | Optimization Modeling |

[1] See also Finance: Sustainable Finance; Real Estate: Sustainable Real Estate.

## MBA Programs for Working Professionals (Evening/ Hybrid)

The 42-credits comprising the MBA for Working Professionals programs (Evening and Hybrid programs) mirror 30 core required classes of the full-time MBA program, plus 12 credits of elective coursework to add greater depth and specificity of knowledge, delivered in a format that accommodates students who are fully employed.

The Evening MBA program maintains a traditional classroom format, with classes convening in-person, twice per week (summer terms may vary). The Hybrid MBA is a combination of enhanced virtual instruction and traditional classroom delivery, meeting roughly one Saturday/month with variation during summer terms.

The Evening MBA Program and Hybrid MBA program each begin in May, with an innovative schedule that allows students to graduate in two years (six semesters). During the second year, students complete MBAC 6052 Capstone Projects. Students in the evening and hybrid programs have access to electives in both programs/formats, including the following options. For additional information about courses by semester, see the Plan(s) of Study tab. Elective coursework varies by term.

### Evening/Hybrid MBA Required Courses

| Code | Title | Credit Hours |
|---|---|---|
| MBAC 6001 | Foundations of Teamwork | 1.5 |
| MBAC 6003 | Foundations of Leadership | 1.5 |
| MBAC 6004 | Social, Moral and Economic Foundations for Business | 1.5 |
| MBAC 6010 | Managerial Economics | 3 |
| MBAC 6020 | Financial Accounting | 3 |
| MBAC 6031 | Quantitative Methods 1 | 1.5 |
| MBAC 6032 | Quantitative Methods 2 | 1.5 |
| MBAC 6050 | Strategy | 3 |
| MBAC 6051 | Operations Management | 3 |
| MBAC 6052 | Capstone Projects | 3 |
| MBAC 6060 | Corporate Finance | 3 |
| MBAC 6090 | Marketing Management | 3 |
| MBAC 6096 | Managerial Communications | 1.5 |

### Evening/Hybrid MBA Elective Courses

| Code | Title | Credit Hours |
|---|---|---|
| **Entrepreneurship** | | |
| MBAX 6101 | Entrepreneurship | |
| MBAX 6111 | Entrepreneurial Finance | |
| MBAX 6171 | New Venture Creation | |
| **Finance** | | |
| MBAX 6111 | Entrepreneurial Finance | |
| MBAX 6211 | Applied Financial Management | |
| MBAX 6221 | Investment Management & Analysis | |
| **Organization Leadership & Information Analytics** | | |
| MBAX 6531 | Negotiating and Conflict Management | |
| MBAX 6561 | Executive Leadership | |
| MBAX 6801 | Global Perspectives Seminar | |
| MSBX 5415 | Advanced Data Analytics | |
| **Marketing** | | |
| MBAX 6311 | Marketing Strategy | |
| MBAX 6331 | Market Intelligence | |
| MBAX 6361 | New Product Development | |
| MBAX 6381 | Consumer Decision-Making: Behavioral Economics, Psychology, and Experimental Design | |
| **Systems and Operations** | | |
| MBAX 6421 | IT & Business Strategy | |

| | |
|---|---|
| MBAX 6441 | Project Management |
| MBAX 6451 | International Business and Strategy |

## Executive MBA

The Executive MBA (EMBA) program is for experienced leaders and executives with a minimum of eight years professional experience who are looking to enhance their leadership capabilities. This program offers a cohort-based model, fostering both professional and personal networks throughout the duration of the program. Spanning four semesters over two academic years (fall and spring), the EMBA program offers a blend of in-person and enhanced virtual learning. This format provides flexibility, allowing students to balance work, personal commitments, and academic responsibilities. Throughout the program, students engage with teams and faculty, utilizing technology to maintain high levels of interaction and collaboration.

The curriculum is designed to equip students with the skills needed to excel in a complex, global business environment while focusing on leadership, innovation, inclusion, and essential business competencies. During the first year, students focus on fundamental business disciplines including strategy, marketing, finance, and accounting. The second year delves into advanced topics including ethics, negotiation, risk management, and entrepreneurship.

Key program features include:

- **Leadership development**: A suite of courses emphasizing executive, strategic, and ethical leadership principles, beginning with a team leadership challenge in year one and a nationally recognized course dedicated to inclusive leadership principles.
- **Experiential learning**: A project-based curriculum with real clients allowing students to apply curriculum lessons. Year one culminates in an innovation project that applies an innovation process integrating finance, strategy and human resources.
- **Entrepreneurial practices**: Leeds EMBA program cultivates an entrepreneurial mindset with a new venture pitch competition and exploring strategies for high growth success from successful entrepreneurs.

In addition to the core curriculum, students have access to a range of academic enrichment opportunities, both in-person and remotely, aimed at supporting ongoing professional development, networking, and lifelong learning. Also included is one year of career coaching to help clearly articulate and realize career goals.

The EMBA program begins every August with a three-day onsite orientation held in Vail, CO. The program includes six mandatory one-week residencies that provide students with the opportunity to collaborate closely with faculty and peers. These intensive residencies, scheduled each academic year in October, January and April, allow students to apply classroom knowledge to real-world business challenges. The first five residencies take place in the United States, and the final residency is held overseas for ten days, offering a global perspective on business issues.

The EMBA curriculum consists of 45 total credits. For detailed course listings, visit the the Plans of Study tab.

# Plans of Study

## Full-Time MBA

**Year One**

| **August Intensive** | | **Credit Hours** |
|---|---|---|
| MBAC 6031 | Quantitative Methods 1 | 1.5 |
| MBAC 6001 | Foundations of Teamwork | 1.5 |
| | **Credit Hours** | **3** |
| **Fall Semester** | | |
| MBAC 6002 | Social, Moral and Economic Foundations for Business | 3 |
| MBAC 6011 | Managerial Economics 1 | 1.5 |
| MBAC 6020 | Financial Accounting | 3 |
| MBAC 6060 | Corporate Finance | 3 |
| MBAC 6081 | Data and Decisions | 3 |
| MBAC 6090 | Marketing Management | 3 |
| MBAC 6098 | Professional Development I | 1 |
| | **Credit Hours** | **17.5** |
| **Spring Semester** | | |
| MBAC 6003 | Foundations of Leadership | 1.5 |
| MBAC 6012 | Managerial Economics 2 | 1.5 |
| MBAC 6050 | Strategy | 3 |
| MBAC 6051 | Operations Management | 3 |
| MBAC 6096 | Managerial Communications | 1.5 |
| Electives | | 6 |
| | **Credit Hours** | **16.5** |

**Year Two**

| | | |
|---|---|---|
| **Fall Semester** | | |
| Electives [1] | | 9 |
| | **Credit Hours** | **9** |
| **Spring Semester** | | |
| Electives [1] | | 9 |
| | **Credit Hours** | **9** |
| | **Total Credit Hours** | **55** |

[1] Students will take a total of 24 elective credits over the course of their degree program. Students gain access to elective credits beginning in the spring semester of their first year, and complete their elective credit balance across fall and spring semesters in year two.

## Evening MBA/Hybrid MBA

**Year One**

| **Summer Review** | | **Credit Hours** |
|---|---|---|
| Summer courses are credit-bearing | | |
| MBAC 6001 | Foundations of Teamwork | 1.5 |
| MBAC 6031 | Quantitative Methods 1 | 1.5 |
| MBAC 6004 | Social, Moral and Economic Foundations for Business | 1.5 |
| MBAC 6032 | Quantitative Methods 2 | 1.5 |
| | **Credit Hours** | **6** |
| **Fall Semester** | | |
| MBAC 6010 | Managerial Economics | 3 |

| | | |
|---|---|---|
| MBAC 6020 | Financial Accounting | 3 |
| | **Credit Hours** | **6** |
| **Spring Semester** | | |
| MBAC 6060 | Corporate Finance | 3 |
| MBAC 6051 | Operations Management | 3 |
| Capstone launch meeting (late April) | | |
| | **Credit Hours** | **6** |
| **Year Two** | | |
| **Summer Review** | | |
| Summer courses are credit-bearing | | |
| MBAC 6003 | Foundations of Leadership | 1.5 |
| MBAC 6090 | Marketing Management | 3 |
| MBAC 6050 | Strategy | 3 |
| MBAC 6096 | Managerial Communications | 1.5 |
| | **Credit Hours** | **9** |
| **Fall Semester** | | |
| Electives [2] | | 6 |
| | **Credit Hours** | **6** |
| **Spring Semester** | | |
| MBAC 6052 | Capstone Projects | 3 |
| Electives [2] | | 6 |
| | **Credit Hours** | **9** |
| | **Total Credit Hours** | **42** |

[2] Students complete a total of 12 elective credits during year two (fall and spring).

## Executive MBA

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| Term A | | |
| MBAE 6081 | Data and Uncertainty | 1.5 |
| MBAE 6560 | Executive Leadership | 1.5 |
| MBAE 6050 | Executive Level Strategy | 3 |
| MBAE 6010 | The Economics of Pricing, Price Forecasting, and the Macroeconomy | 1.5 |
| Term B | | |
| MBAE 6091 | Strategic Marketing I | 1.5 |
| MBAE 6021 | Financial Accounting I | 1.5 |
| | **Credit Hours** | **10.5** |
| **Spring Semester** | | |
| Term A | | |
| MBAE 6565 | Inclusive Leadership | 1.5 |
| MBAE 6092 | Strategic Marketing II | 1.5 |
| MBAE 6022 | Financial Accounting II | 1.5 |
| Term B | | |
| MBAE 6581 | Aligning People with Business Strategy I | 1.5 |
| MBAE 6065 | Business Finance | 3 |
| MBAE 6470 | Creating Value Through Innovation | 3 |
| | **Credit Hours** | **12** |
| **Year Two** | | |
| **Fall Semester** | | |
| Term A | | |
| MBAE 6100 | Entrepreneurship | 3 |
| MBAE 6051 | Operations Management | 3 |
| MBAE 6582 | Aligning People with Business Strategy II | 1.5 |
| Term B | | |
| MBAE 6001 | Ethics I | 1.5 |
| MBAE 6211 | Applied Financial Management I | 1.5 |
| | **Credit Hours** | **10.5** |
| **Spring Semester** | | |
| Term A | | |
| MBAE 6212 | Applied Financial Management II | 1.5 |
| MBAX 6160 | Entrepreneurship: High Growth Companies | 1.5 |
| MBAE 6002 | Ethics II | 1.5 |
| Term B | | |
| MBAE 6205 | Risk Management | 1.5 |
| MBAE 6420 | Digital Strategy | 3 |
| MBAE 6530 | Negotiations | 1.5 |
| MBAE 6806 | Global Business Experience | 1.5 |
| | **Credit Hours** | **12** |
| | **Total Credit Hours** | **45** |

# Dual Degree Programs

## Juris Doctor/MBA

The purpose of this dual degree program is to allow students admitted to both the School of Law and the Leeds School of Business to obtain the juris doctor (JD) and the master of business administration (MBA) degrees in four (or fewer) years of full-time study. The program is designed to train students for careers in which business administration and law overlap.

### Admission

To be eligible for the JD/MBA dual degree program of the School of Law and the Leeds School of Business, a student must apply separately to and be admitted by each of the two schools under their respective admission procedures and standards.

Students may elect the dual degree program at the time of initial application to both schools, or they may apply for the dual degree program during their first year of study in the degree program of either school.

### Course of Study

A student enrolled in the JD/MBA program may commence studies under the program in either the School of Law or the Leeds School of Business. Dual degree students are strongly encouraged to begin their course of study at the School of Law. However, a student must take the first year of the JD curriculum as a unit exclusively in the School of Law. Likewise, a student must take the first year of the MBA curriculum as a unit exclusively in the Leeds School of Business. Students can then take additional courses necessary to meet the requirements of the degree programs of the two schools.

No student in the dual degree program shall be allowed to take fewer than 9 credit hours or more than 16 credit hours during any term (excluding

summer terms) without receiving the consent of the program advisor in each school in which courses are being taken.

### Credit for Law Courses in the JD/MBA Program

The Leeds School of Business grants credit toward the MBA degree for up to 12 credit hours of acceptable performance in law courses taken by a JD/MBA student at the School of Law. Core courses required in the law school program cannot be counted toward the 12 credit hours. A student must earn at least a 77 grade in a law school course to be accepted for Leeds School of Business credit. For credit to be granted, the law school courses must be approved before enrollment by an MBA advisor. Only courses taken after admission into the MBA program are credited toward the degree.

### Grading in the Dual Degree Program

Leeds School of Business credit for courses completed in the School of Law as part of the joint degree program is recorded on a *pass/fail* basis and is not included in the required MBA 3.00 cumulative average.

## MBA/MD

The Leeds School of Business and the University of Colorado School of Medicine offer students the ability to earn both an MBA and a Doctor of Medicine (MD) degree.

With the MD/MBA dual degree, students acquire expertise in business essentials like leadership, finance, accounting, marketing, strategy, innovation and social responsibility. As collaborative leaders, these medical professionals with business fundamentals are positively impacting patient care and healthcare delivery by leveraging their knowledge in powerful new ways. As the medical field rapidly changes and evolves—with new technologies, shifting professional roles, a dynamic public policy landscape, and new healthcare delivery models—physicians need leadership skills now more than ever to tackle complex issues and ensure high standards of care.

### Admission

To ensure student success—both academically and professionally—admission to the program is competitive. Each application undergoes a holistic review, including an evaluation of academic strengths and a high-level assessment of compatibility with the Leeds MBA program. SOM students must apply to become a dual degree student one year prior to beginning the MBA curriculum. All dual degree students must fulfill all requirements for each program, as well as all applicable dual degree requirements.

### Course of Study

The 5-year dual degree from CU Leeds School of Business and CU School of Medicine requires 31 credits of MBA core coursework. Dual degree students begin with the MD program. Students must complete two academic years of the MD program prior to starting the MBA experience. MBA requirements will be satisfied with successful completion of core curriculum (summer/fall/spring).

## MBA/MFA

The Leeds School of Business, in conjunction with the Department of Art and Art History, offers students the ability to earn an MBA and an MA in fine arts through a three-year dual degree program. Students in the MBA/MA dual degree program pursue careers in digital marketing, web design, e-commerce, gallery/museum administration and private art consulting.

### Admission

Applicants must apply to both programs and must meet the application requirements for each program separately. Students may apply simultaneously to both programs or may apply to the second program after starting the first master's program, provided they do so during the first year of study.

### Course of Study

Students in the MBA/MA in fine arts spend the first year of their dual degree program exclusively in either the business school or the fine arts program. In the second year, courses are taken exclusively in the other department. The third year offers students the opportunity to take both MBA and fine arts elective courses.

### Credit for Fine Arts Courses in the MBA/MA Fine Arts Program

Dual degree students in studio arts are required to complete 43 credit hours of MBA coursework and 45 credit hours of fine arts coursework. Dual degree students in art history are required to complete 43 credit hours of MBA coursework and 30 credit hours of fine arts coursework.

## MBA/MA in Anthropology

The MBA/MA in anthropology dual degree program enables students to earn an MBA and an MA in anthropology simultaneously over three or four years depending on the student's subdiscipline in anthropology. Students in this MBA/MA program pursue careers in managing the business aspects of archaeological projects, working in the growing field of corporate cultural anthropology and ethnography or museum management.

### Admission

Applicants must apply to both programs and must meet the application requirements for each program separately. Students may apply simultaneously to both programs or may apply to the second program after starting the first master's program, provided they do so during the first year of study.

### Course of Study

Students in the MBA/MA in anthropology spend the first year of their dual degree program exclusively in either the business school or the department of anthropology. In the second year, courses are taken exclusively in the other department. The remaining year(s) offers students the opportunity to take both MBA and anthropology elective courses.

## MBA/MA in German Studies

The MBA/MA in German studies dual degree program enables students to earn an MBA and an MA in German studies simultaneously over three or four years. Students in this MBA/MA program pursue careers in international business.

### Admission

Applicants must apply to both programs and must meet the application requirements for each program separately. Students may apply simultaneously to both programs or may apply to the second program after starting the first master's program, provided they do so during the first year of study.

### Course of Study

Students in the MBA/MA in German studies spend the first year of their dual degree program exclusively in either the Leeds School of Business or the Department of Germanic and Slavic Languages and Literatures. In the second year, courses are taken exclusively in the other department. The remaining year(s) offers students the opportunity to take both MBA and German studies elective courses.

## MBA/MA in Theater and Dance

The Leeds School of Business, in conjunction with the Department of Theatre and Dance, offers students the ability to earn an MBA and an MA in theatre or dance through a three-year dual degree program. Students in the MBA/MA dual degree program pursue careers in a wide variety of fields and jobs in the world of the performing arts. Types of organizations include theatre companies, dance companies, opera companies, symphonies, arts councils, performing arts complexes, civic auditoriums and arts presenters.

### Admission

Applicants must apply to both programs and must meet the application requirements for each program separately. Students may apply simultaneously to both programs or may apply to the second program after starting the first master's program, provided they do so during the first year of study.

### Course of Study

Students in the MBA/MA in theatre and dance spend the first year of their dual degree program exclusively in either the business school or the theatre/dance program. In the second year, courses are taken exclusively in the other department. The third year offers students the opportunity to take both MBA and theatre/dance elective courses.

### Credit for Courses

Dual degree students are required to complete 43 credit hours of MBA coursework and 24 credit hours of theatre/dance coursework. A minimum of 67 approved credit hours must be completed to earn both degrees.

## MBA/MENV

An MBA degree in combination with the Masters of the Environment (MENV) degree will provide a student with a powerful set of tools and knowledge to expand career options. The MBA offers a valuable business toolkit—including leadership, critical thinking and communication skills. This option allows a student to complete two specialized master's degrees in less time than it would take to earn both separately.

### Admission

Students must apply to each program separately and meet the respective application requirements and admissions standards for each program. Students admitted simultaneously to both programs are advised to begin the MBA program first. A person may elect the dual degree program at the time of initial application to both schools; or a student enrolled in the applicable degree program of either school may apply for admission to the other school and elect to be enrolled under the dual degree program.

### Course of Study

Dual degree students in their second year will exclusively enroll in the Masters of the Environmental Program. Students will choose a specialization and enroll in all core and required MENV courses. MENV specializations include: Environmental Policy; Public Lands and Natural Resources; Renewable and Sustainable Energy; Sustainable Food Systems; and Urban and Regional Sustainability. Both degrees must be awarded simultaneously. Dual degree students must maintain the academic and ethical standards required of both programs. Students in good standing in one school, but not the other, may be allowed to continue in the school in which they are in good standing. Students who do not complete the dual degree program requirements (i.e., who withdraw for any reason from one of the two programs) will be required to meet the full requirements of the remaining program in which they are enrolled. Dual degree students must complete a Dual Degree Curricular Program (DDCP) form for their program and present to both advisors prior to beginning the degree. This is the initial map of the course sequence to meet the dual requirements and can change over time.

### Credit for Courses

The MBA/MENV dual degree program allows for 9 MBA credits to be used for MENV degree requirements, and 12 MENV credits to be used for MBA degree requirements. Dual degree students will be required to complete 43 hours of MBA coursework and 39 hours of MENV coursework, for a total of 82 hours of combined coursework.

## MBA/MS in Business Analytics or Supply Chain Management

The purpose of this dual degree program is to allow students admitted to the Leeds School of Business as a dual degree student to obtain the master of business administration (MBA) and master of science in business analytics or supply chain management degrees in two years of full-time study. An MBA degree in combination with the MS degree will provide students with a set of business tools to develop leadership, critical thinking and communications skills as well as a specialization in one of the STEM designated areas of either Business Analytics or Supply Chain Management. The MBA/MS offers students the opportunity to earn both degrees together in less time than if the degrees were earned separately.

### Admission

To be eligible for the MBA/STEM dual degree program, a student must apply directly to the Leeds School of Business choosing dual degree status. Applicants must select the MBA/MS-SCMN or the MBA/MS-BUAN dual degree option at the time of application to be evaluated for admission to both programs, simultaneously. Students may not apply to the MBA program, and subsequent to the start of classes, add the dual degree designation. Students must meet the admissions standards for each program separately. The Graduate Management Admissions Test (GMAT) or Graduate Record Examinations (GRE) will be used as the standardized examination for admissions to both the Leeds School of Business MBA and MS Supply Chain Management or Business Analytics programs.

### Course of Study

Dual degree students must begin with the MBA program, and will take courses exclusively in the MBA program during the first year. The second year of the dual degree program will consist of the existing MS Supply Chain Management or MS Business Analytics curriculum, in full: 33 credits over three semesters.

### Credit for Courses

Students are required to complete 37 credit hours of MBA coursework and 33 credit hours of MS coursework. Certain MBA elective courses are part of the STEM curriculum and must be taken in the second year as an MS student.

## MBA/MS in Environmental Studies

The MBA/MS in environmental studies enables students to earn an MBA and an MS in environmental studies over three or four years. Students in the MBA/MA program have career interests that combine corporate business and environmental protection, the management of renewal energy, water conservation or environmental programs.

### Admission

Applicants must apply to both programs and must meet the application requirements for each program separately. Students may apply simultaneously to both programs or may apply to the second program

after starting the first master's program, provided they do so during the first year of study.

### Course of Study

Students in the MBA/MS in environmental studies spend the first year of the dual degree program exclusively in either the business school or the environmental studies department. In the second year, courses are taken exclusively in the other department. The remaining year(s) students may take both MBA and environmental studies electives.

# Business Administration - Doctor of Philosophy (PhD)

The Leeds School of Business provides a dynamic professional atmosphere comprised of quality diverse faculty and PhD students, framed by a thriving business community and a beautiful environment. The Leeds PhD program prepares students for research careers at leading universities and equips students with a deep understanding of the most influential research within the disciplines, as well as the tools necessary to contribute state-of-the-art research advancing these disciplines:

- accounting
- finance
- marketing
- information systems
- operations
- organizational behavior
- strategy and entrepreneurship

In addition to the creation of knowledge, the program also supports the dissemination of that knowledge from classrooms to the profession at large. The program is small enough to ensure that all students can receive the mentoring needed to innovate at the frontier of their disciplines.

Dr. Diego García chairs the PhD Curriculum and Policy Committee which oversees the Leeds PhD program.

# Requirements

PhD students must complete all Graduate School, Leeds School of Business and division requirements to be conferred the PhD in business administration. All PhD students are required to complete at least 30 credit hours of coursework and at least 30 credit hours of dissertation at CU Boulder. Additional coursework may be required as determined by the academic advisor. To comply with this 30-credit-hour requirement, a course must be taught by a member of the university's graduate faculty, must be at the 5000 level or above, and the student must achieve a grade of B- or better. Most students complete 7000- and 8000-level PhD seminars.

PhD students in all program areas except for Accounting are required to maintain a minimum GPA of 3.3 or better while in residence in the program. Accounting students must maintain a minimum GPA of 3.0.

PhD students are required to assume teaching apprentice roles for three sections of any course and then independently teach two courses to achieve teaching proficiency. PhD students are also expected to attend eight (8) workshops and/or trainings while in residence.

## Time Limit

PhD students have six years from the commencement of coursework to complete all requirements of the degree, but most PhD students complete their program within five years.

## Comprehensive Examination

Before admission to candidacy, a PhD student must pass a comprehensive examination in the field of concentration. The examination may be oral, written or both, and will test the student's mastery of a broad field of knowledge, not merely the formal coursework completed. Each division will determine the required content, length and standards of evaluation for the exam. Check with the division as to the specific requirements for the comprehensive exam.

## Admission to Candidacy

PhD students are admitted to candidacy according to Graduate School procedures and requirements. PhD students shall complete all coursework and any other requirements listed on their degree plans, earn at least four semesters of residence and successfully pass the comprehensive exams before admission to candidacy is approved by the Graduate School. In addition, requirements related to academic quality of work, graduate-level coursework, the minimum number of course credit hours, and graduate faculty membership must be met before admission to candidacy is approved.

## Dissertation Proposal and Final Defense

All PhD students are required to successfully present and defend a dissertation proposal on a subject approved by the candidate's dissertation committee. The dissertation proposal must be passed before attempting to defend a final dissertation.

A final dissertation must be based upon original investigation showing mature scholarship and critical judgment, as well as competence with research tools and methods. To be acceptable, the dissertation must be a significant contribution to knowledge in the candidate's primary field and must comply with the CU Boulder Graduate School Thesis and Dissertation Specifications. All PhD students are required to present a final dissertation defense, which is open to the public.

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate a comprehensive and intensive knowledge of the theories, concepts, frameworks and empirical findings in a chosen business discipline.
- Evaluate research ideas and completed research projects critically, assessing their conceptual and methodological soundness and importance of contribution to existing knowledge in the field.
- Demonstrate an understanding of ethical considerations in academic research, including issues related to intellectual property, plagiarism and data integrity.
- Demonstrate a comprehensive and intensive knowledge of the research methods and analytical techniques applicable to a chosen business discipline.
- Demonstrate strong oral and written communication skills necessary for teaching, academic publishing and presenting research to both academic and non-academic audiences.
- Teach effectively in a selected discipline at the university level.

# Accounting - Master of Science (MS)

A master's degree in accounting prepares students to become financial professionals who can help a wide range of organizations thrive. Accounting is extremely important to any company because financial information, as analyzed and interpreted by CPAs, allows executives to make informed business decisions that help companies become more successful. Through the program, graduates develop specific expertise in the area of accounting by strengthening and enhancing the ability to interpret and communicate information about a company's operations and finances. Academic experience, combined with a practical internship experience, propels graduates to be proficient in the "language of business" that is accounting.

Typically, over 90 percent of MS accounting students have a job in accounting and financial advisory fields at graduation, and the demand for CU Boulder-educated accountants continues to soar. Many graduates begin careers with public accounting firms in audit, tax or advisory business services. Others prefer information management, tax or compliance positions within corporations. Still other opportunities exist in financial management, nonprofits and government agencies.

# MS Program

Coursework in accounting conveys a comprehensive understanding of the theory and concepts that underlie accounting practice. Emphasis is placed on logical reasoning and the development, understanding and use of information, which enables students to solve problems in accounting and management of organizations and to make sound accounting policy decisions.

Accounting students have many career options to consider after graduation. Those who aspire to pursue careers in public accounting must become Certified Public Accountants (CPAs). The CPA designation is not as critical for other career paths in accounting, but becoming a CPA can be advantageous in any accounting career.

While the CPA requirements of most states have similar components and required courses, the specifics of those requirements differ greatly. Students interested in ultimately pursuing CPA licensure should contact the applicable state licensing board to determine any requirements, including particular courses they may need to fulfill in order to obtain licensure in a particular state.

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s): Business Administration - Bachelor of Science (BS) (https://catalog.colorado.edu/undergraduate/colleges-schools/business/programs-study/business-administration/business-administration-bachelor-science-bs/#acceleratedmasterstext).

# Requirements

The MS accounting degree consists of ten graduate-level courses. Students can opt to take additional courses. The degree can be completed in 9–20 months, depending on whether the student wants, and is offered, a busy-season (spring) internship. This program has start dates in fall, spring and summer terms.

## Prerequisites

The following four intermediate-level accounting courses or their equivalent must be completed before starting the master's-level accounting courses. Course equivalency will be assessed by the MS in Accounting faculty director during transcript review in the application process.

| Code | Title | Credit Hours |
|---|---|---|
| ACCT 3220 | Corporate Financial Reporting 1 | 3 |
| ACCT 3230 | Corporate Financial Reporting 2 | 3 |
| ACCT 3320 | Cost Management | 3 |
| ACCT 3440 | Income Taxation of Individuals | 3 |
| **Total Credit Hours** | | **12** |

## Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ACCT 5240 | Advanced Financial Accounting | 3 |
| ACCT 5450 | Income Taxation of Business Entities | 3 |
| ACCT 5620 | Auditing and Assurance Services | 3 |
| ACCT 6350 | Current Issues in Professional Accounting–Accounting Ethics | 3 |
| ACCT 6620 | Advanced Auditing: Business Risk and Decision Analysis | 3 |
| BSLW 5120 | Advanced Business Law | 3 |
| **Electives** | | **12** |
| Select four: | | |
| ACCT 5100 | Oil and Gas Accounting | |
| ACCT 5250 | Financial Statement Analysis | |
| ACCT 5540 | Accounting Information Systems | |
| ACCT 5550 | Data Analytics for Accounting | |
| ACCT 6290 | Textual Analysis in Business | |
| ACCT 5829 | | |
| ACCT 5120 | Business Analytics | |
| **Total Credit Hours** | | **30** |

# Plan(s) of Study

Students will meet with their advisors to plan out their course of study to meet degree requirements.

# Learning Outcomes

By the completion of the program, students will be able to:

- Interpret and apply accounting standards governing private and public sector financial reporting
- Compute and interpret complex accounting problems relying on technical accounting
- Recognize professional standards of conduct
- Recognize legal, ethical, and social responsibilities related to the field of accounting

- Reason through and solve complex business problems
- Write effective memoranda

# Business Analytics - Master of Science (MS)

The MS degree in business analytics focuses on the exciting and fast-growing field of "big data." Merging developments in marketing and customer analytics with operations research, business analytics, aspects of computer science and statistical methods, the specialization offers a technical, quantitative and statistically intensive program designed to train specialists in turning "big data" into business decisions. Analytics may be used as input for human decisions or may drive fully automated decisions about why some data pattern is observed, what will happen next and how a firm can adapt to optimize that outcome. Students have an option to customize their curriculum by specializing in decision science, healthcare analytics, marketing analytics or research analytics.

This 10-month program includes extensive coursework and an application of materials, preparing students for a range of job opportunities. In addition to the academic coursework, four enrichment seminars in topics ranging from teamwork and leadership to ethics and corporate social responsibility support our commitment to developing the "whole student" by incorporating professional development into the academic experience.

# Distance Education Option via Online+

Students may enroll in the MS Business Analytics (BUAN) or MS Supply Chain Management (SCMN) degree program through distance education (online) and complete the degree requirements established for each MS program. Distance education offers regularly scheduled on-campus graduate courses to remote off-campus (distance) students using advanced virtual and video-conferencing technology. Distance students participate both synchronously (at a scheduled delivery time) and asynchronously (no scheduled delivery time). Instructors, courses, assignments, projects, exams and evaluations are identical for on-campus and off-campus students. Online+ courses are term-based (i.e., follow the regular academic schedule) and structured to maximize student engagement with faculty and other online+ students to support student success and degree completion.

Designed for working professionals, the online option allows students to enroll part-time and follows the same curriculum as the on-campus degree option. Please see degree requirements and plan(s) of study specific to Business Analytics or Supply Chain Management. Based on circumstance and timeline to completion, students enroll in one or two courses each semester, completing the degree in two years.

For more information, connect with the individual graduate program directly.

# Requirements

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| MSBC 5070 | Survey of Business Analytics | 3 |
| MSBX 5410 | Fundamentals of Data Analytics | 3 |
| MSBX 5415 | Advanced Data Analytics | 3 |
| MSBX 5405 | Structured Data Modeling and Analysis | 3 |
| MSBC 5180 | Machine Learning in Python | 3 |
| MSBX 5420 | Unstructured and Distributed Data Modeling and Analysis | 3 |
| MSBC 5190 | Modern Artificial Intelligence: Introduction to AI for Business | 3 |
| MSBC 5490 | BUAN Experiential Projects | 3 |
| **Electives** | | |
| Students will enroll in three of the following track-specific electives. (See track sections below.) | | 9 |
| **Total Credit Hours** | | **33** |

## Experiential Projects

The experiential project pairs students with clients in industry to work on important practical problems in business analytics. Students work under the supervision of faculty and meet together weekly to discuss progress, jointly work on problems and to share experiences. This hands-on analytics project management experience prepares graduates to make an immediate meaningful contribution in the workplace.

For additional information, please visit Leeds School Graduate Programs (http://www.colorado.edu/business/ms-programs/) or email us at leedsgrad@colorado.edu.

## Tracks

The MS in Business Analytics offers tracks to develop analytic skills in specific disciplines: healthcare analytics, decision science and marketing analytics. Beginning Fall 2025, marketing analytics is offered as a standalone MS degree. Learn more below and on the Plan(s) of Study tab.

### Decision Science Track

| Code | Title | Credit Hours |
|---|---|---|
| **Decision Science Track Electives** | | |
| MSBC 5680 | Optimization Modeling | 3 |
| MBAX 6410 | Process Analytics | 3 |
| MBAX 6843 | Supply Chain and Operations Analytics | 3 |

### Healthcare Analytics Track

| Code | Title | Credit Hours |
|---|---|---|
| **Healthcare Analytics Track Electives** | | |
| NURS 6286 | Foundations of Healthcare Informatics (Fall) | 3 |
| NURS 6290 | Information Systems Life Cycle (Spring) | 3 |
| MSBX 5425 | Natural Language Processing for Healthcare Analytics | 3 |

### Marketing Analytics Track

| Code | Title | Credit Hours |
|---|---|---|
| **Marketing Analytics Track Electives** | | |
| MBAX 6330 | Market Intelligence | 3 |
| MSBX 5310 | Customer Analytics | 3 |
| APRD 6342 | | 3 |

# Plans of Study

The sample one-year plan of study found below is restricted to students who are not working professionals. Students who are working professionals enrolled in the online+ degree will engage a two-year plan of study. For more information, contact the department.

| | | |
|---|---|---|
| **Year One** | | |
| **Summer Review** | | **Credit Hours** |
| (Summer B) | | |
| MSBC 5070 | Survey of Business Analytics | 3 |
| MSBX 5410 | Fundamentals of Data Analytics | 3 |
| | **Credit Hours** | **6** |
| **Fall Semester** | | |
| MSBX 5405 | Structured Data Modeling and Analysis | 3 |
| MSBX 5415 | Advanced Data Analytics | 3 |
| MSBC 5180 | Machine Learning in Python | 3 |
| One track-specific elective [1] | | 3 |
| | **Credit Hours** | **12** |
| **Spring Semester** | | |
| MSBC 5190 | Modern Artificial Intelligence: Introduction to AI for Business | 3 |
| MSBC 5490 | BUAN Experiential Projects | 3 |
| MSBX 5420 | Unstructured and Distributed Data Modeling and Analysis | 3 |
| Two track-specific electives [1] | | 6 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **33** |

[1] See the Requirements tab for track-specific elective options.

## Decision Science Track

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| MSBC 5680 | Optimization Modeling | 3 |
| | **Credit Hours** | **3** |
| **Spring Semester** | | |
| MBAX 6410 | Process Analytics | 3 |
| MBAX 6843 | Supply Chain and Operations Analytics | 3 |
| | **Credit Hours** | **6** |
| | **Total Credit Hours** | **9** |

## Healthcare Analytics Track

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| NURS 6286 Foundation of Healthcare Informatics | | 3 |
| | **Credit Hours** | **3** |
| **Spring Semester** | | |
| MSBX 5425 | Natural Language Processing for Healthcare Analytics | 3 |
| NURS 6290 Information Systems Life Cycle | | 3 |
| | **Credit Hours** | **6** |
| | **Total Credit Hours** | **9** |

# Finance - Master of Science (MS)

The nine-month MS in finance provides extensive coursework and an in-depth application of materials, preparing students for a range of job opportunities. In addition to the coursework, enrichment seminars in topics ranging from teamwork and leadership to ethics and corporate social responsibility support the "whole student" experience by incorporating professional development into the academic experience.

The focused finance curriculum offers students a firm grounding in general finance, and helps to develop the specific skills necessary to pursue careers in a variety of financial fields.

The MS degree in finance offers two tracks to develop skills in specific disciplines:

- The **investment management (IM) track** provides the knowledge and practical tools to construct optimal investment portfolios for an investor's desired goals in terms of assets, risks and returns. The curriculum offers strong foundational knowledge of investment theories along with intensive data-driven analysis to inform asset selection, portfolio construction, diversification and risk management. Coursework covers the drivers of value and growth in markets, the institutional features of stocks, bonds and derivatives markets, as well as investors' considerations among the various investment vehicles including ETFs, mutual funds, hedge funds, venture capital and private equity. This track prepares graduates with competencies necessary to pursue a career with an investment management firm and to take the CFA Level I exam.
- The **sustainable finance (SF) track** provides up-to-date knowledge for a wide array of careers helping investors, corporations, and governments allocate capital between different sustainability projects and evaluate the impact of sustainable funding in the markets.
- The **corporate finance/consulting (CF) track** prepares students for a career in management consulting, investment banking, private equity and venture capital.

For additional information, please visit Leeds School Graduate Programs (http://www.colorado.edu/business/ms-programs/) or email us at leedsgrad@colorado.edu.

# Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| MSBC 5031 | Quantitative Methods in Finance | 3 |
| MSBC 5235 | Finance Industry Academy [1] | 3 |
| MSBC 5015 | Managerial Economics | 1.5 |
| MSBC 5020 | Financial Accounting | 1.5 |
| MSBC 5060 | Corporate Finance | 3 |
| MSBC 5220 | Investment Management & Analysis | 3 |
| MBAX 6250 | Derivative Securities | 3 |
| MBAX 6210 | Applied Financial Management | 3 |
| MBAX 6260 | Fixed Income Investing | 3 |
| **Track-Specific Elective Courses** | | |

| | |
|---|---|
| Choose two track-specific electives | 6 |
| **Total Credit Hours** | **30** |

[1] MSBC 5235 delivers as 1.5 credits in fall and 1.5 credits in spring.

# Program Tracks

## Corporate Finance Track

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MSBC 5031 | Quantitative Methods in Finance | 3 |
| MSBC 5235 | Finance Industry Academy [1] | 3 |
| MSBC 5015 | Managerial Economics | 1.5 |
| MSBC 5020 | Financial Accounting | 1.5 |
| MSBC 5060 | Corporate Finance | 3 |
| MSBC 5220 | Investment Management & Analysis | 3 |
| MBAX 6250 | Derivative Securities | 3 |
| MBAX 6210 | Applied Financial Management | 3 |
| MBAX 6260 | Fixed Income Investing | 3 |
| **Elective Courses** | | |
| Select two: | | 6 |
| MBAX 6270 | Applied Derivatives | |
| MSBX 5205 | Financial Strategy and Decision Modeling | |
| MSBX 6290 | Textual Analysis in Business | |
| **Total Credit Hours** | | **30** |

[1] MSBC 5235 delivers as 1.5 credits in fall and 1.5 credits in spring.

## Investment Management Track

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MSBC 5031 | Quantitative Methods in Finance | 3 |
| MSBC 5235 | Finance Industry Academy [1] | 3 |
| MSBC 5015 | Managerial Economics | 1.5 |
| MSBC 5020 | Financial Accounting | 1.5 |
| MSBC 5060 | Corporate Finance | 3 |
| MSBC 5220 | Investment Management & Analysis | 3 |
| MBAX 6250 | Derivative Securities | 3 |
| MBAX 6210 | Applied Financial Management | 3 |
| MBAX 6260 | Fixed Income Investing | 3 |
| **Elective Courses** | | |
| Select two: | | 6 |
| MBAX 6270 | Applied Derivatives | |
| MSBX 5225 | Advanced Portfolio Management | |
| MSBX 6290 | Textual Analysis in Business | |
| **Total Credit Hours** | | **30** |

[1] MSBC 5235 delivers as 1.5 credits in fall and 1.5 credits in spring.

## Sustainable Finance Track

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MSBC 5031 | Quantitative Methods in Finance | 3 |
| MSBC 5235 | Finance Industry Academy [1] | 3 |
| MSBC 5015 | Managerial Economics | 1.5 |
| MSBC 5020 | Financial Accounting | 1.5 |
| MSBC 5060 | Corporate Finance | 3 |
| MSBC 5220 | Investment Management & Analysis | 3 |
| MBAX 6250 | Derivative Securities | 3 |
| MBAX 6210 | Applied Financial Management | 3 |
| MSBX 5260 | Fixed Income Investing | 3 |
| **Electives** | | |
| Select two: | | 6 |
| MSBX 5280 | Sustainable Finance (Elective Courses) | |
| MBAX 6815 | Sustainable Real Estate | |
| MBAX 6720 | ESG Reporting and Analysis | |
| **Total Credit Hours** | | **30** |

[1] MSBC 5235 delivers as 1.5 credits in fall plus 1.5 credits in the spring.

# Sample Plan of Study

**Year One**

| Fall Semester | | Credit Hours |
|---|---|---|
| MSBC 5015 | Managerial Economics | 1.5 |
| MSBC 5020 | Financial Accounting | 1.5 |
| MSBC 5031 | Quantitative Methods in Finance | 3 |
| MSBC 5060 | Corporate Finance | 3 |
| MSBC 5235 | Finance Industry Academy | 1.5 |
| MBAX 6250 | Derivative Securities | 3 |
| MSBC 5220 | Investment Management & Analysis | 3 |
| | **Credit Hours** | **16.5** |
| **Spring Semester** | | |
| MSBC 5235 | Finance Industry Academy | 1.5 |
| MBAX 6210 | Applied Financial Management | 3 |
| MBAX 6260 | Fixed Income Investing | 3 |
| Two track-specific electives (see Requirements tab) | | 6 |
| | **Credit Hours** | **13.5** |
| | **Total Credit Hours** | **30** |

# Program Tracks

## Corporate Finance Track

**Year One**

| Fall Semester | | Credit Hours |
|---|---|---|
| MSBC 5015 | Managerial Economics | 1.5 |
| MSBC 5020 | Financial Accounting | 1.5 |
| MSBC 5031 | Quantitative Methods in Finance | 3 |
| MSBC 5060 | Corporate Finance | 3 |

| | | |
|---|---|---|
| MSBC 5235 | Finance Industry Academy | 1.5 |
| MSBC 5220 | Investment Management & Analysis | 3 |
| MBAX 6250 | Derivative Securities | 3 |
| | **Credit Hours** | **16.5** |
| **Spring Semester** | | |
| MSBX 5260 | Fixed Income Investing | 3 |
| MSBC 5235 | Finance Industry Academy | 1.5 |
| MBAX 6210 | Applied Financial Management | 3 |
| Electives: Select two of the following courses: | | 6 |
| MSBX 5205 | Financial Strategy and Decision Modeling | |
| MSBX 6290 | Textual Analysis in Business | |
| MBAX 6270 | Applied Derivatives | |
| | **Credit Hours** | **13.5** |
| | **Total Credit Hours** | **30** |

## Investment Management Track

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| MSBC 5015 | Managerial Economics | 1.5 |
| MSBC 5020 | Financial Accounting | 1.5 |
| MSBC 5031 | Quantitative Methods in Finance | 3 |
| MSBC 5060 | Corporate Finance | 3 |
| MSBC 5220 | Investment Management & Analysis | 3 |
| MSBC 5235 | Finance Industry Academy | 1.5 |
| MBAX 6250 | Derivative Securities | 3 |
| | **Credit Hours** | **16.5** |
| **Spring Semester** | | |
| MSBC 5235 | Finance Industry Academy | 1.5 |
| MBAX 6210 | Applied Financial Management | 3 |
| MBAX 6260 | Fixed Income Investing | 3 |
| Electives: Select two of the following: | | 6 |
| MBAX 6270 | Applied Derivatives | |
| MSBX 5225 | Advanced Portfolio Management | |
| MSBX 6290 | Textual Analysis in Business | |
| | **Credit Hours** | **13.5** |
| | **Total Credit Hours** | **30** |

## Sustainable Finance Track

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| MSBC 5015 | Managerial Economics | 1.5 |
| MSBC 5020 | Financial Accounting | 1.5 |
| MSBC 5031 | Quantitative Methods in Finance | 3 |
| MSBC 5060 | Corporate Finance | 3 |
| MSBC 5235 | Finance Industry Academy | 1.5 |
| MSBC 5220 | Investment Management & Analysis | 3 |
| MBAX 6250 | Derivative Securities | 3 |
| | **Credit Hours** | **16.5** |
| **Spring Semester** | | |
| MSBC 5235 | Finance Industry Academy | 1.5 |
| MSBX 5260 | Fixed Income Investing | 3 |
| MBAX 6210 | Applied Financial Management | 3 |
| Electives: select two of the following: | | 6 |
| MSBX 5280 | Sustainable Finance | |
| MBAX 6720 | ESG Reporting and Analysis | |
| MBAX 6815 | Sustainable Real Estate | |
| | **Credit Hours** | **13.5** |
| | **Total Credit Hours** | **30** |

# Learning Outcomes

By the completion of the program, students will be able to

- Understand the core principles of financial markets and financial securities.
- Understand securities, securities markets, investment vehicles and derivative securities.
- Compare and contrast securities and portfolios of securities with different risk and return properties.
- Recognize the legal, ethical and social responsibilities of investors, investment managers and financial officers.
- Develop and demonstrate effective written and verbal communication, ensuring professional communication of financial topics.
- Using quantitative tools necessary for rigorous financial analysis, manage, analyze and interpret complex financial data for sound decision-making.
- Utilize financial mathematics and mathematical reasoning to value securities and investment opportunities, making informed business decisions.
- Apply principles of portfolio theory to investment and investment management decisions.
- Build, analyze and utilize financial models for decision-making in finance.

# Marketing Analytics - Master of Science (MS)

The MS in Marketing Analytics is designed to equip students with the skills to influence marketing decisions through the power of data. The program covers a range of topics that equip students with the skills to analyze data and inform marketing strategies. Key areas include customer segmentation, predictive analytics, pricing strategies and campaign performance analysis. Students learn to measure key performance indicators (KPIs), conduct A/B testing and use data visualization to communicate insights. The program also covers consumer behavior analysis, demand forecasting and big data applications, along with specialized areas like programmatic advertising, social media analytics and sentiment analysis. These topics help students develop the ability to make data-driven decisions, enhance customer engagement and optimize marketing effectiveness. Students will learn to leverage data for strategic decision-making, understand customer behavior and optimize marketing effectiveness. A key component of the program is teaching students how to craft compelling narratives from data. Emphasizing quantitative data analysis, customer insights and analytics-driven strategies, the program prepares graduates to make informed, data-driven decisions and offer strategic insights that shape business outcomes.

Students specializing in marketing analytics will become valuable assets to organizations, using data to uncover new opportunities, refine marketing strategies, and drive business success. Their expertise enables companies to stay competitive and adapt to the ever-evolving marketplace.

Career paths in marketing analytics are both varied and impactful. Graduates can pursue roles as Marketing Analysts, where they analyze data to inform marketing strategies, ensuring they are data-driven and effective. Students will be prepared for roles in marketing intelligence, pricing analysis, consumer behavior, advertising, social media marketing, digital marketing and more.

This ten-month program offers comprehensive coursework and practical application, preparing students for diverse job opportunities. In addition to academic learning, students will participate in four enrichment seminars focused on teamwork, leadership, ethics and corporate social responsibility. These seminars reflect our commitment to holistic student development, blending professional growth with academic excellence.

# Requirements

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| MSBC 5070 | Survey of Business Analytics | 3 |
| MSBX 5410 | Fundamentals of Data Analytics | 3 |
| MSBX 5415 | Advanced Data Analytics | 3 |
| MSBX 5405 | Structured Data Modeling and Analysis | 3 |
| MSBC 5180 | Machine Learning in Python | 3 |
| MSBX 5420 | Unstructured and Distributed Data Modeling and Analysis | 3 |
| MSBC 5190 | Modern Artificial Intelligence: Introduction to AI for Business | 3 |
| MSBC 5490 | BUAN Experiential Projects | 3 |
| MSBX 5310 | Customer Analytics | 3 |
| MSBX 5320 | Digital Advertising | 3 |
| MBAX 6330 | Market Intelligence | 3 |

# Plan(s) of Study

**Year One**

| Summer Review | | Credit Hours |
|---|---|---|
| Summer B Session | | |
| MSBC 5070 | Survey of Business Analytics | 3 |
| MSBX 5410 | Fundamentals of Data Analytics | 3 |
| | **Credit Hours** | **6** |
| **Fall Semester** | | |
| MSBX 5415 | Advanced Data Analytics | 3 |
| MSBX 5405 | Structured Data Modeling and Analysis | 3 |
| MSBC 5180 | Machine Learning in Python | 3 |
| MBAX 6330 | Market Intelligence | 3 |
| | **Credit Hours** | **12** |
| **Spring Semester** | | |
| MSBC 5190 | Modern Artificial Intelligence: Introduction to AI for Business | 3 |
| MSBC 5490 | BUAN Experiential Projects | 3 |
| MSBX 5420 | Unstructured and Distributed Data Modeling and Analysis | 3 |
| MSBX 5310 | Customer Analytics | 3 |
| MSBX 5320 | Digital Advertising | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **33** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate technical expertise in marketing analytics.
- Apply managerial and organizational frameworks in marketing.
- Successfully engage in critical thinking and communication of insights from marketing analytics.
- Demonstrate an understanding of the ethical responsibilities of business leaders.
- Productively participate in teamwork and collaboration.

# Real Estate - Master of Science (MS)

The MS in Real Estate program is offered as a nine-month degree for traditional full-time students. The degree keeps students and professionals up-to-date with industry-focused technical skills, necessary for today and the future of where the real estate industry is headed. As technology continues to redefine the real estate industry, data-driven insights on the use of commercial and residential space are critical to maximizing value and impact. With this degree, students will develop analytical skills and innovative thinking, expertise in quantitative financial analysis, basic business concepts and leadership skills. World-class faculty, along with industry influencers, draw from in-depth knowledge of the latest industry trends and business applications giving students an edge in a rapidly advancing field.

This program also incorporates co-curricular opportunities including market treks, case competitions and networking events.

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s): Business Administration - Bachelor of Science (BS) (https://catalog.colorado.edu/undergraduate/colleges-schools/business/programs-study/business-administration/business-administration-bachelor-science-bs/#acceleratedmasterstext).

# Requirements

## Admission Requirements

For additional information, please visit Leeds School's Graduate Programs (http://www.colorado.edu/business/ms-programs/) webpage or email leedsgrad@colorado.edu.

## Required Courses

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MSBC 5610 | Real Estate Finance and Investment | 3 |
| MSBC 5032 | Real Estate Data Analysis | 3 |
| MBAX 6630 | Real Estate Economics | 3 |
| MSBX 5615 | Real Estate Modeling | 3 |
| MBAX 6640 | Real Estate Law and Practice | 3 |
| MBAX 6650 | Real Estate Case Studies | 3 |
| MSBC 5635 | Real Estate Industry Academy [1] | 3 |
| **Elective Courses** | | |
| Choose at least six credits: | | 6 |
| MBAX 6620 | Real Estate Project Competition | |
| MBAX 6815 | Sustainable Real Estate | |
| MSBX 5605 | Real Estate Investment and Risk Management | |
| Choose at most three credits: [2] | | 3 |
| MBAX 6350 | Digital Marketing | |
| MBAX 6440 | Project Management | |
| MBAX 6930 | Commercializing Sustainable Energy Technologies | |
| MBAX 6720 | ESG Reporting and Analysis | |
| MSBX 5280 | Sustainable Finance | |
| **Total Credit Hours** | | **30** |

1. MSBC 5635 delivers as 1.5 credits in the fall semester & 1.5 credits in the spring semester.
2. Additional electives may be available. Students are encouraged to check with program academic advisor.

# Sample Plan of Study

| **Year One** | | |
|---|---|---|
| **Fall Semester** | | **Credit Hours** |
| MSBC 5032 | Real Estate Data Analysis | 3 |
| MSBC 5610 | Real Estate Finance and Investment | 3 |
| MSBX 5615 | Real Estate Modeling | 3 |
| MBAX 6630 | Real Estate Economics | 3 |
| MBAX 6640 | Real Estate Law and Practice | 3 |
| MSBC 5635 | Real Estate Industry Academy [1] | 1.5 |
| | **Credit Hours** | **16.5** |
| **Spring Semester** | | |
| MBAX 6650 | Real Estate Case Studies | 3 |
| MSBC 5635 | Real Estate Industry Academy [1] | 1.5 |
| Nine Elective Credits (see requirements tab) | | 9 |
| | **Credit Hours** | **13.5** |
| | **Total Credit Hours** | **30** |

1. MSBC 5635 delivers as 1.5 credits in fall & 1.5 credits in spring.

# Learning Outcomes

Upon completing the program, students will be able to:

- Recognize the legal and economic foundations of real property markets.
- Describe and compare the features of different forms of real estate financing.
- Apply economic concepts and frameworks to analyze development and transaction opportunities.
- Recognize the legal, ethical and social responsibilities of property market participants.
- Assess how real estate developers and owners can maximize the useful economic life of a property and reduce its carbon footprint.
- Communicate data-driven insights and arguments clearly and effectively to stakeholders, both in writing and orally.
- Build and utilize real estate financial models to aid in valuation when developing or acquiring a property.
- Find, manage, statistically analyze and interpret real estate data to inform decision-making.
- Understand current trends and topics in the real estate industry, applying knowledge to address contemporary challenges.

# Supply Chain Analytics - Master of Science (MS)

The supply chain management master's degree provides students with the expertise needed to manage business supply chains in the global economy. This ten-month program includes extensive coursework which prepares students for a range of job opportunities. In addition to the academic coursework, four enrichment seminars in topics ranging from teamwork and leadership to ethics and corporate social responsibility support our commitment to developing the "whole student" by incorporating professional development into the academic experience.

Based on an "action learning" model, the program is designed to provide hands-on supply chain project management experience, amplified by shared experiences with other students.

Graduates will be prepared for responsible and influential jobs in a variety of organizations, including large manufacturing, retail and distribution organizations; transportation companies; supply chain software companies; and supply chain consulting firms.

# Distance Education Option via Online+

Students may enroll in the MS Business Analytics (BUAN) or MS Supply Chain Management degree program through distance education (online) and complete the degree requirements established for each MS program. Distance education offers regularly scheduled on-campus graduate courses to remote off-campus (distance) students using advanced virtual and video-conferencing technology. Distance students participate both synchronously (at a scheduled delivery time) and asynchronously (no scheduled delivery time). Instructors, courses, assignments, projects, exams and evaluations are identical for on-campus and off-campus students. Online+ courses are term-based (i.e., follows the regular academic schedule) and structured to maximize student engagement with faculty and other online+ students to support student success and degree completion.

Designed for working professionals, the online option allows students to enroll part-time and follows the same curriculum as the on-campus degree option. Please see degree requirements and plan(s) of study specific to business analytics or supply chain management. Based on circumstance and timeline to degree completion, students enroll in one or

two courses each semester, completing the degree in two years. For more information, connect with the individual graduate program directly.

# Requirements

## Admission Requirements

Admissions guidelines and application details are outlined on the master's programs admissions (https://www.colorado.edu/business/ms-programs/masters-programs-admissions/) website. Admission to the program may recommend or require preparation or refresher courses in statistics, math and business.

## Experiential Projects

The experiential project pairs students with clients in industry to work on important practical problems in supply chain management. Students work under the supervision of faculty and meet together weekly to discuss progress, jointly work on problems and to share experiences. This hands-on project management experiences prepares graduates to make an immediate meaningful contribution in the workplace.

For additional information, please visit Leeds School Graduate Programs (http://www.colorado.edu/business/ms-programs/) or email leedsgrad@colorado.edu.

## Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MSBX 5405 | Structured Data Modeling and Analysis | 3 |
| MSBC 5070 | Survey of Business Analytics | 3 |
| MSBX 5410 | Fundamentals of Data Analytics | 3 |
| MSBX 5435 | Planning and Production | 1.5 |
| MSBX 5450 | Transportation and Logistics | 3 |
| MSBC 5460 | Supply Chain Strategy | 3 |
| MSBX 5470 | Procurement and Contracting | 1.5 |
| MSBC 5480 | SCMN Experiential Projects | 3 |
| MBAX 6843 | Supply Chain and Operations Analytics | 3 |
| MSBC 5180 | Machine Learning in Python | 3 |
| **Electives** [1] | | **6** |
| MSBX 5415 | Advanced Data Analytics | |
| MSBC 5680 | Optimization Modeling [2] | |
| MBAX 6330 | Market Intelligence [2] | |
| MSBC 5020 | Financial Accounting [2] | |
| MBAX 6560 | Executive Leadership [2] | |
| MBAX 6410 | Process Analytics [3] | |
| MBAX 6440 | Project Management [3] | |
| MBAX 6530 | Negotiating and Conflict Management [3] | |
| MSBX 5310 | Customer Analytics [3] | |
| MSBX 5420 | Unstructured and Distributed Data Modeling and Analysis [3] | |
| MBAX 6801 | Global Perspectives Seminar [3] | |
| MBAX 6350 | Digital Marketing [3] | |
| MBAX 6360 | New Product Development [3] | |
| MBAX 6450 | International Operations Management | |
| MSBC 5190 | Modern Artificial Intelligence: Introduction to AI for Business | |
| **Total Credit Hours** | | **33** |

1. Elective coursework may be completed in either fall or spring semester; course availability will vary by term.
2. Usually offered in fall.
3. Usually offered in spring.

# Plan of Study

The sample one-year plan of study found below is restricted to students who are not working professionals. Students who are working professionals enrolled in the online+ degree will engage a two-year plan of study. For more information, contact the department.

| Year One | | |
|---|---|---|
| **Summer Review** | | **Credit Hours** |
| MSBX 5410 | Fundamentals of Data Analytics | 3 |
| MSBC 5070 | Survey of Business Analytics | 3 |
| | **Credit Hours** | **6** |
| **Fall Semester** | | |
| MSBX 5405 | Structured Data Modeling and Analysis | 3 |
| MSBX 5450 | Transportation and Logistics | 3 |
| MSBC 5460 | Supply Chain Strategy | 3 |
| MSBC 5180 | Machine Learning in Python | 3 |
| Elective (see Requirements tab) | | 3 |
| | **Credit Hours** | **15** |
| **Spring Semester** | | |
| MSBX 5435 | Planning and Production | 1.5 |
| MSBC 5480 | SCMN Experiential Projects | 3 |
| MBAX 6843 | Supply Chain and Operations Analytics | 3 |
| Elective (see Requirements tab) | | 3 |
| MSBX 5470 | Procurement and Contracting | 1.5 |
| | **Credit Hours** | **12** |
| | **Total Credit Hours** | **33** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Manage, analyze and interpret supply chain risks, and create strategies to minimize costs while improving efficiency.
- Work as part of cross-functional global teams to address supply chain challenges involving suppliers, logistics and manufacturing.
- Assess tradeoffs between onshore and offshore suppliers, calculating the impact on inventory, costs and service levels.
- Assess the societal and environmental impacts of logistics, with a focus on ethical decision-making in supply chain operations.
- Interpret the role of forward/reverse logistics and recommend strategies to enhance sustainability and ethical outcomes in supply chains.
- Demonstrate effective oral and written communication skills by presenting data-driven insights and persuasive executive summaries to stakeholders.

- Interpret industry data and perform structured analysis to develop recommendations for outsourced manufacturing, network design, procurement and spend analysis.
- Recognize key terms and apply methods to solve supply chain problems related to logistics, demand forecasting, and inventory management.
- Develop models and analyze data to solve logistics problems and make informed decisions about inventory and demand forecasts.

# Taxation - Master of Science (MS)

A master's degree in taxation prepares students to become financial professionals who can help a wide range of organizations thrive. Taxation is extremely important to any company because financial information, as analyzed and interpreted by CPAs, allows executives to make informed business decisions that help companies become more successful. Through our program, our graduates develop specific expertise in the area of taxation by strengthening and enhancing the ability to interpret and communicate information about a company's operations and finances. Academic experience, combined with a practical internship experience, propels our graduates to be proficient in the "language of business" that is taxation.

Coursework in taxation conveys a comprehensive understanding of the theory and concepts that underlie accounting practice. Emphasis is placed on logical reasoning and the development, understanding, and use of information, which enable students to solve problems in accounting and management of organizations and to make sound accounting policy decisions.

## CPA Licensure

Taxation students have many career options to consider after graduation. Those who aspire to pursue careers in public accounting must become Certified Public Accountants (CPAs). The CPA designation is not as critical for other career paths in accounting, but becoming a CPA can be advantageous in any accounting career.

While the CPA requirements of most states have similar components and required courses, the specifics of those requirements differ greatly. Students interested in ultimately pursuing CPA licensure should contact the applicable state licensing board to determine any requirements, including particular courses, they may need to fulfill in order to obtain licensure in a particular state.

## Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s): Business Administration - Bachelor of Science (BS) (https://catalog.colorado.edu/undergraduate/colleges-schools/business/programs-study/business-administration/business-administration-bachelor-science-bs/#acceleratedmasterstext).

## Requirements

The MS taxation degree consists of 10 graduate-level courses. Students can opt to take additional courses. The degree can be completed in 9–20 months, depending on whether the student wants, and is offered, a busy-season (spring) internship. This program has start dates in fall, spring and summer terms.

### Prerequisites

The following four intermediate-level accounting courses or their equivalent must be completed before starting the master's-level accounting courses. Course equivalency will be assessed by the faculty director during transcript review in the application process.

| Code | Title | Credit Hours |
|---|---|---|
| ACCT 3220 | Corporate Financial Reporting 1 | 3 |
| ACCT 3230 | Corporate Financial Reporting 2 | 3 |
| ACCT 3320 | Cost Management | 3 |
| ACCT 3440 | Income Taxation of Individuals | 3 |
| **Total Credit Hours** | | **12** |

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ACCT 5450 | Income Taxation of Business Entities | 3 |
| ACCT 5620 | Auditing and Assurance Services | 3 |
| ACCT 6350 | Current Issues in Professional Accounting–Accounting Ethics | 3 |
| ACCT 6420 | Research and Writing in Income Taxation | 3 |
| ACCT 6430 | Taxation of Partnerships | 3 |
| ACCT 6450 | Taxation of Corporations | 3 |
| ACCT 6700 | Income Taxation | 4 |
| BSLW 5120 | Advanced Business Law | 3 |
| **Elective** | | **3** |
| Choose one: | | |
| ACCT 6620 | Advanced Auditing: Business Risk and Decision Analysis | |
| ACCT 6780 | US International Taxation | |
| ACCT 5100 | Oil and Gas Accounting | |
| ACCT 5240 | Advanced Financial Accounting | |
| ACCT 5250 | Financial Statement Analysis | |
| ACCT 5540 | Accounting Information Systems | |
| ACCT 5550 | Data Analytics for Accounting | |
| ACCT 6290 | Textual Analysis in Business | |
| ACCT 5120 | Business Analytics | |
| ACCT 5300 | ESG Reporting and Analysis: Accounting for a Changing World | |
| **Total Credit Hours** | | **28** |

## Plan(s) of Study

Students will meet with their advisors to plan out their course of study to meet degree requirements.

## Learning Outcomes

By the completion of the program, students will be able to:

- Interpret and apply statutory tax authority to unstructured and complex transactions.
- Recognize professional standards of conduct.
- Recognize legal, ethical and social responsibilities related to the field of accounting.
- Reason through and solve complex business problems.
- Write effective memoranda.

# Business Analytic Methods - Graduate Certificate

The business analytic methods certificate courses comprise the foundational topics in a business analytics curriculum, providing business analytics training for mid-career professionals in a number of roles, including human resources, pricing, optimization, procurement, finance, real estate and acquisition.

Designed for nondegree students including working professionals, our online graduate certificates allow students to enroll part-time and advance at their own pace. Following the same curriculum provided to students on campus, online certificate students participate in coursework both synchronously (scheduled delivery time) and asynchronously (no scheduled delivery time). As students progress through the certificate, they have the option to become graduate degree-seeking, applying their certificate coursework toward a formal MS business analytics degree.

## Requirements

### Admission Requirements

To be considered for the graduate certificate, applicants must possess an undergraduate degree. Leeds graduate students can apply through the Leeds online application (https://leeds.apply.colorado.edu/apply/).

Applicants must provide:

- Statement of purpose (1–2 pages) explaining how the business analytic methods graduate certificate will further their professional and/or personal interests
- Formal transcript from an accredited institution of higher education showing proof of completion of an undergraduate degree
- Current resume
- One letter of recommendation

### Course Requirements

Business analytic methods certificate courses include the courses listed below. All courses must be passed with a B grade or better to count towards the certificate.

| Code | Title | Credit Hours |
|---|---|---|
| MSBX 5410 | Fundamentals of Data Analytics | 3 |
| MSBX 5405 | Structured Data Modeling and Analysis | 3 |
| MSBX 5415 | Advanced Data Analytics | 3 |
| MSBX 5420 | Unstructured and Distributed Data Modeling and Analysis | 3 |
| **Total Credit Hours** | | **12** |

## Learning Outcomes

By the completion of the program, students will be able to:

- Understand the principles and techniques of data management, exploration and visualization.
- Demonstrate proficiency in analytics software.
- Integrate considerations of DEI, ethics and social responsibility into analytics projects.
- Interpret and present the results of various predictive modeling techniques.
- Utilize business analytics methods to solve real-world problems.

# Healthcare Analytics - Graduate Certificate

The business analytics healthcare certificate prepares students to turn big data into actionable insights that drive systemic improvements. Students will develop the skillset needed to retrieve, analyze and interpret a vast range of health-related data. Meanwhile, students will learn about predictive analytics including operations research, aspects of computer science and statistical methods. Gain understanding of the informatics structure, organization and functioning of healthcare systems from the lens of invested parties, regulatory frameworks and healthcare delivery models. Learn about healthcare compliance regulations (e.g., HIPAA) and privacy requirements governing the use of healthcare data and develop proficiency for compliance in analytics projects.

The MSBA Healthcare track curriculum includes specialized courses provided by the College of Nursing at the CU Anschutz Medical Campus —a world-class medical institution for transformative education, science, medicine and healthcare-in partnership with Leeds School of Business.

Designed for current students in the University of Colorado College of Nursing's Master of Science in Informatics (https://nursing.cuanschutz.edu/academics/graduate-specialties/advanced-ms-dnp-specialties/health-care-informatics/health-care-informatics-masters-degree/) program or recent graduates of the program, this program's online format allows students to continue caring for patients and making a difference, while they immediately apply what they learn on the job.

## Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

## Requirements

### Admission Requirements

Students currently enrolled in the informatics program at the School of Nursing must apply through the Leeds School of Business as a nondegree student to take the required CU Boulder courses. They will take the required courses at Anschutz as part of their degree program. Previous graduates of the School of Nursing Informatics program who are not currently enrolled at Anschutz must also enroll as a non-degree student at the School of Nursing in order to have access to the Foundations of Healthcare Informatics course, thus applying as a nondegree student to each institution separately.

To be considered for the graduate certificate, applicants must complete the course prerequisite outlined above *and* provide the following:

1. Statement of purpose (1–2 pages) explaining how the Healthcare Analytics graduate certificate will further their professional and/or personal interests.

2. Official transcript from an accredited institution of higher education showing proof of completion of an undergraduate degree.
3. Current resume.
4. One letter of recommendation.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MSBC 5180 | Machine Learning in Python | 3 |
| MSBX 5425 | Natural Language Processing for Healthcare Analytics | 3 |
| MSBC 5070 | Survey of Business Analytics | 3 |
| **Electives** | | **3** |
| Select one of the following: | | |
| MSBX 5405 | Structured Data Modeling and Analysis | |
| MSBC 5190 | Modern Artificial Intelligence: Introduction to AI for Business | |
| NUSR 6286 | Foundations of Healthcare Informatics | |
| **Total Credit Hours** | | **12** |

Nursing students will select one of the 3 credit-hour electives to satisfy certificate requirements. Those who have already completed the NURS 6286 Foundations of Healthcare Informatics course may use it toward the certificate requirements. Alternatively, they can choose to take either MSBX 5405 Structured Data Modeling and Analysis (fall) or MSBC 5190 Modern Artificial Intelligence: Introduction to AI for Business (spring) as the elective option to satisfy certificate requirements.

# Plan(s) of Study

Program Begins with Summer B Session.

| **Year One** | | |
|---|---|---|
| **Fall Semester** | | **Credit Hours** |
| MSBC 5180 | Machine Learning in Python | 3 |
| Elective (optional fall or spring) [1] | | 3 |
| | **Credit Hours** | **6** |
| **Spring Semester** | | |
| MSBX 5425 | Natural Language Processing for Healthcare Analytics | 3 |
| Elective (Optional fall or spring) [1] | | |
| | **Credit Hours** | **3** |
| **Summer** | | |
| MSBC 5070 | Survey of Business Analytics | 3 |
| | **Credit Hours** | **3** |
| | **Total Credit Hours** | **12** |

[1] See Requirements tab. 3 total elective credits must be completed in either fall or spring semester.

# Learning Outcomes

Upon completing the program, students will:

- Gain understanding of the informatics structure, organization and functioning of healthcare systems from the lens of invested parties, regulatory frameworks and healthcare delivery models.
- Learn about healthcare compliance regulations (e.g., HIPAA) and privacy requirements governing the use of healthcare data and develop proficiency for compliance in analytics projects.
- Apply principles of data collection, storage, cleaning and management specific to healthcare data, including electronic health records (EHRs), claims data and other healthcare-related datasets.
- Obtain hands-on experience with healthcare analytics tools and software (e.g., Python, AI) and understand their application in analyzing healthcare data.
- Explore the application of machine learning techniques and AI tools in healthcare analytics, including classification, clustering and natural language processing (NLP) for predictive analytics and risk stratification approaches in patient care.
- Develop skills in project management, teamwork and collaboration to effectively execute healthcare analytics projects, including defining project scope, setting goals and managing timelines and resources.

# Marketing Analytics - Graduate Certificate

The marketing analytics certificate courses comprise the major topics in an advanced business analytics curriculum, providing marketing analytics training for mid-career professionals in business analytics or marketing roles. The courses have been specifically selected in order to teach students core concepts and targeted skills in marketing analytics

Designed for nondegree students including working professionals, our online graduate certificates allow students to enroll part-time and advance at their own pace. Following the same curriculum provided to students on campus, online certificate students participate in coursework both synchronously (scheduled delivery time) and asynchronously (no scheduled delivery time). As students progress through the certificate, they have the option to become graduate degree-seeking, applying their certificate coursework toward a formal MS business analytics degree.

# Requirements

## Admission Requirements

To be considered for the graduate certificate, applicants must possess an undergraduate degree. Leeds graduate students can apply through the Leeds online application (https://leeds.apply.colorado.edu/apply/).

Applicants must provide:

- Statement of purpose (1–2 pages) explaining how the marketing analytics graduate certificate will further their professional and/or personal interests
- Formal transcript from an accredited institution of higher education showing proof of completion of an undergraduate degree
- Current resume
- One letter of recommendation

## Courses

Marketing analytics certificate courses are listed below. All courses must be passed with a B grade or better to count towards the certificate.

| Code | Title | Credit Hours |
|---|---|---|
| MBAX 6330 | Market Intelligence | 3 |
| MSBX 5310 | Customer Analytics | 3 |
| MSBX 5320 | Digital Advertising | 3 |
| MSBX 5410 | Fundamentals of Data Analytics | 3 |
| **Total Credit Hours** | | **12** |

# Plan(s) of Study

| **Year One** | | |
|---|---|---|
| **Fall Semester** | | **Credit Hours** |
| MBAX 6330 | Market Intelligence | 3 |
| | **Credit Hours** | **3** |
| **Spring Semester** | | |
| MSBX 5310 | Customer Analytics | 3 |
| MSBX 5320 | Digital Advertising | 3 |
| | **Credit Hours** | **6** |
| **Summer** | | |
| MSBX 5410 | Fundamentals of Data Analytics | 3 |
| | **Credit Hours** | **3** |
| | **Total Credit Hours** | **12** |

Program begins with Summer B Session.

Some courses are only offered in specific semesters. New students will work out a plan with an advisor to meet all certificate requirements in their desired timeline.

# Supply Chain Analytics - Graduate Certificate

The supply chain analytics certificate courses comprise the major foundational topics in any supply chain management curriculum, providing necessary background for further advanced study. The four courses have been specifically selected in order to teach students core concepts and targeted skills in the fundamentals of supply chain analytics.

Designed for nondegree students including working professionals, our online graduate certificates allow students to enroll part-time and advance at their own pace. Following the same curriculum provided to students on campus, online certificate students participate in coursework both synchronously (scheduled delivery time) and asynchronously (no scheduled delivery time). As students progress through the certificate, they have the option to become graduate degree-seeking, applying their certificate coursework toward a formal MS supply chain degree.

Students educated in supply chain analytics will have the knowledge to expand their careers as analysts in supply chain network design, logistics, purchasing and procurement, inventory and production control, transportation network design, facilities location planning, demand forecasting, long term aggregate planning and sub-specialties therein.

# Requirements

## Admission Requirements

To be considered for the graduate certificate, applicants must possess an undergraduate degree. Leeds graduate students can apply through the Leeds online application (https://leeds.apply.colorado.edu/apply/).

### Course Prerequisite

Students applying to the graduate certificate are required to complete a course prerequisite. The course prerequisite may be satisfied by *one* of the following:

- Successful completion of MSBC 5460 (or successful completion of similar coursework at another university)
- Successful completion of the non-credit Coursera course Supply Chain Management Strategy
- Relevant work experience

Students seeking to meet the prerequisite with experience will need to demonstrate and document proficiency in the relevant topic area by submission of work history and work product. A qualifying test may also be required.

### Additional Materials

In addition, applicants must provide:

- Statement of purpose (1–2 pages) explaining how the supply chain analytics graduate certificate will further their professional and/or personal interests
- Formal transcript from an accredited institution of higher education showing proof of completion of an undergraduate degree
- Current resume
- One letter of recommendation

## Courses

Supply chain analytics certificate courses are listed below. All courses must be passed with a B grade or better to count towards the certificate.

| Code | Title | Credit Hours |
|---|---|---|
| MSBC 5070 | Survey of Business Analytics | 3 |
| MSBC 5180 | Machine Learning in Python | 3 |
| Choose 2 from the following: | | 6 |
| MSBC 5190 | Modern Artificial Intelligence: Introduction to AI for Business | |
| MBAX 6410 | Process Analytics | |
| MBAX 6843 | Supply Chain and Operations Analytics | |
| **Total Credit Hours** | | **12** |

# Plan(s) of Study

| **Year One** | | |
|---|---|---|
| **Fall Semester** | | **Credit Hours** |
| MSBC 5180 | Machine Learning in Python | 3 |
| | **Credit Hours** | **3** |
| **Spring Semester** | | |
| Electives (see Requirements tab) | | 6 |
| | **Credit Hours** | **6** |

| | | |
|---|---|---|
| **Summer** | | |
| MSBC 5070 | Survey of Business Analytics | 3 |
| | **Credit Hours** | **3** |
| | **Total Credit Hours** | **12** |

New students will work out a plan with an advisor to meet all certificate requirements in their desired timeline. Some courses are only offered in specific semesters. Students will choose 2 of the following 3 classes in the spring: MBAX 6843, MBAX 6410 and MSBC 5190.

## Learning Outcomes

By the completion of the program, students will be able to:

- Explain the principles and techniques of data management, exploration and visualization.
- Demonstrate proficiency in analytics software and tools.
- Understand and make recommendations regarding ethical impacts of supply chain decisions.
- Interpret and present data-driven insights clearly and effectively to stakeholders.
- Build analytical models to solve real-world supply chain problems.

# Supply Chain Foundations - Graduate Certificate

The supply chain foundations certificate courses comprise the major foundational topics in any supply chain management curriculum, providing necessary background for further advanced study. The four courses have been specifically selected in order to teach students core concepts and targeted skills in supply chain management.

Designed for nondegree students including working professionals, our online graduate certificates allow students to enroll part-time and advance at their own pace. Following the same curriculum provided to students on campus, online certificate students participate in coursework both synchronously (scheduled delivery time) and asynchronously (no scheduled delivery time). As students progress through the certificate, they have the option to become graduate degree-seeking, applying their certificate coursework toward a formal MS supply chain degree.

## Requirements

### Admission Requirements

To be considered for the graduate certificate, applicants must possess an undergraduate degree. Leeds graduate students can apply through the Leeds online application (https://leeds.apply.colorado.edu/apply/).

#### Course Prerequisite

Students applying to the graduate certificate are required to complete a course prerequisite. The course prerequisite may be satisfied by *one* of the following:

- Successful completion of MSBC 5460 (or successful completion of similar coursework at another university)
- Successful completion of the non-credit Coursera course Supply Chain Management Strategy
- Relevant work experience.

Students seeking to meet the prerequisite with experience will need to demonstrate and document proficiency in the relevant topic area by submission of work history and work product. A qualifying test may also be required.

#### Additional Materials

In addition, applicants must provide:

- Statement of purpose (1–2 pages) explaining how the supply chain foundations graduate certificate will further their professional and/or personal interests
- Formal transcript from an accredited institution of higher education showing proof of completion of an undergraduate degree
- Current resume
- One letter of recommendation

### Courses

Supply chain foundations certificate courses are listed below. All courses must be passed with a B grade or better to count towards the certificate.

| Code | Title | Credit Hours |
|---|---|---|
| MSBX 5450 | Transportation and Logistics | 3 |
| MSBX 5470 | Procurement and Contracting | 1.5 |
| MSBX 5435 | Planning and Production | 1.5 |
| MBAX 6450 | International Operations Management | 3 |
| MSBX 5405 | Structured Data Modeling and Analysis | 3 |

## Plan(s) of Study

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| MSBX 5450 | Transportation and Logistics | 3 |
| MSBX 5405 | Structured Data Modeling and Analysis | 3 |
| | **Credit Hours** | **6** |
| **Spring Semester** | | |
| MSBX 5470 | Procurement and Contracting | 1.5 |
| MSBX 5435 | Planning and Production | 1.5 |
| MBAX 6450 | International Operations Management | 3 |
| | **Credit Hours** | **6** |
| | **Total Credit Hours** | **12** |

Some courses are only offered in specific semesters. New students will work out a plan with an advisor to meet all certificate requirements in their desired timeline.

## Learning Outcomes

Upon completing the program, students will be able to:

- Understand supply chain problems and identify appropriate methods to solve those problems.
- Understand and make recommendations regarding environmental and ethical impacts of logistics.
- Effectively present an analysis related to current industry trends.
- Interpret data to develop models and produce business recommendations.

# Communication, Media, Design & Information

The College of Communication, Media, Design and Information (CMDI) prepares students for careers as engaged and effective citizens endowed with deep understanding of the historical and contemporary context of human communication and expression. Mindful of the active role communication plays in shaping human relationships, CMDI trains graduates to study and practice constructive interaction among people, communities, industries and publics. The college equips students with the skills needed to produce, gather, archive, curate, analyze and evaluate the flood of information, messages, images, sounds and ideas that populate our complex and rapidly evolving global media landscape.

To these ends, CMDI resourcefully combines disciplines newly extended and empowered by digital media and the social and cultural transformations those media engender. These include established scholarly, creative and professional fields such as media studies, communication, the history and interpretation of film and television, journalism, advertising and video production in its cinematic, documentary and broadcast forms. But the college also houses both the fast-growing field of information science—a discipline that, through inquiry and innovation, tackles the problems and opportunities facing an increasingly networked society—and the emergent disciplines of intermedia art, design, music, writing and performance.

In giving these activities a collaborative home, CMDI facilitates innovative interactions among them. Its academic structure accordingly stimulates cross-disciplinary cooperation at all levels of curriculum, research and creative work. Further, CMDI promotes the transformational exchanges it nurtures within its own walls for campus-wide benefit. Its organization thus fosters outreach to—and student and faculty participation from—other schools, colleges, centers and facilities throughout CU Boulder and the wider Colorado community.

CMDI's collaborative character is even more visible at the graduate level and in terms of its faculty's scholarly and creative work. Examples include the doctoral program in information science (p. 1531), the master's in interdisciplinary documentary media practices (p. 1523) and the doctoral program in media research and practice (p. 1544), which offers three PhD tracks, each lodged in a different yet related department. CMDI's signature spirit of collaboration is further reflected in the various centers the college contains:

- the Center for Environmental Journalism (CEJ)
- the Center for Media, Religion and Culture (CMRC)
- the Center for the Study of Conflict, Collaboration and Creative Governance (3CG)

It is also reflected in the close relations the new college hopes to entertain with centers elsewhere on campus—for example, with the Center for Humanities and the Arts (CHA); the B2 Center for Media, Arts and Performance (B2); and the Stan Brakhage Center.

## Statement of Core Skills, Competencies and Scholarly and Creative Initiatives

Given its mission, CMDI attracts students, faculty and industry and creative professionals from across the closely related fields of media, communication and information. All of those either rostered in or affiliated with the new college accordingly share a set of skills, competencies and scholarly and creative interests that form a common core. This core is expressed at all levels of the college, from undergraduate curriculum and graduate training to the research and creative work of its faculty and both internal and external affiliates.

## The Graduate Experience and Faculty Research and Creative Work

CMDI's collaborative character is even more visible at the graduate level and in terms of its faculty's scholarly and creative work. A prime example is the doctoral program in media research and practice (p. 1544), which combines the emphases of the participating departments—advertising, public relations and design, journalism and media studies—and encourages students to develop research agendas that bridge disciplines and cross between academic research and professional practice. In addition to creating efficiencies by combining resources, the program underscores the shared technical and intellectual as well as logistical needs of the units involved, turning streamlined administration into scholarly and creative synergy.

Journalists learn from information scholars about the nature and uses of big data while sharing with them their skills in narrative and communication. Members of the communication faculty deepen colleagues' insights into the underlying forms and principles of organizational, interpersonal and public conversation that structure the worlds in which advertising and strategic communication operate while gaining access from colleagues in these areas to problems and case studies they might have overlooked. Meanwhile, faculty in media studies benefit from direct exposure to the technologies and creative processes explored by media production faculty, offering in return a deeper historical, social and theoretical insight into the way media shape, even as they are shaped by, the wider society they serve.

Centers like CMRC, CEJ and 3CG already harness CU's exceptional multidisciplinary resources in everything from cultural studies to environmental science and from journalism to media design in focused collaborative initiatives of all sorts. By bringing practitioners in all of these areas together with artists and researchers in information science, media production and intermedia art, writing and performance, CMDI provides the environment for many more such common enterprises in the future.

# Programs of Study

# Advertising, Public Relations and Media Design

The Department of Advertising, Public Relations and Design (APRD) offers the graduate programs listed below.

The MA in Corporate Communication (https://www.colorado.edu/cmci/aprd/macc/) is an online professional master's degree designed for early and mid-career professionals who want to advance their career in corporate communication in an increasingly globalized corporate environment. It is well-suited for corporate communication practitioners in business, governmental and non-governmental organizations, as well as mid-career professionals from allied disciplines such as journalism, advertising and marketing who want to switch to corporate communication jobs due to increased demand in this sector. The program's coursework blends conceptual knowledge and practical techniques to make students invaluable and nimble communicators in a globally relevant profession.

The MA in Strategic Communication Design (https://www.colorado.edu/cmci/STCMstudio/) (MSCD) is an immersive 39-credit hour program typically completed in a full calendar year. Located in a state-of-the-art studio in the heart of Boulder's entrepreneurial tech community, the MSCD is entirely project-based. With the guidance of industry-driven instructors, our students leverage design's potential as a critical problem-solving tool in a rapidly changing world. This human-centered program evolves students into branding design and entrepreneurial professionals through innovative, intensive, and progressive learning experiences. MSCD graduates have been appointed to leadership design positions in top companies, including Google, Apple, Uber, Saatchi and Saatchi, Twitter and Dropbox—to name just a few.

Strategic Communication is a distinct track of the PhD in Media Research and Practice (https://www.colorado.edu/cmci/aprd/phd/) program. Students gain an understanding of scholarship through coursework, independent studies and research assistantships that explore theories and methods that shape strategic communication research. We welcome and appreciate both qualitative and quantitative approaches to research. The program emphasizes how theory informs practice, critically analyzing how advertising and public relations operate in ways that can—or could—constructively contribute to the successful, ethical and resilient functioning of society. Students taking this track focus their research and teaching in the areas of advertising, public relations and various types of promotional communication such as health communication, political communication, social media and video gaming.

The department actively encourages students to enroll in courses offered both within and outside CMDI and APRD graduate course are open to students in other units.

**Course codes for these programs are CCOM and APRD.**

# Master's Degrees

- Corporate Communication - Master of Arts (MA) (p. 1512)
- Strategic Communication Design - Master of Arts (MA) (p. 1513)

# Doctoral Degree

- Media Research and Practice - Doctor of Philosophy (PhD) (p. 1544)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Barrett, Bridget (https://experts.colorado.edu/display/fisid_173429/)
Assistant Professor; PhD, University of North Carolina at Chapel Hill

Cheval, Melinda Kiger
Associate Teaching Professor Emerita

Doty, Dawn (https://experts.colorado.edu/display/fisid_158312/)
Associate Teaching Professor; MA, Johns Hopkins University

Duncan, Thomas R.
Professor Emeritus

Elliston, Diane
Assistant Teaching Professor; MFA, Claremont Graduate University

Fisher, Jolene (https://experts.colorado.edu/display/fisid_158335/)
Associate Chair, Associate Professor; PhD, University of Oregon

Gangadharbatla, Harsha (https://experts.colorado.edu/display/fisid_153279/)
Professor; PhD, University of Texas at Austin

Gillette, Jeff
Assistant Teaching Professor; MS, Virginia Commonwealth University

Greenan, LoriBeth
Assistant Teaching Professor; MS, New York University

Hopp, Toby (https://experts.colorado.edu/display/fisid_157745/)
Associate Professor; PhD, University of Oregon

Iyer, Pooja
Assistant Professor; PhD, University of Texas at Austin

Khedekar, Deepti (https://experts.colorado.edu/display/fisid_174027/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Kim, WooJim
Assistant Professor; PhD, University of Illinois at Urbana-Champaign

Labrecque, Joseph (https://experts.colorado.edu/display/fisid_165806/)
Assistant Teaching Professor; MA, University of Denver

Lee, Sangwook
Assistant Professor; PhD, Pennsylvania State University

Lee, Seow Ting (https://experts.colorado.edu/display/fisid_157994/)
Professor; PhD, University of Missouri–Columbia

Ligon, Dan (https://experts.colorado.edu/display/fisid_158313/)
Associate Teaching Professor; MFA, Brown University

Logan, Kelty Irene (https://experts.colorado.edu/display/fisid_147340/)
Associate Professor Emerita

Morehouse, Jordan (https://experts.colorado.edu/display/fisid_173434/)
Assistant Professor; PhD, University of North Carolina Chapel Hill

Moriarty, Sandra E.
Professor Emerita

Nottoli, David (https://experts.colorado.edu/display/fisid_164356/)
Assistant Teaching Professor; MBA, University of Illinois at Urbana-Champaign

Peterson, Loni
Assistant Teaching Professor; MA, University of Denver

Robbs, Brett
Professor Emeritus

Schauster, Erin E. (https://experts.colorado.edu/display/fisid_156310/)
Associate Chair, Associate Professor; PhD, University of Missouri–Columbia

Slayden, David Lee (https://experts.colorado.edu/display/fisid_113297/)
Associate Professor; PhD, Indiana University Bloomington

Sriramesh, Krishnamurthy (https://experts.colorado.edu/display/fisid_163947/)
Professor; PhD, University of Maryland College Park Campus

St. John, Burton (https://experts.colorado.edu/display/fisid_163948/#teaching)
Faculty Director, Professor; PhD, Saint Louis University

Tashakori, Parisa (https://experts.colorado.edu/display/fisid_166723/)
Faculty Director, Assistant Teaching Professor; MA, Islamic Azad University (Iran)

Vargo, Christopher (https://experts.colorado.edu/display/fisid_158320/)
Associate Professor; PhD, University of North Carolina

Wang, Mia (https://experts.colorado.edu/display/fisid_173497/)
Assistant Professor; PhD, University of Illinois at Urbana-Champaign

Weaver, Kay (https://experts.colorado.edu/display/fisid_167189/)
Chair, Professor; PhD, University of Stirling (Scotland)

Willis, Erin (https://experts.colorado.edu/display/fisid_156068/)
Associate Professor; PhD, University of Missouri–Columbia

Young, Morgan (https://experts.colorado.edu/display/fisid_159842/)
Assistant Teaching Professor; M.A., George Washington University

# Courses

**APRD 5001 (3) Foundations of Brand Design**
Focuses on the challenges of designing brands targeted at customer needs and desires. Working through a series of projects, students learn both the theory and practice of identifying brand opportunities, idea generation, global design strategies, testing, and brand launch. Graduate students from other departments who have the appropriate background may be allowed to register on a space-available basis with consent of the Program Director.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5002 (3) Foundations of Experience Design**
Introduces the mindset, skills, and methodologies that are core to the practice of human-centered design in digital environments. By applying different design methods and applications across UX, UI, and IxD capabilities, students will learn to design a holistic experience and develop creative problem-solving skills using interaction design principles, design thinking, and customer journey mapping. Graduate students from other departments who have the appropriate background may be allowed to register on a space-available basis with consent of the Program Director.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5003 (3) Advanced Brand Design**
Builds on core concepts introduced in APRD 5001 by expanding executional skillsets and conceptual frameworks through the development of a unified theory of branding. This course encourages students to establish their core principles as art directors and visual designers. They will learn how to create opportunities for complex, meaning-centered relationships between people and products through research, strategic definition, identity development, expression, communication, and behavioral analysis.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5004 (3) Designing the Customer Journey**
Focuses on bridging the gap between designing digital products and understanding the customer journey as they utilize those products. Using concepts and applications introduced in APRD 5002, students will learn to integrate prototyping activities, along with research and testing techniques, into every stage of the design process to quickly adapt designs based on customer feedback and testing insights. Topics include journey mapping, user research methods and high/low fidelity prototyping.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5006 (3) Design for Startups**
Introduces the basic concepts of entrepreneurship as a discipline, with special emphasis given to the ways that design and creativity impact the entrepreneurial process and how designers can meaningfully engage in a startup studio environment. With a broad overview of early-stage entrepreneurial activities, this course prepares students to create a new business, work for a startup, or launch a new venture within an existing organization. Graduate students from other departments who have the appropriate background may be allowed to register on a space-available basis with consent of the Program Director.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5008 (3) Designing for Scale**
Tailored specifically for designers and creative professionals, this course highlights the role that design plays in driving measurable business results for organizations. With the ROI-driven strategic mindset required in today's competitive landscape, students learn essential business skills needed to deliver not only exceptional design but also measurable impacts for brands and businesses.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5009 (3) Principles of Visual Design**
Examines essential principles that drive innovation and creativity in the design field. Through hands-on projects and critical analysis of historical and contemporary creative communication trends, students work on developing their own design philosophy and visual aesthetic. By the end of the course, students should have the expertise needed to craft compelling, impactful visual design solutions that make branding more engaging and effective. Graduate students from other departments who have the appropriate background may be allowed to register on a space-available basis with consent of the Program Director.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5011 (3) Digital Design Portfolio**
Dedicated to the meticulous curation of an industry-ready professional portfolio. Students receive guidance in crafting their online digital portfolios and fostering professional development tailored to their post-graduation career aspirations. Interaction with industry professionals and successful program alumni allows students to gain valuable advice, tips, and feedback to enhance their portfolios.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5012 (3) Entrepreneurial Design**
Equips students with the tools, strategies, and knowledge necessary to thrive in entrepreneurial business environments. Students will develop a practical understanding of how to validate business strategies by applying the principles of human-centered design and iterative design culture. Practical skills, especially business prototyping, are honed to ensure that students can apply their knowledge in real-world situations and make a profound impact on startup success.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5014 (3) Advanced Tools for Interaction Design**
Introduces advanced practices and tools of the digital design profession with an emphasis on preparing students for the increasingly sophisticated nature of modern digital product design. Students get an overview of the architecture of design systems, gain an understanding of what a design system means across different industries and design practices, and learn to build their own design system.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5015 (3) Brand Design for Sustainable Futures**
An in-depth look at the challenges of designing for sustainability by moving students beyond the confines of a standard project brief to examine the purpose and implications of a brand or service's existence. Immersed in design ethics and the power of visual communication, students will gain the expertise to design with purpose and intention, and to align with circular economy principles to reduce waste and pollution.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5018 (3) Innovative Technologies for Design**
Explores the fusion of design, technology, and coding. The course aims to prepare students to seamlessly integrate technology into design work that addresses real-world challenges. Topics covered in this course include virtual reality, augmented reality, data visualization, and foundational skills in web development using JavaScript, HTML and CSS, and contemporary AI capabilities.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5020 (3) Design Leadership**
Explores the art of using design to drive innovation, impact, and change. Through collaboration and empathy, students will discover the power of design to bring people together to create meaningful solutions to real world problems. From managing design teams, project management processes, product development models, and organizational design, students will gain the skills needed for managing design in today's complex world and discover how to work effectively with others across disciplines and sectors to create impact at scale.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5841 (1-3) Graduate Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**APRD 5851 (1-6) Graduate Professional Project**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**APRD 5931 (1-3) Internship**
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**APRD 6871 (1-3) Special Topics**
Graduate special topics. Topics vary by instructor and semester.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**APRD 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.

**APRD 6951 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**APRD 7001 (3) ProSeminar in Mass Communication Theory 1**
Discusses prominent theoretical and methodological points of view in journalism studies and strategic communication that range from social science to critical studies to the humanities. The premise is that methods are driven by research questions, so there is no best way to conduct research. You should leave this course with an understanding of how to address various mass communication phenomena.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7001
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7002 (3) Research Design**
Adopts a holistic and creative approach to bridging theory with method for the purpose of research design. Students learn how to bridge theory and method, exploring research designs that effectively address research questions and hypotheses through elaboration of theoretical and operational linkages.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7002
**Requisites:** Requires prerequisite courses of APRD 7001, APRD 7003, APRD 7051 and APRD 7061 (all minimum grade C-). Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7003 (3) ProSeminar in Mass Communication Theory II**
Continues introducing and discussing theoretical and methodological points of view in areas of communication, journalism and persuasion. Discusses the most important qualitative and quantitative methodological points of view, and from theoretical viewpoints that range from social science to critical studies. The idea is to develop an appreciation for theories and methodologies that can be employed depending upon the research question.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL7003
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7004 (1) Doctoral Professionalization Seminar**
Introduces you to the university and gives you a chance to think out loud about what your academic future might look like. The course is designed to be responsive to your needs regarding your career, getting a job, getting tenure and teaching. In short, the course prepares you for a career in academia.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7004
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7010 (3) Qualitative Interviewing as a Research Method**
Develops the necessary skills to conceptualize, plan, and execute interview-based research projects. Covers topics such as brainstorming and implementing a research idea, formulating research questions, designing a thorough research plan, navigating the IRB, recruiting participants, creating the interview guide, conducting interviews, and analyzing and writing up data. Course also examines reflexivity and ethical issues that are inherent in interview studies, especially ones involving certain populations.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7010

**APRD 7011 (3) Seminar in Strategic Public Relations**
Analyzes the various dimensions of public relations based on scholarship. The seminar seeks to expose students to key public relations specialties such as issues management, risk and crisis communication, corporate social responsibility, communication campaigns, public diplomacy. It also aims to train students to recognize public relations as a strategic practice that can contribute significantly to organizational effectiveness and social good.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7011
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7012 (3) Ethnography and Media**
Provides a ¿how to¿ concerning the intersection of ethnography and the media. During which, the course examines the epistemology of fieldwork. We will critically examine aspects and approaches to doing and writing ethnography, including with and without social science theory. We will discuss the challenges of entering, being in, and leaving the field. And we will explore data collection techniques.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7012
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7013 (3) Mixed Research Methods**
Examines the practice of mixed-methods research in the social sciences with an emphasis on the pragmatic considerations necessary for such projects. The class will discuss the development and execution, the analyses of data obtained, and the practical tools required for such studies. Throughout the course, students will examine and discuss specific applications of mixed methods research.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7013
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7014 (3) Experimental Design**
Introduces all facets of experimental design for studies of forms of communication. This course study experiments, both for your own research and to help you evaluate the work of others, and provide an overview of research in the field and the various ways in which media can be utilized in experimental research. This is a hands-on, nuts-and-bolts methods course. You will not only learn about the various theories and methodologies, but also implement your own.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7014
**Requisites:** Requires prerequisite course of JRNL 7061 or APRD 7061 (minimum grade D-). Restricted to graduate students only.

**APRD 7020 (3) The Public Sphere**
Investigates the role media play in the public sphere and democratic practices. Does media facilitate support or opposition to political and economic policies and cultural frames that become part of publics? Which institutions best inform publics and why? This course traces the development of U.S. and selected international media institutions. We analyze and debate the relationship of differing media content to political power, freedom of critical inquiry, and the facilitation or inhibition of democratic practices.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7020
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7021 (3) Science Communication**
Focuses on mass communication of issues related to science and follows two lines of inquiry. The seminar takes a cultural perspective, and explores the concept of scientific uncertainty in media. It will use these as a springboard for examining how we use media to conceptualize science, environment, health, etc., and how that impacts the way we live on this planet.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7021
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7030 (3) Media Sociology**
Examines a range of theories for how media messages and media institutions turn out the way they do. `Media sociology¿ refers to theorizing about the media as the `dependent variable;¿ even though many of the `independent variables¿ explored are not narrowly sociological. It connects media actors, organizations, and institutions to sociological concepts such as socialization, interaction, roles, and structures.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7030
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7031 (3) Media Ethics**
Explores the psychological structures and processes that come into play as individuals interpret moral problems, and formulate, select and execute a moral action in response. The seminar will explore the work of Jean Piaget, Lawrence Kohlberg, and James Rest, among others, and apply moral psychology theories and methods to contemporary issues and cases in media professions.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7031
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7034 (3) Health Communication**
Advanced seminar that examines and critiques the literature on health communication in two specific areas: news about health and its impact on individuals, and health promotion campaigns.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7034
**Requisites:** Restricted to graduate students only.

**APRD 7051 (3) Qualitative Research Methods**
Provides a survey of various qualitative modes of inquiry, attending to the philosophical, conceptual, and practical foundations of qualitative research in media, communication, and information. The course is designed to support students in developing a critical understanding of the different considerations in and stages of qualitative research, including the development of research questions, theoretical and conceptual frameworks, methodological approaches, data collection, data analysis, and assessment of reliability and validity of qualitative data. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7051
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7061 (3) Quantitative Research Methods**
Introduces graduate students to concepts and applications in quantitative research methods. The course prepares students fordissertation writing through hands-on experience in developing research designs and conducting independent quantitative research.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7061
**Grading Basis:** Letter Grade

**APRD 7062 (3) Advanced Statistical Analysis for Mass Communication**
Provides instruction on the following topics: ordinary least squares regression, statistical mediation and moderation, path analysis, count and categorical data modeling, and factor analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7062
**Requisites:** Requires prerequisite course of APRD 7061 or JRNL 7061 (minimum grade D-).
**Grading Basis:** Letter Grade

**APRD 7063 (3) Text Analytics for Computational Mass Communication Research**
This course tackles advanced advertising and marketing analytics through three advanced methods aimed at solving these problems: text classification, text topic modeling, and semantic network analysis. Each key area will involve a deep dive into the leading computer science methods aimed at solving these methods using Python. Students will walkthrough conceptual overviews of the methods, and dive into real-world datasets through instructor-led tutorials. Students will also conduct a major project for each of the 3 key methods.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7063
**Requisites:** Requires prerequisite course of APRD 7061 or JRNL 7061 (minimum grade D-).
**Grading Basis:** Letter Grade

**APRD 7133 (3) Digital Games**
Seminar that explores digital games, analog games, and play, and looks at the relatively new field of game studies; the field has moved toward issues of culture and social justice.
**Requisites:** Restricted to doctoral students.

**APRD 7841 (1-3) Independent Study**
Provides opportunities for independent study and research on the graduate level. Students perform independent research under faculty supervision.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to APRD doctoral students only.
**Grading Basis:** Letter Grade

**APRD 7871 (3) Special Topics**
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**APRD 7880 (3) Persuasion Theory**
This seminar acts as an overview of psychological knowledge as it pertains to capturing consumer insight, and includes a consideration of how the brain works, what factors influence consumer choice, and a critical evaluation of psychological assessment tools.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7880
**Requisites:** Restricted to graduate students only.

**APRD 8991 (1-10) Doctoral Dissertation**
Dissertation research and writing. A minimum of 30 hours is required.
**Repeatable:** Repeatable for up to 40.00 total credit hours.
**Requisites:** Restricted to PhD students only.

**MDRP 7871 (3) Special Topics**
Special topics.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

# Corporate Communication - Master of Arts (MA)

Organizations of all types (for-profit corporations, government agencies and not-for-profits) need to build and maintain symbiotic relationships with their key stakeholders (publics). These stakeholders are both internal to an organization (such as employees and suppliers) and external (such as the mass media, government regulators, consumers, citizens and activist groups). The Master of Arts in Corporate Communication (MACC) provides students with the knowledge and skills to use communication in order to build and maintain relationships with these strategic stakeholders (publics). In addition, students will also learn to measure the quality of these relationships and its effect on the reputation of their organizations.

The MACC program is especially designed for:

- Early and mid-career practitioners of corporate communication with a desire to increase their knowledge potentially for career advancement.
- Mid-career professionals from allied disciplines such as journalism, advertising and marketing who might want to switch to corporate communication given the increased demand in this sector.

This program equips students with the conceptual knowledge and practical skills to be effective communicators whether they work for for-profit corporations or not-for-profit organizations.

Key program highlights:

- Corporate communication is fundamentally a practice, but scholarship built over the past fifty years has demonstrated that in order to be effective, this practice needs to be based on sound strategic knowledge. This program emphasizes that purposeful and effective corporate communication blends sound strategies with techniques.
- The program emphasizes the need for corporate communication to take place in a global environment because ethnocentricity in communication results in ineffectiveness in communication. Cultural sensitivity also equips graduates of the program to navigate the ethical challenges that arise in their life as communicators no matter where they practice—in Colorado, within the U.S. or internationally.
- Practicing strategic corporate communication is not possible without basing such practice on empirical evidence—whether the evidence

is culled through qualitative, quantitative or mixed methods. The MACC program seeks to train students on sound methodological principles thereby preparing them to be thoughtful communicators. Evidence reveals that organizational leaders appreciate, and value, communicators who bring theory and evidence-based value to organizational activities.

For more information, visit the Master of Arts in Corporate Communication website (https://www.colorado.edu/cmci/aprd/macc/).

# Requirements

## Admission Requirements

The evaluation of applications is based on a set of criteria that seek to value several key qualities in students, such as professional background and experience, academic record, professional achievements, and career goals (based on a statement of purpose). The evaluation will also be guided by standards set by the Graduate School. The desired qualifications of successful applicants include:

- A baccalaureate degree from a regionally accredited college or university, or its equivalent.
- Professional experience in corporate communication or an allied field such as journalism, advertising or communication.
- An aptitude for corporate communication and potential to pursue academic and research-based work in the field.
- An undergraduate GPA of at least 2.75.

To apply for admission, applicants should submit:

- All academic transcripts.
- A resume or Curriculum Vitae that establishes at least 3–5 years of relevant work experience.
- A statement of purpose describing their preparation for the proposed study as well as future career path relevant to the study.
- Two letters of recommendation, including at least one professional reference.
- Evidence of proficiency in English (international students only).
- Optional: GRE or GMAT scores (even if they are older than 5 years).

## Program Requirements

The Master of Arts in Corporate Communication requires 30 credits of coursework. The program consists of accelerated courses, allowing students to take only one course at a time while still completing two courses during the span of a regular semester.

CU Boulder's Master of Arts in Corporate Communication curriculum was strategically crafted not only to be flexible and serve working professionals around the world, but also to provide the knowledge, skills, and tools needed to practice corporate communication in a globalizing environment. The program offers a focused 10-course, 30-credit curriculum consisting of: five core courses (3 credits each) and five specialty courses (3 credits each).

The courses are designed to provide students with a blend of conceptual and practical knowledge and skills that can be immediately applied in your day-to-day work.

All of the courses are required of all students because they cover the conceptual foundations of sound corporate communication. These courses orient students to theories and frameworks in public relations and corporate communication.

The specialty courses are designed to expose students to the variety of work handled by corporate communication practitioners. Corporate communication is a diverse practice with many skillset areas often divided based on the stakeholders involved: employees (internal publics who are key to an organization's success), investors (that often invest in for-profit corporations or donors to not-for-profit organizations), media, etc.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| CCOM 5101 | Strategic Corporate Communication Management | 3 |
| CCOM 5103 | Corporate Communication and Ethics | 3 |
| CCOM 5104 | Research Methods for Corporate Communication | 3 |
| CCOM 5102 | Strategic Global Corporate Communication | 3 |
| CCOM 5105 | Measurement for Corporate Communication | 3 |
| **Specialty Courses** | | |
| CCOM 5106 | Internal Communication | 3 |
| CCOM 5109 | Issues Management and Public Affairs | 3 |
| CCOM 5110 | Corporate Communication and Digital and Social Media | 3 |
| CCOM 5108 | Corporate Communication Techniques and Media Relations | 3 |
| CCOM 5107 | Risk and Crisis Communication | 3 |
| **Total Credit Hours** | | **30** |

# Learning Outcomes

By the completion of the program, students will:

- Possess a comprehensive and in-depth understanding of corporate communication as a professional practice.
- Possess a comprehensive understanding of topics, techniques and issues related to corporate communication research, measurement and ethics.
- Possess the ability to generate verbal, written and digital deliverables appropriate for professional practice in corporate communications.
- Possess the ability to understand, generate and refine the communication and organizational strategies necessary for effective professional communication practice in global and otherwise diverse contexts.
- Possess the combination of competencies and skills required for employability as a corporate communication professional.

# Strategic Communication Design - Master of Arts (MA)

The Master of Strategic Communication Design (MSCD) is an immersive 39-credit hour program typically completed in a single year. Located in a state-of-the-art studio in the heart of Boulder's entrepreneurial tech community, the MSCD is entirely project-based. With the guidance of industry-driven instructors, our students leverage design's potential

as a critical problem-solving tool in a rapidly changing world. This human-centered program evolves students into branding design and entrepreneurial professionals through innovative, intensive and progressive learning experiences.

MSCD graduates have been appointed to leadership design positions in top companies, including Google, Apple, Uber, Saatchi and Saatchi, Twitter and Dropbox—to name just a few.

# Requirements

## Application Requirements

Applicants to the master's in strategic communication design must have a bachelor's degree from an accredited college or university, with an undergraduate GPA of at least 2.75. Special accommodations may be made for applicants with ancillary degrees, like pre-law or business.

Because this is a fast-paced, intensive program, applicants are strongly discouraged from working full-time while enrolled.

### How to Apply

A complete application to the program must include the following:

- A long-form personal statement showcasing your interest in the program or your experience in the design industry.
- A portfolio showcasing your creative vision and potential. Your portfolio should be uploaded as a PDF alongside your application and should demonstrate your genuine passion for art or design. Your portfolio can demonstrate creativity in any media—basic design, photography, ceramics, painting, digital media, etc.
- One letter of recommendation from professionals or professors. Personal recommendations will not be accepted.
- Unofficial transcripts from all colleges attended.
- A nonrefundable application fee of $60 ($80 for international students)
- International students must also demonstrate English proficiency with an acceptable TOEFL (75), IELTS (6.0) or Duolingo (120) score.

### Application Deadlines

This program is kept intentionally small by design, to facilitate close relationships between faculty and students, and among peers. To have the best chance of being accepted, applicants are encouraged to submit a complete application before the April 15 deadline.

Exceptionally qualified candidates who miss the deadline may be eligible to apply to the program, if space allows. Contact our graduate admissions team (cmcigrad@colorado.edu?subject=Inquiry%20about%20strategic%20communication%20design%20program) to learn more.

## Program Requirements

The Master of Strategic Communication Design (MSCD) is a 39-hour professional master's degree program to be completed within a single calendar year—from August to August—over three semesters: Fall, Spring, and Summer Session D. Students must maintain a 3.0 cumulative grade point average and fulfill all requirements in a timely manner.

**Plan of Study**

| **Year One** | | |
|---|---|---|
| **Fall Semester** | | **Credit Hours** |
| APRD 5001 | Foundations of Brand Design | 3 |
| APRD 5002 | Foundations of Experience Design | 3 |
| APRD 5006 | Design for Startups | 3 |
| APRD 5009 | Principles of Visual Design | 3 |
| | **Credit Hours** | **12** |
| **Spring Semester** | | |
| APRD 5003 | Advanced Brand Design | 3 |
| APRD 5004 | Designing the Customer Journey | 3 |
| APRD 5008 | Designing for Scale | 3 |
| APRD 5014 | Advanced Tools for Interaction Design | 3 |
| APRD 5018 | Innovative Technologies for Design | 3 |
| | **Credit Hours** | **15** |
| **Summer** | | |
| APRD 5011 | Digital Design Portfolio | 3 |
| APRD 5012 | Entrepreneurial Design | 3 |
| APRD 5015 | Brand Design for Sustainable Futures | 3 |
| APRD 5020 | Design Leadership | 3 |
| | **Credit Hours** | **12** |
| | **Total Credit Hours** | **39** |

# Learning Outcomes

By the time students graduate, they will have learned the skills required to become full-stack designers. They will have learned the various elements of completing a design project, from design thinking and usability testing, to brand design and leading design workshops. The learning outcomes for the MSCD program are as follows:

- Demonstrate knowledge of both brand and interaction design and the industries used within.
- Develop skills to define complex problems and apply design thinking for innovative solutions.
- Apply foundational UI design practices and system design principles to create scalable, intuitive digital experiences across various platforms.
- Utilize UX design software across human-centered processes with innovative technology.
- Understand user interface guidelines through principles of human perception and cognition and learn how to apply them to the design of everyday things.
- Communicate creative decisions effectively, emphasizing positive business impact.
- Embrace feedback while collaborating effectively in diverse teams, fostering an inclusive and productive environment for decision-making.
- Build an industry-ready professional portfolio.

# Communication

Graduate study in communication foregrounds the symbolic and material dimensions of social life, with special attention to the role communication plays in both transmitting messages and constituting

relationships. Contexts of study include interpersonal interaction, workplaces and institutions, communities and public/civic life.

Graduate students pursue research within three main areas—community & social interaction, organizational communication, and rhetoric & culture—crafting unique programs of study to meet individual needs.

The master's program provides students with knowledge of key bodies of communication scholarship and develops their skills in analyzing complex communication situations. The program prepares graduates for positions in businesses, nonprofit institutions and community groups, in addition to doctoral study in communication.

The doctoral program provides students with opportunities to conduct theoretically grounded and methodologically rigorous research on pressing communication issues, while also traversing traditional academic boundaries. The program prepares graduates primarily for faculty positions at leading universities, although some graduates pursue positions in business, the nonprofit sector, social services or government.

**Course code for this program is COMM.**

# Master's Degree

- Communication - Master of Arts (MA) (p. 1518)

# Doctoral Degree

- Communication - Doctor of Philosophy (PhD) (p. 1520)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ackerman, John Martin (https://experts.colorado.edu/display/fisid_144951/)
Professor; PhD, Carnegie Mellon University

Ashcraft, Karen Lee (https://experts.colorado.edu/display/fisid_147453/)
Professor; PhD, University of Colorado Boulder

Boromisza-Habashi, David (https://experts.colorado.edu/display/fisid_145833/)
Associate Professor; PhD, University of Massachusetts at Amherst

Burns, Michael
Assistant Teaching Professor; PhD, North Dakota State University

Cruz, Joelle (https://experts.colorado.edu/display/fisid_157594/)
Associate Professor; PhD, Texas A&M University

Frey, Lawrence R. (https://experts.colorado.edu/display/fisid_125937/)
Professor Emeritus; PhD, University of Kansas

Hickerson Dominiski, Ruth (https://experts.colorado.edu/display/fisid_151159/)
Teaching Professor; PhD, University of Denver

Hodge, Danielle (https://experts.colorado.edu/display/fisid_167427/)
Assistant Professor; PhD, University of Colorado Boulder

Izaguirre, José G.
Assistant Professor; PhD, University of Illinois Urbana-Champaign

Jahn, Jody L. (https://experts.colorado.edu/display/fisid_153426/)
Associate Professor; PhD, University of California, Santa Barbara

Kelsie, Amber (https://experts.colorado.edu/display/fisid_171455/)
Assistant Professor; PhD, University of Pittsburgh

Koschmann, Matthew A. (https://experts.colorado.edu/display/fisid_145807/)
Associate Professor; PhD, University of Texas at Austin

Kuhn, Tim (https://experts.colorado.edu/display/fisid_118144/)
Professor; PhD, Arizona State University

Maurer, Christy (https://experts.colorado.edu/display/fisid_148831/)
Teaching Associate Professor; PhD, University of Colorado Boulder

Montiegel, Kristella (https://experts.colorado.edu/display/fisid_172738/)
Assistant Professor; PhD, University of California, Los Angeles

Ochieng, Omedi (https://experts.colorado.edu/display/fisid_170851/)
Associate Professor; PhD, Bowling Green State University

Pezzullo, Phaedra Carmen (https://experts.colorado.edu/display/fisid_156204/)
Professor; PhD, University of North Carolina Chapel Hill

Shrikant, Natasha (https://experts.colorado.edu/display/fisid_157954/)
Associate Professor; PhD, University of Massachusetts at Amherst

Simonson, Peter D.
Professor Emeritus; PhD, University of Iowa

Skerski, Jamie L. (https://experts.colorado.edu/display/fisid_149871/)
Teaching Professor; PhD, Indiana University Bloomington

Sprain, Leah M.H. (https://experts.colorado.edu/display/fisid_151292/)
Associate Professor, Faculty Director; PhD, University of Washington

Taylor, Bryan Copeland (https://experts.colorado.edu/display/fisid_107421/)
Professor; PhD, University of Utah

White, Cindy Hagemeier (https://experts.colorado.edu/display/fisid_107461/)
Associate Professor; PhD, University of Arizona

# Courses

**COMM 5000 (3) Organizational Culture**
Focuses on theory and practice associated with the successful development of organizational culture. Topics covered include symbolic artifacts, beliefs, and assumptions that distinguish organizational, corporate, and occupational/professional identities. Related coverage of the communication practices (e.g., performance, ritual, etc.) through which the cultural elements of organizing are created, maintained and transformed. Special emphasis placed on issues of cultural leadership, cultural control, and cultural change in the contexts of contemporary globalization and technological innovation.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**COMM 5210 (3) Readings in Communication Theory**
Provides a critical overview of influential theoretical traditions in communication studies. Emphasizes the discipline¿s social scientific and humanistic heritage, while also considering emerging trends. Introduces standards for evaluating and critiquing communication theories.
**Requisites:** Restricted to graduate students only.

**COMM 5220 (3) Seminar: Functions of Communication**
Topical seminar on the functions of communication across interpersonal, group, organizational, and public contexts. Reviews current theory and research on topics such as communication and conflict, persuasion, and ethical dimensions of communication practices.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**COMM 5225 (3) Environmental Communication**
Investigates key concepts in environmental communication and considers which theoretical frameworks and practical actions can inform the effects of various constituents to address environmental issues.
**Requisites:** Restricted to graduate students only.

**COMM 5230 (3) Applied Communication**
Examines the study of applications of communication concepts, theories, methods, interventions, and other practices to address real-world issues and problems. Discusses conceptual issues framing applied communication, examines purposes and methods informing such scholarship, and provides opportunity to evaluate and propose research.
**Requisites:** Restricted to graduate students only.

**COMM 5300 (3) Seminar: Rhetoric**
Reviews current theory and research on topics such as rhetoric and publics, rhetoric as an interpretive social science, and rhetoric of social movements and political campaigns.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**COMM 5310 (3) Contemporary Rhetorical Criticism**
Advanced critical analysis of rhetorical texts in terms of how they shape issues and appeals for judgment, create identities for speakers and their audiences, and construct perceptions of time, space, and the human condition.
**Requisites:** Restricted to graduate students only.

**COMM 5320 (3) Readings in Rhetoric**
Survey of classical and contemporary readings in rhetoric. Required for doctoral students in communication; optional for master's students.
**Requisites:** Restricted to graduate students only.

**COMM 5435 (3) Readings in Community and Social Interaction**
Focuses on how everyday communication practices shape and are shaped by community contexts. Contains theoretical and empirical readings that illustrate how interactions among group members negotiate and maintain distinct communities and how group communication practices reflect shared norms among community members. Also reviews methods to study everyday interactions among community members (e.g., discourse analysis, qualitative coding, surveys and applied approaches/methods).
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**COMM 5600 (3) Seminar: Organizational Communication**
Reviews current theory and research on topics such as communication and organizational decision making, organizational culture, gender relations, communication technology, and power and control in organizations.
**Equivalent - Duplicate Degree Credit Not Granted:** COMM 4600
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**COMM 5610 (3) Organizational Ethnography**
Focuses on the historical influence of the ethnographic tradition in organizational communication studies. Reviews landmark studies of organizational culture and power/control, emphasizing issues of ethics and politics associated with the writing and reading of organizational ethnography. Reviews trends in contemporary organizing such as neoliberal globalization and the adoption of artificial intelligence, and their implications for the future of ethnography.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**COMM 5620 (3) Readings in Organizational Communication**
Survey of historical and contemporary readings in organizational communication. Treats theory, research, and application from a variety of perspectives.
**Requisites:** Restricted to graduate students only.

**COMM 5720 (3) Readings in Communication and Technology**
Survey of multidisciplinary research that examines various relationships between communication and technology. Students are encouraged to develop critical skills in perceiving assumptions and perspectives that motivate major theories in this area, and to examine how these phenomena have changed over time.
**Requisites:** Restricted to graduate students only.

**COMM 5930 (1-6) Graduate Internship**
Offers opportunities for graduate-level communication related work projects. Limited to 3 hours in spring and fall semesters, 6 hours in summer. The 6-hour limit at MA level and 9-hour limit at PhD level applies to any combination of independent study and internship credit.
**Repeatable:** Repeatable for up to 9.00 total credit hours.

**COMM 6010 (3) Communication Research and Theory**
Provides an introduction to graduate study of communication, offering an overview of the discipline and its scholarship. Required for MA and Ph.D. communication students.
**Requisites:** Restricted to Communication (COMM or COMN) graduate students only.

**COMM 6020 (3) Quantitative Research Methods**
Introduces students to the practice of quantitative research in communication: conceptualization and critique of research projects, measurements, methods (e.g., experimental and survey), statistical data analysis, and written reports.
**Requisites:** Restricted to graduate students only.

**COMM 6030 (3) Qualitative Research Methods**
Introduction to the epistemology, methodology, and representational practices associated with qualitative communication research. Fieldwork methods emphasized include participant observation, interviewing, and document/artifact analysis.
**Requisites:** Restricted to graduate students only.

**COMM 6200 (3) Seminar: Selected Topics**
Facilitates understanding of current and past theory and research on a selected topic in communication and the ability to develop new theory and research on that topic.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**COMM 6310 (3) Advanced Rhetorical Criticism**
Reviews current critical methods and issues related to rhetorical criticism and rhetorical field methods.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites COMM 5310 and COMM 5320.

**COMM 6320 (3) Rhetorical Theory**
Reviews current theory and research on topics such as contemporary rhetorical theory, rhetoric and public life, rhetoric as an interpretive social science, and rhetoric of social movements and political campaigns.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite COMM 5320.

**COMM 6330 (3) Rhetoric of Inquiry**
Surveys foundational texts and contemporary research in the rhetoric of inquiry. Focuses on the role of persuasion in the production of knowledge. Critical analysis of major theoretical and methodological traditions and topics, with an emphasis on social dimensions of inquiry.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite COMM 5320.

**COMM 6340 (3) Rhetoric and Civic Community**
Considers performances of public life as rhetorical inducements of civitas. Topics include negotiation of self-regulation among interdependent partners, rhetorical exclusions and/or counterpublics, and dialectical tensions of public/private as these contribute to and have civic consequences for publicness, community, and social will.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite COMM 5320.

**COMM 6350 (3) Seminar in Argumentation**
Surveys foundational texts and contemporary research in argumentation. Analysis of distinctions between philosophical and rhetorical approaches to argument. Critical analysis of major theoretical and methodological traditions and topics with an emphasis on social dimensions of argument.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite COMM 5320.

**COMM 6360 (3) Social and Cultural Theory**
Traces select traditions in social and/or cultural theory, emphasizing how those traditions affect and are affected by the field of rhetoric studies. Examines the origins and resolutions of major debates in social and/or cultural theory from a rhetorical perspective.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite COMM 5320.

**COMM 6370 (3) Rhetorics of Transgression and Resistance**
This course examines contemporary philosophies, analyses, and practices of transgression and resistance. Overall, it encourages greater reflexivity about why, how, and for what ends we study the intersections of rhetoric, culture, and social change, including but not limited to choices about naming, stories, discourses, tactics, coalitions, and movements.
**Recommended:** graduate students only.
**Grading Basis:** Letter Grade

**COMM 6410 (3) Discourse Analysis**
Acquaints students with the main types of discourse analysis: conversation analysis, critical discourse analysis, and rhetorically informed discourse approaches. Teaches how to conduct discourse analysis, including transcribing, selecting excerpts, documenting inferences, and linking findings to scholarly controversies.
**Requisites:** Restricted to graduate students only.

**COMM 6420 (3) Interaction Analysis**
Educates students in one of a selected set of methodological specializations used in the study of human interaction.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**COMM 6425 (3) Writing, Reporting, and Publishing**
Helps students hone their abilities to write, report, and publish a scholarly article in the field of communication and beyond. Students gain familiarity with the genre of the scholarly article, engage with theories of writing genres, delve into the politics of scholarly publishing, and learn various strategies for crafting a scholarly article. Students are expected to develop a manuscript for submission to a peer-reviewed journal or other scholarly forum.
**Grading Basis:** Letter Grade

**COMM 6440 (3) Grounded Practical Theory**
Examines theory, method, and application of grounded practical theory, an approach to building normative theory through description, critique, and theoretical reconstruction of situated communicative practices. Semester project involves analysis of a sample of discourse from a public or field observation setting.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite COMM 5210.

**COMM 6445 (3) Intercultural Communication**
Focuses on cultural foundations of social interaction, with a special emphasis on ideology (including potentially contested cultural norms, values and premises) as a basic condition of meaningful interaction. Identities are discussed as culturally variable, historically embedded interactional accomplishments, constructed from communicative resources such as language and other types of signs, that serve the purpose of participation in communal life.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**COMM 6455 (3) Community-based Research Methods**
Facilitates and supports graduate student-led community-based research. Working from multiple CBR traditions, students develop a thoughtful rationale for conducting CBR and practice a repertoire of CBR methods (e.g., group decision-making, managing ethical dilemmas, collaborative data collection and analysis, and communicating findings).
**Grading Basis:** Letter Grade

**COMM 6460 (3) Ethnography of Communication**
Introduces graduate students to the theory, methodology, and practice of the ethnography of communication. Students read existing literature in the tradition, and design and implement a field-based project that centers on culturally patterned forms and styles of communicative conduct. Prior graduate-level coursework in basic qualitative research methods is required.
**Grading Basis:** Letter Grade

**COMM 6470 (3) Public Deliberation and Dialogue**
Explores the theory, research and practices of deliberative democracy and dialogue. Considers "ideal" communicative conduct and common interactional troubles, cross-cultural differences and routine communication practices.
**Requisites:** Restricted to graduate students only.

**COMM 6730 (3) Constitutive Approaches to Organizational Communication**
Explores theory and research that explain how organizing processes are constituted through communication. Course themes might include collaboration, authority, identity, knowledge, risk/resilience, or socio-material arrangements.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites COMM 5620 and COMM 6010.

**COMM 6740 (3) Theory and Philosophy of Organizing and Organizations**
Reviews theory and philosophy of organizations and organizing where communication processes are seen as constitutive. Focuses on discursive and material practices in the formation and change of organizational structure, culture, and operation.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite COMM 5620.

**COMM 6750 (3) Critical-Cultural Approaches to Organizational Communication**
Addresses critical and cultural approaches to communicating and organizing. Topics include relations of culture, power, resistance, identity, and difference as theorized in and around organizational life. Major theoretical works on these topics are highlighted throughout, although specific themes may vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite COMM 5620.
**Grading Basis:** Letter Grade

**COMM 6780 (3) Roles, Relationships, and Identities in Interaction**
Examines how social roles influence communicative practices, the development of relationships, and the impact of relationships on identity. Considers these processes in contexts, such as personal relationships and institutional settings. Topic varies.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**COMM 6840 (1-3) Master's Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**COMM 6910 (1) Communication Research and Theory Practicum**
Focuses primarily on the professionalization of graduate students new to CU's Department of Communication. Introduces them to the department, university, and discipline; develops practical skills related to professionalization (e.g., submitting to conferences, publishing research, and mentoring students); and considers the politics of professionalization. Runs concurrently with COMM 6010, "Communication Research and Theory.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**COMM 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Repeatable:** Repeatable for up to 3.00 total credit hours.

**COMM 6950 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**COMM 7118 (3) Foundations of Environmental Justice**
Examines environmental justice movements, policies, institutions, objectives, and scholarship. Identifies factors that contribute to environmental inequality, and efforts to reduce it. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 7118, ENVS 7118 and PSCI 7118
**Requisites:** Restricted to graduate students only.

**COMM 8840 (1-6) Doctoral Independent Study**
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.

**COMM 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.

# Communication - Master of Arts (MA)

The master's degree provides students with knowledge of communication scholarship and develops their ability to analyze complex communication situations. The program is intended to serve two main groups of students: those planning to pursue the PhD degree and those seeking employment in businesses, nonprofit institutions and community groups.

MA students typically pursue studies in one or more of the department's three main areas:

- Community & social interaction
- Organizational communication
- Rhetoric & culture

Students may choose a thesis or comprehensive examination option.

## Requirements

Students wishing to pursue graduate work toward this degree should carefully read the Graduate School requirements, review the coursework offered in this catalog, and attend to the detailed degree requirements on the department website.

### Application Guidelines

Visit the department's Admissions (http://www.colorado.edu/communication/graduate-degrees/admissions/) webpage for details.

### Course Requirements

To complete the MA, students are required to take COMM 6010, at least one methods course and at least two readings courses (see tables below).

For both the thesis option and the comprehensive examination option, coursework may include a maximum of 6 hours of independent study and/or internship combined. A maximum of 9 hours may be transferred from graduate work completed in/at other programs and/or institutions (including other CU campuses, such as CU Denver). A maximum of 9 credit hours of courses may be taken outside the department. Transfer and outside department courses combined may not exceed 12 credit

hours. Courses in which a grade of C- or below is received are not counted toward the master's degree.

## Degree Plans

### Plan I: Thesis Option

Students pursuing the thesis option are required to complete a minimum of 30 graduate credit hours, including 24 credit hours of graduate-level coursework (at the 5000 level or higher) and 6 thesis hours (including oral defense of the thesis; additional thesis hours cannot be taken).

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| COMM 6010 | Communication Research and Theory | 3 |
| COMM 6950 | Master's Thesis | 6 |
| **Electives** | | |
| At least one methods course: | | 3 |
| COMM 6020 | Quantitative Research Methods | |
| COMM 6030 | Qualitative Research Methods | |
| COMM 6310 | Advanced Rhetorical Criticism | |
| At least two readings courses: | | 6 |
| COMM 5210 | Readings in Communication Theory | |
| COMM 5320 | Readings in Rhetoric | |
| COMM 5425 | | |
| COMM 5435 | Readings in Community and Social Interaction | |
| COMM 5620 | Readings in Organizational Communication | |
| COMM 5720 | Readings in Communication and Technology | |
| Four additional graduate-level courses | | 12 |
| **Total Credit Hours** | | **30** |

Students choosing the thesis option should select a permanent graduate faculty advisor prior to completing 12 credit hours. In consultation with their advisor, students should select two additional committee members and, by the beginning of the second year (assuming a course load of 9 hours per semester), complete the MA Program of Study Form and a written thesis proposal (with the thesis designed such that it can be completed during student's final planned semester in residence).

After the committee has read the thesis, a final oral defense is conducted in conformity with the graduate school's rules. Students must have an affirmative vote from the majority of committee members to pass the thesis. Students who fail the thesis defense may attempt it once more after a period of time that is determined by the committee. Students who fail the second defense are dismissed from the master's program. The final submitted thesis must comply with the CU Boulder Graduate School rules regarding the formatting of theses and dissertations.

### Plan II: Comprehensive Examination Option

Students pursuing the coursework with comprehensive examination option are required to complete a minimum of 30 graduate credit hours (at the 5000 level or higher), a written comprehensive examination and an oral defense of that written comprehensive examination.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Course** | | |
| COMM 6010 | Communication Research and Theory | 3 |
| **Electives** | | |
| At least one methods course: | | 3 |
| COMM 6020 | Quantitative Research Methods | |
| COMM 6030 | Qualitative Research Methods | |
| COMM 6310 | Advanced Rhetorical Criticism | |
| At least two readings courses: | | 6 |
| COMM 5210 | Readings in Communication Theory | |
| COMM 5320 | Readings in Rhetoric | |
| COMM 5425 | | |
| COMM 5435 | Readings in Community and Social Interaction | |
| COMM 5620 | Readings in Organizational Communication | |
| COMM 5720 | Readings in Communication and Technology | |
| Six additional graduate-level courses | | 18 |
| **Total Credit Hours** | | **30** |

Master's students choosing the comprehensive examination option should select a permanent graduate faculty advisor prior to completing 12 credit hours. The associate chair of graduate studies automatically serves as a committee member. Students, in consultation with their advisor, select a third committee member.

By the beginning of the second year of graduate work (assuming a course load of 9 hours per semester), students should complete the MA Program of Study Form.

The comprehensive examination includes two standardized questions created by the associate chair of graduate studies that are completed by all master's students taking the examination at the same time that semester. One is about communication theory (90 minutes), and the other is about research methods (90 minutes). A third question, created by the student's advisor, is unique to the student's area of expertise (2 hours).

A one-hour oral defense must be held within two weeks of completing the written comprehensive examination. Students must have an affirmative vote from the majority of committee members to pass the comprehensive examination.

Should the majority of committee members judge the written and/or oral performance unsatisfactory, students may be required to retake relevant portions of the examination (with a maximum of one opportunity to retake the examination). Prior to retaking the comprehensive examination, students may be required to complete additional coursework and/or research projects. Retaking the comprehensive examination must include another oral defense. Students who retake the comprehensive examination but do not complete it in a satisfactory manner are dismissed from the master's program.

# Learning Outcomes

By the completion of the program, students will be able to:

- Produce academic writing that synthesizes arguments from academic research and theory in the field of communication.

- Demonstrate knowledge of how to design and conduct high-quality original research in communication.
- Effectively present and communicate about communication scholarship to academic and public audiences in both written and oral form.

# Communication - Doctor of Philosophy (PhD)

The PhD in communication typically serves students interested in pursuing academic careers. Students are admitted to the PhD program after having completed an MA degree or equivalent.

PhD students generally specialize in one or more of the department's three main areas:

- community & social interaction
- organizational communication
- rhetoric & culture

Depending on the extent of the student's prior academic work in communication and their rate of progress, the degree can be achieved in three to four years. PhD students are expected to complete all degree requirements within six years from the semester in which they begin coursework in the doctoral program.

# Requirements

## Application Guidelines

For application guidelines, visit the department's Admissions (http://www.colorado.edu/communication/graduate-degrees/admissions/) webpage.

## General Requirements

All PhD students are required to take COMM 6910 and two of three methods courses (COMM 5310, COMM 6020 and COMM 6030). PhD students entering without a background in communication must also take COMM 6010.

Beyond those specific requirements, PhD students develop expertise in four areas: broad-based background in communication, advanced expertise in a primary area of specialization, expertise in a secondary area of specialization and advanced expertise in a primary methodology.

Students' individual coursework requirements must be specified in a PhD plan of study document that is approved by their advisor and committee. A minimum of 54 graduate credit hours of coursework is required, plus 30 hours of dissertation credit, for a minimum total of 84 credit hours. At least 30 graduate credit hours of coursework must be in communication courses.

PhD students may transfer in a maximum of 12 credits from prior graduate coursework. Any graduate courses completed at CU Boulder (including courses completed for the master's in communication) can be applied to the PhD program if they are included in the student's approved PhD plan of study. Students may take a maximum of nine independent study and/or internship credit hours combined.

Students wishing to pursue graduate work toward this degree should carefully read the Graduate School requirements, review the coursework offered in this catalog and attend to the detailed degree requirements on the department website (http://www.colorado.edu/communication/graduate-degrees/phd-communication/).

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| *Research and Theory* | | *1-3* |
| COMM 6010 | Communication Research and Theory (required for students without a background in Communication) | |
| COMM 6910 | Communication Research and Theory Practicum (required for students with a background in Communication) | |
| *Methods* | | |
| Choose at least two: | | 6 |
| COMM 5320 | Readings in Rhetoric | |
| COMM 6020 | Quantitative Research Methods | |
| COMM 6030 | Qualitative Research Methods | |
| **Primary Area of Specialization** | | |
| This requirement is satisfied by taking courses, seminars and/or independent studies (including those outside the department) in the primary specialty declared in the student's approved PhD plan of study. | | |
| **Secondary Area of Specialization** | | |
| This requirement is satisfied by taking courses, seminars and/or independent studies (including those outside the department) in the student's approved PhD plan of study. | | |
| **Primary Methodology** | | **6** |
| This requirement is satisfied by taking methodology courses in communication and/or cognate disciplines; methodological expertise also can be developed through independent studies and participation in research projects. | | |

# Learning Outcomes

By the completion of the program, students will be able to:

- Produce academic writing that synthesizes arguments from academic research and theory in the field of communication.
- Design and conduct high-quality original research in communication.
- Effectively present and communicate about research to academic and public audiences in both written and oral form.

# Critical Media Practices

Critical media practices (CMDP) addresses the changing landscape of electronic media making by developing both analytical and production skills across a wide range of platforms, practices and technologies while simultaneously placing them within the broader perspective of culture and history. The department explores cross-platform media production, computational media and creative ethnography, as well as other time-based media arts practices such as locative media and performance art. Our convergent approach to media spans a variety of media tools including digital photography, audio/video editing and single camera video production, open source programming and digital single lens reflex cameras, as well as emergent tools under development. With an emphasis on the interaction between critical theory and media production practices, students are encouraged to not only thoughtfully

engage with the diversity of media cultures but to also become active entrepreneurial media producers, directors, writers, editors and scholars at the forefront of emerging cultural industries. CMDP prepares students to make productive use of the tools to engage creatively with the future trajectories of media, wherever they may lead.

CMDP students will be exposed to a variety of approaches concerning the study of media, information and communication through core CMDI classes. The undergraduate program is designed to provide basic hands-on grounding in production theory, aesthetics, techniques and approaches emphasizing innovative approaches to media making. As such, the department provides a rich and varied resource for cross-pollination and collaboration. At the graduate level, the program features a terminal MFA. The department also supports a practice-based PhD in emergent technologies and art practices. This innovative merger of theory and praxis, spanning undergraduate through graduate education, places CU on the cutting edge of institutions exploring innovative models for educating twenty-first-century students as well as publishing and disseminating scholarship.

**Course code for this program is CMDP.**

# Master's Degree

- Interdisciplinary Documentary Media Practices - Master of Fine Arts (MFA) (p. 1523)

# Doctoral Degree

- Emergent Technologies and Media Art Practices - Doctor of Philosophy (PhD) (p. 1524)

# Certificate

- Emergent Technologies and Media Art Practices - Graduate Certificate (p. 1525)
- Interdisciplinary Documentary Media Practices - Graduate Certificate (p. 1525)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ambrose, Kirk T. (https://experts.colorado.edu/display/fisid_115914/)
Professor; PhD, University of Michigan Ann Arbor

Auguiste, Reece Luke (https://experts.colorado.edu/display/fisid_149596/)
Chair, Associate Professor, Faculty Director; PhD, University of Nottingham (England)

Biggs, Betsey (https://experts.colorado.edu/display/fisid_158344/)
Assistant Professor; PhD, Princeton University

Boord, Daniel Olin (https://experts.colorado.edu/display/fisid_134649/)
Professor Emeritus; MFA, University of California, San Diego

Clark, Patrick Ryan (https://experts.colorado.edu/display/fisid_156499/)
Assistant Professor, Associate Chair; MFA, San Diego State University

Coombs Esmail, Eric (https://experts.colorado.edu/display/fisid_158305/)
Assistant Professor, Faculty Director; MFA, State University of New York at Buffalo

Eggert, Katherine (https://experts.colorado.edu/display/fisid_103618/)
Professor; PhD, University of California, Berkeley

Ellsworth, Michelle (https://experts.colorado.edu/display/fisid_112060/)
Distinguished Professor; MFA, University of Colorado Boulder

Espelie, Erin Marie (https://experts.colorado.edu/display/fisid_148671/)
Associate Professor; MFA, Duke University

Hammons, Christian Stanford (https://experts.colorado.edu/display/fisid_152915/)
Teaching Associate Professor, Associate Chair, Associate Faculty Director; PhD, University of Southern California

Knight, Tara (https://experts.colorado.edu/display/fisid_158318/)
Associate Professor; MFA, University of California, San Diego

Laurenzo, Tomas (https://experts.colorado.edu/display/fisid_168230/)
Associate Professor; PhD, Universidad De La Republica (Uruguay)

Limerick, Patricia N. (https://experts.colorado.edu/display/fisid_105459/)
Professor; PhD, Yale University

Oakes, Tim (https://experts.colorado.edu/display/fisid_109269/)
Professor; PhD, University of Washington

Rivers, Ed (https://experts.colorado.edu/display/fisid_101652/)
Professor; PhD, University of Oregon

Rueb, Teri Susan (https://experts.colorado.edu/display/fisid_163944/)
Professor, Chair; PhD, Harvard University

Sanford, Jason Sidney (https://experts.colorado.edu/display/fisid_165067/)
Instructor

Saxton, Richard W. (https://experts.colorado.edu/display/fisid_144756/)
Associate Professor; MFA, Indiana University Bloomington

Sylvester, Roshanna (https://experts.colorado.edu/display/fisid_164037/)
Associate Professor; PhD, Yale University

Young, Andrew P. (https://experts.colorado.edu/display/fisid_153434/)
Assistant Professor; PhD, University of California, Los Angeles

# Courses

**CMDP 5100 (3) Research and Methodologies Seminar**
Explores documentary media preproduction tactics and strategies, including basic research approaches, planning, pre-visualization, stylistic approaches, scheduling, working with archive and documentary materials, and documentary ethics.
**Requisites:** Restricted to graduate students only.

**CMDP 5370 (3) Choreography, Cinematograph: Writing in Motion**
Examine media and moving image aesthetics, tactic and strategies by creating work involving movement and expanded notions of choreography. Within this course students compose images and sounds, structuring them temporally as they explore narrative and non-narrative forms.
**Requisites:** Restricted to graduate students only.

**CMDP 5450 (3) Contemporary Documentary Media**
Explores cross platform documentary media practices and contemporary debates in documentary through a study of documentary history, genre, ethics and changing forms. It develops skills in critically analyzing documentary media.
**Requisites:** Restricted to graduate students only.

**CMDP 5500 (3) Documentary Production Workshops**
Workshopping and developing technical skills in documentary media production.
**Requisites:** Restricted to graduate students only.

**CMDP 5600 (3) Documentary Lab Seminar**
Explores and workshops documentary media projects and ideas from a variety of disciplines. A team-taught course, with affiliated faculty working in design groups within the documentary lab in one or more areas, such as Art and Art History, Anthropology or Geography. A total of 12 hours is required for IDMP MFA candidates.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CMDP 5650 (3) Documentary Field Work**
Explores distinctive and varied approaches to documentary field work and the uses of media for creative ethnography and other nonfiction practices. A team-taught course, with affiliated faculty from one or more areas such as Art and Art History, Anthropology and Geography.
**Requisites:** Requires a prerequisite course of CMDP 5100 (minimum grade C-). Restricted to graduate students only.

**CMDP 5900 (3) Documentary Production Topics**
Incorporates reflective study and practice in a course that consists of rotating topics in contemporary documentary practices, such as media essays, observation and participation, personal histories and voices, emergent technologies and documentary media, and interpretive ethnography.
**Repeatable:** Repeatable for up to 12.00 total credit hours.

**CMDP 5910 (3) Individual Project Study**
Requires students to conduct self-directed research and production in a seminar setting. Topics relate to individual projects
**Repeatable:** Repeatable for up to 15.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CMDP 6500 (5) Producing Practicum**
Explores advanced producing principles through the preproduction of the MFA thesis project, including the development of a professional project proposal.
**Requisites:** Requires a prerequisite course of CMDP 5650 (minimum grade C-).
**Grading Basis:** Letter Grade

**CMDP 6600 (5) Documentary MFA Thesis Seminar I**
Explores production of MFA thesis product. Focus is on production strategies, ethical challenges and other practical production issues.
**Requisites:** Requires a prerequisite course of CMDP 6500 (minimum grade C-).
**Grading Basis:** Letter Grade

**CMDP 6650 (5) Documentary MFA Thesis Seminar II**
Explores editing and post-production of the MFA thesis project. Emphasizes aesthetic choices (structure, narration and music), distribution, contracts and audience.
**Requisites:** Requires a prerequisite course of CMDP 6600 (minimum grade C-).
**Grading Basis:** Letter Grade

**CMDP 6841 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CMDP 6871 (3) Special Topics**
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**CMDP 7100 (3) Historical Overview of Media Arts and Technology**
Explores a survey of historical trends in art and technology from the Renaissance to the contemporary global scene. Students investigate how artistic disciplines inform one another and how parallel developments in technology have played a significant role in the history of the arts. This course locates media arts within this broader historical context.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CMDP 7150 (3) Theoretical Overview of Media Arts and Technology**
Surveys major theories of art, culture and technology formulated by both practitioners and theoreticians and examines conversations among technology studies, media theory and artistic practice. Students will investigate a variety of approaches, locating media arts within a broad range of theoretical perspectives.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CMDP 7200 (3) Research and Methodologies I**
Introduces students to modalities of research and methodological practices in the context of media arts and technology. Strategies from a variety of academic disciplines will be critically engaged to provide a foundation for future work.
**Grading Basis:** Letter Grade

**CMDP 7300 (3) Theories of the Avant-Garde**
Explores various manifestations of avant-garde and experimental literature, art and media performance in the 20th century such as Cubism, Futurism, Dada, Surrealism, Theatre of the Absurd, the Situationists, Fluxus, Oulipo and others. Media forms analyzed will include manifestos, sound poetry, theatre, the novel, happenings, cinema, installation and other forms of historical avant-garde art practices.
**Grading Basis:** Letter Grade

**CMDP 7400 (3) Contemporary Practices**
Provides students with access to contemporary practices and discourses in media art and culture. The class engages professional practitioners through performances, field work and workshop encounters that may be open to the public. Students research, coordinate and present on biweekly guest presentations, with alternating weeks for reflection and discussion. Readings complement guest presentations.
**Grading Basis:** Letter Grade

**CMDP 7450 (3) Comprehensive Exam Seminar**
Designed in a seminar format, this course reviews literature and concepts in all prior coursework and guides studies in their preparation for comprehensive exams. All ETMAP students must demonstrate their understanding of the fundamental concepts explored and developed in prior coursework in relation to individual areas of research.
**Requisites:** Requires prerequisites of CMDP 7100, CMDP 7200, CMDP 7300, and 6 credit hours of CMDP 7500 (all with a minimum grade of C-).
**Grading Basis:** Letter Grade

**CMDP 7500 (3) Production Methods I**
Provides technical resources for students to work with emergent technologies in a media arts context. This is a team-taught, practice-based course addressing various production methods, from moving image and video to web and network media to computational media.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CMDP 7560 (3) Emergent Technologies: Theory and Practice**
Explores how discreet modalities of media arts practices and their underpinning theoretical perspectives inform each other through the use of technology. Students investigate and develop theoretical perspectives on the exchange between art, technology and theory within their own research and the broader context of the contemporary social and cultural landscape.
**Grading Basis:** Letter Grade

**CMDP 7841 (1-9) Independent Study**
Independent Study
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**CMDP 7871 (3) Special Topics**
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**CMDP 8100 (3) Dissertation Development**
Designed in a seminar format, this course guides students through the development of a practice-based dissertation in which constant critical thinking is required. Through intensive workshopping and close reading, this class guides students from the dissertation proposal to the opening stages of tangible, original research.
**Grading Basis:** Letter Grade

**CMDP 8500 (3) Collaborative Studio Practice I**
Explores approaches to media arts collaboration across disciplines. Through technological and social systems, students investigate the role of the artist. In analyzing contemporary work in an ongoing cycle of discussion, reading and art practice, students will respond to projects, texts and media in form of creative practice.
**Requisites:** Requires a prerequisite course of CMDP 7450 (minimum grade C-).
**Grading Basis:** Letter Grade

**CMDP 8600 (1-6) Independent Studio Critique**
Work under faculty supervision with individual and group critiques focusing on the development of a practice-based dissertation. Designed to be taken in conjunction with CMDP 8100.
**Grading Basis:** Letter Grade

**CMDP 8991 (1-10) Doctoral Dissertation**
**Repeatable:** Repeatable for up to 40.00 total credit hours.
**Requisites:** Restricted to graduate students only.

# Interdisciplinary Documentary Media Practices - Master of Fine Arts (MFA)

The MFA in Interdisciplinary Documentary Media Practices, a terminal degree, is a three-year program in which students learn and experiment with a variety of documentary media practices as they work toward the completion of a thesis project. The core of the program is the Documentary Lab, in which students from a wide range of disciplines develop and workshop projects at various stages of completion. The program also takes advantage of masterclasses and other opportunities offered by the Center for Documentary and Ethnographic Media.

# Requirements

## Admission Requirements

*DCMP is not currently accepting applications for the MFA program. View* the department website *(*https://www.colorado.edu/cmci/dcmp/mfa/*) for updates.*

### Application Deadlines

The deadline for U.S. and international students is December 1.

### Application Guidelines and Resources

MFA applicants must:

- Hold at least a baccalaureate degree or its equivalent from an accredited college or university and provide transcripts from every institution attended.
- Have an undergraduate grade point average of at least 2.75.
- If international, provide TOEFL or IELTS scores.
- Provide three letters of recommendation.
- Provide a statement of purpose.
- Provide a portfolio of relevant media work, such as video, photographs, sound pieces, websites, and other media art projects. Format preference is Vimeo. Please include a link to your online portfolio in your personal statement.

In the online application, select IDMP-MFA as the academic plan.

### Transcripts

For review and decision purposes, applicants are required to upload an unofficial copy of their transcript(s) in the online application. The program requires a copy of the scanned transcript from each undergraduate and graduate institution that you attended. This includes community colleges, summer sessions, and extension programs. While credits from one institution may appear on the transcript of another institution, unofficial transcripts must be submitted from each institution, regardless of the length of attendance and whether or not courses were completed. *Failure to list and submit transcripts from all institutions previously attended is considered to be a violation of academic ethics and may result in the cancellation of a student's admission or dismissal from the university.*

Candidates will only need to provide official transcripts *only* after they are recommended for admission.

For more information about this program, visit the department website (https://www.colorado.edu/cmci/dcmp/mfa/) or contact the Associate Chair of Graduate Studies or CMDI Graduate Advising.

## Program Requirements

The IDMP MFA is a three-year degree program requiring the successful completion of 60 credit hours of coursework, a first year review, second year review and thesis defense. The thesis consists of an original, media-based project and a written reflection that situates the project within the field of documentary media practices.

# Learning Outcomes

By the completion of the program, students will be able to:

# Emergent Technologies and Media Art Practices - Doctor of Philosophy (PhD)

The emergent technologies and media arts practices (ETMAP) PhD is a practice-led program of scholarly research and exploration of media practices, theories and innovations in art and technology. Students both experiment with and research the media and artistic practices that they study. The ultimate goal is a substantive dissertation and media-based project that situate media art making within broad cultural and art historical perspectives.

Designed to be completed in four years, the program requires 72 credit hours, a first year review, comprehensive exam, prospectus defense and dissertation defense. There is a high degree of flexibility in the curriculum, with students choosing up to 15 credit hours of guided electives and independent study, including courses and independent study with faculty in other departments. After admission to candidacy, students conduct scholarly and creative research over three semesters (30 credit hours), culminating in a dissertation that makes a unique contribution to the field of media arts and technology.

The program takes seriously the balance of theory and practice. The dissertation consists of two equally important components: a written dissertation and a media-based project. Students are expected to be both scholars and creative artists.

# Requirements

## Admission Requirements

An overview of admission requirements may be found below. For additional information, view the program page on the department website (https://www.colorado.edu/cmci/dcmp/phd/).

### Application Deadlines

The application deadline for U.S. and international applicants is December 1.

### Application Guidelines and Resources

PhD applicants must:

- Hold at least a baccalaureate degree or its equivalent from an accredited college or university and provide transcripts from every institution attended.
- Have an undergraduate grade point average of at least 2.75.
- If international, provide TOEFL or IELTS scores.
- Provide three letters of recommendation.
- Provide a statement of purpose.
- Provide a portfolio of relevant media work, such as video, photographs, sound pieces, websites, and other media art projects. Format preference is Vimeo. Please include a link to your online portfolio in your personal statement.
- Provide a writing sample of at least 2500 words.

In the online application, select ETMAP-PHD as the academic plan.

### Transcripts

For review and decision purposes, applicants are required to upload an unofficial copy of their transcript(s) in the online application. The program requires a copy of the scanned transcript from each undergraduate and graduate institution that you attended. This includes community colleges, summer sessions, and extension programs. While credits from one institution may appear on the transcript of another institution, unofficial transcripts must be submitted from each institution, regardless of the length of attendance and whether or not courses were completed. *Failure to list and submit transcripts from all institutions previously attended is considered to be a violation of academic ethics and may result in the cancellation of a student's admission or dismissal from the university.*

Candidates will only need to provide official transcripts *only* after they are recommended for admission.

## Program Requirements

The ETMAP PhD is a four-year degree program requiring the successful completion of 72 credit hours of coursework, a first year review, comprehensive exam, prospectus defense and dissertation defense.

In the comprehensive exam, students must demonstrate their proficiency and understanding of the fundamental historical and theoretical concepts explored and developed in prior coursework. Students advance to candidacy after the prospectus defense.

The dissertation must include practical as well as written theoretical components. Students are expected to publicly present their media-based project before the dissertation defense.

### Required Courses

| Code | Title | Credit Hours |
|---|---|---|
| **ETMAP Fundamentals** | | |
| CMDP 7100 | Historical Overview of Media Arts and Technology | 3 |
| CMDP 7200 | Research and Methodologies I | 3 |
| CMDP 7300 | Theories of the Avant-Garde | 3 |
| CMDP 7450 | Comprehensive Exam Seminar | 3 |
| CMDP 7500 | Production Methods I (x4) | 12 |
| **Dissertation Development** | | |
| CMDP 8100 | Dissertation Development | 3 |
| **Guided Electives and/or Independent Study** | | **15** |
| Guided Elective, within or outside DCMP (repeatable) | | |
| Independent Study, within or outside DCMP (repeatable) | | |
| **Dissertation** | | **30** |
| CMDP 8991 | Doctoral Dissertation | |
| **Total Credit Hours** | | **72** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate proficiency in core methods and techniques for both scholarly research and creative practice.
- Demonstrate expertise in the scholarly literature and media art in their subfield(s) in written, oral and multi-modal presentations.
- Successfully conceive and produce conduct original creative work(s) of media art, generally combining two or more artistic approaches.
- Successfully conceive and conduct original scholarly research informed by media art practices, generally combining two or more methodological approaches.
- Effectively communicate original research and creative work to relevant audiences in written, oral and multi-modal presentations.

# Emergent Technologies and Media Arts Practices - Graduate Certificate

The graduate certificate in emergent technologies and media arts practices (ETMAP) is a 9-credit-hour certificate program that is open to any student pursuing a graduate degree in any department at CU Boulder. In the program, students integrate media practices, theories and innovations in art and technology into their research. Students both experiment with and research the media and artistic practices that they study. The program will be of particular interest to students whose media research is practice-led and students who wish to integrate media arts practices into their research.

## Requirements

### Application Guidelines

To be accepted into the program, students must be a graduate student in good standing with the Graduate School, submit a statement of interest to the Associate Chair of Graduate Studies and meet with the Associate Chair to discuss to their goals as a student in the program. Acceptance into the program is at the discretion of the Associate Chair.

For more information about this program, view the department website (https://www.colorado.edu/cmci/dcmp/cert-etmap/) or contact the Associate Chair of Graduate Studies or CMDI Graduate Advising.

### Required Courses and Credits

The ETMAP certificate requires the successful completion of 9 credit hours in critical studies and media arts practices, as described below.

The certificate program can usually be completed in one to two years. After the course requirements are met, students must provide a transcript to the Associate Chair of Graduate Studies. The certificate will appear on the student's record at that time or upon graduation.

| Code | Title | Credit Hours |
|---|---|---|
| **Critical Studies** | | **3** |
| Choose one: | | |
| CMDP 7100 | Historical Overview of Media Arts and Technology | |
| CMDP 7300 | Theories of the Avant-Garde | |
| CMDP 7871 | Special Topics | |
| **Media Arts Practices** | | **6** |
| Choose two: | | |
| CMDP 7200 | Research and Methodologies I | |
| CMDP 7500 | Production Methods I (repeatable) | |
| CMDP 7871 | Special Topics | |
| **Total Credit Hours** | | **9** |

### Resources

Students have access to DCMP equipment, facilities and other resources as long as they are enrolled in a course that fulfills certificate requirements.

# Interdisciplinary Documentary Media Practices - Graduate Certificate

The graduate certificate in interdisciplinary documentary media practices (IDMP) is a 12-credit-hour certificate program that is open to any student pursuing a graduate degree in any department at CU Boulder. In the program, students integrate documentary media practices into their research. The core of the program is the documentary lab, in which students from a wide range of disciplines develop and workshop projects at various stages of completion. The program also takes advantage of masterclasses and other opportunities offered by the Center for Documentary and Ethnographic Media.

## Requirements

### Application Guidelines

To be accepted into the program, students must be a graduate student in good standing with the Graduate School, submit a statement of interest to the Associate Chair of Graduate Studies, and meet with the Associate Chair to discuss to their goals as a student in the program. Acceptance into the program is at the discretion of the Associate Chair.

For more information about this program, view the department website (https://www.colorado.edu/cmci/dcmp/cert-idmp/) or contact the Associate Chair of Graduate Studies or CMDI Graduate Advising.

### Required Courses and Credits

The IDMP certificate requires the successful completion of 9 credit hours of any seminar courses, production workshops and topics course listed below.

The certificate program can usually be completed in one to two years. After the course requirements are met, students must provide a transcript to the Associate Chair of Graduate Studies. The certificate will appear on the student's record at that time or upon graduation.

| Code | Title | Credit Hours |
|---|---|---|
| CMDP 5100 | Research and Methodologies Seminar | 3 |
| CMDP 5450 | Contemporary Documentary Media | 3 |
| CMDP 5500 | Documentary Production Workshops | 3 |
| CMDP 5600 | Documentary Lab Seminar | 3 |
| CMDP 5650 | Documentary Field Work | 3 |
| CMDP 5900 | Documentary Production Topics | 3 |
| CMDP 6500 | Producing Practicum | 5 |
| CMDP 6841 | Independent Study | 1-3 |
| CMDP 6871 | Special Topics | 3 |

### Resources

Students have access to DCMP equipment, facilities and other resources as long as they are enrolled in a course that fulfills certificate requirements.

# Information Science

Information science considers the relationships between people, places and technology and the information those interactions yield. The internet is a broad example of a socio-technical system that is comprised of hardware and software, but in daily life is better understood as a constantly changing social infrastructure upon which complex forms

of human-human and human-information interaction rest. Scholars and students of information science develop new methods to study these socio-technical phenomena, and translate those findings to the design and development of useful and meaningful technology.

The department will equip students with the conceptual machinery to succeed in a future characterized by new ways of working with information and communication technology.

The knowledge and skills of our graduates will enable them to participate in and shape new structures of enterprise. Customized, creative production—as in the "maker culture" movement—is expanding notions of the enterprise, as are distributed and mobile workforces.

The MS and PhD degrees align with standards set by other universities. Both include liberal arts education combined with empirical work and computing knowledge, and both incorporate the grant-driven, collaborative "lab model" research that characterizes the natural and engineering sciences.

**Course code for this program is INFO.**

# Master's Degree

- Information Science - Master of Science (MS) (p. 1530)

# Doctoral Degree

- Information Science - Doctor of Philosophy (PhD) (p. 1531)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Barker, Lecia Jane (https://experts.colorado.edu/display/fisid_101367/)
Associate Professor; PhD, University of Colorado Boulder

Brubaker, Jed Richards (https://experts.colorado.edu/display/fisid_156193/)
Assistant Professor; PhD, University of California, Irvine

Burke, Robin D. (https://experts.colorado.edu/display/fisid_165005/)
Chair, Professor; PhD, Northwestern University

Carruth, Christopher (https://experts.colorado.edu/display/fisid_153706/)
Instructor; MS, University of Colorado Boulder

Devendorf, Laura (https://experts.colorado.edu/display/fisid_158564/)
Assistant Professor; PhD, University of California, Berkeley

Fiesler, Casey Lynn (https://experts.colorado.edu/display/fisid_155950/)
Assistant Professor, Associate Chair; PhD, Georgia Institute of Technology

Iyasele, Abel
Teaching Assistant Professor; MBA, University of Dundee (UK)

Keegan, Brian (https://experts.colorado.edu/display/fisid_158122/)
Assistant Professor; PhD, Northwestern University

Palen, Leysia A. (https://experts.colorado.edu/display/fisid_114604/)
Professor; PhD, University of California, Irvine

Roque, Ricarose (https://experts.colorado.edu/display/fisid_158315/)
Assistant Professor; PhD, Massachusetts Institute of Technology

Voida, Amy Kathryn Mitchell (https://experts.colorado.edu/display/fisid_155855/)
Associate Professor; PhD, Georgia Institute of Technology

Voida, Stephen A. (https://experts.colorado.edu/display/fisid_155856/)
Assistant Professor; PhD, Georgia Institute of Technology

# Courses

**INFO 5301 (3) Computation for Research in Information Science**
Introduces principles of computational thinking through the manipulation, transformation and creation of data artifacts used in research. Students will be exposed to a high-level overview of algorithms, functions, data structures, recursion and object-oriented computer programming through a series of assignments that emphasize the use of computation as a means of scholarship.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5501 (3) Open Collaboration**
Analyzes the mechanisms of peer production and crowdsourcing systems like Wikipedia and OpenStreetMap. Students will investigate how these crowdsourced platforms work socially and technically, develop skills using tools for their analysis and critically evaluate platform and community limitations.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3501
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5502 (3) Online Communities**
Explores practical and theoretical topics in online communities through inquiry into one or more particular online communities. Student projects will explore online communities as social and technical systems, including their alignment with conceptualizations of community, expressed and apparent interests, nature of membership and participation, history, participants' motivations for involvement, and explicit, implicit, and infrastructural features that enable and constrain behaviors.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3502
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5503 (3) Everyday Information Behavior**
Familiarizes students with practical and theoretical topics in the discipline of information behavior and its application to everyday events, activities and environments. Explores the information dimension of various everyday activities such as buying a car, playing a game or looking up health information online. Students learn to analyze the informational dimensions that occur in their everyday lives.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3503
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5504 (3) Digital Identity**
Explores and analyzes identity in a digital era. Through applied research, students investigate both social and technical aspects of how identity is captured, represented and experienced through technology using theoretical, empirical and design-based inquiry. Methods and platforms studied vary by semester.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3504
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5505 (3) Designing for Creative Learning**
Analyzes learning technologies, discusses learning theories and develops prototypes to investigate strategies for engaging people in creative and inclusive learning experiences. Students explore design, learning and technology by examining sociotechnical systems like construction kits, online communities and makerspaces with a critical lens on equity and inclusion. Studio format enables students to apply constructionist ideas into the design of technology-enabled environments.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3505
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5506 (3) Online Fandom**
Explores and analyzes fan communities in a digital context. Through applied research, students will investigate online spaces devoted to participatory and remix culture, media fandom, and fan creation. This class will draw concepts and methods from fan studies, social computing, ethnography, data science, and sociology to drive project-based inquiry.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3506
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5507 (3) Data and the Humanities**
Introduces students to foundational computing and statistical concepts for analyzing humanities data. This course discusses the influence of digitization and data on humanist inquiry and exposes students to techniques for working with data in different areas of the humanities, including literature, history, and art. The course emphasizes technical practices involved in humanist data analysis. Comfort with programming is strongly encouraged.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3507
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5509 (3) Personal Health Informatics**
Surveys the theoretical and practical foundations for the design of patient-centered health and wellness technologies. Students will conduct an in-depth exploration of the multidisciplinary research literature informing the design of these systems, participate in discussions about the practical information management and interaction design challenges that must be addressed in their implementation, and demonstrate their learning through a variety of research study- and system-design activities. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3509
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5601 (3) Information Ethics and Policy**
Explores ethical and legal complexities of information and communication technology. By combining real-world inquiry with creative speculation, students will probe everyday ethical dilemmas they face as digital consumers, creators and coders, as well as relevant policy. Explores themes such as privacy, intellectual property, social justice, free speech, artificial intelligence, social media and ethical lessons from science fiction.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4601
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5602 (3) Information Visualization**
Explores the design, development and evaluation of information visualizations. Covers visual representations of data and provides hands-on experience with using and building exploratory tools and data narratives. Students create visualizations for a variety of domains and applications, working with stakeholders and their data. Covers interactive systems, user-centered and graphic design, perception, data storytelling and analysis, and insight generation. Programming knowledge is strongly encouraged.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4602
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5603 (3) Survey Research Design**
Familiarizes students with practical and theoretical topics in using survey methods for conducting information science research. Through discussion and real world assignments, students will learn when and why to use surveys for collecting data; effective, efficient and ethical approaches to maximizing response; sampling issues; development of valid items and scales; and how to implement, analyze and report on survey data collection.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4603
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5604 (3) Applied Machine Learning**
Introduces algorithms and tools for building intelligent computational systems. Methods will be surveyed for classification, regression and clustering in the context of applications such as document filtering and image recognition. Students will learn the theoretical underpinnings of common algorithms (drawing from mathematical disciplines including statistics and optimization) as well as the skills to apply machine learning in practice.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4604
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5605 (3) Ethnographic Research in Applied Settings**
Demonstrates the power of ethnography as an investigative approach that is useful in design, evaluation and question formation for information scientists across all workforce sectors. Teaches students how to be keen observers of the unusual as well as the everyday to reveal meaningful insights that elaborate information science projects.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4605
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5606 (3) Critical Technical Practice**
Surveys design theory and methods that can be used to question relationships between technology, culture, and the environment. Students will discuss readings and synthesize those readings through design exercises. The course will equip students with resources for thinking more critically and creatively about design and possible future human-technology relationships.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5606, ATLS 4606 and INFO 4606
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5607 (3) Software Engineering for Data-Centered Systems**
Explores design and engineering of systems for data storage and analysis. Introduces fundamental development concepts used in real-world data systems. By combining software engineering with knowledge from data science and human-centered computing, prepares students to develop systems, interpret and modify codebases, understand modern concepts for managing data at scale, and work in teams to create cutting-edge applications for consumer use.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4607
**Requisites:** Requires prerequisites of INFO 2201 or CSCI 2270 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior)
**Grading Basis:** Letter Grade

**INFO 5608 (3) Community-Based Design**
Surveys techniques in cooperative design with community members as collaborators rather than subjects. Students will explore approaches such as participatory design and co-design. Students will work in teams in partnership with community stakeholders to create tools, experiences, or systems that meet the needs of communities, contribute to social change, and/or lead to advancing academic knowledge.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4608
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5609 (3) User-Centered Design**
Surveys the theoretical and practical foundations of human-computer interaction and user-centered design. Students learn theories of interaction (including cognitive, organizational, collaborative, and task-based approaches), user interface design techniques, design guidelines, and usability testing in the context of developing technology. Course content is explored through a variety of interfaces (desktop, mobile, touch, vision, audio, etc.) and contexts (personal, organizational, cross-cultural, etc.).
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4609
**Requisites:** Restricted to graduate students only.

**INFO 5611 (3) Ubiquitous Computing Experience Design**
Introduces the field of ubiquitous computing, including sensors, ambient displays, tangibles, mobility, location awareness and context awareness. These topics are explored from a user-centered design perspectives, focusing on how a situated models of computing affect requirements gathering, interaction design, prototyping and evaluation. Students gain mastery with contemporary "UbiComp" technologies and learn to incorporate them into a user-centered design process.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4611
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5612 (3) Recommender Systems**
Explores the space of personalized information access applications known as recommender systems. This class will introduce students to a range of approaches for building recommender systems including collaborative, content-based, knowledge-based, and hybrid methods. Students will also explore a variety of applications for recommendation including consumer products, music, social media, and online advertising. The course will also examine controversies surrounding recommendation, including Pariser's "filter bubble", and questions of algorithmic bias. Proficiency in Python programming required.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5613 (3) Network Science**
Introduces theories and methods for analyzing relational data in social, information, and other complex networks. Students will understand the processes and theories explaining network structure and dynamics as well as develop skills analyzing and visualizing real-world network data. No math or statistics training required, but course will assume familiarity with Python.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4613
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5620 (3) Race and Technology**
This course is designed with the understanding that race and racial inequality have been central to how societies and societal systems of power have been shaped and reshaped over time. Students will critically examine how race is created by and through sociotechnical systems. Students will explore how the design, implementation, and use of digital platforms and their data continue to perpetuate and embody white, cisgender, heteronormative systems of power. This course will cover a wide range of foundational and emergent scholarship¿giving voice to Scholars of Color¿providing students with a foundation through which they can continue to critique and explore sociotechnical and other societal arrangements more broadly.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4620
**Requisites:** Restricted to graduate students only.

**INFO 5651 (3) Fundamental Concepts in Data Science**
This intensive course provides a general understanding of the mathematical concepts required for success in data science. This course will cover a wide range of mathematical tools in data science including an overview of calculus and linear algebra along with selected topics from numerical analysis. The course will also explore computational implementations of these ideas. This course provides a bridge for students without these advanced math concepts to learn to apply them within a data science career or within a graduate program in data science.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4651

**INFO 5652 (3) Statistical Programming in R**
This intensive course covers foundational data science tools and techniques in the R programming language, including acquiring, cleaning, exploring, and analyzing data, programming, and conducting reproducible research. The course will emphasize the use of data management best practices such as the tidyverse toolkit in R.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4652

**INFO 5653 (3) Text Mining**
Introduces students to techniques for extracting information from text data, including text gathering and cleaning, and text processing methods, such as dimensionality reduction, normalization, and text visualization. It will introduce applications and methodologies of machine learning for text, such as sentiment analysis, association rule mining, and topic modeling.

**INFO 5747 (4) Defamiliarizing Data: The Ethnography and Design of Making Data Strange**
Introduces students to the design and use of data in an unfamiliar, international context. Develops students¿ ethnographic and design skills for defamiliarizing data¿seeing, characterizing, and designing for data in ways that render it as unfamiliar and strange in order to gain new perspectives and insights about those data and the contexts in which they are produced and consumed.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4747

**INFO 5841 (1-3) Independent Study**
Independent Study
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**INFO 5871 (1-4) Special Topics**
Topics will vary by semester.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**INFO 5919 (3) HCC Survey and Synthesis: Foundations and Trajectories**
Examines the interdisciplinary field of human-centered computing through a comprehensive content and historical survey. Considers new trajectories of inquiry and how the field merges with others. Social computing, is emphasized as a central topic. Students across disciplines will find the course foundational for understanding human-centered technology matters, including computer scientists, information scientists, social scientists, and business and media arts students.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5919
**Requisites:** Restricted to graduate students only.

**INFO 5931 (1-3) Internship**
Internship
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**INFO 6101 (3) Theories and Concepts in Information Science**
Surveys foundational theories and concepts in information science. Students will learn to read and reflect critically about seminal texts, tracing their intellectual genealogies from a variety of originating disciplines to their appropriation by information science. Students will apply these theories to contemporary issues and problems.
**Requisites:** Restricted to PhD students only.
**Grading Basis:** Letter Grade

**INFO 6201 (3) Interdisciplinary Ways of Knowing**
Introduces principles of research design and surveys the breadth of research methods appropriated by the field of information science. Students will explore the diversity of epistemological orientations that make up the field, that influence the types of often mixed research methods applied and that shape the kinds of questions that are and are not explored.
**Requisites:** Restricted to PhD students only.
**Grading Basis:** Letter Grade

**INFO 6301 (3) Computation for Research in Information Science**
Examines the diversity of roles that computation can play in information science research, ranging from an overview of some data-driven practices to prototyping and infrastructure development to computation-as-research-support. Provides students with a level of computational literacy to engage with the multiplicity of roles that computation serves in the different kinds of research work that is happening across the domain, including exemplars of different kinds of technical contributions and approaches.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 6401 (3) Information and Ideas in Design Disciplines**
Introduces fundamental principles and practices from user-centered design disciplines and examines how those principles and practices intersect with contemporary issues in information science. Theory, research and exemplary practices from interaction, graphic, product, communication and experience design are introduced through readings, problems and case histories. Projects provide direct experience with common design tools and exposure to leading practitioners.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 6500 (1) Information Science Seminar**
Enculturates graduate students in the discipline of Information Science through weekly seminar series that hosts guest speakers, internal faculty and graduate speakers and other community building and professional development activities.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 6871 (3) Special Topics**
Topics will vary by semester.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**INFO 6940 (1-6) Supervised Master's Research Project**
Students enrolling in this course will conduct supervised research in Information Science under the supervision of one or more faculty advisors, to include preparation of academic literature reviews, laboratory or field experiments, surveys or interviews with technology stakeholders, interface or system design and development, system evaluation, or other examples of rigorous scholarship in the discipline of Information Science. Some research projects may be carried out in collaboration with other graduate students and faculty members. Although contribution to publishable scholarship (e.g., posters, demonstrations, conference papers, or journal articles) is one possible outcome of this educational experience, the student and his/her advisor(s) may agree to determine alternate mechanisms for assessing mastery of the academic research process, depending on the scope of work carried out as part of this experience, the publishability of the research, and the specific needs and career goals of the student.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**INFO 6950 (1-6) Master's Thesis**
Designing, researching and writing a master's thesis under the supervision of the student's advisors.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**INFO 7000 (3) Introduction to Doctoral Studies in Information Science**
Introduces students to practices associated with successful advancement in a doctoral program, rigorous scholarship in information science and more expert and early participation in their scholarly community of practice.
**Requisites:** Restricted to Information Science (INFO) Ph.D. graduate students only.
**Grading Basis:** Letter Grade

**INFO 7841 (1-3) Independent Study**
Independent Study
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to PhD students only.

**INFO 7871 (3) Special Topics**
Topics will vary by semester.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to PhD students only.

**INFO 8991 (1-10) Doctoral Dissertation**
**Repeatable:** Repeatable for up to 40.00 total credit hours.
**Requisites:** Restricted to PhD students only.

# Information Science - Master of Science (MS)

The Master of Science degree in Information Science is are intended for BS students who desire additional study and experience conducting supervised research to make their résumés even more attractive to industry upon graduation, as well as students considering a PhD in Information Science but lacking either master's-level coursework in the field or demonstrated research experience at the graduate level.

There are two options under this degree:

- Thesis plan: 6 thesis hour credits, typically taken over two semesters (3 credit hours each). A thesis defense with 3 committee members and submission of the thesis to the Graduate School are required.
- Non-thesis plan: 6 credits taken as a graduate-level independent study over two semesters (3 credit hours each) with an INFO faculty member. Students will complete one or more in-depth research projects as part of this plan; however, a formal thesis document and oral presentation/defense are not required.

If an MS elects to continue as a PhD student Information Science—and is admitted, via an explicit and separate application to the program—then up to seven of the courses taken as part of this MS (a maximum of 21 credit hours) could be "rolled-up" to meet PhD curriculum requirements, pending approval of the student's PhD preliminary exam committee and the graduate director.

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s): Information Science - Bachelor of Science (BS) (p. 754)

# Requirements

## Application Guidelines

Applicants must hold at least a bachelor's degree or its equivalent. They must also provide the following documents:

- A CV or resume
- An unofficial transcript from each college or university attended
- Scores from the general GRE are optional; international students must also have a TOEFL score of at least 600 (IBT 100)
- Three letters of recommendation from people qualified to judge the student's potential for success in graduate school (Note: The most compelling recommendation letters will provide specific observations about the candidate's promise in analytical thinking, oral and written scientific communication, and research and teaching, as well as demonstration of teamwork and collegiality)
- A statement of purpose (two pages maximum) that describes a question, problem or topic in information science the student has a passion to address; explains how the student's previous academic training, professional experience and/or personal passions led them to this question, problem or topic and drew them to this degree program; and identifies the faculty members with whom the student is interested in working and why
- Optional: A writing sample in addition to the statement of purpose

We encourage applications from individuals representing the broad range of disciplines. We welcome students that bring diverse skills and perspectives on the range of issues related to understanding and shaping the future of information science. All students admitted to the program will be expected to develop a breadth of competencies that are essential to being a researcher in this diverse, interdisciplinary field. One's ability and willingness to expand skill sets should be demonstrated in the statement of purpose.

Students are required to upload an unofficial copy of their transcript(s) in the online application. We require one copy of the scanned transcript from each undergraduate and graduate institution attended. This includes community colleges, summer sessions and extension programs. While credits from one institution may appear on the transcript of a second institution, unofficial transcripts must be submitted from each institution, regardless of the length of attendance and whether courses were completed. Failure to list and submit transcripts from all institutions previously attended is considered a violation of academic ethics and may result in the cancellation of admission or dismissal from the university.

Only after a student is recommended for admission will they need to provide official transcripts.Assistance with graduate programs is available by phone (303-492-7977) or email (cmcigrad@colorado.edu).

## Required Courses and Credits

Refer to Plan of Study tab for sample plan of study by semester.

| Code | Title | Credit Hours |
|---|---|---|
| **Course Category A: Depth/Specialization** | | |
| *Methods Course* | | *3* |
| Choose one: | | |
| INFO 5507 | Data and the Humanities | |
| INFO 5602 | Information Visualization | |
| INFO 5603 | Survey Research Design | |
| INFO 5604 | Applied Machine Learning | |
| INFO 5605 | Ethnographic Research in Applied Settings | |
| INFO 5607 | Software Engineering for Data-Centered Systems | |
| INFO 5613 | Network Science | |
| INFO 5651 | Fundamental Concepts in Data Science | |
| INFO 5652 | Statistical Programming in R | |
| INFO 5653 | Text Mining | |
| INFO 6201 | Interdisciplinary Ways of Knowing | |

| | | |
|---|---|---|
| INFO 6301 | Computation for Research in Information Science | |
| *Theory or Design Theory Course* | | *3* |
| Choose one: | | |
| INFO 5505 | Designing for Creative Learning | |
| INFO 5602 | Information Visualization | |
| INFO 5606 | Critical Technical Practice | |
| INFO 5608 | Community-Based Design | |
| INFO 5609 | User-Centered Design | |
| INFO 5611 | Ubiquitous Computing Experience Design | |
| INFO 5747 | Defamiliarizing Data: The Ethnography and Design of Making Data Strange | |
| INFO 5919 | HCC Survey and Synthesis: Foundations and Trajectories | |
| INFO 6101 | Theories and Concepts in Information Science | |
| INFO 6401 | Information and Ideas in Design Disciplines | |
| *Electives* | | *6* |
| Choose two graduate-level INFO elective courses, exclusive of the methods or theory courses satisfying the above requirements | | |
| *Seminar* | | *3* |
| INFO 6500 | Information Science Seminar (three semesters, 1 credit-hour each) [1] | |
| **Course Category B: Breadth** | | |
| *Electives* | | *9* |
| Choose three approved electives (3 credit-hour courses) at the graduate level. These may be additional INFO graduate-level courses; they may also include approved courses from other campus units (i.e., “cognate” courses) | | |
| **Course Category C: Thesis/Independent Study** | | **6** |
| Thesis plan: 6 thesis hour credits (INFO 6950 Master's Thesis), typically taken over two semesters (3 credit hours each). A thesis defense with 3 committee members and submission of the thesis to the Graduate School are required | | |
| Non-thesis plan: 6 credits taken as a graduate-level independent study (INFO 5841 Independent Study or INFO 6940 Master's Project) over two semesters (3 credit hours each) with an INFO faculty member. Students will complete one or more in-depth research projects as part of this plan; however, a formal thesis document and oral presentation/defense are not required | | |
| **Total Credit Hours** | | **30** |

[1] Includes required attendance at the weekly INFO departmental seminar/colloquium.

# Plan of Study

| | |
|---|---|
| **Year One** | |
| **Fall Semester** | **Credit Hours** |
| INFO grad-level methods course | 3 |
| INFO grad-level elective course (5000-level) | 3 |
| Grad-level breadth course | 3 |
| INFO seminar | 1 |
| **Credit Hours** | **10** |
| **Spring Semester** | |
| INFO grad-level theory/design theory course | 3 |
| Grad-level breadth course | 3 |
| Thesis/project/independent study course | 3 |
| INFO seminar | 1 |
| **Credit Hours** | **10** |
| **Year Two** | |
| **Fall Semester** | |
| INFO grad-level elective course (5000-level) | 3 |
| Grad-level breadth course | 3 |
| Thesis/project/independent study course | 3 |
| INFO seminar | 1 |
| **Credit Hours** | **10** |
| **Total Credit Hours** | **30** |

# Learning Outcomes

By the completion of the program, students will be able to:

# Information Science - Doctor of Philosophy (PhD)

Information science considers the relationships between people, places and technology—as well as the information or data those interactions yield. It unites a number of interdisciplinary approaches for understanding and shaping a future characterized by pervasively available digital technology. Drawing on knowledge from social science, computer science, data science and the humanities, information scientists support the study and innovation of "socio-technical systems."

Information science takes as a core idea that data are a common denominator for both social and technical systems. By focusing on the transformation of data across systems of people, places, and technology in ways that then make data truly useful and meaningful, students will be in the best possible position to invent what society can do with technology, and what technology can do for society.

The PhD program offers an education that combines training in the liberal arts, empirical investigation and computing knowledge, and incorporates the collaborative "lab model" research that characterizes the natural and engineering sciences.

# Requirements

## Application Guidelines

PhD applicants must:

- Hold at least a bachelor's degree or its equivalent.
- Provide the following documents:
  - A CV or resume
  - An unofficial transcript from each college or university attended
  - Scores from the general GRE are optional; international students must also have a TOEFL score of at least 600 (IBT 100)
  - Three letters of recommendation from people qualified to judge the student's potential for success in graduate school (Note: The most compelling recommendation letters will provide specific observations about the candidate's promise in analytical thinking,

oral and written scientific communication, and research and teaching, as well as demonstration of teamwork and collegiality)
- A statement of purpose (two pages maximum) that describes a question, problem or topic in information science the student has a passion to address; explains how the student's previous academic training, professional experience and/or personal passions led them to this question, problem or topic and drew them to this degree program; and identifies the faculty members with whom the student is interested in working and why
- Optional: A writing sample in addition to the statement of purpose

We encourage applications from individuals representing the broad range of disciplines. We welcome students that bring diverse skills and perspectives on the range of issues related to understanding and shaping the future of information science. All students admitted to the program will be expected to develop a breadth of competencies that are essential to being a researcher in this diverse, interdisciplinary field. One's ability and willingness to expand skill sets should be demonstrated in the statement of purpose.

Students are required to upload an unofficial copy of their transcript(s) in the online application. We require one copy of the scanned transcript from each undergraduate and graduate institution attended. This includes community colleges, summer sessions and extension programs. While credits from one institution may appear on the transcript of a second institution, unofficial transcripts must be submitted from each institution, regardless of the length of attendance and whether courses were completed. Failure to list and submit transcripts from all institutions previously attended is considered a violation of academic ethics and may result in the cancellation of admission or dismissal from the university.

Only after a student is recommended for admission will they need to provide official transcripts. Assistance with graduate programs is available by phone (303-492-7977) or email (cmcigrad@colorado.edu).

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| INFO 7000 | Introduction to Doctoral Studies in Information Science | 3 |
| INFO 6101 | Theories and Concepts in Information Science | 3 |
| INFO 6201 | Interdisciplinary Ways of Knowing | 3 |
| INFO 6500 | Information Science Seminar (four 1-credit sessions, two of which are normally taken during the first year of enrollment) | 4 |
| Twenty-one credit hours of graduate-level elective coursework must be taken. Elective specialization courses can be within or outside of INFO, under the guidance of the student's advisor and committee. Students will also take an additional 30 dissertation hours, typically after finishing their initial coursework. | | 21 |
| **Total Credit Hours** | | **34** |

## PhD Milestones

In addition to coursework, program requirements include the successful completion of the following PhD milestones: preliminary exam, comprehensive exam/dissertation proposal and dissertation.

# Plan(s) of Study

## Sample Plan of Study

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| INFO 7000 | Introduction to Doctoral Studies in Information Science | 3 |
| INFO 6201 | Interdisciplinary Ways of Knowing | 3 |
| INFO 6500 | Information Science Seminar | 1 |
| | **Credit Hours** | **7** |
| **Spring Semester** | | |
| INFO 6201 | Interdisciplinary Ways of Knowing | 3 |
| INFO 6500 | Information Science Seminar | 1 |
| Graduate coursework supporting development of dissertation research topic | | 3 |
| | **Credit Hours** | **7** |
| **Year Two** | | |
| **Fall Semester** | | |
| Graduate coursework supporting development of dissertation research topic | | 6 |
| INFO 6500 | Information Science Seminar | 1 |
| | **Credit Hours** | **7** |
| **Spring Semester** | | |
| Graduate coursework supporting development of dissertation research topic | | 6 |
| INFO 6500 | Information Science Seminar | 1 |
| | **Credit Hours** | **7** |
| **Year Three** | | |
| **Fall Semester** | | |
| Graduate coursework supporting development of dissertation research topic | | 6 |
| Complete Preliminary Examination | | |
| | **Credit Hours** | **6** |
| **Spring Semester** | | |
| INFO 8991 | Dissertation | 6 |
| | **Credit Hours** | **6** |
| **Year Four** | | |
| **Fall Semester** | | |
| INFO 8991 | Dissertation | 6 |
| | **Credit Hours** | **6** |
| **Spring Semester** | | |
| INFO 8991 | Dissertation | 6 |
| Complete Comprehensive Examination (Defend Dissertation Proposal) | | |
| | **Credit Hours** | **6** |
| **Year Five** | | |
| **Fall Semester** | | |
| INFO 8991 | Dissertation | 6 |
| | **Credit Hours** | **6** |
| **Spring Semester** | | |
| INFO 8991 | Dissertation | 6 |

| | |
|---|---|
| Submit and Defend Dissertation | |
| **Credit Hours** | **6** |
| **Total Credit Hours** | **64** |

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate the ability to synthesize arguments through academic writing appropriate to the discipline of information science.
- Demonstrate expertise in how knowledge is communicated and the academic discourse norms employed within the information science discipline.
- Demonstrate proficiency in research methodologies employed across information science research, including qualitative, quantitative, computational and design approaches.
- Demonstrate familiarity with the core theoretical frameworks employed in information science research.
- Design and conduct high-quality original research in information science.
- Effectively communicate and present research to academic and public audiences in both written and oral form.

# Journalism

The Department of Journalism is founded on the principle that a well-informed and engaged public is essential to democracy—perhaps more so now, at a time of dizzying change, than it has ever been—and that, in the face of this change, journalism retains a unique role in contributing to civic life and to the quality of public discourse.

We put this principle to work by helping students become constructive participants in an ever-evolving global media landscape, where distinctions between producers and consumers of content have blurred. More specifically, we prepare them, at both the undergraduate and graduate levels, for careers in journalism and other fields of public communication. We train students to gather information from a diversity of sources, to analyze it critically, and to report what is significant through stories and other media forms across multiple media platforms. We encourage ethical awareness so that students will think independently, being prepared to reflect on and to help shape media practices and norms rather than take them at face value.

We believe in the integration of classroom instruction with practical experience. Many of our students work for, and manage, campus online news and entertainment sites, television programs and a radio station. They intern at broadcast stations, newspapers, magazines, websites and social media companies. Lastly, as a faculty, and with the help of colleagues elsewhere in our College who are working on new and innovative forms of human communication, we are committed to improving journalism through pioneering research and creative work.

**Course code for this program is JRNL.**

## Master's Degree

- Journalism - Master of Arts (MA) (p. 1538)

## Doctoral Degree

- Media Research and Practice - Doctor of Philosophy (PhD) (p. 1544)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ackland, Len (https://experts.colorado.edu/display/fisid_103930/)
Professor Emeritus; MA, Johns Hopkins University

Bergen, Lori Ann (https://experts.colorado.edu/display/fisid_155986/)
Professor; PhD, Indiana University Bloomington

Brinkman, P. Delbert
Professor Emeritus

Chuang, Angie (https://experts.colorado.edu/display/fisid_159485/)
Associate Chair, Associate Professor; MA, Stanford University

Daugherty, Paul J. (https://experts.colorado.edu/display/fisid_128801/)
Senior Instructor; MA, University of Colorado Boulder

Dmukhovskaya, Marina (https://experts.colorado.edu/display/fisid_166268/)
Instructor, Faculty Director; MA, Indiana University Bloomington

Jones, Stephen B. (https://experts.colorado.edu/display/fisid_101578/)
Assistant Dean, Senior Instructor Emeritus; PhD, University of Utah

Kaplan, Frank L.
Professor Emeritus

Kim, Hun Shik (https://experts.colorado.edu/display/fisid_141126/)
Associate Professor; PhD, University of Missouri–Columbia

Larson, Christine M. (https://experts.colorado.edu/display/fisid_159789/)
Assistant Professor; PhD, Stanford University

McDevitt, Michael Joseph (https://experts.colorado.edu/display/fisid_122949/)
Professor; PhD, Stanford University

Moritz, Marguerite J.
Professor Emerita

Plunkett, Chuck (https://experts.colorado.edu/display/fisid_164006/)
Instructor, Faculty Director; MFA, University of Pittsburgh

Rosner, Hillary (https://experts.colorado.edu/display/fisid_164326/)
Instructor; MFA, New York University

Ryan, Kathleen Marie (https://experts.colorado.edu/display/fisid_148481/)
Associate Professor; PhD, University of Oregon

Sama, Vicky
Scholar in Residence; MA, University of Colorado Boulder

Skewes, Elizabeth (https://experts.colorado.edu/display/fisid_122724/)
Associate Professor; PhD, Syracuse University

Taylor, Ross (https://experts.colorado.edu/display/fisid_156501/)
Assistant Professor; MS, Syracuse University

Voakes, Paul S.
Professor Emeritus

Whitt, Jan
Professor Emeritus; PhD, University of Denver

Yulsman, Thomas (https://experts.colorado.edu/display/fisid_109386/)
Professor; MS, Columbia University

# Courses

**JRNL 5001 (3) Media Technology Boot Camp**
Offers a foundation in the technologies of journalistic storytelling across a variety of established and emerging media platforms, such as print, television, radio, online publications, blogs, social media and emerging forms of communication. Students will emerge from the course with basic competence in the technical tools they will need as journalists.
**Requisites:** Restricted to graduate students only.

**JRNL 5011 (3) Newsgathering and Multimedia Storytelling**
Develops skills in research and reporting on public issues and news events, and in the construction of narrative in the journalistic and documentary traditions, using a variety of media platforms.
**Requisites:** Restricted to graduate students only.

**JRNL 5102 (3) Photojournalism Portfolio**
Advanced course intended to give students a forum in which technical skills will be brought to professional standards. Build a polished portfolio of work to present to editors and buyers.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4102
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 5311 (3) Literary Journalism**
Studies the contributions of American literary journalists from Sara Davidson, Joan Didion, Normal Mailer, Hunter S. Thompson and Tom Wolfe; to established writers of nonfiction, including Annie Dillard, Jon Krakauer, Jane Kramer, Adrian Nichole LeBlanc and Terry Tempest Williams; to the newest wave of long-form journalists. Explores the boundaries between fiction and nonfiction and the literary techniques that distinguish creative nonfiction and literary journalism from other reportorial and storytelling forms. Formerly JRNL 6321.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4311
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**JRNL 5344 (3) Video Documentary Production**
Designed to give students the experience of researching, writing, shooting and editing their own documentaries.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4344
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 5402 (3) Journalism and Social Identity**
Provides a discussion-based inquiry into the role of journalism and journalists in the representation of intersectional identities, focusing on race, gender, sexual expression and socioeconomic class in the United States. The study and practice of journalism in this course will address issues of trust, power, privilege and ethics inherent in reporting across difference.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4402
**Requisites:** Restricted to graduate students only.

**JRNL 5411 (3) Global Journalism and International News**
This graduate course provides students with an overview of the field of international and global journalism with particular foci on comparative media research and international affairs reporting. The course seeks to expose students to theoretical foundations and key concepts in the news media systems and journalistic practices around the world. It also addresses the political, social, and economic consequences of global journalism and the challenges related to it.

**JRNL 5502 (3) Newsgathering 2**
Involves writing news and features about actual events for publication under deadline pressure.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 5521 (3) Data Journalism**
Instructs students in data-driven investigative reporting. Includes hands-on, in-depth instruction in gathering data from census reports, commercial databases, information networks, and other sources, and utilizing statistical analysis software and spreadsheets to analyze the information in ways that can help deepen and strengthen journalistic stories on a wide variety of subjects.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**JRNL 5552 (3) Multimedia Editing**
Discusses principles and practice in copy editing and writing headlines for local and wire stories. Practice in page makeup, picture editing, and electronic editing.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 5562 (3) Digital Journalism**
Builds upon digital production skills through the creation of multimedia project. Applies media theory to evaluate digital media content and explore how digital forms influence the news industry, politics, culture and society.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4562
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 5572 (3) News Corps**
Provides students the opportunity to immerse themselves in an explanatory/investigative news project that gives students a chance to use in-depth research to produce content for Colorado news outlets and practice the skills they've learned in previous reporting classes. Students spend several weeks studying the subject in question before reporting and producing their stories.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 5573 (3) News Corps Investigative Reporting and Leadership**
Take lessons learned from the CU News Corps capstone to the next level with this course designed to give elite students the opportunity to broaden and deepen their investigative reporting by either expanding on their capstone project's subject matter, or beat, or by taking a deep dive into a different field of research. Further develop brainstorming and editing skills.
**Requisites:** Requires prerequisite course of JRNL 4572 (minimum grade B).

**JRNL 5602 (3) Opinion Writing**
Concentrates on several of the subjective areas of journalism. Emphasizes editorial and column writing, editorial pages and blogging.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4602
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 5624 (4) NewsTeam**
Students participate in Newsteam Boulder a program broadcast live over the Boulder cable television system.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4624
**Requisites:** Requires prerequisite courses of JRNL 5001 and JRNL 5011 (all minimum grade C-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 5634 (1-3) Broadcast Projects**
Covers interpretation, preparation, and/or reporting in programs for broadcast media. Prepares radio or television documentaries and informational/entertainment programs. Instructor consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4634
**Requisites:** Requires prerequisite courses of JRNL 5001 and JRNL 5011 and JRNL 5514 (all minimum grade C-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 5651 (3) Journalism Law & Ethics**
Explores the legal and ethical frameworks of journalistic practice and media production. Covers historical as well as current frameworks used in examining the legal and ethical issues that arise in newsgathering and publication. Examines the relationships between ethics and the law in various media context.
**Requisites:** Restricted to graduate students only.

**JRNL 5684 (3) The Art of Visual Storytelling**
Teaches students how to raise the production value of their work based on standards used by professionals. Students learn how lenses, lights and contrast can affect an image; how to assemble their shots with pacing and rhythm; how to apply color grading techniques to give video a cinematic look; and how to create motion graphics for titles and lower thirds.
**Requisites:** Requires prerequisite courses of JRNL 5001 and JRNL 5011 (all minimum grade C-). Restricted to graduate students only.

**JRNL 5702 (3) Arts/Cultural Reporting and Criticism**
Emphasizes composition of criticism for the performing arts and other areas of entertainment.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4702
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 5710 (3) Sports Reporting II**
Prepares students for the world of sport journalism. Combines the skills of a hard news reporter, the perspective of an entertainment reporter and the persuasive abilities of an editorial writer. The class focuses on how to cover sports from all angles.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4710

**JRNL 5802 (3) Feature Writing**
Provides practice in writing freelance articles. Considers types, sources, methods, titles, illustrations, and freelance markets. Students submit work for publication.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4802
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 5810 (3) Community-Based Storytelling**
Offers students the opportunity to produce a story or series for publication in local media. A collaboration between the newsroom and the Center for Environmental Journalism, the course operates as a pop-up newsroom where students collaborate on a single project, working together to dive deeply into an underreported topic of importance to the community. Formerly offered as a special topics course.
**Requisites:** Requires prerequisite course of JRNL 5011 (minimum grade D-).

**JRNL 5812 (3) Science Writing**
Helps students acquire the basic skills and knowledge required of science journalists. Also examines issues of scientific importance such as climate change, the nature of scientific knowledge, and how science is covered in various media.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 5822 (3) Reporting on the Environment**
This class examines media coverage of environmental topics, and explores the ways that environmental crises intersect with other stories in the news. Students read contemporary environmental journalism, discuss the complex issues involved in reporting on the environment, and produce their own stories on topics including climate change, energy, water, biodiversity, and food.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4822
**Requisites:** Requires prerequisite courses of JRNL 5001 and JRNL 5011 (all minimum grade C-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 5841 (1-3) Graduate Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**JRNL 5851 (1-6) Graduate Professional Project**
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**JRNL 5871 (1-3) Special Topics**
Special Topics
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**JRNL 5931 (1-3) Internship**
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires pre-requisite of JRNL 5001 and JRNL 5011 and JRNL 5521 (all minimum grade of C-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**JRNL 6551 (3) News Media Representation and Identity**
Examines the role of race, gender, immigration status, religion, and other identities in journalistic representations. Students will apply the work of journalism scholars to historic and current case studies in print, broadcast, and online media. They will apply quantitative and qualitative research methods to more deeply investigate the role of journalism in constructing social identity. Formerly JRNL 5551.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 6651 (3) Media Law**
Graduate seminar in communications law. Studies changing law and applied legal research techniques.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**JRNL 6862 (3) Visual Communication and Mass Media**
Visual communication involves understanding both perception of messages and construction of them. Students analyze their visual thinking abilities and develop habits of visual analysis and criticism, as well as visual communication skills.
**Requisites:** Restricted to graduate students only.

**JRNL 7001 (3) ProSeminar in Mass Communication Theory 1**
Discusses prominent theoretical and methodological points of view in journalism studies and strategic communication that range from social science to critical studies to the humanities. The premise is that methods are driven by research questions, so there is no best way to conduct research. You should leave this course with an understanding of how to address various mass communication phenomena.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7001
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7002 (3) Research Design**
Adopts a holistic and creative approach to bridging theory with method for the purpose of research design. Students learn how to bridge theory and method, exploring research designs that effectively address research questions and hypotheses through elaboration of theoretical and operational linkages.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7002
**Requisites:** Requires prerequisite course of JRNL 7003 or APRD 7003 (minimum grade C-). Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7003 (3) ProSeminar in Mass Communication Theory II**
Continues introducing and discussing theoretical and methodological points of view in areas of communication, journalism and persuasion. Discusses the most important qualitative and quantitative methodological points of view, and from theoretical viewpoints that range from social science to critical studies. The idea is to develop an appreciation for theories and methodologies that can be employed depending upon the research question.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7003
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7004 (1) Doctoral Professionalization Seminar**
Introduces you to the university and gives you a chance to think out loud about what your academic future might look like. The course is designed to be responsive to your needs regarding your career, getting a job, getting tenure and teaching. In short, the course prepares you for a career in academia.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7004
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7010 (3) Qualitative Interviewing as a Research Method**
Develops the necessary skills to conceptualize, plan, and execute interview-based research projects. Covers topics such as brainstorming and implementing a research idea, formulating research questions, designing a thorough research plan, navigating the IRB, recruiting participants, creating the interview guide, conducting interviews, and analyzing and writing up data. Course also examines reflexivity and ethical issues that are inherent in interview studies, especially ones involving certain populations.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7010
**Requisites:** Restricted to graduate students only.

**JRNL 7011 (3) Seminar in Strategic Public Relations**
Analyzes the various dimensions of public relations based on scholarship. The seminar seeks to expose students to key public relations specialties such as issues management, risk and crisis communication, corporate social responsibility, communication campaigns, public diplomacy. It also aims to train students to recognize public relations as a strategic practice that can contribute significantly to organizational effectiveness and social good.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7011
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7012 (3) Ethnography and Media**
Provides a ¿how to¿ concerning the intersection of ethnography and the media. During which, the course examines the epistemology of fieldwork. We will critically examine aspects and approaches to doing and writing ethnography, including with and without social science theory. We will discuss the challenges of entering, being in, and leaving the field. And we will explore data collection techniques.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7012
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7013 (3) Mixed Research Methods**
Examines the practice of mixed-methods research in the social sciences with an emphasis on the pragmatic considerations necessary for such projects. The class will discuss the development and execution, the analyses of data obtained, and the practical tools required for such studies. Throughout the course, students will examine and discuss specific applications of mixed methods research.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7013
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7014 (3) Experimental Design**
Introduces all facets of experimental design for studies of forms of communication. This course study experiments, both for your own research and to help you evaluate the work of others, and provide an overview of research in the field and the various ways in which media can be utilized in experimental research. This is a hands-on, nuts-and-bolts methods course. You will not only learn about the various theories and methodologies, but also implement your own.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7014
**Requisites:** Requires prerequisite course of JRNL 7061 or APRD 7061 (minimum grade D-). Restricted to graduate students only.

**JRNL 7020 (3) The Public Sphere**
Investigates the role media play in the public sphere and democratic practices. Does media facilitate support or opposition to political and economic policies and cultural frames that become part of publics? Which institutions best inform publics and why? This course traces the development of U.S. and selected international media institutions. We analyze and debate the relationship of differing media content to political power, freedom of critical inquiry, and the facilitation or inhibition of democratic practices.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7020
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7021 (3) Science Communication**
Focuses on mass communication of issues related to science and follows two lines of inquiry. The seminar takes a cultural perspective, and explores the concept of scientific uncertainty in media. It will use these as a springboard for examining how we use media to conceptualize science, environment, health, etc., and how that impacts the way we live on this planet.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7021
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7030 (3) Media Sociology**
Examines a range of theories for how media messages and media institutions turn out the way they do. `Media sociology¿ refers to theorizing about the media as the `dependent variable;¿ even though many of the `independent variables¿ explored are not narrowly sociological. It connects media actors, organizations, and institutions to sociological concepts such as socialization, interaction, roles, and structures.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7030
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7031 (3) Media Ethics**
Explores the psychological structures and processes that come into play as individuals interpret moral problems, and formulate, select and execute a moral action in response. The seminar will explore the work of Jean Piaget, Lawrence Kohlberg, and James Rest, among others, and apply moral psychology theories and methods to contemporary issues and cases in media professions.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7031
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7034 (3) Health Communication**
Advanced seminar that examines and critiques the literature on health communication in two specific areas: news about health and its impact on individuals, and health promotion campaigns.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7034

**JRNL 7051 (3) Qualitative Research Methods**
Provides a survey of various qualitative modes of inquiry, attending to the philosophical, conceptual, and practical foundations of qualitative research in media, communication, and information. The course is designed to support students in developing a critical understanding of the different considerations in and stages of qualitative research, including the development of research questions, theoretical and conceptual frameworks, methodological approaches, data collection, data analysis, and assessment of reliability and validity of qualitative data. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7051
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7061 (3) Quantitative Research Methods**
Introduces graduate students to concepts and applications in quantitative research methods. The course prepares students fordissertation writing through hands-on experience in developing research designs and conducting independent quantitative research.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7061
**Grading Basis:** Letter Grade

**JRNL 7062 (3) Advanced Statistical Analysis for Mass Communication**
Provides instruction on the following topics: ordinary least squares regression, statistical mediation and moderation, path analysis, count and categorical data modeling, and factor analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7062
**Grading Basis:** Letter Grade

**JRNL 7063 (3) Text Analytics for Computational Mass Communication Research**
This course tackles advanced advertising and marketing analytics through three advanced methods aimed at solving these problems: text classification, text topic modeling, and semantic network analysis. Each key area will involve a deep dive into the leading computer science methods aimed at solving these methods using Python. Students will walkthrough conceptual overviews of the methods, and dive into real-world datasets through instructor-led tutorials. Students will also conduct a major project for each of the 3 key methods.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7063
**Grading Basis:** Letter Grade

**JRNL 7841 (1-3) Independent Study**
Provides opportunities for independent study at PhD level. Students work on research or reading in a subject area guided by faculty.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**JRNL 7871 (3) Special Topics**
Special Topics
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**JRNL 7880 (3) Persuasion Theory**
This seminar acts as an overview of psychological knowledge as it pertains to capturing consumer insight, and includes a consideration of how the brain works, what factors influence consumer choice, and a critical evaluation of psychological assessment tools.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7880

**JRNL 8991 (1-10) Doctoral Dissertation**
Working on dissertation.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**MDRP 7871 (3) Special Topics**
Special topics.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

# Journalism - Master of Arts (MA)

The master's degree in journalism prepares students for professional success in news outlets, digital and social media platforms, and corporate communications.

The program offers two options, both of which are designed for students with limited academic or professional experience in journalism.

The professional practice option is for students who wish to focus on quickly obtaining advanced journalistic skills. It can be completed with as few as 30 credits and in as little as two semesters plus a summer.

The area of expertise option is for students wishing not only to acquire advanced journalistic skills, but also to complement them with an area of expertise, such as environmental science and policy. This option can be completed with a minimum of 36 credits and in four semesters.

Regardless of option, the degree's focus is on multimedia training and experience. Students develop skills in information-gathering, storytelling and analysis across a variety of platforms and professional contexts, including video, online interactivity, social media, photography and, of course, the printed word. They produce in-depth reporting projects in collaboration with professional media outlets in Colorado, and they complete internships at award-winning radio and television stations, newspapers, magazines, websites and other news organizations nationwide.

# Requirements

## Application Guidelines

Applicants to the MA in journalism must:

- Hold at least a baccalaureate degree or its equivalent from an accredited college or university
- Have an undergraduate grade point average of at least 2.75
- International applicants must also have a TOEFL score of at least 600 (IBT 100)
- Provide three letters of recommendation
- Provide a 500-word statement of purpose
- Provide a resume

## Program Requirements

### Professional Practice Option

This option can be completed with a minimum of 30 credits and in as little as two semesters plus a summer.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| JRNL 5001 | Media Technology Boot Camp | 3 |
| JRNL 5011 | Newsgathering and Multimedia Storytelling [1] | 3 |
| JRNL 5521 | Data Journalism | 3 |
| JRNL 5651 | Journalism Law & Ethics | 3 |
| JRNL 5572 | News Corps | 3 |
| **Journalism Electives** | | |
| Select two or three elective courses in journalism. (JRNL courses at the 5000, 6000, 7000 or 8000 level.) | | 6 |
| **CMDI Electives** | | |
| Select two elective courses outside journalism, but within CMDI. (Includes courses at the 5000, 6000, 7000 or 8000 level in APRD, CMDP, COMM, IAWP, INFO or MDST.) | | 6 |
| **Capstone Course** | | |
| JRNL 5851 | Graduate Professional Project | 3 |
| **Total Credit Hours** | | **30** |

[1] May be waived depending on the student's professional experience.

### Area of Expertise Option

This option can be completed with a minimum of 36 credits and in four semesters.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| JRNL 5001 | Media Technology Boot Camp | 3 |
| JRNL 5011 | Newsgathering and Multimedia Storytelling [1] | 3 |
| JRNL 5521 | Data Journalism | 3 |
| JRNL 5651 | Journalism Law & Ethics | 3 |
| JRNL 5572 | News Corps | 3 |
| **Journalism Electives** | | |
| Select two elective courses in journalism. | | 6 |
| **CMDI Electives** | | |
| Select four elective courses in the chosen area of expertise. | | 12 |
| **Capstone Course** | | |
| JRNL 5851 | Graduate Professional Project | 3 |
| **Total Credit Hours** | | **36** |

[1] May be waived depending on the student's professional experience.

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate the ability to identify a good story idea and angle and to execute on it, reporting, writing, editing and otherwise developing it into a publishable story.
- Develop storytelling proficiency in one or more media platforms—print, audio, visual, video and social.
- Demonstrate an understanding of the legal and moral foundations of journalism.
- Effectively produce a long-form or in-depth reporting project from original idea to final story.

# Media Studies

Contemporary media practitioners, both professional and amateur, influence the values and behaviors of national and global populations, challenging and shaping the authority, legitimacy and control exercised by governments and other powerful social institutions. Because of this, media and cultural studies are central to research about the complex intersections of culture, politics and economics from the local to the global levels. Appropriately, the Department of Media Studies emphasizes the history, nature and impact of mediated sounds, images and texts from a wide range of inter- and cross-disciplinary perspectives.

The Department of Media Studies examines ways of thinking about and conducting research into the intersection of media, communication and cultural practices in both historical and contemporary perspectives. Encompassing humanistic, social scientific and artistic approaches to the study of media and culture, and interdisciplinary in its theoretical and methodological approaches, the degree spans traditional boundaries between theory and practice. It fosters media "literacy" in the broadest sense by providing students with critical skills to analyze contemporary media and culture, along with technical, aesthetic and intellectual principles that facilitate strong media practices.

**Course code for this program is MDRP and MDST.**

## Master's Degree

- Media and Public Engagement - Master of Arts (MA) (p. 1543)

## Doctoral Degree

- Media Research and Practice - Doctor of Philosophy (PhD) (p. 1544)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ardizzoni, Michela (https://experts.colorado.edu/display/fisid_145152/)
Assistant Professor, Director; PhD, Indiana University Bloomington

Berggreen, Shu-Ling Chen (https://experts.colorado.edu/display/fisid_101636/)
Associate Professor; PhD, University of Tennessee-Knoxville

Calabrese, Andrew (https://experts.colorado.edu/display/fisid_101073/)
Professor; PhD, Ohio State University

Echchaibi, Nabil (https://experts.colorado.edu/display/fisid_145054/)
Associate Chair; PhD, Indiana University Bloomington

Fisher, Jolene (https://experts.colorado.edu/display/fisid_158335/)
Assistant Professor; PhD, University of Oregon

Frost, Steven (https://experts.colorado.edu/display/fisid_156502/)
Instructor, Associate Chair; MFA, School of Art Institute of Chicago

Goldstein, Donna M. (https://experts.colorado.edu/display/fisid_100448/)
Professor; PhD, University of California, Berkeley

Hall, Kira (https://experts.colorado.edu/display/fisid_123111/)
Professor; PhD, University of California, Berkeley

Hoover, Stewart (https://experts.colorado.edu/display/fisid_104549/)
Professor; PhD, University of Pennsylvania

McLean, Polly E. (https://experts.colorado.edu/display/fisid_100614/)
Associate Professor; PhD, University of Texas at Austin

Mody, Bella
Professor Emeritus; PhD, Gujarat University, India; PhD, Gujarat University, India

Oakes, Tim (https://experts.colorado.edu/display/fisid_109269/)
Professor; PhD, University of Washington

Peck, Janice Anne (https://experts.colorado.edu/display/fisid_106765/)
Professor Emerita; PhD, Simon Fraser University (Canada)

Rajabi, Samira (https://experts.colorado.edu/display/fisid_165414/)
Assistant Professor; PhD, University of Colorado Boulder

Ristovska, Sandra (https://experts.colorado.edu/display/fisid_159835/)
Assistant Professor; PhD, University of Pennysylvania

Rowland, Willard D.
Professor Emeritus

Schneider, Nathan Todd (https://experts.colorado.edu/display/fisid_156512/)
Director, Associate Faculty Director; MA, University of California, Santa Barbara

Shepperd, Josh (https://experts.colorado.edu/display/fisid_167233/)
Assistant Professor; PhD, University of Wisconsin-Madison

Simonson, Peter D.
Professor; PhD, University of Iowa

Stevens, John Richard (https://experts.colorado.edu/display/fisid_145848/)
Associate Professor, Chair; PhD, University of Texas at Austin

Striphas, Theodore G. (https://experts.colorado.edu/display/fisid_156205/)
Associate Professor; PhD, University of North Carolina Chapel Hill

Tracey, Michael (https://experts.colorado.edu/display/fisid_104259/)
Professor Emeritus; PhD, Univ of Leicester (England)

Trager, Robert
Professor Emeritus

## Courses

**MDST 5000 (3) Media Genre Studies**
Introduces students to the critical study of genres in media cultures. Genre exists as a form of organizing and packaging mediated content, but also as formulaic patterns for analysis that work for and against audience expectations to produce culture. Topics will vary by genre, medium, and transmedia strategies.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 4000
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**MDST 5001 (3) Connected Media Practices**
Provides a crucial frame through which students understand the evolution of film, television and gaming in the digital era. Explores an impending revolution in how screen media are created, circulated and consumed. Relates to a larger trend across the media industries to integrate digital technology and socially networked communication with traditional screen media practices.
**Requisites:** Restricted to graduate students only.

**MDST 5002 (3) Media Activism and Public Engagement**
Explores politics of media activism. Relies on survey of existing theory and scholarship on media activism and close analyses of activist practices within both old and new media and on local, national and global scale. Special attention paid to questions of relativity and efficacy and value of media activism as both aesthetic and political activity.
**Requisites:** Requires a prerequisite course of MDST 5001 (minimum grade C-). Restricted to graduate students only.

**MDST 5003 (3) Digital Media Production and Design**
Introduces techniques, technologies of online development and online media presentation. Contextualizes the technical and social implications of the Internet through historical and critical perspectives. Students engage in online media projects designed to emphasize the affordances, conventions and usability considerations of effective online communication.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 4003
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**MDST 5005 (1) MAPE Workshop**
Connects classroom work to community practice. Students will discuss applied projects and collaborate on public initiatives.
**Repeatable:** Repeatable for up to 4.00 total credit hours.

**MDST 5071 (3) Screenwriting**
Students will learn the fundamentals of screenwriting, but will also learn from peers. Students will workshop scenes, share, and discuss. Students will work scenes through description, dialogue, and action, combine those scenes into sequences, and those sequences into scripts. Students will learn how to create dramatic tension, how to write compelling dialogue, how to deal with character development.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 4071
**Recommended:** restricted to graduate students only.

**MDST 5121 (3) Deconstructing Disney: Mediated American Mythology**
Explores various Disney cultural products ¿ some with which students will be very familiar, some students may have never seen ¿ in order to discuss the cultural messaging The Walt Disney Company has presented over its long and illustrious history. Students will conduct analysis research in popular culture studies.
**Requisites:** Restricted to graduate students only.

**MDST 5211 (3) Asian Media and Culture**
Offers an understanding of the various people, cultures and nations of East Asia through their media systems. Provides a critical overview of the historical, cultural, social, political and economic dimensions of East Asian communication systems in today's digitally connected/disconnected world.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 4211
**Requisites:** Restricted to graduate students only.

**MDST 5220 (3) Viral Video & Media**
Students will examine how viral videos are produced and shared on social media platforms by developing an understanding of the components that make a viral video as well as by engaging in a critical analysis of those viral videos. Students will engage in critical analysis, consider strategies for virality, and learn about production and publishing. Students will analyze their own and their peers¿ work in terms of genre, convention, format, structure, and audience.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 4220
**Recommended:** graduate students only.

**MDST 5311 (3) Mass Communication Criticism**
Introduces the critical perspectives most often employed in qualitative media analysis: semiology, structuralism, Marxism, psychoanalytical criticism, sociological criticism. Texts from contemporary print and broadcast media.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 4311

**MDST 5331 (3) Gender, Race, Class, and Sexuality in Popular Culture**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 5341 (3) Designing Alternative Media Platforms**
This course helps students construct alternative form of media to exhibit their research and build connections with relevant community leaders. Through the practice and examination alternative exhibition traditions of such as Social Practice and Relational Aesthetics students connect with community members to design alternative platforms for media projects that respond to the needs of external communities.
**Requisites:** Restricted to graduate students only.

**MDST 5401 (3) Fan and Audience Studies**
Drawing upon a variety of theoretical perspectives and tools of measurement, students will explore the structures, forces and environments that produce culture. Students will also interpret popular culture as a site of cultural meaning, and to understand the historical approaches scholars have used to analyze meaning in media messages, fan practices, and institutional responses.
**Requisites:** Restricted to graduate students only.

**MDST 5402 (3) Transmedia Worldbuilding**
Guides students to develop entertainment concepts for transmedia delivery. Students will develop concepts and characters built around storytelling themes capable of producing serial and multimedia storylines. This course considers essential elements of storytelling; how to design and actively participate across media platforms; essential elements of meta-narratives; and how to create an immersive and interactive experience for audiences using digital communication tools.
**Requisites:** Restricted to graduate students only.

**MDST 5405 (3) Queer and Trans Identities in Popular Culture**
Give students the theory, media history, and cultural frameworks to advocate for better queer & trans presentation in popular media. Uses queer studies, critical theory, media surveys, and trans theory as a tool for discussing and addressing gaps in media representation. Explores the emergence, codification, and rejection of queer and trans identities and deconstructs the popular media that contributed to the formation of these identities.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 4405
**Requisites:** Restricted to graduate students only.

**MDST 5841 (1-3) Graduate Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**MDST 5851 (1-6) Graduate Professional Project**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**MDST 5871 (1-3) Special Topics**
Special topics in Media Studies.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**MDST 5931 (1-3) Internship**
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**MDST 6031 (3) Documentary and Social Change**
Explores how local, national and international filmmakers use documentaries to provide cultural observation, education, entertainment and memories with the hope of making sense of, and transforming, the realities of contemporary societies. The course emphasizes contemporary issues and practices in the production of documentaries, including the participatory means such as the crowd-sourcing of documentary footage, and the use of newer, non-theatrical means of distribution, including YouTube, Vimeo and other digital outlets.
**Requisites:** Restricted to graduate students only.

**MDST 6051 (3) Media Theories**
Studies theories and perspectives of mass and networked communication and explores the role of media in society.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6061 (3) Media Research**
Introduces concepts, theoretical approaches and research methods of media research. Students apply these frameworks in research on mediated communication. Covers qualitative and quantitative methods of gathering and analyzing data.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6071 (3) Critical Theories of Media and Culture**
Introduces students to critical theories and analysis of media and popular culture. Examines major theoretical traditions and/or theorists that significantly inform media studies (e.g., culturalism, structuralism, Marxism, critical theory, feminism, psychoanalysis, post-structuralism) and applies these to media analysis and criticism.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6100 (3) Theory and Practice of Doing: From the Sciences to the Arts and Humanities**
Introduces students to the theory of doing and making. Guiding questions include: what does it mean to place "doing" at the center of one's research agenda? What does it mean to do hands-on work in an art/design studio, a digital humanities lab, a media lab, a media archaeology lab, a makerspace or a hackerspace?
**Equivalent - Duplicate Degree Credit Not Granted:** IAWP 6100

**MDST 6201 (3) Global Media and Culture**
Explores the historical, cultural, social, political and economic dimensions of media systems in various parts of the world and their relationship with technological and cultural processes. Aims to provide a critical overview of the profound changes in media and culture in today's digitally connected/disconnected world. Formerly MDST 6201.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6211 (3) Communication and International Development**
Studies and analyzes communications technologies and techniques used in addressing social problems in developing countries.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6241 (3) Visual Epistemologies: Theory and Practice**
Examines visuals as a form of knowledge on its own terms with an emphasis on both theory and practice. It first considers how social, cultural and cognitive mechanisms shape visual ways of knowing, and it discusses methodological approaches for working with and in images. Then it traces the complicated status of visual knowledge over time and across institutional contexts¿religion, art, science, the law, journalism and politics.

**MDST 6250 (3) Algorithms, Culture, and Power**
Explores how automated computational processes (algorithms) affect the production, distribution, exchange, and consumption of media and other cultural goods. Also examines the history and politics of algorithms with respect to their growing prevalence in daily life. Foregrounds themes of power, identity, bias, aesthetics, infrastructure, epistemology, and political economy. Employs theories and methods from media studies, science and technology studies, digital humanities, and/or cultural studies.
**Requisites:** Restricted to graduate students only.

**MDST 6301 (3) Communication, Media, and Concepts of the Public**
Introduces students to historical and contemporary uses of fundamental concepts in research and theory about media institutions, particularly public, community, mass, publicity, public space, public opinion, public interest, and the public sphere.
**Equivalent - Duplicate Degree Credit Not Granted:** CMDI 6301
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6311 (3) Power, Politics and Mediated Culture**
Examines various literatures that consider the role of power in shaping social orders and the social beings that constitute that order and the place of media in both processes.
**Requisites:** Restricted to graduate students only.

**MDST 6341 (3) Children, Youth and the Media**
Examines the concepts of children and childhood from the historical, social, cultural, economic and political perspectives, this course explores the interaction between mass media and the socialization and cultivation process of children and youth. Multiple theoretical traditions are used as a framework to study a variety of issues related to children and the media.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6350 (3) Media & Cultural Policy**
Survey the research literature and practical significance of cultural policy as it relates to culture as a basis of social definition, inclusion, exclusion and conflict. The study of cultural policy does not focus exclusively on the role of government, but rather on a broader range of institutions that play central roles in governing contemporary culture, including museums, libraries, and media industries.
**Requisites:** Restricted to graduate students only.

**MDST 6351 (3) Media, Culture & Food Politics**
Stresses intersections among media industries, food industries, and politics, with an emphasis on how public knowledge and activism about food relate to questions of a sustainable environment, human health and safety, and social justice for food producers and consumers. Examines a wide range of political discourses about food, the politics of food labeling, the globalization and hybridization of food, public policies governing food, food activism, the biopolitics of food, and food-related manifestations of cultural capital. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.

**MDST 6551 (3) Media and Communication Policy**
Surveys historical and contemporary developments in media and communications policy, emphasizing social and cultural dimensions.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6552 (3) Media and Public Scholarship**
Historicizes the role of the public intellectual through readings and discussions of biographies of selected scholars and accounts of historical changes in the habitats ¿ the spaces of politics ¿ in which particular types of public engagement by intellectuals occurred in the past. The course will include a ¿media practicum¿ to enable students to understand what it means to become a scholar who has a public voice through direct and indirect engagement in a media-saturated age. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.

**MDST 6671 (3) Media, Myth, and Ritual**
Explores cultural practices of media audiences. Addresses theoretical and methodological implications of studying audiences from a culturalist perspective, with particular focus on media audience practices. Students engage in field research projects related to course content. Formerly MDST 6671.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6711 (3) Media and Popular Culture**
Introduces fundamental methods for understanding the construction of meaning in film, television, popular music and advertising. Traces the study of popular culture through film theory, mass media analysis and cultural studies. Surveys various strands of research that seek to understand popular culture and its effects.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6721 (3) Feminist Media Studies**
Explores the complex relation between feminism and global media consumption and production. Students will be introduced to key theoretical approaches to engage critically with film, print and broadcast media, digital media, and art. Students will engage with themes that frame feminist media studies today: intersectionality, gaze, (in)visibility, consumerism, resistance, bodies, representational narratives, queer identities, decolonial feminism as a theoretical tool of relationality, and explorations of decolonizing feminist practices originating in the global South.
**Requisites:** Restricted to graduate students only.

**MDST 6771 (3) History of Media and Communication: Selected Topics**
Examines history of communication, including the means (technologies) of communication, social practices (institutional, collective, individual) that intersect with the study of communication and media, and cultural forms (texts, products). Situates the study of media, technology, and culture within historical contexts, comparative historical research, media archaeology, genealogy and media history.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6781 (3) Political Economy of Media**
Examines economic problems and political issues relevant to media institutions and industries.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6871 (1-3) Special Topics**
Special topics. May be repeated up to 15 total credit hours hours
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.

**MDST 6951 (1-6) Master's Thesis**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 7001 (1) PhD Colloquium Series**
Introduce the new doctoral students to the Media Research and Practice program and its faculty members and their research. The colloquium series will also include workshops on program planning, publishing, attending conferences, writing a dissertation, preparing and presenting a job talk, etc.
**Repeatable:** Repeatable for up to 2.00 total credit hours. Allows multiple enrollment in term.

**MDST 7011 (3) Proseminar in Media Communication Theory 1**
Introduces the principal concepts, literature, and theoretical and paradigmatic perspectives of media studies and mass communication and their ties and contributions to parallel domains in the social sciences and humanities. Formerly MDST 7011.
**Requisites:** Restricted to doctoral students in Media Studies (MDST), Journalism (JRNL) or Advertising, PR and Media Design (APRD) only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 7021 (3) Proseminar in Media and Communication Theory 2**
Continues the introduction of principle concepts, literature, and theoretical and paradigmatic perspectives of media studies and mass communication and their ties and contributions to parallel domains in the social sciences and humanities. Formerly MDST 7021.
**Requisites:** Requires prerequisite course of MDRP 7011 (minimum grade C-). Restricted to doctoral students in Media Studies (MDST), Journalism (JRNL) or Advertising, PR and Media Design (APRD).
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 7051 (3) Qualitative Research Methods in Media**
Provides a survey of various qualitative modes of inquiry, attending to the philosophical, conceptual, and practical foundations of qualitative research in media, communication, and information. The course is designed to support students in developing a critical understanding of the different considerations in and stages of qualitative research, including the development of research questions, theoretical and conceptual frameworks, methodological approaches, data collection, data analysis, and assessment of reliability and validity of qualitative data.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 7061 (3) Quantitative Research Methods in Media**
Examines various methods of quantitative data gathering methods and analysis in mass media and social media contexts.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 7841 (1-6) Independent Study**
Independent study.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 7871 (3) Special Topics**
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 8991 (1-10) Doctoral Dissertation**
**Repeatable:** Repeatable for up to 40.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDRP 7871 (3) Special Topics**
Special topics.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

# Media and Public Engagement - Master of Arts (MA)

The Master of Arts in media and public engagement (MAPE) trains critical advocates for social change. It is a two-year, interdisciplinary program that spans traditional boundaries between theory and practice, offering opportunities for critical study of the history, institutions, economics and social implications of the media, both nationally and globally. It also offers practice-based media training geared toward civic engagement and community building. In addition to completing courses in media theory and other fields of interest, students learn how to create thoughtful and engaging projects using a variety of media practices, including online platforms, multimedia documentary, social media campaigns and other kinds of tools both longstanding and cutting-edge.

During their two years in the program, MAPE students will collaborate with faculty, community leaders, nonprofit organizations and companies to devise innovative interventions for social change. They may also choose to complete one of several subject-area certificate programs available through the university.

The MAPE prepares students for entering and transforming a variety of professions, both at the national and international level, in government, media, public relations, cultural organizations and the nonprofit sector.

# Requirements

## Application Guidelines

Students are admitted to the program based on the quality of their proposed project and their commitment to social change and the public good. Applicants to the MA in media and public engagement must:

- Hold at least a baccalaureate degree or its equivalent from an accredited college or university.
- Have an undergraduate grade point average of at least 2.75.
- Have a GRE verbal score of at least 153 (62%). International applicants must also have a TOEFL score of at least 600 (IBT 100).
- Provide three letters of recommendation.
- Provide a 500-word statement of purpose.
- Provide a resume.

Graduate advising is available by phone (303-492-7977), email (cmcigrad@colorado.edu) or in person (Hellems 96D).

## Program Requirements

Students in the MAPE program take a total of 30 credit hours, comprised of:

- 24 hours of coursework selected from a range of courses offered by the Media Studies department and/or courses crosslisted with other departments inside and outside the College of Communication, Media, Design and Information (CMDI)
- 6 hours for a thesis project

### Required Courses and Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **Required Foundation Courses** | | |
| MDST 5001 | Connected Media Practices | 3 |
| MDST 5002 | Media Activism and Public Engagement | 3 |
| MDST 6051 | Media Theories | 3 |
| **Additional Requirements** | | |
| Methods of media practice and/or research. [1] | | 6 |
| CMDP 5100 | Research and Methodologies Seminar | |
| CMDP 5370 | Choreography, Cinematograph: Writing in Motion | |

| | | |
|---|---|---|
| CMDP 5450 | Contemporary Documentary Media | |
| CMDP 5500 | Documentary Production Workshops | |
| CMDP 5600 | Documentary Lab Seminar | |
| CMDP 5650 | Documentary Field Work | |
| CMDP 5900 | Documentary Production Topics | |
| IAWP 6000 | Introduction to Practice-Based Research | |
| JRNL 5001 | Media Technology Boot Camp | |
| JRNL 5011 | Newsgathering and Multimedia Storytelling | |
| JRNL 5102 | Photojournalism Portfolio | |
| JRNL 5344 | Video Documentary Production | |
| JRNL 5502 | Newsgathering 2 | |
| JRNL 5512 | | |
| JRNL 5514 | | |
| JRNL 5521 | Data Journalism | |
| JRNL 5552 | Multimedia Editing | |
| JRNL 5562 | Digital Journalism | |
| JRNL 5602 | Opinion Writing | |
| JRNL 5684 | The Art of Visual Storytelling | |
| JRNL 5702 | Arts/Cultural Reporting and Criticism | |
| JRNL 5802 | Feature Writing | |
| JRNL 5812 | Science Writing | |
| JRNL 5822 | Reporting on the Environment | |
| MDST 5871 | Special Topics | |
| MDST 5931 | Internship | |
| Electives in the student's area of emphasis. [2] | | 9 |
| CMCI 6311 | Freedom of Expression | |
| CMCI 6331 | Political Communication | |
| CMCI 6661 | Media Ethics and Responsibility | |
| CMCI 6861 | | |
| COMM 5225 | Environmental Communication | |
| COMM 6340 | Rhetoric and Civic Community | |
| JRNL 6651 | Media Law | |
| MDST 5211 | Asian Media and Culture | |
| MDST 5311 | Mass Communication Criticism | |
| MDST 5331 | Gender, Race, Class, and Sexuality in Popular Culture | |
| MDST 6071 | Critical Theories of Media and Culture | |
| MDST 6201 | Global Media and Culture | |
| MDST 6301 | Communication, Media, and Concepts of the Public | |
| MDST 6341 | Children, Youth and the Media | |
| MDST 6551 | Media and Communication Policy | |
| MDST 6671 | Media, Myth, and Ritual | |
| MDST 6711 | Media and Popular Culture | |
| MDST 6771 | History of Media and Communication: Selected Topics | |
| MDST 6781 | Political Economy of Media | |
| **Master's Thesis** | | |
| MDST 6951 | Master's Thesis | 6 |
| **Total Credit Hours** | | **30** |

1 May consist of an internship or practicum.

2 Students may take a wide range of electives, including graduate seminars in media studies, hands-on courses throughout CMDI and topical offerings throughout the university.

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate familiarity with scholarly literature in media studies and related fields.
- Practice public scholarship through accountable community engagement.
- Develop media production skills appropriate to project goals.
- Design and produce a production-ready media project with collaborators.

# Media Research and Practice - Doctor of Philosophy (PhD)

The media research and practice (MDRP) PhD program is an umbrella that includes three distinct doctoral tracks in three separate departments in the College of Communication, Media, Design and Information:

1. Strategic communication, offered by the Department of Advertising, Public Relations and Design.
2. Journalism studies, offered by the Department of Journalism.
3. Media studies, offered by the Department of Media Studies.

## Program Tracks

### Strategic Communication Track

The strategic communication PhD track offered by the Department of Advertising, Public Relations and Design is one of three separate and distinct tracks of the Media Research and Practice doctoral program within the College of Communication, Media, Design and Information.

Strategic communication is a distinct track that is designed to provide students with rigorous training in theory and research through coursework, independent studies and research assistantships. Students gain an understanding of scholarship through required coursework that explores theories and methods that shape strategic communication research and elective coursework that expands into areas of sociology, psychology, gender studies, politics, economics, business and ethics. The program emphasizes how theory informs practice, critically analyzing how advertising and public relations operate in ways that can—or could—constructively contribute to the successful, ethical and resilient functioning of society. Students taking this track focus their research and teaching in the areas of advertising, public relations and various types of promotional communication such as health communication, political communication, social media and video gaming.

The strategic communication and journalism studies tracks for the PhD are administered together by the departments of Advertising, Public Relations and Design and Journalism. Students in both tracks are taught by and have access to the faculties of both departments. The curriculum includes an overview of mass/public communication literature with specific modules and courses dedicated to advertising, journalism and public relations. Classes also focus on areas that straddle each industry such as social media, political communication, ethics, media organizations, health communication and video games. We welcome and appreciate both qualitative and quantitative approaches to research.

Graduates pursue teaching and research positions at universities as well as work in the private sector.

## Journalism Studies Track

The journalism studies PhD track focuses on exploring the intersection of journalism, journalism practice and society. Students gain a solid foundation through coursework that explores the theories and methods that shape mass communication research. The multidisciplinary program examines not only traditional journalism, but also the ever-increasing boundaries of the industry, including user-generated content, citizen journalism, the audience's impact on news production, the new technologies shaping practice, social media's role in news, new quasi-journalistic outlets, etc.

Students research institutions, content, audiences and publics—and they can approach these subjects through a multitude of methodologies and theoretical lenses: sociological, psychological, historical, cultural, political, economic, legal and more. Students are encouraged to develop their own approach (both theoretical and methodological) to the study of mass communication and journalism, all while learning and collaborating with faculty who have a diverse range of specialties. An integral part of our doctoral students' education is their participation in the department's research and teaching missions through their assignments as research assistants, teaching assistants and graduate instructors.

The strategic communication and journalism studies tracks for the PhD are administered together by the departments of Advertising, Public Relations and Design, and Journalism. Students in both tracks are taught by and have access to the faculties of both departments. The curriculum includes an overview of mass/public communication literature with specific modules and courses dedicated to advertising, journalism and public relations. Classes also focus on areas that straddle each industry such as social media, political communication, ethics, media organizations, health communication and video games. We welcome and appreciate both qualitative and quantitative approaches to research. Graduates pursue teaching and research positions at universities as well as work in the private sector.

## Media Studies Track

Drawing largely from contemporary cultural and critical theory, the media studies track focuses on interactions among the major components of modern communication—media institutions, their contents and messages, and their audiences—as a process by which cultural meaning is generated. It examines this process on an interdisciplinary basis through social, economic, political, historical, legal/policy/regulatory and international perspectives, with a strong emphasis on issues involving new communication technology and policy.

Students graduate from the program with broad knowledge of the intellectual history of media studies as an important interdisciplinary field of research—its origins; its perennial questions and controversies; its evolution in response to technological, political, economic and cultural change; the full range of methods it employs, both humanistic and social scientific—and a demonstrated capacity to design and execute original and socially significant research about media and their historical and contemporary power and importance. The program strives to produce graduates who demonstrate intellectual leadership, nationally and internationally, in the area(s) of research specialization they choose and/or pioneer, and an interest in and aptitude for generating public awareness and conversation about their scholarship. An important part of doctoral students' education is their participation in the department's research and teaching missions through their assignments as research assistants, teaching assistants and instructors.

# Requirements

## Application Guidelines

Applicants to the PhD program in media research and practice are expected to hold a master's degree or have completed equivalent graduate work. In exceptional cases, applicants without a master's degree may be considered for admission.

Completed domestic applications must be received by the program no later than Jan. 10 prior to the fall semester for which entrance is sought. International applications should be submitted by Dec. 1. Late applications may be considered under special circumstances.

Successful applicants typically meet or exceed the following criteria:

- Have an undergraduate cumulative GPA of at least 3.2 and a cumulative GPA of at least 3.5 in previous graduate work.
- Provide three letters of recommendation, with at least two being academic references.
- Provide a 700-word statement of purpose.
- Provide a resume or CV that includes academic and employment experience.
- Provide a writing sample that exhibits the ability to undertake the conceptual and empirical studies required of doctoral students (e.g., a chapter from a master's thesis or graduate-level term paper).
- International applicants must also have a TOEFL score of 625 (IBT 106).

Meeting these criteria does not guarantee acceptance into the program. The program accepts relatively few new doctoral students each fall; there may be more qualified applicants than there are available openings.

In the online application, select "Advertising, Public Relations and Design" as the department, select "Media Research & Practice" as the degree, and then select your chosen program track.

For review and decision purposes, students are required to upload an unofficial copy of their transcript(s) in the online application. The program requires one copy of the scanned transcript from each undergraduate and graduate institution attended. This includes community colleges, summer sessions and extension programs. While credits from one institution may appear on the transcript of a second institution, unofficial transcripts must be submitted from each institution, regardless of the length of attendance and whether courses were completed.

*Failure to list and submit transcripts from all institutions previously attended is considered a violation of academic ethics and may result in the cancellation of admission or dismissal from the university.*

## General Requirements

Students take a minimum of 72 hours to complete their degrees, although they may take additional coursework if there is a justified need. Students are expected to complete their coursework and defend their dissertations in 4–5 years.

It is expected that students will devote their full time to the doctoral program and assistantship duties during the fall and spring semesters while enrolled in the program, unless other arrangements have been made with the department.

## Program Tracks

### Journalism Studies and Strategic Communication Tracks

Students are expected to complete the required courses listed below, in addition to 30 credits of electives.

Students are expected to take courses at the 6000 level or above. There are some exceptions to this in which doctoral students may receive permission to take 5000-level courses.

Students may take a maximum of two independent study courses in their course of study, either inside APRD and JRNL or outside of those home departments. Generally, these will be taken no earlier than the third semester of the program.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| JRNL/APRD 7001 | ProSeminar in Mass Communication Theory 1 | 3 |
| JRNL/APRD 7003 | ProSeminar in Mass Communication Theory II | 3 |
| JRNL/APRD 7004 | Doctoral Professionalization Seminar (1 credit per semester) | 4 |
| JRNL/APRD 7061 | Quantitative Research Methods (Quantitative Methods in Mass Communication) | 3 |
| JRNL/APRD 7051 | Qualitative Research Methods | 3 |
| JRNL/APRD 7002 | Research Design | 3 |
| JRNL/APRD 8991 | Doctoral Dissertation | 30 |
| **Electives** | | |
| Three additional graduate research methods courses (taken inside or outside the departments). | | 9 |
| A minimum of 18 hours of coursework selected on the basis of the student's area(s) of research interest (taken inside or outside the departments). | | 18 |
| **Total Credit Hours** | | **76** |

### Media Studies Track

Students may take up to 15 credit hours of coursework outside the Department of Media Studies, through a required outside emphasis (9 hours), which complements the student's plan of study, and through advanced methods in media research and practice (6 hours), which may include relevant courses offered either inside or outside of the department.

In general, courses in the media studies track emphasize the following cross-cutting themes that are treated throughout the curriculum:

- sophistication in the treatment of theoretical issues
- rigor and high ethical standards in the collection, analysis and presentation of research
- thorough knowledge of the historical context of media institutions and practices
- sustained focus on issues of social and cultural diversity (race, ethnicity, gender, class, sexuality), and on issues arising due to the increase in transnational media and information flows and influences

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MDST 7011 | Proseminar in Media Communication Theory 1 | 3 |
| MDST 7021 | Proseminar in Media and Communication Theory 2 | 3 |
| MDST 7061 | Quantitative Research Methods in Media [1] | 3 |
| MDST 7051 | Qualitative Research Methods in Media | 3 |
| MDRP 8991 | Dissertation | 30 |
| **Electives** | | |
| Advanced research methods | | 3 |
| One additional graduate research methods course or one media practice course | | 3 |
| Inside emphasis (4-5 Media Studies courses) | | 12-15 |
| Outside emphasis (3-4 courses in other units) | | 12-9 |
| **Total Credit Hours** | | **72** |

[1] Or comparable approved course on data methodologies.

## Comprehensive Examinations

Each doctoral student will be required to pass comprehensive examinations, consisting of four questions, which are generally administered after the last semester in which the student takes coursework. The examinations are individually tailored for each student and comprise both written and oral examinations.

## Dissertation

A minimum of 30 hours of dissertation credit, JRNL 8991/MDST 8991, must be taken. Various restrictions apply to these hours, including:

- No more than 10 dissertation credit hours may be taken in any one semester
- No more than 10 dissertation credit hours may be taken prior to the semester in which comprehensive examinations are taken
- No more than 10 dissertation credit hours may be taken in the semester in which comprehensive examinations are taken
- After passing comprehensive examinations, student must enroll for at least 5 dissertation credit hours (full time) or 3 dissertation credit hours (part time) each semester until graduation

Typically students enroll for 10 dissertation hours in the semester in which they are taking comprehensive examinations and 10 dissertation hours each in the following fall and spring terms. Students must be aware of Graduate School rules (http://www.colorado.edu/GraduateSchool/policies/) regarding registration for dissertation hours.

## Time Limit

Students are expected to complete the program and defend the dissertation in four years.

# Learning Outcomes

By the completion of the programs in Strategic Communication and Journalism Studies, students will be able to:

- Demonstrate expertise of conceptual and theoretical knowledge in the research literature of the discipline and demonstrate the ability to synthesize arguments through academic writing

- Demonstrate proficiency in social science methods
- Design and conduct high-quality, original research in the discipline
- Effectively communicate and present research to academic and public audiences in both written and oral form

By completion of the program in Media Studies, students will be able to:

- Demonstrate proficiency in core, interdisciplinary methods
- Gain expert knowledge in the discipline and engage critically with the intellectual origins of the field
- Design and conduct original, high-quality research

# Education

The School of Education offers programs that prepare individuals to lead in a wide array of educational settings, including teaching in K–12 classrooms, conducting educational research, developing evidence-informed policy and designing innovative learning environments both in schools and in community-based settings.

Graduate programs in the School of Education serve practicing teachers, higher education professionals, as well as those seeking to improve education through rigorous research and evidence-informed policy and practice. The School of Education's doctoral program is a cohort-based, full-time program that prepares individuals to lead in universities, research or policy institutes, state or government agencies and innovative non-profit organizations.

## Mission

Our mission in the School of Education is grounded in a lived commitment to democracy, diversity, equity and justice. We teach and conduct research to make a positive difference with and in schools and communities. The work of our faculty, researchers, staff and students leads to evidence-based policy and practice. We aim for our graduates to be engaged and informed educators, researchers, policymakers and community leaders.

## Licensure

The School of Education is authorized by the Colorado Department of Education and the Colorado Department of Higher Education to offer teacher preparation programs.

Because each state has its own laws and standards regarding teacher preparation, our teacher education programs do not prepare candidates for licensure in states other than Colorado. It is strongly recommended that students planning to seek professional licensure or certification in a state other than Colorado contact the appropriate licensing entity (https://www.colorado.edu/education/out-state-licensing-or-reciprocity-co-licensure-other-states/) in that state to seek information and guidance regarding licensure or certification requirements and how a degree from CU Boulder aligns with another state's requirements for licensure in advance of program completion.

# Policies & Requirements

## Admission

Prospective students seeking admission to a graduate degree program should view electronic application instructions and admission information on the School of Education Graduate Program (https://www.colorado.edu/education/academics/graduate-programs/) webpage. GRE test scores are optional for admission to the doctoral programs.

Admission to all programs and degrees in the School of Education is selective. Master's admissions deadlines are October 1 for spring semester, January 15th for Fall and Summer for international students, and February 1st for Fall and Summer for domestic applicants. Note that our MA+ Licensure programs only accept applications for the Summer term. The admissions deadline for PhD applicants is November 15th for international applicants and December 1st for domestic applicants. The PhD program only accepts applications for the Fall semester. Students should visit the International Admissions (http://www.colorado.edu/international/international-admissions/) webpage for additional forms and information.

## Advising

Graduate students are assigned a faculty advisor, who is their primary academic advisor. Students in the MA+ program will also be assigned an SOE Academic Advisor.

## Maximum Load and Part-Time Study

Enrollment status information, including guidelines and policies for full versus part-time enrollment in the context of financial aid and registration standards, can be found here: https://www.colorado.edu/registrar/students/records/info/enrollment-status (https://www.colorado.edu/registrar/students/records/info/enrollment-status/)

## Opportunities for Assistantships

The School of Education has a limited number of assistantships administered by the Dean on the recommendations of faculty and the Associate Deans. Some assistantships involve the supervision of student teachers; others involve helping professors in their teaching or research. Taxable stipends in amounts set by the university are paid for all assistantships. Appointments are usually made in terms of one-fourth time (10 hours a week) or one-half time (20 hours a week).

## Master of Arts in Education

The master of arts degree requires one academic year or more of graduate work beyond the bachelor's degree.

The master's degree must be completed within four years of initial enrollment. The MA plan II (non-thesis) degree requires a minimum of 30 credit hours to graduate. *See the Graduate School section for discussion of plan I and plan II.* Students may transfer no more than 9 credit hours of work taken at another institution or as a non-degree student at CU Boulder.

All program areas have outlined a recommended or required program of study, and students pursuing a degree are expected to follow that program unless they have appropriate substitutions arranged in advance with their advisors and the Associate Dean of Graduate Education.

At the beginning of the final term of study, each student must submit a "Candidacy Application for an Advanced Degree." These forms are available online through the Graduate School (https://www.colorado.edu/graduateschool/admissions/). The form is submitted by the student after conferring with the faculty advisor when submitted to the School of Education Graduate Programs Coordinator for initial approval and then to the Graduate School for final approval. All students are required to pass a final examination or its equivalent, as determined by the

program's faculty committee (for time limits and other information, see the Graduate School section under Master's degree).

# Doctor of Philosophy (PhD) in Education

Please see the PhD in Education (p. 1577) section of the catalog for details.

# Graduation

A student must apply for graduation via the student portal; this is the official notification to the Graduate School of intent to graduate during a given semester. The student will be permitted to graduate during a specific semester only if they have applied by the deadline for that semester. If they do not graduate during the semester for which they applied, the student must apply online again for the new semester. Application submissions are not retained beyond the semester indicated online. The Graduate School determines all deadlines. The student is responsible for meeting all deadlines to ensure graduation during a particular semester.

# Scholarships and Awards

Each year a number of merit-based Teaching Assistantships (TA), Research Assistantships (RA), Graduate Part-Time Instructors (GPTI) and fellowships are available in the School of Education to support full-time doctoral study. Half-time appointments (the maximum allowed) for 20 hours of work per week are the norm. Quarter-time RA, TA and GPTI appointments (10 hours per week) may also be made. The monetary amount of stipends paid for assistantships are set by the university. These stipends are taxable income. Students must be considered full-time to hold an assistantship. (Enrollment status policies are detailed here: https://www.colorado.edu/registrar/students/records/info/enrollment-status (https://www.colorado.edu/registrar/students/records/info/enrollment-status/).)

The strongest doctoral applicants are nominated by the school for fellowships awarded by the Graduate School. Candidates apply in the spring semester for scholarships and awards for the following school year. Application procedures and deadlines are publicized by the Graduate School.

Students are eligible to apply for university-wide financial assistance through the Office of Financial Aid. The Office of Financial Aid, in conjunction with the Graduate School, awards financial aid in the form of grants and work study jobs on the basis of both need and merit criteria. Students must be registered for a minimum of four credits in order to be eligible for Financial Aid.

State and federal programs are available for loan cancellation or forgiveness for Colorado teachers of certain subjects or who teach in designated schools serving students from low-income families. Information about these opportunities may be found on the School of Education (http://www.colorado.edu/education/admissions/financial-aid-scholarships/) website.

# Academic Standards

A grade average of B (3.00) or better is required for all work taken for any graduate degree. Transferred credits are not included when calculating grade averages.

A mark below B- will not be credited toward the PhD program; a mark below C is not acceptable for MA students. Students who do not maintain at least a B (3.00) average or better may be suspended by the Dean of the Graduate School upon the recommendation of the School of Education. Students may also be suspended from the Graduate School for continued failure to maintain satisfactory progress toward the degree sought.

Please refer to the Graduate School (p. 1103) for details on Academic Standing.

# Programs of Special Interest

## Graduate Certificate Programs

There are a number of interdisciplinary Graduate Certificate Programs (https://www.colorado.edu/graduateschool/admissions/where-begin/program-information-deadlines/certificate-programs/) that align with and expand School of Education programs of study. These include, but are not limited to:

### Quantitative Methods for Behavioral Sciences

The purpose of the Graduate Certificate in Quantitative Methods is fourfold: (a) to strengthen interdepartmental links and communication among social and human science departments at CU Boulder, both in general and specifically with regards to quantitative research methodology and statistical analysis, (b) to provide incentive and recognition to graduate students from a diverse set of departments who choose to cultivate expertise in quantitative research methods and methods of statistical analysis, (c) to increase the visibility of and promote courses in quantitative research methods (possibly with the benefit that additional quantitative courses can be developed and taught), and (d) as a consequence of all of the above, to improve the quality of quantitative training of graduate students at CU Boulder, increasing students' chances of employment upon completion of their graduate studies.

Please visit the Quantitative Methods for Behavioral Sciences (https://catalog.colorado.edu/graduate/colleges-schools/interdisciplinary-programs/quantitative-methods-behavioral-sciences-graduate-certificate/#requirementstext) certificate page for more details.

### Teaching English to Speakers of Other Languages

The Graduate Certificate in Teaching English to Speakers of Other Languages (TESOL) is a 14-15 credit post-baccalaureate program designed for individuals who wish to gain, or continue to develop, the professional knowledge, skills and dispositions that qualify them to teach learners of English as an additional language in the U.S. and/or abroad. This graduate certificate prepares teacher candidates to teach young learners, adolescents and adults in a number of contexts, domestic and abroad, including community-based programs, private language institutes, intensive English programs and after school programs.

Please visit the Teaching English to Speakers of Other Languages (https://catalog.colorado.edu/graduate/colleges-schools/arts-sciences/programs-study/linguistics/teaching-english-speakers-other-languages-graduate-certificate/#requirementstext) certificate page for more details.

### Culture, Language and Social Practice

The Graduate Certificate in Culture, Language and Social Practice (CLASP). This program provides an interdisciplinary forum on language and society for CU students and faculty. This is facilitated through regular colloquia on the subject of language and society, as well as the diverse course offerings in the CLASP graduate certificate program. The CLASP program brings cohesion to empirical and theoretical research currently conducted on campus in varied analytic traditions that focus on the study of culture, language and social practice. These traditions

include sociolinguistics, linguistic anthropology, literacy, bilingualism, second language acquisition, language endangerment and revitalization, narrative studies, symbolic interactionism, language variation and change, ethnography of speaking and diverse forms of discourse analysis, such as conversation analysis, critical discourse analysis, interactional sociolinguistics and multimodal discourse analysis.

Please visit the Culture, Language and Social Practice (https://catalog.colorado.edu/graduate/colleges-schools/arts-sciences/programs-study/linguistics/culture-language-social-practice-graduate-certificate/#requirementstext) certificate page for more details.

# Programs of Study

## Degree Programs

The degrees available in the various areas of graduate study are listed below.

### Curriculum & Instruction

- Master of Arts

### Educational Foundations, Policy & Practice

- Master of Arts
- Master of Arts in Higher Education

### Equity, Bilingualism and Biliteracy

- Master of Arts

### Learning Sciences & Human Development

- Master of Arts

### Teacher Leadership

- Master of Arts

### Education

The School of Education offers a PhD in Education, which has seven program areas of emphasis

- Doctor of Philosophy
  - Educational Foundations, Policy, and Practice
  - Equity, Bilingualism, and Biliteracy
  - Learning Sciences and Human Development
  - Literacy Studies
  - Research and Evaluation Methodology
  - STEM Education
  - Teacher Learning, Research and Practice

### Teaching Endorsements at the Graduate Level

Through the School of Education, CU Boulder offers advanced coursework leading to teacher added endorsements in the following areas:

- Culturally & Linguistically Diverse Education (grades K–12)
- Culturally & Linguistically Diverse Bilingual Education Specialist (grades K–12)
- Special Education Generalist (grades K–12)

All of the above programs have degree, licensure or experience requirements that must be fulfilled before admission. Please check with the School of Education before applying.

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Boardman, Alison Gould (https://experts.colorado.edu/display/fisid_141887/)
Associate Professor; PhD, University of Texas at Austin

Boninger, Faith Gleicher (https://experts.colorado.edu/display/fisid_150087/)
Assistant Research Professor; PhD, Ohio State University

Braaten, Melissa (https://experts.colorado.edu/individual/fisid_157744/)
Associate Professor, Associate Dean; PhD, University of Washington

Briggs, Derek Christian Mauthner (https://experts.colorado.edu/display/fisid_129597/)
Professor; PhD, University of California, Berkeley

Cartun, Ashley (https://experts.colorado.edu/display/fisid_157851/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Contreras, Ana (https://experts.colorado.edu/display/fisid_168932/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Crawley, Adam (https://experts.colorado.edu/display/fisid_172505/)
Associate Teaching Professor; PhD, University of Georgia

DiStefano, Philip (https://experts.colorado.edu/display/fisid_101934/)
Dean Emeritus, Professor; PhD, Ohio State University

Donato, Ruben (https://experts.colorado.edu/display/fisid_105537/)
Professor Emeritus; PhD, Stanford University

Dutro, Elizabeth (https://experts.colorado.edu/display/fisid_141157/)
Professor, Associate Dean; PhD, University of Michigan Ann Arbor

Dyrness, Andrea E. (https://experts.colorado.edu/display/fisid_159487/)
Associate Professor; PhD, University of California-Berkeley

Engel, Mimi (https://experts.colorado.edu/display/fisid_159488/)
Associate Professor; PhD, Northwestern University

Escamilla, Kathy M. (https://experts.colorado.edu/display/fisid_109224/)
Professor Emerita; PhD, University of California, Los Angeles

Farrell, Caitlin (https://experts.colorado.edu/display/fisid_155193/)
Associate Research Professor; PhD, University of Southern California

Furtak, Erin M. (https://experts.colorado.edu/display/fisid_144504/)
Professor; PhD, Stanford University

Gleason, Emily (https://experts.colorado.edu/display/fisid_164268/)
Teaching Professor, Faculty Director; PhD, University of California, Berkeley

Glenn, Wendy J. (https://experts.colorado.edu/display/fisid_159489/)
Professor; PhD, Arizona State University

Gort, Mileidis (https://experts.colorado.edu/display/fisid_157992/)
Professor, Associate Dean; EdD, Boston University

Gumina, Deena (https://experts.colorado.edu/display/fisid_168202/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Gurantz, Oded (https://experts.colorado.edu/display/fisid_171734/)
Associate Professor; PhD, Stanford University

Hackett, Chelsea (https://experts.colorado.edu/display/fisid_148516/)
Assistant Teaching Professor; PhD, New York University

Her Many Horses, Ian (https://experts.colorado.edu/display/fisid_144780/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Hildreth, Roudy (https://experts.colorado.edu/display/fisid_155457/)
Assistant Teaching Professor; PhD, University of Minnesota

Jurow, Aachey Susan (https://experts.colorado.edu/display/fisid_129478/)
Professor, Associate Dean; PhD, University of California, Berkeley

Kirshner, Benjamin R. (https://experts.colorado.edu/display/fisid_134707/)
Professor; PhD, Stanford University

Korbelik, Jennifer (https://experts.colorado.edu/display/fisid_165078/)
Assistant Teaching Professor; MA, University of Denver

Leonardi, Bethy (https://experts.colorado.edu/display/fisid_151475/)
Associate Professor; PhD, University of Colorado Boulder

Lindsay, William (https://experts.colorado.edu/display/fisid_168224/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Lopez, Enrique J. (https://experts.colorado.edu/display/fisid_151426/)
Associate Professor, Faculty Director; PhD, Stanford University

McIntosh, Betsy (https://experts.colorado.edu/display/fisid_160017/)
Assistant Teaching Professor; PhD, University of Pennsylvania

Meyer, Elizabeth Jackson (https://experts.colorado.edu/display/fisid_156354/)
Professor; PhD, McGill University (Canada)

Molnar, Alex John (https://experts.colorado.edu/display/fisid_148836/)
Research Professor; MSW, University of Wisconsin-Milwaukee

Moses, Michele S. (https://experts.colorado.edu/display/fisid_141025/)
Professor, Vice Provost; PhD, University of Colorado Boulder

Nogueron-Liu, Silvia (https://experts.colorado.edu/display/fisid_155783/)
Associate Professor; PhD, Arizona State University

Nzinga, Kalonji (https://experts.colorado.edu/display/fisid_165958/)
Assistant Professor; PhD, Northwestern University

Otero, Valerie K. (https://experts.colorado.edu/display/fisid_118377/)
Professor, Faculty Director; PhD, University of California, San Diego

Palmer, Deborah (https://experts.colorado.edu/display/fisid_157996/)
Professor; PhD, University of California, Berkeley

Pasquesi, Kira (https://experts.colorado.edu/display/fisid_158236/)
Associate Teaching Professor; PhD, University of Iowa

Penuel, William Richard (https://experts.colorado.edu/display/fisid_149719/)
Distinguished Professor; PhD, Clark University

Polman, Joseph Louis (https://experts.colorado.edu/display/fisid_151296/)
Professor, Associate Dean; PhD, Northwestern University

Rexroth, Grace (https://experts.colorado.edu/display/fisid_167469/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Santiago Schwarz, Vanessa (https://experts.colorado.edu/display/fisid_163872/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Schultz, Kathy (https://experts.colorado.edu/individual/fisid_157988/)
Professor; PhD, University of Pennsylvania

Scornovacco, Karla
Assistant Teaching Professor; PhD, University of Colorado Boulder

Shear, Benjamin R. (https://experts.colorado.edu/display/fisid_157747/)
Assistant Professor; PhD, Stanford University

Shepard, Lorrie A. (https://experts.colorado.edu/display/fisid_105949/)
Professor Emeritus; PhD, University of Colorado Boulder

Sideris, Sabrina (https://experts.colorado.edu/display/fisid_120493/)
Assistant Teaching Professor; PhD, University of Denver

Sinha, Vandna (https://experts.colorado.edu/display/fisid_165162/)
Associate Research Professor; PhD, University of Denver

Staley, Sara J. (https://experts.colorado.edu/display/fisid_155137/)
Assistant Professor; PhD, University of Colorado Boulder

Stillman, Jamy A. (https://experts.colorado.edu/display/fisid_156381/)
Associate Professor; PhD, University of California, Los Angeles

Taylor, Edward V. (https://experts.colorado.edu/display/fisid_151510/)
Associate Teaching Professor; PhD, University of California, Berkeley

Valladares, Michelle
Associate Research Professor, Associate Director; PhD, University of California, Los Angeles

Van Buskirk, Allison (https://experts.colorado.edu/display/fisid_159795/)
Assistant Teaching Professor; MA, Naropa University

Veveer, Elaina
Assistant Teaching Professor; MA, University of Colorado Boulder

Webb, David C. (https://experts.colorado.edu/display/fisid_141204/)
Associate Professor; PhD, University of Wisconsin–Madison

Welner, Kevin G. (https://experts.colorado.edu/display/fisid_115565/)
Professor Emeritus; PhD, University of California, Los Angeles

White, Terrenda Corisa (https://experts.colorado.edu/display/fisid_152828/)
Associate Professor; PhD, Teachers College at Columbia University

Wilson, Terri Suzanne (https://experts.colorado.edu/display/fisid_155469/)
Associate Professor, Faculty Director; PhD, Columbia University

# Courses

**EDUC 5001 (3) Framing Equity and Justice in the Humanities Classroom**
Critically frames learning to teach for equity and justice within schools as systems. Orients students to the School of Education's mission and guiding principles of the Secondary Humanities program. Provides opportunities for students to enact those principles with mentor teachers in local classrooms. Meets weekly on CU campus and involves a minimum of 50 hours in local schools.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4001
**Requisites:** Restricted to Masters-level teacher licensure students with a English-Secondary Education (EDEN-LICG) or Social Studies-Secondary Educ (EDSS-LICG) plan.
**Grading Basis:** Letter Grade

**EDUC 5002 (3) Framing Equity and Justice in the STEM Classroom**
Critically frames learning to teach for equity and justice in Science, Technology, Engineering, and Mathematics [STEM] Classrooms. Orients students to the School of Education's mission and guiding principles of the CU Teach program. Provides opportunities for students to enact those principles with mentor teachers in local classrooms. Meets weekly on CU campus and involves a minimum of 40 hours in local schools.
**Requisites:** Restricted to Mathematics-Secondary Education (EDMA-LICG) or Science-Secondary Educ (EDSC-LICG) students only.
**Grading Basis:** Letter Grade

**EDUC 5005 (3) Advanced Social Foundations of Education**
Critically examines the intellectual and political forces that shape the aims, policies, and practices of K-12 education in the United States.
**Requisites:** Restricted to Educ-Curriculum Instruction (EDCI) graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5010 (3) Race and Equity in Higher Education**
This course introduces students to recent research and theory surrounding race, ethnicity, access, inclusion, and equity in higher education. It focuses on the development of knowledge, skills and awareness that is crucial in becoming an engaged scholar and practitioner in the areas of diversity, equity, and inclusion. We discuss the responsibilities, tensions, and opportunities one must have in creating and maintaining a pluralistic and inclusive campus for all. We also discuss ways in which themes of identity and diversity operate far beyond one-on-one relationships but rather extend to systems and structures that comprise a college and/or university environment.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4010
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5011 (1) College Student Career Development**
Explores the diverse aspects of career development for college students. Examines the different models of career services for students in different schools, colleges and majors.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5012 (1) Higher Education Finance**
Covers the major, basic elements of budgeting and finance in higher education. It is designed to address the budget process in colleges and universities, as well as the impact of budget activities on other areas of planning and operations within an institution. Enhances students' knowledge of both internal and external financial environments facing higher education.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5014 (1) Ethical Dilemmas in Higher Education**
Examines ethical issues involved in higher education and student affairs administration. Uses real and fictional ethical cases to bring to light various moral and ethical tensions relevant for higher education and student affairs professionals.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5015 (3) International / Comparative Education**
Comparatively studies education in other countries, emphasizing its role in developing nations, with an emphasis on successful models in basic literacy, primary education, secondary curriculum and teacher education. Analyzes political, social and economic policies and ideologies for their relevance to the development process, including the role of international organizations: World Bank, UNICEF, UNESCO, Peace Corps and Volunteer Agencies.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4015
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5020 (1) College Academic Advising**
Explores the diverse aspects of academic advising for college students. Examines the different models of advising for students in different schools, colleges and majors.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5021 (1) College Athletic Affairs**
Examines the relationship between student-athletes and the institution and explores how intercollegiate athletics fits into the academic enterprise of higher education. Key questions include: 1) what purpose does athletics serve and 2) for whose benefit? With these questions in mind, we examine the range of issues at the intersection of athletic administration, student development theory, and educational leadership and policy.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5022 (1) LGBTQ+ Topics in Higher Education**
Explores the diverse aspects of college and university life for students, staff, and faculty who identify as LGBTQ+. Examines the different higher education supports and challenges for LGBTQ+ student populations.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5023 (1) College Admissions and Enrollment**
Explores the diverse aspects of college and university student recruitment, outreach, admissions, and enrollment. Examines the different models of admissions processes and systems, with attention to relevant politics and professional practices.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5026 (1) Technology in Higher Education**
Examines impact of technology on higher education and student affairs. Explores impact of technology on students and their development, and teaching and learning. Although technical aspects of technology are discussed in some depth, this is not designed as a 'technical' course; the content revolves around implications of technology as both a driving and a supportive element within higher education
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5027 (1) Institutional Advancement and Development in Higher Education**
Examines the roles of institutional advancement, development, and fundraising in higher education and student affairs. Explores the impact of advancement on students, staff, and faculty, as well as on teaching and learning, research, campus life, and the larger community. The content will revolve around implications of development work as both a driving and a supportive element within higher education.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5028 (1) International Education in Higher Education and Student Affairs**
To provide an introduction to the field of international education. Students pursuing graduate studies in higher education administration will benefit from an overview of global student mobility trends and an exploration of career pathways within the field. In-class discussions, out-of-class readings, and guest speakers will guide student learning.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade

**EDUC 5030 (1) Accessibility and Students with Disabilities in Higher Education**
Provides students with important knowledge about issues of accessibility and development for students with disabilities in higher education. Examines strategies to offer support and guidance to students with disabilities in order to foster a safe and engaging learning and living environment.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5031 (1) Institutional Research & Analytics in Higher Education**
Examines the roles and uses of institutional research and data analytics in higher education and student affairs. Provides students with a foundational understanding of the field of institutional research and data analytics in higher education. Explores the activities in which institutional researchers engage, the tools they need to be successful in their jobs, the topics they study and issues they investigate.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5032 (1) College Student Leadership Development**
Surveys the study and practice of leadership and provides students with a variety of experiences to wrestle with large leadership questions. What is leadership? Who can be a leader? How is leadership an important aspect of understanding self and others?
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5033 (1) Special Topics in Higher Education**
This 1-credit "module" course examines special topics in higher education practice. The course is designed to feature emerging questions of higher education policy and practice. This course satisfies requirements for the MA in Higher Education program, but is also open to other students.
**Repeatable:** Repeatable for up to 4.00 total credit hours.

**EDUC 5035 (3) Family and Community Engagement**
Focuses on models and strategies for improving parent and community involvement in the schools. Discusses administrative concerns, such as parent advisory councils, and instructional concerns, such as helping children with school assignments.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5050 (3) Knowing and Learning in Mathematics and Science**
The course is aimed at providing graduate students the opportunity to engage deeply with theories of mathematics and science learning for the purposes of designing engaging and affirming learning environments. The course is centered around reading deeply and critically in the literature on learning theory, coupled with a youth and community-based research project.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4050
**Requisites:** Restricted to graduate students only.

**EDUC 5060 (3) Classroom Interactions**
Students design and implement instructional activities informed by what it means to know and learn mathematics and science, and then evaluate the outcomes of those activities on the basis of classroom artifacts. Students examine how content and pedagogy combine to make effective teaching. Students are required to work in a classroom 4 hours per week.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4060
**Requisites:** Restricted to Educ-Curriculum Instruction (EDCI) graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5065 (3) Curriculum Theories**
Examines four central curricular traditions: progressive; conservative; radical; and spiritual. Highlights the strengths and weaknesses of various writers within each tradition with attention paid to the conceptual features and the practical implications of each educational view. Encourages students to examine their own educational assumptions.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5070 (3) Spirituality and Religion in Education**
Examines features of religion, spirituality, and a liberal arts education, so as to further understand the constitutional, historical and cultural constraints on, and acceptable approaches to the study of religion and spirituality in American education. Specifically explores aspects of a contemplative orientation and the degree to which such an orientation should/can be pursued in K-12 public and higher education.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5075 (3) Sociology of Education**
In-depth analysis of theories and concepts in sociology and education. Evolution of curriculum, organization, and enrollment characteristics of American schools. Schooling, race, class, culture, gender, stratification, and educational reform in light of paradigmatic change in theories and concepts of sociology.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5085 (3) History of American Education**
Highlights social and intellectual history perspectives of American educational history, major reform movements from the 19th century to Dewey, and assessment of how differences of race, class, ethnicity, religion, power, and gender affected American education.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5105 (3) Teaching for Understanding and Equity**
Addresses perspectives and evidence-based teaching practices that promote equity and access to conceptual understanding. Introduces the knowledge base on effective and socially just teaching practices, and the theories and research that support these practices. Explores the impact of theory and research on classroom instruction.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5112 (3) Educational Psychology and Adolescent Development**
Analyzes fundamental concepts from psychology and the learning sciences to understand how educators can support youth development in and out of school. Includes service learning requirement. This course is not appropriate for in-service teachers.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4112
**Requisites:** Restricted to graduate students only.

**EDUC 5115 (3) Issues in School Change and Reform**
Examines recent developments in teaching, and trends in the philosophy and practice of education. Focuses special attention on a variety of issues central to school reform.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5135 (3) Story and Memoir**
Explores narrative theory and the epistemological/stylistic commitments of stories as the basis for writing memoir, as well as for studying the written and spoken memoirs of others. We use the word memoir to mean a story of "how one remembers one's own life." Introduces and discusses narrative theory and selected memoirs. Students engage in reflection on their own narrative-making processes and evaluate their practical and analytic understanding of daily narrative practice.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4135
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5145 (3) Gender, Literacy, and the K-12 Classroom**
Explores and critiques various conceptions of gender within popular and scholarly publications that have influenced how gender and sexual diversity is approached in classrooms. Builds a theoretical stance toward gender and sexual diversity that supports equity, engagement and achievement for all children and youth. Discusses teaching strategies that thoughtfully take into account gender identities and equity.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5150 (3) Introduction to Qualitative Research Methods**
Introduces students to qualitative research in education. Examines the foundations, design, methods and analysis of qualitative research methods. Readings include texts about the foundations and purposes of qualitative inquiry, and methodological readings about the application of research techniques. Students will complete a variety of small, hands-on projects that introduce major dimensions of qualitative research including observation, interviewing, and document analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4150
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Education

**EDUC 5165 (3) Children's Literature**
Involves reading and evaluation of picture books, and emphasizes children's interests, authors and illustrators, multicultural literature, the components of narrative, and the features of illustrations. Examines connections between children's literature and children's development as writers.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5177 (3) Curriculum and Policy in Mathematics and Science Education**
This course explores the changing curriculum in school mathematics and science. It will examine the history and evolution of K-20 math and science curricula from the late 1890s to current times. It will examine motivations and political forces that have help shape and change math and science curricula.
**Requisites:** Restricted to graduate students only.

**EDUC 5178 (3) Theories of Learning in Math and Science Education**
This course focuses on research on the learning of mathematics and science in the K-12 schooling environment. It serves to introduce students to seminal learning theories that have guided and shaped mathematics & science education over the past thirty years (e.g., constructivist, cognitive, situative/sociocultural and critical perspectives). Core ideas within each of these theoretical perspectives will be explored such as knowledge construction and conceptual change, argumentation and reasoning, classroom discourse processes, participation and identity, and access and power. Implications of these different theoretical perspectives for classroom teaching and learning will also be examined. For example, questions such as the following are considered: What is the purpose of a theory of learning (e.g., for teaching, for education systems)? What constitutes learning within each perspective? What are the implications of a particular theoretical perspective for organizing learning environments? What are the implica
**Requisites:** Restricted to graduate students only.

**EDUC 5179 (3) Seminar on Teaching and Teacher Education in Math and Science Education**
This course examines how scholarship on teaching and teacher learning has been evolving in mathematics and science educational research since the 1980s and 1990s. Students will explore theories of teacher learning and how they relate to designs for teacher preparation and professional development. We will also study common designs and design principles for conducting research to study teaching and teacher learning.
**Recommended:** Prerequisites EDUC 5060 and EDUC 6318.
**Grading Basis:** Letter Grade

**EDUC 5205 (3) Elementary Mathematics Theory and Methods**
Provides pre-service teachers opportunities to explore contemporary theories of learning, curriculum development, and pedagogical strategies pertaining to teaching elementary-level mathematics. Blends exploration in mathematical content with development of sophisticated mathematical models for teaching.
**Requisites:** Requires corequisite course of EDUC 4351. Restricted to Elementary Education (EDEL) majors only.
**Additional Information:** Departmental Category: Elementary Education

**EDUC 5215 (3) Elementary Science Theory and Methods**
Provides pre-service elementary teachers opportunities to explore contemporary theories of learning, curriculum development, pedagogical strategies, and assessment. Blends scientific content, pedagogy, and practical applications.
**Requisites:** Requires corequsite courses of EDUC 4331 and 4341. Restricted to Elementary Education (EDEL) majors only.
**Additional Information:** Departmental Category: Elementary Education

**EDUC 5220 (3) Curating and Evaluating Reading Materials for K-12 Classrooms**
In this course, MA students will explore how educators can curate, evaluate, and use different literacy materials for reading and other classroom instruction. Of particular focus will be Children's and Young Adult Literature, decodable books, trade books, and non-traditional texts (e.g., web resources) spanning fiction and nonfiction genres. Attention will be given to texts' written and illustrative quality, cultural relevance and authenticity, and the impacts of these on readers' development and interest.
**Requisites:** Restricted to graduate students only.

**EDUC 5222 (3) Language Study for Educators**
Focuses on the nature of linguistic development and performance. Examines works that reflect a range of scholarly approaches to language study, explores language use both in and out of school, takes up the relationships between language practices and power and considers implications for classroom teaching.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4222
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5235 (3) Language and Literacy Across the Curriculum**
Explores the relationship between language and learning in math and science classrooms with the goal of developing teaching practices that engage students in using language as a tool for understanding and constructing meaning across the curriculum. Explores how language/literacy take on different forms and functions in different social contexts and academic disciplines.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4232
**Requisites:** Restricted to EDCI, EECD, EFPP, EPSY or REME graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5245 (3) Foundations of Reading Instruction K-12**
In this course, MA students build and expand their understanding of the five pillars of reading instruction: phonemic awareness, phonics, fluency, vocabulary, and comprehension. They will gain in-depth and up-to-date knowledge about the Science of Reading and the Science of Teaching Reading, as well as the language comprehension and word recognition strands that are woven into skilled reading.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5255 (3) Digital & Disciplinary Literacies**
In this course, MA students will analyze current technology integration practices in literacy instruction, and their impact on the building, expanding, and transformation of disciplinary literacies¿the situated and specific literacy practices necessary to engage in a particular discipline or content area. We will explore the intersections between digital literacies and new media, knowledge building, and project-based inquiry perspectives when children and youth read texts in the content areas of literature, science, and social studies.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5265 (3) Processes & Skills in Writing**
In this course, MA students examine processes that writers use from early ages to maturity by investigating current research related to writing curriculum, instruction, and policy. Includes opportunities for students to engage in inquiry related to writing curriculum and instruction in K-12 classrooms. This course will also examine the ways in which the Science of Reading and Writing can be incorporated into writing pedagogy models.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5275 (3) Diagnostic Reading Assessment & Intervention**
In this course, students develop the concept of reading assessment and evaluation for diagnostic purposes, in order to identify supports for students experiencing reading difficulties and to design reading intervention within an MTSS model. Students explore how factors such as psychological, cognitive, and sociocultural perspectives, educational policies, community and school practices, and curricular and teacher expectations influence assessment (data that are collected) and evaluation (interpretive decisions about assessment data).
**Requisites:** Requires a prerequisite course of EDUC 5245 (minimum grade C-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5285 (3) Literacy Coaching & Leadership**
The objective of the course is to extend, synthesize, and apply learning gained throughout the program, and to engage participants with advanced topics in literacy, particularly those related to reading interventions and instructional leadership. In addition, many opportunities are provided for demonstrating and evaluating quality small-group and whole-class literacy lessons.
**Requisites:** Requires a prerequisite course of EDUC 5275 (minimum grade C-). Restricted to graduate students.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5295 (3) Narrative and Story in the Humanities**
Explores a wide variety of texts that might be used in secondary English and Social Studies classrooms. Examines philosophies and instructional approaches to the teaching of reading and literature. Considers the influence of story and storytelling in the construction of personal and societal meaning.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4295
**Requisites:** Requires prerequisite of EDUC 5001 (minimum grade C-). Restricted to teacher licensure students in English (EDEN-LICG).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5301 (3) Queer(ing) Topics in Education**
Bring critical and queer theoretical perspectives to bear on an inquiry into what's counted as "normal" in social, historical, and political contexts of education in the United States. We'll explore queerness, queer theory, and queer pedagogy, in an effort to examine schooling as a heteronormative institution that has tended toward (re)producing heterosexism, homophobia, and violence against queer bodies and identities.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4301
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5310 (3) Social and Emotional Learning in Schools**
Explore the ways SEL benefits students through investigating its purposes and goals, the competencies it seeks to promote, the characteristics of effective programs, and the range of program formats. We frame these topics through examining ongoing dilemmas in the field. We also conduct in-depth reviews of several programs and the research that supports them.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4310
**Requisites:** Restricted to graduate students only.

**EDUC 5315 (3) Perspectives on Science**
Explores contemporary ideas and issues in the history, philosophy and sociology of science education and science, science as a social and cultural activity and how contemporary issues in science relate to and impact educational practice.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4315
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5316 (3) Nature of Social Studies and Social Studies Education**
Prepares teacher education candidates for teaching social studies in a social context. Participants will understand theoretical and developmental processes associated with social studies learning, methods for teaching social studies in a diverse society, and the integration of classroom instruction with the Colorado Academic Content Standards that foster such processes.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4316
**Requisites:** Restricted to Social Studies Secondary Education (EDSS-LICU or EDSS-LICG) students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5317 (3) Perspectives on Mathematics**
Explores the historical development of mathematics as a human construct, and the relationship between the discipline and the contemporary school mathematics curriculum. Focuses on the sociology of mathematics education and how cultural traditions and societal needs influence the school mathematics curriculum and educational practice.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4317
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5325 (3) Queering Literacy in Secondary Classrooms**
Engages theories and practices of literacy teaching and learning that challenge multiple forms of oppression. Using the tools of queer pedagogy, students will learn, develop, and enact strategies for planning and implementing literacy instruction that moves beyond inclusion of differences in the English/language arts and social studies curriculum.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4325
**Requisites:** Restricted to Master's teacher licensure students in English (EDEN-LICG).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5330 (3) Secondary Social Studies Methods I**
Explores effective social studies teaching techniques used to prepare secondary students for success in college, career, and civic life. An emphasis is placed on interpreting sources, understanding multiple perspectives, and employing critical thinking with diverse students.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4330
**Requisites:** Requires prerequisite of EDUC 5001 (minimum grade C-). Requires corequisite of EDUC 4901. Restricted to teacher licensure students in Social Studies (EDSS-LICG).
**Grading Basis:** Letter Grade

**EDUC 5345 (3) Secondary English Methods I**
Explores the underlying principles and philosophies of several approaches to the teaching of English in the areas of language, writing, and speaking and the practical application of these methods in the secondary classroom. Provides support in constructing activities, assignments, assessments, and units that meet the differentiated needs of students given their diverse identities, lives, interests, and needs.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4345
**Requisites:** Requires a prerequisite of EDUC 5001 (minimum grade C-). Requires corequisite of EDUC 4901. Restricted to teacher licensure students in English (EDEN-LICG).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5355 (3) Secondary Social Studies Methods II**
Explores effective techniques associated with reading, processing, and assessing social studies subject area content with an emphasis on developing critical thinking skills and meeting the needs of diverse students.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4355
**Requisites:** Requires prerequisite course of EDUC 4330 or EDUC 5330 (minimum grade C-). Restricted to teacher licensure students in Social Studies (EDSS-LICG).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5365 (3) Secondary English Methods II**
Explores the underlying principles and philosophies of several approaches to the teaching of English in the areas of reading, thinking, and viewing and the practical application of these methods in the secondary classroom. Provides support in constructing activities, assignments, assessments, and units that meet the differentiated needs of students given their diverse identities, lives, interests, and needs.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4365
**Requisites:** Requires prerequisite course of EDUC 4345 or EDUC 5345 (minimum grade C-). Restricted to teacher licensure students in English (EDEN-LICG).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5375 (3-4) Problem-Based Math Instruction**
Focuses on curriculum, materials, methods and assessment, and related aspects of instruction. Introduces best practices in teaching mathematics in middle and high schools. Students are required to work in a classroom 4 hours per week. Examines the Colorado Academic Content Standards.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4375
**Requisites:** Restricted to EDCI, EDSC, or EDMA majors only.
**Recommended:** Corequisite EDUC 4023.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5385 (4) Phenomenon-Based Science Instruction**
Focuses on curriculum, materials, methods, assessment, and related aspects of instruction. Introduces best practices in teaching science in middle and high schools. Students are required to work in a classroom 4 hours per week. Examines the Colorado Academic Content Standards.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4385
**Requisites:** Restricted to EDCI, EDSC, or EDMA majors only.
**Recommended:** Corequisite EDUC 4023.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5390 (3) Seminar: Teaching for Equity and Justice**
Supports candidates as they continue to develop the skills and stance to teach for equity and justice in public school settings. Explores how educators for equity and justice sustain their commitments through ongoing learning and reflection, care for their students and themselves, and collaboration and advocacy. Supports candidates in making the transition from the university into the profession in a way that allows them to remain true to their vision of who they are and want to be as educators.
**Requisites:** Requires prerequisite of EDUC 5330 or EDUC 5345 (both minimum grade C-). Restricted to teacher licensure students in English (EDEN-LICG) or Social Studies (EDSS-LICG).
**Grading Basis:** Letter Grade

**EDUC 5425 (3) Introduction to Bilingual/Multicultural Education**
Provides an introduction for currently practicing K-12 teachers and non-specialists to bilingual and multicultural education programs for emergent bilingual students. Includes an overview of the history and legislation related to the education of emergent bilingual students, identification and placement, as well as the various models, theoretical and philosophical underpinnings, and pedagogical practices that constitute sound educational practices for emergent bilingual students.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4425
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5435 (3) Materials and Methods in Bilingual/ Multicultural Education**
Provides an in-depth study of the curriculum options available for bilingual and ELD programs. Presents, reviews, and critiques specific methods and strategies for teaching language to minority students. Gives the opportunity to develop and present teaching units in Spanish or in ELD methodology, as appropriate.
**Requisites:** Requires a prerequisite course of EDUC 5425 (minimum grade C-).
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5445 (3) Curriculum for Multicultural Education**
Analyzes curriculum programs and examines principles that inform innovation for education of diverse students at all school levels. Includes topics of ethnic, racial, socio-economic, linguistic, and gender diversity.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5455 (3) Literacy for Linguistically Different Learners**
Presents current and emerging philosophies and methods on teaching reading to culturally diverse second-language learners. Includes review of materials, strategies for teaching reading and writing skills, and important considerations for transference from L1 to L2 reading.
**Requisites:** Requires a prerequisite course of EDUC 5425 (minimum grade C-).
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5460 (3) Teaching and Learning Physics**
Learn how people understand key concepts in physics. Through examination of physics content, pedagogy and problems, through teaching, and through research in physics education, students will explore the meaning and means of teaching physics. Students will gain a deeper understanding of how education research is done and how people learn. Useful for all students, especially for those interested in physics, teaching, and education research.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4460 and PHYS 4460 and PHYS 5460
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5465 (3) Introduction to ELD/Bilingual and Special Education**
Provides students with the fundamental information of ELD, bilingual and special education, including theories, assumptions, philosophies, and paradigms of bilingual and special education. Discusses successful teaching techniques and instructional approaches, including individualization, least restrictive environment, transition, and career education.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5485 (3) Differentiation in the Classroom**
Focuses on teaching culturally and linguistically diverse students, special education students, and differentiation in the classroom. Emphasizes evidence-based teaching practices, programmatic interventions that support student learning and using research to inform practice. Includes practicum. Department enforced prerequisite: restricted to MA+ students.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5490 (3) Blurring Disciplinary Lines in the Humanities**
Explores theories, methods, and materials for building interdisciplinary connections within and across secondary English and Social Studies classrooms. Provides opportunities for collaborative work in building lessons and unit plans that challenge disciplinary boundaries and advocate for complex problem solving.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4490
**Requisites:** Requires prerequisite of EDUC 5345 or EDUC 5330 (minimum grade C-). Restricted to teacher licensure students in English (EDEN-LICG) or Social Studies (EDSS-LICG).
**Grading Basis:** Letter Grade

**EDUC 5505 (3) Education of Students with Learning and Behavior Disorders**
Discusses unique learning needs of students with learning and behavior disorders. Emphasizes development of a systems model for diagnosis, programming, and remediation. Stresses data-based individualization of instruction, with emphasis on intervention in inclusive learning environments and developing a culturally responsive system.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5515 (3) Curriculum and Assessment for Special Learners**
Emphasizes assessment of special education students from pre-referral through staffing and placement, including response to intervention, research-based assessment practices, analytic teaching and assessment, curriculum-based assessment and measurement. Selection, administration, and interpretation of formal and informal assessment devices are studied, with particular emphasis on cultural relevance and equity in assessment for special learners with mild to severe needs.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5525 (3) Research Issues in Special Education**
Provides practical experience in the review, critique, conceptualization, and writing of research studies in special education. Also offers experience in design of evaluation systems for classroom practice.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5535 (3) Assessment in Bilingual Communities**
Promotes critical uses of assessment instruments and information. Provides methods for educators to incorporate assessment as a meaningful activity in the classroom intended to support learning among bilingual students. Examines effectiveness, validity, and fairness in the testing of linguistically diverse populations. Provides first-hand experiences developing, selecting, reviewing, and adapting test materials as critical to making informed teaching decisions.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5545 (3) Strategies for Teaching Students with Special Needs**
Provides teachers with specific evidence-based methods and techniques for teaching students with a wide variety of high and low disabilities including learning and language disabilities, hearing and visual impairments, physical disabilities, and health impairments. Emphasizes different teaching methods, instructional materials, and learning strategies that have proven effective working students with cognitive learning needs.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5555 (3-4) Practicum in Bilingual/Special Education**
Offers supervised field experience in elementary and secondary special education class settings. Each credit hour requires 50 contact hours.
**Requisites:** Requires prerequisite courses of EDUC 5465 and EDUC 5505 and EDUC 5515 or EDUC 5545 (all minimum grade C-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5575 (1-4) Workshop in Curriculum and Instruction**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5580 (3) Physics and Everyday Thinking**
Engages non-physics majors in hands-on, minds-on activities and labs to investigate the physical world, the nature of science, and how science knowledge is constructed. This introductory course is especially relevant for future elementary and middle school teachers although it will meet the needs of most non-physics and non-science majors. Physics content focuses on interactions and energy.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5595 (1-4) Practicum for Educators of Linguistically Diverse Communities**
University supervised, school-based field experience teaching linguistically different students, as well as assistance in the completion of EECD portfolio.
**Requisites:** Requires prerequisite courses of EDUC 5425 and EDUC 5435 and EDUC 5535 (all minimum grade C-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5605 (3) Research Issues in Bilingual Education**
Offers practical experience in the review, critique, conceptualization, and writing of research studies in bilingual/ELD education. Provides experience in the design of classroom evaluation systems.
**Requisites:** Requires a prerequisite course of EDUC 5245 (minimum grade C-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5610 (1-3) Math and Science Education**
Introduces learning theory and teaching practices for mathematics and science learning assistants. Presents theoretical issues such as conceptual development, questioning techniques, cooperative learning, nature of math/science, and argumentation in mathematics and science.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5615 (3) Language Acquisition for Bilingual Learners**
Presents a broad survey of second-language acquisition research. Stresses theoretical concerns and research findings and practical applications to teaching second languages. Gives special emphasis to second-language acquisition.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5625 (3) Methods of Teaching English Language Development**
Exposes students to strategies used to teach English Language Development. Covers both theoretical and applied aspects of language learning and teaching. Exposes students to techniques, activities, strategies and resources to plan instruction for students learning English Language Development. Emphasizes oral language development, literacy and content-area instruction for teaching K-12 students.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite EDUC 5615.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5635 (3) Education and Sociolinguistics**
Explores the discipline of sociolinguistics, the study of language variation and use, and its application within education settings. Not designed as an advanced sociology or linguistics course. Areas of study include language variation, speech communities, the ethnography of communication, speech and social identities, and sociolinguistic research related to teaching and learning.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5706 (3) Assessment in Mathematics and Science Education**
Examines purposes and practices of assessment in mathematics and science education. Particular attention is given to application of theoretical foundations and contemporary research in the design and use of assessment techniques and tools to support teaching for student understanding. Addresses the role of effective formative assessment in teaching and learning.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4706
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5716 (3) Basic Statistical Methods**
Introduces descriptive statistics including graphic presentation of data, measures of central tendency and variability, correlation and prediction, and basic inferential statistics, including the t-test.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5726 (3) Introduction to Disciplined Inquiry**
Considers various research approaches and methodologies included in education including experimental and quasi-experimental methods; anthropological and case study methods; evaluative research and field studies; correlational; and sociological, historical, and philosophical research. Topics include library research, research criticism, research design, and proposal writing.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5800 (1-9) Master's Special Topics**
Designed to meet needs of students with topics of pertinent interest. 00 total credit hours. Allows multiple enrollment in term.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5815 (3) Teaching K-12 Mathematics: Number Sense**
Provides teachers opportunity to explore fundamental mathematical theories and pedagogical perspectives pertaining to the teaching and learning of number and operation. Engages students in explorations of mathematical content underlying number and operations, while highlighting relevant problem solving, reasoning and proof, and mathematical connections. Explores implications of teachers' mathematical learning on their classroom teaching. Develops practices supporting learner's number sense development. Formerly EDUC 5810.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4815
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5821 (3) Teaching K-12 Mathematics: Algebraic Thinking**
Uses reform-based mathematics curricula to engage participants in algebraic thinking, to reflect on their own knowledge of algebraic concepts, and to examine pedagogical ideas that can foster K-12 students' algebraic thinking and learning. Algebraic topics include patterning, variable, functions, multiple representations, equality, and solving linear and systems of equations.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4821
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5822 (3) Teaching and Learning Chemistry**
Explores issues related to how people learn and teach chemistry. Reviews high school and early college chemistry concepts both from the content and pedagogical perspectives. Delves into the chemistry education research, education, psychology and cognitive science literature. Provides an opportunity to observe and/or teach K-12 or college chemistry classes.
**Recommended:** Prerequisite of one semester of college-level chemistry is recommended.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5833 (3) Teaching and Learning Earth Systems**
Learn and develop pedagogically effective strategies for teaching and understanding Earth Science concepts. Particular emphasis is placed on understanding the importance of geoscience habits of mind (i.e. spatial/temporal reasoning, multiple working hypotheses, geographic context). The course focuses upon inquiry and evaluation of evidence, the importance of background knowledge and misconceptions and developing effective discourse within and outside the classroom.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4833 and GEOL 4833 and GEOL 5833
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5835 (3) Teaching K-12 Mathematics: Geometry & Measurement**
Provides an opportunity to explore how to foster geometric thinking while examining fundamental mathematical theory underlying the content area of geometry and measurement. Emphasizes investigative approach involving problem solving, reasoning, connections, and communication as well as learning mathematics content in a flexible and conceptual way. Challenges participants to apply their understanding to teaching practices that foster geometric thinking in K-12 learners. Formerly EDUC 5830.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5844 (3) Teaching and Learning Computational Thinking**
This course is designed for current and future STEM educators interested in understanding Computational Thinking and how it can be enacted to support student learning. Computational Thinking is the process by which people make sense of problems where computation, or computational tools, could be leveraged to enact the solution. For example, when students are tasked with solving a word problem they engage in computational thinking by identifying important elements in the written problem and then leveraging mathematical or scientific methods that would lead to a solution. During this course, students will engage with research-based theories, conceptualizations, and practices for engaging with Computational Thinking in STEM learning environments and experiences. Following an introduction to Computational Thinking, students will be supported in making sense of the ideas and practices through published research, existing tools, classroom activities, and reflection on experiences of problem solving and overcoming

**EDUC 5850 (3) Teaching K-12 Mathematics: Probability & Statistics**
Focuses on teaching probability, data analysis, and statistics in K-12 classrooms. Explores curriculum and assessment strategies in the areas of probability and statistics. Examines research on students' thinking on stochastic tasks and how this research informs teaching practice. Emphasizes deepening of one's conceptual understanding of probability and statistics and their importance in the current information age.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4850
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6110 (3) Student Affairs in Higher Education**
Provides students with a thorough introduction to the field of student affairs administration in higher education. Explores diverse facets of college student affairs administration and its role within US higher education. The course will help students develop a broad foundation for subsequent Higher Education study and practice. Focuses on philosophies, complexities, and futures of the student affairs profession.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6210 (3) Education Policy and the Law**
Approaches education policy issues through the rich history of litigation and current legal challenges facing American K-12 schooling. Builds an understanding of the legal and policy development of the American schooling system, particularly in the 20th century. Laws and legal cases will be used as jumping-off points for broader discussions.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6211 (3) Education Law and Litigation Workshop**
The students in this workshop course will learn through a project-oriented, constructive conversation between legal experts and education policy experts. With elements of community-engaged learning, as well as clinical and street law, the course creates a forum for an iterative process whereby education students, attorneys (adjunct professors) and law students will work together on legal projects of their own choosing. The attorneys and law students will inform the education researchers about how claims for relief or legislation (or a legal argument used in another context) might be shaped, while the researchers would inform the lawyers and law students about whether and how the research supports a potential claim or approach, and about the sorts of remedial orders or interventions that might be beneficial.
**Requisites:** Restricted to graduate students only.

**EDUC 6220 (3) Gender Issues in Education**
Provides a strong foundation in the various issues of gender and sexual diversity in education. Stimulates explorations into the ways the construct of "gender" affects and is affected by the educational system and process. Presents theory and research about contemporary educational issues related to sexism and homophobia. Encourages development of well-considered views about the various issues, research, and theories.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6230 (3) Ethics in Education**
Investigates controversies in education from a self-consciously ethical perspective, drawing as appropriate from moral and political theory as well as law. Focuses on public education's role in fostering democratic citizenship and providing equal educational opportunity. Critically evaluates various education reform policies and curriculum policies. Applies method commonly used in medical ethics to make decisions regarding concrete ethically problematic cases.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6240 (3) African American Education in the United States**
Explores development of schooling for African Americans in the U.S.. Emphasizes historical and contemporary struggles of this group in their quest to access meaningful educational opportunities. Examines how social, economic, political, and judicial action defined and organized policy and practice for this group. Degree credit not granted for EDUC 4240 and 6240.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Education

**EDUC 6245 (3) Latinx Education Across the Americas**
Examines Latinx education across the Americas in comparative perspective, exploring critical issues, themes, and cross-border movements that link Latinx education in the United States and Latin American education. Considers the socio-historical, cultural, and political contexts that shape the education of Latinx communities, with special attention to issues of race, cultural and national identity, and representation as these are negotiated in schools.
**Requisites:** Restricted to graduate students only.

**EDUC 6250 (3) Higher Education in the United States**
Examines major issues in higher education focusing on the sociopolitical contexts in which US universities operate as gatekeepers to opportunities. Topics include the purposes and history of higher education in the United States, college teaching and learning, finance and governance, issues of access and equity related to race, gender, sexual orientation, gender identity, immigration status and class, and student life.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**EDUC 6260 (3) Transnational Migration, Education, and Citizenship**
Examines the education of transnational migrant youth and families in comparative perspective, with a focus on citizenship formation. Compares state-led responses to diversity through education and integration policies with the transnational practices of distinct migrant and diaspora communities in both the United States and Europe. Considers the educational experiences of distinct types of migrants, including undocumented immigrant students and their families and university students studying abroad, and implications for citizenship.
**Requisites:** Restricted to graduate students only.

**EDUC 6318 (3) Psychological Foundations of Education**
Introduces students to theoretical and empirical contributions of educational and developmental psychology and the learning sciences emphasizing applications to educational practices. Topics include learning, development, cognitive processes, social and cultural context, motivation, assessment and individual differences.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6325 (3) Anthropology of Education**
Applies anthropological perspectives to research in educational settings. Focuses on theories of culture, cultural transmission and acquisition, and cultural reproduction and production for understanding schooling and its outcomes.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6328 (3) Advanced Child Growth and Educational Development**
Introduces students to recent theoretical and research advances in the study of children and adolescent's cognitive, social and emotional development, with an emphasis on implications for learning in and out of school.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6368 (3) Adolescent Psychology and Development for Teachers**
Examines current theory and research on adolescent development, learning, motivation, and academic achievement. Emphasizes how theory and research can inform instructional decisions in the secondary classroom.
**Requisites:** Restricted to English-Secondary Education (EDEN), Social Studies-Secondary Educ (EDSS), Mathematics-Secondary Educ (EDMA) or Science-Secondary Educ (EDSC) graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6405 (3) College Student Development and Counseling Theories**
Covers theories of student development in higher education as they apply to the growth of students and the influence of the college environment on growth and development. Examines selected approaches to counseling theory and practice. Theoretical formulations basic to human development and the counseling process are presented including historical and philosophical background. This course explores themes of human development, self-evolution, meaning making, separation and connection, and moral meaning making, and how college students are other adults construct themselves and the meaning they make of their experience.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6504 (3) Issues and Methods in Cognitive Science**
Interdisciplinary introduction to cognitive science, examining ideas from cognitive psychology, philosophy, education, and linguistics via computational modeling and psychological experimentation. Department enforced prerequisite: graduate standing or at least one upper-division course in computer science, linguistics, philosophy, or psychology.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 6402 and LING 6200 and PHIL 6310 and PSYC 6200 and SLHS 6402
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6505 (1-2) Readings and Research in Cognitive Science**
Interdisciplinary reading of innovative theories and methodologies of cognitive science. Share interdisciplinary perspectives through in-class and online discussion and analysis of controversial texts and of their own research in cognitive science. Required for joint PhD in cognitive science.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6506 (2) Cognitive Science Research Practicum**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7412 and LING 7415 and PHIL 7415 and PSYC 7415 and SLHS 7418
**Requisites:** Requires prerequisite course of CSCI 6402 or EDUC 6504 or LING 6200 or PHIL 6310 or PSYC 6200 (minimum grade D-). Restricted to graduate students only.
**Recommended:** Prerequisite EDUC 6505.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6516 (2) Cognitive Science Research Practicum 2**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core disciplineand cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7422 and LING 7425 and PHIL 7425 and PSYC 7425 and SLHS 7428
**Requisites:** Requires prerequisite course of LING 7415 or PSYC 7415 or CSCI 7412 or EDUC 6506 (minimum grade D-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6705 (3) Leadership in Higher Education**
Examines theory and research on leadership and management in higher education, and the structure and governance of colleges and universities. Explores the internal organization and culture of institutions, as well as external and related bodies that affect higher education such as the federal and state governments, accrediting agencies, associations and foundations.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6804 (1-4) Special Topics**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6811 (3) Teaching and Learning Biology**
Provides an introduction to recent research into student learning on the conceptual foundations of modern biology, together with pedagogical methods associated with effective instruction and its evaluation. Students will be involved in active research into conceptual and practical issues involved in biology education, methods to discover student preconceptions, and the design, testing and evaluation of various instructional interventions.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4811 and MCDB 4811 and MCDB 5811
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6844 (1-4) Master's Independent Study**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6855 (1-4) Independent Study in Curriculum and Instruction---Master's Level**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6877 (1-4) Independent Study in Equity, Bilingualism and Biliteracy: Master's Level**
An independent study may be established between a student and a tenure track faculty member if both parties are amenable. The topics, readings and assignments will vary based upon mutually agreed upon goals. The student will be responsible for obtaining and submitting the necessary paperwork from/to the Office of Student Services in the School of Education. This is a variable credit course that ranges from 1 to 4 credits. The number of credits will be determined by the professor based on the workload.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6888 (1-4) Independent Study in Educational and Psychological Studies---Master's Level**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6899 (1-4) Independent Study in Educational Foundations Policy & Practice--Master's Level**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6915 (1-4) Practicum in Curriculum and Instruction**
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6916 (1-4) Practicum in Research and Evaluation Methodology**
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6918 (1-4) Practicum in Educational and Psychological Studies**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6919 (1-4) Practicum in Educational Foundations Policy and Practice**
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6925 (1-4) Readings in Curriculum and Instruction**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6926 (1-4) Readings in Research and Evaluation Methodology**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6927 (1-4) Readings in Equity, Bilingualism and Biliteracy**
Explores topics that are relevant to becoming a scholar and researcher in our field.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6928 (1-4) Readings in Learning Sciences and Human Development**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6929 (1-4) Readings in Educational Foundations Policy and Practice**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6944 (1-3) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6945 (3) MA Capstone Seminar in Foundations of Education**
Supports students completing a summative writing assignment for their Masters degree requirements. Writing assignments will be designed around the professional and academic goals of each student, in collaboration with the student's academic advisor. Students will analyze research studies across different disciplinary and methodological approaches. Through instructor coaching and peer review exercises, students will draft and refine a final assignment.
**Requisites:** Restricted to MA students in Education (EPSY-MA, EFPP-MA, HEDU-MA).
**Recommended:** Students need to meet with their advisor the semester before taking the course to start drafting the capstone project proposal and then department consent to register will be provided when the draft proposal with advisor's approval is submitted to the course instructor.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6954 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6964 (3) Capstone: Inquiry in the Content Areas**
Supports students in using and building on the ideas and content encountered in previous coursework. Requires students to conceptualize, design and implement an original research project that will serve as exit requirement for the degree. Reads and engages in research and theory associated with Teacher Research (i.e. research conducted by teachers for professional purposes).
**Requisites:** Restricted to Educ-Curriculum Instruction (EDCI) graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7015 (3) Teaching Internship in Teacher Education**
One-semester teaching internship in an undergraduate or graduate foundations course.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7055 (3) Philosophy of Education**
Examines exemplars of educational philosophy from ancient times to the present day, emphasizing their relevance and application to current controversies in education (e.g., free speech, multiculturalism, and affirmative action). Formerly EDUC 5055.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7105 (3) Collaboration to Meet Special Needs**
Covers effective collaboration practices involving the special education teacher, other educational personnel, students, and parents. Bilingual special education considerations in collaboration will be described. Issues regarding inclusion will be explored. Practical application to teaching and learning will be made. Strategies for disseminating information and collaborative activities will be discussed.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7115 (3) Critical Inquiry into Becoming a Teacher Educator**
Designed to support doctoral students¿ development as university level instructors/teacher educators, particularly in relation to undergraduate courses that center equity and justice as central topics, this course will draw on critical perspectives and pedagogies to shape course goals, material/content and pedagogical approach. This will be done in two primary ways: a) through the use of pedagogies adapted from Freirean Culture Circles and Boalian Theater, and b) through the application of practitioner inquiry approaches designed to develop critical, reflective practices/habits of mind among teachers and teacher educators.
**Requisites:** Restricted to PhD students only.

**EDUC 7316 (3) Intermediate Statistical Methods**
Studies sampling theory and inferential statistics; advanced applications for testing of hypotheses regarding central tendency, variability, proportion, correlation, and normality; chi-square and the analysis of frequency data; multiple regression and prediction; introduction to the analysis of variance; and related computer programs for statistical analysis.
**Requisites:** Requires prerequisite course of EDUC 5716 (minimum grade D-).
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7326 (3) Quasi-Experimental Design in Causal Inference in Social Sciences**
Focuses on experimental and quasi-experimental designs in educational research; applications of the general linear mode; power and statistical efficiency; randomization and control; multiple comparisons; factorial experiments and interaction with fixed-factor and mixed design; analysis of covariance; effects of assumption violations; and related computer programs for statistical analysis.
**Recommended:** Prerequisite of a graduate-level introduction to stats course.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7336 (3) Methods of Survey Research and Assessments**
Examines theory and techniques involved in each stage of survey research, including problem formulation, questionnaire development, interview and mailed surveys, assessing reliability and validity, sampling plans, data reduction (e.g., factor analysis), and analysis of continuous and categorical data.
**Requisites:** Requires prerequisite courses of EDUC 5726 and EDUC 7316 (all minimum grade D-).
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7346 (3) Ethnographic Methods in Educational Research**
Explores the history of ethnography and its translation into educational research. Students practice participant observation, interviewing, journal writing, artifact searches, qualitative analysis and interpretation, and styles of reporting.
**Requisites:** Requires a prerequisite course of EDUC 6325 (minimum grade C-).
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7376 (3) Theory and Practice of Educational and Psychological Measurement**
Introduces theories of measurement and applications, and presents classical test theory. Includes quantitative concepts, methods, and computational techniques for the development, application, and evaluation of measurement instruments in social/ behavioral science and education.
**Requisites:** Requires prerequisite course of EDUC 5716 (minimum grade D-).
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7386 (3) Educational Evaluation**
Builds an understanding of the range of approaches taken by educational evaluators, focusing particularly on the evaluation of programs. Explores the nature of different evaluation perspectives and how these disparate views translate into methodological and conceptual models. Students develop a familiarity with the most common and influential approaches to evaluation.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7396 (3) Latent Variable and Structural Equation Modeling**
Introduces contemporary advanced multivariate techniques and their application in social science research. Focus on factor analysis and structural equation modeling. Prior experience with multiple regression is assumed.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite of EDUC 8230, EDUC 8240, EDUC 8710.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7416 (3) Seminar: Research Methodology**
Presents selected topics for advanced study in educational research, statistics, measurement, and evaluation.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7446 (3) Policy Issues in Education**
Explores major policy issues confronting U.S. education and examines the nature and undertaking ofeducational policy studies. Learn to approach policy issues from a contextual perspective that highlights systemic forces and analyzes and applies differing policy instruments. While a wide variety of policies are covered in the course, it particularly emphasizes issues of educational equity.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7456 (3) Multilevel Modeling**
Covers in depth two advanced multivariate models common to social science research: latent variable (structural equation) models and multi-level (hierarchical) models. Topics may be taught with a particular analytic context, such as measurement of change (longitudinal analysis) or experimental design.
**Recommended:** Prerequisite of one year of graduate-level stats course.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7775 (1) Topics in Cognitive Science**
Reading of interdisciplinary innovative theories and methodologies of cognitive science. Students participate in the ICS Distinguished Speakers series that hosts internationally recognized cognitive scientists who share and discuss their current research. Session discussions include analysis of leading edge and controversial new approaches in cognitive science.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7772 and LING 7775 and PHIL 7810 and PSYC 7775 and SLHS 7775
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8014 (3) Advanced Seminar in Democracy, Diversity and Social Justice**
Addresses the sociopolitical context of multiculturalism and education, and the sociocultural context of learning. Examines critical issues involved in making schooling responsive to an increasingly multicultural and multilingual society.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to EDUC-PHD students.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8025 (3) Seminar: Curriculum Theories**
Examines in depth recent developments in curriculum theory highlighting conceptual, contextual, and normative issues. Substantially explores distinct curricular traditions, corresponding conceptions of the good life along with related approaches to reason and emotion. Focuses on the works of prominent curriculum theorists.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8045 (3) Philosophical Issues in Educational Research**
Familiarizes students with important concepts and issues from the philosophy of science and, to a lesser extent, political theory and ethics; grounds such concepts and issues in the literature (often in terms of primary philosophical sources); and stimulates students to apply this material to the field of educational research in an informed way.
**Requisites:** Restricted to PhD students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8055 (3) Theoretical Issues in Education Policy**
Provides students with an examination of the theories behind education policy analysis. Takes a thematic approach to the study of policy in order to understand how policy agendas are set; how democratic deliberation should be linked with research and policy; and the relationship between politics, media, social structures, research and policies.
**Requisites:** Restricted to PhD students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8100 (3) Historical and Contemporary Issues in Literacy Research**
In this seminar, students read about, discuss, and respond to issues and debates that have shaped and continue to shape literacy research. The course addresses debates in response to research reports, policy and standards in the past 20 years (beginning in the mid 1990s), as well as the emergence of sociocultural and critical approaches to literacy research. The course traces how scholarly debates and reviews of research represent shifts in the field, and help researchers and educators move towards approaches and methods framing social-justice oriented literacy projects.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**EDUC 8101 (3) Theories of Literacy Research and Practice**
This graduate seminar will examine the foundations and central tenets of influential theories that undergird scholarship in literacy studies. The theories explored will include Critical Race Theory (CRT), critical poststructuralist, feminist, queer, literary, affect, and sociocultural theories. Theoretical traditions will be examined through their historical and social movement roots through their current applications, debates, research techniques, and criticisms, always with particular attention to how they have been taken up in literacy research. A key focus of this course is to examine the utility and limitations of frameworks and consider their possible applications to students' own research.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**EDUC 8102 (3) Literacy Research Methods**
This graduate seminar focuses on some of the central research methods and methodologies employed by literacy researchers. The course will examine methodologies such as ethnography, practitioner research, participatory research, reciprocal partnerships, discourse analysis, literary and textual analysis, design research, and case study, along with specific methods of data collection and analysis commensurate with study designs. Students will read articles focused on methodology specifically, as well as have opportunities to discuss research articles through a focus on the methods scholars describe and enact. The course includes attention to humanizing research practices and issues of relationship, responsibility, and ethics in literacy research. In addition, the course will engage discussions and support for IRB proposals, generative writing practices and processes, as well as dissemination of research through various genres and in academic, practice focused, and publicly accessible venues. May be repeated up
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**EDUC 8103 (3) Special Topics in Literacy Research**
This course provides students an opportunity for deep engagement with important topics and specialty areas in the field of literacy studies. Focused on topics of current interest in the field, the course supports students to examine issues of research and practice, which may include historical and current trajectories of an area of research, theories that animate an area of research and practice, and the methods through which researchers investigate questions related to the topic. In addition to readings and discussion, students complete writing and multimodal projects that allow students to engage with content and process related to the topic to demonstrate and share their learning.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**EDUC 8115 (3) History and Policy Issues in Teaching and Teacher Education**
Examine how issues and dilemmas in teacher education are grounded in historical and political contexts. Analyze patterns in preparation of new teachers, in mechanisms used to govern entry into teaching and make determinations of quality of teachers and teaching, and in efforts to professionalize and de-professionalize teachers and teaching. Investigate contemporary teacher education debates to better understand potential research-policy-practice connections.
**Requisites:** Restricted to PhD students only.

**EDUC 8125 (3) Seminar: Radical Education Theories**
Examines radical analyses of schooling, based on class, gender, sexual identity and race, through which U.S. public schooling is said to maintain dynamics of oppression and domination that undermines the schools' democratic premise. Scrutinizes the conceptual framework, interpretive and explanatory adequacy, and ethical justification of radical claims.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8135 (3) Theories and Methodologies for Examining Teacher Learning**
Examines the potential range and roles of theory in analyzing prospective and practicing teachers' learning (experiences). Explores various conceptions of teacher learning, including, but not limited to: teacher learning as a knowledge-centric phenomenon; teacher learning as a process of assembling a repertoire of practice; teacher learning as an identity-work phenomenon; and teacher learning as an activist/action-in-the-world phenomenon.
**Requisites:** Restricted to EDUC-PHD students.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8145 (3) Designing for Teacher Learning and Teacher Education**
Examines questions and issues related to the design of preservice teacher education programs and practicing teachers' professional development/learning opportunities. Analyzes the program and/or learning opportunity conditions, features and approaches that potentially support and/or constrain prospective and practicing teachers' learning, particularly in relation to their development and as asset-oriented teachers.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8155 (3) Advanced Topics in Literacy Education**
Examines special topics in theory and research related to literacy and literacy education. Topics vary each semester.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8165 (3) Advanced Topics in Mathematics Education**
Examines special topics in theory and research related to mathematics education. Topics vary each semester.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8175 (3) Advanced Topics in Science Education**
Engages participants in the process of curriculum development. Principles that guide the development of curricula and learning environments are discussed as they integrate with learning theory. Participants develop and/or test specific activities in the classroom and modify them as a result. There is a particular focus on incorporating the practices of the discipline into each content-based activity.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8177 (3) Advanced Seminar in Curriculum and Policy in Mathematics & Science Education**
This course explores the changing curriculum in school mathematics and science. It will examine the history and evolution of K-20 math and science curricula from the late 1890s to current times. It will examine motivations and political forces that have help shape and change math and science curricula.
**Grading Basis:** Letter Grade

**EDUC 8178 (3) Advanced Seminar on Learning in Math & Science Education**
This course focuses on research on the learning of mathematics and science in the K-12 schooling environment. It serves to introduce students to seminal learning theories that have guided and shaped mathematics & science education over the past thirty years (e.g., constructivist, cognitive, situative/sociocultural and critical perspectives). Core ideas within each of these theoretical perspectives will be explored such as knowledge construction and conceptual change, argumentation and reasoning, classroom discourse processes, participation and identity, and access and power. Pragmatic implications of these different theoretical perspectives will also be examined. For example, questions such as the following are considered: What is the purpose of a theory of learning (e.g., for research, for practice)? What constitutes learning within each perspective? What are the implications of a particular theoretical perspective for organizing and analyzing learning environments? What are the implications for differences
**Grading Basis:** Letter Grade

**EDUC 8179 (3) Advanced Seminar in Mathematics and Science Teaching & Teacher Education**
This course examines how scholarship on teaching and teacher learning has been evolving in mathematics and science educational research since the 1980s and 1990s. Students will explore theories of teacher learning and how they relate to designs for teacher preparation and professional development. We will also study common designs and design principles for conducting research to study teaching and teacher learning.
**Grading Basis:** Letter Grade

**EDUC 8210 (3) Ways of Knowing in Educational Research**
Introduces students to various theoretical perspectives informing educational research and how they are employed to study teaching, learning, and policy in K-12 classrooms. Includes reading and discussion related to the assumptions,questions, methods, and findings associated with theoretical traditions within and across disciplines.
**Requisites:** Restricted to EDUC-PHD students.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8220 (3) Introduction to Educational Research and Policy**
Introduces conceptual and empirical issues and controversies in educational research and policy. Complements other EDUC doctoral courses in quantitative and qualitative methodology.
**Requisites:** Restricted to EDUC-PHD students.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8230 (3) An Introduction to Quantitative Methods in Educational Research**
Explores the use of statistics to formalize study designs in educational research contexts. Introduces causal inference, experimental design, descriptive statistics, linear regression, probability, and the basics of statistical inference. Includes lab-based instruction in the use of statistical software (e.g., R, Excel) to conduct data analysis.
**Requisites:** Restricted to EDUC-PHD students.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8240 (3) Applied Regression Analysis**
Statistical analysis can be a powerful tool for understanding social, educational, psychological, and developmental processes. In this course, we will learn to answer such questions using multiple regression analysis, to develop an understanding of the strengths and limitations of this approach, and practice communicating results clearly and accurately. By the end of the semester, students in this course should be able to critically examine published research using regression and carefully perform their own regression analyses using empirical data.
**Recommended:** Prerequisites of EDUC 8230 or another course in basic statistical methods.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8250 (3) Qualitative Research Methods in Education**
This course has three main goals. First, it introduces students to the purposes of qualitative research methods in education foregrounding issues of equity and justice. Second, it develops students¿ capacity to design consequential qualitative research through consideration of issues including power and ethics. Third, it supports students in reading and analyzing qualitative research with attention to the relationship between theory and data, answerability to communities and contexts, and diverse and creative ways of representing research.
**Requisites:** Restricted to EDUC-PHD students.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8260 (3) Qualitative Methods II**
Builds on EDUC 8250 to develop knowledge and skills in ethnographic and case study research. Second of a two-course sequence covering qualitative research design, theoretical perspectives, and methods.
**Requisites:** Restricted to EDUC-PHD students.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8270 (3) Intermediate and Advanced Application of Quantitative Methods for Behavioral Sciences**
This courses helps students develop the pragmatic skills needed to conduct quantitative analyses in their own research, in which they must apply concepts with novel data and in novel settings. It also provides a formal introduction to a variety of interstitial topics in quantitative analysis that may be assumed knowledge in more advanced methods courses. In addition, students will learn how to teach themselves new quantitative methods as they need them in their future careers.
**Requisites:** Requires prerequisite courses of EDUC 8230 and EDUC 8240 (all minimum grade B-).

**EDUC 8310 (3) Design of Learning Environments for Radical Possibilities**
Design is a tool for imagining radical new possibilities for living together. We will discuss how we can work with community and school partners to leverage cultural and historical resources in design. This course will introduce students to models of design and tools for participatory design used across the Global North and South that can promote individual, social, and institutional change. It will include attention to political, affective, and ethical dimensions of design, as well as explore dilemmas presented by faculty and students engaged in ongoing design projects.
**Requisites:** Restricted to graduate students only.

**EDUC 8348 (3) Human Development in Cultural, Historical, and Sociopolitical Contexts**
This course takes a critical approach to exploring the moral, sociopolitical, and bio-psychosocial dimensions of human development. It will introduce students to different theories and methods for studying human development across the lifespan. Many traditional approaches to developmental research treat development in Western Educated Industrialized Rich and Democratic (WEIRD) contexts as normative for all populations. This course will focus on approaches that reject the notion that processes of human development are universal, examining the ways that social, cultural and geographic environments and histories shape development and life trajectories.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite EDUC 6318 or EDUC 8210 or instructor consent.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8358 (3) Critical Introduction to Learning Theory and Practice, Part 1**
This course introduces historical and contemporary perspectives in the learning sciences. Areas of scholarship explored include cognition, behaviorism, and sociocultural approaches. Special attention is paid to the linked histories of these traditions in order to broadly explore what concepts are foundational for critical understanding of cultural, historical, social, embodied, and political aspects of learning. The course explores critiques of relevant fields while also exploring how new ideas and movements are generative for moving research and development toward liberatory aims.
**Recommended:** Prerequisite EDUC 6318 or EDUC 8210.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8359 (3) Critical Introduction to Learning Theory and Practice, Part 2**
This course builds on content central to Part 1 of Critical Introduction to Learning Theory and Practice, which explores historical and contemporary perspectives in the learning sciences. Special attention is paid to theory and practice which is currently at the leading edge of research and development in the learning sciences, while attending to their roots. This course addresses multiple epistemologies and ways of knowing, including global perspectives and critical theories such as feminist, indigenous, and queer approaches. The course also examines how learning theories can inform transformation of practice toward justice and equity.
**Requisites:** Requires prerequisite course of EDUC 8358 (minimum grade D-).

**EDUC 8605 (3) Research and Professional Ethics for Educational Researchers**
Examines the central issues and venerable theories of philosophical ethics that have historically framed research ethics. Also examines contemporary ethical theory that emphasizes a greater attention to the social sciences. Focuses on research ethics (both research of human subjects and research misconduct), various issues of professional academic ethics, and the AERA ethical code.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8610 (3) Advanced Topics in Educational Equity and Cultural Diversity**
Examines special topics in theory and research related to educational equity and cultural diversity in education. Topics vary each semester.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8615 (3) Designing for Linguistic Diversity in Education Research**
Examines ways in which issues of language can affect the validity of educational research. Discusses how language can be properly addressed with a multidisciplinary perspective through different stages in the process of an investigation, including design, sampling, data collection, and data analysis. Provides the conceptual basis for addressing linguistic diversity from a multidisciplinary perspective.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8620 (3) Language and Power**
Through language we enact positionality and identity. Language has the power to shape our assumptions and beliefs. This course explores the relationship between linguistic nationalism and xenophobia, bilingual education and accent discrimination, multilingualism and youth culture, code-switching and translanguaging, etc. Participants will analyze domestic policies and current events to understand how language serves to maintain or disrupt the status quo.

**EDUC 8630 (3) Bilingual and Biliterate Development in Children and Adolescents**
This advanced doctoral seminar introduces doctoral students to key theories and empirical research on bilingual and biliterate development in school age children (preK ¿ 12). Participants will explore sociolinguistic, sociocultural, and psycholinguistic perspectives of the language and literacy development of children growing up with two or more languages, and critically examine how varying educational contexts and policies impact the schooling experiences of bilingual learners from early childhood to late adolescence.
**Recommended:** Doctoral students only.
**Grading Basis:** Letter Grade

**EDUC 8640 (3) Rethinking Disability**
Students explore the foundations, trends and future directions of disability in education. Disability is socially, historically, and culturally constructed. It is one of multiple identities that make us human, rather than a problem in need of a cure. This course investigates and disrupts disparities in education that relate to the intersections of disability, culture, race, language, and other identities and explores models for success.
**Requisites:** Restricted to graduate students only.

**EDUC 8710 (3) Measurement in Survey Research**
Introduces students to classical test theory and item response theory. Emphasizes the process of developing, analyzing and validating a survey instrument. Focuses on developing a survey instrument with items that derive from a clearly delineated theory for the construct to be measured. Analyzes item responses and put together a validity argument to support the proposed uses of the survey.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8720 (3) Psychometric Modeling: Item Response Theory**
Focuses on psychometric models for measurement and their applications in educational and psychological research. Emphasizes understanding and evaluating the utility of models from item response theory (IRT). Applies and compares measurement models in the context of simulated or empirical data sets.
**Recommended:** Prerequisite EDUC 8710.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8730 (3) Advanced Qualitative Data Analysis**
Requires students begin semester with qualitative data already collected (from class project, pilot study, dissertation). Instructors present diverse methods of analyzing data and writing about interpretations. Instructors customize part of course to address specific topic of expertise, e.g., discourse analysis, video analysis, textual analysis, ethnographic analysis.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8731 (3) Principles and Practices of Community-Based Participatory Research**
The course topics are organized to follow the life cycle of a community-based participatory research project. Topics include: Map the landscape of participatory and community-based approaches to research; Draw on critical social theory to analyze issues of race, power, and coloniality; Examine arguments about rigor, validity, and generalizability; It is recommended that students have a collaborative research project with communities or schools to workshop during the semester, but this is not required. Previously offered as a special topics course.

**EDUC 8732 (3) Critical Approaches to Discourse Analysis in Qualitative Research**
This course will introduce theories and methods related to Critical Discourse Analysis (CDA) in educational settings. The overarching goal of this course is to ground and inspire students to approach their own data with confidence and creativity. We explore key issues in the theory and practice of critical analysis of discourse: study design, data collection, transcription, tools for analysis, and presentation/write-up. The course will explore foundational readings in CDA along with a range of examples.
**Requisites:** Prerequisite: EDUC 8250 Qualitative Methods (or equivalent Intro to Qual course)

**EDUC 8735 (3) Mixed Methods in Educational Research**
Examines the epistemological and methodological issues involved in conducting studies with mixed methods designs in educational settings. Explores the pragmatic foundations of mixed methods research, developing coding systems, calculating interrater reliability statistics, data collection strategies, making inferences, and writing up mixed methods research reports. All students in the course are expected to have a solid background in both qualitative and quantitative approaches to research. Formerly offered as a special topics course.
**Requisites:** Restricted to graduate students only.

**EDUC 8740 (3) Advances in the Assessment of Student Learning**
Focuses on theories underlying traditional and contemporary proposals for assessment of student learning, and design and research of large-scale and classroom-based methods to assess student learning. Explores intersections between large-scale and classroom assessment, although greater attention is given to issues related to classroom assessment.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8750 (3) Research in Teaching and Teacher Education**
Invites students to acquire a deeper understanding of the history of and challenges in teacher education research, strengthen their knowledge of theoretical and methodological approaches to the study of teacher education, and discuss their own potential contributions to the field.
**Requisites:** Restricted to PhD students only.

**EDUC 8804 (3) Special Topics**
Designed to meet needs of graduate students with topics of pertinent interest.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8844 (1-4) Doctoral Independent Study**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8855 (1-4) Independent Study in Curriculum and Instruction: Doctoral Level**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8866 (1-4) Independent Study in Research and Evaluation Methodology: Doctoral Level**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8877 (1-4) Independent Study in Equity, Bilingualism & Biliteracy: Doctoral Level**
An independent study may be established between a doctoral student and a tenure track faculty member if both parties are amenable. The topics, readings and assignments will vary based upon mutually agreed upon goals. The student will be responsible for obtaining and submitting the necessary paperwork from/to the Office of Student Services in the School of Education. This is a variable credit course that ranges from 1 to 4 credits. The number of credits will be determined by the professor based on the workload.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8888 (1-4) Independent Study in Learning and Human Development: Doctoral Level**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8899 (1-4) Independent Study in Educational Foundations Policy and Practice: Doctoral Level**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8935 (1-6) Internship in Curriculum and Instruction**
**Repeatable:** Repeatable for up to 24.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8936 (1-6) Internship in Research and Evaluation Methodology**
**Repeatable:** Repeatable for up to 36.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8938 (1-6) Internship in Learning Sciences and Human Development**
**Repeatable:** Repeatable for up to 24.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8939 (1-6) Internship in Educational Foundations Policy and Practice**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8940 (3) Scholarly Writing for Graduate Students**
Provides graduate students an opportunity to reflect on their current writing process, on their identity as an academic writer, and how their writing is shaping and being shaped by their emerging scholarship. Explores genres of academic writing, processes of peer review, and publication as students engage in weekly writing assignments that build toward a complete manuscript. Students should enter the class with a draft of an existing paper that they intend to work on.

**EDUC 8950 (3) Proposal and Dissertation Writing**
Provides students with ongoing opportunities to write social science research in the context of the design, analysis and data representation, development, and write-up of students' dissertation proposals and dissertations. Students will learn to expand how they think about and use evidence, clarify their ideas and arguments, and improve their writing. Students working on proposals and dissertations should enroll.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to EDUC-PHD students.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8994 (1-10) Doctoral Dissertation**
**Repeatable:** Repeatable for up to 60.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Education

# Curriculum and Instruction

Curriculum and Instruction (C&I) graduate programs focus on teaching and learning in the following curricular areas: Literacy Studies (PhD, master's) and STEM Education (PhD, master's). Additionally, the MA+ teacher licensure program leads to a Colorado initial teaching license plus a master's degree in C&I. Coursework focuses on foundations of learning, foundations of education and subject matter knowledge and pedagogy. The programs prepare students to understand the complexities of classroom contexts and teaching practice in relation to education goals of equity, democracy and justice.

## Master's Degree

- Curriculum and Instruction - Master of Arts (MA) (p. 1567)

## Doctoral Degree

- Education - Doctor of Philosophy (PhD) (p. 1577)

# Education - Curriculum and Instruction - Master of Arts (MA)

The Curriculum & Instruction (C&I) master's degree requires one academic year or more of graduate work beyond the bachelor's degree.

## Program Tracks

### Reading Instruction and Literacy Leadership Track

This track supports teachers who are interested in becoming knowledgeable in reading instruction and assessment for students experiencing reading difficulties in K–12 classrooms. Once they meet the requirements established by Colorado Department of Education, graduates are eligible to apply for a K–12 Reading Specialist endorsement with the state of Colorado.

### STEM Education Track

The CU Boulder School of Education offers this program to support educators and other education professionals who are interested in developing greater understanding of and expertise in education related to STEM (particularly science, mathematics and computational thinking). The program enables teachers, educational designers and scholars to explore and critically analyze educational, pedagogical and curricular strategies designed to support students' STEM learning and identities. Disciplinary connections to critical issues in STEM are strengthened through lesson design and analysis, fieldwork, coursework and research activities. Throughout these experiences, we center equity, democracy and justice as core concerns in STEM education.

The program serves practicing teachers, educational leaders, designers of informal educational settings, as well as individuals with backgrounds in STEM wishing to learn more about teaching and learning. Graduates of our MA program go on to become teacher leaders, instructional designers, curriculum specialists and district administrators.

### MA+ Teacher Licensure

The MA+ teacher licensure program (https://catalog.colorado.edu/graduate/colleges-schools/education/programs-study/teacher-licensure-program/) leads to a Colorado initial teaching license in Secondary Math, Science, English or Social Studies plus a master's degree in C&I. This program is for candidates who have earned a bachelor's degree from an accredited institution of higher education and who want to elaborate and deepen the close connections between fieldwork and coursework to become a teacher. For more information, contact the School of Education.

## Requirements

### General Requirements

#### Program Requirements

Students must successfully complete 30 credit hours of approved coursework while maintaining at least a B (3.0) average in all work attempted while enrolled.

Students develop a degree plan in consultation with their faculty advisor, typically in their first semester. The frequency of individual course offerings varies; therefore, candidates should plan ahead so that the required 30 credit hours are completed within the four-year time limit.

#### Transfer Credit

Transfer credit is defined as any credit earned at another accredited institution, credits earned on another campus of the CU system, or credits

earned as a nondegree student within the CU system including the Boulder campus. Students who have transfer credits must complete the transfer-of-credit paperwork approval process.

The maximum amount of work that may be transferred from another accredited institution to CU Boulder is 9 credit hours, and is accepted only after approval of the department chair/program director and under the special conditions outlined in the Graduate School Rules. All courses accepted for transfer must be graduate-level courses. A course in which a grade of B- or lower was received will not be accepted for transfer.

Transfer coursework must have been completed in the five years prior to acceptance to the program. Credit may not be transferred until the student has completed 6 credits of graduate-level coursework as a degree-seeking student on the CU Boulder campus with a 3.0 GPA.

Master's degree students who began CU's Teacher Education Program as undergraduates or as post-baccalaureate students have the following transfer credit options:

- If the student took the courses as an undergraduate, they may be eligible to transfer up to two of their track's eligible transfer courses, depending on when those courses were taken and if the credits did not count towards the degree. Contact the School of Education for more information.
- If the student took the courses as a post-baccalaureate student, they may transfer up to two of their track's eligible transfer courses as electives, as long as the courses were taken within the past five years. Note: Students transferring from secondary programs will transfer seven credits; therefore, they will complete a 31-credit master's degree.

### Time Limit
The master's degree must be completed within four years.

## Program Tracks

### Reading Instruction and Literacy Leadership Track with Colorado Reading Specialist Endorsement
Students must complete the following track-specific course requirements.

| Code | Title | Credit Hours |
|---|---|---|
| EDUC 5220 | Curating and Evaluating Reading Materials for K-12 Classrooms | 3 |
| EDUC 5245 | Foundations of Reading Instruction K-12 | 3 |
| EDUC 5255 | Digital & Disciplinary Literacies | 3 |
| EDUC 5265 | Processes & Skills in Writing | 3 |
| EDUC 5275 | Diagnostic Reading Assessment & Intervention | 3 |
| EDUC 5285 | Literacy Coaching & Leadership | 3 |
| EDUC 5465 | Introduction to ELD/Bilingual and Special Education | 3 |

#### Electives
An additional 9 credit hours of electives are required. Courses that meet students' goals and interests are chosen in consultation with the advisor. Education courses must be at the 5000 level or above[1].

[1] GRTE courses may not count toward a master's degree.

### STEM Education Track
In addition to the required core courses, students must complete the following track-specific course requirements.

| Code | Title | Credit Hours |
|---|---|---|
| **Learning and Development** | | |
| Choose at least 3 credit hours of learning and development courses. Examples of eligible courses include but are not limited to: [1] | | 3 |
| EDUC 5050 | Knowing and Learning in Mathematics and Science | |
| EDUC 5105 | Teaching for Understanding and Equity | |
| EDUC 6318 | Psychological Foundations of Education | |
| EDUC 6328 | Advanced Child Growth and Educational Development | |
| **Foundations of Education Curriculum** | | |
| Choose at least 3 credit hours of foundations of education curriculum courses. Examples of eligible courses include but are not limited to: | | 3 |
| EDUC 5005 | Advanced Social Foundations of Education | |
| EDUC 5075 | Sociology of Education | |
| EDUC 5085 | History of American Education | |
| EDUC 5301 | Queer(ing) Topics in Education | |
| EDUC 5425 | Introduction to Bilingual/Multicultural Education | |
| EDUC 5726 | Introduction to Disciplined Inquiry | |
| EDUC 6325 | Anthropology of Education | |
| **Curriculum and Instruction in Mathematics and Science** | | |
| Choose at least 12 credit hours of curriculum and instruction in mathematics and science courses. Eligible courses include but are not limited to: [2] | | 12 |
| EDUC 5317 | Perspectives on Mathematics | |
| EDUC 5460 | Teaching and Learning Physics | |
| EDUC 5706 | Assessment in Mathematics and Science Education | |
| EDUC 5815 | Teaching K-12 Mathematics: Number Sense | |
| EDUC 5821 | Teaching K-12 Mathematics: Algebraic Thinking | |
| EDUC 5822 | Teaching and Learning Chemistry | |
| EDUC 5833 | Teaching and Learning Earth Systems | |
| EDUC 5835 | Teaching K-12 Mathematics: Geometry & Measurement | |
| EDUC 5850 | Teaching K-12 Mathematics: Probability & Statistics | |
| EDUC 6811 | Teaching & Learning Biology In the Classroom | |
| **Capstone Course** | | |
| Students are required to take on one of the seminar courses in the spring before graduation to complete their capstone. | | 3 |
| EDUC 5177 | Seminar in Curriculum and Policy in Mathematics & Science Education | |
| EDUC 5178 | Seminar on Learning in Math & Science Education | |

| | | |
|---|---|---|
| EDUC 5179 | Seminar on Teaching and Teacher Education in Math and Science Education | |
| **Electives** | | |
| Choose at least 9 additional credit hours of courses at the 5000 level or above from within the School of Education, to be chosen in consultation with your advisor. [2,3,4] | | 9 |
| **Total Credit Hours** | | **30** |

1 Speak with your advisor about other courses that could satisfy this requirement.

2 See also "Eligible Transfer Courses" below.

3 GRTE courses may not count toward a master's degree.

4 Students may deepen their content knowledge in the mathematics or science disciplines by taking a maximum of 6 credit hours of courses in the College of Arts & Sciences at the 3000 level or above that are taught by graduate faculty.

**Eligible Transfer Courses**
See the Transfer Credit (p. 1567) section for full details.

| Code | Title | Credit Hours |
|---|---|---|
| EDUC 5050 | Knowing and Learning in Mathematics and Science | 3 |
| EDUC 5205 | Elementary Mathematics Theory and Methods | 3 |
| EDUC 5215 | Elementary Science Theory and Methods | 3 |
| EDUC 5317 | Perspectives on Mathematics | 3 |
| EDUC 5375 | Problem-Based Math Instruction | 4 |
| EDUC 5385 | Phenomenon-Based Science Instruction | 4 |

**Comprehensive Exam**
During the final Spring semester prior to graduation, students must enroll in a content seminar course (EDUC 5177, EDUC 5178 or EDUC 5179). The course is a graduation requirement and requires the completion of a paper or project reviewed by faculty to successfully complete graduation and course requirements.

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate expertise in teaching and learning within and/or across content domains (e.g., Literacy, STEM Education).
- Demonstrate knowledge of research and practitioner inquiry for evidence-informed teaching and equitable learning experiences within and/or across content domains (e.g., Literacy, STEM Education).
- Demonstrate knowledge of research, scholarship, principles, and practices for broadening participation among youth, families, and communities in the design of equitable learning opportunities within and/or across content domains (e.g., Literacy, STEM Education).

# Education - Learning Sciences and Human Development

The Learning Sciences & Human Development (LSHD) program takes an interdisciplinary approach to understanding learning, teaching and the design of learning ecologies. The program is particularly concerned with examining learning and development as it happens in and across a range of settings, including schools, community organizations, families and peer groups. In their research and courses, faculty engage with pressing questions of policy and practice. To this end, program faculty enact innovative teaching practices and lead research projects that are attuned to our current technological and sociopolitical climate. Our interdisciplinary approach and research opportunities encourage students in the program to work in partnership with schools and communities to organize innovative practices that open up opportunities for transformative learning.

The LSHD program is on the leading edge of the field in its theoretical and practical explorations of social and spatial justice, community-engaged research methods, educational design, and culture and diversity in learning. LSHD faculty and students are leaders in theorizing and building partnerships with schools, districts and state agencies, as well as youth and community organizations.

## Master's Degree

- Learning Sciences and Human Development - Master of Arts (MA) (p. 1569)

# Learning Sciences and Human Development - Master of Arts (MA)

The Learning Sciences & Human Development (LSHD) master's program focuses on research, theory and professional knowledge about learning environments in and outside of school. Areas of study include K–12 schools, community settings, youth and student voice, museums and the variety of contexts that young people navigate in their everyday lives. Although we have a primary focus on children and youth, several faculty members also study processes of teacher learning.

The program is structured in ways that emphasize the bridging of theory and practice, lending primary emphasis to academic study and research. The program is designed to provide an academic and practical foundation that prepares students for a variety of career pathways. These include, but are not limited to, work in K–12 education, youth-serving community organizations, educational research and evaluation firms, or in the private sector. Many MA students also go on to pursue PhDs in learning sciences or education research. Faculty advisors and students build programs of study that meet program goals and the student's interests.

## Prior Experience

To make the most of the LSHD MA program, it is helpful—though not required—for students to have taken coursework focused on learning and human development. For example, courses that address topics such as how people learn, cognition and the social and cultural contexts of development, including the study of culture, race, ethnicity, gender or linguistics would be relevant. Commensurate professional or paraprofessional experience in educational settings—in and out of school and with youth and adults—is also a valued prior experience.

## Requirements

### Required Courses and Credits

Students must successfully complete 30 credit hours of approved coursework while maintaining at least a B (3.0) average in all work attempted while enrolled.

Students develop a degree plan in consultation with their faculty advisor, typically in their first semester. The frequency of course offerings varies; therefore, candidates should plan ahead so that the required 30 credit hours are completed within the four-year limit.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Requirements** | | |
| EDUC 5716 | Basic Statistical Methods | 3 |
| EDUC 5726 | Introduction to Disciplined Inquiry | 3 |
| EDUC 6318 | Psychological Foundations of Education | 3 |
| EDUC 6328 | Advanced Child Growth and Educational Development | 3 |
| **Core Electives** | | |
| Choose at least 6 additional credit hours of courses at the 5000 level or above from within the School of Education, to be chosen from the following categories in consultation with your advisor. (Suggested options below.) [1] | | 6 |
| *Learning and Development* | | |
| EDUC 8348 | Human Development in Cultural, Historical, and Sociopolitical Contexts | |
| EDUC 8358 | Critical Introduction to Learning Theory and Practice, Part 1 | |
| *Curriculum and Instruction* | | |
| Please consult with Faculty Advisor | | |
| *Learning and Technology* | | |
| Please consult with Faculty Advisor | | |
| *Foundations* | | |
| EDUC 5075 | Sociology of Education | |
| **Area of Specialization** | | |
| Students will develop their Area of Specialization in close dialogue with their advisor. Courses for the Area of Specialization may be taken outside or inside of the School of Education. | | 6 |
| **Capstone Project** | | **6** |
| **Total Credit Hours** | | **30** |

[1] GRTE courses may not count toward a master's degree.

### Capstone Project

In the year when students anticipate completing their Capstone Project, they should enroll in a 1-3 unit professional seminar focused on community building in the program, the practices of doing research and career planning.

This seminar is meant to be taken in addition to the Capstone Course (EDUC 6945), which is taken in the spring semester.

### Time Limit

The master's degree must be completed within four years.

### Transfer Credit

Transfer credit is defined as any credit earned at another accredited institution, credits earned on another campus of the CU system, or credits earned as a nondegree student within the CU system. Students who have transfer credits must complete the transfer of credit paperwork.

The maximum amount of work that may be transferred from another accredited institution to CU Boulder is 9 credit hours, and is accepted only after approval of the department chair/program director and under the special conditions outlined in the Graduate School Rules. All courses accepted for transfer must be graduate-level courses. A course in which a grade of B- or lower was received will not be accepted for transfer.

Transfer coursework must have been completed in the five years prior to acceptance to the program. Credit may not be transferred until the student has completed 6 credits of graduate-level coursework as a degree-seeking student on the CU Boulder campus with a 3.0 GPA.

## Learning Outcomes

By the completion of the program, students will be able to:

- Develop a deep understanding of sociocultural theories of learning and human development, as they are situated in a variety of contexts, including families, neighborhoods, schools, and community organizations.
- Deepen understanding in a particular domain of learning sciences and human development.
- Gain sophisticated understanding of research design and evidence-based reasoning, including the ability to critically review empirical articles.

# Educational Foundations, Policy and Practice

Educational Foundations, Policy & Practice (EFPP) graduate programs focus on policy analysis and the application of academic disciplines—anthropology, history, law, philosophy and sociology—to the analysis of education. Programs are devoted to the critical examination of the relations among education, society, culture and government, with special emphasis on issues of equity along lines of race, ethnicity, social class, gender, sexual diversity, (dis)ability and intersections of these.

The master's program prepares students for a variety of pathways, including policy analyst careers for state and local organizations and further study at the PhD level. The PhD program prepares students for university faculty positions and other careers requiring deep knowledge of research.

## Master's Degrees

- Educational Foundations, Policy and Practice - Master of Arts (MA) (p. 1570)
- Higher Education - Master of Arts (MA) (p. 1572)

## Doctoral Degree

- Education - Doctor of Philosophy (PhD) (p. 1577)

# Educational Foundations, Policy and Practice - Master of Arts (MA)

The master's program in Educational Foundations, Policy & Practice (EFPP) includes two possible concentrations, each with a different focus: *community-based change*, and *evaluation and policy analysis*. Both concentrations engage students in a critical examination of the relations among education, society, culture and government, with special

emphases on issues of equity along lines of race, ethnicity, social class, gender, sexual diversity, (dis)ability, and intersections of these.

The program stresses analysis of educational theory, policy, and practice by drawing on the humanities and the social sciences. Its foundation is critical scholarship, which examines educational institutions within broad social, political, cultural, legal, and economic contexts in the United States. Program faculty members offer courses in social, cultural, historical, legal and philosophical foundations of education; in policy analysis; transnational, Latinx, African-American, gender and queer studies in education; and in evaluation. Additional related courses are available in other programs within the School of Education and in other departments of the university.

EFPP has designed its master's program as a flexible program with a relatively small size to encourage strong and enduring relationships among students and faculty. All master's program concentrations are designed to prepare graduates for diverse roles as educators, advocates or policy analysts in schools, government agencies, think tanks, policy organizations, community organizations or institutions of higher education. This program also prepares graduates to pursue doctoral work.

The following two are possible concentrations, but students are also welcome to design an individualized concentration that reflects their academic interests and professional goals.

# Community-Based Change Concentration

Students will pursue a course of study to develop expertise in policy analysis, research methods, and program evaluation, as well as specific areas of inquiry such as contemporary school reforms and partnerships between schools and communities. This strand of the EFPP MA program is specifically geared toward educators, non-profit leaders, parents, and other community members who wish to gain skills and knowledge that will assist them in becoming powerful advocates for high-quality, equitable education.

Key foundations courses in this concentration include but are not limited to: policy issues in education, philosophy of education, anthropology of education, sociology in education, history of American education, education policy and the law, international and comparative education, queer(ing) topics in education, and issues in African-American education. Students will create a specific course plan around their interests in consultation with their advisor. Research methods courses can include Community-Based Participatory Research, as well as Disciplined Inquiry, Basic Statistical Methods, or Introduction to Qualitative Methods.

# Evaluation and Policy Analysis Concentration

Students will pursue a course of study to develop expertise in policy analysis, research methods, and program evaluation, as well as specific areas of inquiry such as the process of school reform and the development of more equitable education policies. The program is designed to prepare evaluators and policy analysts for careers in academic institutions and agencies at the state and federal levels. Graduates will be able to analyze, recommend, and evaluate public policies.

Key courses in this concentration include but are not limited to: education evaluation, policy issues in education, philosophy of education, education policy and the law, and theoretical issues in education policy. Students will create a specific course plan around their interests in consultation with their advisor. Research methods courses can include Disciplined Inquiry and Basic Statistical Methods, as well as advanced courses in Program Evaluation, Survey Methodology, or Introduction to Qualitative Methods.

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s): Ethnic Studies - Bachelor of Arts (BA) (p. 305).

Completing the BAM degree program efficiently requires early and careful planning. Interested students can contact education advisors at edadvise@colorado.edu or 303-492-6555, and Ethnic Studies advisors at ethnicst@colorado.edu or 303-492-8852 at any time.

# Requirements

Students must successfully complete 30 credit hours of approved coursework while maintaining at least a B (3.0) average in *all* work attempted while enrolled. Students must also successfully pass their Capstone Course. The master's degree must be completed within four years.

For more information on requirements for the master's degree, visit the Educational Foundations, Policy and Practice (http://www.colorado.edu/education/graduate-programs/educational-foundations-policy-practice-efpp/ma-efpp/degree-requirements/) page on the School of Education website.

## Degree Requirements

Students develop a degree plan in consultation with their faculty advisor, typically in their first semester. The frequency of individual course offerings varies; therefore, candidates should plan ahead so that the required 30 credit hours are completed within the four-year limit set forth below.

Students select the remaining 6 credit hours in consultation with their advisors, depending on the credit distribution in the above categories.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Foundations** | | **15** |
| Choose at least 15 credit hours in educational foundations. Suggested courses: | | |
| EDUC 5015 | International / Comparative Education | |
| EDUC 5075 | Sociology of Education | |
| EDUC 5085 | History of American Education | |
| EDUC 5301 | Queer(ing) Topics in Education | |
| EDUC 6210 | Education Policy and the Law | |
| EDUC 6211 | Education Law and Litigation Workshop | |
| EDUC 6220 | Gender Issues in Education | |
| EDUC 6240 | African American Education in the United States | |
| EDUC 6245 | Latinx Education Across the Americas | |

| | | |
|---|---|---|
| EDUC 6250 | Higher Education in the United States | |
| EDUC 6325 | Anthropology of Education | |
| EDUC 7055 | Philosophy of Education | |
| EDUC 7446 | Policy Issues in Education | |
| EDUC 8055 | Theoretical Issues in Education Policy | |
| EDUC 8125 | Seminar: Radical Education Theories | |
| **Education Research** | | **6** |
| Ordinarily, entering master's-level students will take the following two courses to meet this requirement: | | |
| EDUC 5150 | Introduction to Qualitative Research Methods | |
| EDUC 5716 | Basic Statistical Methods | |
| EDUC 5726 | Introduction to Disciplined Inquiry | |
| Those who have already taken one or more comparable courses can adjust their course of study accordingly. | | |
| **Electives** | | **6** |
| Students may select 6 credits of coursework in consultation with their advisor. | | |
| **Capstone Course** | | **3** |
| **Total Credit Hours** | | **30** |

### Capstone Course

During the final spring semester prior to graduation, students must enroll in the capstone course, EDUC 6945 MA Capstone Seminar in Foundations of Education. This course is only offered in the spring semester. The capstone course requires the submission of a paper or project reviewed by faculty to successfully complete both course and graduation requirements.

### Transfer of Credit

Transfer credit is defined as any credit earned at another accredited institution, credits earned on another campus of the CU system, or credits earned as a nondegree student within the CU system including the Boulder campus. Students who have transfer credits must complete the transfer of credit paperwork approval process.

The maximum amount of work that may be transferred from another accredited institution to CU Boulder is 9 credit hours. These transfer credits are accepted only after approval of the department chair or program director and under the special conditions outlined in the Graduate School Rules. All courses accepted for transfer must be graduate-level courses. A course in which a grade of B- or lower was received will not be accepted for transfer. Transfer coursework must have been completed in the five years prior to acceptance to the program. Credit may not be transferred until the student has completed six credits of graduate-level coursework, with a 3.0 GPA, as a degree-seeking student on the CU Boulder campus.

## Learning Outcomes

By the completion of the program, students will be able to:

- Understand and apply various disciplinary perspectives (sociology, history, anthropology, law, philosophy, political science, etc.) and critical theoretical lenses to analyze educational policy and practice, with a particular focus on the social, political and economic forces that structure educational aims, institutions and practices.
- Develop nuanced and sophisticated understandings of equity and justice in education, as well as the ability to evaluate how (and to what extent) various educational policies and practices advance or undermine such aims.
- Design and conduct a high-quality, research-based project that demonstrates academic skills of argument, evidence and reasoning. Present research-based and policy-relevant findings to an audience.

# Higher Education - Master of Arts (MA)

The MA in Higher Education (MAHE) is a professional degree program designed to prepare students for careers in higher education. The MAHE program is designed to help students broaden their knowledge of higher education policy, research and practice, especially in the areas of student affairs, academic affairs, diversity and community engagement.

The professional MA program offers a supportive community and flexible coursework designed to accommodate busy professionals' schedules. An innovative collaborative effort between the School of Education and various administrative departments on campus, the program offers a dynamic combination of academic knowledge and experiential education.

## Requirements

The MA in Higher Education (MAHE) program aims to develop knowledgeable, ethical, and diverse leaders in higher education. Students will broaden their knowledge of higher education in three key areas: the foundations of higher education; research and evaluation; and higher education and student affairs practice. Students complete two professional practicum experiences in higher education as well as a research-based Capstone project, a summative writing project designed around the professional and academic goals of each student, with feedback from their advisor.

Students must successfully complete 36 credit hours of approved coursework while maintaining at least a B (3.0) grade point average, and must pass their capstone course. Additionally, the master's degree must be completed within four years.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Foundations of Higher Education (9 credits)** | | **9** |
| EDUC 6250 | Higher Education in the United States (Required Course) | |
| *Select 6 credits from a menu of "foundations" courses, including the following:* | | |
| EDUC 5015 | International / Comparative Education | |
| EDUC 5075 | Sociology of Education | |
| EDUC 5085 | History of American Education | |
| EDUC 5301 | Queer(ing) Topics in Education | |
| EDUC 6210 | Education Policy and the Law | |
| EDUC 6220 | Gender Issues in Education | |
| EDUC 6245 | Latinx Education Across the Americas | |
| EDUC 6260 | Transnational Migration, Education, and Citizenship | |
| EDUC 6325 | Anthropology of Education | |
| EDUC 7055 | Philosophy of Education | |
| EDUC 7446 | Policy Issues in Education | |

| | | |
|---|---|---|
| Or other appropriate Foundations courses approved by faculty advisor. | | |
| **Research and Evaluation (6 credits)** | | **6** |
| *Select 6 credits from the following:* | | |
| EDUC 5150 | Introduction to Qualitative Research Methods | |
| EDUC 5716 | Basic Statistical Methods | |
| EDUC 5726 | Introduction to Disciplined Inquiry | |
| EDUC 7386 | Educational Evaluation | |
| Or other appropriate courses approved by faculty advisor. | | |
| **Higher Education Practice** | | **6** |
| *Select 6 credits from the following:* | | |
| EDUC 5010 | Race and Equity in Higher Education | |
| EDUC 6110 | Student Affairs in Higher Education | |
| EDUC 6405 | College Student Development and Counseling Theories | |
| EDUC 6705 | Leadership in Higher Education | |
| **Required Practicum (6 Credits)** | | **6** |
| EDUC 6919 | Practicum in Educational Foundations Policy and Practice (Course taken as 2 credits per semester) | |
| **Electives (6 Credits)** | | **6** |
| *Select six credits from the following 1 cr. courses:* | | |
| EDUC 5011 | College Student Career Development | |
| EDUC 5012 | Higher Education Finance | |
| EDUC 5014 | Ethical Dilemmas in Higher Education | |
| EDUC 5020 | College Academic Advising | |
| EDUC 5021 | College Athletic Affairs | |
| EDUC 5022 | LGBTQ+ Topics in Higher Education | |
| EDUC 5023 | College Admissions and Enrollment | |
| EDUC 5026 | Technology in Higher Education | |
| EDUC 5027 | Institutional Advancement and Development in Higher Education | |
| EDUC 5028 | International Education in Higher Education and Student Affairs | |
| EDUC 5030 | Accessibility and Students with Disabilities in Higher Education | |
| EDUC 5031 | Institutional Research & Analytics in Higher Education | |
| EDUC 5032 | College Student Leadership Development | |
| EDUC 5033 | Special Topics in Higher Education | |
| Or other appropriate courses approved by faculty advisor. | | |
| **Required Capstone Course (3 Credits)** | | **3** |
| EDUC 6945 | MA Capstone Seminar in Foundations of Education | |
| **Total Credit Hours** | | **36** |

## Learning Outcomes

By the completion of the program, students will be able to:

- Understand the mission, roles, and functions of higher education in the United States, including the history and philosophy of higher education; college student development; and key factors that influence student and organizational behavior.
- Translate theoretical knowledge into meaningful practices in the profession, including in areas such as advising, instruction, supervision, program design, administration and research.
- Develop nuanced and sophisticated understandings of equity and justice, as well as the competencies necessary to engage with diverse students and staff with sensitivity, effectiveness and confidence.
- Practice skills of program assessment, design, implementation, and evaluation, as appropriate for various divisions and offices in higher education. Develop professional relationships with peers and team members in a university setting.
- Design a high-quality, research-based project that demonstrates academic skills of argument, evidence and reasoning. Students will be able to offer (and receive) critical and supportive peer feedback, and gain experience presenting work to external audiences.

# Equity, Bilingualism and Biliteracy

Bilingual learners are the fastest growing population in the United States, and they are among the most marginalized, segregated and underserved populations in public education. Situated in the Southwest and serving the populations of the Southwest including speakers of Spanish and indigenous languages, our graduate degrees prioritize equity and justice in PK–12 education for multilingual learners, including students with disabilities.

The Equity, Bilingualism and Biliteracy (EBB) program area seeks to understand and critically respond to issues at the intersection of language, culture, ability and identity; educational and social policies, designing for high quality inclusive education; examining the intersection of language and dis/ability; teacher preparation and teacher learning; and the social and political contexts of schooling. This includes critical explorations of, and interventions related to, the various aspects of schooling that affect multilingual learners and their communities, such as the development of bilingualism and biliteracy, restrictive language and literacy policies, high-stakes accountability, teacher education, disproportionate representation in special education, racio-linguistic ideologies, the implementation of various bilingual education models, immigration policies and transnationalism. EBB aims specifically to prepare critical, equity- and justice-oriented researchers, teacher educators, and school district and community leaders.

With deep connections to teaching and teacher preparation, EBB faculty partner with schools, classrooms and communities to conduct research, support teacher learning and advocate for, and work in solidarity with, multilingual students, families and community members. We offer courses in language acquisition and biliteracy development, language ideologies and policies, critical perspectives on disability, sociolinguistics and the preparation of justice-centered teachers to work with multilingual learners. Faculty also offer courses in special education methodologies, assessment and program development/implementation, and teacher education/learning. We collaborate with programs and departments both inside and outside the School of Education, including the BUENO Center.

All graduate degrees prioritize PK–12 bilingualism in the United States, with a strong emphasis on Spanish/English bilingualism. EBB programs are designed to prepare graduates to work and lead in universities, state, federal and local education agencies, schools, school districts, and community-based organizations. Doctoral level preparation is research oriented and qualifies graduates for a range of roles, including faculty in university positions.

# Master's Degree

- Equity, Bilingualism and Biliteracy - Master of Arts (MA) (p. 1574)

# Doctoral Degree

- Education - Doctor of Philosophy (PhD) (p. 1577)

# Equity, Bilingualism and Biliteracy - Master of Arts (MA)

Equity, Bilingualism and Biliteracy (EBB) offers a course of study devoted to the critical examination of theory, practice and policy in two major areas of emphasis: the education of culturally and linguistically diverse students and the education of students with disabilities. The program stresses analysis, evaluation and implementation of educational programs for students who represent diverse learning needs within the public school system. School culture, language policies and the social and political context of schooling are examined across emphases. Policies that affect the assessment, placement and services provided for exceptional children also are examined.

# Areas of Emphasis

Enrolled students select one of the below:

## Culturally & Linguistically Diverse Education Emphasis

The School of Education offers the master's degree in EBB with an emphasis in Culturally & Linguistically Diverse Education. Completion of this program qualifies one for a Colorado endorsement in the area of Culturally & Linguistically Diverse education (K-12). Some candidates may also be eligible for the Culturally & Linguistically Diverse Education Specialist: Bilingual Education endorsement. Please contact the School of Education for details.

The program provides a range of direct experiences in bilingual/ multicultural/ELD education with the opportunity to develop skills and expertise essential to the work of educators of the bilingual/emerging bilingual learner. The overall purpose of the program is to develop sound bilingual/multicultural/ELD competencies in teachers and school leaders. Program coursework includes foundations of bilingual/ multicultural education, assessment practices and issues, methods in bilingual and ELD, biliteracy, family/community engagement, and a field- based practicum. Participation in the program may be on a part-time basis. International students seeking participation in this program should consult with a faculty advisor before applying for admission and must complete a practicum in a U.S. K-12 public school. This program is not appropriate for individuals wishing to teach English as a foreign language in other countries

## Culturally & Linguistically Diverse Ed/Special Ed Generalist Emphasis

The School of Education offers the master's degree in EBB with an emphasis in bilingual/ELD special education. Completion of this program qualifies one for teacher license endorsements in two areas of Special Education Generalist (K-12) and Culturally & Linguistically Diverse education (K-12). Program graduates are employed in both general and special education programs. The program offers courses in foundations in special and ELD/bilingual/multicultural education; assessment issues and practices in bilingual/ELD special education; methods of bilingual, ELD and special education; biliteracy; family and community engagement; and a field-based practicum. This program is not suitable for international students seeking preparation in Teaching English as a Foreign Language (TEFL). This is a part-time program for practicing educators with courses offered evenings and summers. This program is designed to be completed over a three-year period.

## Social/Multicultural/Bilingual Education Emphasis

This program is a non-endorsement degree with an interdisciplinary focus. The program offers courses in foundations of bilingual/ multicultural education, curriculum and methods in multicultural education, and curriculum theory. Participation in the program may be on a part-time or full-time basis.

# Requirements

## Social/Multicultural/Bilingual Education (Non-Endorsement) Plan

### Program Requirements

Students must successfully complete 30 credit hours of approved coursework while maintaining at least a B (3.0) average in all work attempted while enrolled. Students must also successfully pass their Comprehensive Exam and complete the master's degree within four years.

This program does *not* lead to an added endorsement in Culturally and Linguistically Diverse Education. This program is most appropriate for those who do not have a teaching license, or for licensed teachers who already have the endorsement in Culturally and Linguistically Diverse Education but need a master's degree.

### Required Courses and Credits

The program requires 15 credit hours in bilingual, ELD and multicultural education. The remaining 15 credit hours are electives that may be taken either in the School of Education or in other CU departments, but should be discussed with and approved by an advisor. Education courses must be at the 5000 level or above. GRTE courses may not count toward a master's degree. A maximum of 6 credit hours may be completed in Arts & Sciences courses taken at the 3000 or 4000 level. The frequency of individual course offerings varies; therefore candidates should plan ahead so that the required 30 credit hours are completed within the four-year limit.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Requirements** | | |
| EDUC 5525/5605 | Research Issues in Special Education | 3 |
| Suggested bilingual, ELD and multicultural education courses include the following: | | 12 |
| EDUC 5035 | Family and Community Engagement | |
| EDUC 5425 | Introduction to Bilingual/Multicultural Education | |
| EDUC 5445 | Curriculum for Multicultural Education | |
| EDUC 5455 | Literacy for Linguistically Different Learners | |
| EDUC 5535 | Assessment in Bilingual Communities | |
| EDUC 5615 | Language Acquisition for Bilingual Learners | |
| EDUC 5625 | Methods of Teaching English Language Development | |

| | |
|---|---|
| **Electives** | **15** |
| **Total Credit Hours** | **30** |

### Comprehensive Exam/Capstone Project

A written comprehensive examination or capstone research study must be completed prior to the completion of the master's degree. The project will reflect the content of all work in the program. Students transferring coursework from other institutions to this program (up to 9 credit hours may be taken at other approved institutions) are responsible for the same knowledge as those whose work has been taken entirely at CU Boulder. Students must be enrolled in a course in the same semester they present their final project.

### Transfer of Credit

Transfer credit is defined as any credit earned at another accredited institution, credits earned on another campus of the CU system, or credits earned as a nondegree student within the CU system including the Boulder campus. Students who have transfer credits must complete the transfer-of-credit paperwork approval process.

The maximum amount of work that may be transferred from another accredited institution to CU Boulder is 9 credit hours and is accepted only after approval of the program director and under the special conditions outlines in the Graduate School Rules. All courses accepted for transfer must be graduate-level courses. A course in which a grade of B- or lower was received will not be accepted for transfer. Transfer coursework must have been completed in the five years prior to acceptance to the program. Credit may not be transferred until the student has completed 6 credits of graduate-level coursework as a degree-seeking student on the CU Boulder campus with a 3.0 GPA.

## Culturally & Linguistically Diverse Education (CO CLD Endorsement) Plan

### Program Requirements

Student must successfully complete 31 credit hours of approved coursework while maintaining at least a B (3.0) average in all work attempted while enrolled. Students must also successfully pass their capstone project and complete the master's degree within four years.

### Required Courses and Credits

Students develop a degree plan in consultation with their faculty advisor, typically in their first semester. The frequency of individual course offerings varies; therefore, candidates should plan ahead so that the required 31 credit hours are completed within the four-year limit.

Approved coursework meets the following course requirements:

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| *Course or Requirement:* | | |
| EDUC 5425/5465 | Introduction to Bilingual/Multicultural Education | 3 |
| EDUC 5445 | Curriculum for Multicultural Education | 3 |
| EDUC 5035 | Family and Community Engagement | 3 |
| EDUC 5435 | Materials and Methods in Bilingual/ Multicultural Education | 3 |
| EDUC 5455 | Literacy for Linguistically Different Learners | 3 |
| EDUC 5535 | Assessment in Bilingual Communities | 3 |
| EDUC 5605 | Research Issues in Bilingual Education | 3 |
| EDUC 5615 | Language Acquisition for Bilingual Learners | 3 |
| EDUC 5625 | Methods of Teaching English Language Development | 3 |
| **Comprehensive Exam/Capstone Course** | | **4** |
| EDUC 5595 | Practicum for Educators of Linguistically Diverse Communities | |
| **Total Credit Hours** | | **31** |

### Comprehensive Exam/Capstone Project

A written comprehensive examination or capstone research study must be completed prior to the completion the MA degree. The project will reflect the content of all work in the program. Students transferring coursework from other institutions to this program (up to 9 credit hours may be taken at other approved institutions) are responsible for the same knowledge as those whose work has been taken entirely at CU Boulder.

- Practicum for Educators of Linguistically Diverse Communities (EDUC 5595): (4 credit hours) Practicum includes 200 hours of in-school work (can be taken over two semester blocks)

### Transfer of Credit

Transfer credit is defined as any credit earned at another accredited institution, credits earned on another campus of the CU system, or credits earned as a nondegree student within the CU system including the Boulder campus. Students who have transfer credits must complete the transfer-of-credit paperwork approval process.

The maximum amount of work that may be transferred from another accredited institution to CU Boulder is 9 credit hours and is accepted only after approval of the program director and under the special conditions outlines in the Graduate School Rules. All courses accepted for transfer must be graduate-level courses. A course in which a grade of B- or lower was received will not be accepted for transfer. Transfer coursework must have been completed in the five years prior to acceptance to the program. Credit may not be transferred until the student has completed 6 credits of graduate-level coursework as a degree-seeking student on the CU Boulder campus with a 3.0 GPA.

## Special Education Generalist and Culturally & Linguistically Diverse Education (CO Dual Endorsement) Plan

### Program Requirements

Students must successfully complete 36–37 credit hours of approved coursework while maintaining at least a B (3.0) average in all work attempted while enrolled. Students must also successfully pass their comprehensive exam and complete the master's degree within four years.

Students develop a degree plan in consultation with their faculty advisor, typically in their first semester. The frequency of individual course offerings varies; therefore, candidates should plan ahead so that the required 36–37 credit hours are completed within the four-year limit.

Approved coursework meets the following distribution requirements:

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| *Course or Requirement:* | | |
| EDUC 5035 | Family and Community Engagement | 3 |

| | | |
|---|---|---|
| EDUC 5455 | Literacy for Linguistically Different Learners | 3 |
| EDUC 5465 | Introduction to ELD/Bilingual and Special Education | 3 |
| EDUC 5505 | Education of Students with Learning and Behavior Disorders | 3 |
| EDUC 5515 | Curriculum and Assessment for Special Learners | 3 |
| EDUC 5525 | Research Issues in Special Education | 3 |
| EDUC 5535 | Assessment in Bilingual Communities | 3 |
| EDUC 5545 | Strategies for Teaching Students with Special Needs | 3 |
| EDUC 5615 | Language Acquisition for Bilingual Learners | 3 |
| EDUC 5625 | Methods of Teaching English Language Development | 3 |
| EDUC 7105 | Collaboration to Meet Special Needs | 3 |
| **Comprehensive Exam/Capstone Course** | | **3-4** |
| EDUC 5555 | Practicum in Bilingual/Special Education | |
| **Total Credit Hours** | | **36-37** |

### Comprehensive Exam/Capstone Project

A written comprehensive examination or capstone research study must be completed during the student's last term of study for the master's degree. The examination will cover the content of all work in the program. Students transferring coursework from other institutions to this program (up to 9 credit hours may be taken at other approved institutions) are responsible for the same knowledge as those whose work has been taken entirely at CU Boulder.

- Practicum in Bilingual/Special Education (EDUC 5555): 3-4 credit hours

### Transfer of Credit

Transfer credit is defined as any credit earned at another accredited institution, credits earned on another campus of the CU system, or credits earned as a nondegree student within the CU system including the Boulder campus. Students who have transfer credits must complete the transfer of credit paperwork approval process.

The maximum amount of work that may be transferred from another accredited institution to CU Boulder is 9 credit hours and is accepted only after approval of the program director and under the special conditions outlines in the Graduate School Rules. All courses accepted for transfer must be graduate-level courses. A course in which a grade of B- or lower was received will not be accepted for transfer. Transfer coursework must have been completed in the five years prior to acceptance to the program. Credit may not be transferred until the student has completed 6 credits of graduate-level coursework as a degree-seeking student on the CU Boulder campus with a 3.0 GPA.

## Learning Outcomes

Students in the Equity, Bilingualism and Biliteracy MA program will:

- Develop pedagogical expertise in planning for instruction for bi/multilingual students and/or students with identified special needs in PK–12th grade settings.
- Develop pedagogical expertise in effectively teaching bi/multilingual students and/or students with identified special needs in PK–12th grade settings.
- Develop the knowledge and skills to advocate on behalf of culturally and linguistically diverse learners in schools.

# Research and Evaluation Methodology

The Research & Evaluation Methodology (REM) program offers the opportunity to combine substantive interests in education with advanced training in research methods. The program's central mission is to provide students with the training they need to use sophisticated methods that shed light on policies, programs and practices that have been enacted to facilitate student learning and to mitigate inequality in educational opportunities and outcomes. Students will learn both how to apply a variety of methodological approaches, and, of equal or greater importance, to think deeply about when and why the approach is sensible given the real-world contexts in which these research designs and methods are applied.

A spirit of critical inquiry and intellectual curiosity is a defining feature of the REM community. When claims are made—by students or faculty—it is expected that those claims will be supported by an adequate warrant, drawing on empirical evidence when appropriate.

Within this framing, learning goals for REM students include that they:

- Develop knowledge and skills for applying appropriate research methods and study designs to answer substantive questions about educational policies, programs, and practices aimed at promoting equitable opportunities and outcomes for historically underserved and marginalized populations.
- Learn to communicate relevant findings and insights to a broad audience of stakeholders including the public, policymakers and academic peers.
- Find fulfilling careers in a context that is the best fit for each individual student's research (and teaching) interests. These careers may be in university teaching and research, research and evaluation in state departments of education, large school districts, think tanks or research firms, federally funded regional research and development laboratories; assessment and testing organizations; and consultation for government and education agencies.

REM faculty strive to foster an environment for students that is both challenging and supportive. During the weekly "REM seminar," students have the opportunity to interact with invited speakers, discuss timely research topics and studies, brainstorm ideas for publishable papers, and practice giving oral presentations. Regular interactions among students and faculty is the norm, not the exception. REM faculty teach courses and mentor students with the same commitment and dedication that is evident in our scholarly research. Students will have ongoing support as they embark on a path that begins with coursework, transitions to dissertation prospectus and defense, and culminates in a job that aligns with their particular career aspirations in educational research.

Students participate in graduate research assistantships each semester and most can expect to work with faculty on research projects as part of CADRE at some point during their doctoral studies.

## The Center for Assessment, Design, Research and Evaluation ( CADRE (https://www.colorado.edu/cadre/))

REM students can explore opportunities to be involved in CADRE research. The mission of CADRE is to produce generalizable knowledge that improves the ability to assess student learning and to evaluate programs and methods that may have an effect on this learning. CADRE projects represent a collaboration with the ongoing activities in the School of Education, the university, and the broader national and international community of scholars and stakeholders involved in educational assessment and evaluation. Visit the center's CADRE Projects and Resources (http://www.colorado.edu/cadre/cadre-projects-and-resources/) website for examples.

## Other CU Boulder Center-Based Opportunities

REM faculty are affiliates of various centers at CU Boulder. REM students may have opportunities to gain research experience via faculty collaborations within these centers, which include:

- The Institute of Behavioral Science (https://behavioralscience.colorado.edu/)
- Renée Crown Wellness Institute (https://www.colorado.edu/crowninstitute/)

## Career Opportunities

Opportunities for students with a PhD with an area of emphasis in REM include:

- University teaching and research
- Research, evaluation and testing in state departments of education and large school districts
- Research and policy analysis for think tanks like the RAND Corporation, SRI International, and federally funded regional research and development laboratories
- Measurement or statistical analysis for assessment and testing organizations such as the Educational Testing Service
- Consultation for government and education agencies

Examples of our REM graduates' careers over the past ten years:

- National Center for the Improvement of Educational Assessment (Senior Associate)
- Educational Testing Service (Research Scientist)
- Center for Assessment, Design, Research and Evaluation (Associate Director)
- SRI International (Principal Research Scientist)
- Stanford University (Associate Professor)

## Doctoral Degree

- Education - Doctor of Philosophy (PhD) (p. 1577)

# Education - Doctor of Philosophy (PhD)

## Overview

The School of Education offers a single doctoral degree in education. The degree has seven program areas of emphasis, from which a student chooses:

- Educational Foundations, Policy and Practice
- Equity, Bilingualism and Biliteracy
- Learning Sciences and Human Development
- Literacy Studies
- Research and Evaluation Methodology
- STEM Education
- Teacher Learning, Research and Practice

## Requirements

### Required Courses and Credits

Students must successfully complete 56 credit hours of approved coursework, with 12 credit hours of core courses (see below) taken as a doctoral cohort during the first two years of study. The remaining 44 credits are completed in the student's area of emphasis. Students work with their faculty advisor to develop an individualized, coherent program of study that includes advanced theoretical, methodological and writing experiences.

Students must maintain at least a B (3.0) average with no grade lower than a B- while enrolled.

Students must complete 30 hours of dissertation credit. Students must be registered for a minimum of 5 dissertation hours per semester after successful completion of their comprehensive exam.

All PhD students are required to take the following four courses in their first and second years:

| Code | Title | Credit Hours |
|---|---|---|
| EDUC 8210 | Ways of Knowing in Educational Research | 3 |
| EDUC 8220 | Introduction to Educational Research and Policy | 3 |
| EDUC 8230 | An Introduction to Quantitative Methods in Educational Research | 3 |
| EDUC 8250 | Qualitative Research Methods in Education | 3 |
| **Total Credit Hours** | | **12** |

### Area of Emphasis Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Educational Foundations, Policy and Practice** | | |
| *Specialty Seminar* [1] | | *2* |
| EDUC 6929 | Readings in Educational Foundations Policy and Practice | |
| *Specialty Area Coursework* | | *15* |
| Course options (examples): | | |

| | | |
|---|---|---|
| EDUC 5015 | International / Comparative Education | |
| EDUC 5075 | Sociology of Education | |
| EDUC 5085 | History of American Education | |
| EDUC 6210 | Education Policy and the Law | |
| EDUC 6220 | Gender Issues in Education | |
| EDUC 6230 | Ethics in Education | |
| EDUC 6240 | African American Education in the United States | |
| EDUC 6250 | Higher Education in the United States | |
| EDUC 6260 | Transnational Migration, Education, and Citizenship | |
| EDUC 6325 | Anthropology of Education | |
| EDUC 7055 | Philosophy of Education | |
| EDUC 7446 | Policy Issues in Education | |
| EDUC 8045 | Philosophical Issues in Educational Research | |
| EDUC 8055 | Theoretical Issues in Education Policy | |
| EDUC 8125 | Seminar: Radical Education Theories | |
| *Advanced Methods* | | *9* |
| Minimum nine hours of advanced research methods courses; these courses may be in advanced qualitative or advanced quantitative methods and may be taken in the School of Education or in other departments of the University. Students concentrating in History of Education or Philosophy of Education may choose to fulfill this requirement with courses in historiography or philosophical inquiry, respectively. These must be chosen in consultation with the faculty advisor. Avanced research methods courses do not include required School of Education Core or Specialty Area courses. | | |
| Course options (examples): | | |
| COMM 6410 | Discourse Analysis | |
| EDUC 7386 | Educational Evaluation | |
| EDUC 7396 | Latent Variable and Structural Equation Modeling | |
| EDUC 7456 | Multilevel Modeling | |
| EDUC 7456 | Multilevel Modeling | |
| EDUC 8710 | Measurement in Survey Research | |
| EDUC 8720 | Psychometric Modeling: Item Response Theory | |
| EDUC 8730 | Advanced Qualitative Data Analysis | |
| SOCY 7026 | Feminist Research Methods | |
| SOCY 7121 | Qualitative Analysis | |
| *Writing Seminar* | | *3* |
| EDUC 8940 | Scholarly Writing for Graduate Students | |
| or EDUC 8950 | Proposal and Dissertation Writing | |
| *Electives* | | *15* |
| *Total Credits* | | *44* |
| **Equity, Bilingualism, and Biliteracy** | | |
| *Specialty Seminar* [1] | | *2* |
| EDUC 6927 | Readings in Equity, Bilingualism and Biliteracy | |
| *Specialty Area Coursework* [2] | | *12* |
| EDUC 8615 | Designing for Linguistic Diversity in Education Research | |
| EDUC 8620 | Language and Power | |
| EDUC 8630 | Bilingual and Biliterate Development in Children and Adolescents | |
| EDUC 8640 | Rethinking Disability | |
| *Advanced Methods* | | *12* |
| Minimum twelve hours in advanced methodology, preferably aligned with the methods to be used during dissertation research. Possible School of Education courses include the courses listed below, but methodology classes may be taken outside of the School of Education. Advanced research methods are doctoral level courses and do not include required School of Education Core or Specialty Area courses. | | |
| *Course options (examples):* | | |
| EDUC 6504 | Issues and Methods in Cognitive Science | |
| EDUC 7336 | Methods of Survey Research and Assessments | |
| EDUC 7346 | Ethnographic Methods in Educational Research | |
| EDUC 7386 | Educational Evaluation | |
| EDUC 7396 | Latent Variable and Structural Equation Modeling | |
| EDUC 7456 | Multilevel Modeling | |
| EDUC 8348 | Human Development in Cultural, Historical, and Sociopolitical Contexts | |
| EDUC 8710 | Measurement in Survey Research | |
| EDUC 8720 | Psychometric Modeling: Item Response Theory | |
| EDUC 8730 | Advanced Qualitative Data Analysis | |
| *Electives* | | *18* |
| These courses must be selected in consultation with the faculty advisor and are typically at the 6000-level or higher. | | |
| *Total Credits* | | *44* |
| **Learning Sciences and Human Development** | | |
| *Specialty Seminar* [1] | | *2* |
| EDUC 6928 | Readings in Learning Sciences and Human Development | |
| *Specialty Area Coursework* | | *12* |
| Twelve hours selected with the faculty advisor's approval from 8000-level. Typically these are comprised of the four LSHD doctoral core courses, which are offered on a rotating basis: | | |
| EDUC 8310 | Design of Learning Environments for Radical Possibilities | |
| EDUC 8348 | Human Development in Cultural, Historical, and Sociopolitical Contexts | |
| EDUC 8358 | Critical Introduction to Learning Theory and Practice, Part 1 | |
| EDUC 8359 | Critical Introduction to Learning Theory and Practice, Part 2 | |
| *Advanced Methods* | | *6* |
| Minimum of six credit hours (equivalent to 2 semester-long courses) in advanced research methods, selected in consultation with your doctoral advisor. Advanced research methods are doctoral level courses and do not include required School of Education Core or Specialty Area courses. | | |

| | | |
|---|---|---|
| *Writing Seminar* | | *3* |
| EDUC 8940 | Scholarly Writing for Graduate Students | |
| or EDUC 8950 | Proposal and Dissertation Writing | |
| *Electives* | | *21* |
| *Total Credits* | | *44* |

**Literacy Studies**

| | | |
|---|---|---|
| *Specialty Seminar* [1] | | *2* |
| EDUC 6925 | Readings in Curriculum and Instruction | |
| *Specialty Area Coursework* | | *12* |
| Minimum twelve hours of the advanced doctoral courses in literacy studies are required to be taken within the first four years. Students will enroll in the following four courses. They can be taken in any order, there is no predetermined sequence. | | |
| EDUC 8100 | Historical and Contemporary Issues in Literacy Research | |
| EDUC 8101 | Theories of Literacy Research and Practice | |
| EDUC 8102 | Literacy Research Methods | |
| EDUC 8103 | Special Topics in Literacy Research | |
| *Advanced Methods* | | *6* |
| Minimum six hours of coursework in qualitative, quantitative, and/or mixed methodologies. Courses must be graduate level and may be taken within or outside of the School of Education. Advanced research methods do not include required School of Education Core or Specialty Area courses. For those students also pursuing the Teacher Learning, Research and Practice area of emphasis, one advanced methods requirements can be met through EDUC 7115. | | |
| *Writing Seminar* | | *3* |
| EDUC 8940 | Scholarly Writing for Graduate Students | |
| or EDUC 8950 | Proposal and Dissertation Writing | |
| *Electives* | | *21* |
| *Total Credits* | | *44* |

**Research and Evaluation Methodology**

| | | |
|---|---|---|
| *Specialty Seminar* [1] | | *2* |
| EDUC 6926 | Readings in Research and Evaluation Methodology | |
| *Specialty Area Coursework* | | *21* |
| EDUC 7326 | Quasi-Experimental Design in Causal Inference in Social Sciences | |
| EDUC 7386 | Educational Evaluation | |
| EDUC 7396 | Latent Variable and Structural Equation Modeling | |
| EDUC 7456 | Multilevel Modeling | |
| EDUC 8240 | Applied Regression Analysis | |
| EDUC 8710 | Measurement in Survey Research | |
| EDUC 8720 | Psychometric Modeling: Item Response Theory | |
| *Qualitative Methods* | | *3* |
| An additional qualitative methods course to be taken following the completion of EDUC 8260. | | |
| *Electives* | | *18* |
| *Total Credits* | | *44* |

**STEM Education**

| | | |
|---|---|---|
| *Specialty Seminar* [1] | | *2* |
| EDUC 6925 | Readings in Curriculum and Instruction | |
| *Specialty Area Coursework* | | *9* |
| EDUC 8177 | Advanced Seminar in Curriculum and Policy in Mathematics & Science Education | |
| EDUC 8178 | Advanced Seminar on Learning in Math & Science Education | |
| EDUC 8179 | Advanced Seminar in Mathematics and Science Teaching & Teacher Education | |
| *Advanced Methods* | | *6* |
| Minimum six hours in either qualitative or quantitative methods. Options within and outside of the School of Education may be chosen in consultation with advisor. Advanced research methods do not include required School of Education Core or Specialty Area courses. | | |
| Course options (examples): | | |
| EDUC 8710 | Measurement in Survey Research | |
| EDUC 8720 | Psychometric Modeling: Item Response Theory | |
| EDUC 8730 | Advanced Qualitative Data Analysis | |
| COMM 6410 | Discourse Analysis | |
| *Writing Seminar* | | *3* |
| EDUC 8940 | Scholarly Writing for Graduate Students | |
| or EDUC 8950 | Proposal and Dissertation Writing | |
| *Electives* | | *24* |
| *Total Credits* | | *44* |

**Teacher Learning, Research and Practice**

| | | |
|---|---|---|
| *Specialty Seminar* [1] | | *2* |
| EDUC 6925 | Readings in Curriculum and Instruction | |
| *Specialty Area Coursework* | | *9* |
| Choose three of the following courses: | | |
| EDUC 7115 | Critical Inquiry into Becoming a Teacher Educator | |
| EDUC 8115 | History and Policy Issues in Teaching and Teacher Education | |
| EDUC 8135 | Theories and Methodologies for Examining Teacher Learning | |
| EDUC 8145 | Designing for Teacher Learning and Teacher Education | |
| *Advanced Methods* | | *6* |
| In addition to EDUC 7115, six hours of advanced methods (qualitative or quantitative) are required. The six remaining credit hours are met through courses selected from within or outside the School of Education in consultation with the faculty advisor. Advanced research methods do not include required School of Education Core or Specialty Area courses. Although there are several courses that might fulfill this requirement, examples might include but are not limited to those noted below. | | |
| Course options (examples): | | |
| ANTH 7300 | Seminar: Research Methods in Cultural Anthropology | |
| COMM 6410 | Discourse Analysis | |
| EDUC 8710 | Measurement in Survey Research | |
| EDUC 8730 | Advanced Qualitative Data Analysis | |

| | | |
|---|---|---|
| LING 6310 | Sociolinguistic Analysis | |
| LING 7800 | Open Topics in Linguistics | |
| SOCY 6121 | Qualitative Methods | |
| SOCY 7026 | Feminist Research Methods | |
| SOCY 7171 | Special Topics | |
| WGST 6190 | Feminist Methodology | |
| *Writing Seminar* | | *3* |
| EDUC 8940 | Scholarly Writing for Graduate Students | |
| or EDUC 8950 | Proposal and Dissertation Writing | |
| *Electives* | | *24* |
| *Total Credits* | | *44* |

1 Each program area of emphasis requires a one-credit, specialty seminar course to be taken both fall and spring semesters of the first year. Additionally, first year PhD students participate in a "Professional Seminar" that meets five times each semester. This course is required to fulfill the credits earned in the fall and spring "Readings" (specialty seminar) course.

2 EDUC 5615 Language Acquisition for Bilingual Learners and EDUC 5635 Education and Sociolinguistics are required if not already taken prior to entering the PhD program.

## Dissertation Credit

All doctoral students must take a minimum of 30 dissertation hours (EDUC 8994 Doctoral Dissertation).

Students are allowed to take up to 10 hours prior to passing their comprehensive exam. Once students pass their comprehensive exam, they must be registered for a minimum of 5 dissertation hours every semester. Students may be registered for 3 hours if they are "off-campus" status, meaning they are not on appointment and are not taking any coursework hours.

Students must be registered for a minimum of 5 dissertation hours during the semester they defend.

## Publishable Paper Requirement

In addition to coursework requirements, doctoral students should be immersed in ongoing research with faculty as early in their program as possible. All doctoral students in the School of Education (SOE) are required to complete, at a minimum, one "publishable paper" by May of their third year in the program.

Please see the School of Education Student Handbook (https://www.colorado.edu/education/student-handbook/) for more information on this requirement.

## Comprehensive Examination

Before admission to candidacy for the doctoral degree, students must pass a comprehensive examination, or "comps," in the field of concentration. Students must be registered on the Boulder campus as regular degree-seeking students during the semester that the comprehensive examination is taken. The examination is conducted by an examining board, or comprehensive exam committee.

The comps committee shall consist of the major advisor (chair) and two additional SOE or CU Boulder faculty members. The SOE Associate Dean for Graduate Education and the Associate Dean for Research serve as additional pro-forma (non-examining) committee members. The chair must have a regular Graduate Faculty appointment. Other committee members must have regular or special Graduate Faculty appointments.

Students must schedule comprehensive examinations with the SOE by completing an application for candidacy form and emailing soe.gradvise@colorado.edu with the names of their comps committee members and the date of their exam at the beginning of the semester they plan to take their exams. Students should also request a room booking at this time for the oral component of the examination. For remote oral examinations, the chair must set up the Zoom room for the event.

Successful candidates must receive affirmative votes from a majority of the members of their examination board. A candidate who fails the examination may attempt it once more after a period of time determined by the examination committee.

Please see the School of Education Student Handbook (https://www.colorado.edu/education/student-handbook/) for more information on this requirement.

## Dissertation Proposal Committee

Once students have successfully passed their comprehensive examination, they should consult their faculty advisor to constitute their dissertation/proposal committee.

The dissertation/proposal chair must be a faculty member who is rostered in the doctoral candidate's program area who holds a regular Graduate Faculty Appointment (GFA). In the event that the doctoral candidate would like a dissertation chair from another program area, they may be invited to serve as a co-chair. Once the candidate and the dissertation chair have agreed on the topic of the dissertation, they should proceed together to identify the full dissertation/proposal committee.

Consistent with the Graduate School's requirements, the dissertation/proposal committee must consist of at least five persons, one of whom must be from outside the student's major department. Three committee members must be CU Boulder Graduate Faculty, and all could be SOE faculty members. Up to two committee members could be external to CU Boulder (i.e., not faculty members at CU Boulder) as long as they have appropriate GFAs.

The chair of the committee must have regular membership on the graduate faculty; the other committee members must have either regular or special Graduate Faculty appointments (GFAs). If a student is pursuing a joint or dual-degree, at least two of the committee members must hold graduate appointments in the student's SOE program area. Special membership, which includes faculty from other institutions, requires the approvals of the Associate Dean for Graduate Education and the Graduate School.

The entire list of prospective committee members must be submitted to the Graduate Program Coordinator at soe.gradvise@colorado.edu and approved by the Associate Dean for Graduate Education at the start of the semester during which the proposal will be defended, and then re-approved at the start of the semester during which the dissertation will be defended.

Please check the deadlines sheet for dates and consult the School of Education Student Handbook (https://www.colorado.edu/education/student-handbook/) for more information.

## Dissertation Proposal and Oral Defense

The dissertation proposal is a forward-looking document that outlines the doctoral candidate's proposed terrain of study through elaborating the following: a justification for the study; the conceptual framework and review of relevant literature; and the methodology. The written document should provide a clearly articulated and defensible stance, one which will provide the basis for further discussion among and planning by the proposal committee.

The dissertation proposal must describe the proposed study in sufficient detail so that members of the committee can judge the significance of the intended research and the adequacy of the planned study methods.

The oral defense of the dissertation proposal is a meeting where the candidate and five members of the committee agree to the purpose and methods of the proposed study. All members of the PhD examining committee ("dissertation/proposal committee") are expected to participate in the proposal oral defense and sign the formal proposal examination form. After the dissertation committee members have reviewed the proposal and signed the proposal signature page it must be sent electronically to soe.gradvise@colorado.edu.

If the proposed study involves human subjects, the doctoral candidate must obtain the approval of the University of Colorado Boulder Institutional Review Board (IRB). A copy of the IRB approval of the proposed research must accompany the signed proposal signature page when it is submitted to the Graduate Programs Coordinator.

Please see the School of Education Student Handbook (https://www.colorado.edu/education/student-handbook/) for more information.

## Dissertation (Final) Defense

PhD students must be registered as full time, regular degree-seeking students at CU Boulder for a minimum of 5 dissertation hours during the semester in which they pass the final examination.

Consistent with the Graduate's School's requirements for the final PhD examination (i.e., the dissertation defense), the dissertation committee must consist of at least five persons, one of whom must be from outside the student's major department. Three committee members must be CU Boulder Graduate Faculty, and all could be SOE faculty members. Up to two committee members could be external to CU Boulder (i.e., not faculty members at CU Boulder) as long as they have appropriate GFAs.

The chair of the committee must have regular membership on the graduate faculty; the other committee members must have either regular or special Graduate Faculty appointments (GFAs). If a student is pursuing a joint or dual-degree, at least two of the committee members must hold graduate appointments in the student's SOE program area. Special membership, which includes faculty from other institutions, requires the approvals of the Associate Dean for Graduate Education and the Graduate School.

The entire list of dissertation committee members must be submitted to the Graduate Program Coordinator at soe.gradvise@colorado.edu and (re)approved by the Associate Dean for Graduate Education at the start of the semester during which the dissertation will be defended.

Doctoral candidates must deliver the final dissertation text to all committee members at least three weeks before the scheduled dissertation defense. This allows the committee two weeks to review and evaluate the dissertation. The Chair will request that committee members provide substantive feedback, preferably in writing, about the dissertation whether the document is defense-ready. If it is not ready, the candidate is given more time to work on it and the defense will be rescheduled.

After the PhD dissertation has been accepted for defense by the student's dissertation committee, a final examination on the dissertation is conducted by the committee. Students must notify the Graduate School of their final oral examination at least two weeks before their scheduled examination date. The examination must be scheduled no later than the posted deadline for the semester in which the degree is to be conferred.

All members of the final PhD examining committee ("dissertation committee") must participate in the final examination/dissertation defense, with the mode of participation (e.g., in person, remotely) defined by the committee and approved by the Associate Dean for Graduate Education.

More than one dissenting vote disqualifies the candidate in the final examination. A student who fails the examination may attempt it once more after a period of time determined by the examining committee.

After successful completion of the dissertation defense, all members of the final PhD examining committee ("dissertation committee") must sign the formal final examination form.

Students must upload the completed, final draft of the approved dissertation to the Graduate School according to Graduate School procedures and deadlines.

Please check the deadlines sheet for dates and consult the School of Education Student Handbook (https://www.colorado.edu/education/student-handbook/) for more information.

## Transfer Credit

Transfer credit is defined as any credit earned at another accredited institution, credits earned on another campus of the CU system, or credits earned as a nondegree student within the CU system.

The maximum amount of work that may be transferred from another accredited institution to CU Boulder is 21 credit hours, and is accepted only after approval of the faculty advisor and the Graduate Programs Coordinator, in consultation with the Associate Dean of Students. All courses accepted for transfer must be graduate-level courses. A course in which a grade of B- or lower was received will not be accepted for transfer.

Transfer coursework must have been completed in the five years prior to acceptance to the program. Credit may not be transferred until the student has completed 6 credits of graduate-level coursework as a degree-seeking student on the CU Boulder campus with a 3.0 GPA. Students who have applicable credits to transfer to their PhD degree program must complete the transfer of credit paperwork.

## Time Limit

The doctoral degree must be completed within six years, including defending the dissertation and submitting it to the Graduate School. A one-year extension may be granted if formally requested in writing, recommended by the student's faculty advisor, and approved by the Associate Dean of Students and the Dean of the Graduate School. The extension request must show valid reasons as to why an extension is needed. If an extension is granted, all degree requirements must be completed within the extended time period.

## Establishing State Residency

PhD students who move to Colorado from another state need to petition for Colorado in-state tuition classification within one year so they are eligible for in-state tuition during second year of graduate study. Proof of residency includes a Colorado driver's license and vehicle registration, voter registration, filing Colorado income taxes and proof of employment. Students should save a signed copy of their Graduate Student Assistantship offer letter to serve as proof of employment.

Detailed instructions on how to apply for Colorado residency (also called domicile) can be found on the Office of the Registrar's State Residency webpage (http://www.colorado.edu/registrar/students/state-residency/).

# Areas of Emphasis

### Educational Foundations, Policy and Practice

The Educational Foundations, Policy and Practice (EFPP) program area of emphasis focuses on policy analysis and the application of academic disciplines—anthropology, history, law, philosophy and sociology—to the analysis of education. Faculty in EFPP are devoted to the critical examination of the relations among education, society, culture and government, with special emphasis on issues of equity along lines of race, ethnicity, social class, gender, sexual diversity, nationality/citizenship and intersectional inequalities.

The EFPP program area of emphasis prepares students for university faculty positions and other careers requiring deep knowledge of research.

### Equity, Bilingualism and Biliteracy

The Equity, Bilingualism and Biliteracy (EBB) program area seeks to understand and critically respond to issues at the intersection of language, culture, ability and identity; educational and social policies; teacher preparation and teacher learning; and the social and political contexts of schooling. This includes critical explorations of, and interventions related to, the various aspects of schooling that affect multilingual learners and their communities, such as the development of bilingualism and biliteracy, restrictive language and literacy policies, high-stakes accountability, teacher education, disproportionate representation in special education, racio-linguistic ideologies, the implementation of various bilingual education models, immigration policies and transnationalism. EBB aims specifically to prepare critical, equity- and justice-oriented researchers, teacher educators, and school, district and community leaders. Our EBB graduates go on to work and lead in universities; state, federal and local education agencies; and in school districts and community-based organizations.

### Learning Sciences and Human Development

Faculty and students in the Learning Sciences & Human Development (LSHD) program area study how people learn in the context of organizing for more equitable and sustainable social futures. We consider how research can inform social change that strengthens learning and teaching in K-12 schools, access to higher education for minoritized students and the sustainability of community-based education organizations. Working in partnership with schools and communities is a key component of the approach we take to understanding sociopolitical and educational issues and their possible solutions.

The LSHD program prepares graduate students to research and inform collective efforts to improve conditions of learning, particularly for young people from minoritized and marginalized communities and the adults (including teachers, community organizers and community members) who work with them. The program emphasizes:

- How a strong foundation in psychological perspectives on education and human development can inform efforts to improve conditions for learning in school and out of school contexts.
- The need to go beyond psychological perspectives to interpret learning and development in social, cultural and historical contexts.
- Social justice as a central concern in studying and informing efforts to improve conditions of learning.
- Humanistic approaches to research that draw on interpretive, critical and social practice theories of human action.

Students work with faculty members who conduct research in a range of settings, including schools, preservice teacher education programs, after-school programs, museums, community organizations, workplaces and grassroots social movements. We encourage prospective applicants to review the web pages of individual faculty to learn about current projects.

### Literacy Studies

Faculty and graduate students in the Literacy Studies program study and design literacies in print and multimodal modes and in varied contexts. Literacies are framed as central to envisioning and enacting expansive and justice-centered theories and practices for teaching, learning, imagination and self-expression in K-12 schools, informal learning spaces and communities. Grounded in critical, social and interpretive conceptions of literacy, our program highlights the interrelations among theory, research, practice, policy and the potential for equitable social change.

Through multiple methodologies, research in the program occurs in partnership with children, youth, families and teachers in ways that honor and attend to experiences and identities at the intersections of race, language, gender, sexuality, ability and economic opportunity. Doctoral students collaborate with faculty on a range of research projects, engage in community outreach and work in teacher education programs emphasizing social justice and humanizing approaches to curriculum and instruction that center and address the interests and needs of all learners. The program prepares graduate students for careers in research and teaching in university settings, educational leadership in schools and community organizations and research and development in the private or nonprofit sector.

Students will have the opportunity to:

- Develop an expansive understanding of literacy and its implications for children, youth and their families and communities.
- Understand the theoretical perspectives informing literacy research currently and historically.
- Critically examine and apply research methodologies to questions of significance to them and to the field of literacy studies.
- Collaborate with faculty, peers, youth, communities and other educators to pursue research and pedagogical goals.
- Deepen their understanding of theories and practices that situate literacy as essential for dismantling systems of oppression and building toward anti-racist, anti-oppressive and affirming futures for children and youth, teachers, teacher educators, schools and communities.

### Research and Evaluation Methodology

The Research and Evaluation Methodology (REM) program is a place for intellectually curious and motivated students who want to learn about deep research methodology with an eye toward influencing education

policy and practice. The most common methodological specializations are:

- Psychometrics and educational assessment
- Applied statistics

The program is a full-time commitment, and all admitted students are supported with five years of funding, including tuition remission and a stipend for living expenses. Students participate in graduate research assistant-ships each semester and can expect to work with faculty on research projects as part of CADRE (http://www.colorado.edu/cadre/cadre-projects-and-resources/), the Center for Assessment, Design, Research and Evaluation.

### STEM Education

The STEM Education program offers students an opportunity to build their understanding and expertise in STEM Education. The faculty in the STEM program area have expertise in science, mathematics and computer science in pre-college learning environments with a special focus on diversity and justice. Some faculty members are also affiliates with Engineering departments, and others support college-level learning environments in STEM disciplines. The program supports students in becoming educational researchers through participation in the doctoral cohort and STEM specific coursework. Students develop an understanding of how learning environments can be designed to foster students' understanding of and participation in STEM domains. Our faculty work with collaborators throughout campus and in partnership with teachers, schools, districts and community members. As part of their studies, PhD students have opportunities to work on funded research projects, teach courses, contribute to ongoing work of multiple CU centers, and enroll in courses across specializations in the School of Education. The PhD prepares students for careers in research and teaching in university settings; educational service and public leadership for schools and community organizations; or research and development in the private or nonprofit sectors.

The STEM Education community shares commitments to:

- Viewing learning as changes in participation in STEM pursuits with learning environments that always involve issues of identity and power;
- Collaborating with teachers, public schools, and community organizations as partners in broadening and re-envisioning STEM education to include more humanizing experiences and outcomes;
- Recognizing how current values and traditions of STEM disciplines need to be de-settled to expand what counts as knowing and to be a knower;
- Building and studying programs that engage and sustain learners and their communities through engagement in meaningful and relevant STEM questions; and
- Contributing to youth empowerment and agency by drawing on cultural, everyday, and disciplinary knowledges and practices to explore meaningful questions in their communities.

### Teacher Learning, Research and Practice

The Teacher Learning, Research & Practice (TLRP) program area is for people interested in conducting research and supporting and engaging the practice of teaching and teacher education. Being a teacher educator is a hybrid role combining both research and practice. The Teacher Learning, Research and Practice program is centrally concerned with disrupting the historical legacy of inequalities perpetuated by teacher education. Grounded in equity- and justice-oriented frameworks, TLRP coursework emphasizes the complexities of teachers' learning experiences and processes, as well as broader contexts of teaching and teacher education.

TLRP doctoral students enjoy opportunities to work in and with the school's multiple teacher preparation programs and to collaborate with faculty, other doctoral students and additional stakeholders (e.g., school partners; community organizations) in the critical design and study of these programs. Participating in teacher education and conducting research with members of this community also provides opportunities to deepen understandings from coursework and to pose and pursue questions using a range of research methodologies and methods.

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate both deep knowledge and understanding of a specific area in their field and the ability to use the knowledge to seek and find solutions to important educational problems.
- Demonstrate the research capacities (qualitative, quantitative, and/or mixed methods) needed to conduct original research while also demonstrating sufficient familiarity with other research methodologies to be able to critically read relevant literature in the field.
- Communicate research findings to a broad range of external audiences (scholarly, practitioner, policy makers, communities, etc.).
- Demonstrate knowledge of and contribute to the theoretical and empirical knowledge base on diversity, equity and justice in education.

# Teacher Leadership

## Master of Arts Pathway

To help teachers make a difference in their districts and communities, our innovative online Teacher Leadership Master of Arts degree offers graduate certificates that lead to the master's. Our coursework threads reflective practices, content mastery and skill development throughout so that students can practice leadership skills as they engage with the curriculum. This program is offered *entirely online* and is organized around term-based asynchronous course work (course work completed at separate times) as well as synchronous formats (meeting virtually at the same time).

## Graduate Certificate Pathway

To help teachers make a difference in their districts and communities, our innovative online Teacher Leadership program offers individual graduate certificates. Our coursework threads reflective practices, content mastery and skill development throughout so that students can practice leadership skills as they engage with the curriculum.

The Certificate Pathway is offered *entirely online* and is organized around self-paced asynchronous course work (course work completed at separate times) as well as synchronous formats for capstones (meeting virtually at the same time).

### Certificate Pathways

To earn a certificate, students will take four courses in their chosen certificate area. Each certificate blends together three two-credit online

courses with a synchronous capstone course held in the summer. These affordable certificates have been designed for educators looking to enhance their skills and capacities as classroom teachers and leaders and to make a difference in their schools and local communities. Students can choose to take classes and separately complete certificates without enrolling in the full MA program. However, if they wish to transfer into the Master of Arts in Teacher Leadership, they must do so before they have earned their 24th credit in the Teacher Leadership Program.

## Master's Degree

- Teacher Leadership - Master of Arts (p. 1584)

## Certificates

- Cultivating Compassion and Dignity in Ourselves and Our Schools - Graduate Certificate (p. 1584)
- Designing for Learning: Inquiry-Based Pedagogy for K–12 Educators - Graduate Certificate (p. 1585)
- Inclusive and Special Education - Graduate Certificate (p. 1585)
- Leading for Change in Science Assessment Practice - Graduate Certificate (p. 1586)
- Social and Emotional Learning - Graduate Certificate (p. 1586)
- Teaching Culturally and Linguistically Diverse Students - Graduate Certificate (p. 1587)
- Teachers Leading Change - Graduate Certificate (p. 1587)

# Teacher Leadership - Master of Arts (MA)

To earn the master's degree, students must complete three graduate certificates. Each certificate blends together term-based online courses with a synchronous capstone course held in the summer. This affordable degree has been designed for educators looking to enhance their skills and capacities as classroom teachers and leaders and to make a difference in their schools and local communities.

Students who wish to take classes and separately complete certificates without enrolling in the full MA program should see the Teacher Leadership program graduate certificate pathway (p. 1583).

Graduate certificates include:

- Cultivating Compassion and Dignity in Ourselves and Our Schools - Graduate Certificate (p. 1584)
- Designing for Learning: Inquiry-Based Pedagogy for K-12 Educators - Graduate Certificate (p. 1585)
- Inclusive and Special Education - Graduate Certificate (p. 1585)
- Leading for Change in Science Assessment Practice - Graduate Certificate (p. 1586)
- Social and Emotional Learning - Graduate Certificate (p. 1586)
- Teaching Culturally and Linguistically Diverse Students - Graduate Certificate (p. 1587)
- Teachers Leading Change - Graduate Certificate (p. 1587)

## Program Requirements

The MA in Teacher Leadership degree requires completion of any three Teacher Leadership Certificates (a minimum of 30 credit hours of approved, graduate-level coursework) and a minimum cumulative grade-point average (GPA) of 3.00.

Once a student has completed three of the 10-credit online certificates that prepare them for leadership in their teaching career, they will be awarded the MA in Teacher Leadership. A comprehensive final examination is not required.

People who enroll in the MA in Teacher Leadership must currently be a practicing educator with an established education site. This program does not offer endorsements or licensure.

## Plan(s) of Study

Students must complete three of the 10-credit online certificates to be awarded the MA in Teacher Leadership. Each graduate certificate in teacher leadership requires 10 completed credits, as follows:

- Three two-credit asynchronous classes, taken in sequence. These classes must be completed two weeks before beginning a synchronous capstone in the summer.
- One four-credit synchronous class, taken in the summer. The last course for all certificates is a synchronous capstone course that brings together all the content and curriculum. This course runs as a 3-week intensive after academic school years end in May/June.

For a full listing of all certificates, refer to the Overview (p. 1584) section.

## Learning Outcomes

By the completion of the program, students will:

- Design a project for their classroom, school and/or community related to the central knowledge claims within each certificate domain.
- Demonstrate comprehension of particular K–12 curricular content for students', other teachers and/or community members' development.
- Present the relevant domain's content knowledge to colleagues.
- Utilize instructional strategies within each certificate domain for students, other teachers and community members.

# Cultivating Compassion and Dignity in Ourselves and Our Schools - Graduate Certificate

The four-course certificate explores the ways in which practices of compassion and a focus on the essential dignity of educators and students can contribute to the wellness of educators and schools.

The certificate will prepare educators to lead efforts to promote compassion and dignity in schools. The certificate provides educators with supports and resources for caring for themselves and for cultivating and sustaining compassion for students, families, their school community and colleagues. The courses prioritize ways in which educators can see and feel their own daily teaching practices, struggles, constraints and joys reflected in the curriculum as well as the ways in which educators might become more compassionate teacher leaders. The compassion practices and skills embedded in the courses support district-level equity goals of creating safe and inclusive schools that challenge racism and promote justice. The certificate draws upon rigorous research, contemplative wisdom and deeply embedded lived experience of educators.

The certificate was co-designed by the Crown Institute and the Compassion Institute working in collaboration with teachers, counselors and administrators.

Students who wish to take classes and separately complete certificates without enrolling in the full MA program should see the Teacher Leadership program graduate certificate pathway (p. 1583).

## Requirements

| Code | Title | Credit Hours |
|---|---|---|
| EDUA 5019 | Compassion and Dignity for Educators: Awareness and Intention | 2 |
| EDUA 5020 | Self-Compassion and Dignity | 2 |
| EDUA 5021 | Compassion In Fullness | 2 |
| EDUA 5022 | Compassion In Action: Capstone | 4 |
| **Total Credit Hours** | | **10** |

In order to earn a certificate, students must receive a minimum grade of a C or higher in each course. The cumulative GPA for certificate courses must be 3.0 or higher.

## Learning Outcomes

By the completion of the program, students will be able to:

- Refine an understanding of compassion and contemplative practice in relation to teaching and schooling contexts.
- Evaluate supports and resources for caring for themselves.
- Practice skills to cultivate and sustain compassion for students, families, their school community and colleagues.
- Apply compassion tools and resources to serve as compassionate leaders in school and community settings and to address the many challenges they face in today's increasingly precarious climate.
- Develop compassion tools or resources for a local classroom, school or community context.

# Designing for Learning: Inquiry-Based Pedagogy for K–12 Educators - Graduate Certificate

Dr. Gloria Ladson-Billings argues that instead of organizing curriculum and instruction around the question, "What do you want to be when you grow up?," we can go further in supporting young people in meaningful, culturally relevant and sustaining ways if we instead ask: "What problems do you want to solve?"

This certificate focuses on how to follow Ladson-Billings' suggestion and re-organize our pedagogies around the questions and problems that youth and their communities want to pursue. Rather than approaching teaching as a process of transmitting information and skills to youth, this certificate helps teachers position youth as people whose questions, problems, and problem-solutions are inquiry-worthy.

The certificate offers coursework that introduces teachers to research and theorizing about how people learn through inquiry, how communities engage in knowledge-building and inquiry within and across subject areas, and how teachers can organize curriculum and pedagogy to create inquiry-based learning experiences with young people in schools. The certificate culminates in a capstone experience positioning teachers as pedagogical leaders who can organize and sustain professional learning among peers and colleagues through practitioner inquiry into how young people learn when given the opportunity to pursue questions and problems that they want to solve.

Students who wish to take classes and separately complete certificates without enrolling in the full MA program should see the Teacher Leadership program graduate certificate pathway (p. 1583).

## Requirements

| Code | Title | Credit Hours |
|---|---|---|
| EDUA 5023 | Inquiry-based Pedagogy: How Questions, Dilemmas, and Problems Matter for Learning | 2 |
| EDUA 5024 | Inquiry-Based Pedagogies: Inquiry Within and Across Different Disciplines and Communities | 2 |
| EDUA 5025 | Inquiry-Based Pedagogies: Designing and Facilitating Inquiry-Based Learning Experiences | 2 |
| EDUA 5026 | Inquiry-Based Pedagogies Capstone: Leading for Pedagogical Growth through Practitioner Inquiry | 4 |
| **Total Credit Hours** | | **10** |

In order to earn a certificate, students must receive a minimum grade of a C or higher in each course. The cumulative GPA for certificate courses must be 3.0 or higher.

## Learning Outcomes

By the completion of the program, students will be able to:

- Apply current research exploring how people learn in order to demonstrate the importance of inquiry-based learning as a valid pedagogical strategy.
- Examine how different cultural communities—including subject areas and disciplines—engage in inquiries to build understanding and how communities can incorporate young learners into these inquiries.
- Develop and implement an instructional design that organizes an inquiry-based learning experience within or across subject areas using a combination of curricular and pedagogical tools.
- Prepare a plan for engaging in teacher leadership to build capacity for inquiry-based pedagogies and practitioner inquiry in your school/system.

# Inclusive and Special Education - Graduate Certificate

This certificate prepares educators to be leaders in rethinking inclusive and special education in their schools and districts by humanizing students with dis/abilities and the systems designed to support them, by gaining valuable knowledge about legal, historical and social precedents in special education, and by expanding their instructional toolkit.

Educators will examine federal, state and local policies and they will also learn practical strategies they can use to plan instruction and to support students in general education and intervention settings. Each course draws upon culturally and linguistically appropriate practices that attend

to the needs and strengths of all students, with an emphasis on creating equitable learning environments. Course content and assignments consider dis/ability to be one of multiple identities that makes each of us human, rather than a defect or problem in need of a cure. We use the term dis/ability, choosing purposefully to place a slash between dis and ability.

Students who wish to take classes and separately complete certificates without enrolling in the full MA program should see the Teacher Leadership program graduate certificate pathway (p. 1583).

## Requirements

| Code | Title | Credit Hours |
|---|---|---|
| EDUA 5027 | Introduction to Inclusive and Special Education | 2 |
| EDUA 5028 | Creating and Fostering Inclusive Learning Environments | 2 |
| EDUA 5029 | Strategies for Inclusive Teaching | 2 |
| EDUA 5030 | Capstone: Leadership in Inclusive and Special Education | 4 |
| **Total Credit Hours** | | **10** |

In order to earn a certificate, students must receive a minimum grade of a C or higher in each course. The cumulative GPA for certificate courses must be 3.0 or higher.

## Learning Outcomes

The certificate will prepare teacher leaders to:

- Analyze the historical, political, and social influences on inclusive and special education.
- Identify the features of creative, flexible and supportive inclusive learning environments for students with and without dis/abilities.
- Develop instructional strategies to include students with dis/abilities and those with a range of learning strengths and needs in curriculum and school structures.
- Synthesize knowledge on inclusive and special education to create and implement an advocacy project.

# Leading for Change in Science Assessment Practice - Graduate Certificate

In this certificate, teachers learn how to adapt, develop and pilot assessments that elicit students' integrated understanding of disciplinary core ideas and crosscutting concepts and that connect to students' interests and identities. This certificate supports the needs of partnerships in Colorado and beyond in to develop assessment systems aligned to new science standards.

Students who wish to take classes and separately complete certificates without enrolling in the full MA program should see the Teacher Leadership program graduate certificate pathway (p. 1583).

## Requirements

| Code | Title | Credit Hours |
|---|---|---|
| EDUA 5015 | Envisioning Equitable Teaching and Learning in Science | 2 |
| EDUA 5016 | Designing Meaningful and Equitable Science Assessments | 2 |
| EDUA 5017 | Leadership in Creating Equitable Assessment Systems in Science | 2 |
| EDUA 5018 | Leading in Schools and Systems for Transformation in Science Assessment: Capstone | 4 |
| **Total Credit Hours** | | **10** |

In order to earn a certificate, students must receive a minimum grade of a C or higher in each course. The cumulative GPA for certificate courses must be 3.0 or higher.

## Learning Outcomes

By the completion of the program, students will be able to:

- Explain the key assumptions for the Next Generation Science Standards around equitable and phenomenon-based teaching and assessment.
- Identify supports needed to address new science standards.
- Design tasks that invite students to explain phenomena and solve problems that connect to their interests, experiences and identities.

# Social and Emotional Learning - Graduate Certificate

The certificate in Social and Emotional Learning provides practicing teachers with requisite background knowledge, understanding and preparation so as to engage students in transformative social and emotional learning. In order for teachers to enable students to become more aware and understanding of their own and others' emotions, teachers need to understand their own emotions as well.

The arena of social and emotional learning is a new, growing and much needed public school curricular domain. During the last three decades, public schools have focused almost exclusively on cognitive academic outcomes. While some progress has been achieved, the consensus seems to be that a renewed emphasis on the whole student needs to be restored. At the same time teachers' professional work conditions have deteriorated. Teachers new to the field are leaving the profession at greater rates than in the past. Teacher "burnout" is a recognized and acknowledged public education phenomenon.

Students who wish to take classes and separately complete certificates without enrolling in the full MA program should see the Teacher Leadership program graduate certificate pathway (p. 1583).

## Requirements

| Code | Title | Credit Hours |
|---|---|---|
| EDUA 5004 | The Teacher in SEL - Powerful Personal and Professional Emotions (asynchronous) | 2 |

| | | |
|---|---|---|
| EDUA 5005 | SEL for Students: A Path to Social and Emotional Well-Being (asynchronous) | 2 |
| EDUA 5006 | Expanding SEL (asynchronous) | 2 |
| EDUA 5007 | Social and Emotional Learning Capstone (synchronous) | 4 |
| **Total Credit Hours** | | **10** |

In order to earn a certificate, students must receive a minimum grade of a C or higher in each course. The cumulative GPA for certificate courses must be 3.0 or higher.

## Learning Outcomes

By the completion of the program, students will be able to:

- Critically reflect on the role of emotions in teaching and learning in oneself and one's students.
- Analyze the distinct features and curricular approaches of transformative SEL.
- Explore the relationship between transformative SEL and restorative practices for discipline.
- Examine the intersections of culturally sustaining pedagogy and transformative SEL as complementary pedagogical lenses.
- Develop a project that incorporates transformative SEL and culturally sustaining pedagogy for a class, school or community.

# Teachers Leading Change - Graduate Certificate

This certificate focuses on understanding and developing leadership skills that enable teachers to engage effectively in shared leadership and proactively expand their sphere of influence in meaningful ways. A core tenet of the courses is that teachers start to or continue to see themselves as leaders, to effectively take on a leadership stance, and to do so in a way that feels authentic and builds on each teacher's own histories and priorities for growth. The courses provide students with ideas and tools for leading change in a variety of educational spaces, including within district workshops and community networks.

Students who wish to take classes and separately complete certificates without enrolling in the full MA program should see the Teacher Leadership program graduate certificate pathway (p. 1583).

## Requirements

| Code | Title | Credit Hours |
|---|---|---|
| EDUA 5031 | Teacher Leadership and Learning: Professional Learning Communities in Schools and Districts | 2 |
| EDUA 5032 | Instructional Coaching in Schools and Districts | 2 |
| EDUA 5033 | Teacher Led-Networks: Teacher Leaders within Networks of Advocacy | 2 |
| EDUA 5034 : Capstone | Teachers Leading Change in Action | 4 |
| **Total Credit Hours** | | **10** |

In order to earn a certificate, students must receive a minimum grade of a C or higher in each course. The cumulative GPA for certificate courses must be 3.0 or higher.

## Learning Outcomes

By the completion of the program, students will be able to:

- Describe how to cultivate authentic professional learning communities and a school climate that builds upon the strengths and expertise of teachers as leaders.
- Practice facilitation moves for purposeful coaching activities that foster teacher learning.
- Implement methods to support change in teacher-led networks.
- Develop a plan of action that addresses a pressing need in public education by utilizing teacher-led change at various scales.

# Teaching Culturally and Linguistically Diverse Students - Graduate Certificate

The certificate in Culturally and Linguistically Diverse Education will offer teachers an introduction to the history and current policy and laws that relate to emerging bilingual learners in Colorado public schools. Teachers will learn about the process of language acquisition, develop skills and strategies to teach English and adapt their curriculum and instruction to the developing needs of emerging bilingual learners, and learn key strategies for engaging diverse families in their school and classroom communities.

Students who wish to take classes and separately complete certificates without enrolling in the full MA program should see the Teacher Leadership program graduate certificate pathway (p. 1583).

## Requirements

| Code | Title | Credit Hours |
|---|---|---|
| EDUA 5000 | Introduction to History, Policy and Advocacy for CLD Educators (asynchronous) | 2 |
| EDUA 5001 | Intro to Designing Culturally Sustaining Pedagogy (asynchronous) | 2 |
| EDUA 5002 | Introduction to Teaching Culturally and Linguistically Diverse Learners (asynchronous) | 2 |
| EDUA 5003 | Teaching Culturally/Linguistically Diverse Learners: Capstone (synchronous) | 4 |
| **Total Credit Hours** | | **10** |

In order to earn a certificate, students must receive a minimum grade of a C or higher in each course. The cumulative GPA for certificate courses must be 3.0 or higher.

## Learning Outcomes

This certificate will prepare teacher leaders to:

- Recognize the cultural and linguistic differences within the teacher's classroom, school and communities.

- Analyze their own classroom as a site for second language acquisition and make appropriate adjustments.
- Address the linguistic and cultural differences in classrooms in ways that build on students' linguistic and cultural diversity.
- Assess content learning of students who are at different levels of English proficiency.

# Graduate Teacher Licensure

The MA+ Teacher Licensure program leads to a Colorado initial teaching license in secondary (grades 6–12) Mathematics, Science, English Language Arts, or Social Studies, plus a master's degree in Curriculum & Instruction. This offers an efficient and experiential route to earning a master's degree with teaching licensure.

This program is for candidates who have earned a bachelor's degree from an accredited institution of higher education and want to elaborate upon and deepen the close connections between fieldwork and coursework to become a teacher. Graduate students follow a planned sequence of core courses that meet state content preparation standards, complete a master's degree, and satisfy professional education requirements concurrently. The program involves a combination of courses at the university and secondary school placements.

Students who successfully complete all School of Education requirements will be recommended for a Colorado initial teaching license.

The teacher education programs at the University of Colorado Boulder do not prepare candidates for teacher licensure exams in states other than Colorado. For students planning to seek professional licensure or certification in a state other than Colorado, it is strongly recommended that you contact the appropriate licensing entity in the state in which you are, or plan to be, located to seek information and guidance regarding licensure or certification requirements and how the Colorado license may transfer in advance of program completion. If you will have to take an additional course or pass a different licensure exam to transfer your license, your contact person at the correct state agency will help you plan for that and avoid surprises.

## Program Mission & Commitments

The School of Education prepares educators who are able to enact commitments to social justice and equitable access to deep content learning in school, family and community contexts.

The following principles guide our work in preparing the next generation of educators:

- Teachers must position students as sense-makers and knowledge-generators who desire to invest and succeed in school. This involves noticing youth; building relationships with them; valuing their perspectives; and attending to their thinking, curiosities and capabilities.
- Teaching is both intellectual work and a craft. Deep knowledge of content and pedagogy, creativity and passion, fuel both learning and teaching.
- Teachers must design equitable learning environments in which all youth are engaged in robust and consequential learning.
- Teachers' instruction and student learning are always conducted within the context of larger social systems, structures and hierarchies.
- What we do and say matter and must be analyzed. Our language and action construct or constrain opportunities for youth to build meaningful, positive and sustained relationships to learning and one another.

## Colorado Teacher Quality Standards

Teacher education candidates engage in a planned sequence of courses and accompanying clinical experiences in local community and school sites. Courses and assessments ensure candidates have demonstrated appropriate mastery of (1) content taught in the Colorado Academic Standards and (2) professional practices and dispositions associated with the Colorado Teacher Quality Standards listed below:

1. Teachers demonstrate mastery of and pedagogical expertise in the content they teach. The secondary teacher has knowledge of literacy and mathematics and is an expert in his, her, or their content endorsement area(s).
2. Teachers establish a safe, inclusive and respectful learning environment for a diverse population of students.
3. Teachers plan and deliver effective instruction and create an environment that facilitates learning for their students.
4. Teachers demonstrate professionalism through ethical conduct, reflection and leadership.

## Admission Requirements

To be eligible for admission to the MA+ program, applicants must meet all of the requirements below. Please note, satisfying the minimum criteria does not guarantee acceptance.

### Secondary Mathematics and Secondary Science

To be considered for admission, applicants must meet the following:

- Hold a bachelor's degree from an accredited institution of higher education.
- Earn a minimum 3.00 GPA cumulatively among all institutions attended. Applicants must also have a 3.0 GPA in all content area coursework. Please note, GRE Scores are not required for the MA+ program.
- Meet the basic skills requirement: Complete appropriate, college-level Math and Composition courses with a "B-" or better. Acceptable scores on the ACT, SAT, GRE, or Praxis CORE exam will also satisfy the requirement.
- Complete content coursework. Applicants must complete all content coursework for their teaching area *prior* to the beginning of the fall semester in the program. Any candidate who has not completed their content coursework by that time will be dismissed from the program or may be given the option to defer admission one year.
- Complete the appropriate, state-approved licensure exam (currently the Praxis Subject Assessments exams) for their content area prior to the beginning of the fall semester in the program. Any candidate that has not passed the licensure exam by the time their program this time will be dismissed from the program or may be given the option to defer admission one year.
  - Praxis Mathematics (test code 5165)
  - Praxis General Science (test code 5436)

### Secondary English Language Arts and Secondary Social Studies

To be considered for admission, applicants must meet the following:

- Hold a bachelor's degree from an accredited institution of higher education. English Language Arts applicants must have a degree in English Literature, Ethnic Studies, Spanish Literature, or Humanities with a literature emphasis.

- Earn a minimum 3.00 GPA cumulatively among all institutions attended. Applicants must also have a 3.0 GPA in all content area coursework. Please note, GRE Scores are not required for the MA+ program.
- Meet the basic skills requirement: Complete appropriate, college-level Math and Composition courses with a "B-" or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.
- Complete content coursework. Applicants must complete all content coursework for their teaching area *prior* to the beginning of the spring semester in the program. Any candidate who has not completed their content coursework by that time will be dismissed from the program or may be given the option to defer admission one year.
- Complete the appropriate, state-approved licensure exam (currently the Praxis Subject Assessments exams) for their content area prior to the beginning of the spring semester in the program. Any candidate that has not passed the licensure exam by the time their program this time will be dismissed from the program or may be given the option to defer admission one year.
  - Praxis English Language Arts: Content Knowledge (test code 5038)
  - Praxis Social Studies: Content Knowledge (test code 5081)

# MA+ Secondary English Language Arts (7–12) Teacher Licensure Program

Teacher licensure candidates must maintain a 3.0 cumulative GPA in their content area and Education coursework. All grades must be a B- or better to satisfy a degree requirement. All grades must be a C- or better to satisfy a content coursework requirement.

## Content Coursework Requirement

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| Mathematics: College-level mathematics. | | 3 |
| Natural Science | | 3 |
| Social Science | | 3 |
| Advanced Writing: Critical or creative writing beyond the lower-division/introductory composition level. | | 3 |
| Visual or Digital Communication: Includes theatre, film, or other digital media courses. | | 3 |
| Literature: Must include a component of American literature, British literature, World literature (non-American/non-British literature), and Multicultural literature. | | 12 |
| English and English Language Arts-related courses | | 30 |
| Acceptable course work may be in communication/speech, composition, drama/ theatre, humanities, journalism, and/or literature. (May include courses from the content requirements above.) | | |

## Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **First Semester (Summer)** | | |
| EDUC 5001 | Framing Equity and Justice in the Humanities Classroom | 3 |
| EDUC 5112 | Educational Psychology and Adolescent Development | 3 |
| **Second Semester (Fall)** | | |
| EDUC 5005 | Advanced Social Foundations of Education | 3 |
| EDUC 5295 | Narrative and Story in the Humanities | 3 |
| EDUC 5325 | Queering Literacy in Secondary Classrooms | 3 |
| EDUC 5345 | Secondary English Methods I | 3 |
| EDUC 5485 | Differentiation in the Classroom | 3 |
| **Third Semester (Spring)** | | |
| EDUC 5365 | Secondary English Methods II | 3 |
| EDUC 5490 | Blurring Disciplinary Lines in the Humanities | 3 |
| EDUC 4901 | Student Teaching | 3 |
| EDUC 5390 | Seminar: Teaching for Equity and Justice | 3 |
| **Total Credit Hours** | | **33** |

## Student Teaching

Candidates will complete an intensive academic year of field experiences while taking courses. Candidates will not be able to take other coursework in the Fall and Spring semesters of the program. Student teaching coursework does not count towards the Master's degree.

## Required Tests and Assessments

### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

### Licensure Exam: Prior to Spring Semester of Program

Pass the state-approved licensure exam, PRAXIS English Language Arts: Content Knowledge (test code 5038).

# MA+ Secondary Mathematics (7–12) Teacher Licensure Program

Teacher licensure candidates must maintain a 3.0 cumulative GPA in content area and Education coursework. All grades must be a B- or better to satisfy a degree requirement. All grades must be a C- or better to satisfy a content coursework requirement.

## Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| Literature & Arts | | 3 |
| Natural Science | | 3 |
| Social Science | | 3 |
| Written Communication: College-level composition or writing | | 3 |
| Calculus 1 | | 4-5 |
| Calculus 2 | | 4-5 |
| Linear Algebra | | 3 |
| Functions & Modeling/Analysis/Abstract Mathematics: One course in functions and modeling, analysis or topology. | | 3 |
| Geometry: One course in modern geometry. | | 3 |

| | |
|---|---|
| Probability & Statistics: One course in probability theory and mathematical statistics. | 3 |
| Math or applied math coursework. Eighteen of the required 24 credit hours above must be completed at the sophomore level or higher. (May include requirements above.) | 24 |
| Recent mathematics coursework in the past 5 years. (May include EDUC 5317.) | 6 |

## Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **First Semester (Summer)** | | |
| EDUC 5002 | Framing Equity and Justice in the STEM Classroom | 3 |
| EDUC 5112 | Educational Psychology and Adolescent Development | 3 |
| EDUC 5235 | Language and Literacy Across the Curriculum | 3 |
| **Second Semester (Fall)** | | |
| EDUC 5005 | Advanced Social Foundations of Education | 3 |
| EDUC 5060 | Classroom Interactions | 3 |
| EDUC 5317 | Perspectives on Mathematics | 3 |
| EDUC 5485 | Differentiation in the Classroom | 3 |
| **Third Semester (Spring)** | | |
| EDUC 5375 | Problem-Based Math Instruction | 4 |
| Teaching & Learning Mathematics. Course options (examples): | | 3 |
| EDUC 5815 | Teaching K-12 Mathematics: Number Sense | |
| EDUC 5821 | Teaching K-12 Mathematics: Algebraic Thinking | |
| EDUC 5835 | Teaching K-12 Mathematics: Geometry & Measurement | |
| EDUC 5850 | Teaching K-12 Mathematics: Probability & Statistics | |
| EDUC 5706 | Assessment in Mathematics and Science Education | |
| EDUC 4901 | Student Teaching | 3 |
| **Total Credit Hours** | | **31** |

## Student Teaching

Candidates will complete an intensive academic year of field experiences while taking courses. Candidates will not be able to take other coursework in the Fall and Spring Semesters of the program. Student teaching coursework does not count towards the Master's degree.

## Required Tests and Assessments

### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

### Licensure Exam: Prior to Fall Semester

Pass the state-approved licensure exam, PRAXIS Mathematics (test code 5165).

### Teacher Performance Assessment

Pass a performance-based, subject-specific assessment designed by program faculty.

# MA+ Secondary Science (7–12) Teacher Licensure Program

Teacher licensure candidates must maintain a 3.0 cumulative GPA in their content area and Education coursework. All grades must be a B- or better to satisfy a degree requirement. All grades must be a C- or better to satisfy a content coursework requirement.

## Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| Literature & Arts | | 3 |
| Social Science | | 3 |
| Written Communication: College-level composition or writing. | | 3 |
| Calculus I | | 4-5 |
| Biology | | 3 |
| Chemistry | | 3 |
| Earth/space science | | 3 |
| Physics | | 3 |
| Complete three of the following four content-area lab courses: | | |
| Biology lab | | |
| Earth/space science lab | | |
| Chemistry lab | | |
| Physics lab | | |
| Recent science coursework in the past 5 years | | 6 |
| Students must complete 24 credit hours in one of the sections below: | | 24 |
| Biology (may include courses from biology area above). Coursework must include the study of general biology, matter & energy in living systems, ecology, evolution, genetics, molecular biology, human anatomy, environmental biology and biotechnology. | | |
| Chemistry (may include courses from chemistry area above). Coursework must include the study of analytical, inorganic, organic and physical chemistry. | | |
| Earth/space science (may include courses from Earth/Space Science area above). Coursework must include the study of environmental science, astronomy, historical & physical geology, meteorology, oceanography, and geomorphology & earth systems. | | |
| Environmental science. Coursework must include the study of ecology and astronomy, and 17 credit hours in biology. | | |
| Physics (may include courses from Physics area above). Coursework must include the study of mathematics through differential equations, astronomy, atomic & nuclear, classical mechanics, electricity & magnetism, heat & thermodynamics, optics & sound, quantum mechanics, radiation & radioactivity, relativity and waves. | | |

## Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **First Semester (Summer)** | | |
| EDUC 5002 | Framing Equity and Justice in the STEM Classroom | 3 |
| EDUC 5112 | Educational Psychology and Adolescent Development | 3 |
| EDUC 5235 | Language and Literacy Across the Curriculum | 3 |
| **Second Semester (Fall)** | | |
| EDUC 5005 | Advanced Social Foundations of Education | 3 |
| EDUC 5060 | Classroom Interactions | 3 |
| EDUC 5485 | Differentiation in the Classroom | 3 |
| Teaching & Learning Science. Course options (examples): | | 3 |
| EDUC/PHYS 5460 | Teaching and Learning Physics | |
| EDUC 5580 | Physics and Everyday Thinking | |
| EDUC 5822 | Teaching and Learning Chemistry | |
| EDUC 5833 | Teaching and Learning Earth Systems | |
| EDUC 6811 | Teaching & Learning Biology In the Classroom | |
| **Third Semester (Spring)** | | |
| EDUC 5385 | Phenomenon-Based Science Instruction | 4 |
| Teaching & Learning Science | | 3 |
| EDUC 5706 | Assessment in Mathematics and Science Education | 3 |
| EDUC 4901 | Student Teaching | 3 |
| **Total Credit Hours** | | **34** |

## Student Teaching

Candidates will complete an intensive academic year of field experiences while taking courses. Candidates will not be able to take other coursework in the Fall and Spring Semesters of the program. Student teaching coursework does not count towards the Master's degree.

## Required Tests and Assessments

### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

### Licensure Exam: Prior to Fall Semester

Pass the state-approved licensure exam, PRAXIS General Science (test code 5436).

### Teacher Performance Assessment

Pass a performance-based, subject-specific assessment designed by program faculty.

# MA+ Secondary Social Studies (7–12) Teacher Licensure Program

Teacher licensure candidates must maintain a 3.0 cumulative GPA in their content area and Education coursework. All grades must be a B- or better to satisfy a degree requirement. All grades must be a C- or better to satisfy a content coursework requirement.

## Content Coursework Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Courses and Minimum Required Credit Hours** | | |
| Literature & Arts | | 3 |
| Mathematics: College-level mathematics. | | 3 |
| Natural Science | | 3 |
| Written Composition: College-level composition or writing. | | 3 |
| US History | | 6 |
| World History | | 6 |
| Economics: Must be completed in an Economics department. | | 3 |
| Political Science: Must be completed in a Political Science department. | | 3 |
| Cultural/Human Geography: Must be completed in a Geography department. Physical Geography does NOT qualify. | | 3 |
| Sociology or Social/Cultural Anthropology: Must be completed in a Sociology or Anthropology department. Physical Anthropology does NOT qualify. | | 3 |
| 30 credit hours of course work in one of the following disciplines: Anthropology, Economics, Ethnic Studies, Geography, History, International Affairs or Political Science. A minimum of 12 credit hours must be upper division. (May include courses from the content requirements above.) | | 30 |

## Education Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **First Semester (Summer)** | | |
| EDUC 5001 | Framing Equity and Justice in the Humanities Classroom | 3 |
| EDUC 5112 | Educational Psychology and Adolescent Development | 3 |
| **Second Semester (Fall)** | | |
| EDUC 5005 | Advanced Social Foundations of Education | 3 |
| EDUC 5316 | Nature of Social Studies and Social Studies Education | 3 |
| EDUC 5325 | Queering Literacy in Secondary Classrooms | 3 |
| EDUC 5330 | Secondary Social Studies Methods I | 3 |
| EDUC 5485 | Differentiation in the Classroom | 3 |
| **Third Semester (Spring)** | | |
| EDUC 5355 | Secondary Social Studies Methods II | 3 |
| EDUC 5490 | Blurring Disciplinary Lines in the Humanities | 3 |
| EDUC 5390 | Seminar: Teaching for Equity and Justice | 3 |
| EDUC 4901 | Student Teaching | 3 |
| **Total Credit Hours** | | **33** |

## Student Teaching

Candidates will complete an intensive academic year of field experiences while taking courses. Candidates will not be able to take other coursework in the Fall and Spring semesters of the program. Student teaching coursework does not count towards the Master's degree.

### Required Tests and Assessments

#### Basic Skills: Prior to Student Teaching

Complete an appropriate, college-level math *and* composition course with a B- or better. Acceptable scores on the ACT, SAT, GRE or Praxis CORE exam will also satisfy the requirement.

#### Licensure Exam: Prior to Spring Semester in Program

Pass the state-approved licensure exam, PRAXIS Social Studies: Content Knowledge (test code 5581).

# Engineering & Applied Science

The College of Engineering and Applied Science has a tradition of excellence in engineering education dating back to 1893, and we continually update and improve our programs to reflect the highest standards in teaching and learning, discovery, innovation, community and culture. We are the top-ranked engineering school in the Rocky Mountain region with 17 baccalaureate programs and 16 graduate programs offering more than 40 degrees. Via our partnership program with Colorado Mesa University, we also offer students on the Western Slope the opportunity to earn degrees in mechanical engineering and civil engineering.

## Mission & Vision

The College of Engineering & Applied Science's mission is to generate new knowledge in engineering and related fields, and to equip students from diverse backgrounds to become leaders and citizens responsible for the betterment of individuals and society. Our vision is to be a recognized world leader for excellence and innovation in engineering research and education, with an emphasis on inclusive excellence, active learning and global society.

## Degree Programs

Graduate degrees are offered in the following areas:

- Aerospace engineering sciences (p. 1593)
- Architectural engineering (p. 1614)
- Biomedical engineering (p. 1624)
- Biological engineering (p. 1634)
- Chemical engineering (p. 1629)
- Civil engineering (p. 1635)
- Computer science (p. 1653)
- Creative technology and design (p. 1685)
- Electrical engineering (p. 1699)
- Engineering education (p. 1728)
- Engineering management (p. 1733)
- Environmental engineering (p. 1742)
- Global engineering (p. 1652)
- Materials science and engineering (p. 1748)
- Mechanical engineering (p. 1752)
- Network engineering (p. 1783)
- Robotics (p. 1726)
- Water engineering and management (p. 1783)

# Policies & Requirements

## Academic Excellence

Graduate study in engineering at the University of Colorado Boulder offers a challenging, collaborative environment with exceptional possibilities. Graduate education at the College of Engineering & Applied Science involves the creation and dissemination of knowledge in many forms.

## Academic Standards

### Academic Policies

College of Engineering and Applied Science graduate students must abide by policies within their programs of study, college and the Graduate School policies. Students should refer to these websites often; policies, procedures and forms may be updated throughout the academic year.

### Academic Integrity

Graduate students in the College of Engineering and Applied Science may be required to pass an academic integrity quiz.

See also the campuswide Academic Integrity (p. 1104) and Student Conduct (p. 1121) sections and the Honor Code (http://honorcode.colorado.edu/) website.

### Academic Standing

Refer to the Graduate School (p. 1103) for details.

## Credit and Enrollment

### Attendance and Full-Time Enrollment

While the majority of our students attend classes on the Boulder campus, many of the college's graduate degrees and certificates are available online through Boulder Connect (http://www.colorado.edu/connect/). Attendance and enrollment requirements are governed by Graduate School policies (http://www.colorado.edu/graduateschool/policies/). However, the college's individual graduate programs may have requirements that are more stringent than the Graduate School.

### Credit Policies

#### Final Grade Appeal

Visit the college's Grade Appeal Policy (http://www.colorado.edu/engineering-facultystaff/college-rules-policies/grade-appeal-policy/) webpage.

#### Transfer Credit

Transfer credit requirements are governed by the Graduate School policies (http://www.colorado.edu/graduateschool/policies/). However, the college's individual graduate programs must approve the transfer credits and may have transfer credit requirements that are more stringent than the Graduate School. Refer to the individual graduate programs for specific transfer credit requirements.

#### Petition Policy

A student desiring a waiver of departmental and/or Graduate School policies must request and secure approval for this waiver through a petition procedure. Petitions are first presented to the student's individual graduate program for review, followed by review at the Graduate School.

# Requirements

## Prerequisites

To enroll for an advanced degree in any department or program in the College of Engineering and Applied Science, candidates either must have previously earned a bachelor's degree in a curriculum that includes the necessary prerequisites for that branch of engineering or must qualify for the concurrent BS and MS program. If the candidate's preliminary education was taken at another institution, the degree of qualification for advanced work is determined by the department concerned and by the dean of the Graduate School.

Graduates of engineering technology programs should note that the equivalent of a BS degree in an appropriate engineering field is required for entry into the Graduate School. Because the goals and orientation of engineering programs differ from those of technology programs, technology graduates should expect to make up deficiencies before being admitted to graduate study in engineering. Students may not be admitted to the Graduate School while making up deficiencies, but can enroll as nondegree students.

## Coursework

Graduate work in each department of the College of Engineering and Applied Science falls into two classes:

1. courses that are offered for candidates who have chosen to major in the particular department, and
2. courses that are offered for candidates who have chosen their major in some other department, but who are pursuing a certificate or other complementary coursework.

## Availability of Courses

All courses are not necessarily offered every year. They may only be available if there is sufficient demand.

## Qualifying or Preliminary Examinations

Graduate students who plan to become candidates for the MS or PhD degree may be required to take a qualifying or preliminary examination. Individual departments should be consulted concerning the timing or requirement of this examination.

## Teaching and Research Assistantships

The College of Engineering and Applied Science requires that all graduate teaching assistants and research assistants be proficient and intelligible in spoken English. In order to ensure that this is the case, all prospective teaching assistants and research assistants whose native language is not English, or others for whom the department graduate program coordinator believes that spoken language intelligibility is a concern, regardless of native language, will be tested for spoken language intelligibility prior to or at the beginning of the semester in which the teaching or research assistantship is awarded. In the event that a prospective teaching or research assistant does not demonstrate a satisfactory level of proficiency, as determined by campus assessment, that student will be required to participate in training designed to improve intelligibility.

# Programs of Study

# Aerospace Engineering Sciences

The aerospace engineering program is organized around focus areas in astrodynamics and satellite navigation systems, bioastronautics, remote sensing, Earth and space sciences and aerospace engineering systems, including fluid dynamics and propulsion, automatic control, structures and mechanics of materials.

The Ann and HJ Smead Department of Aerospace Engineering Sciences (http://www.colorado.edu/aerospace/) at the University of Colorado Boulder is one of the top aerospace engineering departments in the nation. Aerospace engineers work on Earth and in space not only to extend frontiers, but also to better understand and preserve our terrestrial environment. Few fields offer as many exciting and diverse career opportunities: becoming an astronaut (15 graduates to date have become astronauts), designing the next generation of aircraft and spacecraft, monitoring our global habitat via remote sensing from space, *in situ* sensing with unmanned vehicles and helping to develop environmentally clean energy and transportation systems.

Aerospace graduate students often formulate degree plans on the basis of their interests and needs. Portions of the program are designed to promote our students' engineering and professional development.

Graduate students are admitted into a specific focus area that provides research advising and financial support and sets specialized admission and program requirements with recommendations for coursework within and outside the department.

The five focus areas are:

- Astrodynamics and Satellite Navigation Systems
- Autonomous Systems
- Bioastronautics
- Fluids, Structures and Materials
- Remote Sensing, Earth and Space Sciences

Each focus area has defined the required characteristics of its successful graduates at the MS and PhD level and defined the required and elective courses that support its educational program.

Aerospace-related research centers in the College include the Colorado Center for Astrodynamics Research, Aerospace Mechanics Research Center, the Research and Engineering Center for Unmanned Vehicles, and BioServe Space Technologies. Other research centers and institutes within the University that are involved in aerospace-related research activities are the Center for Astrophysics and Space Astronomy (CASA), the Cooperative Institute for Research in Environmental Sciences (CIRES), the Earth Science & Observation Center (ESOC), JILA, and the Laboratory for Atmospheric and Space Physics (LASP).

**Course code for this program is ASEN.**

# Master's Degrees

- Aerospace Engineering Sciences - Master of Science (MS) (p. 1606)
- Aerospace Engineering Sciences - Professional Master of Science (MSAES) (p. 1609)

# Doctoral Degree

- Aerospace Engineering Sciences - Doctor of Philosophy (PhD) (p. 1610)

# Certificates

- Astrodynamics and Satellite Navigation Systems - Graduate Certificate (p. 1611)
- Engineering Management in the Aerospace Industry - Graduate Certificate (p. 1741)
- Hypersonics - Graduate Certificate (p. 1612)
- Radio Frequency Engineering for Aerospace - Graduate Certificate (p. 1613)
- Remote Sensing - Graduate Certificate (p. 1613)
- Satellite Systems Design - Graduate Certificate (p. 1780)
- Space Weather and Applications - Graduate Certificate (p. 1782)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ahmed, Nisar R. (https://experts.colorado.edu/display/fisid_153237/)
Associate Professor, Director; PhD, Cornell University

Akos, Dennis M. (https://experts.colorado.edu/display/fisid_131119/)
Professor; PhD, Ohio University

Ali, Hisham (https://experts.colorado.edu/display/fisid_168718/)
Assistant Professor; PhD, Georgia Institute of Technology

Argrow, Brian M. (https://experts.colorado.edu/display/fisid_102860/)
Distinguished Professor, Director, Endowed/Named Professor; PhD, University of Oklahoma

Arquilla, Katya (https://experts.colorado.edu/display/fisid_173943/)
Assistant Professor; PhD, University of Colorado

Arya, Vischala (https://experts.colorado.edu/display/fisid_176850/)
Assistant Professor; PhD, Texas AM University

Axelrad, Penina (https://experts.colorado.edu/display/fisid_100792/)
Distinguished Professor, Endowed/Named Professor; PhD, Stanford University

Bosanac, Natasha (https://experts.colorado.edu/display/fisid_158199/)
Assistant Professor; PhD, Purdue University

Boyd, Iain (https://experts.colorado.edu/display/fisid_165828/)
Professor, Director, Endowed/Named Professor; PhD, University of Southampton (England)

Brasseur, James G. (https://experts.colorado.edu/display/fisid_156801/)
Research Professor; PhD, Stanford University

Chu, Xinzhao (https://experts.colorado.edu/display/fisid_141893/)
Professor; PhD, Peking University (China)

Clark, Torin K. (https://experts.colorado.edu/display/fisid_155959/)
Associate Professor, Associate Chair; PhD, Massachusetts Institute of Technology

Culp, Robert D.
Professor Emeritus; PhD, University of Colorado Boulder

Doostan, Alireza (https://experts.colorado.edu/display/fisid_147382/)
Professor, Faculty Fellow; PhD, Johns Hopkins University

Emery, William J. (https://experts.colorado.edu/display/fisid_106038/)
Professor Emeritus; PhD, University of Hawaii

Evans, John A. (https://experts.colorado.edu/display/fisid_152970/)
Associate Professor, Associate Chair, Faculty Fellow; PhD, University of Texas at Austin

Farnsworth, John A. (https://experts.colorado.edu/display/fisid_153255/)
Associate Professor; PhD, Rensselaer Polytechnic Institute

Felippa, Carlos A. (https://experts.colorado.edu/display/fisid_105701/)
Professor Emeritus; PhD, University of California, Berkeley

Forbes, Jeffrey M. (https://experts.colorado.edu/display/fisid_100264/)
Professor Emeritus; PhD, Harvard University

Frew, Eric W. (https://experts.colorado.edu/display/fisid_134685/)
Professor; PhD, Stanford University

Gerren, Donna S. (https://experts.colorado.edu/display/fisid_108563/)
Teaching Professor Emerita; PhD, University of Kansas

Ghobadi-Far, Khosro (https://experts.colorado.edu/display/fisid_174031/)
Assistant Professor; PhD, University of Newcastle

Glusman, F. Jeff (https://experts.colorado.edu/display/fisid_172040/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Gremban, Keith (https://experts.colorado.edu/display/fisid_166519/)
Research Professor; PhD, Carnegie Mellon University

Hayman, Allison P. (https://experts.colorado.edu/display/fisid_156275/)
Associate Professor; PhD, Massachusetts Institute of Technology

Hodgkinson, Robert F. (https://experts.colorado.edu/display/fisid_153274/)
Associate Teaching Professor; MS, University of Colorado Boulder

Hoke, Charles (https://experts.colorado.edu/display/fisid_175280/)
Associate Teaching Professor; PhD, University of New South Whales

Holzinger, Marcus J. (https://experts.colorado.edu/display/fisid_164054/)
Professor, Endowed/Named Professor; PhD, University of Colorado Boulder

Hussein, Mahmoud I. (https://experts.colorado.edu/display/fisid_144300/)
Professor, Endowed/Named Professor; PhD, University of Michigan Ann Arbor

Jansen, Kenneth E. (https://experts.colorado.edu/display/fisid_147360/)
Professor, Endowed/Named Professor; PhD, Stanford University

Kantha, Lakshmi H. (https://experts.colorado.edu/display/fisid_100231/)
Professor Emeritus; PhD, Massachusetts Institute of Technology

Khan, Alia (https://experts.colorado.edu/display/fisid_158495/)
Associate Professor; PhD, University of Colorado Boulder

Klaus, David M. (https://experts.colorado.edu/display/fisid_107103/)
Professor Emeritus; PhD, University of Colorado Boulder

Knipp, Delores Jane (https://experts.colorado.edu/display/fisid_147655/)
Research Professor; PhD, University of California, Los Angeles

Knudsen, Erik (https://experts.colorado.edu/display/fisid_172046/)
Associate Teaching Professor; PhD, University of Florida

Koster, Jean N.
Professor Emeritus; PhD, Karlsruher Institut für Technologie (Germany)

Lahijanian, Morteza Mehdi (https://experts.colorado.edu/display/fisid_164179/)
Assistant Professor; PhD, Boston University

Larson, Kristine M.
Professor Emerita; PhD, Scripps Institution of Oceanography

Lawrence, Dale A. (https://experts.colorado.edu/display/fisid_104057/)
Professor Emeritus; PhD, Cornell University

Le Moine, Alexandra (https://experts.colorado.edu/display/fisid_168419/)
Assistant Teaching Professor; MS, University of Wisconsin

Leben, Robert R.
Research Professor Emeritus; PhD, University of Colorado Boulder

Li, Xinlin (https://experts.colorado.edu/display/fisid_100016/)
Professor; PhD, Dartmouth College

Lopez Jimenez, Francisco (https://experts.colorado.edu/display/fisid_157867/)
Assistant Professor; PhD, California Institute of Technology

Macdonald, Robyn (https://experts.colorado.edu/display/fisid_165823/)
Assistant Professor; PhD, University of Illinois at Urbana-Champaign

Mah, John K. (https://experts.colorado.edu/display/fisid_164214/)
Associate Teaching Professor; MS, Stanford University

Marshall, David B. (https://experts.colorado.edu/display/fisid_158629/)
Research Professor; PhD, Monash University (Australia)

Marshall, Robert A. (https://experts.colorado.edu/display/fisid_155957/)
Associate Professor, Associate Chair; PhD, Stanford University

Maslanik, James
Research Professor Emeritus

Matsuo, Tomoko (https://experts.colorado.edu/display/fisid_145041/)
Associate Professor, Faculty Fellow; PhD, SUNY at Stony Brook

Maute, Kurt (https://experts.colorado.edu/display/fisid_113875/)
Professor, Associate Dean, Endowed/Named Professor; PhD, University of Stuttgart (Germany)

McMahon, Jay W. (https://experts.colorado.edu/display/fisid_150062/)
Associate Professor, Faculty Fellow; PhD, University of Colorado Boulder

Minton, Timothy K. (https://experts.colorado.edu/display/fisid_167230/)
Professor; PhD, University of California Berkeley

Morton, Yu Jade (https://experts.colorado.edu/display/fisid_159076/)
Professor, Endowed/Named Professor; PhD, The Pennsylvania State University

Nabity, James A. (https://experts.colorado.edu/display/fisid_153102/)
Associate Professor, Associate Chair; PhD, University of Colorado Boulder

Neogi, Sanghamitra (https://experts.colorado.edu/display/fisid_156773/)
Associate Professor; PhD, Pennsylvania State University

Nerem, R. Steven (https://experts.colorado.edu/display/fisid_118478/)
Professor, Director; PhD, University of Texas at Austin

Niederwieser, Tobias (https://experts.colorado.edu/display/fisid_164789/)
Assistant Research Professor; PhD, University of Colorado Boulder

Palo, Scott E. (https://experts.colorado.edu/display/fisid_109033/)
Professor, Endowed/Named Professor; PhD, University of Colorado Boulder

Park, Kwang-Chun
Professor Emeritus; PhD, Clarkson College

Peters, Sean (https://experts.colorado.edu/display/fisid_174034/)
Assistant Professor; PhD, Stanford University

Rafi, Melvin
Assistant Teaching Professor; PhD, Wichita State University

Rhode, Matthew (https://experts.colorado.edu/display/fisid_165079/)
Assistant Teaching Professor; BS, University of Colorado

Schaub, Hanspeter (https://experts.colorado.edu/display/fisid_143818/)
Distinguished Professor, Endowed/Named Professor, Chair; PhD, Texas A&M University

Scheeres, Daniel J. (https://experts.colorado.edu/display/fisid_145035/)
Distinguished Professor, Endowed/Named Professor; PhD, University of Michigan Ann Arbor

Schwartz, Trudy L. (https://experts.colorado.edu/display/fisid_108607/)
Teaching Professor, Associate Chair; MS, University of Colorado Boulder

Shakiba, Maryam (https://experts.colorado.edu/display/fisid_172206/)
Assistant Professor; PhD, Texas AM University

Sirangelo, Mark (https://experts.colorado.edu/individual/fisid_164135/)
Entrepreneur in Residence; JD, Seton Hall University

Sternovsky, Zoltan (https://experts.colorado.edu/display/fisid_115211/)
Professor; PhD, Charles University (Czech Republic)

Stodieck, Louis S. (https://experts.colorado.edu/display/fisid_105272/)
Research Professor; PhD, University of Colorado Boulder

Sunberg, Zachary (https://experts.colorado.edu/individual/fisid_165833/)
Assistant Professor; PhD, Stanford University

Thayer, Jeffrey P. (https://experts.colorado.edu/display/fisid_134469/)
Professor Emeritus, Research Professor, Director; PhD, University of Michigan Ann Arbor

Williams, Christopher (https://experts.colorado.edu/display/fisid_105765/)
Research Professor; PhD, University of Colorado Boulder

Wingate, Kathryn (https://experts.colorado.edu/display/fisid_164029/)
Associate Teaching Professor; PhD, University of Colorado Boulder

# Courses

**ASEN 5007 (3) Introduction to Finite Elements**
Introduces finite element methods used for solving linear problems in structural and continuum mechanics. Covers modeling, mathematical formulation, and computer implementation.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite matrix algebra.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 5010 (3) Spacecraft Attitude Dynamics and Control**
Includes rigid body kinematics and spacecraft attitude descriptions, torque-free attitude dynamics, static attitude determination, motion and stability due to gravity gradient torque and spinning craft, passive and active methods of attitude control, nonlinear regulator and attitude tracking feedback controlaws.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 3200, ASEN 3700, or equivalent and good knowledge of linear algebra, vector calculus, basics of ordinary differential equations.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Astrodynamics and Orbital Mechanics

**ASEN 5012 (3) Mechanics of Aerospace Structures**
Applies fundamental concepts of continuum mechanics, theory of elasticity and energy methods to the analysis of structures.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5023
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisites APPM 2360 and ASEN 2001 or 2701 and ASEN 2003 or 2703 and ASEN 3112 or 3712 or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 5014 (3) Linear Control Systems**
Introduces the theory of linear systems, including vector spaces, linear equations, structure of linear operators, state space descriptions of dynamic systems, and state feedback control methods.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5448 and MCEN 5448
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 3200, ASEN 3700, or equivalent or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Systems and Control

**ASEN 5016 (3) Space Life Sciences**
Familiarizes students with factors affecting living organisms in the reduced-gravity environment of space flight. Covers basic life support requirements, human physiological adaptations, and cellular-level gravity dependent processes with emphasis on technical writing and research proposal preparation.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Bioastronautics and Microgravity Science

**ASEN 5018 (3) Graduate Projects I**
Exposes MS and PhD students to project management and systems engineering disciplines while working a complex aerospace engineering project as part of a project team. The project team may perform some or all of the following project activities during this first semester of the two-semester course sequence: requirements, definition, design and design review, build, test, and verification.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN) majors only.
**Recommended:** Prerequisite ASEN 4138 or ASEN 5148 or ASEN 5158 or instructor consent required.

**ASEN 5022 (3) Dynamics of Aerospace Structures**
Applies concepts covered in undergraduate dynamics, structures and mathematics to the dynamics of aerospace structural components, including methods of dynamic analysis, vibrational characteristics, vibration measurements and dynamic stability.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 5012 or ASEN 5227 or MATH 2130 or APPM 3310 or equivalent or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 5034 (3) Stochastic Methods for Systems Engineering**
Development of stochastic models used in aerospace and other systems engineering and optimization problems. Review of probability theory, stochastic models used in decision theory, random processes, queuing theory, information theory, reliability and quality control. Computer solutions required.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN) majors only.
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 5044 (3) Statistical Estimation for Dynamical Systems**
Introduces theory and methods of statistical estimation for general linear and nonlinear dynamical systems, with emphasis on aerospace engineering applications. Major topics include: review of applied probability and statistics; optimal parameter and dynamic state estimation; theory and design of Kalman filters for linear systems; extended/unscented Kalman filters and general Bayesian filters for non-linear systems.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Systems and Control

**ASEN 5047 (3) Probability and Statistics for Aerospace Engineering Sciences**
Considers probability concepts and theory for better design and control of aerospace engineering systems. Includes descriptive and inferential statistical methods for experimental analysis. Covers discrete and continuous random variable distributions, estimators, confidence intervals, regression, analysis of variance, hypothesis testing, nonparametric statistics, random processes and quality control, including software models of same.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN) majors only.
**Additional Information:** Departmental Category: Computational and Analytic Methods

**ASEN 5050 (3) Space Flight Dynamics**
Includes celestial mechanics, space navigation, and orbit determination; trajectory design and mission analysis trajectory requirements; and orbital transfer and rendezvous.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 5052
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 3200 or ASEN 3700 or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Astrodynamics and Orbital Mechanics

**ASEN 5051 (3) Fundamentals of Fluid Dynamics**
Highlights physical properties of gases and liquids; kinematics of flow fields; and equations describing viscous, heat-conducting Newtonian fluids. Emphasizes exact solutions and rational approximations for low and high speed dissipative flows, surface and internal waves, acoustics, stability, and potential flows.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 3111 or ASEN 3711 (minimum grade B) or an equivalent course.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerodynamics and Fluid Mechanics

**ASEN 5052 (3) Analytical Astrodynamics**
Introduction to astrodynamics with an emphasis on analytical approaches. The primary subjects covered are the general solution of the 2-body problem; orbital trajectories, transfers, targeting, and time of flight; orbit perturbations and averaging analysis; and the restricted 3-body problem. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 5050
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 3200 or 3700 or instructor consent required.
**Grading Basis:** Letter Grade

**ASEN 5053 (3) Space Propulsion**
This course is designed to teach the theory, analysis and design of modern space propulsion systems. Lectures describe the thermodynamics of rocket propulsion and nozzle flow theory, followed by in¿depth study of cold gas thrusters, monopropellant and bipropellant liquid rockets, solid and hybrid rockets, electric propulsion, nuclear rockets, and solar sails. If time permits, other exotic propulsion technologies will be dealt with.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Thermodynamics and Propulsion

**ASEN 5067 (3) Microavionics: Introduction to PIC Microcontrollers for Aerospace Systems**
Provide students an introduction into embedded systems that teaches a basic understanding about the fundamental architecture of a microcontroller and how it operates and interfaces with both sensors and actuators applicable to aerospace engineering. Students will learn how to interface sensors to a PIC microcontroller, collect input, make decisions and take an action in real-time. To gain a full appreciation about how microcontrollers work, students develop their own software code using MPLAB X to program the development board hardware, which uses the Microchip PIC18F87K22 microcontroller as the foundation of the course. Students learn-by-doing through lab assignments and a semester final project. This includes programming in assembly language and then C, to collect data from external sources such as a serial terminal, temperature and rotary sensors, etc. and outputting results to a liquid crystal display (LCD), and sending commands to an actuator such as a servo.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 4067
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors only.
**Grading Basis:** Letter Grade

**ASEN 5090 (3) Introduction to Global Navigation Satellite Systems**
Global Navigation Satellite Systems (GNSS) are important tools for navigation, science, and engineering. Introduces GNSS hardware, signal structure, algorithms, error sources, and modeling techniques. Programming experience is required.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Global Positioning Systems

**ASEN 5098 (3) System Engr and Design**
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 5111 (3) Introduction to Aeroelasticity**
Introduces static and dynamic aeroelasticity of airfoils and wings. Covers the classical aeroelasticity theory and introduces computational methods for aeroelastic problems.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 3111 or ASEN 3711 and MATH 2130 or APPM 3310 and MATH 3430 or equivalent or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 5114 (3) Automatic Control Systems**
Methods of analysis and design of feedback control for dynamic systems. Covers nyquist, bode and linear quadratic methods based on frequency domain and state space models. Laboratory experiments provide exposure to computation for simulation and real time control, and typical control system sensors and actuators. Degree credit not granted for MCEN 4138 and MCEN 5138 and ECEN 4138 and ECEN 5138.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 4114
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN) majors only.
**Recommended:** Prerequisites Undergraduate systems or control course or instructor consent (ASEN 3128 or ASEN 3728 or ASEN 3200 or ASEN 3700).
**Additional Information:** Departmental Category: Systems and Control

**ASEN 5121 (3) Boundary Layers and Convection**
This course presents an introduction to the principles of viscous fluid flow and methods for performing engineering calculations of quantities such as skin friction and heat transfer rates in boundary layers. The first portion of the course material will focus on basic principles of fluid mechanics. We will derive the Navier-Stokes equations and discuss some simple solutions to these equations. The second portion of the course will concentrate on the application of these principles to boundary layers. We will derive the boundary layer equations and discuss their approximate and almost exact solutions. Formerly offered as a special topics course.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 3111 and/or ASEN 5051.
**Grading Basis:** Letter Grade

**ASEN 5122 (3) Control of Aerospace Structures 1**
Introduces the basic problems in dynamic modeling and active control of large spacecraft and satellites. Includes system descriptions, model reduction, controller design, and closed-loop stability analysis.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN) majors only.
**Recommended:** Prerequisite ASEN 3200 or equivalent or instructor consent required.
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 5128 (3) Small Uncrewed Aircraft System Guidance, Navigation, and Control**
Introduce students to advanced techniques for guidance, navigation, and control of the emerging class of small uncrewed aircraft systems (SUAS), which are informally defined as aircraft that weight less than 55 lbs.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisites ASEN 5014 Linear Systems or similar OR ASEN 5044 Estimation or similar.
**Grading Basis:** Letter Grade

**ASEN 5131 (3) Introduction to Hypersonics**
Introduces key elements of hypersonic vehicles, including trajectories, surface heating, propulsion, and thermal protection systems. Provides the necessary background on fluid dynamics and boundary layers, so students from a variety of disciplines are welcome. Also covers thermochemical nonequilibrium, surface pressure, and aerodynamic forces. Includes a mix of empirical techniques and computational analyses. Requires basic programming experience and exposure to partial differential equations.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade

**ASEN 5137 (3) Experimental Design and Statistical Methods**
Examines the applied issues of designing experiments and performing statistical analysis to reach justified scientific conclusions. Approaches are integrated to enable application to real-world research questions, with a focus on the unique challenges of human subject experiments.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** to Aerospace and Biomedical Engineering students.
**Grading Basis:** Letter Grade

**ASEN 5148 (3) Spacecraft Design**
Integrates the design elements and fundamental analyses necessary to complete the conceptual (Phase A) design of an unmanned spacecraft. Lecture and discussion explore mission design, propulsion, power, structure, thermal, attitude control, communication, command, and data handling and attitude control systems. The role of project management and systems engineering are examined. Resource estimating and lessons learned in satellite programs are reviewed.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 5151 (3) Fundamentals of Gas Dynamics**
Presents the fundamental topics of gas dynamics, focusing on compressible flows but providing connections to incompressible topics. Topics include analysis of quasi-one-dimensional flow, the partial differential equations governing inviscid compressible flows, linearized flow theory, supersonic flow around cones, and the method of characteristics applied to both steady two-dimensional supersonic flows, and unsteady one-dimensional flows.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 3111 or equivalent.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerodynamics and Fluid Mechanics

**ASEN 5158 (3) Space Habitat Design**
Utilize systems engineering methods to design and analyze a spacecraft intended for human occupancy with functional knowledge of the technologies used to sustain life. Emphasis placed on deriving requirements from stated mission goals and objectives, developing integrated functional schematics into a conceptual design, and analyzing design options by mass/volume estimation, including launch vehicle selection.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 5212 (3) Composite Structures and Materials**
Develops the macromechanical and micromechanical theory of the elastic behavior and failure of composite laminates. Applies basic theory to a broad range of practical problems including the buckling and vibration of composite plates, columns, and shells.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 5218 (3) Large Space Structures Design**
Develops the necessary structural analysis skills for conducting conceptual and preliminary designs of large space structures with a practical emphasis on structures considered by NASA over the past 20 years. Applies analysis skills to a broad range of space missions requiring large space structures, emphasizing low cost and practical design.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 4218
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 5222 (3) Materials Science for Composite Manufacturing**
Studies common matrix materials and the modificationsand improvements of properties which can be achieved by adding second phase reinforcements. Properties will be significantly affected by the design approach and by requirements, and by the procedure of adding reinforcements. Investigates polymer, ceramic and metallic materials. Explores manufacturing, fabrication and processing techniques. Evaluates future developments.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 4222
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors only.
**Recommended:** Prerequisites ASEN 3112 or ASEN 3712 and ASEN 4012 or equivalent or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 5226 (3) Medicine in Space and Surface Environments**
Introduces concepts of space medicine and provides a focused analysis on exploration medical capabilities. This course provides a unique learning opportunity to understand the medical challenges of human spaceflight. This is done both in the classroom and in an immersive field simulation that allows students to engage in medical care in simulated planetary surface environments. As such, it also introduces students to important concepts in human spaceflight operations which are difficult to teach in the classroom.

**ASEN 5235 (3) Introduction to Atmospheric Radiative Transfer and Remote Sensing**
Examines fundamentals of radiative transfer and remote sensing with primary emphasis on the Earth's atmosphere; emission, absorption and scattering by molecules and particles; multiple scattering; polarization; radiometry and photometry; principles of inversion theory; extinction- and emission-based passive remote sensing; principles of active remote sensing; lidar and radar; additional applications such as the greenhouse effect and Earth's radiative energy budget.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors only.
**Recommended:** Prerequisite one year of calculus-based physics and math up through differential equations.
**Additional Information:** Departmental Category: Remote Sensing

**ASEN 5245 (3) Radar and Remote Sensing**
Examines active techniques of remote sensing, with emphasis on radar fundamentals, radar wave propagation, scattering processes, and radar measurement techniques and design. Examines specific radar systems and applications, such as synthetic aperture radar phased arrays for atmosphere, space, land, and sea applications.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Remote Sensing

**ASEN 5251 (3) Molecular Thermodynamics and Kinetics**
Provides an introduction to chemical kinetics and theories of molecular collisions and chemical reactions. Draws on quantum mechanics, statistical mechanics, and thermodynamics to help understand the magnitude of chemical reaction rates and how they vary with macroscopic parameters, such as temperature, and with microscopic parameters, such as molecular size, structure, and energy spacing.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite general chemistry, general physics, multivariable calculus.
**Grading Basis:** Letter Grade

**ASEN 5254 (3) Algorithmic Motion Planning**
Overview of the lessons learned by the robot motion planning community in the recent years. Examines approaches based on potential functions, graphs, sampling methods, task and motion planning, and basic approaches to planning under uncertainty. Provides a set of tools to tackle new problems and enables the pursuit of complex research questions such as planning for autonomous systems.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisites or corequisites: ASEN 5014 or equivalent, knowledge of how to plot 2-D/3-D functions, arrays and other data structures, standard constructs (loops, functions, etc), C++, Python or MATLAB, and knowledge of differential equations and linear algebra.
**Grading Basis:** Letter Grade

**ASEN 5264 (3) Decision Making under Uncertainty**
Covers algorithms for optimal sequential decision making in the presence of uncertainty. Mathematical formalisms include the Markov decision process (MDP), partially observable Markov decision process (POMDP), and Games. Solution techniques include exact dynamic programming, Monte Carlo tree search, deep reinforcement learning, and alpha vector value approximation for POMDPs. Assignments require programming in a high level language (Julia as of 2023). Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5264
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite fluency in a high-level programming language, willingness to learn another language if required for homework assignments and basic understanding of probability.
**Grading Basis:** Letter Grade

**ASEN 5307 (3) Engineering Data Analysis Methods**
Gives students broad exposure to a variety of traditional and modern statistical methods for filtering and analyzing data. Topics include estimation methods, principal component analyses and spectral analyses. Introduces these methods and provides practical experience with their use. Students carry out problem assignments.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Computational and Analytic Methods

**ASEN 5325 (3) Small Scale Processes in Geophysical Fluids**
Provides an overview of mixing and wave processes in the oceans and the atmosphere. Topics include turbulent boundary layers in the lower atmosphere and the upper ocean, air-sea interactions, and surface and internal waves.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Atmospheric, Oceanic, and Space Sciences

**ASEN 5335 (3) Aerospace Environment**
Examines the components of the solar-terrestrial system and their interactions to provide an understanding of the re-entry and orbital environments within which aerospace vehicles operate. Includes the sun, solar wind, magnetospere, ionosphere, thermosphere, radiation belts, energetic particles, comparative environments (Mars, Venus, etc.), orbital debris, spacecraft charging, particle effects on systems, shielding, and satellite drag.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite Senior or graduate standing in engineering or related physical sciences.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Atmospheric, Oceanic, and Space Sciences

**ASEN 5347 (3) Math Methods in Dynamics**
Two-part graduate-level course on dynamics. Covers both flexible and rigid multibody analytical dynamics and finite element method for dynamics. Emphasizes formulations that naturally lead to easy computer implementation and stability, linearization, and modern rotational kinematics. Department consent required.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 5440 (3) Mission Design and Development for Space Sciences**
Brings science and engineering students together to develop the multidisciplinary skills required to create a successful proposal to develop a NASA-funded small space mission. Goals: 1) develop the proposal science objectives based on scientific community priorities and NASA Announcement of Opportunity. 2) Understand how science requirements lead to the design of instrumentation. 3) Understand practical aspects of mission development.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 5780
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Department of Astrophysical and Planetary Sciences graduate students or Aerospace Engineering Concurrent Degree (C-ASEN and ASEN-P) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 5506 (1-2) Bioastronautics Seminar**
Focuses on current topics related to space habitat systems design and research aimed at understanding the effects of spaceflight on living organisms ranging from humans down to microbes. Literature analysis and scientific presentations are expected. Emphasis is on biophysical mechanisms, comprehensive models, and related technology development.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN) majors only.
**Additional Information:** Departmental Category: Bioastronautics and Microgravity Science

**ASEN 5519 (1-3) Special Topics**
Reflects upon specialized aspects of aerospace engineering sciences. Course content is indicated in the online Class Search.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors only.
**Recommended:** Prerequisite varies.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 5550 (3) Designing for Defense 1**
Designing for Defense/Hacking for Defense is a national service program running at leading research universities across the country. Interdisciplinary teams¿chosen by competitive selection¿work on real-world national security challenges, in close contact with national security agencies. Teams employ the Lean Launchpad entrepreneurship methodology to develop engineering and business concepts to solve real-world challenges for special operations forces, the intelligence community, and other government agencies. Winning teams are eligible for real-world capital investment. The first semester of a two-course sequence. Students take this course, ASEN/CSCI/CYBR 5550, and ASEN/CSCI/CYBR 5580 contiguously as the sequence spans the academic year.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4550 and CYBR 5550 and CSCI 5550
**Grading Basis:** Letter Grade

**ASEN 5580 (3) Designing for Defense 2**
This course allows teams to continue their D4D journey from semester 1 guiding students in launching a business entity that will deploy agile development tools to refine and enhance their first semester MVP, seek funding for that development work, deliver a functioning solution to their sponsor, and extract real value for the members of the business unit.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5580 and CYBR 5580 and CSCI 4580
**Requisites:** Requires prerequisite course of ASEN 5550 or CSCI 5550 or CYBR 5550 (minimum grade B). Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ASEN 5849 (1-6) Independent Study**
Study of special projects.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 5940 (1-3) Engineering Research Internship**
Grants credit to foreign visiting graduate students for conducting research within the Aerospace Engineering Sciences department. Credits can be transferred to the student's home institution. CU-Boulder students may also receive credit for conducting research outside of the university, either overseas or in the US.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 6008 (3) Interplanetary Mission Design**
Exploration of principles and methods related to the design and construction of trajectories for interplanetary mission design. Some topics covered include: two-and three-body motion, gravity assists, maneuver computation, navigation, numerical integration, and construction of orbits. The main focus is on simple ballistic mission designs, such as Galileo or Cassini, however, libration point trajectories will also be covered.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 5050 or ASEN 5052.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Astrodynamics and Orbital Mechanics

**ASEN 6009 (1-2) Special Topics Seminar**
Presents research and developments in each department's focus areas.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN) majors only.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 6010 (3) Advanced Spacecraft Dynamics and Control**
Studies the dynamic modeling and control of spacecraft containing multiple momentum exchange devices, and/or flexible spacecraft components. Will develop nonlinear feedback control algorithms, explore singularity avoidance strategies. The second half of the course derives analytical methods (D'Alembert's equations, Lagrange's equations, Boltzmann Hamel equations) to model a hybrid rigid/flexible spacecraft system.
**Requisites:** Requires prerequisite course of ASEN 5010 (minimum grade D-). Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Astrodynamics and Orbital Mechanics

**ASEN 6011 (3) Experimental Fluid Mechanics**
This course presents an intermediate level introduction into the theory and practice of performing experimental measurements in fluid mechanics. The fundamental principles and definitions associated with instrumentation, measurement procedures, data analysis, and uncertainty quantification will be discussed. A specific focus will be placed on the application of a variety of measurement techniques in low-speed aerodynamic environments. A selection of measurement techniques will be extensively studied and applied including: classical pressure and temperature measurements, thermal (hot-wire) anemometry, laser doppler anemometry, particle image velocimetry, surface and field flow visualization techniques, schlieren and shadowgraph photography techniques. Undergraduates may enroll with instructor permission. Previously offered as a special topics course.
**Requisites:** Requires prerequisite or corequisite course of ASEN 5051 (minimum grade D-). Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade

**ASEN 6013 (3) High Speed Propulsion**
Covers air-breathing and rocket propulsion cycles, their relative performance trade-offs, and how they fit within the context of a vehicle system. Specific emphasis will be placed on fundamental cycle analyses, component level design, and propulsion/airframe integration for rockets, turbojets, ramjets, scramjets, combined cycles, and other advanced propulsion concepts.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 4013 or equivalent or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Thermodynamics and Propulsion

**ASEN 6014 (3) Spacecraft Formation Flying**
Studies the dynamic modeling and control of spacecraft formations orbiting about a planet. Investigate linear and nonlinear relative motion descriptions, rectilinear and curvilinear coordinates, orbit element difference based descriptions, J2-invariant relative orbits, as well as Lyapunov-based relative motion control strategies.
**Requisites:** Requires prerequisite course of ASEN 5050 or ASEN 5052 (minimum grade B-). Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Systems and Control

**ASEN 6015 (3) Space Vehicle Guidance and Control**
The course gives a comprehensive view of guidance systems used in space vehicles, and methods for analyzing the performance of these systems. The types of guidance systems that will be covered are launch vehicle ascent, intercept/rendezvous, interplanetary, orbit station-keeping, atmospheric re-entry, lander, and low-thrust. The mathematical foundation of these systems will be derived and discussed. Real world applications will be presented by reviewing selections from published literature. Course work will emphasize the analysis of the guidance system performance to achieve stated goals. Previously offered as a special topics course.
**Requisites:** Requires prereqs ASEN 5014 and ASEN 5050 (min. grade D-). Restricted to Engineering graduate students, Aero Concurrent Degree (C-ASEN and C-ASENP) mjrs, Aero graduate certificate students.
**Grading Basis:** Letter Grade

**ASEN 6020 (3) Optimal Trajectories**
Introduces the theory and practice of trajectory optimization. The general theory behind optimization and optimal control will be introduced with an emphasis on the properties of optimal trajectories. The main application will be to space trajectories, but other applications will also be considered.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisites ASEN 5050 and ASEN 5014 or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Astrodynamics and Orbital Mechanics

**ASEN 6024 (3) Nonlinear Control Systems**
Introduces the analysis and control design methods for nonlinear systems, including Lyapunov, Describing Function, and Feedback Linearization methods.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5738 and ECEN 5738
**Requisites:** Requires prereq of ASEN 5014 (min. grade C). Restricted to Engineering graduate students, Aerospace Concurrent Degree (C-ASEN and C-ASENP) mjrs, Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Systems and Control

**ASEN 6028 (3) Graduate Projects II**
Exposes MS and PhD students to leadership positions in project management and systems engineering while working a complex aerospace engineering project as part of a project team. The project team may perform some or all of the following project activities during this second semester of the two-semester course sequence: requirements definition, design and design review, build, test, and verification.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors only.
**Recommended:** Prerequisite ASEN 4138 or ASEN 5148 or ASEN 5018 or ASEN 5158 or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 6037 (3) Turbulent Flows**
Studies turbulent closure methods and computational procedures used to solve practical turbulent flows. Emphasizes multi-equation models used with time-averaged equations to calculate free-turbulent shear-flows and turbulent boundary layers. Employs spectral methods in direct and large-eddy simulation of turbulence. Formerly ASEN 5037.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 5051 or equivalent or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerodynamics and Fluid Mechanics

**ASEN 6044 (3) Advanced State Estimation**
Introduces principles and techniques for designing, implementing, and analyzing probabilistic state estimators for dynamical systems that require going beyond traditional least-squares and Kalman filtering approaches. Emphasis on development of practical discrete-time Bayesian state space filtering algorithms for systems characterized by partial observability and non-Gaussian uncertainties, which arise in many applications governed by complex non-linear stochastic dynamics and measurement processes.
**Requisites:** Requires prerequisite ASEN 5044 (min grade B+). Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade

**ASEN 6050 (3) Space Instrumentation**
Provides an overview of the relevant space environment and process, the types of instruments flown on recent mission and the science background of the measurement principles.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 6050 and GEOL 6050
**Requisites:** Requires prerequisite course of ASEN 5335 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 6055 (3) Data Assimilation and Inverse Methods for Earth & Geospace Observations**
Covers a selection of topics in probability theory, spatial statistics, estimation theory, numeric optimization, and geophysical nonlinear dynamics that form the foundation of commonly used data assimilation and inverse methods in the Earth and Space Sciences. Hands-on computational homework and projects provide opportunities to apply classroom curricula to realistic examples in the context of data assimilation.
**Requisites:** Requires prerequisite course of ASEN 5044 (minimum grade B-). Program requirement of CEAS graduate students OR Aerospace Graduate Certificate student.
**Grading Basis:** Letter Grade

**ASEN 6060 (3) Advanced Astrodynamics**
Covers Lagrangian and Hamiltonian formalisms for astrodynamics problems, the computation and characterization of space trajectories in highly dynamic environments, computation of periodic orbits, stability analysis of orbital motion, and development of analytical theories for dynamics.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 5050 or equivalent or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Astrodynamics and Orbital Mechanics

**ASEN 6061 (3) Molecular Gas Dynamics and DSMC**
Describes the composition and flow of gases on a microscopic level to examine the behavior of the molecules that make up a macroscopic flow system. Thermodynamic properties, transport phenomena, and the governing Boltzmann Equation are derived from molecular collision dynamics and the kinetic theory. The Direct Simulation Monte Carlo method is introduced with applications.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerodynamics and Fluid Mechanics

**ASEN 6070 (3) Satellite Geodesy**
Focuses on the measurement of the Earth's gravitational field, rotational characteristics, and shape using Earth and space-based tracking of artificial satellites. Particular emphasis on satellite altimetry and satellite gravity measurements.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 3200, ASEN 3700, or equivalent or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Astrodynamics and Orbital Mechanics

**ASEN 6080 (3) Statistical Orbit Determination**
Course on orbit and advanced estimation techniques. Emphasizes orthogonal transformation techniques such as Givens and Householder, square root filtering and smoothing and considers covariance analysis. Also nonlinear filters and dynamic model compensation techniques. Requires term project that involves the application of many of the techniques required for precise orbit determination.
**Requisites:** Requires prerequisite course of ASEN 5044 (minimum grade D-). Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN) majors and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Astrodynamics and Orbital Mechanics

**ASEN 6084 (3) Optical Multi-Target Tracking**
This course focuses on exploiting sensor information to detect, track, and characterize unresolved objects using optical sensors. This course will cover phenomenological modeling, error statistics, image processing, detection methods, and several multi-object tracking frameworks. Assignments and projects will incorporate both simulated and empirical data generation / collection and reduction.
**Requisites:** Requires prereq ASEN 5044 (min. grade D-). Restricted to Engineering graduate students, Aero Concurrent Degree (C-ASEN and C-ASENP) mjrs, Aero graduate certificate students.
**Grading Basis:** Letter Grade

**ASEN 6090 (3) Advanced Global Navigation Satellite Systems: Software and Applications**
Focuses on high-precision applications of Global Navigation Satellite Systems (GNSS) and the software tools that are needed to achieve these precisions. Topics include precise orbital determination, reference frames, atmospheric delays, relativity, clock models, ambiguity resolution, and scientific applications.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 5090 or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Global Positioning Systems

**ASEN 6091 (3) Global Navigation Satellite System (GNSS) Receiver Architecture**
Investigates the overall architecture of satellite navigation receivers: including both the analog radio frequency conditioning (antenna to the analog-to-digital converter) and the various signal processing algorithms. Such treatment of the operation of the receiver will provide insight into the trade-offs that go into GNSS as well as the more broad generic spread spectrum receiver design.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 5090.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Global Positioning Systems

**ASEN 6092 (3) GNSS for Remote Sensing of the Atmosphere, Ionosphere, and Earth Surface**
Covers technologies that rely on GNSS signals for remote sensing applications. GNSS receiver signal processing techniques and GNSS signal propagation effects due to interactions with the ionosphere, neutral atmosphere, and Earth surface are addressed. Students will learn techniques to process GNSS measurements and to infer ionospheric, atmospheric, and Earth surface properties from real GNSS measurements collected by ground-based receivers and LEO satellites.
**Requisites:** Requires prerequisite course of ASEN 5090 (minimum grade D-). Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade

**ASEN 6107 (3) Nonlinear Finite Element Methods**
Continuation of ASEN 5007. Covers the formulation and numerical solution of nonlinear static structural problems by finite element methods. Emphasizes the treatment of geometric nonlinearities and structural stability.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 5007 or equivalent or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 6114 (3) System Identification for Control**
Explores methods for identification of models for physical processes which will be part of a feedback control system. Focuses on the interplay between robustness of control laws and the performance of identification methods. Covers time-domain and frequency-domain identification methods, using experimental simulations of control systems of interest to the class.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 5014 or ASEN 5114.
**Grading Basis:** Letter Grade

**ASEN 6116 (3) Spacecraft Life Support Systems**
Study the environmental control and the life support systems and technologies that keep people alive and healthy in spacecraft and habitats. Students will learn about thermal control systems, air revitalization processes, water reclamation and treatment, waste handling and the reuse of materials, and food and nutrition. Expect to develop analytical models from first principles and perform hands-on laboratory experiments. Formerly ASEN 5116.
**Requisites:** Requires prereq ASEN 5158 (min. grade D-). Requires coreq ASEN 5016. Restricted to Engineering grad students, Aero Concurrent Degree (C-ASEN and C-ASENP) mjrs, Aero graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Bioastronautics and Microgravity Science

**ASEN 6216 (3) Human Operation of Aerospace Vehicles**
Examines the role, capabilities, and limitations of human operators in aerospace vehicles. Topics include theoretical models of human information processing and decision-making, physiological limitations of the human (particularly spatial orientation illusions), the design of display and control interfaces, and the evaluation of those interfaces for human interaction with complex aerospace systems.
**Requisites:** Requires prerequisite or corequisite course of ASEN 5158 (minimum grade D-). Restricted to College of Engineering (ENGR) graduate students.
**Recommended:** for aerospace and biomedical engineering students.
**Grading Basis:** Letter Grade

**ASEN 6265 (3) Fundamentals of Spectroscopy for Optical Remote Sensing**
Provides a comprehensive overview of the fundamentals of quantum physics, atomic spectroscopy, molecular spectroscopy and laser spectroscopy. Exposes students to the spectroscopy applications in modern optical and laser remote sensing. Assists students to develop the fundamental knowledge and skills for independent learning.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade

**ASEN 6316 (3) Extravehicular Activity**
Expose students to all aspects of extravehicular activity (EVA) to enable them to design systems to facilitate EVA for future human exploration. This course will draw upon the academic elements of design, engineering, technology development, physiology, operations, human-machine interaction, and geology to provide an interdisciplinary look at this topic.
**Requisites:** Requires prerequisite course of ASEN 5158 or ASEN 5016 (minimum grade D-). Restricted to College of Engineering (ENGR) graduate students and Aerospace graduate certificate students.
**Recommended:** aerospace or biomedical engineering students with a focus in bioastronautics.
**Grading Basis:** Letter Grade

**ASEN 6331 (3) Computational Fluid Dynamics**
Focuses on computational approaches to solve the Navier-Stokes equations. Assumes a basic knowledge of the solution of partial differential equations with numerical methods with focus finite element/volume methods (FEM/FVM but primarily FEM). These issues include: the discrete formulation, non-linear equation iterator, linear equation formation, boundary condition prescription and linear equation solution.
**Requisites:** Requires pre or coreqs ASEN 5007 and ASEN 5051 (minimum grade C). Restricted to Engineering graduate students, Aero Concurrent Degree (C-ASEN and C-ASENP) mjrs, Aero graduate certificate students.
**Recommended:** instructor permission required if pre/co requisite of ASEN 5007 and ASEN 5051 haven¿t been met.
**Grading Basis:** Letter Grade

**ASEN 6337 (3) Remote Sensing Data Analysis**
Covers some of the most commonly used machine learning techniques in remote sensing data analysis, specifically for clustering, classification, feature extraction and dimensionality reduction, and inverse methods used to retrieve geophysical information from remote sensing data. Hands-on computational homework and group and individual projects provide opportunities to apply classroom curricula to real remote sensing data.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Remote Sensing

**ASEN 6365 (3) Lidar Remote Sensing**
Provides a comprehensive, yet easily understandable, up-to-date understanding of lidar principles, technologies and applications. Contains approaches for quantitative lidar simulation, lidar sensitivity and error analysis, lidar data retrieval, lidar system design and performance analysis. Gives students opportunities to see and operate real state-of-the-art lidar systems and make connections to lidar experts in the nation and world.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 6412 (3) Uncertainty Quantification**
This advanced topics course provides an exploration of techniques for representation and propagation of uncertainty in PDE/ODE-based systems.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisites APPM 5570 and ECEN 5612 (all minimum grade B) or equivalent courses with instructor consent.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 6519 (1-3) Special Topics**
Reflects upon specialized aspects of aerospace engineering sciences. Course content is indicated in the online Schedule Planner.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite varies.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 6800 (3) Master of Engr Project**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 6849 (1-6) Independent Study**
Studies special projects agreed upon by student and instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 6949 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 6950 (1-6) Master's Thesis**
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 8990 (1-10) Doctoral Dissertation**
**Additional Information:** Departmental Category: Specialized Courses

# Aerospace Engineering Sciences - Master of Science (MS)

CU Boulder's Department of Aerospace Engineering Sciences (AES) is internationally recognized for its research and education leadership in aerospace engineering, Earth and space sciences. Its world-renowned engineers and scientists tackle challenges in aerospace technology and science, focusing on Astrodynamics and Satellite Navigation Systems (ASN); Autonomous Systems (AUT); Bioastronautics (BIO), Fluids, Structures and Materials (FSM); and Remote Sensing, Earth and Space Science (RSESS).

With more than 50 faculty members and over 550 MS and PhD students, our graduate programs prepare aerospace engineering students to meet the needs of our 21st-century society through the understanding, conception, design and application of aerial and spacecraft systems.

In the MS program we focus on hands-on, experiential learning, technical and organizational expertise, and end-to-end mission and systems perspectives via course-based degree options.

Research opportunities for MS students are very limited and are not funded. Students interested in completing an MS thesis are encouraged to take a few of our courses before deciding to pursue that route.

For more information, visit the department's Prospective Graduate Students (https://www.colorado.edu/aerospace/prospective-students/graduates/) webpage and our Graduate Student Handbook (https://www.colorado.edu/aerospace/current-students/graduates/curriculum/graduate-student-handbooks/).

# Requirements

## Program Requirements

Students must complete a total of 30 credit hours, equivalent to 10 classes, with a grade of B- or better and a cumulative GPA of at least 3.00. Of these 30 credits, at least 24 credit hours must be completed at the 5000 level or above, and at least 18 of those credits must be in Aerospace Engineering (ASEN) courses. (Note: EMEN 5405 Fundamentals of Systems Engineering counts as an ASEN class. Seminar credits, even those earned in other disciplines, do not count toward the MS degree.)

Up to 6 credits can be taken at the 4000 level in approved engineering, math and science departments (APPM, AREN, ASTR, ATLS, ATOC, BCHM, BIEN, BMEN, CHEM, CHEN, CSCI, CVEN, CYBR, DTSC, ECEN, ENEN, ENVD, EVEN, GEOL, IPHY, MATH, MCDB, MCEN, MSEN, PHYS, ROBO, STAT). ASEN courses level 4000 or below do not count towards AES graduate degrees.

### Focus Area-Defined Courses

Some focus areas offer the option to take additional courses to satisfy the non-thesis option. This will represent at least an additional six credit hours with respect to the minimum requirement to obtain a MS with that focus area.

| Code | Title | Credit Hours |
|---|---|---|
| *Choose one of the following:* | | |
| **Thesis Option** | | |
| | The MS thesis must consist of original and independent research conducted by the graduate student under the supervision of the faculty advisor. The thesis topic must be related to the major field. | |
| ASEN 6950 | Master's Thesis | |
| **Non-Thesis Option (Select One)** | | |
| ASEN 5018 & ASEN 6028 | Graduate Projects I and Graduate Projects II (6 credits) | |
| | Required courses leading to an approved certificate (or completion of the dual ASEN/EMP degree) | |
| | Course-only option (FSM and AUT) | |

Please visit our Graduate Student Handbook (https://www.colorado.edu/aerospace/current-students/graduates/curriculum/graduate-student-handbooks/) for focus area requirements and coursework offerings.

### Time Limit

All degree requirements must be completed within four years of the date of commencing coursework. Most students complete the degree in approximately two years.

### Astrodynamics and Satellite Navigation Systems (ASN) (https://www.colorado.edu/aerospace/current-students/graduates/curriculum/astrodynamics-satellite-navigation-systems/)

Requirements of the MS degree in the Astrodynamics and Satellite Navigation Systems focus area are:

- Three ASN Core Classes
- One ASEN MS Course or Required course from an outside (non-ASN) AES focus area. The outside course is any course not listed under the ASN curriculum.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | **9** |
| Choose three: | | |
| ASEN 5010 | Spacecraft Attitude Dynamics and Control | |
| ASEN 5044 | Statistical Estimation for Dynamical Systems | |
| ASEN 5050 | Space Flight Dynamics | |
| or ASEN 5052 | Analytical Astrodynamics | |
| ASEN 5090 | Introduction to Global Navigation Satellite Systems | |
| **Additional Course** | | |
| Choose one ASEN MS Course from an outside (non-ASN) AES focus area | | 3 |
| *Elective Courses Offered by ASN Focus Area* | | |
| ASEN 6008 | Interplanetary Mission Design | |
| ASEN 6010 | Advanced Spacecraft Dynamics and Control | |
| ASEN 6014 | Spacecraft Formation Flying | |
| ASEN 6015 | Space Vehicle Guidance and Control | |
| ASEN 6020 | Optimal Trajectories | |
| ASEN 6060 | Advanced Astrodynamics | |
| ASEN 6070 | Satellite Geodesy | |
| ASEN 6080 | Statistical Orbit Determination | |
| ASEN 6084 | Optical Multi-Target Tracking | |

| | |
|---|---|
| ASEN 6090 | Advanced Global Navigation Satellite Systems: Software and Applications |
| ASEN 6091 | Global Navigation Satellite System (GNSS) Receiver Architecture |
| ASEN 6092 | GNSS for Remote Sensing of the Atmosphere, Ionosphere, and Earth Surface |
| ASEN 6519 | Special Topics (Celestial Mechanics & Advanced Astrodynamics) |

## Autonomous Systems (AUT) (https://www.colorado.edu/aerospace/current-students/graduates/curriculum/autonomous-systems/)

Students are required to take one course from three of the following topic areas:

| Code | Title | Credit Hours |
|---|---|---|
| **Autonomous Decision-Making** | | |
| ASEN 5254 | Algorithmic Motion Planning | |
| ASEN 5264 | Decision Making under Uncertainty | |
| **Control Theory** | | |
| ASEN 5014 | Linear Control Systems | |
| ASEN 6024 | Nonlinear Control Systems | |
| **Dynamics and Modelling of Vehicles** | | |
| ASEN 5128 | Small Uncrewed Aircraft System Guidance, Navigation, and Control | |
| ASEN 6114 | System Identification for Control | |
| **Estimation and Sensor Fusion** | | |
| ASEN 5044 | Statistical Estimation for Dynamical Systems | |
| **Programming for Embedded Systems** | | |
| ASEN 5067 | Microavionics: Introduction to PIC Microcontrollers for Aerospace Systems | |
| CSCI 5302 | Advanced Robotics | |
| ECEN 5613 | Embedded System Design | |
| ECEN 5813 | Principles of Embedded Software | |
| MCEN 5115 | Mechatronics and Robotics I | |
| *Elective Courses Offered by AUT Focus Area* | | |
| ASEN 5114 | Automatic Control Systems | |
| ASEN 6044 | Advanced State Estimation | |
| ASEN 6519 | Special Topics (Advanced Survey of Sequential Decision Making) | |
| ASEN 6519 | Special Topics (Cooperative Control) | |
| ASEN 6519 | Special Topics (Hybrid Control Systems) | |
| ASEN 6519 | Special Topics (Verification & Synthesis of Stochastic Systems) | |

For the AUT Course-only MS Requirements, students need to satisfy the AUT-specific MS requirements, plus two additional courses, each from a different topic area. Topic areas used to satisfy the AUT-specific MS requirements can be repeated, with no more than two courses from a single topic area.

## Bioastronautics (BIO) (https://www.colorado.edu/aerospace/current-students/graduates/curriculum/bioastronautics/)

Students are required to take two required core courses, one BIO elective course, one non-BIO course and one math course.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | **6** |
| ASEN 5016 | Space Life Sciences | |
| ASEN 5158 | Space Habitat Design | |
| *Choose one (BIO elective):* | | *3* |
| ASEN 5137 | Experimental Design and Statistical Methods | |
| ASEN 5226 | Medicine in Space and Surface Environments | |
| ASEN 6116 | Spacecraft Life Support Systems | |
| ASEN 6216 | Human Operation of Aerospace Vehicles | |
| ASEN 6316 | Extravehicular Activity | |
| *Choose one (non-BIO course):* | | *3* |
| ASEN 5010 | Spacecraft Attitude Dynamics and Control | |
| ASEN 5012 | Mechanics of Aerospace Structures | |
| ASEN 5014 | Linear Control Systems | |
| ASEN 5044 | Statistical Estimation for Dynamical Systems | |
| ASEN 5050 | Space Flight Dynamics | |
| or ASEN 5052 | Analytical Astrodynamics | |
| ASEN 5090 | Introduction to Global Navigation Satellite Systems | |
| ASEN 5335 | Aerospace Environment | |
| **Approved Math Courses** | | **3** |
| ASEN 5044 | Statistical Estimation for Dynamical Systems [1] | |
| ASEN 5137 | Experimental Design and Statistical Methods [1] | |
| ASEN 5307 | Engineering Data Analysis Methods | |
| ASEN 5519 | Special Topics (Multi-Object Filtering Theory) | |
| ASEN 6412 | Uncertainty Quantification | |
| EMEN 5005 | Introduction to Applied Statistical Methods | |
| ECEN 5612 | Random Processes for Engineers | |
| ECEN 5632 | Theory and Application of Digital Filtering | |
| ECEN 5652 | Detection and Extraction of Signals from Noise | |
| CSCI 5636 | Numerical Solution of Partial Differential Equations | |
| APPM Any 4000, 5000, 6000, 7000 level courses [2] | | |
| MATH Any 4000, 5000, 6000, 7000 level courses [2] | | |
| STAT Any 4000, 5000, 6000, 7000 level courses [2] | | |
| **Elective Courses Offered by BIO Focus Area** | | |
| ASEN 5137 | Experimental Design and Statistical Methods | |
| ASEN 5226 | Medicine in Space and Surface Environments | |
| ASEN 5849 | Independent Study (for MS students) | |
| ASEN 6116 | Spacecraft Life Support Systems | |
| ASEN 6216 | Human Operation of Aerospace Vehicles | |
| ASEN 6316 | Extravehicular Activity | |

| | |
|---|---|
| ASEN 6849 | Independent Study (for PhD 'pre/non-thesis' topic) |

1 Students who elect to take ASEN 5044 or ASEN 5137 as an approved math course, may also count it towards the BIO and non-BIO elective requirements listed above.

2 Up to 6 credit hours at the 4000-level from approved departments may be counted towards the MS degree. 4000-level courses cannot be counted towards the PhD degree.

## Fluids, Structures and Materials (FSM) (https://www.colorado.edu/aerospace/academics/graduates/curriculum/fluids-structures-and-materials/)

Requirements of the MS degree in the Fluids, Structures and Materials (FSM) focus area are:

- Two Core Classes in your chosen track, and one Core course in the other FSM track.
- Two electives from the FSM focus area, with at least one in your chosen track. (See Graduate Handbook for detailed listing.)

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| *Fluids Sub-Track* | | |
| ASEN 5051 | Fundamentals of Fluid Dynamics | |
| ASEN 5151 | Fundamentals of Gas Dynamics | |
| ASEN 5251 | Molecular Thermodynamics and Kinetics | |
| *Structures and Materials Sub-Track* | | |
| ASEN 5007 | Introduction to Finite Elements | |
| ASEN 5012 | Mechanics of Aerospace Structures | |
| ASEN 5022 | Dynamics of Aerospace Structures | |
| **Elective Courses Approved by FSM Focus Area** | | |
| *Fluids* | | |
| ASEN 5053 | Space Propulsion | |
| ASEN 5121 | Boundary Layers and Convection | |
| ASEN 5131 | Introduction to Hypersonics | |
| ASEN 6011 | Experimental Fluid Mechanics | |
| ASEN 6037 | Turbulent Flows | |
| or MCEN 7221 | Turbulence | |
| ASEN 6061 | Molecular Gas Dynamics and DSMC | |
| ASEN 6331/ MCEN 5231 | Computational Fluid Dynamics | |
| ASEN 6519 | Special Topics (Advanced Turbulence Simulation) | |
| MCEN 5022 | Classical Thermodynamics | |
| MCEN 5042 | Heat Transfer | |
| MCEN 5151 | Flow Visualization | |
| MCEN 5152 | Introduction to Combustion | |
| MCEN 6001 | Reacting Flows | |
| *Structures and Materials* | | |
| ASEN 5111 | Introduction to Aeroelasticity | |
| ASEN 5148 | Spacecraft Design | |
| ASEN 5212 | Composite Structures and Materials | |
| ASEN 5218 | Large Space Structures Design | |
| ASEN 5519 | Special Topics (Design Optimization in Aerospace Systems) | |
| ASEN 5519 | Special Topics (Introduction to Phononics) | |
| ASEN 5519 | Special Topics (Nonlinear Mechanical Vibration) | |
| ASEN 6412 | Uncertainty Quantification | |
| ASEN 6519 | Special Topics (Molecular Modeling of Material) | |
| CVEN 5161 | Advanced Mechanics of Materials I | |
| CVEN 6161 | Advanced Mechanics of Materials 2 | |
| CVEN 7141 | Plates and Shells | |
| CVEN 7511 | Computational Finite Inelasticity and Multiphase Mechanics | |
| EMEN 5405 | Fundamentals of Systems Engineering | |
| MCEN 5044 | Mechanical Behavior of Materials | |
| MCEN 5228 | Special Topics in Mechanical Engineering (Mechanics of Composite Materials) | |
| MCEN 5228 | Special Topics in Mechanical Engineering (Mechanics of Soft Materials) | |

## Remote Sensing, Earth and Space Science (RSESS) (https://www.colorado.edu/aerospace/current-students/graduates/curriculum/remote-sensing-earth-space-sciences/)

Note that MS students using the Remote Sensing Certificate for their degree requirements in lieu of an MS thesis or two semester graduate projects may count a maximum of 2 of the 4 required RSESS focus area courses toward the certificate requirement.

| Code | Title | Credit Hours |
|---|---|---|
| **Data or Numerical Analysis Methods Primary Courses** | | |
| Choose one: | | 3 |
| ASEN 5307 | Engineering Data Analysis Methods | |
| ASEN 6055 | Data Assimilation and Inverse Methods for Earth & Geospace Observations | |
| ASEN 6337 | Remote Sensing Data Analysis | |
| APPM 5350 | Methods in Applied Mathematics: Fourier Series and Boundary Value Problems | |
| ECEN 5612 | Random Processes for Engineers | |
| ECEN 5632 | Theory and Application of Digital Filtering | |
| ECEN 5652 | Detection and Extraction of Signals from Noise | |
| STAT 5000 | Statistical Methods and Application I | |
| STAT 5010 | Statistical Methods and Applications II | |
| STAT/MATH 5520 | Introduction to Mathematical Statistics | |
| STAT/MATH 5540 | Introduction to Time Series | |
| **Instrumentation Fundamentals Primary Courses** | | |
| Choose one: | | 3 |
| ASEN 5067 | Microavionics: Introduction to PIC Microcontrollers for Aerospace Systems | |
| ASEN 5090 | Introduction to Global Navigation Satellite Systems | |
| ASEN 5245 | Radar and Remote Sensing | |

| | | |
|---|---|---|
| ASEN 5440 | Mission Design and Development for Space Sciences | |
| ASEN 6050 | Space Instrumentation | |
| ASEN 6265 | Fundamentals of Spectroscopy for Optical Remote Sensing | |
| ASEN 6365 | Lidar Remote Sensing | |
| **Physical Sciences of Earth and Space Primary Courses** | | |
| Choose one: | | 3 |
| ASEN 5335 | Aerospace Environment | |
| ASEN 6519 | Special Topics (Aerospace Environment: Upper Atmospheres) | |
| ASTR 5300 | Introduction to Magnetospheres | |
| ATOC 5050 | Atmospheric Thermodynamics and Dynamics | |
| ATOC 5051 | Introduction to Physical Oceanography | |
| ATOC 5060 | Dynamics of the Atmosphere and Oceans | |
| ATOC 5235 | Introduction to Atmospheric Radiative Transfer and Remote Sensing | |
| PHYS 5141 | Astrophysical and Space Plasmas | |
| PHYS 5150 | Introductory Plasma Physics | |
| **Astrodynamics and Satellite Navigation Systems** | | |
| Choose one: | | 3 |
| ASEN 5014 | Linear Control Systems | |
| ASEN 5044 | Statistical Estimation for Dynamical Systems | |
| ASEN 5050 | Space Flight Dynamics | |
| or ASEN 5052 | Analytical Astrodynamics | |
| ASEN 5051 | Fundamentals of Fluid Dynamics | |
| ASEN 5148 | Spacecraft Design | |
| ASEN 6070 | Satellite Geodesy | |
| **Total Credit Hours** | | **12** |

# Dual Degree Program

## MS in Aerospace Engineering Sciences and ME in Engineering Management

Students may complement their aerospace engineering master's degree with a Master of Engineering (ME) in Engineering Management. To complete the Aerospace Engineering and Engineering Management dual degree program, students must be admitted to Aerospace Engineering first, and apply to Engineering Management afterwards.

### Requirements

The dual degree consists of 45 credits: 24 credits based on Aerospace Engineering requirements and 21 based on Engineering Management requirements, as detailed below.

For more information, visit the Engineering Management Program's MS Aerospace Engineering Sciences & ME Engineering Management (https://www.colorado.edu/aerospace/admissions/graduates/degree-programs/dual-graduate-degree-aerospace-engineering-and-engineering/) webpage.

#### Aerospace Engineering

At least 24 credits at the 5000 level or above:

- At least 18 credits in Aerospace Engineering (ASEN) courses. (Note: EMEN 5405 Fundamentals of Systems Engineering counts as an ASEN class).
- One approved math course (3 credits)
- Professional MS students do not follow focus area-specific requirements and do not require the completion of a certificate, graduate projects or MS thesis
- Traditional MS students:
  - Completion of an approved certificate, graduate projects (6 credits) or MS thesis (6 MS thesis credits)
  - Fulfill focus area-specific requirements

Review our Graduate Student Handbook (https://www.colorado.edu/aerospace/current-students/graduates/curriculum/graduate-student-handbooks/) for details on focus area requirements, GPA and grade minimums, and other information.

#### Engineering Management

Students must complete at least 21 credits. Visit the Engineering Management website for details.

# Aerospace Engineering Sciences - Professional Master of Science (MSAES)

A professional master's degree (MSAES) in aerospace engineering sciences from CU Boulder is designed for working engineers and people planning to pursue a career in industry. We designed the program with industry partners to meet your needs, further your career and with your location in mind—the degree can be earned on campus or 100 percent online.

For more information, visit the department's Prospective Graduate Students (https://www.colorado.edu/aerospace/prospective-students/graduates/) webpage.

# Requirements

## Program Requirements

Students must complete a total of 30 credit hours, equivalent to 10 classes, with a grade of B- or better and a cumulative GPA of at least 3.00. Of these 30 credits, at least 24 credit hours must be completed at the 5000 level or above, and at least 18 of those credits must be in aerospace engineering (ASEN) courses. (Note: EMEN 5405 Fundamentals of Systems Engineering counts as an ASEN class. Seminar  credits, even those earned in other disciplines, do not count toward the MS degree.)

Up to 6 credits can be taken at the 4000 level in approved engineering, math and science departments (APPM, AREN, ASTR, ATLS, ATOC, BCHM, BIEN, BMEN, CHEM, CHEN, CSCI, CVEN, CYBR, DTSC, ECEN, ENEN, ENVD, EVEN, GEOL, IPHY, MATH, MCDB, MCEN, MSEN, PHYS, ROBO, STAT). ASEN courses level 4000 or below do not count towards AES graduate degrees.

| Code | Title | Credit Hours |
|---|---|---|
| **ASEN Courses** | | **18** |
| Choose from the list below (subject to change) | | |
| ASEN 5007 | Introduction to Finite Elements | |
| ASEN 5010 | Spacecraft Attitude Dynamics and Control | |
| ASEN 5012 | Mechanics of Aerospace Structures | |

| | |
|---|---|
| ASEN 5014 | Linear Control Systems |
| ASEN 5016 | Space Life Sciences |
| ASEN 5022 | Dynamics of Aerospace Structures |
| ASEN 5050 | Space Flight Dynamics |
| ASEN 5051 | Fundamentals of Fluid Dynamics |
| ASEN 5052 | Analytical Astrodynamics |
| ASEN 5053 | Space Propulsion |
| ASEN 5067 | Microavionics: Introduction to PIC Microcontrollers for Aerospace Systems |
| ASEN 5090 | Introduction to Global Navigation Satellite Systems |
| ASEN 5111 | Introduction to Aeroelasticity |
| ASEN 5114 | Automatic Control Systems |
| ASEN 5121 | Boundary Layers and Convection |
| ASEN 5128 | Small Uncrewed Aircraft System Guidance, Navigation, and Control |
| ASEN 5131 | Introduction to Hypersonics |
| ASEN 5148 | Spacecraft Design |
| ASEN 5151 | Fundamentals of Gas Dynamics |
| ASEN 5158 | Space Habitat Design |
| ASEN 5212 | Composite Structures and Materials |
| ASEN 5218 | Large Space Structures Design |
| ASEN 5226 | Medicine in Space and Surface Environments |
| ASEN 5235 | Introduction to Atmospheric Radiative Transfer and Remote Sensing |
| ASEN 5245 | Radar and Remote Sensing |
| ASEN 5251 | Molecular Thermodynamics and Kinetics |
| ASEN 5335 | Aerospace Environment |
| ASEN 5440 | Mission Design and Development for Space Sciences |
| ASEN 5519 | Special Topics |
| ASEN 5849 | Independent Study |
| ASEN 6008 | Interplanetary Mission Design |
| ASEN 6010 | Advanced Spacecraft Dynamics and Control |
| ASEN 6011 | Experimental Fluid Mechanics |
| ASEN 6014 | Spacecraft Formation Flying |
| ASEN 6015 | Space Vehicle Guidance and Control |
| ASEN 6020 | Optimal Trajectories |
| ASEN 6024 | Nonlinear Control Systems |
| ASEN 6037 | Turbulent Flows |
| ASEN 6044 | Advanced State Estimation |
| ASEN 6050 | Space Instrumentation |
| ASEN 6055 | Data Assimilation and Inverse Methods for Earth & Geospace Observations |
| ASEN 6060 | Advanced Astrodynamics |
| ASEN 6061 | Molecular Gas Dynamics and DSMC |
| ASEN 6070 | Satellite Geodesy |
| ASEN 6080 | Statistical Orbit Determination |
| ASEN 6090 | Advanced Global Navigation Satellite Systems: Software and Applications |
| ASEN 6091 | Global Navigation Satellite System (GNSS) Receiver Architecture |
| ASEN 6092 | GNSS for Remote Sensing of the Atmosphere, Ionosphere, and Earth Surface |
| ASEN 6107 | Nonlinear Finite Element Methods |
| ASEN 6114 | System Identification for Control |
| ASEN 6116 | Spacecraft Life Support Systems |
| ASEN 6216 | Human Operation of Aerospace Vehicles |
| ASEN 6265 | Fundamentals of Spectroscopy for Optical Remote Sensing |
| ASEN 6316 | Extravehicular Activity |
| ASEN 6331 | Computational Fluid Dynamics |
| ASEN 6337 | Remote Sensing Data Analysis |
| ASEN 6365 | Lidar Remote Sensing |
| ASEN 6519 | Special Topics |
| EMEN 5405 | Fundamentals of Systems Engineering |
| **Additional Coursework** | **12** |
| **Total Credit Hours** | **30** |

### Time Limit

All degree requirements must be completed within four years of the date of commencing coursework.

## Learning Outcomes

By the completion of the program, students will be able to:

# Aerospace Engineering Sciences - Doctor of Philosophy (PhD)

Students typically complete their PhD in aerospace engineering sciences within 4 to 6 years, depending on whether they enter the program with a master's degree.

The primary focus of a PhD student is to perform novel research guided by their faculty advisor. At the time of admission, PhD students must have a faculty advisor who agrees to accept the student into their research program and mentor their academic progress. PhD students are supported through research and teaching assistantships and are also encouraged to apply for their own source of funding.

For more information, visit the department's Prospective Graduate Students (https://www.colorado.edu/aerospace/prospective-students/graduates/) webpage.

## Requirements

### Course Requirements

- A minimum of 30 credit hours of courses numbered 5000 or above (at least 15 of these must be in ASEN) with a minimum of 3.25 GPA.
- 30 credit hours of dissertation credit are required for the degree.
- A maximum of 21 credit hours may be transferred from another accredited institution and applied toward a PhD degree if approved by the Graduate School.
- All courses taken for the master's degree at the 5000 level or above at the University of Colorado may be applied toward the doctoral degree at the university.

### Preliminary Examination

Students must pass the preliminary exam by the fifth semester as a CU Boulder PhD student, although most students take the exam in their third semester. If a student enters the PhD program with a master's degree in aerospace engineering, their faculty advisor can require the exam be taken by their third semester. The preliminary exam is composed of an oral exam in front of a committee of three AES graduate faculty members. The exam focuses upon both research preparation and fundamental knowledge in key subject areas.

The oral exam will be composed of three components:

1. A presentation summarizing the literature review conducted by the student followed by an examination of the presented concepts.
2. Two subject area exams based on approved courses.

### Doctoral Practicum

The Doctoral Practicum (DP) is a required element of the PhD program in Smead AES that complements the primary research and academic experiences which are core to the awarding of a doctorate. The objective of the DP is to provide students with an experience to use their advanced education to teach, mentor and serve as role models. The emphasis of the practicum is on using technical skills, education and insights in service to others. The expectation is that this activity (which should consist of about 40 total hours of work) will help students grow confidence and skills as leaders. The process is formative, and students are responsible for articulating how their chosen practicum will be structured toward achieving the following goals:

1. Provide meaningful educational or societal benefit/impact to others.
2. Provide intrinsic value to the student's professional or personal development.
3. Leverage the research and/or educational skills developed in the PhD program towards the two goals above (I.e., societal benefit and personal development).

### Comprehensive Examination

Students must pass the comprehensive exam to become doctoral candidates. This exam is in front of the student's doctoral committee, which is made up of the student's research advisor and four (or more) other graduate faculty members chosen by the student. Before the exam, the student provides a written proposal for their thesis research to the doctoral committee. The oral exam consists of the student presenting their proposal and any initial research findings to their committee, who then examines the student on the proposal and related technical concepts. After incorporating input from the committee through the Comprehensive Exam and passing this exam, the student will have a plan for their thesis research and will become a doctoral candidate.

### PhD Dissertation

Students must write a dissertation based on original research conducted under the supervision of a graduate faculty member. The dissertation must fulfill all Graduate School requirements. After the dissertation is completed, an oral final examination on the dissertation and related topics is conducted by the student's doctoral committee.

### Time Limit

All degree requirements must be completed within six years of the date of commencing coursework.

## Learning Outcomes

By the completion of the program, students will have:

- Expertise in one or more of the core areas of aerospace engineering and/or aerospace-related sciences.
- Ability to conduct original research in their core area.
- Ability to communicate and defend research motivation, methodology and results through written documentation.
- Ability to communicate and defend research motivation, methodology and results through oral presentation.
- Experience using the skills developed in the PhD program to benefit the community through the doctoral practicum.

# Astrodynamics and Satellite Navigation Systems - Graduate Certificate

The Astrodynamics and Satellite Navigation Systems Certificate recognizes student accomplishments at the graduate level in successfully completing a specialized program of study in Astrodynamics and Satellite Navigation (ASN). It is essentially a specialization of the AES MS degree in the ASN focus area, with additional requirements for breadth and depth in the ASN area. The certificate will make students more desirable to future employers looking for astrodynamics and satellite navigation specialists.

This certificate is available to graduate degree-seeking and non-matriculated students. Additional certificate information can be found on the department's Astrodynamics and Satellite Navigation Systems Certificate (https://www.colorado.edu/aerospace/current-students/graduates/curriculum/certificate-programs/asn-certificate/) webpage.

## Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

## Requirements

### Admissions Requirements

- Completed undergraduate degree from an institution accredited by an agency recognized by the U.S. Department of Education, or its equivalent.
- Undergraduate courses in calculus, linear algebra, and differential equations, two semesters of undergraduate calculus-based physics, and at least two semesters of upper-division undergraduate courses in engineering or physics.
- Ability to program at a level that will enable successful completion of graduate course assignments.

For more information, degree-seeking students may visit the AES Certificates webpage (https://www.colorado.edu/aerospace/current-students/graduates/curriculum/certificates/); nondegree-seeking and non-matriculated students may visit the AES Certificates & Continuing

Education webpage (https://www.colorado.edu/aerospace/admissions/graduates/degree-programs/certificates-continuing-education/).

## Certificate Requirements

Complete all four core area subjects in ASN, plus two advanced ASN courses of the student's choosing (18 credit hours).

Grades of B or higher are required for fulfillment of requirements and certificate award. Students also pursuing other graduate certificates may not use the same courses to count for both certificates.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Requirements** [1] | | |
| ASEN 5010 | Spacecraft Attitude Dynamics and Control | 3 |
| ASEN 5044 | Statistical Estimation for Dynamical Systems | 3 |
| ASEN 5050 | Space Flight Dynamics | 3 |
| or ASEN 5052 | Analytical Astrodynamics | |
| ASEN 5090 | Introduction to Global Navigation Satellite Systems | 3 |
| **Advanced Requirements** | | |
| *Select any two 6000-level ASN courses, including but not limited to:* | | *6* |
| ASEN 6008 | Interplanetary Mission Design | |
| ASEN 6010 | Advanced Spacecraft Dynamics and Control | |
| ASEN 6014 | Spacecraft Formation Flying | |
| ASEN 6015 | Space Vehicle Guidance and Control | |
| ASEN 6020 | Optimal Trajectories | |
| ASEN 6060 | Advanced Astrodynamics | |
| ASEN 6070 | Satellite Geodesy | |
| ASEN 6080 | Statistical Orbit Determination | |
| ASEN 6084 | Optical Multi-Target Tracking | |
| ASEN 6090 | Advanced Global Navigation Satellite Systems: Software and Applications | |
| ASEN 6091 | Global Navigation Satellite System (GNSS) Receiver Architecture | |
| ASEN 6092 | GNSS for Remote Sensing of the Atmosphere, Ionosphere, and Earth Surface | |
| ASEN 6519 | Special Topics (Celestial Mechanics & Advanced Astrodynamics) | |
| **Total Credit Hours** | | **18** |

[1] Any core requirement can be satisfied by taking an additional 6000-level course which has the corresponding core requirement as a prerequisite. *This substitution does not require a petition.*

# Hypersonics - Graduate Certificate

This certificate recognizes student accomplishments at the graduate level in successfully completing a specialized program of study in the cross-disciplinary field of hypersonics. It is sponsored by the Ann and H. J. Smead Department of Aerospace Engineering Sciences (AES) and the Paul M. Rady Department of Mechanical Engineering (ME) and involves courses from AES and ME.

The purpose of the certificate is to develop interdisciplinary skills in the field of hypersonics, which requires knowledge about fundamental areas such as gas dynamics, materials, controls, and how their inter-relationships determine hypersonic vehicle performance.

This certificate is available to graduate degree-seeking and non-matriculated students. Additional certificate information can be found on the department's Hypersonics Certificate (https://www.colorado.edu/aerospace/academics/graduates/curriculum/certificate-programs/hypersonics-certificate/) webpage.

# Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

# Requirements

## Admission Requirements

- Completed undergraduate degree from an institution accredited by an agency recognized by the U.S. Department of Education or its equivalent.
- Undergraduate courses in calculus, linear algebra and differential equations; two semesters of undergraduate calculus-based physics; and at least two semesters of upper-division undergraduate courses in engineering or physics.
- Ability to program at a level that will enable successful completion of graduate course assignments.

For more information, degree-seeking students may visit the AES Certificates (https://www.colorado.edu/aerospace/academics/graduates/curriculum/certificates/) webpage; nondegree-seeking and non-matriculated students may visit the AES Certificates & Continuing Education (https://www.colorado.edu/aerospace/admissions/graduates/degree-programs/certificates-continuing-education/) webpage.

## Required Courses and Credits

The standard requirements of this certificate program are the completion of twelve (12) hours of graduate-level coursework (typically four 3-credit courses).

There is one required course, ASEN 5131 Introduction to Hypersonics. Each student is free to choose the other three courses from the elective list below.

Grades of B or higher are required for fulfillment of requirements and certificate award. Students also pursuing other graduate certificates may not use the same courses to count for both certificates.

| Code | Title | Credit Hours |
|---|---|---|
| **Course Requirements** | | |
| ASEN 5131 | Introduction to Hypersonics | 3 |
| **Electives** | | |
| Choose three: | | 9 |
| ASEN 5018 | Graduate Projects I (Specifically focused on hypersonics, approved by certificate coordinator) | |

| | |
|---|---|
| or ASEN 6028 | Graduate Projects II |
| ASEN 5053 | Space Propulsion |
| ASEN 5121 | Boundary Layers and Convection |
| ASEN 5151 | Fundamentals of Gas Dynamics |
| ASEN 5212 | Composite Structures and Materials |
| ASEN 5251 | Molecular Thermodynamics and Kinetics |
| ASEN 5519 | Special Topics (Hypersonic Vehicle Design Project) |
| ASEN 5849 | Independent Study (Specifically focused on hypersonics, approved by certificate coordinator) |
| ASEN 6015 | Space Vehicle Guidance and Control |
| ASEN 6037 | Turbulent Flows |
| or MCEN 7221 | Turbulence |
| ASEN 6061 | Molecular Gas Dynamics and DSMC |
| ASEN 6331 | Computational Fluid Dynamics |
| or MCEN 5231 | Computational Fluid Dynamics |
| MCEN 5022 | Classical Thermodynamics |
| MCEN 5024 | Materials Chemistry and Structures |
| MCEN 5042 | Heat Transfer |
| MCEN 5152 | Introduction to Combustion |
| MCEN 5228 | Special Topics in Mechanical Engineering (High Temperature Materials) |
| MCEN 6001 | Reacting Flows |
| **Total Credit Hours** | **12** |

# Radio Frequency Engineering for Aerospace - Graduate Certificate

A joint certificate program between Smead Aerospace and the Department of Electrical, Computer & Energy Engineering. This certificate fills an industry need in Colorado and beyond for cross disciplinary graduate level education in aerospace and electrical engineering.

This certificate is open to new and current degree-seeking Aerospace Engineering Sciences (AES) and Electrical, Computer and Energy Engineering (ECEE) students. This certificate is not available to non-matriculated students.

Additional certificate information can be found on the department's Radio Frequency Engineering for Aerospace Certificate (https://www.colorado.edu/aerospace/current-students/graduates/curriculum/certificate-programs/radio-frequency-engineering-aerospace/) webpage.

# Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

# Requirements

## Admissions Requirements

Candidates for admission must be a matriculated graduate student in the AES or ECEE departments. For certificate application and more details, visit the AES Certificates webpage (https://www.colorado.edu/aerospace/current-students/graduates/curriculum/certificates/).

This certificate is co-managed by AES and ECEE. Students must follow the rules and policies of each department. Courses from already awarded degrees cannot be used to fulfill certificate requirements.

## Certificate Requirements

Six courses total (18 credit hours): four required courses (12 credit hours) and two elective courses (6 credit hours).

Grades of B or higher are required for fulfillment of requirements and certificate award. Students also pursuing other graduate certificates may not use the same courses to count for both certificates.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| ASEN 5090 | Introduction to Global Navigation Satellite Systems | 3 |
| ECEN 5134 | Electromagnetic Radiation and Antennas [1] | 3 |
| or ECEN 5104 | Passive Microwave Circuits | |
| ECEN 5634 | Microwave and RF Laboratory | 3 |
| Choose one of the courses below, depending on major: | | 3 |
| ASEN 5148 | Spacecraft Design (required for ECEE majors) | |
| ECEN 3410 | Electromagnetic Waves and Transmission (required for AES majors) [2] | |
| **Elective Courses** | | |
| Choose two: | | 6 |
| ASEN 5018 | Graduate Projects I [3] | |
| or ASEN 6028 | Graduate Projects II | |
| ASEN 5245 | Radar and Remote Sensing | |
| ECEN 5114 | Electromagnetic Theory | |
| ECEN 5134 | Electromagnetic Radiation and Antennas [4] | |
| or ECEN 5104 | Passive Microwave Circuits | |
| ECEN 5154 | Computational Electromagnetics | |
| **Total Credit Hours** | | **18** |

1. For students interested in taking both courses, one course can count as a requirement and one course can count as an elective. A single course cannot count as both a required course and an elective course, simultaneously.
2. Note: ECEN 3410 will only meet graduate degree/MS requirements for AES students enrolled in the RF certificate.
3. Approved radio frequency project; can only count for one elective (3 credit hours).
4. As an elective, choose whichever course not taken as a requirement.

# Remote Sensing - Graduate Certificate

Remote sensing (satellite and ground-based) is increasingly being used as a technique to probe the Earth's atmosphere, ocean and land surfaces. Probing of other planets is accomplished largely by satellite remote sensing. Given national priorities in such areas as climate and global change, the interest in remote sensing will only increase with time. Graduate students, research staff and faculty work on a wide

variety of topics ranging from the theory of remote sensing, to instrument development and application.

This certificate is available to graduate degree-seeking and non-matriculated students. Additional certificate information can be found on the department's Remote Sensing Certificate (https://www.colorado.edu/aerospace/current-students/graduates/curriculum/certificates/remote-sensing-certificate/) webpage.

# Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

# Requirements

## Admissions Requirements

- Completed undergraduate degree from an institution accredited by an agency recognized by the U.S. Department of Education, or its equivalent.
- Undergraduate courses in calculus, linear algebra and differential equations; two semesters of undergraduate calculus-based physics; and at least two semesters of upper-division undergraduate courses in engineering or physics.
- Ability to program at a level that will enable successful completion of graduate course assignments.

For more information, degree-seeking students may visit the AES Certificates (https://www.colorado.edu/aerospace/academics/graduates/curriculum/certificates/) webpage; nondegree and non-matriculated students may visit the AES Certificates & Continuing Education (https://www.colorado.edu/aerospace/admissions/graduates/degree-programs/certificates-continuing-education/) webpage.

## Certificate Requirements

Four courses are required totaling at least 12 credit hours.

- Two courses from one of the following topical areas (6 credit hours):
  - Data analysis
  - Instrumentation and measurement techniques
  - Remote sensing theory
- One course in each of the two remaining topical areas (6 credit hours).

Note that MS students using the Remote Sensing Certificate for their degree requirements in lieu of an MS thesis or two semester graduate projects may count a maximum of 2 of the 4 required RSESS Focus Area courses toward the certificate requirement.

Grades of B or higher are required for fulfillment of requirements and certificate award. Students also pursuing other graduate certificates may not use the same courses to count for both certificates.

| Code | Title | Credit Hours |
|---|---|---|
| **Data Analysis Courses** | | |
| ASEN 5307 | Engineering Data Analysis Methods | 3 |
| ASEN 6337 | Remote Sensing Data Analysis | 3 |
| ASTR 5550 | Observations, Data Analysis and Statistics | 3 |
| ECEN 5244 | Applied Stochastic Signal Processing | 3 |
| ECEN 5254 | Remote Sensing Signals and Systems | 3 |
| ECEN 5612 | Random Processes for Engineers | 3 |
| ECEN 5652 | Detection and Extraction of Signals from Noise | 3 |
| GEOG 5103 | Geographic Information Science: Spatial Analytics | 4 |
| GEOG 5203 | Geographic Information Science: Spatial Modeling | 4 |
| GEOG 5303 | Geographic Information Science: Spatial Programming | 4 |

| Code | Title | Credit Hours |
|---|---|---|
| **Instrumentation & Measurement Techniques Courses** | | |
| ASEN 5245 | Radar and Remote Sensing | 3 |
| ASEN 6050 | Space Instrumentation | 3 |
| ASEN 6091 | Global Navigation Satellite System (GNSS) Receiver Architecture | 3 |
| ASEN 6365 | Lidar Remote Sensing | 3 |
| ASTR 5760 | Astrophysical Instrumentation | 3 |
| ECEN 5134 | Electromagnetic Radiation and Antennas | 3 |
| GEOG 5100 | Special Topics: Geography (Topic needs to be relevant to instrumentation/measurement) | 1-4 |
| PHYS 5160 | Fundamentals of Optics and Lasers | 3 |

| Code | Title | Credit Hours |
|---|---|---|
| **Remote Sensing Theory Courses** | | |
| ASEN 6265 | Fundamentals of Spectroscopy for Optical Remote Sensing | 3 |
| ATOC 5235 | Introduction to Atmospheric Radiative Transfer and Remote Sensing | 3 |
| ATOC 5560 | Radiative Processes in Planetary Atmospheres | 3 |
| ECEN 5264 | Electromagnetic Absorption, Scattering, and Propagation | 3 |
| GEOG 5093 | Remote Sensing of the Environment | 4 |
| GEOG 5100 | Special Topics: Geography (Advanced Remote Sensing) | 1-4 |
| PHYS 5150 | Introductory Plasma Physics | 3 |

# Architectural Engineering

Architectural engineering focuses on the design, construction and operation of buildings and the integration of their systems. The department offers Master of Science (MS), Professional Master of Science (MSAE), and Doctor of Philosophy (PhD) degrees in architectural engineering with focus areas in:

- Building energy engineering
- Illumination engineering
- Materials and carbon
- Construction engineering and management

Graduate studies in architectural engineering are offered through the Department of Civil, Environmental and Architectural Engineering (http://www.colorado.edu/ceae/prospective-students/graduate-studies/).

**Course code for this program is AREN.**

# Research Interests and Facilities

The Larson HVAC Laboratory has been a staple of the University of Colorado's building energy research activities and AREN program education. The laboratory has been the stepping stone for fundamental and applied research in building energy efficiency, energy controls, thermal comfort and indoor air quality. The newly renovated Larson HVAC Laboratory provides a unique facility that permits the evaluation of entire systems in a controlled dynamic environment, providing repeatable test conditions. The laboratory has been recently redesigned to allow maximum flexibility in conducting a wide variety of research and testing procedures. In particular, both the HVAC and control systems in the laboratory are reconfigurable in that components, subsystems or entire systems can be readily installed and tested. For instance, the performance of air handling units, displacement ventilation units, chilled beams and variable refrigerant flow units can be tested. In addition, coils, air mixers, dampers, filters and variable frequency drives can be evaluated. Moreover, the laboratory offers the possibility to test standalone HVAC and refrigeration systems including water heaters, boilers, thermal energy storage tanks and chillers.

The Lighting Laboratory is a learning and research space for lighting students in the AREN program. The lab has a dynamic ceiling with adjustable height to allow a wide range of academic and research exploration. Although the lab has a full-wall, with north-facing windows, there are blackout curtains installed to eliminate any undesirable external light. In addition, this lab houses a goniophotometer used to measure the intensity of light leaving a luminaire at various vertical and horizontal angles. The measured data allow establishing photometric light distribution of the luminaire and metrics such as total lumen output, luminaire luminance and zonal lumen summary. The lab also houses a small lighting sphere, which allows testing of lumen output of LED luminaires and LED chips. In addition, the lighting lab includes a studio space used primarily for lighting research. The lab has an extensive aluminum open ceiling grid that allows for quick electrical and physical connection of light sources and luminaires for research. For lighting design-oriented classes, students have access to theatrical-type and programmable color-changing luminaires to do mock-ups and study lighting effects.

The AREN laboratories offer state-of-the-art facilities to test a wide range of operational and control strategies for lighting and HVAC systems and subsystems. Indeed, several control projects have been carried out in the Larson HVAC laboratory including demand-ventilation controls, optimal chiller and thermal energy storage controls, outdoor air intake controls, and optimal operation of evaporative systems. In addition, fault diagnostic algorithms have been tested in the laboratory for specific HVAC equipment including for heating and cooling coils, chillers and outdoor air intake dampers.

# Master's Degrees

- Architectural Engineering - Master of Science (MS) (p. 1620)
- Architectural Engineering - Professional Master of Science (MSAE) (p. 1621)

# Doctoral Degree

- Architectural Engineering - Doctor of Philosophy (PhD) (p. 1623)

# Certificate

- Architectural Lighting - Graduate Certificate (p. 1731)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Amadei, Bernard (https://experts.colorado.edu/display/fisid_105978/)
Professor Emeritus; PhD, University of California, Berkeley

Amy, Gary L.
Professor Emeritus

Arehart, Joseph Hoberg (https://experts.colorado.edu/display/fisid_164349/)
Assistant Teaching Professor; BS, University of Colorado Boulder

Ayer, Steven
Associate Professor; PhD, Pennsylvania State University

Baker, Kyri A. (https://experts.colorado.edu/display/fisid_159754/)
Associate Professor; PhD, Carnegie Mellon University

Balaji, Rajagopalan (https://experts.colorado.edu/display/fisid_118480/)
Professor, Associate Chair; PhD, Utah State University

Becker, William
Scholar in Residence; PhD, The Johns Hopkins University

Behzadan, Amir
Professor; PhD, University of Michigan Ann Arbor

Bhaskar, Aditi
Associate Professor; Ph.D, University of Maryland, Baltimore County

Bielefeldt, Angela R. (https://experts.colorado.edu/display/fisid_110322/)
Professor; PhD, University of Washington; P.E.

Bolhari, Azadeh (https://experts.colorado.edu/display/fisid_167399/)
Associate Teaching Professor; PhD, Colorado State University

Brandemuehl, Michael J. (https://experts.colorado.edu/display/fisid_102573/)
Professor Emeritus; PhD, University of Wisconsin-Madison

Celoza, Amelia (https://experts.colorado.edu/display/fisid_172038/)
Assistant Professor; Ph.D., University of Texas at Austin

Cook, Sherri M. (https://experts.colorado.edu/display/fisid_154773/)
Associate Professor; PhD, University of Michigan Ann Arbor

Corotis, Ross B. (https://experts.colorado.edu/display/fisid_100942/)
Professor Emeritus; PhD, Massachusetts Institute of Technology

Crimaldi, John P. (https://experts.colorado.edu/display/fisid_115733/)
Professor; PhD, Stanford University

Dashti, Shideh (https://experts.colorado.edu/display/fisid_148493/)
Associate Professor; PhD, University of California, Berkeley

Davis, Robert
Scholar in Residence; PhD, University of Colorado Boulder

DiLaura, David L.
Professor Emeritus

Dow, John O.
Associate Professor Emeritus

Frangopol, Dan M.
Professor Emeritus

Gooseff, Michael N. (https://experts.colorado.edu/display/fisid_155922/)
Professor; PhD, University of Colorado Boulder

Gupta, Vijay
Professor Emeritus

Halek, Milan F.
Senior Instructor Emeritus

Hallowell, Matthew Ryan (https://experts.colorado.edu/display/fisid_146163/)
Professor; PhD, Oregon State University

Hearn, George (https://experts.colorado.edu/display/fisid_101059/)
Associate Professor; PhD, Columbia University

Henze, Gregor P. (https://experts.colorado.edu/display/fisid_146496/)
Professor; PhD, University of Colorado Boulder

Hernandez, Mark T. (https://experts.colorado.edu/display/fisid_107635/)
Professor, Lecturer; PhD, University of California, Berkeley

Hubler, Mija H. (https://experts.colorado.edu/display/fisid_155134/)
Associate Professor; PhD, Northwestern University

Javernick-Will, Amy N. (https://experts.colorado.edu/display/fisid_146430/)
Professor; PhD, Stanford University

Kasprzyk, Joseph R. (https://experts.colorado.edu/display/fisid_151506/)
Associate Professor, Associate Chair; PhD, Pennsylvania State University

Klees, Rita C. (https://experts.colorado.edu/display/fisid_145391/)
Associate Faculty Director, Scholar in Residence; PhD, University of Colorado

Ko, Hon-Yim
Professor Emeritus

Korak, Julie A. (https://experts.colorado.edu/display/fisid_155070/)
Assistant Professor; PhD, University of Colorado Boulder

Krarti, Moncef (https://experts.colorado.edu/display/fisid_104154/)
Professor; PhD, University of Colorado Boulder

Liel, Abbie B. (https://experts.colorado.edu/display/fisid_146431/)
Professor; PhD, Stanford University

Linden, Karl G. (https://experts.colorado.edu/display/fisid_143747/)
Professor, Chair; PhD, University of California, Davis

Livneh, Ben (https://experts.colorado.edu/display/fisid_151999/)
Associate Professor; PhD, University of Washington

Madabhushi, Srikanth (https://experts.colorado.edu/individual/fisid_165826/)
Assistant Professor; PhD, University of Cambridge (England)

Mansfeldt, Cresten (https://experts.colorado.edu/display/fisid_165411/)
Assistant Professor; PhD, Cornell University

Masters, Sheldon (https://experts.colorado.edu/display/fisid_168570/)
Assistant Professor; PhD, Virginia Polytechnic Institute and State University

McKnight, Diane M. (https://experts.colorado.edu/display/fisid_110517/)
Professor; PhD, Massachusetts Institute of Technology

Molenaar, Keith Robert (https://experts.colorado.edu/display/fisid_102373/)
Professor, Dean; PhD, University of Colorado Boulder

Morris, Matthew R. (https://experts.colorado.edu/display/fisid_150037/)
Teaching Professor; MS, University of Colorado Boulder

Neupauer, Roseanna M. (https://experts.colorado.edu/display/fisid_134747/)
Professor; PhD, New Mexico Institute of Mining and Technology

Pak, Ronald Y.S. (https://experts.colorado.edu/display/fisid_105977/)
Professor; PhD, California Institute of Technology

Pourahmadian, Fatemeh (https://experts.colorado.edu/display/fisid_158562/)
Assistant Professor; PhD, University of Minnesota

Regueiro, Richard A. (https://experts.colorado.edu/display/fisid_134705/)
Professor, Associate Chair; PhD, Stanford University

Rosario-Ortiz, Fernando L. (https://experts.colorado.edu/display/fisid_146165/)
Director, Professor; DEnv, University of California, Los Angeles

Ryan, Joseph N. (https://experts.colorado.edu/display/fisid_101037/)
Professor; PhD, Massachusetts Institute of Technology

Salvinelli, Carlo (https://experts.colorado.edu/display/fisid_159846/)
Assistant Teaching Professor; PhD, Missouri University of Science and Technology

Saouma, Victor E. (https://experts.colorado.edu/display/fisid_100429/)
Professor Emeritus; PhD, Cornell University

Scheib, Jennifer G. (https://experts.colorado.edu/display/fisid_159887/)
Assistant Teaching Professor; MS, University of Colorado Boulder

Senseney, Christopher (https://experts.colorado.edu/individual/fisid_166693/)
Associate Teaching Professor; PhD, Colorado School of Mines

Sholtes, Joel Stephen (https://experts.colorado.edu/display/fisid_164757/)
Assistant Teaching Professor; PhD, Colorado State University

Sholtes, Kari A. (https://experts.colorado.edu/display/fisid_164995/)
Assistant Teaching Professor; MS, University of North Carolina Chapel Hill

Silverstein, JoAnn (https://experts.colorado.edu/display/fisid_101482/)
Professor Emeritus; PhD, University of California, Davis

Song, Jeong-Hoon (https://experts.colorado.edu/display/fisid_154468/)
Associate Professor; PhD, Northwestern University

Srubar, Wil V. III (https://experts.colorado.edu/display/fisid_153058/)
Professor; PhD, Stanford University

Straub, Anthony (https://experts.colorado.edu/display/fisid_165027/)
Assistant Professor; PhD, Yale University

Strzepek, Kenneth M.
Professor Emeritus

Sture, Stein
Professor Emeritus

Summers, Scott R. (https://experts.colorado.edu/display/fisid_113151/)
Professor Emeritus; PhD, Stanford University

Techera, Ulises (https://experts.colorado.edu/display/fisid_163403/)
Associate Teaching Professor; PhD, University of Colorado, Boulder

Thomas, Evan (https://experts.colorado.edu/display/fisid_163895/)
Professor, Assistant Professor; PhD, University of Colorado Boulder

Torres-Machi, Cristina (https://experts.colorado.edu/display/fisid_159884/)
Assistant Professor; PhD, Universitat Politecnica de Valencia, Spain

Vàsconez, Sandra L. (https://experts.colorado.edu/display/fisid_144198/)
Teaching Professor; MA, University of Denver

William, Kaspar J.
Professor Emeritus

Xi, Yunping (https://experts.colorado.edu/display/fisid_110518/)
Professor; PhD, Northwestern University

Zhai, John Z. (https://experts.colorado.edu/display/fisid_130604/)
Professor; PhD, Massachusetts Institute of Technology

Zhang, Yida (https://experts.colorado.edu/display/fisid_158222/)
Associate Professor; PhD, Northwestern University

# Courses

**AREN 5001 (3) Building Science and Engineering I**
Prepares graduate students with general knowledge and skills that are required by advanced AREN technical courses. Covers two parts of materials: Building Lighting Systems and Building Electrical Systems.
**Requisites:** Restricted to graduate students in the College of Engineering.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 5002 (3) Building Science and Engineering II**
Introduces AREN fundamentals to new graduate students entering the Architectural Engineering Program (AREN) but without general Civil or Architectural Engineering background. This course is part of a two-course set with AREN 5001: Building Science and Engineering I. This course covers two parts: (1) building thermal science and engineering; (2) building material science and engineering.
**Requisites:** Restricted to graduate students in the College of Engineering.
**Grading Basis:** Letter Grade

**AREN 5010 (3) Energy System Modeling and Control**
Engineering course devoted to building automation and control systems. Topics include HVAC control technology and strategies, measurement and device technologies, analysis and modeling of dynamic systems, simulation of conventional and advanced control approaches, assessment of control loop performance and hands-on direct digital control (DDC) programming exercises as used in current building control practice.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4010
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Recommended:** Prerequisite AREN 4110 or AREN 5110.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 5020 (3) Building Energy Audits**
Analyzes and measures performance of HVAC systems, envelopes, lighting and hot water systems, and modifications to reduce energy use. Emphasizes existing buildings.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4040
**Requisites:** Restricted to graduate students or concurrent degree students with sub-plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisite AREN 3010 or AREN 5002.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 5030 (3) Data Science for Energy and Buildings**
Establishing hands-on skills along with understanding of underlying mathematical concepts of current machine learning approaches including: ordinary least squares, quantile, logistic, and local regression; unsupervised methods including principal component analysis and clustering; tree-based models such as regression trees and random forests; kernel-based methods such as support vector and Gaussian process regression; Bayesian inference; as well as shallow and deep neural networks. Numerous examples and case studies applicable to thermal/building/renewable/district energy systems will be used. Undergraduate seniors will be allowed with instructor consent.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN).

**AREN 5061 (3) Distributed Electricity Generation**
Introduces basic distributed generation (DG) technologies including fuel-based systems and renewable energy technologies and overview approaches to conduct energy, economical, and environmental analysis of selected DG technologies using state-of-the-art analysis tools to evaluate optimal hybrid distributed generation systems to meet required electrical loads specific to urban centers, campuses, and residential communities. Formerly AREN 5060.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4061
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisite AREN 3040 or AREN 5001.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 5080 (3) Computer Simulation of Building Energy Systems**
Introduces major simulation programs for analysis of building energy loads and system performance. Focuses on one hourly simulation program to develop capability for analysis of multizone structure.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisite AREN 3010 or AREN 5002.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 5090 (3) Optimizing Grid Connected Systems**
Address the challenges that the electric power grid is facing from a technical perspective, using grid modeling, mathematics (optimization and linear algebra) and programming (Python). The course will also touch on a variety of topics such as electricity markets, renewable energy integration, and distributed energy resources, including how buildings can help the broader electrical grid. Students will gain skills that will help them prepare for careers in building controls, renewable energy, energy policy, and more. Do not take this class if you have already taken a power systems optimization course.
**Requisites:** Restricted to College of Engineering graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisites students should have prior experience/coursework in programming (beyond Excel) and linear algebra before taking this course.
**Grading Basis:** Letter Grade

**AREN 5110 (3) Building Energy Systems Engineering**
Prepares students for professional practice in building energy systems engineering, i.e., analysis and design of residential and commercial buildings, including district energy systems. Upon completion, students possess the skills to calculate heating, cooling, and ventilation requirements, as well as analyze, design, and evaluate integrated building energy systems to meet the following goals: indoor environmental health, safety, and productivity (codes and standards); economic drivers (affordability, life cycle cost), and societal needs (environmental equity, energy justice, decarbonization).
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4110
**Requisites:** Requires prerequisite of (AREN 5001 and AREN 5002) or AREN 3010, all minimum grade C-. Restricted to graduate and students accepted in the Bachelor Accelerated Masters (BAM) program.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 5130 (3) Optical Design for Illumination and Solid State Lighting**
Covers the optical design process for illumination-based optics, emphasis on applications in architectural lighting. In-depth coverage of luminaire photometry, lamps, materials, manufacturing methods, product performance requirements. Projects utilize optical design software and include a variety of lamp types including LEDs using both reflector/lens optics.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4130
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisite AREN 3540.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 5510 (3) Architectural Lighting I**
Teaches the fundamentals of architectural lighting systems and the human responses to those systems. Describes the properties of light sources, how light interacts with architectural elements, and how light affects human visual and non-visual responses. Provides a broad overview of the holistic effects of light on building occupants, as well as the implications for building energy use and sustainability. Previously offered as a special topics course.
**Requisites:** Restricted to non-degree (NDGR) graduate students only.

**AREN 5520 (3) Architectural Lighting II**
Builds on the fundamentals taught in AREN 5500 with a detailed look at how technical information about lighting systems can be used for design concepts and analyses. Provides an examination of daylighting in buildings. Describes the latest research and design standards for color rendering, glare, flicker, circadian rhythms, and alerting effects. Concludes by considering case studies of various project types.
**Requisites:** Open to Non-degree, Non sponsored Students only.

**AREN 5530 (3) Architectural Lighting Capstone**
Concludes the nine-credit Professional Graduate Certificate in Architectural Lighting with an immersive hands-on experience. Concepts learned in the two prior online courses will be demonstrated and experienced using facilities and equipment available on the CU Boulder campus. A culminating, comprehensive project submittal that includes content developed during the entire three-course sequence will be submitted following the on-campus experience.
**Requisites:** Requires prerequisite courses of AREN 5510 and AREN 5520 (all minimum grade C-). Restricted to non-degree (NDGR) graduate students only.

**AREN 5540 (3) Architectural Exterior and Landscape Lighting Design**
Introduces the fundamentals of nighttime illumination for architectural exteriors and landscapes. Students will learn about the interaction of light and human vision at night; lighting technologies used in outdoor settings; societal, environmental and ecological issues related to the application of light at night; lighting design principles and techniques that use light and darkness both creatively and responsibly.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4540
**Requisites:** Requires prerequisite course of AREN 4550 or (AREN 5001 and AREN 5550), all minimum grade C-. Restricted to graduate students and students accepted in the Bachelor Accelerated Masters (BAM) program.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 5550 (3) Illumination 2**
Applies the principles studied in Illumination 1. Provides further study in architectural lighting design methods. Uses lighting studio work to develop a broad knowledge of lighting equipment, design methods, and their application in a series of practical design problems in modern buildings.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4550
**Requisites:** Requires corequisite course of AREN 5001 for graduate students. Restricted to graduate students and students in the Bachelor Accelerated Masters (BAM) program.
**Grading Basis:** Letter Grade

**AREN 5560 (3) Luminous Radiative Transfer**
Teaches fundamentals of radiative exchange as applied to illumination engineering. Describes and uses principal numerical techniques for radiative transfer analysis. Applies techniques to lighting design and analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4560
**Requisites:** Requires prerequisite course of AREN 3540 or AREN 5001 (minimum grade C-). Restricted to graduate students and students in the Bachelor Accelerated Masters (BAM) program.

**AREN 5570 (3) Building Electrical Systems Design 1**
Introduces the generation and distribution of electrical power. Focuses on understanding the loads, control, and protection of secondary electrical distribution systems in building. Applies the national electric code to residential and commercial buildings. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4570
**Requisites:** Requires prerequisite course of AREN 5001 or AREN 3040 or ECEN 2250 or MCEN 3017 or GEEN 3010 (all minimum grade C-). Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.

**AREN 5580 (3) Daylighting**
Applies the fundamental principles of illumination engineering to architectural daylighting design, exploring the quantitative methods and tools used to develop daylighting designs and evaluate their performance. Topics include solar resource models, energy transfer models, design methods, and controls for integration with electric lighting systems.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4580
**Requisites:** Requires prerequisite course of AREN 3540 or AREN 5001 (minimum grade C-). Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.

**AREN 5620 (3) Adaptive Lighting Systems**
Builds on architectural lighting principles studied in Illumination 1 and 2. Explores quantitative methods and the design process to develop architectural lighting control solutions. Topics include adaptive lighting applications such as daylight integration and occupant well-being, as well as control system architecture and components, codes and standards, and design implementation. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4620
**Requisites:** Requires prerequisite course of AREN 4550 or AREN 5550 (minimum grade C-).
**Recommended:** Prerequisite AREN 4130 or AREN 5130.

**AREN 5630 (3) Advanced Lighting Design**
Intended to help students understand light as a medium in design, begin the formulation of a philosophical perspective for its application, and continue to develop the skills required to design and implement lighting systems. Knowledge from previous lighting classes (Illumination I and Illumination II) is essential to this course.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4630
**Requisites:** Requires prerequisite course of AREN 4550 for BAM students or AREN 5001 and AREN 5550 for graduate students (all minimum grade C-). Restricted to graduate students and students in the Bachelor Accelerated Masters (BAM) program.
**Grading Basis:** Letter Grade

**AREN 5650 (3) Forensic Engineering**
Identify and explore the physical, chemical, mechanical, and biological deterioration mechanisms in the most common construction materials; concrete, masonry, metals, wood, polymers, and fiber-reinforced composites. Course topics include an introduction to failure analysis; materials science; ion diffusion; electrochemistry (corrosion); fracture, fatigue, and creep; and diagnostic, retrofit, and rehabilitation strategies for extended service life.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.

**AREN 5660 (3) Embodied Carbon in Buildings**
Introduces students to whole building life cycle assessment (LCA) and embodied carbon in buildings. Topics include LCA methodologies, whole-building LCA tools, materials science of low-carbon and carbon-storing building materials, and strategies for reducing embodied carbon.
**Requisites:** Restricted to graduate students only, or BAM students with C-AREN, C-CVEN, or C-ARENCVEN subplan.
**Recommended:** Prerequisite AREN 5002.

**AREN 5830 (1-3) Architectural Engineering Special Topic**
Supervised study of special topics of interest to students under instructor guidance.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.

**AREN 5849 (1-3) Independent Study in Architectural Engineering**
The topics and the goals of this course are tailored to fit the needs of the student in various areas related to the Architectural Engineering program. These topics and goals, documented in the course agreement form at the start of the semester, include but are not limited to areas of building energy engineering, building illumination systems, construction engineering and management, building materials and resources, and building electrical systems.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**AREN 5890 (3) Sustainable Building Design**
Introduces green building design procedure/approach and provides insight into evolving design principles; explores aspects of building thermal/energy performance, indoor/outdoor environmental quality, occupant comfort and climate relevant to building design (structures not covered); emphasizes both comprehensive understanding and practical applications of sustainable building design strategies; applies prevailing simulation tools to assist green building design.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4890
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisite AREN 3010 or AREN 5002.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 5990 (3) Compu Fluid Dynamics (CFD) Analysis for Built/Natural Envmnts**
Explores the fundamentals of simulating/analyzing civil and architectural environments with Computational Fluid Dynamics (CFD) method.
Run with two parallel sessions: fundamentals and applications, with fundamental lectures presenting the principles of CFD technologies, and application sessions demonstrating the application of CFD for resolving building and environmental engineering problems (different than MCEN/ASEN) with hands-on exercises.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4990
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisites AREN 2120 and APPM 2360.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 6950 (1-6) Master's Thesis**
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 6960 (1-3) Master's Report**
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 8990 (1-10) Doctoral Dissertation**
A minimum of 30 credit hours is required.
**Additional Information:** Departmental Category: Building Systems Engineering

# Architectural Engineering - Master of Science (MS)

Graduate studies in architectural engineering are offered through the Department of Civil, Environmental and Architectural Engineering. The department offers a Master of Science degree with study emphases in several major areas:

- Building systems engineering
- Illumination engineering
- Materials and carbon
- Construction engineering and management

For more information, visit the department's Graduate Studies (http://www.colorado.edu/ceae/prospective-students/graduate-studies/) webpage.

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s): Architectural Engineering - Bachelor of Science (BS) (p. 904)

# Requirements

For a Master of Science (MS) degree in architectural engineering, students may undertake Plan I (with a thesis) or Plan II (with a project).

Up to 6 credits of independent study may be taken, where an individual course of study is worked out between the student and a faculty member. Up to 9 credits of graduate courses can be transferred from another institution. Students are allowed up to 6 credits in total of non-technical coursework for the MS/PhD degree.

## Degree Plans

### Plan I: Thesis Option

Plan I requires 24 credits of coursework, plus 6 credits of thesis work. The thesis is a formal research report that discusses an organized research topic. Experience has shown that it takes a student from 24 to 30 months to complete this plan. Financial support is generally limited to exceptionally well-qualified students selecting Plan I.

### Plan II: Non-Thesis Option

Plan II requires 27 credits of coursework, plus 3 credits of MS project work. The 3-credit Master's Report (AREN 6960) is related to an applied research AREN topic. It can be successfully completed in 18–24 months by a diligent student. Note that one-half of the coursework must be taken in the CEAE Department (an exception may be made if the relevant courses were taken as part of an undergraduate degree).

With the approval of the advisor, non-CEAE courses at the 4000 level may be used for graduate credit up to a maximum of 6 credits.

## Course Requirements

Courses offered in the architectural engineering graduate program may be separated into four focus areas, one specific to the Construction Engineering & Management discipline and three related to the Building Systems Engineering discipline. Students may decide to concentrate in one of these focus areas, or they may wish to take a broad selection from the courses; there is no requirement for picking any specific focus area under the general focus area option.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | **6** |
| AREN 5001 | Building Science and Engineering I | |
| AREN 5002 | Building Science and Engineering II | |
| **General Courses** | | **6-9** |

(Suitable for any focus area)

| | |
|---|---|
| AREN 5890 | Sustainable Building Design |
| AREN 5990 | Compu Fluid Dynamics (CFD) Analysis for Built/Natural Envmnts |
| AREN 5830 | Architectural Engineering Special Topic (Building Systems Modeling and Simulation) |
| AREN 5030 | Data Science for Energy and Buildings |
| CVEN 5006 | Construction Engineering and Management Fundamentals |
| **Focus Area: Building Energy Engineering** | |
| AREN 5010 | Energy System Modeling and Control |
| AREN 5020 | Building Energy Audits |
| AREN 5061 | Distributed Electricity Generation |
| AREN 5080 | Computer Simulation of Building Energy Systems |
| AREN 5110 | Building Energy Systems Engineering |
| AREN 5570 | Building Electrical Systems Design 1 |
| AREN 5090 | Optimizing Grid Connected Systems |
| ECEN 5007 | Special Topics (Data Analytics and Decision-making for Power Systems) |
| ECEN 5007 | Special Topics (Renewable Energy Future of Power Grid ) |
| ECEN 5007 | Special Topics (Power Systems Planning and Optimizations) |
| **Focus Area: Illumination Engineering** | |
| AREN 5130 | Optical Design for Illumination and Solid State Lighting |
| AREN 5550 | Illumination 2 |
| AREN 5560 | Luminous Radiative Transfer |
| AREN 5540 | Architectural Exterior and Landscape Lighting Design |
| AREN 5580 | Daylighting |
| AREN 5620 | Adaptive Lighting Systems |
| AREN 5630 | Advanced Lighting Design |
| **Focus Area: Materials and Carbon** | |
| AREN 5650 | Forensic Engineering |
| CVEN 5835 | Special Topics for Seniors/Grads (Design of Wood Structures) |
| CVEN 5835 | Special Topics for Seniors/Grads (Design of Masonry Structures) |
| AREN 5660 | Embodied Carbon in Buildings |
| CVEN 5831 | Special Topics (Construction Materials) |
| **Focus Area: Construction Engineering & Management** | |
| CVEN 5246 | Legal Aspects of Construction |
| CVEN 5276 | Engineering Risk and Decision Analysis |
| CVEN 5226 | Construction Safety |
| CVEN 5346 | Managing Construction and Engineering Projects and Organizations |
| CVEN 5446 | Infrastructure Asset Management |

## Graduate Certificate in Global Engineering

Students admitted to the Graduate Certificate in Global Engineering program (https://catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/civil-engineering/engineering-developing-communities-graduate-certificate/) must fulfill the coursework and practicum requirements of that program. For AREN students, up to 6 credits of the required certificate coursework can count as coursework needed for the PhD degree.

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate a mastery of fundamentals of architectural engineering.
- Analyze and develop advanced solutions to improve the performance and/or construction of buildings.
- Communicate knowledge through effective oral presentations and technical writing.
- Design and conduct high-quality, original research in architectural engineering.

# Architectural Engineering - Professional Master of Science (MSAE)

The Professional Master of Science in Architectural Engineering offers contemporary programs of study related to building design and construction.

Students are able to select from one of six focus areas:

- Data science for buildings
- Building energy
- Building decarbonization
- Lighting and daylighting
- Indoor environmental quality for buildings
- Structural engineering
- Construction engineering and management

Students are expected to complete 30 credit hours of coursework to meet the requirements of the MS degree. Each subplan consists of required courses and elective courses that must be selected in consultation with an academic advisor. Students should be able to successfully complete all degree requirements within 12–18 months.

# Requirements

## Required Courses and Credits

As alternatives to some of the elective courses, up to 6 credit hours in independent studies can be considered by the students to enhance their professional skills in any of the focus areas listed below.

### Data Science for Buildings Subplan

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| AREN 5001 | Building Science and Engineering I | 3 |
| AREN 5002 | Building Science and Engineering II | 3 |
| EMEN 5020 | Finance for Engineering Managers | 3 |
| or CVEN 5006 | Construction Engineering and Management Fundamentals | |
| AREN 5030 | Data Science for Energy and Buildings | 3 |
| CVEN 6833 | Special Topics (Advanced Data Analysis Techniques) | 3 |

| | | |
|---|---|---|
| CVEN 5836 | Special Topics for Seniors/Grads (AI/ML in the Built Environment) | 3 |
| **Elective Courses** | | |
| Students can select any set of graduate-level elective courses in architectural engineering, civil engineering, or another science or engineering field with advisor approval, depending on the desired focus area and professional skills. | | 12 |

## Building Energy Subplan

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| AREN 5001 | Building Science and Engineering I | 3 |
| AREN 5002 | Building Science and Engineering II | 3 |
| EMEN 5020 | Finance for Engineering Managers | 3 |
| or CVEN 5006 | Construction Engineering and Management Fundamentals | |
| Select two of the following: | | |
| AREN 5010 | Energy System Modeling and Control | |
| AREN 5080 | Computer Simulation of Building Energy Systems | |
| AREN 5990 | Compu Fluid Dynamics (CFD) Analysis for Built/Natural Envmnts | |
| AREN 5090 | Optimizing Grid Connected Systems | |
| AREN 5830 | Architectural Engineering Special Topic (Building Systems Simulation and Modeling) | |
| **Elective Courses** | | |
| Students can select any set of graduate-level elective courses in architectural engineering, civil engineering, or another science or engineering field with advisor approval, depending on the desired focus area and professional skills. | | 15 |

## Building Decarbonization Subplan

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| AREN 5001 | Building Science and Engineering I | 3 |
| AREN 5002 | Building Science and Engineering II | 3 |
| or | | |
| EMEN 5020 | Finance for Engineering Managers | 3 |
| or CVEN 5006 | Construction Engineering and Management Fundamentals | |
| AREN 5660 | Embodied Carbon in Buildings | 3 |
| AREN 5890 | Sustainable Building Design | 3 |
| **Elective Courses** | | |
| Students can select any set of graduate-level elective courses in architectural engineering, civil engineering, or another science or engineering field with advisor approval, depending on the desired focus area and professional skills. | | 15 |

## Lighting and Daylighting Subplan

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| AREN 5001 | Building Science and Engineering I | 3 |
| AREN 5550 | Illumination 2 | 3 |
| EMEN 5020 | Finance for Engineering Managers | 3 |
| or CVEN 5006 | Construction Engineering and Management Fundamentals | |
| AREN 5580 | Daylighting | 3 |
| AREN 5540 | Architectural Exterior and Landscape Lighting Design | 3 |
| Select one of the following | | |
| AREN 5620 | Adaptive Lighting Systems | |
| AREN 5630 | Advanced Lighting Design | |
| **Elective Courses** | | |
| Students can select any set of graduate-level elective courses in architectural engineering, civil engineering, or another science or engineering field with advisor approval, depending on the desired focus area and professional skills. | | 12 |

## Indoor Environmental Quality for Buildings Subplan

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| AREN 5001 | Building Science and Engineering I | 3 |
| AREN 5002 | Building Science and Engineering II | 3 |
| EMEN 5020 | Finance for Engineering Managers | 3 |
| or CVEN 5006 | Construction Engineering and Management Fundamentals | |
| AREN 5990 | Compu Fluid Dynamics (CFD) Analysis for Built/Natural Envmnts | 3 |
| AREN 5620 | Adaptive Lighting Systems | 3 |
| MCEN 5141 | Indoor Air Pollution | 3 |
| **Elective Courses** | | |
| Students can select any set of graduate-level elective courses in architectural engineering, civil engineering, or another science or engineering field with advisor approval, depending on the desired focus area and professional skills. | | 12 |

## Structural Engineering Subplan

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CVEN 5111 | Structural Dynamics | 3 |
| CVEN 5525 | Computational Structural Analysis 1 | 3 |
| CVEN 6595 | Earthquake Engineering | 3 |
| AREN 5660 | Embodied Carbon in Buildings | 3 |
| Select one of the following: | | |
| CVEN 5575 | Advanced Topics in Steel Design | |
| CVEN 5585 | Advanced Topics in Reinforced Concrete Design | |
| CVEN 5835 | Special Topics for Seniors/Grads (Design of Masonry Structures or Design of Wood Structures) | |
| **Elective Courses** | | |
| Students can select any set of graduate-level elective courses in architectural engineering, civil engineering, or another science or engineering field with advisor approval, depending on the desired focus area and professional skills. | | 15 |

**Construction Engineering Management Subplan**

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| AREN 5001 | Building Science and Engineering I | 3 |
| CVEN 5006 | Construction Engineering and Management Fundamentals | 3 |
| CVEN 5836 | Special Topics for Seniors/Grads (BIM for Capital Projects) | 3 |
| Select three of the following: | | |
| CVEN 5226 | Construction Safety | |
| CVEN 5346 | Managing Construction and Engineering Projects and Organizations | |
| CVEN 5446 | Infrastructure Asset Management | |
| CVEN 5246 | Legal Aspects of Construction | |
| **Elective Courses** | | |
| Students can select any set of graduate-level elective courses in architectural engineering, civil engineering, or another science or engineering field with advisor approval, depending on the desired focus area and professional skills. | | 12 |

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate a mastery of fundamentals of architectural engineering.
- Analyze and develop advanced solutions to improve the performance and/or construction of buildings.
- Communicate knowledge through effective oral presentations and technical writing.

# Architectural Engineering - Doctor of Philosophy (PhD)

Graduate studies in architectural engineering are offered through the Department of Civil, Environmental and Architectural Engineering. The department offers a PhD degree with study emphases in several major areas:

- Building Energy Engineering
- Illumination Engineering
- Materials and Carbon
- Construction Engineering and Management

For more information, visit the department's Graduate Studies (http://www.colorado.edu/ceae/prospective-students/graduate-studies/) webpage.

# Requirements

## Course Requirements

A total of 30 credit hours of graduate-level coursework plus 30 dissertation credit hours are required for the program.

Focus areas include:

- Building Energy Engineering
- Illumination Engineering
- Materials & Carbon
- Construction Engineering & Management

There is no requirement for picking a specific focus area and students can select from courses under any of the four focus areas. Students must complete a minimum of 9 credit hours from the list of courses.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| Required for all students with no AREN undergraduate degrees | | |
| AREN 5001 | Building Science and Engineering I | 3 |
| AREN 5002 | Building Science and Engineering II | 3 |
| **General Courses** | | **9** |
| Suitable for any focus area | | |
| AREN 5890 | Sustainable Building Design | |
| AREN 5990 | Compu Fluid Dynamics (CFD) Analysis for Built/Natural Envmnts | |
| AREN 5830 | Architectural Engineering Special Topic (Building Systems Modeling and Simulation) | |
| AREN 5030 | Data Science for Energy and Buildings | |
| CVEN 5006 | Construction Engineering and Management Fundamentals | |
| **Focus Area: Building Energy Engineering** | | |
| AREN 5010 | Energy System Modeling and Control | |
| AREN 5020 | Building Energy Audits | |
| AREN 5061 | Distributed Electricity Generation | |
| AREN 5080 | Computer Simulation of Building Energy Systems | |
| AREN 5090 | Optimizing Grid Connected Systems | |
| AREN 5110 | Building Energy Systems Engineering | |
| AREN 5570 | Building Electrical Systems Design 1 | |
| ECEN 5007 | Special Topics (Data Analytics and Decision-making for Power Systems) | |
| ECEN 5007 | Special Topics (Renewable Energy Future of Power Grid ) | |
| ECEN 5007 | Special Topics (Power Systems Planning and Optimizations) | |
| **Focus Area: Illumination Engineering** | | |
| AREN 5130 | Optical Design for Illumination and Solid State Lighting | |
| AREN 5550 | Illumination 2 | |
| AREN 5540 | Architectural Exterior and Landscape Lighting Design | |
| AREN 5560 | Luminous Radiative Transfer | |
| AREN 5580 | Daylighting | |
| AREN 5620 | Adaptive Lighting Systems | |
| AREN 5630 | Advanced Lighting Design | |
| **Focus Area: Materials and Carbon** | | |
| AREN 5650 | Forensic Engineering | |
| CVEN 5835 | Special Topics for Seniors/Grads (Design of Wood Structures) | |
| AREN 5660 | Embodied Carbon in Buildings | |
| CVEN 5835 | Special Topics for Seniors/Grads (Design of Masonry Structures) | |

| | |
|---|---|
| CVEN 5831 | Special Topics (Construction Materials) |
| **Focus Area: Construction Engineering & Management** | |
| CVEN 5246 | Legal Aspects of Construction |
| CVEN 5276 | Engineering Risk and Decision Analysis |
| CVEN 5226 | Construction Safety |
| CVEN 5346 | Managing Construction and Engineering Projects and Organizations |
| CVEN 5446 | Infrastructure Asset Management |

### Residency Requirements

For an entrant from another university, up to 21 hours of acceptable graduate courses may be transferred, leaving at least 9 hours of coursework to be completed at the University of Colorado upon the approval of their advisors. The transfer credits are transferable at the discretion of the research advisor, and students may be asked to take additional courses toward the completion of their degree. Work already applied toward a graduate degree received from the University of Colorado or another institution cannot be accepted for transfer toward another graduate degree of the same level at the University of Colorado. All courses accepted for transfer must be graduate-level courses. A course in which a grade of B- or lower was received will not be accepted for transfer.

For students already in the MS program in the CEAE department, 30 hours of graduate coursework performed at CU is applicable towards the PhD degree upon the approval of their advisors. The PhD also requires that 30 hours of dissertation credit be taken, with a minimum residency of two years. After passing the comprehensive exam, PhD candidates are required to maintain continuous registration. Candidates must register for at least 5 hours of dissertation credits each semester.

### Preliminary Examination

Each doctoral student shall take a preliminary examination as determined by the faculty of the specialty area in which the student is enrolled, normally not later than 24 months from the time the student is first enrolled in the doctoral program. Each CEAE group has a designated time for PhD students to take the exam. Students should discuss the schedule, date and format of the exam with their academic adviser.

### Comprehensive Examination

Before admission to candidacy for the doctoral degree, students must pass a comprehensive examination, which shall consist of an oral examination in the field of concentration and related fields. At the comprehensive examination, the student shall present a plan for the dissertation research to the Advisory Committee for approval.

### PhD Dissertation

Students must write a dissertation based on original research conducted under the supervision of a graduate faculty member. The dissertation must fulfill all Graduate School requirements. After the dissertation is completed, an oral final examination on the dissertation and related topics is conducted by the student's doctoral committee.

### Time Limit

All degree requirements must be completed within six years of the date of commencing coursework.

### Graduate Certificate in Global Engineering

Students admitted to the Graduate Certificate in Global Engineering (https://catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/civil-engineering/engineering-developing-communities-graduate-certificate/) program must fulfill the coursework and practicum requirements of that program. For AREN students, up to 6 credits of the required certificate coursework can count as coursework needed for the PhD degree.

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate a mastery of fundamentals of architectural engineering.
- Analyze and develop advanced solutions to improve the performance and/or construction of buildings.
- Communicate knowledge through effective oral presentations and technical writing.
- Design and conduct high-quality, original research in architectural engineering.

# Biomedical Engineering

CU Boulder's Biomedical Engineering program offers students a flexible degree program to achieve their degree and research goals. Biomedical engineering is an exciting, multidisciplinary field that lies at the intersection of medicine, biology and engineering.

With a cross-listed curriculum and an interdisciplinary faculty roster, the BME program delivers a multi-faceted and rigorous education in biomedical engineering. Our department consists of 40+ faculty members from multiple backgrounds and disciplines. They conduct research in the areas of biomechanics, tissue engineering, biomaterials, drug delivery, molecular imaging, image-guided therapy, point-of-care diagnostics, biosensors, prosthetics, bioastronautics, systems biology and many more.

Our program offers students the opportunity to take courses in any of the following areas:

- Biomechanics and mechanobiology
- Imaging and diagnostics
- Medical devices
- Therapeutics

The BME program is directed by Dr. Corey Neu. For more information, visit the Biomedical Engineering Program (https://www.colorado.edu/bme/) website.

**Course code for this program is BMEN.**

## Master's Degree

- Biomedical Engineering - Master of Science (MS) (p. 1628)

## Doctoral Degree

- Biomedical Engineering - Doctor of Philosophy (PhD) (p. 1628)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Ahmed, Alaa A. (https://experts.colorado.edu/display/fisid_144736/)
Assistant Professor; PhD, University of Michigan

Alistar, Mirela (https://experts.colorado.edu/display/fisid_164177/)
Assistant Professor; PhD, Technical University of Denmark

Allen, Mary Ann (https://experts.colorado.edu/display/fisid_149077/)
Research Associate Professor; PhD, University of Colorado Boulder

Borden, Mark A. (https://experts.colorado.edu/display/fisid_148514/)
Associate Professor; PhD, University of California, Davis

Bottenus, Nick (https://experts.colorado.edu/individual/fisid_165371/)
Assistant Professor; PhD, Duke University

Bruns, Carson J. (https://experts.colorado.edu/display/fisid_159851/)
Assistant Professor; PhD, Northwestern University

Calve, Sarah (https://experts.colorado.edu/individual/fisid_165779/)
Associate Professor; PhD, University of Michigan

Cha, Jennifer N. (https://experts.colorado.edu/display/fisid_151746/)
Professor; PhD, University of California, Santa Barbara

Clark, Torin K. (https://experts.colorado.edu/display/fisid_155959/)
Assistant Professor; PhD, Massachusetts Institute of Technology

Davis, Robert H. (https://experts.colorado.edu/individual/fisid_113653/)
Associate Faculty Director; PhD, Stanford University

Del Rio Flores, Antonio
Assistant Professor; PhD, University of California, Berkeley

Ding, Xiaoyun (https://experts.colorado.edu/display/fisid_158563/)
Assistant Professor; PhD, Pennsylvania State University

Dowell, Robin D. (https://experts.colorado.edu/display/fisid_147779/)
Professor; DSc, Washington University

Enoka, Roger M. (https://experts.colorado.edu/display/fisid_110122/)
Professor; PhD, University of Washington

Ferguson, Virginia L. (https://experts.colorado.edu/display/fisid_110131/)
Associate Professor; PhD, University of Colorado Boulder

Fox, Jerome Michael (https://experts.colorado.edu/display/fisid_156682/)
Assistant Professor; PhD, University of California, Berkeley

Gopinath, Juliet T. (https://experts.colorado.edu/display/fisid_147075/)
Associate Professor; PhD, Massachusetts Institute of Technology

Grabowski, Alena Marie (https://experts.colorado.edu/display/fisid_149727/)
Associate Professor; PhD, University of Colorado Boulder

Hayman, Allison P. (https://experts.colorado.edu/display/fisid_156275/)
Assistant Professor; PhD, Massachusetts Institute of Technology

Hind, Laurel (https://experts.colorado.edu/individual/fisid_165642/)
Assistant Professor; PhD, University of Pennsylvania

Huang, Shu-Wei (https://experts.colorado.edu/display/fisid_159847/)
Assistant Professor; PhD, MIT, Cambridge

Jayaram, Kaushik (https://experts.colorado.edu/display/fisid_165370/)
Assistant Professor; PhD, University of California-Berkeley

Layer, Ryan M. (https://experts.colorado.edu/display/fisid_163567/)
Assistant Professor; PhD, University of Virginia

Lynch, Maureen Ellen (https://experts.colorado.edu/display/fisid_163404/)
Assistant Professor; PhD, Cornell University

McLaughin, Jessica (https://experts.colorado.edu/individual/fisid_167401/)
Teaching Assistant Professor; PhD, Northeastern University

McLeod, Robert R. (https://experts.colorado.edu/display/fisid_107547/)
Professor; PhD, University of Colorado Boulder

Mukherjee, Debanjan (https://experts.colorado.edu/individual/fisid_164181/)
Assistant Professor; PhD, University of California, Berkeley

Murray, Todd W. (https://experts.colorado.edu/display/fisid_146549/)
Professor; PhD, Johns Hopkins University

Myers, Chris (https://experts.colorado.edu/display/fisid_167168/)
Professor; PhD, Stanford University

Neu, Corey P. (https://experts.colorado.edu/display/fisid_156210/)
Associate Professor; PhD, University of California, Davis

Park, Won (https://experts.colorado.edu/display/fisid_122676/)
Associate Professor, Associate Chair; PhD, Georgia Institute of Technology

Piestun, Rafael (https://experts.colorado.edu/display/fisid_118538/)
Professor; PhD, Israel Instit of Tech (Israel)

Regueiro, Richard A. (https://experts.colorado.edu/display/fisid_134705/)
Associate Professor; PhD, Stanford University

Rentschler, Mark E. (https://experts.colorado.edu/display/fisid_146091/)
Associate Professor; PhD, University of Nebraska-Lincoln

Sankaranarayanan, Sriram (https://experts.colorado.edu/display/fisid_147413/)
Associate Professor; PhD, Stanford University

Shields, C. Wyatt IV (https://experts.colorado.edu/individual/fisid_165173/)
Assistant Professor; PhD, Duke University

Spencer, Sabrina Leigh (https://experts.colorado.edu/display/fisid_154911/)
Associate Professor; PhD, Massachusetts Institute of Technology

Sprenger, Kayla (https://experts.colorado.edu/individual/fisid_165650/)
Assistant Professor; PhD, University of Washington

Tan, Wei (https://experts.colorado.edu/display/fisid_141464/)
Associate Professor; PhD, University of Illinois at Chicago

Welker, Cara (https://experts.colorado.edu/display/fisid_168549/)
Assistant Professor; Ph.D., Stanford University

Xu, Nicole (https://experts.colorado.edu/display/fisid_172095/)
Assistant Professor; PhD, Stanford University

Yeh, Tom (https://experts.colorado.edu/display/fisid_151584/)
Associate Professor; PhD, Massachusetts Institute of Technology

Zhang, Yide
Assistant Professor; PhD, University of Notre Dame

# Courses

**BMEN 5110 (3) Regenerative Biology and Tissue Repair**
Presents the regenerative biology behind tissue systems, along with the regenerative medicine of that tissue with an emphasis on engineering principles, using the assigned reading as a guideline. Follows lectures with class discussions of current papers on the regenerative biology of the same tissue system. In the final 1 ¿ 2 classes assigned to this topic, individual graduate students give 20 min presentations on a relevant regenerative medicine/engineering-focused paper.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5110, BMEN 4110, and MCEN 4110
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Biomedical Engineering undergraduate majors only.

**BMEN 5111 (3) Introduction to Microfluidics**
Microfluidics deals with the behavior of fluids in small scale. It is a highly multidisciplinary field at the intersection of engineering, physics, chemistry, biology, medicine, nanotechnology, and biotechnology. This course covers the fundamentals and fabrication of microfluidic devices and their applications, particularly in lab-on-a-chip. Includes lectures, literature discussion, team presentations, and possibly one lab on microfluidic devices. Enhances your understanding of microfluidic technologies and their broad applications.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5111 and MCEN 4111 and BMEN 4111
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Biomedical Engineering undergraduate majors only.

**BMEN 5113 (3) Mechanics of Cancer**
Cancer is considered to be an organ or an ecosystem, in which a critical component of the tumor microenvironment is mechanical forces. This course will cover the role of mechanics in cancer and cancer-related processes, with a focus on solid mechanics and fluid mechanics. In this course, you will apply engineering principles to come away with an appreciation of how mechanics influences cancer and its etiology as well as the development of future treatments.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5113 and BMEN 4113 and MCEN 4113
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Biomedical Engineering undergraduate majors only.

**BMEN 5117 (3) Anatomy and Physiology for Biomedical Engineering**
The main objective of this multidisciplinary course is to explore human physiological function from the viewpoint of an engineer. It provides an introduction to human anatomy and physiology with a focus on learning anatomical structures, biological signaling, physiological and pathological conditions, as well as fundamental biomedical engineering concepts that apply quantitative analyses (mass transfer, fluid dynamics, mechanics, modeling) and engineering concepts (e.g., device design to restore defective physiological functions) to understand physiology and pathology. Graduate students will be required to present a primary literature review and lead discussion during a class period, as well as take the lead on the final project: a mock NIH grant proposal.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4117 or MCEN 5117 BMEN 4117
**Requisites:** Restricted to graduate Biomedical Engineering students only.

**BMEN 5127 (3) Biomedical Ultrasound**
Covers the design of ultrasound systems for medical imaging and therapy, including the physics of wave propagation, transducers, pulse-echo imaging, flow, tissue characterization, and microbubble contrast, with an emphasis on current topics in biomedical ultrasound. Includes lectures on theory, practice and special topics; a laboratory on wave propagation; oral presentations on current literature; signal processing exercises; and a team project. Some experience with MATLAB is strongly encouraged for exercises throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5127 and MCEN 4127 and BMEN 4127
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**BMEN 5133 (3) Intro to Tissue Biomechanics**
Focuses on developing an understanding of the fundamental mechanical principles that govern the response of hard and soft biological tissue to mechanical loading. Specifically, covers mechanical behavior of biological materials/tissues, classical biomechanics problems in various tissues, the relationship between molecular, cellular and physiological processes and tissue biomechanics and critical analysis of related journal articles.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4133 and MCEN 5133
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Biomedical Engineering undergraduate majors only.

**BMEN 5157 (3) Modeling of Human Movement**
Human movement analysis is used in physical rehabilitation, sport training, human-robot interaction, animation, and more. Course provides a systematic overview of human movement on multiple levels of analysis, with an emphasis on the phenomenology amenable to computational modeling. Covers muscle physiology, movement-related brain areas, musculoskeletal mechanics, forward and inverse dynamics, optimal control and Bayesian inference, learning and adaptation. Inspires students to see and appreciate the complexities of movement control in all aspects of daily life.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5157 and MCEN 4157 and BMEN 4157
**Requisites:** Restricted to graduate students in the College of Engineering and Applied Science or undergraduate Biomedical Engineering (BMEN) majors with 57+ credits (Junior or Senior).

**BMEN 5171 (3) Biofluids on the Micro Scale**
Introduces fundamental physical concepts and basic mechanisms of biological fluids in microscale. Elaborates on the application of fluid mechanics principles to major biological systems, including human organ systems and animal locomotion in microscale. Covers physiologically relevant fluid flow phenomena on the cellular level and the underlying physical mechanisms from an engineering perspective. Related state-of-art technologies such as organ-on-a-chip and micro/nano fabrication will be emphasized. Will enhance your understanding of organ-on-a-chip technologies and their broad applications.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5171 and MCEN 4171 and BMEN 4171
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Biomedical Engineering undergraduate majors only.

**BMEN 5195 (3) Bioinspired Robotics**
Bioinspired design views the process of how we learn from nature as an innovation strategy translating principles of function, performance, and aesthetics, from biology to human technology. The creative design process is driven by interdisciplinary exchange among engineering, biology, medicine, art, architecture and business. Diverse teams of students will collaborate on, create, and present original bioinspired design projects in the ITLL.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4195, BMEN 4195, and MCEN 5195
**Requisites:** Restricted to graduate students in the College of Engineering and Applied Science or undergraduate Biomedical Engineering (BMEN) majors with 57+ credits (Junior or Senior).

**BMEN 5231 (3) Computational Fluid Dynamics**
This course is an in-depth introduction to the basic principles and applications of computational fluid dynamics (CFD). Students learn about fundamental CFD concepts such as discretization, meshing, error and accuracy; and focus on computational solutions of flow and transport problems using the finite element method. Students conduct multiple hands-on simulation-based activities and exercises on canonical and realistic engineering flow/transport problems. Final project for the course culminates in a mini-conference/symposium where students present their work.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5231 and MCEN 4231 and BMEN 4231
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Biomedical Engineering undergraduate majors only.

**BMEN 5292 (3) Materials and Devices in Medicine**
The main objective of this multidisciplinary course is to provide students with a broad survey of biomaterials and their use in medical devices for restoring or replacing the functions of injured, diseased, or aged human tissues and organs. The topics to be covered include: evolution in the medical device industry, a broad introduction to the materials used in medicine and their chemical, physical, and biological properties, discovery of medical problems, potential impacts of treatment innovations, existing devices and design considerations for several major physiological systems (cardiovascular, neuromuscular, skeletal, pulmonary, renal, dermal), materials interaction with the human body, basic mechanisms of wound healing, biocompatibility issues, testing methods and techniques in accordance with standards and relevant regulations, biofunctionalities required for specific applications, as well as state-of-the-art approaches for the development of new regenerative materials targeting cellular mechanisms. Sam
**Requisites:** Requires prerequisite course of MCEN 4117 or MCEN 5117 (minimum grade C-). Restricted to any College of Engineering and Applied Science graduate students or to BMEN undergraduate majors only.

**BMEN 5840 (1-6) Independent Study**
Provides opportunities for independent study at the graduate level. Subject and/or project agreed upon by the student and instructor to fit the needs of the student.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate Biomedical Engineering students only.

**BMEN 5939 (1-6) Biomedical Engineering Internship**
Grants credit to international graduate students for conducting research via professional research opportunities in the biomedical engineering field. Students are responsible for securing their own internships.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BMEN 6519 (1-3) Special Topics in Biomedical Engineering**
Credit hours and subject matter to be arranged.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.

**BMEN 6949 (1) Master's Candidate for Degree**
Credit hours and subject matter to be arranged.

**BMEN 6950 (1-6) Master's Thesis**
Work with a faculty advisor on a masters thesis.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate Biomedical Engineering students only.

**BMEN 7840 (1-6) Independent Study**
Provides opportunities for independent study at the graduate (PhD) level. Subject and/or project agreed upon by the student and instructor to fit the needs of the student.
**Repeatable:** Repeatable for up to 10.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Biomedical Engineering BMEN-PhD students only.

**BMEN 8990 (1-10) Doctoral Dissertation**
Work with a faculty advisor on a doctoral dissertation.
**Repeatable:** Repeatable for up to 60.00 total credit hours.
**Requisites:** Restricted to Biomedical Engineering (BMEN) Ph.D. graduate students only.

# Biomedical Engineering - Master of Science (MS)

The Biomedical Engineering Master of Science (MS) degree program is designed to be flexible to meet the individual student's needs. Students will collaborate with faculty and other advisors to create a tailored degree plan based on their career interests and goals.

Students may choose either a coursework- or thesis-based MS. The thesis option requires completion of a research project with a faculty mentor, a written thesis that describes the research in detail, and an oral defense in front of a committee of program faculty.

For more information, visit the Biomedical Engineering MS Program (https://www.colorado.edu/bme/masters-program/) page.

## Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s):

- Biomedical Engineering - Bachelor of Science (BSBM) (p. 870)

## Requirements

Biomedical Engineering MS students must complete 30 credit hours of coursework at the 5000 level or higher and obtain a minimum grade of C (2.0) in each class to count towards the degree. Students must also maintain a 3.0 cumulative GPA or higher to be in good standing with the Graduate School.

### Required Courses

| Code | Title | Credit Hours |
|---|---|---|
| **Core Required Course** | | |
| BMEN 5117 | Anatomy and Physiology for Biomedical Engineering (Fall) | 3 |
| **Additional Coursework** | | |
| Designated biomedical engineering courses | | 15 |
| Additional credit hours obtained, as needed, from other fields (e.g., business or other engineering electives). Of these 12 credit hours, MS Thesis students must complete 4-6 thesis credit hours in which they will submit a written thesis following the graduate school specifications and present their research findings to a three-member committee. | | 12 |
| **Total Credit Hours** | | **30** |

For more information, visit the Biomedical Engineering MS Program (https://www.colorado.edu/bme/masters-program/#coursework_requirements-127) webpage.

## Learning Outcomes

By the completion of the program, students will be able to:

- Apply principles of engineering, biology, human physiology, chemistry, physics, mathematics and statistics to solve engineering problems relevant to bio/biomedical engineering or healthcare, including those associated with the interaction between living and non-living systems.
- Analyze, model, design and realize devices, systems, components, or processes relevant to bio/biomedical engineering.
- Make measurements on and/or interpret data from engineering or living systems relevant to bio/biomedical engineering.
- Understand major challenges and needs of industry relevant to bio/biomedical engineering, including those associated with design, manufacturing and regulation.

# Biomedical Engineering - Doctor of Philosophy (PhD)

Biomedical Engineering PhD students have the opportunity to participate in cutting-edge research with engineering faculty in many different biomedical fields. Our program provides the scientific foundation to prepare students for careers in academia, healthcare, industry and government labs.

The PhD program is open to both first-time graduate students as well as those who hold master's degrees.

For more information, visit the Biomedical Engineering PhD Program (https://www.colorado.edu/bme/academics/phd-program/) page.

## Requirements

All Biomedical Engineering PhD student must complete a minimum of 30 credit hours of coursework at the 5000 level or higher, plus 30 credit hours of dissertation credits. Some research advisors will require that their students complete more than 30 course credits, and the department recommends that specific course decisions should be agreed upon through individual faculty/student discussions. Students must receive a minimum grade of B- (2.7) in each class to count towards the degree. Students must also maintain a 3.0 cumulative GPA or higher to be in good standing with the graduate school.

### Required Courses

| Code | Title | Credit Hours |
|---|---|---|
| **Core Required Course** | | |
| BMEN 5117 | Anatomy and Physiology for Biomedical Engineering (Fall) | 3 |
| **Additional Coursework** | | |
| Designated biomedical engineering courses [1] | | 15 |
| Additional credit hours obtained, as needed, from other fields (e.g., business or other engineering electives) [1] | | 12 |
| **Total Credit Hours** | | **30** |

[1] May be fulfilled by courses taken as part of a prior MS or PhD program.

### Preliminary Examination

Biomedical Engineering PhD students are required to pass a preliminary examination. It consists of a comprehensive review of primary literature that supports the current and future research directions of the

student. This must be completed within the first three semesters after matriculation into the program.

### Comprehensive Examination

The Comprehensive Examination is an important second evaluation step required to advance the student to candidacy for the PhD degree, which is typically completed within the first three years after matriculation to the program and greater than one year prior to graduation. It consists of an NIH R21-style research proposal in addition to an oral exam with a selected committee of faculty advisors, both focusing on the proposed course of research. Students will also likely have completed one chapter of their dissertation for submission to a peer-reviewed journal before taking the Comprehensive Exam.

### PhD Dissertation

Students must write a dissertation based on original research conducted under the supervision of a graduate faculty member. The dissertation must fulfill all Graduate School requirements. After the dissertation is completed, an oral final examination on the dissertation and related topics is conducted by the student's doctoral committee.

### Time Limit

All degree requirements for the Biomedical Engineering PhD must be completed within six years of the date commencing coursework.

## Learning Outcomes

By the completion of the program, students will be able to:

- Apply principles of engineering, biology, human physiology, chemistry, physics, mathematics and statistics to solve engineering problems relevant to bio/biomedical engineering or healthcare, including those associated with the interaction between living and non-living systems.
- Analyze, model, design, and realize devices, systems, components or processes relevant to bio/biomedical engineering.
- Make measurements on and/or interpret data from engineering or living systems relevant to bio/biomedical engineering.
- Provide foundational and advanced study in biomedical engineering subdisciplines that align with and help to accelerate student research goals.
- Conduct research and development projects independently.

# Chemical Engineering

The Department of Chemical and Biological Engineering (https://www.colorado.edu/chbe/graduate-program/prospective-graduate-students/) (ChBE) offers an innovative graduate program and emphasizes the doctoral degree. ChBE's outstanding national and international students take advantage of the high level of faculty-student collaboration and benefit from access to three interdisciplinary research centers. Department faculty and students have won numerous awards both nationally and internationally.

General research areas within the Department of Chemical and Biological Engineering include: biomaterials, biopharmaceutical engineering, catalysis, surface science and reaction engineering, complex fluids and microfluidic devices, computational science; energy and environmental applications, membranes and separations, metabolic engineering and directed evolution, nanostructured films and devices, polymer chemistry and engineering, and tissue engineering.

ChBE is one of the top research departments in the nation and maintains sophisticated facilities to support research endeavors. Although research in the department spans many diverse fields, there is a particular emphasis on research in biological engineering, functional materials and renewable energy.

Biological engineering research includes a broad collection of focal areas spanning from the molecular scale (metabolites, genes, proteins) to the cellular and multicellular scales. Biological engineering projects account for a significant portion of the research activity within the ChBE Department. This research is supported in a variety of manners: federal grants (NIH, NSF, DOD, etc.), national foundations (Howard Hughes, Cystic Fibrosis, etc.) and industrial collaborators.

Functional Materials research in the ChBE Department is concentrated in a diverse group of research areas including polymers, nanostructured materials, photovoltaic materials, ultrathin films, catalytic materials, computational materials science, self-assembled monolayers and liquid crystalline materials. The department has strength in studying materials problems at the nanometer and sub-nanometer length scales. Such fundamental investigations are directed toward technological applications.

Finally, the ChBE Department has an active program in renewable energy research. Studies range from the production and utilization of hydrogen to materials for photovoltaics to biorefining and biofuels research. A number of efforts focus on developing catalysts for converting water to hydrogen and $CO^2$ into fuels such as CO and methanol. Another area of focus is the study of novel photovoltaic materials and structures involving organic, inorganic and hybrid structures for efficient solar energy harvesting.

**Course code for this program is CHEN.**

## Master's Degree

- Chemical Engineering - Master of Science (MS) (p. 1633)

## Doctoral Degree

- Chemical Engineering - Doctor of Philosophy (PhD) (p. 1634)
- Biological Engineering - Doctor of Philosophy (PhD) (p. 1634)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Anseth, Kristi S. (https://experts.colorado.edu/display/fisid_103471/)
Distinguished Professor; PhD, University of Colorado Boulder

Bay, R. Kōnane (https://experts.colorado.edu/display/fisid_172688/)
Assistant Professor; PhD, University of Massachusetts at Amherst

Bowman, Christopher N. (https://experts.colorado.edu/display/fisid_102043/)
Distinguished Professor; PhD, Purdue University

Bryant, Stephanie J. (https://experts.colorado.edu/display/fisid_111810/)
Professor; PhD, University of Colorado Boulder

Burdick, A. Jason (https://experts.colorado.edu/display/fisid_168868/)
Professor; PhD, University of Colorado Boulder

Cha, Jennifer N. (https://experts.colorado.edu/display/fisid_151746/)
Professor; PhD, University of California, Santa Barbara

Clough, David Edwards (https://experts.colorado.edu/display/fisid_102332/)
Professor Emeritus; PhD, University of Colorado Boulder

Davis, Robert H. (https://experts.colorado.edu/individual/fisid_113653/)
Distinguished Professor; PhD, Stanford University

deGrazia, Janet (https://experts.colorado.edu/display/fisid_107661/)
Teaching Professor Emerita; PhD, University of Colorado Boulder

Falconer, John L. (https://experts.colorado.edu/display/fisid_101426/)
Professor Emeritus; PhD, Stanford University

Fox, Jerome Michael (https://experts.colorado.edu/display/fisid_156682/)
Assistant Professor; PhD, University of California, Berkeley

Franklin, Trevor (https://experts.colorado.edu/display/fisid_175743/)
Teaching Assistant Professor; PhD, Cornell University

Goodwin, Andrew Pratt (https://experts.colorado.edu/display/fisid_151595/)
Associate Professor; PhD, University of California, Berkeley

Gupta, Ankur (https://experts.colorado.edu/display/fisid_165822/)
Assistant Professor; PhD, Massachusetts Institute of Technology

Hayward, Ryan (https://experts.colorado.edu/individual/fisid_166416/)
Endowed/Named Professor; PhD, University of California Santa Barbara

Heinz, Hendrik (https://experts.colorado.edu/display/fisid_156488/)
Professor; PhD, ETH Zurich (Switzerland)

Hind, Laurel (https://experts.colorado.edu/individual/fisid_165642/)
Assistant Professor; PhD, University of Pennsylvania

Holewinski, Adam P. (https://experts.colorado.edu/display/fisid_155859/)
Assistant Professor; PhD, University of Michigan Ann Arbor

Hrenya, Christine M.
Professor Emerita; PhD, Carnegie Mellon University

Keyvani, Ehsan
Teaching Assistant Professor; PhD, Northeastern University

Kohlmeier, Carolyn (https://experts.colorado.edu/individual/fisid_158386/)
Teaching Associate Professor; PhD, University of Colorado Boulder

Krantz, William
Professor Emeritus

Mahoney, Melissa J.
Teaching Professor; PhD, Cornell University

Marder Seth (https://experts.colorado.edu/display/fisid_167617/)
Professor; PhD, University of Wisconsin-Madison

McGehee, Michael D. (https://experts.colorado.edu/display/fisid_163453/)
Professor; PhD, University of California, Santa Barbara

Medlin, James William (https://experts.colorado.edu/display/fisid_122699/)
Professor; PhD, University of Delaware

Nuttelman, Charles Raymond (https://experts.colorado.edu/display/fisid_142758/)
Teaching Professor; PhD, University of Colorado Boulder

O'Harra, Katie
Teaching Assistant Professor; PhD, University of Alabama

Ramirez, Walter
Professor Emeritus

Randolph, Theodore W. (https://experts.colorado.edu/display/fisid_101768/)
Professor; PhD, University of California, Berkeley

Schwartz, Daniel K. (https://experts.colorado.edu/display/fisid_118479/)
Professor, Endowed Chair; PhD, Harvard University

Shields, C. Wyatt IV (https://experts.colorado.edu/individual/fisid_165173/)
Assistant Professor; PhD, Duke University

Shirts, Michael R. (https://experts.colorado.edu/display/fisid_156474/)
Professor; PhD, Stanford University

Smith, Wilson (https://experts.colorado.edu/display/fisid_166095/)
Professor; PhD, University of Georgia

Sprenger, Kayla (https://experts.colorado.edu/individual/fisid_165650/)
Assistant Professor; PhD, University of Washington

Stansbury, Jeffrey W.
Professor; PhD, University of Maryland

Toney, Michael (https://experts.colorado.edu/individual/fisid_167235/)
Professor; PhD, University of Washington

Weimer, Alan W. (https://experts.colorado.edu/display/fisid_109152/)
Professor; PhD, University of Colorado Boulder

White, Timothy J. (https://experts.colorado.edu/display/fisid_163899/)
Professor, Associate Chair; PhD, University of Iowa

Whitehead, Timothy Andrew (https://experts.colorado.edu/display/fisid_164364/)
Associate Professor; PhD, University of California-Berkeley

Young, Wendy Mores (https://experts.colorado.edu/display/fisid_146942/)
Teaching Professor, Associate Chair; PhD, University of Colorado Boulder

# Courses

**CHEN 5090 (1) Seminar in Chemical Engineering**
Required of all chemical engineering graduate students. Includes reports on research activities and on special current topics.
**Requisites:** Restricted to graduate students only.

**CHEN 5128 (3) Applied Statistics In Research and Development**
Students learn current and emerging statistical methods that are appropriate to experimentation in research and development activities. Statistical design of experiments and model fitting is emphasized. Department enforced prereq.: one introductory probability/statistics course.

**CHEN 5150 (3) Biomolecular Kinetics, Transport, and Thermodynamics**
Required for the Biological Engineering PhD. This course covers aspects of kinetics, transport, and thermodynamics as they relate to interactions between biomolecules and cells. These core subjects will be introduced within concepts common to cell biology, protein/genetic engineering, and signaling, among others. Undergraduate enrollment with instructor consent only.
**Recommended:** Prerequisites Introductory biology and/or biochemistry, linear algebra, differential equations, thermodynamics, organic chemistry.

**CHEN 5160 (3) Systems Analysis of Cells and Tissues**
Required for the Biological Engineering PhD. This course explores how to describe signaling and regulation networks present at the cell and tissue level. Topics include gene expression, stem cell differentiation, homeostasis, and others.
**Requisites:** Restricted to Chemical Engineering (CHEN) or Biological Engineering (BIEN) graduate students only.
**Recommended:** Prerequisite prior experience in introductory biology and/or biochemistry, linear algebra, differential equations, thermodynamics, and organic chemistry.

**CHEN 5210 (4) Transport Phenomena**
Considers continuum mechanics, emphasizing fundamental relationships for fluid mechanics and heat and mass transfer and their applications to engineering problems. Department enforced prerequisites: undergraduate courses in fluid mechanics, heat transfer, and differential equations.
**Requisites:** Restricted to students with 87-180 credits (Seniors) or graduate students only.

**CHEN 5360 (3) Catalysis and Kinetics**
Studies principles of chemical kinetics and catalytic reactions, emphasizing heterogeneous catalysis.
**Requisites:** Requires corequisite course of CHEN 4330. Restricted to Chemistry (CHEM) or Chemical Engineering (CHEN) graduate students only.

**CHEN 5370 (3) Intermediate Chemical Engineering Thermodynamics**
Reviews fundamentals of thermodynamics, application to pure fluids and mixtures, and physical equilibrium and changes of state. Examines the equation of state and computation of fluid properties for pure fluids, mixtures and solutions. Also looks at relations between thermodynamics and statistical mechanics. Department enforced prerequisite: an undergraduate course in chemical thermodynamics.
**Requisites:** Restricted to graduate students only.

**CHEN 5390 (3) Chemical Reactor Engineering**
Studies ideal and nonideal chemical reactors, including unsteady state behavior, mixing effects, reactor stability, residence time distribution and diffusion effects. Department enforced prerequisite: undergraduate course in chemical reactor design/kinetics.
**Requisites:** Restricted to graduate students only.

**CHEN 5420 (3) Physical Chemistry and Fluid Mechanics of Interfaces**
Covers thermodynamics of interfaces and surface tension measurement; adsorption at liquid-gas, liquid-liquid, and solid-gas interfaces; monolayers; conservation equations for a fluid interface; rheology of interfaces; surface tension driven flows; contact angle and wettability; and double layer phenomena.
**Requisites:** Requires prerequisite course of CHEN 3200 (minimum grade D-).

**CHEN 5440 (3-4) Design of Materials**
The course content includes introduction and study of important concepts in solid state physics (particularly those relevant for design of materials); origin, characterization and design of mechanical, electronic, optical, magnetic, thermal and electrochemical properties of materials; design of bulk and nanostructured composites; introduction to polymers and soft materials; fundamentals of colloids and interfaces; and nanoscale chemistry and physics for design or desired material properties.
**Grading Basis:** Letter Grade

**CHEN 5450 (3) Polymer Chemistry**
Introduces polymer science with a focus on polymer chemistry and polymerization reactions. Focuses on polymerization reaction engineering and how polymer properties depend on structure.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 4450
**Requisites:** Restricted to graduate students only.

**CHEN 5460 (3) Polymer Engineering**
Introductory polymer engineering course reviewing basic terminology and definitions; the properties and synthetic routes of important industrial polymers; and processing of polymers and their applications.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 4460
**Requisites:** Restricted to graduate students only.

**CHEN 5470 (3) Functional Materials Chemistry**
The synthesis, organization, and processing of materials can enable functional performance. Curriculum will overview the synthesis and design of functional organic and inorganic materials. A particular emphasis will be placed on structure-performance correlations between chemistry and materials organization. Topical foci will include polymers, biomaterials, and materials for energy.
**Recommended:** Prerequisite Introductory course(s) in materials or organic chemistry.

**CHEN 5480 (3) Solar Cells and Optical Devices for Sustainable Buildings**
This course assumes no background in electronic materials and explains how silicon and cutting-edge metal halide perovskite solar cells are designed, fabricated and characterized. Topics will include optics, band diagrams, wafer fabrication, most thin film deposition techniques, module design and economics. Other optical devices that can help the world rapidly reduce its carbon emissions, such as light-emitting diodes and energy saving windows with dynamic tinting, will also be covered.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 4480
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite a course in materials science (for example CHEN 4440), the physics of electromagnetism and optics at a very basic level.

**CHEN 5490 (3) Electrochemical Engineering**
This course discusses fundamentals and applications of electrochemical systems from an engineering perspective. Aspects of thermodynamics, reaction kinetics, and transport phenomena relevant to the description of electrode/electrolyte interfaces and charge transfer reactions are covered. Topics include cell equilibrium (Nernst equation), reactions rates within Butler-Volmer and Marcus theory, electrochemical double layer structure, ion transport (Poisson-Nernst-Planck equation), potential and current distributions in electrochemical cells, and experimental electroanalytical techniques. Applications include fuel cells, electrolyzers, batteries, sensors, and corrosion. Contact instructor to request to take prerequisites as corequisites.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 4490
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite courses of (CHEN 4330 or CHEN 4830) and PHYS 1120 or equivalents.
**Grading Basis:** Letter Grade

**CHEN 5630 (1) Intellectual Property Law and Engineering**
Learn the fundamentals of the various types of intellectual property, obtain the ability to search the USPTO database for patents, learn the difference between provisional patents, utility patents and foreign patents and learn the timing requirements related to the filing of patents and public disclosure, use, and/or sale of an invention.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 4630
**Requisites:** Restricted to graduate students only.

**CHEN 5650 (3) Particle Technology**
Aims to identify the important physical mechanisms occurring in processes involving particles, formulate and solve mathematical descriptions of such processes, and analyze experimental and theoretical results in both a qualitative and quantitative manner. Teaches students to apply this knowledge to the design of particulate systems. Conveys the breadth and depth of natural and industrial applications involving particulates. Extra work required for graduate course.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 4650
**Requisites:** Restricted to graduate students only.

**CHEN 5670 (3) Environmental Separations**
Lect. Covers traditional, as well as new, chemical separations processes that have environmental applications. Includes chemically benign processing (pollution prevention) as well as approaches to address existing pollution problems.

**CHEN 5730 (1) Mathematical Methods Short Course for Chemical Engineers**
Determine and apply appropriate analytical methods, which may include linear and nonlinear algebraic equations, ordinary differential equations and partial differential equations, to solve an array of chemical engineering problems. Identify and interpret the differences between model predictions and experimental results.
**Grading Basis:** Letter Grade

**CHEN 5740 (3) Analytical Methods in Chemical Engineering**
Presents applied analytical and numerical mathematical methods in the context of chemical engineering problems. Topics include modeling techniques, algebraic equations, and ordinary and partial differential equations. Department enforced requisite: working knowledge of computing, calculus, differential equations, linear algebra, and vector operations; and undergraduate courses in physics, fluid mechanics, heat transfer, and reaction engineering.
**Requisites:** Restricted to students with 87-180 credits (Seniors) or graduate students only.

**CHEN 5750 (3) Numerical Methods in Chemical Engineering**
Covers numerical methods for solving ordinary differential, partial differential, and integral equations. These principles are employed to develop, test, and assess computer programs for solving problems of interest to chemical engineers.
**Requisites:** Restricted to graduate students only.

**CHEN 5800 (3) Bioprocess Engineering**
Reviews the recent developments in the fields of microbiology, molecular genetics, and genetic engineering that are of commercial value and benefit to mankind. Covers engineering implementation of such biological processes.

**CHEN 5805 (3) Biological Interactions to Biomaterials**
Covers major classes of materials used in medical applications. Provide an in-depth view of advanced biomaterial concepts with a focus on biological interactions with materials that relate to protein and cell interactions, the innate and acquired immune response, blood interactions and infection.
**Requisites:** Restricted to graduate students only.

**CHEN 5830 (1) Introduction to Modern Biotechnology**
Introduces students to the biotechnology enterprise. Topics include the biotechnology industry and profession, the various academic disciplines of biotechnology, intellectual property, financing, and ethics.

**CHEN 5831 (2) Biotechnology Case Studies**
Capstone course required of all graduate students in the interdisciplinary graduate biotechnology certificate program. Reviews molecular genetics, product synthesis and purification, economics, intellectual property, and business planning. Working in teams, students present a biotechnology product plan.
**Requisites:** Requires prerequisite course of CHEN 5830 (minimum grade D-).

**CHEN 5835 (3) Colloids and Interfaces**
Provides a deep exploration of the fundamental principles of colloid and interface science and of related applications. Core topics include fundamental equations of interfacial science, capillary phenomena, interfacial thermodynamics interfaces, molecular monolayers, electrical surface properties, and interfacial a forces. Advanced topics include wetting phenomena, adsorption isotherms, dynamic interfacial behavior, surface modification, tribiology, surfactant self-assembly, and foams/emulsions among others.
**Requisites:** Requires prerequisite course of CHEN 3320 (minimum grade C-).

**CHEN 5836 (3) Nanomaterials**
Presents fundamental chemical and physical concepts that give rise to the unique optical, electronic and magnetic properties of nanoscale materials. Introduces important synthetic routes for producing nanomaterials, and interparticle forces governing colloidal behavior and self-assembly. Discusses current and potential applications in catalysis, biomedicine, renewable energy, and other fields.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 4836
**Requisites:** Restricted to graduate students only.

**CHEN 5838 (1-3) Special Topics in Chemical Engineering**
Graduate-selected topics courses offered upon demand.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**CHEN 5840 (1-4) Independent Study**
Allows multiple enrollment in term.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**CHEN 5900 (3) Pharmaceutical Biotechnology**
Incorporates biochemistry, pharmaceutical science, and engineering for application in the pharmaceutical industry. Emphasizes microscale mechanisms affecting drug delivery, bioavailability, and stability. Specific topics include thermodynamics of macromolecular conformational stability, crystallization kinetics, interfacial phenomena, and industrial protein folding.
**Requisites:** Restricted to graduate students only.

**CHEN 5919 (1-5) Special Topics in CHBE**
**Repeatable:** Repeatable for up to 5.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEN 5930 (1-3) Professional Internship**
This class provides a structure for CHEN and BIEN graduate students to receive academic credit for participating in internship experiences with industry partners that have an academic component consistent with graduate-level education in the engineering arts and sciences. Participation in this class requires an internship agreement between the student and the employment (industry) partner, detailing the academic goals of the internship experience. Instructor participation will include facilitation of mid-term and final assessment of student performance as well as additional educational opportunities during the internship period. May be taken during any term following initial enrollment and participation in CHEN or BIEN graduate programs.
**Requisites:** Restricted to graduate students only.

**CHEN 6210 (3) Microhydrodynamics of Suspensions and Colloids**
Focuses on fluid mechanics and colloid science of suspensions of particles, cells, and drops. Covers fundamentals, applications, and research frontiers.
**Requisites:** Requires prerequisite course of CHEN 5210 (minimum grade D-).

**CHEN 6820 (3) Biochemical Engineering Fundamentals**
Covers design and operation of fermentation processes, microbial and enzyme kinetics, multiple substrate and multiple species of fermentation, regulation of enzyme activity, energetics of cellular growth, immobilized enzyme and cell reactors, and transport phenomenain microbial systems and downstream processing.
**Requisites:** Restricted to Chemistry (CHEM), Chemical Engineering (CHEN), Biological Engineering (BIEN), or Biological Sciences (MCDB) graduate students only.

**CHEN 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.

**CHEN 6950 (1-6) Master's Thesis**

**CHEN 8990 (1-10) Doctoral Dissertation**

# Chemical Engineering - Master of Science (MS)

The Master of Science degree in Chemical Engineering requires 30 hours of approved credit hours and successful completion of a comprehensive final exam or thesis defense.

For more information, visit the department's Prospective Graduate Student (https://www.colorado.edu/chbe/graduate-program/prospective-graduate-students/) webpage.

*Note*: The department does not accept students interested in a terminal master's degree except under special circumstances. Students generally obtain a master's degree in the course of fulfilling the requirements for the Chemical Engineering - Doctor of Philosophy (PhD) (p. 1634) or the Biological Engineering - Doctor of Philosophy (PhD) (p. 1634).

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s): Chemical Engineering - Bachelor of Science (BS) (https://catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/chemical-biological-engineering/chemical-engineering-bachelor-science-bs/#acceleratedmasterstext).

# Requirements

## Admission Requirements

General criteria for regular admission to the master's program include a bachelor's degree with a 3.25/4.00 or better overall GPA from a college or university of recognized standing, equivalent to the degree given at this university (or college work equivalent to that required for such a degree, at least 96 credit hours of which must be acceptable toward a degree at this university)# promise of ability to pursue advanced study and research, as judged by previous scholastic record or otherwise# and adequate preparation to begin graduate study in the chosen field.

## Degree Requirements

The following course requirements are subject to change; for the most current information, visit the department's Prospective Graduate Student (https://www.colorado.edu/chbe/graduate-program/prospective-graduate-students/) webpage.

A candidate for the Master of Science degree in chemical engineering must complete at least 30 credits, including at least 24 credits of coursework and 4–6 credits of MS thesis credit (CHEN 6950).

Only courses 5000-level and above may be applied towards the MS degree. Moreover, only courses at the 5000-level and above in any department count toward the PhD degree. An advisor must approve all courses.

Only those courses for which the student receives a grade of B- or better will count toward the MS degree. The overall grade point average must be 3.00 or better.

A successful oral defense of the MS thesis is required.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CHEN 5210 | Transport Phenomena | 3 |

| | | |
|---|---|---|
| CHEN 5370 | Intermediate Chemical Engineering Thermodynamics | 3 |
| CHEN 5390 | Chemical Reactor Engineering | 3 |
| **Total Credit Hours** | | **9** |

Additionally, 15 of the total required credits must be chemical and biological engineering courses, and pass/fail courses do not count toward the degree.

A degree plan must be prepared at the beginning of the academic program in consultation with an advisory committee. The student is urged to maintain close contact with this advisory committee during the entire course of study.

### Residency and Time Limit

It is expected that a qualified student can complete the MS degree in two years or less. All work, including the thesis defense and filing of the thesis with the Graduate School, must be completed in the two-year requirement.

## Learning Outcomes

By the completion of the program, students will be able to:

# Biological Engineering - Doctor of Philosophy (PhD)

The Department of Chemical and Biological Engineering (ChBE) offers an innovative graduate program that emphasizes the doctoral degree. ChBE's outstanding national and international students take advantage of the high level of faculty-student collaboration and benefit from access to interdisciplinary research centers.

This degree seeks to leverage the measurement, theory and manipulation of biomolecules and biological systems for addressing the next challenges in our world. Recent advancements in imaging, data processing and synthesis have enabled access to biological information previously limited to the imagination. Thus, modern biology serves as the foundation of this program for the development of new models, processes and technologies to advance human needs.

Students who enroll in this program will learn how biological components interact on many size scales, how to understand the interplay of different interactions and networks and how to form concrete models from complex data. Key discoveries are applied to the creation of complex synthetic architectures for mimicking cell-tissue interactions, programming metabolic and synthetic pathways to drive cell-mediated chemical production of fuels and chemicals and developing smart, shape-shifting materials.

For additional information, visit the department's Biological Engineering (https://www.colorado.edu/chbe/graduate-program/biological-engineering-phd-program/) and Prospective Graduate Students (https://www.colorado.edu/chbe/graduate-program/prospective-graduate-students/) webpage.

## Requirements

### Course Requirements

The student must work out an informal degree plan early in the PhD program with the aid of a research committee. This degree plan must include a total of at least 30 semester hours of 5000-level or above courses and at least 30 semester hours of Doctor Thesis credits.

Biological Engineering PhD students are required to complete two core courses: CHEN 5150 Biomolecular Kinetics, Transport, and Thermodynamics and CHEN 5160 Systems Analysis of Cells and Tissues.

Students are expected to complete with distinction all work in the formal courses that apply toward the degree, and achieve an overall grade-point average of 3.00 or better. A course grade below B- will not be counted toward the minimum requirements for the PhD degree, but it will be considered in the overall grade-point average.

### Preliminary Examination

A preliminary examination is required of all PhD candidates. This examination consists of an oral and written component to be completed in the third semester. In addition, all students entering the program without a degree closely related to chemical engineering must either take the FE exam or have completed four chemical engineering core undergraduate courses with a grade of B or better (Fluids/Heat, Mass Transfer, Thermodynamics, Kinetics, or the equivalent courses). The graduate director or department chair will make assessments as to whether a degree is closely related to the chemical engineering degree.

### Comprehensive Examination

Students must complete and pass an oral examination before the student's doctoral committee of five or more graduate faculty members chosen by the student and approved by the department and the Graduate School. This is followed by a group question-and-answer period with all committee members. The oral examination before the committee is based primarily on a written report the student provides to committee members two weeks in advance.

### PhD Dissertation

Students must write a dissertation based on original research conducted under the supervision of a graduate faculty member. The dissertation must fulfill all Graduate School requirements. After the dissertation is completed, an oral final examination on the dissertation and related topics is conducted by the student's doctoral committee.

### Time Limit

All degree requirements must be completed within six years of the date of commencing coursework.

## Learning Outcomes

By the completion of the program, students will be able to:

# Chemical Engineering - Doctor of Philosophy (PhD)

The Department of Chemical and Biological Engineering (ChBE) offers an innovative graduate program that emphasizes the doctoral degree. ChBE's outstanding national and international students take advantage of the high level of faculty-student collaboration and benefit from access to three interdisciplinary research centers. Department faculty and students have won numerous awards both nationally and internationally.

General research areas within ChBE include: biomaterials, biopharmaceutical engineering, catalysis, surface science and reaction engineering, complex fluids and microfluidic devices, computational science, energy and environmental applications, membranes and separations, metabolic engineering and directed evolution,

nanostructured films and devices, polymer chemistry and engineering, and tissue engineering.

ChBE is one of the top research departments in the nation and maintains sophisticated facilities to support research endeavors. Although research in the department spans many diverse fields, there is a particular emphasis on research in biological engineering, functional materials and renewable energy.

For more information, visit the department's Prospective Graduate Student (https://www.colorado.edu/chbe/graduate-program/prospective-graduate-students/) webpage.

# Requirements

## Course Requirements

The student must work out an informal degree plan early in the PhD program with the aid of a research committee. This degree plan must include a total of at least 30 course credit hours of 5000-level or above courses and at least 30 semester hours of Doctor Thesis credits. Students are required to complete three core courses:

- CHEN 5370 Intermediate Chemical Engineering Thermodynamics
- CHEN 5390 Chemical Reactor Engineering
- CHEN 5210 Transport Phenomena

Students are expected to complete with distinction all work in the formal courses that apply toward the degree, and achieve an overall grade-point average of 3.00 or better. A course grade below B- will not be counted toward the minimum requirements for the PhD degree, but it will be considered in the overall grade-point average.

## Preliminary Examination

A preliminary examination is required of all PhD candidates. This examination consists of an oral and written component to be completed in the third semester. In addition, all students entering the program without a degree closely related to chemical engineering must either take the FE exam or have completed four chemical engineering core undergraduate courses with a grade of B or better (Fluids/Heat, Mass Transfer, Thermodynamics, Kinetics, or the equivalent courses). The graduate director or department chair will make assessments as to whether a degree is closely related to the chemical engineering degree.

## Comprehensive Examination

Students must complete and pass an oral examination before the student's doctoral committee of five or more graduate faculty members chosen by the student and approved by the department and the Graduate School. This is followed by a group question-and-answer period with all committee members. The oral examination before the committee is based primarily on a written report the student provides to committee members two weeks in advance.

## PhD Dissertation

Students must write a dissertation based on original research conducted under the supervision of a graduate faculty member. The dissertation must fulfill all Graduate School requirements. After the dissertation is completed, an oral final examination on the dissertation and related topics is conducted by the student's doctoral committee.

## Time Limit

All degree requirements must be completed within six years of the date of commencing coursework.

# Learning Outcomes

By the completion of the program, students will be able to:

# Civil Engineering

Graduate studies in civil engineering are offered up to the doctoral level through the Department of Civil, Environmental and Architectural Engineering (http://www.colorado.edu/ceae/). Fundamental and applied research areas pursued in the civil engineering program include geotechnical engineering and geomechanics, structural mechanics and engineering, construction management and engineering, environmental and geoenvironmental engineering, hydrology, environmental fluid mechanics, civil engineering systems, and engineering science. Together with relevant advanced coursework, graduates possess high competence and versatility to pursue a wide variety of careers in both engineering and non-engineering fields.

**Course code for this program is CVEN.**

# Research Interests and Facilities

The Department has a variety of computational and experimental research facilities. It has multiple disciplinary computer labs as well as the CEAE Bechtel lab which houses dozens of workstations with a wide range of professional engineering analysis software for teaching and research, and owns time and ready access to the university's supercomputer system. Physical experimental facilities for geotechnical engineering and geomechanics research include 3 geotechnical centrifuges, with one being a world-class 440g-ton centrifuge with a servo-controlled shake table for advanced physical simulations and soil model testing. For soil and rock mechanics research, analytical research can be conducted in the M.Y. Leung Computational Lab for Soils and Structures and its graduate experimental soil mechanics lab which houses multiple triaxial and cubical cells for simulating complicated 3D ascending and cyclic stress paths on geomaterials, consolidation devices with load-, deformation- and seepage-control, and special test cells for unsaturated soil mechanics testing. For structural mechanics and material engineering research, sophisticated testing for static and dynamic response of structures and their components is available by means of multiple high-speed high-force actuators, a large strong floor and a hydraulic shake table. Four uniaxial loading frames and MTS equipment for studies of mechanical and durability properties of structural and construction materials under combined load and environmental conditions are in use. Sophisticated real-time hybrid experimental-computational pseudo-dynamic testing of large-scale structures whose critical part is tested physically as a substructure with its measured response serving as input to a computer model of the rest of the structure which in turn computes the next load increment to be applied experimentally to the former in a coupled manner can also be set up.

The hydraulics and water resources research laboratories include excellent facilities in water quality and water resources management for which an advanced networked workstation environment for developing advanced decision support systems is available. For environmental fluid mechanics research and instruction, a state-of-the-art Ecological Fluid Dynamics Laboratory is available for fluid mechanics and studies of the interaction between biological processes and ecological systems

from fluid stirring, mixing, and reactions, and how organisms evolved and adapt to their physical environment. The facility utilizes laser-based instrumentation for quantifying turbulence and transport of contaminants, microorganisms and odors. For environmental engineering research, the Sustainable Energy and Environmental Laboratories (SEEL) houses a variety of experimental facilities including multiple liquid chromatography mass spectrometers and an automated solid phase extraction system. They offer unique opportunities for studies of environmental microbiology, environmental chemistry, water quality, air quality, molecular biology, toxicology and field ecology with modern PCs in all laboratories for instrument control and data acquisition. For building energy and systems research and studies, the Illumination Laboratory is a special facility for testing and evaluating architectural lighting systems as well as daylighting and lighting control design. Its Larson Building Systems Laboratory (https://www.colorado.edu/ceae/larsonlab/) is a unique facility in the HVAC industry for both education and research purposes and is designed for dynamic testing of complete and full-scale commercial HVAC and building systems. The facility consists of a full-size commercial HVAC system, four representative commercial building zones, a system for producing repeatable and controllable loads on the HVAC system, and sophisticated data acquisition and control systems. The graduate program in construction engineering and management is well equipped in terms of computer hardware and software, and can arrange access to other unique lab facilities in the department.

To provide further synergy in research, the department operates several centers:

- The Center for Infrastructure, Energy and Space Testing (https://www.colorado.edu/geotech-centrifuge/) supports research and instructions in structural and geotechnical testing, characterization of the fundamental mechanical, structural, hydraulic, and thermal properties of materials relevant to the performance of infrastructural systems.
- The Design of Risk-reducing, Innovative-implementable Small-system Knowledge (DeRISK) Center aims to identify, develop, demonstrate and facilitate widespread acceptance and applicability of novel and innovative technologies and approaches to measure or treat groups of microbiological or chemical contaminants, or their precursors, apply novel new information technology systems and improve the sustainability of small drinking water systems.
- The Center for Environmental Mass Spectrometry (CEMS) is a laboratory that focuses on the detection of pharmaceuticals, hormones and other organic contaminants in water and evaluating the effectiveness of methods for removing these compounds.
- The Center for Advanced Decision Support for Water and Environmental Systems (CADSWES) is an interdisciplinary center of excellence that focuses on applying advanced computing techniques to provide decision makers with decision support systems (DSSs) to help them more effectively manage water and environmental systems.
- The Mortenson Center in Global Engineering focuses on promoting integrated and participatory solutions to humanitarian development by educating globally responsible engineering students and professionals to address pressing problems faced by developing communities worldwide, with the goal of transforming the understanding, application and evaluation of engineering globally.

Current research includes such topics as water and wastewater treatment, surface and subsurface contaminant transport, environmental processes, fluid mechanics, decision support systems, hydraulic research, land treatment, rapid infiltration and activated sludge processes. Cost prediction in construction projects, construction management, worker safety, energy conservation in buildings, solar applications and lighting systems are included. Active research is ongoing in advanced constitutive soil modeling and experimental characterization for geotechnical engineering, computational geomechanics, soil dynamics, seismic wave propagation and geophysics, geotechnical earthquake engineering, wave-based sounding, centrifugal modeling, geosynthetics and glaciology. Research in structures includes stability, damage and fracture, material microstructures, durability, temperature effects, finite element modeling, reinforced concrete, earthquake responses, reinforced masonry structures, prestressed concrete and dynamic control. In water resources and fluid mechanics, work is continuing in stochastic hydrology and hydroclimatology, physics of scalar transport, mixing and reactions and hydrodynamics of ecological flows. Research in engineering science includes theoretical, mathematical and computational mechanics with applications to solid and fluid dynamics, blast and shock loading, mathematical physics, heat transfer, earth science, and multi-scale multiphase material modeling. Making use of model-based analysis, experimental and past performance data of built and human environment, the civil systems program focuses on providing training of a systems approach for life-cycle design decisions, management and monitoring of civil infrastructure systems, accounting for engineering, social science, economics and public policies in design holistically.

## Master's Degrees

- Civil Engineering - Master of Science (MS) (p. 1649)
- Civil Engineering - Professional Master of Science (MSCVE) (p. 1650)

## Doctoral Degree

- Civil Engineering - Doctor of Philosophy (PhD) (p. 1649)

## Certificates

- Architectural Lighting - Graduate Certificate (p. 1731)
- Global Engineering - Graduate Certificate (p. 1652)
- Water Engineering and Management - Graduate Certificate (p. 1783)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Amadei, Bernard (https://experts.colorado.edu/display/fisid_105978/)
Professor Emeritus; PhD, University of California, Berkeley

Amy, Gary L.
Professor Emeritus

Arehart, Joseph Hoberg (https://experts.colorado.edu/display/fisid_164349/)
Assistant Teaching Professor; BS, University of Colorado Boulder

Ayer, Steven
Associate Professor; PhD, Pennsylvania State University

Baker, Kyri A. (https://experts.colorado.edu/display/fisid_159754/)
Associate Professor; PhD, Carnegie Mellon University

Balaji, Rajagopalan (https://experts.colorado.edu/display/fisid_118480/)
Professor, Associate Chair; PhD, Utah State University

Becker, William
Scholar in Residence; PhD, The Johns Hopkins University

Behzadan, Amir
Professor; PhD, University of Michigan Ann Arbor

Bhaskar, Aditi
Associate Professor; Ph.D, University of Maryland, Baltimore County

Bielefeldt, Angela R. (https://experts.colorado.edu/display/fisid_110322/)
Professor; PhD, University of Washington; P.E.

Bolhari, Azadeh (https://experts.colorado.edu/display/fisid_167399/)
Associate Teaching Professor; PhD, Colorado State University

Brandemuehl, Michael J. (https://experts.colorado.edu/display/fisid_102573/)
Professor Emeritus; PhD, University of Wisconsin-Madison

Celoza, Amelia (https://experts.colorado.edu/display/fisid_172038/)
Assistant Professor; Ph.D., University of Texas at Austin

Cook, Sherri M. (https://experts.colorado.edu/display/fisid_154773/)
Associate Professor; PhD, University of Michigan Ann Arbor

Corotis, Ross B. (https://experts.colorado.edu/display/fisid_100942/)
Professor Emeritus; PhD, Massachusetts Institute of Technology

Crimaldi, John P. (https://experts.colorado.edu/display/fisid_115733/)
Professor; PhD, Stanford University

Dashti, Shideh (https://experts.colorado.edu/display/fisid_148493/)
Associate Professor; PhD, University of California, Berkeley

Davis, Robert
Scholar in Residence; PhD, University of Colorado Boulder

DiLaura, David L.
Professor Emeritus

Dow, John O.
Associate Professor Emeritus

Frangopol, Dan M.
Professor Emeritus

Gooseff, Michael N. (https://experts.colorado.edu/display/fisid_155922/)
Professor; PhD, University of Colorado Boulder

Gupta, Vijay
Professor Emeritus

Halek, Milan F.
Senior Instructor Emeritus

Hallowell, Matthew Ryan (https://experts.colorado.edu/display/fisid_146163/)
Professor; PhD, Oregon State University

Hearn, George (https://experts.colorado.edu/display/fisid_101059/)
Associate Professor; PhD, Columbia University

Henze, Gregor P. (https://experts.colorado.edu/display/fisid_146496/)
Professor; PhD, University of Colorado Boulder

Hernandez, Mark T. (https://experts.colorado.edu/display/fisid_107635/)
Professor, Lecturer; PhD, University of California, Berkeley

Hubler, Mija H. (https://experts.colorado.edu/display/fisid_155134/)
Associate Professor; PhD, Northwestern University

Javernick-Will, Amy N. (https://experts.colorado.edu/display/fisid_146430/)
Professor; PhD, Stanford University

Kasprzyk, Joseph R. (https://experts.colorado.edu/display/fisid_151506/)
Associate Professor, Associate Chair; PhD, Pennsylvania State University

Klees, Rita C. (https://experts.colorado.edu/display/fisid_145391/)
Associate Faculty Director, Scholar in Residence; PhD, University of Colorado

Ko, Hon-Yim
Professor Emeritus

Korak, Julie A. (https://experts.colorado.edu/display/fisid_155070/)
Assistant Professor; PhD, University of Colorado Boulder

Krarti, Moncef (https://experts.colorado.edu/display/fisid_104154/)
Professor; PhD, University of Colorado Boulder

Liel, Abbie B. (https://experts.colorado.edu/display/fisid_146431/)
Professor; PhD, Stanford University

Linden, Karl G. (https://experts.colorado.edu/display/fisid_143747/)
Professor, Chair; PhD, University of California, Davis

Livneh, Ben (https://experts.colorado.edu/display/fisid_151999/)
Associate Professor; PhD, University of Washington

Madabhushi, Srikanth (https://experts.colorado.edu/individual/fisid_165826/)
Assistant Professor; PhD, University of Cambridge (England)

Mansfeldt, Cresten (https://experts.colorado.edu/display/fisid_165411/)
Assistant Professor; PhD, Cornell University

Masters, Sheldon (https://experts.colorado.edu/display/fisid_168570/)
Assistant Professor; PhD, Virginia Polytechnic Institute and State University

McKnight, Diane M. (https://experts.colorado.edu/display/fisid_110517/)
Professor; PhD, Massachusetts Institute of Technology

Molenaar, Keith Robert (https://experts.colorado.edu/display/fisid_102373/)
Professor, Dean; PhD, University of Colorado Boulder

Morris, Matthew R. (https://experts.colorado.edu/display/fisid_150037/)
Teaching Professor; MS, University of Colorado Boulder

Neupauer, Roseanna M. (https://experts.colorado.edu/display/fisid_134747/)
Professor; PhD, New Mexico Institute of Mining and Technology

Pak, Ronald Y.S. (https://experts.colorado.edu/display/fisid_105977/)
Professor; PhD, California Institute of Technology

Pourahmadian, Fatemeh (https://experts.colorado.edu/display/fisid_158562/)
Assistant Professor; PhD, University of Minnesota

Regueiro, Richard A. (https://experts.colorado.edu/display/fisid_134705/)
Professor, Associate Chair; PhD, Stanford University

Rosario-Ortiz, Fernando L. (https://experts.colorado.edu/display/fisid_146165/)
Director, Professor; DEnv, University of California, Los Angeles

Ryan, Joseph N. (https://experts.colorado.edu/display/fisid_101037/)
Professor; PhD, Massachusetts Institute of Technology

Salvinelli, Carlo (https://experts.colorado.edu/display/fisid_159846/)
Assistant Teaching Professor; PhD, Missouri University of Science and Technology

Saouma, Victor E. (https://experts.colorado.edu/display/fisid_100429/)
Professor Emeritus; PhD, Cornell University

Scheib, Jennifer G. (https://experts.colorado.edu/display/fisid_159887/)
Assistant Teaching Professor; MS, University of Colorado Boulder

Senseney, Christopher (https://experts.colorado.edu/individual/fisid_166693/)
Associate Teaching Professor; PhD, Colorado School of Mines

Sholtes, Joel Stephen (https://experts.colorado.edu/display/fisid_164757/)
Assistant Teaching Professor; PhD, Colorado State University

Sholtes, Kari A. (https://experts.colorado.edu/display/fisid_164995/)
Assistant Teaching Professor; MS, University of North Carolina Chapel Hill

Silverstein, JoAnn (https://experts.colorado.edu/display/fisid_101482/)
Professor Emeritus; PhD, University of California, Davis

Song, Jeong-Hoon (https://experts.colorado.edu/display/fisid_154468/)
Associate Professor; PhD, Northwestern University

Srubar, Wil V. III (https://experts.colorado.edu/display/fisid_153058/)
Professor; PhD, Stanford University

Straub, Anthony (https://experts.colorado.edu/display/fisid_165027/)
Assistant Professor; PhD, Yale University

Strzepek, Kenneth M.
Professor Emeritus

Sture, Stein
Professor Emeritus

Summers, Scott R. (https://experts.colorado.edu/display/fisid_113151/)
Professor Emeritus; PhD, Stanford University

Techera, Ulises (https://experts.colorado.edu/display/fisid_163403/)
Associate Teaching Professor; PhD, University of Colorado, Boulder

Thomas, Evan (https://experts.colorado.edu/display/fisid_163895/)
Professor, Assistant Professor; PhD, University of Colorado Boulder

Torres-Machi, Cristina (https://experts.colorado.edu/display/fisid_159884/)
Assistant Professor; PhD, Universitat Politecnica de Valencia, Spain

Vàsconez, Sandra L. (https://experts.colorado.edu/display/fisid_144198/)
Teaching Professor; MA, University of Denver

William, Kaspar J.
Professor Emeritus

Xi, Yunping (https://experts.colorado.edu/display/fisid_110518/)
Professor; PhD, Northwestern University

Zhai, John Z. (https://experts.colorado.edu/display/fisid_130604/)
Professor; PhD, Massachusetts Institute of Technology

Zhang, Yida (https://experts.colorado.edu/display/fisid_158222/)
Associate Professor; PhD, Northwestern University

# Courses

**CVEN 5006 (3) Construction Engineering and Management Fundamentals**
Provides an overview of the construction industry to establish a foundation for subsequent graduate courses in construction engineering and management. Students will be exposed to projects of varying funding sources, contracts, scope and complexity. Project phases will be established including planning, funding, design, construction, turnover, operation and maintenance. The course will focus on fundamental construction cost estimating, scheduling, delivery systems, contractual relationships, key contract clauses, risk allocation, building materials/systems and project controls. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Grading Basis:** Letter Grade

**CVEN 5109 (1) Introduction to Environmental and Development Economics for Engineers**
Addresses main development topics and their environmental implications based on a theoretical framework applied to practical real-life examples. Students will be introduced to the history of economic thought, the process of economic reform, agricultural and industrial development, income distribution, health, education, and international economic relations. Students analyze how these apply to economic development and how this impacts poverty and environmental degradation in the global south. Furthermore, students will examine how engineering intersects the solutions space.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** of EVEN 2909 or CVEN 5919 or CVEN 5909.
**Grading Basis:** Letter Grade

**CVEN 5111 (3) Structural Dynamics**
Focuses on the response of single- and multi-degree of freedom structures subjected to harmonic, impulsive and arbitrary loads (including earthquake base excitation). Sources and modeling of damping will be discussed. Analytical and numerical solutions will be considered for both linear and nonlinear structural systems. Elastic and inelastic response spectra will be discussed.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or seniors or students with concurrent degree sub plans C-AREN, C-CVEN, C-MCEN or C-ASEN.
**Additional Information:** Departmental Category: Mechanics

**CVEN 5119 (1) Introduction to Global Health for Engineers**
Global Health, a multidisciplinary academic and professional discipline, works to address the unequal distribution of disease determinants and burden in low income communities. In this course, engineering students engaged in Global Engineering, poverty reduction efforts, technology and intervention design will be introduced to the conditions, context, and professional activities and standards of global health practice.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** of enrollment in Mortenson Center graduate program or instructor approval.
**Grading Basis:** Letter Grade

**CVEN 5122 (3) The Colorado River Water Crisis: Water Policy, Hydrological Variability, and Climate Change**
Analyzes the physical basis and policy origins for today¿s Colorado River water crisis. Surveys the history of Colorado River water development, and allocation. Examines political and policy decisions that have occurred. Unravels the physical drivers for the river¿s flow, its variability, and change. Places timelines of policy choices into context of emerging scientific understanding of Colorado River hydro-climate. Integrates evolving policy and physical factors to address today¿s water crisis that informs pathways for solutions.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4122
**Requisites:** Restricted to students in ENGR, ATOC, HIST, CAMW, ENVS, GEOG, PSCI, Law School, Getches-Wilkinson Natural Resources Law Center, Ecology and Evolutionary Biology, Journalism, or Environmental Journalism.
**Recommended:** Prerequisite physical hydrology; This is a multi-disciplinary upper division lecture course open to both undergraduate and graduate students with interest in history, policy, politics, humanities, geography, hydrology, and meteorology.
**Grading Basis:** Letter Grade

**CVEN 5129 (1) Program and Project Management**
Covers the principles, practice, and phases of international development program and project management including design, implementation, monitoring and evaluation, exit strategy, and scaling up. Emphasis will be posed on challenges and constrains related to the multidisciplinary, dynamic, and complex nature of global development projects. Students will be exposed to several methodologies and tools commonly used to identify needs and promote social change, including the Theory of Change and the Logical Framework Approach.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** of EVEN 2909 or CVEN 5919 or CVEN 5909.
**Grading Basis:** Letter Grade

**CVEN 5131 (3) Continuum Mechanics and Elasticity**
Provides foundation for advanced study of structural, mechanical and geo-material behavior and continuum theories in mechanics. Topics: Cartesian tensors, formulation of continuum mechanics for small and large deformation, constitutive laws for elastic solids, energy principles, methods of potentials, formulations and solutions of 2D and 3D elastostatic and elastodynamic problems, analytical and numerical formulations.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or seniors or students with concurrent degree sub plans C-AREN, C-CVEN, C-MCEN or C-ASEN.
**Recommended:** Prerequisite CVEN 3161.
**Additional Information:** Departmental Category: Mechanics

**CVEN 5133 (3) Land Use and Water Quality**
Principles, processes, and control of nonpoint source pollution. Particular emphasis is placed on non-point source (NPS) problems associated with urban runoff, agricultural influences on water quality, and impacts of mining and forestry. Surface and ground water pollution in diverse aquatic systems including stream, river, lake, reservoir, estuarine environments are considered. Students are exposed to a variety of structural and non-structural management principles.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4133
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisite CVEN 4333, Engineering Hydrology.

**CVEN 5139 (1) Solution Identification and Proposal Development**
Presents an overview of strategies and best practices to develop effective grant proposals for international development interventions, as well as major funding mechanisms and processes. This is a project-based course, students will work in teams with an NGO to develop a concept note for a current request for proposal. The proposal will have to respect priorities and requirements of the target population, principles and goals of the proposing NGO, and guidelines of the donor.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** of EVEN 2909 or CVEN 5919 or CVEN 5909.
**Grading Basis:** Letter Grade

**CVEN 5147 (3) Civil Engineering Systems**
Theory and application of the principles of engineering economics and classical and metaheuristic optimization techniques for evaluating problems in civil and environmental engineering.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4147
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 5151 (3) Wave Methods for Design and Characterization of Advanced Materials**
Covers key theoretical concepts and applications of wave propagation with the focus on ultrasonic scattering. The course material includes: (i) dispersion analysis for design and characterization of materials with random and periodic microstructure, and (ii) advanced elastodynamic formulations rooted in 2D and 3D boundary integral equations for the purpose of inverse scattering and imaging. The course is intended to be self-contained, research-oriented and accessible for multidisciplinary audience.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.

**CVEN 5157 (3) A Systems Approach to Global Engineering**
Introduces engineering students to the global context in which engineers are asked to operate in the 21st century using system dynamics tools and other decision-making tools (network analysis, agent based modeling, etc.) necessary to analyze the uncertainty and complexity inherent in global projects.
**Equivalent - Duplicate Degree Credit Not Granted:** EDEN 4147, CVEN 4157 and EDEN 5147
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.

**CVEN 5161 (3) Advanced Mechanics of Materials I**
Covers advanced topics in the mechanics of solids. Some topics such as asymmetric bending of beams, torsion of non-circular cross-sections, are extensions of topics seen in CVEN 3161. Others like 3-D stress and strain analysis, failure theories and stability of columns and frames are new. Includes selected laboratory experiments.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4161
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Mechanics

**CVEN 5206 (3) Design Development**
Provides an overview of the development process and proforma, investigates the interrelationship between design decisions and building costs, and evaluates the impact of each major building system on the development budget and schedule. Provides a simulated development experience where students respond to a Request for Proposal, including proformas, design, estimates and outline specifications. Department consent required. Taught intermittently.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Construction

**CVEN 5226 (3) Construction Safety**
Comprehensively studies construction safety in the construction industry. Focuses on advanced safety management issues such as accident causation theory, economic modeling, safety risk quantification and analysis, design for safety, predictive analytics and learning. Skills developed in this course will prepare graduate students to be effective quality and safety managers or researchers.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Construction

**CVEN 5246 (3) Legal Aspects of Construction**
Applies law in engineering practice; contracts, construction contract documents, construction specification writing, agency, partnership, and property; types of construction contracts; and legal responsibilities and ethical requirements of the professional engineer. Taught intermittently.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** graduate standing or department consent required.
**Additional Information:** Departmental Category: Construction

**CVEN 5276 (3) Engineering Risk and Decision Analysis**
Acquaints students with the fundamental principles and techniques of risk and decision analysis. Oriented toward project-level decisions in which risk or uncertainty plays a central role. Introduces students to Monte Carlo analyses, and various types of multicriteria decision analyses. Culminates in a larger term project.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisite CVEN 3227 and graduate standing or instructor consent required.
**Additional Information:** Departmental Category: Construction

**CVEN 5286 (3) Design Construction Operations**
Considers effective/efficient design of construction operations. Front end planning; construction labor relations; productivity management. Emphasizes construction productivity improvement by group field studies and discrete event simulation modeling. How overtime, changes, weather, and staffing levels influence productivity. Industrial engineering techniques are applied to the construction environment to improve the use of equipment, human, and material resources.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** graduate standing or department consent required.
**Additional Information:** Departmental Category: Construction

**CVEN 5303 (3) Analysis of Urban Water Systems**
Examines water systems in the urban environment in an integrated manner. Focus is placed on analyzing the behavior of urban water distribution and collection systems using model applications. Students completing this course will be able to understand local urban water resources problems, effectively use complementary urban water models, and examine the interactions between water supply, drainage systems, surface water, and groundwater.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4303
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.

**CVEN 5313 (3) Environmental Fluid Mechanics**
Analysis of viscous incompressible flows, with first-principle solutions for environmental fluid flows in oceans, rivers, lakes and the atmosphere. Topics include the Navier-Stokes equations, kinematics, vorticity dynamics, geophysical fluid dynamics, and density stratification.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisites APPM 2350 and APPM 2360 and CVEN 3313.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 5323 (3) Applied Stream Ecology**
Emphasizes the integration of hydrologic, chemical, and biological processes in controlling river, stream, and reservoir ecosystems at several spatial scales. Students apply ecosystem concepts to current environmental and water quality problems and learn field methods in field trips and a team project.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Additional Information:** Departmental Category: Environmental

**CVEN 5333 (3) Physical Hydrology**
Introduces hydrology as a quantitative science describing the occurrence, distribution and movement of water at and near the surface of the earth. Develops a quantitative understanding of atmospheric water, infiltration, evapotranspiration and surface runoff. Studies global climatology and large scale climate drivers of regional hydrology at interannual time scales. Solves engineering problems related to water resources.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisite CVEN 4333.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 5343 (3) Transport and Dispersion in Surface Water**
Studies transport and dispersion of introduced contaminants in turbulent surface water flows. Emphasizes developing a physical understanding of fluid processes responsible for turbulent dispersion. Includes analytical development, numerical modeling, and experimental approaches to the problem.
**Requisites:** Restricted to graduate students and Engineering Management BAM students only.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 5346 (3) Managing Construction and Engineering Projects and Organizations**
Explores organizational and managerial issues and concerns facing executives in engineering and construction organizations. Through readings, case studies, simulation exercises, and projects, students are introduced to and apply concepts of strategy, core competencies, vision, innovation, team dynamics, interpersonal influence, organizational design issues, and global projects to engineering and construction organizations.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Construction

**CVEN 5353 (3) Groundwater Hydrology**
Studies the occurrence, movement, extraction for use, and quantity and quality aspects of groundwater. Introduces and uses basic concepts to solve engineering and geohydrologic problems.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisites CVEN 3313 or AREN 2120 or CHEN 3200 or GEEN 3853 or MCEN 3021 and APPM 2360.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 5363 (3) Modeling of Hydrologic Systems**
Introduces students to modeling techniques. Focus areas include physical hydrology and hydrometeorology; measurement and inference; climate change impacts; role of scale in hydrology; uncertainty analysis; and a case study project. Projects will examine hydrologic impacts of various drivers such as climate warming or land cover change, utilizing an assessment of historic conditions to better understand and model future disturbance scenarios.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 5373 (3) Water Law, Policy, and Institutions**
Discusses contemporary issues in water management based on legal doctrine. Identifies legal issues in water resources problems and discusses in close relationship with technical, economic, and political considerations.
**Requisites:** Restricted to students with 87-180 credits (Seniors), graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 5383 (3) Applied Groundwater Modeling**
Studies analytical and numerical methods for solving problems of groundwater flow and chemical transport. Emphasizes fundamental modeling techniques and the relationship between the physical system and the model results. Applies models and modeling techniques to solve problems in ground water hydrology using contemporary software. Includes computer laboratory sessions.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4383
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisites APPM 2360 and CVEN 4353 or CVEN 5353.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 5393 (3) Water Resources System and Management**
Introduces water resources planning and management as an integrated systems problem that satisfies multiple competing obejctives under constraints and uncertainty. Includes problem formulation and solution using decision support systems, optimization with and without uncertainty, stochastic simulation, and multiobjective optimization. Introduces water resources economics and planning under uncertainties such as climate change and increasing urbanization.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 5404 (3) Water Chemistry**
Introduces chemical fundamentals governing the chemistry of natural and treated waters. Topics include thermodynamics and kinetics of acid and base reactions, carbonate chemistry, air-water exchange, precipitation, dissolution, complexation, oxidation-reduction, and sorption.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Additional Information:** Departmental Category: Environmental

**CVEN 5414 (3) Water Chemistry Laboratory**
Uses experimental and analytical laboratory techniques to develop a better understanding of the concepts of aquatic chemistry and to investigate water chemistry in treated and natural water systems. Techniques include titration, spectrophotometry, gas chromatography, other advanced instrumentation, sampling, portable analyses, and basic statistics and experimental design. Course focuses on water chemistry of Boulder Creek and other local waters.
**Requisites:** Requires prerequisite course of CVEN 5404 or GEOL 5280 (minimum grade C-). Requires corequisite course of CVEN 5424. Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Environmental

**CVEN 5423 (3) Water Resources Engineering Design**
Studies principles and techniques of water resources engineering design. Introduces environmental modeling under uncertainty, stormwater design, precipitation estimation and flow routing. Surveys hydropower, reservoir management and water resources economics.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4323
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 5424 (3) Environmental Organic Chemistry**
Examines the fundamental physical and chemical processes that impact the fate and transport of organic contaminants in natural and engineered systems. Emphasizes both equilibrium and kinetic aspects, including solubility, vapor pressure, air-water exchange, sorption, abiotic redox reactions, and photodegradation.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Additional Information:** Departmental Category: Environmental

**CVEN 5434 (3) Environmental Engineering Design**
Team-based design of facilities or processes for water or wastewater or solid waste treatment or remediation under multiple real-world constraints. Department consent required.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Recommended:** Prerequisite CVEN 5524 or CVEN 5534 or CVEN 5474.
**Additional Information:** Departmental Category: Environmental

**CVEN 5444 (3) Municipal Des Proj**
**Additional Information:** Departmental Category: Environmental

**CVEN 5446 (3) Infrastructure Asset Management**
Introduces a framework that combines engineering principles with economic theory to facilitate a more organized and logical approach to decision-making in the management of infrastructure. Topics covered include asset valuation, modeling infrastructure deterioration, life-cycle cost analysis, and optimization. Although the concepts introduced in this course are applicable to different infrastructure systems, especial emphasis will be given to transportation projects.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CVEN 5454 (3) Statistical Methods for Natural and Engineered Systems**
Applies traditional and modern probability and statistical methods to environmental, hydrological, climatological and engineering data analysis. Topics include: basic probability, data visualization, fitting univariate and multivariate distributions, Monte Carlo simulations, extreme value distributions, confidence intervals and hypothesis testing, nonparametric density estimators, linear regression, and Bayesian analysis. The data analysis tool, R, is used throughout the course.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Environmental

**CVEN 5464 (3) Environmental Engineering Processes**
Develops and utilizes analytic solutions for environmental process models that can be used in a) reactor design for processes used in the treatment of water, wastewater and hazardous waste and b) process analysis of natural systems, such as streams and groundwater flow. Models facilitate the tracking of contaminants in engineered and natural systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4464 and EVEN 4464
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Additional Information:** Departmental Category: Environmental

**CVEN 5474 (3) Hazardous and Industrial Waste Management**
Evaluates processes used for treatment of wastes requiring special handling and disposal: toxic organic chemicals, heavy metals, acidic, caustic and radioactive waste material. Discusses techniques for destruction, immobilization and resource recovery and assessment of environmental impact of treatment process end products.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4474
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Environmental

**CVEN 5484 (3) Integrative Environmental and Molecular Microbiology**
Surveys microbiology topics germane to modern civil and environmental engineering. Provides fundamentals needed to understand microbial processes and ecology in engineered and natural systems and reviews applications emphasizing the interface between molecular biology and classical civil engineering.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4484, EVEN 4484, and EVEN 5484
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Environmental

**CVEN 5494 (3) Surface Water Quality Modeling**
Examines the relationships among air, water, and landpollution, water quality, and beneficial uses. Using models, develops the ability to quantify and predict the impacts of pollutants in the aquatic environment, and to develop approaches to minimize unfavorablewater quality conditions. Department consent required.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Environmental

**CVEN 5511 (3) Introduction to Finite Element Analysis**
Covers systematic formulation of finite element approximation and isoparametric interpolation (weighted residual and energy methods, triangular and quadrilateral elements). Includes computation applications to the solution of one- and two-dimensional stress-deformation problems and steady and transient heat conduction.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4511
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or seniors or students with concurrent degree sub plans C-AREN, C-CVEN, C-MCEN or C-ASEN.
**Additional Information:** Departmental Category: Mechanics

**CVEN 5514 (3) Bioremediation**
Advanced study on biological processes used to treat toxic organic and inorganic compounds contained in contaminated water, air, and soil; design and evaluation of in situ toxic compound biotransformation; fundaments of phytoremediation; critical reviews of current literature on bioremediation.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 5514
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisite CVEN 4484 or CVEN 5424 or CVEN 5484.
**Additional Information:** Departmental Category: Environmental

**CVEN 5524 (3) Drinking Water Treatment**
Provides advanced study on theory-of-treatment processes, including design and operation of municipal water supplies.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Recommended:** Prerequisite CVEN 4464 or CVEN 5464 or graduate standing or instructor consent required.
**Additional Information:** Departmental Category: Environmental

**CVEN 5525 (3) Computational Structural Analysis 1**
Covers the principles and formulations of the direct stiffness method and its transition to the finite element method with the computational modelling and analysis of framed structures in 2D plane and 3D space. The dynamic analysis and the introduction to the nonlinear structural problems are provided. Familiarity with the modern computing and programming environments is increased to address the needs in the structural engineering and mechanics area. Computer programming is applied to the solution of problems in structural analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4525
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Structures

**CVEN 5534 (3) Wastewater Treatment**
Covers the processes used to treat municipal wastewater, focusing on biological processes. Includes: design of aerobic, anoxic, anaerobic and suspended growth technologies to remove and transform pollutants; design and assessment of treatment approaches that recover energy, nutrients and water from wastewater; application of fundamental concepts of aquatic chemistry, environmental microbiology and computational models.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Recommended:** Prerequisites CVEN 5404 and CVEN 5484 and CVEN 5464.
**Additional Information:** Departmental Category: Environmental

**CVEN 5537 (3) Numerical Methods in Civil Engineering**
Introduces the use of numerical methods in the solution of civil engineering problems, emphasizing obtaining solutions with high-speed electronic computers. Applies methods to all types of civil engineering problems.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4537
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 5544 (3) Solid Waste Management and Resource Recovery**
Covers the scope of the nonhazardous solid waste problem and regulations that drive its management; discussions of nonengineering factors that impact waste management and recycling; design of incinerators, composting facilities, and landfills used to treat and dispose of solid waste.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 5544 and EVEN 4544
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisite CVEN 3414.
**Additional Information:** Departmental Category: Environmental

**CVEN 5554 (3) Fundamentals of Air Quality Management**
Introduces engineering methods for the study of air quality. Topics include: indoor air quality, greenhouse gases, dispersion modeling, source apportionment modeling, chemistry of combustion, pollution sources and controls, human exposure to air pollutants. A focus on Engineering for Developing Communities runs throughout. Required for CVEN environmental engineering graduate students.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4554
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Environmental

**CVEN 5564 (3) Water Profession: Communication and Utility Finance**
Develops and improves the skills and tools needed for graduate students and young professionals. Focusing on highly effective leaders; leadership with impact; effective communication tools; and communicating with teams, city councils, governing boards, and the public.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environmental

**CVEN 5565 (3) Design of Wood Structures**
Applies basic principles of structural engineering and mechanics to the design of wood structures, including the design and analysis of columns, trusses, beams and connections using dimensional lumber, glulam and cross-laminated timber.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4565
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Structures

**CVEN 5574 (3) Water Utility Management: Current Issues and Future Challenges**
Develops the skills and tools for graduate students and young professionals to work in the water profession. Focuses on management, leadership, communication and utility financial in the new water profession era. Undergraduate seniors may contact instructor for permission to enroll.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Environmental

**CVEN 5575 (3) Advanced Topics in Steel Design**
Covers steel structure design and analysis. Includes plate girders, moment connections for beams, design of multistory frames, and other topics determined by class interest. Undergraduate may enroll with permission of the instructor.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisite CVEN 4545.
**Additional Information:** Departmental Category: Structures

**CVEN 5584 (3) Water Profession: Leadership and Management**
Develops the skills and tools for graduate students and young professionals to work in the water profession. Focuses on financing water services, capital planning, rates, management planning, staffing and organization and critical thinking. Undergraduates may request instructor permission to enroll.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Environmental

**CVEN 5585 (3) Advanced Topics in Reinforced Concrete Design**
Covers design and analysis topics for prestressed concrete and/or reinforced concrete structures. Includes review of the current ACI design code, slabs, prestressed concrete, seismic design, folded plates and shells, finite element analysis, and other topics determined by class interest. Undergraduates may enroll with the permission of the instructor.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisite CVEN 4555.
**Additional Information:** Departmental Category: Structures

**CVEN 5594 (3) Water Reuse and Reclamation**
Explores development of a safe, reliable and acceptable program for reusing impaired waters. As fresh water becomes scarcer around the world, communities are looking for security through development of new water resources. Reuse of impaired water is one solution to the growing water crisis. Focus is on advanced treatment technologies with emphasis on public perception, economics and regulations.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4594
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Recommended:** Prerequisites CVEN 3141 and CVEN 3424.
**Additional Information:** Departmental Category: Environmental

**CVEN 5604 (3) UV Disinfection and Advanced Oxidation**
Provides a fundamental basis for design of UV processes in water and wastewater treatment. Includes principles of photochemistry and photobiology. Applications to disinfection of water and degradation of chemical compounds in the environment. Design of UV disinfection systems and reactors and advanced oxidation processes. Environmental UV-based decay of pollutants.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisites CVEN 3414 and CVEN 3424.
**Additional Information:** Departmental Category: Environmental

**CVEN 5614 (3) Bioenergy & Bioresource Recovery**
Introduces fundamental theories and applied technologies used in production and conversion of renewable biomass including waste materials into bioenergy and other value-added products. Conducts quantitative evaluations on conversion processes such as renewable biogas production, electricity generation, liquid fuels, metal and nutrients recovery and organic chemical production.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisite CVEN 4484.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environmental

**CVEN 5628 (3) Seepage and Slopes**
Covers fundamental principles of seepage in soils under both saturated and unsaturated conditions and limit equilibrium solution to slope stability problems. The seepage effects on slope stability are analyzed in detail and both conventional slope stability method and the finite element technique are applied to solving the engineering problems.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisites CVEN 3708 and CVEN 3718.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5678 (3) Soil Improvement and Reinforcement**
Provides students with principles and working knowledge of design and construction procedures in soil stabilization, retaining structures, geosynthetics, and soil reinforcement.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisite CVEN 3718.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5688 (3) Environmental Geotechnics**
Provides an understanding of the use of geotechnical concepts in the analysis and design of environmental systems. Focus is placed on the evaluation of waste containment facilities. Including relevant saturated, unsaturated, and multiphase flow machanisms in cover and liner systems. Includes stability analyses for landfills and geosynthetic interface shear strength. Covers relevant aspects of mining geotechnics and remediation technologies of contaminated sites.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5708 (3) Soil Mechanics**
Offers an advanced course in soil mechanics. Coverage includes basic principles of continuum mechanics; elasticity, viscoelasticity, and plasticity theories applied to soils; effective stress principle; consolidation; shear strength; critical state concepts; and constitutive, numerical, and centrifuge modeling.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5718 (3) Mechanics and Dynamics of Glaciers**
Develops a quantitative physical basis for understanding the functions of snow, ice and glaciers in the environment, with emphasis on developing an understanding of continuum mechanics and thermodynamics and their application to Earth systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4718
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5728 (3) Foundation Engineering**
Focuses on geotechnical design of shallow and deep foundations, including spread footings, mats, driven piles and drilled piers. Coverage includes bearing capacity, settlement, group effects and lateral load capacity of the various foundation types. The application of lower and upper bound plasticity analyses for the structural and geotechnical design of foundation systems, and how these relate to design codes, is additionally covered.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4728
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5738 (3) Centrifuge Modeling for Sustainable Infrastructure: Advanced Experimental Methods in Engineering**
Studies the application of advanced experimental methods used in physical modeling for civil engineering research and practice. Topics include acquisition and analysis techniques of experimental data including filtering in the frequency domain, wavelet transforms and digital image correlation techniques to obtain displacement and strain fields. Centrifuge modeling considerations are theoretically and practically introduced, including scaling laws, boundary conditions and modeling errors for static and dynamic test design towards improving the sustainability of civil engineering infrastructure.
**Requisites:** Restricted to graduate students or (students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs and requires prerequisite of CVEN 3718 (minimum grade C-)).
**Recommended:** Prerequisite Advanced Mechanics of Materials (CVEN 4161/5161) or Foundations Engineering (CVEN 4728/5728).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5748 (3) Design of Earth Structures**
Covers theory, design, and construction of earth embankments and waste facilities, including isolation systems. Uses published data, field exploration, and laboratory tests on soils and rock in investigating foundations and construction materials. Involves principles of compaction and settlement, permeability analysis, landslide recognition and control, use of composite clay, and liner systems.
**Requisites:** Requires a prerequisite course of CVEN 5708 (minimum grade C-). Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5758 (3) Flow Processes in Soils**
Examines fundamental principles of flow through porous media and related engineering problems. Topics include the saturated seepage theory and flow nets; the unsaturated flow theory; suction-saturation and saturation-hydraulic conductivity relationships; nonlinear finite strain consolidation and desiccation theory; laboratory and field testing methods for determining material characteristics; and numerical models for flow-related engineering problems.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisite CVEN 3718.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5768 (3) Introduction to Rock Mechanics**
Nature of rocks and rock masses; engineering properties rock and rock mass; rock mass classifications; planes of weakness; application of rock mechanics to design of rock slopes, underground excavations, and foundations.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisites CVEN 3708 and CVEN 3718.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5788 (3) Computational Modeling in Geotechnical Engineering**
Introduces computational modeling for geotechnical engineering applications such as the Discrete Element Method (DEM) for granular materials, nonlinear Finite Element Analysis (FEA) of seepage, coupled soil elastoplastic consolidation, elastoplasicity models for soil and rock, and advanced computational methods for failure in soil and rock. Uses DEM, FEA, and other software programs for analysis. Recommended Prereq: CVEN 5708
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5798 (3) Dynamics of Soils and Structures**
Covers fundamental characterization of soils, foundations and structures under general dynamic and earthquake loads. Principles of vibrations and wave propagation for 1D, 2D, 3D. In-situ and laboratory determination of dynamic soil properties; methods for site response analysis, foundation vibrations, dynamic soil-structure interaction and liquefaction problems.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or seniors or students with concurrent degree sub plans C-AREN, C-CVEN, C-MCEN or C-ASEN.
**Recommended:** Prerequisite CVEN 3708.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5818 (3) Geotechnical Earthquake Engineering**
Familiarizes students with the fundamentals of engineering seismology, soil and structural dynamics, and the modern practice of geotechnical earthquake engineering. Focuses on describing earthquake hazards and methods for seismic analysis and design.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisite CVEN 5798.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5822 (3) Geographical Information Systems for Civil and Environmental Systems**
Theory and use of geographical information systems in civil engineering, environmental studies, natural resources and other related disciplines. Topics include spatial data models, data capture, global positioning system, database linkage, use in design, analysis and implementation. Laboratory work includes applications of Arc-View and Arc-GIS software.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Surveying and Transportation

**CVEN 5830 (1-3) Special Topics for Seniors/Grads**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Building Systems

**CVEN 5831 (3) Special Topics**
Supervised study of special topics of interest to students under instructor guidance. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Mechanics

**CVEN 5833 (1-3) Special Topics**
Supervised study of special topics of interest to students under instructor guidance.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 5834 (1-3) Special Topics**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Additional Information:** Departmental Category: Environmental

**CVEN 5835 (1-3) Special Topics for Seniors/Grads**
Supervised study of special topics of interest to students under instructor guidance.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Structures

**CVEN 5836 (1-3) Special Topics for Seniors/Grads**
Supervised study of special topics of interest to students under instructor guidance. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Construction

**CVEN 5837 (1-3) Special Topics for Seniors/Grads**
Supervised study of special topics of interest to students under instructor guidance.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 5838 (1-3) Special Topics**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5849 (1-6) Independent Study**
Available only through approval of graduate advisor. Subject arranged to fit needs of student.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Special Topics

**CVEN 5899 (1) Graduate Engineering Internship Experience**
An academically supervised graduate-level engineering experience that is integral to the students' graduate research and study by connecting classroom instructions to professional practice. Requires a pre-approved written plan of the proposed graduate-level work experience and a signed cooperative agreement or offer letter from employer. The 1-unit course will count toward the graduate student¿s degree together with the required minimum of 30 credit hours of regular core and elective courses in the student¿s major.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CVEN 5909 (3) Hazards, Resilience, and Sustainability for the Natural and Built Environments**
Introduces students to the effects of global climate change on natural and built environments, including its impact on the frequency and intensity of hazards and climatic extremes, social inequalities, and opportunities in engineering design for adaptation and mitigation, providing a survey approach to understanding major hazards and emerging engineering solutions.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** of enrollment in Mortenson Center graduate program or instructor approval.
**Grading Basis:** Letter Grade

**CVEN 5919 (3) Global Development for Engineers**
Focuses on the fundamental tools necessary to address sustainable community development projects in low-income communities (LICs). Topics include: human development, sustainable development, and presentation of an integrative and participatory framework for development projects in LICs. The framework consists of a combination of development and engineering project management tools. Framework is illustrated through case studies and student-driven team projects.
**Requisites:** Restricted to students with sub-plan of Engineering Developing Communities (EDC) or certificate (ENDC-CERG) only.
**Additional Information:** Departmental Category: Special Topics

**CVEN 5929 (3) Sustainable Community Development 2**
Covers the principles, practices and strategies of appropriate technology as part of an integrated and systems approach to community-based development. Course content areas include technical issues in development, environmental health and communicable disease, appropriate and sustainable technologies with hands-on workshops, and global cooperation in development.
**Requisites:** Requires prerequisite course of CVEN 5919 (minimum grade C-). Restricted to students with Engineering Developing Commnities (EDC) sub-plan or EDC certificate (ENDC-CERG).
**Additional Information:** Departmental Category: Special Topics

**CVEN 5939 (3) Global Engineering and Hazard Resilience Practicum**
Provides students with a field-based and/or team project-based opportunity to synthesize and integrate knowledge acquired in Mortenson Center courses and other learning experiences, and to apply theory and principles in a situation that approximates professional practice in global engineering and hazard resilience.
**Requisites:** Requires prerequisite course CVEN 5919 or CVEN 5909 (minimum grade C-). Restricted to students with sub-plan of Global Engineering/Engineering Developing Communities (EDC) or certificate (ENDC-CERG) only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 5969 (1-3) Water, Sanitation, and Hygiene**
Studies the fundamentals behind effective hygiene and remediation processes and engineering solutions developed/designed for specific international problems. Approaches to hygiene, clean water and sanitation in lesser industrialized countries often demand alternative solutions to those developed for industrialized societies. Explores issues and solutions developed to tackle these problems.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisites CVEN 3424 and CVEN 3414.
**Additional Information:** Departmental Category: Environmental

**CVEN 5979 (1) Community Appraisal**
Provides conceptual and methodological tools that can be employed in different phases of international development projects and studies. Community appraisal methods will be presented with emphasis on participatory research approaches, need assessment tools, and ethnographic methods; related cultural, ethical, and personal issues will be also discussed. Students will be introduced to secondary data gathering, and the usage of the main data resources on food and water security, energy access, and health status.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** of EVEN 2909 or CVEN 5919 or CVEN 5909.
**Grading Basis:** Letter Grade

**CVEN 5989 (1) Study Design and Impact Evaluation**
Covers the characteristics of the different study designs that can be used to assess the impact of international development interventions. Students will be introduced to the main types of study design, including randomized controlled trials, quasi-experimental studies, and interrupted time series. Ethical considerations faced when conducting research on human subjects and the compliance process to obtain approval from the Institutional Review Board will be presented.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** EVEN 2909 or CVEN 5919 or CVEN 5909.
**Grading Basis:** Letter Grade

**CVEN 5999 (1) Data Analytics for Development**
Provides students with skills in using the collection of R tidyverse packages as a tool for data analysis, reproducible research and communication. Lectures will be delivered through participatory live coding for students to learn how to write code in code-along exercises. We will use publicly available data related to waste management, air quality, water, and sanitation. Students will learn how to build upon the obtained skills to apply them to their data analysis projects.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisites of EVEN 2909 or CVEN 5919 or CVEN 5909.
**Grading Basis:** Letter Grade

**CVEN 6161 (3) Advanced Mechanics of Materials 2**
Fundamentals of continuum mechanics, finite deformations, Lagrangian finite strains, Cauchy and Piola Kirchoff stress tensors, plasticity and thermo-elasticity, elements of damage mechanics, elements of fracture mechanics, rehological and visoelastic theories, and modern experimental techniques.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisite CVEN 5161.
**Additional Information:** Departmental Category: Mechanics

**CVEN 6333 (3) Introduction to Multi-Scale Variability and Scaling in Hydrology**
Provides a foundational physical understanding of channel networks, runoff, precipitation, and evapotranspiration at multiple spatial scales of drainage basins using modern analytical concepts for understanding non-linear phenomena, e.g., fractals, multifractals, statistical scaling, criticality, and renormalization.
**Requisites:** Requires a prerequisite course of CVEN 5333 (minimum grade C-).
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 6383 (3) Flow and Transport through Porous Media**
Studies basic physics of flow and transport of water, air, and other fluid mixtures through a porous medium. Course topics are relevant to applications in contaminant hydrology, contaminant transport in aquifers, hazardous waste management, geohydrology, soil physics, and geoenvironmental engineering.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 6393 (1) Hydrologic Sciences and Water Resources Engineering Seminar**
Provides a broad introduction to a variety of research topics from hydrologic sciences and water resources engineering. Offered as a one-hour weekly seminar by the departmental water faculty, graduate students,and external speakers.
**Requisites:** Restricted to graduate student Civil (CVEN) Engineering students only.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 6414 (3) Aquatic Surfaces and Particles**
Examines the role of surfaces and particles in the fate and transport of contaminants in the aquatic environment. Emphasizes modeling of absorption, dissolution, precipitation, surface-catalyzed reactions, and coagulation and filtration kinetics.
**Requisites:** Requires prerequisite course of CVEN 5404 or GEOL 5280 (minimum grade C-).
**Additional Information:** Departmental Category: Environmental

**CVEN 6511 (3) Nonlinear Finite Element Analysis of Solids and Porous Media**
Covers constitutive modeling, multiphase mechanics, and finite element implementation of constitutive models and coupled solid-fluid mechanical governing equations for inelastic porous media at small strain. Considers transient and steady state conditions. Analyzes structural, geotechnical, geological, mechanical, biomechanical, and other related modern engineering problems. Uses general purpose finite element software program for implementation and analysis.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Mechanics

**CVEN 6525 (3) Computational Structural Analysis 2**
Covers theoretical underpinnings of nonlinear analysis of framed structure in terms of the direct stiffness method along with its transition to the finite element method. Computational modelling and nonlinear analysis of geometric and material nonlinearities are explored. Familiarity with the modern computing and programming environments is increased to address the needs in the structural engineering and mechanics area. Computer programming is applied to the solution of problems in nonlinear structural analysis.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Structures

**CVEN 6595 (3) Earthquake Engineering**
Analyzes and designs structures for earthquake load covering: properties of earthquake ground motions, ground motion prediction equations, seismic hazard analysis, response spectra, response of linear and nonlinear structures, construction of design spectra, seismic design methods, and building code requirements.
**Requisites:** Requires prerequisite course of CVEN 5111 (minimum grade of C-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Structures

**CVEN 6708 (3) Constitutive Modeling of Soils and Materials**
Train students to interpret and develop constitutive models for soils and other materials. Cover the basics of tensors, stress strain, and balance laws to set up the mathematical background for describing continuums. Review failure criteria, elastic and elastoplastic models for materials. The concept of critical state and the Cam-Clay Model will be discussed as a unified description of soils. Poroelasticity, viscoelasticity, viscoplasticity, and energy principles in constitutive modeling will be discussed as advanced topics.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CVEN 5708 and corequisite or prerequisite of CVEN 5131 Continuum Mechanics and Elasticity.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Geotechnical

**CVEN 6830 (3) Special Topics**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Building Systems

**CVEN 6831 (3) Special Topics**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Mechanics

**CVEN 6833 (1-3) Special Topics**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 6834 (1-3) Special Topics**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Environmental

**CVEN 6835 (3) Special Topics**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Structures

**CVEN 6836 (3) Special Topics**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Construction

**CVEN 6837 (3) Sp Tpcs Comp Graphics**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 6838 (3) Special Topics**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 6839 (1-3) Special Topics**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Special Topics

**CVEN 6949 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Additional Information:** Departmental Category: Special Topics

**CVEN 6959 (1-4) Master's Thesis**
**Additional Information:** Departmental Category: Special Topics

**CVEN 6969 (1-3) Masters Report**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Special Topics

**CVEN 7111 (3) Advanced Structural Dynamics**
Includes general vibrations of civil engineering structures and their response to various types of time-dependent loads.
**Requisites:** Requires prerequisite course of CVEN 5111 (minimum grade C-).
**Additional Information:** Departmental Category: Mechanics

**CVEN 7141 (3) Plates and Shells**
Teaches mathematical theories of plate and shell structures and their applications. Involves numerical finite element solutions of plates and shells of various shapes under static and dynamic loadings.
**Requisites:** Requires prerequisite courses of CVEN 5131 or CVEN 5161 (minimum grade C-).
**Additional Information:** Departmental Category: Mechanics

**CVEN 7161 (3) Fracture Mechanics**
Includes three parts: 1) fundamentals through rigorous mathematical formulations of linear/nonlinear elastic fracture mechanics, 2) materials' theoretical strength, including metals, granular materials, polymers and steel, 3) numerical (finite element) methods in fracture mechanics. Heavy emphasis on project and independent work.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Mechanics

**CVEN 7511 (3) Computational Finite Inelasticity and Multiphase Mechanics**
Covers kinematics, thermodynamics, coupled balance equations and constitutive models, numerical time integration, and finite element implementation of finite strain inelasticity and multiphase mechanics. Kinematics of multiplicative decomposition, and finite strain mixture theory. Linearization for global nonlinear Newton-Raphson and solution algorithm of nonlinear constitutive models and coupled balance equations.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisites CVEN 5131 and CVEN 5511 and CVEN 6511.
**Additional Information:** Departmental Category: Mechanics

**CVEN 7788 (3) Soil Behavior**
Topics include soil mineralogy, formation of soils through sedimentary processes and weathering, determination of soil composition, soil water, colloidal phenomena in soils, fabric property relationships, analysis of mechanical behavior including compressibility, strength and deformation, and conduction phenomena in terms of physicochemical principles. Involves applications for stabilization and improvement of soils, and disposal of waste materials.
**Recommended:** Prerequisite CVEN 3718.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 7831 (1-3) Sp Tpc-Constitutive Mech**
**Repeatable:** Repeatable for up to 10.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Mechanics

**CVEN 7838 (3) Special Topics**
**Additional Information:** Departmental Category: Geotechnical

**CVEN 7849 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Special Topics

**CVEN 8999 (1-10) Doctoral Dissertation**
**Additional Information:** Departmental Category: Special Topics

# Civil Engineering - Doctor of Philosophy (PhD)

Students typically complete their PhD in civil, environmental and architectural engineering within 4 to 5 years, depending on whether they enter the program with a master's degree. It is possible for highly qualified students to enter the PhD program directly without a master's degree.

Our PhD program is intended to help students achieve a high level of engineering competence and develop their ability to perform original research that advances the field of civil engineering and beyond. PhD students in the program are typically supported with research and teaching assistantships, but are also often successful in obtaining their own fellowships or sponsorships from external agencies.

Areas of study within the Civil Engineering Department are:

- Building systems engineering
- Construction engineering and management
- Geoenvironmental engineering
- Geotechnical engineering
- Civil systems engineering
- Engineering science
- Structural engineering and structural mechanics
- Hydrology, water resources and environmental fluid mechanics

For more information, visit the department's Graduate Studies (http://www.colorado.edu/ceae/prospective-students/graduate-studies/) webpage.

## Requirements

The PhD requires 30 credit hours of coursework, plus 30 hours of dissertation credit. PhD students are also required to successfully complete a preliminary exam, a comprehensive exam and a final dissertation defense.

### Preliminary Examination

Each doctoral student shall take a preliminary examination as determined by the faculty of the specialty area in which the student is enrolled, normally not later than 12 months from the time the student is first enrolled in the doctoral program. The student must pass this examination in order to continue in the doctoral program. Specific format of the preliminary examination varies by the area of study, so the student should check with their advisor for additional details.

### Comprehensive Examination

The comprehensive examination shall consist of a written and an oral examination. The exam may not be attempted until the student's last semester of formal coursework. At the comprehensive examination, the student shall present a plan for the dissertation research to the advisory committee for approval. Failure to pass the comprehensive examination may be remedied by repeating the examination after an interval of not less than four months. Specific format of the comprehensive examination varies by the area of study, so the student should check with their advisor for additional details.

### PhD Dissertation

Students must write a dissertation based on original research conducted under the supervision of a graduate faculty member. The dissertation must fulfill all Graduate School requirements. After the dissertation is completed, an oral final examination on the dissertation and related topics is conducted by the student's doctoral committee.

### Time Limit

All degree requirements must be completed within six years of the date of commencing coursework.

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate a mastery of the fundamentals of their chosen civil engineering discipline.
- Communicate knowledge through effective oral presentations and technical writing.
- Successfully conduct high-quality, original research in civil engineering.

# Civil Engineering - Master of Science (MS)

The department's objective is to produce engineers capable of identifying, preventing and solving building, construction and environmental problems. In addition to the well-established graduate programs in environmental, water resource and geotechnical engineering, students in the department may also choose to study in the emerging field of geoenvironmental engineering. Campus facilities, including a National Science Foundation-funded earthquake simulator, permit a case-study approach, which exposes students to real-world problems and allows experimentation, testing and analysis.

Areas of study within the Civil Engineering Department are:

- Building systems engineering
- Civil systems engineering
- Construction engineering and management
- Engineering science
- Environmental engineering
- Environmental fluid mechanics and hydraulic engineering
- Geoenvironmental engineering
- Geotechnical engineering and geomechanics
- Global engineering
- Structural engineering and structural mechanics
- Hydrology and water resources management

For more information, visit the department's Graduate Studies (http://www.colorado.edu/ceae/prospective-students/graduate-studies/) webpage.

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s):

- Architectural Engineering - Bachelor of Science (BS) (p. 904)
- Civil Engineering - Bachelor of Science (BS) (https://catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/civil-environmental-architectural-engineering/civil-engineering-bachelor-science-bs/#acceleratedmasterstext)
- Environmental Engineering - Bachelor of Science (BS) (https://catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/civil-environmental-architectural-engineering/environmental-engineering-bachelor-science-bs/#acceleratedmasterstext)

# Requirements

## Course Requirements

The Master of Science degree in civil engineering requires a total of 30 credit hours (including coursework and thesis hours) with a grade of B- or better and a cumulative GPA of at least 3.00. At least 24 credit hours must be completed at the 5000 level or above, and at least 18 of those credits must be in CVEN courses. In addition, specific focus area requirements must be met.

Students may apply up to 6 credit hours of approved 4000-level courses from departments outside CEAE to their master's degree if the courses fit with the student's degree plan.

## Degree Plans

### Plan I: Thesis Option

Students must complete 6 credit hours of MS thesis. Plan I culminates with an oral presentation and/or written report or oral examination.

### Plan II: Non-Thesis Option

There are two non-thesis options:

- Students choosing Plan IIa must complete at least 30 credit hours of coursework, including a 3-credit independent study report.
- Students choosing Plan IIb must complete at least 30 credit hours of coursework and pass a final exam.

## Time Limit

All degree requirements must be completed within four years of the date of commencing coursework. Most students complete the degree in one to two years.

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate a mastery of the fundamentals of their chosen civil engineering discipline.
- Communicate knowledge through effective oral presentations and technical writing.
- Demonstrate experience and facility with civil engineering methods through successful hands-on projects and/or research.

# Civil Engineering - Professional Master of Science (MSCVE)

The Department of Civil, Environmental and Architectural Engineering offers a professional master's degree tailored toward working engineers who desire to develop a new skill set. The programs are coursework based and result in a Master of Science degree.

# Areas of Emphasis

## Water Engineering and Management Emphasis

CU Boulder's professional Master of Science degree in civil engineering, with an emphasis in water engineering and management (WE&M), combines technical courses in environmental and civil engineering with highly-valued professional, non-technical skills in communication, leadership, management, utility finance and governance. The water engineering and management program provides students with leadership skills so they can effectively manage teams and initiatives typically faced in the water profession.

The water engineering and management professional master's program (PMP), designed for working professionals, provides the tools you need to produce results and solve increasingly complex problems in the water profession. Courses are delivered on campus and live streamed/recorded options over the internet, allowing working professionals from around the world to earn a graduate MS degree while continuing to put the learning into practice in their work.

Students are young and mid-career professionals working for utilities, consulting firms, government and regulatory agencies, looking to advance their careers in the water industry. With faculty of senior water professionals from across the country, including those from utilities, consulting firms, and global professional organizations, students gain an opportunity to network and learn through real work case studies.

All of the graduate courses are available to distance and on campus students. All the students can come to class, watch the live classes over Zoom and/or the recorded Zoom classes. The PMP program is a coursework-only degree and requires 30 credits. These credits can be obtained with ten, 3-credit hour courses.

The WE&M courses are available for a WE&M graduate certificate (https://www.colorado.edu/ceae/water-engineering-management-certificate/) or as an Professional MS degree (https://www.colorado.edu/ceae/water-engineering-management-professional-masters-program/).

## Global Engineering Emphasis

The master of science degree in civil engineering with an emphasis in global engineering is a unique program offered by the Mortenson Center at CU Boulder. This degree is a professional track of the MS program in civil engineering. It is designed to offer students exposure to a breadth of knowledge in relevant areas such as global health, development economics and impact evaluation, while also building technical skills and providing the opportunity for further study in a specific area of interest within global engineering. In addition to classroom-based learning, students are required to complete a field practicum, embedded for six weeks to six months with a global development organization. These practicum placements have taken place in over 50 countries, partnering with over 80 organizations. Learn more about our practicum partnerships on the Mortenson Center (https://www.colorado.edu/center/mortenson/education/practicum-placements/) website.

Our graduates are able to provide technical expertise to development agencies or other firms by recognizing the many facets of community development that are critical to sustainable solutions. Students gain

skills in data analysis, project management and systems thinking so they can help create and implement solutions to address worldwide needs.

For more information, visit the Mortenson Center in Global Engineering (https://www.colorado.edu/center/mortenson/) webpage.

## Dual-Track Civil Engineering Emphasis

The dual-track professional master of science degree in civil engineering provides students and practicing professionals graduate-level engineering specialization and technical competence in more than a single area. The intended cross-disciplinary training and perspective is often needed to serve or lead in the diverse field of civil engineering where engineers typically have to work in and interact with others from more than one discipline in large and small projects, private and government sectors, in design and development as well as consulting services. The broader technical preparation expands their career opportunities, professional outlook and provides multiple pathways to leadership and management positions. The high demand nationally for more broadly trained graduates in civil engineering to satisfy our sustainable and resilient infrastructure needs and in turn the national's overall economical development points to the benefit of a cross-disciplinary general civil engineering coursework-only professional master's degree.

For more information, visit the department (https://www.colorado.edu/ceae/civil-engineering-professional-master-science-mscve-dual-track-option/) website.

# Requirements

## Course Requirements

The following course requirements are subject to change; for the most current information, visit the department's Water Engineering & Management webpage or the Mortenson Center in Global Engineering (https://www.colorado.edu/center/mortenson/) webpage.

The professional master's degree requires a total of 30 credit hours, at least 24 of which must be completed at the 5000 level or above. At least 18 credit hours must be from coursework in CVEN.

## Time Limit

All degree requirements must be completed within four years of the date of commencing coursework.

## Areas of Emphasis

### Water Engineering & Management Emphasis

This emphasis requires at least 30 credit hours from the following categories.

| Code | Title | Credit Hours |
|---|---|---|
| **Environmental Engineering Core Courses** | | |
| CVEN 5464 | Environmental Engineering Processes | 3 |
| CVEN 5404 | Water Chemistry | 3 |
| CVEN 5484 | Integrative Environmental and Molecular Microbiology | 3 |
| Choose one: | | 3 |
| CVEN 5524 | Drinking Water Treatment | |
| CVEN 5534 | Wastewater Treatment | |
| CVEN 5474 | Hazardous and Industrial Waste Management | |
| **Water Engineering & Management Core Courses** | | |
| CVEN 5564 | Water Profession: Communication and Utility Finance | 3 |
| CVEN 5574 | Water Utility Management: Current Issues and Future Challenges | 3 |
| CVEN 5584 | Water Profession: Leadership and Management | 3 |
| **Electives & Master's Report and Seminar Courses** | | |
| Choose from the the following for a total of 9 credits: | | 9 |
| Civil engineering electives (3-9 credits) | | |
| Public affairs electives at CU Denver (0-3 credits) | | |
| Master's Report and Seminar (2 credits) | | |
| Additional courses to fulfill 30-credit minimum, if necessary. | | |
| **Total Credit Hours** | | **30** |

### Global Engineering Emphasis

This emphasis requires at least 30 credit hours distributed as follows.

- **Required core courses**: All global engineering emphasis students start their program with Hazard, Resilience and Sustainability for the Natural and Built Environments or Global Development for Engineers, each of which introduces students to the complexities of global climate change and its hazards, inequalities and opportunities, providing a survey approach to understanding major historical causes, theories, institutions, policies and emerging solutions. The Global Engineering and Hazard Resilience Practicum provides students with a field-based and/or team project-based opportunity to synthesize and integrate knowledge acquired in Mortenson Center courses and other learning experiences and to apply theory and principles in a situation that approximates professional practice in global engineering and hazard resilience. Students typically fulfill the practicum requirement the summer after the first academic year in the program. These two core courses fulfill six of the required 30 credits for the PMP.
- **Global sustainability recommended courses**: The courses are recommended for students to provide breadth in skills and subject matter exposure in the areas of geospatial data analytics, environmental change and socially responsible enterprise. The courses may be adjusted or substituted based on agreement with a student's advisor.
- **Global engineering and resilience series**: The Mortenson Center offers courses as a series of five-week modules, with each module worth one credit-hour. For the Professional Master in Global Engineering, students are required to complete 9-12 credit-hours from the series.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Core Courses** | | |
| CVEN 5919 | Global Development for Engineers | 3 |
| or CVEN 5909 | Hazards, Resilience, and Sustainability for the Natural and Built Environments | |
| CVEN 5939 | Global Engineering and Hazard Resilience Practicum | 3 |
| **Global Sustainability Recommended Courses** | | **12-15** |
| ENVS 5100 | Special Topics in Environmental Studies (Geospatial Data Analytics) | |
| ENVM 5018 | The Scientific Basis of Environmental Change | |

| | | |
|---|---|---|
| MBAX 6000 | Socially Responsible Enterprise | |
| Electives | | |
| **Global Engineering and Resilience Series** | | **9-12** |
| *Principles* | | |
| CVEN 5109 | Introduction to Environmental and Development Economics for Engineers | |
| CVEN 5119 | Introduction to Global Health for Engineers | |
| *Project Management* | | |
| CVEN 5129 | Program and Project Management | |
| CVEN 5139 | Solution Identification and Proposal Development | |
| *Field Methods* | | |
| CVEN 5979 | Community Appraisal | |
| CVEN 5989 | Study Design and Impact Evaluation | |
| CVEN 5999 | Data Analytics for Development | |
| *Water, Sanitation and Hygiene (WASH)* | | |
| CVEN 5969 | Water, Sanitation, and Hygiene | |
| *Disaster Risk Reduction and Recovery* | | |
| EVEN 5979 | Introduction to Humanitarian Aid | |
| EVEN 5989 | Disaster Risk Reduction | |
| EVEN 5999 | Refugees and Displacement | |
| *Household Energy* | | |
| MCEN 5299 | Household Energy Systems | |
| **Total Credit Hours** | | **30** |

[1] Global Engineering Series course options can be found on the Mortenson Center (https://www.colorado.edu/center/mortenson/graduate-education/professional-masters-degrees/) website.

### Dual-Track Emphasis

For this emphasis, students are required to:

1. Select 9 credit hours from the courses listed in **Group A** and 15 credit hours from **Group B** of more than one **sub-areas listed below**.
2. Select 6 credits of 5000-level free electives from the extensive course offerings from civil or other engineering disciplines in the College or professional management classes, collectively referred to as **Group C**.

| Code | Title | Credit Hours |
|---|---|---|
| **Sub-area 1: Structural Engineering** | | |
| *Group A* | | |
| CVEN 5161 | Advanced Mechanics of Materials I | |
| CVEN 5525 | Computational Structural Analysis 1 | |
| CVEN 5511 | Introduction to Finite Element Analysis | |
| CVEN 5111 | Structural Dynamics | |
| *Group B* | | |
| CVEN 5575 | Advanced Topics in Steel Design | |
| CVEN 5585 | Advanced Topics in Reinforced Concrete Design | |
| CVEN 6595 | Earthquake Engineering | |
| **Sub-area 2: Construction Engineering** | | |
| *Group A* | | |
| CVEN 5006 | Construction Engineering and Management Fundamentals | |
| CVEN 5226 | Construction Safety | |
| CVEN 5346 | Managing Construction and Engineering Projects and Organizations | |
| CVEN 5446 | Infrastructure Asset Management | |
| *Group B* | | |
| CVEN 5246 | Legal Aspects of Construction | |
| CVEN 5276 | Engineering Risk and Decision Analysis | |
| CVEN 5836 | Special Topics for Seniors/Grads (BIM for Capital Projects) | |
| CVEN 5836 | Special Topics for Seniors/Grads (AI/ML in the Built Environment) | |
| **Sub-area 3: Geotechnical Engineering** | | |
| *Group A* | | |
| CVEN 5708 | Soil Mechanics | |
| CVEN 5798 | Dynamics of Soils and Structures | |
| CVEN 5788 | Computational Modeling in Geotechnical Engineering | |
| CVEN 5768 | Introduction to Rock Mechanics | |
| *Group B* | | |
| CVEN 5628 | Seepage and Slopes | |
| CVEN 5728 | Foundation Engineering | |
| CVEN 5818 | Geotechnical Earthquake Engineering | |
| **Sub-area 4: Water Resources Engineering** | | |
| *Group A* | | |
| CVEN 5333 | Physical Hydrology | |
| CVEN 5353 | Groundwater Hydrology | |
| CVEN 5313 | Environmental Fluid Mechanics | |
| CVEN 5454 | Statistical Methods for Natural and Engineered Systems | |
| CVEN 5537 | Numerical Methods in Civil Engineering | |
| *Group B* | | |
| CVEN 5363 | Modeling of Hydrologic Systems | |
| CVEN 5393 | Water Resources System and Management | |
| CVEN 5383 | Applied Groundwater Modeling | |
| CVEN 5343 | Transport and Dispersion in Surface Water | |
| CVEN 5423 | Water Resources Engineering Design | |

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate a mastery of the fundamentals of their chosen civil engineering discipline.
- Communicate knowledge through effective oral presentations and technical writing.
- Successfully gain hands-on experience with civil engineering methods through hands-on projects or research.

# Global Engineering - Graduate Certificate

The Mortenson Center in Global Engineering & Resilience trains engineers to work in partnership with institutions and communities worldwide to

develop improved tools, technologies and methods to address global challenges.

Any student pursuing a relevant graduate degree at CU Boulder may apply for concurrent enrollment in the Mortenson Center **Graduate Certificate in Global Engineering**. The certificate gives you a broad, multi-disciplinary introduction to international development and will prepare you to work globally and in low-resource settings regardless of your background. The program includes a **hands-on, in-person Practicum** where you will be placed with one of our 80+ partner programs to further your knowledge and experience and to contribute to their mission. For more information, visit the Mortenson Center (https://www.colorado.edu/center/mortenson/education/graduate-education/graduate-certificate/) website.

# Requirements

## Eligibility

The Mortenson Center in Global Engineering & Resilience offers a graduate certificate to degree-seeking graduate-level students (including BS/MS students in their final year and MS or PhD students) enrolled in a relevant degree program at CU Boulder. The global engineering graduate certificate requirements are separate from the graduate degree requirements established by each student's home department. Therefore, graduate students interested in completing the certificate need to contact their respective academic advisors to determine how the certificate courses will fit into their overall degree plan.

- Submit a Certificate Enrollment Form (https://www.colorado.edu/center/mortenson/node/1577/) signed by your academic advisor prior to being able to register for Mortenson Center courses.
- Earn the certificate by satisfactorily completing 12 credit-hours approved by the Mortenson Center, with a grade of B- or higher in each course or module.

## Program Requirements

Students earn the certificate by satisfactorily completing the four required courses listed below, with a grade of B- or higher in each course.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CVEN 5919 | Global Development for Engineers | 3 |
| CVEN 5929 | Sustainable Community Development 2 | 3 |
| CVEN 5939 | Global Engineering and Hazard Resilience Practicum | 3 |
| CVEN 5837 | Special Topics for Seniors/Grads (Fieldwork Methods for Development Engineers) | 3 |
| **Total Credit Hours** | | **12** |

# Computer Science

The University of Colorado Boulder Computer Science graduate program is one of the top ranked programs in the *U.S. News & World Report* Best Graduate Schools issue among public universities. Students receive a strong education and conduct groundbreaking tier-one research. We have 60+ faculty members conducting fundamental and applied research in artificial intelligence, complex systems, robotics, computational biology, human centered computing, numerical & scientific computing, programming languages, software engineering, systems and networking, verification and theory of computing.

The department has also been awarded funds for national centers like the Pervasive Personalized Intelligence IUCRC, ASPIRE, NSF AI Institute for Students-AI Teaming.

Boulder is also home to research and development operations for many large companies and four federal research labs: the National Center for Atmospheric Research, the National Institute for Standards and Technology, the National Oceanic and Atmospheric Administration and the National Renewable Energy Laboratory.

Recent doctoral and master's graduates accepted employment at companies including, but not limited to, the following: Microsoft, Apple, Google, Facebook, Twitter, Cisco, Raytheon, HP, NASA, Amazon, Sandia National Laboratories, Northrop Grumman and Seagate. Many of our graduating PhD students also enter careers in academia.

For more information, visit the Computer Science (http://www.colorado.edu/cs/) website.

# Master's Degrees

- Computer Science - Master of Science (MS) (p. 1672)
- Computer Science - Master of Science (MS) Online (p. 1674)
- Computer Science - Professional Master of Science (MSCPS) (p. 1676)
- Network Engineering - Master of Science (MSNE) (p. 1681)

# Doctoral Degree

- Computer Science - Doctor of Philosophy (PhD) (p. 1683)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Acuna, Daniel (https://experts.colorado.edu/display/fisid_172426/)
Associate Professor; PhD, University of Minnesota Twin Cities

Agocs, Fruzsina
Assistant Professor; PhD, University of Cambridge

Ahmed, Nisar R. (https://experts.colorado.edu/display/fisid_153237/)
Associate Professor; PhD, Cornell University

Alistar, Mirela (https://experts.colorado.edu/display/fisid_164177/)
Assistant Professor; PhD, Technical University of Denmark

Anderson, Kenneth M. (https://experts.colorado.edu/display/fisid_113566/)
Chair, Professor; PhD, University of California, Irvine

Antoniak, Maria
Visiting Assistant Professor; Ph.D., Cornell University

Ashraf, Asa
Associate Teaching Professor; MS, South Dakota State University

Ayanzadeh, Ramen
Assistant Professor; PhD, University of Maryland

Banic, Amy
Visiting Associate Professor

Bastias, Alfonso (https://experts.colorado.edu/display/fisid_143688/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Bennett, Huck (https://experts.colorado.edu/display/fisid_174352/)
Assistant Professor; PhD, New York University

Black, John (https://experts.colorado.edu/display/fisid_126540/)
Associate Professor; PhD, University of California, Davis

Bortz, David Matthew (https://experts.colorado.edu/display/fisid_143348/)
Associate Professor; PhD, North Carolina State University

Bradley, Elizabeth (https://experts.colorado.edu/display/fisid_100546/)
Professor; PhD, Massachusetts Institute of Technology

Brown, Jed (https://experts.colorado.edu/display/fisid_153965/)
Associate Professor; DSc, ETH Zürich (Switzerland)

Brubaker, Jed Richards (https://experts.colorado.edu/display/fisid_156193/)
Assistant Professor; PhD, University of California, Irvine

Burke, Robin D. (https://experts.colorado.edu/display/fisid_165005/)
Professor; PhD, Northwestern University

Cai, Xiao-Chuan (https://experts.colorado.edu/display/fisid_100636/)
Professor Emeritus; PhD, New York University

Chang, Bor-Yuh Evan (https://experts.colorado.edu/display/fisid_146087/)
Associate Chair, Associate Professor; PhD, University of California, Berkeley

Chaspari, Theodora (https://experts.colorado.edu/display/fisid_173681/)
Associate Professor; PhD, University of Southern California

Chen, Lijun (https://experts.colorado.edu/display/fisid_149472/)
Associate Professor; PhD, California Institute of Technology

Chen, Yueqi (https://experts.colorado.edu/display/fisid_171984/)
Assistant Professor; PhD, Pennsylvania State University

Clauset, Aaron (https://experts.colorado.edu/display/fisid_147554/)
Professor; PhD, University of New Mexico

Colunga, Eliana (https://experts.colorado.edu/display/fisid_129477/)
Associate Professor; PhD, Indiana University Bloomington

Correll, Nikolaus J. (https://experts.colorado.edu/display/fisid_147555/)
Associate Professor; PhD, Ecole Polytech Federale de Lausanne (Switzerland)

Cox, Murray William (https://experts.colorado.edu/display/fisid_153192/)
Associate Teaching Professor; PhD, Texas A&M University

D'Mello, Sidney (https://experts.colorado.edu/display/fisid_159117/)
Professor; PhD, University of Memphis

Devendorf, Laura (https://experts.colorado.edu/display/fisid_158564/)
Assistant Professor; PhD, University of California, Berkeley

Do, Ellen Yi-Luen (https://experts.colorado.edu/display/fisid_159925/)
Professor; PhD, Georgia Institute of Technology

Dowell, Robin D. (https://experts.colorado.edu/display/fisid_147779/)
Associate Professor; DSc, Washington University

Dykes Jim (https://experts.colorado.edu/display/fisid_156791/)
Assistant Teaching Professor; MS, University of Colorado Boulder

Eichen, Elliot
Research Professor; PhD, University of Arizona

El Helbawy, Mona
Associate Faculty Director, Associate Teaching Professor; PhD, University of Colorado Boulder

Fiesler, Casey Lynn (https://experts.colorado.edu/display/fisid_155950/)
Associate Professor; PhD, Georgia Institute of Technology

Frew, Eric W. (https://experts.colorado.edu/display/fisid_134685/)
Professor; PhD, Stanford University

Frongillo, Rafael M. (https://experts.colorado.edu/display/fisid_156416/)
Associate Professor; PhD, University of California, Berkeley

Gifford, Kevin K. (https://experts.colorado.edu/display/fisid_104361/)
Faculty Director, Research Professor; PhD, University of Colorado Boulder

Godley Christopher (https://experts.colorado.edu/display/fisid_172491/)
Assistant Teaching Professor; MS, University of Colorado Boulder

Grochow, Joshua A. (https://experts.colorado.edu/display/fisid_158240/)
Associate Professor; PhD, University of Chicago

Gross, Mark D. (https://experts.colorado.edu/display/fisid_100095/)
Director, Professor; PhD, Massachusetts Institute of Technology

Grunwald, Dirk C. (https://experts.colorado.edu/display/fisid_102261/)
Associate Chair, Professor; PhD, University of Illinois at Urbana–Champaign

Guinn, Curry
Associate Teaching Professor; Ph.D, Duke University

Gurari Danna (https://experts.colorado.edu/display/fisid_104361/)
Assistant Professor; PhD, Boston University

Ha, Sangtae (https://experts.colorado.edu/display/fisid_153246/)
Associate Professor; PhD, North Carolina State University

Hamza, Ahmed
Associate Teaching Professor; PhD, University of Portsmouth (England)

Hauser, Thomas (https://experts.colorado.edu/individual/fisid_148662/)
Associate Professor Adjunct; PhD, Technische Universität München (Germany)

Hayes, Bradley H. (https://experts.colorado.edu/display/fisid_159810/)
Associate Professor; PhD, Yale University

Heckman, Christoffer (https://experts.colorado.edu/display/fisid_155294/)
Associate Professor; PhD, Cornell University

Herman, C.J. (https://experts.colorado.edu/individual/fisid_152265/)
Faculty Director, Associate Teaching Professor; BS, Stony Brook University

Herzfeld, Ute C. (https://experts.colorado.edu/display/fisid_106575/)
Research Professor; PhD, Johannes Gutenberg-Universität Mainz (Germany)

Hoenigman, Rhonda (https://experts.colorado.edu/display/fisid_152997/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Hunter, Lawrence (https://experts.colorado.edu/display/fisid_143568/)
Professor; PhD, Yale University

Izraelevitz, Joe (https://experts.colorado.edu/display/fisid_166042/)
Assistant Professor; PhD, University of Rochester

Jansen, Kenneth E. (https://experts.colorado.edu/display/fisid_147360/)
Professor; PhD, Stanford University

Jessup, Elizabeth R. (https://experts.colorado.edu/display/fisid_102065/)
Professor Emeritus; PhD, Yale University

Kaki, Gowtham (https://experts.colorado.edu/individual/fisid_167225/)
Assistant Professor; PhD, Purdue University

Karimzadeh, Morteza (https://experts.colorado.edu/display/fisid_166081/)
Assistant Professor; PhD, Pennsylvania State University

Keegan, Brian (https://experts.colorado.edu/display/fisid_158122/)
Assistant Professor; PhD, Northwestern University

Keller, Eric Robert (https://experts.colorado.edu/display/fisid_151647/)
Associate Professor; PhD, Princeton University

King, Roger A.
Professor Emeritus

Kissler, Stephen
Assistant Professor; PhD, University of Cambridge

Knox, David Allen (https://experts.colorado.edu/display/fisid_158054/)
Assistant Teaching Professor; PhD, University of Colorado Health Sciences Center

Lahijanian, Morteza Mehdi (https://experts.colorado.edu/display/fisid_164179/)
Assistant Professor; PhD, Boston University

Larremore, Daniel B. (https://experts.colorado.edu/display/fisid_159893/)
Assistant Professor; PhD, University of Colorado Boulder

Layer, Ryan M. (https://experts.colorado.edu/display/fisid_163567/)
Assistant Professor; PhD, University of Virginia

Lehman, Tamara (https://experts.colorado.edu/display/fisid_165649/)
Assistant Professor; PhD, Duke University

Lewis, Clayton H. (https://experts.colorado.edu/display/fisid_100307/)
Professor Emeritus; PhD, University of Michigan Ann Arbor

Lladser, Manuel E. (https://experts.colorado.edu/display/fisid_134170/)
Associate Professor; PhD, The Ohio State University

Lofquist, Mark
Assistant Research Professor; PhD, University of Colorado Boulder

Lv, Qin (https://experts.colorado.edu/display/fisid_145832/)
Professor, Associate Chair; PhD, Princeton University

MacCurdy, Robert B. (https://experts.colorado.edu/display/fisid_163307/)
Assistant Professor; PhD, Cornell University

Martin, James H. (https://experts.colorado.edu/display/fisid_100495/)
Professor; PhD, University of California, Berkeley

Mishra, Shivakant (https://experts.colorado.edu/display/fisid_118376/)
Professor; PhD, University of Arizona

Monteleoni, Claire Elizabeth (https://experts.colorado.edu/display/fisid_163979/)
Associate Professor; PhD, Massachusetts Institute of Technology

Morrison, Rebecca E. (https://experts.colorado.edu/display/fisid_159999/)
Assistant Professor; PhD, University of Texas Austin

Mozer, Michael C. (https://experts.colorado.edu/display/fisid_105922/)
Research Professor; PhD, University of California, San Diego

Naidu, Supriya (https://experts.colorado.edu/display/fisid_166267/)
Assistant Teaching Professor; MS, University of Colorado Boulder

Nath Sreesha (https://experts.colorado.edu/display/fisid_165807/)
Associate Chair, Assistant Teaching Professor; MS, University of Colorado Boulder

Nielsen Katherine (https://experts.colorado.edu/display/fisid_172532/)
Assistant Teaching Professor; PhD, University of California, Los Angeles

Onyejekwe, Osita Eluemuno (https://experts.colorado.edu/display/fisid_164235/)
Assistant Teaching Professor; PhD, Florida Institute of Technology

Oscamou, Maribeth B. (https://experts.colorado.edu/display/fisid_159794/)
Associate Teaching Professor; MS, University of Colorado Boulder

Pacheco, Maria
Assistant Professor; PhD, Purdue University

Palen, Leysia A. (https://experts.colorado.edu/display/fisid_114604/)
Distinguished Professor, Associate Chair; PhD, University of California, Irvine

Palmer, Martha
Research Professor; PhD, University of Edinburgh (Scotland)

Paradise, Alan (https://experts.colorado.edu/display/fisid_158849/)
Associate Teaching Professor; MS, Washington University in St. Louis

Peleg, Orit (https://experts.colorado.edu/display/fisid_159998/)
Associate Professor; PhD, ETH Zürich (Switzerland)

Perigo, Levi (https://experts.colorado.edu/display/fisid_155562/)
Scholar in Residence; PhD, Nova Southeastern University

Phillips, Caleb Timothy (https://experts.colorado.edu/individual/fisid_152384/)
Assistant Professor Adjunct

Quigley, David Philp (https://experts.colorado.edu/display/fisid_164079/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Reckwerdt, Eric
Assistant Teaching Professor; PhD, University of Hawaii Manoa

Reed, David P. (https://experts.colorado.edu/display/fisid_152458/)
Scholar in Residence; PhD, Carnegie Mellon University

Repenning, Alexander (https://experts.colorado.edu/display/fisid_104946/)
Professor Adjunct; PhD, University of Colorado Boulder

Rivera, Michael (https://experts.colorado.edu/display/fisid_169859/)
Assistant Professor; PhD, Carnegie Mellon University

Rolf, Esther
Assistant Professor; PhD, University of California Berkeley

Roncone, Alessandro (https://experts.colorado.edu/display/fisid_164509/)
Assistant Professor; PhD, Istituto Italiano di Tecnologia (Italy)

Roque, Ricarose (https://experts.colorado.edu/display/fisid_158315/)
Assistant Professor; PhD, Massachusetts Institute of Technology

Rozenberg, Grzegorz (https://experts.colorado.edu/display/fisid_100478/)
Professor Adjoint

Sankaranarayanan, Sriram (https://experts.colorado.edu/display/fisid_147413/)
Assistant Dean, Professor, Associate Chair; PhD, Stanford University

Santos, Jose R. (https://experts.colorado.edu/display/fisid_124623/)
Associate Teaching Professor; MS, University of Colorado Boulder

Schnabel, Robert B. (https://experts.colorado.edu/display/fisid_100499/)
Professor, Faculty Director; PhD, Cornell University

Schreüder, Willem A. (https://experts.colorado.edu/display/fisid_143834/)
Associate Professor Adjunct; PhD, University of Stellenbosch

Stade, Elisabeth Cote (https://experts.colorado.edu/display/fisid_147089/)
Associate Teaching Professor, Faculty Director; MA, University of Colorado Boulder

Sumner, Tamara (https://experts.colorado.edu/display/fisid_105742/)
Professor; PhD, University of Colorado Boulder

Thrall, Lloyd Gregory
Associate Faculty Director; MA, University of London (England)

Trivedi, Ashutosh (https://experts.colorado.edu/display/fisid_156589/)
Associate Professor; PhD, University of Warwick (UK)

Truong, Le Hoang (https://experts.colorado.edu/display/fisid_172198/)
Assistant Teaching Professor; PhD, University of Colorado Boulder

Tufo, Henry (https://experts.colorado.edu/display/fisid_127040/)
Professor; PhD, Brown University

Velasquez, Alvara (https://experts.colorado.edu/display/fisid_172313/)
Visiting Assistant Professor; PhD, University of Central Florida

Vernerey, Divya E. (https://experts.colorado.edu/display/fisid_145131/)
Teaching Professor; PhD, Northwestern University

Voida, Amy Kathryn Mitchell (https://experts.colorado.edu/display/fisid_155855/)
Associate Professor; PhD, Georgia Institute of Technology

Voida, Stephen A. (https://experts.colorado.edu/display/fisid_155856/)
Associate Professor; PhD, Georgia Institute of Technology

von der Wense, Katharina (https://experts.colorado.edu/display/fisid_166417/)
Assistant Professor; PhD, University of Munich (Germany)

Waggoner, Bo (https://experts.colorado.edu/individual/fisid_164188/)
Assistant Professor; PhD, Harvard University

Ward, Wayne Hinson (https://experts.colorado.edu/display/fisid_114680/)
Research Professor; PhD, University of Colorado Boulder

Wright, William
Assistant Teaching Professor; MS, Stanford University

Wustrow, Eric A. (https://experts.colorado.edu/display/fisid_156419/)
Assistant Professor; BE, University of Michigan Ann Arbor

Yeh, Tom (https://experts.colorado.edu/display/fisid_151584/)
Associate Professor; PhD, Massachusetts Institute of Technology

Yuan, Lei (https://experts.colorado.edu/individual/fisid_167699/)
Assistant Professor; PhD, Northwestern University

Zagrodzki, Maciej
Associate Chair, Associate Teaching Professor; MSc, Colorado School of Mines

Zamani, Majid (https://experts.colorado.edu/individual/fisid_164967/)
Associate Professor; PhD, University of California, Los Angeles

# Courses

**CSCI 5000 (1) Introduction to the Computer Science Research-Based MS Program**
Instructs new research-based MS students in Computer Science how to become an effective member in terms of research, teaching, and presentation, and potentially advancing to the PhD program. Makes students aware of formal requirements, educational objectives, and research themes. Provides evaluative criteria and guidelines for all objectives to be achieved.
**Requisites:** Restricted to Computer Science (CSCI) MS students only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 5010 (3) Fundamentals of Data Communication**
Combining conceptual knowledge about data communications and core Internet technologies with hands-on labs that reinforce the conceptual knowledge, this course provides students with the ability to create innovative technology solutions in their discipline. Learning how the Internet works and being able to evaluate and operate an Internet network is a valuable skill; students in this course will have a competitive advantage in this foundational field.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5010
**Requisites:** Restricted to Computer Science Network Engineering MS Majors.

**CSCI 5020 (3) Fundamentals of Network Programming**
This course provides an immersion into the foundation theories of network programming and software development for emerging technologies. Students will gain direct experience with real-world programming lab experiments and demonstrations that will relate to the prolific increase of cross-discipline programming.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5020
**Requisites:** Restricted to Computer Science Network Engineering MS Majors.

**CSCI 5030 (3) Fundamentals of System Administration and Virtualization**
Introduces the basic use and administration of Unix and Linux systems. Topics include booting and system management, scripting, storage and logical volume management, filesystem configuration, account management and password security, process control, software installation, event logging and system auditing. Students will also develop familiarity with virtualization platforms such as VirtualBox and VMware to implement and test their system configurations.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5030 CSCI 5113 and CYBR 5113 and CSCI 4113
**Requisites:** Restricted to Computer Science Network Engineering MS Majors.

**CSCI 5040 (3) Professional Masters Project 1**
First class in a two semester cycle. Focuses on applied best practice in all facets of software engineering in industry and the application of those practices. Students are part of a development team involved in a two-semester project. Each student has a specific role on the project, and all will be responsible for some level of actual software development. The first semester focuses on design, requirements, and prototyping and is based on common waterfall project practices with gate reviews and project artifacts. Testing, soft skills for teamwork, project management, and other supporting aspects will be driven throughout the semester. The outcome of the two-semester cycle is a final project delivery of a software product for an institutional or industrial partner and/or for entry into software development competitions.
**Requisites:** Restricted to Computer Sciences Professional Masters (CSEN-MSCPS) graduate students only.

**CSCI 5050 (3) Professional Masters Project 2**
Second class in a two-semester cycle. Focuses on applied best practice in all facets of software engineering in industry and the application of those practices. Students are part of a development team involved in a two-semester project. Each student has a specific role on the project, and all will be responsible for some level of actual software development. The second semester focuses on development, code construction, and delivery, using agile-based project management for development. Students work in both Scrum and Kanban agile project cycles. Testing, soft skills for teamwork, project management, and other supporting aspects will be driven throughout the semester. The outcome of the two-semester cycle is a final project delivery of a software product for an institutional or industrial partner and/or for entry into software development competitions.
**Requisites:** Requires prerequisite course of CSCI 5040 (minimum grade of B). Restricted to CSEN-MSCPS graduate students only.

**CSCI 5100 (1) Computer Science Colloquium**
Learn about innovative research and teaching in computer science by attending talks and discussions by leading researchers and educators. Learn professional presentation skills and etiquette of participating in scientific research presentations. Students can attend during any term even if they are not enrolled
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to Computer Science (CSCI) MS students only.

**CSCI 5113 (3) Linux System Administration**
Introduces Linux system administration and related topics. Includes hardware and software installation, storage management, configuration of user accounts and system services, development of automation and monitoring tools, and the provisioning of common network services. This laboratory focused course will provide significant exposure to the network security concerns of Internet connected hosts. Students will build a network of Linux servers from the ground up, using provided computing resources, and must maintain and secure these servers themselves. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5113 and CSCI 4113 CYBR 5030 and CSCI 5030
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 3753 (minimum grade B).

**CSCI 5114 (3) Practical Algorithmic Complexity**
When coming across an algorithmic problem, how do we think about how hard it is? Beyond just how much time or memory it takes, computational complexity offers a plethora of concepts for understanding this fundamental question. This leads to the appropriate choice of algorithm for the job, the development of new algorithms, and understanding the role of algorithmic complexity in natural settings such as biology and physics.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4114
**Requisites:** Restricted to graduate students only.

**CSCI 5122 (3) Neural Networks and Deep Learning for Data Science**
Explores neural networks and their application to real-world data science and AI problems. Covers neural network theory, algorithms, programming, and applications across various data formats.
**Recommended:** Prerequisites Python programming, college algebra, and differential, integral, and multivariate calculus.

**CSCI 5135 (3) Computer-Aided Verification**
Covers two-level and multilevel minimization, optimization via expert systems, algebraic and Boolean decomposition, layout methodologies, state assignment, encoding and minimization, silicon compilation.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5139
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites ECEN 2703 and general proficiency in discrete mathematics and programming.
**Additional Information:** Departmental Category: Programming Languages

**CSCI 5140 (2) CLASIC Capstone**
In this capstone to the Computational Linguistics, Analytics, Search and Informatics (CLASIC) professional master¿s program, we will review each student¿s internship project and prepare presentations and technical reports based on those internships. Students will present their work on the annual Industry Day or at an Advisory Board meeting to industry representatives. They will also submit a paper to a relevant conference or workshop. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5140
**Requisites:** Restricted to students in the Computational Linguistics, Analytics, Search and Informatics (CLSI) program only.
**Recommended:** It is recommended that this course be taken after the CLASIC internship has been completed.

**CSCI 5160 (3) Introduction to Enterprise Networks**
Provides direct experience with networking functions and equipment through experiments and demonstrations. Students learn the fundamental principles and techniques of voice and data switching and routing within an enterprise environment. Procedures require the use of actual commercial equipment (including Cisco, Juniper, and Arista) plus network services and observation using packet analyzers. Weekly experiments and exams are designed to reflect real-world networking scenarios and require an additional hours of lab work. Most lab exercises involve activities which require physical access to the hardware and cannot be done remotely. Students are expected to spend 6 hours per week in the lab. In addition to the lab time, students should also anticipate up to 6 additional hours of time for homework, reading, lab preparation and studying for exams. Recommended restriction: students are expected to know the OSI Model, principles of Ethernet Switching, IP Addressing and operation of protocols such as ARP, DHCP, DN
**Requisites:** Restricted to graduate students only.

**CSCI 5170 (3) IP Routing Protocols and Policies**
Explores practical usage and conceptual underpinnings of link state and distance vector routing protocols. The course further explores a holistic view of how the Internet works from a technical routing aspect as well as policy and economics. The course is supplemented with frequent labs to fully explore the specific workings of the routing protocols RIP, OSPF, and BGP and the relationships between them in practical lab based routing scenarios.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 5010 or CYBR 5010 or CSCI 4273 or CSCI 5273 or ECEN 5273.

**CSCI 5180 (3) Network Management and Automation**
Teaching both technical and soft skills, this course incorporates best practices and the key theories behind them such as understanding common services needed for network functionality, maintenance, and troubleshooting. The goal of this course is to equip students with the valuable skills and tools they need to hit the ground running in most network management, operation, automation, and DevOps roles within a company. By the end of the course, students will be competent in the technologies, services, and tools used to manage and automate complex networks.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite background in Linux system administration, Python programming and computer network engineering/data communications.

**CSCI 5190 (3) Voice Over IP: Voice Network Design and Implementation**
Provides an in-depth immersion into the foundational theories and technologies of Voice Over IP (VoIP). This course supplements these theories with direct experience through real-world, hands-on lab experiments and demonstrations. The fundamentals of voice technologies, services, and tools used in industry to design, deploy and troubleshoot VoIP networks will be explored in detail, providing the student with a competitive advantage in the job market.
**Requisites:** Requires prerequisite course of CSCI 5170 or CSCI 5160 or CSCI 5180 (minimum grade B). Restricted to graduate students.

**CSCI 5200 (3) Introduction to Wireless Systems**
Overviews the distinctive characteristics of the wireless communications medium. Topics covered include: Analog signals, Antennas and Propagation, Digital Signals, Sampling, Quadrature Signals, Digital Modulation, SNR and SINR Concepts, Channel Models, Channel Statistics, and Link Budgets. The course includes an introduction to MIMO and beam-forming as implemented in modern communication systems. Software Defined Radio (SDR) is introduced to facilitate student hands-on learning of radio operation. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5200 and CSCI 4200
**Recommended:** Prerequisites CYBR 5010 and CYBR 5012.

**CSCI 5202 (3) Introduction to Robotics**
Introduction to Robotics prepares graduate students in the Robotics graduate program to be equipped with fundamental methods and tools in the field. This involves both a theoretical and a practical component, which are offered in a lecture and laboratory format.
**Equivalent - Duplicate Degree Credit Not Granted:** ROBO 5000
**Requisites:** Restricted to graduate students only.

**CSCI 5214 (3) Big Data Architecture**
Provides students with a comprehensive survey of technologies used today in the collection, storage, processing, analytics and display of big data. Focuses on cultivating real world skills with students working on semester long projects to execute on a group project.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4214, ATLS 5214, and CSCI 4214
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CSCI 5220 (3) Wireless Local Area Networks**
Emphasis on the IEEE P802.11 family of WLAN standards. Students learn the legacy versions of the standard (802.11DS/b), the current generation of WLAN systems (802.11a/g/n/ac), and will to analyze and critique upcoming versions (802.11ax/ba), and gain insight into proposals for new research in WLAN. Exposure to the interoperability and certification process for WLAN by the Wi-Fi Alliance, study the newest Wi-Fi Certified¿ programs, and will learn how to model and analyze WLAN traffic using industry standard tools.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5220 and ECEN 5122
**Requisites:** Requires prerequisite course of CYBR 5010 or CSCI 5010 or CSCI 5273 (minimum grade B).
**Recommended:** Prerequisite CYBR 5200 or CSCI 5200.

**CSCI 5229 (3) Computer Graphics**
Studies design, analysis and implementation of computer graphics techniques. Topics include interactive techniques, 3D viewing and models, clipping, transformations, projection, removal of hidden surfaces, lighting, textures and shadows. Knowledge of basic linear algebra is required.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4229
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graphics

**CSCI 5230 (3) Wireless Systems Lab**
This Wireless Solutions Architecture course is designed to examine the core concepts of wireless architecture, design and implementation. The course will focus on architecting solutions unlicensed technology, specifically enterprise Wi-Fi networks. Students will learn how to design, implement, troubleshoot and operate enterprise wireless networks.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5230
**Requisites:** Requires prerequisite course of CSCI 5200 or CYBR 5200 (minimum grade B).

**CSCI 5239 (3) Advanced Computer Graphics**
Studies design, analysis and implementation of advanced computer graphics techniques. Topics include shaders, using the GPU for high performance computing, graphics programming on embedded devices such as mobile phones; advanced graphics techniques such as ray tracing.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4239
**Requisites:** Requires prerequisite course of CSCI 5229 (minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: Graphics

**CSCI 5240 (3) Introduction to Blockchain**
Examines an emerging technology known as blockchain. Blockchain refers to the distributed and decentralized database technology behind popular cryptocurrencies such as Bitcoin and Ethereum. However, it can be used to record and transfer any digital asset, not just currency. This course explores the fundamentals of blockchain technology and its application from three key perspectives: policy and governance, technology, and application. Students gain an understanding of key concepts and how to apply them in the industry. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5240 and CSCI 4240
**Requisites:** Restricted to graduate students only.

**CSCI 5244 (3) Quantum Computation and Information**
This course will introduce to students basic and important quantum algorithms, complexity classes, error correction and fault-tolerant computing, quantum communication, quantum optimization, and quantum learning.
**Recommended:** Prerequisite Calculus, Linear Algebra and Quantum mechanics, introduction to quantum computing for undergraduates.

**CSCI 5253 (3) Datacenter Scale Computing - Methods, Systems and Techniques**
Covers the primary problem solving strategies, methods and tools needed for data-intensive programs using large collections of computers typically called "warehouse scale" or "data-center scale" computers. Examines methods and algorithms for processing data-intensive applications, methods for deploying and managing large collections of computers in an on-demand infrastructure and issues of large-scale computer system design.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4253 and CSPB 4253 and ECEN 5253
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 5273.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 5254 (3) Convex Optimization and Its Applications**
Discuss basic convex analysis (convex sets, functions and optimization problems), optimization theory (linear, quadratic, semidefinite and geometric programming; optimality conditions and duality theory), some optimization algorithms (descent methods and interior-point methods), basic applications (in signal processing, control, communications, networks, statistics, machine learning, circuit design and mechanical engineering, etc.), and some advanced topics (distributed decomposition, exact convex relaxation, parsimonious recovery).
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 5260 (3) Datacenter Networks**
Covers design and configuration principles required to build highly scalable and highly redundant network solutions used by datacenters. Class makes use of commercial grade equipment to build network toplogies and services. Students will work in teams to build a virtualized cluster, load balance application traffic between multiple server blades, assure high availability in Ethernet and IP layers, and able to prioritize important services using QoS. This lab-based course requires an average of 6 hours per week where the students are physically present in the CU Network Engineering Lab. Most lab exercises involve activities which require physical access to the hardware and cannot be done remotely. In addition to the lab time, students should also anticipate up to 6 additional hours of time for homework, reading, lab preparation and studying for exams.
**Requisites:** Requires prerequisite course of CSCI 5160 (minimum grade B). Restricted to graduate students.

**CSCI 5264 (3) Decision Making under Uncertainty**
Covers algorithms for optimal sequential decision making in the presence of uncertainty. Mathematical formalisms include the Markov decision process (MDP), partially observable Markov decision process (POMDP), and Games. Solution techniques include exact dynamic programming, Monte Carlo tree search, deep reinforcement learning, and alpha vector value approximation for POMDPs. Assignments require programming in a high level language (Julia as of 2023). Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 5264
**Grading Basis:** Letter Grade

**CSCI 5270 (3) IP Network Design**
Focuses on the design and implementation of network solutions according to the needs of a client. The course helps students develop skills to be a consultant and walks them through the complete life cycle of network project development as a member of a professional services team. Implement fundamentals of IP Routing Protocols and apply them directly to design based networking problems. Design scenarios will incorporate physical and logical design, financial analysis, and laboratory configuration.
**Requisites:** Requires prerequisite course of CSCI 5170 or CSCI 5160 (minimum grade B). Restricted to graduate students.
**Recommended:** Prerequisite strong familiarity with network protocol operation and implementation.

**CSCI 5273 (3) Network Systems**
Focuses on design and implementation of network programs and systems, including topics in network protocols, architectures, client-server computing, software-driven networking, and other contemporary network hardware-software system design and programming techniques. Familiarity with C and Unix is required.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5273
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CSCI 4273 and CSCI 4573.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 5280 (3) Software-Defined Networking**
Provides an in-depth immersion into the foundational theories and technologies of Software-Defined Networking (SDN), Network Functions Virtualization (NFV), and emerging technologies for computer networks. Supplements the theoretical knowledge learned through direct experience with real-world lab experiments and demonstrations. This knowledge will give students an advantage in the job market for this in-demand, constantly changing subject.
**Requisites:** Requires prerequisite course of CSCI 5180 (minimum grade B). Restricted to graduate students.

**CSCI 5302 (3) Advanced Robotics**
Exposes students to current research topics in the field of robotics and provides hands-on experience in solving a grand challenge program.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4302 and ROBO 5302
**Requisites:** Restricted to graduate students only. Prerequisite of CSCI 5202 or ROBO 5000.
**Recommended:** Prerequisite CSCI 3302 or instructor consent required.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 5303 (1) Cybersecurity Club Companion Course**
Gives students hands-on experience applying practical security skills and adversarial thinking to real-world problems. Students will work in small teams on internal challenges, lab development, open source contributions, and will represent the university in larger teams for external challenges at the national and global level, such as those hosted by Collegiate Cyber Defense Competition (CCDC), Wicked6, DOE CyberForce, etc. Students will be expected to participate in both internal and external challenges, attend meetings, and present short presentations to the group when appropriate. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5303 and CSCI 4303
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Recommended:** Prerequisites CSCI 5403 or CSCI 3403.

**CSCI 5313 (3) Concurrent Programming**
Introduces the theory and practice of multicore programming. The first part of the course presents foundations of concurrent programming: mutual exclusion, wait-free and lock-free synchronization, spin locks, monitors, memory consistency models. The second part presents a sequence of concurrent data structures and techniques used in their implementations (coarse-grained, fine-grained, optimistic and lock-free synchronization).
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5313 and ECEN 4313 and CSCI 4313
**Requisites:** Requires prerequisite courses of CSCI 2270 and ECEN 2360 or CSCI 2400 (minimum grade C). Restricted to graduate students only.
**Recommended:** Prerequisite ECEN 3593.

**CSCI 5314 (3) Dynamic Models in Biology**
Surveys computational and mathematical modeling to illuminate biological processes. Students work together to learn to build and analyze models using a variety of numerical tools, tackle meaningful biological problems, and communicate effectively across disciplines. Specific topics: Langevin dynamics of protein folding, agent-based models, finite difference models of organismal growth, stochastic and deterministic cellular automata game of life, models of behavior.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4314
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite comfort with mathematics and/or programming experience, and more advanced understanding (upper undergraduate level) of any relevant discipline.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 5322 (3) Algorithmic Human-Robot Interaction**
Creating autonomous systems that interact with humans requires the synthesis of insights from a variety of disciplines. This course aims to provide students with the algorithms, models, and frameworks that form the building blocks required for developing intelligent autonomous systems that perform useful tasks while interacting with, coordinating with, co-existing with, or otherwise assisting humans. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.

**CSCI 5340 (3) Startup Essentials: Entrepreneurial Projects in Computing**
Provides students with the tools to be successful technical co-founders of their own startups. Explores the initial stages of founding a startup, including team formation, idea validation, pivoting and pitching, while employing an iterative methodology. Student teams will develop a minimum viable product, pitch their final startup concept and be evaluated on product/market fit. CS coding concepts relevant for startups, including potentially cloud programming, mobile programming and agile software engineering, will be taught. Does not satisfy breadth requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4348
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 5350 (3) Entrepreneurial Projects II**
Follows CSCI 5340. In the second semester of this entrepreneurial project capstone, student teams will seek to find market traction for a high-fidelity Minimum Viable Product (MVP), software and/or hardware, that they will develop as part of their startup project. Teams will further learn to incorporate principles of marketing, business finance and legal issues into the business model for their startup concept. Does not satisfy breadth requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4358
**Requisites:** Requires a prerequisite course of CSCI 5340 (minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 5352 (3) Network Analysis and Modeling**
Examines modern techniques for analyzing and modeling the structure and dynamics of complex networks. Focuses on statistical algorithms and methods, and emphasizes model interpretability and understanding the processes that generate real data. Applications are drawn from computational biology and computational social science. No biological or social science training is required.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CSCI 3104 and APPM 3570.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 5360 (3) Internet Service Provider Networks**
This course presents advanced networking design and implementation techniques through experiments with network measurement equipment, switches, router, and management interfaces. The course primarily focuses on Service Provider Transport technologies for capacity, scalability and fault tolerance. Students learn the essential network architectures of last mile and long haul network solutions used for public and private network traffic transport; implementation of SLAs, load balancing, first hop redundancy, and MPLS transport and L2/L3 VPN solutions. This course requires an average of 6 hours per week in the lab. Most lab exercises involve activities which require physical access to the hardware and cannot be done remotely. In addition to the lab time, students should also anticipate up to 6 additional hours of time for homework, reading, lab preparation and studying for exams.
**Requisites:** Requires prerequisite course of CSCI 5160 (minimum grade B). Restricted to graduate students.
**Recommended:** Prerequisite CSCI 5170.

**CSCI 5380 (3) Network Virtualization and Orchestration**
Provides an advanced, in-depth immersion into the theories and technologies of Software-Defined Networking (SDN), Network Functions Virtualization (NFV), network virtualization/orchestration, and emerging technologies for computer networks. Expands on the real-world lab experiments and theoretical demonstrations learned from the course pre-requisite. The knowledge and critical thinking skills learned from this course will arm students with an advantage in the job market for this in-demand, constantly changing subject.
**Requisites:** Requires prerequisite of CSCI 5280 (minimum grade B). Restricted to graduate students.

**CSCI 5402 (3) Research Methods in Human-Robot Interaction**
Introduces students to the field of human-robot interaction (HRI). Covers HRI theory, principles, methodologies, and applications with links to robotics, artificial intelligence, human factors, human-computer interaction, design, cognitive psychology, education and other domains. Coursework includes readings from state-of-the-art in HRI research, team exercises and problem-solving sessions, and implementation and evaluation of a human-robot interaction systems for specific applications.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5402
**Requisites:** Restricted to graduate students only.

**CSCI 5403 (3) Introduction to Computing Security**
Introduces core concepts in cybersecurity including confidentiality, integrity, authentication, risk management, and adversarial thinking. The concepts will be applied to both traditional information technology (IT) systems and cyber physical systems (CPS). At the conclusion of the course, students should have a solid foundation in cybersecurity and hands-on experience. Students must have access to either native or virtual machines running on Windows OR Linux (Parrot, Kali, Ubuntu).
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5300
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite This course requires programming ability, a number of computing courses, mathematical maturity, some familiarity with Unix operating systems (command-line experience, system administration OR Operating Systems OR Computer Architecture), and programming/scripting ability in a high-level language (basic programming).

**CSCI 5413 (3) Computer Security and Ethical Hacking**
Teaches basic exploit design and development through hands-on experimentation and testing. Uses a controlled environment to give students a "playground" in which to test penetration skills that are normally not allowed on live networks.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4413
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 5423 (3) Biologically-inspired Multi-Agent Systems**
Explores the principles and emergent properties of collective dynamics through computational modeling and theory. Focuses on multi-agent systems using insights from biology, like the self-assemblage of cells and insect colony behavior. Topics include designing swarm intelligence, networked agents, cellular computing and self-assembly, optimization, synchronization, and evolutionary computation. Uses cross-discipline research developments to practice applied techniques. Biology background is not required.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 2270 and basic knowledge of programming.

**CSCI 5434 (3) Probability for Computer Science**
This course will introduce computer science students to topics in probability and statistics that will be useful in other computer science courses. Basic concepts in probability will be taught from an algorithmic and computational point of view, with examples drawn from computer science.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite courses of APPM 1360 or MATH 2300 and CSCI 2824 or MATH 2001 or ECEN 2703 (all minimum grade B).

**CSCI 5444 (3) Introduction to Theory of Computation**
Reviews regular expressions and finite automata. Studies Turing machines and equivalent models of computation, the Chomsky hierarchy, context-free grammars, push-down automata, and computability.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 5446 (3) Chaotic Dynamics**
Explores chaotic dynamics theoretically and through computer simulations. Covers the standard computational and analytical tools used in nonlinear dynamics and concludes with an overview of leading-edge chaos research. Topics include time and phase-space dynamics, surfaces of section, bifurcation diagrams, fractal dimension and Lyapunov exponents.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4446 and ECEN 4423 and ECEN 5423
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 5448 (3) Object-Oriented Analysis and Design**
An applied analysis and design class addressing the use of object-oriented techniques. Topics include domain modeling, use cases, architectural design and modeling notations. Students apply the techniques in analysis and design projects.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4448
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Software Engineering

**CSCI 5454 (3) Design and Analysis of Algorithms**
Techniques for algorithm design, analysis of correctness and efficiency; divide and conquer, dynamic programming, probabilistic methods, advanced data structures, graph algorithms, etc. Lower bounds, NP-completeness, intractability.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 2270 or equivalent.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 5502 (3) Data Mining**
Introduces basic data mining concepts and techniques for discovering interesting patterns hidden in large-scale data sets, focusing on issues relating to effectiveness and efficiency. Topics covered include data preprocessing, data warehouse, association, classification, clustering, and mining specific data types such as time-series, social networks, multimedia, and Web data.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4502
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 5514 (3) Algorithms for Whole Genome Sequence Analysis**
Explore the algorithms that have been developed to assemble and analyze genome sequencing data. Genome sequencing produces vast and complex data that are intractable without efficient algorithms. This course covers the core data structures and algorithms which form the basis for research in topics ranging from evolution to the cause and treatment of many diseases, including cancer. Topics include string matching, indexing, compression, and succinct data structures. No prior knowledge of biology, DNA, or genetics is required.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite basic understanding of complexity analysis, core algorithms (for example, sort) and data structures (for example, graphs).

**CSCI 5523 (3) Modern Offense and Defense in Cybersecurity**
Introduce students to the modern techniques used in cyber-attacks and defenses. Topics covered: Stack canary, ASLR, SMEP/SMAP, CFI, Program Misusing, ROP, JOP, ret2lib, off-by-one, unsafe-unlink, UAF, ptmalloc, t-cache, Race condition, Kernel Exploitation.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CSCI 2400, ECEN 4133.

**CSCI 5525 (3) Compiler Construction**
Introduces the principles and techniques for compiling high-level programming languages to assembly code. Topics include parsing, instruction selection, register allocation, and compiling high-level features such as polymorphism, first-class functions, and objects. Students build a complete compiler for a simple language.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4555 and ECEN 4553 and ECEN 5523
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CSCI 3155 and CSCI 2400 or ECEN 3350 (or ECEN 2360).
**Additional Information:** Departmental Category: Programming Languages

**CSCI 5526 (3) Computational Tools for Multiscale Problems**
Discusses state-of-the-art methods and software for the fast and accurate numerical solution of problems with features on multiple scales. This course starts from the fundamentals of numerical computation (linear solve, interpolation, differentiation, quadrature) and builds up to hybrid ODE solvers and boundary integral equation methods. Methods for developing scientific computing software will be discussed and practiced in-class and via assignments.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 3656 Numerical Computation, CSCI 5636 Numerical Solution of Partial, Differential Equations, Knowledge of a programming language (eg Python, C++, MATLAB), Linear algebra, and Calculus, including vector calculus, Complex analysis.

**CSCI 5535 (3) Fundamental Concepts of Programming Languages**
Considers concepts common to a variety of programming languages--how they are described (both formally and informally) and how they are implemented. Provides a firm basis for comprehending new languages and gives insight into the relationship between languages and machines.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5533
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 3155 or instructor consent required.
**Additional Information:** Departmental Category: Programming Languages

**CSCI 5550 (3) Designing for Defense 1**
Designing for Defense/Hacking for Defense is a national service program running at leading research universities across the country. Interdisciplinary teams¿chosen by competitive selection¿work on real-world national security challenges, in close contact with national security agencies. Teams employ the Lean Launchpad entrepreneurship methodology to develop engineering and business concepts to solve real-world challenges for special operations forces, the intelligence community, and other government agencies. Winning teams are eligible for real-world capital investment. The first semester of a two-course sequence. Students take this course, ASEN/CSCI/CYBR 5550, and ASEN/CSCI/CYBR 5580 contiguously as the sequence spans the academic year.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4550 and ASEN 5550 and CYBR 5550
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CSCI 5573 (3) Advanced Operating Systems**
Intended to create a foundation for operating systems research or advanced professional practice. Examines the design and implementation of a number of research and commercial operating systems and their components, system organization and structure, threads, communication and synchronization, virtual memory, distribution, file systems, security and authentication, availability and Internet services.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5573
**Requisites:** Requires prerequisite course of CSCI 2400 and CSCI 3753 (all minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 5576 (4) High-Performance Scientific Computing**
Introduces computing systems, software and methods used to solve large-scale problems in science and engineering. Students use high-performance workstations and a supercomputer.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4576
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 5580 (3) Designing for Defense 2**
This course allows teams to continue their D4D journey from semester 1 guiding students in launching a business entity that will deploy agile development tools to refine and enhance their first semester MVP, seek funding for that development work, deliver a functioning solution to their sponsor, and extract real value for the members of the business unit.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 5580 and CYBR 5580 and CSCI 4580
**Requisites:** Requires prerequisite course of ASEN 5550 or CSCI 5550 or CYBR 5550 (minimum grade B). Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CSCI 5593 (3) Advanced Computer Architecture**
Provides a broad-scope treatment of important concepts in the design and implementation of high-performance computer systems. Discusses important issues in the pipelining of a processor, out-of-order instruction issue and superscalar designs, design of cache memory systems and architectural features required for multicore processor designs. Also studies current and historically important computer architectures, including hardware security concepts.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5593 and ECEN 4693
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 4593 or instructor consent required.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 5606 (3) Principles of Numerical Computation**
Highlights computer arithmetic, solution of linear systems, least-squares approximations, nonlinear algebraic equations, interpolation, and quadrature.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CSCI 3656 and three semesters of calculus or equivalent.
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 5612 (3) Machine Learning for Data Science**
Explores the data science lifecycle with a focus on machine learning. Topics include data preparation, unsupervised and supervised analyses, ensemble methods, results illustration, and data communication. Unsupervised methods include clustering, association rule mining, and dimensionality reduction. Supervised models include regression, tree-based models, Bayesian models, and support vector machines. Recommended restrictions: This course is specific to Data Science students and the MS-DS degree program, this course would not be suitable for CSCI majors to meet CS degree requirements.
**Recommended:** Prerequisites probability, statistics, multivariate calculus, and linear algebra.

**CSCI 5616 (3) Introduction to Virtual Reality**
Introduces students to the field of virtual reality (VR). Covers the historical development of virtual reality technologies and virtual reality as a research field, the mathematics of 3D coordinate systems, fundamental principles, algorithms, and design patterns in developing interactive virtual environments, the perceptual science behind mixed reality technologies, and libraries and tools for creating VR experiences. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4616, ATLS 4616, ATLS 5616
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 2270 or CSCI 2275 (minimum grade B).

**CSCI 5620 (3) Advanced Wireless Lab**
Provides a comprehensive, hands-on set of laboratory exercises for the teaching and demonstration of key technical skills required to understand, build, test, and analyze both analog and digital wireless communications concepts. In conjunction with lecture-based content to provide a solid foundation in digital communication theory, SDR-based laboratory exercises enable the synthesis of several fundamental concepts utilizing the latest, modern communications systems technologies.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5620
**Requisites:** Requires prerequisite course of CSCI 5200 or CYBR 5200 (minimum grade B).
**Recommended:** Prerequisites CSCI 5630 or CYBR 5630 and CSCI 5220 or CYBR 5220.

**CSCI 5622 (3) Machine Learning**
Trains students to build computer systems that learn from experience. Includes the three main subfields: supervised learning, reinforcement learning and unsupervised learning. Emphasizes practical and theoretical understanding of the most widely used algorithms (neural networks, decision trees, support vector machines, Q-learning). Covers connections to data mining and statistical modeling. A strong foundation in probability, statistics, multivariate calculus, and linear algebra is highly recommended.
**Requisites:** Prereqs:(APPM 3310 or CSCI 2820 or MATH 2130 or 2135 or 3130 or 3135) OR (APPM 3570 or 4570 or CHEN 3010 or CSCI 3022 or CVEN 3227 or ECEN 3810 or ECON 3818 or MATH 3510 or 4510 or MCEN 3047 or STAT 3100 or 4000 or 4520) (min grade B) Grad students only
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 5630 (3) Wireless and Cellular Systems**
Studies technologies and architectures employed in modern cellular wireless systems. Major topics include radio propagation, multiple access techniques, analog and digital cellular telephony, and personal communications systems. Presents the necessary tools to understand the wireless industry, its technical details, and its business drivers. Topics include modeling, spectrum, weather, multipath, Doppler effect, and shadowing and covers important aspects of multiple access technologies such as CDMA and OFDMA. introduces modern radio standards including LTE.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5630
**Requisites:** Requires prerequisite course of CSCI 5200 or CYBR 5200 (minimum grade B).

**CSCI 5636 (3) Numerical Solution of Partial Differential Equations**
Focuses on discretization techniques such as finite difference, finite element and finite volume methods, and parallel solution algorithms such as Krylov subspace methods, domain decomposition and multilevel methods.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites (CSCI 2820 or APPM 2360 or APPM 3310 or MATH 2130 or MATH 2135 or MATH 3130 or MATH 3135) AND (CSCI 3656 or APPM 4650 or MATH 4650 or MCEN 3030 or PHYS 2600) (all minimum grade B).
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 5646 (3) Numerical Linear Algebra**
Offers direct and iterative solutions of linear systems. Also covers eigen value and eigenvector calculations, error analysis, and reduction by orthogonal transformation. A sound knowledge of basic linear algebra, experience with numerical computation, and programming experience is required.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 5654 (3) Linear Programming**
Presents algorithms, simplex and modifications. Examines theory-duality and complementary slackness. Involves network flow algorithms. Introduces integer programming.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite linear algebra.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 5673 (3) Distributed Systems**
Examines systems that span multiple autonomous computers. Topics include system structuring techniques, scalability, heterogeneity, fault tolerance, load sharing, distributed file and information systems, naming, directory services, resource discovery, resource and network management, security, privacy, ethics and social issues.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5673
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 5573 or a course in computer networks.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 5676 (3) Numerical Optimization**
Focuses on computational methods for solution of unconstrained and some constrained optimization problems, nonlinear least-squares problems and systems of nonlinear equations. Formerly CSCI 6676.
**Recommended:** Prerequisite (CSCI 2820 or APPM 2360 or APPM 3310 or MATH 2130 or MATH 2135 or MATH 3130 or MATH 3135) AND (CSCI 3022 or CSCI 3656 or APPM 4650 or MATH 4650 or MCEN 3030 or PHYS 2600) (all minimum grade B), and restricted to grad students.
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 5714 (3) Formal Languages**
Explores context-free languages: pumping lemma and variants, closure properties, and decision properties. Involves parsing algorithms, including general and special languages, e.g., LR. Additional topics chosen by instructor.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 5444 or instructor consent required.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 5722 (3) Computer Vision**
Explores algorithms that can extract information about the world from images or sequences of images. Topics covered include: imaging models and camera calibration, early vision (filters, edges, texture, stereo, optical flow), mid-level vision (segmentation, tracking), vision-based control and object recognition.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4722
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite probability, multivariate calculus and linear algebra.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 5753 (3) Computer Performance Modeling**
Presents a broad range of system measurement and modeling techniques, emphasizing applications to computer systems. Topics include system measurement, work load characterization and analysis of data; design of experiments; simulation; and queuing theory and queuing network models.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4753 and ECEN 4753 and ECEN 5753
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 5802 (1) Data Science Team Companion Course**
Gives students hands-on experience applying data science techniques and machine learning algorithms to real-world problems. Students work in small teams on internal challenges, many of which will be sponsored by local companies and organizations and will represent the university in larger teams for external challenges at the national and global level, such as those hosted by Kaggle. Students will be expected to participate in both internal and external challenges, attend meetings and present short presentations to the group when appropriate. Instructor consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4802
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 5809 (3) Computer Animation**
Develops a firm understanding of the general principles of computer animation. Lectures cover the creation of models, materials, textures, surfaces, and lighting. Path and key frame animation, particle dynamics, and rendering are introduced. Students are assigned a number of animation tutorials to carry out.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4809 and ATLS 4809 and ATLS 5809
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graphics

**CSCI 5817 (3) Database Systems**
Provides an advanced treatment of basic database concepts.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 3753.
**Additional Information:** Departmental Category: Database Systems

**CSCI 5822 (3) Probabilistic and Causal Modeling in Computer Science**
Introduces a set of modeling techniques that have become a mainstay of modern artificial intelligence and machine learning research. These techniques combine graphical models, Bayesian analysis, and multivariate statistics for probabilistic and causal inference and for interpreting the statistical structure of large data sets. Applications include healthcare, economics, marketing, social sciences, and more.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite undergraduate course in probability and statistics.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 5828 (3) Foundations of Software Engineering**
Provides an introduction to software engineering concepts and techniques. Topics include the history of software engineering, fundamental software engineering principles and theory, software life cycles, software testing, and the design and implementation of concurrent and large-scale software systems.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Software Engineering

**CSCI 5832 (3) Natural Language Processing**
Explores the field of natural language processing as it is concerned with the theoretical and practical issues that arise in getting computers to perform useful and interesting tasks with natural language. Covers the problems of understanding complex language phenomena and building practical programs.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5832
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 5839 (3) User-Centered Design and Development 1**
Develops the skills and practices necessary to apply user-centered approaches to software requirements analysis, and the design and evaluation of computer applications.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graphics

**CSCI 5840 (3) Advanced Network Automation**
Combining lectures, lab experiments, and demonstrations, students in this course will develop advanced skills and knowledge in network automation technologies, services, and tools. They will learn to analyze, evaluate, and apply historical and future services needed for network functionality, maintenance, and troubleshooting. The course will cover a range of topics, from technical to soft skills, including best practices and key theories.
**Requisites:** Requires prerequisite course of CSCI 5180 (minimum grade B). Restricted to Network Engineering students only.

**CSCI 5849 (3) Input, Interaction, and Accessibility**
Explores input and interaction techniques, with an emphasis on universal design and alternative interfaces. Students will explore traditional input methods such as keyboard and mouse input, and alternative techniques such as voice and eye gaze. Students will conduct performance evaluations of existing techniques, and prototype new interaction methods. Students will design technologies to support people with varying abilities and disabilities.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4849
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 3002 or CSCI 5839 (minimum grade B).

**CSCI 5854 (3) Theoretical Foundations of Autonomous Systems**
Covers techniques for modeling, design and verification of autonomous systems and application domains including automotive systems, robotics and medical devices. Modeling topics include timed systems, differential equations, switched systems, hybrid dynamical systems. Verification topics: reachability and stability verification. Temporal specifications. Synthesis of controllers. Applications: automotive systems, medical devices.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 5880 (3) Interactive Machine Learning for Customizable and Expressive Interfaces**
Introduces students to techniques for applying machine learning in the development of customizable human-computer interfaces. Students will learn to process a wide variety of input data (e.g. video and accelerometer streams), using different machine learning algorithms to detect semantically meaningful events that can afford the construction of new interactive systems. They will complete substantial projections within the domains of assistive or creative technologies. Does not fulfill Breadth Requirement for CSEN graduate students.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4889, ATLS 4889 and ATLS 5880
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 5897 (3) Computational and Mathematical Modeling of Infectious Diseases**
Explores the ways we model infectious diseases using math and computing, from the dynamic spread of infectious diseases between humans, to a pathogen's growth within the body. Learning goals include (i) gaining a mastery of both classic and modern infectious disease models (ii) learning about a variety of infectious diseases, and (iii) engaging with the ethics of infectious disease modeling. Requires beginner or advanced-beginner skill in Python or R.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4897
**Recommended:** Prerequisites Data structures (CSCI 2270) or equivalents (ASTR 2600, CSCI 2275, INFO 2201, PHYS 2600, as well as APPM 3650) and Prob/Stats (APPM3570/CHEN3010/CSCI3022/CVEN3227/EBIO4410/ECEN3810/ECON3818/IPHY3280/MATH3510/4510/4520/MCDB3450/MCEN3047/PSYC2111/STAT2600/3100/4000/4520, Calc 1, Beginner or Advanced Beginner skill in Python or R, Calc 2).

**CSCI 5900 (1-6) Master's Level Independent Study**
Provides opportunities for independent study at the master's level.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Computer Science (CSEN) graduate students or Computer Science Concurrent Degree majors only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 5919 (3) HCC Survey and Synthesis: Foundations and Trajectories**
Examines the interdisciplinary field of human-centered computing through a comprehensive content and historical survey. Considers new trajectories of inquiry and how the field merges with others. Social computing, is emphasized as a central topic. Students across disciplines will find the course foundational for understanding human-centered technology matters, including computer scientists, information scientists, social scientists, and business and media arts students.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5919
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graphics

**CSCI 5922 (3) Fundamentals of Neural Networks and Deep Learning**
This course covers the fundamentals of neural networks and deep learning as well as how they are used to address many artificial intelligence problems in society. Students will learn to design and implement multi-layered neural network architectures, train them on large amounts of data, and evaluate their performance. Included will be examination of popular architectures such as fully connected networks, convolutional neural networks, recurrent neural networks, and transformers, alongside learning strategies such as backpropagation, initialization, and regularization. Students will also gain practical, hands-on experience by applying learned skills to analyze visual data (computer vision) and textual data (natural language processing).
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 5929 (3) HCC Survey and Synthesis: New Disciplinary Directions**
Studies recent advances in human-computer interaction through critical analysis of influential papers and self-guided research. Examines new paradigms in input, output, and visualization for technology design and interaction. Considers innovative methods to assess various population design and technological needs. Studies in computer-related fields, social science, business, media arts and communications benefit learning about human-centered computing research.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 5919.
**Additional Information:** Departmental Category: Graphics

**CSCI 6000 (1) Introduction to the Computer Science PhD Program**
Instructs new Ph.D students in Computer Science how to obtain a Ph.D and how to become an effective member of the computer science research community. Makes students aware of formal requirements, educational objectives, and research themes. Provides evaluative criteria and guidelines for all objectives to be achieved.
**Requisites:** Restricted to Computer Science (CSCI) PhD. students only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 6100 (1) Computer Science Colloquium**
Learn about innovative research and teaching in computer science by attending talks and discussions by leading researchers and educators. Learn professional presentation skills and etiquette of participating in scientific research presentations. Not repeatable for credit. Students can attend during any term even if they are not enrolled.
**Requisites:** Restricted to Computer Science (CSCI) PhD. students only.

**CSCI 6110 (1) Graduate Writing Workshop**
Covers fundamentals of writing, editing, revising, and presenting. Students are encouraged to embrace the writing and editing processes as means not only to lively and impactful papers, but even better science. Focus given to clarity and simplicity of writing; multiple angles of editing; impact of content; and writing as a conversation. Ready participation in each class is expected.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CSCI 6114 (3) Computational Complexity Theory**
Covers standard complexity classes including: time-bounded, space-bounded, nondeterministic, randomized, quantum, parallel, counting, and nonuniform classes. Covers standard relationships between these complexity classes, as well as landmark results in complexity theory. Additional topics may be covered depending on time and interest.
**Requisites:** Requires prerequisite course of CSCI 5454 (minimum grade B). Restricted to graduate students only.
**Recommended:** Corequisite CSCI 5444.

**CSCI 6118 (3) Software Engineering for Scientists**
Learn the core principles of software engineering and design to make scientific software more robust and reproducible. This class targets quantitative scientists with programming skills (in any language) who want to use software in their research. We will cover the version control, testing, benchmarking, data structures, algorithms, and pipelines. This course opens computing to a variety of student disciplines, and is an advanced course in computing geared toward STEM. Instructor approval required for CS majors and CS minors. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4118
**Requisites:** Restricted to graduate students. Restricted to Non-Computer Science students only.
**Recommended:** Prerequisites ASEN 1320 or CSCI 1200 or CSCI 1300 or CSCI 2275 or ECEN 1310 or INFO 1201, knowledge of a programming language, preferably Python, and upper division STEM course recommended.

**CSCI 6166 (3) Validation and Uncertainty Quantification for Computational Models**
Assesses the reliability of computational models, which are used to describe physical and engineering systems in nearly every aspect of our lives, from an airplane wing interacting with turbulent air to the human heart pumping blood. But for various reasons model results might not be reliable. This course formulates and analyzes representations of uncertainty and validation tests for computational models.
**Recommended:** Prerequisites probability, linear algebra, calculus.

**CSCI 6200 (1) Computer Science PhD Career Development**
Learn how to make the most of your CS PhD by understanding and preparing for a career as a computer science research in academia, industry, and government. Students need to take this class once they complete Preliminary Exam and before their proposal defense.
**Requisites:** Requires prerequisite course of CSCI 6000 (minimum grade B). Restricted to Computer Science (CSCI) MS and PhD students only.

**CSCI 6214 (3) Randomized Algorithms**
Randomization is a powerful tool to design and analyze algorithms, and one that has played, and continues to play, a key role in the theory of algorithms and complexity. This course will give a technical foundation in common probabilistic tools to design and analyze algorithms, and use this foundation to cover several important randomized algorithms.
**Requisites:** Requires prerequisite course of CSCI 5454 (minimum grade B). Restricted to graduate students only.

**CSCI 6254 (3) Advanced Data Structures**
Learn about data structures beyond trees, heaps, and hashtables that are covered in introductory classes on algorithms and data structures. Key topics will include hashtables and their applications, amortized analysis and data structures using amortization, important balanced tree data structures including B-trees, treaps and skip lists, mergeable heaps: binomial and Fibonacci heaps, persistent data structures, tries, suffix tries, suffix automata and spatial data structures.
**Requisites:** Requires prerequisite course of CSCI 5454 (minimum grade B).
**Recommended:** Prerequisite CSCI 5434.

**CSCI 6268 (3) Foundations of Computer and Network Security**
Studies methods to protect information, and the ability to process and move information, from theft, misuse, tampering, destruction and unauthorized access. Introduces foundational topics of computer and network security, including security models, cryptography and authentication protocols.
**Equivalent - Duplicate Degree Credit Not Granted:** TLEN 5550
**Requisites:** Requires prerequisite course of CSCI 5273 (minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: Software Engineering

**CSCI 6302 (3) Speech Recognition and Synthesis**
Introduction to automatic speech recognition and understanding, conversational agents, dialogue systems, and speech synthesis/text-to-speech. Topics include the noisy channel model, Hidden Markov Models, A* and Viterbi decoding, language modeling (N-grams, entropy), concatenative synthesis, text normalization, dialogue and conversation modeling.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CSCI 5832 or LING 5200 or instructor consent required.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 6314 (3) Algorithmic Economics**
This course will survey the frontier of algorithmic economics: the study of incentives and strategic behavior through a computational lens. It will show how microeconomic theory applies to the design of algorithms, and conversely, how algorithmic thinking applies to economics. Other topics may include game theory, mechanism design / auction theory, forecasting mechanisms, and voting / social choice theory.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 5454.

**CSCI 6402 (3) Issues and Methods in Cognitive Science**
Interdisciplinary introduction to cognitive science, examining ideas from cognitive psychology, philosophy, education, and linguistics via computational modeling and psychological experimentation. Includes philosophy of mind; learning; categorization; vision and mental imagery; consciousness; problem solving; decision making, and game-theory; language processing; connectionism. No background in Computer Science will be presumed.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 6504 and LING 6200 and PHIL 6310 and PSYC 6200 and SLHS 6402
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 6414 (3) Information theory, statistical inference, and experimental design**
Introduces key concepts in information theory (entropy, compression, Shannon¿s source coding theorem) and presents these as a foundation for Bayesian inference. Covers statistical modeling approaches and Markov Chain Monte Carlo techniques. Concludes with a unit on designing maximally informative scientific experiments.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite Calc 1 (MATH 1300 or APPM 1350 or similar); introductory probability (APPM 3570 or similar).

**CSCI 6454 (3) Advanced Algorithms**
Topics include matching and network flows, matroids, computational geometry, parallel computation (PRAM, hypercube, mesh). Also includes VIsi, database theory, distributed computation, cryptography, robotics, scheduling, probabilistic algorithms, approximation algorithms, average case, and amortized analysis, time permitting.
**Requisites:** Requires prerequisite course of CSCI 5454 (minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 6502 (3) Big Data Analytics: Systems, Algorithms, and Applications**
This course studies state-of-the-art practice and research on efficient and effective systems and algorithms design for managing and exploring massive amounts of digital data in various application domains. The course takes an integrated approach that studies all three aspects of big data analytics: systems, algorithms, and applications. Specifically, this course covers big data systems for MapReduce, NoSQL, stream processing, deep learning, mobile/wearable/IoT sensing, as well as practical use of indexing, sketching, recommendation, graph, and deep learning algorithms. Domain-specific data management and analysis, such as those in online social networks, scientific discovery, business intelligence, health informatics, urban computing, are also covered.
**Requisites:** Restricted to graduate students only.

**CSCI 6622 (3) Advanced Machine Learning**
Covers advanced theoretical and practical topics in machine learning and latest developments in the field. Students conduct original research, either applied or theoretical, and present their results.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 5622 or instructor consent required.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 6644 (1) Theory of Computing Reading Group**
Exposition of key results in major areas of Theory of Computing presented by graduate students. The topics are selected every semester by voting. Examples of topics from previous semesters include: Hardness of Approximation and PCPs, Unique Games Conjecture, and Optimal Inapproximability Results for Max Cut. Previously offered as a special topics course.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites Graduate-level courses in Algorithms and Complexity Theory.

**CSCI 6686 (3) Numerical Methods for Constrained Optimization**
Covers computational methods for constrained optimization. Topics include basic theory, methods for quadratic programming, active set strategies for linear constraints, and penalty and successive quadratic programming methods for nonlinearly constrained problems.
**Requisites:** Requires prerequisite course of CSCI 5606 (minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 6712 (3) Data-Centric Computer Vision**
This course will cover core and new problems in computer vision through examination of the types of algorithms commonly used as well as the data employed to train and evaluate those algorithms. The course is taught in a seminar style, with students expected to regularly read and critique research papers from premiere computer vision conferences.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite Machine Learning experience (CSCI 5622 of CSCI 5922).

**CSCI 6810 (1) Seminar in Computational Biology**
Provides an overview of current research topics in computational biology and health informatics, with a focus on research conducted on campus. Each week students will attend an on-campus seminar or a presentation by an on-campus research group. Prepares students to participate in a research project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4810
**Additional Information:** Departmental Category: General Computer Science

**CSCI 6930 (1-3) Professional Internship**
This class provides a structure for CS graduate students to receive academic credit for internships with industry partners that have an academic component to them suitable for graduate-level work. Participation in the program will consist of an internship agreement between a student and an industry partner who will employ the student in a role that supports the academic goals of the internship. Instructor participation will include facilitation of mid-term and final assessments of student performance as well as support for any academic-related issues that may arise during the internship period. May be taken during any term following initial enrollment and participation in CS graduate programs.
**Requisites:** Restricted to graduate students only.

**CSCI 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to Computer Science (CSEN) graduate students or Computer Science Concurrent Degree majors only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 6950 (1-6) Master's Thesis**
**Requisites:** Restricted to Computer Science (CSEN) graduate students or Computer Science Concurrent Degree majors only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 7000 (1-4) Current Topics in Computer Science**
Covers research topics of current interest in computer science that do not fall into a standard subarea.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 7114 (1) Seminar in Algorithms and Computational Complexity**
Research-level topics in algorithms and computational complexity that are not covered in standard courses and often not covered in textbooks.
**Repeatable:** Repeatable for up to 40.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite Algorithms (or Advanced Algorithms or similar) and one course in complexity theory (Theory of Computation, Computational Complexity, or Practical Algorithmic Complexity).

**CSCI 7123 (3) Topics in Operating Systems**
Topics selected by instructor. Possible topics are system design, measurement and evaluation, simulation, mathematical modeling, and parallelism.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of CSCI 5573 (minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 7135 (1-3) Topics in Programming Languages**
Topics selected by instructor. Possible topics are syntax, semantics, metacompilers, compiler design, and translator writing systems. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Programming Languages

**CSCI 7143 (3) Topics in Computer Systems**
Topics selected by instructor. Possible topics are online systems, multiprocessing, microprogramming, architecture, data communications, and computing networks. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 7154 (3) Topics in Theory of Computation**
Selected topics of current interest in theory of computation.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of CSCI 5454 (minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 7176 (3) Topics in Numerical Computation**
Topics selected by instructor. Possible topics are numerical linear algebra, solution of differential equations, nonlinear algebra and optimization, data fitting, linear and nonlinear programming, and solution of large problems. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 7222 (3) Topics in Nonsymbolic Artificial Intelligence**
Topics vary from year to year. Possible topics include human and machine vision, signal and speech processing, artificial life, mathematical foundations of connectionism, and computational learning theory.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 5622 or instructor consent required.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 7314 (1) Seminar on Algorithmic Economics and Machine Learning**
Current research topics in algorithms economics, algorithmic game theory, and theoretical machine learning.
**Repeatable:** Repeatable for up to 40.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CSCI 7412 (2) Cognitive Science Research Applications Seminar 1**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 7415 and EDUC 6506 and LING 7415 and PHIL 7415 and SLHS 7418
**Requisites:** Requires a prerequisite course of CSCI 6402 or EDUC 6504 or LING 6200 or PHIL 6310 or PSYC 6200 (minimum grade B). Restricted to graduate students only.
**Recommended:** Prerequisite EDUC 6505.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 7422 (2) Cognitive Science Research Applications Seminar 2**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 7425 and EDUC 6516 and LING 7425 and PHIL 7425 and SLHS 7428
**Requisites:** Requires a prerequisite course of LING 7415 or PSYC 7415 or CSCI 7412 or EDUC 6506 (minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 7565 (3) Computational Phonology and Morphology**
Surveys of the main approaches and central questions related to computational modeling and learning of morphology and phonology. We consider questions related to learnability of phonology/morphology, machine learning implementations, and linguist-driven grammar modeling.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 7565

**CSCI 7575 (3) Computational Lexical Semantics**
Computational semantics has recently been upended by the advent of language models trained on vast amounts of text. These have proven to be very effective as a starting point for building robust downstream applications, although their ability to appropriately take context and world knowledge into account is still open to question. At the same time, rich representational schemes such as Abstract Meaning Representation (AMR) have been improving performance on numerous semantic tasks, including information extraction, question-answering, co-reference, and entailment. This class will explore the theory and practice behind these two advances, examine their respective strengths and weaknesses, and brainstorm about ways of combining them.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 7575
**Recommended:** Graduate students only.
**Grading Basis:** Letter Grade

**CSCI 7585 (3) Computational Models of Discourse and Dialogue**
This course is an introduction to computational models, corpora, and processing methods for discourse and dialogue. The course will introduce students to the foundational concepts and approaches, building a base from which students can go on to do research in these areas. Recommended restriction: Graduate students only.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 7585
**Recommended:** Prerequisite CSCI 5832 Natural Language Processing.
**Grading Basis:** Letter Grade

**CSCI 7717 (3) Topics in Database Systems**
Studies topics such as distributed databases, database interfaces, data models, database theory, and performance measurement in depth.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of CSCI 5817 (minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: Database Systems

**CSCI 7772 (1) Topics in Cognitive Science**
Reading of interdisciplinary innovative theories and methodologies of cognitive science. Students participate in the ICS Distinguished Speakers series that hosts internationally recognized cognitive scientists who share and discuss their current research. Session discussions include analysis of leading edge and controversial new approaches in cognitive science.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 7775 and LING 7775 and PHIL 7810 and PSYC 7775 and SLHS 7775
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 7818 (3) Topics in Software Engineering**
Studies selected topics of current interest in software engineering. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Software Engineering

**CSCI 7900 (1-6) Doctoral Level Independent Study**
For doctoral students.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 8990 (1-10) Doctoral Dissertation**
Investigates some specialized field of computer science. Approved and supervised by faculty members.
**Repeatable:** Repeatable for up to 30.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Computer Science

**CYBR 5000 (3) Seminar in Technology, Cybersecurity and Policy**
Introduces students to major topics and research at the interface of technology, cybersecurity, and policy by providing a weekly series of guest lectures with questions and discussion. These lectures will be followed by related readings, class discussions, and group work, which show the relationship of cybersecurity and new technology to policy.

**CYBR 5010 (3) Fundamentals of Data Communication**
Combining conceptual knowledge about data communications and core Internet technologies with hands-on labs that reinforce the conceptual knowledge, this course provides students with the ability to create innovative technology solutions in their discipline. Learning how the Internet works and being able to evaluate and operate an Internet network is a valuable skill; students in this course will have a competitive advantage in this foundational field.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5010
**Requisites:** Restricted to Technology, Cybersecurity and Policy MS Majors and Business Analytics MS Majors.

**CYBR 5020 (3) Fundamentals of Network Programming**
This course provides an immersion into the foundation theories of network programming and software development for emerging technologies. Students will gain direct experience with real-world programming lab experiments and demonstrations that will relate to the prolific increase of cross-discipline programming.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5020
**Requisites:** Restricted to Technology, Cybersecurity and Policy MS Majors.

**CYBR 5030 (3) Fundamentals of System Administration and Virtualization**
Introduces the basic use and administration of Unix and Linux systems. Topics include booting and system management, scripting, storage and logical volume management, filesystem configuration, account management and password security, process control, software installation, event logging and system auditing. Students will also develop familiarity with virtualization platforms such as VirtualBox and VMware to implement and test their system configurations.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5030 CSCI 5113 and CYBR 5113 and CSCI 4113
**Requisites:** Restricted to Technology, Cybersecurity and Policy MS Majors.

**CYBR 5113 (3) Linux System Administration**
Introduces Linux system administration and related topics. Includes hardware and software installation, storage management, configuration of user accounts and system services, development of automation and monitoring tools, and the provisioning of common network services. This laboratory focused course will provide significant exposure to the network security concerns of Internet connected hosts. Students will build a network of Linux servers from the ground up, using provided computing resources, and must maintain and secure these servers themselves. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5113 and CSCI 4113 CYBR 5030 and CSCI 5030
**Requisites:** Restricted to Technology, Cybersecurity and Policy (CYBR) graduate students only.
**Recommended:** Prerequisite CSCI 3753 (minimum grade B).

**CYBR 5200 (3) Introduction to Wireless Systems**
Overviews the distinctive characteristics of the wireless communications medium. Topics covered include: Analog signals, Antennas and Propagation, Digital Signals, Sampling, Quadrature Signals, Digital Modulation, SNR and SINR Concepts, Channel Models, Channel Statistics, and Link Budgets. The course includes an introduction to MIMO and beam-forming as implemented in modern communication systems. Software Defined Radio (SDR) is introduced to facilitate student hands-on learning of radio operation. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5200 and CSCI 4200
**Recommended:** Prerequisites CYBR 5010 and CYBR 5012.

**CYBR 5220 (3) Wireless Local Area Networks**
Emphasis on the IEEE P802.11 family of WLAN standards. Students learn the legacy versions of the standard (802.11DS/b), the current generation of WLAN systems (802.11a/g/n/ac), and will to analyze and critique upcoming versions (802.11ax/ba), and gain insight into proposals for new research in WLAN. Exposure to the interoperability and certification process for WLAN by the Wi-Fi Alliance, study the newest Wi-Fi Certified¿ programs, and will learn how to model and analyze WLAN traffic using industry standard tools.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5220 and ECEN 5122
**Requisites:** Requires prerequisite course of CYBR 5010 or CSCI 5010 or CSCI 5273 (minimum grade B).
**Recommended:** Prerequisite CYBR 5200 or CSCI 5220.

**CYBR 5230 (3) Wireless Systems Lab**
This Wireless Solutions Architecture course is designed to examine the core concepts of wireless architecture, design and implementation. The course will focus on architecting solutions unlicensed technology, specifically enterprise Wi-Fi networks. Students will learn how to design, implement, troubleshoot and operate enterprise wireless networks.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5230
**Requisites:** Requires prerequisite course of CYBR 5200 (minimum grade B).
**Recommended:** Prerequisite CYBR 5010.

**CYBR 5240 (3) Introduction to Blockchain**
Examines an emerging technology known as blockchain. Blockchain refers to the distributed and decentralized database technology behind popular cryptocurrencies such as Bitcoin and Ethereum. However, it can be used to record and transfer any digital asset, not just currency. This course explores the fundamentals of blockchain technology and its application from three key perspectives: policy and governance, technology, and application. Students gain an understanding of key concepts and how to apply them in the industry. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5240 and CSCI 4240
**Requisites:** Restricted to graduate students only.

**CYBR 5250 (2-4) Technology Law and Policy Clinic**
Features technology law advocacy before administrative, legislative and judicial bodies in the public interest. Formerly TLEN 5250. Instructor consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 7809
**Requisites:** Restricted to CYBR/TLEN graduate students.
**Grading Basis:** Letter Grade

**CYBR 5260 (3) Seminar: Law and Economics of the Information Age**
Examines basic regulatory and legal challenges of our information economy and digital age. Emphasizes the "networked" information industries, the proper role of "unbundling" policies to advance competition and how intellectual property and antitrust rules should be developed. Formerly TLEN 5260.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 8341
**Requisites:** Restricted to CYBR/TLEN graduate students.

**CYBR 5300 (3) Cybersecurity**
Introduces core concepts in cybersecurity including confidentiality, integrity, authentication, risk management, and adversarial thinking. The concepts will be applied to both traditional information technology (IT) systems and cyber physical systems (CPS). The course provides a cyber security foundation that will allow practitioners in other fields apply to understand cyber security trade-offs and will also provide interested students with a basis further study in cyber security. At the conclusion of the course, students should have a solid foundation in cybersecurity and hands-on experience.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5403
**Requisites:** Restricted to graduate students only.

**CYBR 5303 (1) Cybersecurity Club Companion Course**
Gives students hands-on experience applying practical security skills and adversarial thinking to real-world problems. Students will work in small teams on internal challenges, lab development, open source contributions, and will represent the university in larger teams for external challenges at the national and global level, such as those hosted by Collegiate Cyber Defense Competition (CCDC), Wicked6, DOE CyberForce, etc. Students will be expected to participate in both internal and external challenges, attend meetings, and present short presentations to the group when appropriate. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5303 and CSCI 4303
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Recommended:** Prerequisites CYBR 5300 or CSCI 5403 or CSCI 3403.

**CYBR 5320 (3) Cybersecurity Network Analytics**
This Cybersecurity Network Analytics course takes a hands-on approach to detecting malicious activity within network traffic. The course will first introduce methodologies for analyzing cyber data. This knowledge will then be used practically, as the students will be given the chance to test out approaches on real traffic. At the conclusion, students will have both a theoretical understanding of cyber algorithms and their use in a real-world setting.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 4320
**Requisites:** Requires prerequisite courses CYBR 5300 or CSCI 3403 or CSCI 5403 or MSBX 5480 (minimum grade B).
**Recommended:** Requisite C++ and Linux/Unix experience and knowledge of computer networking.

**CYBR 5330 (3) Digital Forensics**
Learn how to identify, collect, examine, analyze, and present digital evidence and the legal challenges associated with conducting digital forensics investigations. Explore various file system types and structures. Learn how to recovery and extract potential evidence from deleted files and directories. Learn how to capture and profile data residing in live memory. Analyze running processes and recover memory artifacts. Learn about various methods data can be hidden on a computing devices, storage media, and within covert communications channels.
**Recommended:** Prerequisites CYBR 5300 or CSCI 3403 or CSCI 5403.

**CYBR 5340 (3) VOIP Network Design**
Focuses on VoIP network design and optimization. The emphasis is on the convergence of VoIP, PSTN and cell phone networks and signaling. Topics include voice processing as well as IP and SS7 signaling. In addition there will be a review of ISDN, DSL, Sonet, ATM, SIP and MPLS. There will be a case problem for sizing a VoIP network using silence suppression. Formerly TLEN 5340.
**Requisites:** Requires corequisite of CYBR 5001. Restricted to CYBR or BUSN graduate students.

**CYBR 5350 (3) Security Auditing and Penetration Testing**
This course is an introduction to the principles and techniques associated with security auditing and penetration testing. Topics covered include; planning, reconnaissance, scanning, enumeration, exploitation, post-exploitation, and reporting. Students discover how system vulnerabilities can be exploited. Students will develop an understanding of current cybersecurity issues and how user, administrator, and programmer errors can result in security breaches.
**Recommended:** Prerequisites CYBR 5300 or CSCI 3403 or CSCI 5403.

**CYBR 5400 (3) Principles of Internet Policy**
Engages in the critical strategic analysis and debate of controversial public policy issues raised by the Internet. Learn how to develop well-reasoned positions on the regulations applied to new Internet-based technologies and business models based on interdisciplinary frameworks that characterize the significant intersection of technology, economics, business, and public policy. Policy topics covered include Broadband as a Universal Service, Net Neutrality, Spectrum Management, Online Privacy, and Cybersecurity.

**CYBR 5410 (3) Telecommunications Law and Policy**
Examines laws governing telecommunications industries, including federal and state regulation and international aspects. Includes telephone, cable, satellite, cellular and other wireless systems and the Internet. Formerly TLEN 5240.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 7241
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to CYBR or BUSN graduate Students

**CYBR 5420 (3) Spectrum Management and Policy**
Studies how spectrum policy is developed and implemented. A general framework is developed for understanding telecommunications law and regulatory objectives. Specifically analyzes international and domestic dimensions of spectrum policy. Considers how economics, administrative processes and innovative technologies affects management of the spectrum. Formerly TLEN 5230.
**Requisites:** Restricted to graduate students only.

**CYBR 5505 (3) Leading Oneself**
Provides working engineers a background in leadership concepts and methods and enables students to develop practical leadership skills through numerous in-class exercises and experimentation based assignments. Topics include authentic leadership, motivating self and others, cultivating emotional intelligence, personal mastery, creating accountability, conflict resolution, leading change and organizational culture. Required for all Engineering Management degree students.
**Requisites:** Restricted to Leeds School of Business or College of Engineering graduate students only.

**CYBR 5510 (3) Technology: Commercial Strategy and Operations**
Working in groups of 2 to 4, students will leverage their technical skills to learn and apply commercial/business skills via the consideration of a hypothetical competitive technically-oriented business, including its strategy, long-term financial outlook, and operating platform. Upon successful course completion, students should expect to feel confident when speaking with (and ultimately moving into roles of) management and leadership, regarding all critical aspects of business, especially the creation of equity value through scale at pace, aligning interests of all key stakeholders. Open to undergraduates with instructor consent.
**Requisites:** Restricted to graduate students only.

**CYBR 5550 (3) Designing for Defense 1**
Designing for Defense/Hacking for Defense is a national service program running at leading research universities across the country. Interdisciplinary teams¿chosen by competitive selection¿work on real-world national security challenges, in close contact with national security agencies. Teams employ the Lean Launchpad entrepreneurship methodology to develop engineering and business concepts to solve real-world challenges for special operations forces, the intelligence community, and other government agencies. Winning teams are eligible for real-world capital investment. The first semester of a two-course sequence. Students take this course, ASEN/CSCI/CYBR 5550, and ASEN/CSCI/CYBR 5580 contiguously as the sequence spans the academic year.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4550 and ASEN 5550 and CSCI 5550
**Grading Basis:** Letter Grade

**CYBR 5580 (3) Designing for Defense 2**
This course allows teams to continue their D4D journey from semester 1 guiding students in launching a business entity that will deploy agile development tools to refine and enhance their first semester MVP, seek funding for that development work, deliver a functioning solution to their sponsor, and extract real value for the members of the business unit.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 5580 and CSCI 5580 and CSCI 4580
**Requisites:** Requires prerequisite course of ASEN 5550 or CSCI 5550 or CYBR 5550 (minimum grade B). Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CYBR 5620 (3) Advanced Wireless Lab**
Provides a comprehensive, hands-on set of laboratory exercises for the teaching and demonstration of key technical skills required to understand, build, test, and analyze both analog and digital wireless communications concepts. In conjunction with lecture-based content to provide a solid foundation in digital communication theory, SDR-based laboratory exercises enable the synthesis of several fundamental concepts utilizing the latest, modern communications systems technologies.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5620
**Requisites:** Requires prerequisite course of CSCI 5200 or CYBR 5200 (minimum grade B).
**Recommended:** Prerequisites CYBR 5630 or CSCI 5630 and CYBR 5220 or CSCI 5220.

**CYBR 5630 (3) Wireless and Cellular Systems**
Studies technologies and architectures employed in modern cellular wireless systems. Major topics include radio propagation, multiple access techniques, analog and digital cellular telephony, and personal communications systems. Presents the necessary tools to understand the wireless industry, its technical details, and its business drivers. Topics include modeling, spectrum, weather, multipath, Doppler effect, and shadowing and covers important aspects of multiple access technologies such as CDMA and OFDMA. introduces modern radio standards including LTE.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5630
**Requisites:** Requires prerequisite course of CSCI 5200 or CYBR 5200 (minimum grade B).

**CYBR 5830 (1-6) Special Topics**
Current topics in technology, cybersecurity and policy.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**CYBR 5910 (1-6) Independent Study**
Special projects agreed upon by student and instructor. Department consent required. Formerly TLEN 5920.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to CYBR/TLEN graduate students.

**CYBR 6940 (1) Master's Candidate for Degree**
This course is for TCP Master's students who are approved candidates to receive their degree.
**Requisites:** Restricted to CYBR/TLEN graduate students.

**CYBR 6950 (1-6) Master's Thesis**
Original and independent research conducted by a graduate student under the supervision of a faculty advisor. Formerly TLEN 6950.
**Requisites:** Restricted to CYBR/TLEN graduate students.

**CYBR 8990 (1-10) Doctoral Dissertation**
Investigates specialized topic or field in the area of telecommunications. Approved and supervised by faculty members. Formerly TLEN 8990.
**Requisites:** Restricted to CYBR/TLEN PhD students.

# Computer Science - Master of Science (MS)

The Master of Science degree in computer science is a research-based option which permits graduate students the flexibility in defining specialized interdisciplinary fields that meet their professional needs. The research-based MS degree option is well-suited to students pursuing a career in academia or industry with a research component.

Students have two options under this degree:

- The thesis option, wherein students will have to complete *six* credits of MS thesis hours while working on a research problem and completing their thesis work. They work with a committee of *three* and have to defend their thesis.
- The non-thesis option, wherein students will have to complete *six* credits of MS independent study research hours, while working on research projects with individual faculty. These *six* hours may or may not be with the same faculty.

With support from the research advisor, students in this program have the option of smoothly transitioning in the PhD program. If students receive support from a research advisor, they do not have to apply to the PhD program; the department processes the degree advancement based on the support.

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s):

- Applied Computer Science - Post-Baccalaureate Bachelor of Science (BSACS) (p. 945)
- Computer Science - Bachelor of Arts (BA) (p. 937)
- Computer Science - Bachelor of Science (BSCS) (p. 941)

# Requirements

## Admission Requirements

Applicants for graduate study in computer science must hold at least a bachelor's degree or its equivalent from an accredited institution. They should have programming experience, a number of computer science courses and sufficient mathematical maturity to understand pure mathematics courses at the upper division (junior/senior) level.

A minimum undergraduate GPA of 3.00 is required for admission to the master's program.

### Mathematics Courses

A student's academic background should include at least three semesters of mathematics at the level of sophistication of calculus or above. Examples of such courses include calculus, differential equations, linear algebra, probability, statistics and abstract algebra. The courses should indicate that the student has achieved the mathematical maturity expected of an upper-level science, engineering or mathematics undergraduate.

### Computer Science Courses

At least four one-semester courses in computer science that are beyond the introductory level are required for admissions. These are intended to demonstrate breadth of basic computer science knowledge in the areas of computer hardware, software and theory. The courses should include the equivalent of the following CU Boulder offerings:

- Hardware requirement: CSCI 2400 Computer Systems (Computer Systems)
- Software requirement: Either CSCI 3155 Principles of Programming Languages or CSCI 3753 Design and Analysis of Operating Systems
- Theory requirement: CSCI 2270 Computer Science 2: Data Structures and either CSCI 3104 Algorithms or CSCI 3434 Theory of Computation

More advanced versions of all courses are acceptable. The above courses are prerequisites to many of the graduate-level offerings, so it's important to complete these to be considered for graduate admissions. Admission without these prerequisites or their equivalents may be considered under extraordinary circumstances only.

## Program Requirements

### Degree Plans

While pursing the traditional MS degree in CS, students have to complete a total of 30 credits of graduate level coursework and may select between two options.

#### Plan I: Thesis Option

The MS thesis option curriculum is designed to provide a balance between modern technological focus and disciplinary depth. Students must secure a thesis advisor for research and course guidance.

Under this option, students complete 24 credits of coursework and 6 thesis credits at the 5000-level or above. At least 24 credits (eight courses) must be completed in computer science, including three required breadth courses. Up to 6 credits (two courses) may be taken outside of the department as long as those are 5000 level and above and offered at CU Boulder main campus.

In addition to this, students must fulfill any other MS degree requirements as stated by the department. For more information, visit the Traditional MS Degree Program Requirements (http://www.colorado.edu/cs/current-students/graduate-students/ms-degree/traditional-ms-degree-requirements/) webpage.

#### Plan II: Non-Thesis Option

Under this option, students complete 24 credits of coursework at the 5000-level or above. At least 24 credits (eight courses) must be completed in computer science, including three required breadth courses. Up to 6 credits must be independent study research hours. Up to 6 credits (two courses) may be taken outside of the department as long as those are 5000 level and above and offered at CU Boulder main campus.

In addition to this, students must fulfill any other MS degree requirements as stated by the department. For more information, visit the Traditional MS Degree Program Requirements (http://www.colorado.edu/cs/current-students/graduate-students/ms-degree/traditional-ms-degree-requirements/) webpage.

### Course Requirements

The following course requirements are subject to change; for the most current information, visit the department's Traditional MS Degree Program Requirements (http://www.colorado.edu/cs/current-students/graduate-students/ms-degree/traditional-ms-degree-requirements/) webpage.

| Code | Title | Credit Hours |
|---|---|---|
| **Professional Development Series** | | |
| Complete three one-credit Professional Development courses. [1] | | 3 |
| CSCI 5000 | Introduction to the Computer Science Research-Based MS Program | |
| CSCI 5100 | Computer Science Colloquium | |
| CSCI 5100 | Computer Science Colloquium | |
| **Breadth Courses** [2] | | |
| Students must complete one breadth course from each of the three bins listed below. | | |
| *Bin One* | | |
| Choose one: | | 3 |
| CSCI 5229 | Computer Graphics | |
| CSCI 5254 | Convex Optimization and Its Applications | |
| CSCI 5434 | Probability for Computer Science | |
| CSCI 5444 | Introduction to Theory of Computation | |
| CSCI 5446 | Chaotic Dynamics | |
| CSCI 5454 | Design and Analysis of Algorithms | |
| CSCI 5576 | High-Performance Scientific Computing | |
| CSCI 5606 | Principles of Numerical Computation | |
| CSCI 5636 | Numerical Solution of Partial Differential Equations | |
| CSCI 5646 | Numerical Linear Algebra | |
| CSCI 5654 | Linear Programming | |
| CSCI 5676 | Numerical Optimization | |
| *Bin Two* | | |
| Choose one: | | 3 |
| CSCI 5202 | Introduction to Robotics | |
| CSCI 5302 | Advanced Robotics | |
| CSCI 5322 | Algorithmic Human-Robot Interaction | |
| CSCI 5352 | Network Analysis and Modeling | |
| CSCI 5402 | Research Methods in Human-Robot Interaction | |

| | | |
|---|---|---|
| CSCI 5502 | Data Mining | |
| CSCI 5616 | Introduction to Virtual Reality | |
| CSCI 5622 | Machine Learning | |
| CSCI 5722 | Computer Vision | |
| CSCI 5822 | Probabilistic and Causal Modeling in Computer Science | |
| CSCI 5832 | Natural Language Processing | |
| CSCI 5839 | User-Centered Design and Development 1 | |
| CSCI 5849 | Input, Interaction, and Accessibility | |
| CSCI 5922 | Fundamentals of Neural Networks and Deep Learning | |
| *Bin Three:* | | |
| Choose one: | | 3 |
| CSCI 5135 | Computer-Aided Verification | |
| CSCI 5253 | Datacenter Scale Computing - Methods, Systems and Techniques | |
| CSCI 5273 | Network Systems | |
| CSCI 5403 | Introduction to Computing Security | |
| CSCI 5413 | Computer Security and Ethical Hacking | |
| CSCI 5448 | Object-Oriented Analysis and Design | |
| CSCI 5523 | Modern Offense and Defense in Cybersecurity | |
| CSCI 5525 | Compiler Construction | |
| CSCI 5535 | Fundamental Concepts of Programming Languages | |
| CSCI 5573 | Advanced Operating Systems | |
| CSCI 5673 | Distributed Systems | |
| CSCI 5753 | Computer Performance Modeling | |
| CSCI 5817 | Database Systems | |
| CSCI 5828 | Foundations of Software Engineering | |
| CSCI 5854 | Theoretical Foundations of Autonomous Systems | |
| **Research Hours** | | **6** |
| Complete six credits of either MS thesis or MS Independent Study Resarch Hours | | |
| CSCI 5900 | Master's Level Independent Study | |
| or CSCI 6950 | Master's Thesis | |
| **Electives** | | |
| An additional 12 credits of approved graduate-level coursework are required to complete the degree, with restrictions. [3] | | 12 |
| **Total Credit Hours** | | **30** |

1 The third one-credit course may be a repeat of CSCI 5100 or any other one-credit research related approved graduate level coursework that is *not* an independent study research hour.

2 For a list of breadth courses by category, visit the department's MS/ME Breadth Requirement (http://www.colorado.edu/cs/current-students/graduate-students/msme-breadth-requirement/) webpage.

3 Out of these credits, only 6 credits may be non-CS graduate courses.

### Time Limit

All degree requirements must be completed within four years of the date of commencing coursework.

## Learning Outcomes

By the completion of the program, students will be able to:

- Be knowledgeable in a subfield of computer science and make a research contribution to the subfield.
- Solve technical problems in computer science through writing code, pseudocode, technical writing and/or applying foundational concepts from a variety of subfields.
- Cast large, societal and/or complex problems as computational problems.
- Communicate clearly about their ideas and their research.
- Complete the required coursework with a minimum GPA of 3.0. (Evaluation Method 1)
- Formulate a research thesis and defend it against a panel of experts, or conduct an independent study under the supervision of a faculty member. (Evaluation Method 2)

# Computer Science - Master of Science (MS) Online

The Master of Science in Computer Science (MS-CS) program hosted online through the Coursera platform offers stackable graduate-level courses, a graduate certificate, and a fully accredited master's degree in computer science. MS-CS on Coursera students earn the same credentials as on-campus students. There are no online or Coursera designations on official CU transcripts or diplomas.

The Department of Computer Science has embraced this degree as an ideal opportunity to expand access to the excellent graduate-level courses offered by the department's highly reputed faculty beyond CU Boulder's physical campus. The goal of the MS-CS on Coursera program is to produce creative, workforce-ready graduates equipped with versatile specialized skills and technical leadership.

Students pursuing this degree will also have access to a wide range of courses taught as part of other CU Boulder degrees offered on the Coursera platform, including topics such as data science, engineering management, and electrical engineering

## Program Policies

This CU Boulder on Coursera program does not align with standard campus policies. Please refer to the Online Programs (p. 1895) section of the catalog for more information.

## Requirements

### Admission

The MS-CS on Coursera uses *performance-based admissions*, which means students earn program admission simply by performing well in a three-course pathway. Students enroll in and complete their preferred three-course pathway with a grade of B or better in each of the three courses to be admitted to the program. Pathway courses are a required part of the curriculum, which means students make direct progress toward the degree while they work toward program admission.

There is no traditional application for admission to the degree. The University of Colorado Boulder never asks for transcripts, previous test scores (like GRE or TOEFL), application essays, letters of recommendation, or application fees. A prior degree is not required for

admission. Because this program is fully online, students do not need to complete a background check to enroll.

A student must complete four required protocols to earn admission to the MS-CS on Coursera:

1. Earn at least a grade of B in each for-credit course within one of the following pathway specializations:
   - *Foundations of Data Structures and Algorithms* –
     CSCA 5414 Dynamic Programming, Greedy Algorithms
     CSCA 5424 Approximation Algorithms and Linear Programming
     CSCA 5454 Advanced Data Structures, RSA and Quantum Algorithms
   - *Network Systems: Principles and Practices (Linux and Cloud Networking)* –
     CSCA 5063 Network Systems Foundation
     CSCA 5073 Network Principles in Practice: Linux Networking
     CSCA 5083 Network Principles in Practice: Cloud Networking
2. Have a cumulative GPA of at least 3.00 for all for-credit courses taken to date.
3. Declare intent to seek the degree via the enrollment form. This can be done before, during or after completing any work in a pathway specialization.

Upon completion of these three steps, the student is admitted to the MS-CS on Coursera. Students may successfully complete a designated pathway specialization and declare intent at any point in their academic journey. Completion of a pathway specialization is not required for students to begin earning academic credit, only to earn the degree.

Non-degree-seeking students may also enroll in for-credit courses. All courses attempted and/or completed for credit will appear on official CU Boulder transcripts (unless dropped by the drop deadline) and will count toward the cumulative GPA.

## Prerequisite Knowledge

There are no course prerequisites or corequisites for MS-CS courses on Coursera. Nevertheless, it is important that students are prepared for individual courses. Course descriptions will advise students of assumed incoming knowledge, and students are strongly encouraged to take course sequences in the order they are presented on the Coursera platform.

*Students are also encouraged to take a non-credit version in some form before moving to the for-credit version to test whether they can succeed, especially if they are unsure whether they have the background knowledge required for a course*

## Program Requirements

The MS-CS on Coursera is a non-thesis degree program that requires 30 credit hours of graduate-level coursework. This includes 15 credits of breadth coursework and a choice of 15 credits hours of elective coursework from the options listed below. Students must complete 5 elective specializations or a combination of 4 complete elective specializations and three 1-credit elective courses totaling 15 credits.

Up to 6 graduate-level credit hours of courses offered by other CU degrees on Coursera may be applied as elective credits toward the MS-CS on Coursera degree. All courses must be graduate level, offered through Coursera, and meet all applicable academic standards. This includes all courses offered by the ME-EM (https://catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/engineering-management/engineering-management-master-engineering-me-online/), MS-DS (https://catalog.colorado.edu/graduate/colleges-schools/interdisciplinary-programs/data-science-master-science-ms-online/), and MS-EE (https://catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/electrical-engineering/electrical-engineering-master-science-online-msee/) programs on Coursera that do not start with a "CSCA" prefix, with the exception of the following courses. Credit from these courses cannot be applied toward MS-CS on Coursera requirements:

- DTSA 5302 Cybersecurity for Data Science
- DTSA 5303 Ethical Issues in Data Science
- DTSA 5501 Algorithms for Searching, Sorting, and Indexing
- DTSA 5502 Trees and Graphs: Basics
- DTSA 5707/CSCA 5812 Deep Learning Applications for Computer Vision

Courses may not be double-counted toward two credentials of the same level. This means students can apply credit from a particular course toward one graduate certificate and one graduate degree, but they cannot apply credit from a particular course toward two graduate certificates or two graduate degrees. CU certificates on Coursera are automatically conferred once all requirements are met.

The MS-CS on Coursera requires a minimum cumulative GPA of 3.00 and a grade of B or better in each breadth class (including the two required pathway specializations and the three additional required breadth specializations). Courses in which grades below C (2.0) are received may not be applied toward degree requirements.

| Code | Title | Credit Hours |
|---|---|---|
| **Breadth Courses** | | |
| Foundations of Data Structures and Algorithms (Pathway Specialization) | | 3 |
| CSCA 5414 | Dynamic Programming, Greedy Algorithms | |
| CSCA 5424 | Approximation Algorithms and Linear Programming | |
| CSCA 5454 | Advanced Data Structures, RSA and Quantum Algorithms | |
| Network Systems: Principles and Practice (Linux and Cloud Networking) (Pathway Specialization) | | 3 |
| CSCA 5063 | Network Systems Foundation | |
| CSCA 5073 | Network Principles in Practice: Linux Networking | |
| CSCA 5083 | Network Principles in Practice: Cloud Networking | |
| Machine Learning | | 3 |
| CSCA 5622 | Introduction to Machine Learning - Supervised Learning | |
| CSCA 5632 | Unsupervised Algorithms in Machine Learning | |
| CSCA 5642 | Introduction to Deep Learning | |
| Computing, Ethics, and Society | | 3 |
| CSCA 5214 | Computing, Ethics, and Society Foundations | |
| CSCA 5224 | Ethical Issues in AI and Professional Ethics | |
| CSCA 5234 | Ethical Issues in Computing Applications | |

| | | |
|---|---|---|
| Foundations of Autonomous Systems | | 3 |
| CSCA 5834 | Modeling of Autonomous Systems | |
| CSCA 5844 | Requirement Specifications for Autonomous Systems | |
| CSCA 5854 | Verification and Synthesis of Autonomous Systems | |
| **Elective Courses** | | |
| Take five specializations or combination of four complete specializations and three 1-credit courses totaling 15 credits | | 15 |
| Software Architecture for Big Data | | |
| CSCA 5008 | Fundamentals of Software Architecture for Big Data | |
| CSCA 5018 | Software Architecture Patterns for Big Data | |
| CSCA 5028 | Applications of Software Architecture for Big Data | |
| Data Mining Foundations and Practice | | |
| CSCA 5502 | Data Mining Pipeline | |
| CSCA 5512 | Data Mining Methods | |
| CSCA 5522 | Data Mining Project | |
| Natural Language Processing: Deep Learning Meets Linguistics | | |
| CSCA 5832 | Fundamentals of Natural Language Processing | |
| CSCA 5842 | Deep Learning for Natural Language Processing | |
| CSCA 5852 | Model and Error Analysis for Natural Language Processing | |
| Human-Computer Interaction | | |
| CSCA 5859 | Ideating and Prototyping Interfaces | |
| CSCA 5869 | User Interface Testing and Usability | |
| CSCA 5879 | Emerging Topics in HCI: Designing for VR, AR, AI | |
| Generative AI | | |
| CSCA 5112 | Introduction to Generative AI | |
| CSCA 5122 | Modern Applications of Generative AI | |
| CSCA 5132 | Advances in Generative AI | |
| Internet Policy: Principles and Problems | | |
| CSCA 5433 | When to Regulate? The Digital Divide and Net Neutrality | |
| CSCA 5443 | Protecting Individual Privacy on the Internet | |
| CSCA 5453 | Cybersecurity in Crisis: Information and Internet Security | |
| Object Oriented Analysis and Design | | |
| CSCA 5428 | Object-Oriented Analysis and Design: Foundations and Concepts | |
| CSCA 5438 | Object-Oriented Analysis and Design: Patterns and Principles | |
| CSCA 5448 | Object-Oriented Analysis and Design: Practice and Architecture | |
| Introduction to Robotics with Webots | | |
| CSCA 5312 | Basic Robotic Behaviors and Odometry | |
| CSCA 5332 | Robotic Mapping and Trajectory Generation | |
| CSCA 5342 | Robotic Path Planning and Task Execution | |
| Computer Visualization | | |
| CSCA 5222 | Introduction to Computer Vision | |
| CSCA 5322 | Deep Learning for Computer Vision | |
| CSCA 5422 | Computer Vision for Generative AI | |
| Stand-Alone Electives | | |
| CSCA 5702 | Fundamentals of Data Visualization | |
| Special Topics | | |
| CSCA 7000 | Special Topics | |
| **Total Credit Hours** | | **30** |

The Department of Computer Science will continue to roll out additional program curriculum. Currently, the department is developing courses covering topics such as data center scale computing, high-performance and parallel computing, theory of computation, robotics, object-oriented analysis and design, network systems, and big data challenges and NoSQL solutions.

Faculty members who develop courses and/or serve as instructor of record for graduate level courses will have approved Graduate Faculty Appointments.

### Time Limit

Courses used toward the MS-CS on Coursera degree must have been completed within eight years of the degree conferral date. Courses taken more than eight years prior to graduation will appear on the transcript and be calculated in the cumulative GPA but may not be used toward the degree. Students may continue to pursue the degree even after eight years, but they must accrue 30 credits within an eight-year window in order to earn the degree.

The eight-year restriction is applied to courses on a rolling basis and is determined by the date that credit was awarded in the course.

## Learning Outcomes

By the completion of the program, students will be able to:

- Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Design, implement and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Communicate effectively in a variety of professional contexts.
- Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- Apply computer science theory and software development fundamentals to produce computing-based solutions.

# Computer Science - Professional Master of Science (MSCPS)

The Professional Master of Science (MSCPS) is a degree program that offers possibilities for a wide range of students. Whether the student is

a working engineer or an undergraduate considering a career in industry, there are program options to meet their needs.

The department offers nine degree tracks, each of which result in a Professional Master of Science in Computer Science:

- Algorithms, Network and Optimization (ANO) (https://www.colorado.edu/cs/academics/graduate-programs/professional-masters-computer-science/algorithms-network-and/)
- Artificial Intelligence (AIG) (https://www.colorado.edu/cs/academics/graduate-programs/professional-masters-computer-science/artificial-intelligence-aig-sub/)
- Data Science and Engineering (DSE) (https://www.colorado.edu/cs/data-science-engineering-sub-plan-requirements/)
- Human-Centered Computing (HCC) (https://www.colorado.edu/cs/human-centered-computing-sub-plan-requirements/)
- Numerical Computation (NUM) (https://www.colorado.edu/cs/current-students/graduate-students/ms-degree/professional-ms-degree-requirements/numerical/)
- Robotics (RBT) (https://www.colorado.edu/cs/current-students/graduate-students/ms-degree/professional-ms-degree-requirements/robotics-sub-plan/)
- Software Systems and Cloud Computing (SSC) (https://www.colorado.edu/cs/current-students/graduate-students/ms-degree/professional-ms-degree-requirements/software-systems/)
- Security (SEC) (https://www.colorado.edu/cs/academics/graduate-programs/professional-masters-computer-science/security-sec-sub-plan/)
- General Track

The Department of Computer Science has embraced this degree as an ideal opportunity to expand the high quality courses in the fields above into a wide array of courses leading to a full master's degree. The goal of the MSCPS program is to produce creative, workforce-ready graduates equipped with versatile specialized skills and technical leadership.

Adding several new subplan courses to the program now enables greater options for earning professional MS degree with a these subplans, while also offering plenty of courses to complete a full master's degree, principally with a subplan focus. Students pursuing this degree will also have access to many excellent graduate-level courses offered by the department's highly reputed faculty.

# Subplans

## General Track

Students opting for this track have the option to select classes from an approved list for the degree. The jobs these students get are also similar to other subplans. However, specializing in a subplan is more beneficial.

## Algorithms, Network and Optimization

The subplan enables students to employ powerful mathematical tools and techniques from algorithms, graph theory, computational complexity theory and mathematical optimization to solve problems that may arise in research and development of cutting edge computing systems. Skills include: design and analysis of algorithms, understanding inherent problem complexity and deploying optimization-based tools and techniques. We expect graduates to fill software development roles with an emphasis on algorithms design, data analysis and solution design.

Potential job titles include: graph theorist, optimization analyst, software developer on algorithms design and data analysts on algorithms design. Potential employers include Twitter, Google, Facebook, Amazon, Oracle, Uber, Microsoft and Apple.

## Data Science and Engineering

This subplan provides the skills to develop computer solutions that require expertise in data science and engineering. Students who complete the program receive both a master's degree in computer science and a specialization within data science and engineering. This combination is very attractive as technology companies are looking for developers that have experience in data science. Students complete both a set of core courses for the degree in addition to a set of data science courses.

Potential job titles include: Hadoop developer, BI developer, quantitative data engineer, search engineer, technical architect, big data analyst, solutions architect, data warehouse engineer, data science software engineer and ETL developer. Potential employers include Twitter, Google, Facebook, Amazon, Oracle, Uber, Microsoft and Apple.

## Human-Centered Computing

In this track, students learn how to design, implement and evaluate user interfaces for a range of computing technology, and gain skills related to designing technologies to support the needs of real people. Topics covered include user-centered design, information visualization, universally accessible design and computer-supported cooperative work. Students will gain experience with the entire user-centered design process, from requirements gathering, prototyping, and qualitative and quantitative user evaluation. Many courses in this concentration are project-based and will involve user-centered research in the lab and in the field.

Potential job titles for graduates of this program include user experience researcher, user interface engineer, data scientist, interaction designer, front-end developer, accessibility specialist, mobile application developer. Potential employers include Facebook, Google, Microsoft, Twitter, Adobe, Autodesk, Sphero, Snap and Oculus.

## Artificial Intelligence and Robotics

The subplans in artificial intelligence and robotics build expertise in algorithms and methods for developing autonomous systems, including robotics and cyber-physical systems. As part of this program, students will design and analyze systems which leverage computation to interact with the world around them through sensors and actuators. Machine learning, signal processing and control theory are all components to this program, where students become experts in creating the software for devices ranging from climate control systems to automobiles.

Potential job titles for graduates of this program focusing on artificial intelligence include: software engineer, perception engineer, data scientist and research engineer. Potential employers include Lockheed-Martin, Amazon, Microsoft, Google and Facebook.

Potential job titles for graduates of this program focusing on robotics include: robotics engineer, perception engineer, control engineer and robotics scientist. Potential employers include: Amazon Robotics, Uber, Google, iRobot and DJI.

## Numerical Computation

Ongoing improvements in computational capability and memory performance have increased the importance of high-fidelity simulations, optimization and data-driven science and engineering applications. Students in this subplan develop the skills to design robust and high-

performance numerical methods for addressing real-world problems and develop production-grade implementations using state of the art software tools to target modern architectures and large-scale parallel computers.

Potential job titles: Computational scientist/engineer, numerical/data analyst, research scientist, software engineer, HPC developer and quantitative software engineer. Potential employers include national labs, universities, engineering ISVs (ANSYS, MSC, CD-adapco), aerospace (NASA, Boeing, ULA, SpaceX, Lockheed), exploration (Shell, Schlumberger, CMG), manufacturing (P&G, GE), technology (Amazon, Google, IBM, Motorola) and finance (HFT, mutual funds, credit card).

### Software Systems and Cloud Computing

In this subplan, students learn about software systems and how they are applied to real world problems. They'll also discover how emerging cloud computing technologies can be used to implement some of the world's most popular services and applications.

### Security

This sub-plan provides students with opportunities to explore cybersecurity and related challenges in the protection of critical systems and information from digital attacks. Security challenges impact many aspects of computer architecture, networks, applications, data, devices, and other sensitive infrastructure and information assets. Students will gain a broad spectrum of practical knowledge and experience, an understanding of theoretical underpinnings, and awareness of policy/standards that are related to computer and network security.

Potential job titles include—but are not limited to—security engineer, information security analyst, penetration tester, network security engineer, and data recovery professional. Companies that typically hire security-related positions range throughout industry, software, and government agencies including Meta, Google, Amazon, Splunk, Accenture, NSA, Salesforce, Mastercard, and many others.

For more information, visit the department's Professional MS Degree Program Requirements (http://www.colorado.edu/cs/current-students/graduate-students/ms-degree/professional-ms-degree-requirements/) webpage.

## Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s):

- Applied Computer Science - Post-Baccalaureate Bachelor of Science (BSACS) (p. 945)
- Computer Science - Bachelor of Arts (BA) (p. 937)
- Computer Science - Bachelor of Science (BSCS) (p. 941)

## Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

# Requirements

## Admission Requirements

Applicants for graduate study in computer science must hold at least a bachelor's degree or its equivalent from an accredited institution. They should have programming experience, a number of computer science courses and sufficient mathematical maturity to understand pure mathematics courses at the upper division (junior/senior) level. A minimum undergraduate GPA of 3.0 (on a scale of 4.0) is required for admission to the master's program.

Applicants are *not* required to submit GRE scores.

### Mathematics Courses

A student's academic background should include at least three semesters of mathematics at the level of sophistication of calculus or above. Examples of such courses include calculus, differential equations, linear algebra, probability, statistics and abstract algebra. The courses should indicate that the student has achieved the mathematical maturity expected of an upper-level science, engineering or mathematics undergraduate.

### Computer Science Courses

At least four one-semester courses in computer science that are beyond the introductory level are required for admissions. These are intended to demonstrate breadth of basic computer science knowledge in the areas of computer hardware, software and theory. The courses should include the equivalent of the following CU Boulder offerings:

- Hardware requirement: CSCI 2400 Computer Systems (Computer Systems)
- Software requirement: Either CSCI 3155 Principles of Programming Languages or CSCI 3753 Design and Analysis of Operating Systems
- Theory requirement: CSCI 2270 Computer Science 2: Data Structures and either CSCI 3104 Algorithms or CSCI 3434 Theory of Computation

## Required Courses and Credits

The following requirements are subject to change; for the most current information, visit the department's Professional MS Degree Program Requirements (http://www.colorado.edu/cs/current-students/graduate-students/ms-degree/professional-ms-degree-requirements/) webpage.

### Degree Requirements

Students must complete a total of 30 credit hours of approved graduate level course work with a grade of C or better and a cumulative GPA of at least 3.00. Students are allowed to take two non-CS courses as long as these are 5000 level and above and are offered at CU Boulder main campus. Students under this option are *not* allowed to take research hours or thesis option.

| Code | Title | Credit Hours |
|---|---|---|
| **Breadth Courses** | | |
| Students must complete one breadth course from each of the three bins listed below, for a total of 9 credits of breadth courses. Students must earn a grade of B or better in each of the three breadth courses. | | |
| *Bin One* | | |
| Choose one: | | 3 |
| CSCI 5229 | Computer Graphics | |

| | | |
|---|---|---|
| CSCI 5254 | Convex Optimization and Its Applications | |
| CSCI 5434 | Probability for Computer Science | |
| CSCI 5444 | Introduction to Theory of Computation | |
| CSCI 5446 | Chaotic Dynamics | |
| CSCI 5454 | Design and Analysis of Algorithms | |
| CSCI 5576 | High-Performance Scientific Computing | |
| CSCI 5606 | Principles of Numerical Computation | |
| CSCI 5636 | Numerical Solution of Partial Differential Equations | |
| CSCI 5646 | Numerical Linear Algebra | |
| CSCI 5654 | Linear Programming | |
| CSCI 5676 | Numerical Optimization | |
| *Bin Two* | | |
| Choose one: | | 3 |
| CSCI 5202 | Introduction to Robotics | |
| CSCI 5302 | Advanced Robotics | |
| CSCI 5322 | Algorithmic Human-Robot Interaction | |
| CSCI 5352 | Network Analysis and Modeling | |
| CSCI 5402 | Research Methods in Human-Robot Interaction | |
| CSCI 5502 | Data Mining | |
| CSCI 5616 | Introduction to Virtual Reality | |
| CSCI 5622 | Machine Learning | |
| CSCI 5722 | Computer Vision | |
| CSCI 5822 | Probabilistic and Causal Modeling in Computer Science | |
| CSCI 5832 | Natural Language Processing | |
| CSCI 5839 | User-Centered Design and Development 1 | |
| CSCI 5849 | Input, Interaction, and Accessibility | |
| CSCI 5922 | Fundamentals of Neural Networks and Deep Learning | |
| *Bin Three* | | |
| Choose one: | | 3 |
| CSCI 5135 | Computer-Aided Verification | |
| CSCI 5253 | Datacenter Scale Computing - Methods, Systems and Techniques | |
| CSCI 5273 | Network Systems | |
| CSCI 5403 | Introduction to Computing Security | |
| CSCI 5413 | Computer Security and Ethical Hacking | |
| CSCI 5448 | Object-Oriented Analysis and Design | |
| CSCI 5523 | Modern Offense and Defense in Cybersecurity | |
| CSCI 5525 | Compiler Construction | |
| CSCI 5535 | Fundamental Concepts of Programming Languages | |
| CSCI 5573 | Advanced Operating Systems | |
| CSCI 5673 | Distributed Systems | |
| CSCI 5753 | Computer Performance Modeling | |
| CSCI 5817 | Database Systems | |
| CSCI 5828 | Foundations of Software Engineering | |
| CSCI 5854 | Theoretical Foundations of Autonomous Systems | |
| **Project Courses** | | |
| Complete six credits of projects class from either of the following two options. All students must earn a B or better (not B-) in these courses. | | 6 |
| CSCI 5340 & CSCI 5350 | Startup Essentials: Entrepreneurial Projects in Computing and Entrepreneurial Projects II | |
| CSCI 5040 & CSCI 5050 | Professional Masters Project 1 and Professional Masters Project 2 | |
| **Additional Coursework** | | |
| An additional 15 credits are required to complete the degree, with restrictions. [1] | | 15 |
| **Total Credit Hours** | | **30** |

[1] Additional coursework may consist of no more than two non-CS classes, except for classes under subplans. (Classes listed under required sub-plans will not be considered against the two non-CS.)

## Time Limit

All degree requirements must be completed within four years of the date of commencing coursework.

## Subplan Tracks

In addition to the above mentioned required courses, students enrolled in any the following subplans must also complete the required subplan courses as listed below.

Students must earn a grade of B or better all subplan courses. Students may count the same course towards their subplan and breadth requirements.

### Algorithms, Network and Optimization (ANO) (https://www.colorado.edu/cs/academics/graduate-programs/professional-masters-computer-science/ANO/)

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| Choose four: | | |
| CSCI 5114 | Practical Algorithmic Complexity | |
| CSCI 5254 | Convex Optimization and Its Applications | |
| CSCI 5352 | Network Analysis and Modeling | |
| CSCI 5434 | Probability for Computer Science | |
| CSCI 5654 | Linear Programming | |
| CSCI 5676 | Numerical Optimization | |
| CSCI 6114 | Computational Complexity Theory | |
| CSCI 6214 | Randomized Algorithms | |
| CSCI 6314 | Algorithmic Economics | |

### Data Science and Engineering (DSE) (https://www.colorado.edu/cs/data-science-engineering-sub-plan-requirements/)

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| Choose four: | | |
| CSCI 5253 | Datacenter Scale Computing - Methods, Systems and Techniques | |
| CSCI 5254 | Convex Optimization and Its Applications | |
| CSCI 5352 | Network Analysis and Modeling | |
| CSCI 5434 | Probability for Computer Science | |
| CSCI 5502 | Data Mining | |

| | |
|---|---|
| CSCI 5576 | High-Performance Scientific Computing |
| CSCI 5622 | Machine Learning |
| CSCI 5654 | Linear Programming |
| CSCI 5676 | Numerical Optimization |
| CSCI 5722 | Computer Vision |
| CSCI 5832 | Natural Language Processing |
| CSCI 5922 | Fundamentals of Neural Networks and Deep Learning |
| CSCI 6502 | Big Data Analytics: Systems, Algorithms, and Applications |
| ATLS 5214 | Big Data Architecture |

Human-Centered Computing (HCC) (https://www.colorado.edu/cs/human-centered-computing-sub-plan-requirements/)

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| Choose four: | | |
| CSCI 5229 | Computer Graphics | |
| CSCI 5239 | Advanced Computer Graphics | |
| CSCI 5322 | Algorithmic Human-Robot Interaction | |
| CSCI 5402 | Research Methods in Human-Robot Interaction | |
| CSCI 5616 | Introduction to Virtual Reality | |
| CSCI 5809 | Computer Animation | |
| CSCI 5839 | User-Centered Design and Development 1 | |
| CSCI 5849 | Input, Interaction, and Accessibility | |
| CSCI 5919 | HCC Survey and Synthesis: Foundations and Trajectories | |
| CSCI 5929 | HCC Survey and Synthesis: New Disciplinary Directions | |
| CSCI 6402 | Issues and Methods in Cognitive Science | |
| CSCI 7772 | Topics in Cognitive Science | |
| INFO 5502 | Online Communities | |
| INFO 5601 | Information Ethics and Policy | |
| INFO 5602 | Information Visualization | |
| INFO 5603 | Survey Research Design | |
| INFO 5605 | Ethnographic Research in Applied Settings | |
| INFO 5609 | User-Centered Design | |
| INFO 5611 | Ubiquitous Computing Experience Design | |

**Artificial Intelligence (AIG)**

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| Choose four: | | 12 |
| CSCI 5254 | Convex Optimization and Its Applications | |
| CSCI 5202 | Introduction to Robotics | |
| CSCI 5302 | Advanced Robotics | |
| CSCI 5322 | Algorithmic Human-Robot Interaction | |
| CSCI 5352 | Network Analysis and Modeling | |
| CSCI 5434 | Probability for Computer Science | |
| CSCI 5502 | Data Mining | |
| CSCI 5622 | Machine Learning | |
| CSCI 5673 | Distributed Systems | |
| CSCI 5722 | Computer Vision | |
| CSCI 5822 | Probabilistic and Causal Modeling in Computer Science | |
| CSCI 5832 | Natural Language Processing | |
| CSCI 5922 | Fundamentals of Neural Networks and Deep Learning | |
| APPM 8500 | Statistics, Optimization and Machine Learning Seminar | |

Numerical Computation (NUM) (https://www.colorado.edu/cs/current-students/graduate-students/ms-degree/professional-ms-degree-requirements/numerical/)

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| Choose four: | | |
| CSCI 5229 | Computer Graphics | |
| CSCI 5239 | Advanced Computer Graphics | |
| CSCI 5446 | Chaotic Dynamics | |
| CSCI 5576 | High-Performance Scientific Computing | |
| CSCI 5606 | Principles of Numerical Computation | |
| CSCI 5636 | Numerical Solution of Partial Differential Equations | |
| CSCI 5646 | Numerical Linear Algebra | |
| CSCI 5654 | Linear Programming | |
| CSCI 5676 | Numerical Optimization | |

Robotics (RBT) (https://www.colorado.edu/cs/current-students/graduate-students/ms-degree/professional-ms-degree-requirements/robotics-sub-plan/)

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| Choose four: | | |
| CSCI 5202 | Introduction to Robotics | |
| CSCI 5254 | Convex Optimization and Its Applications | |
| CSCI 5302 | Advanced Robotics | |
| CSCI 5322 | Algorithmic Human-Robot Interaction | |
| CSCI 5434 | Probability for Computer Science | |
| CSCI 5622 | Machine Learning | |
| CSCI 5722 | Computer Vision | |
| CSCI 5854 | Theoretical Foundations of Autonomous Systems | |
| CSCI 5922 | Fundamentals of Neural Networks and Deep Learning | |
| ASEN 5347 | Math Methods in Dynamics | |
| ASEN 6020 | Optimal Trajectories | |
| ASEN 6412 | Uncertainty Quantification | |

Software Systems and Cloud Computing (SSC) (https://www.colorado.edu/cs/current-students/graduate-students/ms-degree/professional-ms-degree-requirements/software-systems/)

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| Choose four: | | |
| CSCI 5135 | Computer-Aided Verification | |
| CSCI 5253 | Datacenter Scale Computing - Methods, Systems and Techniques | |
| CSCI 5273 | Network Systems | |
| CSCI 5413 | Computer Security and Ethical Hacking | |
| CSCI 5448 | Object-Oriented Analysis and Design | |
| CSCI 5502 | Data Mining | |
| CSCI 5525 | Compiler Construction | |
| CSCI 5535 | Fundamental Concepts of Programming Languages | |
| CSCI 5573 | Advanced Operating Systems | |
| CSCI 5673 | Distributed Systems | |
| CSCI 5817 | Database Systems | |
| CSCI 5828 | Foundations of Software Engineering | |

Security (SEC) (https://www.colorado.edu/cs/academics/graduate-programs/professional-masters-computer-science/security-sec-sub-plan/)

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| Choose four: | | |
| CSCI 5113 | Linux System Administration | |
| CSCI 5273 | Network Systems | |
| CSCI 5403/ CYBR 5300 | Introduction to Computing Security | |
| CSCI 5413 | Computer Security and Ethical Hacking | |
| CSCI 5523 | Modern Offense and Defense in Cybersecurity | |
| CYBR 5320 | Cybersecurity Network Analytics | |
| CYBR 5330 | Digital Forensics | |
| CYBR 5350 | Security Auditing and Penetration Testing | |
| ECEN 5133 | Fundamentals of Computer Security | |
| ECEN 5793 | Secure Computer Architecture | |

# Learning Outcomes

By the completion of the program, students will be able to:

- Solve technical problems in computer science through writing code, pseudocode, technical writing and/or applying foundational concepts from a variety of subfields.
- Cast large, societal and/or complex problems as computational problems.
- Communicate clearly about their ideas and their capstone project.
- Successfully complete the required course work with a minimum GPA of 3.0. (Evaluation Method 1)
- Successfully complete a capstone project as part of the required project classes. (Evaluation Method 2)

# Dual Degree

## MSCPS/EMEN in Computer Science and Engineering Management

Computer Science and Engineering Management (https://www.colorado.edu/emp/) have teamed up to offer an exciting dual degree (https://www.colorado.edu/cs/current-students/graduate-students/ms-degree/dual-professional-ms-engineering-management/) for MSCPS students. Student complete a total of 45 credits of graduate-level coursework. Of those, 24 credits are in CS courses and 21 credits are in EMEN courses. All degree requirements must be completed within four years of the date of commencing coursework.

Students filling out the candidacy application (https://www.colorado.edu/graduateschool/media/216/) for CSMSCPS/EMEN dual degree during the semester they graduate, will have to include the 24 credits of CS coursework plus six credits of approved EMEN courses to come up with the required 30 credits of the CSMSCPS degree within the dual degree.

# Network Engineering - Master of Science (MSNE)

Global interconnectivity requires the continuous expansion and evolution of network infrastructure, in response to trends in e-commerce, the Internet of Things, mobile data and enterprise operations. To assure the continuous operation of this infrastructure, companies need highly educated and technically proficient individuals with the vision to anticipate and build systems for emerging communication needs. This course-based degree prepares students to join the next generation of leaders in Internet, cloud and intranet networking. Students will learn how to develop, build and maintain network solutions tailored to the diverse needs of your organization within the private or public sectors.

The intended audience for the Network Engineering program is both working professionals trying to develop or update their technical skills and abilities to match the latest requirements of the Internet service and cloud provider landscapes, as well as new entrants to this industry pursuing academic, professional or research success.

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s):

- Applied Computer Science - Post-Baccalaureate Bachelor of Science (BSACS) (p. 946)
- Computer Science - Bachelor of Arts (BA) (p. 939)
- Computer Science - Bachelor of Science (BSCS) (p. 941)

# Requirements

## Admission Requirements

Applicants for graduate study in network engineering must hold at least a bachelor's degree or its equivalent from an accredited institution. We recommend that candidates have at least some experience in network engineering, system administration, or network programming.

A minimum undergraduate GPA of 3.0 (on a scale of 4.0) is required for admission to the master's program.

GRE scores are not required for admissions to this program.

## Program Requirements

### Required Courses and Credits

Students must complete a total of 30 credit hours of approved graduate-level coursework with a grade of C or better and a cumulative GPA of at least 3.00.

Students will take courses in the following categories: fundamentals (6 credits), core (6 credits), advanced electives (9 credits) and electives (9 credits).

#### Fundamentals

The courses in the Fundamentals category are designed to provide students with the background they need to succeed in this degree. Courses in this category cover the fundamental concepts of how the internet operates; how to develop network systems; and how to administer the machines (both physical and virtual) that deploy them.

| Code | Title | Credit Hours |
|---|---|---|
| CSCI 5010 | Fundamentals of Data Communication | 3 |
| CSCI 5020 | Fundamentals of Network Programming | 3 |
| CSCI 5030 | Fundamentals of System Administration and Virtualization | 3 |

Students are required to take two courses (6 credits) from the Fundamentals category unless they can demonstrate that they have acquired the necessary skills and knowledge via their undergraduate degree. Such students can petition to take up to two extra elective or advanced elective courses instead. Only 6 credits from the Fundamentals category can count towards the degree.

#### Core

The courses in the Core category begin to lay the foundation for exploring network engineering topics in depth. All aspects of network engineering from the management of network systems to the policies that govern traffic on the internet to the wireless systems that deliver information to devices on the edge are all covered.

| Code | Title | Credit Hours |
|---|---|---|
| CSCI 5113 | Linux System Administration | 3 |
| CSCI 5160 | Introduction to Enterprise Networks | 3 |
| CSCI 5170 | IP Routing Protocols and Policies | 3 |
| CSCI 5180 | Network Management and Automation | 3 |
| CSCI 5200 | Introduction to Wireless Systems | 3 |
| CSCI 5220 | Wireless Local Area Networks | 3 |
| CSCI 5230 | Wireless Systems Lab | 3 |

Students are required to take two courses (6 credits) from the Core category to help set the stage for taking courses in the Advanced Electives category. Students can be guided in their choice of Core courses by using the suggested focus areas below to craft a curriculum plan that best meets their academic goals. If a student feels that they need to take more courses from the Core category, they can certainly do so by choosing to take additional Core classes and applying those credits towards meeting the credits associated with the Electives category.

#### Advanced Electives

The courses in the Advanced Electives category go in-depth on a variety of network engineering topics. Students are required to take three courses (9 credits) of advanced electives to graduate.

| Code | Title | Credit Hours |
|---|---|---|
| CSCI 5190 | Voice Over IP. Voice Network Design and Implementation | 3 |
| CSCI 5260 | Datacenter Networks | 3 |
| CSCI 5270 | IP Network Design | 3 |
| CSCI 5280 | Software-Defined Networking | 3 |
| CSCI 5360 | Internet Service Provider Networks | 3 |
| CSCI 5380 | Network Virtualization and Orchestration | 3 |
| CSCI 5620 | Advanced Wireless Lab | 3 |
| CSCI 5630 | Wireless and Cellular Systems | 3 |
| CSCI 5840 | Advanced Network Automation | 3 |
| CSCI 7000 | Current Topics in Computer Science (Special Topics in Cloud Technologies) | 3 |

#### Electives

The three courses (9 credits) associated with the Electives category allow students to customize the MS in Network Engineering degree to meet their academic goals. These credits can include any of the following options:

- Any of the remaining Core courses
- Any of the remaining Advanced Electives Courses
- Any CS 5000-level course
- At most three graduate-level courses (9 credits) from outside CS approved by petition

For the last two options, students are encouraged to submit petitions to the CS graduate committee *before* taking the courses they want to apply to the Electives category.

### Suggested Focus Areas

The following sets of courses represent common focus areas that students can take to target a particular area of network engineering in depth.

#### Network Design and Configuration

| Code | Title | Credit Hours |
|---|---|---|
| CSCI 5160 | Introduction to Enterprise Networks | 3 |
| CSCI 5260 | Datacenter Networks | 3 |
| CSCI 5360 | Internet Service Provider Networks | 3 |

**Network Programmability and Automation**

| Code | Title | Credit Hours |
|---|---|---|
| CSCI 5180 | Network Management and Automation | 3 |
| CSCI 5280 | Software-Defined Networking | 3 |
| CSCI 5380 | Network Virtualization and Orchestration | 3 |
| CSCI 5840 | Advanced Network Automation | 3 |

**Wireless Networking**

| Code | Title | Credit Hours |
|---|---|---|
| CSCI 5200 | Introduction to Wireless Systems | 3 |
| CSCI 5220 | Wireless Local Area Networks | 3 |
| CSCI 5620 | Advanced Wireless Lab | 3 |
| CSCI 5630 | Wireless and Cellular Systems | 3 |

**Comprehensive Networking Solutions**

| Code | Title | Credit Hours |
|---|---|---|
| CSCI 5160 | Introduction to Enterprise Networks | 3 |
| CSCI 5170 | IP Routing Protocols and Policies | 3 |
| CSCI 5190 | Voice Over IP. Voice Network Design and Implementation | 3 |
| CSCI 5200 | Introduction to Wireless Systems | 3 |
| CSCI 5270 | IP Network Design | 3 |

# Learning Outcomes

Network engineering education prepares students to become the individuals responsible for the design, construction and operation of data communication systems. Network engineering and automation teaches students how to develop, build and maintain network solutions tailored to the diverse needs of the industry within the private or public sectors.

Global interconnectivity requires the continuous expansion and evolution of its infrastructure, in response of latest trends in e-commerce, IoT, mobile data and enterprises operations. To assure the continuous operation of this infrastructure the industry needs a constant supply of highly technical individuals with both the knowledge and the vision to anticipate and build for upcoming communication needs. The professional master's in network engineering (MSNE) would prepare students via technical and management courses to be the next leaders in Internet, Cloud and Intranet networking.

The curriculum will use an applied interdisciplinary approach through lab-based courses in multiple disciplines to give students the skills they will need to:

- Gain expertise in designing, building and deploying scalable network architectures using multi-vendor solutions.
- Develop skills in using programming and automation to manage networks, identify critical issues and resolve problems at scale.
- Create and deploy software-defined solutions to enhance network intelligence, performance and resilience.
- Effectively plan, scope and manage complex network projects while communicating technical concepts clearly to diverse audiences.

# Computer Science - Doctor of Philosophy (PhD)

As a computer science PhD student at CU Boulder, students take part in tier one research, learning from nationally and internationally recognized faculty.

Computer Science faculty, staff, and students are engaged in cutting edge research projects that address some of the most important challenges facing society today. From harnessing the power of big data to modeling climate change to understanding the role of social media, advances in computer science today will change the world tomorrow. The department offers opportunities in seven main research areas (https://www.colorado.edu/cs/research/).

Students select from focus areas in artificial intelligence, robotics, computational biology, human-centered computing, numerical and scientific computing, programming languages, software engineering, systems and networking, security and theory of computing. The PhD program in computer science is available whether a student is entering graduate studies for the first time or if they already have a master's degree. While a master's is not required to enroll, our PhD students will typically earn one on the way to a PhD.

PhD students consult with a faculty advisor throughout the duration of their degree to review their research progress and course selection.

For more information, visit the department's PhD Degree (http://www.colorado.edu/cs/current-students/graduate-students/phd/) and Research (http://www.colorado.edu/cs/research/) webpages.

# Requirements

## Course Requirements

- 30 credit hours in courses numbered 5000 or above, including three breadth (https://www.colorado.edu/cs/academics/graduate-programs/breadth-courses/), three 1-credit professional development, and six depth courses (3 credits of the depth needs to be CSCI)
- 30 credit hours of dissertation credit.
- A maximum of 21 credit hours of graduate coursework may be transferred from another accredited institution.
- All courses (except MS Thesis hours) taken for the master's degree at the 5000-level or above at CU Boulder may be applied toward the doctoral degree at the university.

## Preliminary Examination

The purpose of the area examination is to ensure that the student has sufficient depth to begin research in a selected area. Thus the exam tests knowledge of the general area of computer science that contains the research topic, deeper specialized knowledge of the specific research area that the student will be working in, and intellectual sophistication needed to conduct research in the area.

The area examination contrasts with the comprehensive exam, which is devoted to a focused research theme. It complements the coursework requirement of the preliminary exam, which is meant to build breadth in Computer Science in general and general knowledge of the student's research area.

For more information, visit the department's PhD Area Exams (https://www.colorado.edu/cs/current-students/graduate-students/phd/requirements/) information.

### Comprehensive Examination

After passing the preliminary examination, the student continues their coursework and prepares a written thesis prospectus within four years of their admission to the program. When ready, the student takes an oral comprehensive examination covering their graduate coursework and thesis prospectus. The oral examination is based primarily on a written proposal for the thesis research provided by the student to committee members in advance. This examination is conducted before the student's doctoral committee of five or more graduate faculty members chosen by the student and approved by the department and the Graduate School.

For more information, visit the "PhD Comprehensive Exam/Proposal" section of the department's PhD Program Requirements (http://www.colorado.edu/cs/current-students/graduate-students/phd/requirements/) webpage.

### PhD Dissertation

Students must write a dissertation based on original research conducted under the supervision of a graduate faculty member. The dissertation must fulfill all Graduate School requirements. After the dissertation is completed, an oral final examination on the dissertation and related topics is conducted by the student's doctoral committee.

### Time Limit

All degree requirements must be completed within six years of the date of commencing coursework.

## Learning Outcomes

By the completion of the program, students will be able to:

- Become experts in a subfield of computer science, and make a major research contribution to the subfield.
- Solve technical problems in computer science through writing code, pseudocode, technical writing and/or applying foundational concepts from a variety of subfields.
- Cast large, societal and/or complex problems as computational problems.
- Communicate clearly about their ideas and their research.

### Evaluation Methods

1. Peer-reviewed research publications in journals and conference proceedings relevant to the field of study. Formulating a coherent research thesis and successfully defending it against a panel of experts.
2. Completion of departmental PhD milestones: breadth course completion with the required grades; Area Exam, Proposal Defense and Final Defense by departmental defined timeline.

# Artificial Intelligence - Graduate Certificate (Online)

The graduate certificate in Artificial Intelligence (AI) provides students a strong foundation in key AI topics. Students apply Machine Learning (ML) algorithms to real-world data sets; examine ethical issues in the design and implementation of current and future computing systems and technologies; create an appreciation for the tight interplay between mechanism, sensor and control in the design of robotic and intelligent systems; and study vital topics in generative AI reinforcement learning, natural language processing and autonomous systems.

## Program Policies

This CU Boulder on Coursera program does not align with standard campus policies. Please refer to the Online Programs (p. 1895) section of the catalog for more information.

## Requirements

The AI graduate certificate requires 12 credit hours of coursework. To earn the certificate, students must complete 4 full specializations from the following courses with a grade of C or higher in each course and a 3.0 cumulative GPA. Each course in a specialization is 1 credit.

| Code | Title | Credit Hours |
|---|---|---|
| **Specializations** | | |
| Choose four specializations from the list below: | | 12 |
| *Computing, Ethics and Society* | | |
| CSCA 5214 | Computing, Ethics, and Society Foundations | |
| CSCA 5224 | Ethical Issues in AI and Professional Ethics | |
| CSCA 5234 | Ethical Issues in Computing Applications | |
| *Natural Language Processing: Deep Learning Meets Linguistics* | | |
| CSCA 5832 | Fundamentals of Natural Language Processing | |
| CSCA 5842 | Deep Learning for Natural Language Processing | |
| CSCA 5852 | Model and Error Analysis for Natural Language Processing | |
| *Artificial Intelligence* | | |
| *Reinforcement Learning* | | |
| *Foundations of Autonomous Systems* | | |
| CSCA 5834 | Modeling of Autonomous Systems | |
| CSCA 5844 | Requirement Specifications for Autonomous Systems | |
| CSCA 5854 | Verification and Synthesis of Autonomous Systems | |
| *Introduction to Robotics with Webots* | | |
| CSCA 5312 | Basic Robotic Behaviors and Odometry | |
| CSCA 5332 | Robotic Mapping and Trajectory Generation | |
| CSCA 5342 | Robotic Path Planning and Task Execution | |
| *Generative AI* | | |
| CSCA 5112 | Introduction to Generative AI | |
| CSCA 5122 | Modern Applications of Generative AI | |
| CSCA 5132 | Advances in Generative AI | |
| *Machine Learning* | | |
| CSCA 5622 | Introduction to Machine Learning - Supervised Learning | |
| CSCA 5632 | Unsupervised Algorithms in Machine Learning | |

| | | |
|---|---|---|
| CSCA 5642 | Introduction to Deep Learning | |
| **Total Credit Hours** | | **12** |

## Learning Outcomes

- Students will gain a deep knowledge of AI, machine learning theory and its numerous applications including (but not limited to) natural language processing, computer vision, robotics, healthcare and human-centered computing.
- Students will be able to design and implement comprehensive solutions for practical problems that incorporate the latest AI techniques.
- Students will be able to identify the ethical implications in the design and application of AI technology and contribute to the emerging discussion in these areas as ethical developers of new technologies.
- Students will understand CS foundations, probability/statistics, programming languages and computer systems. Specifically, their knowledge will extend to how ideas from these sub-disciplines of CS support AI systems and vice-versa.
- Students will keep up with the state-of-the-art methods and techniques in this rapidly changing discipline of AI. Students will read and comprehend research papers and consider how the ideas in them can be applied in their everyday practice.

# Creative Technology and Design

The ATLAS Institute's Creative Technology and Design (CTD) graduate programs prepare students to be multidisciplinary leaders versed in real-world design challenges and technical know-how. Degrees are granted by the College of Engineering and Applied Science.

The program is built for versatility: students pursue their passion in UX/UI, product development, interactive media, game design, sustainability, performing arts technology, social impact—or anywhere engineering and creativity converge.

ATLAS is home to students who transcend traditional disciplinary structures of engineering, design, science and art to inspire new realms of invention. They collaborate on complex design problems. They lead teams. They conceive, prototype, refine and deploy useful solutions to thorny problems. They do work that matters.

Each ATLAS lab serves as a hub for leading research in textiles, human-computer interaction, biomaterials, nanotech, data, fabrication, music, language, art, performance and more. Together they comprise a larger force for unconventional lines of inquiry, radical creative expression and spontaneous collaboration toward achieving meaningful impact.

Graduates of the professional MS program go on to fulfilling work in design shops, NGOs, Fortune 500 companies, and arts organizations—or start their own businesses. PhD alumni continue to pursue academic careers or seek research roles in industry or government.

Interested in joining our vibrant community? Visit the ATLAS Institute's Graduate Programs webpages (https://www.colorado.edu/atlas/academics/) to learn more.

**Course code for this program is ATLS.**

## Master's Degree

- Creative Technology and Design - Professional Master of Science (MS) (p. 1690)
- Creative Technology and Design - Master of Science (MS) (p. 1692)

## Doctoral Degree

- Creative Technology and Design - Doctor of Philosophy (PhD) (p. 1692)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Alistar, Mirela (https://experts.colorado.edu/display/fisid_164177/)
Assistant Professor; PhD, Technical University of Denmark

Bruns, Carson J. (https://experts.colorado.edu/display/fisid_159851/)
Assistant Professor; PhD, Northwestern University

Chopra, Aidan
Lecturer; MArch, Rice University

Cohen, Ruscha (https://experts.colorado.edu/display/fisid_149781/)
Scholar in Residence, Director; MS, University of Colorado Denver

Devendorf, Laura (https://experts.colorado.edu/display/fisid_158564/)
Assistant Professor; PhD, University of California, Berkeley

Do, Ellen Yi-Luen (https://experts.colorado.edu/display/fisid_159925/)
Professor; PhD, Georgia Institute of Technology

Gross, Mark D. (https://experts.colorado.edu/display/fisid_100095/)
Professor, Institute Director; PhD, Massachusetts Institute of Technology

Johnson, Gabriel
Lecturer; PhD, Carnegie Mellon University

Leslie, Grace (https://experts.colorado.edu/display/fisid_172297/)
Assistant Professor; PhD, University of California San Diego

Margaret, Annie (https://experts.colorado.edu/display/fisid_159961/)
Associate Teaching Professor; PhD, Northwestern University

Pinter, Anthony (https://experts.colorado.edu/display/fisid_171867/)
Assistant Teaching Professor; Ph.D., University of Colorado Boulder

Rankin, Daniel (https://experts.colorado.edu/display/fisid_156453/)
Associate Teaching Professor, Associate Director; MS, University of Colorado Boulder

Rezvani, Sheiva
Associate Teaching Professor, Faculty Director; MA, New York University

Rivera, Michael (https://experts.colorado.edu/display/fisid_169859/)
Assistant Professor; PhD, Carnegie Mellon University

Schaal, David A. (https://experts.colorado.edu/display/fisid_114824/)
Associate Teaching Professor; MFA, University of Colorado Boulder

Suzuki, Ryo (https://experts.colorado.edu/display/fisid_167629/)
Assistant Professor; PhD, University of Colorado Boulder

Swanson, Joel E. (https://experts.colorado.edu/display/fisid_134311/)
Assistant Professor; MFA, University of California, San Diego

Weaver, Zachary (https://experts.colorado.edu/display/fisid_166757/)
Assistant Teaching Professor; MArch, Carnegie Mellon University

Zamore, Shaz (https://experts.colorado.edu/display/fisid_166083/)
Assistant Teaching Professor; PhD, University of Washington

# Courses

**ATLS 5040 (3) Game Design**
Introduces students to game design, development, history, theory and culture through readings, discussion, game analysis and the iterative design process of non-digital games.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4040
**Requisites:** Restricted to students in the Atlas student group (PATL) only.

**ATLS 5050 (3) Alt Arcade Interfaces**
In this project-based studio course, students will move beyond conventional button and joystick interfaces into the design of bespoke interfaces for game control, with an emphasis on games designed for public exhibition. Students will, both individually and in groups, design and develop multiple games, and build custom control interfaces for them.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4050
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5060 (3) Tiny Games**
Guides students into fluency across a suite of technical tools (Bitsy, PuzzleScript, Pico-8, and others) to construct tiny games: short games with tight technical constraints, created in relatively brief amounts of time, and built around singular ideas.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4060
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5112 (3) Neurohacking**
Explores psychotechnologies for developing high level metacognition and individual sovereignty. We investigate the optimization of conscious human experience, mindfulness, and creativity through the lenses of neuroscience, cognitive science, evolutionary psychology, and philosophy. Students will learn to critique primary literature, experimental design, and be guided in developing a set of practices to enhance cognition and achieve various desired mental states.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4112
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5120 (3) Mobile Application Development**
Provides a comprehensive overview of developing mobile applications using a range of technologies including software developers' kits, object-oriented programming and human interface design principles. Students incorporate leading edge technologies with their own academic pursuits and personal interests to develop mobile applications. Explores the social and cultural effects of app and mobile-based computing.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4120
**Grading Basis:** Letter Grade

**ATLS 5130 (3) Experimental Typography**
This course is an advanced investigation of typography for visual communication and expression. Emphasis is placed on the analysis of meaning as conveyed through materials, technology, and design. Projects are experimental and are designed to challenge you to expand your understanding of the function of typography in communication, design, art, and culture.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4130
**Requisites:** Restricted to graduate students only.

**ATLS 5140 (3) Game Development**
Builds on concepts and processes learned in ATLS 4040/5040. Reinforces game design principles through analysis and discussion of digital games, and introduces students to key practices in the development of digital game experiences, including game flow, mechanics, 2D and 3D graphics, and artificial intelligence.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4140

**ATLS 5150 (1) Managing Effectively in a Changing Telecommunications Environment**
Provides students with an opportunity to join international managers and policy makers from around the world in an intensive seminar focused on the challenges of managing in a telecommunications environment in an era of technological change. Guest lecturers provide an effective overview of the cutting-edge issues managers face in telecom and technology companies around the world.
**Equivalent - Duplicate Degree Credit Not Granted:** TLEN 5150
**Requisites:** Restricted to CYBR/TLEN graduate students.

**ATLS 5151 (3) Flow Visualization**
Explores techniques for the visualization of the physics of fluid flows including seeding with dyes, particles and bubbles, and shadowgraphy and schlieren. Reviews optics and fluid physics, especially atmospheric clouds. Assignments are student-driven, to individuals and mixed teams of graduates, undergraduates, engineering majors and photography/video majors.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4200, MCEN 4151, ARTF 5200, ATLS 4151 and MCEN 5151

**ATLS 5201 (3) Biodesign**
This class covers basic design techniques, together with essential wetlab skills. Students will learn how to culture and work with various types of organisms, such as bacteria, algae (dynoflagellates, cyanobacteria) and fungus. These organisms will become the living media or processed biomaterials that the students will design with. This is a lab-based class.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4201
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5202 (3) Computational Fabrication**
This course will explore techniques, representations, and workflows for computational fabrication. Digital fabrication machines like 3D printers and laser-cutters bring complicated designs into physical form, and computer programming helps overcome design challenges that are difficult or nearly impossible. Blending these two tools, students will use computational fabrication techniques to design and build functional, creative objects leveraging existing computer-aided design (CAD) tools, programming languages and digital fabrication machinery.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4202
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5203 (3) Light and Perception**
Traces human and camera vision in close detail. Students explore visual perception between two and three dimensions by exploring advanced experiments in designing light. Starting with different analog illustration exercises, students explore how light informs the perception of three dimensional space and objects. Students then explore techniques to play with visual perception, using advanced technologies like Augmented and Virtual Reality, Interactive Sculpture, Digital Games, and Immersive Media.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4203
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5210 (3) Global Development I**
Introduces students to the theories and policy of international development. Examines the role of multilateral agencies, foundations, aid organizations, corporate entities and academia in development as both an industry and a research field. Focuses on development movements and their outcomes, the inter-related nature of development and its effect on policies and programs, and critiques.
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5214 (3) Big Data Architecture**
Provides students with a comprehensive survey of technologies used today in the collection, storage, processing, analytics and display of big data. Focuses on cultivating real world skills with students working on semester long projects to execute on a group project.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4214, CSCI 5214, and CSCI 4214
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ATLS 5220 (3) Global Development II**
Explores the impact of economic, geographical and social/cultural conditions on development outcomes through standalone course components taught by subject matter experts in region and in residency at ATLAS. Components may include, but are not limited to, development economics, environmental sustainability, public health, climate change, globalization and migration, religion, and gender as these broad themes relate to development.
**Requisites:** Requires prerequisite courses of ATLS 5210 (minimum grade D-). Restricted to graduate students only.

**ATLS 5221 (3) Interactive Sound**
Interactive Sound explores generative coding to produce unique audio design systems that can be employed in a wide array of interactive projects. Students will learn to use Max (a visual programing tool) to combine and control sound, video, OpenGL 3D objects, and microcontrollers. Example inputs: real time video, data scraping for the sonification of natural phenomena, or environmental sensor data collected via Arduino. Example outputs: reactive audio-visual installations, immersive projection, or multichannel spatial sound systems.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4221
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5230 (3) Case Studies in Social Impact**
Serves as foundation course for MS-Social Impact program. Students will evaluate case studies across a range of technologies and applications. Students will learn how to match available technologies to human and environmental needs and resources, be introduced to the seminal work and leaders in the field, and discuss the future of Social Impact as an emerging area of academic focus.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4230
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5240 (3) Technology for Social Impact Laboratory**
Prepares students for the semester-long practicum. Students work in teams to design interventions that address unique socio-economic and environmental development issues. Teams will design a variety of interventions, including telehealth and distance education programs, communication networks, and pro-development policies. Topics will be chosen by teams and guided by program faculty and external domain experts.
**Requisites:** Requires prerequisite courses of ATLS 5230 (minimum grade D-). Restricted to graduate students only.

**ATLS 5244 (3) Empathy and Technology**
Explores how the creative integration of empathy and compassion with design and technology can benefit society. Reviews foundational neuroscience and evolution of empathy. Through readings, discussion, and reflection students will develop personal practices for fostering empathy and critically investigate: empathy as a finite resource, tribalism/polarization, the weaponization of empathy, and principles for designing social systems that promote well-being. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4244
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ATLS 5250 (3) Fieldwork Methods**
Introduces methods and models that can be employed in program development and deployment. Examines the applications of participatory research, value-centric design, program scale, cross-disciplinary work, and appropriate monitoring and evaluation. The goal is to build student confidence around existing evaluation toolkits and methods, while advancing multi-method approaches to designing and analyzing initiatives.
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5279 (3) Aesthetics in Design**
Focuses on aesthetic aspects of design via hands-on design-build experiences. Students individually create dynamic artifacts of their own choice with the assistance of teammates. Content includes major design movements since 1900, constructive critique practice, hand sketching techniques and other selected industrial design topics. Students publish their design work on an archival public blog which provides a professional portfolio element.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5279 and MCEN 4279 and ATLS 4279

**ATLS 5320 (3) Mobile Application Development: Advanced Topics**
Explores advanced topics in mobile application design and development, including examining different approaches to information design and the various user interaction models associated with them. Understanding how data is structured, accessed, stored and flows through apps is a core theme of the course. Explores the interaction with external data sources and storage models.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4320
**Requisites:** Requires prerequisite course of ATLS 5120 (minimum grade C).
**Grading Basis:** Letter Grade

**ATLS 5330 (3) Wearable Technologies**
Introduces elements of embedding electronic and computational behaviors into clothing and accoutrements such as watches, handbags, and other wearable accessories. In weekly exercises students build, test, and demonstrate canonical wearable projects. Readings and video viewings survey past and current trends in wearable technologies, including materials, components, fashion and social acceptability. Participants design, develop, debug and document a wearable technology term project.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4330
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5402 (3) Research Methods in Human-Robot Interaction**
Introduces students to the field of human-robot interaction (HRI). Covers HRI theory, principles, methodologies, and applications with links to robotics, artificial intelligence, human factors, human-computer interaction, design, cognitive psychology, education and other domains. Coursework includes readings from state-of-the-art in HRI research, team exercises and problem-solving sessions, and implementation and evaluation of a human-robot interaction systems for specific applications.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5402
**Requisites:** Restricted to graduate students only.

**ATLS 5410 (3) Creative Technologies**
This course gives students hands-on exposure to a wide range of technologies, including 3D printing, laser cutting, microcontrollers, sensors and programming. Through rapid prototyping and problem solving, students gain technical fluency and competence while identifying technology skills they wish to develop further.
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5420 (3) Professional Seminar: Business of Creativity**
This course was designed specifically to prepare students to make the most of their time in the CTD Master¿s Program, and to prepare them for a career within the creative technology and design professional landscape. The course helps students identify career goals and mentors, and helps them position themselves for industry through course-selection, portfolio development, and projects. There is also a survey element to the course which exposes students to creative technology professionals who discuss their career paths, offer advice, and provide insight into their individual design process.
**Requisites:** Restricted to Atlas (ATLS) graduate students only.
**Grading Basis:** Letter Grade

**ATLS 5430 (3) Design Methods**
In this course, students will learn to develop sense-making techniques as designers. This includes framing and structuring design research, making representations to generate insights, as well as documenting and communicating processes and outcomes. The class is structured around weekly discussions and activities anchored in real-world design challenges; and it will also offer tutorials on key design skills such as rapid prototyping and visual communication.
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5440 (3) Design Studio**
In this course students work with both faculty and industry expert mentors on developing a semester-long group project. In small teams, students learn to develop an interactive experience that combines project design and technical execution. The class is designed to reflect a ¿real world¿ interactive design project experience, in which students must present and deliver a large scale completed project for demonstration/exhibition at the end of the semester.
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5519 (1-3) Adv Topics**
Analyzes special interest areas of multidisciplinary creative technologies and design research and practice.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ATLS 5529 (1-3) Adv Critical Topics**
Analyzes critical perspectives in technology, art and media. Within these courses, students will develop vocabularies, theoretical perspectives and critical approaches relevant to technology and its effects on culture and society.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4529
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ATLS 5606 (3) Critical Technical Practice**
Surveys design theory and methods that can be used to question relationships between technology, culture, and the environment. Students will discuss readings and synthesize those readings through design exercises. The course will equip students with resources for thinking more critically and creatively about design and possible future human-technology relationships.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5606, ATLS 4606 and INFO 4606
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ATLS 5610 (6) Startup Practicum**
Presumes that entrepreneurism can be learned through the conception, build, and launch of an original product or service by student teams within a single semester. Immerses students in the daily leadership and innovation challenges of the startup environment and serves as a clinic in thinking, decision making and mental agility that will benefit any area of business--not just startups.
**Requisites:** Restricted to graduate students only.

**ATLS 5616 (3) Introduction to Virtual Reality**
Introduces students to the field of virtual reality (VR). Covers the historical development of virtual reality technologies and virtual reality as a research field, the mathematics of 3D coordinate systems, fundamental principles, algorithms, and design patterns in developing interactive virtual environments, the perceptual science behind mixed reality technologies, and libraries and tools for creating VR experiences. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4616, ATLS 4616, CSCI 5616

**ATLS 5620 (3) User-Experience Design 1**
Through lecture, industry illustrations, and hands-on projects students will learn the end-to-end UX Design process. Through this course students will learn how to craft a professional design portfolio piece, understand contemporary UX design methodologies, and be shown how to innovate when designing at scale.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4620
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5630 (3) Web Front-End Development**
Explores interactivity on the web using front-end web development concepts and technologies. Students will work with a range of technologies including JavaScript, jQuery, HTML5, APIs and user interface design methods to create interactive web applications. Individual and group projects will include animations, games, interactive narratives and web applications.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4630
**Requisites:** Restricted to graduate students only.

**ATLS 5640 (4) Design Thinking**
Explores design thinking and how it can be applied conceptually and practically to innovation in areas as diverse as business organization and product development to topics and areas including but not limited to, story, design, UX, interaction design, communication strategy and presentation. Fast-paced, project-based, and immersive, students will work in small teams to discover solutions to real-world problems.
**Requisites:** Restricted to graduate students only.

**ATLS 5650 (3) Introduction to Programming**
Explores computation as a powerful tool for creative design and expression in a project-based studio environment. Students learn the fundamentals of creative coding, computational thinking, and object-oriented programming. Hands-on topics include generative art and design, interactivity, animation, and visualization. This class is a mix of technical instruction (both inside and outside the classroom), readings, viewings, lectures, workdays, and critiques. This is a projects-based class, but projects will vary.
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5660 (3) Creative Code**
Exposes students to front-end, web-based design and development processes and best practices. WordPress will be used as the back end CMS. Students will learn how to design and develop using WordPress as a framework. At the end of the semester, students will present a final project to illustrate what they have learned and the logic of their build.
**Requisites:** Restricted to Atlas (ATLS) graduate students only.
**Recommended:** Prerequsites: exposure to HTML, CSS, JavaScript, PHP and MySQL and previous experience with WordPress for blogging and/or content publication.

**ATLS 5680 (3) Creative Tech Studio**
Emphasizes fundamentally, theoretically, and practically that technology and creativity are not opposing disciplines but rather a dynamic and complementary blending of idea and execution that is iterative and evolving through the dynamic exchange and interaction of ideas and tools. Each Studio will offer a different conceptual challenge, such as using technology to bridge physical and digital environments, game design, or storytelling.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Grading Basis:** Letter Grade

**ATLS 5720 (3) User-Experience Design 2**
Expands on techniques and opportunities presented in User-Experience Design 1 with a deeper dive into research and prototyping practices as means to insight into user desires and preference, adoption, and execution of product and branded experiences in a variety of contexts and locations within the global experience economy.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4720
**Requisites:** Requires prerequisite course of ATLS 5620 (minimum grade C).

**ATLS 5730 (3) Front-End Development 2**
Requires that students are proficient in front-end environment and ready for advanced front-end development using these tools - HTML 5, CSS3, JS - on weekly projects, a mid-term project, and a final project. This course develops more robust and elegant uses of the semantic use of elements as well as the benefits of using standards-based, valid code, CSS efficiencies, and JS and its libraries.

**ATLS 5809 (3) Computer Animation**
Develops a firm understanding of the general principles of computer animation. Lectures cover the creation of models, materials, textures, surfaces, and lighting. Path and key frame animation, particle dynamics, and rendering are introduced. Students are assigned a number of animation tutorials to carry out.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4809 and CSCI 4809 and CSCI 5809
**Requisites:** Restricted to graduate students only.

**ATLS 5880 (3) Interactive Machine Learning for Customizable and Expressive Interfaces**
Introduces students to techniques for applying machine learning in the development of customizable human-computer interfaces. Students will learn to process a wide variety of input data (e.g. video and accelerometer streams), using different machine learning algorithms to detect semantically meaningful events that can afford the construction of new interactive systems. They will complete substantial projections within the domains of assistive or creative technologies. Does not fulfill Breadth Requirement for CSEN graduate students.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4889, CSCI 4889 and CSCI 5880
**Requisites:** Requires prereqs (CSCI 3022 or APPM 4570 or APPM 3570 or APPM 4520 or CVEN 3227 or MATH 3510 or MATH 4510 or ECEN 3810 or ECON 3818 or MCEN 4120) (CSCI 3002 or CSCI 3202 or CSCI 4448) all min grade C-. Restricted to grad students in the ATLAS program.
**Grading Basis:** Letter Grade

**ATLS 5900 (1-6) Masters Level Independent Study**
Provides opportunities for independent study and research at the Masters level. Students work on research project guided by faculty.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ATLS 6519 (1-3) Advanced Special Topics in Creative Technology and Design**
Analyzes special interest areas of multidisciplinary in creative technology and design research and practice.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ATLS 6900 (1-3) Professional Internship**
The objective of this course is for students to receive academic credit for internships with industry partners that have an academic component to them suitable for graduate-level work. Participation in the program will consist of an internship agreement between a student and an industry partner who will employ the student in a role that supports the academic goals of the internship. Instructor participation will include facilitation of mid-term and final assessments of student performance as well as support for any academic-related issues that may arise during the internship period.
**Repeatable:** Repeatable for up to 3.00 total credit hours.

**ATLS 6910 (3-6) Social Impact Practicum**
This practicum allows Social Impact MS students to synthesize what they have learned and test their readiness for a career in Social Impact. Practicum assignments are arranged under the supervision of the MS Program Director and involve work with a non-governmental organization, development agency or technology/policy entity. Successful completion is required for graduation from the Social Impact MS Program.
**Requisites:** Requires prerequisite courses of ATLS 5210 and ATLS 5220 and ATLS 5230 and ATLS 5240 and ATLS 5250 (all minimum grade D-).

**ATLS 6920 (3) Creative Industries Final Project**
This course allows MS-CTD students to synthesize what they have learned and test their readiness for a career in the creative technologies and design field. Through this class students work with an academic and/or industry mentor to create a capstone final project emblematic of their focus during their master degree studies. Students learn to propose and scope work, adhere to budget constraints and time schedules, communicate their work, and create a final end deliverable that is presented to the larger ATLAS community. This final project is meant to serve as a culminating portfolio project that helps position students for industry after graduation. Successful completion is required for graduation from the MS-CTD Program.
**Requisites:** Restricted to Tech, Media and Society (ATLS) master's degree students only.

**ATLS 7000 (1) ATLAS Colloquium**
Each week during the fall and spring semesters, the ATLAS Colloquium features dynamic speakers from academia and industry who work in fields of interest to the creative technology and design community. Whether artists, creatives, scientists, researchers, entrepreneurs or free spirits, these speakers share their interdisciplinary experience and knowledge in an intimate, small-group setting. Topics may include programmable matters, do-it-yourself technologies, new design medium, robotic teleoperations, virtual/augmented/mixed reality, information visualization, games, design computation, creativity and cognition, personal health informatics, addictive fabrication, cyber security, ethics, education, human computer interaction and others. The ATLAS Colloquium promotes rigorous, curiosity-driven investigation in a thriving academic community that is supportive, energetic and playful.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ATLS 7500 (3) ATLAS Graduate Research Methods**
The objective of this course is to provide a primer for key methodological approaches used in the field. Students will investigate a broad set of techniques for conducting theoretical, design, and experimental research. They will explore how to formulate and investigate research questions using these methods. Topics covered will include basic research ethics, research project design, approaches to constructing theory, research through design techniques, and methods for experimental study.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ATLS 7900 (1-6) Doctoral Level Independent Study**
Provides opportunities for independent study and research at the Doctoral level. Students perform independent research under faculty supervision.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 8990 (1-10) Doctoral Dissertation**
Approved research conducted under the supervision of members of the graduate faculty. Investigates some specialized topic or field in the area of interdisciplinary information and communication technology. All doctoral students must register for at least 30 hours of dissertation credit as part of the requirement for the ATLAS doctoral degree.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

# Creative Technology and Design - Professional Master of Science (MS)

## Professional Master of Science in Creative Technology and Design

The ATLAS Institute's two-year professional Master of Science in Creative Technology and Design (CTD) program prepares students to become multidisciplinary leaders versed in real-world design challenges and technical know-how. Degrees are granted by the College of Engineering and Applied Science.

The program is built for flexibility: students pursue their passions deeply, whether in UX/UI, product development, interactive media, game design, sustainability, performing arts technology, social impact—or anywhere engineering and creative insight converge.

Through the program's project-based curriculum, students build outstanding portfolios highlighting their ability to bridge stakeholder insights with design skills and technical rigor. Many MS students also choose to embed in one of the ATLAS Institute's research labs to further deepen their experience. ATLAS labs live at the vanguard of innovation in human-computer interaction, biomaterials, fabrication, design, neuroscience and more.

## Program Tracks

Students can pursue a track that best aligns with their specialty.

### Creative Industries

Students learn to apply a deep design approach to addressing challenges through classes that emphasize technical skills and strategic thinking. From digital tools to industrial design and fabrication to creative performance technology, students take many approaches. They graduate as creative technologists equipped with the experience and portfolio to give them an edge in a broad range of fulfilling careers.

### Social Impact

Students focus on applying design expertise to affect systemic change, support underserved communities and improve everyday lives. They learn to transform idealism and passion into meaningful impact, culminating in the final semester with a field-based practicum when students work with NGOs, development agencies, foundations or technology companies to apply social impact interventions to real-world needs.

Interested in joining our vibrant community? Visit the ATLAS Institute's Graduate Programs webpages (https://www.colorado.edu/atlas/academics/) to learn more.

The course code for this program is ATLS.

## Requirements

### Creative Industries Track

The creative industries track requires a total of 33 credit hours, of which at least 27 must be completed at the 5000 level or above, including the mandatory core courses listed below. In addition, specific focus area requirements must be met. Students must receive a grade of B or higher in all coursework, maintaining a minimum overall GPA of 3.000.

For more information, visit the ATLAS Institute (https://www.colorado.edu/atlas/academics/graduate/ms-technology-media-society/) webpage.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| ATLS 5420 | Professional Seminar: Business of Creativity | 3 |
| ATLS 5430 | Design Methods | 3 |
| ATLS 5650 | Introduction to Programming | 3 |
| or ATLS 5660 | Creative Code | |
| ATLS 5410 | Creative Technologies | 3 |
| ATLS 5440 | Design Studio | 3 |
| ATLS 6920 | Creative Industries Final Project | 3 |

## Social Impact Track

The social impact track requires a total of 33 credit hours, of which at least 27 of which must be completed at the 5000 level or above, including the mandatory core courses listed below. In addition, specific focus area requirements must be met. Students must receive a grade of B or higher in all coursework, maintaining a minimum overall GPA of 3.000.

For more information, visit the ATLAS Institute (https://www.colorado.edu/atlas/ictd/) webpage.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| ATLS 5230 | Case Studies in Social Impact | 3 |
| ATLS 5240 | Technology for Social Impact Laboratory | 3 |
| ATLS 5430 | Design Methods | 3 |
| or CVEN 5919 | Global Development for Engineers | |
| ATLS 5650 | Introduction to Programming | 3 |
| or ATLS 5660 | Creative Code | |
| ATLS 5250 | Fieldwork Methods | 3 |
| ATLS 5410 | Creative Technologies | 3 |
| ATLS 6910 | Social Impact Practicum | 6 |

# Two-Year Plans of Study

## Creative Industries Track

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| ATLS 5420 | Professional Seminar: Business of Creativity | 3 |
| ATLS 5430 | Design Methods | 3 |
| ATLS 5650 | Introduction to Programming | 3 |
| or ATLS 5660 | or Creative Code | |
| | **Credit Hours** | **9** |
| **Spring Semester** | | |
| ATLS 5410 | Creative Technologies | 3 |
| Focus Elective 1 | | 3 |
| Focus Elective 2 | | 3 |
| | **Credit Hours** | **9** |
| **Year Two** | | |
| **Fall Semester** | | |
| Focus Elective 3 | | 3 |
| Focus Elective 4 | | 3 |
| ATLS 5440 | Design Studio | 3 |
| | **Credit Hours** | **9** |
| **Spring Semester** | | |
| Focus Elective 5 | | 3 |
| ATLS 6920 | Creative Industries Final Project | 3 |
| | **Credit Hours** | **6** |
| | **Total Credit Hours** | **33** |

## Social Impact Track

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| ATLS 5230 | Case Studies in Social Impact | 3 |
| ATLS 5430 | Design Methods | 3 |
| or CVEN 5919 | or Global Development for Engineers | |
| ATLS 5650 | Introduction to Programming | 3 |
| or ATLS 5660 | or Creative Code | |
| | **Credit Hours** | **9** |
| **Spring Semester** | | |
| ATLS 5250 | Fieldwork Methods | 3 |
| ATLS 5410 | Creative Technologies | 3 |
| Focus Elective 1 | | 3 |
| | **Credit Hours** | **9** |
| **Year Two** | | |
| **Fall Semester** | | |
| ATLS 5240 | Technology for Social Impact Laboratory | 3 |
| Focus Elective 2 | | 3 |
| Focus Elective 3 | | 3 |
| | **Credit Hours** | **9** |
| **Spring Semester** | | |
| ATLS 6910 | Social Impact Practicum | 6 |
| | **Credit Hours** | **6** |
| | **Total Credit Hours** | **33** |

# Learning Outcomes

By the completion of the program, students will be:

- Positioned to achieve their professional goals both in industry and academic fields.
- Creative problem solvers, able to leverage principles of design and technology to arrive at an effective solution.
- Well versed in a wide range of technologies, able to respond to a complex and rapidly evolving sociotechnical landscape.
- Aware of societal impacts of designs and issues of equity and sustainability.
- Effective communicators of their interdisciplinary contributions as demonstrated through oral, written and visual communication outputs.

# Creative Technology and Design - Traditional Master of Science (MS)

The master's degree in this field is not available through direct admission and may only be earned under special circumstances. Please contact program for additional information and requirements.

# Creative Technology and Design - Doctor of Philosophy (PhD)

The ATLAS Institute's Creative Technology and Design (CTD) PhD program emphasizes out-of-the-box invention and radical inquiry, and is suited to students whose interests transcend traditional disciplinary boundaries. Degrees are granted by the College of Engineering and Applied Science.

ATLAS is a thriving community of engineers, designers, makers, artists and all-of-the-aboves who believe in the power of a multidisciplinary approach to addressing complex problems.

Each ATLAS lab serves as a hub for leading research in human-computer interaction, neuroscience, nanotech, biomaterials, textiles, AR/VR/MR, fabrication, robotics, music, art, performance and more. Together the labs comprise a larger force for unconventional lines of inquiry, radical creative investigation and spontaneous collaboration. PhD students embed in an ATLAS lab or seek an advisor elsewhere on campus to pursue their research focus.

Structurally, CTD is a research-based doctoral program: a student forms an advisory committee, takes courses, completes a qualifying examination, proposes a dissertation, performs research, then writes and defends a dissertation.

Due to its inherently interdisciplinary nature, CTD has a small number of required courses. Each student then crafts their remaining curriculum individually, working with their advisory committee to identify the expertise needed in their focus area.

Interested in joining our vibrant community? Visit the ATLAS Institute's Graduate Programs webpages (https://www.colorado.edu/atlas/academics/) to learn more.

Course code for this program is ATLS.

# Requirements

## Course Requirements

- A minimum of 30 credit hours of courses numbered 5000 or above where students earn a minimum of 3.00 GPA.
- A minimum of 30 credit hours of dissertation credit are required for the degree.
- Students must complete the following two courses: Research Methods and PhD Research Professional Seminar, and attend the ATLAS Colloquium three semesters over the span of their time in the PhD program.

## Program Proposal

To maintain good standing in the program, all students must complete their academic program plan/program proposal by the end of the second semester. In general, ATLAS academic plan/program proposals include general research area and the courses to be taken and other research/disciplinarily appropriate activities planned.

## Preliminary Examination

Each student will work with their advisor during their first two semesters to design a customized plan of study that addresses that student's interests and provides the breadth and depth of knowledge needed for their dissertation research. To maintain good standing in the program, all students must complete and submit the plan of study by the end of their second semester. Students should refer to the ATLAS PhD handbook for details.

## Comprehensive Examination

To maintain good standing in the program, all students must complete their comprehensive exam by the end of the second semester of their fourth year in the program. The comprehensive examination will outline the student's completed research and proposed research agenda. This includes both an oral and written exam delivered to their dissertation committee and open to the larger community.

## PhD Dissertation

Students must write a dissertation based on original research conducted under the supervision of a graduate faculty member. The dissertation must fulfill all CU Boulder Graduate School requirements. After the dissertation is completed, an oral final examination on the dissertation and related topics is conducted by the student's doctoral committee.

# Plan(s) of Study

Due to the highly interdisciplinary nature of the program, each student's plan of study is developed in consultation with their advisor to address their unique research goals.

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate expertise in and knowledge of their interdisciplinary focus as directed by their advisory committee.
- Demonstrate the ability to effectively communicate, both orally and in written forms, a deep understanding in their area of study.
- Design, conduct and contribute high quality intellectual research in their focus area.
- Make intellectual contributions to the academic community through professional and academic conferences.
- Work across diverse research domains and contribute to interdisciplinary intellectual projects.

# Data Science

Data science is a multidisciplinary field that focuses on the extraction of knowledge and insight from large datasets. Data scientists are tasked with using a range of skills in applied mathematics, statistics, and computer science, and in domain applications such as information science, geography, business, media and the humanities.

# Master's Degrees

- Data Science - Master of Science (MS) (p. 1693)
- Data Science - Master of Science (Online) (p. 1695)

# Certificates

- Data Science - Graduate Certificate (p. 1698)
- Data Science - Graduate Certificate (Online) (p. 1698)

# Data Science - Master of Science (MS)

The on-campus Master of Science in Data Science program focuses on developing knowledge and skills in interdisciplinary and collaborative data science competencies including statistical analysis, data structures and algorithms, data mining, machine learning, big data architecture and data visualization.

The MSDS provides learners with a strong foundation in acquiring, cleaning and managing data. Learners will learn to analyze large datasets using data mining and machine learning techniques. Students will also design, conduct and run statistical experiments and models; draw rational conclusions from data using probability theory and statistics; and more.

Graduates of the program will be well-prepared to apply data science skills to a specific domain area. Graduates will also be able to clearly communicate the results of data science analysis to a non-technical audience; structure effective meetings and projects using collaboration skills; and act ethically in the role of professional data scientist.

# Topic Areas

## Applied Mathematics

The Department of Applied Mathematics in the College of Arts and Sciences offers a range of courses and research opportunities in many areas, including computational mathematics, mathematical biology, nonlinear phenomena, physical applied mathematics, and probability and statistics.

## Computer Science

Computer science is an exciting and challenging field that impacts many parts of our lives. Computer scientists craft the technologies that enable the digital devices we use every day. They develop the large-scale software that powers business and industry, and they advance the computational techniques and write the software that supports scientists in their study of the world around us. Many new applications of computing technology remain to be discovered. Computing will be at the heart of future revolutions in business, science and society. Students who study computer science will be at the forefront of these important advances.

## General Data Science

Data science is a multidisciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from structured and unstructured data.

## Information Science

Information science considers the relationships between people, places and technology and the information those interactions yield. The internet is a broad example of a socio-technical system that is comprised of hardware and software, but in daily life is better understood as a constantly changing social infrastructure upon which complex forms of human-human and human-information interaction rest. Scholars and students of information science develop new methods to study these socio-technical phenomena and translate those findings to the design and development of useful and meaningful technology.

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s):

- Applied Computer Science - Post-Baccalaureate Bachelor of Science (BSACS) (p. 945)
- Computer Science - Bachelor of Arts (BA) (p. 937)
- Computer Science - Bachelor of Science (BSCS) (p. 941)

# Requirements

## Admission Requirements

Applicants are eligible to apply to the program if they have earned a bachelor's degree or its equivalent from a regionally accredited college or university. Applicants must show promise of their ability to pursue advanced study and research, as judged by the student's scholastic record. Applicants must have a minimum of a 2.75 cumulative GPA in their prior degree program to be considered. International students may have country-specific requirements and/or English proficiency requirements.

Strong applicants will also have an undergraduate GPA of 3.2 or higher on a 4.0 scale (3.0 = B)

### Prerequisite Knowledge

Applicants with the following prior knowledge or equivalent experience are eligible for admission to the Direct to Data Science Pathway and can complete the degree with 30 total credits:

- Mathematics: Applicants should be familiar with differential calculus (including derivatives), integral calculus, linear algebra, and have some experience with infinite sequences and series. Multivariate calculus is preferred but not required.
- Programming: Applicants should have some programming experience, whether it is formal, informal or on the job. Some advanced knowledge of R is also helpful before starting the program.

Applicants without the specific math and programming experience above are eligible for admission to the Bridge to Data Science Pathway and can complete the degree with 30–34 total credits as determined by the graduate committee upon a review of the student's prior experience.

#### Potential Additional Curriculum

The graduate committee may require students in this pathway to complete one or more of the following courses (up to 7 credits) . Courses should be taken in the first year and are subject to Graduate School grade and cumulative GPA standards. Up to 3 hours of bridge courses which meet applicable standards can count toward the degree in the electives category.

- INFO 5651 Fundamental Concepts in Data Science (3)
- INFO 5652 Statistical Programming in R (3)
- DTSC 5003 Programming for Data Science - Python for Data Science (1)

### Application Requirements

To apply, applicants must submit the following:

- A completed graduate admission application
- An application fee
- Unofficial undergraduate transcripts and, if applicable, any graduate transcripts
- A statement of purpose that briefly describes the applicant's background, academic goals, and professional goals
- Two to three letters of recommendation
- A current curriculum vitae or resume

An applicant whose native language is not English must provide proof ofEnglish proficiency by submitting documents. A TOEFL score of at least 80, IELTS score of at least 6, or Duolingo score of at least 100 is required. To report TOEFL and IELTS scores, students should request that the testing agency submit scores directly to the Office of Admissions. They can also ask the agency to automatically submit TOEFL scores to CU Boulder using institution code 4841. To report official Duolingo scores, click Send Results from inside the application, then choose University of Colorado Boulder – Undergraduate.

See the Data Science website for details about application deadlines.

For information about application deadlines, please see the Graduate School's Admissions Deadlines (https://www.colorado.edu/graduateschool/admissions/prepare-apply/program-information-deadlines/).

## Program Requirements

The on-campus data science master's degree seeks to shape tomorrow's leaders by providing learners with the skills, competencies and knowledge necessary to fuel creative problem-solving, adaptability, and the capability to communicate effectively across diverse organizations.

The MS degree is a non-thesis degree, though students may have the opportunity to complete a capstone or project as part of the 30 required credit hours.Students in the Bridge to Data Science Pathway may be required to complete up to 4 additional credits as determined by the graduate committee upon a review of the student's prior experience.

All students must complete 21 credits of core coursework in statistics, computer science and general core concepts as well as 9 credits of elective coursework.#The degree does not require a master's final/comprehensive examination.

### Courses by Topic Area

| Code | Title | Credit Hours |
|---|---|---|
| **Applied Mathematics** | | |
| STAT 5000 | Statistical Methods and Application I | 3 |
| STAT 5010 | Statistical Methods and Applications II | 3 |
| STAT 5600 | Methods in Statistical Learning [1] | 3 |
| **Computer Science** | | |
| DTSC 5501 | Data Structures and Algorithms [1] | 3 |
| CSCI 5502 | Data Mining | 3 |
| CSCI 5622 | Machine Learning | 3 |
| **General Data Science** | | |
| DTSC 5301 | Data Science as a Field | 1 |
| DTSC 5302 | Ethical Issues in Data Science | 1 |
| DTSC 5303 | Cybersecurity for Data Science | 1 |
| **Data Science Electives** | | |
| CSCI 5253 | Datacenter Scale Computing - Methods, Systems and Techniques | 3 |
| CSCI 5302 | Advanced Robotics | 3 |
| CSCI 5314 | Dynamic Models in Biology | 3 |
| CSCI 5322 | Algorithmic Human-Robot Interaction | 3 |
| CSCI 5352 | Network Analysis and Modeling | 3 |
| CSCI 5402 | Research Methods in Human-Robot Interaction | 3 |
| CSCI 5403 | Introduction to Computing Security | 3 |
| CSCI 5423 | Biologically-inspired Multi-Agent Systems | 3 |
| CSCI 5454 | Design and Analysis of Algorithms | 3 |
| CSCI 5576 | High-Performance Scientific Computing | 4 |
| CSCI 5722 | Computer Vision | 3 |
| CSCI 5822 | Probabilistic and Causal Modeling in Computer Science | 3 |
| CSCI 5832 | Natural Language Processing | 3 |
| CSCI 5880 | Interactive Machine Learning for Customizable and Expressive Interfaces | 3 |
| CSCI 5922 | Fundamentals of Neural Networks and Deep Learning | 3 |
| CSCI 6502 | Big Data Analytics: Systems, Algorithms, and Applications | 3 |
| CSCI 7000 | Current Topics in Computer Science | 1-4 |
| DTSC 5810 | Capstone | 3 |
| DTSC 5840 | Independent Study | 1-3 |
| DTSC 5900 | Special Topics | 3 |
| DTSC 5930 | Professional Internship | 1-3 |
| GEOG 4303/5303 | Geographic Information Science: Spatial Programming | 4 |
| GEOG 5103 | Geographic Information Science: Spatial Analytics | 4 |
| GEOG 5203 | Geographic Information Science: Spatial Modeling | 4 |
| GEOG 5563 | Earth Analytics | 3 |
| IPHY 5262 | | 3 |
| IPHY 5800 | Advanced Statistics and Research Methods in Integrative Physiology | 4 |
| IPHY 6010 | Seminar | 1-3 |
| INFO 5507 | Data and the Humanities | 3 |
| INFO 5601 | Information Ethics and Policy | 3 |
| INFO 5602 | Information Visualization | 3 |
| INFO 5612 | Recommender Systems | 3 |
| INFO 5613 | Network Science | 3 |
| MATH 5440 | Mathematics of Coding and Cryptography | 3 |
| MBAX 6330 | Market Intelligence | 3 |

| | | |
|---|---|---|
| MBAX 6410 | Process Analytics | 3 |
| MSBC 5070 | Survey of Business Analytics | 3 |
| MSBC 5680 | Optimization Modeling | 3 |
| MSBX 5310 | Customer Analytics | 2-3 |
| MSBX 5405 | Structured Data Modeling and Analysis | 3 |
| MSBX 5420 | Unstructured and Distributed Data Modeling and Analysis | 3 |
| STAT 5680 | Statistical Collaboration | 3 |

[1] Option: Methods in Statistical Learning (STAT 5600); Datacenter Scale Computing - Methods, Systems and Techniques (CSCI 5253) *or* Big Data Architecture (ATLS 5214); Information Visualization (INFO 5602); Design and Analysis of Algorithms (CSCI 5454).

## Time Limit

All degree requirements must be completed within four years of the date of commencing coursework. Most students complete the degree in one-and-a-half to two years.

# Plans of Study

## Data Structures and Algorithms Option

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| DTSC 5301 | Data Science as a Field | 1 |
| DTSC 5302 | Ethical Issues in Data Science | 1 |
| DTSC 5303 | Cybersecurity for Data Science | 1 |
| DTSC 5501 | | 3 |
| STAT 5000 | Statistical Methods and Application I | 3 |
| | **Credit Hours** | **9** |
| **Spring Semester** | | |
| STAT 5010 | Statistical Methods and Applications II | 3 |
| CSCI 5502 | Data Mining | 3 |
| Elective | | 3 |
| | **Credit Hours** | **9** |
| **Year Two** | | |
| **Fall Semester** | | |
| CSCI 5622 | Machine Learning | 3 |
| Option [1] | | 3 |
| | **Credit Hours** | **6** |
| **Spring Semester** | | |
| Electives | | 6 |
| | **Credit Hours** | **6** |
| | **Total Credit Hours** | **30** |

[1] Intro to Statistical Learning (STAT 5600); Datacenter Scale Computing (CSCI 5253) *or* Big Data Architecture (ATLS 5214); Information Visualization (INFO 5602)

## Non-Data Structures and Algorithms Option

| | | |
|---|---|---|
| **Year One** | | |
| **Fall Semester** | | **Credit Hours** |
| DTSC 5301 | Data Science as a Field | 1 |
| DTSC 5302 | Ethical Issues in Data Science | 1 |
| DTSC 5303 | Cybersecurity for Data Science | 1 |
| STAT 5000 | Statistical Methods and Application I | 3 |
| CSCI 5502 | Data Mining | 3 |
| | **Credit Hours** | **9** |
| **Spring Semester** | | |
| STAT 5010 | Statistical Methods and Applications II | 3 |
| CSCI 5622 | Machine Learning | 3 |
| Option [1] | | 3 |
| | **Credit Hours** | **9** |
| **Year Two** | | |
| **Fall Semester** | | |
| Option [1] | | 3 |
| Elective | | 3 |
| | **Credit Hours** | **6** |
| **Spring Semester** | | |
| Electives | | 6 |
| | **Credit Hours** | **6** |
| | **Total Credit Hours** | **30** |

[1] Intro to Statistical Learning (STAT 5600); Datacenter Scale Computing (CSCI 5253) *or* Big Data Architecture (ATLS 5214); Information Visualization (INFO 5602); Design and Analysis of Algorithms (CSCI 5454)

# Learning Outcomes

By the completion of the program, students will be able to:

# Data Science - Master of Science (MS) Online

The online Master of Science degree in Data Science (MSDS) on Coursera is an interdisciplinary degree program offered through the University of Colorado Boulder and hosted online through Coursera's learning platform. With performance-based admissions and no application process, the MSDS is ideal for individuals with a broad range of undergraduate education and/or professional experience in computer science, information science, mathematics and statistics.

The MSDS on Coursera provides learners with a strong foundation in acquiring, cleaning and managing data. Students will learn to analyze large datasets using data mining and machine learning techniques. Students will also design, conduct, and run statistical experiments and models; draw rational conclusions from data using probability theory and statistics; and more.

Graduates of the online Master of Science degree in Data Science on Coursera program will be well-prepared to apply data science skills to a specific domain area. Graduates will also be able to clearly communicate the results of data science analysis to a non-technical audience; structure effective meetings and projects using collaboration skills; and act ethically in the role of professional data scientist.

# Topic Areas

### General Data Science

Data science is a multidisciplinary field that uses scientific methods, processes, applications, algorithms and systems to extract knowledge and insights from structured and unstructured data.

### Applied Mathematics

The Department of Applied Mathematics in the College of Arts and Sciences offers a range of courses and research opportunities in many areas, including computational mathematics, mathematical biology, nonlinear phenomena, physical applied mathematics, and probability and statistics.

### Computer Science

Computer science is an exciting and challenging field that has an impact on many parts of our lives. Computer scientists craft the technologies that enable the digital devices we use every day. They develop the large-scale software that powers business and industry, advance the computational techniques and write the software that supports scientists in their study of the world around us. Many new applications of computing technology remain to be discovered. Computing will be at the heart of future revolutions in business, science and society. Students who study computer science will be at the forefront of these important advances.

### Information Science

Information science considers the relationships between people, places and technology and the information those interactions yield. The internet is a broad example of a socio-technical system that is comprised of hardware and software, but in daily life is better understood as a constantly changing social infrastructure upon which complex forms of human-human and human-information interaction rest. Scholars and students of information science develop new methods to study these socio-technical phenomena and translate those findings to the design and development of useful and meaningful technology.

# Program Policies

This CU Boulder on Coursera program does not align with standard campus policies. Please refer to the Online Programs (p. 1895) section of the catalog for more information.

# Requirements

## Admission Requirements

Students are automatically admitted to the degree program after meeting all admission requirements below.#All admitted students receive an official offer letter via email. See the program website for details.

- Pass one pathway with a pathway GPA of 3.0 or higher
- Earn a C or better in all pathway courses within their chosen pathway
- Earn an overall cumulative GPA of 3.0 or higher
- Indicate interest in degree admission (via the enrollment form)

### Performance-Based Admission

To be admitted as a degree-seeking student, students must enroll in and complete a pathway with a 3.00 GPA or better. A pathway is a series of 3 one-credit courses with a focus on either statistics or computer science—students choose the pathway that is right for them. Pathway courses are an important part of the required curriculum, so students make direct progress toward their degree as they complete their pathway.

### Prerequisite Knowledge

There are no formal prerequisites, but students should be knowledgeable in the following:

- Python
- R programming
- Calculus including derivatives and integrals
- Linear algebra including matrix multiplication, matrix inversion and solving linear systems using matrices

If students do not yet feel ready to complete their pathway courses, the program suggests reviewing courses on the Coursera platform. Students can enroll in a pathway as a non-credit learner, which gives them the option of previewing course content.Then, they can upgrade to the for-credit version and pay tuition when they are ready.

## Required Courses and Credits

The MSDS is a non-thesis degree that requires 30 credit hours of coursework. Students must complete 21 credits of core coursework in statistics, computer science and general core concepts, as well as 9 credits of elective coursework. Students will also participate in practical, hands-on projects that utilize cloud-based programming environments and Jupyter Notebooks. Coursework includes access to real-world big data sets to prepare students for their future careers.

### Learner Journeys

Students may complete courses in any order but are advised to follow one of the recommended learner journeys below.

#### Statistics Pathway

We recommend that students who are skilled in statistics complete their courses in the following order.

| Code | Title | Credit Hours |
|---|---|---|
| **Data Science Foundations: Statistical Inference Courses** | | **3** |
| DTSA 5001 | Probability Theory: Foundation for Data Science | |
| DTSA 5002 | Statistical Inference for Estimation in Data Science | |
| DTSA 5003 | Hypothesis Testing for Data Science | |
| **Vital Skills for Data Scientists Courses** | | **4** |
| DTSA 5301 | Data Science as a Field | |
| DTSA 5302 | Cybersecurity for Data Science | |
| DTSA 5303 | Ethical Issues in Data Science | |
| DTSA 5304 | Fundamentals of Data Visualization | |
| **Core Courses** | | |
| Complete in any order | | |
| *Statistical Modeling for Data Science Courses* | | *3* |
| DTSA 5011 | Modern Regression Analysis in R | |
| DTSA 5012 | ANOVA and Experimental Design | |
| DTSA 5013 | Generalized Linear Models and Nonparametric Regression | |
| *Foundations of Data Structures & Algorithms Courses* | | *3* |
| DTSA 5501 | Algorithms for Searching, Sorting, and Indexing | |
| DTSA 5502 | Trees and Graphs: Basics | |
| DTSA 5503 | Dynamic Programming, Greedy Algorithms | |

| | | |
|---|---|---|
| *Data Mining: Foundations & Practice* | | *3* |
| DTSA 5504 | Data Mining Pipeline | |
| DTSA 5505 | Data Mining Methods | |
| DTSA 5506 | Data Mining Project | |
| *Machine Learning Courses* | | *3* |
| DTSA 5509 | Introduction to Machine Learning - Supervised Learning | |
| DTSA 5510 | Unsupervised Algorithms in Machine Learning | |
| DTSA 5511 | Introduction to Deep Learning | |
| *Databases Courses* | | *2* |
| DTSA 5733 | Relational Database Design | |
| DTSA 5734 | The Structured Query Language (SQL) | |
| **Data Science Elective Courses** | | **9** |
| **Total Credit Hours** | | **30** |

### Computer Science Pathway

We recommend that students who are skilled in computer science complete their courses in the following order.

| Code | Title | Credit Hours |
|---|---|---|
| **Foundations of Data Structures and Algorithms Courses** | | **3** |
| DTSA 5501 | Algorithms for Searching, Sorting, and Indexing | |
| DTSA 5502 | Trees and Graphs: Basics | |
| DTSA 5503 | Dynamic Programming, Greedy Algorithms | |
| **Vital Skills for Data Scientists Courses** | | **4** |
| DTSA 5301 | Data Science as a Field | |
| DTSA 5302 | Cybersecurity for Data Science | |
| DTSA 5303 | Ethical Issues in Data Science | |
| DTSA 5304 | Fundamentals of Data Visualization | |
| **Core Courses** | | |
| Complete in any order | | |
| *Data Science Foundations: Statistical Inference for Data Science Courses* | | *3* |
| DTSA 5001 | Probability Theory: Foundation for Data Science | |
| DTSA 5002 | Statistical Inference for Estimation in Data Science | |
| DTSA 5003 | Hypothesis Testing for Data Science | |
| *Statistical Modeling for Data Science Courses* | | *3* |
| DTSA 5011 | Modern Regression Analysis in R | |
| DTSA 5012 | ANOVA and Experimental Design | |
| DTSA 5013 | Generalized Linear Models and Nonparametric Regression | |
| *Data Mining Foundations and Practice Courses* | | *3* |
| DTSA 5504 | Data Mining Pipeline | |
| DTSA 5505 | Data Mining Methods | |
| DTSA 5506 | Data Mining Project | |
| *Machine Learning Courses* | | *3* |
| DTSA 5509 | Introduction to Machine Learning - Supervised Learning | |
| DTSA 5510 | Unsupervised Algorithms in Machine Learning | |
| DTSA 5511 | Introduction to Deep Learning | |
| *Databases Courses* | | *2* |
| DTSA 5733 | Relational Database Design | |
| DTSA 5734 | The Structured Query Language (SQL) | |
| **Data Science Elective Courses** | | **9** |
| **Total Credit Hours** | | **30** |

### Other Electives

Students may apply up to six graduate-level credit hours of select courses offered by the engineering management and computer science degrees on Coursera toward the MSDS on Coursera degree. All courses are graduate level, offered through Coursera, and meet all applicable academic standards. Students wishing to complete degrees in more than one program must complete all the requirements for both degrees with no shared or overlapping coursework. Select courses include:

#### Engineering Management Electives

| Code | Title | Credit Hours |
|---|---|---|
| **Project Management Courses** | | **3** |
| EMEA 5031 | Project Management: Foundations and Initiation | |
| EMEA 5032 | Project Planning and Execution | |
| EMEA 5033 | Agile Project Management | |
| **Product Development Courses** | | **3** |
| EMEA 5021 | Product Cost and Investment Cash Flow Analysis | |
| EMEA 5022 | Project Valuation and the Capital Budgeting Process | |
| EMEA 5023 | Financial Forecasting and Reporting | |
| **Total Credit Hours** | | **6** |

### Computer Science Electives

Courses from the MSCS on Coursera (https://www.colorado.edu/cs/academics/online-programs/mscs-coursera/) program that start with a "CSCA" prefix *except* the following courses, which *cannot* be applied toward MSDS degree requirements: CSCA 5214, CSCA 5224 and CSCA 5234.

Courses that begin with a "DTSA" prefix and courses that are cross-listed with a DTSA-prefixed course are not considered outside electives and do not count against the six-credit limit.

### Prior Learning Credit

The online Master of Science in Data Science (hosted on Coursera) may accept credit for prior learning in limited instances for students formally admitted to the degree program. Please visit the MSDS on Coursera Student Handbook (https://www.colorado.edu/program/data-science/media/104/) for more information on eligibility, requirements, and credit approval.

## Learning Outcomes

By the completion of the program, students will be able to:

- Develop proficiency in foundational and cutting edge data science tools.

- Conduct exploratory data analyses and apply statistical and probabilistic modeling techniques to draw insights and support decision-making in data-driven projects.
- Develop and implement efficient algorithms for processing and analyzing large-scale data sets, selecting appropriate computational approaches for complex problems.
- Apply machine learning and data mining techniques to analyze large data sets, identify patterns, make predictions and derive actionable insights.
- Recognize and address ethical issues and data security concerns, employing best practices to manage sensitive data responsibly and maintain privacy.
- Clearly communicate complex analytical findings and insights to both technical and non-technical audiences, bridging the gap between data science outputs and actionable understanding.

# Data Science - Graduate Certificate

The on-campus Master of Science in Data Science program focuses on developing knowledge and skills in interdisciplinary and collaborative data science competencies including statistical analysis, data structures and algorithms, data mining, machine learning, big data architecture and data visualization. The on-campus program offers a stackable graduate certificate that can be earned on its own or applied toward the full master's degree.

Graduates of the certificate and/or full master's degree program will be well-prepared to apply data science skills to a specific domain area. Graduates will also be able to clearly communicate the results of data science analysis to a non-technical audience; structure effective meetings and projects using collaboration skills; and act ethically in the role of professional data scientist.

## Admission Requirements

Initially, the proposed Residential Data Science Graduate Certificate will be primarily for students who meet either of the following criteria:

- Currently matriculated CU Boulder residential or online (Canvas) graduate student in a participating department on Main Campus.
- Graduate or non-degree seeking students in other disciplines with an interest in data science.

Students are required to have an awarded bachelor's degree to be admitted into the residential Data Science or Online (Canvas) Graduate Certificate and will be subject to graduate main campus graduate certificate policies for admission/award. Further admission requirements and processes will be refined by the Data Science Faculty Director and oversight committee.

## Required Courses and Credits

The residential Data Science Graduate Certificate requires 12 credit hours of coursework. Students must complete the required courses listed below.

In order to earn a certificate, students must receive a minimum grade of a C or higher in each course. The cumulative GPA for certificate courses must be 3.0 or higher.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CSCI 5502 | Data Mining | 3 |
| STAT 5000 | Statistical Methods and Application I | 3 |
| Choose two: | | 6 |
| STAT 5600 | Methods in Statistical Learning | |
| CSCI 5622 | Machine Learning | |
| STAT 5010 | Statistical Methods and Applications II | |
| **Total Credit Hours** | | **12** |

## Learning Outcomes

By the completion of the program, students will be able to:

- Acquire, clean, wrangle, and manage data
- Correctly perform exploratory data analysis in order to assist with the generation of scientific hypotheses
- Apply principles and methods of probability theory and statistics to draw rational conclusions from data
- Construct an appropriate statistical model in order to answer important scientific or business-related questions
- Assess the validity of a statistical model when applied to a particular dataset
- Use statistical techniques to design an experiment
- Understand and be able to apply the main computational techniques used to analyze large data sets, including a variety of data mining and machine learning approaches
- Understand the principles of computer representation, storage and access of large data sets and be able to determine the appropriate approaches for specific problem
- Clearly communicate the results of a data science analysis to a non-technical audience

# Data Science - Graduate Certificate (Online)

The Master of Science in Data Science program hosted online through the Coursera platform offers stackable graduate-level courses, a graduate certificate, and a fully accredited master's degree in data science. Students earn the same credentials as on-campus students. There are no online or Coursera designations on official CU transcripts or diplomas.

## Program Policies

This CU Boulder on Coursera program does not align with standard campus policies. Please refer to the Online Programs (p. 1895) section of the catalog for more information.

## Program Requirements

### Admission Requirements

There are no admission processes for learners seeking to earn the Data Science Graduate Certificate.

All courses attempted and/or completed for credit will appear on an official CU Boulder transcript (unless dropped by the drop deadline) and will count toward the cumulative GPA.

## Prerequisite Knowledge

There are no formal prerequisites for the Data Science Graduate Certificate, but we recommend that prospective students be knowledgeable in Python, R Programming, Calculus including derivatives and integrals, and Linear Algebra including matrix multiplication, matrix inversion, and solving linear systems using matrices. If they are not, we encourage them to try out non-credit coursework before attempting for-credit courses.

## Required Courses and Credits

To earn the Data Science Graduate Certificate (12 credits), students must complete the following required specializations:

- Data Mining Foundations and Practice (3 credits)
- Data Science Foundations: Statistical Inference (3 credits)

As well as two specializations from the following:

- Introduction to Statistical Learning for Data Science (3 credits)
- Machine Learning (3 credits)
- Statistical Modeling for Data Science (3 credits)

In order to earn a certificate, students must receive a minimum grade of a C or higher in each course. The cumulative GPA for certificate courses must be 3.0 or higher.

The Data Science Graduate Certificate requires 12 credit hours of coursework. Students must complete the follow required courses:

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| DTSA 5504 | Data Mining Pipeline | 1 |
| DTSA 5505 | Data Mining Methods | 1 |
| DTSA 5506 | Data Mining Project | 1 |
| DTSA 5001 | Probability Theory: Foundation for Data Science | 1 |
| DTSA 5002 | Statistical Inference for Estimation in Data Science | 1 |
| DTSA 5003 | Hypothesis Testing for Data Science | 1 |
| **Additional Requirements** | | |
| Students must complete an additional 6 credits and can choose to complete any 2 of the following 3 specializations | | 6 |
| *Introduction to Statisical Learning for Data Science* | | |
| DTSA 5020 | Statistical Learning for Data Science: Regression and Classification | |
| DTSA 5021 | Statistical Learning for Data Science: Resampling, Selection and Splines | |
| DTSA 5022 | Statistical Learning for Data Science: Trees, SVM and Unsupervised Learning | |
| *Machine Learning* | | |
| DTSA 5509 | Introduction to Machine Learning - Supervised Learning | |
| DTSA 5510 | Unsupervised Algorithms in Machine Learning | |
| DTSA 5511 | Introduction to Deep Learning | |
| *Statistical Modeling for Data Science* | | |
| DTSA 5011 | Modern Regression Analysis in R | |
| DTSA 5012 | ANOVA and Experimental Design | |
| DTSA 5013 | Generalized Linear Models and Nonparametric Regression | |
| **Total Credit Hours** | | **12** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Acquire, clean, wrangle and manage data.
- Correctly perform exploratory data analysis in order to assist with the generation of scientific hypotheses.
- Apply principles and methods of probability theory and statistics to draw rational conclusions from data.
- Construct an appropriate statistical model in order to answer important scientific or business-related questions.
- Assess the validity of a statistical model when applied to a particular dataset.
- Use statistical techniques to design an experiment.
- Understand and be able to apply the main computational techniques used to analyze large data sets, including a variety of data mining and machine learning approaches.
- Understand the principles of computer representation, storage and access of large data sets and be able to determine the appropriate approaches for specific problem.
- Clearly communicate the results of a data science analysis to a non-technical audience.

# Electrical & Computer Engineering

Areas of focus in electrical and computer engineering include photovoltaic, wind and renewable energy systems, power electronics systems, electromagnetic theory, microwave systems, antennas, remote sensing, bioelectronics and biomedical engineering, communications and signal processing, medical imaging, quantum engineering, optoelectronics, nanophotonics and nanodevices, biophotonics, human/machine interfaces, controls theory, embedded systems engineering and complex network systems.

With a highly regarded faculty and $15.1 million awarded in new contract and grant funding in fiscal year 2023, the Department of Electrical, Computer and Energy Engineering (http://www.colorado.edu/ecee/) is the perfect place for students to take their education to the next level.

We offer several degree options tailored to both working engineers looking to advance their careers and to those looking to pursue a career in academia. Research is concentrated in six broad areas: computer engineering; learning, information, network and data sciences; systems and controls; electromagnetics, RF and microwaves; photonics and quantum engineering; and power electronics.

**Course code for this program is ECEN.**

# Research Centers

## Colorado Power Electronics Center (CoPEC)

Since it was founded in 1983, the power electronics group at the University of Colorado has maintained a tradition of innovative design-oriented and application-driven research. Colorado Power Electronics Center (CoPEC) activities now span the range of applications from high-efficiency milliwatt converters for portable battery-operated systems, to hundreds or thousands of watts for computer, data centers, telecommunications, aerospace, and medical applications, to hundreds of

kilowatts for electrified transportation, solar photovoltaic and wind power systems.

Our current research activities include projects in high-efficiency, high-power converter technology, power electronics for portable, battery-operated systems, converter modeling and computer-aided analysis, high-efficiency modular and composite power conversion architectures utilizing wide bandgap power semiconductors, low harmonic rectifier technology for single-phase and three-phase applications, solar photovoltaic power systems, and advanced digital and mixed-signal control techniques. We collaborate with other research groups at the University of Colorado, including those in power and renewable energy systems, microelectronics packaging, RF/microwave systems, control and semiconductor devices. We also maintain collaborations with the National Renewable Energy Laboratory and within the NSF Engineering Research Center ASPIRE, which is focused on electrified transportation. For more information, call 303-492-7327 or visit the CoPEC (http://ecee.colorado.edu/copec/) website.

### ASPIRE

Launched in 2020, **ASPIRE** (Advancing Sustainability through Powered Infrastructure for Roadway Electrification) is exploring a diverse range of electrified transportation questions, from electrified highways that energize vehicles to the placement of charging stations, data security and workforce development. Participating in ASPIRE are CU Boulder researchers in electrical, computer and energy engineering, including Colorado Power Electronics Center, Power and Renewable Energy Systems, Optimization, and Data Science, as well as researchers in computer science and mechanical engineering. The ASPIRE Engineering Research Center is funded by a $26 million National Science Foundation (NSF) grant and led by Utah State University.

### The University of Colorado Center for Environmental Technology (CET)

Understanding and managing the environment—whether for agriculture, health, water resources, disaster mitigation, energy generation, transportation, weather forecasting, climate modeling or biodiversity—requires accurate knowledge of many variables on a wide range of time and space scales. Measurements for environmental purposes are made either using in situ or remote sensors, and rely upon a variety of different means, including acoustic and electromagnetic waves, point measurements and wide-area imaging and active and passive systems. A variety of different types of platforms can be used for environmental observation, including ships and submersibles, aircraft (both manned and unmanned), spacecraft and stationary sites.

Research and educational activities at the CU Center for Environmental Technology are focused on developing sensors, systems of sensors and associated hardware and algorithms for environmental observation with a focus on new remote and in situ techniques to meet contemporary scientific and applications goals. This is accomplished by direct involvement of CU faculty, CET engineering staff and undergraduate and graduate students on the development of sensing systems to meet the observational needs of a number of government and industry sponsors. CET training involves close interaction between students and experienced professional engineers, practicing scientists and CU faculty.

The CET was established in 2006 with a major donation of equipment from the NOAA Earth System Research Laboratory, and has members, associates and students from within the broad earth science and engineering communities of Colorado. For more information, contact the CET director at 303-492-9688 or visit the Center for Environmental Technology website.

### The STROBE Center

The STROBE Science & Technology Center brings together imaging science experts from seven universities and partners with national labs, industry and academe to push the boundaries of imaging science capabilities and technologies, while building a diverse workforce that is prepared for 21st century careers in science and technology.

Modern functional materials require a deep knowledge of interactions within them to understand how heterogeneity defines function. STROBE brings together academia, national laboratories and industry to develop and advance multimodal multi-scale imaging modalities and their application to material and bio-systems science.

## Research and Instructional Equipment

The department's special equipment and facilities include a class 1000 clean room facility for epitaxial growth and fabrication of microwave and optical devices; an anechoic chamber; high-vacuum and vacuum deposition equipment for thin-films research; an integrated circuits laboratory; ion implantation equipment; crystal growing facilities; a modern systems laboratory; a laboratory for data storage research; a digital system design laboratory; a power electronics research laboratory; undergraduate laboratories in circuits, electronics; power electronics; digital signal processing and communications; embedded systems; microwaves; a holography and optics laboratory; an advanced optical metrology lab; numerous special purpose computers; a computer system development laboratory; a roof-mounted antenna range; a special microscope for laser manipulation of microorganisms in vivo; a bio-microwave laboratory; a solar power lab; photovoltaic device fabrication and characterization facilities; and bioelectronics fabrication and integration capabilities.

The Colorado Shared Instrumentation in Nanofabrication and Characterization (COSINC) is an open user facility on campus. Our mission is to provide expertise, facilities, infrastructure and teaming environments to enable and facilitate interdisciplinary research in microelectronics, optoelectronics and MEMS.

The Department of Electrical, Computer and Energy Engineering has a large variety of computing equipment to support its research and instructional activities. In addition to specialized computing equipment, this includes several hundred PCs, Macs, a department server and a student server. These machines are connected to the campus-wide ethernet network.

## Master's Degrees

- Electrical & Computer Engineering - Master of Engineering (ME) (p. 1716)
- Electrical & Computer Engineering - Master of Science (MS) (p. 1716)
- Electrical & Computer Engineering - Master of Science (MSECE) Online (https://catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/electrical-computer-engineering/electrical-computer-engineering-master-science-online-msee/)
- Electrical & Computer Engineering - Professional Master of Science (MSECE) (https://catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/electrical-computer-

engineering/electrical-computer-engineering-professional-master-science-msee/)

## Doctoral Degree

- Electrical & Computer Engineering - Doctor of Philosophy (PhD) (p. 1725)

## Certificates

- Embedded Systems Engineering - Graduate Certificate (p. 1731)
- Power Electronics - Graduate Certificate (p. 1732)
- Photonics - Graduate Certificate (p. 1725)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Akos, Dennis M. (https://experts.colorado.edu/display/fisid_131119/)
Professor; PhD, Ohio University

Anderson, Dana Z. (https://experts.colorado.edu/display/fisid_102371/)
Professor; PhD, University of Arizona

Baker, Kyri A. (https://experts.colorado.edu/display/fisid_159754/)
Assistant Professor; PhD, Carnegie Mellon University

Barnes, Frank S. (https://experts.colorado.edu/display/fisid_104148/)
Distinguished Professor Emeritus; PhD, Stanford University

Barton, Taylor Wallis (https://experts.colorado.edu/display/fisid_157939/)
Faculty Fellow, Associate Professor; DSc, Massachusetts Institute of Technology

Becker, Stephen R. (https://experts.colorado.edu/display/fisid_154263/)
Associate Professor; PhD, California Institute of Technology

Blum, Arielle Melissa (https://experts.colorado.edu/display/fisid_154695/)
Instructor; MS, University of Colorado Boulder

Bogatin, Eric (https://experts.colorado.edu/display/fisid_151431/)
Lecturer; PhD, University of Arizona

Brancucci, Carlo
Lecturer; PhD, Technische Universiteit Delft (Netherlands)

Bright, Victor Mark (https://experts.colorado.edu/display/fisid_112696/)
Professor; PhD, Georgia Institute of Technology

Carter Carston, Ronald McKell (https://experts.colorado.edu/display/fisid_154921/)
Assistant Professor; PhD, California Institute of Technology

Chang, Bor-Yuh Evan (https://experts.colorado.edu/display/fisid_146087/)
Associate Professor; PhD, University of California, Berkeley

Chaudhary, Sumeet (https://experts.colorado.edu/display/fisid_167980/)
Instructor; PhD, University of Cincinnati

Chen, Xudong (https://experts.colorado.edu/display/fisid_158323/)
Assistant Professor; PhD, Harvard University, Cambridge, MA

Clauset, Aaron (https://experts.colorado.edu/display/fisid_147554/)
Associate Professor; PhD, University of New Mexico

Cogswell, Carol (https://experts.colorado.edu/display/fisid_141919/)
Research Professor; MArch, University of Oregon

Combes, Josh (https://experts.colorado.edu/display/fisid_166284/)
Assistant Professor; PhD, Griffith University

Corradini, Luca (https://experts.colorado.edu/display/fisid_146380/)
Associate Professor, Visiting Associate Professor; PhD, University of Padova (Italy)

Correll, Nikolaus J. (https://experts.colorado.edu/display/fisid_147555/)
Associate Professor; PhD, Ecole Polytech Federale de Lausanne (Switzerland)

Dall'Anese, Emiliano (https://experts.colorado.edu/display/fisid_158949/)
Assistant Professor; PhD, University of Padova (Italy)

Diddams, Scott A. (https://experts.colorado.edu/display/fisid_148274/)
Visiting Professor, Professor Adjoint; PhD, University of New Mexico

Erickson, Robert W. (https://experts.colorado.edu/display/fisid_105514/)
Professor; PhD, California Institute of Technology

Femrite, Andrew
Senior Instructor, Faculty Director; BS, University of Colorado Boulder

Fiez, Terri S. (https://experts.colorado.edu/display/fisid_156578/)
Professor; PhD, Oregon State University

Filipovic, Dejan S. (https://experts.colorado.edu/display/fisid_126278/)
Professor; PhD, University of Michigan Ann Arbor

Gasiewski, Albin J. (https://experts.colorado.edu/display/fisid_142882/)
Professor; PhD, Massachusetts Institute of Technology

Gopinath, Juliet T. (https://experts.colorado.edu/display/fisid_147075/)
Professor; PhD, Massachusetts Institute of Technology

Grunwald, Dirk C. (https://experts.colorado.edu/display/fisid_102261/)
Professor; PhD, University of Illinois at Urbana–Champaign

Hauser, John (https://experts.colorado.edu/display/fisid_102555/)
Associate Professor; PhD, University of California, Berkeley

Heckman, Christoffer (https://experts.colorado.edu/display/fisid_155294/)
Assistant Professor; PhD, Cornell University

Herzfeld, Ute C. (https://experts.colorado.edu/display/fisid_106575/)
Research Professor; PhD, Johannes Gutenberg-Universität Mainz (Germany)

Hodge, Bri-Mathias (https://experts.colorado.edu/display/fisid_158358/)
Associate Professor; PhD, Purdue University

Huang, Shu-Wei (https://experts.colorado.edu/display/fisid_159847/)
Assistant Professor; PhD, MIT, Cambridge

Izraelevitz, Joe (https://experts.colorado.edu/display/fisid_166042/)
Assistant Professor; PhD, University of Rochester

Kapteyn, Henry C. (https://experts.colorado.edu/display/fisid_115334/)
Professor; PhD, University of California, Berkeley

Keller, Eric Robert (https://experts.colorado.edu/display/fisid_151647/)
Associate Professor; PhD, Princeton University

Kuester, Edward F.
Professor Emeritus

Lasser, Gregor (https://experts.colorado.edu/display/fisid_156178/)
Assistant Research Professor; PhD, Technische Universität Wien (Austria)

Le, Hanh-Phuc
Assistant Professor; PhD, University of California, Berkeley

Lehman, Tamara (https://experts.colorado.edu/display/fisid_165649/)
Assistant Professor; PhD, Duke University

Lightner, Michael R. (https://experts.colorado.edu/display/fisid_101723/)
Professor; PhD, Carnegie Mellon University

Liu, Youjian (https://experts.colorado.edu/display/fisid_126283/)
Associate Professor; PhD, Ohio State University

MacCurdy, Robert B. (https://experts.colorado.edu/display/fisid_163307/)
Assistant Professor; PhD, Cornell University

Majerfeld, Arnoldo
Professor Emeritus

Maksimovic, Dragan (https://experts.colorado.edu/display/fisid_105609/)
Professor; PhD, California Institute of Technology

Mathys, Peter (https://experts.colorado.edu/display/fisid_100084/)
Associate Professor; PhD, ETH Zürich (Switzerland)

McAuliffe, Rik
Lecturer

McClure, Linden
Professor Adjunct

McLeod, Robert R. (https://experts.colorado.edu/display/fisid_107547/)
Professor; PhD, University of Colorado Boulder

Mendelson, Jay
Lecturer

Mihran, Richard
Professor Adjunct

Mishra, Shivakant (https://experts.colorado.edu/display/fisid_118376/)
Professor; PhD, University of Arizona

Moddel, Garret (https://experts.colorado.edu/display/fisid_105440/)
Professor; PhD, Harvard University

Murnane, Margaret (https://experts.colorado.edu/display/fisid_115333/)
Distinguished Professor; PhD, University of California, Berkeley

Nicotra, Marco M. (https://experts.colorado.edu/display/fisid_164182/)
Assistant Professor; PhD, Universite Libre de Bruxelles

Palo, Scott E. (https://experts.colorado.edu/display/fisid_109033/)
Professor; PhD, University of Colorado Boulder

Pao, Lucy Y. (https://experts.colorado.edu/display/fisid_107151/)
Professor; PhD, Stanford University

Park, Won (https://experts.colorado.edu/display/fisid_122676/)
Professor, Associate Chair; PhD, Georgia Institute of Technology

Perkins, Mike
Lecturer; PhD, Stanford University

Piestun, Rafael (https://experts.colorado.edu/display/fisid_118538/)
Professor; PhD, Israel Instit of Tech (Israel)

Piket-May, Melinda J. (https://experts.colorado.edu/display/fisid_102097/)
Associate Professor; PhD, Northwestern University

Pleszkun, Andrew R.
Professor Emeritus

Popovic, Zoya (https://experts.colorado.edu/display/fisid_101494/)
Distinguished Professor; PhD, California Institute of Technology

Poveda, Jorge
Assistant Professor

Psychogiou, Dimitra (https://experts.colorado.edu/display/fisid_158311/)
Assistant Professor; PhD, ETH Zürich (Switzerland)

Sankaranarayanan, Sriram (https://experts.colorado.edu/display/fisid_147413/)
Professor; PhD, Stanford University

Scherr, Timothy (https://experts.colorado.edu/display/fisid_156259/)
Senior Instructor; MS, University of Utah

Schibli, Thomas Richard (https://experts.colorado.edu/display/fisid_143464/)
Professor; PhD, Univ of Karlsruhe (Germany)

Shaheen, Sean Eric (https://experts.colorado.edu/display/fisid_153664/)
Professor; PhD, University of Arizona

Sheafor, Steve
Lecturer; PhD, University of Illinois

Siewert, Sam
Associate Professor Adjunct

Sluiter, David
Professor Adjunct; BS, Michigan Technological University

Somenzi, Fabio (https://experts.colorado.edu/display/fisid_103969/)
Professor, Associate Chair; PhD, Politecnico Di Torino (Italy)

Spriggs, Benjamin
Lecturer, Scholar in Residence

Thayer, Jeffrey P. (https://experts.colorado.edu/display/fisid_134469/)
Professor; PhD, University of Michigan Ann Arbor

Trivedi, Ashutosh (https://experts.colorado.edu/display/fisid_156589/)
Assistant Professor; PhD, University of Warwick (UK)

Van Zeghbroeck, Bart J. (https://experts.colorado.edu/display/fisid_104113/)
Professor, Associate Chair; PhD, University of Colorado Boulder

Varanasi, Mahesh K. (https://experts.colorado.edu/display/fisid_103090/)
Professor; PhD, Rice University

Wagner, Kelvin (https://experts.colorado.edu/display/fisid_105344/)
Professor; PhD, California Institute of Technology

Walkes, Dan
Lecturer

Williamson, James A.
Lecturer

Wustrow, Eric A. (https://experts.colorado.edu/display/fisid_156419/)
Assistant Professor; BE, University of Michigan Ann Arbor

Zabotin, Nikolay
Research Professor; DSc, Russian Academy of Science

# Courses

**ECEN 5005 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Nanostructures and Devices

**ECEN 5008 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 5009 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: VLSI CAD Methods

**ECEN 5011 (1-4) Special Topics**
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4011
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Bioengineering

**ECEN 5012 (3) Special Topics**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5013 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Campus section restricted to ECEE graduate students in Academic subplans ESE or C-EEENP or C-ECENEEEP only.
**Grading Basis:** Letter Grade

**ECEN 5016 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Additional Information:** Departmental Category: Optics

**ECEN 5018 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 5021 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students in Electrical Engineering (EEEN) or in Electrical/Computer Engineering (ECEN) or to Electrical or Electrical/Computer Engineering BS/MS Concurrent degree students or to Graduate Certificate Engineering (CRTGE) students.
**Additional Information:** Departmental Category: Bioengineering

**ECEN 5023 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering, Embedded Systems.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Campus section restricted to graduate students in EEEN or BS/Professional MS concurrent degree students with BS portion in EEEN or ECEN.
**Additional Information:** Departmental Category: Embedded Systems Engineering

**ECEN 5024 (3) Special Topics**
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4024
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 5028 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 5032 (3) Special Topics**
**Additional Information:** Departmental Category: Bioengineering

**ECEN 5053 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering - Embedded Engineering.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4053
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Campus section restricted to graduate students in Academic sub-plans ESE or C-EEENP or C-ECENEEEP.
**Additional Information:** Departmental Category: Embedded Systems Engineering

**ECEN 5104 (3) Passive Microwave Circuits**
Building on fundamentals taught in a class such as ECEN 3410 (Electromagnetic Waves), this course teaches fundamentals of microwave passive circuit analysis using scattering parameters. Design of impedance matching networks, impedance transformers, couplers, filters, dividers/combiners and other typical circuits used at microwave frequencies are covered. Using an industry-standard CAD tool, design of microstrip circuits is emphasized. Assignments include theoretical and CAD approaches to analysis and design of passive microwave transmission-line circuits.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 5105 (3) Introduction to VLSI Design**
This is an introductory course that will cover basic theories and techniques of digital VLSI (Very Large-Scale Integrated Circuits) design and CMOS technology. The objective of this course is to understand the theory and design of digital systems at the transistor level. The course will cover MOS transistor theory, CMOS processing technology, techniques to design fast digital circuits, techniques to design power efficient circuits, standard CMOS fabrications processes, CMOS design rules, and static and dynamic logic structures.
**Requisites:** Prerequisite of ECEN 2350 (C- or better) and Instructor Consent.

**ECEN 5110 (1-3) Graduate Teaching Practicum**
Provides training and hands-on experience in teaching of ECEE courses. Students will work with an instructor of an ECEE course to carry out teaching activities such as lecturing, leading discussion sessions, writing homework and examination problems, and relevant grading.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**ECEN 5111 (3) Engineering Applications in Biomedicine: Cardiovascular Devices and Systems**
Application of engineering in medicine has grown dramatically in recent years. Engineers enter the clinical and experimental medical arenas with many new devices and procedures emerging as alternatives to conventional surgical and pharmacological treatments. This course, presents general principles of biomedical engineering as applied to the development of a variety of specific devices and techniques for therapy and diagnosis, with a focus on devices and systems for the cardiovascular system. This class will present relevant anatomy and physiology as part of the class discussion, which will be supplemented by a physiology reference text. Questions, exchanges of ideas, and active classroom discussion are encouraged. Biomedical engineering is an emerging field which is highly interdisciplinary- engineers and scientists from all fields are invited and encouraged to participate in this course. There are no formal prerequisites.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4111

**ECEN 5114 (3) Electromagnetic Theory**
This course covers theory and applications of Maxwell's equations at the graduate level, including various electromagnetic wave types. Additionally, fundamental electromagnetic theorems such as Poynting, equivalence, duality, reciprocity and compensation, are studied through examples across the electromagnetic spectrum.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 5121 (3) Design of Implantable Medical Devices: Neuromodulation**
Application of engineering in medicine has grown dramatically in recent years. Engineers enter the clinical and experimental medical arenas with many new devices and procedures emerging as alternatives to conventional surgical and pharmacological treatments. This course, presents general principles of biomedical engineering as they are applied to the development of a variety of specific implantable devices.It will present relevant anatomy and physiology as part of the class discussion, which will be supplemented by a physiology reference text. Questions, exchanges of ideas, and active classroom discussion are encouraged throughout the course. Biomedical engineering is an emerging field which is highly interdisciplinary- engineers and scientists from all fields are invited and encouraged to participate in this course.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4121

**ECEN 5122 (3) Wireless Local Area Networks**
Emphasis on the IEEE P802.11 family of WLAN standards. Students learn the legacy versions of the standard (802.11DS/b), the current generation of WLAN systems (802.11a/g/n/ac), and will to analyze and critique upcoming versions (802.11ax/ba), and gain insight into proposals for new research in WLAN. Exposure to the interoperability and certification process for WLAN by the Wi-Fi Alliance, study the newest Wi-Fi Certified¿ programs, and will learn how to model and analyze WLAN traffic using industry standard tools.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5220 and CYBR 5220
**Requisites:** Requires prerequisite course of ECEN 3810 or APPM 3570 or MATH 4510 (minimum grade D-).
**Recommended:** Prerequisite CYBR 5430.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5126 (3) Computational Optical Imaging**
Covers the fundamentals of computational optical imaging modalities, namely systems in which the hardware (optics, sensors, illumination) is designed in conjunction with algorithms (implemented optically, electronically and via software) to deliver information about a scene. Students learn the analysis and design of modern imaging systems. Covers a variety of applications including biomedical imaging, nanoscopy, photography and space imaging.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ECEN 5133 (3) Fundamentals of Computer Security**
Practice thinking like an attacker by exploring several modern computer security attacks and defenses through hands-on programming projects. Topics include applied cryptography (encryption, authentication), web security (XSS, CSRF, SQL Injection), network security (TLS, MITM attacks), application security (shell injection, buffer overflows), and other current events and trends (government surveillance, botnets, cryptocurrencies).
**Grading Basis:** Letter Grade

**ECEN 5134 (3) Electromagnetic Radiation and Antennas**
This course is introduction to antenna theory and antenna applications in applied electromagnetics. Elements of electromagnetic theory are first reviewed through the discussion of fundamental antenna parameters. Topics such as input impedance, radiation pattern, gain, radar cross section, near- and far-field, antenna temperature, and others are discussed first. The theory of operation of electric and magnetic dipoles, small and large dipoles, monopoles, and loops, as well as impact of different grounds on their parameters are discussed next. Other antennas such as bicones, helices, Yagi-Uda, microstrip patches, horns, reflectors, slots, spirals, log-periodics, etc. are also discussed. The fundamentals of array theory inclusive of linear, planar and circular topologies, coupling, beamforming, as well as elements of array synthesis are also discussed. Students will be exposed to the commercial software tools used to design antennas and will work individually or in teams to accomplish different project assignme
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 5138 (3) Control Systems Analysis**
Introduction to fundamental principles and techniques for analysis and synthesis of feedback control systems in the time and frequency domains. Laplace transforms, transfer functions and block diagrams. Stability, dynamic response, and steady-state analysis. Analysis and design of control systems using root locus and frequency response methods. Computer aided design and analysis. Introduction to state space representations and state feedback control.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 4114 and ASEN 5114 MCEN 4138 and ECEN 4138 and MCEN 5138
**Requisites:** Restricted to graduate students in Electrical Engineering (EEEN) or in Electrical/Computer Engineering (ECEN) or to Electrical or Electrical/Computer Engineering BS/MS Concurrent degree students or to Graduate Certificate Engineering (CRTGE) students.
**Recommended:** Prerequisite ECEN 3300.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 5139 (3) Computer-Aided Verification**
Covers theoretical and practical aspects of verification of finite-state systems (hardware) and infinite-state systems (programs). Model checking: temporal logics, explicit-state and symbolic search, BDDs. Constraint solvers: SAT solvers, decision procedures. Program verification: invariants, partial vs. total correctness, abstraction. Department enforced requisite: general proficiency in discrete mathematics and programming.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5135
**Requisites:** Restricted to Electrical/Computer Engineering (EEEN) graduate students or Concurrent Degree students in Electrical Engineering (C-EEEN) or Electrical/Computer Engineering (C-ECENEEEN) or to Graduate Certificate Engineering (CRTGE) students.
**Recommended:** Prerequisite CSCI 2824.
**Additional Information:** Departmental Category: VLSI CAD Methods

**ECEN 5154 (3) Computational Electromagnetics**
This course is introduction to the frequency domain methods used in computational electromagnetics (CEM) for solving complex radio-frequency (RF) problems. The course starts with the review of electromagnetic theory and mathematical concepts used in CEM, followed by the introduction to the partial differential and integral equation based methods. Specifically, the fundamentals behind the finite difference method, finite element method, and method of moments are discussed and implemented to solve problems such as shielded microstrip line, charge distribution on metallic objects, waveguide modes, wire antennas, etc. Students will work independently and in teams to develop their own codes to solve given boundary value problems. The implementation of different methods in commercial software tools is continuously emphasized. An understanding of electrostatics and electromagnetic waves (such as covered in ECEN 3400 and ECEN 3410) is assumed.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 5156 (3) Physical Optics**
Covers the application of Maxwell's equations to optical wave propagation in free space and in media.Topics include polarization, dispersion, geometrical optics, interference, partial coherence, and diffraction.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ECEN 3410.
**Additional Information:** Departmental Category: Optics

**ECEN 5164 (3) Electromagnetic Metamaterials**
Enables students to design engineered structures to realize materials with desired electromagnetic properties that are difficult or impossible to achieve using conventional materials. Exact and approximate techniques are explored to develop an intuitive understanding of the electromagnetic response of these structures.
**Recommended:** Prerequisite ECEN 3410 (EM Waves and Transmissions) or equivalent course in fundamental electromagnetic theory.

**ECEN 5224 (3) High Speed Digital Design**
Covers fundamentals of high-speed properties of logic gates, measurement techniques, transmission lines, ground planes and layer stacking, terminations, vias, power systems, connectors, ribbon cables, clock distribution and clock oscillators.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4224
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 5244 (3) Applied Stochastic Signal Processing**
Provides a baseline understanding for research and development in signal processing and analytics for environmental and other data-intensive applications. Topics include parameter estimation, transforms, linear and nonlinear estimation, data assimilation and detection. Applications include numerical weather prediction, GNSS sensing, ionospheric sounding, radar, radiometry, surveillance, target detection and tracking. Previous coursework in linear systems and electromagnetic waves recommended.
**Grading Basis:** Letter Grade

**ECEN 5253 (3) Datacenter Scale Computing - Methods, Systems and Techniques**
Covers the primary problem solving strategies, methods and tools needed for data-intensive programs using large collections of computers typically called "warehouse scale" or "data-center scale" computers. Examines methods and algorithms for processing data-intensive applications, methods for deploying and managing large collections of computers in an on-demand infrastructure and issues of large-scale computer system design.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4253 and CSPB 4253 and CSCI 5253
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 5273 or ECEN 5273.

**ECEN 5254 (3) Remote Sensing Signals and Systems**
Examines passive and active techniques for remote sensing with emphasis on fundamental noise and detection issues from radio to optical frequencies. Emphasis is placed on electromagnetic wave detection, statistical signal and noise analysis, remote sensing system architecture, and hardware for remote sensing systems. Systems studied include radiometers, radars (real and synthetic aperture), interferometers, and lidars. Applications to detection and surveillance, Earth remote sensing, astronomy, and imaging systems are covered.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 5264 (3) Electromagnetic Absorption, Scattering, and Propagation**
Electromagnetic waves in communication, navigation, and remote sensing systems from radio to optical frequencies, including propagation in deterministic and random media. Topics include absorption and refraction by gases, discrete scattering by precipitation, clouds, and aerosols, continuous scattering by refractivity fluctuations, earth-space propagation and Faraday rotation in plasmas, and radiative transfer theory.
**Recommended:** Prerequisites ECEN 3400 and ECEN 3410.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 5273 (3) Network Systems**
Focuses on design and implementation of network programs and systems, including topics in network protocols, architectures, client-server computing, software-driven networking, and other contemporary network hardware-software system design and programming techniques. Familiarity with C and Unix is required.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5273
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 5295 (3) Foundations of Quantum Hardware**
Introduces students to the principles and operation of quantum hardware. In this course you will learn how to describe many different physical systems (trapped Ions, superconducting circuits, and optical systems) mathematically. This will allow you to model quantum sensors, communication systems and computing hardware.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4295

**ECEN 5313 (3) Concurrent Programming**
Introduces the theory and practice of multicore programming. The first part of the course presents foundations of concurrent programming: mutual exclusion, wait-free and lock-free synchronization, spin locks, monitors, memory consistency models. The second part presents a sequence of concurrent data structures and techniques used in their implementations (coarse-grained, fine-grained, optimistic and lock-free synchronization).
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5313 and ECEN 4313 and CSCI 4313
**Requisites:** Requires prerequisite courses of CSCI 2270 and ECEN 2360 or CSCI 2400 (minimum grade C). Restricted to graduate students only.
**Recommended:** Prerequisite ECEN 3593.

**ECEN 5322 (3) Data and Network Science**
The course covers the theory and design of algorithms that are used to model, analyze, and extract information from large scale datasets and networks. The course includes a project.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4322
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5341 (3) Bioelectromagnetics**
Effects of electric and magnetic fields on biological systems are described with applications to therapy and safety. The complexity of biological systems is described to provide a better understanding of the distribution of fields inside the body. Risk analysis is also introduced.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4341
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Bioengineering

**ECEN 5345 (3) Introduction to Solid State Physics**
Provides an introduction to the electronic, photonic and phononic properties of solid state materials and devices. Covers optical constants, free electron gas, plasmons, energy bands, semiconductors and doping, excitons, quantum wells, phonons and electrooptical effects. Makes use of quantum mechanical methods. Department enforced prerequisite: basic quantum mechanics.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Nanostructures and Devices

**ECEN 5355 (3) Principles of Electronic Devices 1**
Relates performance and limitations of solid state devices to their structures and technology. Examines semiconductor physics and technology. Includes Pn-junction, Mos, and optoelectronic devices. For both advance circuit and device engineers.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ECEN 3320.
**Additional Information:** Departmental Category: Nanostructures and Devices

**ECEN 5385 (3) Optical Properties of Materials**
Surveys optical properties of materials important in optoelectronic and optical devices. Covers the relationships between optical constants, optical properties of semiconductors, dielectrics, ferroelectrics, liquid crystals, and metals.
**Additional Information:** Departmental Category: Nanostructures and Devices

**ECEN 5395 (3) Organic Electronic Materials and Devices**
Covers the materials and physics principles of organic electronic devices, including organic light emitting diodes (OLEDs), photovoltaics (OPVs), field effect transistors (OFETs), electrochemical transistors (OECTs), and bioelectronic and neuromorphic devices. The molecular, structural, and electronic properties of organic semiconductors are introduced, and the architectures and operating principles of the devices are then taught. Assignments will require computational solutions and simulations. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4395
**Recommended:** Prerequisite ECEN 5345.

**ECEN 5407 (3) Renewable Energy and the Future Power Grid**
This course will begin with an introduction to the power grid including planning and operations for the transmission and distribution level power grid. The course will reflect that while many of the solutions to the integration of variable generation are technical in nature, policy and economics play a large role in the changes that are occurring within the power system. After examining the technological specifications of the most important variable generation sources (wind power, solar photovoltaics, and solar thermal power), as well as traditional power generation sources, other aspects of power system planning and operations in the future power grid will be examined in detail.
**Requisites:** Restricted to students in College of Engineering and Applied Science (ENGR) only.
**Grading Basis:** Letter Grade

**ECEN 5414 (3) Essential Principles of Signal Integrity**
Designing a robust and cost-effective product is about following a process that helps apply your engineering intuition to balance cost and design tradeoffs specific to your product. This class introduces essential principles of signal integrity, including principles of transmission lines, reflections, inductance, ground bounce, differential pairs, losses, terminations, routing, discontinuities, impedance, PDN design and EMC with respect to optimized design.
**Recommended:** Prerequisite students are expected to have completed an electromagnetics course during their undergraduate curriculum; in the CU curriculum it would be ECEN3400.

**ECEN 5417 (3) Power System Analysis**
This course covers the basics of power system analysis techniques. Students will be introduced to the concepts behind the fundamental principles of traditional bulk power systems. The difference between single and three phase powers will be discussed. Students will learn how to model bulk power system components and the per unit system. Understanding the flow of power in the system will be examined in detail as students will learn about and apply both AC and DC powerflow formulations.
**Recommended:** Corequisite ECEN 5407.
**Grading Basis:** Letter Grade

**ECEN 5423 (3) Chaotic Dynamics**
Explores chaotic dynamics theoretically and through computer simulations. Covers the standard computational and analytical tools used in nonlinear dynamics and concludes with an overview of leading-edge chaos research. Topics include time and phase-space dynamics, surfaces of section, bifurcation diagrams, fractal dimension and Lyapunov exponents.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4423 and CSCI 4446 and CSCI 5446
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 5424 (3) High Speed Channel Design for Signal Integrity**
Designing a robust and cost-effective product is about following a process that helps apply your engineering intuition to balance cost and design tradeoffs specific to your product. This class introduces design principles for advanced gigabit channel design. Four primary interconnect problems are identified and material and technology solutions to reduce these problems to acceptable levels are explored.
**Requisites:** Requies prerequisite course of ECEN 5414 (minimum grade C).

**ECEN 5427 (3) Power System Planning & Operations**
This course will focus on bulk power system planning and operations, with special emphasis on systems with high variable renewable energy penetrations. Electricity markets will also be presented, and the differences with vertically integrated utilities will be discussed. Students will develop an understanding of electricity market dynamics in one of the course projects by participating in an electricity market game. The application of optimization problems in bulk power system operations will be discussed and applied by the students in another course project. They will develop a production cost model to simulate bulk power system operations of a test system under different scenarios.
**Requisites:** Requires prerequisite course ECEN 5407 (minimum grade B-).
**Recommended:** Prerequisite ECEN 5417.
**Grading Basis:** Letter Grade

**ECEN 5434 (3) S-Parameters for Signal Integrity in High Speed Digital Engineering**
Designing a robust and cost-effective product is about following a process that helps apply your engineering intuition to balance cost and design tradeoffs specific to your product. This class introduces design principles obtained by understanding S-Parameter results for complex PCB structures. Single-ended and Differential Transmission lines are analyzed and four common S-Parameter patterns are identified.
**Requisites:** Requires prerequisite ECEN 5414 ECEN minimum grade C.
**Recommended:** Prerequisite students are expected to have completed an electromagnetics course during their undergraduate curriculum; in the CU curriculum it would be ECEN 3400.

**ECEN 5437 (3) Distribution System Analysis**
Fundamental aspects of the analysis of power distributions systems, including the traditional distribution grid, loads, components, topologies, operational aspects, and power flow analysis. Includes how the distribution system is changing with the introduction of distributed energy resources.
**Requisites:** Requires corequisite course of ECEN 5407.
**Recommended:** Corequisite ECEN 5417.
**Grading Basis:** Letter Grade

**ECEN 5444 (3) Electromagnetic Compatibility (EMC) for High-Speed Digital Engineering**
Understanding and applying the theoretical principles of electromagnetics to high speed digital engineering with respect to electromagnetic compatibility (EMC). Faster data rates and shorter rise times make signal integrity in high-speed digital engineering (HSDE) increasingly difficult. Signal distortion has adverse effects on EMC. This course covers understanding the radiation mechanisms and susceptibility of PCB circuits in HSDE.
**Recommended:** Prerequisite students are expected to have completed an electromagnetics course during their undergraduate curriculum; in the CU curriculum it would be ECEN 3400.

**ECEN 5447 (3) Power System Dynamics with Renewable Energy**
To introduce the current and future electrical power systems dynamics coupled with inverter based renewable generators. Fundamentals of renewable generators dynamic models, power system dynamics will be introduced. Previously offered as a special topics course.
**Recommended:** Prerequisites ECEN 5417: Power systems analysis, ECEN 5407: Renewable Energy and the Future Power Grid, and graduate standing in the College of Engineering and Applied Science.

**ECEN 5448 (3) Linear Control Systems**
Offers a state space approach to analysis and synthesis of linear systems, state transition matrix, controllability and observability, system transformation, minimal realization, and analysis and synthesis of multi-input and multi-output systems.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5448 and ASEN 5014
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites ECEN 3300 and ECEN 4138.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 5457 (3) Energy Systems Optimization**
Covers basic elements of power system modeling; optimization tasks at the transmission level such as economic dispatch and DC optimal power flow (OPF); and essential techniques for formulating linear, second-order cone, and semidefinite programming approximations to AC OPF problems for transmission and distribution systems. Distributed optimization approaches are covered and tied to future architectural frameworks for smart power systems. Previously offered as a special topics course.
**Recommended:** graduate standing in the College of Engineering and Applied Science.

**ECEN 5458 (3) Sampled Data and Digital Control Systems**
Provides an analysis and synthesis of discrete-time systems. Studies sampling theorem and sampling process characterization, z-transform theory and z-transferfunction, and stability theory. Involves data converters (A/D and D/A), dead-beat design, and digital controller design.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites ECEN 3300 and ECEN 4138.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 5467 (3) Data Analytics and Data-Driven Decision Making for Modern Power and Energy Systems**
Focuses on modern power and energy systems with high penetration of distributed energy resources (solar, batteries, electrical vehicles). Analytical methods for inference and decision making in such systems will be covered, including state estimation, forecasting, and optimal control. The emphasis is on data-driven methods, rooted in machine-learning techniques, such as kernel-based regression and reinforcement learning.
**Recommended:** Prerequisite ECEN 5407 and graduate standing in the College of Engineering and Applied Science.

**ECEN 5478 (3) Online Convex Optimization and Learning**
Covers basics of convex optimization, online learning, time-varying optimization, online first-order methods, learning problems over networks, zeroth-order methods, bandit optimization, projection-free methods, distributed methods for online convex optimization. Application domains considered in the course include Machine Learning, Signal Processing, and Data-driven Control. Specific application examples include the Internet of Things, recommendation systems, power systems, sensor networks, and transportation systems. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ECEN 5448.

**ECEN 5488 (3) Geometric Control Theory**
Introduce geometric approaches to study dynamical control systems over manifolds. Cover fundamental control-theoretical results, such as controllability, observability, feedback stabilizability, symmetries and group actions, that are beyond linear control systems. Establish connections between control theory and mathematics, especially topology, differential geometry, Lie groups and Lie algebras. Final project focuses on engineering applications related to students¿ own research interests.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5488
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites a solid foundation in Linear Algebra and ECEN 4138/5138 and ECEN 5448.

**ECEN 5498 (3) Stochastic Control Theory**
Introduce a toolbox for dealing with stochastic control systems. Cover topics such as stochastic calculus, linear and nonlinear filtering, and dynamic programming. Discuss system theoretic issues and derive optimal control laws for a variety of stochastic control problems, including, e.g., the separation principle for Linear-quadratic-Gaussian problems. Final project focuses on engineering applications related to students¿ own research interests.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5498
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites a solid foundation in Probability Theory and ECEN 4138/5138, ECEN 5448 and ECEN 5612.

**ECEN 5514 (3) Principles of Electromagnetics for High-Speed Digital Engineering**
Teaches understanding and application of the theoretical principals of electromagnetics to printed circuit board design. Students learn to apply advanced concepts related to Maxwell¿s equations for SI and PI and High-Speed applications. Some topics covered include: skin effect, surface roughness, non-uniform dielectric constant, coupling, reflection, and losses; boundary conditions and boundary value problems; displacement and conduction currents.
**Recommended:** Prerequisite students are expected to have completed an electromagnetics course during their undergraduate curriculum; in the CU curriculum it would be ECEN 3400.

**ECEN 5517 (3) Power Electronics and Photovoltaic Power Systems Laboratory**
Focuses on analysis, modeling, design and testing of electrical energy processing systems in a practical laboratory setting. Studies power electronics converters for efficient utilization of available energy sources, including solar panels and utility. Experimental projects involve design, fabrication and testing of a solar power system.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4517
**Requisites:** Requires prerequisite course of ECEN 5797 (minimum grade C-).
**Additional Information:** Departmental Category: Power

**ECEN 5523 (3) Compiler Construction**
Introduces the principles and techniques for compiling high-level programming languages to assembly code. Topics include parsing, instruction selection, register allocation, and compiling high-level features such as polymorphism, first-class functions, and objects. Students build a complete compiler for a simple language.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4555 and ECEN 4553 and CSCI 5525
**Requisites:** Restricted to Electrical/Computer Engineering (EEEN) graduate students or Concurrent Degree students in Electrical Engineering (C-EEEN) or Electrical/Computer Engineering (C-ECENEEEN) or to Graduate Certificate Engineering (CRTGE) students.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 5524 (3) Principles of Computational Electromagnetics for Signal and Power Integrity**
Introduces students to practical computational electromagnetics (CEM) and numerical methods concepts necessary for solving SI/PI problems. Fundamentals behind finite difference, finite element, and method of moments are studied to solve problems like a microstrip line and others related to SI-PI applications. Students will study the concepts of accuracy, stability, convergence and boundary conditions as they apply to commercial EM tools.
**Recommended:** Prerequisite students are expected to have completed an electromagnetics course during their undergraduate curriculum; in the CU curriculum it would be ECEN 3400.

**ECEN 5527 (3) Power Electronics Design Laboratory**
Create, build, and debug an original design of a power converter to meet given a specification, project schedule, and related requirements. Lectures provide supporting information. Compliance to the specification is shown through a formal test report and demonstration to an instructor.
**Requisites:** Requires prerequisite courses of ECEN 5517 and ECEN 5797 (all minimum grade B-).
**Grading Basis:** Letter Grade

**ECEN 5532 (3) Digital Signal Processing Laboratory**
Develops experience in code development, debugging and testing of real-time digital signal processing algorithms using dedicated hardware. Applications include filtering, signal synthesis, audio special effects and frequency domain techniques based on the Fast Fourier Transform.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4532
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5533 (3) Fundamental Concepts of Programming Languages**
Considers concepts common to a variety of programming languages--how they are described (both formally and informally) and how they are implemented. Provides a firm basis for comprehending new languages and gives insight into the relationship between languages and machines.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5535
**Requisites:** Requires prerequisite course CSCI 3155 (minimum grade D-).
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 5534 (3) Signal Integrity Measurements for High Speed Digital Engineering**
Taking accurate measurements are the anchor to reality in all HSDE analysis. This course introduces the three important high speed measurement instruments; the VNA, the TDR and the high-speed oscilloscope. Measurements above 200 MHz bandwidth require special considerations. Topics covered include S-parameter analysis of interconnects, de-embedding, probing methods, measurement-simulation correlation and building circuit topology models from S-parameters.
**Requisites:** Requires prerequisites ECEN 5224 and ECEN 5730 (all minimum grade C).
**Recommended:** Prerequisite students are expected to have completed an electromagnetics course during their undergraduate curriculum; in the CU curriculum it would be ECEN 3400.

**ECEN 5544 (3) EM Signal Modeling for HSDE using Ansys HFSS and Q3D**
Doing high speed digital engineering using HFSS from Ansys. This is a one semester hands-on capstone design course for the high-speed digital engineering professional master¿s program. Students will deepen their understanding of EM signal modeling for HSDE applications while learning how to correctly use HFSS to do a variety of high-speed designs for PCBs.
**Recommended:** Prerequisite students are expected to have completed an electromagnetics course during their undergraduate curriculum; in the CU curriculum it would be ECEN 3400.

**ECEN 5554 (3) Designing PCB Memory Systems using Keysight ADS**
Doing high speed digital engineering using ADS from Keysight. This is a one semester hands-on capstone design course for the high-speed digital engineering professional master¿s program. Students will deepen their understanding of EM signal modeling for HSDE PCB memory applications while learning how to correctly use ADS to do a variety of high-speed memory designs for PCBs.
**Requisites:** Requires prerequisite course of ECEN 5524 (minimum grade C).
**Recommended:** Prerequisite students are expected to have completed an electromagnetics course during their undergraduate curriculum; in the CU curriculum it would be ECEN 3400.

**ECEN 5555 (3) Principles of Energy Systems and Devices**
Develops principles underlying electronic, optical and thermal devices, materials and nanostructures for renewable energy. Provides a foundation in statistical thermodynamics and uses it to analyze the operation and efficiency limits of devices for photovoltaics, energy storage (batteries & ultra-capacitors), chemical conversion (fuel cells and engines), solid state lighting, heat pumps, cooling and potentially harvesting zero-point energy from the vacuum.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4555
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors) or Graduate students only.
**Additional Information:** Departmental Category: Nanostructures and Devices

**ECEN 5565 (3) Advanced Network Systems**
Provides an advanced study of network architecture, across the end hosts, the network elements, and the people and systems that manage the network. The course provides the foundation for modern network systems, beyond the basic understanding of the OSI layers, and into the system which make networks work.
**Requisites:** Requires prerequisite of CSCI 4273 or CSCI 5273 or ECEN 5273 (minimum grade C). Restricted to graduate students in the College of Engineering.
**Grading Basis:** Letter Grade

**ECEN 5573 (3) Advanced Operating Systems**
Intended to create a foundation for operating systems research or advanced professional practice. Examines the design and implementation of a number of research and commercial operating systems and their components, system organization and structure, threads, communication and synchronization, virtual memory, distribution, file systems, security and authentication, availability and Internet services.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5573
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 5590 (3) Computer Organization**
Studies computer design at the microarchitecture level. Discusses instruction set architecture design, arithmetic and logic unit design, control logic, memory design and caches, simple pipelining, I/O and peripheral devices. Briefly covers aspects of modern computer architecture, such as multicore processors and hardware security.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3593 or CSCI 3593

**ECEN 5592 (3) Modern Signal Processing**
Presents a mathematical tour of modern signal processing focusing on sparse signal representations and their applications. Extends classical Fourier transform and traditional digital signal processing techniques to enable various types of computational harmonic analysis. Covers time-frequency and wavelet analysis, filter banks, nonlinear approximation of functions, compression, signal restoration, compressive sensing, and convolutional neural networks.
**Recommended:** Prerequisites familiarity with Fourier transforms, z-transforms, filters, linear algebra, bases, norms, inner products, eigendecompositions, singular value decomposition (SVD) and MATLAB.

**ECEN 5593 (3) Advanced Computer Architecture**
Provides a broad-scope treatment of important concepts in the design and implementation of high-performance computer systems. Discusses important issues in the pipelining of a processor, out-of-order instruction issue and superscalar designs, design of cache memory systems and architectural features required for multicore processor designs. Also studies current and historically important computer architectures, including hardware security concepts.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5593 and ECEN 4693
**Recommended:** Prerequisite ECEN 3593, ECEN 5090.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 5603 (3) Software Project Management**
Presents topics and techniques critical to the management of software product development, including estimating, planning, quality, tracking, reporting, team organization, people management and legal issues. Gives special attention to problems unique to software projects.
**Requisites:** Requires prerequisite courses ECEN 4583 and ECEN 5543 and CSCI 4318 (all minimum grade D-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 5606 (3) Optics Laboratory**
Provides advanced training in experimental optics. Consists of optics experiments that introduce the techniques and devices essential to modern optics, including characterization of sources, photodetectors, modulators, use of interferometers, spectrometers,and holograms and experimentation of fiber optics and Fourier optics. Department enforced prerequisite: undergraduate optics course (e.g. PHYS 4510).
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5606
**Additional Information:** Departmental Category: Optics

**ECEN 5607 (3) Power Electronics for Electrified Transportation**
Covers analysis, modeling, control, simulations, and design of electric-drive vehicles and the charging infrastructure. Vehicle system architectures and dynamics are used to determine the requirements and to validate the performance of electric-vehicle drivetrain subsystems. Analysis, modeling, and design of the subsystems are addressed, including battery systems, battery management electronics, dc-dc converters, dc-ac inverters, motor drives, and chargers.
**Requisites:** Restricted to Electrical/Computer Engineering (EEEN) graduate students or Concurrent Degree students in Electrical Engineering (C-EEEN) or Electrical/Computer Engineering (C-ECENEEEN) or to Graduate Certificate Engineering (CRTGE) students.

**ECEN 5612 (3) Random Processes for Engineers**
Deals with random time-varying functions and is therefore useful in the broad range of applications where they occur. Topics include review of probability, convergence of random sequences, random vectors, minimum mean-square error estimation, basic concepts of random processes, Markov processes, Poisson processes, Gaussian processes, linear systems with random inputs, and Wiener filtering. Applications range from communications, communication networks, and signal processing to random vibration/stress analysis, mathematical finance, physics, etc.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5613 (3) Embedded System Design**
Introduces system hardware and firmware design for embedded applications. Students independently design and develop a hardware platform encompassing a microcontroller and peripherals. Firmware is developed in C and assembly. A significant final project is designed, developed, documented and presented. Prioritized for EEEN graduate students with ESE (Embedded Systems Engineering) sub-plan.
**Additional Information:** Departmental Category: Embedded Systems Engineering

**ECEN 5616 (3) Optoelectric System Design**
Examines optical components and electro-optic devices with the goal of integrating into well design optoelectronic systems. Sample systems include optical storage, zoom lenses and telescopes.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4616
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Optics

**ECEN 5622 (3) Information Theory and Coding**
Covers fundamental limits of data compression, reliable transmission of information and information storage. Topics include information measures, typicality, entropy rates of information sources, limits and algorithms for lossless data compression, mutual information, and limits of information transmission over noisy wired and wireless links. Optional topics include lossy data compression, limits of information transmission in multiple-access and broadcast networks, and limits and algorithms for information storage.
**Requisites:** Restricted to Electrical/Computer Engineering, Computer Science, Applied Math or Physics graduate students only.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5623 (3) Real-Time Embedded Systems**
Design and build a microprocessor-based embedded system application requiring integration of sensor/actuator devices, a real-time operating system and application firmware and software. Real-time rate monotonic theory and embedded architecture are covered. Prioritized for EEEN graduate students with ESE (Embedded Systems Engineering) sub-plan.
**Additional Information:** Departmental Category: Embedded Systems Engineering

**ECEN 5626 (3) Active Optical Devices**
Analysis of active optical devices such as semiconductor laser, detector and flat panel display by clearly defining and interconnecting the fundamental physical mechanism, device design and operating principles and device performance.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ECEN 5355.
**Additional Information:** Departmental Category: Optics

**ECEN 5632 (3) Theory and Application of Digital Filtering**
Digital signal processing and its applications are of interest to a wide variety of scientists and engineers. The course covers such topics as characterization of linear discrete-time circuits by unit pulse response, transfer functions, and difference equations, use of z-transforms and Fourier analysis, discrete Fourier transform and fast algorithms (FFT), design of finite and infinite impulse response filters, frequency transformations, study of optimized filters for deterministic signals.
**Requisites:** Prereq of ECEN 3300 (minimum grade C-). Restricted to EEEN graduate students or Concurrent Degree students in Electrical Engineering (C-EEEN) or Electrical/Computer Engineering (C-ECENEEEN) or to Graduate Certificate Engineering (CRTGE) students.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5634 (3) Microwave and RF Laboratory**
This course is a hands-on introduction to RF and microwave topics, from fundamentals including vector network analyzer (VNA) calibration and operation, power measurements, and antenna characterization, to system-level topics such as RADAR systems and superheterodyne links. Students work in small groups on weekly experiments based on both coaxial and waveguide setups. An understanding of electromagnetic waves (such as covered in ECEN 3400 and ECEN 3410) is assumed.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4634
**Requisites:** Restricted to any graduate students or Electrical/Computer Engineering or Electrical Engineering Concurrent Degree majors only.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 5638 (3) Control Systems Laboratory**
Provides experience in control system design and analysis, using both real hardware and computer simulation. Covers the entire control system design cycle: modeling the system, synthesizing a controller, conducting simulations, analyzing the design to suggest modifications and improvements, and implementing the design for actual testing.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4638, MCEN 4638, and MCEN 5638
**Requisites:** Requires prerequisite course of ECEN/MCEN 4138/5138 (minimum grade D-). Restricted to graduate students only.

**ECEN 5645 (3) Introduction to Optical Electronics**
Introduces lasers, Gaussian optics, modulators, nonlinear optics, optical detectors, and other related devices.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Nanostructures and Devices

**ECEN 5652 (3) Detection and Extraction of Signals from Noise**
Introduces detection, estimation, and related algorithms. Topics in detection include simple/composite hypothesis testing, repeated observations and asymptotic performance and sequential detection. Topics in estimation include Bayesian estimation including minimum mean-square estimation and non-random parameter estimation. Topics in algorithms vary. Examples include algorithms for state estimation and smoothing in Hidden Gauss-Markov models and the expectation-maximization algorithm. Applications include communications, radar/sonar/geophysical signal processing, image analysis, authentication, etc.
**Requisites:** Restricted to Electrical/Computer Engineering, Computer Science, Applied Math or Physics graduate students only.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5672 (3) Digital Image Processing**
Course objective is to present the fundamental techniques available for image representation and compression (e.g., wavelets), filtering (e.g., Wiener and nonlinear filter), and segmentation (e.g., anisotropic diffusion).
**Requisites:** Requires prerequisite course ECEN 5632 (minimum grade C-).
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5673 (3) Distributed Systems**
Examines systems that span multiple autonomous computers. Topics include system structuring techniques, scalability, heterogeneity, fault tolerance, load sharing, distributed file and information systems, naming, directory services, resource discovery, resource and network management, security, privacy, ethics and social issues.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5673
**Recommended:** Prerequisite CSCI 5573 or a course in computer networks.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 5678 (3) Control of Multi-agent Systems**
Covers basics of matrix theory and graph theory; distributed averaging and consensus methods on graphs; parallel computation of fixed points; basics of optimization; parallel and distributed optimization methods over graphs; convergence analysis. The techniques and methodologies presented in the course are introduced through application setups including Internet of Things, power and energy systems, sensor networks, transportation systems, and social networks. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites ECEN 5448 and courses in convex optimization.

**ECEN 5682 (3) Theory and Practice of Error Control Codes**
Introduces error control coding techniques for reliable transmission of digital data over noisy channels. Topics include algebraic characterizations of cyclic codes, convolutional codes, modern graph codes, decoding algorithms for block codes, Viterbi algorithm and iterative decoding on graphs. Applications include modern digital communication and storage systems including deep space communications, satellite broadcasting, cellular networks, and optical disk storage.
**Requisites:** Restricted to Electrical/Computer Engineering (EEEN) graduate students or Concurrent Degree students in Electrical Engineering (C-EEEN) or Electrical/Computer Engineering (C-ECENEEEN) or to Graduate Certificate Engineering (CRTGE) students.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5692 (3) Principles of Digital Communication**
Introduces fundamental principles of efficient and reliable transmission of information used in wired and wireless digital communication systems including cable modems, smart phones/tablets, cellular networks, local area (wi-fi) networks, and deep-space communications. Topics include bandwidth and power constraints, digital modulation methods, optimum transmitter and receiver design principles, error rate analysis, channel coding potential in wired/wireless media, trellis coded modulation, and equalization.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5696 (3) Fourier Optics**
Introduces a system level approach to the analysis and design of optical systems. Topics include holography, Fourier transform properties of lenses, two-dimensional convolution and correlation functions, spatial filtering and optical computing techniques. Also covers coherent and incoherent imaging techniques, tomography, and synthetic aperture imaging.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites ECEN 3300 and ECEN 3410.
**Additional Information:** Departmental Category: Optics

**ECEN 5712 (3) Machine Learning for Engineers**
Prepares students to apply/improve machine learning methods for engineering applications and to perform related research. Covers popular algorithms and theories for learning from data, e.g., supervised learning, unsupervised learning, online learning, neural networks, VC-dimension, PAC learning theory. Explores the connections with detection/estimation theory and information theory. The course project focuses on engineering applications related to students¿ majors.
**Recommended:** Prerequisites ECEN 5612, 5652 and 5622.

**ECEN 5713 (3) Advanced Embedded Software Development**
Building on fundamentals taught in ECEN 5813 PES, this course teaches more advanced programming principles for embedded systems that are implemented with the use of an embedded operating system. Topics include Linux kernel space and user programming, driver design, multi-threaded programming, and operating systems fundamentals, software design patterns, sound development methods and practices, and use of debugging and performance tools to create applications and enhance operating systems' services embedded system prototypes and products.
**Requisites:** Requires prerequisite course of ECEN 5813 (minimum grade D-).
**Recommended:** Prerequisites This course assumes students have direct coding and tool experience including C-programming Bare Metal Firmware Design, Compilation with GCC & Build Systems with GNU Make, Git, Linux command line operations, shell environment, compilation, Lab instruments, DVM, Logic Analyzer, Oscilloscope or demonstration of portable, maintainable, and testable software design.

**ECEN 5720 (1) Practical Printed Circuit Board Design Accelerator**
This course introduces students to the most important skills needed to convert a back-of-the-napkin circuit sketch into a working widget with first time success. Students will learn the seven steps in every board project: planning, selecting components, schematic entry, layout, assembly, bring up and debug, and documentation. This process will be exercised with a custom board design project. A commercial EDA tool widely used in the electronics industry will be used for the project. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4730 or ECEN 5730 ECEN 4720
**Recommended:** Prerequisites ECEN 2250 and ECEN 2260 and ECEN 2270.

**ECEN 5722 (3) Artificial Intelligence: Reasoning and Overview**
Presents tools for deterministic and probabilistic reasoning in artificial intelligence (AI) and engineering applications and explores the latest advances. Prepares students to further study and invent new AI technologies. Covers search algorithms, a unified graphical model for deterministic and probabilistic reasoning, reasoning with neural networks together with an overview of related areas of AI, such as reinforcement learning, deep learning, natural language processing, and ethics. The course project focuses on engineering applications chosen by students based on their own interests.
**Requisites:** Requires prerequisite course of ECEN 5612 Random Processes for Engineers.

**ECEN 5730 (3) Practical Printed Circuit Board Design and Manufacture**
This course prepares students with all skills needed to convert a back-of-the-napkin circuit sketch into a working widget with first time success. Students will master the seven steps in every board project: planning, selecting components, schematic entry, layout, assembly, bring up and debug, and documentation. This process will be exercised with three different board design projects with increasing challenge. A commercial EDA tool widely used in the electronics industry will be used for all projects. Previously offered as a special topics course. Degree credit not offered for this course and ECEN 4720 or ECEN 5720 or ECEN 3730.
**Recommended:** Prerequisites ECEN 2250 and ECEN 2260 and ECEN 2270.

**ECEN 5732 (3) Deep Learning and Its Connections to Information Theory**
Provides a hands-on introduction to deep learning using Python and explores related concepts in information theory to guide the design of neural networks. Covers the mechanism and various architectures of neural networks (convolutional, recurrent, Transformer, generative models, etc.), an introduction to related concepts in information theory (entropy, mutual information, divergence, channel capacity, data compression, rate-distortion theory, information bottleneck, Kolmogorov complexity, etc.) and information theory guided neural network design and optimization.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4732
**Requisites:** Prerequisite or corequisite: ECEN 5612 Random Processes for Engineers.
**Recommended:** Prerequisite ECEN 5622 (Information Theory and Coding), ECEN 5722 (Artificial Intelligence Foundations and Overview), and ECEN 5712 (Machine Learning for Engineers).

**ECEN 5737 (3) Adjustable-Speed AC Drives**
Presents unified treatment of complete electrical drive systems: mechanical load, electrical machine, power converter, and control equipment. Emphasizes induction, synchronous, and permanent-magnet drives. Uses simulation programs (e.g., SPICE, Finite Element/Difference Program) to simulate drive system components (e.g., gating, inverter, electric machine).
**Requisites:** Restricted to Electrical/Computer Engineering (EEEN) graduate students or Concurrent Degree students in Electrical Engineering (C-EEEN) or Electrical/Computer Engineering (C-ECENEEEN) or to Graduate Certificate Engineering (CRTGE) students.
**Recommended:** Prerequisite ECEN 3170.
**Additional Information:** Departmental Category: Power

**ECEN 5738 (3) Nonlinear Control Systems**
Nonlinear systems and control. Introduction to nonlinear phenomena: multiple equilibria, limit cycles, bifurcations, complex dynamical behavior. Planar dynamical systems, analysis using phase plane techniques. Input-output analysis and stability. Passivity. Lyapunov stability theory. Feedback linearization. Exploration of examples and applications. Formerly ECEN 7438.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5738 ASEN 6024
**Requisites:** Requires prerequisite course of ECEN 5448 (minimum grade C-). Restricted to graduate students only.
**Recommended:** Prerequisite knowledge in differential equations.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 5752 (3) Communication Laboratory**
Analysis and design of realistic communication signals in a modern digital signal processing environment. Covers both analog and digital communication signals with and without noise and distortion. Pulse amplitude modulation is used initially at baseband and then combined with amplitude and phase/frequency modulation to produce the kind of bandpass signals that are used in cell phones and wireless data networks.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4752
**Requisites:** Requires prerequisite course of ECEN 4242 (minimum grade C-). Restricted to College of Engineering majors only.

**ECEN 5753 (3) Computer Performance Modeling**
Presents a broad range of system modeling techniques, emphasizing applications to computer systems. Covers stochastic processes, queuing network models, stochastic Petri nets and simulation (including parallel processing techniques). Also requires second-semester calculus.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4753 and CSCI 4753 and CSCI 5753
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 5763 (3) Embedded Computer Vision**
Introduces students to machine vision and machine learning methods used in automation, autopilots and security and inspection systems. Embedded and automation topics include implementation of algorithms with FPGA or GP-GPU embedded real time co-processing for autopilots (intelligent transportation), general automation and security including methods for detection, classification, recognition of targets for inspection, surveillance, search and rescue, and machine vision navigation applications.
**Requisites:** Campus section restricted to graduate students in Academic sub-plans ESE or C-EEENP or C-ECENEEEP.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Embedded Systems Engineering

**ECEN 5773 (3) Developing the Industrial Internet of Things**
This course goes beyond consumer IoT hype to emphasize a much greater space for potential embedded system applications and growth: The Industrial Internet of Things (IIoT), also known as Industry 4.0. Cisco¿s CEO stated: ¿IoT overall is a $19 Trillion market. IIoT is a significant subset including digital oilfield, advanced manufacturing, power grid automation, and smart cities¿. The course examines emerging markets, technology trends, applications and skills required for exploring career opportunities in this space.
**Requisites:** Restricted to students with an Embedded Systems Engineering (ESE) subplan or Electrical Engr-Prof Degree (C-EEENP) or Elec Cmp Elec Eng-Prof Degree (C-ECENEEENP) only.
**Recommended:** Prerequisites ECEN 5613, ECEN 5823, ECEN 5053, and ECEN 5133.

**ECEN 5783 (3) Embedded Interface Design**
This course deeply explores interface design approaches and architectures for creating embedded system prototypes and products. For both machine and user interfaces, we will examine best practices for the interface design process, including considerations of characteristics of the information to be transferred between devices or between a device and a user. Projects leverage the now standard Raspberry Pi 3 single-board computer (SBC), providing a strong foundation for exploring many elements of interface design.
**Requisites:** Restricted to students with an Embedded Systems Engineering (ESE) subplan or Electrical Engr-Prof Degree (C-EEENP) or Elec Cmp Elec Eng-Prof Degree (C-ECENEEENP) only.
**Recommended:** Prerequisites knowledge of programming, particularly Python, ECEN 2120, ECEN 2350, ECEN 1030, ECEN 1310, CSCI 1300.

**ECEN 5793 (3) Secure Computer Architecture**
Explore cutting-edge secure architectures that look to protect the system from the hardware up. This course covers advanced topics in security with an emphasis on computer architecture on both the attack and defense sides. Discussion oriented classes will deepen understanding of weekly technical reading assignments, enhance the ability to analyze technical papers, and help carry out a semester long research project.
**Requisites:** Requires prerequisite or corequisite course of ECEN 5593 (minimum grade D-).

**ECEN 5797 (3) Introduction to Power Electronics**
An introduction to switched-mode converters. Includes steady-state converter modeling and analysis, switch realization, discontinuous conduction mode and transformer-isolated converters. Ac modeling of converters using averaged methods, small-signal transfer functions, feedback loop design and transformer design.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4797
**Requisites:** Restricted to Electrical/Computer Engineering (EEEN) graduate students or Concurrent Degree students in Electrical Engineering (C-EEEN) or Electrical/Computer Engineering (C-ECENEEEN) or to Graduate Certificate Engineering (CRTGE) students.
**Additional Information:** Departmental Category: Power

**ECEN 5803 (3) Mastering Embedded Systems Architecture**
Acquire an understanding of embedded systems architectures for the purpose of creating prototypes or products for a variety of applications. The salient issues in the decision making process will be examines, including trade-offs between hardware and software implementations, processor and operating system selection and IP creation or acquisition. Projects will involve the latest software development and tools and hardware platforms.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Embedded Systems Engineering

**ECEN 5807 (3) Modeling and Control of Power Electronic Systems**
Studies modeling and control topics in power electronics. Averaged switch modeling of converters, computer simulation, ac modeling of the discontinuous conduction mode, the current programmed mode, nulldouble injection techniques in linear circuits, input filter design, and low-harmonic rectifiers.
**Requisites:** Requires prerequisite course of ECEN 5797 (minimum grade C-).
**Additional Information:** Departmental Category: Power

**ECEN 5813 (3) Principles of Embedded Software**
Introduces principles around embedded software elements and software development needed for the Embedded Systems Engineering core curriculum. Student will write C program applications hat employ efficient, high performance and robust software design techniques. Topics include bare-metal firmware, c-programming optimization and introductions to underlying embedded architecture. Sound testing and debug practices will be instilled and utilized in several application projects.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Embedded Systems Engineering

**ECEN 5817 (3) Resonant and Soft-Switching Techniques in Power Electronics**
Covers resonant converters and inverters, and soft switching; sinusoidal approximations in analysis of series, parallel, LCC, and other resonant dc-dc and dc-ac converters; state-plane analysis of resonant circuits; switching transitions in hand-switched and soft-switched PWM converters; zero-voltage switching techniques, including resonant, quasi resonant, zero voltage transition, and auxiliary switch circuits.
**Requisites:** Requires prerequisite course of ECEN 5797 (minimum grade C-).
**Additional Information:** Departmental Category: Power

**ECEN 5823 (3) Internet of Things Embedded Firmware**
Acquire firmware development skills to meet low energy and internet connectivity demands of embedded systems. Event-driven firmware techniques will be explored through programming assignments, transitioning to programming an Internet of Things RF Network Protocol such as Bluetooth Low Energy or Thread. The coursework will align with the latest industry firmware and embedded wireless protocol trends.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Embedded Systems Engineering

**ECEN 5827 (3) Analog IC Design**
Covers the fundamentals of transistor-level analog integrated circuit design. Starting with motivations from application circuits, the course develops principles of dc biasing, device models, amplifier stages, frequency response analysis and feedback and compensation techniques for multi-stage operational amplifiers.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4827
**Requisites:** Restricted to Electrical/Computer Engineering (EEEN) graduate students or Concurrent Degree students in Electrical Engineering (C-EEEN) or Electrical/Computer Engineering (C-ECENEEEN) or to Graduate Certificate Engineering (CRTGE) students.
**Additional Information:** Departmental Category: Power

**ECEN 5828 (3) Hybrid Dynamical Systems: Theory and Applications**
Students will study the basic properties of differential and difference equations and inclusions including: existence of solutions, uniqueness, invariance principles; introduction to basic hybrid systems that combine continuous-time and discrete-time dynamics: automata, switched systems, etc.; Lyapunov theory for hybrid systems; and examples and applications in the areas of optimization, feedback control, machine learning, energy systems, social networks, multi-agent systems, and asynchronous systems. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.

**ECEN 5830 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General

**ECEN 5833 (3) Low Power Embedded Design Techniques**
The course explores through weekly quizzes, assignments, and a course project, low energy hardware design concepts, selecting components to meet reliability goals, radio implementation, power supply design, product design, and system bring up. The programming of the microcontroller or SoC will most likely be ¿coding to the metal¿ to control individual microcontroller peripherals and utilizing them in the most energy efficient ways.
**Requisites:** Restricted to students with an Embedded Systems Engineering (ESE) subplan or Electrical Engr-Prof Degree (C-EEENP) or Elec Cmp Elec Eng-Prof Degree (C-ECENEEENP) only.
**Recommended:** Requisites Students should have knowledge of assembly and C programming, digital logic design, and embedded computer architecture, and have had at least one course in each of these subjects, such as ECEN 5813 or ECEN 5823, students should also have experience using a microcontroller Integrated Development Environment (IDE) and its associated tools including its debugger and register views.

**ECEN 5837 (3) Mixed-Signal IC Design Lab**
Software laboratory course extends the concepts developed in ECEN 5827 to full design and layout of mixed analog and digital custom integrated circuits. Assignments explore implementation of analog to digital and digital to analog converters, and final project developes a full custom IC for a target application.
**Requisites:** Requires prerequisite course of ECEN 5827 (minimum grade C-).
**Additional Information:** Departmental Category: Power

**ECEN 5840 (1-6) Independent Study**
Offers an opportunity for students to do independent, creative work at the master's level. Numbered ECEN 5840-5849. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: General

**ECEN 5853 (3) Embedding Sensors and Motors**
Introduces students to the design of sensors and motors, and methods that integrate them into embedded systems used in consumer and industrial products. Students will learn about sensor technologies and motors through lectures, recorded and online videos, online reading, and through laboratory experiments. Students will build systems that take sensor inputs, and sort, filter and evaluate the resulting data. They will also learn how to use sensor input to measure properties of motors.
**Requisites:** Restricted to students with an Embedded Systems Engineering (ESE) subplan or Electrical Engr-Prof Degree (C-EEENP) or Elec Cmp Elec Eng-Prof Degree (C-ECENEEENP) only.
**Recommended:** Prerequisites ECEN 1400, ECEN 2250, ECEN 2260 and ECEN 2440 or equivalent coursework.

**ECEN 5857 (3) Digital Control for Power Electronics**
Focuses on analysis, modeling and design of digitally controlled power converters. Covers the dynamical discrete-time analysis of power converters, digital compensator design and main nonlinear phenomena due to quantization effects. Addresses the basics of controller autotuning.
**Requisites:** Requires prerequisite course of ECEN 5797 (minimum grade C-).

**ECEN 5863 (3) Programmable Logic Embedded System Design**
Learn to design programmable systems on a chip for the purpose of creating prototypes or products for a variety of applications. Explore complexities, capabilities and trends of Field Programmable Gate Arrays (FPGA) and Complex Programmable Logic Devices (CPLD). Implement synchronization and timing closure in these devices. Projects will involve the latest software and FPGA development tools and hardware platforms.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Embedded Systems Engineering

**ECEN 5907 (3) Special Topics**
Special topics class.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**ECEN 5915 (3) Foundations of Quantum Engineering**
Introduces engineers to quantum theory. In this course you will learn how to describe many different physical systems (such as atoms, electrons, light, mechanical oscillators, and tops) mathematically. It also explores different notions of quantumness such as entanglement and non-contextuality. The foundations obtained in this course are important for further study of quantum hardware (sensors), communication, and computing.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3915

**ECEN 5925 (3) Foundations of Quantum Hardware**
Introduces students to the principles and operation of quantum hardware. In this course you will learn how to describe many different physical systems (trapped Ions, superconducting circuits, and optical systems) mathematically. This will allow you to model quantum sensors, communication systems and computing hardware.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4295

**ECEN 5930 (1-3) Industry Internship**
This class provides a structure for ECEE graduate students to receive academic credit for internships with industry partners that have an academic component to them suitable for graduate-level work. Participation in the program will consist of an internship agreement between a student and an industry partner who will employ the student in a role that supports the academic goals of the internship. Instructor participation will include facilitation of mid-term and final assessments of student performance as well as support for any academic-related issues that may arise during the internship period. May be taken during any term following initial enrollment and participation in ECEE graduate programs.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Grading Basis:** Letter Grade

**ECEN 5933 (3) Engineering Genetic Circuits**
Presents recent research into methods and software tools for the modeling, analysis, and design of genetic circuits that are enabling the new field of synthetic biology. Teaches both biological and engineering principles in order to enable collaborations between engineers and biologists working in the field of synthetic biology.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4933
**Recommended:** Prerequisite some familiarity with genetics, cell biology, molecular biology, or biochemistry or familiarity with engineering methods for modeling, analysis and design, but students are not expected to have knowledge in both.

**ECEN 6016 (1-3) Special Topics**
**Additional Information:** Departmental Category: Optics

**ECEN 6106 (3) Numerical Methods in Photonics**
Teaches students how to create and use their own computational techniques to explore optical physics, devices and systems. Learning is project-based, that is no traditional homework or exams are used. Instead, students write their own series of different numerical tools such as finite difference time domain and Fourier beam propagation. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ECEN 5696 Fourier Optics or equivalent and some familiarity with a numerical programming language such as Matlab is strongly recommended.

**ECEN 6139 (3) Logic Synthesis of VLSI Systems**
Studies synthesis and optimization of sequential circuits, including retiming transformations and don't care sequences. Gives attention to hardware description languages and their application to finite state systems. Also includes synthesis for testability and performance, algorithms for test generation, formal verification of sequential systems, and synthesis of asynchronous circuits.
**Recommended:** Prerequisites ECEN 5139 and CSCI 5454.
**Additional Information:** Departmental Category: VLSI CAD Methods

**ECEN 6144 (3) Electromagnetic Boundary Problems**
Provides mathematical and physical fundamentals necessary for the systematic analysis of electromagnetic fields problems. Covers basic properties of Maxwell's equations, potentials and jump conditions; scattering and diffraction by canonical structures; Green's functions, integral equations and approximate methods. Requires some maturity in electromagnetics.
**Requisites:** Requires prereq course of ECEN 5114 or 5134 (minimum grade C-). Restricted to graduate students in Electrical Engr (EEEN) or Electrical/Computer Engr (ECEN) or Electrical Engr Concurrent or Electrical/Computer Engr Concurrent Degree students only.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 6800 (3) Master of Engineering Report**
**Additional Information:** Departmental Category: General

**ECEN 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Additional Information:** Departmental Category: General

**ECEN 6950 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General

**ECEN 6960 (3) Master of Engineering Project**
**Additional Information:** Departmental Category: General

**ECEN 7840 (1-6) Independent Study**
Offers an opportunity for students to do independent, creative work at the doctoral level. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: General

**ECEN 7849 (1-6) Independent Study**
Offers an opportunity for students to do independent, creative work at the doctoral level. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: VLSI CAD Methods

**ECEN 8990 (1-10) Doctoral Dissertation**
**Repeatable:** Repeatable for up to 10.00 total credit hours.
**Additional Information:** Departmental Category: General

# Electrical & Computer Engineering - Master of Engineering (ME)

At CU Boulder, the Department of Electrical, Computer & Energy Engineering (http://www.colorado.edu/ecee/graduate-program/degrees-programs/master-engineering/) has focused our ME degree on professional master's programs that serve highly employable disciplines and provide skills based on industry needs.

## Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

## Requirements

A minimum of 30 credit hours of academic work acceptable to the student's advisory committee and within the rules established by the College of Engineering and Applied Science and the Graduate School will be required for the ME degree (http://www.colorado.edu/ecee/graduate-program/degrees-programs/master-engineering/).

- All 30 course credit hours in ECEN at the 5000-level or above or:
- Minimally, 15 in sufficiently technical ECEN 5000+ with remainder in related STEM (Science, Technology, Engineering, Math) including up to 15 EMEN course credit hours upon permission from faculty advisor
- In the Embedded Systems Engineering (ESE) subplan with ME degree, you can maximally take just 9 credit hours (3 courses) in related STEM, while 21 credit hours must be courses in ESE. Other professional master's subplans might also vary.
- *Optionally*, maximally 6 credit hours may be at the 4000+ level. However, all coursework from ECEN, TLEN/CYBR, EMEN and ATLS *must solely be* at the 5000+ level.

### Time Limit

All degree requirements must be completed within four years of the date of commencing coursework (if on campus) or six years (if working full-time and taking only one course, each semester). Most students complete the degree in 2 to 5 years (on-campus, full-time student vs. off-campus, full-time worker/part-time student, respectively).

## Dual Degree Program

### ME in Electrical, Computer & Energy Engineering and Engineering Management

The Department of Electrical, Computer & Energy Engineering also offers a dual ME degree with the Engineering Management Program. The dual degree requires 45 total credit hours, where 21 credits are from the Engineering Management Program (EMP) and 24 credits are from the Electrical, Computer & Energy Engineering Program.

For more information, visit the program's dual degrees (https://www.colorado.edu/emp/graduate-programs/dual-graduate-degrees/) webpage.

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate the necessary understanding and skillsets with specific kinds of software and hardware in order to perform at a relatively strong level in optional industry internships and in post-graduation industry employment.
- Practice the necessary technical and interpersonal skills to gain meaningful employment within the chosen field of study through university relations with local and national companies and laboratories in addition to career events.
- Demonstrate the experimental and/or analytical skills essential to a career in the chosen field of study.
- Demonstrate a broad perspective of the field along with soft-technical skills through successfully completing course work in programs such as the engineering management and the technology, cybersecurity and policy programs.

# Electrical & Computer Engineering - Master of Science (MS)

The Department of Electrical, Computer & Energy Engineering (ECEE) offers degree options tailored to both working engineers looking to advance their careers and to those looking to pursue a career in academia. Research and coursework is concentrated in six broad areas:

- Photonics and quantum engineering
- Learning, information, network, communication and data sciences
- Computer engineering
- Systems and controls
- Electromagnetics, RF and microwaves
- Power electronics

For more information, visit the department's Prospective Students (https://www.colorado.edu/ecee/academics/graduate-programs/master-science-electrical-engineering/degree-requirements/) webpage or the application requirements (https://www.colorado.edu/ecee/admissions/graduate-admissions/) webpage.

## Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

## Coursera Option

The Master of Science in Electrical & Computer Engineering is also available as a completely online master's degree (https://www.colorado.edu/ecee/msee/) through the Coursera platform.

## Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab (https://www.colorado.edu/ecee/undergraduate-program/degrees/bachelors-accelerated-masters-degree/) for the associated bachelor's degree(s):

- Electrical and Computer Engineering - Bachelor of Science (BS) (https://catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/electrical-computer-energy-engineering/electrical-computer-engineering-bachelor-science-bs/#acceleratedmasterstext)
- Electrical Engineering - Bachelor of Science (BS) (https://catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/electrical-computer-energy-engineering/electrical-engineering-bachelor-science-bs/#acceleratedmasterstext)

## Requirements

- All MS students must complete a total of 30 credit hours of coursework (including thesis hours, if applicable) with a grade of C or better and a cumulative GPA of at least 3.00.
- At least 24 credit hours must be completed at the 5000 level or above, and at least 18 of those credits must be in sufficiently technical[1] ECEN courses.
- The remaining courses can also be ECEN 5000+ or in other STEM (Science, Tech, Engineering, Math) departments.
- *Optionally*, maximally 6 credit hours may be at the 4000+ level. However, all coursework from ECEN, TLEN/CYBR, EMEN and ATLS *must solely be* at the 5000+ level.

For more information, visit the department's Master of Science (http://www.colorado.edu/ecee/graduate-program/degrees-programs/master-science/) webpage.

### Degree Plans

#### Plan I: Thesis Option

Students must complete 4–6 credit hours of MS thesis. The total number of combined hours of independent study and thesis research shall not exceed 9 hours. The Plan I project culminates with an oral presentation and written thesis.

#### Plan II: Non-Thesis Option

A maximum of 6 credit hours of independent study can be used toward the 30-credit-hour requirement. No thesis is required, and there is no cumulative examination.

### Time Limit

All degree requirements must be completed within four years of the date of commencing coursework. Most students complete the degree in two years.

1 "Sufficiently technical" usually means the course requires at least one technical pre-requisite course, and that its primary focus is engineering/mathematical problem-solving rather than having a policy-based focus.

## Learning Outcomes

By the completion of the program, students will:

- Gain the necessary understanding to interpret and explain results published within their field of study and enable them to address modern engineering challenges (thesis or non-thesis).
- Learn the necessary communication skills to help them gain meaningful employment within their chosen field of study (thesis or non-thesis).
- Acquire the experimental and/or analytical skills essential to a career in their chosen field of study (thesis or non-thesis).
- Learn to conduct scientific research effectively (thesis only).
- Learn communication skills essential to the dissemination of their technical findings (thesis only).

# Electrical & Computer Engineering - Master of Science (MSECE) Online

The online Master of Science in Electrical & Computer Engineering (MSEE), hosted on the internationally acclaimed Coursera (https://www.coursera.org/degrees/msee-boulder/) platform, offers stackable graduate-level courses, graduate certificates and a fully accredited master's degree in electrical engineering. The Master of Science in Electrical & Computer Engineering on Coursera students earn the same credentials as our on-campus students. There are no designations on official CU transcripts, degrees or certificates that this is an online program.

### Focus Areas

#### Embedded Systems

Embedded system engineering is used in industries such as aerospace and defense, energy, industrial automation, health care, networking and communication, security, transportation and more. Embedded systems also drive the Internet of Things (IoT), enabling countless human-to-machine and machine-to-machine applications including home automation, security and more.

The embedded systems engineering curriculum covers essential embedded technologies, synthesizes foundational principles and directly applies them to current tools and trends. It is structured to provide you with a broad, versatile and highly competitive skill set. We emphasize practical, project-based learning across hardware and embedded software design that addresses numerous end markets, as well as multiple semiconductor technologies including sensors, controllers, programmable devices and development tools.

#### Power Electronics

Power electronics is a key enabling technology in essentially all electronic systems and is increasingly important in the grid interface of renewable energy sources and in efficient electrical loads. The necessity

for power electronics technology in these rapidly expanding areas creates an increasing need for design engineers equipped with knowledge and skills to actively participate in multidisciplinary teams.

The power electronics curriculum addresses this demand for skilled power electronics design engineers, covering switching power supplies, DC-DC converters, inverters, power factor correction converters and LED lighting drivers. The power electronics curriculum emphasizes fundamentals and application in the power electronics field. This domain competency applies to end markets such as power management, portable power, computer systems, medical applications, spacecraft power systems, the automotive industry, renewable energy and the utilities.

### Photonics & Optics

While 20th-century technology was defined by the growth of electronics, the 21st century belongs to photonics. LEDs will light households powered by photovoltaic panels and filled with displays and cameras communicating by optical fiber to distant owners wearing virtual reality glasses. Laser 3D printing will transform manufacturing. New microscopes and telescopes will peer into the depths of living cells and distant galaxies.

The photonics curriculum provides a firm theoretical foundation on the generation, modulation, radiative or guided transmission, sensing, and detection of optical signals. It also covers optical telecommunications, medical instrumentation, photovoltaic power generation, information processing, optical instruments and environmental sensing. While some of these industries are mature, photonics continues to grow into new industries such as LED lighting and on-chip silicon photonics for multi-core CPUs.

# Program Policies

This CU Boulder on Coursera program does not align with standard campus policies. Please refer to the Online Programs (p. 1895) section of the catalog for more information.

Up to 9 credits offered by the MS in Computer Science (p. 1674) and/or MS in Data Science (https://catalog.colorado.edu/graduate/colleges-schools/interdisciplinary-programs/data-science-master-science-ms-online/) and/or ME in Engineering Management (p. 1737) on Coursera programs in which a student earns a grade of solid B or higher (B-minus is too low) may be applied toward the MS in Electrical Engineering degree's required 30 credits. Courses must be graduate level and meet all applicable academic standards and may not be double counted toward two credentials of the same level. Only courses offered through CU Boulder's for-credit programs on Coursera may be used.

# Admission Requirements

The MSEE program utilizes performance-based admissions for enrollment. There is no traditional application for admission to the degree. Students do not need to take the GRE or submit letters of recommendation or proof of language proficiency. Neither a prior degree nor university transcripts are required for admission. Because this is a purely online program, students do not need to complete a background check to enroll.

A student desiring admission to the MSEE program must complete four required protocols:

1. Take one pathway specialization for credit with at least a grade of C in each course.
2. Achieve a computed pathway specialization grade-point average (GPA) of at least 3.00.
3. Have a cumulative GPA of at least 3.00 for all for-credit courses taken to date.
4. Declare their intention to seek the degree, which they can do before, during, or after any work in a pathway specialization.

Upon completion of these four steps the student is admitted to the MSEE program. Students may successfully complete a designated pathway specialization and declare intent at any point in their academic journey. Completion of a pathway specialization is not required for students to begin earning academic credit, only to earn the degree. Non-degree seeking students may enroll in for-credit courses.

All courses attempted and/or completed for credit will appear on an official CU Boulder transcript (unless dropped by the drop deadline) and will count toward the cumulative GPA.

# Program Requirements

The diagram displayed on the Electrical Engineering (https://www.colorado.edu/ecee/msee/) website shows how the program's courses and certificates can be stacked into the full 30 credit hour degree.

Up to 9 credits offered by the MS-DS or ME-EM on Coursera programs may be applied toward the Electrical Engineering MS degree required 30 credits. Courses must be graduate level and meet all applicable academic standards and may not be double counted toward two credentials of the same level. Only courses offered through Coursera may be used.

## Embedded Systems Track

### Computer Engineering / Embedded Systems Engineering

**Computer engineering** encompasses a wide range of topics surrounding this interaction between hardware and software. Computer engineers of the future will be versatile full-stack developers, comfortable with understanding the technical depths of software development while also possessing a wide knowledge of the underlying hardware implementations. The MSEE on Coursera curriculum in computer engineering emphasizes computer-aided verification and synthesis.

**Embedded systems engineering** is used in industries such as aerospace and defense, energy, industrial automation, health care, networking and communication, security, transportation and more. Embedded systems also drive the Internet of Things (IoT), enabling countless human-to-machine and machine-to-machine applications including home automation, security and more.

The MSEE on Coursera's Embedded Systems Engineering curriculum covers essential embedded technologies, synthesizes foundational principles, and directly applies them to current tools and trends. It is structured to provide you with a broad, versatile and highly competitive skill set. We emphasize practical, project-based learning across hardware and embedded software design that addresses numerous end markets, as well as multiple semiconductor technologies including sensors, controllers, programmable devices and development tools.

### Industrial Internet of Things - Graduate Certificate

To earn a graduate certificate (9 credits), students must complete the required specializations.

Required specializations:

- Embedded Sensors and Motors Specialization
- Embedded Interface Design Specialization
- Developing Industrial Internet of Things Specialization

**Advanced Embedded Linux Development Specialization**

| Code | Title | Credit Hours |
|---|---|---|
| ECEA 5305 | Linux System Programming and Introduction to Buildroot | |
| ECEA 5306 | Linux Kernel Programming and Introduction to Yocto | |
| ECEA 5307 | Embedded System Topics and Project | |

**Embedding Sensors and Motors Specialization**

| Code | Title | Credit Hours |
|---|---|---|
| ECEA 5340 | Embedding Sensors and Motors: Sensors, Sensor Circuit Design | |
| ECEA 5341 | Embedding Sensors and Motors: Motors, Motor Control Circuits | |
| ECEA 5342 | Embedding Sensors and Motors: Pressure and Motion Sensors | |
| ECEA 5343 | Embedding Sensors and Motors: Sensor Manufact, Process Ctrl | |

**FPGA Design for Embedded Systems Specialization**

| Code | Title | Credit Hours |
|---|---|---|
| ECEA 5360 | FPGA Design for Embedded Systems: Intro to FPGA Dsgn for ES | |
| ECEA 5361 | FPGA Design for Embedded Systems: Hardwr Desc Lang FPGA Dsgn | |
| ECEA 5362 | FPGA Design for Embedded Systems: FPGA Softcore Proc, IP Acq | |
| ECEA 5363 | FPGA Design for Embedded Systems: Building FPGA Projects | |

**Developing Industrial Internet of Things Specialization**

| Code | Title | Credit Hours |
|---|---|---|
| ECEA 5385 | Industrial IoT Markets and Security | |
| ECEA 5386 | Developing Industrial IoT: Proj Planning, Machine Learning | |
| ECEA 5387 | Developing Industrial IoT: Modeling and Debugging Embed Sys | |

**Real-time Embedded Systems Specialization**

| Code | Title | Credit Hours |
|---|---|---|
| ECEA 5315 | Real-Time Embedded Systems: Concepts and Practices | |
| ECEA 5316 | Real-Time Embedded Systems: Theory and Analysis | |
| ECEA 5317 | Real-Time Embedded Systems: Mission-Critical, SW Application | |
| ECEA 5318 | Real-Time Embedded Systems: Project | |

**Embedded Interface Design Specialization**

| Code | Title | Credit Hours |
|---|---|---|
| ECEA 5346 | Embedded Interface Design: User Exp I/F Design for Emb Sys | |
| ECEA 5347 | Embedded Interface Design: Rapid Prototyping Emb I/F Designs | |
| ECEA 5348 | Embedded Interface Design: M2M, IoT I/F Design & Protocols | |

**Network Systems: Principles and Practice (Linux and Cloud Networking)**

| Code | Title | Credit Hours |
|---|---|---|
| ECEA 5370 | Network Systems Foundation | |
| ECEA 5371 | Network Principles in Practice: Linux Networking | |
| ECEA 5372 | Network Principles in Practice: Cloud Networking | |

**Sensors for a Carbon Free World Specialization**

| Code | Title | Credit Hours |
|---|---|---|
| ECEA 5349 | Sensors for a Carbon Free World: Electric Vehicle Sensors | |
| ECEA 5350 | Sensors for a Carbon Free World: Wind Turbine Sensors | |
| ECEA 5351 | Sensors for a Carbon Free World: Solar Power Sensors | |

**Engineering Genetic Circuits Specialization**

| Code | Title | Credit Hours |
|---|---|---|
| ECEA 5934 | Engineering Genetic Circuits: Design | |
| ECEA 5935 | Engineering Genetic Circuits: Modeling and Analysis | |
| ECEA 5936 | Engineering Genetic Circuits: Abstraction Methods | |

### Spectrum Engineering - Graduate Certificate

The spectrum engineering graduate certificate requires 12 credit hours of coursework. Three hours of coursework is recommended, though not required.

| Code | Title | Credit Hours |
|---|---|---|
| **Recommended Specialization** | | **3** |
| ECEA 5453 | The Electromagnetic Spectrum | |
| ECEA 5454 | Signal Fundamentals | |
| ECEA 5455 | Economics, Management and Policy | |
| **Required Specializations** | | **12** |
| ECEA 5450 | The Science of Spectrum Access | |
| ECEA 5451 | Radio Frequency Engineering | |
| ECEA 5452 | Signals and Propagation | |
| ECEA 5456 | Radio Services and Broadcast Applications | |
| ECEA 5457 | Mobile Communication: Cellular and Wi-Fi | |
| ECEA 5458 | Radio Determination and Space Applications | |
| ECEA 5459 | The Electromagnetic Spectrum | |
| ECEA 5460 | History of Spectrum Management | |
| ECEA 5461 | Spectrum Sharing | |
| ECEA 5462 | Consumer Demand and Valuation | |
| ECEA 5463 | Firm Supply and the Structure of the Market | |
| ECEA 5464 | Optimal Pricing with Market Power | |

## Power Electronics Track

### Power Electronics - Graduate Certificate

To earn a graduate certificate (9 credits), students must complete the required specializations/courses.

Required specializations:

- Power Electronics Specialization
- Modeling and Control of Power Electronics Specialization
- Power Electronics Project Course: ECEA 5715

**Power Electronics Specialization**

| Code | Title | Credit Hours |
|---|---|---|
| ECEA 5700 | Power Electronics: Introduction to Power Electronics | 0.8 |
| ECEA 5701 | Power Electronics: Converter Circuits | 1.0 |
| ECEA 5702 | Power Electronics: Converter Control | 1.2 |
| ECEA 5703 | Power Electronics: Magnetics Design | 1.0 |

**Modeling and Control of Power Electronics Specialization**

| Code | Title | Credit Hours |
|---|---|---|
| ECEA 5705 | Modeling, Control of Power Elec: Avged-Sw Modeling and Sim | 0.8 |
| ECEA 5706 | Modeling, Control of Power Elec: Tech Dsgn-Oriented Analysis | 0.6 |
| ECEA 5707 | Modeling, Control of Power Elec: Input Filter Design | 0.6 |
| ECEA 5708 | Modeling, Control of Power Elec: Current-mode Control | 1.2 |
| ECEA 5709 | Modeling, Control of Power Elec: Mod/Ctrl 1-Phase Rect/Inv | 0.6 |

**Power Electronics Project Course**

| Code | Title | Credit Hours |
|---|---|---|
| ECEA 5715 | Power Electronics Capstone Project | 1.2 |

**Algorithms for Battery Management Systems Specialization**

| Code | Title | Credit Hours |
|---|---|---|
| ECEA 5730 | Introduction to Battery-Management Systems | 0.8 |
| ECEA 5731 | Equivalent-Circuit Cell-Model Simulation | 0.8 |
| ECEA 5732 | Battery State-of-Charge (SOC) Estimation | 1.0 |
| ECEA 5733 | Battery State-of-Health (SOH) Estimation | 0.8 |
| ECEA 5734 | Battery-Pack Balancing and Power Estimation | 0.8 |

**Photovoltaic Power Electronics Specialization**

| Code | Title | Credit Hours |
|---|---|---|
| ECEA 5716 | Open-Loop Photovoltaic Power Electronics Laboratory | 1.0 |
| ECEA 5717 | Closed-Loop Photovoltaic Power Electronics Laboratory | 1.0 |
| ECEA 5718 | Photovoltaic Power Electronics Battery Management Laboratory | 1.0 |

**Power Semiconductor Devices Specialization (3.6 credits)**

| Code | Title | Credit Hours |
|---|---|---|
| ECEA 5721 | Introduction to Power Switches | 0.6 |
| ECEA 5722 | High-Voltage p-n and Schottky Diodes | 1.2 |
| ECEA 5723 | MOSFETs, IGBTs and more | 1.2 |
| ECEA 5724 | Power Device Fabrication | 0.6 |

**Control Systems Analysis Specialization is part of the Systems and Controls Track**

| Code | Title | Credit Hours |
|---|---|---|
| ECEA 5800 | Control Systems Analysis: Modeling of Dynamic Systems | |
| ECEA 5801 | Feedback Control and Root Locus Design | |
| ECEA 5802 | Frequency-Domain and State-Space Design | |

## Photonics and Optics Track

### Semiconductor Photonics - Graduate Certificate

Admission to a graduate degree-seeking program in the ECEE department is not required for students pursuing the certificate. Certificate credit hours may be applied towards a full master's degree, provided the student is admitted to the electrical engineering graduate program as a degree-seeking student.

The semiconductor photonics certificate is comprised of 3 specializations, each of which is comprised of 3–4 individual online courses (MOOCs), which deliver about one month of content:

To complete a certificate, you must complete the following required specializations/courses.

**Semiconductor Photonics Graduate Certificate (9 credits)**

Required specializations:

- Optical Engineering Specialization
- Semiconductor Specialization
- Active Optical Devices Specialization

**Optical Engineering Specialization**

| Code | Title | Credit Hours |
|---|---|---|
| ECEA 5600 | Optical Engineering: First Order Optical System Design | 1.0 |
| ECEA 5601 | Optical Engineering: Optical Efficiency and Resolution | 1.0 |
| ECEA 5602 | Optical Engineering: Design High-Performance Optical Systems | 1.0 |

**Semiconductor Devices Specialization**

| Code | Title | Credit Hours |
|---|---|---|
| ECEA 5630 | Semiconductor Devices: Semiconductor Physics | 1.0 |
| ECEA 5631 | Semiconductor Devices: Diode: pn junction and metal semiconductor contact | 1.0 |
| ECEA 5632 | Semiconductor Devices: Transistor: Field Effect Transistor and Bipolar Junction Transistor | 1.0 |

**Active Optical Devices Specialization**

| Code | Title | Credit Hours |
|---|---|---|
| ECEA 5605 | Active Optical Devices: LEDs and Semiconductor Lasers | 1.2 |
| ECEA 5606 | Active Optical Devices: Nanophotonics and Detectors | 1.2 |
| ECEA 5607 | Active Optical Devices: Displays | 0.6 |

**Quantum Mechanics for Engineers Specialization**

| Code | Title | Credit Hours |
|---|---|---|
| ECEA 5610 | Foundations of Quantum Mechanics | 1.4 |
| ECEA 5611 | Theory of Angular Momentum | 0.8 |
| ECEA 5612 | Approximation Methods | 0.8 |

For further details regarding Photonics content under our online MSEE degree through Coursera, see Photonics and Optics (https://www.colorado.edu/ecee/academics/online-programs/ms-ee-coursera/curriculum/photonics-and-optics/).

## Learning Outcomes

By the completion of the program, students will be able to:

# Electrical & Computer Engineering - Professional Master of Science (MSECE)

The professional Master of Science degree in electrical & computer engineering is a professional degree composed of advanced courses relevant to working engineers.

The department offers many professional degree tracks, each of which result in a professional Master of Science degree in electrical engineering (MSEE).

## Program Tracks

### Embedded Systems Engineering (ESE) Track

The Embedded Systems Engineering (http://www.colorado.edu/ecee/graduate-program/degrees/embedded-systems/) (ESE) track provides comprehensive coverage of essential embedded technologies, current tools and trends. It is structured to provide students with a broad, versatile skill set and is coupled with industry input for continuous curriculum updates.

Through flexible core course options and electives, students enrolled in the ESE program pursue a 30-credit-hour MSEE degree. Many courses offer distance learning options through CU Boulder Distance Education.

### High-Speed Digital Engineering (HSDE) Track

The High-Speed Digital Engineering (https://www.colorado.edu/ecee/academics/graduate-programs/professional-masters/high-speed-digital-engineering/)(HSDE) track is an innovative practical degree plan that prepares students for a career in industry with the specialized knowledge required to be a successful high-speed design engineering team member and to be able to solve complex signal integrity, power integrity and electromagnetic compatibility design problems quickly and efficiently. Simulation and measurement tools used in industry are leveraged to develop and enhance high-speed digital engineering design intuition at the same time fundamental principles are studied through best practices from industry in design, measurement, simulation and analysis. The program facilitates lifelong learning capabilities and is continuously updated with industry input.

Through five core courses and five elective options, students enrolled in this program pursue a ten course, 30-credit-hour degree. Most courses emphasize practical, hands-on experience, understanding and solving real world problems faced by the electronics industry today. Students with a background in electrical engineering fundamentals will be well-prepared for this program. It is intended for students and engineers with a bachelor's degree in electrical engineering or equivalent, including a background in basic electromagnetics. Students with other relevant engineering or scientific backgrounds may still be admitted to the program with a personalized study program to address foundational knowledge gaps.

## Next-Generation Power and Energy Systems (PPS) Track

The Next-Generation Power and Energy Systems (https://www.colorado.edu/ecee/graduate-program/degrees-programs/next-generation-power-and-energy-systems/) (PPS) track offers five core courses and numerous electives for the 30-credit hour program to prepare students with the specialized knowledge required to practice grid integration of renewable energy into integrated energy systems, taught by instructors from CU Boulder's faculty and National Renewable Energy Laboratory (NREL) research programs

Through flexible core course options and electives, students enrolled in the PPS program pursue a 30-credit-hour MSEE degree. Many courses also offer distance learning options.

## Power Electronics (PPE) Track

Power Electronics (http://www.colorado.edu/ecee/graduate-program/degrees/power-electronics-certificate/) is a key enabling technology in essentially all electronic systems and is increasingly important in the grid interface of renewable energy sources and in efficient electrical loads. The necessity for power electronics technology in these rapidly expanding areas creates an increasing need for design engineers equipped with knowledge and skills to actively participate in multidisciplinary teams.

Through flexible core course options and electives, students enrolled in this program pursue a 30-credit-hour MSEE degree. The program is intended for students and engineers with a BS degree in electrical engineering or the equivalent. Entering students must have adequate knowledge of circuits and electronics, as taught in undergraduate courses intended for EE majors.

## Quantum Engineering (QE) Track

Inspired by the promise of more powerful computers and better sensors the global rise in funding for quantum technology has skyrocketed. This can be evidenced by the investment in several large companies (Google, IBM, Intel and Amazon). The quantum engineering track provides a unique overview of one of the fastest-growing technological fields and will help to prepare students for the quantum workforce of today and tomorrow.

The QE track provides students with a working knowledge of the principles of quantum mechanics and how they can be implemented in technological areas such as quantum computing, communications and sensing. Through core course options and electives, students enrolled in this program pursue a 30-credit-hour professional MSEE degree. The program is intended for students and engineers with a BS degree in STEM with solid knowledge in calculus, linear algebra and probability.

# Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

# Requirements

## Admission

A minimum undergraduate GPA of 3.00 is required for application to the master's program. Students who are interested in the PhD degree and have strong academics (including 3.50 or higher GPA) should apply directly to the PhD program (https://catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/electrical-engineering/electrical-engineering-doctor-philosophy-phd/).

## Course Requirements

The following course requirements are subject to change; for the most current information, visit the ECEE department's Professional Master's Program webpage (https://www.colorado.edu/ecee/academics/graduate-programs/professional-masters/).

Students must complete a total of 30 course credit hours with a grade of C or better and a cumulative GPA of at least 3.00. At least 24 credit hours must be completed at the 5000-level or above, and at least 18 of those credits must be in sufficiently technical ECEN 5000+ level courses.

## Time Limit

All degree requirements must be completed within four years of the date of commencing coursework. Most students complete the degree in one-and-a-half to two years.

## Program Tracks

### Embedded Systems Engineering (ESE) Track

| Code | Title | Credit Hours |
|---|---|---|
| A minimum of 5 ESE core courses (15 credit hours) and 2 ESE elective courses (6 credit hours) from the ESE course list are required. | | |
| **ESE Core Courses** | | |
| Choose five of the following: | | 15 |
| ECEN 5613 | Embedded System Design | |
| ECEN 5623 | Real-Time Embedded Systems | |
| ECEN 5803 | Mastering Embedded Systems Architecture | |
| ECEN 5813 | Principles of Embedded Software | |
| ECEN 5823 | Internet of Things Embedded Firmware | |
| ECEN 5833 | Low Power Embedded Design Techniques | |
| ECEN 5853 | Embedding Sensors and Motors | |
| ECEN 5863 | Programmable Logic Embedded System Design | |
| **ESE Program Electives** | | |
| Choose two of the following (or additional ESE core courses): | | 6 |
| ECEN 5133 | Fundamentals of Computer Security | |
| ECEN 5224 | High Speed Digital Design | |
| ECEN 5593 | Advanced Computer Architecture | |
| ECEN 5713 | Advanced Embedded Software Development | |
| ECEN 5763 | Embedded Computer Vision | |
| ECEN 5730 | Practical Printed Circuit Board Design and Manufacture | |
| ECEN 5773 | Developing the Industrial Internet of Things | |
| ECEN 5783 | Embedded Interface Design | |
| ECEN 5313 | Concurrent Programming | |
| ECEN 5139 | Computer-Aided Verification [1] | |
| **Open 5000 Level Electives** | | **9** |

| | |
|---|---|
| Choose three 5000-level electives from the ESE core, ESE electives, other ECEE courses, or courses in other departments, with approval of academic advisor. | |
| **Total Credit Hours** | **30** |

[1] Can also optionally take ECEN 5525 Compiler Construction and/or ECEN 5033 Special Topics: Datacenter Scale Computing, when available.

For more information, visit the department's Embedded Systems Engineering (http://www.colorado.edu/ecee/graduate-program/degrees/embedded-systems/) webpage. (At that page, please click on the "Courses (https://www.colorado.edu/ecee/academics/graduate-programs/professional-masters/embedded-systems/embedded-systems-iot-courses/)" button to see particular semesters of course availability).

## High-Speed Digital Engineering (HSDE) Track

This program track consists of 10 courses totaling 30 credits. Five of the courses (15 credits) must be the core courses of the curriculum. A minimum of two additional courses (6 credits) must be chosen from the HSDE PMP elective courses list. The remaining three courses (9 credits) may be chosen from the HSDE PMP elective courses list OR from the courses that fulfill general ECEE Master's degree requirements.

A grade of C or better is required for each course applied towards the HSDE PMP track for degree-seeking students.

For HSDE courses taken non-degreed, and subsequently wanting to transfer maximally 9 credit hours toward a degree, the minimal grade in each course must be a solid B or better.

| Code | Title | Credit Hours |
|---|---|---|
| **HSDE Core Courses** | | |
| All five required: | | |
| ECEN 5224 | High Speed Digital Design (spring) | 3 |
| ECEN 5514 | Principles of Electromagnetics for High-Speed Digital Engineering (spring) | 3 |
| ECEN 5524 | Principles of Computational Electromagnetics for Signal and Power Integrity (spring) | 3 |
| ECEN 5534 | Signal Integrity Measurements for High Speed Digital Engineering (fall) | 3 |
| ECEN 5730 | Practical Printed Circuit Board Design and Manufacture (fall, spring) | 3 |
| **HSDE Program Electives** | | |
| Choose two: | | 6 |
| ECEN 5013 | Special Topics (Advanced PCB Design for high-speed serial links (fall)) | |
| ECEN 5414 | Essential Principles of Signal Integrity (spring) | |
| ECEN 5424 | High Speed Channel Design for Signal Integrity (spring 2024) | |
| ECEN 5434 | S-Parameters for Signal Integrity in High Speed Digital Engineering (fall) | |
| ECEN 5444 | Electromagnetic Compatibility (EMC) for High-Speed Digital Engineering (fall) | |
| ECEN 5544 | EM Signal Modeling for HSDE using Ansys HFSS and Q3D (spring) | |
| ECEN 5554 | Designing PCB Memory Systems using Keysight ADS (fall) | |
| *Choose three more from the above HSDE electives list, or from other STEM electives* | | *9* |
| **Total Credit Hours** | | **30** |

- For more information, visit the department's High-Speed Digital Engineering (https://www.colorado.edu/ecee/academics/graduate-programs/professional-masters/high-speed-digital-engineering/)webpage.

## Next-Generation Power and Energy Systems (PPS) Track

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| ECEN 5797 | Introduction to Power Electronics | 3 |
| ECEN 5407 | Renewable Energy and the Future Power Grid (Renewable Energy and the Future Power Grid) | 3 |
| ECEN 5417 | Power System Analysis (Power Systems Analysis) | 3 |
| ECEN 5427 | Power System Planning & Operations (Power System Operations & Planning) | 3 |
| ECEN 5437 | Distribution System Analysis (Distribution System Analysis) | 3 |
| **Elective Courses** | | |
| At least 3 credit hours of ECEN courses at the 5000 level or above. | | 3 |
| AREN 5010 | Energy System Modeling and Control | |
| AREN 5570 | Building Electrical Systems Design 1 (Building Electrical Systems) | |
| AREN 5060 | | |
| AREN 5830 | Architectural Engineering Special Topic (Grid-Connected Systems) | |
| ECEN 5007 | Special Topics (Electrified Transportation) | |
| ECEN 5007 | Special Topics (Power System Protection) | |
| ECEN 5007 | Special Topics (High Voltage AC and DC Transmission) | |
| ECEN 5447 | Power System Dynamics with Renewable Energy | |
| ECEN 5457 | Energy Systems Optimization | |
| ECEN 5467 | Data Analytics and Data-Driven Decision Making for Modern Power and Energy Systems | |
| ECEN 5517 | Power Electronics and Photovoltaic Power Systems Laboratory | |
| ECEN 5807 | Modeling and Control of Power Electronic Systems | |
| ENVM 5005 | The Business of Renewable and Sustainable Energy | |
| ENVM 5006 | Sustainable Energy Policy | |

## Power Electronics (PPE) Track

This curriculum is built around a core of three theory courses and two laboratory courses that provide practical laboratory and design experience of specific relevance to the practice of power electronics.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Theory Courses** | | |
| ECEN 5797 | Introduction to Power Electronics (fall) | 3 |
| ECEN 5807 | Modeling and Control of Power Electronic Systems (alternate spring) | 3 |
| ECEN 5817 | Resonant and Soft-Switching Techniques in Power Electronics (alternate spring) | 3 |
| **Required Laboratory Courses** | | |
| The degree also requires completion of the following laboratory course in power electronics. | | |
| ECEN 5527 | Power Electronics Design Laboratory (fall) | 3 |
| ECEN 5517 | Power Electronics and Photovoltaic Power Systems Laboratory (spring) | 3 |
| **Electives** | | |
| Select at least one of the following power electronics electives: | | 3 |
| *Digital Control for Power Electronics* | | |
| ECEN 5857 | Digital Control for Power Electronics (fall) | |
| *Electric Vehicles* | | |
| ECEN 5607 | Power Electronics for Electrified Transportation (alternate fall) | |
| ECEN 5737 | Adjustable-Speed AC Drives (alternate spring) | |
| *Power Management Integrated Circuits* | | |
| ECEN 5827 | Analog IC Design (alternate fall) | |
| *Grid Integration of Renewables (variable semesters)* | | |
| ECEN 5407 | Renewable Energy and the Future Power Grid | |
| ECEN 5417 | Power System Analysis | |
| ECEN 5427 | Power System Planning & Operations | |
| ECEN 5437 | Distribution System Analysis | |
| ECEN 5447 | Power System Dynamics with Renewable Energy | |
| ECEN 5457 | Energy Systems Optimization | |
| ECEN 5467 | Data Analytics and Data-Driven Decision Making for Modern Power and Energy Systems | |
| **Technical Electives** | | |
| Choose up to three technical electives with advisor approval. | | 9 |
| **Open Elective** | | |
| Choose an additional elective course with advisor approval. | | 3 |
| **Total Credit Hours** | | **30** |

For more information, visit the department's Power Electronics (http://www.colorado.edu/ecee/graduate-program/degrees/power-electronics-certificate/) webpage.

## Quantum Engineering Track

Quantum engineering has a wide variety of hardware platforms to choose from and quantum engineers need a broad range of skills that are more traditional EE topics. To address this diversity and help quantum engineers make informed choices, the program offers a wide range of options, allowing students to tailor their education to their interests and to the specific demands of the quantum industry.

1-Both of the two **core courses** below are required.

2-Two **quantum electives** are also required (of the four listed below, with the offerings changing semester to semester).

3-Additionally, students may request specific 5000-level (graduate) courses be counted on a case-by-case basis.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Core courses** | | |
| ECEN 5915 | Foundations of Quantum Engineering | |
| ECEN 5925 | Foundations of Quantum Hardware | |
| **Required Quantum Elective Courses** | | |
| PHYS 7570 | Quantum Information and Computing<br>Must have UG Quantum pre-reqs | |
| Quantum Metrology & Sensing. (Currently ECEN 5005 Special Topics: Optical & Quantum Metrology) Must have Quantum pre-reqs | | |
| CSCI 7000 Special Topics: Intro Quantum Comp Arch/Sys | | |
| CSCS 7000 Special Topics: Quantum Complexity and Beyond | | |
| **Other Electives** | | |
| *Electromagnetics / RF Electives* | | |
| ECEN 5114 | Electromagnetic Theory | |
| ECEN 5154 | Computational Electromagnetics | |
| ECEN 5634 | Microwave and RF Laboratory | |
| ECEN 5104 | Passive Microwave Circuits | |
| ECEN 5014 | Special Topics (Active Microwave Circuits) | |
| *Optics Electives* | | |
| ECEN 5156 | Physical Optics | 3 |
| ECEN 5696 | Fourier Optics | 3 |
| ECEN 5645 | Introduction to Optical Electronics | 3 |
| ECEN 5126 | Computational Optical Imaging | 3 |
| ECEN 6006 | Special Topics (Crystal & Nonlinear Optics) | 3 |
| *Embedded Systems Engineering Electives* | | |
| ECEN 5623 | Real-Time Embedded Systems | 3 |
| ECEN 5803 | Mastering Embedded Systems Architecture | 3 |
| ECEN 5593 | Advanced Computer Architecture | 3 |
| ECEN 5783 | Embedded Interface Design | 3 |
| ECEN 5863 | Programmable Logic Embedded System Design | 3 |
| *Theory Electives* | | |
| ECEN 5712 | Machine Learning for Engineers | 3 |
| PHYS 5250 | Introduction to Quantum Mechanics 1 | 3 |
| PHYS 5260 | Introduction to Quantum Mechanics 2 | 3 |
| ECEN 5345 | Introduction to Solid State Physics | 3 |
| PHYS 7560 | Quantum Optics | 3 |

By petition, other STEM (Science, Technology, Engineering, Math) courses will be considered if not explicitly listed.

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate the necessary understanding and skillsets with specific kinds of software and hardware in order to perform at a relatively strong level in industry jobs, both for optional industry internships and in post-graduation employment.
- Practice the necessary technical and interpersonal skills to gain meaningful employment within their chosen field of study through university relations with local and national companies and laboratories in addition to career events.
- Demonstrate a deeper, specialized set of technical skills through successful completion of additional, concentrated coursework in a chosen specialty within the field of study.
- Demonstrate the experimental and/or analytical skills essential to a career in their chosen field of study.

# Electrical & Computer Engineering - Doctor of Philosophy (PhD)

The Doctor of Philosophy (PhD) is the terminal degree for those seeking a technical or research career in electrical & computer engineering.

Students typically complete their PhD within 4 to 6 years, depending on whether they enter the program with a master's degree. It is possible for highly qualified students to enter the PhD program directly without a master's degree.

The primary focus of a PhD student is to perform novel research in collaboration with their faculty advisor. At the time of admission, PhD students must have a faculty advisor who agrees to accept the student into their research program and mentor their academic progress. Most of our PhD students are supported through research and teaching assistantships, and are also encouraged to apply for their own source of funding.

For more information, visit the department's Prospective Students (https://www.colorado.edu/ecee/academics/graduate-programs/doctor-philosophy/degree-requirements/) webpage and application information (https://www.colorado.edu/ecee/admissions/graduate-admissions/) webpage.

## Requirements

### Course Requirements

- A minimum of 30 credit hours of engineering, math and science courses numbered 5000 or above (at least 18 of these must be in technical ECEN; none can be TLEN/CYBR, EMEN or ATLS) with a minimum of 3.00 GPA (with no lower than a B- in any single course).
- 30 credit hours of dissertation credit are required for the degree.
- A maximum of 21 credit hours may be transferred from another accredited institution and applied toward a PhD degree if approved by the graduate committee of the department and the Graduate School.
- All courses taken for the master's degree at the 5000 level or above at the University of Colorado may be applied toward the doctoral degree at the university, however, the technical requirements in the first bullet point still apply.

### Preliminary Examination

PhD students must take a preliminary examination, generally completed within their first two years. They are given two chances to pass. If a student takes an exam in one research area on their first attempt and a different area on their second attempt, those comprise their two maximum attempts.

Preliminary exams are given by faculty in respective research groups. Depending on the research area, the exam could consist of oral and written parts, or a literature search and an oral report, or some other form of exam. If a student passes one part on the first attempt, then they need only take and pass the remaining part during their subsequent attempt. The outcome of an exam can also be a conditional pass, in which the student is required to carry out additional activities such as problem solving or taking a course to build foundational knowledge.

Those who do not pass after two attempts can earn a master's degree pending fulfilling the other academic requirements for that program; their tenure in the PhD will be at a close.

### Comprehensive Examination

Students must pass an oral comprehensive examination before the student's doctoral committee of five or more graduate faculty members, three of which must be rostered in the ECEE department, chosen by the student and approved by the department and the Graduate School. The oral examination before the committee is based primarily on a written proposal for the thesis research provided by the student to committee members in advance.

### PhD Dissertation

Students must write a dissertation based on original research conducted under the supervision of a graduate faculty member. The dissertation must fulfill all Graduate School requirements. After the dissertation is completed, an oral final examination on the dissertation and related topics is conducted by the student's doctoral committee.

### Time Limit

All degree requirements must be completed within six years of the date of commencing coursework. Extensions beyond this timeline may be granted via petition to the Graduate College and approval by the ECEE Chair of Graduate Studies.

## Learning Outcomes

By the completion of the program, students will:

- Gain the necessary understanding to interpret results published within their research field and broader scientific community.
- Acquire the experimental and/or analytical skills essential to a career in their chosen field of study.
- Learn communication skills essential to the dissemination of their technical findings.
- Learn to conduct scientific research effectively and independently.
- Learn to identify opportunities for technical advancements within their chosen field of study.
- Publish research findings in peer-reviewed journals and/or conferences.

# Photonics - Graduate Certificate

While 20th-century technology was defined by the growth of electronics, the field of photonics is coming of age in the 21st century. LEDs are

lighting households powered by photovoltaic panels and connected to the internet via optical fiber. Holographic displays and virtual reality glasses are providing new forms of visualization. New microscopes are peering into living cells with resolutions that break previous limits. Photons are being used to interrogate atoms for quantum computations. Photonics graduates will command skills in theory, design, fabrication and laboratory practice to place them at the forefront of these industries and many more not yet invented.

Photonics is the electrical engineering sub-discipline concerned with the generation, modulation, radiative or guided transmission, sensing and detection of optical-frequency signals. Application areas include optical telecommunications and instrumentation, optical computing and data transmission, medical imaging, renewable energy, and environmental sensing. While some of these industries are mature, photonics continues to rapidly grow into emerging technologies such as quantum computing and cryptography, optogenetics, and virtual reality.

Photonics courses at CU Boulder engage high-caliber students from around the world. The courses typically run at a fast pace, often involving a mixture of fundamental theory, design in relevant industry standard CAD tools and individual projects.

For more information visit the department website (https://www.colorado.edu/ecee/graduate-program/degrees/photonics/).

# Requirements

Admission to a graduate degree-seeking program in the ECEE department is not required for students pursuing the certificate.

Graduate students pursuing a photonics certificate are not required to matriculate into the program subplan through a master's degree, although degree-seeking students enrolled in the program will be given course registration priority.

Photonics certificate credit hours may be applied towards a full master's degree, provided the student is admitted to the electrical engineering graduate program as a degree-seeking student. However, credit hours may not count toward both a BS and a master's degree.

## Required Courses

Nine credit hours of graduate-level coursework, made up of any three of the six core photonics courses, will be required to complete the certificate program. Students must earn at least a B in each course and a minimum GPA of 3.0 is required to remain in good academic standing.

| Code | Title | Credit Hours |
|---|---|---|
| **Photonics Core Courses** | | |
| ECEN 5616 | Optoelectric System Design | 3 |
| ECEN 5606 | Optics Laboratory | 3 |
| ECEN 5156 | Physical Optics | 3 |
| ECEN 5696 | Fourier Optics | 3 |
| ECEN 5626 | Active Optical Devices | 3 |
| ECEN 5345 | Introduction to Solid State Physics | 3 |
| **Total Credit Hours** | | **18** |

# Engineering & Applied Science

# Robotics - Master of Science (MS)

The Master of Science in Robotics provides advanced training and study in robotics-related topics consistent with the program focus on autonomy and AI, field robotics, human-robot interaction, smart materials, security, controls and estimation, bio-inspired systems and advanced manufacturing.

The program provides a strong foundation in mathematics and engineering, while also allowing flexibility to select courses across departments to achieve the breadth and depth required for research and industry advances beyond the state of the art. Students will achieve their educational goals through interdisciplinary coursework and optional research opportunities under the instruction of one or more of the program's faculty members.

For more detailed information, see the Robotics (https://www.colorado.edu/program/robotics/academics/) website.

# Degree Requirements

The MS in Robotics offers a flexible curriculum that encourages in-depth study across disciplines from departments and programs hosted in the College of Engineering & Applied Science (CEAS), including aerospace engineering sciences, biomedical engineering, chemical and biological engineering, civil, environmental, and architectural engineering, computer science, electrical, computing, and energy engineering, engineering management, mechanical engineering, and the ATLAS Institute. To fulfill graduation requirements, students must complete a minimum of 30 credit hours of coursework in courses numbered 5000 or above and taught by members of the graduate faculty, with grades of C or better and a minimum GPA of 3.00. Students may choose to pursue one of two program options: thesis or non-thesis. More detailed information on course requirements and a list of approved courses can be found at the bottom of this page, under "Course Requirements."

Students in the MS thesis option must complete 4–6 hours of MS thesis credit, two hours of ROBO 5009 Robotics Seminar and one hour of ROBO 5008 Introduction to Research, as part of the required 30 credit hours. They must also meet thesis examination and submission requirements. Non-thesis MS students must complete all coursework requirements but are not required to complete a final examination. A maximum of nine credit hours of graduate coursework may be transferred from another accredited institution if the courses meet program and Graduate School standards. For policies regarding good academic standing, please see the Academic Standards and Advising section of the university's Graduate Catalog.

## Thesis Examination (MS Thesis Option Only)

In addition to completing the required coursework, students pursuing the MS thesis option must write a thesis based on original research conducted under the supervision of a graduate faculty member. The MS thesis must fulfill all Graduate School requirements. After the thesis is completed, a final oral examination is conducted by the student's thesis committee, which is made up of at least three faculty members. The approved thesis must be submitted to the program and the Graduate School.

## Time Limit

Per Graduate School policy, all requirements for the program must be completed within four years of admission to the degree program. A waiver from the Graduate Committee is required for every semester beyond the time limit listed above. Students who wish to extend their

time limit (up to one year) will also need to submit a petition to the Graduate School.

## Course Requirements

Students must complete ROBO 5000 Introduction to Robotics, plus one course selected from each breadth bin (as listed below), to complete their robotics fundamentals requirements. These courses provide a foundation for advanced study in the field. The remaining 18 credit hours may be chosen from any of the courses on the approved list. This allows for maximum flexibility for students to tailor coursework for a variety of post-graduation career goals. Students may opt to replace up to six of those 18 credit hours with any course offered through a CEAS department or program as non-ROBO engineering electives. Any other course substitutions will require a petition to the Graduate Committee.

Students are not required to submit a course plan to the Graduate Committee for approval, but they are encouraged to work with the Graduate Program Assistant to identify specific courses that will help them reach their objectives.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Course Requirement** | | |
| ROBO 5000 | Introduction to Robotics | 3 |
| **Breadth Requirement: Dynamics and Mechatronics** | | |
| Choose One: | | 3 |
| ASEN 5050 | Space Flight Dynamics | |
| ASEN 5067 | Microavionics: Introduction to PIC Microcontrollers for Aerospace Systems | |
| ECEN 5853 | Embedding Sensors and Motors | |
| MCEN 5115 | Mechatronics and Robotics I | |
| MCEN 5173 | Finite Element Analysis | |
| MCEN 5195 | Bioinspired Robotics | |
| MCEN 5228 | Special Topics in Mechanical Engineering (Advanced Dynamics) | |
| ROBO 5302 | Advanced Robotics | |
| **Breadth Requirement: Perception and Control** | | |
| Choose One: | | 3 |
| ASEN 5044 | Statistical Estimation for Dynamical Systems | |
| ASEN 5014 | Linear Control Systems | |
| ASEN 5114 | Automatic Control Systems | |
| ASEN 6024 | Nonlinear Control Systems | |
| CSCI 5722 | Computer Vision | |
| ECEN 5138 | Control Systems Analysis | |
| ECEN 5244 | Applied Stochastic Signal Processing | |
| ECEN 5448 | Linear Control Systems | |
| ECEN 5738 | Nonlinear Control Systems | |
| MCEN 5228 | Special Topics in Mechanical Engineering (Advanced Computer Vision) | |
| **Breadth Requirement: Cognition and Interaction** | | |
| Choose One: | | 3 |
| ASEN 5254 | Algorithmic Motion Planning | |
| ASEN 5264 | Decision Making under Uncertainty | |
| CSCI 5254 | Convex Optimization and Its Applications | |
| CSCI 5302 | Advanced Robotics | |
| CSCI 5322 | Algorithmic Human-Robot Interaction | |
| CSCI 5622 | Machine Learning | |
| CSCI 5832 | Natural Language Processing | |
| CSCI 5854 | Theoretical Foundations of Autonomous Systems | |
| CSCI 5922 | Fundamentals of Neural Networks and Deep Learning | |
| CSCI 7000 | Current Topics in Computer Science (Deep Reinforcement Learning and Robotics) | |
| ECEN 5478 | Online Convex Optimization and Learning | |
| **Seminar and Research Requirement (MS Thesis Only)** | | |
| ROBO 5008 | Introduction to Research (Intro to Research) [1] | 1 |
| ROBO 5009 | Robotics Seminar [1] | 1 |
| ROBO 6950 | Master's Thesis [2] | 1-6 |
| **Robotics Electives [3]** | | **18** |
| ASEN 5128 | Small Uncrewed Aircraft System Guidance, Navigation, and Control | |
| ASEN 6010 | Advanced Spacecraft Dynamics and Control | |
| ASEN 6044 | Advanced State Estimation | |
| ASEN 6412 | Uncertainty Quantification | |
| ASEN 6519 | Special Topics (Hybrid Systems) | |
| ASEN 6519 | Special Topics (Verifiable Control of Stochastic Systems) | |
| ASEN 6519 | Special Topics (System Identification for Control) | |
| ASEN 6216 | Human Operation of Aerospace Vehicles | |
| CHEN 5836 | Nanomaterials | |
| CSCI 5616 | Introduction to Virtual Reality | |
| CSCI 7000 | Current Topics in Computer Science (Physical Human-Robot Interaction) | |
| ECEN 5623 | Real-Time Embedded Systems | |
| ECEN 5863 | Programmable Logic Embedded System Design | |
| ECEN 5008 | Special Topics (Game Theory) | |
| ECEN 5028 | Special Topics (Constrained Control) | |
| ECEN 5458 | Sampled Data and Digital Control Systems | |
| ECEN 5638 | Control Systems Laboratory | |
| ECEN 5678 | Control of Multi-agent Systems | |
| ECEN 5763 | Embedded Computer Vision | |
| ECEN 5712 | Machine Learning for Engineers | |
| MCEN 5157 | Modeling of Human Movement | |
| MCEN 5228 | Special Topics in Mechanical Engineering (Automated Mechanical Design) | |
| MCEN 5293 | Mechanics of Soft Matter | |
| MCEN 5636 | Micro-Electro-Mechanical Systems 1 | |
| MCEN 5228 | Special Topics in Mechanical Engineering (Mechatronics 2) | |
| MCEN 5228 | Special Topics in Mechanical Engineering (Industrial Automation) | |

| | |
|---|---|
| MCEN 6228 | Special Topics in Mechanical Engineering (Robust Multivariable Control) |

1 Two credit hours of Robotics Seminar and one credit hour of Intro to Research is required for MS thesis students and will replace three hours of robotics electives.

2 Master's Thesis (4-6 credit hours) is required for MS thesis students and will replace 4-6 hours of robotics electives.

3 Students may substitute courses from other departments and programs in the College of Engineering & Applied Science for up to six hours of robotics electives. Contact the Robotics Program for details.

## Learning Outcomes

By the completion of the program, students will be able to:

- Core Knowledge in Robotics: Demonstrate an understanding of foundational robotics principles.
- Broad Competency Across Robotics Domains: Demonstrate interdisciplinary knowledge in robotics, covering at least three core areas of study.
- Technical Application Skills: Demonstrate capability to apply robotics tools and techniques in coursework to solve practical problems.
- Clear Technical Communication (MS Thesis only): Demonstrate capability to communicate robotics concepts effectively through written and oral assignments.

# Engineering Education - Doctor of Philosophy (PhD)

The Engineering Education (ENED) doctoral program is designed for students with a background in engineering and an interest in improving the education of engineers. Our vision of engineering education goes beyond curriculum design and pedagogy to include attracting and graduating diverse students with a well-rounded education and a desire to improve society and the environment. ENED graduates will be prepared to conduct research to study significant problems in engineering education, apply research-based instructional strategies in engineering courses, and understand policy implications for student success. The flexible and cross-disciplinary Engineering Education PhD program is designed to allow students to tailor their curriculum and research and to prepare them to achieve their goals in engineering education.

The PhD program is open to first-time graduate students as well as those who hold master's degrees.

For more information, visit the Engineering Education PhD Program (https://www.colorado.edu/program/ide/phd-engineering-education/) page.

## Requirements

### Required Courses and Credits

All Engineering Education PhD students must complete a minimum of 30 credit hours of coursework at the 5000 level or higher, plus 30 credit hours of dissertation credits. Some research advisors will require that their students complete more than 30 course credits, and the department recommends that specific course decisions should be agreed upon through individual faculty/student discussions. Students must receive a minimum grade of B- (2.7) in each class to count towards the degree. Students must also maintain a cumulative GPA of 3.0 or higher to be in good standing with the graduate school.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** [1] | | |
| Engineering or computer science technical courses | | 9 |
| Designated engineering education related courses. Approved courses include but are not limited to ENED and EDUC. [2] | | 12 |
| Additional relevant credit hours from engineering, education, or other fields (e.g., business, sociology, psychology) | | 9 |
| **Total Credit Hours** | | **30** |

1 Up to 21 credit hours of graduate-level coursework may be transferred or applied to meet the 30-credit hour course requirement for the PhD. Courses transferred or applied must be relevant to the PhD degree, and their acceptance is at the discretion of the program faculty and the Graduate School.

2 See table below for list of approved graduate-level engineering cognate area and education courses.

### Engineering Cognate Area and Education Courses

| Code | Title | Credit Hours |
|---|---|---|
| **Engineering Cognate Area** | | |
| Graduate-level engineering courses at the 5000-level or higher; from departments and programs hosted in CEAS, including AREN, ASEN, BMEN, CHEN, CVEN, CSCI, ECEN, EEEN, EMEN, EVEN and MCEN. | | 9 |
| **Education Courses** | | |
| Graduate-level courses related to engineering education research and teaching at the 5000-level or higher; from EDEN, EDUC, INFO, PHYS, PSYC, SOCY, etc. For example: | | 12 |
| EDUC 5445 | Curriculum for Multicultural Education | |
| EDUC 5835 | Teaching K-12 Mathematics: Geometry & Measurement | |
| EDUC 5844 | Teaching and Learning Computational Thinking | |
| EDUC 6210 | Education Policy and the Law | |
| EDUC 6220 | Gender Issues in Education | |
| EDUC 6240 | African American Education in the United States | |
| EDUC 6245 | Latinx Education Across the Americas | |
| EDUC 6250 | Higher Education in the United States | |
| EDUC 6318 | Psychological Foundations of Education | |
| EDUC 6405 | College Student Development and Counseling Theories | |
| EDUC 6504/ PSYC 6200 | Issues and Methods in Cognitive Science | |
| EDUC 6705 | Leadership in Higher Education | |
| EDUC 6928 | Readings in Learning Sciences and Human Development | |
| EDUC 7326 | Quasi-Experimental Design in Causal Inference in Social Sciences | |
| EDUC 7376 | Theory and Practice of Educational and Psychological Measurement | |

| | |
|---|---|
| EDUC 7386 | Educational Evaluation |
| EDUC 7446 | Policy Issues in Education |
| EDUC 8025 | Seminar: Curriculum Theories |
| EDUC 8348 | Human Development in Cultural, Historical, and Sociopolitical Contexts |
| EDUC 8358 | Critical Introduction to Learning Theory and Practice, Part 1 |
| EDUC 8710 | Measurement in Survey Research |
| ENED 5100 | Foundations of Engineering Education 1 |
| ENED 5200 | Foundations of Engineering Education 2 |
| ENED 5400 | Teaching Design |
| ENED 6599 | Special Topics in Engineering Education |
| ENED 6999 | Graduate Seminar in Engineering Education |
| ENED 7900 | Independent Study |
| ENED 8999 | Doctoral Dissertation |
| INFO 5602 | Information Visualization |
| PHYS 5460 | Teaching and Learning Physics |
| PSYC 5145 | Advanced Cognitive Psychology |
| PSYC 5835 | Thinking Proseminar |
| SOCY 5031 | Research Design |
| SOCY 5111 | Statistics 1: Introduction to Social Statistics |
| SOCY 5181 | Logics of Qualitative Inquiry |
| SOCY 6111 | Stats 2: Statistic Analysis |
| SOCY 6121 | Qualitative Methods |
| SOCY 7111 | Data III--Advanced Data Analysis |
| SOCY 7121 | Qualitative Analysis |
| STAT 5000 | Statistical Methods and Application I |
| STAT 5010 | Statistical Methods and Applications II |
| **Additional Coursework** | |
| The remaining credit hours can be related to either the engineering cognate area or education courses as described above as befits the individual student, with the approval of their faculty advisor and dissertation committee. | 9 |
| **Total Credit Hours** | **30** |

## Preliminary Examination

Satisfactory completion of a preliminary examination. Engineering Education PhD students are required to pass a preliminary examination that will include written and/or oral components, per the discretion of a group of 3 or more faculty affiliated with the ENED program in consultation with the student. This is typically completed within the first three semesters after matriculation into the program.

## Comprehensive Examination

Satisfactory completion of a comprehensive examination to defend the PhD thesis proposal. The Comprehensive Examination is an important second evaluation step required to advance the student to candidacy for the PhD degree. It is typically completed within the first three years after matriculation to the program and more than one year prior to graduation. It consists of a written research proposal in addition to an oral exam with a selected committee of faculty advisors, both focusing on the proposed course of research.

## PhD Dissertation

Satisfactory completion of a minimum of 30 semester hours of dissertation credits. Satisfactory completion and defense of a PhD dissertation under the supervision of a research advisor who is a CU Boulder faculty member affiliated with the ENED program. The dissertation must fulfill all Graduate School requirements. After the dissertation is completed, an oral final examination on the dissertation and related topics is conducted by the student's doctoral committee.

## Time Limit

All degree requirements for the Engineering Education PhD must be completed within six years of the date commencing coursework.

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate expertise of knowledge in engineering education and/or computer science education
- Demonstrate the ability to synthesize information and formulate conclusions and recommendations related to engineering education and/or computer science education through academic writing
- Design and conduct high-quality and original research in the discipline of engineering education and/or computer science education
- Effectively communicate research to academic audiences in both written and oral form.

# Robotics - Doctor of Philosophy (PhD)

The doctoral program in robotics provides advanced training and study in robotics-related topics consistent with the program focus on autonomy and AI, field robotics, human-robot interaction, smart materials, security, controls and estimation, bio-inspired systems and advanced manufacturing. The program prepares students for careers in local and national industry, government, national labs, academic research laboratories and university faculty positions.

The program provides a strong foundation in mathematics and engineering, while also allowing flexibility to select courses across departments to achieve the breadth and depth required for research advances beyond the state of the art. Students will achieve their educational goals through a combination of cross-disciplinary coursework and research under the supervision of one or more of the program's faculty members.

For more information, see the Robotics (https://www.colorado.edu/program/robotics/academics/)website.

# Required Courses and Credits

The PhD in Robotics offers a flexible curriculum that encourages in-depth study across disciplines from departments and programs hosted in the College of Engineering & Applied Science (CEAS), including aerospace engineering sciences, biomedical engineering, chemical and biological engineering, civil, environmental, and architectural engineering, computer science, electrical, computing, and energy engineering, engineering management, mechanical engineering, and the ATLAS Institute. To fulfill graduation requirements for the program, students must complete a minimum of 30 credit hours of coursework in courses numbered 5000 or above and taught by members of the graduate faculty, plus 30

hours of dissertation credit. More coursework may be required at the faculty advisor's discretion. Coursework applying to the degree must be completed with grades of B- or better, and students must maintain a 3.00 GPA or higher while enrolled in the Graduate School. More detailed information and a list of approved courses can be found at the bottom of this page, under "Course Requirements."

A maximum of 21 credit hours of graduate coursework may be transferred from another accredited institution if the courses meet program and Graduate School standards. All courses taken in a master's degree program at CU Boulder may be applied toward a doctoral degree at the university, provided that they are numbered 5000 or above and meet doctoral standards. For policies regarding good academic standing, please see the Academic Standards and Advising section of the university's Graduate Catalog.

## Preliminary Examination

Every student desiring to pursue the PhD degree must pass a preliminary examination. As a part of this evaluation, students must pass a multiple subject area oral examination to test fundamental robotics competency. Subject areas are based on the breadth bins within the robotics program and will be selected by the student. Overall performance in the required examinations will determine pass/fail status.

## Comprehensive Examination

After passing the preliminary examination, students continue their coursework and prepare a written dissertation prospectus. When ready, they will take an oral comprehensive examination covering the graduate coursework and the dissertation prospectus. The oral examination is based primarily on a written proposal for the dissertation research provided by the student to committee members in advance. This examination is conducted before the student's doctoral committee of five or more graduate faculty members chosen by the student and approved by the program and the Graduate School.

## PhD Dissertation

A minimum of 30 dissertation credit hours are required for the PhD degree. Up to 10 credit hours may be taken in any given semester. Students must write a dissertation based on original research conducted under the supervision of a graduate faculty member. The dissertation must fulfill all Graduate School requirements. After the dissertation is completed, an oral final examination on the dissertation and related topics is conducted by the student's doctoral committee of at least five members. The approved dissertation must be submitted to the program and the Graduate School.

## Time Limit

Per Graduate School policy, all requirements for the program must be completed within six years of admission to the degree program. A waiver from the Graduate Committee is required for every semester beyond the time limit listed above. Students who wish to extend their time limit (up to one year) will also need to submit a petition to the Graduate School.

## Course Requirements

Students must complete ROBO 5000 Introduction to Robotics, plus one course selected from each breadth bin (as listed below), to complete their robotics fundamentals coursework requirements. These courses provide a foundation for advanced study in the field. PhD students must also complete two credit hours of ROBO 5009 Robotics Seminar and one credit hour of ROBO 5008 Introduction to Research as a requirement for graduation. The remaining 15 credit hours may be chosen from any of the courses on the approved ROBO courses list. This allows for maximum flexibility for students to tailor coursework for a variety of post-graduation career goals. Students may opt to replace up to six of those 15 credit hours with any course offered through a CEAS department or program as non-ROBO engineering electives. Any other course substitutions will require a petition to the Graduate Committee. Each PhD student, in consultation with their faculty advisor, is required to develop a course plan and submit it to the Graduate Committee for approval.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Course Requirement** | | |
| ROBO 5000 | Introduction to Robotics | 3 |
| **Breadth Requirement: Dynamics and Mechatronics** | | |
| Choose one: | | 3 |
| ASEN 5050 | Space Flight Dynamics | |
| ASEN 5067 | Microavionics: Introduction to PIC Microcontrollers for Aerospace Systems | |
| ECEN 5853 | Embedding Sensors and Motors | |
| MCEN 5115 | Mechatronics and Robotics I | |
| MCEN 5173 | Finite Element Analysis | |
| MCEN 5195 | Bioinspired Robotics | |
| MCEN 5228 | Special Topics in Mechanical Engineering (Advanced Dynamics) | |
| ROBO 5302 | Advanced Robotics | |
| **Breadth Requirement: Perception and Control** | | |
| Choose one: | | 3 |
| ASEN 5044 | Statistical Estimation for Dynamical Systems | |
| ASEN 5014 | Linear Control Systems | |
| ASEN 5114 | Automatic Control Systems | |
| ASEN 6024 | Nonlinear Control Systems | |
| CSCI 5722 | Computer Vision | |
| ECEN 5138 | Control Systems Analysis | |
| ECEN 5244 | Applied Stochastic Signal Processing | |
| ECEN 5448 | Linear Control Systems | |
| ECEN 5738 | Nonlinear Control Systems | |
| MCEN 5228 | Special Topics in Mechanical Engineering (Advanced Computer Vision) | |
| **Breadth Requirement: Cognition and Interaction** | | |
| Choose one: | | 3 |
| ASEN 5254 | Algorithmic Motion Planning | |
| ASEN 5264 | Decision Making under Uncertainty | |
| CSCI 5254 | Convex Optimization and Its Applications | |
| CSCI 5302 | Advanced Robotics | |
| CSCI 5322 | Algorithmic Human-Robot Interaction | |
| CSCI 5622 | Machine Learning | |
| CSCI 5832 | Natural Language Processing | |
| CSCI 5854 | Theoretical Foundations of Autonomous Systems | |
| CSCI 5922 | Fundamentals of Neural Networks and Deep Learning | |
| CSCI 7000 | Current Topics in Computer Science (Deep Reinforcement Learning and Robotics) | |

| | | |
|---|---|---|
| ECEN 5478 | Online Convex Optimization and Learning | |
| **Seminar Requirement** | | |
| ROBO 5008 | Introduction to Research (Intro to Research) | 1 |
| ROBO 5009 | Robotics Seminar [1] | 2 |
| **Robotics Electives [2]** | | **18** |
| ASEN 5128 | Small Uncrewed Aircraft System Guidance, Navigation, and Control | |
| ASEN 6010 | Advanced Spacecraft Dynamics and Control | |
| ASEN 6044 | Advanced State Estimation | |
| ASEN 6412 | Uncertainty Quantification | |
| ASEN 6519 | Special Topics (Hybrid Systems) | |
| ASEN 6519 | Special Topics (Verifiable Control of Stochastic Systems) | |
| ASEN 6519 | Special Topics (System Identification for Control) | |
| ASEN 6216 | Human Operation of Aerospace Vehicles | |
| CHEN 5836 | Nanomaterials | |
| CSCI 5616 | Introduction to Virtual Reality | |
| CSCI 7000 | Current Topics in Computer Science (Physical Human-Robot Interaction) | |
| ECEN 5623 | Real-Time Embedded Systems | |
| ECEN 5863 | Programmable Logic Embedded System Design | |
| ECEN 5008 | Special Topics (Game Theory) | |
| ECEN 5028 | Special Topics (Constrained Control) | |
| ECEN 5458 | Sampled Data and Digital Control Systems | |
| ECEN 5638 | Control Systems Laboratory | |
| ECEN 5678 | Control of Multi-agent Systems | |
| ECEN 5763 | Embedded Computer Vision | |
| ECEN 5712 | Machine Learning for Engineers | |
| MCEN 5157 | Modeling of Human Movement | |
| MCEN 5228 | Special Topics in Mechanical Engineering (Automated Mechanical Design) | |
| MCEN 5293 | Mechanics of Soft Matter | |
| MCEN 5636 | Micro-Electro-Mechanical Systems 1 | |
| MCEN 5228 | Special Topics in Mechanical Engineering (Mechatronics 2) | |
| MCEN 5228 | Special Topics in Mechanical Engineering (Industrial Automation) | |
| MCEN 6228 | Special Topics in Mechanical Engineering (Robust Multivariable Control) | |

1 Two credit hours of Robotics Seminar and one credit hour of Intro to Research are required for PhD students and will replace three hours of robotics electives.

2 Students may substitute courses from other departments and programs in the College of Engineering & Applied Science for up to six hours of robotics electives. Contact the Robotics Program for details.

## Learning Outcomes

By the completion of the program, students will be able to:

- Core Knowledge in Robotics: Demonstrate an understanding of foundational robotics principles.
- Broad Competency Across Robotics Domains: Demonstrate interdisciplinary knowledge in robotics, covering at least three core areas of study.
- Technical Application Skills: Demonstrate capability to apply robotics tools and techniques in coursework to solve practical problems.
- Depth of Knowledge in Specialization: Achieve expertise in a chosen area of robotics research.
- Research Planning and Execution: Formulate and pursue original research questions, leading to independent investigation and problem-solving in robotics.
- Research Communication: Clearly communicate research findings, both in writing and orally.

# Architectural Lighting - Graduate Certificate

The architectural lighting certificate is offered to nondegree students from the professional community to help them build their confidence and competence, contribute more fully to their companies and further advance their careers.

## Requirements

In order to be admitted to the certificate students must have previously earned a bachelor's degree.

To earn the certificate, students must receive a minimum grade of a B- or higher in each course. The cumulative GPA for certificate courses must be 3.0 or higher.

Depth of understanding and proficiency grows throughout a two-semester online course sequence that begins in September and ends in April, and the certificate program culminates in a capstone course that includes hands-on practical experience with lighting measurements, equipment and software tools during an on-campus week-long intensive as part of a six-week course in July and August. The professional graduate Architectural Lighting certificate is awarded to students who complete this series of three 3-credit courses.

| Code | Title | Credit Hours |
|---|---|---|
| AREN 5510 | Architectural Lighting I | 3 |
| AREN 5520 | Architectural Lighting II | 3 |
| AREN 5530 | Architectural Lighting Capstone | 3 |
| **Total Credit Hours** | | **9** |

# Embedded Systems Engineering - Graduate Certificate

Most of us will casually encounter dozens of embedded systems by mid-morning each day throughout our residences, roadways and workplaces. Fundamentally, an embedded system is some combination of hardware and software that is designed for a particular function. It senses a real-

world condition, does some computing, then produces output data or control of some kind.

These intelligent machines are a permanent part of our global landscape and are continuously being expanded and upgraded by a world of forward-thinking engineers and entrepreneurs. Application domains include aerospace and defense, energy, industrial automation, medical, networking and communication, security, transportation and more. Also expected to fuel much more growth is an overarching megatrend referred to as the Internet of Things (IoT), which involves connecting more embedded systems to the internet, enabling countless human-to-machine and machine-to-machine applications ranging from home automation to security and many beyond.

Fueled by dramatic reductions in size, cost and power consumption, combined with ever increasing availability of wireless networking technology, the industry estimates that there could be 100 billion connected devices by 2027. Revenue projections for IoT nodes, gateways, platforms, software and services could be as high as $1,149 billion by 2027. This trend ushers in greater hardware and software design challenges for low-power and effectively managing and securing connected devices, as well as capturing and harnessing vast amounts of data produced by business operations. From whatever perspective students prefer to examine, the magnitude and breadth of opportunities is very clear across a multitude of end markets.

The embedded systems engineering certificate, which is offered by the Department of Electrical, Computer and Energy Engineering, provides students the competitive hardware and software knowledge and skills needed to design and implement these systems.

For more information, visit the department's Embedded Systems Engineering (http://www.colorado.edu/ecee/graduate-program/degrees/embedded-systems/) webpage.

# Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

# Requirements

## Application Requirements

Applicants for the certificate program must have been or currently be enrolled for a baccalaureate degree from an accredited institution and have satisfied the prerequisites for each course through coursework or work experience. They need not be enrolled in a degree-granting program at CU Boulder.

Graduate students pursuing an ESE certificate are not required to matriculate into the ESE program subplan through a master's degree.

Admission to a graduate degree-seeking program in the ECEE Department is *not* required for students pursuing only the certificate.

## Program Requirements

The embedded systems engineering (ESE) certificate curriculum consists of two core courses and one elective course from an approved list, totaling at least 9 credit hours. A grade of C or higher is required for each course applied toward the standalone certificate (or, toward a certificate being taken simultaneous to a degree in electrical engineering), along with a cumulative GPA of 3.0 for certificate qualification. A grade of B or higher is required to qualify for transfer from the nondegree to the master's degree program.

ESE certificate credit hours may be applied towards a full master's degree, provided the student is admitted to the electrical engineering graduate program as a degree-seeking student. However, credit hours may not count toward both a bachelor's and a master's degree.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| Choose two of the following: [1] | | 6 |
| ECEN 5613 | Embedded System Design | |
| ECEN 5623 | Real-Time Embedded Systems | |
| ECEN 5803 | Mastering Embedded Systems Architecture | |
| **Elective** | | |
| Choose one course from the approved ESE course list (core or elective). [2] | | 3 |
| **Total Credit Hours** | | **9** |

1. Students may complete the certificate by taking all three core courses, rather than taking two core courses and an ESE elective.
2. Embedded Systems course list (https://www.colorado.edu/ecee/graduate-program/degrees-programs/professional-masters-programs/embedded-systems/embedded-systems/).

# Power Electronics - Graduate Certificate

Power electronics is a key enabling technology in essentially all electronic systems ranging from wireless communication devices, portable and desktop computers, to telecommunication infrastructure systems, renewable energy systems and industrial systems. The necessity for power electronics technology in these rapidly expanding areas creates a rising need for design engineers equipped with knowledge and skills to follow sound engineering principles and actively participate in multidisciplinary teams. The power electronics field has evolved rapidly with the advances in technology and introduction of many new application areas. As a result, it is likely that the required knowledge and skills were not in the curricula when many of today's professionals were in college. This creates a strong ongoing demand for continuing education of the workforce in the area of power electronics. The certificate program addresses the ongoing demand for skilled power electronics design engineers.

This program offers an opportunity for electrical engineers to obtain the specialized knowledge required to practice power electronics. It is intended for students and engineers having a BS degree in electrical engineering or equivalent.

# Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

# Requirements

The Power Electronics Certificate (https://www.colorado.edu/ecee/academics/graduate-programs/professional-masters/power-electronics/)

program was initiated by the Colorado Power Electronics Center, and is operated through the Department of Electrical, Computer, and Energy Engineering (http://www.colorado.edu/ecee/) and through Boulder Connect (http://www.colorado.edu/connect/). A grade of C or better is required for each course applied toward the certificate, along with a cumulative GPA of 3.0 in certificate courses.

Power electronics certificate credit hours may be applied towards a full master's degree, provided the student is admitted to the electrical engineering graduate program as a degree-seeking student. However, credit hours may not count toward both a BS and a master's degree.

### Required Courses and Semester Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| ECEN 5797 | Introduction to Power Electronics | 3 |
| ECEN 5807 | Modeling and Control of Power Electronic Systems | 3 |
| ECEN 5817 | Resonant and Soft-Switching Techniques in Power Electronics | 3 |
| **Total Credit Hours** | | **9** |

# Engineering Management

The Lockheed Martin Engineering Management Program (EMP) is a management and leadership program that prepares students in the engineering and technical fields for early to mid-career positions. It is designed for students who are looking to advance in management, successfully contribute to the overall business or venture, and develop leadership skills.

The program offers a Master of Engineering, four engineering dual degrees and graduate certificates. Courses are offered both on campus and online (available in real-time distance class participation, as well as recorded videos for later viewing) to meet the needs of busy professionals. Courses are taught by faculty whose expertise in the engineering and technical industry and business leadership bring real-world experiences to the classroom.

For more information, visit the Lockheed Martin Engineering Management Program (EMP) (http://www.colorado.edu/emp/) website.

**Course code for this program is EMEN.**

## Master's Degree

- Engineering Management - Master of Engineering (ME) (p. 1736)

## Certificates

- Design for the Circular Economy (p. 1740)
- Design for the Circular Economy (Online) (p. 1738)
- Engineering Management in the Aerospace Industry (p. 1741)
- Innovation and Entrepreneurship in Engineering (p. 1741)
- Leadership and Management (p. 1741)
- Project Management (p. 1742)

## Partnership Certificate

- Water Engineering and Management (p. 1783)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Angel, George
Lecturer; BS, University of Albuquerque

Bouvier, Claudia
Lecturer; ME, University of Colorado Boulder

Bozic, Christy L. (https://experts.colorado.edu/display/fisid_155482/)
Instructor Adjunct; PhD, Purdue University

Crofton, Karen (https://experts.colorado.edu/display/fisid_164479/)
Scholar in Residence; MBA, Rice University

Dietrich, Alex
Lecturer; MBA, George Washington University

Duren, Ron G. Jr. (https://experts.colorado.edu/display/fisid_157263/)
Teaching Associate Professor; ME, University of Colorado Boulder

Egan, Kristen
Lecturer; ME, University of Colorado Boulder

Gazarik, Michael
Scholar in Residence, Director; PhD, Georgia Institute of Technology

Katz, Tami
Lecturer; PhD, Colorado State University

Kirschling, Wayne (https://experts.colorado.edu/display/fisid_123149/)
Professor Emeritus; DBA, University of Colorado Boulder

Kramer, Amy
Lecturer; JD, University of Colorado Boulder

Leeker, Eric
Lecturer; MBA, Purdue University

Leeker, Jessica Rush (https://experts.colorado.edu/display/fisid_167166/)
Instructor Adjunct; PhD, Purdue University

Martin, Wendy Lynn (https://experts.colorado.edu/display/fisid_154942/)
Teaching Associate Professor; ME, University of Colorado Boulder

McCluskey, Alyssa
Lecturer; PhD, University of Colorado Boulder

Moorer, Daniel F. Jr. (https://experts.colorado.edu/display/fisid_151590/)
Scholar in Residence; PhD, University of Colorado Boulder

Murray, Seth (https://experts.colorado.edu/display/fisid_148038/)
Teaching Assistant Professor; ME, University of Colorado Boulder

Readey, Michael J. (https://experts.colorado.edu/display/fisid_157363/)
Instructor Adjunct; PhD, Case Western Reserve University

Songer, Anthony
Lecturer; PhD, University of California Berkeley

Svoboda, John D. (https://experts.colorado.edu/display/fisid_154884/)
Lecturer; MBA, University of California-Los Angeles

Thomas, John (https://experts.colorado.edu/display/fisid_167167/)
Scholar in Residence; PhD, Arizona State University

Tobey, Kathryn
Scholar in Residence; ME, University of Colorado Boulder

Van Atten, Bill
Lecturer; MS, Johns Hopkins University

# Courses

**EMEN 5005 (3) Introduction to Applied Statistical Methods**
Covers statistical reasoning and analysis in support of business and engineering decision making. Topics include: engineering and applied research, descriptive and inferential statistics to include estimation and hypothesis testing using both traditional parametric as well as nonparametric procedures for research situations involving one or two groups of treatment conditions. The R statistical analysis and programming system is used.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5015 (3) Engineering Communication**
Enables students to communicate their thoughts and ideas in written and oral form in professional environments. Understand and demonstrate the ability to write a correctly-formed document. Develop active listening skills, particularly when providing and receiving feedback. Learn to orally communicate ideas by speaking clearly, persuasively, energetically, and with appropriate non-verbal elements. Present in various environments and to various audiences.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5020 (3) Finance for Engineering Managers**
This course empowers technical managers to make better financial management decisions about issues like capital budgeting, project selection, financial planning, and working capital management.
The course also covers topics essential to engineering managers communicating outside of engineering, including interpreting financial statements, the time value of money, and determining financial metrics of NPV and IRR in project valuation. Special topics covered include triple bottom line accounting and sustainability reporting as part of corporate risk management initiatives.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.
**Recommended:** Prerequisites beginning algebra and familiarity working with Excel spreadsheets.

**EMEN 5030 (3) Fundamentals of Project Management**
Project managers work cross-functionally to plan, monitor, and manage projects to successful completion. This course provides an introduction to the project management discipline, including the processes, tools, and techniques used in the management and leadership of projects. Key topics covered include the role of the project manager; the project team; stakeholder communications and management; cost, schedule, and risk management; quality in projects; and the project lifecycle.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5032 (3) Advanced Project Management**
Advance and elevate your skills to lead technical teams in pursuit of challenging projects and programs. You will investigate real-world, judgment-intensive decision-making via case studies drawn from famous and infamous engineering projects across a range of industries. You will acquire knowledge and abilities to employ throughout your career as a technical leader. Sophisticated tools such as Monte Carlo Analysis are investigated and assessed for real-world utility.
**Requisites:** Requires prereq courses of EMEN 5030 or MBAX 6440 (all min grade B). Restricted to Coll of Engineering grad students, Grad Certificate Engineering (CRTGE), Engr EMEN BAM students students w/ subplans C-ASENEMEN, C-ECENEMEN, C-EEEN-EME or C-MCENEMEN.

**EMEN 5033 (3) Aerospace Program Management**
Focuses on how program/project management fundamentals are adapted and extended within the specific needs and frameworks of aerospace programs, which are typically complex, multi-year, and high-stakes, with stringent safety, performance, and reliability requirements. Students learn to balance sponsor/customer objectives with business goals across U.S. Government (DoD, NASA), commercial, and international contexts, emphasizing lifecycle management, best practices, and integration across program disciplines. Case studies develop practical skills for managing diverse aerospace programs.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.
**Recommended:** Prerequisite EMEN 5030 Fundamentals of Project Management.
**Grading Basis:** Letter Grade

**EMEN 5042 (3) Quality Management**
Focuses on the principles and practices of quality management in modern organizations. Students will develop an understanding of theories, methodologies, and tools used to achieve and maintain high levels of quality in products and services. Topics covered include Total Quality Management, Six Sigma, Lean Management, ISO 9001, and Continuous Improvement. Students will learn how to design and implement quality management systems, conduct process improvement initiatives, measure / analyze performance data, lead organizational change.
**Requisites:** Restricted to graduate students and Engineering Management BAM students only.

**EMEN 5050 (3) Leading Oneself**
The "Leading Oneself" course offers a comprehensive blueprint for professional's keen on honing their leadership capabilities, starting with the cornerstone of personal excellence. The curriculum delves into essential areas such as personal accountability, genuine leadership traits, individual brand development, enhanced self-awareness, fostering a growth mindset, mastering emotional intelligence, and achieving personal mastery. This content lays the foundation for all leadership to follow.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5052 (3) Leading Others**
Understand and apply leadership techniques that develop and sustain a high-powered technical organization. Specifically, students evaluate qualities associated with successful leaders, learn practical leadership skills such as defining roles and responsibilities, setting vision, coaching, and dealing with conflicts. The course then addresses team building, from hiring the right team members, to managing the team, and conducting effective team meetings.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5053 (3) Leading Technical Organizations**
Leadership of technical, complex organizations is challenged by the pace of technology development, innovation, hyper competition by new entrants and a workforce that demands to be engaged and recognized. Examining relevant technical organization leadership skills using the context of stakeholder value creation is the basis of this course. The class explores how leaders multiply their abilities by leading through others, develop an accountable team, build enduring relationships, exhibit leadership presence, and create executable strategies.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5054 (3) Neuroscience of Leadership**
Examines leadership techniques through the lens of social cognitive neuroscience and psychology. Utilizing the latest research, we develop a leadership practice based on neuroscience. Consideration for leading oneself, leading others and leading organizations is covered. Topics include neuroplasticity, psychological safety, resililence, mental toughness, primal power of storytelling, improv and creativity, as well as the subtle power of influence.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5055 (3) Leading for Diversity, Equity and Inclusion in Engineering**
This course focuses on the importance of embedding diversity equity inclusion (DEI) in engineering workplace environments. Students focus on the historical narrative of institutions and institutional structures that have shaped instances of inclusion and exclusion in engineering, how their own identity and background shape their thoughts and actions, and how transformational leadership is enacted for DEI in a challenging atmosphere.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5065 (3) Global Topics in Aerospace**
Examining current international space topics including civil, military, and commercial activities forms the basis for this course. The origins and evolution of space policy and laws, current organizational and governance structures, space economics, space sustainability, human exploration strategies, the future of space exploration, and recent developments in the commercial space sector will be analyzed. The course exposes students to the current context of the industry to prepare them for a career in the space economy.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5080 (3) Ethical Decision-Making in Engineering Management**
Learn how to recognize ethical issues and dilemmas affecting managers in the workplace. Understand various models and practices offering solutions to these issues and how to create a culture of ethics and integrity in supporting and/or building a profitable, healthy and responsible organization.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5090 (3) Marketing and Technology Ventures**
Why do great products often lose in tech markets? This course analyzes processes for developing the customer bases essential for commercial success. Student teams develop strategic launch programs for actual tech startups of their choosing. Students will analyze and discuss real-world case studies and alternative strategies. Structured towards professional applicability for engineers in large enterprises as well as startups.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5094 (3) Technology Entrepreneurship**
This course is designed for engineers, project managers, and technical leaders interested in learning how to leverage technology to solve problems and meet emerging market demands. Students learn how to apply a holistic approach that engages an entrepreneurial mindset with methods like entrepreneurial systems thinking and opportunity pattern recognition to identify and address target customer needs. The course empowers students with the knowledge, skills, and methods needed to create and launch a new technology company.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5215 (3) Applied Sustainability for Engineering Managers**
Provides students the tools to integrate sustainability into business. The course explores why social and environmental sustainability are important, and how successful companies are incorporating sustainability as a core strategy. It then addresses the engineer¿s role in developing sustainable products through principles of the circular economy and life cycle assessment. The course culminates with a discussion of triple bottom line accounting, and how companies use the sustainability report to demonstrate progress toward their sustainability goals.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students and Engineering Management BAM students only.

**EMEN 5220 (3) Product Design for the Circular Economy**
Product Design for the Circular Economy provides the tools and knowledge necessary to implement Circular Economy (CE) principles, including design frameworks defined by Design for ¿R¿, Cradle-to-Cradle, Biomimicry, ISO 14000 and several EU Directives. Products can be certified if they meet certain criteria, and the course covers the major certifications available today. Finally, the course shows how companies report their progress using methods prescribed by the Global Reporting Initiative (GRI).

**EMEN 5225 (3) Sustainable and Resilient Operations and Supply Chains**
Innovative organizations need leaders and managers who understand the complex nature of corporate social responsibility, sustainability, and resilience. In this course, students will learn strategies to become good corporate citizens while still creating value for stakeholders. Students will learn concepts and practices companies employ to manage business processes that meet business needs while reducing negative impacts on the pollution and waste. You will also learn to build a more sustainable and socially responsible supply chains.

**EMEN 5230 (3) Resilience Engineering and Leadership in Crisis**
This course examines the qualities, concepts, and methodologies of resilience leadership amid conditions of chaos, uncertainty, and catastrophic breakdowns of complex social, ecological, and technological systems. The curriculum draws on topics from resilience policy, resilience engineering, crisis leadership, contemporary literature, and current events. These components collectively build a comprehensive understanding of resilience as a dynamic blend of processes embedded within and across complex systems like critical infrastructure essential to public health, safety, security, and well-being.
**Requisites:** Restricted to graduate students and Engineering Management BAM students only.
**Grading Basis:** Letter Grade

**EMEN 5315 (3) Business Law for Engineering Managers**
Provides engineering students an introduction to important areas of business law likely to be encountered as technology and engineering managers. Topics include fundamental legal concepts, intellectual property and strategy, contracts, data privacy and product liability. The course uses experiential and practical approaches and exercises to enable the student to identify and address critical legal issues in real-world business contexts.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5400 (3) Technical Product Development**
Product Development introduces contemporary methods like design thinking and sustainability for the circular economy to identify and create products and services that address verified customer needs and problems. By focusing on solutions and benefits offered, the course takes a project-based approach from ideation, concept development, and prototyping to customer validation, pricing, and productization. Students learn how to present their product concepts to senior management or potential investors and showcase their prototypes in a tradeshow-like setting.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5405 (3) Fundamentals of Systems Engineering**
Examines the disciplined process of designing a complex system to meet a specified customer need. We begin with identifying the needed capability through operational and functional analysis, then progress through defining requirements that articulate operational and environmental capabilities that address reliability, maintainability, and producibility considerations across the system lifecycle. The course also introduces technical management tasks to include risk management, technology readiness assessment, and program controls using real-world, current aerospace industry examples.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5415 (3) Introduction to Requirements, Verification and Validation**
This course introduces the concepts of Requirements, Verification and Validation as applied during system development. Students completing this course will understand the terminology, usage, planning, organization roles, as well as how these methods are used during the system development lifecycle and how to determine what methods are appropriate for the type of project they may be working.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.
**Grading Basis:** Letter Grade

**EMEN 5500 (3) Lean and Agile Management**
Learn lean and agile concepts and tools to improve customer value, improve processes and reduce waste. Examine and apply lean and agile principles in diverse circumstances including hardware/software, product development/ongoing operations and manufacturing products/providing services. Apply your learning to improving performance in current responsibilities, whether as an individual contributor or as a manager.
**Equivalent - Duplicate Degree Credit Not Granted:** OPIM 6080
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5830 (3) Special Topics**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students and Engineering Management BAM students only.

**EMEN 5840 (1-3) Independent Study Project**
Available only through approval of graduate advisor. Subjects arranged to fit the needs of the particular student. Non-EMP students require instructor permission.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

# Engineering Management - Master of Engineering (ME)

The Master of Engineering in engineering management is an excellent alternative to an MBA for engineers, scientists and technical professionals who want to move into management. The program facilitates technically minded people to learn and practice data-driven management, develop leadership capabilities and apply proven principles for business performance improvement.

The core curriculum addresses the business basics of engineering management, project management, finance, technical communication and leadership. Elective courses provide in-depth skills in areas such as quality management, product management, R&D, ethical decision-making, lean and agile management, systems engineering and entrepreneurship. Graduates of the program are prepared to lead people and organizations and respond to the challenges that go along with managing engineering and technology businesses.

For more information, visit the program's Master of Engineering in Engineering Management (https://www.colorado.edu/emp/graduate-programs/me-engineering-management/) webpage.

# Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s):

- Aerospace Engineering Sciences - Bachelor of Science (BSAE) (p. 845)
- Electrical and Computer Engineering - Bachelor of Science (BSEC) (p. 974)
- Electrical Engineering - Bachelor of Science (BSEE) (p. 978)
- Mechanical Engineering - Bachelor of Science (BSME) (p. 1032)

# Requirements

The following course requirements are subject to change; for the most current information, visit the program's Degree Requirements (http://www.colorado.edu/emp/degree-requirements/) webpage.

## Degree Requirements

The ME degree requires 30 credit hours. Students complete four core courses and six elective courses.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| EMEN 5015 | Engineering Communication | 3 |
| EMEN 5020 | Finance for Engineering Managers | 3 |
| EMEN 5030 | Fundamentals of Project Management | 3 |
| or EMEN 5405 | Fundamentals of Systems Engineering | |
| EMEN 5050 | Leading Oneself | 3 |
| **Elective Courses** | | |
| 18 credits of EMEN coursework 5000 level or above will count, except for EMEN 5000 | | 18 |
| **Total Credit Hours** | | **30** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Identify, explain and use engineering management concepts and theories.
- Analyze personal leadership awareness.
- Communicate effectively with technical and non-technical professionals.
- Understand the financial implications of engineering decisions.

# Dual Degree Programs

In addition to the Master of Engineering in Engineering Management, the Engineering Management Program also offers dual degrees in the following areas:

- Aerospace Engineering Sciences
- Computer Science
- Electrical, Computer and Energy Engineering
- Mechanical Engineering

For more information, visit the program's Dual Graduate Degree Programs (https://www.colorado.edu/emp/graduate-programs/dual-graduate-degrees/) webpage.

# Engineering Management - Master of Engineering (ME) Online

The Master of Engineering in Engineering Management (ME-EM) degree hosted online through the Coursera platform is a fully accredited master's degree. ME-EM on Coursera students earn the same credentials as on-campus students. There are no online or Coursera designations on official CU transcripts and diplomas.

The ME-EM is an excellent alternative to an MBA for engineers, scientists and technical professionals who want to move into management. The ME-EM prepares individuals for leadership roles within technology-driven industries. This highly multidisciplinary program integrates contemporary concepts of authentic leadership, organizational management and quantitative analysis to provide students the specific tools and knowledge to succeed in today's rapidly evolving business environment.

The program's core curriculum builds foundational skills in technical communication, project management, finance and leadership. Students then have the opportunity to dive deeper into subject of interest through a variety of elective courses including product development, technology entrepreneurship, systems engineering, innovation management and more.

# Program Policies

This CU Boulder on Coursera program does not align with standard campus policies. Please refer to the Online Programs (p. 1895) section of the catalog for more information.

# Program Requirements

The ME-EM on Coursera utilizes performance-based admissions for enrollment. There is no traditional application for admission to the degree. Students do not need to take the GRE or submit letters of recommendation or proof of language proficiency. Neither a prior degree nor university transcripts are required for admission. Because this is a purely online program, students do not need to complete a background check to enroll.

A student desiring admission to the ME-EM on Coursera must complete four required protocols:

1. Take one of the following two pathway specializations for credit:
   a. **Finance for Technical Managers (3 credit)**

```
Product Cost & Investment Cash Flow Analysis (1 credit)
```

```
Project Valuation and the Capital Budgeting Process (1
 credit)
```

```
Financial Forecasting and Reporting (1 credit)
```

b. **Project Management (3 credits)**

```
Foundations and Initiation (1 credit)
```

```
Project Planning and Execution (1 credit)
```

```
Agile Project Management (1 credit)
```

2. Achieve a computed pathway specialization grade-point average (GPA) of at least 3.00.
3. Have a cumulative GPA of at least 3.00 for all for-credit courses taken to date.
4. Declare their intent to seek the degree via the enrollment form, which they can do before, during, or after any work in a pathway specialization.

Upon completion of these four steps, the student is admitted to the ME-EM on Coursera. Students may successfully complete a designated pathway specialization and declare intent at any point in their academic journey. Completion of a pathway specialization is not required for students to begin earning academic credit, only to earn the degree.

Nondegree seeking students may enroll in for-credit courses. All courses attempted and/or completed for credit will appear on an official CU Boulder transcript (unless dropped by the drop deadline) and will count toward the cumulative GPA.

## Prerequisites & Assumed Background Knowledge

There are no course prerequisites or corequisites for EMP courses on Coursera. Nevertheless, it is important that students are prepared for individual courses. Course descriptions will advise students of assumed incoming knowledge, and students are strongly encouraged to take course sequences in the order they are presented on the Coursera platform. Students are also encouraged to take a non-credit version in some form before moving to the for-credit version to test whether they can succeed, especially if they are unsure whether they have the background knowledge required for a course.

## Course Requirements

The ME-EM on Coursera is a non-thesis degree that requires 30 credit hours of coursework. Students must complete the following 12 credits of core coursework and 18 credits hours of elective courses (any EMEA course (https://www.colorado.edu/emp/coursera/curriculum/) counts). Please note, 9 elective credit hours can be accepted from the CU Boulder on Coursera graduate programs.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | **12** |
| EMEA 5016 | Communication as a Technical Leader | |
| EMEA 5017 | Technical Managerial Written Skills | |
| EMEA 5018 | Speaking to a Technical Group | |
| EMEA 5021 | Product Cost and Investment Cash Flow Analysis | |
| EMEA 5022 | Project Valuation and the Capital Budgeting Process | |
| EMEA 5023 | Financial Forecasting and Reporting | |
| EMEA 5031 | Project Management: Foundations and Initiation | |
| EMEA 5032 | Project Planning and Execution | |
| EMEA 5033 | Agile Project Management | |
| EMEA 5051 | Leading Oneself with Self-Knowledge | |
| EMEA 5052 | Leading Oneself with Purpose and Meaning | |
| EMEA 5053 | Leading Oneself with Personal Excellence | |
| **Elective Courses** | | **18** |
| Any EMEA course, along with up to 9 credits from the CU Boulder on Coursera graduate programs. | | |
| **Total Credit Hours** | | **30** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Identify, explain and use engineering management concepts and theories.
- Analyze personal leadership awareness.
- Communicate effectively to technical and non-technical professionals.
- Evaluate the ethical and environmental implications of engineering and management practices.
- Analyze and design complex systems using multiple tools and systems.
- Interpret quantitative and qualitative data to make sound engineering and managerial decisions.
- Manage complex projects with a systems-approach.
- Understand the financial implications of engineering decisions.

# Design for the Circular Economy - Graduate Certificate (Online)

The design for the circular economy certificate on the Coursera platform provides students and working professionals the skills necessary to succeed in the emerging field of the circular economy, where businesses are focused on redesigning products to be less resource intensive and can readily be transformed into new products at the end of their life.

Career opportunities in this field are expanding rapidly within business, government and nonprofit enterprises.

The curriculum focuses on the unique requirements of technical management of circular business models and product development initiatives within an organization, including cradle-to-cradle design methodologies, sustainable and resilient operations and supply chains, and leadership.

This program is offered 100% online, enabling students' greater flexibility with their work schedule and providing for broad reach to students across the globe.

# Requirements

The Design for the Circular Economy - Graduate Certificate (Online) is a 9-credit hour, 100% online program. The program offers four specializations consisting of 12 one-credit hour courses, as outlined below. From the list below, students are required to complete any two 3-credit hour specializations (totaling 6 credit hours) and 3 additional courses (totaling 3 credit hours), which could include another specialization, or any three topical electives.

There are no prerequisites for any of the courses offered within the program. To earn the certificate, students must have a separately computed minimum cumulative GPA of 3.00 across courses applicable toward the certificate. Up to three credits of C+ may be applied toward the certificate requirements.

| Code | Title | Credit Hours |
|---|---|---|
| **Applied Sustainability for Technical Managers** | | |
| EMEA 5216 | Sustainability and the Circular Economy | 1 |
| EMEA 5217 | Applied Sustainability Engineering | 1 |
| EMEA 5218 | Leading the Circular and Sustainable Business | 1 |
| **Sustainable and Circular Product Development** | | |
| EMEA 5222 | Product Design for the Circular Economy | 1 |
| EMEA 5223 | Packaging Design for the Circular Economy | 1 |
| EMEA 5224 | Circular Product Design Frameworks and Certifications | 1 |
| **Sustainable & Resilient Operations and Supply Chains** | | |
| EMEA 5226 | Sustainable and Resilient Operations Management | 1 |
| EMEA 5227 | Developing and Managing Sustainable Supply Chains | 1 |
| EMEA 5228 | Impacts of Sustainable Operations and Supply Chains | 1 |
| **Transformative Leadership in the Circular Economy** | | |
| EMEA 5241 | The Circular Economy | 1 |
| EMEA 5242 | Sustainable Marketing and Consumer Trends | 1 |
| EMEA 5243 | Leading the Way: Becoming a Sustainability Change Agent | 1 |

# Learning Outcomes

Learning outcomes for completion of the certificate include foundational technical knowledge and practical professional skills. Students will be able to integrate sustainability and circular economy concepts with the design of products and services that have positive environmental and social impacts, while creating and leading organizations that incorporate principles and practices of the circular economy as core strategic initiatives.

Our graduates will be specialists in the rapidly emerging field of the circular economy. They will understand the underlying foundations of sustainability engineering, the context of how this knowledge can be successfully applied in a business setting, and the leadership skills to drive transformational change within their organizations and communities. As specialists, students will be able to:

- Have a science and fact-based discussion with friends, family and work colleagues that explains the need to rapidly move to a more circular economy.
- Describe our current economic and industrial model of “take-make-waste” and the need to transition to a more resilient and sustainable circular economy.
- Design sustainable products and packaging using cradle-to-cradle methodologies.
- Quantitatively assess a product and organization’s social and environmental impacts using the latest data scoring frameworks, including life-cycle analysis, carbon and water footprint analyses.
- Employ brand management strategies to communicate the organizations values and value proposition to their customers.
- Establish operations and supply chains consistent with the organization’s sustainability and circular economy goals.
- Identify and apply international frameworks (i.e., ISO 14000) within the organization.

# Engineering Management - Graduate Certificate (Online)

Advancing your career as a successful manager of technical and engineering teams means demonstrating effective leadership and possessing a range of real-world competencies. In this online graduate certificate program through the Coursera platform, students will master the key elements of engineering management and business-related functions, including finance, project management and authentic leadership. Through this comprehensive approach to management, students will be well-prepared to make an immediate and significant impact within their organizations.

The Engineering Management Graduate Certificate is an affordable way to gain new skills, earn an industry-recognized credential, and prepare for career advancement. For students interested in continuing their education, the certificate consists of the first three specializations within the ME-EM on Coursera master’s degree (https://www.colorado.edu/emp/coursera/) and can be stacked toward the full degree.

ME-EM and Engineering Management Graduate Certificate on Coursera students earn the same credentials as on-campus students. There are no online or Coursera designations on official CU transcripts and diplomas.

# Program Policies

This CU Boulder on Coursera program does not align with standard campus policies. Please refer to the Online Programs (p. 1895) section of the catalog for more information.

# Requirements

## Admission Requirements

There are no admission processes for learners seeking to earn the Engineering Management Graduate Certificate on the Coursera platform. All courses attempted and/or completed for credit will appear on an official CU Boulder transcript (unless dropped by the drop deadline) and will count toward the cumulative GPA.

## Program Requirements

To earn the Engineering Management Graduate Certificate, students must earn 9 credit hours in the required courses listed below. To earn the certificate, students must have a separately computed minimum

cumulative GPA of 3.000 across courses applicable toward the certificate. Up to three credits of C+s may be applied toward the certificate requirements.

### Prerequisite Knowledge

There are no formal prerequisites for the Engineering Management Graduate Certificate, but we recommend that prospective students have an undergraduate degree in engineering, science or a technical field (including areas such as physics, applied mathematics and computer science). If they do not have an undergraduate degree in engineering or a technical field, we recommend that students try the non-credit versions of courses to test their readiness before upgrading to the for-credit versions.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Finance for Technical Managers** | | |
| EMEA 5021 | Product Cost and Investment Cash Flow Analysis | 1 |
| EMEA 5022 | Project Valuation and the Capital Budgeting Process | 1 |
| EMEA 5023 | Financial Forecasting and Reporting | 1 |
| **Project Management** | | |
| EMEA 5031 | Project Management: Foundations and Initiation | 1 |
| EMEA 5032 | Project Planning and Execution | 1 |
| EMEA 5033 | Agile Project Management | 1 |
| **Leading Oneself** | | |
| EMEA 5051 | Leading Oneself with Self-Knowledge | 1 |
| EMEA 5052 | Leading Oneself with Purpose and Meaning | 1 |
| EMEA 5053 | Leading Oneself with Personal Excellence | 1 |
| **Total Credit Hours** | | **9** |

## Learning Outcomes

By the completion of the program, students will be able to:

- Analyze personal leadership awareness.
- Manage complex projects with a systems-approach.
- Understand the financial implications of engineering decisions.

# Design for the Circular Economy - Graduate Certificate

The Design for the Circular Economy certificate provides students and working professionals the skills necessary to succeed in the emerging field of the circular economy, where businesses are focused on redesigning products to be less resource intensive and can readily be transformed into new products at the end of their life.

Career opportunities in this field are expanding rapidly within business, government and nonprofit enterprises.

The curriculum focuses on the unique requirements of technical management of circular business models and product development initiatives within an organization, including cradle-to-cradle design methodologies, sustainable and resilient operations and supply chains, and leadership.

## Requirements

Design for the circular economy is a 9-credit hour certificate program, with courses outlined below. There are no prerequisites for any of the courses offered within the program, and students must achieve a B or better in order to obtain credit for the course.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| EMEN 5215 | Applied Sustainability for Engineering Managers | 3 |
| EMEN 5220 | Product Design for the Circular Economy | 3 |
| EMEN 5225 | Sustainable and Resilient Operations and Supply Chains | 3 |
| **Total Credit Hours** | | **9** |

## Learning Outcomes

Learning outcomes for completion of the certificate include foundational technical knowledge and practical professional skills. Students will be able to integrate sustainability and circular economy concepts with the design of products and services that have positive environmental and social impacts, while creating and leading organizations that incorporate principles and practices of the circular economy as core strategic initiatives.

Our graduates will be specialists in the rapidly emerging field of the circular economy. They will understand the underlying foundations of sustainability engineering, the context of how this knowledge can be successfully applied in a business setting, and the leadership skills to drive transformational change within their organizations and communities. As specialists, students will be able to:

- Have a science and fact-based discussion with friends, family and work colleagues that explains the need to rapidly move to a more circular economy.
- Describe our current economic and industrial model of “take-make-waste” and the need to transition to a more resilient and sustainable circular economy.
- Design sustainable products and packaging using cradle-to-cradle methodologies.
- Quantitatively assess a product and organization’s social and environmental impacts using the latest data scoring frameworks, including life-cycle analysis, carbon and water footprint analyses.
- Employ brand management strategies to communicate the organizations values and value proposition to their customers.
- Establish operations and supply chains consistent with the organization’s sustainability and circular economy goals.
- Identify and apply international frameworks (i.e., ISO 14000) within the organization.

# Engineering Management in the Aerospace Industry - Graduate Certificate

The certificate in engineering management in the aerospace industry is designed for students enrolled in the MS in Aerospace Engineering or ME Engineering Management, as well as other master's degree programs (computer science, electrical engineering and mechanical engineering).

Learn leadership and program management skills widely employed by the aerospace industry in this jointly sponsored program between the Ann and H. J. Smead Aerospace Engineering Science Department and the Engineering Management Program.

For more information, visit the Engineering Management in the Aerospace Industry Certificate (https://www.colorado.edu/emp/graduate-programs/traditional-semester-based-graduate-certificates/engineering-management-aerospace/) webpage.

## Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

## Requirements

This certificate requires 12 credit hours.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| EMEN 5030 | Fundamentals of Project Management [1] | 3 |
| EMEN 5033 | Aerospace Program Management | 3 |
| EMEN 5053 | Leading Technical Organizations | 3 |
| EMEN 5065 | Global Topics in Aerospace | 3 |
| **Total Credit Hours** | | **12** |

[1] May be waived for another course with experience or PMP; see department.

# Innovation and Entrepreneurship in Engineering - Graduate Certificate

Whether forming a new company, or being part of a larger organization, students interested in the innovation & entrepreneurship in engineering graduate certificate will learn how to develop new and innovative products, and the processes required to successfully introduce into the marketplace.

The certificate is a hands-on, practical series of courses that begins with a focus on the product development process, emphasizing where good product ideas come from, and identifying the characteristics that resonate with customers. From there, students learn how products are commercialized within the framework of an existing company and the methods necessary in launching a new high-tech startup.

All courses are taught by faculty that have successfully launched new products or new companies, and have therefore lived what they teach. Finally, the courses are project-based, culminating with student presentations suitable for potential customers, their company's C-Suite or venture capitalists.

For more information, visit the Innovation & Entrepreneurship in Engineering Certificate (https://www.colorado.edu/emp/graduate-programs/traditional-semester-based-graduate-certificates/innovation-entrepreneurship/) webpage.

## Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

## Requirements

This certificate requires 12 credit hours.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| Choose four from the following: | | 12 |
| EMEN 5020 | Finance for Engineering Managers | |
| EMEN 5090 | Marketing and Technology Ventures | |
| EMEN 5094 | Technology Entrepreneurship | |
| EMEN 5215 | Applied Sustainability for Engineering Managers | |
| EMEN 5400 | Technical Product Development | |
| EMEN 5315 | Business Law for Engineering Managers | |
| **Total Credit Hours** | | **12** |

# Leadership and Management - Graduate Certificate

With the leadership and management graduate certificate from the Engineering Management Program, you'll gain an in-depth understanding of management, leadership and strategy deployment to improve performance quality; discover how to use natural strengths to become the best leader possible; learn to navigate ethical decisions and maintain integrity as a leader; and find the leverage points in an organization for delivering exceptional results.

For more information, see the Leadership and Management (https://www.colorado.edu/emp/graduate-programs/traditional-semester-based-graduate-certificates/leadership-management-certificate/) certificate webpage.

## Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

## Requirements

This certificate requires 12 credit hours.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| EMEN 5020 | Finance for Engineering Managers | 3 |
| EMEN 5030 | Fundamentals of Project Management | 3 |

| | | |
|---|---|---|
| or EMEN 5405 | Fundamentals of Systems Engineering | |
| EMEN 5050 | Leading Oneself | 3 |
| or EMEN 5052 | Leading Others | |
| or EMEN 5053 | Leading Technical Organizations | |
| EMEN 5080 | Ethical Decision-Making in Engineering Management | 3 |
| **Total Credit Hours** | | **12** |

# Project Management - Graduate Certificate

Project management is the leadership and control of unique, limited-duration undertakings to produce a new service, product or other desired outcome. Projects typically entail the formation and oversight of a team comprised of highly diverse staff, perhaps varying in experience, skills, location and employer, as well as personal background. The project manager assumes responsibility for ensuring overall success of the endeavor given an array of challenges. Fundamental to those is of course the nature of limited resources, generally defined in terms of cost and time, with engineering projects aggregating additional factors of quality and scope.

Projects are fundamental to nearly all engineering sectors, including aerospace, civil, software, medical devices, electronics, materials science and environmental. Project managers apply their skill and knowledge, both of engineering process/systems as well as of team leadership, to ensure the successful progression and completion of the undertaking at hand. Successful PMs thrive in dynamic, complex environments under continual change. Many times PMs are tapped to lead organizations through significant crises. PMs have the talent and experience to lead ad-hoc groups towards an effective and strategic response, in real-time and under challenging demands.

Individuals who aspire to be agents of change and assume a central role in balancing many forces should consider a project management certificate towards entry into this thriving profession.

For more information, see the Project Management (https://www.colorado.edu/emp/graduate-programs/traditional-semester-based-graduate-certificates/project-management-certificate/) certificate webpage.

## Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

### Requirements

This certificate requires 12 credit hours.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| EMEN 5030 | Fundamentals of Project Management | 3 |
| EMEN 5032 | Advanced Project Management | 3 |
| EMEN 5033 | Aerospace Program Management | 3 |
| EMEN 5405 | Fundamentals of Systems Engineering | 3 |
| **Total Credit Hours** | | **12** |

# Environmental Engineering

The Environmental Engineering Graduate Program (http://www.colorado.edu/even/) focuses on the fundamental and applied understanding of the processes which govern our natural and engineered environmental systems.

The program consists of over 35 research and instructional faculty members and about 70 graduate students, covers topics ranging from drinking and wastewater treatment, water reuse, ecosystem processes, fate and transport of contaminants, alternative energy, air quality, sustainability and global engineering. The program offers MS, Professional MS, and PhD degrees in environmental engineering.

For more information, visit the Environmental Engineering Program (https://www.colorado.edu/even/prospective-students/) website.

**Course code for this program is EVEN.**

## Master's Degrees

- Environmental Engineering - Master of Science (MS) (p. 1745)
- Environmental Engineering - Professional Master of Science (MSENV) (p. 1746)

## Doctoral Degree

- Environmental Engineering - Doctor of Philosophy (PhD) (p. 1748)

## Certificate

- Architectural Lighting - Graduate Certificate (p. 1731)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Balaji, Rajagopalan (https://experts.colorado.edu/display/fisid_118480/)
Professor, Chair; PhD, Utah State University

Cook, Sherri M. (https://experts.colorado.edu/display/fisid_154773/)
Assistant Professor; PhD, University of Michigan Ann Arbor

Crimaldi, John P. (https://experts.colorado.edu/display/fisid_115733/)
Professor; PhD, Stanford University

Emery, William J. (https://experts.colorado.edu/display/fisid_106038/)
Professor Emeritus; PhD, University of Hawaii

Evans, Thomas
Assistant Professor; PhD, University of Colorado Boulder

Gooseff, Michael N. (https://experts.colorado.edu/display/fisid_155922/)
Professor; PhD, University of Colorado Boulder

Hannigan, Michael P. (https://experts.colorado.edu/display/fisid_122655/)
Professor; PhD, California Institute of Technology

Henze, Daven K. (https://experts.colorado.edu/display/fisid_144858/)
Associate Professor; PhD, California Institute of Technology

Hernandez, Mark T. (https://experts.colorado.edu/display/fisid_107635/)
Professor; PhD, University of California, Berkeley

Hertzberg, Jean R. (https://experts.colorado.edu/display/fisid_105315/)
Associate Professor; PhD, University of California, Berkeley

Javernick-Will, Amy N. (https://experts.colorado.edu/display/fisid_146430/)
Associate Professor; PhD, Stanford University

Kasprzyk, Joseph R. (https://experts.colorado.edu/display/fisid_151506/)
Assistant Professor; PhD, Pennsylvania State University

Klees, Rita C. (https://experts.colorado.edu/display/fisid_145391/)
Scholar in Residence; PhD, University of Colorado

Korak, Julie A. (https://experts.colorado.edu/display/fisid_155070/)
Assistant Professor; PhD, University of Colorado Boulder

Kuchenrither, Richard D.
Scholar in Residence; PhD, University of Colorado Boulder

Linden, Karl G. (https://experts.colorado.edu/display/fisid_143747/)
Professor; PhD, University of California, Davis

Livneh, Ben (https://experts.colorado.edu/display/fisid_151999/)
Assistant Professor; PhD, University of Washington

Mansfeldt, Cresten (https://experts.colorado.edu/display/fisid_165411/)
Assistant Professor; PhD, Cornell University

McKnight, Diane M. (https://experts.colorado.edu/display/fisid_110517/)
Professor; PhD, Massachusetts Institute of Technology

Milford, Jana B. (https://experts.colorado.edu/display/fisid_103268/)
Professor

Miller, Shelly L. (https://experts.colorado.edu/display/fisid_110394/)
Professor; PhD, University of California, Berkeley

Neupauer, Roseanna M. (https://experts.colorado.edu/display/fisid_134747/)
Professor; PhD, New Mexico Institute of Mining and Technology

Pellegrino, John (https://experts.colorado.edu/display/fisid_130902/)
Research Professor; PhD, University of Colorado Boulder

Rosario-Ortiz, Fernando L. (https://experts.colorado.edu/display/fisid_146165/)
Director, Professor; DEnv, University of California, Los Angeles

Ryan, Joseph N. (https://experts.colorado.edu/display/fisid_101037/)
Professor, Faculty Director; PhD, Massachusetts Institute of Technology

Silverstein, JoAnn (https://experts.colorado.edu/display/fisid_101482/)
Professor; PhD, University of California, Davis

Summers, Scott R. (https://experts.colorado.edu/display/fisid_113151/)
Professor; PhD, Stanford University

Vance, Marina E. (https://experts.colorado.edu/display/fisid_158217/)
Assistant Professor; PhD, Virginia Polytechnic Institute and State University

Walker, Michael Edward (https://experts.colorado.edu/display/fisid_155103/)
Instructor; PhD, Illinois Institute of Technology

Writer, Jeffrey Hawkins
Instructor; PhD, University of Colorado Boulder

Young, Wendy Mores (https://experts.colorado.edu/display/fisid_146942/)
Senior Instructor; PhD, University of Colorado Boulder

# Courses

**EVEN 5131 (3) Air Pollution Control Engineering**
Introduces air quality regulations, meteorology and modeling. Examines methods for controlling major classes of air pollutants, including particulate matter and oxides of sulfur and nitrogen, as well as control technology for industrial sources and motor vehicles. Requires interdisciplinary design projects.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5131 and MCEN 4131 and EVEN 4131
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering or Environmental Engineering undergraduate majors only.

**EVEN 5141 (3) Indoor Air Pollution**
Describes the impact of indoor air pollutants on human health, including an introduction to key pollutants and their sources. Students will estimate emission factors, calculate generation/ventilation rates, quantify the impact of deposition and chemical reactions and explore relevant control technology. Current issues will also be addressed, including climate change, green building design, economic concerns and relevance to the developing world.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5141, MCEN 4141, and EVEN 4141
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering or Environmental Engineering undergraduate majors only.

**EVEN 5444 (3) Analytical Methods, Experimental Design, and Applied Data Analysis**
Focuses on experimental design and applied statistical methods for data analysis in the environmental engineering field. Students learn how to design and interpret experiments considering multiple variables, avoid confounding effects, and identify interactions between variables. Statistical tools are applied to analytical methods to validate environmental analytical samples. Students learn how to decipher analytical methods to ensure that environmental samples are collected and analyzed following robust quality assurance/quality control procedures.
**Requisites:** Restricted to College of Engineering and Applied Science graduate students or BS/MS Concurrent Degree Students only.
**Recommended:** Prerequisite an undergraduate statistics course.
**Grading Basis:** Letter Grade

**EVEN 5484 (3) Integrative Environmental and Molecular Microbiology**
Surveys microbiology topics germane to modern civil and environmental engineering. Provides fundamentals needed to understand microbial processes and ecology in engineered and natural systems and reviews applications emphasizing the interface between molecular biology and classical civil engineering.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4484, EVEN 4484, and CVEN 5484
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.

**EVEN 5514 (3) Bioremediation**
Advanced study on biological processes used to treat toxic organic and inorganic compounds contained in contaminated water, air, and soil; design and evaluation of in situ toxic compound biotransformation; fundaments of phytoremediation; critical reviews of current literature on bioremediation.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5514

**EVEN 5544 (3) Solid Waste Management and Resource Recovery**
Covers the scope of the nonhazardous solid waste problem and regulations that drive its management; discussions of nonengineering factors that impact waste management and recycling; design of incinerators, composting facilities, and landfills used to treat and dispose of solid waste.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5544 and EVEN 4544
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisite CVEN 3414.

**EVEN 5584 (3) Sustainable Engineering Design**
Introduces students to sustainable design and quantitative sustainability assessment methods. Students will develop an understanding of quantitative sustainable design and how to navigate engineering decision-making. Students will learn tools for economic (life cycle costing, LCC) and environmental (life cycle assessment, LCA) sustainability assessments, and how to link these tools to engineering design decisions under uncertainty. Students will design engineered technologies individually and in teams, with special attention to energy and water technologies. Main course objectives are that students will have the ability to assess the relative sustainability of design alternatives using quantitative tools and to complete the detailed design of civil/environmental engineering infrastructure while navigating trade-offs across and within dimensions of sustainability.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**EVEN 5830 (1-4) Environmental Engineering Special Topic**
Supervised study of special topics of interest to students under instructor guidance.
**Repeatable:** Repeatable for up to 30.00 total credit hours. Allows multiple enrollment in term.

**EVEN 5959 (3) International Environmental Impact Assessment**
Provide elements needed to develop Environmental Impact Assessments (EIA) in countries around the world. Familiarizes students with terms and definitions used in environmental practice. Explains the application of methodologies/tools used globally in EIA studies, taking into consideration the cause-effect relationships between project activities and the environment. Overview of World Bank and regional evaluation criteria driven by local ecosystems, society, and regulations. Case studies focus on the application of tools/methodologies and criteria in various international scenarios.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 4959
**Requisites:** Requires prerequisite or corequisite course of EVEN 3414 (minimum grade C-). Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Recommended:** Prerequisite or corequisite EVEN 3550.

**EVEN 5979 (1-3) Introduction to Humanitarian Aid**
Addresses the humanitarian-development nexus and gives an overview of the main ethical and professional principles, standards, and key stakeholders involved in humanitarian aid. Students will learn the historical and legal frameworks that shaped these principles, and examine their applicability to the challenges faced by humanitarian actors today. Increasing frequency, intensity, complexity, and length of emergency situations require new approaches and coordination among historically divided humanitarian and development actors.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) or graduate students only.
**Recommended:** Prerequisite CVEN 4839/5919 Global Development for Engineers.
**Grading Basis:** Letter Grade

**EVEN 5989 (1-3) Disaster Risk Reduction**
Explores disaster governance, the decentralization of disaster resources and responsibilities, and best practices and tools in preparedness and mitigation. Students will examine the intersection of development, climate change, and disasters, by studying the impact of crisis events on human, social, and political behavior, and associated responses from impacted populations. Students will learn how to use data, tools, and geospatial techniques (GIS) that can inform and enhance vulnerability assessments, mitigation planning, and response operations.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) or graduate students only.
**Recommended:** Prerequisite CVEN 4839/5919 Global Development for Engineers, or EVEN 5979, Introduction to Humanitarian Aid.
**Grading Basis:** Letter Grade

**EVEN 5999 (1-3) Refugees and Displacement**
Examines the processes and policies contributing to and driving refugee and migration flows, as well as response strategies. The focus will be on forced displacement, which currently impact the lives of almost 80 million people worldwide. This course covers solutions, particularly in the settlement context, for the appropriate provision of covered living space to adequately shelter displaced populations, while also promoting safer, healthier settlements that link emergency shelter and settlement assistance to longer-term recovery efforts. Previously offered as a special topics course.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) or graduate students only.
**Recommended:** Prerequisites CVEN 4839/5919, EVEN 5979 and EVEN 5989.
**Grading Basis:** Letter Grade

**EVEN 6504 (3) Advanced Physical-Chemical Processes for Water and Water Reuse Treatment**
Teaches the process fundamentals of (1) granular activated carbon adsorption (2) UV, ozone and advanced oxidation processes (3) membrane filtration and reverse osmosis treatment and (4) ion exchange. These processes, as applied to impaired water sources, including brackish/saline/saltwater and wastewater reuse, will address water quality parameters including pathogenic microorganism, background organic matter, specific organic contaminants, metals and salts.
**Requisites:** Requires prerequisite course of CVEN 5524 (minimum grade C-).
**Grading Basis:** Letter Grade

**EVEN 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.

**EVEN 6950 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**EVEN 6960 (1-3) Master's Report**
Offers report research under faculty supervision. Faculty advisor consent required.
**Repeatable:** Repeatable for up to 3.00 total credit hours.

**EVEN 8990 (1-10) Doctoral Dissertation**
**Repeatable:** Repeatable for up to 10.00 total credit hours.

# Environmental Engineering - Master of Science (MS)

The Master of Science in the Environmental Engineering Program focuses on fundamental and applied understanding of the processes that govern our natural and engineered environmental systems. The program of over 35 research and instructional faculty members and about 70 graduate students covers topics ranging from drinking and wastewater treatment, water re-use, ecosystem processes, fate and transport of contaminants, alternative energy, air quality, sustainability and global engineering.

For more information, visit the Environmental Engineering Program (https://www.colorado.edu/even/prospective-students/) website.

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s): BSEV in Environmental Engineering (p. 910)

# Requirements

## General Requirements

The following course requirements are subject to change; for the most current information, visit the Program's Curriculum and Courses (http://www.colorado.edu/even/prospective-students/graduate-studies/curriculum-and-courses/) webpage.

Students must complete at least 30 credit hours.

For students who have undertaken prior graduate study, up to 9 hours of relevant graduate-level coursework may be transferred to meet the course requirements for the MS degree, following the rules established by the Graduate School for transfer credit.

## Degree Plans

Requirements for the Master of Science in environmental engineering can be fulfilled in two ways.

### Plan I: Thesis Option

In addition to 24 credit hours of coursework, candidates complete 4–6 credit hours of thesis credit with a sum of course and thesis credit of at least 30 hours. Additionally, the successful completion and defense of an MS thesis is required.

### Plan II: Non-Thesis Option

In addition to 24 credit hours of coursework, candidates complete an additional 6 credit hours of elective courses or independent study.

## Course Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Required Common Core** | | **6** |
| CVEN 5464 | Environmental Engineering Processes | 3 |
| CVEN 5404 | Water Chemistry | 3 |
| or CHEM 5151 | Atmospheric Chemistry | |
| **Emphasis Area** | | **12-18** |
| See list below | | |
| **Electives** | | **0-9** |
| Elective courses will be determined in consultation with the student's faculty advisor. | | |
| **Environmental Engineering Graduate Seminar** | | **0** |
| Two semesters of Environmental Engineering graduate seminar, a non-credit seminar requiring attendance at 2/3 of the seminars each semester for satisfactory completion. | | |
| **Plan I: Thesis Option** | | **4-6** |
| Thesis Credits | | |
| **Plan II: Non-Thesis Option** | | **6** |
| Additional elective or independent study credits | | |

## Requirements for Recommended Emphasis Areas

### General Environmental Engineering Emphasis

| Code | Title | Credit Hours |
|---|---|---|
| CVEN 5484 | Integrative Environmental and Molecular Microbiology | 3 |
| MCEN 5131 | Air Pollution Control Engineering | 3 |
| CVEN 5524 | Drinking Water Treatment | 3 |
| or CVEN 5534 | Wastewater Treatment | |
| Select one of the following: | | |
| CVEN 5537 | Numerical Methods in Civil Engineering | 3 |
| or CVEN 5454 | Statistical Methods for Natural and Engineered Systems | |
| **Total Credit Hours** | | **12** |

### Drinking Water, Wastewater and Water Reuse Treatment Emphasis

| Code | Title | Credit Hours |
|---|---|---|
| CVEN 5484 | Integrative Environmental and Molecular Microbiology | 3 |
| CVEN 5524 | Drinking Water Treatment | 3 |
| CVEN 5534 | Wastewater Treatment | 3 |
| Select one of the following: | | |
| CVEN 5537 | Numerical Methods in Civil Engineering | 3 |
| or CVEN 5454 | Statistical Methods for Natural and Engineered Systems | |
| **Total Credit Hours** | | **12** |

### Natural Waters Emphasis

| Code | Title | Credit Hours |
|---|---|---|
| CVEN 5424 | Environmental Organic Chemistry | 3 |
| CVEN 5353 | Groundwater Hydrology | 3 |
| CVEN 5333 | Physical Hydrology | 3 |

| | | |
|---|---|---|
| CVEN 5323 | Applied Stream Ecology | 3 |
| CVEN 5537 | Numerical Methods in Civil Engineering | 3 |
| or CVEN 5454 | Statistical Methods for Natural and Engineered Systems | |
| **Total Credit Hours** | | **15** |

### Global Engineering Emphasis

| Code | Title | Credit Hours |
|---|---|---|
| CVEN 5919 | Global Development for Engineers | 3 |
| CVEN 5939 | Global Engineering and Hazard Resilience Practicum | 3 |
| CVEN 5969 | Water, Sanitation, and Hygiene | 3 |
| CVEN 5484 | Integrative Environmental and Molecular Microbiology | 3 |
| CVEN 5524 | Drinking Water Treatment | 3 |
| or CVEN 5534 | Wastewater Treatment | |
| or MCEN 5131 | Air Pollution Control Engineering | |
| **Total Credit Hours** | | **15** |

### Air Quality Emphasis

| Code | Title | Credit Hours |
|---|---|---|
| MCEN 5131 | Air Pollution Control Engineering | 3 |
| MCEN 5021 | Introduction to Fluid Dynamics | 3 |
| or CVEN 5313 | Environmental Fluid Mechanics | |
| Select one of the following: | | |
| MCEN 5141 | Indoor Air Pollution | 3 |
| or MCEN 5161 | Aerosols | |
| or CVEN 5484 | Integrative Environmental and Molecular Microbiology | |
| Select one of the following: | | |
| CVEN 5537 | Numerical Methods in Civil Engineering | 3 |
| or CVEN 5454 | Statistical Methods for Natural and Engineered Systems | |
| **Total Credit Hours** | | **12** |

### Water & Engineering Management Emphasis

| Code | Title | Credit Hours |
|---|---|---|
| CVEN 5564 | Water Profession: Communication and Utility Finance | 3 |
| CVEN 5574 | Water Utility Management: Current Issues and Future Challenges | 3 |
| CVEN 5584 | Water Profession: Leadership and Management | 3 |

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate and exercise technical training in core environmental engineering topics that form the foundation of modern-day environmental engineering problems and solutions.
- Successfully conduct research that answers questions of interest to the environmental engineering community and that employs appropriate research methods.
- Effectively communicate and present research to academic and public audiences.

# Environmental Engineering - Professional Master of Science (MSENV)

The professional master's degree (MSENV) in environmental engineering is a coursework-only program that offers possibilities for a range of prospective students.

Whether a prospective student is a working engineer or an undergraduate considering widening their exposure to areas of environmental engineering, we have program options to meet their needs. Prospective professional master's degree students may choose between three different tracks:

- Environmental engineering
- Water reuse
- Water engineering & management

For more information, visit the department's Curriculum and Courses (http://www.colorado.edu/even/prospective-students/graduate-studies/curriculum-and-courses/) webpage.

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s): Integrated Design Engineering - Bachelor of Science (BSIDE) (p. 1016).

# Requirements

## General Requirements

The following course requirements are subject to change; for the most current information, visit the Program's Curriculum and Courses (http://www.colorado.edu/even/prospective-students/graduate-studies/curriculum-and-courses/) webpage.

The professional master's degree requires 30 credit hours of graduate-level courses with a minimum cumulative GPA of 3.00.

For students who have undertaken prior graduate study, up to 9 semester credit hours of relevant graduate-level course work may be transferred to meet the course requirements for the MSENV degree, following the rules established by the Graduate School for transfer credit.

## Program Tracks

### General Environmental Engineering Track

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CVEN 5464 | Environmental Engineering Processes | 3 |
| CVEN 5404 | Water Chemistry | 3 |
| or CHEM 5151 | Atmospheric Chemistry | |

| | | |
|---|---|---|
| CVEN 5484 | Integrative Environmental and Molecular Microbiology | 3 |
| MCEN 5131 | Air Pollution Control Engineering | |
| **Electives** | | |
| Choose one of the following: | | 3 |
| CVEN 5524 | Drinking Water Treatment | |
| CVEN 5534 | Wastewater Treatment | |
| Choose five additional electives in consultation with the student's faculty advisor. | | 15 |
| **Total Credit Hours** | | **27** |

### Water Reuse Track

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CVEN 5464 | Environmental Engineering Processes | 3 |
| CVEN 5484 | Integrative Environmental and Molecular Microbiology | 3 |
| CVEN 5404 | Water Chemistry | 3 |
| CVEN 5524 | Drinking Water Treatment | 3 |
| CVEN 5534 | Wastewater Treatment | 3 |
| **Water Reuse Required Courses** | | |
| CVEN 5594 | Water Reuse and Reclamation | 3 |
| CVEN 5834 | Special Topics (Water Reuse Planning and Implementation) | 3 |
| **Elective Courses** | | |
| *General Water Reuse Track:* | | *9* |
| Choose one of the following | | 3 |
| CVEN 5393 | Water Resources System and Management | |
| CVEN 5834 | Special Topics (Advanced Water Treatment) | |
| And choose two from the following or above: | | 6 |
| CVEN 5564 | Water Profession: Communication and Utility Finance | |
| CVEN 5574 | Water Utility Management: Current Issues and Future Challenges | |
| CVEN 5424 | Environmental Organic Chemistry | |
| EVEN 5584 | Sustainable Engineering Design | |
| *Water Reuse Management Track* | | *9* |
| CVEN 5393 | Water Resources System and Management | |
| CVEN 5564 | Water Profession: Communication and Utility Finance | |
| CVEN 5574 | Water Utility Management: Current Issues and Future Challenges | |
| *Water Reuse Advanced Technology Track* | | *9* |
| CVEN 5834 | Special Topics (Advanced Water Treatment) | |
| EVEN 5584 | Sustainable Engineering Design | |
| CVEN 5424 | Environmental Organic Chemistry | |
| **Total Credit Hours** | | **30** |

### Global Environmental Engineering Track

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CVEN 5464 | Environmental Engineering Processes | 3 |
| CVEN 5404 | Water Chemistry | 3 |
| or CHEM 5151 | Atmospheric Chemistry | |
| CVEN 5484 | Integrative Environmental and Molecular Microbiology | 3 |
| CVEN 5919 | Global Development for Engineers | 3 |
| CVEN 5939 | Global Engineering and Hazard Resilience Practicum | 3 |
| **Global Engineering Series** [1] | | |
| Choose one of the following: | | 3 |
| CVEN 5969 | Water, Sanitation, and Hygiene | |
| MCEN 5228 | Special Topics in Mechanical Engineering (Household Energy Systems in the Global South) | |
| Choose 6 one-credit modules from remaining Global Engineering Series offerings: | | 6 |
| EVEN 5004 | Introduction to Humanitarian Aid | |
| EVEN 5014 | Disaster Risk Reduction | |
| EVEN 5024 | Refugees and Displacement | |
| CVEN 5837 | Special Topics for Seniors/Grads (Program & Project Management (1), Solution Identification & Proposal Development (1), Community Appraisal (1), Study Design & Impact Evaluation (1), Data Collection & Analysis Tools (1)) | |
| CVEN 5838 | Special Topics (Intro to Development Economics for Engineers (1), Intro to Global Health for Engineers (1)) | |
| **Electives** | | |
| Choose one of the following: | | 3 |
| CVEN 5524 | Drinking Water Treatment | |
| CVEN 5534 | Wastewater Treatment | |
| MCEN 5131 | Air Pollution Control Engineering | |
| Choose one additional elective in consultation with the student's faculty advisor. | | 3 |
| **Total Credit Hours** | | **30** |

[1] Global Engineering Series course options can be found on the Mortenson Center website (https://www.colorado.edu/center/mortenson/graduate-education/professional-masters-degrees/).

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate and exercise technical training in core environmental engineering topics that form the foundation of modern-day environmental engineering problems and solutions.
- Effectively communicate and present their scientific knowledge to academic or public audiences.
- Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives.

# Environmental Engineering - Doctor of Philosophy (PhD)

The Environmental Engineering Graduate Program (http://www.colorado.edu/even/) focuses on fundamental and applied understanding of the processes that govern our natural and engineered environmental systems. The program of over 35 research and instructional faculty members and about 70 graduate students covers topics ranging from drinking and wastewater treatment, water re-use, ecosystem processes, fate and transport of contaminants, alternative energy, air quality, sustainability and global engineering.

For more information, visit the Environmental Engineering Program (https://www.colorado.edu/even/prospective-students/) website.

## Requirements

The PhD in environmental engineering requires 30 credit hours of relevant graduate-level coursework, plus 30 credit hours of thesis credit. PhD students are also required to successfully complete a preliminary exam, a comprehensive exam and a final dissertation defense.

Applicants for this degree must demonstrate the capability for both rigorous academic accomplishments and independent research.

All doctoral students must have completed the environmental engineering core courses (6 credit hours), and a quantitative analysis class (3 credit hours). Coursework must be completed with a minimum cumulative GPA of 3.00.

Graduates of the department's MS program may transfer up to 30 credit hours of relevant graduate-level courses, pending program approval. Up to 21 credit hours of previous graduate-level work from another institution may be transferred with advisor and Graduate School approval.

### Preliminary Examination

Students must pass a preliminary examination based on MS degree-level coursework in environmental engineering topics. Each doctoral student shall take a preliminary examination as determined by the faculty of the specialty area in which the student is enrolled, normally not later than 12 months from the time the student is first enrolled in the doctoral program. The student must pass this examination in order to continue in the doctoral program.

### Comprehensive Examination

By no later than the fifth semester, students must also take and pass a comprehensive examination. The comprehensive examination shall consist of a written and an oral examination. The exam may not be attempted until the student's last semester of formal coursework. At the comprehensive examination, the student shall present a plan for the dissertation research to the advisory committee for approval. Failure to pass the comprehensive examination may be remedied by repeating the examination after an interval of not less than four months.

### PhD Dissertation

Students must write a dissertation based on original research conducted under the supervision of a graduate faculty member who is a member of the Environmental Engineering Program faculty.

### Time Limit

All degree requirements must be completed within six years of the date of commencing coursework.

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate and exercise technical training in core environmental engineering topics that form the foundation of modern-day environmental engineering problems and solutions.
- As independent learners, demonstrate knowledge of the scientific literature in environmental engineering topics, the ability to critically evaluate that literature, and the ability to synthesize that knowledge and critical evaluation in written and oral forms.
- Successfully design and conduct original research that answers questions of interest to the environmental engineering community and that employs appropriate research methods.
- Effectively communicate and present research to academic and public audiences.
- Demonstrate expert knowledge in environmental engineering and the ability to synthesize research results in the form of academic writing in peer-reviewed journal publications.

# Materials Science and Engineering

The Materials Science and Engineering (MSE) program at CU Boulder is an interdisciplinary, graduate-level program that allows students to explore science at the intersection of advanced chemistry, biology, engineering and physics. Our faculty members work across a broad range of scientific and engineering disciplines (https://www.colorado.edu/mse/news-events-0/), but all share expertise and passion for materials development and application. Students will achieve their educational goals through a combination of cross-disciplinary coursework and research under the supervision of one or more of the program's science and engineering faculty members.

The program offers two degrees to provide students with the necessary skills to be successful in industry. At CU Boulder, students have the opportunity to choose from seven unique program tracks for specialization including:

- Electronic, magnetic and photonics materials
- Soft materials
- Structural materials
- Materials characterization and processing
- Materials for energy
- Biomaterials
- Computational materials science

The MSE program is directed by Professor Stephanie Bryant of the Department of Chemical and Biological Engineering. For more information, see the Materials Science & Engineering Program (https://www.colorado.edu/mse/) website.

## Master's Degree

- Materials Science and Engineering - Master of Science (MS) (p. 1751)

## Doctoral Degree

- Materials Science and Engineering - Doctor of Philosophy (PhD) (p. 1752)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Betterton, Meredith D. (https://experts.colorado.edu/display/fisid_125396/)
Associate Professor; PhD, Harvard University

Borden, Mark A. (https://experts.colorado.edu/display/fisid_148514/)
Associate Professor; PhD, University of California, Davis

Bowman, Christopher N. (https://experts.colorado.edu/display/fisid_102043/)
Distinguished Professor; PhD, Purdue University

Bryant, Stephanie J. (https://experts.colorado.edu/display/fisid_111810/)
Professor; PhD, University of Colorado Boulder

Cao, Gang (https://experts.colorado.edu/display/fisid_157991/)
Professor; PhD, Temple University

Cha, Jennifer N. (https://experts.colorado.edu/display/fisid_151746/)
Professor; PhD, University of California, Santa Barbara

Clark, Noel A. (https://experts.colorado.edu/display/fisid_101947/)
Professor; PhD, Massachusetts Institute of Technology

Dessau, Daniel S. (https://experts.colorado.edu/display/fisid_107532/)
Professor; PhD, Stanford University

Ding, Yifu (https://experts.colorado.edu/display/fisid_146088/)
Associate Professor; PhD, University of Akron

Dukovic, Gordana (https://experts.colorado.edu/display/fisid_147414/)
Associate Professor; PhD, Columbia University

Ferguson, Virginia L. (https://experts.colorado.edu/display/fisid_110131/)
Associate Professor; PhD, University of Colorado Boulder

George, Steven (https://experts.colorado.edu/display/fisid_103289/)
Professor; PhD, University of California, Berkeley

Goodwin, Andrew Pratt (https://experts.colorado.edu/display/fisid_151595/)
Associate Professor; PhD, University of California, Berkeley

Gopinath, Juliet T. (https://experts.colorado.edu/display/fisid_147075/)
Associate Professor; PhD, Massachusetts Institute of Technology

Heinz, Hendrik (https://experts.colorado.edu/display/fisid_156488/)
Associate Professor; PhD, ETH Zurich (Switzerland)

Holewinski, Adam P. (https://experts.colorado.edu/display/fisid_155859/)
Assistant Professor; PhD, University of Michigan Ann Arbor

Huang, Shu-Wei (https://experts.colorado.edu/display/fisid_159847/)
Assistant Professor; PhD, MIT, Cambridge

Keplinger, Christoph M.
Assistant Professor; PhD, Johannes Kepler Universität Linz (Austria)

Lee, Minhyea (https://experts.colorado.edu/display/fisid_145209/)
Assistant Professor; PhD, University of Chicago

Lee, Sehee (https://experts.colorado.edu/display/fisid_144739/)
Professor; PhD, Seoul National University (South Korea)

MacLennan, Joseph E. (https://experts.colorado.edu/display/fisid_104854/)
Professor; PhD, University of Colorado Boulder

Maute, Kurt (https://experts.colorado.edu/display/fisid_113875/)
Professor; PhD, University of Stuttgart (Germany)

McGehee, Michael D. (https://experts.colorado.edu/display/fisid_163453/)
Professor, Associate Faculty Director; PhD, University of California, Santa Barbara

McLeod, Robert R. (https://experts.colorado.edu/display/fisid_107547/)
Professor; PhD, University of Colorado Boulder

Medlin, James William (https://experts.colorado.edu/display/fisid_122699/)
Professor; PhD, University of Delaware

Moddel, Garret (https://experts.colorado.edu/display/fisid_105440/)
Professor; PhD, Harvard University

Murnane, Margaret (https://experts.colorado.edu/display/fisid_115333/)
Distinguished Professor; PhD, University of California, Berkeley

Murray, Todd W. (https://experts.colorado.edu/display/fisid_146549/)
Professor; PhD, Johns Hopkins University

Musgrave, Charles Bruce (https://experts.colorado.edu/display/fisid_144977/)
Professor; PhD, California Institute of Technology

Nair, Devatha P.
Assistant Professor; PhD, University of Colorado Boulder

Neogi, Sanghamitra (https://experts.colorado.edu/display/fisid_156773/)
Assistant Professor; PhD, Pennsylvania State University

Park, Won (https://experts.colorado.edu/display/fisid_122676/)
Professor; PhD, Georgia Institute of Technology

Pellegrino, John (https://experts.colorado.edu/display/fisid_130902/)
Research Professor; PhD, University of Colorado Boulder

Perkins, Thomas T. (https://experts.colorado.edu/display/fisid_124578/)
Associate Professor Adjoint; PhD, Stanford University

Raj, Rishi (https://experts.colorado.edu/display/fisid_108413/)
Professor; PhD, Harvard University

Regueiro, Richard A. (https://experts.colorado.edu/display/fisid_134705/)
Associate Professor; PhD, Stanford University

Reznik, Dmitry (https://experts.colorado.edu/display/fisid_147659/)
Associate Professor; PhD, University of Illinois at Urbana–Champaign

Rogers, Charles (https://experts.colorado.edu/display/fisid_101331/)
Professor; PhD, Cornell University

Rumbles, Garry (https://experts.colorado.edu/display/fisid_147479/)
Professor Adjoint; PhD, University of London (England)

Smalyukh, Ivan (https://experts.colorado.edu/display/fisid_144757/)
Professor; PhD, Kent State University

Song, Jeong-Hoon (https://experts.colorado.edu/display/fisid_154468/)
Assistant Professor; PhD, Northwestern University

Srubar, Wil V. III (https://experts.colorado.edu/display/fisid_153058/)
Assistant Professor; PhD, Stanford University

Stansbury, Jeffrey W.
Associate Dean; PhD, University of Maryland

Stoldt, Conrad R. (https://experts.colorado.edu/display/fisid_126290/)
Professor; PhD, Iowa State University

Tan, Wei (https://experts.colorado.edu/display/fisid_141464/)
Associate Professor; PhD, University of Illinois at Chicago

van de Lagemaat, Jao (https://experts.colorado.edu/display/fisid_148357/)
Assistant Professor

Vernerey, Franck J. (https://experts.colorado.edu/display/fisid_144760/)
Associate Professor; PhD, Northwestern University

Walba, David M. (https://experts.colorado.edu/display/fisid_105830/)
Professor; PhD, California Institute of Technology

Weimer, Alan W. (https://experts.colorado.edu/display/fisid_109152/)
Professor; PhD, University of Colorado Boulder

White, Timothy J. (https://experts.colorado.edu/display/fisid_163899/)
Professor; PhD, University of Iowa

Whiting, Gregory L. (https://experts.colorado.edu/display/fisid_159727/)
Associate Professor; PhD, University of Cambridge (England)

Xi, Yunping (https://experts.colorado.edu/display/fisid_110518/)
Professor; PhD, Northwestern University

Xiao, Jianliang (https://experts.colorado.edu/display/fisid_149777/)
Assistant Professor; PhD, Northwestern University

Yang, Ronggui
Professor; PhD, Massachusetts Institute of Technology

Yin, Xiaobo
Associate Professor; PhD, Stanford University

Yu, Liping
Assistant Research Professor

Zhang, Wei (https://experts.colorado.edu/display/fisid_146429/)
Professor; PhD, University of Illinois at Urbana–Champaign

Zunger, Alexander (https://experts.colorado.edu/display/fisid_149868/)
Research Professor; PhD, Tel Aviv Univ (Israel)

# Courses

**MSEN 5000 (1-3) Fundamentals of Materials Science and Engineering**
Discusses fundamental topics in materials science and engineering.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**MSEN 5064 (3) Soft Machines**
Introduces soft machines as a new paradigm of engineering that starts to impact healthcare, consumer electronics, renewable energy and collaborative robotics. Prepares students to participate in research on soft machines by starting with fundamentals of soft materials and by covering soft robotics, stretchable electronics, energy harvesting and functional polymers. Includes guest lectures, a literature review and a hands-on lab project.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4046 and MCEN 5046
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechancial (MCEN) majors or College of Engineering graduate students only.
**Grading Basis:** Letter Grade

**MSEN 5270 (3) Materials Characterization for Engineering**
Rigorous materials characterization is at the heart of understanding property-structure-processing relationships of materials, including soft matter. The goal of the course is to prepare graduate students to understand the basic principles behind material characterization tools and techniques. This class will offer students (1) an introduction to the principles and practice of diffraction, (2) introductory exposure to common characterization methods for the determination of structure, composition, and defects in inorganic and organic solids.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**MSEN 5370 (3) Materials Thermodynamics and Kinetics**
Reviews fundamentals of thermodynamics and kinetics and applies them to understand the chemical, thermal, and mechanical behavior of materials. Examines equations of state, solution theory, equilibrium diagrams, and phase changes. Examines kinetics of phase transformations including theories of diffusion, nucleation and growth, and solidification.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**MSEN 5430 (3) Transmission Electron Microscopy in Materials Science & Engineering**
This course provides a comprehensive introduction to transmission electron microscopy (TEM) as a powerful characterization tool in materials science. It is aimed at beginners and intermediate users of TEM and covers both the theoretical and practical aspects of advanced electron microscopy techniques. By taking this course, students will be able to interpret and analyze TEM data and understand electron microscopy publications. Students will learn the necessary theoretical basis for taking practical training on modern aberration-corrected TEMs. Previously offered as a special topics course.
**Requisites:** Restricted to students with 87-180 credits (Senior, 5th Yr Senior) or graduate students only.
**Recommended:** Prerequisite Experience on electron microscopy is recommended but not necessary.
**Grading Basis:** Letter Grade

**MSEN 5470 (3) Materials Composition and Structure**
The synthesis, organization, and processing of materials can enable functional performance. Curriculum will overview the synthesis and design of functional organic and inorganic materials. A particular emphasis will be placed on structure-performance correlations between chemistry and materials organization. Topical foci will include polymers, biomaterials, and materials for energy.

**MSEN 5840 (1-6) Independent Study**
Offers an opportunity for students to do independent work. Subject arranged to fit the needs of the student.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to MS and PhD students in the Materials Science and Engineering program (MTEN) only.

**MSEN 5919 (1-5) Special Topics in MSE: Mass Transport**
Mass Transport Phenomena for Materials & Membranes: Fundamentals of mass transport with particular attention to design problems associated with materials science (reactive 3d printing), electrochemistry and energy systems (fuel cells & batteries), environmental concerns ($CO_2$ capture), and general separations (water desalination). The principles of transport phenomena in material systems, involving multiple components, phases, chemical reaction, and simultaneous momentum, heat and mass transport will be discussed
**Repeatable:** Repeatable for up to 10.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**MSEN 6101 (1) Seminar in Materials Science and Engineering**
Required of all materials science and engineering PhD students. Student, faculty, and guest presentations and discussions of current research in materials science and engineering.
**Recommended:** first- and second-year materials science and engineering PhD MSE students.
**Grading Basis:** Letter Grade

**MSEN 6930 (3) Materials Science and Engineering Professional Internship**
This class provides a mechanism for MSE graduate students to receive academic credit for internships with industry partners that include an academic component suitable for graduate-level work. Participation in the course will consist of an internship agreement between the student and an industry partner who will employ the student in a role that supports the academic goals of the MSE program and the internship. Instructor participation will include facilitation of the mid-term and final assessments of student performance as well as support for any academic-related issues that may arise during the internship period. May be taken during any term after one semester of coursework in MSE graduate program.
**Grading Basis:** Letter Grade

**MSEN 6950 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to MS students in the Materials Science and Engineering program (MTEN) only.

**MSEN 8990 (1-10) Doctoral Dissertation**
Doctoral Dissertation hours
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to PhD students in the Materials Science and Engineering program (MTEN) only.

# Materials Science and Engineering - Master of Science (MS)

CU Boulder's Master of Science degree in Materials Science and Engineering provides students with a wide range of knowledge within the broad industry of materials engineering. Students in the master's program complete 30 hours of coursework covering cutting-edge industry topics, such as traditional and emerging materials systems, experimental methods and advanced computational analyses.

For more information, visit the program's Master's Degree (http://www.colorado.edu/mse/professional-masters-degree/) webpage.

## Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s):

- Biological Engineering - Bachelor of Science (BSCB) (https://catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/chemical-biological-engineering/biological-engineering-bachelor-science-bscb/#acceleratedmasterstext)
- Chemical Engineering - Bachelor of Science (BSCHE) (p. 883)
- Mechanical Engineering - Bachelor of Science (BSME) (p. 1032)

## Requirements

All master's students must declare a track by their second semester. Students enrolled in the master's program are not eligible to hold a teaching assistantship or research assistantship appointment. The following course requirements are subject to change; for the most current information, visit the department's coursework (https://www.colorado.edu/mse/current-students/coursework/) webpage.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Core Courses for All Tracks** | | |
| MSEN 5919 | Special Topics in MSE: Mass Transport (Functional Materials Chemistry) | 3 |
| MSEN 5370 | Materials Thermodynamics and Kinetics | 3 |
| MSEN 5919 | Special Topics in MSE: Mass Transport (Materials Characterization in Engineering) | 3 |
| **Specialized Track Courses** | | **12** |
| Students must take four approved track-specific courses | | |
| **Breadth Electives** | | **9** |
| Students must select three breadth electives with approved of the MSE Graduate Advisor. Independent study and MSEN 5000 may count as breadth electives. Prof. MS students may also take up to 6 credit hours of Engineering Management courses. | | |
| **Total Credit Hours** | | **30** |

## Learning Outcomes

By the completion of the program, students will be able to:

# Materials Science and Engineering - Doctor of Philosophy (PhD)

The Materials Science and Engineering (MSE) program is an interdisciplinary PhD program aimed at providing a rigorous education in materials science and engineering and the fundamental physics, engineering, chemistry and biology that underlie this discipline.

Educational goals are achieved through both coursework and training in cross-disciplinary research supervised by one or more science and engineering faculty members.

For more information, visit the Materials Science and Engineering (http://www.colorado.edu/mse/) website.

## Requirements

All PhD students must declare a track by the second semester. With the approval of their advisor, the student can change tracks. The course program should represent a coordinated approach to the attainment of the student's ultimate goals, including class work, professional preparation and research.

The following course requirements are subject to change; for the most current information, visit the department's Coursework (http://www.colorado.edu/mse/graduate-study/coursework/) webpage.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Core Courses for All Tracks** | | |
| MSEN 5919 | Special Topics in MSE: Mass Transport (Functional Materials Chemistry) | 3 |
| MSEN 5370 | Materials Thermodynamics and Kinetics | 3 |
| MSEN 5919 | Special Topics in MSE: Mass Transport (Materials Characterization in Engineering) | 3 |
| **Specialized Track Courses** [1] | | **12** |
| Students must take four approved track-specific courses | | |
| **Breadth Electives** | | **9** |
| Students must select three breadth electives with approval of the PhD research advisor and program. Independent study and MSEN 5000 may count as breadth electives. | | |
| **Total Credit Hours** | | **30** |

1. Required track-specific courses and approved track-specific electives are listed on the department's Coursework (http://www.colorado.edu/mse/graduate-study/coursework/) webpage.

### Preliminary Examination

The preliminary exam will normally be given in the spring of the student's second year. If the first attempt is failed, a second attempt will be scheduled in the following months. The second prelim attempt should be completed before the beginning of the third academic year. Students who have a master's degree should complete the preliminary exam in the third semester of study. If a student fails their first attempt, then they must retake the exam at latest in the following semester. Two successive failures result in a terminal MS as the highest possible degree.

### Comprehensive Examination

Before admission to candidacy for the doctoral degree, students must pass a comprehensive examination, which shall consist of a written and an oral examination in the field of concentration and related fields. At the comprehensive examination, the student shall present a plan for the dissertation research to the Advisory Committee for approval.

### PhD Dissertation

Students must write a dissertation based on original research conducted under the supervision of a graduate faculty member. The dissertation must fulfill all Graduate School requirements. After the dissertation is completed, an oral final examination on the dissertation and related topics is conducted by the student's doctoral committee.

### Time Limit

All degree requirements must be completed within six years of the date of commencing course work.

## Learning Outcomes

By the completion of the program, students will be able to:

# Mechanical Engineering

CU Boulder's Mechanical Engineering Graduate Program (http://www.colorado.edu/mechanical/prospective-students/graduate/) is one of the top ranked programs in the U.S. News & World Report Best Graduate Schools issue among public universities. Students receive a strong education and conduct groundbreaking tier-one research. We have 50+ faculty members conducting fundamental and applied research in air quality, biomedical, materials, mechanics of materials, micro/nanoscale, robotics and systems design, and thermo fluid sciences.

Boulder is also home to research and development operations for many large companies and four federal research labs: the National Center for Atmospheric Research, the National Institute for Standards and Technology, the National Oceanic and Atmospheric Administration, and the National Renewable Energy Laboratory.

Recent doctoral and master's graduates accepted employment at companies including, but not limited to: ConocoPhilips, Ford, Google, NASA Jet Propulsion Laboratory, Lockheed Martin, Nike, Sandia National Laboratories and Seagate. Many of our graduating PhD students also enter careers in academia.

## Master's Degrees

- Mechanical Engineering - Master of Science (MS) (p. 1764)
- Mechanical Engineering - Professional Master of Science (MSME) (p. 1764)

## Doctoral Degree

- Mechanical Engineering - Doctor of Philosophy (PhD) (p. 1765)

## Certificates

- Advanced Mechanics and Failure Analysis - Graduate Certificate (p. 1767)
- Biomedical Engineering - Graduate Certificate (p. 1766)

- Food Engineering - Graduate Certificate (p. 1767)
- Mechanical Design and Product Development - Graduate Certificate (p. 1768)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Affrunti, Andrew J. (https://experts.colorado.edu/display/fisid_149937/)
Instructor; MSEE, University of Illinois at Urbana–Champaign

Ahmed, Alaa A. (https://experts.colorado.edu/display/fisid_144736/)
Professor; PhD, University of Michigan

Ban, Chunmei (https://experts.colorado.edu/display/fisid_165780/)
Associate Professor; PhD, SUNY at Binghamton

Barthelat, Francois (https://experts.colorado.edu/display/fisid_164866/)
Professor; PhD, Northwestern University

Bates, Kelvin (https://experts.colorado.edu/display/fisid_173937/)
Assistant Professor; PhD, California Institute of Technology

Blacklock, Jenifer L. (https://experts.colorado.edu/individual/fisid_159680/)
Faculty Director, Senior Instructor, Visiting Instructor; PhD, Wayne State University

Borden, Mark A. (https://experts.colorado.edu/display/fisid_148514/)
Professor; PhD, University of California, Davis

Bottenus, Nick (https://experts.colorado.edu/individual/fisid_165371/)
Assistant Professor; PhD, Duke University

Branch, Melvyn C.
Professor Emeritus

Bright, Victor Mark (https://experts.colorado.edu/display/fisid_112696/)
Professor; PhD, Georgia Institute of Technology

Bruns, Carson J. (https://experts.colorado.edu/display/fisid_159851/)
Assistant Professor; PhD, Northwestern University

Burleson, Grace
Visiting Assistant Professor; PhD, University of Michigan

Calve, Sarah (https://experts.colorado.edu/individual/fisid_165779/)
Assistant Professor; PhD, University of Michigan

Carlson, Lawrence E.
Professor Emeritus; D.Eng, University of California Berkeley

Castro, Francisco (https://experts.colorado.edu/display/fisid_147992/)
Senior Instructor; PhD, University of Colorado Boulder

Cui, Longji (https://experts.colorado.edu/display/fisid_164283/)
Assistant Professor; ME, Beihang University (China)

Daily, John W. (https://experts.colorado.edu/display/fisid_100131/)
Research Professor; PhD, Stanford University

Datta, Subhendu K.
Professor Emeritus

Ding, Xiaoyun (https://experts.colorado.edu/display/fisid_158563/)
Professor; PhD, Pennsylvania State University

Ding, Yifu (https://experts.colorado.edu/display/fisid_146088/)
Professor; PhD, University of Akron

Ferguson, Virginia L. (https://experts.colorado.edu/display/fisid_110131/)
Professor; PhD, University of Colorado Boulder

Geers, Thomas L.
Professor Emeritus

Greenberg, Alan R.
Professor Emeritus

Gupta, Mohit
Instructor Adjunct

Hamlington, Peter Edward (https://experts.colorado.edu/display/fisid_149800/)
Associate Professor, Chair, Faculty Fellow; PhD, University of Michigan Ann Arbor

Hampson, Gregory (https://experts.colorado.edu/display/fisid_166888/)
Scholar in Residence; PhD, University of Wisconsin–Madison

Hannigan, Michael P. (https://experts.colorado.edu/display/fisid_122655/)
Professor, Endowed Chair; PhD, California Institute of Technology

Henze, Daven K. (https://experts.colorado.edu/display/fisid_144858/)
Professor, Associate Chair; PhD, California Institute of Technology

Hertzberg, Jean R. (https://experts.colorado.edu/display/fisid_105315/)
Professor; PhD, University of California, Berkeley

Humbert, J. Sean (https://experts.colorado.edu/display/fisid_156202/)
Professor, Associate Chair; PhD, California Institute of Technology

Jayaram, Kaushik (https://experts.colorado.edu/display/fisid_165370/)
Assistant Professor; PhD, University of California-Berkeley

Kassoy, David R.
Professor Emeritus

Knappe, Svenja A. (https://experts.colorado.edu/display/fisid_139588/)
Associate Research Professor; PhD, Rheinische Friedrich-Wilhelms-Universität (Germany)

Knight, Daniel
Associate Research Professor; PhD, University of Tennessee

Knutsen, Jeffrey S. (https://experts.colorado.edu/display/fisid_145534/)
Associate Teaching Professor; PhD, University of Colorado Boulder

Koch, Jeremy (https://experts.colorado.edu/display/fisid_166589/)
Assistant Teaching Professor; PhD, University of Illinois

Kotys-Schwartz, Daria (https://experts.colorado.edu/display/fisid_144738/)
Teaching Professor; PhD, University of Colorado Boulder

Labbe, Nicole J. (https://experts.colorado.edu/display/fisid_157742/)
Assistant Professor; PhD, University of Massachusetts, Amherst

Lee, Sehee (https://experts.colorado.edu/display/fisid_144739/)
Professor; PhD, Seoul National University (South Korea)

Lee, Yung-Cheng (https://experts.colorado.edu/display/fisid_103170/)
Professor Emeritus

Long, Rong (https://experts.colorado.edu/display/fisid_151301/)
Associate Professor; PhD, Cornell University

Lynch, Maureen Ellen (https://experts.colorado.edu/display/fisid_163404/)
Assistant Professor; PhD, Cornell University

MacCurdy, Robert B. (https://experts.colorado.edu/display/fisid_163307/)
Assistant Professor; PhD, Cornell University

McConnell, Katherine (https://experts.colorado.edu/display/fisid_147567/)
Scholar in Residence; EdD, University of Colorado Denver

McNeill, Nathan John (https://experts.colorado.edu/display/fisid_151518/)
Associate Teaching Professor; PhD, Purdue University

Michelsen, Hope (https://experts.colorado.edu/individual/fisid_165261/)
Associate Professor; PhD, Stanford University

Milford, Jana B. (https://experts.colorado.edu/display/fisid_103268/)
Professor Emerita

Miller, Shelly L. (https://experts.colorado.edu/display/fisid_110394/)
Professor; PhD, University of California, Berkeley

Mitrano, Peter P. (https://experts.colorado.edu/display/fisid_155075/)
Assistant Teaching Professor; PhD, University of Colorado, Boulder

Mizzi, Arthur
Assistant Research Professor; PhD, University of Colorado Boulder

Mukherjee, Debanjan (https://experts.colorado.edu/individual/fisid_164181/)
Assistant Professor; PhD, University of California, Berkeley

Murray, Todd W. (https://experts.colorado.edu/display/fisid_146549/)
Professor, Associate Chair; PhD, Johns Hopkins University

Neu, Corey P. (https://experts.colorado.edu/display/fisid_156210/)
Professor; PhD, University of California, Davis

Norris, Jan Adam (https://experts.colorado.edu/display/fisid_101412/)
Instructor Adjunct; PhD, University of Colorado Boulder

Pacheco, Carmen Consuelo (https://experts.colorado.edu/display/fisid_148773/)
Scholar in Residence; MS, University of Arizona

Pellegrino, John (https://experts.colorado.edu/display/fisid_130902/)
Research Professor; PhD, University of Colorado Boulder

Raj, Rishi (https://experts.colorado.edu/display/fisid_108413/)
Professor; PhD, Harvard University

Reamon, Derek T. (https://experts.colorado.edu/display/fisid_120538/)
Teaching Professor; PhD, Stanford University

Rentschler, Mark E. (https://experts.colorado.edu/display/fisid_146091/)
Professor; PhD, University of Nebraska-Lincoln

Rieker, Gregory Brian (https://experts.colorado.edu/display/fisid_151727/)
Associate Professor, Faculty Fellow; PhD, Stanford University

Riffell, Daniel J. (https://experts.colorado.edu/display/fisid_154141/)
Associate Professor, Lecturer; MS, University of Colorado Boulder

Ruben, Shalom D. (https://experts.colorado.edu/display/fisid_149492/)
Associate Teaching Professor; PhD, University of California, Los Angeles

Saccone, Max (https://experts.colorado.edu/display/fisid_175898/)
Assistant Professor; PhD, California Institute of Technology

Segil, Jacob Lionel (https://experts.colorado.edu/display/fisid_155128/)
Research Professor; PhD, University of Colorado Boulder

Singh, Chahat (https://experts.colorado.edu/display/fisid_175890/)
Assistant Professor; PhD, University of Maryland

Steinbrenner, Julie E. (https://experts.colorado.edu/display/fisid_152041/)
Associate Teaching Professor, Associate Chair; PhD, Stanford University

Stoldt, Conrad R. (https://experts.colorado.edu/display/fisid_126290/)
Professor Emeritus; PhD, Iowa State University

Tan, Wei (https://experts.colorado.edu/display/fisid_141464/)
Associate Professor; PhD, University of Illinois at Chicago

Tsai, Janet Yi-Jen (https://experts.colorado.edu/display/fisid_156447/)
Associate Teaching Professor, Associate Chair; PhD, University of Colorado Boulder

Vance, Marina E. (https://experts.colorado.edu/display/fisid_158217/)
Assistant Professor; PhD, Virginia Polytechnic Institute and State University

Vanderbeek, Greg (https://experts.colorado.edu/display/fisid_159741/)
Assistant Teaching Professor; MS, Colorado School of Mines

Vernerey, Franck J. (https://experts.colorado.edu/display/fisid_144760/)
Professor; PhD, Northwestern University

Vriend, Nathalie Maria (https://experts.colorado.edu/display/fisid_165036/)
Associate Professor; PhD, California Institute of Technology

Walker, Michael Edward (https://experts.colorado.edu/display/fisid_155103/)
Associate Teaching Professor; PhD, Illinois Institute of Technology

Weidman, Patrick D.
Professor Emeritus

Welker, Cara (https://experts.colorado.edu/display/fisid_168549/)
Assistant Professor; Ph.D., Stanford University

Whiting, Gregory L. (https://experts.colorado.edu/display/fisid_159727/)
Associate Professor; PhD, University of Cambridge (England)

Wiedinmeyer, Christine
Research Professor; PhD, University of Texas at Austin

Xiao, Jianliang (https://experts.colorado.edu/display/fisid_149777/)
Associate Professor; PhD, Northwestern University

Xu, Nicole (https://experts.colorado.edu/display/fisid_172095/)
Assistant Professor; PhD, Stanford University

Zable, Jack L.
Professor Emeritus

# Courses

**MCEN 5000 (3) Sociotechnical Industry Skills**
Provides an introduction to sociotechnical skills as they relate to the practice of engineering. Themes include career exploration, communication, ethics, leadership, and teamwork. Students conduct several self-assessments to build awareness of their working styles and strengths. Students work on teams to be more effective as leaders and working on teams. Alumni and industry professionals regularly participate in the course to provide expertise and networking opportunities.
**Requisites:** Restricted to graduate students in the College of Engineering and Applied Science or undergraduate Mechanical Engineering (MCEN) majors with 57+ credits (Junior or Senior).

**MCEN 5010 (3) Microsystems Integration**
A microsystem consists of microelectronic, optoelectronic, microwave, microelectromechanical and energy components interconnected. Thermal, electrical, fabrication and assembly issues for microsystems represented by iPhone series will be studied. The packaging and interconnection technologies used to establish the design and manufacturing infrastructure of microsystems will be reviewed. Other optoelectronic, MEMS and batter components for microsystems will also be studied.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4010
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechancial (MCEN) majors or College of Engineering graduate students only.
**Grading Basis:** Letter Grade

**MCEN 5012 (3) Renewable Fuels, Fuel Cells and Internal Combustion Engines**
With the accelerated availability of carbon-free and renewable fuels, we will explore high-efficiency, low-emissions fuel cell and internal combustion engine energy conversion technologies, preparing students to enter the rapidly changing fields of power and propulsion on the path to net-zero greenhouse gas emissions. Through thermodynamic modeling, systems engineering, and requirements flow-down, students will apply the fundamentals of thermodynamics, fluids and heat transfer, combustion and electrochemistry for fuel cells and IC Engines.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4012
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.

**MCEN 5014 (3) Energy Materials Characterization**
Introduces theoretical framework for characterization techniques including X-ray diffraction, X-ray photoelectron spectroscopy and imaging methods used in the structural and morphological characterization of energy materials. Helps students determine characterization techniques suitable for their study and understand their data. Uses energy storage case studies to provide the methodologies for determining the nature and composition of materials. Helps students learn new characterization techniques from the literature and seek the characterization resources from DOE funded user facilities.
**Requisites:** Restricted to graduate students in the College of Engineering and Applied Science or undergraduate Mechanical Engineering (MCEN) majors with 57+ credits (Junior or Senior).
**Recommended:** Prerequisite MCEN 1024 Chemistry or equivalent, and MCEN 2024 Materials Science or equivalent.

**MCEN 5020 (3) Methods of Engineering Analysis 1**
Studies selected topics from linear algebra, multi-variable calculus, differential equations, and Fourier series. Assigns computer exercises. Correlates with analysis topics in other mechanical engineering graduate courses, and emphasizes applications. Prior courses in Calculus I, II, II, differential equations, and linear algebra strongly recommend.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Math

**MCEN 5021 (3) Introduction to Fluid Dynamics**
Focuses on physical properties of gases and liquids, and kinematics of flow fields. Analyzes stress; viscous, heat-conducting Newtonian fluids; and capillary effects and surface-tension-driven flow. Other topics include vorticity and circulation, ideal fluid flow theory in two and three dimensions, Schwartz-Christoffel transformations, free streamline theory, and internal and free-surface waves.
**Requisites:** Requires corequisite course of MCEN 5020. Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Fluids

**MCEN 5022 (3) Classical Thermodynamics**
First and second laws of thermodynamics. Entropy and availability. Cycle analysis. Thermodynamic properties of pure substances and mixtures. Property relations. Chemical reactions and chemical availability. Energy systems analysis.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Thermal

**MCEN 5023 (3) Solid Mechanics 1**
Introduces stress, strain and motion of a continuous system. Discusses material derivative; fundamental laws of mass, momentum, energy and entropy; constitutive equations and applications to elasticand plastic materials.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 5012
**Requisites:** Requires coreq course of MCEN 5020. Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering (MCEN) majors only.
**Additional Information:** Departmental Category: Solids

**MCEN 5024 (3) Materials Chemistry and Structures**
Provides graduate level students with a comprehensive overview of the chemistry and structure of material systems, with a focus on chemical bonding., the resulting material structures and their properties. This course is intended to become one of the four core courses offered in the new Materials Science curriculum. Course topics include: bonding in solids, crystalline and amorphous states, basic group theory, diffraction, metals and alloys, ceramics, and an intro to mat. characterization.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Materials

**MCEN 5027 (1) Graduate Seminar**
Offers weekly presentations by visiting speakers, faculty, and students.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5030 (3) Introduction to Research**
Provides students with fundamental skills important for success in research. Covers approaches to generating project and program ideas, securing funding, performing a literature search to understand the state of a field, communicating results through presentations and papers, understanding scientific ethics, developing a network of trusted peers, establishing and negotiating collaborations, fostering diversity, ensuring equity and inclusivity, and establishing a professional profile and becoming a leader in your field.
**Requisites:** Restricted to undergraduate or graduate Mechanical Engineering students only.

**MCEN 5032 (3) Sustainable Energy**
Examines sustainability of our current energy systems, including transportation, using environmental and economic indicators. Uses systems analysis that addresses energy supply and demand. Explores the science and technology as well as environmental and economic feasibility of efficiency measures and renewable energy technologies. Additional emphasis is given to the global nature of the challenges and the potential for locally optimal solutions.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4032
**Requisites:** Restricted to graduate students in the College of Engineering and Applied Science or undergraduate Mechanical Engineering (MCEN) majors with 57+ credits (Junior or Senior).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Thermal

**MCEN 5034 (3) Thermodynamics of Materials**
Provides a unified presentation of fundamental concepts applicable to the thermodynamics of engineering materials. Develops quantitative tools for understanding the physical principles that govern phase equilibrium and transformation. Generates binary and ternary phase diagrams and determine the resulting materials structures and corresponding physical and mechanical properties.
**Recommended:** Prerequisites MCEN 2024 and MCEN 3012.
**Additional Information:** Departmental Category: Materials

**MCEN 5040 (3) Methods of Engineering Analysis 2**
Studies selected topics from the theory of complex variables, integral transform methods, partial differential equations, and variational methods. Assigns computer exercises. Correlates with analysis topics in other mechanical engineering graduate courses, and emphasizes applications.
**Requisites:** Requires prerequisite course of MCEN 5020 (minimum grade D-). Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Math

**MCEN 5041 (3) Advanced Fluid Mechanics 1**
Highlights exact solution of Navier-Stokes equations and fundamentals of rotating fluids. Considers Low Reynolds number flow; similarity solutions; viscous boundary layers, jets, and wakes; and unsteady viscous flow.
**Requisites:** Requires corequisite course of MCEN 5020. Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Fluids

**MCEN 5042 (3) Heat Transfer**
Studies development of equations governing transport of heat by conduction, convection, and radiation, and their solution. Includes analytical and numerical solution of initial and boundary value problems representative of heat conduction in solids. Describes heat transfer in free and forced convection, including laminar and turbulent flow. Also involves radiation properties of solids, liquids, and gases and transport of heat by radiation.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Thermal

**MCEN 5044 (3) Mechanical Behavior of Materials**
This introductory-level graduate course incorporates relevant aspects of materials science, solid mechanics, thermodynamics and mathematics, and applies them to achieve a fundamental understanding of the mechanical behavior of crystalline and non-crystalline engineering materials.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering (MCEN) majors only.
**Additional Information:** Departmental Category: Materials

**MCEN 5045 (3) Design for Manufacturability**
Topics include general design guidelines for manufacturability; aspects of manufacturing processes that affect design decisions; design rules to maximize manufacturability; economic considerations; value engineering and design for assembly. Presents case studies of successful products exhibiting DFMA principles. Prerequisite of MCEN 4026 required for undergraduate students.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering (MCEN) majors only.
**Additional Information:** Departmental Category: Materials

**MCEN 5055 (3) Advanced Product Design**
Introduces engineering design and development of consumer products. Includes learning sketching, brainstorming, idea generation, design thinking, user-centered design, product requirements and specifications, product constraints, human factors, aesthetics, industrial design, intellectual property, concept prototyping, idea selection, tolerancing, cost estimating, design for assembly, and materials selection. Entails a semester-long team re-design of a consumer product.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Design

**MCEN 5057 (3) Environmental Modeling**
Enables students to develop and evaluate pollutant transport, fate, exposure, and risk models for air, water, and multi-media systems, with a special emphasis on air. Emphasizes the fundamental physics and chemistry that govern contaminant fate and transport and the basic mathematical equations and numerical approaches for describing these processes.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4057
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5064 (3) Soft Machines**
Introduces soft machines as a new paradigm of engineering that starts to impact healthcare, consumer electronics, renewable energy and collaborative robotics. Prepares students to participate in research on soft machines by starting with fundamentals of soft materials and by covering soft robotics, stretchable electronics, energy harvesting and functional polymers. Includes guest lectures, a literature review and a hands-on lab project.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4046 and MSEN 5046
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechancial (MCEN) majors or College of Engineering graduate students only.
**Grading Basis:** Letter Grade

**MCEN 5065 (3) Graduate Design I**
First part of a two-course graduate product design experience in mechanical engineering. Covers problem definition and specifications, determining design requirements, user feedback, alternative design concepts, engineering analysis, concept prototypes and CAD drawings. Students make several oral design reviews, a final design presentation and prepare a written report. Entails a team product design, fabrication and testing cycle of sponsored project. Students who complete this course are encouraged to take MCEN 5075 Graduate Design II.
**Requisites:** Requires prerequisite course of MCEN 5055 (minimum grade C).
**Additional Information:** Departmental Category: Design

**MCEN 5075 (3) Graduate Design II**
Second part of two-course graduate product design experience in mechanical engineering. Includes refinement of prototype, design optimization, fabrication, testing, and evaluation. Students orally present the final design and prepare a written report and operation manual for the product. Entails a team product design, fabrication, and testing cycle of a sponsored project, leading to a fully-functional product.
**Requisites:** Requires prerequisite course of MCEN 5065 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Design

**MCEN 5110 (3) Regenerative Biology and Tissue Repair**
Presents the regenerative biology behind tissue systems, along with the regenerative medicine of that tissue with an emphasis on engineering principles, using the assigned reading as a guideline. Follows lectures with class discussions of current papers on the regenerative biology of the same tissue system. In the final 1 ¿ 2 classes assigned to this topic, individual graduate students give 20 min presentations on a relevant regenerative medicine/engineering-focused paper.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 5110, BMEN 4110, and MCEN 4110
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.

**MCEN 5111 (3) Introduction to Microfluidics**
Microfluidics deals with the behavior of fluids in small scale. It is a highly multidisciplinary field at the intersection of engineering, physics, chemistry, biology, medicine, nanotechnology, and biotechnology. This course covers the fundamentals and fabrication of microfluidic devices and their applications, particularly in lab-on-a-chip. Includes lectures, literature discussion, team presentations, and possibly one lab on microfluidic devices. Enhances your understanding of microfluidic technologies and their broad applications.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 5111 and MCEN 4111 and BMEN 4111
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Recommended:** Prerequisite MCEN 3021 or CHEN 3200 or CVEN 3313.

**MCEN 5112 (3) Introduction to Nanoscale Transport**
Introduces the basic concepts, theoretical methods, and experimental techniques related to nanoscience and nanoengineering that are ubiquitous in microelectronics, renewable energy technology, heat transfer, nano-optics, MEMS/NEMS, and emerging quantum technologies. Discusses microscopic pictures and theories of various energy transport and conversion phenomena and real-world examples and demonstrations.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4112
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors with 57+ credits only.

**MCEN 5113 (3) Mechanics of Cancer**
Cancer is considered to be an organ or an ecosystem, in which a critical component of the tumor microenvironment is mechanical forces. This course will cover the role of mechanics in cancer and cancer-related processes, with a focus on solid mechanics and fluid mechanics. In this course, you will apply engineering principles to come away with an appreciation of how mechanics influences cancer and its etiology as well as the development of future treatments.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 5113 and BMEN 4113 and MCEN 4113
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical and Biomedical Engineering undergraduate majors only.

**MCEN 5115 (3) Mechatronics and Robotics I**
Focuses on design and construction of microprocessor-controlled electro-mechanical systems. Lectures review critical circuit topics, introduce microprocessor architecture and programming, discuss sensor and actuator component selection, robotic systems and design strategies for complex, multi-system devices. Lab work reinforces lectures and allows hands-on experience with robotic design. Students must design and build an autonomous robotic device. Project expenses may be incurred ($50 maximum).
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4115
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Design

**MCEN 5117 (3) Anatomy and Physiology for Engineers**
Explores human physiological function from an engineering, specifically mechanical engineering, viewpoint. Provides an introduction to human anatomy and physiology with a focus on learning fundamental concepts and applying engineering (mass transfer, fluid dynamics, mechanics, modeling) analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 4117 and BMEN 5117 MCEN 4117
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5118 (3) Mechanics of Snow**
This course covers the composition, structure and mechanics of ice and snow, from plasticity of ice at the atomic scale, to snowflakes and snow metamorphism, to fracture mechanics and avalanches in large snow slabs. Experiments and models (micromechanics, fracture mechanics) applied to ice and snow are reviewed. Fundamental knowledge is applied to predicting the mechanical strength and reliability of different types of snow. Assessment is largely based on in-class activities, and on a final project.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4118
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors with 57+ credits only.
**Recommended:** Prerequisite 2063 Mechanics of Solids or equivalent.

**MCEN 5121 (3) Compressible Flow**
Applies energy, continuity, and momentum principles to compressible flow. Topics include normal and oblique shocks; Prandtl-Meyer expansion; methods of characteristics; and one-, two-, and three-dimensional subsonic, supersonic, and hypersonic flows.
**Requisites:** Requires prerequisite course of MCEN 5021 (minimum grade D-). Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Fluids

**MCEN 5122 (3) Statistical Thermodynamics**
Axiomatic formulation of macroscopic thermodynamics. Quantum mechanical description of atomic and molecular structure. Statistical mechanics description of thermodynamic properties of gases, liquids and solids. Elementary kinetic theory of gases and evaluation of transport properties. Department enforced requisite: undergraduate thermodynamics.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Thermal

**MCEN 5125 (3) Optimal Design**
Focuses on linear optimization and will introduce non-linear optimization. Formulating engineering applications as optimization problems that can be solved using industry known solvers will be learned. Some of these applications will include minimum cost mechanical design, wind farm power maximization, minimum energy control, production control, and more. Previous programming experience required.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4125
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Design

**MCEN 5127 (3) Biomedical Ultrasound**
Covers the design of ultrasound systems for medical imaging and therapy, including the physics of wave propagation, transducers, pulse-echo imaging, flow, tissue characterization, and microbubble contrast, with an emphasis on current topics in biomedical ultrasound. Includes lectures on theory, practice and special topics; a laboratory on wave propagation; oral presentations on current literature; signal processing exercises; and a team project. Some experience with MATLAB is strongly encouraged for exercises throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 5127 and MCEN 4127 and BMEN 4127
**Requisites:** Restricted to graduate students in the College of Engineering and Applied Science or undergraduate Mechanical Engineering (MCEN), Biomedical Engineering (BMEN), and Environmental Engineering (ECEN) majors with 57+ credits (Junior or Senior).
**Recommended:** Prerequisite MCEN 4043 System Dynamics or equivalent.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5131 (3) Air Pollution Control Engineering**
Introduces air quality regulations, meteorology and modeling. Examines methods for controlling major classes of air pollutants, including particulate matter and oxides of sulfur and nitrogen, as well as control technology for industrial sources and motor vehicles. Requires interdisciplinary design projects.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 5131 and MCEN 4131 and EVEN 4131
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering or Environmental Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Fluids

**MCEN 5133 (3) Intro to Tissue Biomechanics**
Focuses on developing an understanding of the fundamental mechanical principles that govern the response of hard and soft biological tissue to mechanical loading. Specifically, covers mechanical behavior of biological materials/tissues, classical biomechanics problems in various tissues, the relationship between molecular, cellular and physiological processes and tissue biomechanics and critical analysis of related journal articles.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4133 and BMEN 5133
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical and Biomedical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Materials

**MCEN 5135 (3) Wind Energy and Wind Turbine Design**
Focuses on understanding and applying principles related to current wind energy technologies. Students will apply technical coursework from throughout the engineering curriculum (environmental, fluids, statics, dynamics, power, economics, etc.) to the process of designing wind turbines and wind farms. Practical, real world examples will be integrated into the lessons and problems.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4135
**Requisites:** Restricted to Mechanical (MCEN), Civil (CVEN) or Aerospace (ASEN) Engineering graduate students only or Mechanical (MCEN) undergraduates with 57+ credits (juniors and seniors).
**Additional Information:** Departmental Category: Design

**MCEN 5137 (3) Anatomy and Physiology 2**
Provides in-depth understandings of anatomy and physiology as well as introductions to transport phenomena, flow mechanics and solid mechanics in several organ systems: the cardiovascular, pulmonary, kidney, endocrine and digestive systems. Introduces artificial physiological systems to replace or assist physiological functions and introduce the concepts of physiological barriers that prevent diagnosis or effective therapeutics.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4137
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5138 (3) Control Systems Analysis**
Introduction to fundamental principles and techniques for analysis and synthesis of feedback control systems in the time and frequency domains. Laplace transforms, transfer functions and block diagrams. Stability, dynamic response, and steady-state analysis. Analysis and design of control systems using root locus and frequency response methods. Computer aided design and analysis. Introduction to state space representations and state feedback control.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 4114 and ASEN 5114 MCEN 4138 and ECEN 4138 and ECEN 5138
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Recommended:** Prerequisite MCEN 4043 or comparable knowledge gained through outside coursework.

**MCEN 5141 (3) Indoor Air Pollution**
Describes the impact of indoor air pollutants on human health, including an introduction to key pollutants and their sources. Students will estimate emission factors, calculate generation/ventilation rates, quantify the impact of deposition and chemical reactions and explore relevant control technology. Current issues will also be addressed, including climate change, green building design, economic concerns and relevance to the developing world.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 5141, MCEN 4141, and EVEN 4141
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering or Environmental Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Fluids

**MCEN 5147 (3) Mechanobiology**
Studies how mechanical forces modulate the morphological and structural fitness of biological tissues. Current molecular mechanisms by which cells convert mechanical stimulus into chemical activity and the literature supporting them will be discussed. Students will acquire an understanding and expertise from the analysis of primary literature and completion of a synthesis project.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechancial (MCEN) majors or College of Engineering graduate students only.
**Grading Basis:** Letter Grade

**MCEN 5151 (3) Flow Visualization**
Explores techniques for the visualization of the physics of fluid flows including seeding with dyes, particles and bubbles, and shadowgraphy and schlieren. Reviews optics and fluid physics, especially atmospheric clouds. Assignments are student-driven, to individuals and mixed teams of graduates, undergraduates, engineering majors and photography/video majors.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4200 MCEN 4151, ARTF 5200, ATLS 4151 and ATLS 5151
**Additional Information:** Departmental Category: Fluids

**MCEN 5152 (3) Introduction to Combustion**
Focuses on the mechanisms by which fuel and oxidizers are converted into combustion products. Application to practical combustion devices such as Otto, Diesel, gas turbine and power plant combustion systems. Consideration of combustion-generated air pollution, fire safety and combustion efficiency.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4152
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Thermal

**MCEN 5153 (3) Introduction to Fracture Mechanics**
This course will introduce fundamental concepts, analytical approaches, and experimental methods to characterize the fracture of solid materials. Topics to be discussed include: linear elastic analysis of 2D cracks, energy flows and criteria for elastic fracture, experimental methods for elastic fracture, application of fracture mechanics in adhesion, introduction to elastic plastic fracture, and nonlinear fracture mechanics of soft materials.
**Requisites:** Requires prerequisite course of MCEN 2063 or CVEN 3161 or MCEN 5023 or ASEN 5012 (all minimum grade C).

**MCEN 5154 (3) Biocolloids and Biomembranes**
Covers the thermodynamics and mechanics of biological membranes and biomedical colloids. Considers intermolecular and surface forces, self-assembly and colloidal stability. Addresses structure-property relationships and design principles for biomedical applications. Focuses on monolayers, bilayers, micelles, filomicelles, liposomes, polymersomes, emulsions, microbubbles, polyplexes and polyelectrolyte multilayer capsules.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4154
**Recommended:** Prerequisites APPM 2360 and PHYS 1120.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Materials

**MCEN 5155 (3) Automated Mechanical Design Synthesis**
Introduces computational approaches to automatically generate complex multimaterial mechanical designs that satisfy predefined high-level specifications, discusses algorithms to solve design as a constrained non-convex multi-objective optimization problem. Topics: expert-driven design process; computational analysis tools based on mechanical simulation (finite element methods, mesh-free methods); topological optimization; compositional design; multi-objective optimization; evolutionary design; design for manufacturing with additives (FDM, SLA, Inkjet). Students design a part to specifications, fabricate using advanced (3D printing, laser cutting, CNC, etc) tools.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4155
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Recommended:** Prerequisite students should be comfortable with MATLAB, PDEs, linear algebra, free body diagrams, mechanical modeling/design; exposure to finite-element modeling and state-space representations.

**MCEN 5157 (3) Modeling of Human Movement**
Human movement analysis is used in physical rehabilitation, sport training, human-robot interaction, animation, and more. Course provides a systematic overview of human movement on multiple levels of analysis, with an emphasis on the phenomenology amenable to computational modeling. Covers muscle physiology, movement-related brain areas, musculoskeletal mechanics, forward and inverse dynamics, optimal control and Bayesian inference, learning and adaptation. Inspires students to see and appreciate the complexities of movement control in all aspects of daily life.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 5157 and MCEN 4157 and BMEN 4157
**Requisites:** Restricted to graduate students in the College of Engineering and Applied Science or undergraduate Mechanical Engineering (MCEN) and Biomedical Engineering (BMEN) majors with 57+ credits (Junior or Senior).

**MCEN 5161 (3) Aerosols**
Introduces atmospheric aerosols and properties of their distributions, followed by fundamental descriptions of single particle dynamics, thermodynamics, nucleation, coagulation, mass transfer and populations dynamics. During the second half of the course, the focus will shift to sources and sinks of atmospheric aerosols, their impacts on atmospheric chemistry and radiation, and the impacts of these processes on air quality and climate.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Fluids

**MCEN 5171 (3) Biofluids on the Micro Scale**
Introduces fundamental physical concepts and basic mechanisms of biological fluids in microscale. Elaborates on the application of fluid mechanics principles to major biological systems, including human organ systems and animal locomotion in microscale. Covers physiologically relevant fluid flow phenomena on the cellular level and the underlying physical mechanisms from an engineering perspective. Related state-of-art technologies such as organ-on-a-chip and micro/nano fabrication will be emphasized. Will enhance your understanding of organ-on-a-chip technologies and their broad applications.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 5171 and MCEN 4171 and BMEN 4171
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering or Biomedical Engineering undergraduate majors with 57+ credits.

**MCEN 5173 (3) Finite Element Analysis**
Introduces the theory behind and applications of the finite element method as a general and powerful tool to model a variety of phenomena in mechanical engineering. Applications include structural mechanics, mechanics of elastic continua and heat conduction.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4173
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Solids

**MCEN 5174 (3) Failure of Engineering Materials**
Examines the fundamental concepts regarding the failure of engineering materials. Case studies are used to integrate a basic understanding of material failure mechanisms with analysis techniques and tools. Topics include the elastic properties (isotropic and anisotropic materials) and the origin of elastic behavior, viscoelasticity, plasticity (dislocation mechanisms, yielding criteria, strengthening mechanisms), creep, fracture and fatigue.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4174
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Materials

**MCEN 5183 (3) Mechanics of Composite Materials**
Introduces various kinds of composite materials, composite fabrication techniques, the physical and mechanical behavior of composites, and analytical and experimental methodologies.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4183
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Solids

**MCEN 5193 (3) Design of Coffee**
Serves as an introduction to how engineers use their disciplinary training to approach and solve problems outside of the traditional confines of their discipline, as illustrated by the roasting and brewing of coffee. In addition to focusing on the science, engineering and craftsmanship of making a cup of coffee from bean to cup, we will also study the global sourcing and sustainability aspects of coffee.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4193
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.

**MCEN 5194 (3) Electrochemical Energy Conversion and Storage**
Presents the fundamentals, principles and experimental techniques of electrochemistry, the background of ionic or electronic conduction of metal, semiconductor, inorganic and polymer materials and applications in the areas of batteries, fuel cells, electrochemical double layer capacitors, electrochemical photonics, sensors and semiconductor electrochemistry.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4194
**Recommended:** Prerequisites MCEN 2024 and MCEN 3032.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Materials

**MCEN 5195 (3) Bioinspired Robotics**
Bioinspired design views the process of how we learn from nature as an innovation strategy translating principles of function, performance, and aesthetics, from biology to human technology. The creative design process is driven by interdisciplinary exchange among engineering, biology, medicine, art, architecture and business. Diverse teams of students will collaborate on, create, and present original bioinspired design projects in the ITLL.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4195, BMEN 4195, and BMEN 5195
**Requisites:** Restricted to graduate students in the College of Engineering and Applied Science or undergraduate Mechanical Engineering (MCEN) majors with 57+ credits (Junior or Senior).
**Recommended:** Prerequisite MCEN 3017 and MCEN 3025 or comparable electronics and design knowledge.

**MCEN 5208 (1-4) Special Topics**
Credit hours and subject matter to be arranged.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to undergraduate or graduate Mechanical Engineering students only.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5215 (3) Design for Inclusion**
Examines the ways technologies like apps, products, public infrastructures and educational systems have excluded the needs of certain user groups while optimizing for others. Explores design approaches including universal design, humanitarian engineering, and culturally responsive design through multiple hands-on projects with the goal of equipping all to become more capable designers for inclusion rather than exclusion.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4215
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors with 87+ credits only.

**MCEN 5228 (1-4) Special Topics in Mechanical Engineering**
Subject matter to be selected from topics of current interest.
**Repeatable:** Repeatable for up to 30.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students in the College of Engineering and Applied Science or undergraduate Mechanical Engineering (MCEN) majors with 57+ credits (Junior or Senior).
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5231 (3) Computational Fluid Dynamics**
This course is an in-depth introduction to the basic principles and applications of computational fluid dynamics (CFD). Students learn about fundamental CFD concepts such as discretization, meshing, error and accuracy; and focus on computational solutions of flow and transport problems using the finite element method. Students conduct multiple hands-on simulation-based activities and exercises on canonical and realistic engineering flow/transport problems. Final project for the course culminates in a mini-conference/symposium where students present their work.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 5231 and MCEN 4231 and BMEN 4231
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.

**MCEN 5255 (3) Design for Mfg**
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Design

**MCEN 5258 (1-3) Sp Tpcs-Combustion Seminar**
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Special Topics

**MCEN 5279 (3) Aesthetics in Design**
Focuses on aesthetic aspects of design via hands-on design-build experiences. Students individually create dynamic artifacts of their own choice with the assistance of teammates. Content includes major design movements since 1900, constructive critique practice, hand sketching techniques and other selected industrial design topics. Students publish their design work on an archival public blog which provides a professional portfolio element.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5279 and MCEN 4279 and ATLS 4279
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.

**MCEN 5291 (1-2) Project Based Learning in Rural Schools**
Focuses on the use of low cost air quality monitoring tools, dubbed Pods, to implement PBL curriculum in high school environmental science classes in rural communities in Colorado. Each student will be paired with a high school class and will serve as curriculum and technology advisors as well as science experts. During the fall semester, students will be trained to effectively work in those roles and will also travel to their schools to be introduced. During the spring semester, students will support high school teachers in implementing an existing PBL air quality curriculum with the Pods. This will include monthly visits to schools in the spring and reporting back to the class. Enrollment during Fall is required for enrollment during Spring. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4291
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students and undergraduates with 57+ credits (juniors and seniors).

**MCEN 5292 (3) Materials and Devices in Medicine**
The main objective of this multidisciplinary course is to provide students with a broad survey of biomaterials and their use in medical devices for restoring or replacing the functions of injured, diseased, or aged human tissues and organs. The topics to be covered include: evolution in the medical device industry, a broad introduction to the materials used in medicine and their chemical, physical, and biological properties, discovery of medical problems, potential impacts of treatment innovations, existing devices and design considerations for several major physiological systems (cardiovascular, neuromuscular, skeletal, pulmonary, renal, dermal), materials interaction with the human body, basic mechanisms of wound healing, biocompatibility issues, testing methods and techniques in accordance with standards and relevant regulations, biofunctionalities required for specific applications, as well as state-of-the-art approaches for the development of new regenerative materials targeting cellular mechanisms. Rec
**Requisites:** Requires prerequisite course of MCEN 4117 or MCEN 5117 (minimum grade C). Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.

**MCEN 5293 (3) Mechanics of Soft Matter**
Provides a general overview of fundamental concepts behind the mechanical behavior of soft matter. The term soft matter (which includes polymers, colloids, liquid crystals and surfactants, to name a few) is typically used to describe classes of materials whose structural unit is much larger than atoms, making their response more complex and often richer that of traditional solids. The objective of this class is to understand how chemical and mechanical forces between these small units yield macroscopic behaviors that one can observe in everyday life. Key engineering applications will also be discussed.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4293
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Recommended:** Prerequisite knowledge comparable to that gained through MCEN 2063.

**MCEN 5298 (3) Introduction to Polymers**
Polymers represent a major class of engineering materials that are used by mechanical engineers. In this class, we will discuss the most fundamental concepts regarding polymeric materials. Topics include synthesis/manufacturing and chemical properties of polymers, statistical properties of polymer chains, multiphase polymers including polymer solutions and polymer blends, crystallization and glass transition of polymers, and viscoelastic properties of polymers.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4298
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Recommended:** Prerequisite knowledge comparable to that gained through MCEN 2024.

**MCEN 5299 (3) Household Energy Systems**
Cooking, heating and lighting in the developing world often involves inefficient and incomplete combustion of solid or liquid fuels. The Global Burden of Disease Study in 2010, ranked this combustion as the 4th largest risk factor, causing 4 million premature deaths per year. There is a strong societal need to tackle this problem. Students leaving this course will be able to meet this need as they will have the skills to assess existing and new technology used in the developing world for cooking, heating and lighting. The course will cover (1) food conversion chemistry with the focus on increasing useable calories, (2) combustion and heat transfer as related to cooking, heating and lighting, and (3) combustion emissions and stove use assessment. There will be case studies interlaced throughout the content and the bulk of the workload will be homeworks and projects. Recommended prerequisite: knowledge comparable to that gained through MCEN 3022 or concurrent enrollment in MC
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering or Environmental Engineering undergraduate majors only.

**MCEN 5448 (3) Linear Control Systems**
Introduces the theory of linear systems, including state space descriptions of dynamic systems, linear spaces, linear mappings, structure of linear operators, stability, controllability, observability, state variable estimation and feedback control methods.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5448 and ASEN 5014
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Recommended:** Prerequisite MCEN 4138 or MCEN 5138 and strong foundational knowledge of linear algebra and differential equations.

**MCEN 5488 (3) Geometric Control Theory**
Introduce geometric approaches to study dynamical control systems over manifolds. Cover fundamental control-theoretical results, such as controllability, observability, feedback stabilizability, symmetries and group actions, that are beyond linear control systems. Establish connections between control theory and mathematics, especially topology, differential geometry, Lie groups and Lie algebras. Final project focuses on engineering applications related to students¿ own research interests.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5488

**MCEN 5498 (3) Stochastic Control Theory**
Introduce a toolbox for dealing with stochastic control systems. Cover topics such as stochastic calculus, linear and nonlinear filtering, and dynamic programming. Discuss system theoretic issues and derive optimal control laws for a variety of stochastic control problems, including, e.g., the separation principle for Linear-quadratic-Gaussian problems. Final project focuses on engineering applications related to students¿ own research interests.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5498

**MCEN 5636 (3) Micro-Electro-Mechanical Systems 1**
Addresses issues of micro-electro-mechanical systems (MEMS) modeling, design, and fabrication. Emphasizes the design and fabrication of sensors and actuators due to significance of these devices in optics, medical instruments, navigation components, communications, and robotics. Department consent required.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Manufacturing and Systems

**MCEN 5638 (3) Control Systems Laboratory**
Provides experience in control system design and analysis, using both real hardware and computer simulation. Covers the entire control system design cycle: modeling the system, synthesizing a controller, conducting simulations, analyzing the design to suggest modifications and improvements, and implementing the design for actual testing.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4638, MCEN 4638, and ECEN 5638
**Requisites:** Requires prerequisite course of ECEN/MCEN 4138/5138 (minimum grade D-). Restricted to graduate students only.

**MCEN 5738 (3) Nonlinear Control Systems**
Nonlinear systems and control. Introduction to nonlinear phenomena: multiple equilibria, limit cycles, bifurcations, complex dynamical behavior. Planar dynamical systems, analysis using phase plane techniques. Input-output analysis and stability. Passivity. Lyapunov stability theory. Feedback linearization. Exploration of examples and applications. Formerly ECEN 7438.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5738 ASEN 6024
**Requisites:** Requires prerequisite course of ECEN 5448 (minimum grade C-). Restricted to graduate students only.
**Recommended:** Prerequisite knowledge in differential equations.

**MCEN 5832 (3) Special Topics**
**Additional Information:** Departmental Category: Special Topics

**MCEN 5848 (1-6) Independent Study**
Available only through approval of graduate advisor. Subjects arranged to fit the needs of the particular student. May be repeated for up to 6 total credits.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering graduate students only.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5858 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5868 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5878 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5888 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5930 (1-3) Professional Internship**
This class provides a structure for Mechanical Engineering graduate students to receive academic credit for internships with industry partners that have an academic component to them suitable for graduate-level work. Participation in the program will consist of an internship agreement between a student and an industry partner who will employ the student in a role that supports the academic goals of the internship. Instructor participation will include facilitation of mid-term and final assessments of student performance as well as support for any academic-related issues that may arise during the internship period. May be taken during any term following initial enrollment and participation in ME graduate programs. Department permission required to enroll.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Mechanical Engineering graduate students only.

**MCEN 6001 (3) Reacting Flows**
Provides an introduction to reacting flows and combustion. Covers chemical kinetics, including global and detailed mechanisms and the variable density flow equations are derived. Relevant non-dimensional parameters and limiting behaviors are discussed. The Rankine-Hugoniot relations are presented and various aspects of diffusion, kinetically dominated and balanced combustion are outlined. Flame structures are discussed, including laminar and turbulent flames, and the Burke-Schumann solution is outlined. The turbulent forms of the motion equations are derived, and the reactive scalar transport equation and mixture fraction variable are presented. The flamelet progress variable approach is outlined, including a comparison of steady and unsteady flamelet models. Specific topics in spray combustion, triple flames, solid-gas reactors and detonations are discussed.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 6001
**Requisites:** Requires prerequisite course of MCEN 5021 (minimum grade C-). Restricted to College of Engineering and Applied Science graduate students or BS/MS Concurrent Degree Students only.
**Additional Information:** Departmental Category: Fluids

**MCEN 6184 (3) Structure and Properties of Polymers**
Emphasizes the relationships between molecular structures and macroscopic properties of polymers. Structural aspects include chain conformation, configuration, and the crystalline and amorphous states. Discusses physical, mechanical and dynamic properties with a focus on solution and phase behavior, transitions of bulk polymers, and rubber and viscoelastic behavior.
**Requisites:** Restricted to College of Engineering graduate students only.
**Recommended:** Prerequisite an intro-level polymer course.
**Additional Information:** Departmental Category: Materials

**MCEN 6228 (1-4) Special Topics in Mechanical Engineering**
Subject matter to be selected from topics of current interest.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering graduate students only.
**Additional Information:** Departmental Category: Special Topics

**MCEN 6848 (1-6) Independent Study**
Available only through approval of graduate advisor. Subjects arranged to fit the needs of the particular student.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 6858 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 6868 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 6878 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 6888 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 6949 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Additional Information:** Departmental Category: Thesis

**MCEN 6959 (1-6) Master's Thesis**
**Additional Information:** Departmental Category: Thesis

**MCEN 7221 (3) Turbulence**
Hydrodynamic stability theory, equations for turbulent flows, free shear flows and boundary layers, homogeneous and isotropic turbulence, overview of turbulent combustion, reaction kinetics, energy equation, Favre averaging, Pdfs, premixed and nonpremixed flame modeling, and recent developments.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Fluids

**MCEN 7228 (3) Special Topics**
**Additional Information:** Departmental Category: Special Topics

**MCEN 8999 (1-10) Doctoral Dissertation**
**Additional Information:** Departmental Category: Thesis

# Mechanical Engineering - Master of Science (MS)

The Master of Science Thesis is a degree program that is well suited for students pursuing a career in academia or industry with a research component. MS Thesis students may choose from focus areas including (but not limited to) air quality, biomedical, design, energy and environment, materials, mechanics of materials, microsystems, and robotics/control. Students declare the MS Thesis program only after confirmation of a faculty member willing to serve as their thesis advisor. With support from the thesis advisor, students in this program have the option of smoothly transitioning into the PhD program.

If a student plans to earn a master's degree and then immediately continue on to a PhD, they can apply directly to the PhD program (p. 1765); it is not necessary to earn a master's degree separately.

For more information, visit the department's Master of Science Thesis (https://www.colorado.edu/mechanical/academics/ms-programs/master-science-thesis-program/) webpage.

## Requirements

Students must complete at least 30 graduate-level credit hours, to include at least 18 credits in mechanical engineering, including 6 credits of thesis work. Students must also take MCEN 5020 Methods of Engineering Analysis 1 (3) and MCEN 5030 Introduction to Research (3). Up to 12 credits may be taken outside of the department. To have courses count towards the degree, they must be numbered 5000-level or above secure a thesis advisor for research and earn a C or above.

Students must secure a thesis advisor for research and course guidance. Submission of thesis and successful defense of thesis required. Please see Graduate School Rules (https://www.colorado.edu/graduateschool/faculty-staff/policies-procedures/rules/graduate-education/thesis-dissertation-requirements/) for information.

For more information, visit the department's Master of Science Thesis (https://www.colorado.edu/mechanical/academics/ms-programs/master-science-thesis-program/) webpage.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MCEN 5030 | Introduction to Research | 3 |
| MCEN 5020 | Methods of Engineering Analysis 1 | 3 |
| MCEN 6959 | Master's Thesis | 6 |
| Mechanical engineering (MCEN) graduate-level (5000-level or higher) courses | | 6 |
| **Elective Courses** | | |
| 5000-level or higher graduate-level courses from any department (MCEN or otherwise) [1] | | 12 |
| **Total Credit Hours** | | **30** |

[1] Approval to enroll in non-MCEN courses is at the discretion of the department offering the course. Approval is not guaranteed.

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate working knowledge of core theoretical concepts utilized within the discipline of mechanical engineering, including opportunities for hands on and/or virtual learning.
- Design and conduct high-quality original research.
- Demonstrate expertise in the history of the development of knowledge in the discipline, proficiency with current research methodologies, formulation of well-posed research plans, and appreciation of their work's (field's) potential impact on areas such as human health, security and sustainability. Exposure to experts in the field.
- Effectively communicate and present disciplinary knowledge and research to academic and public audiences in written, visual and/or oral form that may include peer reviewed journal articles and/or conference proceedings.

# Mechanical Engineering - Professional Master of Science (MSME)

The Master of Science Professional is a degree program that offers possibilities for a wide range of prospective students. This coursework-focused degree program emphasizes both project-based and curriculum-driven learning. It is targeted at working engineers and undergraduates considering, or already pursuing, a career in industry, but can also be completed with the ultimate goal of matriculating in a PhD program.

A thesis is not required to earn this degree. If a student plans to earn a master's degree and then immediately continue on to a PhD, they can apply directly to the PhD program (p. 1765); it is not necessary to earn a master's degree separately.

For more information, visit the department's Master of Science Professional (https://www.colorado.edu/mechanical/current-students/graduate/master-science-professional/) webpage.

# Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s):

- Mechanical Engineering - Bachelor of Science (BSME) (https://catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/mechanical-engineering/mechanical-engineering-bachelor-science-bsme/)
- Environmental Engineering - Bachelor of Science (BSEV) (https://catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/civil-environmental-architectural-engineering/environmental-engineering-bachelor-science-bsev/#acceleratedmasterstext)
- Integrated Design Engineering - Bachelor of Science (BSIDE) (p. 1016)

# Requirements

The Master of Science Professional is a degree program that offers possibilities for a wide range of prospective students. It emphasizes project-based and curriculum-driven learning and is targeted for working engineers and undergraduates considering a career in industry.

This program offers courses in five focus areas, including a flex option that allows students to combine courses across the academic spectrum to meet their specific needs.

Students must complete at least 30 graduate-level credit hours, to include at least 18 credits in mechanical engineering. Students must take MCEN 5000 Sociotechnical Industry Skills as a part of the professional degree requirements. Up to 12 credits may be taken outside of the department. To have any course count towards the MS degree, they must be numbered 5000-level or above and earn a C or above. Students must have a 3.0 cumulative GPA or higher to graduate and to stay in good academic standing. A thesis is not required for this degree.

For more information, visit the department's Master of Science Professional (https://www.colorado.edu/mechanical/current-students/graduate/master-science-professional/) webpage.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MCEN 5000 | Sociotechnical Industry Skills | 3 |
| Graduate courses (5000-level or higher) in MCEN | | 15 |
| **Elective Courses** | | |
| Graduate courses (5000-level or higher) from any department, MCEN or otherwise [1] | | 12 |
| **Total Credit Hours** | | **30** |

[1] Approval to enroll in non-MCEN courses is at the discretion of the department offering the course. Approval is not guaranteed.

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate working knowledge of core theoretical concepts utilized within the discipline of mechanical engineering, including opportunities for hands on and/or virtual learning.
- Demonstrate knowledge of the professional field of mechanical engineering, identify career goals and interact with alumni in the field of mechanical engineering, use effective communication to work collaboratively with others, integrate ethical thinking into engineering decision-making process, exhibit leadership behaviors, and work productively with a team to move toward common goals.

# Mechanical Engineering - Doctor of Philosophy (PhD)

Mechanical engineering PhD students at CU Boulder take part in cutting edge, tier-one research, learning from nationally and internationally recognized faculty.

Our research harnesses state-of-the-art experimental, theoretical and computational approaches to expand the frontiers of technology, while advancing fundamentals in the underlying disciplines of fluid and solid mechanics, thermal engineering and materials science and engineering.

PhD students choose from focus areas in air quality, biomedical, design, materials, mechanics of materials, micro/nanoscale, robotics and systems design, and thermo fluid sciences.

The PhD program in mechanical engineering is available to students entering graduate studies for the first time as well as those who already have a master's degree. While a master's is not required to enroll, our PhD students will typically earn one on the way to a PhD. The best way to do that is by following an MS thesis curriculum (see the department's Master of Science - Thesis Option (http://www.colorado.edu/mechanical/prospective-students/graduate/master-science-thesis-option/) webpage).

PhD students consult with a faculty advisor throughout the duration of their degree to review their research progress and course selection.

For more information, visit the department's PhD (http://www.colorado.edu/mechanical/prospective-students/graduate/phd/) webpage.

# Requirements

## Course Requirements

The PhD requires a minimum of 30 credit hours of coursework in courses numbered 5000 or above, with a minimum GPA of 3.25, plus 30 credit hours of dissertation credit. More coursework may be required at the faculty advisor's discretion.

A maximum of 21 credit hours of graduate coursework may be transferred from another accredited institution. All courses taken for the

master's degree at the 5000 level or above at CU Boulder may be applied toward the doctoral degree at the university.

PhD students choose from focus areas in air quality, biomedical, materials, mechanics of materials, micro/nanoscale, robotics and systems design, and thermo fluid sciences.

For more information, visit the department's PhD (http://www.colorado.edu/mechanical/prospective-students/graduate/phd/) and Focus Areas (http://www.colorado.edu/mechanical/research/focus-areas/) webpages.

### Preliminary Examination

Every student desiring to pursue the PhD degree must pass a preliminary examination. As a part of this evaluation, students must pass two oral examinations designed to test research and fundamental mechanical engineering competency. Students must also pass a research presentation given to a committee of at least three faculty members. Overall performance in the required examinations will determine pass/fail status.

### Comprehensive Examination

After passing the preliminary examination, students continue their coursework and prepare a written thesis prospectus. When ready, they take an oral comprehensive examination covering the graduate coursework and the thesis prospectus. The oral examination is based primarily on a written proposal for the thesis research provided by the student to committee members in advance. This examination is conducted before the student's doctoral committee of five or more graduate faculty members chosen by the student and approved by the department and the Graduate School.

### PhD Dissertation

Students must write a dissertation based on original research conducted under the supervision of a graduate faculty member. The dissertation must fulfill all Graduate School requirements. After the dissertation is completed, an oral final examination on the dissertation and related topics is conducted by the student's doctoral committee.

### Time Limit

All requirements for the mechanical engineering PhD must be completed within six years of the date of commencing coursework.

## Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate working knowledge of core theoretical concepts utilized within the discipline of mechanical engineering.
- Demonstrate expertise in background knowledge in the discipline, proficiency with current research methodologies, formulation of well-posed research plans including potential team collaboration, and appreciation of their work's (field's) potential impact on areas such as human health, security, and sustainability.
- Design and conduct high-quality original research.
- Effectively communicate and present disciplinary knowledge and research to academic and public audiences in written, visual, and oral form including peer reviewed journal articles and/or conference proceedings.
- Develop and apply effective engineering pedagogy, and prepare for roles as potential educators and mentors.

# Biomedical Engineering - Graduate Certificate

The graduate certificate in biomedical engineering trains next-generation professional engineers to interface engineering and medicine with design and problem solving to improve human health.

- Apply knowledge and skills to a broad range of biomedical fields, from the establishment of disruptive imaging technologies or fabrication of new biomimetic tissue replacements to conception of innovative medical devices.
- Engage with clinical, veterinary, and entrepreneurial partners at cutting edge institutions along the Front Range such as Anschutz Medical Campus, Colorado State University for veterinary medicine and local companies, such as Allosource, Medtronic and Terumo, among others.
- Gain unique experience in translational and applied medicine.

## Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

## Requirements

### Admission Requirements

Applicants who are not degree-seeking students at the university may apply for a graduate certificate through Continuing Education by submitting a Nondegree Graduate Certificate Application (https://ce.apply.colorado.edu/register/nondegree_grad_cert_app/). Eligible candidates must hold an undergraduate degree in engineering, sciences or mathematics from an institution accredited by an agency recognized by the U.S. Department of Education. Our preferred minimum GPA is 3.0.

Internal applicants who are enrolled bachelor's–accelerated master's (BAM) who are at graduate standing or graduate students at CU Boulder in engineering, sciences or mathematics and have a 3.0 cumulative GPA or higher are eligible to apply. We accept applications on a rolling basis.

For more information on applying, visit the department's graduate certificates (https://www.colorado.edu/mechanical/academics/graduate-certificates/) webpage or contact megrad@colorado.edu.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| MCEN 5110 | Regenerative Biology and Tissue Repair | 3 |
| MCEN 5111 | Introduction to Microfluidics | 3 |
| MCEN 5117 | Anatomy and Physiology for Engineers | 3 |
| MCEN 5127 | Biomedical Ultrasound | 3 |
| MCEN 5113 | Mechanics of Cancer | 3 |
| MCEN 5133 | Intro to Tissue Biomechanics | 3 |
| MCEN 5147 | Mechanobiology | 3 |
| MCEN 5157 | Modeling of Human Movement | 3 |
| MCEN 5171 | Biofluids on the Micro Scale | 3 |
| MCEN 5195 | Bioinspired Robotics | 3 |
| MCEN 5228 | Special Topics in Mechanical Engineering (biomedical focused topics) | 3 |

| | | |
|---|---|---|
| MCEN 5292 | Materials and Devices in Medicine | 3 |
| MCEN 5293 | Mechanics of Soft Matter | 3 |
| MCEN 6228 | Special Topics in Mechanical Engineering | 3 |

# Food Engineering - Graduate Certificate

This certificate introduces students to the local food industry in Colorado and potential career opportunities in the food industry. Students will learn key scientific concepts and engineering principles of food products. The certificate focuses on the science and engineering of foods like specialty coffee and chocolate. Students will receive both a broad overview and in-depth content on food engineering and food product design, in addition to learning about food sustainability.

## Requirements

### Admission Requirements

Applicants who are not degree-seeking students at the university may apply for a graduate certificate through Continuing Education by submitting a Nondegree Graduate Certificate Application (https://ce.apply.colorado.edu/register/nondegree_grad_cert_app/). Eligible candidates must hold an undergraduate degree in engineering, sciences or mathematics from an institution accredited by an agency recognized by the U.S. Department of Education. Our preferred minimum GPA is 3.0.

Internal applicants who are enrolled bachelor's–accelerated master's (BAM) who are at graduate standing or graduate students at CU Boulder in engineering, sciences or mathematics and have a 3.0 cumulative GPA or higher are eligible to apply. We accept applications on a rolling basis.

For more information on applying, visit the department's graduate certificates (https://www.colorado.edu/mechanical/academics/graduate-certificates/) webpage or contact megrad@colorado.edu.

### Required Courses and Credits

To earn this certificate, students must complete 9 graduate level credits, or three 3-credit graduate courses. These credits may be chosen by the student, in consultation with certificate program faculty and the graduate advisors, based on the available courses and description of curriculum in subsection c) below. At least one relevant course will be offered each fall and spring semester to ensure that students are able to make progress toward completion of the certificate.

All degree and non-degree seeking certificate students must meet the following minimum academic standards for successful completion of the certificate:

- Students must receive a minimum grade of a B or higher in each course applied towards certificate requirements; and
- A cumulative GPA of 3.0 or higher in certificate courses.

### Required Courses

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| Students must take two of the following three courses: | | |
| MCEN 5193 | Design of Coffee | 3 |
| MCEN 5228 | Special Topics in Mechanical Engineering (Design of Chocolate) | 3 |
| MCEN 5228 | Special Topics in Mechanical Engineering (Design of Beer) | 3 |
| Strongly recommended electives: | | |
| MCEN 5021 | Introduction to Fluid Dynamics (Recommended only for students with engineering/math/physics undergraduate degree) | 3 |
| MCEN 5022 | Classical Thermodynamics (Recommended only for students with engineering/math/physics undergraduate degree) | 3 |
| MCEN 5042 | Heat Transfer (recommended only for students with engineering/math/physics undergraduate degree) | 3 |
| MCEN/BMEN 5117 | Anatomy and Physiology for Engineers | 3 |
| MCEN 5228 | Special Topics in Mechanical Engineering (Farm to Table: Sustainability in Contemporary Food Systems) | 3 |
| MCEN 5299 | Household Energy Systems | 3 |
| MSEN 5919 | Special Topics in MSE: Mass Transport (Membranes) | 1-5 |
| MDST 6351 | Media, Culture & Food Politics | 3 |
| **Elective Courses** | | |
| ENVM 6100 | Special Topics for Master of the Environment Program (Introduction to Food Systems) | 3 |
| ENVM 6100 | Special Topics for Master of the Environment Program (Quantitative Analysis in Food Systems) | 3 |
| ENVS 6305 | Reducing the Environmental Impact of Food Systems: Evidence-Based Solutions | 3 |

## Learning Outcomes

By the completion of the program, students will:

- Be introduced to potential career opportunities in the food industry.
- Be introduced to the local food industry in Colorado.
- Learn the key scientific concepts and engineering principles of food products.
- Focus on the science and engineering of specialty coffee, food engineering and food product design.
- Understand the role of food at the intersection of science, engineering and culture.

# Advanced Mechanics and Failure Analysis - Graduate Certificate

The certificate provides training in engineering mechanics that goes beyond the typical undergraduate curriculum in two aspects. First, students will have the opportunity to establish systematic fundamental knowledge in advanced engineering mechanics through the courses on solid mechanics, finite element analysis and continuum mechanics. Second, students will be able to learn specialized methods in failure

analysis, composite materials, soft materials, and vibration to address challenging problems in engineering design.

Students who complete this certificate will have the necessary knowledge and skills for a broad range of industrial sectors that involve structural design and reliability assessment.

# Requirements

## Admission Requirements

Applicants who are not degree-seeking students at the university may apply for a graduate certificate through Continuing Education by submitting a Nondegree Graduate Certificate Application (https://ce.apply.colorado.edu/register/nondegree_grad_cert_app/). Eligible candidates must hold an undergraduate degree in engineering, sciences or mathematics from an institution accredited by an agency recognized by the U.S. Department of Education. Our preferred minimum GPA is 3.0.

Internal applicants who are enrolled bachelor's–accelerated master's (BAM) students at graduate standing or graduate students at CU Boulder in engineering, sciences or mathematics and have a 3.0 cumulative GPA or higher are eligible to apply. We accept applications on a rolling basis.

For more information on applying, visit the department's graduate certificates (https://www.colorado.edu/mechanical/academics/graduate-certificates/) webpage or contact megrad@colorado.edu.

# Requirements

To complete the certificate program, students will be required to complete 9 graduate level credits. These credits can be chosen by the student, in consultation with certificate program faculty and the graduate advisors, based on the available courses and description of curriculum in subsection b) below. Courses offered each semester will depend on the availability of faculty. At least one relevant course will be offered each fall and spring semester to ensure that students are able to make progress toward completion of the certificate. In accordance with university policy, degree-seeking students will only be eligible for award of the certificate upon completion of their MS degree.

All degree and non-degree seeking certificate students must meet the following minimum academic standards for successful completion of the certificate:

- Students must receive a minimum grade of a B or higher in each course applied towards certificate requirements; and
- A cumulative GPA of 3.0 or higher in certificate courses.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| Students must take two of the following three courses: | | |
| MCEN 5228/6228 | Special Topics in Mechanical Engineering (Continuum Mechanics) | |
| MCEN 5023 | Solid Mechanics 1 | |
| MCEN 5173 | Finite Element Analysis | |
| **Electives** | | |
| Strongly recommended electives: | | |
| MCEN 5174 | Failure of Engineering Materials | |
| MCEN 5183 | Mechanics of Composite Materials | |
| MCEN 5228 | Special Topics in Mechanical Engineering (Vibrations) | |
| MCEN 5228 | Special Topics in Mechanical Engineering (Fracture Mechanic) | |
| MCEN 5293 | Mechanics of Soft Matter | |

Other electives may be considered in consultation with the certificate director.

# Mechanical Design and Product Development - Graduate Certificate

This certificate provides training in mechanical design and product development. Students will build on methods from across the field of design to create learning experiences that will directly influence their potential career path in product design and development. Students will be challenged throughout the certificate coursework with complex, ambiguous design problems with solutions that are uncertain, and they will be challenged to solve those issues creatively and communicate those solutions to others effectively.

Students who complete this certificate will have the necessary knowledge and skills for a broad range of industrial sectors that involve product design and development.

# Requirements

## Admission Requirements

Applicants who are not degree-seeking students at the university may apply for a graduate certificate through Continuing Education by submitting a Nondegree Graduate Certificate Application (https://ce.apply.colorado.edu/register/nondegree_grad_cert_app/). Eligible candidates must hold an undergraduate degree in engineering, sciences or mathematics from an institution accredited by an agency recognized by the U.S. Department of Education. Our preferred minimum GPA is 3.0.

Internal applicants who are enrolled bachelor's–accelerated master's (BAM) who are at graduate standing or graduate students at CU Boulder in engineering, sciences or mathematics and have a 3.0 cumulative GPA or higher are eligible to apply. We accept applications on a rolling basis.

For more information on applying, visit the department's graduate certificates (https://www.colorado.edu/mechanical/academics/graduate-certificates/) webpage or contact megrad@colorado.edu.

## Additional Information

To earn this certificate, students must complete 12 graduate level credits. These credits can be chosen by the student, in consultation with certificate program faculty and the graduate advisors, based on the available courses and description of curriculum below.

Courses offered each semester will depend on the availability of faculty. At least one relevant course will be offered each fall and spring semester to ensure that students are able to make progress toward completion of the certificate. In accordance with university policy, degree-seeking students will only be eligible for award of the certificate upon completion of their M.S. degree.

All degree-seeking and nondegree certificate students must meet the following minimum academic standards for successful completion of the certificate:

- A minimum grade of a B or higher in each course applied towards certificate requirements; and
- A cumulative GPA of 3.0 or higher in certificate courses.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| MCEN 5055 | Advanced Product Design | 3 |
| MCEN 5045 | Design for Manufacturability | 3 |
| **Electives** | | |
| *Elective Option 1* [1] | | |
| Choose any two: | | |
| MCEN 5279 | Aesthetics in Design | |
| MCEN 5155 | Automated Mechanical Design Synthesis | |
| MCEN 5215 | Design for Inclusion | |
| MCEN 5228 | Special Topics in Mechanical Engineering (Design Research Theory and Methods) | |
| EMEN 5400 | Technical Product Development | |
| COEN 5550 | | |
| *Elective Option 2* [2] | | |
| MCEN 5065 | Graduate Design I | |
| MCEN 5075 | Graduate Design II | |

1 Degree-seeking and nondegree students.

2 Nondegree students are ineligible to complete Elective Option 2; degree-seeking students must apply separately to complete Elective Option 2.

## Learning Outcomes

Educational and scholarly goals of the certificate:

- To introduce students to potential career opportunities in the mechanical design and product development industry.
- To introduce students to industry tools and expectations for product development.
- To teach students the key concepts and engineering principles of mechanical design and product development.
- To understand the role of engineering design at the intersection of science, engineering, and culture.

# Interdisciplinary Programs

CU Boulder offers interdisciplinary master's degrees as well as graduate certificate programs to complement a traditional education.

New graduate certificates must be approved by the Graduate School's Executive Advisory Council (EAC). For an updated list of graduate interdisciplinary certificates, visit the Graduate School Admissions (https://www.colorado.edu/graduateschool/admissions/prepare-apply/program-information-deadlines/) webpage.

## Master's Degrees

- Computational Linguistics - Master of Science (MS) (p. 1769)
- Organizational Leadership - Master of Science (MS) (p. 1770)

## Certificates

- College Teaching - Graduate Certificate (p. 1772)
- Digital Humanities - Graduate Certificate (p. 1773)
- Earth Data Analytics - Foundations - Graduate Certificate (p. 1773)
- Future Faculty Development - Graduate Certificate (p. 1775)
- Hydrologic Sciences - Graduate Certificate (p. 1775)
- Interdisciplinary Quantitative Biology - Graduate Certificate (p. 1777)
- International Affairs - Graduate Certificate (p. 1777)
- Native American and Indigenous Studies - Graduate Certificate (p. 1778)
- Quantitative Methods for Behavioral Sciences - Graduate Certificate (p. 1779)
- Satellite System Design - Graduate Certificate (p. 1780)
- Social Innovation - Graduate Certificate (p. 1781)
- Space Weather and Applications - Graduate Certificate (p. 1782)
- Water Engineering and Management - Graduate Certificate (p. 1783)

# Computational Linguistics, Analytics, Search and Informatics - Master of Science (MS)

This unique interdisciplinary degree provides a solid foundation in both computer science and linguistics as well as in current methods used in natural language processing and artificial intelligence. CLASIC training is aimed at preparing students for careers in language modeling, automatic question-answering, machine translation and interactive virtual agents.

## Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

Due to the hands-on learning experience, some courses for the CLASIC degree must be taken on campus. This program cannot be completed entirely through distance learning.

## Bachelor's–Accelerated Master's Degree Program

Students may earn this degree as part of the bachelor's–accelerated master's (BAM) degree program, which allows currently enrolled CU Boulder undergraduate students the opportunity to earn a bachelor's and master's degree in a shorter period of time.

For more information, see the Accelerated Master's tab for the associated bachelor's degree(s):

- Applied Computer Science - Post-Baccalaureate Bachelor of Science (BSACS) (p. 946)
- Computer Science - Bachelor of Arts (BA) (p. 939)
- Computer Science - Bachelor of Science (BSCS) (p. 943)
- Linguistics - Bachelor of Arts (BA) (p. 472)

## Requirements

Students must complete at least 32 hours of approved graduate study, including a 2-credit capstone course focused on a publishable research project, which will run in conjunction with an internship or a CU-based

research project. As part of the capstone, students will be evaluated by their employer or industry project manager. Students will also prepare a technical report on the completed project that the program directors and project leader will jointly evaluate. The minimum course grade is a B and the minimum GPA for graduation is a 3.0.

Choose from graduate breadth courses offered in the three different breadth bins. CSCI/LING 5832, Natural Language Processing (NLP) in Bin 2 is required as a Core CLASIC course; one course from Bin 3 is required; the third course can be from any of the bins.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Core Linguistics Courses** | | **9** |
| Choose two of the following: | | |
| LING 5030 | Linguistic Phonetics | |
| LING 5420 | Morphology and Syntax | |
| or LING 6450 | Syntactic Analysis | |
| LING 5430 | Semantics and Pragmatics | |
| Choose one: | | |
| Any LING course at the 5000-, 6000- or 7000-level (subject to advisor approval) | | |
| **Core Computer Science Courses** | | **6** |
| *Bin 1* [1] | | |
| Recommended options: | | |
| CSCI 5454 | Design and Analysis of Algorithms | |
| CSCI 5434 | Probability for Computer Science | |
| *Bin 2* | | |
| Recommended options: | | |
| CSCI 5622 | Machine Learning | |
| CSCI 5502 | Data Mining | |
| CSCI 5922 | Fundamentals of Neural Networks and Deep Learning | |
| *Bin 3* | | |
| Recommended options: | | |
| CSCI 5253 | Datacenter Scale Computing - Methods, Systems and Techniques (Bin 3) | |
| CSCI 5448 | Object-Oriented Analysis and Design | |
| CSCI 5535 | Fundamental Concepts of Programming Languages | |
| **CLASIC Capstone** | | |
| LING/CSCI 5140 | CLASIC Capstone | 2 |
| **Core CLASIC Courses** | | **15** |
| CSCI/LING 5832 | Natural Language Processing (Required for everyone. Bin 2 course.) | |
| Choose two of the following: | | |
| CSCI/LING 7565 | Computational Phonology and Morphology | |
| CSCI/LING 7575 | Computational Lexical Semantics | |
| CSCI/LING 7585 | Computational Models of Discourse and Dialogue | |
| Choose two electives from the folowing: | | |
| CSCI 5352 | Network Analysis and Modeling | |
| CSCI 6622 | Advanced Machine Learning | |
| CSCI 7000 | Current Topics in Computer Science (Inference, Models & Simulation for Complex Systems) | |
| CSCI 7222 | Topics in Nonsymbolic Artificial Intelligence (Probabilistic Models of Human & Machine Intelligence) | |
| CSCI 7222 | Topics in Nonsymbolic Artificial Intelligence (Representation Learning for Language) | |
| LING 5200 | Introduction to Computational Corpus Linguistics | |
| LING 5800 | Open Topics in Linguistics (Machine Learning and Linguistics) | |
| LING 6300/3800 | Topics in Language Use (Formal Models of Linguistics) | |
| LING 6520 | Topics in Comparative Linguistics (Computational Grammars) | |
| PHIL 5440 | Topics in Logic | |
| PHIL 5460 | Modal Logic | |
| Any other CSCI or LING course at the 5000-, 6000- or 7000-level | | |
| Any Core course listed above (not already taken) | | |
| **Total Credit Hours** | | **32** |

1 Visit the computer science department website (http://www.colorado.edu/cs/current-students/graduate-students/graduate-breadth-courses/) for a full list of course options in each of the 3 breadth bins. (Updated every two years.)

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate skills in computer programming, quantitative analysis, data management and processing, statistical machine learning and the development and deployment of large language models.
- Understand the implementation of statistical machine learning and the development and deployment of large language models.
- Identify major concepts of linguistics, including both the structures of language and the social context of language use and variation, and apply those concepts to building better and fairer applications.
- Analyze and develop solutions to real-world problems in the field of computational linguistics, also known as text analytics, natural language processing and informatics.
- Communicate knowledge in the discipline through writing and oral communication.

# Organizational Leadership - Master of Science (MS)

The Master of Science in Organizational Leadership is an interdisciplinary, fully online professional master's degree that prepares early- to mid-career professionals to succeed as tomorrow's dynamic leaders. Through coursework that blends business, communications and social sciences, the program develops the knowledge and skills students need to think critically about organizational challenges and how to address them using best practices. Students learn to align others around a shared vision, build and manage effective teams, and apply the leadership skills

necessary to excel in an increasingly fast-paced and complex working world.

For more information, visit the Master of Science in Organizational Leadership (https://online.colorado.edu/organizational-leadership-ms/) webpage.

# Requirements

Students must complete at least 30 credit hours of graduate coursework. The program is composed of 10 courses: six core courses and four specialized track courses.

## Core Courses

Core courses ensure that students have the necessary understanding of the complexities of organizational leadership and the varied dimensions of change within the context of public, private and nonprofit organizations. The curriculum prepares graduates to be successful in understanding organizational cultures, anticipating and managing change, and enhancing performance and human capital management. Core courses include:

| Code | Title | Credit Hours |
|---|---|---|
| ORGL 5005 | Leadership and Organizations | 3 |
| ORGL 5010 | Leading Change and Innovation | 3 |
| ORGL 5015 | Analytics and Data-Driven Decision Making | 3 |
| ORGL 5020 | Strategic Communication | 3 |
| ORGL 5025 | Performance Management | 3 |
| ORGL 6830 | Master's Capstone (MSOL) | 3 |

The purpose of the capstone, the final course of the program, is for students to apply knowledge and skills acquired during their program to addressing actual challenges facing an organization. Students do this—under the guidance of the instructor and other subject matter experts—by collecting, processing and analyzing data and information about the organization and applying appropriate analytic methods to develop, propose and substantiate their recommended solution to the organization's problem.

## Specialized Track Courses

Students may choose to specialize in one of the following tracks.

### Human Resources Track

This track is ideal for students who wish to enter or advance a career in Human Resources or who want to focus on enhancing employee satisfaction and organizational performance as they assume increasing management and leadership responsibilities. Courses include:

| Code | Title | Credit Hours |
|---|---|---|
| ORGL 5105 | Negotiation and Conflict Resolution | 3 |
| ORGL 5110 | Human Resources Law | 3 |
| ORGL 5115 | Total Rewards Strategies | 3 |
| ORGL 5120 | Training and Development | 3 |

### Strategic Leadership Track

This track is geared for students who want to hone their ability to think, plan, and operate strategically, lead personnel in the allocation of organizational resources and accomplish organizational objectives in a deliberate and systematic manner. Courses include:

| Code | Title | Credit Hours |
|---|---|---|
| ORGL 5205 | Strategic Planning in Organizations | 3 |
| ORGL 5210 | Competitive Analysis and Positioning | 3 |
| ORGL 5220 | Operations and Designs of Organizations | 3 |
| ORGL 5305 | Leadership and Intrapreneurship | 3 |
| or ORGL 5315 | Strategy and Innovation | |

### Leading Innovation Track

The leading innovation track explores leadership at the intersection of business and innovation and helps students learn to drive strategic organizational transformation. It addresses the gap that exists between the aspirations of executives to innovate and their ability to execute. It focuses on the question: why and how should leadership, innovations and technologies be leveraged to shape and support strategic and entrepreneurial initiatives in the global competitive landscape. Courses include:

| Code | Title | Credit Hours |
|---|---|---|
| ORGL 5305 | Leadership and Intrapreneurship | 3 |
| ORGL 5310 | Design Thinking | 3 |
| ORGL 5315 | Strategy and Innovation | 3 |
| ORGL 5320 | Building and Leading Innovative Work Teams | 3 |

### Organizational Communication Track

Communication is the key social process that creates and sustains all features of organizational life—including assumptions about power, knowledge, diversity, culture and teamwork that shape the practice of leadership. The organizational communication track offers a perspective that puts communication at the center of our understanding and explanation of all organizational and leadership phenomena. Courses include:

| Code | Title | Credit Hours |
|---|---|---|
| ORGL 5405 | Diversity and Organizational Communication | 3 |
| ORGL 5410 | Dynamics of Group Communication | 3 |
| ORGL 5415 | Organizational Culture | 3 |
| ORGL 5420 | Knowledge Management | 3 |

### Corporate Communication and Public Relations Track

Relationship building with key stakeholders is critical for organizational function. The corporate communication and public relations track offers students the opportunity to become skilled in the strategic development of organization/stakeholder interactions and relationships. Courses include:

| Code | Title | Credit Hours |
|---|---|---|
| Select four: | | 12 |
| CCOM 5101 | Strategic Corporate Communication Management | |
| CCOM 5102 | Strategic Global Corporate Communication | |

| | |
|---|---|
| CCOM 5103 | Corporate Communication and Ethics |
| CCOM 5104 | Research Methods for Corporate Communication |
| CCOM 5105 | Measurement for Corporate Communication |
| CCOM 5106 | Internal Communication |
| CCOM 5107 | Risk and Crisis Communication |
| CCOM 5108 | Corporate Communication Techniques and Media Relations |
| CCOM 5109 | Issues Management and Public Affairs |
| CCOM 5110 | Corporate Communication and Digital and Social Media |

### Executive Leadership Track

This track is geared for students who want to enhance their executive leadership skills and broaden their perspectives regarding multiple aspects of organizational structure, strategy, and people management. Students completing this track will learn to navigate strategic thinking that drives organizations forward while building organizational cultures that are productive, cohesive and inclusive. Courses include:

| Code | Title | Credit Hours |
|---|---|---|
| ORGL 5205 | Strategic Planning in Organizations | 3 |
| ORGL 5415 | Organizational Culture | 3 |
| Select two: | | 6 |
| ORGL 5110 | Human Resources Law | |
| ORGL 5115 | Total Rewards Strategies | |
| ORGL 5120 | Training and Development | |
| ORGL 5210 | Competitive Analysis and Positioning | |
| ORGL 5220 | Operations and Designs of Organizations | |
| ORGL 5305 | Leadership and Intrapreneurship | |
| ORGL 5310 | Design Thinking | |
| ORGL 5420 | Knowledge Management | |

### Leading High-Achieving Teams Track

Students pursuing the leading high-achieving teams track will learn strategies for creating and maintaining productive and cohesive teams within organizations. From building teams, resolving conflict and enhancing communication, courses within this track emphasize the importance of leadership in creating teams that enhance organizations. Courses include:

| Code | Title | Credit Hours |
|---|---|---|
| Select four: | | 12 |
| ORGL 5105 | Negotiation and Conflict Resolution | |
| ORGL 5320 | Building and Leading Innovative Work Teams | |
| ORGL 5410 | Dynamics of Group Communication | |
| ORGL 5420 | Knowledge Management | |
| ORGL 5505 | Sports and Coaching Leadership | |

### Organizational Training and Development Track

The organizational training and development track is well suited for students seeking to improve the effectiveness of organizations through building and improving training and development programs. The courses in this track allow students to explore different areas of organizational structure that are critical for understanding how to improve and develop the organization and its people. Courses include:

| Code | Title | Credit Hours |
|---|---|---|
| ORGL 5120 | Training and Development | 3 |
| ORGL 5220 | Operations and Designs of Organizations | 3 |
| ORGL 5415 | Organizational Culture | 3 |
| Select one: | | 3 |
| ORGL 5115 | Total Rewards Strategies | |
| ORGL 5410 | Dynamics of Group Communication | |

### Organizational Leadership (Broad Perspective) Track

This is a great track option for those who want to customize their degree to obtain broad exposure to the field of organizational leadership. Students select any four track courses from the offerings available under the other tracks listed above. With pre-approval, students also have the option of transferring in up to three relevant graduate courses from other programs and colleges.

## Learning Outcomes

By the completion of the program, students will be able to:

- Acquire professional competency through acquisition of knowledge about leadership theories, contemporary leadership challenges, best practices and industry standards related to leadership. \
- Develop and apply strong critical thinking, decision-making, presentation and writing skills based upon a synthesis of knowledge.
- Articulate an ethical personal leadership philosophy for a diverse and multicultural 21st century workforce.
- Develop the ability to provide vision and mission articulation, problem identification and definition, strategic planning and ongoing/iterative evaluation.
- Integrate skills in multiple types of analysis allowing the application of data analysis to organizational situations and challenges.
- By participating in application-orientated assignments delivered via a collaborative cohort model, develop high-demand career skills that contribute to employability and professional advancement.

# College Teaching - Graduate Certificate

The certificate in college teaching (CCT) is designed for graduate students and postdoctoral scholars who teach laboratories, recitations or courses on the CU Boulder campus.

This certificate is offered by the Center for Teaching & Learning (https://www.colorado.edu/center/teaching-learning/), which supports graduate students who teach on the Boulder campus and provides continued professional development opportunities for all graduate students. The Center for Teaching & Learning prepares graduate students for success on the job market in higher education or in the private sector as professionals.

To that end, we offer:

- Comprehensive college teacher training (workshops on teaching, individual consultation on any aspect of the graduate experience, video consultation on teaching in labs, recitations and courses).

- Workshops and guidance to support the scholarship of teaching and learning.
- Academic and nonacademic career preparation opportunities through conferences, seminars and individual consultations on curriculum vitae, job letters, teaching statements, diversity statements and interviewing skills.

## Requirements

The certificate is open to graduate students in good standing who hold, have held or will hold a teaching position on the CU Boulder campus.

For more information and completion requirements, visit the Center for Teaching & Learning website's Certificate in College Teaching webpage (https://www.colorado.edu/center/teaching-learning/programs/graduate-certificates/certificate-college-teaching/).

# Digital Humanities - Graduate Certificate

The digital humanities graduate certificate welcomes students from all disciplines, including the humanities and arts, social sciences, natural sciences, computational and mathematical sciences, engineering, and communication, media and information science. The certificate prepares students to:

- create, utilize and evaluate digital methods and tools for research;
- integrate methods and tools into their teaching;
- assess the diverse impacts of technologies on people and society; and
- leverage digital technologies for public outreach and engagement.

Through an interdisciplinary curriculum, the certificate provides graduate students from across campus the opportunity to explore the evolution and variety of digital humanities theories and practices and to study approaches in the field in-depth. Moreover, the certificate is intended to stimulate collaborations among graduate students in a range of fields, thus preparing them for work in a team-based environment.

For additional details, including the procedures to declare and complete the certificate, visit the Digital Humanities Graduate Certificate (https://www.colorado.edu/crdds/dhgc/) webpage.

## Requirements

### Required Course and Credits

The certificate consists of course requirements only, at least 9 credit hours at the graduate level with an average GPA of 3.0 (B) or better.

In addition to the core course, students must choose two elective courses to complete the certificate. Certain special topics courses also count as electives. For a full list, please visit the certificate website's Elective Courses (https://www.colorado.edu/crdds/what-we-do/digital-scholarship/digital-humanities-graduate-certificate/elective-courses/) webpage.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Course** | | **3** |
| DHUM 5000 | Introduction to Digital Humanities: Movements, Methods, and Tools | |
| **Electives** | | **6** |
| ATLS 5040 | Game Design | |
| ATLS 5120 | Mobile Application Development | |
| ATLS 5214 | Big Data Architecture | |
| ATLS 5244 | Empathy and Technology | |
| ATLS 5410 | Creative Technologies | |
| ATLS 5440 | Design Studio | |
| ATLS 5630 | Web Front-End Development | |
| ATLS 5650 | Introduction to Programming | |
| CMDP 7100 | Historical Overview of Media Arts and Technology | |
| CMDP 7200 | Research and Methodologies I | |
| CMDP 7500 | Production Methods I | |
| CSCI 5352 | Network Analysis and Modeling | |
| CSCI 5502 | Data Mining (Same as CSCI 4502) | |
| CSCI/LING 5832 | Natural Language Processing | |
| GEOG 5043 | Advanced Geovisualization and Web Mapping | |
| GEOG 5103 | Geographic Information Science: Spatial Analytics | |
| GEOG 5203 | Geographic Information Science: Spatial Modeling | |
| GEOG 5403 | Geographic Information Science: Space Time Analytics | |
| GEOG 5603 | GIS in the Social and Natural Sciences | |
| HIST 6790 | Readings in Digital History | |
| INFO 5502 | Online Communities | |
| INFO 5504 | Digital Identity | |
| INFO 5507 | Data and the Humanities | |
| INFO 5601 | Information Ethics and Policy | |
| INFO 5602 | Information Visualization | |
| INFO 5604 | Applied Machine Learning | |
| INFO 5613 | Network Science | |
| INFO 6301 | Computation for Research in Information Science | |
| JRNL 5001 | Media Technology Boot Camp | |
| JRNL 5344 | Video Documentary Production | |
| JRNL 5521 | Data Journalism | |
| JRNL 5562 | Digital Journalism | |
| LING 5200 | Introduction to Computational Corpus Linguistics | |
| MDST 5001 | Connected Media Practices | |
| PSCI 7185 | Political Network Analysis | |
| STAT 5680 | Statistical Collaboration | |
| STAT 5700 | Philosophical and Ethical Issues in Statistics | |
| **Total Credit Hours** | | **9** |

# Earth Data Analytics - Foundations - Graduate Certificate

The Earth Data Analytics - Foundations (https://earthlab.colorado.edu/earth-data-analytics-professional-graduate-certificate/?utm_source=course-catalog&utm_medium=website&utm_campaign=certificate-2019)

professional certificate provides students with skills to launch or advance their careers in the rapidly expanding world of earth data science. The three-course program can be completed online at a student's own pace or in person in as little as ten months. Students do not need any background in programming or science to enroll.

Data are becoming increasingly available as technology grows and improves. This data can help address some of the world's most pressing environmental problems. As a result of this, earth and environmental scientists with data science expertise (earth data scientists) are now in high demand in the job market. All skills taught in the program are identified through market research on in-demand skills in industry and government.

Through this nine-credit program students will learn:

- Applied data science skills
- Skills needed to work with different types of data
- Interdisciplinary communication & collaboration techniques and approaches
- Skills needed to address scientific challenges using data

Students will emerge from the program with skills in:

- Scientific programming
- GIS and remote sensing
- Using APIs
- Creating automated workflows using data that anyone can use
- Open reproducible science
- And more

Visit the Earth Lab website (https://www.earthdatascience.org/) to explore lessons and tutorials related to this program.

## Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

## Requirements

The professional graduate certificate requires three sequential courses beginning in the fall semester and ending in June, and can be completed entirely online.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| GEOG 5463 | Earth Analytics Data Science Bootcamp | 3 |
| GEOG 5563 | Earth Analytics | 3 |
| GEOG 5663 | Earth Analytics Applications | 3 |
| **Total Credit Hours** | | **9** |

## Plan of Study

The three certificate courses must be completed sequentially and can be completed in as little as ten months or up to three years. All certificate courses are offered once annually on the following schedule:

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| GEOG 5463 | Earth Analytics Data Science Bootcamp | 3 |
| | **Credit Hours** | **3** |
| **Spring Semester** | | |
| GEOG 5563 | Earth Analytics | 3 |
| | **Credit Hours** | **3** |
| **Summer** | | |
| GEOG 5663 | Earth Analytics Applications | 3 |
| | **Credit Hours** | **3** |
| | **Total Credit Hours** | **9** |

Through completing the certificate, students will learn to:

- Apply data science skills to scientific challenges related to earth systems.
- Code using Python and Jupyter Notebooks.
- Use the command line and other tools to work with environmental and earth systems data.
- Use version control systems like Git and GitHub to work collaboratively as well as back-up and document workflows.
- Use different data types and formats including GIS, remote sensing, social media, text, time series, and more.
- Communicate and collaborate with people across different disciplines using different tools.
- Create fully automated and reproducible data workflows.

# Environmental Justice - Graduate Certificate

Environmental justice (EJ) refers to the right to a safe and healthy environment for everyone, regardless of race, class, gender, ability or other considerations, as well as a place at decision-making tables. From this perspective, the environment is not separate from society, but includes spaces where people live, work, play, learn and pray. Research demonstrates that environmental and climate-related problems and hazards often disproportionately impact the health and economic opportunities of communities of color, Indigenous communities and working-class communities. These patterns are related to systemic forms of inequality in society, including unequal representation in environmental decision-making and leadership, racism and other forms of oppression, and the neglect of diverse value systems.

The graduate certificate in environmental justice provides training in the interdisciplinary and dynamic field of environmental justice studies, as well as opportunities for engaged interactions with the challenges and solutions environmental justice communities face today.

The certificate program is open to CU Boulder graduate students from all units and programs, as well as to nondegree students, and seeks to include scholars and practitioners from diverse disciplinary and experiential backgrounds in its development.

For more information, visit the Graduate Certificate in Environmental Justice (https://www.colorado.edu/certificate/ej/) website.

## Requirements

Students must complete 12 credits, including the 3-credit pillar course and three approved electives.

At least one of the electives must be taken outside of the student's home department. To satisfactorily complete each course, students must earn a grade of B or higher.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Course** | | |
| ENVS/GEOG/PSCI/COMM 7118 | Foundations of Environmental Justice | 3 |
| **Electives** | | |
| Choose three of the following: | | 9 |
| COMM 5225 | Environmental Communication (focused on an EJ-related topic such as Toxic Bodies) | |
| ENVS 5100 | Special Topics in Environmental Studies ("Power, Justice and Climate Change" or "Conflict Management and Collaboration for Human-Environment Systems") | |
| ETHN 5233 | Native American and Indigenous Environmental Issues | |
| ETHN 6101 | Topics: Specialized Comparative Studies (Topic: Indigenous Political Ecologies) | |
| ETHN 6103 | Indigenous Thought and Theory: Foundations in NAIS | |
| GEOG 5662 | Seminar: Topics in Economic Geography (Topic: Geographies of Dispossession) | |
| GEOG 6402 | Seminar: Political Ecology | |
| HIST 6410 | Readings in Environmental History | |
| LAWS 7202 | Environmental Law | |
| PHIL/ENVS 5240 | Seminar in Environmental Philosophy | |
| PSCI 7024 | Seminar: Selected Political Theories (Topic: Environment and Political Theory) | |
| SOCY/ENVS 6007 | Foundations of Environmental Sociology | |
| SOCY/ENVS 6017 | Inequality, Democracy, and the Environment | |
| **Total Credit Hours** | | **12** |

# Future Faculty Development - Graduate Certificate

The future faculty development certificate (FFD) allows graduate students and postdoctoral scholars who do not teach the chance to do a project to learn about postsecondary teaching or institutions.

The certificate is sponsored by the Center for Teaching & Learning (https://www.colorado.edu/center/teaching-learning/), which supports graduate students on the Boulder campus and provides continued professional development opportunities. The Center for Teaching & Learning prepares graduate students for success on the job market in higher education or in the private sector as professionals.

To that end, we offer:

- Comprehensive college teacher training (workshops on teaching, individual consultation on any aspect of the graduate experience, video consultation on teaching in labs, recitations and courses).
- Workshops and guidance to support the scholarship of teaching and learning.
- Academic and nonacademic career preparation opportunities through conferences, seminars and individual consultations on curriculum vitae, job letters, teaching statements, diversity statements and interviewing skills.

## Requirements

The certificate is open to all graduate students in good standing.

For more information and completion requirements, visit the Center for Teaching & Learning website's Future Faculty Development webpage (https://www.colorado.edu/center/teaching-learning/programs/graduate-certificates/future-faculty-development-certificate/).

# Hydrologic Sciences - Graduate Certificate

The hydrologic sciences graduate program focuses on quantitative studies of water in the environment including its role in geologic and biogeochemical processes, ecosystem functions and global elemental cycling. The program is interdisciplinary, interdepartmental and designed to encourage students with a variety of academic backgrounds to enter the field. It is intended for science and engineering graduate students, allowing them to obtain recognition for their accomplishments in hydrologic sciences and to demonstrate the quantitative multidisciplinary education desired by many prospective employers.

All hydrologic sciences graduate program students are admitted through one of the participating departments: Atmospheric and Oceanic Sciences (ATOC) (https://www.colorado.edu/atoc/academics/prospective-graduate-students/); Civil, Environmental and Architectural Engineering (CEAE) (https://www.colorado.edu/ceae/prospective-students/graduate-studies/); Ecology and Evolutionary Biology (EBIO) (https://www.colorado.edu/ebio/graduate-overview/); Environmental Studies (ENVS) (https://www.colorado.edu/envs/graduate-studies/); Geography (GEOG) (https://www.colorado.edu/geography/grad-program/graduate-curriculum/) or Geological Sciences (GEOL) (https://www.colorado.edu/geologicalsciences/academic/graduate-degree-programs/). Graduate students may apply for admission (https://www.colorado.edu/program/hydrosciences/academics/admissions/) to hydrologic sciences after admission to one of these departments.

The program offers a certificate in hydrologic sciences to research-oriented graduate students in the participating departments. PhD students in ATOC, ENVS, GEOG and GEOL may enroll in the hydrologic sciences PhD subplan or the certificate. Course requirements are identical for the subplan and certificate.

Hydrologic sciences students conduct research within participating departments, research institutes and centers (e.g., INSTAAR (https://instaar.colorado.edu/)), or partnering government agency labs in the Boulder area (e.g., USGS (https://www.usgs.gov/), NOAA (https://www.noaa.gov/)). Primary supervision of the student's research may be provided by any faculty member approved by their department, though the hydrologic sciences program requires representation from program faculty on students' comprehensive exam and defense committees.

For additional information, please visit the program webpage (https://www.colorado.edu/program/hydrosciences/) or contact the Graduate Coordinator (hydrogrd@colorado.edu).

# Requirements

- Completion of all hydrologic sciences program courses with a grade of B or better.
- Completion of degree requirements for graduate degree within the student's home department.
- For the graduate certificate: The thesis topic includes substantial use of hydrologic science and the thesis committee includes at least one Hydrologic Sciences Program faculty member (https://www.colorado.edu/program/hydrosciences/people/faculty/).
- For the PhD subplan: The dissertation topic is approved by Hydrologic Sciences Program co-director and the dissertation committee includes at least two Hydrologic Sciences Program faculty member (https://www.colorado.edu/program/hydrosciences/people/faculty/)s (https://www.colorado.edu/program/hydrosciences/people/faculty/).

Students are referred to their home department (ATOC, CEAE, EBIO, ENVS, GEOG or GEOL) and the University Catalog for general information on requirements for their degree. In case of a conflict between those documents and the requirements stated here, the rules of the Graduate School apply.

## Research Supervision

Primary supervision of the student's research may be provided by any faculty member approved by the student's home department.

## Course Prerequisites

All students entering the program are expected to have advanced-level knowledge of mathematics: a full year of college level calculus including differential and integral calculus. (Linear algebra and differential equations are strongly encouraged.) Students are expected to have completed one semester of college-level physics (mechanics).

In addition, students are encouraged to work with their advisors and committees to identify and fulfill any other specialized degree and/or research-related required courses. For example, students interested in the physical aspects of hydrologic sciences are expected to have advanced-level knowledge of physics (mechanics and thermodynamics) and fluid mechanics. Similarly, students interested in the chemical aspects of hydrologic sciences may be expected to have advanced-level knowledge of organic and/or physical chemistry, students interested in the biological or ecological aspects of hydrologic sciences are expected to have an advanced-level knowledge of biology and/or ecology.

Students may also need to complete other specific undergraduate prerequisites required by their home department.

## Required Courses and Credits

Five courses are required for the Hydrologic Sciences Certificate and PhD Subplan. The number of courses is intentionally kept low, so that the student is free to design an overall academic program that meets their needs in terms of specialized scholarly interests. Hydrologic sciences courses are included in the minimum semester hours required for all graduate students. The coursework is designed to assure competency in appropriate subject matter at the graduate level.

The five courses are required, as follows:

- One course from List A
- One course from List A or B
- Three elective courses

| Code | Title | Credit Hours |
|---|---|---|
| *List A* | | |
| ATOC 5050 | Atmospheric Thermodynamics and Dynamics | 3 |
| ATOC 5060 | Dynamics of the Atmosphere and Oceans | 3 |
| CVEN 5313 | Environmental Fluid Mechanics | 3 |
| CVEN 5353 | Groundwater Hydrology | 3 |
| GEOL 5110 | Geomechanics | 3 |
| *List B* | | |
| ATOC 5051 | Introduction to Physical Oceanography | 3 |
| ATOC 5061 | Advanced Ocean Dynamics and Air-Sea Coupled ENSO Mechanisms | 3 |
| CVEN 5333 | Physical Hydrology | 3 |
| CVEN 5404 | Water Chemistry | 3 |
| GEOG 5321 | Snow Hydrology | 3-4 |
| GEOL 5080 | Advanced Hydrogeology and Modeling Concepts | 3 |

## Electives

| Code | Title | Credit Hours |
|---|---|---|
| ATOC 5235 | Introduction to Atmospheric Radiative Transfer and Remote Sensing | 3 |
| ATOC 5500 | Special Topics in Atmospheric and Oceanic Sciences (Field Observations and Measurements) | 1-3 |
| ATOC 5550 | Mountain Meteorology | 3 |
| ATOC 5600 | Physics and Chemistry of Clouds and Aerosols | 3 |
| ATOC 5730 | Physical Oceanography and Climate | 3 |
| ATOC 5750 | Desert Meteorology and Climate | 3 |
| ATOC 5780 | Ice Sheets and Climate | 3 |
| ATOC 5850 | Numerical Methods Laboratory | 3 |
| CHEM 5141 | Environmental Water and Soil Chemistry | 3 |
| CVEN 5323 | Applied Stream Ecology | 3 |
| CVEN 5343 | Transport and Dispersion in Surface Water | 3 |
| CVEN 5363 | Modeling of Hydrologic Systems | 3 |
| CVEN 5383 | Applied Groundwater Modeling | 3 |
| CVEN 5404 | Water Chemistry | 3 |
| CVEN 5454 | Statistical Methods for Natural and Engineered Systems | 3 |
| CVEN 5833 | Special Topics (Analysis of Urban Water Systems) | 1-3 |
| CVEN 5537 | Numerical Methods in Civil Engineering | 3 |
| CVEN 5833 | Special Topics (Environmental Transport and Dispersion Processes) | 1-3 |
| CVEN 6383 | Flow and Transport through Porous Media | 3 |
| CVEN 6414 | Aquatic Surfaces and Particles | 3 |

| | | |
|---|---|---|
| EBIO 5030 | Limnology | 3 |
| ENVS 5840 | Global Biogeochemical Cycles | 3 |
| GEOG 5023 | Advanced Quantitative Methods for Spatial Data | 4 |
| GEOG 5093 | Remote Sensing of the Environment | 4 |
| GEOG 5241 | Topics in Physical Geography (Watershed Biogeochemistry) | 1-3 |
| GEOG 5241 | Topics in Physical Geography (Fluvial Geomorphology) | 1-3 |
| GEOG 5251 | River Processes and Forms: Fluvial Geomorphology | 4 |
| GEOG 5271 | The Arctic Climate System | 3 |
| GEOG 5303 | Geographic Information Science: Spatial Programming | 4 |
| GEOL 5060 | Oceanography | 4 |
| GEOL 5093 | Remote Sensing of the Environment | 4 |
| GEOL 5270 | Marine Chemistry and Geochemistry | 3 |
| GEOL 5280 | Aqueous and Environmental Geochemistry | 3 |
| GEOL 5305 | Global Biogeochemical Cycles | 3 |
| GEOL 5430 | Paleoceanography and Paleoclimatology | 3 |
| GEOL 5700 | Geological Topics Seminar (Terrestrial Hydrology) | 3-4 |
| GEOL 5700 | Geological Topics Seminar (Sedimentary Modeling) | 1-4 |

# Interdisciplinary Quantitative Biology - Graduate Certificate

The Interdisciplinary Quantitative Biology (IQ Biology) PhD Certificate program is designed for students in life sciences, engineering, computer science and applied mathematics who are interested in learning the essential competencies of researchers who work and collaborate effectively across disciplines, and want to unravel the complexity of biological systems. These competencies are attained in a number of ways, including integrative coursework, lab rotations, team science, internships and outreach activities.

## Requirements

### Core Courses

These courses cover cutting-edge quantitative techniques, and include one course in the fall and two courses in the spring. IQ Biology core courses count simultaneously toward a student's chosen academic department's electives. Core courses have included topics like quantitative optical imaging, mathematical and computational biology, bioinformatics and genomics, biologically-inspired multi-agent systems, and biophysics.

### Gap-Filling Courses

Students take one to three courses outside of their primary discipline(s). These courses allow students to explore other areas of quantitative biology and fill any "gaps" in their background to benefit their future interdisciplinary research.

### Lab Rotations

Students rotate through four different research labs in at least two different disciplines. These rotations allow students to explore their interests, learn new techniques and work with prospective thesis advisors.

### Additional Coursework and Research

During the second year, students begin taking the courses required by their chosen academic department, and those advised by their departmental thesis committee.

### Engagement

While pursuing the PhD degree, IQ biology student remain engaged with the IQ biology program by:

- Volunteering in academic outreach and teaching projects.
- Pursuing industry or government internships.
- Attending seminars with the IQ biology community, as well as meeting with the speaker.
- Developing and presenting research in a student-run IQ biology symposium on campus.
- Mentoring or tutoring new IQ biology students.
- Attending social gatherings held for the entire IQ biology community.

After completing all program requirements, graduating students will receive a certificate in Interdisciplinary Quantitative Biology in addition to their PhD from their chosen academic department.

# International Affairs - Graduate Certificate

The graduate certificate in international affairs allows currently matriculated graduate students across CU Boulder to examine global issues and position their own graduate research in a global context. It will also allow graduate students in specific disciplines to study international affairs in an interdisciplinary way and with access to courses across the social sciences, humanities and natural sciences.

## Requirements

### Admission Requirements

Students must be enrolled in a graduate degree program at the University of Colorado Boulder. They may apply for the graduate certificate at any point in their graduate career by emailing the International Affairs Program at iafs@colorado.edu with the following:

- A brief essay indicating how their research, professional or creative work, or teaching will relate to international affairs
- A statement of approval from their graduate advisor or graduate program in their home department

Requirements fulfilled at CU prior to admission to the Graduate Certificate in International Affairs may be counted towards certificate requirements.

### Required Courses and Credits

The certificate requires successful completion of 3 graduate courses (9 credit hours) with a grade of B or higher from our list of approved graduate courses. A maximum of 6 credits can be taken from any one discipline. This list is built upon our undergraduate interdisciplinary model and draws from our main cognate units in the Social Sciences, Arts & Humanities, and Natural Sciences divisions, and includes courses taught by faculty on the International Affairs Committee.

Students may request that the IAFS Graduate Director approve courses (including independent study courses) from outside this list, if the course contains significant international content and the student's completed work for that course is related to international affairs. The courses may be drawn from the Social Sciences, Arts & Humanities, or Natural Sciences divisions in the College of Arts of Sciences, as well as from other schools and colleges at CU Boulder.

In addition to the 9 credit hours of graduate coursework, the certificate requires participation in the International Affairs Colloquium. The colloquium is intended for graduate students to present their works-in-progress for discussion and feedback from faculty and participants. Works-in-progress encompass various aspects of intellectual and professional life. Projects may include academic papers, thesis and dissertation chapters, grant proposals, conference presentations, or job applications. Two semesters of participation in the colloquium will be required. One semester of participation is defined as attendance at a colloquium session and presentation of a work in progress during that semester.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Requirement** | | |
| International Affairs Colloquium | | |
| **Electives** | | |
| Choose three of the following: | | 9 |
| ANTH 5500 | Cross-Cultural Aspects of Socioeconomic Development | |
| ANTH 5630 | Nomadic Peoples of East Africa | |
| ANTH 5730 | Latin American Politics and Culture through Film and Text | |
| ANTH 5750 | Culture and Society in South Asia | |
| ANTH 5755 | Cultures of Expertise: Science, Power and Knowledge | |
| ANTH 5745 | Science, Technology and Society | |
| CHIN 5880 | Topics in Modern and Contemporary Culture | |
| CHIN 5890 | Topics in Chinese Film | |
| ENVS 5820 | Energy Policy in the 21st Century | |
| ENVS 5830 | Critical Issues in Climate and the Environment | |
| ETHN 5353 | Indigenous Traditions and Law: A Global Perspective | |
| ETHN 6301 | Decolonial/Postcolonial Theory | |
| FREN 5170 | Francophone African Literature | |
| GEOG 5292 | Migration, Immigrant Adaptation, and Development | |
| GEOG 5632 | Development Geography | |
| GEOG 5662 | Seminar: Topics in Economic Geography | |
| GEOG 5712 | Political Geography | |
| GEOG 5732 | Population Geography | |
| GEOG 5852 | Health and Medical Geography | |
| GRMN 5301 | Gender, Race, and Immigration in Germany and Europe | |
| HIST 5126 | History of U.S. Foreign Relations Since 1941 | |
| HIST 5128 | The History of Modern Mexico Since 1821 | |
| HIST 5328 | The Modern Middle East, 1600 to the Present | |
| HIST 5349 | Decolonization of the British Empire | |
| HIST 5538 | History of Modern India | |
| HIST 5619 | Women in East Asian History | |
| HIST 5638 | Contemporary China: Radicalism and Reform, 1949 to Present | |
| HIST 5728 | Japan's Empire: Birth and Death | |
| HIST 6800 | Readings in Global History | |
| JPNS 5830 | Readings in Modern and Contemporary Japanese Thought and Culture | |
| JPNS 5920 | Topics in Modern Literature and Culture | |
| MUSC 5012 | African Music | |
| MUSC 5168 | World Music Theories | |
| MUSC 5892 | Latin American Music | |
| RLST 5650 | Islam in the Modern World | |
| PSCI 7043 | Seminar: Problems of International Institutions | |
| PSCI 7053 | War and Peace | |
| PSCI 7073 | Seminar: Global Political Economy | |
| PSCI 7183 | International Cooperation | |
| PSCI 7203 | Political Economy of International Migration and Policy | |
| RUSS 5120 | | |
| RUSS 5481 | | |
| SOCY 6007 | Foundations of Environmental Sociology | |
| SOCY 6017 | Inequality, Democracy, and the Environment | |

# Native American and Indigenous Studies - Graduate Certificate

The Center for Native American and Indigenous Studies (CNAIS) offers both a graduate and undergraduate certificate in Native American and Indigenous Studies (NAIS). These certificate programs offer students the opportunity to strengthen their interdisciplinary knowledge and experience in this increasingly important area.The rise of global and scholarly attention to issues of indigeneity signals a larger transformation in conceptions of nation, citizenship and transnationalism in the context of globalization.

A founding principle of CNAIS is to value and expand upon the connections and interdisciplinary nature of Native American & Indigenous scholarly work. The issues facing Native American and Indigenous peoples today require expertise from multiple disciplines and draw from scholarship in a number of fields, including art & art history, anthropology, ethnic studies, environmental studies, geography, history, law, linguistics, literature, political science, religion and sociology.

CU Boulder has recruited an unprecedented number of faculty working in a wide array of areas related to NAIS, and already enjoys a high national and international reputation in several of these areas. In pursuing the NAIS certificate, students join a vibrant and growing community at CU Boulder, including graduate and undergraduate students and more than 40 professors.

For more information, visit the Center for Native American and Indigenous Studies (http://www.colorado.edu/cnais/) website or contact cnais@colorado.edu.

# Requirements

This interdisciplinary certificate requires a total of four courses (12 credits). One introductory course (ETHN 6103) is required of all students; the other courses can be taken electively, with the provision that two of the four courses be outside the student's home department.

*Note*: some courses listed in the catalog are taught by revolving faculty member who are not affiliated with CNAIS. Catalog course content is subject to change from semester to semester. For questions regarding course sections or more information on approved courses, please visit the department's graduate certificate webpage (https://www.colorado.edu/cnais/certificate-program/graduate-certificate/) or contact cnais@colorado.edu.

## Required Courses and Semester Credit Hours

| Code | Title | Credit Hours |
|---|---|---|
| **Required Course** | | |
| ETHN 6103 | Indigenous Thought and Theory: Foundations in NAIS | 3 |
| **Electives** [1] | | **9** |
| At least three of the four required elective courses must be taken outside the student's home department. | | |
| *Approved Anthropology Courses* | | |
| ANTH 5045 | Introduction to Museum Anthropology | |
| ANTH 5210 | Southwestern Archaeology | |
| ANTH 5220 | From Olmec to Aztec: The Archaeology of Mexico | |
| ANTH 5224 | Archaeology of the Maya and Their Neighbors | |
| ANTH 5270 | Plains Archaeology | |
| ANTH 5630 | Nomadic Peoples of East Africa | |
| ANTH 6150 | | |
| *Approved Art and Art History Courses* | | |
| ARTH 6939 | Graduate Seminar: Open Topics in Art History (Topic: Visual, Material and Artistic Culture of the Plains and Plateau regions, 1800-1900) | |
| *Approved English Courses* | | |
| ENGL 5169 | Multicultural/Postcolonial Studies | |
| ENGL 7179 | Advanced Multicultural/Postcolonial Studies | |
| *Approved Ethnic Studies Courses* | | |
| ETHN 5233 | Native American and Indigenous Environmental Issues | |
| ETHN 5353 | Indigenous Traditions and Law: A Global Perspective | |
| ETHN 6101 | Topics: Specialized Comparative Studies (Indigenous Film & Media) | |
| ETHN 6841 | Advanced Directed Readings in Ethnic Studies (Indigenous Topics) | |
| *Approved Geography Courses* | | |
| GEOG 6402 | Seminar: Political Ecology | |
| *Approved Law School Courses* | | |
| LAWS 6602 | Cultural Property Law | |
| LAWS 7715 | Indigenous Peoples in International Law | |
| LAWS 7725 | American Indian Law I | |
| LAWS 7735 | American Indian Law II | |
| LAWS 7846 | Independent Legal Research (on an American Indian Law topic) | |
| LAWS 8725 | Seminar: Advanced Topics in American Indian Law | |
| *Approved Linguistics Courses* | | |
| LING 7800 | Open Topics in Linguistics (Language Revitalization) | |
| *Approved Music Courses* | | |
| MUSC 5112 | Proseminar in Ethnomusicology | |
| MUSC 5142 | American Indian Music | |
| *Approved Museum and Field Studies Courses* | | |
| MUSM 5045 | Introduction to Museum Anthropology | |
| MUSM 5912 | Collections Research Practicum in Cultural Anthropology | |
| **Total Credit Hours** | | **12** |

[1] Elective courses not taught by CNAIS core or affiliate faculty must be approved by the CNAIS director.

# Quantitative Methods for Behavioral Sciences - Graduate Certificate

The purpose of the graduate certificate in quantitative methods is fourfold:

- to strengthen interdepartmental links and communication among social and human science departments at CU Boulder, both in general and specifically with regards to quantitative research methodology and statistical analysis,
- to provide incentive and recognition to graduate students from a diverse set of departments who choose to cultivate expertise in quantitative research methods and methods of statistical analysis,
- to increase the visibility of and promote courses in quantitative research methods (possibly with the benefit that additional quantitative courses can be developed and taught), and
- as a consequence of all of the above, to improve the quality of quantitative training of graduate students at CU Boulder, increasing students' chances of employment upon completion of their graduate studies.

# Requirements

## Application Process

1. Review the course requirements below.
2. Complete the application form (found on the School of Education's Graduate Certificate webpage (https://www.colorado.edu/education/academics/graduate-programs/research-evaluation-methodology/graduate-certificate-quantitative/)).
3. Review application with the advisor to ensure the courses meet the advisor's expectations for expertise in quantitative methods training.

4. Submit the application electronically—along with all available syllabi and an unofficial transcript—to soe.gradvise@colorado.edu. (allison.atteberry@colorado.edu)

Note: If a student's course plan meets the requirements and all courses have already been completed at the time of application, the student will receive approval for the certificate. If some of the intended coursework will take place in future semesters, then the student will be given "conditional" approval. Once all coursework is completed, the student must submit an updated application that includes an unofficial transcript showing that the courses were satisfactorily completed.

Applications will be reviewed on a rolling basis.

## Course Requirements

Students will be awarded the certificate if they complete a two-semester foundational sequence in statistics (e.g., EDUC 8230/EDUC 8240, PSYC 5741/PSYC 5751, SOCY 5111/SOCY 6111) as well as a minimum of four additional courses from the approved list below, at least one of which must be outside the student's home department.

The guidelines serve as a minimum threshold for the application process. However, each student's advisor may require their students to take more than the minimum of 6 courses, or to decide that certain courses are not sufficiently rigorous to count towards the certificate. The application will then be reviewed by a cross-disciplinary committee to evaluate whether the course plan meets the certificate requirements.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Foundational Sequence in Statistics** | | |
| Sequence examples: [1] | | 6 |
| EDUC 8230 & EDUC 8240 | An Introduction to Quantitative Methods in Educational Research and Applied Regression Analysis | |
| PSYC 5741 & PSYC 5751 | General Statistics 1 and General Statistics 2 | |
| SOCY 5111 & SOCY 6111 | Statistics 1: Introduction to Social Statistics and Stats 2: Statistic Analysis | |
| **Approved Electives** | | |
| Choose a minimum of four: [2] | | 12 |
| EDUC 7326 | Quasi-Experimental Design in Causal Inference in Social Sciences | |
| EDUC 7386 | Educational Evaluation | |
| EDUC 7396 | Latent Variable and Structural Equation Modeling | |
| EDUC 7456 | Multilevel Modeling | |
| EDUC 8710 | Measurement in Survey Research | |
| EDUC 8720 | Psychometric Modeling: Item Response Theory | |
| IPHY 5300 | Statistical Genetics for Complex Traits | |
| IPHY 5800 | Advanced Statistics and Research Methods in Integrative Physiology | |
| MKTG 7310 | Design and Analysis of Experiments in Business | |
| ORMG 7830 | Research Design and Methods in Management | |
| PSCI 7108 | Special Topics | |
| PSCI 7155 | Maximum Likelihood Estimation and Generalized Linear Models | |
| PSYC 5122 | Quantitative Genetics | |
| PSYC 5242 | Biometrical Methods in Behavioral Genetics | |
| PSYC 5541 | Special Topics in Psychology | |
| PSYC 5761 | Structural Equation Modeling | |
| PSYC 6200 | Issues and Methods in Cognitive Science | |
| PSYC 6761 | Topics in Advanced Structural Equations Modeling | |
| SOCY 5031 | Research Design | |
| SOCY 7111 | Data III--Advanced Data Analysis | |
| **Total Credit Hours** | | **18** |

1 Students from a department that does not offer a two-semester sequence of this nature are welcome to take one of the three sequences listed above, and are encouraged to contact the instructors of those sequences to determine which of them would provide the best fit.

2 At least one must be outside the student's home department.

# Satellite System Design - Graduate Certificate

The certificate recognizes student accomplishments at the graduate level in successfully completing a specialized program of study in Satellite System Design (SSD). It blends courses from the Smead Department of Aerospace Engineering Sciences, Electrical, Computer and Energy Engineering and Engineering Management Departments. The certificate allows students to develop interdisciplinary skills in the area of satellite design and be more desirable to potential employers.

This certificate is available to degree-seeking and non-matriculated students. Additional certificate information can be found on the department's Satellite System Design Certificate (https://www.colorado.edu/aerospace/current-students/graduates/curriculum/certificate-programs/satellite-system-design-certificate/) webpage.

# Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

# Requirements

## Admissions Requirements

- Completed undergraduate degree from an institution accredited by an agency recognized by the U.S. Department of Education or its equivalent.
- Undergraduate courses in calculus, linear algebra and differential equations; two semesters of undergraduate calculus-based physics; and at least two semesters of upper-division undergraduate courses in engineering or physics.
- Ability to program at a level that will enable successful completion of graduate course assignments.

For more information, degree-seeking students may visit the AES Certificates (https://www.colorado.edu/aerospace/academics/

graduates/curriculum/certificates/) webpage; nondegree-seeking and non-matriculated students may visit the AES Certificates & Continuing Education (https://www.colorado.edu/aerospace/admissions/graduates/degree-programs/certificates-continuing-education/) webpage.

## Certificate Requirements

Four courses are required totaling at least 12 credit hours.

Grades of B or higher are required for fulfillment of requirements and certificate award. Students also pursuing other graduate certificates may *not* use the same courses to count for both certificates.

### Program Tracks

The certificate in satellite system design (SSD) offers two track options.

**Track 1: Hands-on (recommended for on-campus students.)**

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | **12** |
| ASEN 5018 | Graduate Projects I (Project must have a satellite or rocket focus) | 3 |
| ASEN 5148 | Spacecraft Design | 3 |
| ASEN 6028 | Graduate Projects II (Project must have a satellite or rocket focus) | 3 |
| One course from the Elective list below | | 3 |

**Track 2: Distance Compatible**

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | **12** |
| ASEN 5148 | Spacecraft Design | 3 |
| EMEN 5405 | Fundamentals of Systems Engineering | 3 |
| Two elective courses from list below (no more than one EMEN course) | | 6 |

### Elective List

Students are required to meet course prerequisites. Questions should be directed to the course instructor.

To develop cross-disciplinary breadth, students are strongly encouraged, but not required, to choose elective courses outside of their major.

| Code | Title | Credit Hours |
|---|---|---|
| **Electives** | | |
| ASEN 5010 | Spacecraft Attitude Dynamics and Control [1] | 3 |
| ASEN 5050 | Space Flight Dynamics [1] | 3 |
| or ASEN 5052 | Analytical Astrodynamics | |
| ASEN 5067 | Microavionics: Introduction to PIC Microcontrollers for Aerospace Systems [2] | 3 |
| ASEN 5090 | Introduction to Global Navigation Satellite Systems [1] | 3 |
| ASEN 5335 | Aerospace Environment | 3 |
| ECEN 5134 | Electromagnetic Radiation and Antennas | 3 |
| ECEN 5264 | Electromagnetic Absorption, Scattering, and Propagation | 3 |
| ECEN 5517 | Power Electronics and Photovoltaic Power Systems Laboratory | 3 |
| ECEN 5613 | Embedded System Design | 3 |
| ECEN 5623 | Real-Time Embedded Systems | 3 |
| ECEN 5634 | Microwave and RF Laboratory | 3 |
| ECEN 5692 | Principles of Digital Communication | 3 |
| ECEN 5797 | Introduction to Power Electronics | 3 |
| ECEN 5813 | Principles of Embedded Software | 3 |
| EMEN 5030 | Fundamentals of Project Management | 3 |
| EMEN 5033 | Aerospace Program Management | 3 |
| EMEN 5405 | Fundamentals of Systems Engineering | 3 |
| EMEN 5415 | Introduction to Requirements, Verification and Validation | 3 |

1 Core ASN certificate courses (ASEN 5010, ASEN 5050, ASEN 5052, and ASEN 5090). Cannot be counted for both certificates.

2 Course enrollment limited to non-Electrical Engineering students.

# Social Innovation - Graduate Certificate

The graduate certificate in social innovation trains students to be social innovation catalysts and maximize their social impact in a world that rewards professionals comfortable with change, experimentation and working across disciplines. Its two required classes are taught by faculty in business and the social sciences and with a focus on designing, implementing, evaluating and sustaining solutions to society's most pressing problems.

This certificate may be of special interest to graduate students who do not plan to pursue a career in academia but are interested in working in nonprofits, public service and other fields whose primary mission is to advance human welfare. All students enrolled in a degree-granting graduate program at CU Boulder are eligible to petition for admission to this certificate program.

## Requirements

The certificate requires successful completion of two graduate methods courses (6 credit hours) and one elective graduate course in a substantive area (3 credit hours) with a grade of B or higher. The required methods classes are MBAX 6130 and a 5000-level version of SOCY 4160.

Participants can apply one of the following electives to the certificate:

| Code | Title | Credit Hours |
|---|---|---|
| **Electives** | | |
| ANTH 5700 | Practicing Anthropology | 3 |
| ANTH 7000 | Seminar: Current Research Topics in Cultural Anthropology (Anthropology of Policy) | 3 |
| ATLS 5519 | Adv Topics (Venture Capital and Private Equity; limited to 5 students.) | 3 |
| BMEN 5117 | Anatomy and Physiology for Biomedical Engineering | 3 |
| EDUC 5301 | Queer(ing) Topics in Education | 3 |
| EDUC 5010 | Race and Equity in Higher Education | 3 |
| EDUC 5075 | Sociology of Education | 3 |
| EDUC 6245 | Latinx Education Across the Americas | 3 |

| | | |
|---|---|---|
| EDUC 6211 | Education Law and Litigation Workshop | 3 |
| EDUC 6220 | Gender Issues in Education | 3 |
| EDUC 6240 | African American Education in the United States | 3 |
| EDUC 6260 | Transnational Migration, Education, and Citizenship | 3 |
| EDUC 7446 | Policy Issues in Education | 3 |
| EMEN 5020 | Finance for Engineering Managers | 3 |
| EMEN 5030 | Fundamentals of Project Management | 3 |
| EMEN 5052 | Leading Others | 3 |
| EMEN 5215 | Applied Sustainability for Engineering Managers | 3 |
| EMEN 5220 | Product Design for the Circular Economy | 3 |
| EMEN 5225 | Sustainable and Resilient Operations and Supply Chains | 3 |
| EMEN 5230 | Resilience Engineering and Leadership in Crisis | 3 |
| ENVM 5050 | Social Innovation and Sustainable Cities | 3 |
| ENVS 5340 | Conservation Biology and Practice in Brazil's Atlantic Forest | 4 |
| ENVS 5750 | Climate Politics and Science-Policy | 3 |
| ENVS 5820 | Energy Policy in the 21st Century | 3 |
| ENVS 6301 | Environmental and Energy Economics | 3 |
| ENVS 6305 | Reducing the Environmental Impact of Food Systems: Evidence-Based Solutions | 3 |
| JRNL 5812 | Science Writing | 3 |
| JRNL 5822 | Reporting on the Environment | 3 |
| JRNL 7021 | Science Communication | 3 |
| JRNL 7030 | Media Sociology | 3 |
| JRNL 7034 | Health Communication | 3 |
| PHIL 5120 | Philosophy and Animals | 3 |
| PHIL 5150 | Topics in Applied Ethics | 3 |
| PHIL 5210 | | |
| PHIL 5230 | Bioethics and Public Policy | 3 |
| PHIL 5240 | Seminar in Environmental Philosophy | 3 |
| PHIL 5290 | Topics in Values and Social Policy | 3 |
| SLHS 7550 | Prevention of Hearing Loss from a Public Health Perspective (subject to availability) | 3 |
| SOCY 7171 | Special Topics (Work and Organizations) | 3 |

# Plan(s) of Study

**Year One**

| **Fall Semester** | | **Credit Hours** |
|---|---|---|
| SOCY 4160 | Designing Social Innovations | 3 |
| | **Credit Hours** | **3** |
| **Spring Semester** | | |
| MBAX 6130 | Sustainable Venturing | 3 |
| | **Credit Hours** | **3** |

**Year Two**

| **Fall Semester** | | |
|---|---|---|
| LAWS 7271 | Venture Capital and Private Equity | 3 |
| | **Credit Hours** | **3** |
| | **Total Credit Hours** | **9** |

# Learning Outcomes

By the completion of the program, students will be able to:

- Understand the different forms of social innovation.
- Cultivate the mindset and values of a problem solver.
- Illuminate the various contexts within which social innovation occurs.
- Appreciate the role of empathy in innovation.
- Grasp the different approaches to problem solving.
- Develop and critically assess a novel design for social change.
- Master a set of skills for operationalizing and implementing social solutions.
- Learn tools for critically evaluating the success and sustainability of solutions.

# Space Weather and Applications - Graduate Certificate

This certificate provides students with interdisciplinary skills in the field of space weather of both fundamental processes in science and practical applications to space-based and ground-based technology.

This certificate is available to degree-seeking and non-matriculated students. Additional certificate information can be found on the department's Space Weather and Applications Certificate (https://www.colorado.edu/aerospace/current-students/graduates/curriculum/certificate-programs/space-weather-and-applications/) webpage.

# Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

# Requirements

## Admission Requirements

- Completed undergraduate degree from an institution accredited by an agency recognized by the U.S. Department of Education or its equivalent.
- Undergraduate courses in calculus, linear algebra and differential equations; two semesters of undergraduate calculus-based physics; and at least two semesters of upper-division undergraduate courses in engineering or physics.
- Ability to program at a level that will enable successful completion of graduate course assignments.

For more information, degree-seeking students may visit the AES Certificates (https://www.colorado.edu/aerospace/academics/graduates/curriculum/certificates/) webpage; nondegree-seeking and non-matriculated students may visit the AES Certificates & Continuing Education (https://www.colorado.edu/aerospace/admissions/graduates/degree-programs/certificates-continuing-education/) webpage.

## Required Courses and Credits

Students are required to complete 12 credit hours total for this certificate, including ASEN 5335, two courses from the Tier 1 electives list and one additional 3-credit course from the Tier 2 electives list. At least one course must be outside of the student's home department if pursuing a graduate degree.

Grades of B or higher are required for fulfillment of requirements and certificate award. Students also pursuing other graduate certificates may *not* use the same courses to count for both certificates.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Course** | | |
| ASEN 5335 | Aerospace Environment | 3 |
| **Tier 1 Foundational Electives** [1,2] | | |
| Choose two: | | 6 |
| ASEN 6050 | Space Instrumentation | |
| ASEN 6365 | Lidar Remote Sensing | |
| ASTR 5140 | Astrophysical and Space Plasmas | |
| ASTR 5150 | Introductory Plasma Physics | |
| ASTR 5300 | Introduction to Magnetospheres | |
| ATOC 5050 | Atmospheric Thermodynamics and Dynamics | |
| ATOC 5235 | Introduction to Atmospheric Radiative Transfer and Remote Sensing | |
| **Tier 2 Concentration/Focus Electives** [2] | | |
| Choose one: | | 3 |
| *Applications* | | |
| ASEN 5016 | Space Life Sciences | |
| ASEN 5090 | Introduction to Global Navigation Satellite Systems | |
| ASEN 6265 | Fundamentals of Spectroscopy for Optical Remote Sensing | |
| *Design & Instrumentation* | | |
| ASEN 5158 | Space Habitat Design | |
| ASEN 5440/ ASTR 5780 | Mission Design and Development for Space Sciences | |
| *Radiative Processes & Atmosphere Coupling* | | |
| ASTR 5120 | Radiative and Dynamical Processes | |
| ATOC/ASTR 5560 | Radiative Processes in Planetary Atmospheres | |
| *Electromagnetics & Plasma* | | |
| ASTR/PHYS 7160 | Intermediate Plasma Physics | |
| *Data Science* | | |
| ASEN 6055 | Data Assimilation and Inverse Methods for Earth & Geospace Observations | |
| APPM 5510 | Data Assimilation in High Dimensional Dynamical Systems | |
| or STAT 5250 | Data Assimilation in High Dimensional Dynamical Systems | |
| STAT 5000 | Statistical Methods and Application I | |
| STAT 5010 | Statistical Methods and Applications II | |
| *Selected Topics* [3] | | |
| ASEN 5519/6519 | Special Topics | |
| ASTR/ATOC/GEOL 5830 | Topics in Planetary Science | |
| ASTR 7500 | Special Topics in Astrophysical and Planetary Sciences [2] | |
| ATOC 5500 | Special Topics in Atmospheric and Oceanic Sciences [2] | |
| **Total Credit Hours** | | **12** |

1. Students are required to meet each course's prerequisites, though exceptions can be made by course instructors.
2. If cross-listed in the student's home department, a course cannot count as the outside course within the certificate for students pursuing a graduate degree.
3. For courses with rotating topics, a particular offering must be on a topic relevant to space weather in order to count for this certificate. These courses will need approval from the program director.

# Water Engineering and Management - Graduate Certificate

The water engineering and management (WE&M) graduate certificate provides students with the tools they need to produce results and solve increasingly complex problems in the water profession. Young and mid-career professionals can build non-technical competencies with courses on leadership, management, communication, finance and governance. Courses are delivered on campus and live streamed/recorded options over the internet, allowing working professionals and distance students from around the world to earn a graduate certificate while continuing to put the learning into practice in their work.

Current students include young and mid-career professionals working for utilities, consulting firms, government and regulatory agencies, and degree-seeking graduate students at CU Boulder. With faculty of senior water professionals from across the country, including those from utilities, consulting firms and global professional organizations, students gain an opportunity to network and learn through real work case studies.

Upon completion of the three core courses and an additional elective, students are granted a certificate by the WE&M program, from the University of Colorado, Department of Civil Environmental and Architectural Engineering. The certificate courses count towards the Civil Engineering - Master of Science (MS) (https://catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/civil-engineering/civil-engineering-master-science-ms/) degree or the Engineering Management - Master of Engineering (ME) (https://catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/engineering-management/engineering-management-master-engineering-me/) degree.

# Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

- Water & Engineering Management Graduate Program (https://www.colorado.edu/ceae/research/interdisciplinary-programs/water-engineering-management/)
- Water & Engineering Management Professional Master's Program (https://www.colorado.edu/ceae/water-engineering-management-professional-masters-program/)

- Water & Engineering Management Graduate Certificate (https://www.colorado.edu/ceae/water-engineering-management-certificate/)

## Requirements

The certificate consists of three required courses plus one elective course, for a total of 12 credit hours.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| CVEN 5564 | Water Profession: Communication and Utility Finance | 3 |
| CVEN 5574 | Water Utility Management: Current Issues and Future Challenges | 3 |
| CVEN 5584 | Water Profession: Leadership and Management | 3 |
| **Electives** | | |
| Choose one: | | 3 |
| CVEN 5147 | Civil Engineering Systems (Engineering Economics and System Design) | |
| CVEN 5834 | Special Topics (Water Reuse Planning and Implementation) | |
| CVEN 5834 | Special Topics (Small System Water/ Wastewater Treatment) | |
| PUAD 5631 | Seminar in Environmental Politics & Policy [1] | |
| Other electives with permission of WE&M Program Director | | |
| **Total Credit Hours** | | **12** |

[1] CU Denver course.

# Music

The CU Boulder College of Music inspires artistry and discovery, together.

The College of Music provides specialized training designed to prepare students for a variety of careers in music. The college offers seven undergraduate and graduate degrees in 24 fields of study, along with an array of interdisciplinary opportunities, including certificates in music technology, entrepreneurship and arts administration.

Established by the Regents of the University of Colorado in 1920, the College of Music is a fully accredited member of the National Association of Schools of Music.

The widely varied functions of music in the world today present many challenging and interesting opportunities for teachers, performers, creative artists, technicians and commercial personnel. While these different pursuits require specialized emphases, the faculty of the College of Music recognize the musical and educational experiences that are common to all. Therefore, each curriculum of the College of Music is designed to present music as an integrated whole. Solo performance and technique, ensemble performance, historical and theoretical studies, concert and recital opportunities and elective courses both inside and outside the college are intended to give students a balanced approach to musical understanding and musicianship.

## Entrepreneurship Center

The Entrepreneurship Center for Music (ECM) is a national leader in professional development for musicians. The ECM equips today's music students with the skills and tools they need to create sustainable careers in the arts. ECM students are encouraged to develop entrepreneurial skills to explore the vast opportunities inherent in a changing marketplace, and to develop plans to implement career-enhancing ventures across the artistic spectrum. Offerings include courses for credit, an undergraduate Certificate in Music Entrepreneurship, workshops and internships with a wide range of arts organizations and businesses nationwide.

## Facilities

The College of Music has several beautiful performance halls, including the 2,000-seat Macky Auditorium, the 500-seat Grusin Music Hall, the 270-seat Music Theatre and the 111-seat Recital Hall. The college is located primarily in the Warner Imig Music Building, a large complex of practice rooms, faculty studios, offices, ensemble rehearsal areas, seminar facilities and classrooms. An addition to the east side of the building features a 4,300 square foot rehearsal space with a 35-foot ceiling and acoustical draping. Additional rehearsal and classroom facilities are located in Macky Auditorium.

The college's outstanding Howard B. Waltz Music Library is considered to be among the nation's most comprehensive. The library contains over 150,000 volumes, scores, recordings and periodicals. Computerized facilities are provided for listening to recordings and work stations are available for computer-based reference searching.

The college also features extensive facilities for music technology and electronic music study. The Computer-Assisted Music Laboratories (I and II) are multi-purpose labs designed primarily for classroom instruction. They feature numerous workstations, each with a Musical Instrument Digital Interface, sampling keyboard and a computer. The CRUNCH Lab is a fully-featured electronic music project studio. This lab is optimized for computer music research (including live interactive performance systems), as well as sound recording and editing projects and audio/video production. The Class Piano Laboratory is equipped with 12 digital pianos.

## Performances

Each year the College of Music presents over 400 concerts by students, faculty and guests. In addition to individual musical pursuits, students at all levels have the opportunity to perform in a variety of outstanding ensembles including orchestras, choirs, bands, world music ensembles, chamber and early music groups, jazz ensembles and combos, opera productions and musicals. Many of these groups have been invited to perform at prestigious national and international events. Recitals by students and faculty are supplemented by visits from world-class guest artists, all of which provide the Boulder community with the chance to hear some of the finest music being performed today. The vast majority of these excellent performances are free and open to the public.

Other music programs presented by CU Presents include:

- Artist Series
- Eklund Opera Program
- Takács Quartet Series
- Holiday Festival

For a schedule of all College of Music performances, call 303-492-8008 or visit the College of Music (http://www.colorado.edu/music/) website.

## Student Organizations

The student body of the College of Music has its own government, represented by the College of Music Student Government. Honorary music fraternities are Sigma Alpha Iota, Mu Phi Epsilon and Kappa Kappa Psi. Pi Kappa Lambda, a national music honor society, and the Music Teachers National Association both have active chapters within the College of Music. Music education majors are eligible for membership in student chapters of the National Association for Music Educators, the American Choral Directors Association and the American String Teachers Association. Additional organizations include CU Trombone Society, CU Trumpet Alliance and Diverse Musicians Alliance.

Additional organizations include CU Trombone Society, CU Trumpet Alliance and Diverse Musicians Alliance.

# Policies & Requirements

## Scholarships and Awards

A number of scholarships and awards are designed specifically for students in the College of Music.

Graduate students must enroll as full-time students, maintaining a 3.00 GPA, and make adequate progress toward their degrees. The college offers approximately 100 graduate assistantships as well as graduate fellowships and a variety of endowed scholarships for graduate students.

## Academic Ethics

Students are expected to conduct themselves in accordance with the highest standards of honesty and integrity. Cheating, plagiarism, illegitimate possession and disposition of examinations, alteration, forgery, or falsification of official records and similar acts or the attempt to engage in such acts are grounds for suspension or expulsion from the university.

In particular, students are advised that plagiarism consists of any act involving the offering of the work of someone else as their own. It is recommended that students consult with their instructors as to the proper preparation of reports, papers, etc., in order to avoid this and similar offenses. Students are expected to be acquainted with and abide by provisions of the University of Colorado Boulder Honor Code.

## Scholastic Requirements

A student is required to maintain at least a B (3.0) grade point average in all work attempted while enrolled in the Graduate School, and a student must have at least an overall 3.0 average to receive a graduate degree. Courses in which grades below C (2.0) are received are not accepted for master's degree programs or for the removal of academic deficiencies.

Students whose cumulative grade point average falls below 3.0 at any time during their graduate career will be placed on academic warning by the Graduate School.

Music majors are eligible for scholarships or renewal of their scholarships as long as they make satisfactory progress in their major (as determined by the faculty), demonstrate satisfactory proficiency in jury exams and auditions, participate in ensemble (when required in degree plan) and maintain a minimum cumulative GPA of 3.00. Students who have a cumulative GPA below 3.00 will be placed on scholarship warning for a maximum of two semesters (consecutive or cumulative), provided the GPA improves each semester. Students on scholarship probation who do not earn a cumulative GPA of 3.00 or higher by the end of the probationary period will have their scholarships revoked.

## Admission Requirements

Admission requirements for specific degree programs that supplement the Graduate School requirements are discussed in the degree program descriptions that follow. Applicants to the Master of Music Education program with an undergraduate GPA below 3.0 must submit GRE general test (http://www.ets.org/gre/) scores to be considered for admission.

## Preliminary Examinations

Before the beginning of their first semester of work toward a master's or doctoral degree, students are given preliminary exams covering the major field, several areas of music theory and music history. Specific requirements vary with the student's degree and program. Students pursuing the master's and doctoral degrees in voice also must pass proficiency requirements in piano and diction (English, French, German and Italian). Choral students must pass diction requirements in French, German, Italian and Latin.

Results from the major-field examination serve as one basis for recommending specific coursework in the program. Conducting majors should be knowledgeable in areas of repertoire, score analysis and conducting techniques. Select performance majors are examined in the areas of technique, repertoire, stylistically informed performance and pedagogy. Students enrolled in the master's degree in Jazz Performance and Pedagogy must demonstrate knowledge of jazz theory and history and jazz keyboard proficiency.

## College Teaching and Professional Development

Most graduate degrees in music require coursework in music pedagogy. Students who plan to teach at the college level are urged to be involved in the many offerings of CU Boulder's renowned Center for Teaching and Learning. Workshops, observations, consultations and other professional development opportunities are scheduled throughout the academic year. These include campus-level offerings as posted at the Center for Teaching and Learning (https://www.colorado.edu/center/teaching-learning/) website, as well as music-specific events organized by the Lead Teaching Assistants in the College of Music. The program offers three certificates that graduate students may pursue during their studies at CU Boulder: the Certificate in College Teaching (CCT), Professional Development Certificate for Preparing Future Faculty (PDC:PFF) (http://www.colorado.edu/gtp/certificates/professional-development-certificate-preparing-future-faculty/), and Professional Development Certificate for Preparing Future Professionals in Business, Government, Industry and the Arts (PDC:BGIA). For details, see Graduate Certificates (https://www.colorado.edu/center/teaching-learning/programs/graduate-certificates/).

## Financial Aid

In addition to the opportunities for financial aid described in the Graduate School section, the College of Music grants merit aid in the form of teaching assistantships, graduate assistantships and graduate part-time instructorships (GPTI) to numerous graduate students each year. The assistantships and instructorships, which are usually one-quarter time (25 percent), include both a stipend and the waiver of 5 or 6 credit hours of tuition each semester. There are also scholarships offered by the individual departments and external fellowships awarded through the Graduate School. All prospective students who have completed their

applications by December 1 will automatically be considered for available scholarships and assistantships.

## English Language Requirements

A student who is noticeably deficient in the use of the English language may not obtain an advanced degree from the University of Colorado. Satisfaction of this requirement depends not so much upon ability to pass formal tests, although these may be required, as upon the consistent use of good English in all oral and written work.

A valid TOEFL, IELTS or Duolingo English Test (DET see here for an updated list (https://www.colorado.edu/music/admissions/prospective-graduate-students/#step_two_upload_supplemental_materials-2284) of acceptable exams) is required of all international graduate applicants whose native language is not English. International students who have completed at least one year of full-time academic study at a U.S. institution (or at an institution in a country where English is the native language) at the time they apply and within two years from their desired admission term may request an **English proficiency score waiver**. Requests will be evaluated by the Associate Dean for Graduate Studies at the College of Music and subject to approval. Please see the College of Music international applications webpage for more details and waiver request deadline.

## Graduate Auditions

Auditions are required for all performance and performance/pedagogy programs. A personal audition is strongly preferred and required for consideration of a Graduate Assistantship position. Note that some studios require a preliminary, recorded audition before a student may be invited to schedule an audition on campus. For specific information and audition dates, refer to the Prospective Graduate Students Auditions (http://www.colorado.edu/music/admissions/prospective-graduate-students/auditions/) website or contact the office of the associate dean for graduate studies at 303-492-2207 or gradmusc@colorado.edu.

# Programs of Study

# Music

The College of Music's renowned faculty will guide students through the Master of Music, Doctor of Musical Arts, Doctor of Philosophy in Music or Artist Diploma programs, while a variety of ensembles are available for honing performance skills.

Visit the College of Music (http://www.colorado.edu/music/) website for more information about the school, academics, ensembles and more.

## Master's Degree

- Music - Master of Music (MMus) (p. 1797)

## Doctoral Degree

- Music - Doctor of Philosophy (PhD) (p. 1803)

## Artist Diplomas

- Chamber Music Performance (p. 1805)
- Opera and Solo Vocal Performance (p. 1805)
- Orchestral Performance (p. 1806)
- Solo Instrumental Performance (p. 1806)
- String Quartet Performance (p. 1806)
- Vocal Coaching (p. 1807)

## Certificates

- Arts Administration - Graduate Certificate (p. 1808)
- Music Theory - Graduate Certificate (p. 1808)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Aaholm, Philip
Professor Emeritus

Austin, James R. (https://experts.colorado.edu/display/fisid_103455/)
Professor; PhD, University of Iowa

Barnett, Michael T. (https://experts.colorado.edu/display/fisid_116467/)
Instructor; DMA, University of Colorado Boulder

Bartels, Justin P. (https://experts.colorado.edu/display/fisid_152074/)
Lecturer

Berg, Margaret H. (https://experts.colorado.edu/display/fisid_118371/)
Professor, Associate Dean; PhD, Northwestern University

Bernstein, Giora
Professor Emeritus

Bird-Arvidsson, Jennifer (https://experts.colorado.edu/display/fisid_147651/)
Associate Professor; MM, University of Michigan Ann Arbor

Brody, James M. (https://experts.colorado.edu/display/fisid_101948/)
Associate Professor; MM, Indiana University Bloomington

Bruns, Steven M. (https://experts.colorado.edu/display/fisid_103483/)
Associate Professor; PhD, University of Wisconsin–Madison

Caballero, Carlo (https://experts.colorado.edu/display/fisid_111681/)
Associate Professor, Faculty Fellow; PhD, University of Pennsylvania

Carthy, Nicholas R. (https://experts.colorado.edu/display/fisid_135356/)
Associate Professor; BA, Guildhall School of Music, London (England)

Chang, Philip C. (https://experts.colorado.edu/display/fisid_143541/)
Senior Instructor; PhD, University of Rochester

Chellis, Matthew Wren (https://experts.colorado.edu/display/fisid_154415/)
Associate Professor; MM, Manhattan School of Music

Conlon, Joan Catoni
Professor Emerita

Cooper, Peter W. (https://experts.colorado.edu/display/fisid_134522/)
Senior Instructor; BM, Northwestern University

Cooperstock, Andrew B. (https://experts.colorado.edu/display/fisid_115393/)
Professor; DMA, Peabody Institute of Johns Hopkins University

Cremaschi, Alejandro M. (https://experts.colorado.edu/display/fisid_134168/)
Professor; DMA, University of Minnesota Twin Cities

Davis, John S. (https://experts.colorado.edu/display/fisid_115443/)
Professor, Dean; DMA, University of Northern Colorado

Dockendorf, Matthew Paul (https://experts.colorado.edu/display/fisid_154511/)
Assistant Professor, Faculty Director; DMA, Michigan State University

Drumheller, John E. (https://experts.colorado.edu/display/fisid_103707/)
Senior Instructor; DMA, University of Colorado Boulder

Dunn, James M. (https://experts.colorado.edu/display/fisid_140593/)
Associate Professor; MM, Arizona State University

Dusinberre, Edward (https://experts.colorado.edu/display/fisid_101358/)
Faculty Fellow, Artist in Residence; Diploma, The Juilliard School

Eakin, Charles
Professor Emeritus

Eckert, Erika L. (https://experts.colorado.edu/display/fisid_101844/)
Associate Professor; BM, University of Rochester

Ellsworth, Oliver
Professor Emeritus

Erhard, Paul M. (https://experts.colorado.edu/display/fisid_100493/)
Professor; DMA, The Juilliard School

Farr, Elizabeth G. (https://experts.colorado.edu/display/fisid_101732/)
Professor Emerita; DMA, University of Michigan Ann Arbor

Fejer, Andras (https://experts.colorado.edu/display/fisid_103923/)
Faculty Fellow, Artist in Residence; Diploma, Franz Liszt Academy of Music

Fink, Robert
Professor Emeritus

Galm, John
Professor Emeritus

Gardner, Ryan (https://experts.colorado.edu/individual/fisid_165331/)
Associate Professor; DMA, Manhattan School of Music

Garland, Andrew B (https://experts.colorado.edu/display/fisid_159725/)
Assistant Professor; MM, University of Cincinnati

Gentry, Gregory R.
Associate Professor, Faculty Director, Faculty Fellow; DMA, University of Missouri–Kansas City

Goode, Bradley M. (https://experts.colorado.edu/display/fisid_134686/)
Associate Professor; MM, DePaul University

Graham, Larry
Professor Emeritus

Gunther, John G. (https://experts.colorado.edu/display/fisid_141165/)
Professor, Faculty Director; PhD, New York University

Hata, Kuniaki
Professor Emeritus

Hayes, Deborah
Professor Emerita

Hayghe, Jennifer C. (https://experts.colorado.edu/display/fisid_155969/)
Associate Professor; DMA, The Juilliard School

Heil, Leila (https://experts.colorado.edu/display/fisid_149780/)
Associate Professor; PhD, University of Colorado Boulder

Hill, Robert Stephen (https://experts.colorado.edu/display/fisid_163943/)
Professor, Endowed Chair; PhD, Harvard University

Holman-Johnson, Leigh (https://experts.colorado.edu/display/fisid_141980/)
Associate Professor; DMA, University of Colorado Boulder

Ishikawa, Yoshiyuki (https://experts.colorado.edu/display/fisid_102125/)
Professor; DMA, University of Michigan Ann Arbor

Jackson, Dennis
Professor Emeritus

Jenkins, Jeff (https://experts.colorado.edu/individual/fisid_146511/)
Instructor; Studied, Univeristy of North Texas

Jennings, Christina A. (https://experts.colorado.edu/display/fisid_143545/)
Professor; MM, The Juilliard School

Kearns, William
Professor Emeritus

Keister, Jay (https://experts.colorado.edu/display/fisid_115734/)
Associate Professor; PhD, University of California, Los Angeles

Kim, Suyeon (https://experts.colorado.edu/display/fisid_153470/)
Instructor; DMA, University of Texas at Austin

Korevaar, David J. (https://experts.colorado.edu/display/fisid_118374/)
Distinguished Professor, Faculty Fellow; DMA, The Juilliard School

Lehnert, Doris Pridonoff
Professor Emerita

Lehnert, Oswald
Professor Emeritus

Leong, Daphne (https://experts.colorado.edu/display/fisid_115747/)
Professor; PhD, University of Rochester

Lewis, Gary J. (https://experts.colorado.edu/display/fisid_145854/)
Professor, Endowed Chair; MM, Texas Tech University

Lin, Hsiao-Ling (https://experts.colorado.edu/display/fisid_149958/)
Instructor; DMA, Northwestern University

Malin, Jonathan (https://experts.colorado.edu/display/fisid_151714/)
Associate Professor; PhD, University of Chicago

Maloy, Rebecca (https://experts.colorado.edu/display/fisid_125582/)
Professor, Faculty Fellow, Endowed/Named Professor; PhD, University of Cincinnati

Mason, Patrick C. (https://experts.colorado.edu/display/fisid_101840/)
Professor Emeritus; MM, University of Nebraska-Lincoln

McCarthy, Kevin
Professor Emeritus

McDonald, Margaret M. (https://experts.colorado.edu/display/fisid_134703/)
Associate Professor; DMA, University of California, Santa Barbara

McKee, Paul (https://experts.colorado.edu/display/fisid_154465/)
Associate Professor; MM, University of Texas at Austin

McKinney, Donald J.
Professor, Faculty Director; DMA, University of Michigan Ann Arbor

McMurray, Allan
Professor Emeritus

Meneghini-Stalker, Tamara L. (https://experts.colorado.edu/display/fisid_146090/)
Associate Professor; MFA, Northern Illinois University

Miranda, Martina L. (https://experts.colorado.edu/display/fisid_140091/)
Associate Professor; DMA, Arizona State University; PhD, Arizona State University

Moteki, Mutsumi (https://experts.colorado.edu/display/fisid_100992/)
Professor, Faculty Fellow; DMA, University of Michigan Ann Arbor

Myer, Tom R. (https://experts.colorado.edu/display/fisid_100922/)
Associate Professor; MM, East Texas State University

Nguyen, Alexandra (https://experts.colorado.edu/display/fisid_145847/)
Associate Professor; DMA, University of Rochester

Nims, Abigail Andrews (https://experts.colorado.edu/display/fisid_152977/)
Associate Professor; MM, Westminster Choir College

Nytch, Jeffrey C. (https://experts.colorado.edu/display/fisid_147341/)
Associate Professor, Faculty Director; DMA, Rice University

Okigbo, Austin Chinagorom (https://experts.colorado.edu/display/fisid_151507/)
Associate Professor; PhD, Indiana University Bloomington

Pann, Carter N. (https://experts.colorado.edu/display/fisid_141461/)
Professor, Faculty Fellow; DMA, University of Michigan Ann Arbor

Peterson, Patti H.
Professor Emerita

Pinkow, David
Professor Emeritus

Reger, Jeremy J. (https://experts.colorado.edu/display/fisid_156224/)
Assistant Professor, Faculty Director; DMA, University of Michigan Ann Arbor

Requiro, David (https://experts.colorado.edu/display/fisid_155785/)
Assistant Professor; MM, University of Michigan Ann Arbor

Rhodes, Harumi B. (https://experts.colorado.edu/display/fisid_155971/)
Associate Professor, Faculty Fellow, Artist in Residence; MM, New England Conservatory of Music

Riis, Thomas L.
Professor Emeritus

Roeder, Matthew J. (https://experts.colorado.edu/display/fisid_120180/)
Associate Professor, Associate Dean; DMA, University of Colorado Boulder

Romero, Brenda M. (https://experts.colorado.edu/display/fisid_106117/)
Professor Emerita; PhD, University of California-Los Angeles

Sable, Barbara Kinsey
Professor Emeritus

Sampsel, Laurie (https://experts.colorado.edu/display/fisid_101802/)
Professor; PhD, University of Pittsburgh

Sawchuk, Terry M.
Associate Professor Emeritus; MM, University of Michigan Ann Arbor

Schranz, Karoly
Senior Instructor; Diploma, Franz Liszt Academy of Music

Schut, Joel
Instructor; DMA, Michigan State University

Scott, F. Wayne
Professor Emeritus

Seesholtz, John (https://experts.colorado.edu/display/fisid_163908/)
Associate Professor, Faculty Director; DMA, University of North Texas

Shay, Robert S. (https://experts.colorado.edu/display/fisid_154671/)
Dean, Professor; PhD, University of North Carolina Chapel Hill

Sher, Daniel (https://experts.colorado.edu/individual/fisid_100194/)
Professor, Dean Emeritus; EdD, Columbia University

Silver, Daniel S. (https://experts.colorado.edu/display/fisid_115564/)
Professor; MM, University of Michigan Ann Arbor

Sim, Claude
Assistant Professor; BM, Oberlin Conservatory

Smith, Jeremy L. (https://experts.colorado.edu/display/fisid_118265/)
Professor; PhD, University of California, Santa Barbara

Spera, Nicolo Ruggero Ferruccio (https://experts.colorado.edu/display/fisid_148406/)
Associate Professor; DMA, University of Colorado Boulder

Spillman, Robert
Professor Emeritus

Stanley, William J. (https://experts.colorado.edu/display/fisid_103616/)
Associate Professor; DMA, University of Illinois at Urbana–Champaign

Steinmetz, Branden (https://experts.colorado.edu/display/fisid_165415/)
Instructor, Faculty Director; DMA, Michigan State University

Swadener, Marc
Professor Emeritus

Swanson, Elizabeth (https://experts.colorado.edu/display/fisid_159726/)
Assistant Professor, Faculty Director; DMA, Northwestern University

Teitelbaum, Benjamin Raphael (https://experts.colorado.edu/display/fisid_151338/)
Associate Professor; PhD, Brown University

Theodore, Michael (https://experts.colorado.edu/display/fisid_113318/)
Associate Professor; PhD, University of California, San Diego

Thomas, Susan
Professor, Faculty Director; PhD, Brandeis University

Thornton, Michael Robert (https://experts.colorado.edu/display/fisid_116318/)
Professor; BM, Temple University

Walter, Douglas W. (https://experts.colorado.edu/display/fisid_101811/)
Professor; DMA, Temple University

Waters, Keith John (https://experts.colorado.edu/display/fisid_107518/)
Professor; PhD, University of Rochester

Weiss, Meta (https://experts.colorado.edu/display/fisid_164484/)
Senior Instructor; DMA, The Juilliard School

Wetherbee, Charles Tyler
Associate Professor; BM, Curtis Institute of Music

Wolzien, Charles
Professor Emeritus

# Courses

**MUSC 5002 (3) Proseminar in Historical Musicology**
Prepares students to pursue independent research in the history of music. Meeting as a seminar, the course focuses on the nature of evidence, methods and tools of research, and theoretical or historiographic issues.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5011 (2) 16th Century Counterpoint**
Provides a stylistic study of the main contrapuntal genres of the period including free, two- and three-part imitative counterpoint in the style of Palestrina. Provides a foundation in species counterpoint, working towards free counterpoint; stresses composing in 16th century styles. Offered fall of even-numbered years.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4011
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5012 (3) African Music**
Studies music cultures of Africa and the Black Diaspora, including folk and art music traditions, religious and popular music genres. Specific course topics could cover any or all of these styles, including exploring interconnections of musical stylistics of Africa and the Black Diaspora.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4012 and MUEL 4012
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5021 (2) 18th Century Counterpoint**
Provides a stylistic study of main contrapuntal genres of the period including inventions, suite movements and fugues. Provides a foundation in species counterpoint; stresses analysis and composing in the styles. Offered fall terms only.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5026 (2) Percussion Literature**
In-depth investigation of major original solo works for percussion, significant ensemble literature including chamber and large ensembles, and selected transcriptions. Offered fall semester of even numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5036 (2) Brass Literature**
Investigates major original solo works for trumpet, horn, trombone, euphonium, and tuba, and ensemble literature including chamber and large settings. Offered every other spring term.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5041 (3) Advanced Orchestration**
Provides an advanced study of orchestration techniques through score analysis and student projects. Offered spring of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5061 (3) Advanced Tonal Analysis**
Surveys tonal repertory and analytical techniques. Student must have passed general written theory and aural skills preliminary exam or completed remediation before enrolling in course.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5071 (3) Post-tonal Theory and Analysis I**
Focuses on theory and analysis of post-tonal literature pre-1945. Student must have passed general written theory and aural skills preliminary exam or completed remediation before enrolling in course.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5078 (1) Piano Technician for Pianists**
Familiarizes pianists with the development of the modern grand piano, its construction and the proper terminology of parts and specifications. Trains pianists in minor repairs and adjustments of the grand piano action and in minor tuning tasks.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4078
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prerequisite piano majors.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 5081 (3) Applications in Music Technology**
Presents advanced strategies for applying computer technology in music creation. Synthesis, DSP, MIDI and audio sequencing, as well as advanced music engraving, will be explored through the use of various software platforms including Logic, Reason, MAX and Finale. Offered fall term only.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5091 (3) Contemporary Theory - Jazz and Modal Music**
Studies the composition and improvisation of Herbie Hancock, Wayne Shorter, Chick Corea and their contemporaries. Broadly examines modality in jazz and its similarities to music of Ravel and Debussy, as well as systems of organization in Messiaen and others. Strategies for analysis and integration of the material into a personal vocabulary as a composer and improviser are explored. Offered spring of even-numbered years.
**Requisites:** Requires prerequisite course of MUSC 3081 (minimum grade D-). Restricted to College of Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5103 (3) Teaching General Music**
Provides an in-depth examination of teaching and learning processes in the elementary general music classroom, based on the integration of child development and musical development theories with content and delivery skills appropriate for K-5 general music classrooms. Students implement and evaluate music instruction, design curricular projects, and build a repertoire of vocal, instrumental, and speech-based arrangements. Offered fall of odd-numbered years.
**Requisites:** Restricted to Music (MUSD) or Music Education (MMED or MUED) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5112 (3) Proseminar in Ethnomusicology**
Examines the definition, scope, and methods of ethnomusicology, the discipline that focuses on approaches to the study of music theory, history, and performance practices of world cultures.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5121 (3) Advanced Topics in Music Technology**
Conducts advanced research in techniques and tools of music technology. Topics vary from term to term and may include: user interfaces for computer music; advanced sound design; digital modeling of acoustic sounds; computer-aided analysis of sound; modeling music intelligence in real time. Lectures and work sessions will support student projects.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 5081 (minimum grade D-). Restricted to College of Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5136 (2) Advanced Conducting**
Offers advanced work in conducting.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5141 (2) Instrument Design Lab: Sound, Perception & Creativity**
Explore fundamental physical concepts of sound and music in a hands-on laboratory environment. Survey a number of topics through the construction of PVC overtone flutes, an investigation in the timbral intention of Dolly Parton's vocal technique, physical modeling through the testing of 3D-printed vowel flutes, the construction of a "Long String Instrument," and more. Specific topics include: tuning and temperament, harmony and timbre, and preparing the piano (digital and analog).
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4141
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 5142 (3) American Indian Music**
Examines Native North American musical cultures, emphasizing music as an integral part of religious expression and community life.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4142
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5143 (2) Topics in Choral Music Education**
Prepares students to teach, conduct and facilitate music making in various choral ensembles. Examines skills, teaching techniques and administrative procedures necessary for developing and maintaining various choirs at the elementary through high school levels. Includes discussion of current topics in choral music education and community choral field experiences. Offered fall terms, every two years.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4143
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5151 (3) Topics in Music Analysis**
Analytical study of a specific topic to be determined by the instructor (e.g., German Lieder, Bartok quartets, tonal rhythm, Schenker, etc). Study published analyses representing a variety of methodologies and produce original analyses. Student must have passed graduate preliminary exams or completed remediation before enrolling in this course.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prerequisite MUSC 5061 or MUSC 5071 as appropriate to the topic, or instructor consent required.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5153 (1) Advanced Topics in K-12 Music Pedagogy**
Examines the literature, skills, and pedagogical applications of selected topics applicable to all K-12 Music Educators such as curriculum, music listening, and composition.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Music Education (MMED-MMUE) students only.
**Grading Basis:** Letter Grade

**MUSC 5156 (2) Symposium in Choral Music**
Provides an advanced study of choral repertoire by style period. Required of all choral graduate students for a minimum of two semesters.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5163 (1) Advanced Topics in Secondary Choral Music Education Pedagogy**
Examines the literature, skills, and pedagogical applications of selected topics in choral music classrooms, such as adolescent vocal development, vocal jazz ensemble directing, and development of piano skills.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 5168 (3) World Music Theories**
Examines music rules, concepts or music theories and sociocultural elements that musicians use in creating musical sound, with emphasis on music practices from a variety of world traditions; observing shared and diverging principles, making cross-cultural comparisons and developing a new pedagogy that supports the substantive study of global musics.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4168
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5173 (1) Advanced Instrumental Techniques and Pedagogy**
Reviews and expands knowledge of brass, woodwind, percussion, or string instrumental techniques and pedagogical tools, extending upon skills gained in a typical introductory class teachers complete prior to licensure. Students complete a project based on synthesizing new pedagogical resources and materials. Intended for music educators who teach in K-12 school settings.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Music Education (MMED-MMUE) students only.
**Grading Basis:** Letter Grade

**MUSC 5176 (2) Conducting 3**
This is a study in advanced conducting techniques. Demonstration of advanced score study techniques as well as the application to gesture and rehearsal techniques linked with conducting will be explored. Participation fully in discussion readings and contribute to the learning of all is expected.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4176
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Music Education (MMED) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 5183 (2) Research in Music Teaching**
Introduces basic descriptive, experimental, and qualitative research methods, including sampling, design, data collection, and analysis. Students review published music research and conduct one original research study. Offered fall of odd-numbered years.
**Requisites:** Restricted to Music (MUSD) or Music Education (MMED or MUED) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5203 (2) Topics in Music Education**
Provides an in-depth examination of contemporary topics in music education. Students implement and design relevant projects.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5215 (1-2) Studies in Piano Teaching**
Studies the practical aspects and techniques for teaching piano at the intermediate and advanced levels in pre-college and college settings, as well as teaching group piano at the college level.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prereqsuisites: MUSC 5305 and MUSC 5315.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5246 (3) Jazz Improvisation and Analysis**
Application of performance skills for the advanced improviser through specific harmonic, melodic and rhythmic techniques. Also includes analysis of transcriptions and varied harmonic contexts as well as a focus on the development of repertoire. Offered fall semester of odd-numbered years. Requires prerequisite course or instructor consent.
**Requisites:** Requires prerequisite course of MUSC 3071 (minimum grade D-). Restricted to Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5256 (3) Jazz Studies Administration and Pedagogy**
Surveys approaches, techniques, philosophies and materials available for teaching jazz at both pre-college and collegiate level. Subject areas covered include improvisation, composition and arranging, studio teaching and directing ensembles. Studies the organization and administration of collegiate jazz programs. Topic include curriculum, program philosophy, teaching techniques, funding, teacher training and evaluation. Offered fall terms of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prerequisite MUSC 3253.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5273 (2) Comprehensive String Pedagogy**
Comparative study and application of the principles of string teaching. In-depth analysis of individual instrument pedagogy and application to advanced studio and class teaching. Historical survey of major violin, viola, cello, and double bass pedagogues. Includes apprenticeship teaching. Offered fall of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5285 (3) Organ Survey**
Survey of organ repertoire and the history of organ building from the 16th century to the present.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4285
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5305 (2) Piano Pedagogy Group Techniques**
Discusses materials and techniques for teaching beginning piano students of various ages in studio and class settings. Special attention given to adult classes. Includes an introduction to educational technology used in group instruction. Offered fall of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5313 (3) Teaching Choral Music**
Examines choral music curricula, instructional materials and teaching techniques appropriate for secondary choral settings. Also addresses administrative strategies for choral music programs. Offered spring only.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4313
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5315 (2) Piano Pedagogy: Intermediate Literature**
Surveys repertoire at the intermediate level and discusses teaching techniques. Explores issues related to intermediate and advanced piano performance, such as performance anxiety, physical and psychological well-being of the performer, and the development of technique. Introduces educational technology relevant to intermediate teaching. Offered spring of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5325 (2) Keyboard Literature 1**
Examines areas of style, genre, and performance practice in selected keyboard music from 1600 to 1830. Emphasizes student presentation of specific topic areas. Offered fall terms of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5335 (2) Keyboard Literature 2**
Examines areas of style, genre, and performance practice in selected areas of keyboard music from 1830 to the present. Emphasizes student presentation of specific topic areas. Offered spring terms of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5336 (2) Brass Pedagogy**
Analyzes pedagogical techniques and philosophies of teaching brass instruments, and examines materials. Offered every other spring terms.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4336
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5345 (2) Research: Piano Literature and Pedagogy**
Looks at individual or group research related to piano pedagogy or literature for piano.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5346 (2) Woodwind Pedagogy**
Provides the knowledge and skills to teach woodwind instruments in both individual studio and collegiate class settings. Considers pedagogical techniques for all levels of instruction. Offered fall terms of odd-numbered years.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4346
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5356 (2) Jazz Studies Practicum**
Implements independent, project-based studies for further developing knowledge and experience in jazz pedagogy, performance and composition. Student is assessed and guided by faculty to develop specific skills needed toward becoming a more effective jazz educator. Offered spring of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prerequisite MUSC 5256.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5365 (2) Advanced Accompanying**
An in-depth study of collaborative repertoire in individually assigned projects, coached by collaborative piano faculty and others.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5375 (2) Opera Coaching for Pianists**
Teaches skills for opera coaches and rehearsal pianists.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5405 (2) Basso-Continuo Accompaniment**
Studies the history, theory and practice of Basso-continuo accompaniment. Provides practical instruction in realizing harmony from a given bass line (figured or unfigured), projecting affect and creating dynamics at the harpsichord. Emphasizes individual cognition and creativity.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4405
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5415 (2) Advanced Basso Continuo**
Explores advanced basso continuo, serving as more in depth study for those who have completed or tested out of Basso-Continuo Accompaniment (MUSC 5405).
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4415
**Requisites:** Prerequisite: MUSC 5405 - Basso-Continuo Accompaniment and restricted to graduate students only.

**MUSC 5425 (2) Collaborative Literature for Piano with Winds, Brass, and Percussion**
Study of all forms of wind, brass and percussion repertoire involving collaboration with piano including sonatas, duos, short pieces and concerti. Collaborative piano major or instructor consent required. Offered fall terms of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5435 (2) Collaborative Literature for Piano with Strings**
Study of all forms string repertoire involving collaboration with piano including sonatas, duos, short pieces and concerti. Collaborative piano major or instructor consent required. Offered spring terms of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5443 (3) Teaching Instrumental Music**
Examines instrumental music curricula, instructional materials and teaching techniques appropriate for rehearsal, class, and lesson settings. Also addresses administration strategies for instrumental music programs. Offered spring only.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4443
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5444 (2) Vocal Pedagogy**
In depth study of the physiology, acoustics, and health aspects of the singing voice. Recommended for all graduate students in voice.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 5446 (1) Supervised Teaching Practicum**
Designed to provide supervised teaching experience that includes feedback on weekly teaching; weekly and longer-term planning; and reflection on the impact of teacher characteristics and actions on student development.
**Repeatable:** Repeatable for up to 5.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 5273 (minimum grade D-). Restricted to College of Music (MUSC) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 5454 (2) Repertory for Young Voices**
Survey of the solo repertoire for young voices, the physiological aspects of mutational voices, techniques of vocalizing young voices, and class voice procedure.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 5464 (2) Voice Literature I: French Song Literature and Oratorio/ Concert Solo Literature**
Explores the vocal literature of French Art Song and Oratorio/Concert Solo Literature in a graduate-level survey course taught in two modules.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Voice

**MUSC 5484 (2) Graduate Seminar in Vocal Pedagogy**
A thorough investigation of the challenges of studio voice pedagogy, including corrective techniques, psychological philosophies, and video analysis of student teaching. Examination and evaluation of comparative methodologies of vocal technique.
**Requisites:** Requires prerequisite course of MUSC 5444 (minimum grade D-). Restricted to College of Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 5564 (2) Voice Literature II: German, British & American Song Literature**
Explores the rich variety of German, British and American Song Literature from the late Middle Ages to the present in a graduate-level survey course taught in two modules.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 5583 (2) Inclusive Music Classroom**
Surveys strategies necessary for teaching music to all students, including those with special needs. Offered fall of even-numbered years.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4583
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5608 (1) Wellness for Musicians 1**
Explores strategies that help musicians maintain health while achieving peak performance. Investigate and employ powerful somatic methodologies including Alexander Technique and Body Mapping that improve physical functioning and prevent injury. Incorporates a variety of wellness aspects such as performance psychology, mental health, effective exercise, nutrition, breathing, hearing and vocal health.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 5642 (3) Jazz History and Literature**
Studies musical trends and cultural forces influencing jazz, with analysis of improvisational styles, melodic and motivic variations, transcriptions and orchestrations from significant periods in its history. Offered spring terms only.
**Requisites:** Requires prerequisite course of MUSC 3642 (minimum grade D-). Restricted to College of Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5666 (2) Chamber Music Literature: Woodwinds**
Provides a stylistic-historical survey in various genres from Baroque era to present. Offered fall terms of even numbered years.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5708 (2) Introduction to Music Bibliography and Research**
Explores basic informational sources about music and musicians; a study of citation formats, research methodologies and writing techniques employed in music research papers, theses and dissertations. Intended to increase students' information fluency. Required in all master's degree programs.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 5712 (3) Renaissance Music**
Provides a repertory and analysis of polyphonic music, 1400-1600.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4712
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5742 (3) Performance Practice of Early Music**
Examines instrumental and vocal performance practices through the 18th century. Topics may vary from year to year.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5752 (3) Women in Music**
Examines the role of women as creators and performers of Western Music. Explores related issues in musicology, including canon formation, reception history and feminist aesthetics.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4752
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5762 (3-4) History of Choral Literature**
Provides a seminar in analysis of musical style and history of choral repertory . Those wishing review of literature and repertory may enroll for 4 credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5772 (3) History of Opera**
Examines representative operas from the 17th through the 21st centuries. Emphasizes both cultural and analytical aspects and surveys related musicological literature.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4772
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5802 (3) Studies in 20th Century Music**
Offers intensified work in history of music in the 20th century. Topics vary from year to year.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4802
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5808 (1) Wellness for Musicians 2**
Develops and further integrates material covered in Wellness for Musicians 1. Deeper exploration of somatic and wide-ranging wellness strategies, including FM Alexander¿s conception of Inhibition and other approaches for proactive self-care and improvement. Consideration of how to integrate methodologies in teaching, pedagogy, and practice. Students will complete several projects related to their specific musical pursuits and interests.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4608
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 5608 (minimum grade C-). Restricted to College of Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 5822 (3) Ancient and Medieval Music**
Surveys sources from the ancient Greeks to the early Christian era and music from the 8th to the 14th century.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5832 (3) Studies in American Music**
Offers intensified work in folk, popular, and art music of the United States.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5842 (3) Aesthetics of Music**
Surveys various philosophies of music in writings of philosophers, psychologists, sociologists, composers, critics and historians.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5852 (3) 17th and Early 18th Century Music**
Examines music and writings about music from the Baroque era. Emphasizes cultural and musical analysis and surveys current musicological literature.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4852
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5872 (3) Late 18th and 19th Century Music**
Studies European and American music from the last developments of the styles through romanticism and its later 19th century reverberations.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4872
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Recommended:** Prerequisite or corequisite MUSC 3812.
**Additional Information:** Departmental Category: Musicology

**MUSC 5882 (3) Studies in 18th and 19th Century Music**
Meets as a seminar and examines selected topics in Classic and Romantic music, 1750-1900. Topics vary from year to year.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5892 (3) Latin American Music**
Explores music of cultures of the Americas south of the United States and in the diaspora, emphasizing the relationships of music and culture in folk, popular and arts styles.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4892
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5908 (1-3) Arts Administration Internship**
Engage with music/music business organizations in the community (for profit or non-profit) to pursue specific tasks or projects relevant to the student's career goals. A minimum of 48 hours is required per semester for one credit.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4908
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 5918 (2) Graduate Career Seminar**
Equips graduate music students with the tools and skills required to pursue a professional career in music. Topics include (but are not limited to) professional materials (resumes, CVs, websites), networking/social media, grant writing/fundraising, exploring career options, and copyrights/other legal issues.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 5938 (3) Management and Leadership in the Arts**
Focus on management, leadership, and communication strategies and their application to arts organizations. Concepts and approaches for leaders of small, medium, and large arts organizations in both the for-profit and nonprofit sectors, including human resource management, problem solving, and effective communication will be examined. Students will practice and refine their written communication skills by writing clearly and concisely throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4968
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 5948 (3) Sustainable Arts Organizations: Forecasting and Fundraising**
Equips students to create comprehensive fundraising plans rooted in strategic business planning for arts organizations, which depend on contributed income for sustainability. Students will learn the basics of planning, budgeting and forecasting, along with proven, effective fundraising strategies and techniques. Includes cased studies and guest speakers with extensive professional expertise in the field.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 5958 (2) Community Performances**
Explore the real-world issues of planning and presenting concerts. Learn to program music for all types of audiences, gain confidence speaking about your music and handle the logistics of concert production. Discuss the role of concerts in the 21st century and examine new styles of presentation, audience engagement and outreach. Course culminates in a concert presented in a local venue.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4958
**Requisites:** Requires prerequisite course of MUSC 5918 (minimum grade D-). Restricted to College of Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 5978 (3) Introduction to Arts Administration**
Introduce students to current trends in arts administration, explore the fundamentals of managing arts organizations and develop concrete tools for managing boards, volunteers and staff, effective fund raising, strategic planning and program development. Current issues, the role of the arts and arts advocacy will be discussed.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4978
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 5988 (3) The Entrepreneurial Artist**
Learn the core principles of entrepreneurship, such as idea formation, venture models, opportunity assessment, market analysis and strategies for launching a venture and apply them to entrepreneurial ideas. Lectures, projects, entrepreneur interviews and case studies will culminate in a feasibility study for an original entrepreneurial concept.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4988
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prerequisite MUSC 5918.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 6041 (3) Advanced Orchestration**
Provides an advanced study of orchestration techniques through score analysis and student projects. Offered spring of even-numbered years.
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 6051 (3) Pedagogy of Music Theory**
Explores methods, materials, practical techniques for teaching undergraduate music theory, aural skills and analysis. Student must have passed general written theory and aural skills preliminary exam or completed remediation before enrolling in course. Offered spring of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 6113 (2) Foundations of Music Education**
Surveys historical and philosophical bases of contemporary music education. Offered fall of even-numbered years.
**Requisites:** Restricted to Music (MUSD) or Music Education (MMED or MUED) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 6133 (2) Comprehensive Musicianship through Performance**
Explores curricular models for music education. Emphasizes comprehensive musicianship and standards-based frameworks for curriculum and development. Offered spring terms of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 6193 (1-3) Selected Studies in Music Education**
Instructor consent required.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to Music (MUSD) or Music Education (MMED-MMUE) students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 6203 (2) Psychology of Music Learning**
Provides an overview of psychological concepts relevant to music teaching and learning. Topics include learning theories, selected individual difference variables (motivation, anxiety, creativity, and personality), physiological structures related to hearing, psychoacoustics, and approaches to examining musical ability (e.g. brain research, music aptitude, and skill acquisition). Offered spring terms only.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 6213 (2) Assessment of Music Learning**
Provides an overview of traditional and contemporary approaches to music assessment. Topics include psychometrics, standardized tests, test construction, grade reports, and student portfolios. Offered on a rotating basis during summer session.
**Requisites:** Restricted to Music Education (MMED-MMUE) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 6223 (2) Sociology of Music Education**
Studies sociological perspectives related to music education. Topics include functions and uses of music; teacher and student role/identity development; social aspects of music performance, and cultural perspectives on music learning. Offered fall of even-numbered years.
**Requisites:** Restricted to Music (MUSD) or Music Education (MMED or MUED) graduate students only.
**Recommended:** Prerequisite MUSC 6113.
**Additional Information:** Departmental Category: Music Education

**MUSC 6233 (2) Pedagogy of Music Teaching and Learning**
Explores four topics (reflective/critical thinking, teacher effectiveness, cultural/program contexts, teachers' lives/career development) relevant to long-term teacher development. Includes individualized feedback on teaching. Open to graduate students in music education and performance-pedagogy. Offered spring terms of odd numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prerequisite MUSC 6113 and/or significant teaching experience.
**Additional Information:** Departmental Category: Music Education

**MUSC 6243 (1) Applications of Music Pedagogy**
Provides a structured, collaborative environment for graduate students with K-12 teaching duties to apply the content from music education courses to their current pedagogical environments. Students will apply inquiry strategies as they design and implement an applied project that synthesizes specific theoretical or conceptual areas. Offered fall term only.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to Music Education (MMED-MMUE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Music Education

**MUSC 6325 (2) Seminar in Piano Literature**
Provides an intensive study of a selected area of repertoire or history. Offered fall terms only.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 6343 (1) Capstone Portfolio Project**
Designed as the capstone course for students enrolled in the Summer MME degree program. Students are guided in their composition of three summative essays involving reflection on connections between two or more courses, comparisons between their entrance essays and current thinking, and identification of pedagogical impacts on their K-12 teaching.
**Requisites:** Restricted to Music Education (MMED-MMUE) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 6801 (3) Advanced Topics in Music Theory**
Intensive study of a specialized topics in theory and analysis through critical reading and analysis, class presentations and independent research. Student must have passed graduate preliminary exams and completed 6 credits hours of graduate-level theory before enrolling in course. Instructor determined prerequisite will be enforced as appropriate to the topic.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of MUSC 5708 (minimum grade D-). Restricted to Music (MUAD, MUED or MUSD) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 6822 (3) Advanced Studies in Musicology**
Intensive study of a specialized topic in musicology. Students will be guided in critical reading, historical or ethnographic issues, analysis, oral presentations, and independent research.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of MUSC 5708 (minimum grade D-). Restricted to Music (MUAD, MUED or MUSD) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 7046 (3) Seminar in Jazz Literature**
Provides advanced study in jazz literature and styles. Students present results of research on individually chosen topics or aspects of a topic central to the class. Requires class presentations and a major paper or project. Offered spring semester only.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.
**Recommended:** Prerequisites MUSC 5091 and MUSC 5642.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 7103 (3) Historical Research in Music Education**
Topics include oral history, archival collections, data verification, and critiquing/publishing research. Students conduct one original research study. Offered spring of even-numbered years.
**Requisites:** Restricted to Music Education (MMED-MMUE) doctoral students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 7113 (3) Quantitative Research in Music Education**
Topics include sampling, questionnaire development, research design, intermediate and advanced statistics, presenting/publishing research, and research ethics. Students conduct an original research study. Offered fall of even-numbered years.
**Requisites:** Restricted to Music Education (MMED-MMUE) students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 7138 (3) Contemporary Issues in College Teaching**
Examines music teaching within colleges and universities, including the evolution of university music programs, undergraduate and graduate music curricula, music professors and their work, and sociopolitical issues. Offered spring of odd-numbered terms.
**Requisites:** Restricted to College of Music (MUED or MUSD) graduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 7143 (3) Qualitative Research in Music Education**
Topics include qualitative research traditions, site and participant selection, data collection and analysis methods, quality standards, and research ethics. Students conduct an original research study. Offered fall of odd-numbered years.
**Requisites:** Restricted to MUED students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 7203 (3) Doctoral Seminar in Music Education**
Provides an advanced study of topics central to the music education profession. Requires class presentations and a major paper or project. Offered fall of even-numbered years.
**Requisites:** Restricted to MUED students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 7801 (3) Doctoral Seminar in Music Theory**
Provides advanced study in theory. Students present results of research on individually chosen topics or aspects of a topic central to the class. Requires a major paper or project. Student must have passed graduate preliminary exams and completed 6 credits hours of graduate-level theory before enrolling in course. Instructor determined prerequisite will be enforced as appropriate to the topic.
**Requisites:** Requires a prerequisite course of MUSC 5708 (minimum grade D-). Restricted to College of Music (MUED or MUSD) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 7822 (3) Seminar in Musicology**
Required of all musicology majors before completion of comprehensive examinations. A different research area is designated each semester. Offered fall only.
**Repeatable:** Repeatable for up to 30.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Music (MUAD or MUSD) graduate students only.
**Additional Information:** Departmental Category: Musicology

# Music - Master of Music (MMus)

The Master of Music degree programs at CU Boulder are modeled after the guiding principles outlined by the National Association of Schools of Music. The purpose of Master of Music degree work is to refine skills in music performance, music composition, research and writing, and pedagogy. There are numerous fields of study within the Master of Music program as listed below. The musicology program admits students only at the PhD level.

The Master of Music degree provides advanced studies in performance, performance/pedagogy, composition (with an optional emphasis in technology), music theory, and conducting (choral, orchestral and wind). Areas of emphasis in performance and performance/pedagogy include all band and orchestral instruments, guitar, harp, harpsichord, historical performance and research, jazz, piano and voice. Each of the MM degrees incorporates studies in the major area, support courses in music electives (or a secondary area) and thesis/recital work. The minimum credit hours required for a MM degree varies from 30 to 34 depending on the area of study. For specific major area requirements, see the list of Master of Music degrees (https://www.colorado.edu/music/academics/graduate-advising/degrees/) at the College of Music website.

Brass, conducting, harpsichord, historical performance and research, percussion, string, voice and woodwind majors are required to participate in a music ensemble. A student's ensemble placement will be determined by an audition during the first week of classes.

# Requirements

## Prerequisites

Students should have completed undergraduate preparation equivalent to that expected for the bachelor's degree at this university. Normally this is a bachelor of music degree in the proposed area of concentration.

Before admission, composition majors should upload representative scores and recordings (to the digital portfolio on the application) and a list of completed compositions. Theory majors should upload two scholarly writing samples that demonstrate ability in critical analysis, appropriate research techniques and skill in the cogent use of English. For further details, see the Application Process section of the website.

## Program Requirements

The master of music (MM) degree, which the Graduate School considers a Plan II program, requires a minimum of 30–32 credit hours of graduate coursework, including thesis projects. Many students find it necessary to exceed this minimum in order to meet the musical and academic standards demanded by the MM preliminary examinations. Specific degree requirements (https://www.colorado.edu/music/academics/graduate-advising/degrees/) for each program are available online at the College of Music website.

Each student's program is directed by a three-member advisory committee headed by the major advisor (the student's major professor). A second member is chosen from the major area; the third member is usually from outside the major area. (Major areas include: composition, music education, music theory and performance.) By the second semester of residence, the student should complete a tentative degree plan and obtain the approval of the advisory committee and the associate dean for graduate studies. Students must complete the master's degree within four years of matriculation into the program.

### Examinations

In addition to preliminary examinations, master's degree students in music must take the Master's Qualifying Examination. The procedures, guidelines for registration and deadlines for taking these examinations are announced by the Music Graduate Office.

### Recital/Thesis Requirements

The recital/thesis requirement for the MM in composition is a body of work(s) lasting at least 20 minutes in duration. This could be comprised of one or more original works for varying forces. For the major in conducting, the requirement is a public practicum and a performance-related or other scholarly document. For the major in music theory, it is two thesis papers. Or, with consent of the faculty advisory committee, a single, extended thesis for four credit hours. For the major in performance, presentation of two public recitals fulfills the requirement. For the major in performance and pedagogy, a full-length recital and a research document in pedagogy are required.

### Required Courses and Credits

**Composition**

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Composition** | | |
| PMUS 5526 | Composition (variable from 2-3 per semester) [1] | 9 |

*Thesis*

| | | |
|---|---|---|
| A body of work(s) lasting at least 20 minutes in duration. This could be comprised of one of more original works of varying forces for each Thesis project. | | |
| TMUS 6956 | Master's Thesis | 2 |
| TMUS 6957 | Master's Thesis 2 | 2 |
| **Category II: Other Requirements in Music** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5XX2 | Musicology or Ethnomusicology Elective | 3 |
| MUSC 5XX1 | Electives in Music Theory | 9 |
| *Electives* | | *3* |
| Maximum 2 credits of ensemble | | |
| **Total Credit Hours** | | **30** |

1 Regular attendance at composition seminar is expected.

### Composition with an Emphasis in Music Technology

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Composition** | | |
| PMUS 5526 | Composition (Emphasis in traditional techniques) [1] | 3 |
| PMUS 5526 | Composition (Emphasis in Music Technology - variable 2 or 3 credits) [1] | 6 |
| *Thesis* | | |
| One major composition for musical ensemble and electronic media to be approved in advance by the composition faculty | | |
| TMUS 6956 | Master's Thesis | 2 |
| TMUS 6957 | Master's Thesis 2 | 2 |
| **Other Requirements in Music** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5XX2 | Musicology or Ethnomusicology Elective | 3 |
| MUSC 5XX1 | Electives in Music Theory | 6 |
| MUSC 5081 | Applications in Music Technology | 3 |
| Electives (maximum 2 credits of ensemble) | | 3 |
| **Total Credit Hours** | | **30** |

1 Regular attendance at Composition Seminar is expected

### Music Theory

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Music Theory** | | |
| MUSC 5151 | Topics in Music Analysis (Schenkerian Analysis or Diatonic/Chromatic Harmonies) | 3 |
| MUSC 5071 | Post-tonal Theory and Analysis I | 3 |
| MUSC 5XX1 | Electives in Music Theory | 6 |
| TMUS 6956 | Master's Thesis [1] | 2 |
| TMUS 6957 | Master's Thesis 2 [1] | 2 |
| **Category II: Other Requirements in Music** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5XX2 | Musicology or Ethnomusicology Elective | 3 |
| MUSC 6051 | Pedagogy of Music Theory | 3 |
| Music Electives outside of the major area [2] | | 3 |
| **Category III: Free Electives** | | |
| Free Electives [2] | | 3 |
| **Total Credit Hours** | | **30** |

1 With the consent of the faculty advisory committee, the student may write a single, extended thesis for 4 credit hours (TMUS 6956 and TMUS 6957). The master's thesis project(s) culminates in an oral defense before the three members of the student's advisory committee. This is in addition to the MM Qualifying Oral Examination.

2 Electives may include ensemble participation (limited to 3 credits for the degree) or private applied instruction. Free electives may be in or outside of the College of Music, but must be outside of the major area or germane to the program of study. Reading proficiency in a foreign language is strongly recommended.

### Choral Conducting

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Choral Conducting** | | |
| MUSC 5156 | Symposium in Choral Music | 4 |
| MUSC 5136 | Advanced Conducting | 2 |
| PMUS 5536 | Intermed Conducting (Intermediate Conducting - to be taken concurrently with Thesis Practicum where possible) | 6 |
| TMUS 6956 | Master's Thesis [1] | 2 |
| TMUS 6957 | Master's Thesis 2 [1] | 2 |
| **Category II: Other Requirements in Music** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5XX1 | Electives in Music Theory | 3 |
| MUSC 5712 | Renaissance Music | 3 |
| PMUS 5726 | Voice (Voice Pedagogy) | 4 |
| or MUSC 5444 | Vocal Pedagogy | |
| or MUSC 5454 | Repertory for Young Voices | |
| **Electives** | | **2** |
| Maximum 2 credits of ensemble | | |
| **Total Credit Hours** | | **30** |

1 See degree plan for details on thesis projects

2 Choral Ensemble (required each semester of residence; credit is attached to applied study)

### Choral Conducting with an Emphasis in Voice Performance

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Choral Conducting** | | |
| MUSC 5156 | Symposium in Choral Music | 4 |
| MUSC 5136 | Advanced Conducting | 2 |
| PMUS 5536 | Intermed Conducting [1] | 6 |
| TMUS 6956 | Master's Thesis (Conducting Practicum) [2] | 2 |
| **Category II: Other Requirements in Music** | | |
| *Voice Performance* [3] | | |
| PMUS 5726 | Voice (Three semesters) | 6 |
| MUSC 5444 | Vocal Pedagogy | 2 |

| | | |
|---|---|---|
| TMUS 6957 | Master's Thesis 2 (Voice recital or research paper) [4] | 2 |
| *Academic Courses* | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5XX1 | Electives in Music Theory | 3 |
| MUSC 5712 | Renaissance Music | 3 |
| Choral Ensemble required each semester of residence; credit attached to applied study | | |
| **Total Credit Hours** | | **32** |

1. To be taken concurrently with Thesis Practicum where possible.
2. See degree plan for details for the conducting practicum.
3. Acceptance for Emphasis in Voice requires an audition with the Voice Faculty.
4. A recital may be presented if the student regularly studies voice or an instrument at the 5000-level and if the particular applied Faculty approves the recital in preview.

### Orchestral Conducting

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Orchestral Conducting** | | |
| PMUS 5536 | Intermed Conducting (Intermediate Conducting) | 6 |
| MUSC 5136 | Advanced Conducting | 2 |
| TMUS 6956 | Master's Thesis (Conducting Practicum) | 2 |
| TMUS 6957 | Master's Thesis 2 (Research Paper) | 2 |
| **Category II: Other Requirements in Music** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5XX1 | Electives in Music Theory | 3 |
| MUSC 5XX2 | Musicology or Ethnomusicology Elective | 3 |
| MUSC 5156 | Symposium in Choral Music | 2 |
| Instrumental Ensemble (Required each semester of residence - credit attached to applied study) | | |
| PMUS 5XXX | Applied Instrumental Instruction | 4 |
| Electives (maximum 2 credits of ensemble) | | 4 |
| **Total Credit Hours** | | **30** |

### Wind Band Conducting

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Wind Band Conducting** | | |
| PMUS 5536 | Intermed Conducting (Intermediate Conducting) | 8 |
| MUSC 5136 | Advanced Conducting | 2 |
| TMUS 6956 | Master's Thesis (Conducting Practicum) | 2 |
| TMUS 6957 | Master's Thesis 2 (Reseach Paper) | 2 |
| **Category II: Other Requirements in Music** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5XX1 | Electives in Music Theory | 3 |
| MUSC 5XX2 | Musicology or Ethnomusicology Elective | 3 |
| MUSC 5156 | Symposium in Choral Music | 2 |
| Instrumental Ensemble required each semester of residence, credit attached to applied study | | |
| Music elective outside Conducting | | 2 |
| Electives (maximum 2 credits of ensemble) | | 4 |
| **Total Credit Hours** | | **30** |

### Brass Performance

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Brass Performance** | | |
| PMUS 5XX6 | (Applied Brass Instruction) [1] | 10 |
| EMUS 5507 | Chamber Music | 2 |
| TMUS 6956 | Master's Thesis [2] | 2 |
| TMUS 6957 | Master's Thesis 2 [2] | 2 |
| **Category II: Other Requirements in Music** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5036 | Brass Literature | 2 |
| MUSC 5336 | Brass Pedagogy | 2 |
| Graduate-level electives in Music Theory 5XX1; Musicology/ Ethnomusicology 5XX2, or Music Education 6XX3 | | 6 |
| **Electives** | | **2** |
| Maximum 2 credits of ensemble | | |
| **Total Credit Hours** | | **30** |

1. Four semesters of applied study are required. University ensemble participation is required during each semester of applied study.
2. Two recitals; one may be a chamber recital.

### Guitar

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Guitar Performance** | | |
| PMUS 5566 | Guitar (Applied Guitar Instruction) | 9 |
| TMUS 6956 | Master's Thesis [1] | 2 |
| TMUS 6957 | Master's Thesis 2 [1] | 2 |
| **Category II: Other Requirements in Music** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5XX1 | Electives in Music Theory | 3 |
| MUSC 5XX2 | Musicology or Ethnomusicology Elective | 3 |
| Other music electives (outside Guitar Performance) [2] | | 2 |
| Electives (maximum 2 credits of ensemble) | | 7 |
| **Total Credit Hours** | | **30** |

1. Two recitals *or* one recital and a major paper.
2. A two-credit Special Studies in guitar literature (TMUS 5564) is recommended before the Qualifying Examination is taken.

### Collaborative Piano

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Collaborative Piano** | | |
| PMUS 5636 | Piano (Applied Piano Instruction and Performance Class) | 8 |
| TMUS 6956 | Master's Thesis (Collaborative Recital) | 2 |

| | | |
|---|---|---|
| TMUS 6957 | Master's Thesis 2 (Collaborative Recital) | 2 |
| **Category II: Other Requirements in Music** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5XX1 | Electives in Music Theory | 3 |
| MUSC 5XX2 | Musicology or Ethnomusicology Elective | 3 |
| MUSC 5425 | Collaborative Literature for Piano with Winds, Brass, and Percussion | 2 |
| MUSC 5435 | Collaborative Literature for Piano with Strings | 2 |
| **Category III: Additional Courses in Music** | | **6-8** |
| Choose three or more courses from the following: | | |
| MUSC 5375 | Opera Coaching for Pianists | |
| MUSC 5405 | Basso-Continuo Accompaniment | |
| MUSC 5464 | Voice Literature I: French Song Literature and Oratorio/Concert Solo Literature | |
| MUSC 5564 | Voice Literature II: German, British & American Song Literature | |
| **Electives** | | **2-3** |
| Additional music electives outside of the major | | |
| **Total Credit Hours** | | **32-35** |

### Harp

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Harp Performance** | | |
| PMUS 5576 | Harp (Applied Harp Instruction) | 10 |
| Ensembles (credit attached to applied study) | | |
| TMUS 6956 | Master's Thesis [1] | 2 |
| TMUS 6957 | Master's Thesis 2 [1] | 2 |
| **Category II: Other Requirements in Music** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5XX1 | Electives in Music Theory | 3 |
| MUSC 5XX2 | Musicology or Ethnomusicology Elective | 3 |
| Music electives outside Harp Performance [2] | | 2 |
| **Electives** | | **6** |
| Maximum 2 credits of ensemble | | |
| **Total Credit Hours** | | **30** |

1. Two recitals *or* one recital and a research paper.
2. A two-credit Special Studies (TMUS 5564) in harp literature is recommended before the Qualifying Examination is taken.

### Harpsichord

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Harpsichord Performance** | | |
| PMUS 5586 | Harpsichord (Applied Harpsichord Instruction) | 10 |
| EMUS 5367 | Early Music Ensemble | 4 |
| TMUS 6956 | Master's Thesis (Recital) | 2 |
| TMUS 6957 | Master's Thesis 2 (Recital) | 2 |
| **Category II: Research** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5XX2 | Musicology Electives | 3 |
| MUSC 5XX1 | Music Theory Elective | 3 |
| MUSC 5405 | Basso-Continuo Accompaniment | 2 |
| **Electives** [1] | | **2** |
| **Total Credit Hours** | | **30** |

1. An approved course within or outside of the College of Music or Special Studies (TMUS 5544) could satisfy these required hours, preferably in an area that strengthens the individual focus of the student's program.

### Percussion Performance

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Percussion Performance** | | |
| PMUS 5626 | Percussion (Applied Percussion Instruction) [1] | 10 |
| TMUS 6956 | Master's Thesis (Recital) | 2 |
| TMUS 6957 | Master's Thesis 2 (Recital) | 2 |
| **Category II: Other Requirements in Music** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5XX1 | Electives in Music Theory | 3 |
| MUSC 5XX2 | Musicology or Ethnomusicology Elective | 3 |
| MUSC 5026 | Percussion Literature | 2 |
| **Electives** | | **6** |
| Maximum 2 credits of ensemble | | |
| **Total Credit Hours** | | **30** |

1. Four semesters of applied study are required. University ensemble participation is *required* during each semester of applied study.

### Piano Performance (Solo)

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Piano Performance** | | |
| PMUS 5636 | Piano (Applied Piano Instruction and Performance Class) | 8 |
| TMUS 6956 | Master's Thesis (Solo Recital) | 2 |
| TMUS 6957 | Master's Thesis 2 (Solo Recital, Chamber Recital, Research Paper) | 2 |
| **Category II: Other Requirements in Music** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5XX1 | Electives in Music Theory | 3 |
| MUSC 5XX2 | Musicology or Ethnomusicology Elective | 3 |
| MUSC 5325 | Keyboard Literature 1 | 2 |
| MUSC 5335 | Keyboard Literature 2 | 2 |
| **Category III: Additional Courses in Music** | | **4-6** |
| Choose two or three of the following in consultation with advisor: | | |
| MUSC 5365 | Advanced Accompanying | |
| MUSC 5305 | Piano Pedagogy Group Techniques | |
| MUSC 5315 | Piano Pedagogy: Intermediate Literature | |

| | | |
|---|---|---|
| MUSC 5375 | Opera Coaching for Pianists | |
| MUSC 5405 | Basso-Continuo Accompaniment | |
| MUSC 5464 | Voice Literature I: French Song Literature and Oratorio/Concert Solo Literature | |
| MUSC 5564 | Voice Literature II: German, British & American Song Literature | |
| **Electives** | | **2-3** |
| Additional music electives in music or non-music other than piano performance | | |
| **Total Credit Hours** | | **30-33** |

### String Performance (Bowed)

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: String Performance** | | |
| PMUS 5XX6 | Applied String Instrument Instruction | 10 |
| TMUS 6956 | Master's Thesis (Recital) | 2 |
| TMUS 6957 | Master's Thesis 2 [1] | 2 |
| **Category II: Other Requirements in Music** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5XX1 | Electives in Music Theory | 3 |
| MUSC 5XX2 | Musicology or Ethnomusicology Elective | 3 |
| **Electives** [2] | | **6** |
| Outside of string performance; maximum 2 credits of ensemble | | 2 |
| **Total Credit Hours** | | **30** |

1. A research paper and/or a performance from a repertory list before a jury may substitute for a second recital.
2. Orchestra may not be included.

### Voice Performance

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Voice Performance** | | |
| PMUS 5726 | Voice (Applied Voice Instruction) | 8 |
| TMUS 6956 | Master's Thesis [1] | 2 |
| TMUS 6957 | Master's Thesis 2 [1] | 2 |
| *Ensemble* | | *2* |
| One credit hour of Opera Theatre Practicum (PMUS 5157) plus one hour of one of the following: EMUS 5217, EMUS 5227 or EMUS 5367 or an additional hour of Opera Theatre Practicum | | |
| **Category II: Other Requirements in Music** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5XX1 | Electives in Music Theory | 3 |
| MUSC 5XX2 | Musicology or Ethnomusicology Elective | 3 |
| MUSC 5444 | Vocal Pedagogy | 2 |
| MUSC 5484 | Graduate Seminar in Vocal Pedagogy | 2 |
| MUSC 5464 | Voice Literature I: French Song Literature and Oratorio/Concert Solo Literature | 2 |
| or MUSC 5564 | Voice Literature II: German, British & American Song Literature | |
| **Electives** [2] | | **4** |
| PMUS 5497 | Vocal Repertoire Coaching | |
| PMUS 5137 | Opera Theatre 1 | |
| PMUS 5147 | Opera Theatre 2 | |
| **Total Credit Hours** | | **32** |

1. TMUS 6956 must be a full-length recital, but may be fulfilled by one of the following: a traditional full-length recital; a lecture recital with supporting program notes; a major opera role; a mid-sized opera role *and* a half-hour recital; a concert of oratorio solo involving significant singing time and difficulty level.
2. May take additional vocal literature course to fulfill requirement.

### Woodwind Performance

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Woodwind Performance** | | |
| PMUS 5XX6 | Applied Woodwind Instruction | 10 |
| Ensemble [1] | | |
| TMUS 6956 | Master's Thesis (Recital) | 2 |
| TMUS 6957 | Master's Thesis 2 (Recital) | 2 |
| **Category II: Other Requirements in Music** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5XX1 | Electives in Music Theory | 3 |
| MUSC 5XX2 | Musicology or Ethnomusicology Elective | 3 |
| MUSC 5346 | Woodwind Pedagogy | 2 |
| MUSC 5666 | Chamber Music Literature: Woodwinds | 2 |
| **Electives** | | **4** |
| Maximum 2 credits of ensemble | | |
| **Total Credit Hours** | | **30** |

1. Required each semester of residence up to four semesters; credit is attached to applied study. See Faculty Chair regarding the specific ensemble required.

### Brass Performance with an Emphasis in Pedagogy

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Brass Performance** | | |
| PMUS 5XX6 | Applied Brass Instruction [1] | 10 |
| TMUS 6956 | Master's Thesis (Solo or Chamber recital) | 2 |
| **Category II: Brass Pedagogy** | | |
| MUSC 6203 | Psychology of Music Learning | 2 |
| MUSC 5036 | Brass Literature | 2 |
| MUSC 5336 | Brass Pedagogy | 2 |
| TMUS 6957 | Master's Thesis 2 (Research Paper) | 2 |
| **Category III: Other Requirements in Music** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| Graduate-level electives (Music Theory 5XX1, Musicology/ Ethnomusicology 5XX2 or Music Education 6XX3) | | 6 |
| **Electives** | | **2** |
| May include ensemble credit | | |
| **Total Credit Hours** | | **30** |

[1] Four semesters of applied study are required. University ensemble participation is required during each semester of applied study.

**Jazz Performance and Pedagogy**

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Jazz Performance** | | |
| EMUS 5427 | Jazz Ensemble [1] | 2 |
| EMUS 5437 | Jazz Combo [1] | 2 |
| PMUS 58X6 | Applied Jazz Lessons | 4 |
| TMUS 6956 | Master's Thesis (Recital) | 2 |
| **Category II: Jazz Pedagogy** | | |
| MUSC 5256 | Jazz Studies Administration and Pedagogy | 3 |
| MUSC 5356 | Jazz Studies Practicum | 2 |
| TMUS 6957 | Master's Thesis 2 (Research Paper) | 2 |
| **Category III: Other Requirements in Music** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5642 | Jazz History and Literature | 3 |
| MUSC 5091 | Contemporary Theory - Jazz and Modal Music | 3 |
| MUSC 5246 | Jazz Improvisation and Analysis | 3 |
| Electives (outside of Jazz area) [2] | | 3 |
| **Total Credit Hours** | | **31** |

[1] Whenever possible, students are expected to enroll in both Jazz Ensemble and Jazz Combo. (Minimum: two semesters each.)

[2] Recommended courses include classes in musicology, ethnomusicology, music education, music technology, ensemble, entrepreneurship, arts administration, wellness and applied lessons. For other courses or options not listed, approval is required from the student's advisory committee chair and the chair of the jazz department.

**Piano Performance and Pedagogy**

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Piano Performance** | | |
| PMUS 5636 | Piano (Applied Piano Instruction and Performance Class) | 8 |
| TMUS 6956 | Master's Thesis (Solo Recital) | 2 |
| **Category II: Piano Pedagogy** | | |
| TMUS 6957 | Master's Thesis 2 (Research Paper) | 2 |
| MUSC 5305 | Piano Pedagogy Group Techniques | 2 |
| MUSC 5315 | Piano Pedagogy: Intermediate Literature | 2 |
| MUSC 5345 | Research: Piano Literature and Pedagogy | 2 |
| MUSC 5215 | Studies in Piano Teaching | 1 |
| MUSC 5325 | Keyboard Literature 1 | 2 |
| MUSC 5335 | Keyboard Literature 2 | 2 |
| **Category III: Additional Courses in Music** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5XX1 | Electives in Music Theory | 3 |
| MUSC 5XX2 | Musicology or Ethnomusicology Elective | 3 |
| **Electives** | | **2** |
| In music or non-music, other than piano performance | | |
| **Total Credit Hours** | | **33** |

**String (Bowed) Performance and Pedagogy**

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: String Performance** | | |
| PMUS 5XX6 | Applied String Instrument Instruction | 8 |
| Orchestra (Credit is attached to applied study) [1] | | |
| TMUS 6956 | Master's Thesis (Recital) | 2 |
| **Category II: Other Requirements in Music** | | |
| *String Pedagogy* | | |
| MUSC 5273 | Comprehensive String Pedagogy | 2 |
| MUSC 6203 | Psychology of Music Learning | 2 |
| TMUS 5564 | Special Study-Strings | 2 |
| TMUS 6957 | Master's Thesis 2 (Research Paper/ Pedagogy Project) | 2 |
| MUSC 5446 | Supervised Teaching Practicum | 1 |
| MUSC 5608 | Wellness for Musicians 1 | 1 |
| *Additional courses* | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5XX1 | Electives in Music Theory | 3 |
| MUSC 5XX2 | Musicology or Ethnomusicology Elective | 3 |
| **Electives** [2] | | **2** |
| Maximum 2 credits of ensemble | | |
| **Total Credit Hours** | | **30** |

[1] Participation is orchestra is *required* during each semester of applied instruction.

[2] Orchestra may ***not*** be included.

**Voice Performance and Pedagogy**

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Voice Performance** | | |
| PMUS 5726 | Voice | 8 |
| TMUS 6956 | Master's Thesis (Recital) [1] | 2 |
| *Ensemble* | | *2* |
| One credit in Opera Theatre Practicum PMUS 5157, plus one credit in one of the following: EMUS 5217, EMUS 5227 or Early Music Ensemble (EMUS 5267) or an additional hour of Opera Theatre Practicum | | |
| **Category II: Other Requirements in Music** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5XX1 | Electives in Music Theory | 3 |
| MUSC 5XX2 | Musicology or Ethnomusicology Elective | 3 |
| TMUS 6957 | Master's Thesis 2 [1] | 2 |
| MUSC 5444 | Vocal Pedagogy | 2 |
| MUSC 5484 | Graduate Seminar in Vocal Pedagogy | 2 |
| MUSC 5464 | Voice Literature I: French Song Literature and Oratorio/Concert Solo Literature | 2 |
| or MUSC 5564 | Voice Literature II: German, British & American Song Literature | |

| | | |
|---|---|---|
| Electives [2] | | 4 |
| PMUS 5497 | Vocal Repertoire Coaching | |
| PMUS 5137 | Opera Theatre 1 | |
| PMUS 5147 | Opera Theatre 2 | |
| **Total Credit Hours** | | **32** |

1. TMUS 6956 must be a full-length recital, but may be fulfilled by one of the following: a traditional full-length recital; a lecture recital with supporting program notes; a major opera role; a mid-sized opera role *and* a half-hour recital; a concert of oratorio solo involving significant singing time and difficulty level.
2. May take an additional vocal literature course to fulfill requirement

**Woodwind Performance and Pedagogy**

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Woodwind Performance** | | |
| PMUS 5XX6 | Applied Woodwind Instruction | 10 |
| Ensemble [1] | | |
| TMUS 6956 | Master's Thesis (Recital) | 2 |
| **Category II: Other Requirements in Music** | | |
| *Woodwind Pedagogy* | | |
| MUSC 5666 | Chamber Music Literature: Woodwinds | 2 |
| MUSC 5346 | Woodwind Pedagogy | 2 |
| MUSC 6203 | Psychology of Music Learning | 2 |
| TMUS 6957 | Master's Thesis 2 (Research Paper) | 2 |
| *Other courses* | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5XX1 | Electives in Music Theory | 3 |
| MUSC 5XX2 | Musicology or Ethnomusicology Elective | 3 |
| **Electives** | | **2** |
| **Total Credit Hours** | | **30** |

1. Required each semester of residence up to four semesters; credit is attached to applied study. See Faculty Chair regarding the specific ensemble required.

**Historical Performance and Research**

| Code | Title | Credit Hours |
|---|---|---|
| **Category I - Historical Performance** | | |
| Applied Instruction (4 semesters) [1] | | 8 |
| PMUS 5586 | Harpsichord | |
| MUSC 5405 | Basso-Continuo Accompaniment | 2 |
| or MUSC 5415 | Advanced Basso Continuo | |
| EMUS 5367 | Early Music Ensemble | 3 |
| PMUS 5425 | Tuning and Temperaments | 1 |
| TMUS 6956 | Master's Thesis ((Recital)) [2] | 2 |
| TMUS 6957 | Master's Thesis 2 ((Recital) ) [2,3] | 2 |
| **Category II - Research** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| MUSC 5742 | Performance Practice of Early Music | 3 |
| MUSC 5XX2 | Musicology Electives [4] | 6 |
| TMUS 6958 | Master's Thesis 3 ((Research Thesis) ) [3] | 2 |
| Free Electives (appropriate to focus of degree, outside of performance) [5] | | 3 |
| **Total Credit Hours** | | **34** |

1. Students whose instrument is not harpsichord receive applied lessons in historical interpretation.
2. Half of one of the recitals must be chamber music.
3. The second recital and research thesis are thematically intertwined. See degree plan for detailed requirements.
4. One theory course on a pre-1750 topic may be substituted with faculty approval.
5. Appropriate electives might include courses in Music Theory, History, Literature or Art History.

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate advanced accomplishment in area of specialization (performance, conducting or composition).
- Synthesize and apply knowledge of the discipline sufficient to perform proficient analyses.
- Effectively communicate and present discipline-based learning to an academic audience in both written and oral form.
- Demonstrate knowledge of and skills in effective applied lesson and/or group (chamber music) teaching. (Emphasis in pedagogy)
- Demonstrate knowledge of applied lesson and/or group (chamber music) repertoire for area of specialization. (Emphasis in pedagogy)

# Dual Emphasis Program

## Master of Music Degree with Dual Emphasis

Students may apply for a master's in music degree that combines the requirements from two programs (with approval from both departments) in the College of Music. The student receives one diploma, with two areas of emphasis listed on the transcript. To guarantee the ability to pursue a master's degree with dual emphases, the student must apply separately and be admitted by the faculty in each of the degree programs under their respective admissions procedures and standards. The student must be accepted into both areas of emphasis at the time of the initial application. If a student is already accepted to the College of Music in a Master of Music degree program and is interested in adding a second area of emphasis, the second area of emphasis course plan must be approved by both area Department Chairs and the Associate Dean of the College of Music.

In consultation with the Department Chairs, Associate Dean and Graduate Studies Coordinator, a comprehensive degree plan will be devised for all requirements expected for the student to earn the Master of Music degree with dual emphasis. This plan must be completed before the last anticipated semester of study in the student's original degree. With the exception of thesis credit hours, courses that fulfill requirements in both degree programs need only be taken once to be counted for both degrees. A minimum of 45 credit hours must be earned.

# Music - Doctor of Philosophy (PhD)

The PhD in Music emphasizes research in the principal areas of music education or musicology (either historical musicology or ethnomusicology). Each program plan is developed through collaboration

between student and advisor, keeping the specific goals of each student in mind. The objective is to prepare the student for a career in research and college teaching. Minimum requirements for PhD degrees are: 60 credit hours beyond the bachelor degree for musicology and 75 for music education, including 30 hours of thesis credit. Graduate-level courses taken at the University of Colorado Boulder for a master of music degree are automatically applied; graduate courses taken at another university may be considered for transfer (up to 21 credits).

# Areas of Emphasis

The two principal areas of study are music education and musicology.

## Music Education Emphasis

The Doctor of Philosophy degree in music, with music education as a field of specialization, is offered through the Graduate School for students who demonstrate both scholarly potential and a superior commitment to the music education profession.

This degree program requires that individuals think abstractly, generalize knowledge, apply research results to areas of specialization, and communicate effectively in both oral and written forms.

Coursework emphasizes the study of historical, philosophical, psychological and sociological foundations of music education, the theoretical and pedagogical principles of music teaching and learning, curriculum development, testing and assessment, and research techniques.

Graduates typically pursue careers in music education at the college level or supervisory positions in elementary and secondary schools.

## Musicology Emphasis

For the musicology student, the Doctor of Philosophy in music degree is intended to emphasize research in music history, music theory, ethnomusicology or some other aspect of music in culture.

An advanced degree will not be conferred merely because a student completes a specified period of residence and passes a given number of courses. One should not expect to gain from formal courses all the training, knowledge, and understanding of ideas necessary to meet the requirements for an advanced degree. The culminating work on a PhD is the dissertation, a substantial document based upon original investigation and showing mature scholarship and critical judgment, as well as a command of the tools and methods of research in music.

# Requirements

## Admission Requirements

### Music Education Emphasis

Application requirements include letters of recommendation, personal statement, professional resume, and writing sample demonstrating critical thinking, appropriate research techniques and evidence of cogent use of English. PhD with Music Education emphasis also requires a critical issue essay (https://www.colorado.edu/music/media/10573/). Additionally, a GRE general test score is required for applicants with a GPA below 3.0.

### Musicology Emphasis

Application requirements include letters of recommendation, personal statement, professional resume and a writing sample (term paper) for all PhD musicology applicants. The document should demonstrate ability in critical thinking, appropriate research techniques and skill in the cogent use of English. A GRE score is not required for PhD musicology applicants.

## Prerequisites

Students applying to the PhD program should have a bachelor's degree or equivalent in a music field related to their intended area of study. Applicants for the PhD with an emphasis in music education should hold an MME degree.

## Degree Requirements

Upon entrance to the degree program, students must pass the preliminary examinations and begin working toward basic requirements.

### Music Education Emphasis

#### Course Requirements

Students must complete a minimum of 45 credit hours of courses numbered 5000 or above, 15 of which may be transferred from the master's degree, and a minimum of 30 credit hours of doctoral dissertation credit.

#### Dissertation Requirements

Each candidate must complete a dissertation based on original investigation that demonstrates mature scholarship. Following successful completion of the comprehensive examination, the student designates a dissertation committee, develops a dissertation prospectus and presents it to the committee for approval. After the dissertation has been accepted, a final oral examination on the dissertation and related topics is conducted by the student's dissertation committee.

For more details, consult the PhD in Music Education (https://www.colorado.edu/music/sites/default/files/attached-files/phd_music_ed_degree_plan-2.pdf) program description at the College of Music website.

### Musicology Emphasis

#### Course Requirements

Students must complete a minimum of 30 credit hours of courses numbered 5000 or above, although the minimum number is almost always exceeded. At least six doctoral seminars (7000 level) in musicology are required and must be taken at CU Boulder as part of PhD course work. Additionally, certain seminars in related disciplines, such as Music Theory and Analysis, Religious Studies, Anthropology, Sociology, and so on, may count in lieu of the former requirement, with the consent of the student's advisory committee. Students are expected to complete with distinction all work in the formal courses in which they enroll.

Students must also complete at least 30 credit hours of dissertation credit, with not more than 10 of those credit hours in any one semester.

Up to 21 credit hours of graduate work taken at another institution may be considered for transfer. All requests for credit transfer, however, must be approved by the chair of the musicology faculty and other college and university officers as specified on a form for that purpose.

The College of Music requires proficiency in two foreign languages appropriate to the student's program of study. Normally, the language requirement is met by a translation examination scheduled through the graduate music office.

#### Dissertation Requirements

The dissertation should be an original and worthwhile contribution to knowledge in the field of musicology. It is expected that the student work closely with a major professor who will serve as the first reader and critic

before the dissertation is submitted to the other dissertation committee members.

For more details, consult the PhD Musicology (https://www.colorado.edu/music/sites/default/files/attached-files/phd_musicology_degree_plan_0.pdf) program description at the College of Music website.

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate expertise of knowledge in the discipline.
- Demonstrate the ability to synthesize and critically interpret arguments through academic sources.
- Design and conduct high-quality original research in the discipline.
- Effectively communicate and present their research to academic and public audiences in both written and oral form.

# Artist Diploma: Chamber Music Performance - Graduate Certificate

This graduate program is for pre-professionals who exhibit potential for a national and/or international performing career.

The program offers exceptionally gifted instrumentalists the opportunity to deepen their artistry, broaden their musical perspective and refine their performance skills under the guidance of College of Music faculty. In addition, all Artist Diploma students have access to courses and career advising offered by the Entrepreneurship Center for Music. Students are provided both coaching and individualized instruction, with extensive opportunities for performance, in preparation for a performance career.

# Requirements

## Admission Requirements

An earned baccalaureate degree and a successful audition are required for admission into this program.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Requirements in Music** | | |
| PMUS 6XX6 | Applied Instruction (Four semesters required, one-hour weekly lesson plus weekly studio class) | 8 |
| EMUS 5507 | Chamber Music (Four semesters required) | 4 |
| TMUS 6956 | Master's Thesis (Chamber recital) | 2 |
| TMUS 6957 | Master's Thesis 2 (Chamber recital ) | 2 |
| TMUS 6958 | Master's Thesis 3 (Chamber recital - A public performance with lecture/demonstration) | 2 |
| EMUS 5XX7 | Conducted Ensemble (Two semesters required.) [1] | 2 |
| **Category II: Other requirements in Music** [2] | | **4-5hrs** |
| **Electives** | | |
| Coursework in literature, pedagogy, entrepreneurship, wellness, musicology, ethnomusicology or music theory. [3] | | |
| **Total Credit Hours** | | **24-25** |

1. Pianists not participating in a conducted ensemble are required to take two extra credits of chamber music and/or accompanying.
2. A maximum of two credits at the 4000-level may be used to fulfill requirements.
3. Students who wish to take academic classes at the 5000-level or above must pass the appropriate preliminary exam.

# Artist Diploma: Opera and Solo Vocal Performance - Graduate Certificate

This program is designed to provide intensive performance studies for those who have the talent and potential for a career in opera, chamber and solo vocal performance.

Studies include individualized voice instruction, vocal coaching, and performance opportunities in opera, solo, oratorio and other concert work, with elective studies in entrepreneurship, as preparation for a performance career.

# Requirements

## Admission Requirements

Admissions requirements for this program include completing all required university graduate admission requirements, submitting a CU Boulder application, three letters of recommendation, a pre-screening recorded audition, and then performing a live on-campus audition and being interviewed by the faculty.

An earned baccalaureate degree in voice performance is the minimum requirement for admission into this program.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Requirements in Major Area** | | |
| PMUS 6726 | Voice (four semesters required; 1 credit each) [1] | 4 |
| PMUS 5497 | Vocal Repertoire Coaching (four semesters required; 1 credit each) | 4 |
| TMUS 6956 | Master's Thesis (Major opera role) | 2 |
| TMUS 6957 | Master's Thesis 2 (Second major opera role) | 2 |
| TMUS 6958 | Master's Thesis 3 (Recital) | 2 |
| TMUS 6959 | Master's Thesis 4 (Major role in an oratorio or opera, a major work with orchestra, or a second recital) | 2 |
| **Other Requirements in Music** [2] | | |
| **Electives** [3] | | **4-5** |
| Coursework in entrepreneurship, wellness, vocal literature, voice pedagogy, opera theater, musicology, ethnomusicology or music theory at the 4000- or 5000-level. [3] | | |
| **Total Credit Hours** | | **20-21** |

1 One-hour weekly lesson, plus one-hour weekly performance class.

2 A maximum of two credits at the 4000-level may be taken in fulfillment of the certificate requirements.

3 Students who wish to take academic classes at the 5000-level or above will be required to pass the appropriate preliminary exams.

# Artist Diploma: Orchestral Performance - Graduate Certificate

This program is for pre-professionals who exhibit potential for successfully gaining employment in an orchestra.

The program offers exceptionally gifted instrumentalists the opportunity to deepen their artistry, broaden their musical perspective, and refine their performance skills under the guidance of College of Music faculty. In addition, all Artist Diploma students have access to courses and career advising offered by the Entrepreneurship Center for Music. Students are provided both coaching and individualized instruction, with extensive opportunities for performance, in preparation for an orchestral performance career.

## Requirements

### Admission Requirements

Professional performance level on an orchestral instrument, an earned baccalaureate degree and a successful audition are required for admission into this program.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Requirements in Music** | | |
| PMUS 6XX6 | Applied Instruction (Four semesters required, one-hour weekly lesson plus weekly studio class) | 8 |
| TMUS 6956 | Master's Thesis (Solo recital or two concerto performances) | 2 |
| TMUS 6957 | Master's Thesis 2 (Orchestral Repertoire [Excerpts] - public performance and lecture/demonstration) | 2 |
| TMUS 6958 | Master's Thesis 3 (Orchestral Repertoire [Excerpts] - recording project) | 2 |
| EMUS 5XX7 | Conducted Ensemble (Four semesters required) | 4 |
| **Category II: Other requirements in Music** [1] | | |
| **Electives** | | **4-5** |
| Coursework in entrepreneurship, wellness, literature, pedagogy, musicology, ethnomusicology or music theory. [2] | | |
| **Total Credit Hours** | | **22-23** |

1 A maximum of two credits at the 4000-level may be used to fulfill certificate requirements.

2 Students who wish to take academic classes at the 5000-level or above will be required to pass the appropriate preliminary exam.

# Artist Diploma: Solo Instrumental Performance - Graduate Certificate

This graduate program is for pre-professionals who exhibit potential for a national and/or international performing career.

The program offers exceptionally gifted instrumentalists the opportunity to deepen their artistry, broaden their musical perspective, and refine their performance skills under the guidance of College of Music faculty. In addition, all Artist Diploma students have access to courses and career advising offered by the Entrepreneurship Center for Music. Students are provided both coaching and individualized instruction, with extensive opportunities for performance, in preparation for a performance career.

## Requirements

### Admission Requirements

An earned baccalaureate degree and a successful audition are required for admission into this program.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Requirements in Music** | | |
| PMUS 6XX6 | Applied Instruction (Four semesters required, one-hour weekly lesson plus weekly studio class) [1] | 8 |
| TMUS 6956 | Master's Thesis (Solo recital or two concerto performances) | 2 |
| TMUS 6957 | Master's Thesis 2 (Solo recital) | 2 |
| TMUS 6958 | Master's Thesis 3 (Solo or Chamber Recital) | 2 |
| TMUS 6959 | Master's Thesis 4 (Public performance with lecture/demonstration) | 2 |
| EMUS 5XX7 | Conducted Ensemble (Two semesters required) [1] | 2 |
| **Category II: Other requirements in Music** [2] | | |
| **Electives** | | **4-5** |
| Coursework in literature, pedagogy, entrepreneurship, wellness, musicology, ethnomusicology or music theory. [3] | | |
| **Total Credit Hours** | | **22-23** |

1 Students awarded an assistantship position will be considered for additional performance-related service to the College. String students will participate in University Symphony Orchestra each semester.

2 A maximum of two credits at the 4000-level may be used to fulfill certificate requirements.

3 Students who wish to take academic classes at the 5000-level or above will be required to pass the appropriate preliminary exam.

# Artist Diploma: String Quartet Performance - Graduate Certificate

The professional certificate in string quartet performance is designed to provide intensive performance experiences and coaching for those that have the potential for a career in string quartet performance. An earned

baccalaureate degree in performance is the minimum requirement for admission into this program.

Students are provided both coaching and individualized instruction, with extensive opportunities for performance, as well as elective studies in entrepreneurship, in preparation for a performance career.

Applications are open to:

1. Pre-formed string quartets.
2. Individuals who would like to be considered for placement in a new graduate string quartet formed by the Takács Quartet. The Takács Graduate Quartet Residency is a two-year position with only one ensemble in residence at a time.

# Requirements

## Admission Requirements

Admissions requirements for this program include completing all required university graduate admission requirements, submitting a CU Boulder application, three letters of recommendation, a pre-screening recorded audition, performing a live audition and being interviewed by faculty.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Requirements in Major Area** | | |
| PMUS 6696 | Viola (two semesters for one year) [1] | 4 |
| or PMUS 6706 | Violin | |
| or PMUS 6716 | Violoncello | |
| TMUS 6956 | Master's Thesis (chamber music recital) [2] | 2 |
| TMUS 6957 | Master's Thesis 2 (chamber music recital) [2] | 2 |
| TMUS 6958 | Master's Thesis 3 (chamber music recital) | 2 |
| TMUS 6959 | Master's Thesis 4 (chamber music recital or solo recital ) | 2 |
| EMUS 5327 | Symphony Orchestra (two semesters) [3] | 2 |
| **Other Requirements in Music** | | |
| **Electives** [4] | | **6-7** |
| Additional credits in the College of Music at the 4000- or 5000-level. Coursework, in entrepreneurship, wellness, literature, pedagogy, musicology, ethnomusicology, or theory. [5] | | |
| **Total Credit Hours** | | **20-21** |

1 Applied string instruction. Registration for applied study is for two credit hours per semester, entitling each member of the quartet to one hour of private lessons per week.

2 This four-recital requirement entitles the quartet to one hour of coaching per week. The string faculty will decide if one of these recitals should be a solo recital.

3 Two fall semesters as principals in the Chamber Orchestra (1 credit each).

4 A maximum of two credits at the 4000-level may be taken in fulfillment of the certificate requirements.

5 Students who wish to take academic classes at the 5000-level or above will be required to pass the appropriate preliminary examinations.

# Artist Diploma: Vocal Coaching - Graduate Certificate

This graduate program is for pre-professionals who exhibit potential for a specialized career in vocal accompanying.

The program offers exceptionally gifted collaborative pianists the opportunity to deepen their artistry, broaden their musical perspective, and refine their performance skills under the guidance of College of Music faculty. In addition, all Artist Diploma students have access to courses and career advising offered by the Entrepreneurship Center for Music. Students are provided both coaching and individualized instruction, with extensive opportunities for performance, in preparation for a career as a professional vocal coach.

# Requirements

## Admission Requirements

An earned master of music degree in collaborative piano with commensurate language and diction training (or equivalent professional experience) and a successful audition are required for admission into this program.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Category I: Requirements in Music** | | |
| PMUS 6636 | Applied Instruction (Four semesters required, one-hour weekly lesson plus weekly studio class; to be divided equally between collaborative piano and vocal coaching) | 8 |
| TMUS 6956 | Master's Thesis (Collaborative recital - instrumental) | 2 |
| TMUS 6957 | Master's Thesis 2 (Collaborative recital - vocal) | 2 |
| TMUS 6958 | Master's Thesis 3 (Collaborative recital - vocal) | 2 |
| TMUS 6959 | Master's Thesis 4 (Opera Scenes performance) | 2 |
| PMUS 5157 | Opera Theatre Practicum (Serve as rehearsal pianist and continuo player for all major operas, as well as outreach presentations and special events) [1] | 0-4 |
| **Category II: Other Requirements in Music** | | |
| MUSC 5375 | Opera Coaching for Pianists | 2 |
| **Electives** | | **2** |
| Coursework in collaborative literature, song literature, pedagogy, entrepreneurship, wellness, musicology, ethnomusicology or theory. [2] | | |
| **Total Credit Hours** | | **20-24** |

1 Student enrolls for variable credit according to faculty recommendation.

[2] Students who wish to take academic classes at the 5000-level or above will be required to pass the appropriate preliminary exam.

# Arts Administration - Graduate Certificate

CU Boulder's professional graduate certificate in arts administration provides students with the managerial skills and knowledge to work in the performing arts industry. Students will gain knowledge and insights into the opportunities and challenges facing today's arts administration professionals. This program offers the skills and education needed for a successful career in arts management in music, dance and theater.

## Requirements

### Admission Requirements

Applicants should have either an undergraduate degree in an arts discipline, or a bachelor's degree in any other discipline *plus* at least 3 years of professional experience working in an arts organization. This certificate program is also open to all students already enrolled in a graduate degree in music, theatre or dance.

### Required Courses and Credits

The graduate certificate in arts administration is comprised of three 3-credit courses:

| Code | Title | Credit Hours |
|---|---|---|
| MUSC 5978 | Introduction to Arts Administration | 3 |
| MUSC 5938 | Management and Leadership in the Arts | 3 |
| MUSC 5948 | Sustainable Arts Organizations: Forecasting and Fundraising | 3 |

For application instructions and deadlines, please consult the Graduate School's Admissions (https://www.colorado.edu/graduateschool/admissions/prepare-apply/program-information-deadlines/) webpage and the College of Music.

# Music Theory - Graduate Certificate

The Graduate Certificate in Music Theory provides advanced studies in music theory and theory pedagogy without the full requirements of the master's degree in music theory. This credential enhances the professional training and future employment options for students in existing graduate degrees across the College of Music. The curricular requirements of the Music Theory Certificate are readily combined with theory coursework required in all MM and DMA degree programs.

## Requirements

The Graduate Certificate in Music Theory requires 12 credit hours. Required coursework includes MUSC 6051 Pedagogy of Music Theory (3) and TMUS 5524 Special Study-Music Theory (3), which culminates in a research project and public presentation of research.

For the remaining 6 credit hours, students also must complete two of the three following 3-credit courses: MUSC 5151 Topics in Music Analysis-Schenkerian Analysis; MUSC 5071 Post-tonal Theory and Analysis I (3); and a further elective, either MUSC 5151 Topics in Music Analysis (3) for MM students, or Advanced Topics in Music Theory (MUSC 6801 Advanced Topics in Music Theory (3) for DMA and PhD students.

Any of the required courses listed here may also be applied toward theory coursework required in the student's major degree program.

# Music Education

Students in this degree program complete advanced studies that are designed to refine their teaching philosophy and practices. These studies include courses in historical and philosophical foundations of music education, psychological theories of music learning, basic research methods, curriculum development and assessment. The minimum number of credit hours required is 30.

The college also offers a master of music education degree/certification with K–12 teaching for students who have completed an undergraduate degree in music, but in a major area other than music education. Coursework leads to a master's degree and a Colorado K–12 music teaching license. The entire program requires a minimum of 71 credit hours.

## Master's Degree

- Music Education - Master of Music Education (MMusEd) (p. 1817)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Austin, James R. (https://experts.colorado.edu/display/fisid_103455/)
Professor; PhD, University of Iowa

Dockendorf, Matthew Paul (https://experts.colorado.edu/display/fisid_154511/)
Instructor; DMA, Michigan State University

Heil, Leila (https://experts.colorado.edu/display/fisid_149780/)
Associate Professor; PhD, University of Colorado Boulder

Miranda, Martina L. (https://experts.colorado.edu/display/fisid_140091/)
Associate Professor; DMA, Arizona State University; PhD, Arizona State University

Rickels, David Aaron (https://experts.colorado.edu/display/fisid_151424/)
Associate Professor; DMA, Arizona State University

Roeder, Matthew J. (https://experts.colorado.edu/display/fisid_120180/)
Associate Professor; DMA, University of Colorado Boulder

## Courses

**MUSC 5002 (3) Proseminar in Historical Musicology**
Prepares students to pursue independent research in the history of music. Meeting as a seminar, the course focuses on the nature of evidence, methods and tools of research, and theoretical or historiographic issues.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5011 (2) 16th Century Counterpoint**
Provides a stylistic study of the main contrapuntal genres of the period including free, two- and three-part imitative counterpoint in the style of Palestrina. Provides a foundation in species counterpoint, working towards free counterpoint; stresses composing in 16th century styles. Offered fall of even-numbered years.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4011
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5012 (3) African Music**
Studies music cultures of Africa and the Black Diaspora, including folk and art music traditions, religious and popular music genres. Specific course topics could cover any or all of these styles, including exploring interconnections of musical stylistics of Africa and the Black Diaspora.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4012 and MUEL 4012
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5021 (2) 18th Century Counterpoint**
Provides a stylistic study of main contrapuntal genres of the period including inventions, suite movements and fugues. Provides a foundation in species counterpoint; stresses analysis and composing in the styles. Offered fall terms only.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5026 (2) Percussion Literature**
In-depth investigation of major original solo works for percussion, significant ensemble literature including chamber and large ensembles, and selected transcriptions. Offered fall semester of even numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5036 (2) Brass Literature**
Investigates major original solo works for trumpet, horn, trombone, euphonium, and tuba, and ensemble literature including chamber and large settings. Offered every other spring term.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5041 (3) Advanced Orchestration**
Provides an advanced study of orchestration techniques through score analysis and student projects. Offered spring of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5061 (3) Advanced Tonal Analysis**
Surveys tonal repertory and analytical techniques. Student must have passed general written theory and aural skills preliminary exam or completed remediation before enrolling in course.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5071 (3) Post-tonal Theory and Analysis I**
Focuses on theory and analysis of post-tonal literature pre-1945. Student must have passed general written theory and aural skills preliminary exam or completed remediation before enrolling in course.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5078 (1) Piano Technician for Pianists**
Familiarizes pianists with the development of the modern grand piano, its construction and the proper terminology of parts and specifications. Trains pianists in minor repairs and adjustments of the grand piano action and in minor tuning tasks.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4078
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prerequisite piano majors.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 5081 (3) Applications in Music Technology**
Presents advanced strategies for applying computer technology in music creation. Synthesis, DSP, MIDI and audio sequencing, as well as advanced music engraving, will be explored through the use of various software platforms including Logic, Reason, MAX and Finale. Offered fall term only.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5091 (3) Contemporary Theory - Jazz and Modal Music**
Studies the composition and improvisation of Herbie Hancock, Wayne Shorter, Chick Corea and their contemporaries. Broadly examines modality in jazz and its similarities to music of Ravel and Debussy, as well as systems of organization in Messiaen and others. Strategies for analysis and integration of the material into a personal vocabulary as a composer and improviser are explored. Offered spring of even-numbered years.
**Requisites:** Requires prerequisite course of MUSC 3081 (minimum grade D-). Restricted to College of Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5103 (3) Teaching General Music**
Provides an in-depth examination of teaching and learning processes in the elementary general music classroom, based on the integration of child development and musical development theories with content and delivery skills appropriate for K-5 general music classrooms. Students implement and evaluate music instruction, design curricular projects, and build a repertoire of vocal, instrumental, and speech-based arrangements. Offered fall of odd-numbered years.
**Requisites:** Restricted to Music (MUSD) or Music Education (MMED or MUED) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5112 (3) Proseminar in Ethnomusicology**
Examines the definition, scope, and methods of ethnomusicology, the discipline that focuses on approaches to the study of music theory, history, and performance practices of world cultures.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5121 (3) Advanced Topics in Music Technology**
Conducts advanced research in techniques and tools of music technology. Topics vary from term to term and may include: user interfaces for computer music; advanced sound design; digital modeling of acoustic sounds; computer-aided analysis of sound; modeling music intelligence in real time. Lectures and work sessions will support student projects.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 5081 (minimum grade D-). Restricted to College of Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5136 (2) Advanced Conducting**
Offers advanced work in conducting.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5141 (2) Instrument Design Lab: Sound, Perception & Creativity**
Explore fundamental physical concepts of sound and music in a hands-on laboratory environment. Survey a number of topics through the construction of PVC overtone flutes, an investigation in the timbral intention of Dolly Parton's vocal technique, physical modeling through the testing of 3D-printed vowel flutes, the construction of a "Long String Instrument," and more. Specific topics include: tuning and temperament, harmony and timbre, and preparing the piano (digital and analog).
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4141
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 5142 (3) American Indian Music**
Examines Native North American musical cultures, emphasizing music as an integral part of religious expression and community life.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4142
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5143 (2) Topics in Choral Music Education**
Prepares students to teach, conduct and facilitate music making in various choral ensembles. Examines skills, teaching techniques and administrative procedures necessary for developing and maintaining various choirs at the elementary through high school levels. Includes discussion of current topics in choral music education and community choral field experiences. Offered fall terms, every two years.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4143
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5151 (3) Topics in Music Analysis**
Analytical study of a specific topic to be determined by the instructor (e.g., German Lieder, Bartok quartets, tonal rhythm, Schenker, etc). Study published analyses representing a variety of methodologies and produce original analyses. Student must have passed graduate preliminary exams or completed remediation before enrolling in this course.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prerequisite MUSC 5061 or MUSC 5071 as appropriate to the topic, or instructor consent required.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5153 (1) Advanced Topics in K-12 Music Pedagogy**
Examines the literature, skills, and pedagogical applications of selected topics applicable to all K-12 Music Educators such as curriculum, music listening, and composition.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Music Education (MMED-MMUE) students only.
**Grading Basis:** Letter Grade

**MUSC 5156 (2) Symposium in Choral Music**
Provides an advanced study of choral repertoire by style period. Required of all choral graduate students for a minimum of two semesters.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5163 (1) Advanced Topics in Secondary Choral Music Education Pedagogy**
Examines the literature, skills, and pedagogical applications of selected topics in choral music classrooms, such as adolescent vocal development, vocal jazz ensemble directing, and development of piano skills.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 5168 (3) World Music Theories**
Examines music rules, concepts or music theories and sociocultural elements that musicians use in creating musical sound, with emphasis on music practices from a variety of world traditions; observing shared and diverging principles, making cross-cultural comparisons and developing a new pedagogy that supports the substantive study of global musics.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4168
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5173 (1) Advanced Instrumental Techniques and Pedagogy**
Reviews and expands knowledge of brass, woodwind, percussion, or string instrumental techniques and pedagogical tools, extending upon skills gained in a typical introductory class teachers complete prior to licensure. Students complete a project based on synthesizing new pedagogical resources and materials. Intended for music educators who teach in K-12 school settings.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Music Education (MMED-MMUE) students only.
**Grading Basis:** Letter Grade

**MUSC 5176 (2) Conducting 3**
This is a study in advanced conducting techniques. Demonstration of advanced score study techniques as well as the application to gesture and rehearsal techniques linked with conducting will be explored. Participation fully in discussion readings and contribute to the learning of all is expected.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4176
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Music Education (MMED) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 5183 (2) Research in Music Teaching**
Introduces basic descriptive, experimental, and qualitative research methods, including sampling, design, data collection, and analysis. Students review published music research and conduct one original research study. Offered fall of odd-numbered years.
**Requisites:** Restricted to Music (MUSD) or Music Education (MMED or MUED) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5203 (2) Topics in Music Education**
Provides an in-depth examination of contemporary topics in music education. Students implement and design relevant projects.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5215 (1-2) Studies in Piano Teaching**
Studies the practical aspects and techniques for teaching piano at the intermediate and advanced levels in pre-college and college settings, as well as teaching group piano at the college level.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prereqsuisites: MUSC 5305 and MUSC 5315.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5246 (3) Jazz Improvisation and Analysis**
Application of performance skills for the advanced improviser through specific harmonic, melodic and rhythmic techniques. Also includes analysis of transcriptions and varied harmonic contexts as well as a focus on the development of repertoire. Offered fall semester of odd-numbered years. Requires prerequisite course or instructor consent.
**Requisites:** Requires prerequisite course of MUSC 3071 (minimum grade D-). Restricted to Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5256 (3) Jazz Studies Administration and Pedagogy**
Surveys approaches, techniques, philosophies and materials available for teaching jazz at both pre-college and collegiate level. Subject areas covered include improvisation, composition and arranging, studio teaching and directing ensembles. Studies the organization and administration of collegiate jazz programs. Topic include curriculum, program philosophy, teaching techniques, funding, teacher training and evaluation. Offered fall terms of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prerequisite MUSC 3253.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5273 (2) Comprehensive String Pedagogy**
Comparative study and application of the principles of string teaching. In-depth analysis of individual instrument pedagogy and application to advanced studio and class teaching. Historical survey of major violin, viola, cello, and double bass pedagogues. Includes apprenticeship teaching. Offered fall of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5285 (3) Organ Survey**
Survey of organ repertoire and the history of organ building from the 16th century to the present.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4285
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5305 (2) Piano Pedagogy Group Techniques**
Discusses materials and techniques for teaching beginning piano students of various ages in studio and class settings. Special attention given to adult classes. Includes an introduction to educational technology used in group instruction. Offered fall of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5313 (3) Teaching Choral Music**
Examines choral music curricula, instructional materials and teaching techniques appropriate for secondary choral settings. Also addresses administrative strategies for choral music programs. Offered spring only.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4313
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5315 (2) Piano Pedagogy: Intermediate Literature**
Surveys repertoire at the intermediate level and discusses teaching techniques. Explores issues related to intermediate and advanced piano performance, such as performance anxiety, physical and psychological well-being of the performer, and the development of technique. Introduces educational technology relevant to intermediate teaching. Offered spring of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5325 (2) Keyboard Literature 1**
Examines areas of style, genre, and performance practice in selected keyboard music from 1600 to 1830. Emphasizes student presentation of specific topic areas. Offered fall terms of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5335 (2) Keyboard Literature 2**
Examines areas of style, genre, and performance practice in selected areas of keyboard music from 1830 to the present. Emphasizes student presentation of specific topic areas. Offered spring terms of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5336 (2) Brass Pedagogy**
Analyzes pedagogical techniques and philosophies of teaching brass instruments, and examines materials. Offered every other spring terms.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4336
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5345 (2) Research: Piano Literature and Pedagogy**
Looks at individual or group research related to piano pedagogy or literature for piano.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5346 (2) Woodwind Pedagogy**
Provides the knowledge and skills to teach woodwind instruments in both individual studio and collegiate class settings. Considers pedagogical techniques for all levels of instruction. Offered fall terms of odd-numbered years.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4346
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5356 (2) Jazz Studies Practicum**
Implements independent, project-based studies for further developing knowledge and experience in jazz pedagogy, performance and composition. Student is assessed and guided by faculty to develop specific skills needed toward becoming a more effective jazz educator. Offered spring of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prerequisite MUSC 5256.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5365 (2) Advanced Accompanying**
An in-depth study of collaborative repertoire in individually assigned projects, coached by collaborative piano faculty and others.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5375 (2) Opera Coaching for Pianists**
Teaches skills for opera coaches and rehearsal pianists.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5405 (2) Basso-Continuo Accompaniment**
Studies the history, theory and practice of Basso-continuo accompaniment. Provides practical instruction in realizing harmony from a given bass line (figured or unfigured), projecting affect and creating dynamics at the harpsichord. Emphasizes individual cognition and creativity.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4405
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5415 (2) Advanced Basso Continuo**
Explores advanced basso continuo, serving as more in depth study for those who have completed or tested out of Basso-Continuo Accompaniment (MUSC 5405).
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4415
**Requisites:** Prerequisite: MUSC 5405 - Basso-Continuo Accompaniment and restricted to graduate students only.

**MUSC 5425 (2) Collaborative Literature for Piano with Winds, Brass, and Percussion**
Study of all forms of wind, brass and percussion repertoire involving collaboration with piano including sonatas, duos, short pieces and concerti. Collaborative piano major or instructor consent required. Offered fall terms of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5435 (2) Collaborative Literature for Piano with Strings**
Study of all forms string repertoire involving collaboration with piano including sonatas, duos, short pieces and concerti. Collaborative piano major or instructor consent required. Offered spring terms of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5443 (3) Teaching Instrumental Music**
Examines instrumental music curricula, instructional materials and teaching techniques appropriate for rehearsal, class, and lesson settings. Also addresses administration strategies for instrumental music programs. Offered spring only.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4443
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5444 (2) Vocal Pedagogy**
In depth study of the physiology, acoustics, and health aspects of the singing voice. Recommended for all graduate students in voice.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 5446 (1) Supervised Teaching Practicum**
Designed to provide supervised teaching experience that includes feedback on weekly teaching; weekly and longer-term planning; and reflection on the impact of teacher characteristics and actions on student development.
**Repeatable:** Repeatable for up to 5.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 5273 (minimum grade D-). Restricted to College of Music (MUSC) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 5454 (2) Repertory for Young Voices**
Survey of the solo repertoire for young voices, the physiological aspects of mutational voices, techniques of vocalizing young voices, and class voice procedure.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 5464 (2) Voice Literature I: French Song Literature and Oratorio/ Concert Solo Literature**
Explores the vocal literature of French Art Song and Oratorio/Concert Solo Literature in a graduate-level survey course taught in two modules.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Voice

**MUSC 5484 (2) Graduate Seminar in Vocal Pedagogy**
A thorough investigation of the challenges of studio voice pedagogy, including corrective techniques, psychological philosophies, and video analysis of student teaching. Examination and evaluation of comparative methodologies of vocal technique.
**Requisites:** Requires prerequisite course of MUSC 5444 (minimum grade D-). Restricted to College of Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 5564 (2) Voice Literature II: German, British & American Song Literature**
Explores the rich variety of German, British and American Song Literature from the late Middle Ages to the present in a graduate-level survey course taught in two modules.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 5583 (2) Inclusive Music Classroom**
Surveys strategies necessary for teaching music to all students, including those with special needs. Offered fall of even-numbered years.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4583
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5608 (1) Wellness for Musicians 1**
Explores strategies that help musicians maintain health while achieving peak performance. Investigate and employ powerful somatic methodologies including Alexander Technique and Body Mapping that improve physical functioning and prevent injury. Incorporates a variety of wellness aspects such as performance psychology, mental health, effective exercise, nutrition, breathing, hearing and vocal health.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 5642 (3) Jazz History and Literature**
Studies musical trends and cultural forces influencing jazz, with analysis of improvisational styles, melodic and motivic variations, transcriptions and orchestrations from significant periods in its history. Offered spring terms only.
**Requisites:** Requires prerequisite course of MUSC 3642 (minimum grade D-). Restricted to College of Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5666 (2) Chamber Music Literature: Woodwinds**
Provides a stylistic-historical survey in various genres from Baroque era to present. Offered fall terms of even numbered years.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5708 (2) Introduction to Music Bibliography and Research**
Explores basic informational sources about music and musicians; a study of citation formats, research methodologies and writing techniques employed in music research papers, theses and dissertations. Intended to increase students' information fluency. Required in all master's degree programs.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 5712 (3) Renaissance Music**
Provides a repertory and analysis of polyphonic music, 1400-1600.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4712
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5742 (3) Performance Practice of Early Music**
Examines instrumental and vocal performance practices through the 18th century. Topics may vary from year to year.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5752 (3) Women in Music**
Examines the role of women as creators and performers of Western Music. Explores related issues in musicology, including canon formation, reception history and feminist aesthetics.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4752
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5762 (3-4) History of Choral Literature**
Provides a seminar in analysis of musical style and history of choral repertory . Those wishing review of literature and repertory may enroll for 4 credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5772 (3) History of Opera**
Examines representative operas from the 17th through the 21st centuries. Emphasizes both cultural and analytical aspects and surveys related musicological literature.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4772
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5802 (3) Studies in 20th Century Music**
Offers intensified work in history of music in the 20th century. Topics vary from year to year.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4802
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5808 (1) Wellness for Musicians 2**
Develops and further integrates material covered in Wellness for Musicians 1. Deeper exploration of somatic and wide-ranging wellness strategies, including FM Alexander¿s conception of Inhibition and other approaches for proactive self-care and improvement. Consideration of how to integrate methodologies in teaching, pedagogy, and practice. Students will complete several projects related to their specific musical pursuits and interests.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4608
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 5608 (minimum grade C-). Restricted to College of Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 5822 (3) Ancient and Medieval Music**
Surveys sources from the ancient Greeks to the early Christian era and music from the 8th to the 14th century.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5832 (3) Studies in American Music**
Offers intensified work in folk, popular, and art music of the United States.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5842 (3) Aesthetics of Music**
Surveys various philosophies of music in writings of philosophers, psychologists, sociologists, composers, critics and historians.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5852 (3) 17th and Early 18th Century Music**
Examines music and writings about music from the Baroque era. Emphasizes cultural and musical analysis and surveys current musicological literature.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4852
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5872 (3) Late 18th and 19th Century Music**
Studies European and American music from the last developments of the styles through romanticism and its later 19th century reverberations.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4872
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Recommended:** Prerequisite or corequisite MUSC 3812.
**Additional Information:** Departmental Category: Musicology

**MUSC 5882 (3) Studies in 18th and 19th Century Music**
Meets as a seminar and examines selected topics in Classic and Romantic music, 1750-1900. Topics vary from year to year.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5892 (3) Latin American Music**
Explores music of cultures of the Americas south of the United States and in the diaspora, emphasizing the relationships of music and culture in folk, popular and arts styles.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4892
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5908 (1-3) Arts Administration Internship**
Engage with music/music business organizations in the community (for profit or non-profit) to pursue specific tasks or projects relevant to the student's career goals. A minimum of 48 hours is required per semester for one credit.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4908
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 5918 (2) Graduate Career Seminar**
Equips graduate music students with the tools and skills required to pursue a professional career in music. Topics include (but are not limited to) professional materials (resumes, CVs, websites), networking/social media, grant writing/fundraising, exploring career options, and copyrights/other legal issues.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 5938 (3) Management and Leadership in the Arts**
Focus on management, leadership, and communication strategies and their application to arts organizations. Concepts and approaches for leaders of small, medium, and large arts organizations in both the for-profit and nonprofit sectors, including human resource management, problem solving, and effective communication will be examined. Students will practice and refine their written communication skills by writing clearly and concisely throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4968
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 5948 (3) Sustainable Arts Organizations: Forecasting and Fundraising**
Equips students to create comprehensive fundraising plans rooted in strategic business planning for arts organizations, which depend on contributed income for sustainability. Students will learn the basics of planning, budgeting and forecasting, along with proven, effective fundraising strategies and techniques. Includes cased studies and guest speakers with extensive professional expertise in the field.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 5958 (2) Community Performances**
Explore the real-world issues of planning and presenting concerts. Learn to program music for all types of audiences, gain confidence speaking about your music and handle the logistics of concert production. Discuss the role of concerts in the 21st century and examine new styles of presentation, audience engagement and outreach. Course culminates in a concert presented in a local venue.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4958
**Requisites:** Requires prerequisite course of MUSC 5918 (minimum grade D-). Restricted to College of Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 5978 (3) Introduction to Arts Administration**
Introduce students to current trends in arts administration, explore the fundamentals of managing arts organizations and develop concrete tools for managing boards, volunteers and staff, effective fund raising, strategic planning and program development. Current issues, the role of the arts and arts advocacy will be discussed.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4978
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 5988 (3) The Entrepreneurial Artist**
Learn the core principles of entrepreneurship, such as idea formation, venture models, opportunity assessment, market analysis and strategies for launching a venture and apply them to entrepreneurial ideas. Lectures, projects, entrepreneur interviews and case studies will culminate in a feasibility study for an original entrepreneurial concept.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4988
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prerequisite MUSC 5918.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 6041 (3) Advanced Orchestration**
Provides an advanced study of orchestration techniques through score analysis and student projects. Offered spring of even-numbered years.
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 6051 (3) Pedagogy of Music Theory**
Explores methods, materials, practical techniques for teaching undergraduate music theory, aural skills and analysis. Student must have passed general written theory and aural skills preliminary exam or completed remediation before enrolling in course. Offered spring of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 6113 (2) Foundations of Music Education**
Surveys historical and philosophical bases of contemporary music education. Offered fall of even-numbered years.
**Requisites:** Restricted to Music (MUSD) or Music Education (MMED or MUED) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 6133 (2) Comprehensive Musicianship through Performance**
Explores curricular models for music education. Emphasizes comprehensive musicianship and standards-based frameworks for curriculum and development. Offered spring terms of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 6193 (1-3) Selected Studies in Music Education**
Instructor consent required.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to Music (MUSD) or Music Education (MMED-MMUE) students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 6203 (2) Psychology of Music Learning**
Provides an overview of psychological concepts relevant to music teaching and learning. Topics include learning theories, selected individual difference variables (motivation, anxiety, creativity, and personality), physiological structures related to hearing, psychoacoustics, and approaches to examining musical ability (e.g. brain research, music aptitude, and skill acquisition). Offered spring terms only.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 6213 (2) Assessment of Music Learning**
Provides an overview of traditional and contemporary approaches to music assessment. Topics include psychometrics, standardized tests, test construction, grade reports, and student portfolios. Offered on a rotating basis during summer session.
**Requisites:** Restricted to Music Education (MMED-MMUE) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 6223 (2) Sociology of Music Education**
Studies sociological perspectives related to music education. Topics include functions and uses of music; teacher and student role/identity development; social aspects of music performance, and cultural perspectives on music learning. Offered fall of even-numbered years.
**Requisites:** Restricted to Music (MUSD) or Music Education (MMED or MUED) graduate students only.
**Recommended:** Prerequisite MUSC 6113.
**Additional Information:** Departmental Category: Music Education

**MUSC 6233 (2) Pedagogy of Music Teaching and Learning**
Explores four topics (reflective/critical thinking, teacher effectiveness, cultural/program contexts, teachers' lives/career development) relevant to long-term teacher development. Includes individualized feedback on teaching. Open to graduate students in music education and performance-pedagogy. Offered spring terms of odd numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prerequisite MUSC 6113 and/or significant teaching experience.
**Additional Information:** Departmental Category: Music Education

**MUSC 6243 (1) Applications of Music Pedagogy**
Provides a structured, collaborative environment for graduate students with K-12 teaching duties to apply the content from music education courses to their current pedagogical environments. Students will apply inquiry strategies as they design and implement an applied project that synthesizes specific theoretical or conceptual areas. Offered fall term only.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to Music Education (MMED-MMUE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Music Education

**MUSC 6325 (2) Seminar in Piano Literature**
Provides an intensive study of a selected area of repertoire or history. Offered fall terms only.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 6343 (1) Capstone Portfolio Project**
Designed as the capstone course for students enrolled in the Summer MME degree program. Students are guided in their composition of three summative essays involving reflection on connections between two or more courses, comparisons between their entrance essays and current thinking, and identification of pedagogical impacts on their K-12 teaching.
**Requisites:** Restricted to Music Education (MMED-MMUE) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 6801 (3) Advanced Topics in Music Theory**
Intensive study of a specialized topics in theory and analysis through critical reading and analysis, class presentations and independent research. Student must have passed graduate preliminary exams and completed 6 credits hours of graduate-level theory before enrolling in course. Instructor determined prerequisite will be enforced as appropriate to the topic.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of MUSC 5708 (minimum grade D-). Restricted to Music (MUAD, MUED or MUSD) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 6822 (3) Advanced Studies in Musicology**
Intensive study of a specialized topic in musicology. Students will be guided in critical reading, historical or ethnographic issues, analysis, oral presentations, and independent research.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of MUSC 5708 (minimum grade D-). Restricted to Music (MUAD, MUED or MUSD) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 7046 (3) Seminar in Jazz Literature**
Provides advanced study in jazz literature and styles. Students present results of research on individually chosen topics or aspects of a topic central to the class. Requires class presentations and a major paper or project. Offered spring semester only.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.
**Recommended:** Prerequisites MUSC 5091 and MUSC 5642.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 7103 (3) Historical Research in Music Education**
Topics include oral history, archival collections, data verification, and critiquing/publishing research. Students conduct one original research study. Offered spring of even-numbered years.
**Requisites:** Restricted to Music Education (MMED-MMUE) doctoral students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 7113 (3) Quantitative Research in Music Education**
Topics include sampling, questionnaire development, research design, intermediate and advanced statistics, presenting/publishing research, and research ethics. Students conduct an original research study. Offered fall of even-numbered years.
**Requisites:** Restricted to Music Education (MMED-MMUE) students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 7138 (3) Contemporary Issues in College Teaching**
Examines music teaching within colleges and universities, including the evolution of university music programs, undergraduate and graduate music curricula, music professors and their work, and sociopolitical issues. Offered spring of odd-numbered terms.
**Requisites:** Restricted to College of Music (MUED or MUSD) graduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 7143 (3) Qualitative Research in Music Education**
Topics include qualitative research traditions, site and participant selection, data collection and analysis methods, quality standards, and research ethics. Students conduct an original research study. Offered fall of odd-numbered years.
**Requisites:** Restricted to MUED students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 7203 (3) Doctoral Seminar in Music Education**
Provides an advanced study of topics central to the music education profession. Requires class presentations and a major paper or project. Offered fall of even-numbered years.
**Requisites:** Restricted to MUED students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 7801 (3) Doctoral Seminar in Music Theory**
Provides advanced study in theory. Students present results of research on individually chosen topics or aspects of a topic central to the class. Requires a major paper or project. Student must have passed graduate preliminary exams and completed 6 credits hours of graduate-level theory before enrolling in course. Instructor determined prerequisite will be enforced as appropriate to the topic.
**Requisites:** Requires a prerequisite course of MUSC 5708 (minimum grade D-). Restricted to College of Music (MUED or MUSD) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 7822 (3) Seminar in Musicology**
Required of all musicology majors before completion of comprehensive examinations. A different research area is designated each semester. Offered fall only.
**Repeatable:** Repeatable for up to 30.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Music (MUAD or MUSD) graduate students only.
**Additional Information:** Departmental Category: Musicology

**NCMU 5093 (0.2-3) Special Topics in Music**
**Repeatable:** Repeatable for up to 3.00 total credit hours.

# Music Education - Master of Music Education (MMusEd)

The Master of Music Education program addresses the professional development needs of music teachers in the field. Students are challenged to develop a greater understanding and mastery of music teaching-learning processes, to improve personal musicianship and to become committed leaders within the music education profession.

Students in this degree program complete advanced studies that are designed to refine their teaching philosophy and practices. These studies include courses in historical and philosophical foundations of music education, psychological theories of music learning, basic research methods, curriculum development and assessment. The minimum number of credit hours required is 30.

The college also offers a Master of Music Education degree/certification with K–12 teaching for students who have completed an undergraduate degree in music, but in a major area other than music education. Coursework leads to a master's degree and a Colorado K–12 music teaching license. The entire program requires a minimum of 71 credit hours.

# Requirements

## Admission Requirements

Applicants are expected to provide evidence of undergraduate preparation equivalent to that required for the bachelor of music education degree at this university. Applicants also must possess a music teaching certificate/license or agree to work toward a Colorado music teaching license. Applicants with an undergraduate GPA below 3.0 must submit GRE scores to be considered for admission. Individuals who wish to pursue music performance or conducting as their cognate area must demonstrate at least senior-level proficiency on their particular medium through an audition.

## Program Requirements

### Program of Study

Students earning the MMusEd degree must complete a minimum of 30 credit hours of course work, including 12 credit hours in music education, 12 credit hours in music and 6 credit hours of open electives in a specialization area or other areas of interest. Of the 12 credit hours in music, a 2-credit-hour course in bibliography and research is required, as well as 6 credit hours of study in a cognate area, which includes musicology/ethnomusicology, music theory/music technology or performance (including conducting, pedagogy and jazz studies).

The music component of the degree should assist students in developing their musical knowledge and skills. One member of the student's graduate advisory committee should be from the cognate area, and it is assumed that at least some part of the student's study is with that faculty member. All music studies must be at the 5000 level or above. Under special circumstances, up to 6 credit hours at the 4000-level may be applied to the open electives portion of the degree.

Students typically complete the degree in two academic years, or one academic year plus two summers. Degree work must be completed within four years of the semester in which the student is accepted into a degree program and begins studies. A summers-only MMusEd program (completed in three summers) is also available; for details, see the Summer MMusEd webpage (https://www.colorado.edu/music/summer-college-music/summer-mme/) or contact the music education faculty. Because most master's level music education courses are offered in late afternoons, students who live within commuting distance can earn a significant portion of credit toward the degree while continuing to work full time.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Category I - Music Education** | | |
| MUSC 6113 | Foundations of Music Education | 2 |
| MUSC 6203 | Psychology of Music Learning | 2 |
| MUSC 5183 | Research in Music Teaching | 2 |
| MUSC 6233 | Pedagogy of Music Teaching and Learning (Required for Summer MME students; optional for AY students) | 2 |
| Music Education electives and workshops | | 4-6 |
| **Category II - Other requirements in music** | | |
| MUSC 5708 | Introduction to Music Bibliography and Research | 2 |
| *Cognate Area* [1] | | *6* |
| Courses accepted for this requirement include: | | |
| 5000- or 6000-level MUSC course | | |
| 5000-level PMUS course (Applied Lessons) | | |
| IMUS 5093 | Contemporary Topics in Music Education [2] | |
| PMUS 5536 | Intermed Conducting [2] | |
| MUSC 5156 | Symposium in Choral Music [2] | |
| MUSC 6243 | Applications of Music Pedagogy [2] | |
| MUSC 5136 | Advanced Conducting | |
| IMUS 5018 | Conducting Symposium [3] | |
| 5000-level TMUS course [2] | | |
| *Music Electives and Workshops (outside of major)* | | *4* |
| Courses accepted for this requirement include: | | |
| 5000- or 6000- MUSIC course (except MUSC 5XX3 or MUSC 6XX3) | | |
| 5000-level PMUS course (Applied Lessons) [4] | | |
| 5000- or 6000-level EMUS course [4] | | |
| IMUS 5093 | Contemporary Topics in Music Education [4] | |
| 5000-level TMUS course [4] | | |
| **Electives** | | |
| Elective courses and workshops/intensives. Courses accepted for this requirement include: | | 6 |
| Any 5000- or 6000-level course (music or non-music) | | |
| 5000-level PMUS course [2] | | |

| | | |
|---|---|---|
| 4000-, 5000- or 6000-level EMUS course [2] | | |
| 4000-level MUSC course [2] | | |
| IMUS 5093 | Contemporary Topics in Music Education [2] | |
| 5000-level TMUS course [2] | | |
| **Total Credit Hours** | | **30-32** |

1 Summer MME: Technology, Musicology, Ethnomusicology, Conducting. Acadmic Year MME: Technology, Theory, Musicology, Ethnomusicology, Conducting, Performance, Performance & Pedagogy, Piano Pedagogy, Vocal Pedagogy, Jazz Studies.

2 Repeatable up to 6 hours.

3 Repeatable up to 2 hours.

4 Repeatable up to 4 hours.

# Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate knowledge of the philosophical, historical, and psychological foundations of K–12 music teaching and learning.
- Design and conduct a small-scale research study in the discipline, demonstrating knowledge of basic quantitative and qualitative research methods.
- Effectively communicate and present acquired foundational knowledge and research to an academic audience in written or oral form.

# Dual Degree Program

## Master of Music Education and Master of Music Dual Degree

Students may apply for a dual master's degree that combines the master of music education and the master of music program (with approval from both departments) in the College of Music. To guarantee the ability to pursue a dual MME/MM degree, the student must apply separately and be admitted by the faculty in each of the degree programs under their respective admissions procedures and standards. The student must be accepted into both degree programs at the time of the initial application. If a student is already accepted to the College of Music in one degree program and is interested in adding a second degree, the second master's degree must be approved by both area Department Chairs and the Associate Dean of the College of Music. In consultation with the Department Chairs, Associate Dean and Graduate Studies Coordinator, a comprehensive degree plan will be devised for all requirements expected for the student to earn the dual degree. This plan must be completed before the last anticipated semester of study in the student's original degree. With the exception of thesis credit hours, courses that fulfill requirements in both degree programs need only be taken once to be counted for both degrees. A minimum of 45 credit hours must be earned.

# Musical Arts

The faculty of the College of Music has modeled the DMA degree programs at CU Boulder after the guiding principles outlined by the National Association of Schools of Music (NASM). As defined by NASM, the Doctor of Musical Arts degree is intended for those seeking "the highest level of professional practice emphasizing the creation or performance of musical works and the application and transmission of knowledge about musical works, or pedagogy... Creation, performance, and teaching are highly disciplined efforts; inquiry and investigation, and often research and scholarship, are components of performance practice" (*NASM Handbook*, 2009–10: 116).

# Doctoral Degree

- Doctor of Musical Arts (DMA) (p. 1821)

# Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Aaholm, Philip
Professor Emeritus

Austin, James R. (https://experts.colorado.edu/display/fisid_103455/)
Professor; PhD, University of Iowa

Barnett, Michael T. (https://experts.colorado.edu/display/fisid_116467/)
Instructor; DMA, University of Colorado Boulder

Bartels, Justin P. (https://experts.colorado.edu/display/fisid_152074/)
Lecturer

Berg, Margaret H. (https://experts.colorado.edu/display/fisid_118371/)
Professor, Associate Dean; PhD, Northwestern University

Bernstein, Giora
Professor Emeritus

Bird-Arvidsson, Jennifer (https://experts.colorado.edu/display/fisid_147651/)
Associate Professor; MM, University of Michigan Ann Arbor

Brody, James M. (https://experts.colorado.edu/display/fisid_101948/)
Associate Professor; MM, Indiana University Bloomington

Bruns, Steven M. (https://experts.colorado.edu/display/fisid_103483/)
Associate Professor; PhD, University of Wisconsin–Madison

Caballero, Carlo (https://experts.colorado.edu/display/fisid_111681/)
Associate Professor, Faculty Fellow; PhD, University of Pennsylvania

Carthy, Nicholas R. (https://experts.colorado.edu/display/fisid_135356/)
Associate Professor; BA, Guildhall School of Music, London (England)

Chang, Philip C. (https://experts.colorado.edu/display/fisid_143541/)
Senior Instructor; PhD, University of Rochester

Chellis, Matthew Wren (https://experts.colorado.edu/display/fisid_154415/)
Associate Professor; MM, Manhattan School of Music

Conlon, Joan Catoni
Professor Emerita

Cooper, Peter W. (https://experts.colorado.edu/display/fisid_134522/)
Senior Instructor; BM, Northwestern University

Cooperstock, Andrew B. (https://experts.colorado.edu/display/fisid_115393/)
Professor; DMA, Peabody Institute of Johns Hopkins University

Cremaschi, Alejandro M. (https://experts.colorado.edu/display/fisid_134168/)
Professor; DMA, University of Minnesota Twin Cities

Davis, John S. (https://experts.colorado.edu/display/fisid_115443/)
Professor, Dean; DMA, University of Northern Colorado

Dockendorf, Matthew Paul (https://experts.colorado.edu/display/fisid_154511/)
Assistant Professor, Faculty Director; DMA, Michigan State University

Drumheller, John E. (https://experts.colorado.edu/display/fisid_103707/)
Senior Instructor; DMA, University of Colorado Boulder

Dunn, James M. (https://experts.colorado.edu/display/fisid_140593/)
Associate Professor; MM, Arizona State University

Dusinberre, Edward (https://experts.colorado.edu/display/fisid_101358/)
Faculty Fellow, Artist in Residence; Diploma, The Juilliard School

Eakin, Charles
Professor Emeritus

Eckert, Erika L. (https://experts.colorado.edu/display/fisid_101844/)
Associate Professor; BM, University of Rochester

Ellsworth, Oliver
Professor Emeritus

Erhard, Paul M. (https://experts.colorado.edu/display/fisid_100493/)
Professor; DMA, The Juilliard School

Farr, Elizabeth G. (https://experts.colorado.edu/display/fisid_101732/)
Professor Emerita; DMA, University of Michigan Ann Arbor

Fejer, Andras (https://experts.colorado.edu/display/fisid_103923/)
Faculty Fellow, Artist in Residence; Diploma, Franz Liszt Academy of Music

Fink, Robert
Professor Emeritus

Galm, John
Professor Emeritus

Gardner, Ryan (https://experts.colorado.edu/individual/fisid_165331/)
Associate Professor; DMA, Manhattan School of Music

Garland, Andrew B (https://experts.colorado.edu/display/fisid_159725/)
Assistant Professor; MM, University of Cincinnati

Gentry, Gregory R.
Associate Professor, Faculty Director, Faculty Fellow; DMA, University of Missouri–Kansas City

Goode, Bradley M. (https://experts.colorado.edu/display/fisid_134686/)
Associate Professor; MM, DePaul University

Graham, Larry
Professor Emeritus

Gunther, John G. (https://experts.colorado.edu/display/fisid_141165/)
Professor, Faculty Director; PhD, New York University

Hata, Kuniaki
Professor Emeritus

Hayes, Deborah
Professor Emerita

Hayghe, Jennifer C. (https://experts.colorado.edu/display/fisid_155969/)
Associate Professor; DMA, The Juilliard School

Heil, Leila (https://experts.colorado.edu/display/fisid_149780/)
Associate Professor; PhD, University of Colorado Boulder

Hill, Robert Stephen (https://experts.colorado.edu/display/fisid_163943/)
Professor, Endowed Chair; PhD, Harvard University

Holman-Johnson, Leigh (https://experts.colorado.edu/display/fisid_141980/)
Associate Professor; DMA, University of Colorado Boulder

Ishikawa, Yoshiyuki (https://experts.colorado.edu/display/fisid_102125/)
Professor; DMA, University of Michigan Ann Arbor

Jackson, Dennis
Professor Emeritus

Jenkins, Jeff (https://experts.colorado.edu/individual/fisid_146511/)
Instructor; Studied, Univeristy of North Texas

Jennings, Christina A. (https://experts.colorado.edu/display/fisid_143545/)
Professor; MM, The Juilliard School

Kearns, William
Professor Emeritus

Keister, Jay (https://experts.colorado.edu/display/fisid_115734/)
Associate Professor; PhD, University of California, Los Angeles

Kim, Suyeon (https://experts.colorado.edu/display/fisid_153470/)
Instructor; DMA, University of Texas at Austin

Korevaar, David J. (https://experts.colorado.edu/display/fisid_118374/)
Distinguished Professor, Faculty Fellow; DMA, The Juilliard School

Lehnert, Doris Pridonoff
Professor Emerita

Lehnert, Oswald
Professor Emeritus

Leong, Daphne (https://experts.colorado.edu/display/fisid_115747/)
Professor; PhD, University of Rochester

Lewis, Gary J. (https://experts.colorado.edu/display/fisid_145854/)
Professor, Endowed Chair; MM, Texas Tech University

Lin, Hsiao-Ling (https://experts.colorado.edu/display/fisid_149958/)
Instructor; DMA, Northwestern University

Malin, Jonathan (https://experts.colorado.edu/display/fisid_151714/)
Associate Professor; PhD, University of Chicago

Maloy, Rebecca (https://experts.colorado.edu/display/fisid_125582/)
Professor, Faculty Fellow, Endowed/Named Professor; PhD, University of Cincinnati

Mason, Patrick C. (https://experts.colorado.edu/display/fisid_101840/)
Professor Emeritus; MM, University of Nebraska-Lincoln

McCarthy, Kevin
Professor Emeritus

McDonald, Margaret M. (https://experts.colorado.edu/display/fisid_134703/)
Associate Professor; DMA, University of California, Santa Barbara

McKee, Paul (https://experts.colorado.edu/display/fisid_154465/)
Associate Professor; MM, University of Texas at Austin

McKinney, Donald J.
Professor, Faculty Director; DMA, University of Michigan Ann Arbor

McMurray, Allan
Professor Emeritus

Meneghini-Stalker, Tamara L. (https://experts.colorado.edu/display/fisid_146090/)
Associate Professor; MFA, Northern Illinois University

Miranda, Martina L. (https://experts.colorado.edu/display/fisid_140091/)
Associate Professor; DMA, Arizona State University; PhD, Arizona State University

Moteki, Mutsumi (https://experts.colorado.edu/display/fisid_100992/)
Professor, Faculty Fellow; DMA, University of Michigan Ann Arbor

Myer, Tom R. (https://experts.colorado.edu/display/fisid_100922/)
Associate Professor; MM, East Texas State University

Nguyen, Alexandra (https://experts.colorado.edu/display/fisid_145847/)
Associate Professor; DMA, University of Rochester

Nims, Abigail Andrews (https://experts.colorado.edu/display/fisid_152977/)
Associate Professor; MM, Westminster Choir College

Nytch, Jeffrey C. (https://experts.colorado.edu/display/fisid_147341/)
Associate Professor, Faculty Director; DMA, Rice University

Okigbo, Austin Chinagorom (https://experts.colorado.edu/display/fisid_151507/)
Associate Professor; PhD, Indiana University Bloomington

Pann, Carter N. (https://experts.colorado.edu/display/fisid_141461/)
Professor, Faculty Fellow; DMA, University of Michigan Ann Arbor

Peterson, Patti H.
Professor Emerita

Pinkow, David
Professor Emeritus

Reger, Jeremy J. (https://experts.colorado.edu/display/fisid_156224/)
Assistant Professor, Faculty Director; DMA, University of Michigan Ann Arbor

Requiro, David (https://experts.colorado.edu/display/fisid_155785/)
Assistant Professor; MM, University of Michigan Ann Arbor

Rhodes, Harumi B. (https://experts.colorado.edu/display/fisid_155971/)
Associate Professor, Faculty Fellow, Artist in Residence; MM, New England Conservatory of Music

Riis, Thomas L.
Professor Emeritus

Roeder, Matthew J. (https://experts.colorado.edu/display/fisid_120180/)
Associate Professor, Associate Dean; DMA, University of Colorado Boulder

Romero, Brenda M. (https://experts.colorado.edu/display/fisid_106117/)
Professor Emerita; PhD, University of California-Los Angeles

Sable, Barbara Kinsey
Professor Emeritus

Sampsel, Laurie (https://experts.colorado.edu/display/fisid_101802/)
Professor; PhD, University of Pittsburgh

Sawchuk, Terry M.
Associate Professor Emeritus; MM, University of Michigan Ann Arbor

Schranz, Karoly
Senior Instructor; Diploma, Franz Liszt Academy of Music

Schut, Joel
Instructor; DMA, Michigan State University

Scott, F. Wayne
Professor Emeritus

Seesholtz, John (https://experts.colorado.edu/display/fisid_163908/)
Associate Professor, Faculty Director; DMA, University of North Texas

Shay, Robert S. (https://experts.colorado.edu/display/fisid_154671/)
Dean, Professor; PhD, University of North Carolina Chapel Hill

Sher, Daniel (https://experts.colorado.edu/individual/fisid_100194/)
Professor, Dean Emeritus; EdD, Columbia University

Silver, Daniel S. (https://experts.colorado.edu/display/fisid_115564/)
Professor; MM, University of Michigan Ann Arbor

Sim, Claude
Assistant Professor; BM, Oberlin Conservatory

Smith, Jeremy L. (https://experts.colorado.edu/display/fisid_118265/)
Professor; PhD, University of California, Santa Barbara

Spera, Nicolo Ruggero Ferruccio (https://experts.colorado.edu/display/fisid_148406/)
Associate Professor; DMA, University of Colorado Boulder

Spillman, Robert
Professor Emeritus

Stanley, William J. (https://experts.colorado.edu/display/fisid_103616/)
Associate Professor; DMA, University of Illinois at Urbana–Champaign

Steinmetz, Branden (https://experts.colorado.edu/display/fisid_165415/)
Instructor, Faculty Director; DMA, Michigan State University

Swadener, Marc
Professor Emeritus

Swanson, Elizabeth (https://experts.colorado.edu/display/fisid_159726/)
Assistant Professor, Faculty Director; DMA, Northwestern University

Teitelbaum, Benjamin Raphael (https://experts.colorado.edu/display/fisid_151338/)
Associate Professor; PhD, Brown University

Theodore, Michael (https://experts.colorado.edu/display/fisid_113318/)
Associate Professor; PhD, University of California, San Diego

Thomas, Susan
Professor, Faculty Director; PhD, Brandeis University

Thornton, Michael Robert (https://experts.colorado.edu/display/fisid_116318/)
Professor; BM, Temple University

Walter, Douglas W. (https://experts.colorado.edu/display/fisid_101811/)
Professor; DMA, Temple University

Waters, Keith John (https://experts.colorado.edu/display/fisid_107518/)
Professor; PhD, University of Rochester

Weiss, Meta (https://experts.colorado.edu/display/fisid_164484/)
Senior Instructor; DMA, The Juilliard School

Wetherbee, Charles Tyler
Associate Professor; BM, Curtis Institute of Music

Wolzien, Charles
Professor Emeritus

# Musical Arts - Doctor of Musical Arts (DMA)

The DMA degree programs at CU Boulder are modeled after the guiding principles outlined by the National Association of Schools of Music. As defined by the NASM, the Doctor of Musical Arts degree is intended for those seeking "the highest level of professional practice emphasizing the creation or performance of musical works and the application and transmission of knowledge about musical works, or pedagogy... Creation, performance, and teaching are highly disciplined efforts; inquiry and investigation, and often research and scholarship, are components of performance practice" (*NASM Handbook*, 2016-17: 135).

This professional degree is intended for composers, conductors and performers who possess both creative and scholarly abilities. Graduates of this program go on to careers as composers and performers in solo, chamber music, opera, jazz or orchestra, or as choral, jazz, band and/or orchestral conductors. A particular focus of the DMA is the preparation for a career as a college, conservatory or university teacher. Students work closely with an advisor in developing a degree plan that reflects their needs and interests. This degree requires a minimum of 30 hours beyond the master's level, including 12 hours in seminar and other coursework, and a minimum of 18 hours of performance and written projects (constituting the dissertation portion of the degree).

For outlines of specific programs, visit the college's Degrees (http://www.colorado.edu/music/academics/graduate-advising/degrees/) webpage or contact the Music Graduate Studies office.

# Requirements

## Prerequisites

Entrance requirements include a master's degree in music or demonstrated background comparable to that of the master of music degree at this university. All graduate applicants must complete an audition, interview, or some other demonstration of their ability in the major field. If at all possible, a visit to the campus is strongly encouraged. As part of the application, composition majors should upload representative scores and recordings (to the digital portfolio tab on the application), and a list of completed compositions. Performance majors should submit a repertoire list and arrange for a personal audition and interview, if at all possible. Some areas require applicants to send a pre-audition screening recording of their performance. Conducting majors must upload a video of a performance. All DMA applicants must also submit a scholarly writing sample that demonstrates ability in critical thinking, appropriate research techniques, and skill in the cogent use of English. For full details concerning audition and application requirements, visit the college's Prospective Graduate Students (http://www.colorado.edu/music/admissions/prospective-graduate-students/) webpage.

## Course Requirements

Students must take a minimum of 30 credit hours of coursework, of which at least 18 credit hours are dissertation projects. Students take two doctoral topic classes (at the 6000 level), one each in musicology and music theory; prerequisites are stipulated by the theory and musicology faculties. Some areas require specific coursework prior to or in conjunction with work on dissertation projects. In other instances students may be advised to take coursework in preparation for the comprehensive examination. Applied music instruction may be elected for the duration of the residency requirement.

## Advisory Committee

Each DMA program is directed by a five-member advisory committee headed by the major advisor, who is usually the student's main studio teacher. At least one member must hold the PhD degree in musicology, music theory, composition or music education.

## Residence Requirements

The minimum residence requirement is six semesters of work beyond the attainment of an acceptable bachelor's degree. Two semesters of residence credit may be allowed for a master's degree from another institution of approved standing, but at least four semesters of residence credit, two of which must be consecutive in one academic year, must be earned for coursework and/or dissertation work taken at this university.

Not more than one-half semester of residence credit may be earned in a summer session. Students must be registered full-time to earn residence credit. For employed students, only those with one-fourth time or less in work that does not contribute directly to their degree program may earn full residence credit.

## Continuous Registration

After the residence requirements for the doctor of musical arts program have been satisfied, a student must enroll for fall and spring semesters of each year until attaining the degree. If a student has enrolled in all required dissertation courses but is still working on dissertation projects to complete the degree requirements, they should enroll in TMUS 8019, or TMUS 8029, until the degree is completed.

## Degree Plans

A degree plan approved by the advisory committee will be presented to the associate dean for graduate studies at the beginning of the second semester of residence. The student's major professor is responsible for helping the student formulate this plan. The plan should include members of the student's doctoral committee, projected remedial and supporting coursework, proposed dissertation projects, and tentative dates for the comprehensive and final examinations. In consultation with the major advisor, the student should form the five-member faculty advisory committee by the third semester in residence.

The following degree plans are available for the doctor of musical arts degree:

- Brass Performance and Pedagogy
- Percussion Performance and Pedagogy
- Composition
- Conducting and Literature - Choral
- Conducting and Literature - Orchestral
- Conducting and Literature - Wind
- Jazz Performance
- Solo Piano - Thesis
- Solo Piano - Non-thesis
- Collaborative Piano
- String Performance
- Voice Performance and Pedagogy
- Woodwinds Performance and Pedagogy

Learn more about degree plans on the College of Music's Degrees webpage (https://www.colorado.edu/music/academics/graduate-advising/degrees/).

## Language Requirement

Brass + percussion; collaborative piano; choral conducting; orchestral conducting; voice; and musicology students are required to demonstrate foreign language proficiency before being allowed to take the comprehensive examination. The choice of the language(s) must be approved by the student's advisory committee. Specific requirements include:

- Brass + percussion: Passing score on a foreign language repertoire terms exam
- Collaborative piano: instrumental emphasis: One year of French, German, or Italian; vocal emphasis: One year of two languages (selected from French, German, or Italian)
- Choral conducting: Two years of one language
- Orchestral conducting: Two years of one language
- Voice: One year of three languages. Students may petition the voice faculty for an exception to this policy. Please see the DMA Voice Performance & Pedagogy degree plan for more information.
- Musicology: Two years of two languages or specialty language training (with approval)

## Dissertation

The DMA dissertation consists of a specified number of performances, projects, and documents. The student's permanent advisory committee must approve all dissertation projects.

## Time Limit

DMA degree work must be completed within six years of first registration.

# Program Tracks

## Brass Performance and Pedagogy

| Code | Title | Credit Hours |
|---|---|---|
| **Academic Requirements** | | |
| MUSC 6822 | Advanced Studies in Musicology | 3 |
| MUSC 6801 | Advanced Topics in Music Theory | 3 |
| **Major Area** | | |
| Applied Lessons (PMUS 6XX6) | | 6 |
| MUSC 5336 | Brass Pedagogy | 0-2 |
| MUSC 5036 | Brass Literature | 0-2 |
| MUSC 6203 | Psychology of Music Learning | 0-2 |
| **Dissertation Projects** | | |
| TMUS 8219 | Dissertation Project 1 (Solo Recital, Choral Concert, Composition) | 3 |
| TMUS 8229 | Dissertation Project 2 (Solo Recital, Choral Concert, Composition, Vocal Pedagogy) | 3 |
| TMUS 8239 | Diss Proj 3 (Chamber Music Recital, Vocal Pedagogy Project, Choral Project, Composition Recital) | 3 |
| or TMUS 8259 | Dissertation Project 5 (Research Lecture) | |
| TMUS 8249 | Diss Proj 4 (Chamber Music Recital, Choral Project, Composition Recital, Wind/Percussion Practicum) | 3 |
| TMUS 8329 | Document/Pedagogy Project | 6 |
| **Total Credit Hours** | | **30-36** |

## Collaborative Piano

| Code | Title | Credit Hours |
|---|---|---|
| **Academic Requirements** | | |
| MUSC 6801 | Advanced Topics in Music Theory | 3 |
| MUSC 6822 | Advanced Studies in Musicology | 3 |
| **Major Area** | | |
| PMUS 6636 | Piano | 6 |
| *Literature Course and Seminar* | | *6* |
| MUSC 5464 | Voice Literature I: French Song Literature and Oratorio/Concert Solo Literature | |
| MUSC 5564 | Voice Literature II: German, British & American Song Literature | |
| MUSC 5425 | Collaborative Literature for Piano with Winds, Brass, and Percussion | |
| MUSC 5435 | Collaborative Literature for Piano with Strings | |
| *Elective Courses* | | *2-4* |
| MUSC 5375 | Opera Coaching for Pianists | |
| MUSC 5405 | Basso-Continuo Accompaniment | |
| PMUS 5586 | Harpsichord | |
| PMUS 5616 | Organ | |
| **Dissertation Projects** | | |
| TMUS 8219 | Dissertation Project 1 (Solo Recital, Choral Concert, Composition) | 3 |
| TMUS 8229 | Dissertation Project 2 (Solo Recital, Choral Concert, Composition, Vocal Pedagogy) | 3 |
| TMUS 8239 | Diss Proj 3 (Chamber Music Recital, Vocal Pedagogy Project, Choral Project, Composition Recital) | 3 |
| TMUS 8249 | Diss Proj 4 (Chamber Music Recital, Choral Project, Composition Recital, Wind/Percussion Practicum) | 3 |

| | | |
|---|---|---|
| TMUS 8259 | Dissertation Project 5 (Research Lecture) | 3 |
| TMUS 8269 | Dissertation Project 6 (Research Lecture) | 3 |
| **Total Credit Hours** | | **38-40** |

## Composition

| Code | Title | Credit Hours |
|---|---|---|
| **Academic Requirements** | | |
| MUSC 6822 | Advanced Studies in Musicology | 3 |
| MUSC 6041 | Advanced Orchestration | 3 |
| MUSC 6051 | Pedagogy of Music Theory | 3 |
| **Composition and Dissertation Projects** | | |
| TMUS 8119 | Composition Project 1 | 4 |
| TMUS 8129 | Composition Project 2 | 4 |
| TMUS 8249 | Diss Proj 4 (Chamber Music Recital, Choral Project, Composition Recital, Wind/Percussion Practicum) | 3 |
| TMUS 8329 | Document/Pedagogy Project | 4 |
| TMUS 8339 | Major Composition | 6 |
| **Total Credit Hours** | | **30** |

## Conducting and Literature - Choral

| Code | Title | Credit Hours |
|---|---|---|
| **Academic Requirements** | | |
| MUSC 6801 | Advanced Topics in Music Theory | 3 |
| MUSC 6822 | Advanced Studies in Musicology | 3 |
| **Major Area** | | |
| MUSC 5156 | Symposium in Choral Music | 4 |
| PMUS 6536 | Adv Conducting | 6 |
| **Dissertation Projects** | | |
| TMUS 8219 | Dissertation Project 1 (Solo Recital, Choral Concert, Composition) | 3 |
| TMUS 8229 | Dissertation Project 2 (Solo Recital, Choral Concert, Composition, Vocal Pedagogy) | 3 |
| TMUS 8239 | Diss Proj 3 (Chamber Music Recital, Vocal Pedagogy Project, Choral Project, Composition Recital) | 3 |
| TMUS 8259 | Dissertation Project 5 (Research Lecture) [1] | 3 |
| TMUS 8319 | Repertoire Project | 3 |
| TMUS 8329 | Document/Pedagogy Project | 3 |
| **Total Credit Hours** | | **34** |

[1] Option 1: Research Lecture in Choral Pedagogy; Option 2: Solo Voice Recital.

## Conducting and Literature - Wind

| Code | Title | Credit Hours |
|---|---|---|
| **Academic Requirements** | | |
| MUSC 6801 | Advanced Topics in Music Theory | 3 |
| MUSC 6822 | Advanced Studies in Musicology | 3 |
| **Major Area** | | |
| PMUS 6536 | Adv Conducting | 6 |
| **Dissertation Projects** | | |
| TMUS 8219 | Dissertation Project 1 (Solo Recital, Choral Concert, Composition) | 3 |
| TMUS 8229 | Dissertation Project 2 (Solo Recital, Choral Concert, Composition, Vocal Pedagogy) | 3 |
| TMUS 8249 | Diss Proj 4 (Chamber Music Recital, Choral Project, Composition Recital, Wind/Percussion Practicum) | 3 |
| TMUS 8259 | Dissertation Project 5 (Research Lecture) | 3 |
| TMUS 8269 | Dissertation Project 6 (Research Lecture) | 3 |
| TMUS 8319 | Repertoire Project | 3 |
| **Total Credit Hours** | | **30** |

## Harpsichord

| Code | Title | Credit Hours |
|---|---|---|
| **Academic Requirements** | | |
| MUSC 6801 | Advanced Topics in Music Theory | 3 |
| MUSC 6822 | Advanced Studies in Musicology | 3 |
| **Major Area** | | |
| PMUS 6586 | Harpsichord | 6 |
| *Historical Performance Practice* | | *6* |
| MUSC 5405 | Basso-Continuo Accompaniment | |
| MUSC 5742 | Performance Practice of Early Music | |
| EMUS 5367 | Early Music Ensemble | |
| **Dissertation Projects** | | |
| TMUS 8219 | Dissertation Project 1 (Solo Recital, Choral Concert, Composition) | 3 |
| TMUS 8229 | Dissertation Project 2 (Solo Recital, Choral Concert, Composition, Vocal Pedagogy) | 3 |
| TMUS 8239 | Diss Proj 3 (Chamber Music Recital, Vocal Pedagogy Project, Choral Project, Composition Recital) | 3 |
| TMUS 8339 | Major Composition (Recording Project) | 4 |
| TMUS 8329 | Document/Pedagogy Project | 6 |
| **Total Credit Hours** | | **37** |

## Jazz Studies

| Code | Title | Credit Hours |
|---|---|---|
| **Academic Requirements** | | |
| MUSC 6801 | Advanced Topics in Music Theory | 3 |
| MUSC 6822 | Advanced Studies in Musicology | 3 |
| **Major Area** | | |
| Applied Jazz Lessons (PMUS 68X6) | | 4 |
| MUSC 7046 | Seminar in Jazz Literature | 3 |
| EMUS 5427 | Jazz Ensemble | 2 |
| EMUS 5437 | Jazz Combo | 2 |
| MUSC 5256 | Jazz Studies Administration and Pedagogy | 0-3 |
| **Dissertation Projects** | | |

| | | |
|---|---|---|
| TMUS 8219 | Dissertation Project 1 (Solo Recital, Choral Concert, Composition) | 3 |
| TMUS 8229 | Dissertation Project 2 (Solo Recital, Choral Concert, Composition, Vocal Pedagogy) | 3 |
| TMUS 8239 | Diss Proj 3 (Chamber Music Recital, Vocal Pedagogy Project, Choral Project, Composition Recital) | 3 |
| TMUS 8259 | Dissertation Project 5 (Research Lecture) | 3 |
| TMUS 8319 | Repertoire Project | 3 |
| TMUS 8329 | Document/Pedagogy Project | 4 |
| **Total Credit Hours** | | **36-39** |

## Percussion

| Code | Title | Credit Hours |
|---|---|---|
| **Academic Requirements** | | |
| MUSC 6801 | Advanced Topics in Music Theory | 3 |
| MUSC 6822 | Advanced Studies in Musicology | 3 |
| **Major Area** | | |
| PMUS 6626 | Percussion | 8 |
| MUSC 5026 | Percussion Literature | 2 |
| **Dissertation Projects** | | |
| TMUS 8219 | Dissertation Project 1 (Solo Recital, Choral Concert, Composition) | 3 |
| TMUS 8229 | Dissertation Project 2 (Solo Recital, Choral Concert, Composition, Vocal Pedagogy) | 3 |
| TMUS 8239 | Diss Proj 3 (Chamber Music Recital, Vocal Pedagogy Project, Choral Project, Composition Recital) | 3 |
| TMUS 8249 | Diss Proj 4 (Chamber Music Recital, Choral Project, Composition Recital, Wind/Percussion Practicum) | 3 |
| TMUS 8319 | Repertoire Project | 3 |
| TMUS 8329 | Document/Pedagogy Project | 4 |
| **Total Credit Hours** | | **35** |

## Piano (Non-Thesis)

| Code | Title | Credit Hours |
|---|---|---|
| **Academic Requirements** | | |
| MUSC 6801 | Advanced Topics in Music Theory | 3 |
| MUSC 6822 | Advanced Studies in Musicology | 3 |
| **Major Area** | | |
| PMUS 6636 | Piano | 6 |
| *Seminars in Piano Lit* | | *4* |
| MUSC 6325 | Seminar in Piano Literature | |
| MUSC 5325 | Keyboard Literature 1 | |
| MUSC 5335 | Keyboard Literature 2 | |
| *Graduate Piano Pedagogy* | | *2* |
| MUSC 5305 | Piano Pedagogy Group Techniques | |
| MUSC 5315 | Piano Pedagogy: Intermediate Literature | |
| MUSC 5345 | Research: Piano Literature and Pedagogy | |
| **Dissertation Projects** | | |
| TMUS 8219 | Dissertation Project 1 (Solo Recital, Choral Concert, Composition) | 3 |
| TMUS 8229 | Dissertation Project 2 (Solo Recital, Choral Concert, Composition, Vocal Pedagogy) | 3 |
| TMUS 8239 | Diss Proj 3 (Chamber Music Recital, Vocal Pedagogy Project, Choral Project, Composition Recital) | 3 |
| TMUS 8249 | Diss Proj 4 (Chamber Music Recital, Choral Project, Composition Recital, Wind/Percussion Practicum) | 3 |
| TMUS 8259 | Dissertation Project 5 (Research Lecture) | 3 |
| TMUS 8269 | Dissertation Project 6 (Research Lecture) | 3 |
| **Total Credit Hours** | | **36** |

## Piano (Thesis)

| Code | Title | Credit Hours |
|---|---|---|
| **Academic Requirements** | | |
| MUSC 6801 | Advanced Topics in Music Theory | 3 |
| MUSC 6822 | Advanced Studies in Musicology | 3 |
| **Major Area** | | |
| PMUS 6636 | Piano | 6 |
| *Seminars in Piano Literature* | | *4* |
| MUSC 6325 | Seminar in Piano Literature | |
| MUSC 5325 | Keyboard Literature 1 | |
| MUSC 5335 | Keyboard Literature 2 | |
| *Graduate Piano Pedagogy* | | *2* |
| MUSC 5305 | Piano Pedagogy Group Techniques | |
| MUSC 5315 | Piano Pedagogy: Intermediate Literature | |
| MUSC 5345 | Research: Piano Literature and Pedagogy | |
| **Dissertation Projects** | | |
| TMUS 8219 | Dissertation Project 1 (Solo Recital, Choral Concert, Composition) | 3 |
| TMUS 8239 | Diss Proj 3 (Chamber Music Recital, Vocal Pedagogy Project, Choral Project, Composition Recital) | 3 |
| TMUS 8259 | Dissertation Project 5 (Research Lecture) | 3 |
| TMUS 8229 | Dissertation Project 2 (Solo Recital, Choral Concert, Composition, Vocal Pedagogy) | 3 |
| or TMUS 8249 | Diss Proj 4 (Chamber Music Recital, Choral Project, Composition Recital, Wind/Percussion Practicum) | |
| or TMUS 8269 | Dissertation Project 6 (Research Lecture) | |
| TMUS 8329 | Document/Pedagogy Project | 6 |
| **Total Credit Hours** | | **36** |

## String Performance

| Code | Title | Credit Hours |
|---|---|---|
| **Academic Requirements** | | |
| MUSC 6801 | Advanced Topics in Music Theory | 3 |
| MUSC 6822 | Advanced Studies in Musicology | 3 |
| **Major Area** | | |
| Applied Lessons (PMUS 6XX6) | | 6 |

| | | |
|---|---|---|
| **Dissertation Projects** | | |
| TMUS 8219 | Dissertation Project 1 (Solo Recital, Choral Concert, Composition) | 3 |
| TMUS 8229 | Dissertation Project 2 (Solo Recital, Choral Concert, Composition, Vocal Pedagogy) | 3 |
| TMUS 8239 | Diss Proj 3 (Chamber Music Recital, Vocal Pedagogy Project, Choral Project, Composition Recital) | 3 |
| TMUS 8259 | Dissertation Project 5 (Research Lecture) | 3 |
| TMUS 8319 | Repertoire Project | 3 |
| TMUS 8329 | Document/Pedagogy Project | 4 |
| **Total Credit Hours** | | **31** |

## Voice Performance and Pedagogy

| Code | Title | Credit Hours |
|---|---|---|
| **Academic Requirements** | | |
| MUSC 6801 | Advanced Topics in Music Theory | 3 |
| MUSC 6822 | Advanced Studies in Musicology | 3 |
| **Major Area** | | |
| PMUS 6726 | Voice | 6 |
| **Dissertation Projects** | | |
| TMUS 8219 | Dissertation Project 1 (Solo Recital, Choral Concert, Composition) | 3 |
| TMUS 8229 | Dissertation Project 2 (Solo Recital, Choral Concert, Composition, Vocal Pedagogy) | 3 |
| TMUS 8239 | Diss Proj 3 (Chamber Music Recital, Vocal Pedagogy Project, Choral Project, Composition Recital) | 3 |
| TMUS 8269 | Dissertation Project 6 (Research Lecture) | 3 |
| TMUS 8279 | Performance Research Document 1 | 3 |
| TMUS 8329 | Document/Pedagogy Project | 3 |
| **Total Credit Hours** | | **30** |

## Woodwind Performance and Pedagogy

| Code | Title | Credit Hours |
|---|---|---|
| **Academic Requirements** | | |
| MUSC 6801 | Advanced Topics in Music Theory | 3 |
| MUSC 6822 | Advanced Studies in Musicology | 3 |
| **Major Area** | | |
| Applied Lessons (PMUS 6XX6) | | 6 |
| MUSC 5346 | Woodwind Pedagogy | 0-2 |
| MUSC 5666 | Chamber Music Literature: Woodwinds | 0-2 |
| MUSC 6203 | Psychology of Music Learning | 0-2 |
| **Dissertation Projects** | | |
| TMUS 8219 | Dissertation Project 1 (Solo Recital, Choral Concert, Composition) | 3 |
| TMUS 8229 | Dissertation Project 2 (Solo Recital, Choral Concert, Composition, Vocal Pedagogy) | 3 |
| TMUS 8239 | Diss Proj 3 (Chamber Music Recital, Vocal Pedagogy Project, Choral Project, Composition Recital) | 3 |
| TMUS 8249 | Diss Proj 4 (Chamber Music Recital, Choral Project, Composition Recital, Wind/Percussion Practicum) | 3 |
| TMUS 8329 | Document/Pedagogy Project | 6 |
| **Total Credit Hours** | | **30-36** |

# Learning Outcomes

By the completion of the program, students will be able to:

# CONTINUING EDUCATION CATALOG

The mission of the Division of Continuing Education is to provide quality, innovative, lifelong learning opportunities to a diverse student population by extending the educational resources of the University of Colorado Boulder. Continuing Education collaborates with departments across campus to offer a variety of evening and online courses for university credit, graduate certificates and degree programs, as well as K-12 STEM programming, English language courses for international students and outreach opportunities for faculty. The Division facilitates non-degree enrollment in main campus classes for visiting and high school students and non-credit enrollment for auditors. (Non-degree refers to students who have not been formally admitted to a CU Boulder degree program; non-credit refers to learners who take courses or enroll in programs that do not offer university credit.) Continuing Education is also involved in the administration of CU Boulder's Summer Session and CU Boulder Online. Only university-approved faculty teach in Continuing Education programs.

## ACCESS

The ACCESS (Available Credit Courses for Eligible Special Students) Program (https://ce.colorado.edu/programs/access/), offered in conjunction with many of the university's academic departments, allows non-degree students to enroll on a space available basis in Boulder main campus undergraduate and graduate credit courses.

## Applied Music Program

The Applied Music Program (https://ce.colorado.edu/programs/applied-music/) allows students to earn CU credit while receiving private or group music lessons. It also provides an opportunity for graduate students to obtain valuable teaching experience.

## CE Evening Credit Program

Offered in conjunction with CU Boulder academic departments, the CE Evening Credit Program (https://ce.colorado.edu/programs/ce-evening-credit/) provides academic, credit-bearing courses in the evening in a variety of formats including in-person, remote and hybrid in-person/online. With an annual enrollment of approximately 2,000, these affordable smaller-sized classes are provided in a variety of subject areas.

## CE Online Credit Program

The CE Online Credit Program (https://ce.colorado.edu/programs/ce-online-credit/) offers online versions of approved CU Boulder courses from 35 departments on campus. Online courses offer the same breadth, depth and rigor as on-campus, in-person courses while allowing students more flexibility in how they complete their coursework. Faculty and instructional designers use their expertise in learning technologies to build and enhance innovative digital classroom experiences. Courses range from traditional semester-long courses to shorter intensive terms as well as online flexible courses with date-of-enrollment based start dates.

## CU Complete

The goal of CU Complete (http://ce.colorado.edu/programs/cu-complete/) is to assist former CU Boulder students in the completion of their degrees. Advisors work with each student individually to review degree requirements and offer recommendations, resources and assistance in completing remaining requirements. Scholarships for CU Complete (https://ce.colorado.edu/programs/cu-complete/#financial-aid) participants are available.

## Extraordinary Program

The Extraordinary Program offers CU Boulder academic units the administrative flexibility and support needed to deliver programs focused on serving uniquely defined populations of non-degree, undergraduate and graduate students. Over 350 courses that cannot be offered or administered through existing programs or processes are scheduled annually through this program.

## Finish What You Started

The Finish What You Started program (https://ce.colorado.edu/program-landing/finish-what-you-started/), with support from the American Rescue Plan and the Colorado Opportunity Scholarship Initiative, offers financial assistance and advising and coaching services to undergraduate, in-state students who have taken time off from college coursework, have been economically impacted by the pandemic and have not completed their degrees. Eligible students receive a minimum of $1,500 in scholarships each semester for the duration of the program. The 2025-26 academic year is the final year of the program, so no new applicants will be accepted.

## High School ACCESS

The High School ACCESS program (https://ce.colorado.edu/programs/high-school-access/) is designed for high school students interested in the challenge of completing college courses at the University of Colorado Boulder. High School ACCESS students earn college credit that becomes part of their permanent academic record and appears on a University of Colorado transcript. Some high schools allow college credit to be applied to high school graduation requirements.

## Individualized Instruction

Individualized Instruction provides an opportunity for students to receive credit for university courses by meeting with faculty members outside the regular classroom setting. This option may be used when the student cannot reasonably be expected to enroll in the main campus course.

## International English Center

The International English Center (http://iec.colorado.edu/) (IEC) offers a range of comprehensive English language and culture programs designed for international pre-collegiate, undergraduate and graduate students, working professionals and special groups. Students build and refine their communication skills through engaging classroom instruction, experiential learning, extended practice and cultural activities. Full and part-time programs are available. Programs include Intensive English, Pathway to CU (for conditionally admitted CU Boulder students), Legal English, ESL Credit for graduate students, EducationUSA virtual Academy for international high school students, global professional English, teacher training and customized options for special groups. The IEC is authorized to issue a form I-20 for qualified students seeking to study full-time on an F-1 visa. For some programs, qualified exchange visitors may request a form DS-2019 from the IEC to apply for a J-1 visa.

# Post-Baccalaureate Health Professions Program

The Post-Baccalaureate Health Professions program (https://www.colorado.edu/ceprehealth/) is designed for college graduates who are preparing to apply to medical school, dental school or other professional school programs in clinical health care. Our students typically range in age from their 20s to their 40s and beyond. By enrolling in CU Boulder's rigorous math and science courses, our students complete the prerequisite coursework needed to apply to professional school. Additionally, students work closely with our expert team of dedicated pre-health advisors. Our robust program of pre-health advising and application coaching services are designed to enhance our students' competitiveness for admission to professional school. Each year, 95-100% of our students who apply to professional school are successful in gaining admission.

We offer two enrollment options:

- An accelerated, one-year Structured Cohort program that features a cohort experience, dedicated tutors and mentors, rigorous full-time academics, and extensive pre-health advising services.
- A flexible, Individually Designed program that allows students to tailor their coursework to their individual needs while offering dedicated mentors and extensive pre-health advising services.

# Science Discovery

The mission of Science Discovery (https://www.colorado.edu/sciencediscovery/) is to heighten interest and increase literacy in science, technology, engineering and math (STEM) by providing hands-on experiences that connect K-12 students, teachers, and the community to current CU science. Annual activities include delivering over 300 classroom programs and STEM workshops throughout Colorado, approximately 120 K-12 summer camps and high school classes on the CU Boulder campus, school year classes for grades K-8, and math enrichment programs at local elementary schools. Science Discovery also assists CU Boulder faculty in designing Broader Impacts activities for grant proposals. In total, Science Discovery programs annually serve more than 80 CU students and 10,000 K-12 students throughout the state, of whom approximately 40% qualify for free/reduced-cost lunch programs.

# Winter Session

Winter Session (https://www.colorado.edu/winter/) offers current CU students the opportunity to earn credit toward their degree during a three-week intensive online class over winter break. Students can use winter classes to focus their studies on a particular course or to shorten their time to graduation. Dedicated CU faculty representing various schools and colleges from across the university, and with a passion for online teaching, provide a dynamic learning experience to the CU community during this special session.

# Summer Session

Summer Session (https://www.colorado.edu/summer/) offers approximately 750 campus courses and enrolls more than 8,500 students in a relaxed, comfortable learning environment. Many CU Boulder students enroll in Summer Session to accelerate their academic progress or to get back into good academic standing. Students visiting from other colleges, teachers, high school students or others interested in professional development or personal enrichment are also encouraged to enroll. Three, five, eight and 10-week terms are available.

Visit the Summer Session (https://www.colorado.edu/summer/) website to learn more about summer at CU Boulder.

# Auditing

The auditing program (https://ce.colorado.edu/programs/auditors/) is available to community members who are at least 18 years old and not currently registered as CU students. Auditors are provided the opportunity to explore new areas of interest or expand their knowledge of a specific topic, without earning college credit, by sitting in on lectures or online courses offered by CU Boulder's world-class faculty.

# Office for Public and Community-Engaged Scholarship

The Office for Public and Community-Engaged Scholarship (PACES) (https://www.colorado.edu/outreach/paces/) connects CU Boulder scholars with communities across Colorado and beyond through engaged research, teaching and creative work. As the campus's lead unit for building capacity to undertake engaged scholarship, PACES provides funding, assistance with community partnership development, amplifies CU Boulder's engaged scholarship story, and elevates opportunities and issues to enhance the work for all.

# CU Boulder Online

CU Boulder Online (https://online.colorado.edu/) is an extension of the University of Colorado Boulder administered collaboratively by the Division of Continuing Education (http://ce.colorado.edu/) and the Office of Academic and Learning Innovation (https://www.colorado.edu/ali/). The online academic programs under the CU Boulder Online umbrella are extensions of CU Boulder's campus programs, vetted and developed by our faculty. CU Boulder Online also brings to market professional development programs that are created in response to industry needs.

# Academic Integrity

## Why Do We Have a Student Honor Code?

### Mission

The mission of the Honor Code at the University of Colorado Boulder is to secure an environment where academic integrity can flourish.

### Values

The Honor Code recognizes the importance of honesty, trust, fairness, respect, and responsibility and aims to instill these principles as essential features of the University of Colorado Boulder campus. The Honor Code allows all students to have responsibility for, and the ability to attain, appropriate recognition for their academic and personal achievements.

## What is a Violation?

**Academic Misconduct** includes any act in which a student gains or provides, or attempts to gain or provide, an unfair academic advantage over other students. These acts include, but are not limited to the following and also include any attempts to engage in the following:

1. **Cheating:**
    a. Use of prohibited notes, study aids, or other explicitly prohibited course materials;

   b. Allowing another party to do one's work/exam and turning in that work/exam as one's own;
   c. Copying coursework from another student or from an unauthorized source (including but not limited to internet sources);
   d. Collaborating on coursework when prohibited;
   e. Failing to abide by the specific written course instructions including, but not limited to,
      i. the extent artificial intelligence is permitted,
      ii. exams, homework assignments, and syllabi;
   f. Clicker Fraud. Using, or having someone else use, clicker technology improperly in an effort to receive academic credit.
2. **Plagiarism.** This includes, but is not limited to:
   a. Portrayal of another's work or ideas as one's own;
   b. Improper citation of another's work;
   c. Improper citation of one's own previous work;
   d. Use of paper writing services or technology (such as essay bots or other artificial intelligence) whether paid or unpaid.
3. **Resubmission.** Submitting the same or similar work for credit, including, but not limited to, homework more than once without permission from all course faculty involved.
4. **Fabrication.** Falsification or creation of data, research, or resources, or altering graded work without the prior consent of the course faculty.
5. **Lying.** Deliberate falsification with the intent to deceive as it relates to an academic submission.
6. **Bribery.** Providing, offering, or taking rewards in exchange for a grade, an assignment, or in the aiding of Academic Misconduct.
   a. Rewards include, but are not limited to: currency, tangible items, services, or recompense.
7. **Threat.** Acting to intimidate a student, staff, or faculty member for the purpose of affecting a grade or in an effort to prevent the reporting of an Honor Code allegation, or in connection with any other form of Academic Misconduct.
   a. **Retaliation.** Retaliating against or discouraging, directly or through third parties, an individual from participating in the Honor Code process. To be considered retaliation, there must be a causal connection between a materially adverse action and the act of reporting a violation or participating in an Honor Code process. A materially adverse action is one that would dissuade a reasonable person from reporting a violation, and includes, but is not limited to, intimidation, 5 threats, or coercion. A determination of whether an action is materially adverse is a fact-dependent inquiry made on a case-by-case basis by Student Conduct and Conflict Resolution (SCCR) staff.
8. **Unauthorized Access.** Gaining access to, giving access to, or use of, protected academic information including, but not limited to: CU-SIS; a faculty, student, or staff member's computer, files, and/or physical space; and/or secure information on an online server.
9. **Aiding Academic Misconduct.** Facilitating any act which may help a student to gain an unfair academic advantage including, but not limited to, any of the aforementioned acts.
   a. **Sharing course materials,** including but not limited to, personal notes, in an unauthorized online bank or forum, or crowdsourcing site whether for profit or for free, is strongly discouraged and may result in a referral to the Honor Code process.
   b. **Sharing personal authentication credentials/login information** to third party sites is strongly discouraged and may result in a referral to the Honor Code process.

### Resolution Processes

SCCR resolves alleged academic misconduct through the informal resolution process or the formal resolution process. Resolution specialists have the authority and sole discretion to determine the type of resolution process without Honor Code Advisory Board (HCAB) consultation.

#### Informal Resolution

This process may generally include, but is not limited to, a meeting with a resolution specialist, completion of the assigned resolution outcomes and/or participation in the CU Restorative Justice process.

During the meeting, if the resolution specialist determines that the informal resolution process may be appropriate, the resolution specialist will offer it as an option to the responding student and address any questions the responding student may have about the process. If the responding student accepts responsibility for the alleged academic misconduct, agrees to, and completes the agreement developed during the meeting, then SCCR will consider the matter to be resolved informally. In some cases, the HCAB will also review the referrals before a final determination is made.

#### Formal Resolution

This process generally includes: i. written notice of the factual allegations and alleged academic misconduct; ii. the opportunity to meet with the resolution specialist to address the allegations and provide information to the resolution specialist; iii. the resolution specialist reviewing the allegations and making factual and violation determinations based on preponderance of the evidence; and iv. written notice to the responding student of the resolution specialist's determinations.

The resolution specialist will consider the following in making this determination: i. the allegations in the Resolution Meeting Notice and the student's response to those allegations; ii. all documents and/or information that the resolution specialist finds relevant, including, without limitation, relevant documents presented by the responding student, reporting party, or any other interested party; iii. the oral or written statements of any witnesses with relevant information, as presented by the responding student, any reporting party, or other interested party, as it appears in a referral, and/or as requested by the resolution specialist; and iv. the recommendations of HCAB regarding responsibility and Resolution Outcomes related to the incident or precedent.

Questions regarding academic integrity should be directed to Student Conduct & Conflict Resolution, studentconduct@colorado.edu, 10 UCB Boulder, CO 80309, phone 303-492-5550.

The full Student Honor Code can also be viewed on the Student Conduct & Conflict Resolution (https://www.colorado.edu/sccr/) website.

# Student Affairs
# Health & Wellness
## Health and Wellness Services

Health and Wellness Services is a part of CU Boulder Strategic Resources and Support. As part of Strategic Resources and Support, we are

collectively committed to the success and wellbeing of all our students as well as the faculty and staff we serve.

All CU Boulder undergraduate and graduate students have access to a full range of on-campus health and wellness services in addition to a variety of virtual offerings.

To learn more, visit Health and Wellness Services (http://www.colorado.edu/health/).

## Administrative Services

The Administrative Services team oversees all aspects of medical insurance, billing and medical records at CU Boulder. To learn more, visit Administrative Services (https://www.colorado.edu/healthcenter/insurance-billing-medical-records/).

## Counseling and Psychiatric Services

Counseling and Psychiatric Services (CAPS) offers confidential, on-campus short-term mental health and psychiatric services for all fee-paying students. CAPS addresses a variety of concerns such as academics, anxiety, body image, depression, relationships, substance use and more. To learn more, visit CAPS (http://www.colorado.edu/health/counseling/).

## Center for Disability and Access

The Center for Disability and Access is dedicated to providing students with disabilities an equal opportunity to participate in university programs, courses and activities through reasonable accommodations and services. Our office is here to support students, staff and faculty with accommodation requests, implementation, guidance and general information. To learn more, visit the Center for Disability and Access (https://www.colorado.edu/disabilityservices/).

## Health Promotion

Health Promotion provides outreach and education on a variety of health topics to help students make informed decisions about their health and wellbeing. Health Promotion collaborates with student groups and campus departments to provide programs and services that positively influence student health. To learn more, visit Health Promotion (https://www.colorado.edu/health/promotion/).

## Medical Services

Medical Services is the primary healthcare resource for CU Boulder students. Through comprehensive care and education we strive to give students the skills and knowledge they need to develop healthy life-long habits. To learn more, visit Medical Services (https://www.colorado.edu/healthcenter/). (https://www.colorado.edu/healthcenter/)

## Recovery Community

The CU Collegiate Recovery Community (CUCRC) provides community, support and connection for students, faculty and staff in recovery or seeking recovery from a wide range of behaviors. Our mission is to help develop peer-to-peer connections, support resiliency and contribute to their overall wellbeing through a welcoming and supportive community. To learn more, visit Recovery Center (https://www.colorado.edu/recoverycenter/).

## The Office of Victim Assistance

The Office of Victim Assistance (OVA) provides free and confidential information, consultation, support, advocacy and short term counseling services to University of Colorado Boulder students, graduate students, faculty and staff who have experienced a traumatic, disturbing or life-disruptive event. Call 303-492-8855 to connect with an OVA counselor or to receive after-hours support. To learn more, visit The Office of Victim Assistance (https://www.colorado.edu/ova/).

## CU Boulder Student Health Insurance Plan (SHIP)

All students are required to carry a comprehensive medical insurance plan while attending CU Boulder. CU Boulder would like students to have financial protection should they suffer a serious illness or injury during their time here. Our hope is that an insurance plan will help them through these times so that they can continue with their educational endeavors.

**Students may elect health insurance coverage through:**

- Anthem Gold Student Health Insurance Plan (SHIP) - A plan exclusively for CU students.
- Private or personal insurance (an individual health insurance plan through a family member, employer or government-sponsored)

Students must meet this requirement their first semester at CU Boulder and at the beginning of each academic year. Those taking six (6) or more undergraduate credit hours or one (1) or more graduate credit hours are required to complete the health insurance requirement process. Once a student is registered for their semester credits, the student will begin receiving email communications from Academic HealthPlans. These emails explain the insurance requirement and outline the process of enrolling or waiving the Anthem Gold SHIP.

All fee-paying students, regardless of their insurance plan, have full access to the services provided by Health and Wellness Services.

For more information, visit the Health Insurance Requirement (http://www.colorado.edu/health/insurance/health-insurance/)webpage.

*Note*: Plans available through the health insurance marketplace meet CU's health insurance requirement. Colorado students may sign up through the Connect for Health Colorado (http://connectforhealthco.com/)website. Nonresident students may sign up through their home state health exchange or through the national HealthCare.gov (https://www.healthcare.gov/)website.

# Student Conduct & Colorado Creed

# Student Conduct & Conflict Resolution

## What We Believe

Student Conduct & Conflict Resolution (SCCR) strives to provide students with individualized responses to support community standards and conflict resolution that emphasize accountability and growth by:

- Fostering reflection on the impact of their behaviors;
- Promoting responsible community membership and repairing harm; and
- Cultivating the wellbeing and safety of the CU Boulder community.

### What Is Important to Us

1. The student will understand the impact of their behavior on others.
2. The student will demonstrate ethical development, will comply with institutional policy and will engage in no further violations of policy.
3. The student will gain an understanding of the institutional values reflected in institutional policies.

4. The student will gain a better understanding of the importance of personal integrity.
5. Through SCCR processes, the student will be asked to reflect on their beliefs, ethics and values.
    a. The student will be able to articulate their personal ethics and values, will act in congruence with those ethics and values, and will make decisions that reflect their beliefs.
6. The student will contribute positively to the CU Boulder community and beyond.
7. The student will gain a better understanding of the consequences and potential consequences of their personal actions and will learn the purposes of institutional policies.
8. The student will employ critical thinking in problem solving and ultimately obtain a degree.

## Why Do We Have a Student Code of Conduct? (Authority)

Article 7, Part B, of the Laws of the Regents of the University of Colorado requires each campus to develop a student code of conduct. Student Conduct & Conflict Resolution (SCCR) is authorized to establish and administer this policy. Any questions regarding interpretation of this code or any of its provisions should be directed to the Dean of Students or their designee for final determination.

Questions regarding student behavior should be directed to Student Conduct & Conflict Resolution, studentconduct@colorado.edu, Center for Community, S485, 10 UCB Boulder, CO 80309, phone 303-492-5550.

## When and Where Does the Student Code of Conduct Apply? (Jurisdiction)

1. The Student Code of Conduct applies to:
    a. Student conduct that occurs on, or as it relates to, CU Boulder property or at official functions and CU Boulder sponsored programs conducted away from the campus.
    b. Student conduct that occurs off CU Boulder property is subject to this policy if it:
        i. Adversely affects the health, safety or security of any member of the CU Boulder community, including the student alleged to have violated CU Boulder policy or the mission of CU Boulder; or
        ii. Involves any records or documents of CU Boulder;
        iii. Involves conduct that may be a violation of federal, state or local law, as determined by SCCR.
    c. For this policy's purposes, CU Boulder's mission is broadly defined to include its academic goals and the importance of developing civic responsibility in our students.
2. Recognized Student Organizations and Recognized Social Greek Organizations:
    a. Wherever the Student Code of Conduct refers to "responding student," the same also applies to Recognized Student Organizations (RSOs) and Recognized Social Greek Organizations (RSGOs). RSOs, as described in the Student Organization Handbook (https://www.colorado.edu/involvement/), are general student organizations recognized by the Center for Student Involvement (CSI) and CU Boulder. Recognized Social Greek Organizations are recognized by Fraternity & Sorority Life (FSL) and CU Boulder.
        i. RSOs and RSGOs, as well as their members and other students, may be held collectively and/or individually responsible for violations.
        ii. The RSO and RSGO officers, leaders, signers or individuals currently listed in an official position in the Center for Student Involvement records or Fraternity & Sorority Life records may be held collectively and/or individually responsible for violations when such violations are committed by persons associated with the organization who have received consent or encouragement from the organization's officers or leaders, if those officers or leaders knew, or reasonably should have known, that such violations were being or would be committed.
        iii. The officers or leaders of a student organization may be directed by CU Boulder officials to take action designed to prevent or end violations by the organization or by any persons associated with the organization. Failure to comply with a directive may be considered a violation of the Student Code of Conduct, both by the officers or leaders of the organization and by the organization.
3. Actions taken under a resolution process are separate and apart from any law enforcement or other court process or proceeding, such as a civil lawsuit or criminal prosecution, that may relate to the same underlying factual incident. SCCR's jurisdiction does not depend on whether a responding student is criminally charged through the criminal justice system. A resolution process is not postponed while criminal or civil proceedings are pending unless otherwise determined by the resolution specialist. Dismissal of criminal charges or acquittal in a criminal case does not prevent SCCR from investigating and resolving an incident.
4. The unexcused failure of a responding student to appear and/or respond to a resolution process does not prevent CU Boulder from proceeding with or completing a resolution process.
5. For jurisdictional information related to sexual misconduct (including sexual assault, sexual harassment, intimate partner violence and gender/sex-based stalking), protected class discrimination, harassment and any related retaliation, see Section M of the Student Code of Conduct.
6. For jurisdictional information pertaining to academic misconduct, see Section M of the Student Code of Conduct.
7. Questions or concerns regarding policy and procedures for students charged or convicted of a crime that occurred prior to being admitted should be directed to SCCR.

## Student Resolution Processes

SCCR resolves alleged prohibited conduct through the informal resolution process, the formal resolution process or the restorative justice process. Resolution specialists have the authority and sole discretion to determine the type of resolution process. This decision is primarily based on, but not limited to, the following factors:

- If the responding student admits or otherwise takes responsibility for the alleged prohibited conduct;
- The responding student's prior conduct record;
- The nature and severity of the alleged prohibited conduct;
- The alleged impact and/or harm caused to another person or community;
- Whether the alleged conduct would violate the Student Code of Conduct; and/or

- Any other factors that the resolution specialist finds relevant to the specific allegations.

The formal resolution process is an adjudication of the alleged prohibited conduct, considered an educational and disciplinary process, and may result in resolution outcomes and a disciplinary conduct record. The informal resolution process and restorative justice process are intended as forms of alternative dispute resolution, are voluntary, primarily educational in nature, not an adjudication of the allegations, not considered a disciplinary process and instead will result in a written agreement with the responding student. Because SCCR does not consider the informal resolution process or restorative justice process to be disciplinary processes, they do not result in a disciplinary conduct record or file. Informal resolutions and restorative justice will never result in resolution outcomes such as suspension or expulsion.

The first step in each resolution process is initiated by the resolution specialist issuing a written Resolution Meeting Notice to the responding student, which prompts the responding student to attend a scheduled meeting with the resolution specialist as outlined in the notice.

### Informal Resolution

This process may generally include, but is not limited to, a meeting with a resolution specialist, completion of the assigned resolution outcomes and/or participation in the restorative justice process.

During the meeting, if the resolution specialist determines that the informal resolution process may be appropriate, the resolution specialist will offer it as an option to the responding student and address any questions the responding student may have about the process. If the responding student accepts responsibility for the alleged prohibited conduct and completes educational resolution outcomes assigned by the resolution specialist, then SCCR will consider the matter to be resolved informally.

### Formal Resolution

This process generally includes:

1. Written notice of the factual allegations and alleged violations of the Student Code of Conduct;
2. The opportunity to meet with the resolution specialist to address the allegations and provide information to the resolution specialist;
3. The resolution specialist reviewing the allegations and making factual and violation determinations based on preponderance of the evidence; and
4. Written notice to the responding student of the resolution specialist's determinations.

The resolution specialist will consider the following in making this determination:

1. The allegations in the Resolution Meeting Notice and the responding student's response to those allegations;
2. Any documents or information that the resolution specialist finds relevant, including without limitation, relevant documents presented by the responding student, complainant or any other interested party; and/or
3. The oral or written statements of any witnesses with relevant information, as presented by the responding student, any alleged victim or other interested party, as appears in a report, or as requested by the resolution specialist.

All students residing in Housing & Dining Services facilities are subject to Residential Handbook policies and any policy properly communicated through Housing & Dining Services staff. For more information, visit the Housing & Dining Policies (https://www.colorado.edu/living/housing/policies-forms-and-accommodations/) webpage.

Cases involving sexual misconduct (including sex assault, sexual harassment, sexual exploitation, intimate partner violence and gender/sex-based stalking), protected class discrimination and harassment, and any related retaliation are subject to the Office of Institutional Equity and Compliance (OIEC) process and procedures (https://www.colorado.edu/oiec/policies/). For more information about these policies and procedures, contact the OIEC at (303) 492- 2127 or visit the OIEC (https://www.colorado.edu/oiec/) website.

Excerpts from the Colorado Revised Statutes regarding hazing, ethnic intimidation and riots are also presented. Colorado law prohibits persons convicted of rioting from enrolling in state-supported universities/colleges for 12 months following the date of a conviction.

For information about student classroom and course-related behavior, visit the policies (https://www.colorado.edu/compliance/policies/student-classroom-course-related-behavior/) webpage.

## Colorado Creed

The Colorado Creed, developed by students in 2003, is a social code of conduct and a lifestyle by which students at CU Boulder live. The text of the creed is:

As a member of the Boulder community and the University of Colorado, I agree to:

- Act with honor, integrity and accountability in my interactions with students, faculty, staff and neighbors.
- Respect the rights of others and accept our differences.
- Contribute to the greater good of this community.

I will strive to uphold these principles in all aspects of my collegiate experience and beyond.

For more information, visit the Colorado Creed (http://www.colorado.edu/creed/) website.

## Student Resources

The Division of Student Affairs (http://www.colorado.edu/studentaffairs/) offers many on-campus resources for our students. Visit our offices to learn more.

## Student Life & Involvement

- Center for Inclusion and Social Change (https://www.colorado.edu/cisc/): Explore identity and inclusivity, participate in educational programs, attend events and build community with others.
- Center for Student Involvement (https://www.colorado.edu/involvement/): Be involved! Find your community by connecting with student organizations, campus-wide events and leadership opportunities.
- CU Student Government (https://www.colorado.edu/cusg/): Make a difference! Get involved with your student government representatives, elected by students, for students. CUSG is your voice on campus.

- Environmental Center (https://www.colorado.edu/ecenter/): Help CU Boulder become a global leader in sustainability through recycling, student bus pass, bicycle and educational programs.
- Fraternity & Sorority Life (https://www.colorado.edu/greeks/): Find opportunities for friendship, leadership and growth in CU's vibrant and diverse Greek community.
- Housing & Dining (https://www.colorado.edu/living/): Explore information about on-campus life including residence halls, meal plans and dining options!
- New Student & Family Programs (https://www.colorado.edu/orientation/): The campus resource for new students and families as they begin their journey at CU Boulder. Ask questions and be sure to join for welcome events throughout the year.
- Off-Campus Housing & Neighborhood Relations (https://www.colorado.edu/offcampus/): Explore off-campus rentals on Ralphie's List, register your party and learn about the legal aspects of off-campus living.
- Recreation Services (https://www.colorado.edu/recreation/): Get moving with all that The Rec has to offer, including intramural sports, fitness classes, nutritional services and Outdoor Pursuits.
- Residence Life (https://www.colorado.edu/living/): Explore the opportunities that residence life provides, from on-campus housing and employment to student resources like free tutoring.
- University Memorial Center (https://www.colorado.edu/umc/): Visit the CU Book Store, student services and student organization offices, as well as plenty of entertainment, dining and hangout options.

## Student Support & Development

- Basic Needs Center (https://www.colorado.edu/support/basicneeds/): Get connected to essential resources when you need them most. Access the Buff Pantry and other assistance with food, housing and other on-campus and community services.
- Career Services (https://www.colorado.edu/career/): Become more employable and find meaningful work through learning how to fine-tune your resume, develop your skills, land an internship and make connections with employers.
- Student Conduct & Conflict Resolution (https://www.colorado.edu/sccr/): Get support for resolving conflicts and learn more about the Student Code of Conduct and the Honor Code.
- Student Legal Services (https://www.colorado.edu/studentlegal/): Access low-cost legal advice and education regarding your rights and responsibilities, and how to navigate the legal system.
- Student Support & Case Management (https://www.colorado.edu/studentaffairs/sscm/): Find individual support for students and advocates for their needs in all aspects of campus life.
- Veteran and Military Affairs (https://www.colorado.edu/veterans/): Prospective and current student veterans and veteran dependents: find program information, policies, pay and support services.
- Volunteer Resource Center (https://www.colorado.edu/volunteer/): Explore volunteer and leadership opportunities on campus and throughout the greater Boulder community.

# Student Data Privacy

## Annual Notice to Students

As a CU Boulder student, it's important to understand your rights regarding access to and disclosure of information in your education record. The Family Educational Rights and Privacy Act (https://www.colorado.edu/registrar/students/records/ferpa/) (FERPA) affords you the right to:

- Inspect and review your education record
- Request amendment of your education record
- Consent to disclosure of personally identifiable information in your education record
- File a complaint with the U.S. Department of Education (Family Policy Compliance Office, U.S. Department of Education, 400 Maryland Avenue, SW, Washington, DC 20202)

To review or request an amendment to your record, contact the Office of the Registrar or the university office that maintains the record. This does not apply to grade changes, which are at faculty discretion.

Under FERPA, the university may release education record information if the disclosure is:

- To CU Boulder officials who have a legitimate educational interest (https://www.colorado.edu/registrar/students/records/ferpa/glossary/)
- To officials of another institution at which you seek or intend to enroll
- To authorized representatives of federal, state or local educational authorities
- To connection with financial aid you've applied for or received
- To an organization conducting studies for or on behalf of the university
- To your parents or guardians (if you are a dependent student for tax purposes)
- To an accrediting organization
- To comply with a judicial order or lawfully issued subpoena
- In connection with a health or safety emergency or other exception under FERPA (https://www.colorado.edu/registrar/students/records/ferpa/exceptions/)
- To fulfill a request for data that CU Boulder defines as directory information (https://www.colorado.edu/registrar/students/records/ferpa/directory-info/)

Student data that is *not* directory information may only be released with your documented consent.

To authorize third-party access to your non-directory information, see CU Guest Access (https://www.colorado.edu/registrar/students/records/privacy/guest-access/) and FERPA Consent to Release (https://www.colorado.edu/registrar/students/records/privacy/consent/). You may restrict the release of directory information by placing full privacy (https://www.colorado.edu/registrar/students/records/privacy/full/) on your record.

Questions may be directed to the Office of the Registrar.

## Directory Information

The following items of student information have been designated by the University of Colorado Boulder as public or "directory" information:

- student name[1]
- hometown (city, state)
- campus email address[2]
- dates of attendance
- previous educational institutions attended

- school/college or division of enrollment
- majors, minors and fields of study
- classification level (e.g., first-year, sophomore, etc.)
- university-recognized honors and awards
- degree status (e.g., expected graduation date and/or conferral dates/terms)
- enrollment status
- employment related to student status (e.g., teaching assistant, resident assistant or work-study) and dates for positions held
- participation in officially recognized activities/sports, including height and weight of athletes.
- photos and videos taken or maintained by the university

Directory information shall not be provided to anyone outside of the CU community (except to vendors/organizations with which the university has contracted in order to provide goods or services to students). The university retains the discretion to refuse disclosure of directory information if it believes such disclosure would be an infringement on student privacy rights. In an effort to protect student privacy, CU directories may only contain a student's name, email address, class and major field of study.

[1] If a student provides a preferred name, the university uses it when communicating directly with the student and in campus systems, rosters, etc., unless there is a documented business or legal reason to use a student's primary name. When communicating with outside third parties, including parents, the university generally uses a student's primary (legal) name. Students may also select a diploma name (https://www.colorado.edu/registrar/students/graduation/) for graduation and commencement materials.

[2] Campus email addresses may not be used for solicitation.

### Withholding Directory Information (Full Privacy)

Students have the right to request full privacy which withholds directory information from being released to inquirers. To request full privacy and restrict the release of directory information, students must bring a photo ID to the Office of the Registrar during business hours to complete a privacy form.

### Student Consent for Release of Non-directory (Confidential) Information

Students may authorize the university to release educational records to parents, spouses or other third parties by granting consent in their student portal. The Privacy Settings (http://www.colorado.edu/registrar/students/records/privacy/) webpage has more information about various options for granting and restricting access to student records.

### Release of Disciplinary Information

Provisions of the Family Educational Rights and Privacy Act of 1974, as amended by the Higher Education Amendments of 1998, govern access to a student's academic transcript or conduct file. The student and/or those university officials who demonstrate a legitimate educational need for disciplinary information may have access to the student's conduct file.

Parent(s) who provide proof that a student is a dependent as defined in Section 152 of the Internal Revenue Code of 1954 (i.e., a copy of the last federal income tax return listing the student as a dependent) may have access to the student's conduct file without written consent of the student. In this case, parents may have access to a conduct file, even if the student has requested otherwise.

In addition, parent(s) may be notified if a student under 21 is found responsible for a violation involving use or possession of alcohol and controlled substances. All other inquiries, including but not limited to inquiries from employers, government agencies, news media, family, friends or police agencies, require a written release from the student before access to university conduct files is granted. Exception: information may be released pursuant to a lawfully issued subpoena and as provided by the Campus Security Act as amended by the Higher Education Amendments of 1992.

The Campus Security Act permits higher education institutions to disclose to alleged victims of any crime of violence (e.g., murder, robbery, aggravated assault, burglary, motor vehicle theft, arson) the results of the conduct proceedings conducted by the institution against an alleged perpetrator with respect to such crime. The Campus Security Act also requires that both the accused and the accuser be informed of campus conduct proceedings involving a sexual assault.

# Tuition Classification

## In-State and Out-of-State Tuition Classification

Tuition classification is governed by state law and by judicial decisions that apply to all public institutions of higher education in Colorado. Since tuition classification is governed by state law (https://www.colorado.edu/registrar/students/state-residency/guidelines/), the University of Colorado cannot alter or waive the eligibility criteria for any reason, including financial hardship or academic excellence.

New students are classified as Colorado residents (in-state) or nonresidents (out-of-state) for tuition purposes based on information provided on their admission application and other relevant information. Applicants may be required to submit evidence substantiating their claim of in-state eligibility.

Current nonresident students who believe they have become eligible for a change to resident classification must submit a petition with documentation to have their eligibility reviewed. The petition requirements, deadlines for submission, explanation of Colorado tuition classification statutes, specific legal residency exceptions and Office of the Registrar contact information are available on the Tuition Classification (http://www.colorado.edu/registrar/students/state-residency/) webpage.

- For undergraduate students who are not yet 23 years old when a term begins, classification is based upon the domicile of a biological parent or court-appointed legal guardian.
- In order for a student to qualify for resident classification through their own domicile information, they must be one of the following: at least 23 years old on the first day of the term, or married for at least one year before the first day of the term, or entering the second year of a graduate program.
- There are rare individuals who may qualify for resident classification as an emancipated minor (under the age of 23) if they are able to prove that they are totally financially and residentially independent.

## Basic Requirements for Establishing Colorado Residency

To become eligible for resident classification, a person must establish legal residence in Colorado. Legal residence, or "domicile," is defined as a person's true, fixed, and permanent home and place of habitation. No person may establish domicile in Colorado solely for the purpose of obtaining in-state tuition benefits.

The qualifying person must demonstrate at least 12 consecutive months of Colorado domicile immediately preceding the beginning of the term for which the student is seeking resident classification. Domicile includes both physical presence and evidence of intent to stay, which is demonstrated by establishing legal ties to Colorado.

To be eligible to *begin* the 12-month period to establish Colorado domicile, an individual must be at least one of the following:

- 22 years of age or older
- Married
- A graduate student
- An emancipated student
- The parent of a student under the age of 23

## Unemancipated Minors

Students under age 23 who depend on their parents for support may qualify for in-state tuition if either of their parents, regardless of custody, has been domiciled in Colorado for 12 consecutive months preceding the first day of class in a given semester, even if the student resides elsewhere. In certain circumstances, students may qualify through their parents up to age 23.

## Emancipation

An emancipated minor is an individual under age 23 who demonstrates total financial and residential independence. This means the student's parents and all others have entirely surrendered the right to the student's care, custody and earnings, and make no provision for support of any kind. Emancipation is very rare; undergraduates under age 23 who do not have a parent domiciled in Colorado are highly unlikely to be classified as a Colorado resident student.

Students who provide false information to evade payment of out-of-state tuition or who fail to provide timely notice of their loss of in-state eligibility as an emancipated minor are subject to retroactive assessment of out-of-state tuition, as well as disciplinary and legal actions.

## Evidence of Domicile

Establishing Colorado domicile includes actions that would be expected of any permanent resident. Pursuant to Colorado law, the following are actions that may be considered evidence of domicile:

- Filing a tax return in Colorado and, if applicable, payment of Colorado state income tax.
- Colorado driver's license or Colorado ID card within 120 days of move to Colorado.
- Colorado vehicle registration within 180 days of move to Colorado.
- Voter registration in Colorado.
- Graduation from a Colorado high school.
- Lease or deed showing permanent occupancy of residential real property in Colorado.
- Continued residence in Colorado while not enrolled as a student and during semester breaks.
- Permanent employment or acceptance of future employment in Colorado
- Any other factor particular to the individual that tends to establish the necessary intent to make Colorado a permanent home.

No single factor constitutes proof of domicile. All evidence, both positive and negative, is considered. Not all of the listed items are necessary, however individuals should take action on all factors that are applicable to their circumstances. For more information on all requirements, see the Tuition Classification (http://www.colorado.edu/registrar/students/state-residency/) webpage.

## Domicile Exceptions

Colorado tuition law provides the following rare exceptions to the one-year domicile requirement in certain circumstances:

- Colorado National Guard members
- Members of American Indian Tribes with Historical Ties to Colorado
- Active duty military stationed in Colorado and their dependents
- Honorably discharged members of the U.S. Armed Forces and their dependents
- Returning active-duty military members
- Canadian military stationed in Colorado
- ASSET law qualified students with one year Colorado High School attendance (must have attended a Colorado high school for at least one year preceding the date of graduation; also requires Colorado high school graduation/Colorado GED ***and*** 12 consecutive months of physical presence in Colorado prior to enrolling at the institution)
- Children of new faculty members at Colorado state colleges and universities
- Employees of companies moving to Colorado receiving government economic incentives
- Western Regional Graduate Program enrollees in specific major fields of study
- Olympic athletes training in Colorado
- Others (see Residency Exceptions for Domicile (http://www.colorado.edu/registrar/students/state-residency/domicile-exceptions/) webpage)

Requirements, including spouse and child eligibility, and a list of qualifying tribes are detailed on the Residency Exceptions for Domicile (http://www.colorado.edu/registrar/students/state-residency/domicile-exceptions/) webpage.

# University Policies

## Alcohol and Other Drugs

In order to create the best possible environment for teaching and learning, the University of Colorado Boulder affirms its support for a responsible campus policy that addresses the inappropriate use of alcohol and other drugs.

In compliance with the federal Drug Free Schools and Communities Act, the University of Colorado Boulder prohibits the unlawful manufacture, possession, use or distribution of a controlled substance (illicit drugs and alcohol) of any kind and in any amount. These prohibitions cover any individual's actions that are part of any university activities, including

those occurring while on university property or in the conduct of university business away from the campus.

Information on policies, penalties, health effects and resources available to students and staff regarding alcohol and other drugs can be found on the Alcohol & Other Drugs Information (http://www.colorado.edu/aod/) website.

These policies are also described by various university offices in several publications:

- **Campus housing:** See the Residential Handbook (https://www.colorado.edu/living/housing/policies-forms-and-accommodations/#residential_handbook-1317) webpage.
- **Student Code of Conduct:** See the Student Code of Conduct (https://www.colorado.edu/sccr/).
- **Safety:** Annual Security and Fire Safety Report (https://www.colorado.edu/clery/annual-security-fire-safety-report-asfsr/).

Individual and group counseling for students with substance abuse concerns is available through Counseling and Psychiatric Services. For more information, visit the Counseling and Psychiatric Services (https://www.colorado.edu/counseling/services/substance-use-services/) webpage or call 303-492-2277.

### Smoking

For student health and the health of our community, smoking is prohibited in all campus buildings and on all campus grounds.

At this time, the use of smoking products of any sort shall be prohibited on all university-owned and operated campus grounds both indoors and outdoors. This smoking ban does not apply to public rights-of-way (sidewalks, streets) on the perimeter of the campus.

"Smoking," as used in this policy, means smoking any substance, including but not limited to, tobacco, cloves or marijuana. "Smoking products" include, but are not limited to, all cigarette products (cigarettes, bidis, kreteks, e-cigarettes, etc.) and all smoke-producing products (cigars, pipes, hookahs, etc.). University-owned and operated campus grounds include, but are not limited to: all outdoor common and educational areas; all university buildings; university-owned on-campus housing; campus sidewalks; campus parking lots; recreational areas; outdoor stadiums; and university-owned and leased vehicles (regardless of location). In keeping with university policy, the sale, distribution and sampling of all tobacco products and tobacco-related merchandise is prohibited on all university-owned and operated property and at university-sponsored events. Littering campus with remains of smoking products is prohibited.

This policy applies to all employees, students, visitors, contractors and externally affiliated individuals or companies renting university-owned space on university-owned and operated property campus grounds.

## Campus Safety

### Personal Safety on Campus

While the University of Colorado Boulder is a relatively safe place to be, the campus is not a haven from community problems. Through the joint effort of various organizations on campus, CU is committed to providing ample safety resources for faculty, staff and students.

Specific efforts to promote safety on campus include the provision of adequate lighting, police protection, educational programs and special prevention programs, such as the CU NightRide escort services and laptop and bicycle registration programs.

In compliance with the federal Clery Act, students and employees receive information on campus security policies and programs, including crime statistics, in an Annual Security and Fire Safety Report (https://www.colorado.edu/clery/annual-security-fire-safety-report-asfsr/). This report will be sent to CU Boulder affiliates by Oct. 1 of each year. In any emergency or life-threatening situation, always call 9-1-1.

Members of the university community are encouraged to report any incident of threatening or harmful behavior to the CU Boulder Police by calling 9-1-1 in an emergency or the non-emergency line, 303-492-6666. Visit Don't Ignore It (http://www.colorado.edu/dontignoreit/) for more information about the wide range of campus and community resources and reporting options available.

Additional safety information can be found on the CU Police Department (http://www.colorado.edu/police/) website. For information on crime alerts, trends and safety tips, follow the CU Police Department on Twitter (@ (https://twitter.com/cuboulderpolice/)CUBoulderPolice) and Facebook (CUBoulderPolice (https://www.facebook.com/CUBoulderPolice/)).

## Communication

### Student Email

All CU students receive an email account from the university, which is an official means of sending information to students. Students are responsible for maintaining this CU email address. The official email address can be used by professors to contact students and provide course-related information. Administrative offices, such as the Office of the Registrar, use official email addresses to contact students and provide important information. Students are responsible for frequently checking their official CU email address. For more information on the student email policy, visit the Student E-mail Policy (http://www.colorado.edu/policies/student-e-mail-policy/) webpage, call the IT Service Center at 303-735-HELP or email HELP@colorado.edu. To learn more about student email accounts, visit the Office of Information Technology's Messaging and Collaboration webpage (https://oit.colorado.edu/node/237/).

## Copyright & Fair Use

The University of Colorado Boulder community respects the intellectual property of others, regardless of the medium by which it is transmitted. This is a cornerstone of academic integrity. We prohibit the use of unauthorized distribution of copyrighted material, which is subject to both civil and criminal penalties as well as university procedures.

Distributing copyrighted materials using peer-to-peer or file-sharing programs is illegal and the university uses technological solutions to deter this activity. Still, the university regularly receives notices of copyright violations and is required by law to take action. Common consequences include loss of network access and referral to the Office of Judicial Affairs. Guidance on campus fair use and copyright issues is provided on the University Libraries (http://www.colorado.edu/libraries/copyright-information/) website.

## Diversity & Nondiscrimination

### Commitment to Diversity

The Division of Student Affairs supports and contributes to creating and sustaining a diverse, multicultural, socially just and inclusive

campus climate by learning about, recognizing and honoring the diverse backgrounds, histories, identities and life experiences of all our students, faculty and staff. Our goal is to create an environment in which all campus community members can thrive while feeling welcomed, safe and at home.

At the University of Colorado Boulder, we are committed to building a campus community in which diversity is a fundamental value. People are different and the differences among us are what we call diversity —a natural and enriching hallmark of life. Diversity includes, but is not limited to, ethnicity, race, gender, age, class, sexual orientation, religion, disability, veteran status, gender identity/expression, veteran status, political affiliation or political philosophy, and health status. A climate of healthy diversity is one in which people value individual and group differences, respect the perspectives of others and communicate openly.

"Diversity is a key to inclusive excellence in education. A diverse learning environment better prepares all students for the world that awaits them. CU Boulder is committed to enriching the lives of our students, faculty and staff by providing a diverse campus where the exchange of ideas, knowledge and perspectives is an active part of learning."—from the Guidelines for Diversity Planning *(*https://www.colorado.edu/odece/diversity-plan/*)*.

### Nondiscrimination Statement

The University of Colorado Boulder does not discriminate on the basis of race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy in admission and access to, and treatment and employment in, its educational programs and activities. The university takes affirmative action to increase ethnic, cultural, and gender diversity; to employ qualified disabled individuals; and to provide equal access and opportunity to all students and employees.

## Equity & Compliance

The University of Colorado Boulder is committed to maintaining a positive learning, working, and living environment free from discrimination and harassment. The Office of Institutional Equity and Compliance (OIEC) (http://www.colorado.edu/oiec/) addresses all claims of sexual misconduct, harassment and/or discrimination, or related retaliation by students, staff and faculty under the University of Colorado Sexual Misconduct, Intimate Partner Violence and Stalking Policy, the University of Colorado Boulder Policy on Protected-Class Discrimination and Harassment, and the University of Colorado Policy on Conflict of Interest in Cases of Amorous Relationships. The university is committed to addressing concerns and taking appropriate action against those found in violation of these policies.

In response to a report, OIEC determines what immediate and long-term support and safety measures are needed to minimize disruptions to education or employment and to help keep the involved parties and the campus safe. OIEC also provides education and assessment to identify areas in need of improvement to foster a more welcoming and inclusive culture.

To learn more about university policy or the role and programs offered by OIEC, please visit the Office of Institutional Equity and Compliance (https://www.colorado.edu/oiec/) website or call 303-492-2127.

# LAW

Welcome to Colorado Law. We are a diverse and inclusive community of outstanding students, faculty, staff and alumni who help one another succeed. Our selective admissions process keeps our student body small, enabling our faculty, staff, alumni and professional network to invest deeply in each student's success. Because we take our responsibility to educate and train future lawyers very seriously, our curriculum, research centers, and experiential learning opportunities are designed to prepare students for success in today's changing legal environment.

**Our students** have extraordinary credentials and life experiences (http://www.colorado.edu/law/node/1759/). In addition to being intelligent, congenial, hard-working and entrepreneurial, our students are engaged with the community. A plethora of active student organizations (http://www.colorado.edu/law/node/239/), rich externship opportunities (http://www.colorado.edu/law/node/117/) and a robust Public Service Pledge Program (http://www.colorado.edu/law/node/123/) enable our students to foster Colorado Law's tradition of service.

**Our** faculty **(**http://lawweb.colorado.edu/profiles/allFaculty.jsp**)** are national and international leaders in their fields and are committed to helping Colorado Law students develop the legal knowledge, critical thinking, writing and problem-solving skills necessary for professional success. Our intentionally designed low student-to-faculty ratio of 5.7 to 1 enables meaningful interaction between faculty and students, giving students abundant opportunities to develop deep substantive expertise and long-lasting professional relationships.

**Our staff** is devoted to helping students and alumni succeed. From the moment our students commit to attending Colorado Law and throughout their professional careers, we provide unwavering personal and professional support. Our admissions (http://www.colorado.edu/law/node/1/) office welcomes students to the Colorado Law community, and our student affairs (http://www.colorado.edu/law/node/235/) office provides support for students as they develop their professional identity and skills. Our career development office (http://www.colorado.edu/law/node/177/) helps students secure and retain rewarding employment. Those unsure about their field of interest can rely on our wealth of career exploration opportunities and resources.

**Our** alumni **(**http://www.colorado.edu/law/node/255/**)** represent Colorado Law in a variety of professional settings and fields across Colorado and nationwide. They thrive in a variety of professional domains: national law firms, regional law firms, government organizations (both at the federal and state levels), business organizations (often utilizing their legal skills in business roles), and public interest organizations. Not only do our alumni thrive professionally, but they also enthusiastically work with current Colorado Law students in a number of key ways that foster students' career success.

**We are educating students for success**. Our relevant and challenging curriculum prepares students to thrive in a variety of sectors and settings. Our three research centers enable students to develop unique connections and insights in today's most important fields, including:

- Natural Resources, Energy, and Environmental Law and Policy—the Getches Wilkinson Center (http://www.colorado.edu/law/node/149/).
- Technology and Entrepreneurship/Business—the Silicon Flatirons Center (https://siliconflatirons.org/).
- Public Law/Public Service—the White Center (http://www.colorado.edu/law/node/135/).

In addition, our Schaden Experiential Learning Program and Clinical Program (with nine clinics (http://www.colorado.edu/law/node/53/) representing a range of practice areas) allow students to develop and hone their legal skills through extensive real-world experiences while in school.

We invite you to learn more about what makes the Colorado Law experience (http://www.colorado.edu/law/node/4079/) so special. Please contact us (http://www.colorado.edu/law/node/231/) for more information or, even better, come visit us (http://www.colorado.edu/law/node/219/).

Thanks for taking the time to get to know us better.

Sincerely,

Lolita Buckner Inniss (https://lawweb.colorado.edu/profiles/profile.jsp?id=1033), Dean and Provost's Professor of Law

## About Colorado Law

The University of Colorado Law School, established in 1892, has a long and proud history as a top public law school. The first students of color entered in 1898. The school became a charter member of the Association of American Law Schools, organized in 1901. The first woman graduated in 1908. And the school has been on the American Bar Association's list of accredited law schools since its first publication in 1923.

Today, Colorado Law, housed in the beautiful new "green" Wolf Law Building with one of the largest law libraries in the country, is also one of the most technologically advanced law schools in the country. Most importantly, it provides one of the best comprehensive legal educations in the nation, featuring:

- A favorable faculty-student ratio (5.7:1) that produces class sizes that encourage discussion
- 60 highly published resident faculty dedicated to interacting with students inside and outside the classroom
- First-year students who are placed in small sections for more class participation opportunities and to build relationships with classmates and professors
- Full-time, three-year Juris Doctor (JD) degree, one-year Master of Laws (LLM) degree, one-year Master of Studies in Law (MSL) degree, eight dual degrees, eight certificates, three centers and three journals
- An Experiential Learning Program that integrates lawyering activities, including nine legal clinics, externships, public service pledge and trial and moot court competitions
- Comprehensive program to prepare students for a wide range of careers; many graduates obtain judicial clerkships

### Law School Vision

With our roots in Colorado and a global outlook, we are a supportive and diverse community of scholars and students in a place that inspires vigorous pursuit of ideas, critical analysis and civic engagement in order to advance the rule of law in an open, sustainable society.

### Our Mission

To be an outstanding public law school that: provides students with a state-of-the-art legal education and prepares them to serve wisely and with professionalism; advances the development of knowledge through

scholarship, testing of new ideas, and challenges to the status quo; and serves as a vehicle and catalyst for meaningful public service, all of which deliver high value to our students and have positive impacts—both locally and globally—on the legal profession and society.

## Wolf Law Building

The five-story Wolf Law Building was completed in 2006 and was only possible through the financing of alumni, friends, law firms and 61 percent by students.

- Top "green" certification, from construction to operation, including 88 percent renewable energy and electricity, 40 percent water use reduction and 59 percent regionally manufactured materials
- Technologically advanced wireless networking, video conferencing, videotaping capabilities for distance learning and digital kiosks
- All classrooms have electrical outlets for each student and complete audio-visual equipment (LCD projectors, DVD, VHS, cable) with built-in touch-screen control systems
- Student commons with café and patio, study and interview rooms, individual lockers and mailboxes, law bookstore and courtyard with barbeque
- Suites and offices for centers, clinics, student organizations, journals and all faculty offices
- A 250-seat main courtroom with judge's chambers, 30-seat teaching courtroom with jury box and witness stand and a mock trial practice room for competition and clinic training

The three-story William A. Wise Law Library is housed in the Wolf Law Building.

- Most comprehensive law library in the 12-state Rocky Mountain region, one of the largest in the country, serving as a selective federal government depository
- Six computer stations, five group study rooms, 12 study pods, and 459 total seats
- Access in print or online to more than 500,000 volumes

# Student Life

Students who choose the University of Colorado Law School generally seek the very best all-around legal education combined with a great location, a supportive community, top specialties, interdisciplinary study, dedicated faculty, a public service tradition and so much more. Colorado Law is distinguished by the extraordinary quality of its students. As a competitively selective school, its students rank in the top tier, represent a rich blend of geographic and ethnic backgrounds and bring experiences of leadership, career achievement and community service. Although competitiveness among students with such elite qualifications is typical at many law schools, CU Law students have a proud history of putting collegiality first.

## Commitment to Diversity

Colorado Law is proud to have been one of the earliest law schools in the nation to graduate lawyers of color. The first students of color entered the University of Colorado Law School in 1898 and the first woman graduated in 1908. Colorado Law's commitment to diversity is evident throughout the Law School. We seek students with not only the academic credentials to excel in a rigorous legal education program, but also a desire to join a diverse community of future lawyers committed to the service of others. Student organizations offer support and networking opportunities.

## Academic Support

From the student's first day, Colorado Law invests in her or his academic success. Through the Rothgerber Academic Assistance Program, upper-division law students tutor first-year students in their courses, except Legal Writing. The program is open to all first-year students, and more than 50 percent of the class participates in this free opportunity.

## Honor System

Members of the legal profession are held to the highest standards of ethical and professional conduct, and Law School faculty and students are expected to maintain the same level of professional competence and integrity in their work. The Colorado Law School Honor Code, subscribed to by all students, is a system of rules administered by student officers and demands the highest ethical conduct.

## Legal Research and Writing

Colorado Law's Legal Research and Writing Program ensures that its graduates are proficient in legal research, analysis and writing, and capable of adapting these skills to varying contexts. All first-year Legal Writing courses are taught by resident legal writing faculty, and legal research and research strategy is guided by professional librarian instructors. Upper-division courses are designated as writing classes and students spend a seminar preparing a substantial paper requiring significant legal research and writing.

## Journals

Colorado Law is home to three nationally respected student-led law journals. These journals provide legal research, writing, editorial and publishing experience to competitively chosen second- and third-year law students, with a select number of third-year students serving as prestigious Editorial Board members. Subscribers include government agencies, judicial courts, law school and government libraries, judges, attorneys, faculty and alumni.

- *University of Colorado Law Review* (founded in 1928)
- *Colorado Environmental Law Journal*
- *Colorado Technology Law Journal*

## Student Organizations

Colorado Law's student organizations reflect the diverse interests and concerns of its active student body. Students increase their knowledge in specific areas, gain leadership experience and work closely with fellow students, faculty, alumni and legal professionals with similar passions. The Student Bar Association serves as the school's student government, represents the interests of law students generally, allocates funding to other organizations and administers the school's honor code with the Honor Council.

- American Constitution Society
- Asian Pacific American Law Students Association
- Barristers' Council
- Black Law Students Association
- Breakthrough Student Group
- Cannabis Law League
- Christian Legal Society
- Colorado Disability Justice Alliance
- Colorado Law Animal Legal Defense Fund
- Colorado Law Adventure Club
- Colorado Law Democrats

- Colorado Law Student Parents Group
- Construction and Real Estate Law Association
- Criminal Prosecution Society
- Doman Society of International Law
- Environmental Law Society
- Federalist Society for Law and Public Policy Studies
- Health Law Society
- If/When/How
- Immigration Law and Policy Society
- Intellectual Property Association
- International Law Student Society
- International Moot Court
- Jewish Law Students Association
- Juvenile and Family Law Club
- Korey Wise Innocence Project Club
- LatinX Law Student Association
- Middle East and North Africa Law Students Association
- Military Law Society
- Muslim Law Student Association
- National Lawyers Guild
- Native American Law Students Association
- OUTlaw
- People's Parity Project
- Public Defense Association
- Public Interest Students Association
- Silicon Flatirons Students Group
- Space Law Society
- Sports and Entertainment Law Student Association
- Student Bar Association
- Society for Work, Employment & Labor Law
- Women of Color Collective
- Women's Law Caucus

# Career Development

Colorado Law prepares students for a wide variety of careers. The Career Development Office offers students and alumni individualized career counseling and professional development advice to help them identify and achieve their career goals. The office has career counselors with JDs who have many years of experience in a wide range of law practice areas. It maintains state-of-the-art career development and job search resources and helps students prepare for and pursue job opportunities during and after law school.

## Services and Programs

- **Career Counseling:** Each first-year student meets with a career counselor who helps with résumés and job search action plans.
- **Employer Outreach:** Counselors conduct extensive employer outreach in- and out-of-state.
- **Career Fairs/Symposia:** The office organizes employer networking opportunities on and off campus.
- **On-Campus Interviews:** Each year approximately 100 employers come on campus to interview students for summer clerkships, internships and associate attorney positions with law firms and government agencies.
- **Résumé Collections:** Résumés from interested students are sent to in- and out-of-state employers.
- **Brown Bag Speaker Series:** Practicing attorneys from the local and national legal community are regularly invited to speak to students during weekly lunch-hour informational sessions about what it's like to work in a variety of legal areas.
- **Job Postings:** Through a secure web-based system, students and alumni can review current job listings and an online resources library.
- **Mock Interviews:** Counselors set up appointments with students for practice interviews with the counselors or with volunteer attorneys. Students receive tips and feedback to help them improve.
- **Referrals:** Counselors help students connect with alumni and other legal professionals as resources for information about a field or practice area of law in Colorado or any other part of the country or world.
- **Mentoring and Community Involvement:** The office regularly helps students get involved in the legal community by referring them to mentor programs (including the Student Alumni Mentoring Program), bar associations, Inns of Court and other law-related organizations.

## Job Opportunities

Colorado Law helps students pursue numerous job opportunities and helps connect them to valuable part-time and permanent legal positions, including:

- **Paid internships** are academic year or summer, part or full-time positions with law firms, businesses, government agencies and nonprofits.
- **For-credit externships** are for students working as volunteers for government agencies and non-profits for academic credit under the supervision of a field and faculty supervisor.
- **Fellowships** provide funding for law students and graduates to work with public service organizations or academic programs.
- **Honors programs** are prestigious summer and post-graduate programs for students and graduates to work within federal government agencies.
- **Judicial clerkships** are prestigious paid positions for new graduates working for state and federal judges across the country.

# Experiential Learning

Experiential education encompasses lawyering activities in which students receive experience outside the classroom—clinics, externships, appellate and trial competitions and voluntary public service work. Colorado Law's Experiential Learning Program gives greater coherence to our entire curriculum and builds linkages with faculty involved in experiential education and those involved in traditional classroom teaching.

## Legal Clinics

Colorado Law's Clinical Education Program started in 1948 and now serves almost 700 clients each year. Clinics are courses that provide practical learning experiences for our students, much-needed assistance to those less fortunate in our community and invaluable service to the public good. By handling actual cases, students make the transition from legal theory to legal practice, enabling them to take classroom knowledge and turn it into real-world understanding. Under the supervision of expert clinical faculty, student practitioners take primary responsibility for understanding the goals of their clients, and working to represent those

clients' interests persuasively and competently. Clinics are available to all interested students.

- American Indian Law Clinic
- Civil Practice Clinic
- Community Collaboration Law Lab
- Criminal Defense Clinic
- Criminal/Immigration Defense Clinic
- Entrepreneurial Law Clinic
- Juvenile and Family Law Clinic
- Natural Resources and Environmental Law Clinic
- Technology Law and Policy Clinic
-

### Public Service Pledge Program

Colorado Law is a public institution with a public spirit. The faculty and the students have a passion for and deep appreciation of a lawyer's civic responsibilities to serve the underprivileged and the community. Students who complete a voluntary pledge of at least 50 hours of law-related public service work, not for credit or other compensation, receive recognition on their transcripts. Such service provides students with valuable skills and values, such as legal research and writing, client interviewing and legal argument development. Students can perform pro bono work for any government agency engaged in legal work (administrative agencies, public defenders, district attorney offices and judiciary), nonprofits that provide legal services, public interest law firms or private firms on pro bono projects.

### Trial Advocacy and Moot Court

Appellate advocacy, mock trials and moot court competitions help to develop skills in appellate brief writing and oral argument, and gain valuable trial practice experience. Colorado Law teams have consistently been extremely competitive and participate in and host more and more competitions each year. Coaching and support come from an experienced group of faculty, fellow students, alumni who recently competed and judges and lawyers in the community. Students may earn academic credit for their participation. Examples of recent competitions are:

- Constance Baker Motley National Moot Court Competition
- Emory Civil Rights and Liberties Competition
- Hispanic National Bar Association Moot Court
- Jessup International Law Moot Court Competition
- Jim R. Carrigan Trial Advocacy Competition
- Mardi Gras National Moot Court Competition
- National Moot Court Competition
- National Moot Court Competition in Child Welfare and Adoption Law
- National Student Trial Advocacy Competition
- National Telecommunications Moot Court Competition
- The National Trial Competition
- Native American Law Students Association Moot Court Competition
- Pace National Environmental Law Moot Court Competition
- Philip C. Jessup International Law Moot Court Competition:
- The Rothgerber Moot Court Competition
- Saul Lefkowitz National Moot Court Competition

### Externships

Students may gain academic credit for performing substantive legal work with government agencies, public institutions and not-for-profit organizations. Students develop professional lawyering skills, gain insight into various aspects of the legal system and profession and cultivate a sense of professional responsibility. While uncompensated, students receive credit hours (1 credit hour per 50 hours of work) toward their degrees.

## Research Centers

Widely recognized for its intellectual diversity and originality, the faculty at Colorado Law encompasses an array of prominent legal scholars. The faculty's record of scholarly publication is both extensive and frequently cited. Together with the faculty's commitment to public service, this work has positioned the faculty of Colorado Law to exert important and constructive influences on legal and public policy debates at the local, national, and international levels.

Colorado Law's three research centers have earned national prominence for their research, publications and leading conferences that debate legal and policy issues, foster practical solutions and innovative ideas, facilitate networking and produce scholarship. Students are an integral part of the centers. Students may work as volunteers, externs or research assistants on research projects, reports, newsletters and events. In addition, students will have unique access to national and local policymakers, researchers, scientists, entrepreneurs and legal practitioners in many areas of the law.

### Byron R. White Center for the Study of American Constitutional Law

Named in honor of the retired Supreme Court Justice and CU alumnus, the Byron White Center (http://www.colorado.edu/law/node/135/) for the Study of American Constitutional Law was founded in 1990 to enhance the study and teaching of Constitutional law and stimulate public debate and understanding of our Constitutional system. Each year, the center gathers politicians, academics and practitioners for the Ira C. Rothgerber, Jr. Conference. Recent topics have included home rule, reapportioning Colorado, state initiatives, academic freedom and conscience and the free exercise of religion. The center is the cornerstone of Colorado Law's public service (http://www.colorado.edu/law/node/1125/) commitment.

### Getches-Wilkinson Center for Natural Resources, Energy and the Environment

The Getches-Wilkinson Center (http://www.colorado.edu/law/node/149/) for Natural Resources, Energy, and the Environment is the 21st century name of the Natural Resources Law Center (NRLC) and crown jewel of Colorado Law's dedication to natural resources, energy, and the environment. The center is dedicated to serving the people of the American West, the nation and the world through creative, interdisciplinary research, bold, inclusive teaching and innovative problem solving in order to further true sustainability for our lands, waters and environment. The Getches-Wilkinson Center is building on the successful legacies not only of the NRLC, but also of other existing programs in natural resources, energy and the environment at Colorado Law.

The Getches-Wilkinson Center regularly hosts an array of conferences and distinguished speakers, including the Annual Martz Summer Conference, the Energy Innovation Speaker Series and various seminars for practitioners and the interested public. Students are invited to join these events and visit some of the center's ongoing projects, such as the longstanding work to improve western water management, to develop and deploy best management practices for oil and gas production and

to develop practical strategies and solutions to provide appropriate sustainable energy technologies.

### Silicon Flatirons Center for Law, Technology and Entrepreneurship

The Silicon Flatirons Center (http://www.colorado.edu/law/node/151/) for Law, Technology, and Entrepreneurship is Colorado Law's influential foundation that supports and enables entrepreneurship in the technology community. The center is nationally recognized as a telecommunications law powerhouse. It hosts leading technology policy conferences with legal, technical, regulatory and business experts to elevate the debate around technology policy issues, facilitate networking and develop "human capital" in the Colorado technology community. Students assist on major research projects including the Software Regulation Clearing House and help organize 15–20 events a year on topics such as digital broadband migration, entrepreneurial law and startups, new technology, business plan competition, private equity, software patents and regulatory law and economics.

# Academic Calendar & Exams

## Academic Calendar

The campus operates year round, with fall and spring semesters, a winter session in between fall and spring semesters, and a summer term.

For a complete calendar of the Law School's academic and financial dates and deadlines, visit the CU Boulder Law School Registrar's Calendars and Schedules (https://www.colorado.edu/law/academics/calendars-and-schedules/) webpage. (http://colorado.edu/registrar/)

**Final Examinations**

For more information about final examinations, please see the Exam Procedures & Technology page (https://www.colorado.edu/law/academics/courses-and-registration/exam-procedures-technology/) of the CU Boulder Law website.

# Academic Integrity

## Why Do We Have a Student Honor Code?

### Mission

The mission of the Honor Code at the University of Colorado Boulder is to secure an environment where academic integrity can flourish.

### Values

The Honor Code recognizes the importance of honesty, trust, fairness, respect, and responsibility and aims to instill these principles as essential features of the University of Colorado Boulder campus. The Honor Code allows all students to have responsibility for, and the ability to attain, appropriate recognition for their academic and personal achievements.

## What is a Violation?

**Academic Misconduct** includes any act in which a student gains or provides, or attempts to gain or provide, an unfair academic advantage over other students. These acts include, but are not limited to the following and also include any attempts to engage in the following:

1. **Cheating:**
   a. Use of prohibited notes, study aids, or other explicitly prohibited course materials;
   b. Allowing another party to do one's work/exam and turning in that work/exam as one's own;
   c. Copying coursework from another student or from an unauthorized source (including but not limited to internet sources);
   d. Collaborating on coursework when prohibited;
   e. Failing to abide by the specific written course instructions including, but not limited to,
      i. the extent artificial intelligence is permitted,
      ii. exams, homework assignments, and syllabi;
   f. Clicker Fraud. Using, or having someone else use, clicker technology improperly in an effort to receive academic credit.
2. **Plagiarism.** This includes, but is not limited to:
   a. Portrayal of another's work or ideas as one's own;
   b. Improper citation of another's work;
   c. Improper citation of one's own previous work;
   d. Use of paper writing services or technology (such as essay bots or other artificial intelligence) whether paid or unpaid.
3. **Resubmission.** Submitting the same or similar work for credit, including, but not limited to, homework more than once without permission from all course faculty involved.
4. **Fabrication.** Falsification or creation of data, research, or resources, or altering graded work without the prior consent of the course faculty.
5. **Lying.** Deliberate falsification with the intent to deceive as it relates to an academic submission.
6. **Bribery.** Providing, offering, or taking rewards in exchange for a grade, an assignment, or in the aiding of Academic Misconduct.
   a. Rewards include, but are not limited to: currency, tangible items, services, or recompense.
7. **Threat.** Acting to intimidate a student, staff, or faculty member for the purpose of affecting a grade or in an effort to prevent the reporting of an Honor Code allegation, or in connection with any other form of Academic Misconduct.
   a. **Retaliation.** Retaliating against or discouraging, directly or through third parties, an individual from participating in the Honor Code process. To be considered retaliation, there must be a causal connection between a materially adverse action and the act of reporting a violation or participating in an Honor Code process. A materially adverse action is one that would dissuade a reasonable person from reporting a violation, and includes, but is not limited to, intimidation, 5 threats, or coercion. A determination of whether an action is materially adverse is a fact-dependent inquiry made on a case-by-case basis by Student Conduct and Conflict Resolution (SCCR) staff.
8. **Unauthorized Access.** Gaining access to, giving access to, or use of, protected academic information including, but not limited to: CU-SIS; a faculty, student, or staff member's computer, files, and/or physical space; and/or secure information on an online server.
9. **Aiding Academic Misconduct.** Facilitating any act which may help a student to gain an unfair academic advantage including, but not limited to, any of the aforementioned acts.
   a. **Sharing course materials,** including but not limited to, personal notes, in an unauthorized online bank or forum, or crowdsourcing site whether for profit or for free, is strongly discouraged and may result in a referral to the Honor Code process.

b. **Sharing personal authentication credentials/login information** to third party sites is strongly discouraged and may result in a referral to the Honor Code process.

### Resolution Processes

SCCR resolves alleged academic misconduct through the informal resolution process or the formal resolution process. Resolution specialists have the authority and sole discretion to determine the type of resolution process without Honor Code Advisory Board (HCAB) consultation.

#### Informal Resolution

This process may generally include, but is not limited to, a meeting with a resolution specialist, completion of the assigned resolution outcomes and/or participation in the CU Restorative Justice process.

During the meeting, if the resolution specialist determines that the informal resolution process may be appropriate, the resolution specialist will offer it as an option to the responding student and address any questions the responding student may have about the process. If the responding student accepts responsibility for the alleged academic misconduct, agrees to, and completes the agreement developed during the meeting, then SCCR will consider the matter to be resolved informally. In some cases, the HCAB will also review the referrals before a final determination is made.

#### Formal Resolution

This process generally includes: i. written notice of the factual allegations and alleged academic misconduct; ii. the opportunity to meet with the resolution specialist to address the allegations and provide information to the resolution specialist; iii. the resolution specialist reviewing the allegations and making factual and violation determinations based on preponderance of the evidence; and iv. written notice to the responding student of the resolution specialist's determinations.

The resolution specialist will consider the following in making this determination: i. the allegations in the Resolution Meeting Notice and the student's response to those allegations; ii. all documents and/or information that the resolution specialist finds relevant, including, without limitation, relevant documents presented by the responding student, reporting party, or any other interested party; iii. the oral or written statements of any witnesses with relevant information, as presented by the responding student, any reporting party, or other interested party, as it appears in a referral, and/or as requested by the resolution specialist; and iv. the recommendations of HCAB regarding responsibility and Resolution Outcomes related to the incident or precedent.

Questions regarding academic integrity should be directed to Student Conduct & Conflict Resolution, studentconduct@colorado.edu, 10 UCB Boulder, CO 80309, phone 303-492-5550.

The full Student Honor Code can also be viewed on the Student Conduct & Conflict Resolution (https://www.colorado.edu/sccr/) website.

# Academic Records

## Diplomas

A diploma is issued for each different degree type earned at the University of Colorado Boulder. A diploma will list degree, and dependent on the college, a student's major(s). Diplomas will not list any minors earned or a specific track or option. Undergraduate diplomas will list Latin or academic honors earned based on eligible GPA or successful participation in a honors program. Graduate students are not awarded Latin or academic honors based on GPA. Minors and eligible certificates earned will appear on the official transcript. Diplomas are mailed to all graduating students approximately eight weeks after the close of the semester in which degree requirements were completed and the student applied for graduation. Delivery windows are posted to the graduation and diplomas calendar (https://www.colorado.edu/registrar/students/calendar/graduation/) webpage. *Note:* International students must resolve all financial obligations with CU before a diploma is issued.

CU Boulder also offers a certified electronic diploma (CeDiploma) (http://www.colorado.edu/registrar/students/graduation/cediploma/) for students who complete a university-approved degree from Fall 2015 and onwards.

Graduating students with Federal Perkins/NDSL loans must complete a loan exit interview and clear all outstanding financial balances before leaving the university. Failure to do so results in a hold on the student's record. The hold prevents registration for future terms. Students can complete a loan exit interview by contacting Heartland ECSI at 1-888-549-3274 or via the Heartland ECSI (http://www.heartlandecsi.com/)website. Questions may be directed to University Student Loans & Debt Management in the Bursar's Office at 303-492-5571, toll free at 800-925-9844.

Display diplomas or replacement diplomas may be ordered online after graduation. For more information, visit the Office of the Registrar's diplomas (http://www.colorado.edu/registrar/alumni/diplomas/)webpage.

## Transcripts

### Official Transcripts

Current and former students may order transcripts online (https://exchange.parchment.com/send/adds/?main_page=login&s_id=7i3anAeWu6K3ErXO); no IdentiKey is required. Official transcripts are available in electronic PDF or paper format. Transcripts may be ordered as either a complete academic record of courses taken at all University of Colorado campuses or as a select career (undergraduate, graduate, law or noncredit) for coursework taken after 1988.

In certain circumstances, transcripts can be withheld for ongoing financial obligations to the university or for disciplinary actions.

Official transcripts bear the signature of the registrar and the official seal of the university (not applicable to noncredit transcripts).

### Unofficial Transcripts

Currently enrolled students and alumni who have access to the student portal may view and print unofficial transcripts free of charge through Buff Portal (https://buffportal.colorado.edu/). Unofficial transcripts display the complete academic record of courses taken at the University of Colorado. However, academic institutions and potential employers generally do not accept the unofficial transcript as evidence of a student's career at CU Boulder, as this transcript does not carry the registrar's signature, the seal of the university or other security features. Unofficial transcripts are primarily used for advising and counseling in offices at University of Colorado campuses.

## Educational Record Changes

Students whose degrees have been conferred are not eligible for retroactive changes to their educational record.

### Law School/Law Career Transcripts

The Office of the Registrar can provide Law School/Law Career Transcripts for the Class of 1985 to the present. These transcripts are considered *official* by university standards and will include all coursework taken specifically towards a degree at the University of Colorado Law School as well as Law School ranks, Public Service Pledge awards, certificates and Order of the Coif and Dean's List notations, as applicable.

To order a Law School/Law Career transcript, students may order transcripts online (https://exchange.parchment.com/send/adds/?main_page=login&s_id=7i3anAeWu6K3ErXO). Students should request their "Law Only" transcripts when selecting the transcript for ordering.

# Admissions

Colorado Law values leadership, character, diversity and commitment to service in its students pursuing their Juris Doctor (JD). The small size of the incoming JD class—about 170 every fall—and the larger number of applicants require a very selective admissions process. In evaluating applications, the Admissions Committee relies on (1) the completed application form, (2) the report of LSAT scores, (3) undergraduate GPA and transcripts, (4) personal essay(s), and (5) recommendations. The Committee also conducts a holistic analysis of special qualities and individual circumstances such as motivation, undergraduate program, diversity in economic, social, or cultural background, employment or other experience (e.g., military), leadership, and perseverance in overcoming personal handicaps or disadvantages. Graduate level work is also considered. The Admissions Committee is also seeking evidence of character, leadership and diversity, which are the hallmarks of the Colorado Law student body.

# Application Process

Regular admission applications with all required materials should be submitted starting Oct. 1. Find complete application instructions at www.lsac.org (http://www.lsac.org/) and on the Colorado Law (http://www.colorado.edu/law/admissions/apply-colorado-law/) website. The Admissions Committee considers regular decision applications beginning in October. Applicants are notified by letter of decisions from early fall until the class is filled. Admission from the waitlist, which is not ranked, can occur as late as August, and the number of offers varies from year to year.

# International Students

International applicants have additional requirements as explained on the school's website, including transcripts showing completion of the equivalent of an American bachelor's degree, foreign degree verification and transcript translation, if applicable. The TOEFL is required of all students whose native language is not English, as a thorough and excellent command of written and spoken English is crucial to success in law school. After admissions, international students must submit a financial affidavit stating that they have the financial resources to support themselves while attending school in the United States, since the Colorado Law cannot offer loan assistance to international students.

# Transfer Students

Students who have completed at least one full year of study (approximately 30 credit hours) at a law school accredited by the American Bar Association may apply for fall transfer admission to Colorado Law. Typically, applications for fall enrollment are accepted after May 1 and must be received by July 1. The number of transfer students admitted varies each year, and only those who have done very well in their law studies elsewhere have a substantial chance of admission.

# Visiting Students

Colorado Law admits some students who are receiving their law degree from another law school to study here for the fall or spring semester or both. Admission as a visiting student is available to applicants who have completed one or two years of high-quality work at another law school and have demonstrated a compelling need to attend Colorado Law. Financial aid for visiting students is usually handled by a consortium agreement between Colorado Law and the degree-granting institution.

# Credits & Grading

## Grading System

The following grading system is standardized for law school students. Each instructor is responsible for determining the requirements for a class and for assigning grades on the basis of those requirements and grading scale by the grade submission deadline each term.

### Standard Grade Points per Hour of Credit

| | |
|---|---|
| **A** | 4.0 (Law School Numerical Grade 93 & Above) |
| **A-** | 3.7 (Law School Numerical Grade 90-92) |
| **B+** | 3.3 (Law School Numerical Grade 86-89) |
| **B** | 3.0 (Law School Numerical Grade 83-85) |
| **B-** | 2.7 (Law School Numerical Grade 80-82) |
| **C+** | 2.3 (Law School Numerical Grade 76-79) |
| **C** | 2.0 (Law School Numerical Grade 73-75) |
| **C-** | 1.7 (Law School Numerical Grade 70-72) |
| **D+** | 1.3 (Law School Numerical Grade 66-69) |
| **D** | 1.0 (Law School Numerical Grade 63-65) |
| **D-** | 0.7 (Law School Numerical Grade 60-62) |
| **F** | 0.0 (Law School Numerical Grade 59 or Below) |

### Grading

Letter grades within the University's 12-step plus/minus grading system will be reported for all students in the JD degree program to the appropriate University administrative office. For each credit hour, the letter grades shall have the credit point value shown above. Through Spring 2012 for JD students who matriculated before Fall 2010, for Law School purposes only, a numerical system of grading shall be used in addition to the University's plus/minus grading system. For JD and LLM students who matriculate in the Fall 2010 semester or later, only letter grades shall be assigned.

### Grade Symbols

| | |
|---|---|
| **I** | incomplete; If the I grade is given, the instructor and the Dean's Office shall determine in writing the appropriate date for completion of the requirements of the course, such period not to extend beyond the end of the next regular (i.e., not summer) term. If the student fails to complete the requirements of the course by the assigned date, the I grade will be converted to an F. If, at the end of the next succeeding regular (i.e., not summer) term, the faculty member has not provided a new grade to the Law School Registrar, the I grade will be automatically converted to an F unless, prior to that time, the instructor and the Dean's Office have agreed that the grade of W is appropriate. The W grade should be given only where the circumstances preventing completion of course requirements are serious, unforeseeable, and beyond the student's control. |
| **P** | passing; pass-graded course shall mean that the grade of "pass" will be given when in the judgment of the instructor the quality and quantity of the work is such that on a graded basis such work would be equivalent to at least a C. Should the work not receive a grade of "pass," the work shall be assigned that letter grade between C- and F that the instructor determines is appropriate. |
| **W** | withdrew |
| *** | class grades were not submitted when final grades were processed, or the student is currently enrolled in the course. |

#### Explanation of an I (Incomplete) Grade

The grade I may be given if the instructor and the Dean's Office determine that 1) an incomplete grade is appropriate because of serious illness of the student or for other equally justifiable reason; or 2) the scope of the work involved in the course is such that it is appropriate to extend the time for its completion beyond the end of the semester.

### Grade Point Average

The overall University of Colorado grade point average (GPA) is computed as follows: the credit hours and credit points are totaled for all courses and across all campuses within the same career (UGRD, GRAD or LAW); then the total credit points are divided by the total credit hours. Courses with grade symbols of P, *** (grade not yet entered), W, and I are excluded from calculations. All standard letter grades (A-F) are included in the GPA, including grades of F earned for courses graded on a pass/graded basis. Below is example GPA calculation for a hypothetical semester:

| | |
|---|---|
| Grade Earned: A; | Credit Points per Hour: 4.0; x Credit Hours: 4.0 = Credit Points in Course: 16.0 |
| Grade Earned: A-; | Credit Points per Hour: 3.7; x Credit Hours: 4.0 = Credit Points in Course: 14.8 |
| Grade Earned: B+; | Credit Points per Hour: 3.3; x Credit Hours: 4.0 = Credit Points in Course: 13.2 |
| Grade Earned: P; | Credit Points per Hour: —; x Credit Hours: 3.0 = Credit Points in Course: — (excluded) |
| Grade Earned: F; | Credit Points per Hour: 0; x Credit Hours: 3.0 = Credit Points in Course: 0 |
| | Total of 15 credit hours with 44 credit points, so 44/15 = 2.93 GPA |

For individual GPA calculations related to academic standing and graduation from a college or school, students should refer to their academic dean's office.

## Credit Limits

For academic purposes, law students must be enrolled for a minimum of 10 credit hours to be considered full time in the fall and spring. For more information, visit the Colorado Law (http://www.colorado.edu/law/) website. Law students may apply a maximum of 18 credit hours toward a degree during the fall and spring semesters. Students who receive financial aid or veterans benefits or who live in university housing should check with the appropriate office regarding course-load requirements for eligibility purposes.

# Graduation

## Graduation

Students are eligible to graduate at the close of the term in which they successfully complete all requirements for their degree program. Degrees and certificates are typically conferred at the close of fall semester, spring semester and summer session. Credentials in select programs may be conferred mid-semester.

Students must apply for graduation through Buff Portal by the published deadline for the term in which they complete degree requirements. Instructions for applying and important dates and deadlines are available on the Office of the Registrar's Graduation & Commencement (http://www.colorado.edu/registrar/students/graduation/) webpage. Individual colleges and schools may require additional processes for students completing their degrees.

## Commencement

A general commencement ceremony is held in May for all students who have graduated or anticipate to graduate in a given academic year (fall, spring and summer). This ceremony is open to the public and no tickets are required. Many departments, colleges and schools hold recognition ceremonies in both fall and spring semesters. For dates and

details about the ceremony, visit CU Boulder's Commencement (http://www.colorado.edu/commencement/) website.

## Diplomas

Please see the Academic Records (p. 1842) section.

# Registration & Enrollment

## Registration

Visit the Office of the Registrar's Academic Calendar (http://www.colorado.edu/registrar/students/academic-calendar/) webpage for specific academic and financial dates and deadlines. Students should also consult Colorado Law's Courses and Registration webpage (https://www.colorado.edu/law/academics/courses-and-registration/) for additional information on special requirements and deadlines. The following registration policies are intended to serve as general guidelines.

Students who require accommodations because of a disability should visit the Disability Services (http://www.colorado.edu/disabilityservices/) website or call 303-492-8671.

*When registering for courses, most Law School classes may be located searching under the subject code LAWS.*

## Student Portal

Student registration and other important information and services are available through the student portal (https://www.colorado.edu/studentportal/). Students access the portal using a secure CU login name and IdentiKey password. For more information and registration instructions, visit the Registration (http://www.colorado.edu/registrar/students/registration/) webpage.

## Holds

A hold may be placed on a student's record for a number of reasons, including but not limited to financial, advising, scholastic, conduct and health. A hold may prevent a student from registering, returning to school, obtaining an official transcript or receiving a diploma. Students should resolve holds as quickly as possible by contacting the appropriate campus office identified in the hold in their student portal.

## Withdrawing from the Semester

A withdrawal from a Main Campus semester occurs if the student:

- Never registers for classes in a fall or spring semester
- Drops all classes for a semester
- Submits a withdrawal request to the Office of the Registrar

A student who desires to withdraw from the university and drop all Main Campus classes should visit the Office of the Registrar's Withdraw from the Semester (https://www.colorado.edu/registrar/students/withdraw/) webpage and review the current term's withdrawal calendar and the withdrawal checklist to understand the potential impacts of withdrawing. Failure to withdraw properly may result in failing grades recorded for every class and liability for the full amount of tuition and fees for that term.

Rules for withdrawing may vary with each college and school. Students anticipating a withdrawal should consult their advisor to understand the potential impacts to their degree requirements.

Withdrawing students (including students applying for a graduate leave of absence) with Federal Perkins/NDSL loans must complete a loan exit interview and clear all outstanding financial balances before leaving the university. Failure to do so results in a hold on the student's record. This hold prevents registration for future terms. Students can complete a loan exit interview by contacting University Student Loans & Debt Management in the Bursar's Office at 303-492-5571, toll free at 800-925-9844 or TTY 303-492-3528.

Undergraduate students who withdraw and then wish to return to the university have two semesters (plus summer) from their last graded semester to return to the university without having to reapply for admission. Graduate students can apply for an approved leave of absence.

Details are available on the Withdraw from the Semester (https://www.colorado.edu/registrar/students/withdraw/) webpage. For more information, contact the Office of the Registrar at 303-492-6970 or withdraw@colorado.edu. For information about tuition and fee obligations for withdrawing students, see either the Undergraduate Tuition and Fee Policies (p. 67) or the Graduate Tuition and Fee Policies (p. 1126) sections.

### Active Duty

Students who are military personnel, fire fighters and police officers called to active duty and/or to help with disasters may request to go on a leave of absence. These students should contact the Office of the Registrar. For more information, visit the Withdraw from the Semester (https://www.colorado.edu/registrar/students/withdraw/) webpage.

### Law Student Withdrawal and Leave of Absence

A law student who desires to withdraw from the university and drop all classes during the first (fall) semester must reapply for readmission, may only be readmitted to resume in a subsequent fall semester, and shall receive no readmission preference. First-year law students are not eligible for a leave of absence. Students who withdraw after completing the fall semester but before beginning on the second (spring) semester, must reapply for admission, shall normally be expected to wait until the next spring semester to resume their studies, and shall receive admission preference only in the next regularly scheduled spring semester. Law students *must* apply for a leave of absence (https://www.colorado.edu/registrar/students/withdraw/leave-of-absence/) or will be discontinued from the university. Department and college approval is required on the application.

# Student Affairs

# Health & Wellness

## Health and Wellness Services

Health and Wellness Services is a part of CU Boulder Strategic Resources and Support. As part of Strategic Resources and Support, we are collectively committed to the success and wellbeing of all our students as well as the faculty and staff we serve.

All CU Boulder undergraduate and graduate students have access to a full range of on-campus health and wellness services in addition to a variety of virtual offerings.

To learn more, visit Health and Wellness Services (http://www.colorado.edu/health/).

### Administrative Services

The Administrative Services team oversees all aspects of medical insurance, billing and medical records at CU Boulder. To learn more, visit Administrative Services (https://www.colorado.edu/healthcenter/insurance-billing-medical-records/).

### Counseling and Psychiatric Services

Counseling and Psychiatric Services (CAPS) offers confidential, on-campus short-term mental health and psychiatric services for all fee-paying students. CAPS addresses a variety of concerns such as academics, anxiety, body image, depression, relationships, substance use and more. To learn more, visit CAPS (http://www.colorado.edu/health/counseling/).

### Center for Disability and Access

The Center for Disability and Access is dedicated to providing students with disabilities an equal opportunity to participate in university programs, courses and activities through reasonable accommodations and services. Our office is here to support students, staff and faculty with accommodation requests, implementation, guidance and general information. To learn more, visit the Center for Disability and Access (https://www.colorado.edu/disabilityservices/).

### Health Promotion

Health Promotion provides outreach and education on a variety of health topics to help students make informed decisions about their health and wellbeing. Health Promotion collaborates with student groups and campus departments to provide programs and services that positively influence student health. To learn more, visit Health Promotion (https://www.colorado.edu/health/promotion/).

### Medical Services

Medical Services is the primary healthcare resource for CU Boulder students. Through comprehensive care and education we strive to give students the skills and knowledge they need to develop healthy life-long habits. To learn more, visit Medical Services (https://www.colorado.edu/healthcenter/). (https://www.colorado.edu/healthcenter/)

### Recovery Community

The CU Collegiate Recovery Community (CUCRC) provides community, support and connection for students, faculty and staff in recovery or seeking recovery from a wide range of behaviors. Our mission is to help develop peer-to-peer connections, support resiliency and contribute to their overall wellbeing through a welcoming and supportive community. To learn more, visit Recovery Center (https://www.colorado.edu/recoverycenter/).

### The Office of Victim Assistance

The Office of Victim Assistance (OVA) provides free and confidential information, consultation, support, advocacy and short term counseling services to University of Colorado Boulder students, graduate students, faculty and staff who have experienced a traumatic, disturbing or life-disruptive event. Call 303-492-8855 to connect with an OVA counselor or to receive after-hours support. To learn more, visit The Office of Victim Assistance (https://www.colorado.edu/ova/).

### CU Boulder Student Health Insurance Plan (SHIP)

All students are required to carry a comprehensive medical insurance plan while attending CU Boulder. CU Boulder would like students to have financial protection should they suffer a serious illness or injury during their time here. Our hope is that an insurance plan will help them through these times so that they can continue with their educational endeavors.

**Students may elect health insurance coverage through:**

- Anthem Gold Student Health Insurance Plan (SHIP) - A plan exclusively for CU students.
- Private or personal insurance (an individual health insurance plan through a family member, employer or government-sponsored)

Students must meet this requirement their first semester at CU Boulder and at the beginning of each academic year. Those taking six (6) or more undergraduate credit hours or one (1) or more graduate credit hours are required to complete the health insurance requirement process. Once a student is registered for their semester credits, the student will begin receiving email communications from Academic HealthPlans. These emails explain the insurance requirement and outline the process of enrolling or waiving the Anthem Gold SHIP.

All fee-paying students, regardless of their insurance plan, have full access to the services provided by Health and Wellness Services.

For more information, visit the Health Insurance Requirement (http://www.colorado.edu/health/insurance/health-insurance/)webpage.

*Note*: Plans available through the health insurance marketplace meet CU's health insurance requirement. Colorado students may sign up through the Connect for Health Colorado (http://connectforhealthco.com/)website. Nonresident students may sign up through their home state health exchange or through the national HealthCare.gov (https://www.healthcare.gov/)website.

# Housing

## Off-Campus Housing

Off-Campus Housing & Neighborhood Relations (a service of CUSG) maintains listings of apartments, houses and rooms for rent in the Boulder area. Currently enrolled students may view listings and connect with potential roommates on Ralphie's List, CU's rental database, on the Off-Campus Housing & Neighborhood Relations (http://offcampushousing.colorado.edu/) website. The office also maintains a detailed list of apartments and property management companies available for download or pickup in the office.

The department has a staff attorney available on Tuesdays and Fridays to advise students about leases, security deposits, maintenance issues and roommate and landlord conflicts. Office assistants will help students locate properties and answer questions about the surrounding neighborhoods.

During the academic year, the office sponsors several off-campus housing fairs where landlords, property managers and related businesses offer their services to students in a trade-show format.

For additional information, visit the Off-Campus Housing & Neighborhood Relations (http://offcampushousing.colorado.edu/) website or call 303-492-7053. Office hours are 9 a.m.–5 p.m., Monday–Friday. Summer hours are 7:30 a.m.–4:30 p.m.

# Graduate & Family Housing

The University of Colorado Children's Center provides childcare for the children of students, staff, faculty and Graduate & Family Housing residents.

Graduate & Family Housing offers an affordable, convenient and comfortable living environment that serves the needs of a diverse population of students at CU Boulder. We are home to residents from over 70 nations and offer a variety of apartment types and sizes, flexible leases and community-building programs and events. To learn more, visit the Housing and Dining (https://living.colorado.edu) website or call, write or email the Graduate & Family Housing Office at the address provided.

Graduate & Family Housing Office
1350 20th Street, #A10
University of Colorado Boulder
Boulder, CO 80302
T: 303-492-6384
graduatefamilyhousing@colorado.edu

# Student Conduct & Colorado Creed

## Student Conduct & Conflict Resolution

### What We Believe

Student Conduct & Conflict Resolution (SCCR) strives to provide students with individualized responses to support community standards and conflict resolution that emphasize accountability and growth by:

- Fostering reflection on the impact of their behaviors;
- Promoting responsible community membership and repairing harm; and
- Cultivating the wellbeing and safety of the CU Boulder community.

#### What Is Important to Us

1. The student will understand the impact of their behavior on others.
2. The student will demonstrate ethical development, will comply with institutional policy and will engage in no further violations of policy.
3. The student will gain an understanding of the institutional values reflected in institutional policies.
4. The student will gain a better understanding of the importance of personal integrity.
5. Through SCCR processes, the student will be asked to reflect on their beliefs, ethics and values.
    a. The student will be able to articulate their personal ethics and values, will act in congruence with those ethics and values, and will make decisions that reflect their beliefs.
6. The student will contribute positively to the CU Boulder community and beyond.
7. The student will gain a better understanding of the consequences and potential consequences of their personal actions and will learn the purposes of institutional policies.
8. The student will employ critical thinking in problem solving and ultimately obtain a degree.

### Why Do We Have a Student Code of Conduct? (Authority)

Article 7, Part B, of the Laws of the Regents of the University of Colorado requires each campus to develop a student code of conduct. Student Conduct & Conflict Resolution (SCCR) is authorized to establish and administer this policy. Any questions regarding interpretation of this code or any of its provisions should be directed to the Dean of Students or their designee for final determination.

Questions regarding student behavior should be directed to Student Conduct & Conflict Resolution, studentconduct@colorado.edu, Center for Community, S485, 10 UCB Boulder, CO 80309, phone 303-492-5550.

### When and Where Does the Student Code of Conduct Apply? (Jurisdiction)

1. The Student Code of Conduct applies to:
    a. Student conduct that occurs on, or as it relates to, CU Boulder property or at official functions and CU Boulder sponsored programs conducted away from the campus.
    b. Student conduct that occurs off CU Boulder property is subject to this policy if it:
        i. Adversely affects the health, safety or security of any member of the CU Boulder community, including the student alleged to have violated CU Boulder policy or the mission of CU Boulder; or
        ii. Involves any records or documents of CU Boulder;
        iii. Involves conduct that may be a violation of federal, state or local law, as determined by SCCR.
    c. For this policy's purposes, CU Boulder's mission is broadly defined to include its academic goals and the importance of developing civic responsibility in our students.
2. Recognized Student Organizations and Recognized Social Greek Organizations:
    a. Wherever the Student Code of Conduct refers to "responding student," the same also applies to Recognized Student Organizations (RSOs) and Recognized Social Greek Organizations (RSGOs). RSOs, as described in the Student Organization Handbook (https://www.colorado.edu/involvement/), are general student organizations recognized by the Center for Student Involvement (CSI) and CU Boulder. Recognized Social Greek Organizations are recognized by Fraternity & Sorority Life (FSL) and CU Boulder.
        i. RSOs and RSGOs, as well as their members and other students, may be held collectively and/or individually responsible for violations.
        ii. The RSO and RSGO officers, leaders, signers or individuals currently listed in an official position in the Center for Student Involvement records or Fraternity & Sorority Life records may be held collectively and/or individually responsible for violations when such violations are committed by persons associated with the organization who have received consent or encouragement from the organization's officers or leaders, if those officers or leaders knew, or reasonably should have known, that such violations were being or would be committed.
        iii. The officers or leaders of a student organization may be directed by CU Boulder officials to take action designed to prevent or end violations by the organization or by any

persons associated with the organization. Failure to comply with a directive may be considered a violation of the Student Code of Conduct, both by the officers or leaders of the organization and by the organization.

3. Actions taken under a resolution process are separate and apart from any law enforcement or other court process or proceeding, such as a civil lawsuit or criminal prosecution, that may relate to the same underlying factual incident. SCCR's jurisdiction does not depend on whether a responding student is criminally charged through the criminal justice system. A resolution process is not postponed while criminal or civil proceedings are pending unless otherwise determined by the resolution specialist. Dismissal of criminal charges or acquittal in a criminal case does not prevent SCCR from investigating and resolving an incident.
4. The unexcused failure of a responding student to appear and/or respond to a resolution process does not prevent CU Boulder from proceeding with or completing a resolution process.
5. For jurisdictional information related to sexual misconduct (including sexual assault, sexual harassment, intimate partner violence and gender/sex-based stalking), protected class discrimination, harassment and any related retaliation, see Section M of the Student Code of Conduct.
6. For jurisdictional information pertaining to academic misconduct, see Section M of the Student Code of Conduct.
7. Questions or concerns regarding policy and procedures for students charged or convicted of a crime that occurred prior to being admitted should be directed to SCCR.

## Student Resolution Processes

SCCR resolves alleged prohibited conduct through the informal resolution process, the formal resolution process or the restorative justice process. Resolution specialists have the authority and sole discretion to determine the type of resolution process. This decision is primarily based on, but not limited to, the following factors:

- If the responding student admits or otherwise takes responsibility for the alleged prohibited conduct;
- The responding student's prior conduct record;
- The nature and severity of the alleged prohibited conduct;
- The alleged impact and/or harm caused to another person or community;
- Whether the alleged conduct would violate the Student Code of Conduct; and/or
- Any other factors that the resolution specialist finds relevant to the specific allegations.

The formal resolution process is an adjudication of the alleged prohibited conduct, considered an educational and disciplinary process, and may result in resolution outcomes and a disciplinary conduct record. The informal resolution process and restorative justice process are intended as forms of alternative dispute resolution, are voluntary, primarily educational in nature, not an adjudication of the allegations, not considered a disciplinary process and instead will result in a written agreement with the responding student. Because SCCR does not consider the informal resolution process or restorative justice process to be disciplinary processes, they do not result in a disciplinary conduct record or file. Informal resolutions and restorative justice will never result in resolution outcomes such as suspension or expulsion.

The first step in each resolution process is initiated by the resolution specialist issuing a written Resolution Meeting Notice to the responding student, which prompts the responding student to attend a scheduled meeting with the resolution specialist as outlined in the notice.

### Informal Resolution

This process may generally include, but is not limited to, a meeting with a resolution specialist, completion of the assigned resolution outcomes and/or participation in the restorative justice process.

During the meeting, if the resolution specialist determines that the informal resolution process may be appropriate, the resolution specialist will offer it as an option to the responding student and address any questions the responding student may have about the process. If the responding student accepts responsibility for the alleged prohibited conduct and completes educational resolution outcomes assigned by the resolution specialist, then SCCR will consider the matter to be resolved informally.

### Formal Resolution

This process generally includes:

1. Written notice of the factual allegations and alleged violations of the Student Code of Conduct;
2. The opportunity to meet with the resolution specialist to address the allegations and provide information to the resolution specialist;
3. The resolution specialist reviewing the allegations and making factual and violation determinations based on preponderance of the evidence; and
4. Written notice to the responding student of the resolution specialist's determinations.

The resolution specialist will consider the following in making this determination:

1. The allegations in the Resolution Meeting Notice and the responding student's response to those allegations;
2. Any documents or information that the resolution specialist finds relevant, including without limitation, relevant documents presented by the responding student, complainant or any other interested party; and/or
3. The oral or written statements of any witnesses with relevant information, as presented by the responding student, any alleged victim or other interested party, as appears in a report, or as requested by the resolution specialist.

All students residing in Housing & Dining Services facilities are subject to Residential Handbook policies and any policy properly communicated through Housing & Dining Services staff. For more information, visit the Housing & Dining Policies (https://www.colorado.edu/living/housing/policies-forms-and-accommodations/) webpage.

Cases involving sexual misconduct (including sex assault, sexual harassment, sexual exploitation, intimate partner violence and gender/sex-based stalking), protected class discrimination and harassment, and any related retaliation are subject to the Office of Institutional Equity and Compliance (OIEC) process and procedures (https://www.colorado.edu/oiec/policies/). For more information about these policies and procedures, contact the OIEC at (303) 492- 2127 or visit the OIEC (https://www.colorado.edu/oiec/) website.

Excerpts from the Colorado Revised Statutes regarding hazing, ethnic intimidation and riots are also presented. Colorado law prohibits persons convicted of rioting from enrolling in state-supported universities/colleges for 12 months following the date of a conviction.

For information about student classroom and course-related behavior, visit the policies (https://www.colorado.edu/compliance/policies/student-classroom-course-related-behavior/) webpage.

# Colorado Creed

The Colorado Creed, developed by students in 2003, is a social code of conduct and a lifestyle by which students at CU Boulder live. The text of the creed is:

As a member of the Boulder community and the University of Colorado, I agree to:

- Act with honor, integrity and accountability in my interactions with students, faculty, staff and neighbors.
- Respect the rights of others and accept our differences.
- Contribute to the greater good of this community.

I will strive to uphold these principles in all aspects of my collegiate experience and beyond.

For more information, visit the Colorado Creed (http://www.colorado.edu/creed/) website.

# Student Resources

The Division of Student Affairs (http://www.colorado.edu/studentaffairs/) offers many on-campus resources for our students. Visit our offices to learn more.

# Student Life & Involvement

- Center for Inclusion and Social Change (https://www.colorado.edu/cisc/): Explore identity and inclusivity, participate in educational programs, attend events and build community with others.
- Center for Student Involvement (https://www.colorado.edu/involvement/): Be involved! Find your community by connecting with student organizations, campus-wide events and leadership opportunities.
- CU Student Government (https://www.colorado.edu/cusg/): Make a difference! Get involved with your student government representatives, elected by students, for students. CUSG is your voice on campus.
- Environmental Center (https://www.colorado.edu/ecenter/): Help CU Boulder become a global leader in sustainability through recycling, student bus pass, bicycle and educational programs.
- Fraternity & Sorority Life (https://www.colorado.edu/greeks/): Find opportunities for friendship, leadership and growth in CU's vibrant and diverse Greek community.
- Housing & Dining (https://www.colorado.edu/living/): Explore information about on-campus life including residence halls, meal plans and dining options!
- New Student & Family Programs (https://www.colorado.edu/orientation/): The campus resource for new students and families as they begin their journey at CU Boulder. Ask questions and be sure to join for welcome events throughout the year.
- Off-Campus Housing & Neighborhood Relations (https://www.colorado.edu/offcampus/): Explore off-campus rentals on Ralphie's List, register your party and learn about the legal aspects of off-campus living.
- Recreation Services (https://www.colorado.edu/recreation/): Get moving with all that The Rec has to offer, including intramural sports, fitness classes, nutritional services and Outdoor Pursuits.
- Residence Life (https://www.colorado.edu/living/): Explore the opportunities that residence life provides, from on-campus housing and employment to student resources like free tutoring.
- University Memorial Center (https://www.colorado.edu/umc/): Visit the CU Book Store, student services and student organization offices, as well as plenty of entertainment, dining and hangout options.

# Student Support & Development

- Basic Needs Center (https://www.colorado.edu/support/basicneeds/): Get connected to essential resources when you need them most. Access the Buff Pantry and other assistance with food, housing and other on-campus and community services.
- Career Services (https://www.colorado.edu/career/): Become more employable and find meaningful work through learning how to fine-tune your resume, develop your skills, land an internship and make connections with employers.
- Student Conduct & Conflict Resolution (https://www.colorado.edu/sccr/): Get support for resolving conflicts and learn more about the Student Code of Conduct and the Honor Code.
- Student Legal Services (https://www.colorado.edu/studentlegal/): Access low-cost legal advice and education regarding your rights and responsibilities, and how to navigate the legal system.
- Student Support & Case Management (https://www.colorado.edu/studentaffairs/sscm/): Find individual support for students and advocates for their needs in all aspects of campus life.
- Veteran and Military Affairs (https://www.colorado.edu/veterans/): Prospective and current student veterans and veteran dependents: find program information, policies, pay and support services.
- Volunteer Resource Center (https://www.colorado.edu/volunteer/): Explore volunteer and leadership opportunities on campus and throughout the greater Boulder community.

# Student Data Privacy

## Annual Notice to Students

As a CU Boulder student, it's important to understand your rights regarding access to and disclosure of information in your education record. The Family Educational Rights and Privacy Act (https://www.colorado.edu/registrar/students/records/ferpa/) (FERPA) affords you the right to:

- Inspect and review your education record
- Request amendment of your education record
- Consent to disclosure of personally identifiable information in your education record
- File a complaint with the U.S. Department of Education (Family Policy Compliance Office, U.S. Department of Education, 400 Maryland Avenue, SW, Washington, DC 20202)

To review or request an amendment to your record, contact the Office of the Registrar or the university office that maintains the record. This does not apply to grade changes, which are at faculty discretion.

Under FERPA, the university may release education record information if the disclosure is:

- To CU Boulder officials who have a legitimate educational interest (https://www.colorado.edu/registrar/students/records/ferpa/glossary/)
- To officials of another institution at which you seek or intend to enroll
- To authorized representatives of federal, state or local educational authorities
- To connection with financial aid you've applied for or received
- To an organization conducting studies for or on behalf of the university
- To your parents or guardians (if you are a dependent student for tax purposes)
- To an accrediting organization
- To comply with a judicial order or lawfully issued subpoena
- In connection with a health or safety emergency or other exception under FERPA (https://www.colorado.edu/registrar/students/records/ferpa/exceptions/)
- To fulfill a request for data that CU Boulder defines as directory information (https://www.colorado.edu/registrar/students/records/ferpa/directory-info/)

Student data that is *not* directory information may only be released with your documented consent.

To authorize third-party access to your non-directory information, see CU Guest Access (https://www.colorado.edu/registrar/students/records/privacy/guest-access/) and FERPA Consent to Release (https://www.colorado.edu/registrar/students/records/privacy/consent/). You may restrict the release of directory information by placing full privacy (https://www.colorado.edu/registrar/students/records/privacy/full/) on your record.

Questions may be directed to the Office of the Registrar.

# Directory Information

The following items of student information have been designated by the University of Colorado Boulder as public or "directory" information:

- student name[1]
- hometown (city, state)
- campus email address[2]
- dates of attendance
- previous educational institutions attended
- school/college or division of enrollment
- majors, minors and fields of study
- classification level (e.g., first-year, sophomore, etc.)
- university-recognized honors and awards
- degree status (e.g., expected graduation date and/or conferral dates/terms)
- enrollment status
- employment related to student status (e.g., teaching assistant, resident assistant or work-study) and dates for positions held
- participation in officially recognized activities/sports, including height and weight of athletes.
- photos and videos taken or maintained by the university

Directory information shall not be provided to anyone outside of the CU community (except to vendors/organizations with which the university has contracted in order to provide goods or services to students). The university retains the discretion to refuse disclosure of directory information if it believes such disclosure would be an infringement on student privacy rights. In an effort to protect student privacy, CU directories may only contain a student's name, email address, class and major field of study.

1 If a student provides a preferred name, the university uses it when communicating directly with the student and in campus systems, rosters, etc., unless there is a documented business or legal reason to use a student's primary name. When communicating with outside third parties, including parents, the university generally uses a student's primary (legal) name. Students may also select a diploma name (https://www.colorado.edu/registrar/students/graduation/) for graduation and commencement materials.

2 Campus email addresses may not be used for solicitation.

## Withholding Directory Information (Full Privacy)

Students have the right to request full privacy which withholds directory information from being released to inquirers. To request full privacy and restrict the release of directory information, students must bring a photo ID to the Office of the Registrar during business hours to complete a privacy form.

## Student Consent for Release of Non-directory (Confidential) Information

Students may authorize the university to release educational records to parents, spouses or other third parties by granting consent in their student portal. The Privacy Settings (http://www.colorado.edu/registrar/students/records/privacy/) webpage has more information about various options for granting and restricting access to student records.

## Release of Disciplinary Information

Provisions of the Family Educational Rights and Privacy Act of 1974, as amended by the Higher Education Amendments of 1998, govern access to a student's academic transcript or conduct file. The student and/or those university officials who demonstrate a legitimate educational need for disciplinary information may have access to the student's conduct file.

Parent(s) who provide proof that a student is a dependent as defined in Section 152 of the Internal Revenue Code of 1954 (i.e., a copy of the last federal income tax return listing the student as a dependent) may have access to the student's conduct file without written consent of the student. In this case, parents may have access to a conduct file, even if the student has requested otherwise.

In addition, parent(s) may be notified if a student under 21 is found responsible for a violation involving use or possession of alcohol and controlled substances. All other inquiries, including but not limited to inquiries from employers, government agencies, news media, family, friends or police agencies, require a written release from the student before access to university conduct files is granted. Exception: information may be released pursuant to a lawfully issued subpoena and as provided by the Campus Security Act as amended by the Higher Education Amendments of 1992.

The Campus Security Act permits higher education institutions to disclose to alleged victims of any crime of violence (e.g., murder, robbery, aggravated assault, burglary, motor vehicle theft, arson) the results of the conduct proceedings conducted by the institution against an alleged perpetrator with respect to such crime. The Campus Security Act also

requires that both the accused and the accuser be informed of campus conduct proceedings involving a sexual assault.

# Student Finances

All admission decisions are made without regard to students' financial need. Financial assistance may be available in the form of federal and private educational loans, grants, work-study and scholarships. Students who wish to be considered for financial aid, or law scholarships that require financial-need, should complete the Free Application for Federal Student Aid (FAFSA) (https://studentaid.gov/h/apply-for-aid/fafsa/) as soon as possible.

Eligible students are offered Federal Direct Unsubsidized Loans up to a maximum of $20,500 per year. Federal Graduate PLUS loans are also available, but require a credit check. Private loans (https://www.colorado.edu/financialaid/node/29/) have interest rates and fees that vary according to the lender, the credit rating of the student, and whether there is a co-signer. Both loan fees and interest rates may be higher than federal loans and there is no cap on interest rates.

# Scholarships, Fellowships and Awards

A number of competitive scholarships, fellowships and awards are provided annually. All first-year students are considered for scholarships at the time of admission, however, it's possible for scholarships to be awarded through August. Colorado Law also offers some scholarships to second-year and third-year students each spring. These scholarships are awarded based on academic performance and other criteria.

# Tuition Classification

## In-State and Out-of-State Tuition Classification

Tuition classification is governed by state law and by judicial decisions that apply to all public institutions of higher education in Colorado. Since tuition classification is governed by state law (https://www.colorado.edu/registrar/students/state-residency/guidelines/), the University of Colorado cannot alter or waive the eligibility criteria for any reason, including financial hardship or academic excellence.

New students are classified as Colorado residents (in-state) or nonresidents (out-of-state) for tuition purposes based on information provided on their admission application and other relevant information. Applicants may be required to submit evidence substantiating their claim of in-state eligibility.

Current nonresident students who believe they have become eligible for a change to resident classification must submit a petition with documentation to have their eligibility reviewed. The petition requirements, deadlines for submission, explanation of Colorado tuition classification statutes, specific legal residency exceptions and Office of the Registrar contact information are available on the Tuition Classification (http://www.colorado.edu/registrar/students/state-residency/) webpage.

- For undergraduate students who are not yet 23 years old when a term begins, classification is based upon the domicile of a biological parent or court-appointed legal guardian.
- In order for a student to qualify for resident classification through their own domicile information, they must be one of the following: at least 23 years old on the first day of the term, or married for at least one year before the first day of the term, or entering the second year of a graduate program.
- There are rare individuals who may qualify for resident classification as an emancipated minor (under the age of 23) if they are able to prove that they are totally financially and residentially independent.

## Basic Requirements for Establishing Colorado Residency

To become eligible for resident classification, a person must establish legal residence in Colorado. Legal residence, or "domicile," is defined as a person's true, fixed, and permanent home and place of habitation. No person may establish domicile in Colorado solely for the purpose of obtaining in-state tuition benefits.

The qualifying person must demonstrate at least 12 consecutive months of Colorado domicile immediately preceding the beginning of the term for which the student is seeking resident classification. Domicile includes both physical presence and evidence of intent to stay, which is demonstrated by establishing legal ties to Colorado.

To be eligible to *begin* the 12-month period to establish Colorado domicile, an individual must be at least one of the following:

- 22 years of age or older
- Married
- A graduate student
- An emancipated student
- The parent of a student under the age of 23

## Unemancipated Minors

Students under age 23 who depend on their parents for support may qualify for in-state tuition if either of their parents, regardless of custody, has been domiciled in Colorado for 12 consecutive months preceding the first day of class in a given semester, even if the student resides elsewhere. In certain circumstances, students may qualify through their parents up to age 23.

## Emancipation

An emancipated minor is an individual under age 23 who demonstrates total financial and residential independence. This means the student's parents and all others have entirely surrendered the right to the student's care, custody and earnings, and make no provision for support of any kind. Emancipation is very rare; undergraduates under age 23 who do not have a parent domiciled in Colorado are highly unlikely to be classified as a Colorado resident student.

Students who provide false information to evade payment of out-of-state tuition or who fail to provide timely notice of their loss of in-state eligibility as an emancipated minor are subject to retroactive assessment of out-of-state tuition, as well as disciplinary and legal actions.

## Evidence of Domicile

Establishing Colorado domicile includes actions that would be expected of any permanent resident. Pursuant to Colorado law, the following are actions that may be considered evidence of domicile:

- Filing a tax return in Colorado and, if applicable, payment of Colorado state income tax.

- Colorado driver's license or Colorado ID card within 120 days of move to Colorado.
- Colorado vehicle registration within 180 days of move to Colorado.
- Voter registration in Colorado.
- Graduation from a Colorado high school.
- Lease or deed showing permanent occupancy of residential real property in Colorado.
- Continued residence in Colorado while not enrolled as a student and during semester breaks.
- Permanent employment or acceptance of future employment in Colorado
- Any other factor particular to the individual that tends to establish the necessary intent to make Colorado a permanent home.

No single factor constitutes proof of domicile. All evidence, both positive and negative, is considered. Not all of the listed items are necessary, however individuals should take action on all factors that are applicable to their circumstances. For more information on all requirements, see the Tuition Classification (http://www.colorado.edu/registrar/students/state-residency/) webpage.

# Domicile Exceptions

Colorado tuition law provides the following rare exceptions to the one-year domicile requirement in certain circumstances:

- Colorado National Guard members
- Members of American Indian Tribes with Historical Ties to Colorado
- Active duty military stationed in Colorado and their dependents
- Honorably discharged members of the U.S. Armed Forces and their dependents
- Returning active-duty military members
- Canadian military stationed in Colorado
- ASSET law qualified students with one year Colorado High School attendance (must have attended a Colorado high school for at least one year preceding the date of graduation; also requires Colorado high school graduation/Colorado GED ***and*** 12 consecutive months of physical presence in Colorado prior to enrolling at the institution)
- Children of new faculty members at Colorado state colleges and universities
- Employees of companies moving to Colorado receiving government economic incentives
- Western Regional Graduate Program enrollees in specific major fields of study
- Olympic athletes training in Colorado
- Others (see Residency Exceptions for Domicile (http://www.colorado.edu/registrar/students/state-residency/domicile-exceptions/) webpage)

Requirements, including spouse and child eligibility, and a list of qualifying tribes are detailed on the Residency Exceptions for Domicile (http://www.colorado.edu/registrar/students/state-residency/domicile-exceptions/) webpage.

# University Policies

## Alcohol and Other Drugs

In order to create the best possible environment for teaching and learning, the University of Colorado Boulder affirms its support for a responsible campus policy that addresses the inappropriate use of alcohol and other drugs.

In compliance with the federal Drug Free Schools and Communities Act, the University of Colorado Boulder prohibits the unlawful manufacture, possession, use or distribution of a controlled substance (illicit drugs and alcohol) of any kind and in any amount. These prohibitions cover any individual's actions that are part of any university activities, including those occurring while on university property or in the conduct of university business away from the campus.

Information on policies, penalties, health effects and resources available to students and staff regarding alcohol and other drugs can be found on the Alcohol & Other Drugs Information (http://www.colorado.edu/aod/) website.

These policies are also described by various university offices in several publications:

- **Campus housing:** See the Residential Handbook (https://www.colorado.edu/living/housing/policies-forms-and-accommodations/#residential_handbook-1317) webpage.
- **Student Code of Conduct:** See the Student Code of Conduct (https://www.colorado.edu/sccr/).
- **Safety:** Annual Security and Fire Safety Report (https://www.colorado.edu/clery/annual-security-fire-safety-report-asfsr/).

Individual and group counseling for students with substance abuse concerns is available through Counseling and Psychiatric Services. For more information, visit the Counseling and Psychiatric Services (https://www.colorado.edu/counseling/services/substance-use-services/) webpage or call 303-492-2277.

### Smoking

For student health and the health of our community, smoking is prohibited in all campus buildings and on all campus grounds.

At this time, the use of smoking products of any sort shall be prohibited on all university-owned and operated campus grounds both indoors and outdoors. This smoking ban does not apply to public rights-of-way (sidewalks, streets) on the perimeter of the campus.

"Smoking," as used in this policy, means smoking any substance, including but not limited to, tobacco, cloves or marijuana. "Smoking products" include, but are not limited to, all cigarette products (cigarettes, bidis, kreteks, e-cigarettes, etc.) and all smoke-producing products (cigars, pipes, hookahs, etc.). University-owned and operated campus grounds include, but are not limited to: all outdoor common and educational areas; all university buildings; university-owned on-campus housing; campus sidewalks; campus parking lots; recreational areas; outdoor stadiums; and university-owned and leased vehicles (regardless of location). In keeping with university policy, the sale, distribution and sampling of all tobacco products and tobacco-related merchandise is prohibited on all university-owned and operated property and at university-sponsored events. Littering campus with remains of smoking products is prohibited.

This policy applies to all employees, students, visitors, contractors and externally affiliated individuals or companies renting university-owned space on university-owned and operated property campus grounds.

# Campus Safety

## Personal Safety on Campus

While the University of Colorado Boulder is a relatively safe place to be, the campus is not a haven from community problems. Through the joint effort of various organizations on campus, CU is committed to providing ample safety resources for faculty, staff and students.

Specific efforts to promote safety on campus include the provision of adequate lighting, police protection, educational programs and special prevention programs, such as the CU NightRide escort services and laptop and bicycle registration programs.

In compliance with the federal Clery Act, students and employees receive information on campus security policies and programs, including crime statistics, in an Annual Security and Fire Safety Report (https://www.colorado.edu/clery/annual-security-fire-safety-report-asfsr/). This report will be sent to CU Boulder affiliates by Oct. 1 of each year. In any emergency or life-threatening situation, always call 9-1-1.

Members of the university community are encouraged to report any incident of threatening or harmful behavior to the CU Boulder Police by calling 9-1-1 in an emergency or the non-emergency line, 303-492-6666. Visit Don't Ignore It (http://www.colorado.edu/dontignoreit/) for more information about the wide range of campus and community resources and reporting options available.

Additional safety information can be found on the CU Police Department (http://www.colorado.edu/police/) website. For information on crime alerts, trends and safety tips, follow the CU Police Department on Twitter (@ (https://twitter.com/cuboulderpolice/)CUBoulderPolice) and Facebook (CUBoulderPolice (https://www.facebook.com/CUBoulderPolice/)).

# Communication

## Student Email

All CU students receive an email account from the university, which is an official means of sending information to students. Students are responsible for maintaining this CU email address. The official email address can be used by professors to contact students and provide course-related information. Administrative offices, such as the Office of the Registrar, use official email addresses to contact students and provide important information. Students are responsible for frequently checking their official CU email address. For more information on the student email policy, visit the Student E-mail Policy (http://www.colorado.edu/policies/student-e-mail-policy/) webpage, call the IT Service Center at 303-735-HELP or email HELP@colorado.edu. To learn more about student email accounts, visit the Office of Information Technology's Messaging and Collaboration webpage (https://oit.colorado.edu/node/237/).

# Copyright & Fair Use

The University of Colorado Boulder community respects the intellectual property of others, regardless of the medium by which it is transmitted. This is a cornerstone of academic integrity. We prohibit the use of unauthorized distribution of copyrighted material, which is subject to both civil and criminal penalties as well as university procedures.

Distributing copyrighted materials using peer-to-peer or file-sharing programs is illegal and the university uses technological solutions to deter this activity. Still, the university regularly receives notices of copyright violations and is required by law to take action. Common consequences include loss of network access and referral to the Office of Judicial Affairs. Guidance on campus fair use and copyright issues is provided on the University Libraries (http://www.colorado.edu/libraries/copyright-information/) website.

# Diversity & Nondiscrimination

## Commitment to Diversity

The Division of Student Affairs supports and contributes to creating and sustaining a diverse, multicultural, socially just and inclusive campus climate by learning about, recognizing and honoring the diverse backgrounds, histories, identities and life experiences of all our students, faculty and staff. Our goal is to create an environment in which all campus community members can thrive while feeling welcomed, safe and at home.

At the University of Colorado Boulder, we are committed to building a campus community in which diversity is a fundamental value. People are different and the differences among us are what we call diversity—a natural and enriching hallmark of life. Diversity includes, but is not limited to, ethnicity, race, gender, age, class, sexual orientation, religion, disability, veteran status, gender identity/expression, veteran status, political affiliation or political philosophy, and health status. A climate of healthy diversity is one in which people value individual and group differences, respect the perspectives of others and communicate openly.

"Diversity is a key to inclusive excellence in education. A diverse learning environment better prepares all students for the world that awaits them. CU Boulder is committed to enriching the lives of our students, faculty and staff by providing a diverse campus where the exchange of ideas, knowledge and perspectives is an active part of learning."—from the Guidelines for Diversity Planning *(*https://www.colorado.edu/odece/diversity-plan*/).*

## Nondiscrimination Statement

The University of Colorado Boulder does not discriminate on the basis of race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy in admission and access to, and treatment and employment in, its educational programs and activities. The university takes affirmative action to increase ethnic, cultural, and gender diversity; to employ qualified disabled individuals; and to provide equal access and opportunity to all students and employees.

# Equity & Compliance

The University of Colorado Boulder is committed to maintaining a positive learning, working, and living environment free from discrimination and harassment. The Office of Institutional Equity and Compliance (OIEC) (http://www.colorado.edu/oiec/) addresses all claims of sexual misconduct, harassment and/or discrimination, or related retaliation by students, staff and faculty under the University of Colorado Sexual Misconduct, Intimate Partner Violence and Stalking Policy, the University of Colorado Boulder Policy on Protected-Class Discrimination and Harassment, and the University of Colorado Policy on Conflict of Interest in Cases of Amorous Relationships. The university is committed to addressing concerns and taking appropriate action against those found in violation of these policies.

In response to a report, OIEC determines what immediate and long-term support and safety measures are needed to minimize disruptions to education or employment and to help keep the involved parties and the

campus safe. OIEC also provides education and assessment to identify areas in need of improvement to foster a more welcoming and inclusive culture.

To learn more about university policy or the role and programs offered by OIEC, please visit the Office of Institutional Equity and Compliance (https://www.colorado.edu/oiec/) website or call 303-492-2127.

# Programs of Study

Colorado Law's curriculum provides students one of the best comprehensive legal educations in the nation, employing a solid foundation in the fundamentals of law, robust theoretical inquiry, doctrinal and policy analysis, real world experience, legal reasoning tools and professional skills. Our faculty members are passionate about teaching and are committed to providing a well-rounded learning experience that prepares students to serve wisely and with professionalism.

## Graduate Degrees

- Law - Juris Doctor (JD) (p. 1885)
- Law - Master of Laws (LLM) (p. 1883)
- Law - Master of Studies in Law (MSL) (p. 1884)

## Certificates

- American Indian Law (p. 1888)
- Civil Rights and Racial Justice (p. 1889)
- Energy, Environmental, and Natural Resources Law and Policy (https://catalog.colorado.edu/law/programs-study/natural-resources-law-policy-graduate-certificate/)
- Entrepreneurial Law (p. 1890)
- Health Law and Policy (p. 1891)
- International Law (p. 1892)
- Juvenile and Family Law (p. 1893)
- Tax Emphasis (p. 1894)

## Faculty

While many faculty teach both undergraduate and graduate students, some instruct students at the undergraduate level only. For more information, contact the faculty member's home department.

Aaronson, Norman F. (https://experts.colorado.edu/display/fisid_100377/)
Professor Emeritus; JD, Boston University

Anaya, S. James (https://experts.colorado.edu/display/fisid_157985/)
Distinguished Professor, Endowed/Named Professor; JD, Harvard Law

Bauer, Amy (https://experts.colorado.edu/display/fisid_148723/)
Senior Instructor, Faculty Director, Assistant Dean; JD, College of William and Mary

Benhalim, Rabea (https://experts.colorado.edu/individual/fisid_165324/)
Associate Professor, Faculty Director; JD, University of Texas at Austin

Bernthal, John Bradley (https://experts.colorado.edu/display/fisid_142379/)
Associate Professor, Faculty Director; JD, University of Colorado Boulder

Bloom, Frederic M. (https://experts.colorado.edu/display/fisid_151709/)
Professor, Endowed/Named Professor, Associate Dean; JD, Stanford University

Briscoe, Georgia K. (https://experts.colorado.edu/display/fisid_105331/)
Senior Instructor Emerita; MA, University of San Diego

Bruff, Harold (https://experts.colorado.edu/display/fisid_109137/)
Professor, Dean Emeritus; JD, Harvard University

Buckner Inniss, Lolita
Dean, Distinguished Professor; PhD, York University (Canada)

Campos, Paul F. (https://experts.colorado.edu/display/fisid_102518/)
Professor; JD, University of Michigan Ann Arbor

Cantrell, Deborah Jane (https://experts.colorado.edu/display/fisid_144607/)
Professor, Faculty Director, Endowed Chair; JD, University of Southern California

Carpenter, Kristen Ann (https://experts.colorado.edu/display/fisid_147188/)
Professor, Endowed/Named Professor, Faculty Director; JD, Harvard University

Chapin, Violeta Raquel (https://experts.colorado.edu/display/fisid_147683/)
Associate Dean, Faculty Director; JD, New York University

Ciota, Rebecca (https://experts.colorado.edu/display/fisid_167609/)
Librarian; MLIS, University of Illinois at Urbana-Champaign

Collins, Richard B. (https://experts.colorado.edu/display/fisid_101884/)
Professor Emeritus; LLB, Harvard University

Cushing, Matthew
Director; JD, University of Pennsylvania

Dalton, Shamika (https://experts.colorado.edu/display/fisid_173969/)
Associate Professor; JD, North Carolina Central University

DeForest, Denise (https://experts.colorado.edu/display/fisid_158832/)
Instructor, Director for Academic Support; JD, Georgetown University

Desautels-Stein, Justin Jacob (https://experts.colorado.edu/display/fisid_147370/)
Associate Professor; LLM, Harvard University; JD, University of North Carolina, Chapel Hill

England, Margaret Ann (https://experts.colorado.edu/display/fisid_142239/)
Clinical Professor; JD, University of Denver

Francis, John A.
Instructor; JD, University of Michigan Ann Arbor

Funk, Samantha
Assistant Professor; JD, University of Michigan

Furman, H. Patrick
Professor Emeritus; JD, University of Colorado Boulder

Gerding, Erik F. (https://experts.colorado.edu/display/fisid_149723/)
Professor, Endowed/Named Professor; JD, Harvard University

Gulasekaram, Pratheepan (https://experts.colorado.edu/display/fisid_173498/)
Professor; JD, Stanford University

Guruswamy, Lakshman (https://experts.colorado.edu/display/fisid_120000/)
Professor Emeritus, Professor; PhD, University of Durham (England)

Hall, Megan
Legal Writing Professor; JD, University of Colorado Boulder

Hendricks, Jennifer Susan (https://experts.colorado.edu/display/fisid_151111/)
Professor; JD, Harvard University

Hill, David
Professor Emeritus; JD, University of Nebraska-Lincoln

Hynes, Dennis
Professor Emeritus; LLB, University of Colorado Boulder

Jamshidi, Maryam (https://experts.colorado.edu/display/fisid_173668/)
Associate Professor; JD, University of Pennsylvania

Kalwara, James (https://experts.colorado.edu/display/fisid_158919/)
Librarian; MLS, Indiana University Bloomington

Kaminski, Margot E. (https://experts.colorado.edu/display/fisid_159595/)
Associate Professor, Faculty Director; JD, Yale University

Kay, Melanie
Instructor, Director for Daniels Fund Ethics Initiative; JD, University of California, Berkeley

Kiernan-Johnson, Derek Huntley (https://experts.colorado.edu/display/fisid_145008/)
Legal Writing Professor, Senior Instructor; JD, University of Michigan Ann Arbor

Krakoff, Sarah A. (https://experts.colorado.edu/display/fisid_109697/)
Professor, Endowed/Named Professor; JD, University of California, Berkeley

Krishnamurthy, Vivek (https://experts.colorado.edu/display/fisid_174200/)
Associate Professor; JD, Yale University

Loewenstein, Mark J. (https://experts.colorado.edu/display/fisid_102088/)
Professor, Endowed/Named Professor; JD, University of Illinois at Urbana–Champaign

Marks, Alexia Brunet (https://experts.colorado.edu/display/fisid_147610/)
Associate Professor, Associate Dean; PhD, Purdue University

Matsumoto, Sarah (https://experts.colorado.edu/display/fisid_173769/)
Clinical Associate Professor; JD, Seattle University

Moss, Scott A. (https://experts.colorado.edu/display/fisid_144741/)
Professor; JD, Harvard University

Mountin, Zachary (https://experts.colorado.edu/display/fisid_165640/)
Clinical Associate Professor, Instructor Adjunct; JD, University of Colorado Boulder

Mueller, Christopher B. (https://experts.colorado.edu/display/fisid_103756/)
Professor, Endowed Chair; JD, University of California, Berkeley

Nagel, Robert (https://experts.colorado.edu/display/fisid_101312/)
Professor; JD, Yale University

Nevelow Mart, Susan
Professor Emerita; MLS, San Jose State University

Norton, Helen Louise (https://experts.colorado.edu/display/fisid_144613/)
Professor, Endowed Chair; JD, University of California, Berkeley

Orian Peer, Nadav (https://experts.colorado.edu/display/fisid_165323/)
Associate Professor; SJD, Harvard University

Pappas, Michael (https://experts.colorado.edu/display/fisid_171742/)
Professor; JD, Stanford University

Parsons, Amanda (https://experts.colorado.edu/display/fisid_169702/)
Assistant Professor; JD, Yale University

Penn, Michelle (https://experts.colorado.edu/display/fisid_171985/)
Head of Library Services; JD, Washington University in St. Louis

Pizzi, William
Professor Emeritus; JD, Harvard University

Policastri, Joan Frances (https://experts.colorado.edu/display/fisid_153867/)
Librarian; MLS, University of Denver

Ramsey, Carolyn (https://experts.colorado.edu/display/fisid_118536/)
Professor; JD, Stanford University

Reid, Blake E. (https://experts.colorado.edu/display/fisid_152860/)
Associate Professor; JD, University of Colorado Boulder

Robinson, Colene Flynn (https://experts.colorado.edu/display/fisid_140754/)
Clinical Professor; JD, Loyola University of Chicago

Roithmayr, Daria
Professor; JD, Georgetown University

Said, Wadie
Professor; JD, Columbia University

Schlag, Pierre J. (https://experts.colorado.edu/display/fisid_105653/)
Distinguished Professor, Endowed/Named Professor; JD, University of California, Los Angeles

Schwartz, Andrew Abraham (https://experts.colorado.edu/display/fisid_146092/)
Professor; JD, Columbia University

Simon, Peter
Associate Professor Emeritus; JD, University of California, Berkeley

Skinner-Thompson, Jonathan (https://experts.colorado.edu/display/fisid_164900/)
Associate Professor; JD, Duke University

Skinner-Thompson, Scott (https://experts.colorado.edu/display/fisid_159158/)
Associate Professor; JD, New York University

Speck, Sloan G. (https://experts.colorado.edu/display/fisid_155972/)
Associate Professor; LLM, New York University

Spencer, Doug (https://experts.colorado.edu/display/fisid_167579/)
Associate Dean, Associate Professor; PhD, University of California-Berkeley

Squillace, Mark S. (https://experts.colorado.edu/display/fisid_140895/)
Professor, Endowed/Named Professor; JD, University of Utah

Stafford, Gabrielle Marks (https://experts.colorado.edu/display/fisid_115917/)
Legal Writing Professor, Senior Instructor; JD, Boston University

Stafford, Todd (https://experts.colorado.edu/display/fisid_120676/)
Legal Writing Professor, Faculty Director, Senior Instructor; JD, Duke University

Stanton, Christina (https://experts.colorado.edu/display/fisid_156456/)
Clinical Professor; JD, University of Colorado Boulder

Sullivan, Jennifer (https://experts.colorado.edu/display/fisid_157727/)
Assistant Teaching Professor; JD, Duke University

Surden, Harry Adam (https://experts.colorado.edu/display/fisid_146083/)
Professor, Faculty Director; JD, Stanford University

Thompson, Jane Ellen (https://experts.colorado.edu/display/fisid_103388/)
Senior Instructor Emerita; JD, University of Denver

Travers, Art
Professor Emeritus; LLB, Harvard University

Waggoner, Michael
Professor Emeritus; LLB, Harvard University

Weiser, Philip J. (https://experts.colorado.edu/display/fisid_114575/)
Adjunct Faculty, Dean Emeritus, Professor; JD, New York University

Wesson, Marianne
Professor Emerita; JD, University of Texas at Austin

# Courses

**LAWS 5064 (1-2) Legal Analysis**
Designed to help students develop the analytical skills necessary for success in law school and on the bar exam. Students will strengthen their core analytical skills, written communication skills, and ability to retain information. The ability to engage legal questions at the highest level is a skill that can be practiced and improved.
**Requisites:** Restricted to Professional Year 1 Law students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Research and Writing

**LAWS 5103 (1) Legal Ethics & Professionalism: What Kind of Lawyer Do You Want to Be?**
Explores both the kind of law students might decide to practice and the ethical, personal and professional commitments central to the practice of law.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 5121 (4) Contracts**
Covers basic principles of contract liability, offer, acceptance and consideration, statute of frauds, contract remedies, the parole evidence rule, performance of contracts, conditions, effect of changed circumstances, third-party beneficiaries, assignment and specific performance.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 5201 (1) Entrepreneurship, Innovation and Public Policy**
Explores cutting edge questions around entrepreneurship, including being an entrepreneur, leadership and what makes a great founding team, building and scaling a business, entrepreneurial communities, financing entrepreneurial companies, leadership in government, entrepreneurship and innovation policy.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Business

**LAWS 5203 (1) Legal Ethics, Professionalism and Creative Problem Solving**
Developing reflective, creative problem solving and ethical legal professionals by touching a core set of issues facing lawyers, including the duty of confidentiality to clients and the hazard of conflicts of interest, providing students with an opportunity to confront these challenges in an interactive and engaged environment.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Electives

**LAWS 5205 (3) Legislation and Regulation**
Introduces lawmaking in the modern administrative state. Examines the way Congress and administrative agencies adopt binding rules of law (statutes and regulations, respectively) and the way that implementing institutions, courts and administrative agencies, interpret and apply these laws. Considers the structure of the modern administrative state, the incentives that influence the behavior of the various actors, and the legal rules that help to structure the relationships among Congress, the agencies and the courts.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 5211 (1) Framing and Legal Narrative**
Thinking through the fundamental concepts that inform and animate different areas of law.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail

**LAWS 5223 (2) Legal Writing II**
Students prepare appellate briefs and related documents and deliver oral arguments before a three-judge court composed of faculty, upper-division students, and practicing attorneys. Practice arguments are videotaped and critiqued.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 5226 (2) Legal Writing I**
Provides an intensive introduction to the resources available for legal research. Students also prepare written material of various kinds designed to develop research skills, legal writing style, and analysis of legal problems.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 5303 (4) Civil Procedure**
Studies modern practice in civil suits, including rules governing pleading, joinder of parties, discovery, jurisdiction of courts over the subject matter and parties, right to jury trial, appeals, and res judicata and collateral estoppel, with emphasis on the Federal Rules of Civil Procedure and their Colorado counterpart.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 5323 (1) Courtroom Observation Civil**
An elective that requires 15 hours observing actual civil proceedings in a courtroom, attending a two-hour class meeting every other week, preparing and submitting a journal of recorded observations. Figuring out how to gain access to appropriate proceedings is part of the student's work, although the professor is available for advice and guidance.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 5425 (3) Torts**
Studies nonconsensual allocation of losses for civil wrongs, focusing primarily on concepts of negligence and strict liability.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 5503 (4) Criminal Law**
Studies statutory and common law of crimes and defenses, the procedures by which the law makes judgments as to criminality of conduct, the purposes of criminal law, and the constitutional limits upon it.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 5513 (1) Courtroom Observation Criminal**
An elective that requires 15 hours observing actual criminal proceedings in a courtroom, attending a two-hour class meeting every other week, preparing and submitting a journal of recorded observations. Figuring out how to gain access to appropriate proceedings is part of the student's work, although the professor is available for advice and guidance.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 5624 (4) Property**
Topics include personal property, estates and interests in land, landlord-tenant, basic land conveyancing, and private land use controls.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Property

**LAWS 5646 (1) Foundations of Legal Research**
Designed to move students from the brief introduction to legal research offered in the first-year legal writing classes to the problem-centered research students will perform starting in the summer after their first year. Provides students with a conceptual understanding of the organization and connectivity of legal authority and with instruction in research methodology at both the project and resource levels.
**Requisites:** Restricted to Professional Year 1, 2, or 3 Law students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Research and Writing

**LAWS 5803 (1) Courtroom Observation International**
An elective that requires fifteen hours observing proceedings before an international tribunal(s), attending a two-hour class meeting every other week, preparing and submitting a journal of recorded observations. The proceedings observed will be available streaming online and the professor will provide information about how to gain access to them.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 6002 (3) Public Land Law**
Deals with the legal status and management of resources on federal lands, including national forests, parks and BLM lands. Explores federal law, policy, and agency practice affecting the use of mineral, timber, range, water, wildlife and wilderness resources on public lands.
**Requisites:** Requires prerequisite course of LAWS 6112 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 6004 (3) Real Estate Transactions**
Focuses on legal issues that arise in all phases of real estate transactions, with an emphasis on the role of the lawyer in the business of real estate as well as on the regulation of real estate markets.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Property

**LAWS 6005 (4) Constitutional Law**
Studies constitutional structure: judicial review, federalism, separation of powers; and constitutional rights of due process and equal protection.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 6007 (4) Income Taxation**
Emphasizes the fundamentals of the federal income tax system and examines its impact on the individual.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 6700
**Requisites:** Restricted to Professional Year 1, 2, or 3 Law students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Taxation

**LAWS 6008 (3) Foundations of International Legal Thought**
Provides students with a broad historical and philosophical introduction to international law. Addresses changing conceptions of sovereignty between 1492 and World War II, I the contexts of the Spanish conquest of the Americas, the international legality of the slave trade, relations between the Ottoman Empire and the "Great Powers", the Chinese opium wars and the rise of modern international institutions.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 6009 (4) Legal Aid Civil Practice 1**
Emphasizes procedural and practical remedies and defenses available in civil litigation. Assigns civil cases related to the course material. Develops working knowledge of courtroom skills.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 6019 (4) Civil Practice Clinic 2**
Emphasizes procedural and practical remedies and defenses available in civil litigation. Assigns civil cases related to the course material. Develops working knowledge of courtroom skills.
**Requisites:** Requires prerequisite or corequisite course of LAWS 6353 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 6021 (3) Secured Transactions**
Explores the methodology and policies of Article 9 of the Uniform Commercial Code, dealing with financing transactions in personal property.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 6029 (4) Criminal and Immigration Defense Clinic**
Provides thorough grounding in problems of criminal defense. Students defend indigent misdemeanants in Boulder courts. Develops working knowledge of courtroom skills.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 6031 (2) Consumer Protection Laws and Policies**
Focuses on deceptive trade practices and consumer rights. Reviews the law of deception/misrepresentation at common law, and federal and state laws regarding unfair acts and practices. Covers credit practices, environmental and health claims, and telecommunications and privacy. Discusses remedies, including governmental enforcement actions, and individual and class actions.
**Grading Basis:** Letter Grade

**LAWS 6035 (3) White Collar Crime**
Examines distinctions between white collar crime and other types of criminal activity and the needs for and arguments against white collar laws and law enforcement. Studies securities fraud, mail and wire fraud, insider trading, money laundering, false statements, conspiracy and criminal forfeiture statutes. Includes use of the grand jury, privileges applicable in the corporate setting, immunity, discovery and the impact of parallel civil proceedings. Examines effect of government policy on corporations and their counsel, pre-trial and trial strategy, jury selection and victim notification and restitution options.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 6039 (4) Criminal Defense Clinic 2**
Provides thorough grounding in problems of criminal defense. Students defend indigent misdemeanants in Boulder courts. Develops working knowledge of courtroom skills.
**Requisites:** Requires prerequisite or corequisite course of LAWS 6353 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 6045 (3) Criminal Procedure**
Focuses primarily on the constitutional limitations applicable to such police investigative techniques as arrest, search, seizure, electronic surveillance, interrogation and lineup identification.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 6055 (3) Post-Conviction Criminal Procedure**
Addresses sentencing process and schemes, direct appeals, probation modification and revocation, parole revocation, pardon and commutation processes, post-conviction litigation and appeal in both state and federal court, federal review of state convictions through habeas and/or the AEDPA, and ethical issues that arise in post-conviction proceedings.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 6059 (2-3) Legal Aid and Defender**
**Grading Basis:** Letter Grade

**LAWS 6060 (3) White Collar Crime Practicum**
Addresses the non-trial portion of white collar criminal law. Drawing examples and problems from wire fraud, securities fraud, health care, and computer fraud contexts, explores a white collars case's major investigative and charging phases, corporate and organizational issues, as well as pleas and punishment.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 6069 (4) Immigration Clinic**
Emphasizes practice skills in immigration cases. Includes litigation before Federal Immigration judges, Board of Immigration Appeals, and Federal Circuit Court of Appeals.
**Requisites:** Requires prerequisite or corequisite course of LAWS 6353 (minimum grade D-).
**Grading Basis:** Pass/Fail

**LAWS 6079 (4) Criminal Defense Clinic**
Provides thorough grounding in problems of criminal defense. Students defend indigent misdemeanants. Develops working knowledge of courtroom skills, advocacy and evidence presentation. Concludes with full mock trial.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 6099 (4) Family Law Clinic**
Represents low-income clients in family law cases in local state district court. Students will gain court-based experience in dissolution's and allocations of parental responsibilities. Seminar component includes instruction on substantive family law, related ethical issues, and theoretical backgrounds of poverty lawyering.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation, Negotiation Alt Dispute Resolution

**LAWS 6103 (2-3) Legal Ethics Professionalism**
Examines the legal profession as an institution, its history and traditions and the ethics of the bar with particular emphasis on the professional responsibilities of the lawyer. Discusses the Model Rules of Professional Conduct.
**Requisites:** Restricted to Professional Year 1, 2, or 3 Law students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 6104 (3) Wills and Trusts**
Covers intestate succession; family protection; execution of wills; revocation and revival; will contracts and will substitutes; creation of trusts;modification and termination; charitable trusts; fiduciary administration, including probate and contest of wills; construction problems in estate distribution.
**Requisites:** Restricted to Professional Year 1, 2, or 3 Law students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Property

**LAWS 6108 (3) Conflict of Laws**
Addresses the conflicts that arise when the significant facts of a case are connected with more than one jurisdiction, whether that jurisdiction belongs to a state, the federal government, or a foreign government. The subject is studied in its theoretical and historical context, with special emphasis on the international aspects of extraterritorial jurisdiction.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 6109 (2) Trial Advocacy**
Focuses on voir dire, opening statement, direct examination of witnesses and cross examination.
**Requisites:** Restricted to Professional Year 1, 2, or 3 Law students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 6112 (3) Foundations of American Natural Resources Law**
Introduces students to the law of natural resources. Examines the legal, historical, political, and intellectual influences that shape resources development and conservation.
**Requisites:** Restricted to Professional Year 1, 2, or 3 Law students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 6113 (2) Legal Ethics and Professionalism: Ethics and the Law of Lawyering**
Continuation of LAWS 5103. Focuses on the Model Rules of Professional Conduct. Provides the nuts and bolts of the ethical rules needed to begin to explore externships, clinics, pro bono projects and other practice experiences during law school.
**Requisites:** Requires prerequisite course of LAWS 5103 (mimimum grade D-). Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 6114 (2) Construction Law**
Focuses on the basic principles and practices of construction law. Provides an overview of construction industry participants and players (engineers, contractors, insurers) and discusses and analyzes the various obligations and liabilities of these parties. Covers construction and design contracting, construction claims, professional negligence, construction insurance and suretyship and ADR in construction. Provides transactional-practice oriented exercises.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Property

**LAWS 6115 (2-3) Representing the Spanish-Speaking Client**
This course is a survey of the substantive law of matters likely to be encountered by attorneys representing Spanish-speaking clients in Colorado. Topics may include, among others, family law, criminal law, employment law, wage theft, and consumer rights. The course will not only introduce legal Spanish vocabulary, but more importantly, it will teach students how to communicate legal concepts so as to be understood by the clients.
**Grading Basis:** Letter Grade

**LAWS 6119 (1) Deposition Skills**
Provides valuable skills to assume active roles in the deposition process. Explores why and when to take depositions; drafting and objecting to deposition notices for individual deponents, non-party witnesses and corporate designees; drafting successful outlines, proper questions and objections; using exhibits; furthering case theory, making and using stipulations; using depositions in pretrial motions and at trial.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 6122 (2) International Natural Resources Law and Policy**
Examines the suite of policy issues and legal ramifications associated with sustainable natural resource development. Examines most recent research on the "resource curse" theory. Examines recent policy developments and discussions that have occurred among industry, NGOs, multilateral development agencies and governments. Examines issues related to bribery and corruption in developing country environments and dispute resolution mechanisms at national and local levels.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment Natural Resources
Departmental Category: International Comparative Law

**LAWS 6123 (2) Legislative and Policy Drafting**
Exposes students to the process of drafting and amending enacted legal texts such as statutes, regulations, and polities of both governmental and non-governmental entities. Students will critically examine lawyers' roles as counselors, advocates and experts in different legislative and policy-drafting contexts.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 6128 (1-3) Statutory Interpretation**
Examines theories of legislation and the relation between legislatures and courts, emphasizing problems of statutory interpretation and other issues in the judicial use or misuse of statutes.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 6157 (3) Corporate Taxation**
Examines the federal income taxation of ¿subchapter C¿ corporations and their shareholders. Topics may include choice of entity, operations, distributions, redemptions, formations, liquidations, taxable asset and stock acquisitions, and tax-free reorganizations (that is, mergers and acquisitions).
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 6450
**Requisites:** Requires prerequisite course of LAWS 6007 (minimum grade D-). Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Taxation

**LAWS 6167 (3) Partnership Taxation**
Examines the federal income taxation of partnerships and other pass-through entities, which represent most small businesses in the United States. Topics may include the allocation of operating income and deductions among owners, contributions and distributions of property, and acquisitions and dispositions of partnership interests by partners.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 6430
**Requisites:** Requires a prerequisite course of LAWS 6007 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Taxation

**LAWS 6170 (1-2) E-Discovery**
Exposes students to the legal and practical challenges presented by E-discovery and how electronically stored information shapes litigation and the pretrial process. Students gain an understanding of how electronically stored information can impact an overall discovery strategy and how this complicates a lawyer's ethical and professional obligations.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 6201 (3-4) Agency, Partnership, and the LLC**
Surveys agency law whose principles are important in many other areas of law. Studies the legal organizations commonly used by small businesses: partnerships and limited liability companies (LLCs).
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 7621 and LAWS 6211
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 6207 (2) Writing in the Regulatory State**
Provides an umbrella for several advanced business law sections, each providing an intensive intellectual experience for law students by requiring them to connect deep concepts and knowledge from basic business courses to complex transactional environments. Students are required to solve client problems and negotiate transactions in the face of intricate and conflicting legal regimes that sprawl across doctrinal fields.
**Grading Basis:** Letter Grade

**LAWS 6209 (4) Community Collaboration Law Lab**
Provide legal and policy advice, guidance and representation related to sustainable development with a focus on fostering social enterprise, healthy communities and poverty reduction.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Grading Basis:** Letter Grade

**LAWS 6211 (3-4) Corporations**
Covers formation of corporations and their management; relations among shareholders, officers and directors; the impact of federal legislation on directors' duties; the special problems of closed corporations.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 7621 and LAWS 6201
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 6213 (2) Advanced Appellate Advocacy**
Advanced study and practice of written and oral appellate advocacy. Builds on the first-year advocacy course, but provides more advanced techniques for brief writing, and preparing for and conducting oral argument. Students are required to write an appellate brief and participate in several oral arguments, and receive detailed, one-on-one critiques of work product.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 6217 (3) Estate and Gift Tax Planning**
Explores structural and planning aspects of the current federal wealth transfer tax system, including the federal tax code provisions governing estate and gift taxation.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 7217 or ACCT 6720
**Requisites:** Requires prerequisite course of LAWS 6104.
**Recommended:** Prerequisite LAWS 6007.
**Grading Basis:** Letter Grade

**LAWS 6221 (3) Compliance**
Covers requirements for corporate compliance programs and key components of them, including the role of audit committee, internal audit and ethics and compliance. Looks closely at different compliance regimes, including Sarbanes Oxley, the privacy and security components of the Health Insurance Portability and Accountability Act of 1996 (HIPAA), the evolution of other data privacy standards and the anti-corruption standards of the Foreign Corrupt Practices Act and the UK Bribery Act.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 6223 (3) Research and Writing in the Regulatory State**
Focus on developing in students the research, writing and analytical skills necessary to operate within any highly regulated field. Students will work broadly on research and writing skills required in a regulatory practice and narrowly on how that applies to particular areas of expertise, to gain an understanding of a particular area of the law.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 6226 (1-3) Advanced Legal Writing**
Builds on skills learned in the first-year legal writing course to improve written legal analysis. Students will complete multiple written assignments and will receive individual feedback on their work. Sections vary significantly depending on the professor; please check the Legal Writing page of the Colorado Law website to read each professor's course description.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 6228 (1) Writing in Context**
Provides the opportunity to improve legal writing and analytical skills in a particular field of law. This course will be offered in conjunction with a doctrinal course, and the writing assignments will be based on the law taught in the doctrinal course. Students enrolled in this course will need to be concurrently enrolled in the doctrinal course.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to 2L or 3L students only.
**Grading Basis:** Letter Grade

**LAWS 6236 (2) Judicial Opinion Writing**
Considers the contemporary American judicial opinion in historical and comparative context. Examines institutional constraints and emerging challenges to judicial decision-making. Analyzes individual opinion authors¿ writing styles. Builds upon the first-year legal-writing curriculum. Challenges students to develop a personal style and approach to writing and editing opinions.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 6246 (2) Introduction to United States Legal System/Legal Reasoning, Research and Writing**
Introduces students without a law degree to the basic structure and content of the United States legal system, examining how the three branches of government at the state and federal levels make law and policy in the United States. The course will provide a basic introductory overview of the following: the various sources of law, including an understanding of how statutes are enacted by legislative institutions; the role of the United States court system in interpreting laws; application of judicial precedent in common-law systems; trial and appellate court procedures; and judicial review standards. The course will also introduce students to the methodology of American law, including legal reasoning, research, and writing, through a variety of in-class and outside research and writing assignments.
**Grading Basis:** Letter Grade

**LAWS 6270 (1-2) Law and Mathematics**
Covers basic mathematical concepts frequently encountered in the practice of law. Examines the relationships between evidence, calculation, and truth. Intended especially for students who lack confidence in their math skills and/or have not previously studied statistics, but all are welcome.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Electives

**LAWS 6271 (1-2) Special Topics: Deals Lab**
Provides an umbrella for several advanced business law sections, each providing an intensive intellectual experience for law students by requiring them to connect deep concepts and knowledge from basic business courses to complex transactional environments. Students are required to solve client problems and negotiate transactions in the face of intricate and conflicting legal regimes that sprawl across doctrinal fields.
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite LAWS 6211.
**Grading Basis:** Letter Grade

**LAWS 6280 (1) Intensive Intro to Financial Info, Accounting and the Law: Accounting Boot Camp**
Exposes students to the basics of financial accounting and when and how lawyers encounter accounting problems. Students will leave the course with an understanding of the basic framework of accounting, including the double-entry method, balance sheets, income statements, and statements of cash flows; time value of money; discount rates; basic methods of business valuation; and risk and diversification concepts.
**Grading Basis:** Letter Grade

**LAWS 6281 (3) Accounting Issues for Lawyers**
Studies accounting and auditing problems in the form they are placed before the lawyer, including a succinct study of basic bookkeeping, in-depth legal analysis of the major current problems of financial accounting, and consideration of the conduct of the financial affairs of business.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 6301 (3) Introduction to Intellectual Property Law**
Provides an overview of our nation's intellectual property laws, including patents, copyrights, trademarks and trade secrets. Discusses other matters related to intellectual property, including licensing, competition policy issues and remedies.
**Equivalent - Duplicate Degree Credit Not Granted:** TLEN 5245
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 6302 (3) Water Resources**
Analyzes regional and national water problems, including the legal methods by which surface and ground water supplies are allocated, managed and protected.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 6315 (2) The Prosecutor's Role in the Criminal Justice System**
Designed to familiarize students with the professional and ethical duties of the prosecutor in the criminal justice system, with the goal of encouraging students to think about the role that prosecutors play. While the focus of the materials and presentations will center on the Colorado criminal Justice system, the concepts and principles addressed translate to all state systems and the federal system. National trends and legislative policy decisions related to criminal law, and their potential impact on public safety and prosecution efforts will also be discussed.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Criminal

**LAWS 6318 (3) Economic Analysis of Law**
Introduces the basic elements of economic theory and emphasizes demand and utility, cost and optimality.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 6321 (2-3) Computer Crime**
Explores legal issues that judges, legislators, prosecutors, and defense attorneys confront as they respond to recent explosions in computer-related crime. Includes the Fourth Amendment in cyberspace, the law of electronic surveillance, computer hacking and other computer crimes, encryption, online economic espionage, cyberterrorism, First Amendment in cyberspace, federal/state relations in enforcement of computer crime laws, and civil liberties online.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 6331 (1) The Technology of Privacy**
Explores the escalating debates by policymakers, scholars, advocates and industry representatives about the growing spread of tracking and surveillance in society. Debates are being spurred by the pace of changes to technology and particularly of changes to Internet and mobile technology. Practitioners in information privacy law or technology policy must understand the past, present, and likely future, of the technology of privacy.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 6353 (3) Evidence**
Studies the methods and forms of proof in litigation, including detailed consideration of hearsay, impeachment of witnesses, relevancy and certain restrictions on authentication and best evidence doctrines, and privileges.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 6361 (2-3) Information Privacy and Cybersecurity**
Explores the laws that regulate the basic technologies of the internet and the management of information in the digital age. It examines the most significant statutes, regulations and common law practices that comprise this emerging legal framework.
**Grading Basis:** Letter Grade

**LAWS 6363 (5) Evidence and Trial Practice**
Studies methods and forms of proof in litigation, including detailed consideration of hearsay, impeachment of witnesses, relevancy and certain restrictions on authentication and best evidence doctrines, and privileges. Applies rules and doctrine of evidence in simulated trial settings. Combined Evidence and Trial Practice course. Satisfies the trial practice requirement and counts two hours toward the 14 credit hour maximum in clinical hours.
**Grading Basis:** Letter Grade

**LAWS 6373 (3) Federal Litigation: Everything but the Trial**
Litigates through all pretrial phases as plaintiff's counsel, a mock federal case: an employee's challenge to compensation and termination, with possible claims including breach of contract, breach of the implied covenant of good faith and fair dealing, violation of wage payment statutory and regulatory requirements, and fraudulent inducement to contract.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 6383 (1) Applied Evidence**
Provides the opportunity to improve the legal writing and analytical skills by practicing written analysis based on the law of Evidence. Professors Griffin and Bloom designed materials specifically for this course, which is designed to be taken concurrently with Professor Bloom's Evidence class. Student receive individual feedback on every exercise and assignment.
**Requisites:** Requires corequisite course of LAWS 6353.
**Grading Basis:** Letter Grade

**LAWS 6400 (3) International Law**
Examines the nature, structure and sources of international law, the relationship between international law and domestic U.S. law, the role of international organizations such as the United Nations, the methods of resolving international disputes, the bases of international jurisdiction, and select substantive areas of international law that may change from semester to semester.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 6401 (1) Investigating Allegations of Bribery, Human Trafficking, and Related Misconduct**
We, as consumers, expect that the products we purchase will not be tainted by bribery, corruption, or any form of forced labor (including trafficked and child labor). This interactive class examines private practitioners' role in the fight, including their role as lawyers investigating allegations of misconduct, interacting with US and foreign authorities, conducting due diligence, and ensuring compliance. The legal market recognizes the need for lawyers who understand these rapidly developing areas of law. This class is designed to give students that competitive advantage.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade

**LAWS 6410 (3) International Trade Law**
Examines the law of the World Trade Organization and the General Agreement on Tariffs and Trade. Examines rules restraining national restrictions on trade that addresses tariff and non-tariff barriers, discrimination, regionalism, anti-dumping, countervailing duties and safeguards. Considers the relationship between trade and other regulatory areas or social values, such as environmental protection, health and safety standards, human rights, intellectual property protection.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 6420 (1) Law and the Holocaust**
Explores comparative law, jurisprudence, conflicts of laws and international law. Examines the Nazi philosophy of law emanating from its egregious racial ideology, and how it was used to pervert Germany's legal system to discriminate against, ostracize, dehumanize and eliminate certain classes of people. Studies the role of international law in rectifying the damage by bringing perpetrators to justice and constructing a legal system designed to prevent a repetition.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 6501 (2-3) The Practice of Labor and Employment Law**
Focuses on aspects of the practice of employment law, rather than the examination of legal doctrines. Discusses typical issues presented in advising and litigating on behalf of employers and employees. Topics include special attention to ethical issues.
**Grading Basis:** Letter Grade

**LAWS 6502 (2) Wildlife and the Law**
Examines the law that protects wildlife, its habitat and biodiversity. Explores human-caused threats including habitat destruction, illegal trade and climate change. Focuses on statutes, case law, environmental ethics, and current controversies to highlight legal, scientific and political strategies for protecting biodiversity. Particular emphasis is placed on the U.S. Endangered Species Act.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 6508 (1) The Philosophy of Law**
Questions the nature of law, characteristics and considerations of a legal system, rights and from where they come; thinking like a lawyer, basic techniques of legal reasoning, difference between doctrinal and normative legal analysis. Explores law's frontier and what distinguishes law from morality or politics. Focuses on influential texts from the end of WWII to the end of the Cold War.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 6510 (2-3) International Environmental Law**
Examines international environmental law, including transboundary impacts and global issues. Addresses such issues as intergenerational equities, principles of compensation, and if international environmental norms should receive special environmental norm consideration. A course in public international law is not a prerequisite, but students who have not taken such a course will probably find it useful to do some additional background reading. Offered in alternate years.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 6511 (3) Labor Law**
Relates to labor unions and other collective aspects of employment, including the right of workers to form and join unions, to provoke collective bargaining and to strike and engage other forms of protest. Focuses on domestic law at the federal level and with a particular statute, the National Labor Relations Act, and the workings of particular agency, the National Labor Relations Board. Engages other sources of law, including constitutional law, as well as judicial decisions and other statues.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 6518 (2-3) Introduction to Islamic Law & Jurisprudence**
Develops student understanding of the internal working of Islamic law at its theoretical roots. Analyzes the various methodologies that are represented in Islamic legal literature, heling to enable the students to identify modern manifestations of these methodologies in contemporary Muslim discourses. Contextualizes the subject of Islamic law within various governmental and constitutional structures, beginning with the classical period, continuing through colonialism and reaching into the present day.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 6521 (3) Employment Law**
Entails a survey of employment-at-will, workplace safety, workplace torts; ERISA and retirement, workers' compensation; controls on hours and wages; health insurance; disability and unemployment compensation.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 6525 (2-3) Elder Law**
The counseling and legal representation of older persons and their representatives. Topics may include: legal aspects of health and long-term care planning, public benefits, surrogate decision making, legal capacity, the conservation, disposition, and administration of older persons' estates, the implementation of their decisions concerning such matters, and the broad ethical issues of representing clients in this field of practice.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 6528 (3) Capital Punishment in America**
Surveys the history and current status of capital punishment in the United States, with a critical examination of arguments both for and against the death penalty.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 6540 (3) Global Law & Global Governance**
Addresses contemporary theories of globalization. We will explore questions such as: What is globalization, and in particular, what is the globalization of law? What is the extent of legal globalization, and how can we know? Are global law and global governance good things? How are these categories any different from what has traditionally been called "international law"? Our search for answers will be guided by a selection of recent books from theorists of globalization and global governance, such as David Held, Immanuel Wallerstein, and David Kennedy.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 6541 (2) Colorado Worker's Compensation Theory and Practice**
Introduces the legal theories that underlie the no-fault compensation system, its historical evolution, policy conundrums and ethical quandaries. Teaches the application of the procedural rules most frequently utilized in administrative setting. Studies the Workers' Compensation Act, the Workers' Compensation Rules of Procedure and the Office of Administrative Courts Rules of Procedure.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 6551 (3) Employee Benefits and Compensation Law**
Examines past and present employee benefits and compensation practices among private and public employers. Covers ERISA and defined benefit, defined contribution, and welfare benefit plans; equity awards granted by corporations; equity awards granted by LLCs and partnerships; nonqualified deferred compensation and Section 409A of the Internal Revenue Code; golden parachutes and Sections 280G and 4999 of the Internal Revenue Code.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 6555 (2-3) Disability Rights**
Explores the theories of disability, including whether disability is the product of society/social construction or medicine. The course will then explore some of the major federal protections for disability, including the Americans with Disabilities Act, which prohibits discrimination in employment and public accommodations, and the Individuals with Disabilities in Education Act.
**Grading Basis:** Letter Grade

**LAWS 6602 (3) Cultural Property Law**
Concerns domestic and International regulation of property that expresses group identity and experience. Organized around traditional categories of property (real, personal and intellectual), covers historic preservation, archeological resources, art and museum law, with attention to indigenous people's advocacy on burial sites, traditional lands, ceremonies, music, symbols, ethnobotany, genetic information and language. May satisfy upper-level writing requirement.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 6631 (3) Artificial Intelligence and the Law**
This course will investigate emerging legal frameworks being created to address the uses of Machine Learning (ML) and Artificial Intelligence (AI) across society, by private parties and public actors alike. Students will survey laws from the United States, as well as other countries. They will discuss how AI is shaping the practice of law itself. The course draws a thread through many practice areas to ask: what are the consistent challenges of regulating AI systems?
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade

**LAWS 6702 (1) Climate Justice**
Introduces the field of climate justice and seeks to identify legal and policy tools for advancing fair outcomes in climate change decision making. Climate justice is concerned with the intersection of race and/or indignity, poverty, and climate change.
**Grading Basis:** Letter Grade

**LAWS 6708 (1-3) LAWS:**
Explores special topics in law.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 6712 (3) Climate Change Law and Policy**
Examines the science of climate change and the broader role of science in public policymaking. Reviews the changing legal landscape to abate greenhouse gas emissions and key issues in policy design. Reviews the Supreme Court's April 2, 2007, decision in Massachusetts v. EPA, overturning EPA's refusal to regulate greenhouse gas pollution from motor vehicle tailpipes and the aftermath in the courts, Executive Branch and Congress.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 6722 (3) Energy Law and Regulation**
Provides an introduction to energy law and regulation in the United States. Covers basic principles of rate regulation and public utilities, the division of jurisdiction between federal and state governments and the key federal statutes and regulatory regimes governing natural gas, electricity and nuclear power. Focuses on the basic federal frameworks for natural gas and electricity regulation, with an emphasis on understanding the messy and uneven transition to wholesale competition in these sectors and, in the electricity context, the experience with state restructuring and retail competition.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 6732 (3) Renewable Energy Project Finance and Development**
Examines renewable energy and how legal topics impact financing projects. Reviews structure, regulation, and functioning of electric energy industry and laws applicable to development, ownership and operation of renewable energy projects across technologies. Addresses legal policy, economic and financing issues associated with expansion and improvement of the transmission grid to support renewable energy development.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 6801 (1) Anti-money Laundering Law**
Explores domestic and foreign laws against money laundering, including know your customer and bank secrecy rules.
**Grading Basis:** Letter Grade

**LAWS 6808 (1) LILAC Symposium Course: Leadership in Law and Community**
Addresses issues in law, community, and leadership, explored through multiple pedagogies in teaching and learning, in a symposium-style setting. After introductory classes on the theme of leadership in law and community, and related topics of professional responsibility and personal identity, social change, creative lawyering, the course will turn to spring service projects in law and community.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Grading Basis:** Pass/Fail

**LAWS 6813 (2) Problem-Solving, Professional Judgment, and Decision Making**
Drawing from materials in psychology, behavioral economics, and mathematics, the course studies a range of patterns, fallibilities, and best practices concerning the complex problems commonly encountered by attorneys. Topics include general problem-solving strategies, techniques for operating in environments of uncertainty and complexity, empirically supported cognitive biases and errors, and strategies for recognizing and overcoming those errors.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 6816 (1-2) Problem-Solving and Writing**
Enhances students' ability to solve problems and writing concise coherent memos to clients or other legal documents outlining their legal analysis and strategic thinking. Uses diagnostic exams in which students are given multiple documents for fact patterns to begin their analysis.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 6823 (1-2) Legal Reasoning**
This course of seven 100-minute classes aims to present legal reasoning skills crucial to the crafting and criticism of legal arguments. The classes will cover seven topics: rules and standards, the art of the legal distinction, dealing with legal contradictions, facts and framing, level of abstraction, baselines, and legal interpretation.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 6826 (2-3) Interactive Programming for Lawyers**
Teaches students how to develop simple computer applications that would help in the practice of law and the delivery of legal services, using a drag-n-drop application development platform. Students will learn programming logic and principles of user-centric design. No programming experience is required. Includes substantial legal research and analysis.
**Grading Basis:** Pass/Fail

**LAWS 6836 (1) Special Topics in Legal Research**
Builds upon first-year legal research problem solving skills by exposing students to the nuances of research topics in a specialized topic and tracking related doctrinal classes, e.g., environmental and natural resources law.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 6856 (2-3) Advanced Legal Research**
Offers an in-depth look at research resources and methods. Includes sources from the judicial, legislative, and executive branches of federal and state government; research in topical areas such as environmental law, taxation, and international law; and extensive coverage of secondary and nonlaw resources. Covers both print and electronic sources. Students will have several assignments and a final project.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 6866 (1) Colorado Legal Research**
Surveys resources and methods to effectively research Colorado law. Covers primary and secondary resources including Colorado statutes, cases and digests, regulations, and constitution and practice materials. Covers how to research Colorado municipal law and other Colorado topics.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 6876 (2) Legal Research Skills for Practice**
Focuses on preparing students to research in a transactional law legal practice. Students will learn how to research in transactional law subject areas using practitioner-focused research platforms, including Westlaw Practical Law, Lexis Practice Advisor, and Bloomberg Law. Students will also learn how to research corporate and industry data, property records and dockets as well as acquire other competencies and skills helpful for researching in a transactional law practice.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 6886 (3) Advanced Legal Research and Analysis**
Develops students' ability to think critically about and solve current legal problems. Evaluates the benefits and detriments of both print and on-line legal resources, and how to create an efficient research plan. Formulates and applies research strategies to real-world legal problems, and uses legal analysis to refine and improve research results. Note: students who have taken LAWS 6856 may not enroll in this course.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 6896 (3) Advanced Legal Research and Writing for Practice**
Advances and improves legal research and writing skills learned in first year. Proposes variety of assignment types across substantive and procedural areas to prepare for experiences as summer associates or new attorneys.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 7003 (3) Federal Courts**
Looks at structure and jurisdiction of the federal courts, emphasizing problems of federalism and separation of powers and their relationship to resolution of substantive disputes.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 7004 (3) Advanced Deals Lab: Real Estate Transactions**
Using documents from actual real estate transactions, this course will focus on the drafting and negotiation skills required for the successful practice of real estate transaction law. Students will negotiate and draft actual real estate transactional documents.
**Requisites:** Requires prerequisite course of LAWS 6004 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 7005 (3) Internet and Media Law**
Provides a survey of common, statutory, and regulatory law as applied to the media, including the internet. Topics include: the law as it affects the gathering of news; publisher liability online and offline; First Amendment issues; and related regulation of the internet and computer technologies.
**Grading Basis:** Letter Grade

**LAWS 7011 (3) Creditors' Remedies and Debtors' Protections**
Examines typical state rights and procedures for the enforcement of claims and federal and state law limitations providing protection to debtors in the process. Includes prejudgment remedies, statutory and equitable remedies, fraudulent conveyance principles and exemptions and other judicial protections afforded debtors.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7013 (2) Supreme Court Decision Making**
Students deliberate over several important cases as "Justices" of the Supreme Court. Class is divided into three "Courts" with the first hour spent in deliberation and the second hour in discussion of the deliberative process as well as the substantive issues.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 7015 (3) First Amendment**
Examines speech and religion clauses of the First Amendment. Includes the philosophical foundation of free expression, analytical problems in First Amendment jurisprudence and the relationships between free exercise of religion and the separation of church and state.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 7019 (1-3) Advanced Clinical Practicum**
Enables a clinical student an optional 1-3 credits to complete advanced legal work in the Clinical Education Program. Course must follow enrollment in an existing clinical offering already successfully completed. Permission of the appropriate clinical faculty member required. For each credit taken, a clinical student must complete a minimum of 50 hours of legal work, all of which shall be graded pass/graded. A clinical student may complete 1-3 credits of work over the course of no more than two semesters. A clinical student may earn no more than 3 credits total over the student¿s law school career.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7021 (3-4) Bankruptcy**
Bankruptcy is the field of law that governs economic failure, and oftentimes, economic revival. The course includes both consumer and corporate bankruptcy, and for each of these areas, we will learn liquidation, and reorganization. Students will gain a strong understanding of Chapters 7, 11 and 13 of the Bankruptcy Code.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7023 (2) Jury Selection and History**
Studies the history of the jury from ancient times through the implications of Apprendi, the grand jury from the time of Henry II through modern federal practice, and current jury selection procedures, both federal and Colorado, both civil and criminal. Experienced trial attorneys will work with students to demonstrate jury selection.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 7024 (2-3) Real Estate Planning**
Considers various contemporary legal problems involved in the ownership, use, development, and operation of real estate, with particular emphasis on the federal income tax aspects of these issues. Topics may include sales, leases, and loans; choice of entity; leveraged partnerships; tax credit financing, foreign and tax-exempt investors; and real estate investment trusts.
**Requisites:** Requires prerequisite or corequisite course of LAWS 6007 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Property

**LAWS 7025 (3) Civil Rights**
Presents a comprehensive study of federal civil rights statutes briefly reviewed in other courses (e.g., Constitutional Law or Federal Courts). Studies federal civil rights statutes, their judicial application,and their interrelationships as a discretely significant body of law of increasing theoretical interest and practical importance.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 7029 (3) Appellate Advocacy Practicum**
Offers the opportunity to represent parties in federal and state civil appeals. Students draft opening briefs in the fall semester, and draft reply briefs and appear fororal argument in the spring. Prior appellate advocacy experience will be helpful. Enrollment is limited to six students.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7031 (3) Regulation of Financial Institutions**
Focuses on the core banking law and works outward to cover a broader spectrum of bank-like financial institutions. Covers bank licensing, restrictions on bank business, regulating safety and soundness of banks, consumer protection of depositors and other bank customers and regulatory examination and enforcement.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7045 (3) Criminal Procedure: Adjudicative Process**
Focuses primarily on criminal procedure at and after trial. Looks at bail, prosecutorial discretion, discovery, plea bargaining, speedy trial, jury trial, the right to counsel at trial, double jeopardy, appeal and federal habeas corpus.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 7051 (1-3) Transactional Drafting**
Focuses on principles of contemporary transactional drafting. Skills gained will be applicable to transactional practice and will also be useful to litigators. Students will learn to translate, draft and review contracts, as well as how to add value to deals.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade

**LAWS 7055 (3) Education Law**
Considers issues raised by the interaction of law and education. Issues may include the legitimacy of compulsory schooling, alternatives to public schools, socialization and discipline in the schools and questions of equal educational opportunities.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 7065 (3-4) Immigration and Citizenship Law**
Covers legal issues pertaining to noncitizens of the United States, especially their right to enter and remain as immigrants and nonimmigrants. Topics include admission and exclusion, deportation, and refugees and political asylum. Approaches topics from various perspectives, including constitutional law, statutory interpretation, planning, ethics, history and policy.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 7071 (2-3) Advanced Transactional Drafting**
Provides students with the opportunity to further develop skills gained in LAWS 7051 and put them to use in simulations and business contexts across various areas of practice. Students will be asked to draft industry specific contract provisions, revise existing contracts, counsel and negotiate on behalf of clients and work through ethical dilemmas encountered by transactional attorneys.
**Requisites:** Requires a prerequisite course of LAWS 7051 (minimum grade D-).
**Grading Basis:** Letter Grade

**LAWS 7079 (2-3) Wrongful Convictions**
Focuses on the issues and remedies in cases of people who have been convicted, whose traditional appellate remedies have been exhausted, and who continue to claim actual innocence. Preference given to those who have taken or are taking more criminal procedure courses.
**Grading Basis:** Letter Grade

**LAWS 7085 (2) Law and Religion**
Uses judicial decisions as well as historical and theoretical materials to explore significant aspects of the relationship between law and religion. The religion clauses of the First Amendment are a central but not exclusive subject of study. Offered in alternate years.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 7101 (4) Deals: Engineering Financial Transactions**
Explores the business lawyer's role in creating valueby helping clients identify, assess and manage business risks through efficient contract design while achieving the optimal legal, tax or regulatory treatment for the deal. Includes case studies of actual transactions.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7102 (2-3) Oil and Gas**
Deals with the legal problems associated with private arrangements for the ownership and development of oil and gas: deeds and leases to oil and gas rights, trespass, adverse possession, implied covenants in leases, conveyances of fractional interests, and the interaction of private rights and conservation regulation.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7103 (2-3) Ethics and Compliance Capstone**
Integrates skills and knowledge from the introductory compliance course and other courses in law school compliance curriculum as students develop a compliance program for an institution.
**Requisites:** Requires prerequisite course of LAWS 6221 (minimum grade D).
**Grading Basis:** Letter Grade

**LAWS 7105 (3) Family Law**
Focuses on nature of marriage, actions for annulment and divorce, problems of alimony and property division, separation agreements, and custody of children. Also considers illegitimacy, abortion, contraception, the status of married women in common law and under modern statutes and relations of parent and child.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7106 (1-2) Moot Court Competition**
Offers an intensive involvement in legal research, appellate brief writing and oral arguments in a competitive context. Student finalists may continue involvement in regional and national competitions.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7115 (3) Juvenile Justice**
Covers how the judicial system deals with minors accused of crimes, and the collateral consequences for youth in the educational and child welfare systems.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7116 (1) Barristers Council**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Pass/Fail

**LAWS 7122 (2-3) Mining and Mineral Development Law**
Addresses major issues affecting the development of mineral resources in the western United States. Includes the regulation of the impacts of hardrock and coal mining and oil and gas development on the environment under federal and state laws. Covers the Mining Law of 1872, the Mineral Leasing Act, 'split estates,' and state regulation of mineral development.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7126 (1-2) Transactional Competition**
Covers a broad array of topics, including, but far from limited to, contract negotiation, health law, mergers and acquisitions, and client counseling. A valuable opportunity for students to gain experience outside the classroom and develop tactics for interacting with clients, negotiation, techniques, and transactional drafting skills. Provides great opportunities for networking. A division of Barristers' Council.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7128 (2-4) Jurisprudence**
Addresses a number of fundamental questions, such as: What is law? What should it be? How is it created? Our readings consist of cutting-edge articles from leading modernist/postmodernist schools of thought including legal formalism, legal realism, interpretive theory, law and economics, feminist jurisprudence, critical legal studies and law and literature.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 8128
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 7135 (3) Parent, Child, and State**
Examines the legal rights of parents and children in a constitutional framework, as well as the state's authority to define and regulate the parent-child relationship. Addresses rights of parents and children to freedom of expression and religious exercise, termination of parental rights and adoption, paternity orientation and culture in defining the family.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7145 (3) Comparative Family Law**
Examines and critiques law, legal institutions and traditions of the country of focus and the US as they affect children, families, and work. Enhances research and writing skills, including field and international research. Contributes to host country through scholarship and service. Increases cultural competence through active engagement with peers and with social justice issues in another country. Includes required field study component and service learning project over spring break.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7154 (3) Land Use Planning**
Explores mechanisms for public control of private land uses, such as planning, zonin, and regulation of land development; including consideration of federal and state constitutional and statutory limitations on local governments. Offered in alternate years.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Property

**LAWS 7155 (3) American Legal History**
Explores the history of American law from the Constitution to the twenty-first century Global War on Terror. It covers topics including the law of slavery and freedom, the development of civil rights law, business regulation and deregulation, the origins of the administrative state, and the rise of the conservative legal movement. Throughout, the course emphasizes the ways that political and economic change shapes the law and the practical effect law has on social movements.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade

**LAWS 7159 (2) Advanced Trial Advocacy**
Offers an advanced course covering trial practice elements. Open only to students who have taken LAWS 6109.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7169 (2) Motions Advocacy**
Provides practical training in preparing and arguing pretrial, post-trial and chambers motions to an experienced federal judge based on materials from actual case files. Assigns some research papers. Limited to students with interest in trial advocacy and willingness to participate in confrontational exercises.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7201 (3) Antitrust**
Studies American competition policy: collaborations among competitors, including agreements on price and boycotts, definition of agreement, monopolization, vertical restraints such as resale price maintenance and territorial confinement of dealers.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7202 (3) Environmental Law**
Examines and analyzes federal, state, and tribal regulation of clean air and water, hazardous wastes, toxic substances, and contaminated properties. Considers related environmental justice theory, economic, ethics and policy issues.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7205 (3) Administrative Law**
Covers practices and procedures of administrative agencies and limitations thereon, including the Federal Administrative Procedure Act, and the relationship between courts and agencies.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 7207 (3) Federal Estate and Gift Tax**
Analyzes the federal estate and gift taxation of inter vivos and testamentary transfers, introduces the federal income taxation of estates and trusts, and explores elementary estate planning. Prior or simultaneous enrollments in Income Taxation (LAWS 6007) and Wills and Trusts (LAWS 6104) are helpful, but not required. Students may receive credit for this course and either Estate Planning (LAWS 7217) or Estate and Gift Tax Planning (LAWS 6217).
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Taxation

**LAWS 7209 (4) Natural Resources and Environmental Law Clinic**
Offers hands-on experience in the practice of natural resources law in the Rocky Mountain region to a select number of clinic students. The clinic's docket of active cases focuses on public land law and the environmental statutes protecting those lands and their resources. Students participate in projects that test the full range of lawyering skills, including traditional litigation, administrative advocacy, legislative drafting, and the conduct of complex negotiations and settlements.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7211 (3) Business Planning**
Focuses on the development and use of concepts derived from a number of legal areas in the context of business planning and counseling. Topics such as formation of business entities, sale of a business, recapitalization, division, reorganization and dissolution are considered.
**Requisites:** Requires prerequisite course of LAWS 6007 (minimum grade D-).
**Recommended:** Prerequisite or corequisite LAWS 6201 or LAWS 6211.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7217 (2) Estate Planning**
Deals with the practical application of estate planning principles to various client situations, including certain federal wealth transfer taxation issues. Students may not receive credit for both Estate Planning (LAWS 7217) and Estate and Gift Tax Planning (LAWS 6217).
**Requisites:** Requires prerequisite course of LAWS 7207 (minimum grade D-).
**Recommended:** Prerequisites LAWS 6007 and LAWS 6104.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Taxation

**LAWS 7222 (2-3) Environmental Decision-Making**
Explores the foundational issues that underlie agency decision-making, including environmental ethics, cost-benefit analysis, risk assessment, constitutional law and administrative law. Compares and contrasts National Environmental Policy Act and the National Historic Preservation Act and the Endangered Species Act.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 6222
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7232 (3) Global Energy Justice**
Establishes why nearly a third of the world populated by the energy oppressed poor, presents a major national and international "legislative" or socio political problem calling for answers from governments and civil societies in the developed and developing world. Explains and elucidates the concept of energy justice, its jurisprudential heritage and its meaning and relevance in contemporary society. Case studies present problem solving frameworks spanning the political, social, behavioral, engineering, natural sciences and law.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7241 (3) Telecommunications and Internet Law and Policy**
Examines laws governing telecommunications industries, including federal and state regulation and international aspects. Includes telephone, cable, satellite, cellular and other wireless systems and the Internet.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5410
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/Technology/Telecommunication

**LAWS 7242 (3) Environmental Justice and Law**
Examines issues of unequal environmental protection across various contexts, including air and water pollution, siting of toxic and hazardous waste, noxious land uses, and access to environmental goods such as public lands. The course will explore the role that U.S. law has played in constructing the unequal distribution of environmental harms and benefits. It will then examine efforts within the U.S. to use law and other tactics to redress environmental injustice.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade

**LAWS 7251 (3) Non-Profit Law**
Examines the legal and policy issues raised by non-profits. Topics may include the formation of a non-profit, qualification for federal tax exemption, the rise and role of private foundations, fiduciary duty issues, restrictions on political activity and private benefit, and the unrelated business income tax. Also focuses on broader social questions raised by giving, charities, and philanthropy.
**Grading Basis:** Letter Grade

**LAWS 7255 (3) Local Government**
Studies state legislative and judicial control of the activities, powers and duties of local governmental units, including home-rule cities and counties, and some problems of federal, state, and local constitutional and statutory limitations on governmental powers when exercised by local governmental units (e.g., the powers to regulate private activities, tax, spend, borrow money and condemn private property for public uses).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 7271 (3) Venture Capital and Private Equity**
Provides overview of the legal and financial principles to represent privately held companies, their founders and managers and their investors. Emphasizes transaction structuring rather than judicial opinions. Includes the organization and financing of start-ups, structuring buyout transactions, exit strategies, legal organization of investment funds and other financial intermediaries. Discusses the relevant regulatory landscape, including securities law, bankruptcy, ERISA and tax law.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7285 (2-3) Marshall-Brennan Constitutional Literacy Project**
Teaches students how to educate high school students in the local Denver Metro area high schools about the constitution, public speaking, and logical reasoning. Interested students must apply and requires a commitment teaching once per week in a local high school. Encourages individual development as teachers, writers, and critical thinkers and provides an opportunity to grow as colleagues and teammates.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Government and Public

**LAWS 7301 (2-3) Copyright**
Examines state and federal laws relating to the protection of works of authorship ranging from traditional works to computer programs. Studies the1976 Copyright Act as well as relevant earlier acts. Gives attention to state laws, such as interference with contractual relations, the right of publicity, moral right, protection of ideas and misappropriation of trade values, that supplement federal copyright.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 7302 (2) Advanced Oil and Gas**
Covers the history of oil and gas conservation and its regulation, proration and allowable regulation, compulsory pooling and unitization, permitting and environment regulation, and the interplay between federal, state and local regulation.
**Requisites:** Requires prerequisite course of LAWS 7102 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7303 (3) Complex Civil Litigation**
Covers civil procedure in modern complex multiparty suits, including class actions in such settings as employment discrimination and mass torts, and problems in discovery, joinder, res judicata, collateral estoppel and judicial management in such suits.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 7309 (2-4) American Indian Law Clinic**
Offers a clinical education course involving participation in the representation and advocacy of Indian causes -- land or water claims, Indian religious freedom, job or other discrimination based on race and issues implicating tribal sovereignty.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7310 (1-3) International Dispute Settlement**
Examines various mechanisms for the settlement of international disputes. Includes negotiation, inquiry, mediation, conciliation, arbitration, and adjudication. Focuses on intergovernmental dispute resolution.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 7311 (2-3) Patent Law**
Covers selected topics, such as patentable subject matter, patentability and utilization of patent rights through licensing and infringement litigation. Covers practice and procedure of the patent and trademark office.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 7312 (2) Advanced Water Law**
Builds on the study of basic water law principles for those interested in practicing in this field. Explores in more detail the highly developed legal and administrative system of water law in Colorado and other states, including the use of special courts to adjudicate the existence of water rights and approve changes of use.
**Requisites:** Requires prerequisite course of LAWS 6302 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7315 (3) Criminal Justice Policy and Practice**
Focuses on policy and practice issues rather than case law. Examines how American criminal justice is (and has been) dispensed in the vast majority of cases that never reach trial. Devotes attention to systemic issues rather than case-specific problems. Studies policy behavior, prosecutorial charging and bargaining discretion, the provision of defense services, bail and preventive detention, plea negotiation, and sentencing---aspects of the criminal process that affect huge volumes of cases and require thought in global terms.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Criminal

**LAWS 7318 (3) Economics of the American Legal System**
Explores the economics of the American legal system. Topics include the cost of producing lawyers, the market for legal services, the practical challenges of running small and large law firms and the government's role in making legal services available.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7321 (1-2) Patent Drafting and Prosecution**
Covers transactions, and often high-tech deals involving intellectual property rights. Studies IP ownership; assignment or rights; commercialization transactions (licensing, distribution, strategic); antitrust; emerging issues. Gives students essential tools to draft and analyze technology contracts.
**Requisites:** Requires prerequisite course of LAWS 6301 or 7301 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 7323 (2-3) Patent Litigation**
Focuses on unique aspects of patent litigation: substantive patent law, civil procedure, federal jurisdiction and litigation strategy; includes claim construction, infringement, anticipation and obviousness defenses, unenforceability challenges, declaratory judgments, injunctions, damages, settlements, licenses and trial strategy. Of interest and useful to those interested in intellectual properly generally, not just patents or in litigation.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 7325 (3) Election Law**
Examines the rapidly evolving field of election law: the right to vote, voting procedures, redistricting, candidate selection, campaign finance laws and direct democracy. Emphasizes federal law, including applicable constitutional jurisprudence.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 7331 (2-3) Sports Law**
Covers the application of rules from agency, antitrust, contracts, constitutional law (including sex discrimination), labor law, property, torts, unincorporated associations and other subjects to those persons involved in the production and delivery of athletic competition to consumers. Explores the development of the application of these rules to a sports setting and related economic issues.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7333 (2) Advanced Evidence: Forensic Science and the Criminal Courts**
Explores the admissibility of forensic science opinion and expert testimony, its use as evidence at a trial, and the challenges that such evidence may pose for the courts and the entire criminal justice system in the future.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 7341 (3) Trademark and Unfair Competition Law**
Examines trademark protection, the interaction of trademark and unfair competition law with other intellectual property doctrines, the requirements for acquiring and retaining federal trademark rights, false advertising and other misrepresentations, the right of publicity and related claims, remedies for infringement, and international aspects of trademark protection.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 7343 (2) Technical & Engineering Knowledge in Litigation**
Teaches law students and engineering students to work with each other in varied legal disputes implicating technical matters (acccidents, trade secrets, pollution, etc.), covering expert witness law and practice, use of empirical methods in litigation, and more broadly the roles of lawyers and of engineers in such disputes. Experiential learning-based assignments may include initial investigations, witness testimony, and legal writings that include engineers¿ expert witness reports and lawyers¿ complaints and motions.
**Grading Basis:** Letter Grade

**LAWS 7350 (2-3) Analytical Strategies**
Develops analytical, writing and problem-solving skills necessary to pass the bar exam and succeed in practice. Designed for third-year law students in their final semester. Students will improve their techniques for analyzing, organizing and writing responses to essay and performance test questions through frequent written exercises and individual feedback on those exercises.
**Grading Basis:** Letter Grade

**LAWS 7361 (2) Cybersecurity**
Introduces students to the laws that regulate the basic technologies of the Internet and the management of information in the digital age. It examines the most significant statutes, regulations, and common law principles that comprise this emerging legal framework, including the Federal Wiretap Act, the HIPAA Privacy Rule, and the Digital Millennium Copyright Act.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 7365 (2) Comp Constitutional Law**
**Grading Basis:** Letter Grade

**LAWS 7381 (3) Intellectual Property Counseling and Licensing**
Introduces strategic development and procurement of IP, including patents, trademarks, copyrights, and trade secrets. Evaluates the latest cases and legal trends from a practical and strategic perspective. Focuses on widely accepted best practices and critical thinking in these areas.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property, Technolgy Telecomm

**LAWS 7401 (3) Securities Regulation**
Stresses statutory interpretation of the various federal statutes regulating the issue of corporate securities and the cases and regulations that have arisen out of those statutes.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7402 (2) The Law of Toxic and Hazardous Wastes**
Examines the EPA's federal hazardous waste statutes, including the Resource Conservation and Recovery Act of 1976 (RCRA), and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). Analyzes the RCRA "Cradle-to-grave" hazardous waste program and addresses the evolving CERCLA liability scheme and cleanup process.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7405 (2-3) Health Law 2: Medical Malpractice and Quality Regulation**
Explores (1) the law controlling ethical issues that arise during the delivery of medical care, (2) the substantive law of medical malpractice and tort reform aimed at reducing the frequency and severity of medical malpractice verdicts, and (3) the practical aspects of litigating a medical malpractice case. Cross-listed at the Health Sciences Center; will include field trips there.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7406 (1) International Moot Court Competition**
Open only to students who actively participate in the seminar preparing for the competition, in the preparation of memorials for the competition, and in the practice of oral arguments or regional oral arguments.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7407 (1-3) Tax Policy**
Explores current issues in tax policy. Topics may include the tax legislative process, consumption taxes, taxes and distributive justice, the tax exemption for nonprofits, carbon taxes, corporate taxes and integration, and taxes and entrepreneurship. There are no required prerequisites, but Federal Income Tax will be helpful.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Taxation

**LAWS 7409 (3) Legal Negotiation**
Explores the fundamentals of effective negotiation techniques and policies for lawyers. Students engage in mock negotiations of several legal disputes.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7411 (2-3) Mergers, Acquisitions and Reorganizations**
Studies the planning of corporate mergers, acquisitions and reorganizations, examining the application and integration of state corporate law, federal securities law, accounting principles, tax law, labor law, products liability law, environmental law, ERISA and antitrust law.
**Equivalent - Duplicate Degree Credit Not Granted:** BADM 6900
**Requisites:** Requires prerequisite LAWS 6211 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7415 (2) Bioethics and Law**
**Grading Basis:** Letter Grade

**LAWS 7418 (2) Legal Imagination**
Advanced course in reading and writing for law students. Varied literary and other works are read. May be of interest to the student interested in the question: Does my choice to become a lawyer mean the sacrifice of my ambitions to be a serious writer (or person)?
**Grading Basis:** Letter Grade

**LAWS 7421 (2-3) Business and Human Rights**
Examine the role of international human rights law in regulating or influencing businesses enterprises, along with relevant policy considerations.
**Grading Basis:** Letter Grade

**LAWS 7425 (2-3) Health Law and Policy**
Acquaints students with the issues arising at the interface between law and medicine through analysis of cases and other materials. Critically analyzes methods used by courts and legislatures to address medical/legal problems in an effort to determine whether the legal resolution was reasonable and appropriate in light of medical, social and political considerations. Offered in alternate years.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7426 (2) Health Care Compliance**
Introduces students to a number of primary laws and regulations that give rise to the vast majority of serious fraud and abuse cases. The primary statues and regulations implementing them will then be viewed from the context of common problems in the health care industry such as: up-coding, unbundling, worthless services/quality of care, medically unnecessary care, over-utilization, joint ventures with referral physicians, off-label marketing.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7433 (3) Remedies**
Examines the types of relief available to vindicate various rights. Covers damages, specific performance, injunctions, and restitution. Emphasizes the planning aspect of enforcement, in view of the limitations and problems of proof associated with specific remedies.
**Grading Basis:** Letter Grade

**LAWS 7439 (2-3) Mediation**
Explores mediation, one of the more important methods of alternative dispute resolution and the legal issues that may arise related to mediation. Considers what kinds of persons and disputes are most appropriate for mediation. Includes role playing.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7440 (3) International Human Rights and Humanitarian Law**
Surveys international human rights both in law and in philosophy, both current and historical.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 7445 (2) Insurance Law**
**Grading Basis:** Letter Grade

**LAWS 7449 (2-4) Juvenile and Family Law Clinic**
Examines the world of child welfare from the view of the child client, by representing their best interests in abuse and neglect cases. As Guardians ad litem, students will represent children in abuse and neglect cases from the beginning, at the temporary shelter hearing, through the conclusion of the case at a permanency orders hearing.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7450 (2) Regional Human Rights Protection for JD Students**
Examines how human rights law and policy is created, interpreted and enforced within regional systems. Explores the main sources of human rights law including treaties, international customary law, constitutional law, municipal law, comparative law and principles; the jurisprudence of regional courts and tribunals, the institutions that support human rights advocacy and the cultural perspectives of affected communities and peoples.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**LAWS 7451 (3) Law and Finance for Entrepreneurs**
Studies unique legal problems faced by entrepreneurs, including formation issues (choice of entity, rights of the founders, initial investors), operation issues (governance, key employees, intellectual property, financing), IPOs and buy-outs.
**Equivalent - Duplicate Degree Credit Not Granted:** BADM 6910
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7461 (1) Dispute Resolution in the Digital Age**
Explores the need for expanded and equalized access to remedies in consumer cases, and how the internet opens doors to online dispute resolution ("ODR") systems that utilize cost-effective negotiation, mediation, and arbitration processes for resolving complaints. This course will look at the various systems currently used by major companies, as well as the rules and treaty developments in global markets.
**Grading Basis:** Letter Grade

**LAWS 7465 (2) Public Health Law and Ethics**
Explores the legal and ethical dimension of public health. Focuses on topics that generate legal and ethical controversies, including governmental duties to protect citizens, nature and the extent of the government's ability to regulate conduct and responses to epidemics.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7471 (3) Securities Litigation and Enforcement**
Covers the provisions of the Securities Exchange Act of 1934 and related federal statutes, concentrating on the arbitration of private securities claims; SEC enforcement actions; international securities regulation; securities manipulation and fraud; self-regulatory organizations; and regulation of attorneys and accountants practicing before the SEC.
**Grading Basis:** Letter Grade

**LAWS 7475 (2) Advanced Torts**
Studies selected tort actions and theories. Topics covered may include "Dignitary torts" (e.g., defamation, privacy, etc.), business torts, and product liability. Offered in alternate years.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 7505 (2) Sexuality and the Law**
Examines the regulation of sexuality in local, state,and federal law, with particular emphasis on sexual orientation. Explores how sexuality shapes, and is shaped by, an array of laws and policies, which may include family law, military regulations, tax law, employment law, trusts and estates, obscenity law, and criminal law.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7507 (2-3) State and Local Taxation**
Examines the operation of the income, property and sales tax used to finance our state and local governments. Includes requirements of equal protection and due process. Covers jurisdiction to tax allocation of the tax base among different state and local governments.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 6760
**Grading Basis:** Letter Grade

**LAWS 7509 (1) Mock Trial Competition**
Student teams further develop trial and advocacy skills in a competitive mock-trial format involving two or more rounds of trials. Requires preparation of trial briefs and drafting other court pleadings and documents. Credit is limited to the top two teams (six students). Student finalists may continue involvement in regional and national competitions.
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7512 (2) Advanced Environmental Law: Air Pollution**
Provides an examination of efforts to regulate air pollution in the United States under the Clean Air Act. Covers key provisions, basic approach of cooperative federalism, role of science and risk assessment establishing health-based standards, implications of instrument choice and regulatory design on innovation and economic growth, development of 'first generation' climate policies, and new approaches to compliance and enforcement.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7513 (3) Domestic Violence**
Explores the law, policy, history and theory of domestic violence. Examines the limits of legal methods and remedies for holding batterers accountable and keeping victims safe; the dynamics of abusive relationships; the history of the criminal justice system's response to domestic violence; the defenses available to battered persons who kill their abusers; the legal paradigm of the sympathetic victim; psychological and feminist theories about abusive relationships; civil rights and tort liability for batterers and third parties; and the intersection of domestic violence with international human rights.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7515 (3) Poverty Law**
Explores the legal and policy responses to poverty in the United States and addresses how the law shapes the lives of poor people and communities. Examines the extent of poverty in the United States, the root causes and the historical development of social welfare policy. Focuses on the rights-based aspect of poverty law and various policies that attempt to ameliorate poverty.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 7520 (3) Food Law and Practice**
Surveys the basic regulatory landscape of food law with insight into critical legal issues facing industry and consumers. Covers federal, state and municipal regulation, litigation, government incentives, international standards and soft-law. Combines doctrinal approaches with simulation and problem solving to introduce systems-level thinking. No prerequisites or prior knowledge if required, though interest in food law and corporate law are helpful.
**Grading Basis:** Letter Grade

**LAWS 7529 (1) Appellate Advocacy Competition**
Gives students the opportunity to participate in an intermural appellate advocacy competition, in which a brief must be filed and reviewed, critiqued, and deemed credit-worthy by a member of the faculty. (Law School Rule 3-2-9 (b) should be consulted prior to enrollment.)
**Grading Basis:** Pass/Fail

**LAWS 7531 (3) Wage Law and Litigation**
Teaches federal and state wage statutes, common-law claims for unpaid wages (e.g., fraud, contract/quasi-contract, etc.), and complex statutes outside employment law (racketeering, antitrust, etc.) that creative wage litigators sometimes use. Coverage of the limits of wage law scope may include non-employee contractors (both traditional and gig economy workers), undocumented workers, students, volunteers, and/or prisoners. Teaches litigation practice and strategy, including class/collective action practice, plus experiential learning assignments that may include deposition-taking/client-interviewing, claim-strategizing, damages-calculating, and/or motion-writing.
**Grading Basis:** Letter Grade

**LAWS 7535 (2) Poverty, Health and Law 1**
Introduces students to the substantive areas of health and poverty law. Topics include health disparities and the role of law, cultural competence, standards of care for vulnerable populations, relationships between income, employment, housing, education, health, violence, and immigrants. Students will also help with intake of clinic patients and support client representation by the attorney of record.
**Grading Basis:** Letter Grade

**LAWS 7541 (2-3) Employment Discrimination**
Examines statutory and constitutional prohibitions ofdiscrimination in employment on the basis of race, gender, age, religion, national origin and disability.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7545 (2) Poverty, Health and Law Practicum**
A service learning course in which students draw from the substantive materials studied in LAWS 7535 to develop competency in case planning, problem solving, cooperative decision making, and client counseling. Students will staff cases under the supervision of a CO Legal Services (CLS) staff attorney or a pro bono attorney working on behalf of CLS.
**Requisites:** Requires prerequisite course of LAWS 7535 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7551 (2) Trade Secrets**
Examines law of trade secrets and how companies and entrepreneurs use this field to protect intellectual property in conjunction with other forms of legal protection (e.g., patent, copyright and trademark).
**Grading Basis:** Letter Grade

**LAWS 7555 (4) Poverty, Health, and Law Practicum**
Introduces students to the substantive areas of health and poverty law. Topics include health disparities and the role of law, cultural competence, standards of care for vulnerable populations, relationships between income, employment, housing, education, and health. Students will also staff cases under the supervision of a Colorado Legal Services (CLS) staff attorney or a pro bono attorney working on behalf of CLS, and will develop competency in case planning, problem solving, cooperative decision making, and client counseling.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7565 (3) Corporate Transactions in Health Law**
Introduces key corporate and regulatory issues impacting the delivery of health care. Focus will be transactional, with students gaining an understanding of basic corporate law and regulatory principles, and then learning to integrate core federal and state laws into choice and use of corporate structures and operational strategies.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7601 (2-3) Business Transactions**
Provides a practical understanding of how to apply the law in both transactional and litigation settings. Gives an interdisciplinary look at how various areas of the law are brought together in common factual settings. Teaches students to negotiate, document and close the acquisition of a business covering the areas of practice of corporate, contracts, real property, secured transactions and bankruptcy law. Tests, in a litigation setting, the decisions made during the acquisition stage.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7605 (2-3) Refugee and Asylum Law**
Focuses on protections offered under international and domestic law for persons who are threatened by persecution or other adverse conditions in their country of origin. Covers who is a refugee and the protections they have or do not have under United States and international law.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 7609 (1-2) Law Practice Management**
Studies the establishment of a solo or small-firm legal practice. Topics include the business structure (PC, LLC, etc.), office systems, marketing and development, staffing, liability insurance, managing time, technology and billing. (This practice course counts toward the 14 credit hour maximum of practice hours.) Course supported by the Section of Law Practice Management of the ABA in memory of Harold A. Feder, CU Law '59.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7611 (2-3) International Business Transactions**
Examines the sources of international business law, the relationship between such law and the U.S. legal system, the choice of law in international business disputes, the special issues that arise when doing business with foreign governments, the law governing international sales and the shipment of goods and international intellectual property protection. Offered in alternate years.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 7615 (4) Immigration Law and Immigrants' Rights**
Addresses four broad questions: Who is a citizen of the United States? Who else can come to this country? When and why can noncitizens be forced to leave? Who has the authority to answer these questions? These questions prompt us to examine the history of U.S. immigration, the constitutional-statutory-regulatory framework that governs immigration and citizenship law and the federal agencies that administer it. Also addresses contemporary challenges to, and assertions of, immigrants' rights.
**Equivalent - Duplicate Degree Credit Not Granted:** PSCI 7181
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 7617 (3) International Taxation**
Explores the United States income taxation of international activities, principally U.S. persons doing business abroad and foreign persons doing business in the United States. This course focuses on the Internal Revenue Code as well as tax treaties.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 6780
**Requisites:** Requires prerequisite course of LAWS 6007 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Taxation

**LAWS 7618 (1) Marijuana Law and Policy**
Covers three distinct but interwoven topics: substantive law governing marijuana; policy rationales behind and outcomes produced by different approaches to regulating the drug; and the legal authority to regulate the drug. The objective is to prepare to handle legal issues that arise in practice but also to provide informed counsel on proposed an future reforms to the law.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Electives

**LAWS 7619 (3-4) Entrepreneurial Law Clinic**
Provides law students with practical experience in transactional law while offering valuable legal services without charge to local startup businesses lacking access to legal resources. Enrollment priority is given to third year law students. The ELC professor may set forth additional requirements to ensure that students are qualified to provide services to ELC clients.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7621 (4) Business Associations**
Covers the law of agency, partnerships, limited liability companies and corporations. It includes principles of agency, formation and operation of business entities, fiduciary duties of the actors in business entities, and the relevant federal and state laws related to those entities.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 6201 and LAWS 6211
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade

**LAWS 7629 (1) Introduction to the In-House Practice of Law**
Explores cutting edge questions around the practice of law as an employee of a business. Demonstrates how the combination of law and business can be valuable to businesses and also innovative, challenging and rewarding to legal professionals. Legal services to corporate America is changing dramatically with more entities relying on in-house counsel, compared to private practitioners, to obtain legal advice and counsel.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7640 (2-3) Comparative Law On Indigenous Peoples**
This course examines and compares the treatment of Indigenous peoples by the legal systems of a sampling of countries in the Western Hemisphere and elsewhere. The course will also compare the foreign legal regimes examined to relevant United States law and to international standards, with the aim of critically assessing the comparative adequacy of U.S. law in this context and exploring potential reforms in U.S. law that might be informed by legal developments in other countries. Students will gain knowledge of the similarities and differences in the foundational characteristics of diverse legal systems and of their histories and political contexts.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade

**LAWS 7709 (3) Advanced Legal Negotiation**
Deepens students' understanding of the economic, psychological, cultural, and critical literatures related to legal negotiation and bargaining, provides students an advanced set of negotiations, experiences and simulations that introduce new dynamics and problems not dealt wit in the core course, and deepens students' self-understanding and ability to learn from experience.
**Requisites:** Requires prerequisite course of LAWS 7409 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7710 (2-3) Space Law and Policy**
Examines the role of international law in the regulation of outer space activities. Topics include current and potential future uses of outer space, law-making process related to space activities, legal regime of outer space and celestial bodies, legal status of spacecraft, liability for damage caused by space activities, settlement of space-related disputes.
**Grading Basis:** Letter Grade

**LAWS 7715 (3) Indigenous Peoples in International Law**
Studies developments in the substance and procedure of international human rights law pertaining to indigenous peoples, examining these developments through varying perspectives, doctrinal and political, pragmatic and critical. Students will become familiar with indigenous peoples' involvement in the human rights movement both before and after WWII, and corresponding developments in the United Nations, Organization of American States, and other institutions.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 7718 (2) The Regulation of Marijuana**
Covers three distinct but interwoven topics: substantive law governing marijuana, policy rationales behind and outcomes produced by different approaches to regulating the drug and the legal authority to regulate the drug. Prepares one to handle legal issues that arise in practice, but also to provide informed counsel on proposed and future reforms to law.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 7725 (3) American Indian Law I**
Investigates the federal statutory, decisional and constitutional law that bears upon American Indians, tribal governments and Indian reservation transactions.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7735 (3) American Indian Law II**
Investigates the legal history and current legal status of Alaska Natives and Native Hawaiians. Addresses other current topics such as tribal water rights, tribal fishing and hunting rights, tribal justice systems, religious freedom, and tribal natural resource and environmental management.
**Requisites:** Requires prerequisite course of LAWS 7725 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7745 (2-3) Tribal Law**
Tribes are sovereign nations with inherent powers of self-government, including the right to ¿make their own laws and be ruled by them. ¿¿Williams v. Lee, 358 U.S. 217, 220 (1959). This course provides a historical and contemporary overview of the internal laws of Tribal nations. It serves as a general introduction to the diverse types of laws by which Tribal nations govern themselves, with attention paid to topics such as oral tradition, Tribal governments, membership, Tribal constitutions, criminal and civil jurisdiction, and Tribal court jurisprudence. This course is intended to not only familiarize students with traditional and continuously developing aspects of Tribal law, but also to examine external impacts and limitations on the internal law of Tribal nations.¿Although this course primarily considers the laws of Tribes located in the United States, we may also from¿time¿to time explore the¿laws of indigenous peoples in other¿parts of the world.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7751 (3) Arbitration**
Discusses the nature of arbitration, enforcement of arbitration agreements and awards, complexities of multi-party arbitrations, fairness and efficiency of the arbitral process and other issues related to arbitration's prevalence in contexts ranging from corporate to consumer and employment disputes.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7801 (1) Tech Policy Advocacy**
Provides an intensive, one-week look at the substance, strategy, tactics, and import of technology policy advocacy. Each year, we will study one particular theme or conflict and examine it in-depth. The point of studying one particular episode is to learn lessons about the practice of technology policy advocacy that apply beyond this one historical moment. This class is meant to combine traditional doctrinal approaches with an experiential focus.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 7809 (2-4) Technology Law and Policy Clinic**
Features technology law advocacy before administrative, legislative and judicial bodies in the public interest.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5250
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7846 (1-3) Independent Legal Research**
Involves independent study and preparation of a research paper under faculty supervision. Students produce a research paper equivalent to a seminar research paper. a draft is submitted, subjected to critique by the faculty member, and redrafted. Available during or after the fifth semester of law school. Instructor consent required.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 7896 (1) Journal: University of Colorado Law Review**
Gives students the opportunity to participate in the research, writing and editing activities involved in publishing the University of Colorado Law Review.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Research and Writing

**LAWS 7906 (1-4) Journal: University of Colorado Law Review**
Gives students the opportunity to participate in the research, writing, and editing activities involved in publishing the University of Colorado Law Review.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Research and Writing

**LAWS 7916 (1) Colorado Environmental Law Journal**
Gives students the opportunity to participate in the research, writing and editing activities involved in publishing the Colorado Environmental Law Journal.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Research and Writing

**LAWS 7926 (1-4) Colorado Environmental Law Journal**
Gives students the opportunity to participate in the research, writing and editing activities involved in publishing the Colorado Environmental Law Journal.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Research and Writing

**LAWS 7936 (1) Journal: Colorado Technology Law Journal**
Gives students the opportunity to participate in the research, writing and editing activities involved in publishing the Journal of Telecommunications and High Technology Law.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Research and Writing

**LAWS 7939 (1-10) Extern Program**
Extern credit may be earned for uncompensated work for a sponsor, which may be any lawyer, judge, or organization that employs lawyers or judges and is approved by the Academic and Student Affairs Committee. Work is done under the direction of a field instructor (a lawyer or judge as the sponsor) and a member of the law faculty. Requires a substantial writing component and 50 hours of working time per credit hour.
**Repeatable:** Repeatable for up to 10.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7946 (1-4) Journal: Colorado Technology Law Journal**
Gives students the opportunity to participate in the research, writing, and editing activities involved in publishing the Colorado Technology Law Journal.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Research and Writing

**LAWS 7949 (2) Remote Externship Course Component**
Accompanies remote externship placements and provides and opportunity for structured and interactive reflection on the educational experience afforded by the externship placement.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 8002 (1-3) Sem: Special Topics in Law**
Explores special topics in law. Students will be given the opportunity for in-depth discussion and study on law-related topics. Law topics will vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**LAWS 8003 (2) Seminar: Lawyers and Leadership**
Analyzes challenges and responsibilities of serving in leadership roles, with particular emphasis on utilizing law as a vehicle to change organizations and societies. Topics include characteristics, models, styles, and theories of leadership, charisma, civil and human rights, conflict management, decision-making, diversity, ethical responsibilities, forms of influence and persuasion, innovation, mindfulness, organizational dynamics, positive organizational scholarship, and scandal. Materials will include cutting-edge research, case histories, exercises, problems, simulations, and video clips from popular culture and media.
**Grading Basis:** Letter Grade

**LAWS 8015 (1-3) Seminar: Constitutional Theory**
Aims at thinking broadly about the challenges, and problems of constitutionalism in the U.S. What are the fundamental tensions that attend the constitutional enterprise¿internally, externally? What relations does the Constitution have to democracy and liberalism? Readings will be taken from legal theory, social theory, philosophy and occasionally judicial opinions. Emphases will differ slightly each year as announced.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 8021 (2-3) Seminar: Consumers and the Law**
Expands understanding and analysis of contracts beyond the basic concepts learned in the first-year contracts course. Explores norms, goals and functions of consumer law and also observes the law "in action" through a class blog and outreach with the Boulder County Department of Housing and Human Services ("BCDHHS"), who assists people throughout Boulder County with an array of financial, housing and other consumer issues.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 8035 (2) Seminar Speech, Religion, and Equality: Constitutional Values in Tension**
Addresses past and continuing debates involving potential tensions between antidiscrimination principles and free speech, free exercise and establishment clause values. Examines constitutional protections under the First Amendment and the equal protection clause, together with an array of existing and proposed federal and state antidiscrimination laws regulating employment,housing, and public accommodations, among other areas.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 8036 (2-3) Seminar: Special Topics in Intellectual Property**
Applies copyright doctrine to the digital music contexts. Topics may include but are not limited to radio, compulsory licensing, performance rights, sampling, user generated content, term extension, termination rights, "open-access" and the public domain, emerging technologies and infringement, social implications of copyright legislation, digital fair use and the first sale doctrine and moral rights for users and artists.
**Requisites:** Require a prerequisite course of LAWS 6301 or LAWS 7301 (minimum grade D-).
**Grading Basis:** Letter Grade

**LAWS 8060 (3) Seminar: Poverty and Inequality in Comparative Perspective**
Investigates the nature, causes, consequences and major responses to persistent poverty and inequality in the United States and several other countries. Students are expected to write short response papers for each assignment as well as a substantial research paper on a topic selected in discussion with the instructor.
**Grading Basis:** Letter Grade

**LAWS 8075 (2) Seminar: Race, Racism, and American Law**
Focuses on issues of race reform law, in particular the group of issues dealing with Black Americans. (Students of all hues and persuasions are welcome.)Offers an interpretive or critical dimension, rather than a litigation-oriented one. Helps students understand how race reform law works and how attitudes and historical forces have shaped that body of law.
**Grading Basis:** Letter Grade

**LAWS 8085 (2-3) Sem: Critical Race Theory**
Studies Critical Race Theory, a radical left movement of legal scholars who have focused a critical eye on race and racism. Traces the intellectual history of the movement through key writings that have formed the center of CRT. May cover subjects like intersectionality, racial capitalism and interest convergence, as well as more specific topics like police brutality, affirmative action, and immigration.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade

**LAWS 8095 (2) Seminar: Problems in Constitutional Law**
Explores, in depth, various topics in U.S. constitutional law. Examines history, societal impacts, and challenges raised by those topics. The coverage of the seminar varies from year to year, depending on the instructor¿s interests and expertise.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 8101 (3) Seminar: Business Law Colloquium**
Business law scholars from CU and around the country present research papers at this weekly colloquium. Topics may include contracts, corporate law, securities regulation, tax, intellectual property, venture capital and private equity and the legal profession. No prior knowledge of law and economics is expected, although some knowledge of business organizations will be useful.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 8105 (3) Seminar: Comparative Family Law**
Examines and critiques law, legal institutions and traditions of the country of focus and the U.S. as they affect children, families and work. Enhances research and writing skills, including field and international research. Contributes to the host country through scholarship and service. Increases cultural competence through active engagement with peers and with social justice issues in another country. Includes required field study component and service learning project over spring break.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 8110 (2) Seminar: Fascism and the Liberal State**
Explores fascist legal theory and its critiques of the liberal democratic state. Readings of major conservative, liberal, fascist, Nazi and Marxist theorists including Marx, Gentile, Fuller, Neumann, Schmitt, Agamben, Hayek and Mill. Understand from a variety of perspectives, the structure and character of the liberal democratic state, its strengths and weaknesses as well as it susceptibility of fascism.
**Grading Basis:** Letter Grade

**LAWS 8111 (3) Sem: National Security Law and US Foreign Policy**
Explores the legal frameworks influencing the development of national security policy and U.S. foreign policy. Students will be introduced to applicable U.S. Foreign Relations Law, U.S. National Security Law and International Law before considering how such apply and interact in response to current threats to national security.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 8112 (2-3) Seminar: Advanced Natural Resources Law**
Provides in-depth study and analysis of current problems in natural resources law, using historical, literary, and scientific materials. Includes field-trip, and requires additional field trip expenses. Department enforced prerequisites or corequisites: any two of the following: LAWS 6002 or LAWS 6112 or LAWS 6302 or LAWS 7725.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite LAWS 6112.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 8120 (2-3) Special Topics in Constitutional Law**
Offers students the opportunity for in-depth discussion and study on an important topic of constitutional law. Topics may vary from year to year.
**Grading Basis:** Letter Grade

**LAWS 8128 (2-3) Seminar: Jurisprudence**
Addresses a number of fundamental questions, such as: What is law? What should it be? How is it created? Our readings consist of cutting-edge articles from leading modernist/postmodernist schools of thought including legal formalism, legal realism, interpretive theory, law and economics, feminist jurisprudence, critical legal studies and law and literature.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 7128
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Legal Theroy, Jurisprudence Social Policy

**LAWS 8145 (2) Seminar: History and Law of American Policing**
Explores the development of policing in the United States since the nineteenth century. We will examine a number of related topics including professionalization, strikebreaking, order maintenance policing, racial profiling, police brutality, federal law enforcement, militarization, and sheriffs. We will also discuss the process of suing police under § 1983, including barriers such as qualified immunity.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade

**LAWS 8210 (2) Seminar: Comparative Law**
Develops student understanding of the internal working of Islamic law at its theoretical roots. Analyzes the various methodologies that are represented in Islamic legal literature, helping to enable the students to identify modern manifestations of these methodologies in contemporary Muslim discourses. Contextualizes the subject of Islamic law within various governmental and constitutional structures, beginning with the classical period, continuing through colonialism and reaching into the present day.
**Grading Basis:** Letter Grade

**LAWS 8211 (2) Sem: Comp Constitutional Law: US, UK and Australia**
Takes a comparative law approach to the constitutional law of the United States, the United Kingdom, and Australia. The seminar's intellectual purpose is to understand all three nations more deeply (especially our own) by seeing what they do similarly, what they do differently, what the advantages and disadvantages of each nation's approach appear to be, and whether any lessons learned in one place could profitably be transferred to another.
**Grading Basis:** Letter Grade

**LAWS 8235 (2) Seminar: Advanced Topics In Family Law**
Explores a variety of current issues related to family law: topics will change to reflect emerging issues and will draw from legal and social science scholarship as well as relevant statues and cases. Possible topics include reproductive technology, children's rights, the role of religion in family law, and political theories of the family.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 8242 (2) Seminar: Funding Climate Action**
Explores the menu of legal and policy options that can be used to fund climate change mitigation, as well as adaptation to climate risks already underway. Robust climate action will require investment on an enormous scale and an increasingly tight timeline. How to fund these investments is one of the central questions of climate policy today.
**Grading Basis:** Letter Grade

**LAWS 8251 (2) Seminar: Advanced Corporate Law**
Explores current issues in corporate and securities law, including developments in fiduciary duties of officers and directors, corporate governance, executive compensation, revisions to the model business corporation act, and state and federal litigation reform.
**Grading Basis:** Letter Grade

**LAWS 8252 (2-3) Seminar: Policy and Climate Change In The Mont Blanc Region**
Explore the Mont Blanc region including the history and culture, along with the political and economic forces that have shaped it. Attention to the environmental and land use issues and climate change impact. Consideration of the opportunities and obstacles for regional political leaders in adapting to changes in the regional climate. Review techniques to monitor and understand baseline conditions and how climate change may be impacting those conditions. Field work on site required.
**Grading Basis:** Letter Grade

**LAWS 8285 (2-3) Seminar: Education and the Constitution**
Teaches the substantive constitutional law governing public education. Students will teach constitutional materials to high school students in the local Denver Metro area high schools. Interested students must apply and requires a commitment to a full-year curriculum. Encourages individual development as teachers, writers, and critical thinkers, and provides an opportunity to grow as colleagues and teammates. Requires exatra time outside of class.
**Requisites:** Restricted to Law (LAWS) students only.
**Recommended:** Prerequisite LAWS 7055.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 8300 (3) Seminar: International Adjudication**
Focuses on writing briefs and memoranda of law suitable for practice before tribunals such as the International Courts of Justice. Emphasis will be on students writing, legal analysis, and presentationof oral arguments. Instruction identifies how to research and analyze international materials, such as treaties, covenants, and international customary law.
**Grading Basis:** Letter Grade

**LAWS 8303 (2) Seminar: Advanced Oil and Gas**
Covers the history of oil and gas conservation and its regulation, proration and allowable regulation, compulsory pooling and unitization, permitting and environmental regulation, and the interplay between federal, state and local regulation.
**Requisites:** Requires prerequisite course of LAWS 7102 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 8312 (3) Seminar: The Law of the Colorado River**
Addresses the many areas of law and policy that affect management of the Colorado River and the communities that depend on it. The seminar will also include material and presentations from experts in other disciplines, including conservation biology, climate science, anthropology, geology, and hydrology. The centerpiece of the class will be a two-week raft trip through the Grand Canyon.
**Grading Basis:** Letter Grade

**LAWS 8315 (2) Seminar: Advanced Criminal Justice**
Studies policy and practice issues rather than case law. Focuses primarily on how American criminal justice is dispensed in cases that do not reach trial, including police behavior, prosecutorial discretion, defense services, bail, plea bargaining, and sentencing.
**Grading Basis:** Letter Grade

**LAWS 8318 (2) Seminar: Law and Economics**
Introduces the uses and limitations of microeconomic theory for understanding and resolving legal problems. Emphasizes concepts prominent in the law and economics literature such as cost, transaction costs, utility, and rational self interest.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 8320 (2-3) Seminar: Oil and International Relations**
Addresses the extent to which the international community of nations is oil dependent. Assesses the impact and the geopolitical dangers to international relations arising from the expanding demand for scarce oil from developing, as well as developed, economies.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 8321 (2) Seminar: Computers and Law**
Explores a range of topics surrounding the juxtaposition of computers and law. Most are aware of the impact that law has on computers through the myriad of regulations that govern computers and related technologies. Less well known is the impact that computer technology is having on governance and on the practice of law. Explores both sides of this dynamic interplay between law impacting computing, and computing impacting law.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/Technology/Telecommunication

**LAWS 8322 (3) Seminar: Environmental Decision Making**
Explores the foundational issues that underlie agency decision making, including environmental ethics, cost benefit analysis, risk assessment, constitutional law and administrative law. Compares and contrasts National Environmental Policy Act and the National Historic Preservation Act and the Endangered Species Act.
**Grading Basis:** Letter Grade

**LAWS 8341 (3) Seminar: Law and Economics of the Information Age**
Examines basic regulatory and legal challenges of our information economy and digital age. Emphasizes the "networked" information industries, the proper role of "unbundling" policies to advance competition and how intellectual property and antitrust rules should be developed.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5260
**Requisites:** Requires prerequisite course of LAWS 7201 or LAWS 7241 or LAWS 7301 (minimum grade D-).
**Grading Basis:** Letter Grade

**LAWS 8351 (2) Seminar: Law and Economics of Utility Regulation**
Discusses economics of regulation and matters ranging from neoclassical economic analysis to public choice theory to new institutional economics. Discusses several regulatory domains, including antitrust law, telecommunications regulation and energy regulation. Highlights both economic and non-economic goals,including universal service, sustainability (e.g., renewable energy) and architecture (e.g., free speech concerns with regard to telecommunications networks).
**Requisites:** Requires prerequisite course of LAWS 6301 or 7201 or 7241 (mimimum grade D-). Restricted to Law (LAWS) or Telecommunications (TELE) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 8355 (2) Seminar: Sentencing Law and Policy**
Studies sentencing law against the backdrop of criminal justice policy and concerns of public policy. Covers theories of punishment, the merits of indeterminate sentencing, sentencing guidelines, and nonincarcerative sanctions. Confronts problems of race, class, and other disparities in criminal sentencing.
**Grading Basis:** Letter Grade

**LAWS 8361 (2) Seminar: Advanced Information Privacy**
Explores current issues in information privacy law and cybersecurity law at depth. Topics will change to reflect subjects that emerge each time that the seminar is offered. Some examples include: federal consumer protection law, federal sectoral privacy statutes, state privacy laws, cybersecurity regulation, and European and comparative data privacy law.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/Technology/Telecommunication

**LAWS 8385 (2) Sem Law & Religion**
**Grading Basis:** Letter Grade

**LAWS 8400 (2) Seminar: Special Topics in International Law**
Provides in-depth coverage of particular issues in international law and exposes students to intellectual concepts in the field. Students write seminar length papers and develop critical thinking through writing and research.
**Grading Basis:** Letter Grade

**LAWS 8401 (2) Seminar: Securities Litigation and Enforcement**
Designed for students interested in studying topics related to securities litigation. Covers civil liability under the Securities Act of 1933, proxy fraud, class actions (with special emphasis on the Private Securities Litigation Reform Act and the Securities Litigation Uniform Standards Act), market manipulation, SEC enforcement actions, enforcement issues involving attorneys and accountants, criminal enforcement, international securities fraud and securities arbitration.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 8407 (2) Seminar: Tax Law, Economics and Policy**
Explores current issues in tax policy. Topics may include equity, efficiency, and distributive justice;¿the role of tax law in furthering structural inequalities and racism;¿choice of tax base, including consumption taxes; social policy in the Internal Revenue Code; corporate taxation and tax incidence;¿current issues in international taxation;¿and¿the intersection of tax law and technological innovation.¿
**Requisites:** Requires prerequisite or corequisite course of LAWS 6007 (minimum grade D-). Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Taxation

**LAWS 8412 (2) Seminar: Critical Law and Economics**
Explores some of the more successful and enduring critiques of Chicago Law and Economics. Starts with an introduction to economic analysis, including basic analytic tools like rational actor theory, supply and demand, efficiency notions, and cost concepts. Later classes will explore more advanced works in the area.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 8425 (2) Seminar: Advanced Torts**
Explores how dignitary interests have influenced the development of and have been incorporated into law, using the common law of torts and the constitutional rights of life and liberty as a general (but not exclusive) focal point of discussion.
**Grading Basis:** Letter Grade

**LAWS 8426 (2) Seminar: The Law of Pandemics**
Develops student understanding of the numerous ways in which the law must reckon with, regulate, and regulate around, pandemics. Shows how, while public health law primarily engages with pandemic to stop its spread, secondary legal regimes must also take pandemics into account in order to ensure the operation of law. This includes the laws of contract, tort, property, finance, welfare, and the like. Situates reading and format within ongoing pandemics to the degree appropriate.
**Grading Basis:** Letter Grade

**LAWS 8440 (1-3) Seminar: International Human Rights**
Exposes students to a variety of human rights issues and the responses by international institutions. In the fall, the seminar will meet for several sessions in a colloquium format, featuring guest speakers from around the world. In the spring semester, students will complete a paper that satisfies the law school's seminar writing requirement.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Grading Basis:** Letter Grade

**LAWS 8446 (2) Seminar: Pharmaceutical Regulation**
This course will explore how overlapping regulations affect how pharmaceutical companies innovate and how patients access medicine. It will cover FDA, patent, and Medicare regulations that govern how the government approves drugs and pays for them, as well as the role of antitrust law. Throughout the course, we will discuss political debates around prescription drug prices and seek to understand: why are drug prices so high? No prerequisites required.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade

**LAWS 8455 (2) Seminar: Gender and Criminal Justice**
Explores the intersection of gender and criminal justice in such areas as police and prosecutorial discretion, the investigation and prevention of crimes, the definition of offenses and defenses, factors contributing to criminality, criminal sentencing and the experience of punishment, and the societal ramifications of incarcerating children's caregivers.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 8458 (2) Seminar: Law and Literature**
Focuses on the question of what literature can teach lawyers through a variety of literary works and films. Covers traditional works by Shakespeare, Tolstoy, Camus, Kafka and Melville, as well as more contemporary works by Toni Morrison and Norman Mailer. Several short reflection papers, a journal and a final paper will be required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 8533 (2) Seminar: Criminal Law in Context: Legal and Social Images of Victims and Perpetrators**
Contextualizes criminal law by engaging in an in depth study of the legal and social characterizations of victims and perpetrators in U.S. law, politics and popular culture.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 8535 (2) Seminar: Class and Law**
Explores issues relating social class to such areas as labor relations, law enforcement, controls on radical movements and the distribution of wealth and power. Considers problems defining social class.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 8545 (2-3) Seminar: Food Law and Policy**
Introduces students to the laws and regulations that govern our food supply. The focus is federal law provided by the U.S. Food and Drug Administration, with additional readings, videos and speakers. Topics to be covered include legal definitions for food, rules on food labeling, standards for food safety, biotechnology, international trade, organic and environmental regulation, hunger, farmer's markets and obesity.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 8548 (1-2) Seminar: Theory of Punishment**
Explores the various justifications that philosophers have developed to explain why we have the right to punish. Examines the historical evolution of our punishment system and focuses on the death penalty as a critical contemporary issue in the debate about the proper role of punishment in our society.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 8565 (1-3) Seminar: Citizenship and Equality**
The concept of citizenship connects immigration with studies of race, international human rights, gender, criminality and many others. It has been receiving growing attention in many scholarly disciplines. Examines the notion of citizenship in recent scholarship spanning law, political science, sociology and history.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 8605 (3) Seminar: Regulation and Innovation**
Explores two related questions: first, what role does regulation play in encouraging (or inhibiting) innovation? Second, what kinds of innovation approaches to regulation itself are being employed or might be employed and how might these strategies improve the environment for private innovation?
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Electives

**LAWS 8608 (2) Seminar: Power, Ethics, and Professionalism**
Examines critically the possibility and character of ethical reasoning within the legal profession in light of its institutional structures. Explores descriptive/normative accounts of the profession's structure, "Professionalism," and individual conscience. Put simply, the seminar explores whether it is possible to be a good lawyer and ethical person.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 8611 (2) Seminar: US National Security and Foreign Relations in a Time of Change**
Explores the legal frameworks influencing the development of national security policy and US foreign policy. Students will be introduced to aplicable US Foreign Relations Law, US National Security Law and International Law and will engage in analysis about current policy approaches to emergy national security threats.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 8613 (2) Seminar: Civil Liberties Litigation**
Studies issues unique to the prosecution and defense of civil liberties lawsuits. Discusses litigation strategies with reference to lawsuits currently pending in the federal courts.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public Law

**LAWS 8645 (3) Seminar: Law and Politics Colloquium: Race in America**
A co-taught colloquium that exposes students to highly prominent scholars conducting research on current topics at the intersection of race, social science and the law, including racial profiling, hate crime and affirmative action. Students will complete a final paper satisfying the CU Law seminar requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** PSCI 7191
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 8650 (3) Seminar: Conflict of Laws**
This seminar addresses the conflicts that arise when the significant facts of a case are connected with more than one jurisdiction, whether that jurisdiction belongs to a state, the federal government, or a foreign government. The subject is studied in its theoretical and historical context, with special emphasis on the international aspects of extraterritorial jurisdiction.
**Grading Basis:** Letter Grade

**LAWS 8665 (2) Seminar: Sexuality, Gender Identity, and Law**
Examines the regulation of sexuality and gender identity in local, state, and federal law. Explores how sexuality and gender identity shape, and are shaped by, an array of laws and policies, which may include family law, military regulations, tax law, employment law, trusts and estates, obscenity law, and criminal law.
**Grading Basis:** Letter Grade

**LAWS 8701 (2) Seminar: Counseling Families in Business**
Explores the legal aspects of owning, managing and participating in a successful family business system, including corporate structure, legal issues, succession planning and estate management, internal capital markets in private enterprise, ownership issues in private businesses, how lawyers can assist with family governance, planning for and managing family philanthropy, gender issues in family business and conflict resolution.
**Recommended:** Prerequisites LAWS 6104 and LAWS 6157 and LAWS 6211 and/or LAWS 7409.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 8722 (2-3) Seminar: Advanced Energy Law**
Provides an opportunity for students to further develop their knowledge of the field and to engage in a substantial writing project. Examples of possible topics include hydraulic fracturing, regulation of air emissions from power plants, the smart grid, transmission siting and development, the ratemaking process, design and regulation of electricity markets, energy finance or comparative study of energy regulation.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 8725 (2) Seminar: Advanced Topics in American Indian Law**
Examines a variety of current issues related to American Indian Law. Topics will change to reflect the subjects that emerge at each time that the seminar is offered. Some examples of topics considered include legal protections for American Indian religion and culture, cultural property, Tribal law, gaming law, and Native American natural and cultural resources law. Department enforced corequisite: LAWS 7725.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 8728 (2) Seminar: Critical Theory Colloquium**
Surveys critical legal theory; introduces the discipline of analytical engagement with law review literature; feminist legal theory, and critical race theory. Offers a deeper understanding of the purposes behind legal reforms, the interaction between law on the books and law in action, how different groups experience the law in different ways and difficult yet rewarding nature of working through seemingly intractable and emotionally charged race, sex and class issues.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 8765 (2) Seminar: Gender, Law, and Public Policy**
Introduces students to various schools of feminist theory and examines the relationship between feminist theories and concrete problems in such areas as constitutional law, education law, employment discrimination, family law and criminal law.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 8785 (2-3) Seminar: Access to Justice**
Explores the scholarship that has developed around the provision of legal services - or the lack of legal services - for those who cannot afford market prices for attorneys. The seminar will also examine recent efforts to provide empirical support for the range of political claims that are made about access to the legal system.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Electives

**LAWS 8795 (2) Seminar: Topics in Law and Feminism**
Explores a variety of current issues related to feminism and the law: topics will change to reflect emerging issues and will draw from legal and social science scholarship as well as relevant statues and cases. Possible topics include reproductive justice, sex discrimination in education and employment, gender and human rights, international and comparative feminism, legal regulation of sex, and feminist legal theory.
**Grading Basis:** Letter Grade

**LAWS 8808 (2) Seminar: Rhetoric and the Art of Persuasion**
Explores recent work in rhetoric to identify the principles and techniques of effective persuasion in law. Examines the ways in which cognition, language, imagery, metaphor, narrative, and scene setting shape the ways in which lawyers and judges strive to persuade each other.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 9003 (3) Ethical Organizations and Professionals**
Provides students, particularly those in the Master of Studies in Law (MSL) in Ethics and Compliance program, the opportunity to examine what drives ethical behavior within organizations and the role that ethics and compliance professionals play in promoting ethical behavior. Investigates ethical challenges and decision making, methods to assess ethical organizational culture and qualities of ethical leadership.
**Grading Basis:** Letter Grade

**LAWS 9005 (3) Introduction to U.S. Law for MSL Students**
Provides an overview of the US legal system and will help MSL students begin to 'think like lawyers'. Students will be provided with the necessary vocabulary and skills to use legal resources and legal reasoning in academic and professional environments, including reading and analyzing cases, statues and regulations, doing legal research, and applying existing law to the issue at hand to predict answers to legal questions.
**Requisites:** Restricted to Master of Studies in Law (LAWS-MSL) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Electives

**LAWS 9025 (2-3) Introduction to U.S. Law For LLM Students**
Reviews the fundamentals of the U.S. legal system, including an overview of the U.S. Constitution, federalism, the structure and function of courts, sources of legal authority, and common-law methodology.
**Requisites:** Restricted to students in the LLM program.
**Grading Basis:** Letter Grade

**LAWS 9221 (2) Advanced Applied Compliance**
Enables students to discover what is takes to transform a company's compliance program beyond a "paper program." The class will explore the elements of a strong, effective and mature Compliance program. Taught by an experienced compliance professional with the support of several expert guests, the class will investigate how the best Compliance programs augment compliance policies with processes, controls and continuous monitoring.
**Grading Basis:** Letter Grade

**LAWS 9222 (1-2) Topics in Compliance**
Learn how to assess allegations of wrongdoing and recognize situations in which internal investigations are appropriate. Students will lean how to develop an investigation plan and will be introduced to the primary steps in an investigation including the following: initiating an investigation, locating and gathering evidence, conducting interviews, analyzing evidence, articulating conclusions and drafting investigative reports.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Studies in Law (MSL) or Law-JD students only.
**Grading Basis:** Letter Grade

**LAWS 9223 (1-2) Investigations**
Learn how to assess allegations of employee wrongdoing and recognize situations in which internal investigations are appropriate. They will learn how to develop an investigation plan and will be introduced to the primary steps in an investigation including the following: initiating an investigation, locating and gathering evidence, conducting interviews, analyzing evidence, articulating conclusions and drafting investigative reports.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade

**LAWS 9226 (1-3) Communications for Compliance Professionals**
Develops the tools students will need to thrive in the law school's MSL program. Deepens students' understanding of the United States legal system and develops their ability to communicate effectively and appropriately in writing and orally to their intended audience, and research, organize and explain their ideas clearly, using appropriate writing conventions.
**Requisites:** Restricted to Master of Studies in Law (LAWS-MSL) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 9246 (2-3) Intro to U.S. Legal Practice: Legal Writing, Research and Analysis**
Assist LL.M. students develop their legal writing skills as well as teach practical skills needed in the U.S. legal environment including locating cases, statutes and other legal source materials, citing legal authority correctly, and checking the validity of case citations.
**Requisites:** Restricted to students in the LLM program.
**Grading Basis:** Letter Grade

**LAWS 9846 (1-2) LLM Seminar**
LLM students study academic legal writing in this 1-credit per semester yearlong course. Topics covered will include: the purpose of academic legal writing; how academic legal writing differs from other forms of legal writing; topic selection; legal research (methods and ethics); first drafts; editing; academic workshops; and publishing. In addition, guest speakers will talk to LLM students about career planning and job seeking. International LLM students will learn about the American legal system.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 9856 (1-4) LL.M Thesis**
Provides eligible LL.M students the option to enroll in this two-credit LLM Thesis course. The course requires a significant work of original research on a topic chosen in consultation with a faculty supervisor and other law school faculty with set assignments for topic selection, drafts, and a workshop. In exceptional circumstances and only after pre-approval, an LLM student may enroll for a third or fourth credit.
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

# Law - Master of Laws (LLM)

Colorado Law offers a one-year, full-time LLM degree in the following areas:

- Natural Resources, Energy & Environmental Law
- International Law & Human Rights
- Indigenous Peoples Law & Policy
- Entrepreneurship & Business Law
- Intellectual Property, Technology and Telecommunications Law
- US Law for Foreign Lawyers

Colorado Law's LLM degree program is global in scope and is for talented lawyers from diverse backgrounds and countries. The LLM program fully immerses students in Colorado Law and offers inclusive access to programming, courses/modules, and the greater CU Boulder campus; our JD and LLM students learn side-by-side and from each

other. At Colorado Law, we recognize that each of our LLM students have unique and diverse backgrounds and experiences, backgrounds and experiences that can enrich our community of scholars and students and help to advance Colorado Law's intellectual leadership in the world.

LLM program course options are diverse, and LLM students has the ability to design a program of study suited to his or her academic and professional interests. While students complete most courses at the law school, they also have the opportunity to complement their legal studies with graduate-level courses in other departments within the greater university.

## Requirements

The Master of Laws requires 24 credits.

For more information, contact Director of International Programs, Jimmy Ilseng at jimmy.ilseng@colorado.edu.

## Learning Outcomes

Colorado Law's mission is to be an outstanding public law school that provides students with a state-of-the-art legal education and prepares them to serve wisely and with professionalism; advances the development of knowledge through scholarship, testing of new ideas and challenges to the status quo; and serves as a vehicle and catalyst for meaningful public service, all of which deliver high value to our students and have positive impacts—both locally and globally—on the legal profession and society.

As this mission statement makes clear, we believe that excellence in legal education requires a commitment to a plurality of purposes. To achieve some of those purposes, Colorado Law has identified the following learning outcomes for its students:

- Knowledge and understanding of legal theory and doctrine.
- Related substantive knowledge, including societal context.
- Legal analysis.
- Legal research skills.
- Oral and written communication.
- Professional and ethical responsibilities to clients and the legal system.
- Other professional skills.

# Law - Master of Studies in Law (MSL)

Colorado Law's Master of Studies in Law (MSL) degree is a one-year, 28-credit, no-LSAT-required program that enables students who hold at least an undergraduate degree to obtain legal training short of a full Juris Doctor (JD). Increasingly, emerging job markets have openings that require some legal knowledge and employers are assigning a number of legal tasks traditionally performed by lawyers to non-lawyers. Colorado Law's MSL will prepare students to obtain and excel in those positions.

## Ethics and Compliance Curriculum

The ethics and compliance track trains students to become compliance and ethics officers at large corporations, as well as at nonprofit entities, such as colleges, universities, and hospitals. These organizations are subject to an increasing number of legal requirements and need trained professionals to lead effective in-house programs to ensure compliance with statutes and regulations.

This track prepares students to develop, improve, and manage ethics and compliance programs and help organizations obey the law, reduce the risk of fraud, other law-breaking, and misconduct, and mitigate their firms' legal liability and reputation risk. Students have the opportunity to focus on specific fields of law, such as privacy/cybersecurity, healthcare and financial services.

## Requirements

Colorado Law's Master of Studies in ethics and compliance is designed to prepare prospective ethics and compliance officers in privacy/cybersecurity, health care and financial services.

All MSL students will take courses designed specifically for MSL students—one that introduces them to the American legal system, and one that introduces them to legal research, writing and analysis. In addition to those introductory courses, MSL students will take required and elective courses, alongside JD students, relevant to their specialty track.

Satisfactory completion of the following requirements leads to the degree Master of Studies
in Law (MSL):

A. Completion of 28 credits of course work, approved in advance by the faculty director of the MSL program, with a numerical average of 2.0 or better. MSL students may undertake these credits in a full-time schedule over one year or undertake a part-time schedule over a longer period of time.

B. As part of the 28 credits, completion of Introduction to US Law for MSL Students.

C. Demonstration of domain expertise within a specialty track by completing the requirements for the student's chosen specialty, as determined by the faculty director of the track consistent with Part 4 of this Article and subject to approval by the dean. Each MSL candidate shall choose one, and only one, specialty track.

D. Satisfaction of any conditions imposed at the time of admission.

Any MSL student whose cumulative grade average is below 2.0 at the end of any semester shall be expelled.

## Course Requirements

The Ethics and Compliance track for the MSL degree requires 28 credits total, including, in addition to the general MSL requirements:

(1) Communications for Compliance Professionals;
(2) Compliance;
(3) Ethical Organizations and Professionals;
(4) either Accounting for Lawyers or Special Topics in Compliance: Investigations, unless waived by the track's faculty director due to prior coursework in accounting;
(5) electives from a list approved by the faculty director.

## Learning Outcomes

Colorado Law's mission is to be an outstanding public law school that provides students with a state-of-the-art legal education and prepares them to serve wisely and with professionalism; advances the development of knowledge through scholarship, testing of new ideas, and challenges to the status quo; and serves as a vehicle and catalyst for meaningful public service, all of which deliver high value to our

students and have positive impacts—both locally and globally—on the legal profession and society.

As this mission statement makes clear, we believe that excellence in legal education requires a commitment to a plurality of purposes. To achieve some of those purposes, Colorado Law has identified the following learning outcomes for its students:

- Knowledge and understanding of legal theory and doctrine.
- Related substantive knowledge, including societal context.
- Legal analysis.
- Legal research skills.
- Oral and written communication.
- Professional and ethical responsibilities to clients and the legal system.
- Other professional skills.

# Law - Juris Doctor of Laws (JD)

Colorado Law's three-year, full-time Juris Doctor (JD) degree provides a strong, well-rounded legal education with a rich mixture of theory, policy, doctrinal analysis and professional skills. Students have broad flexibility to meet their individual interests and needs.

# Areas of Academic Strength

## Environmental, Energy and Natural Resources Law

Ranked consistently among the very best in the country, environmental and natural resources law has been a key focus of the Colorado Law curriculum for more than half a century, and is one of the strongest and deepest programs of its kind.

## Technology and Intellectual Property Law

Colorado Law has developed one of the nation's most comprehensive legal programs oriented around information technology. Technology lawyers address interesting policy challenges and novel legal issues, and rank among the most satisfied within the legal profession. Colorado Law is the right place at the right time for those interested in exploring the frontiers of entrepreneurial law, technology policy and intellectual property.

## Entrepreneurial and Business Law

Colorado Law provides a robust curriculum in business law, tailored for aspiring deal lawyers in Boulder, Denver and beyond. Boulder has a vibrant entrepreneurial community with many start-up and emerging companies. We place students in small law firms that serve small business and emerging companies, as well as in larger law firms who serve traditional larger corporate clients. In recent years, we have placed students in interesting and fulfilling in-house positions.

## American Indian Law

At Colorado Law, we believe that American Indians deserve the very best lawyers and that we have an obligation to train them. Our American Indian Law Program faculty, including the nation's top scholars and practitioners in the field, offers a full slate of introductory and advanced classes in the field to prepare students for all aspects of Indian law practice, and we now have dozens of successful alumni practicing Indian law in tribal government, federal agencies and at law firms. Colorado Law graduates are equally prepared to work on impact litigation, economic development, policy advocacy, individual legal services and tribal governance in Indian law. Our American Indian Law Program also appeals to many students with broader practice interests in natural resources, public lands, property, museum and art law, technology, entrepreneurship, family law and beyond. Indeed, because American Indian law raises questions regarding the rule of law and legal pluralism, the contours of sovereignty and governance, cross-cultural representation and minority rights and interdisciplinary study and practice, it offers important intellectual development opportunities for all Colorado Law students.

## Juvenile and Family Law

Juvenile and family law covers a broad range of practice areas, such as marriage, divorce, custody, visitation, family support, child abuse and neglect, delinquency, adoption, estate planning, education law and elder law. The Juvenile and Family Law Program (JFLP) provides students with opportunities to acquire specialized knowledge in this field, develop a network of, and foster collaboration between, students, academics, and practitioners and engage in interdisciplinary work in the study and practice of the field. The Program includes specialized courses, research projects, externships and clinical opportunities.

# Requirements

## First Year

First-year courses lay the foundation and all JD candidates take these courses to learn to "think like a lawyer." Common law courses taught in the Socratic Method allow students to develop legal reasoning and critical thinking skills.

### Fall Semester

- **Civil Procedure (LAWS 5303):** Rules governing pleading, joinder of parties, discovery, jurisdiction of courts, right to jury trial, appeals and res judicata and collateral estoppel, with emphasis on the Federal and State Rules of Civil Procedure.
- **Contracts (LAWS 5121):** Contract liability, offer and acceptance, consideration, frauds statute, contract remedies, the parol evidence rule, contract performance, conditions, changed circumstances.
- **Legal Writing I (LAWS 5226):** Legal analysis and document preparation, objective legal analysis techniques, legal rule synthesis, authority use to explain rules and rule application to case facts.
- **Legislation and Regulation (LAWS 5205):** Statutory interpretation, architecture of the administrative state and interpretation and review of regulation.
- **Torts (LAWS 5425):** Nonconsensual allocation of losses for civil wrongs, focusing on negligence and strict liability.

### Spring Semester

- **Legal Writing II (LAWS 5223) :** Appellate brief and document preparation, oral arguments before a three-judge mock court, techniques of persuading a court to accept a client's view of the law and facts, professional judgments within ethical boundaries and lawyer credibility.
- **Constitutional Law (LAWS 6005):** Constitutional structure, including judicial review, federalism, separation of powers and constitutional rights of due process and equal protection.
- **Criminal Law (LAWS 5503):** Statutory and common law of crimes and defenses, the procedures by which the law makes judgments as to criminality of conduct, constitutional limits.
- **Property (LAWS 5624):** Personal property, estates and interests in land, landlord–tenant, basic land conveyancing and private land use controls.

## Second and Third Years

The elective program in the second and third years builds upon the foundation laid in the first-year curriculum. Students must take Evidence (LAWS 6353) and Legal Ethics Professionalism (LAWS 6103) courses and a seminar (labeled as a LAWS 8000-level course).

## Experiential Learning

Students who start law school in the fall 2016 semester or later also have to complete six credit hours of experiential courses. Experiential courses are simulation courses, law clinics and externships. At least two of these credits must be obtained in courses with regularly scheduled class sessions as specified in Miscellaneous Rule 36(A). Externships do not qualify as courses with regularly scheduled class sessions, and Law School Rules generally cap credits that may be earned in externships at 4 credits. The registrar's office will post which courses in a given semester meet the definition of simulation courses before registration begins for that semester.

No student shall receive more than 14 credit hours toward the JD degree from co-curricular activities such as journals, moot court and trial competitions; Independent Legal Research; courtroom observation courses; externships; or coursework completed in another department, school or college of the university or at another institution of higher learning.

Students must complete eighty-nine (89) total credit hours with a numerical GPA of at least 2.0 and all other requirements as laid out in the Law School Rules to receive the Juris Doctor.

### Elective Courses

#### Business

- Accounting Issues for Lawyers
- Agency, Partnership and the LLC
- Antitrust
- Bankruptcy
- Business Planning
- Business Transactions
- Corporate Finance
- Corporations
- Deals
- Deals Lab: Advanced Venture Capital
- Law Practice Management
- Mergers, Acquisitions and Reorganizations
- Secured Transactions
- Securities Regulation
- Venture Capital and Private Equity

#### Criminal

- Capital Punishment in America
- Criminal Procedure: Investigative Phase
- Criminal Procedure: Adjudicative Process
- Post Conviction Criminal Procedure
- White Collar Crime

#### Family, Gender and Health

- Domestic Violence
- Family Law
- Gender, Law, and Public Policy
- Health Law I: Finance, Administration and Organization of Health Care
- Health Law II: Medical Malpractice Litigation
- Juvenile Justice
- Parent, Child and State
- Sexuality and the Law

#### Government and Public Interest

- Administrative Law
- Education Law
- Election Law
- Employment Discrimination
- Employment Law
- Federal Courts
- First Amendment
- Labor Law
- Legislation
- Local Government
- Race and American Law

#### Intellectual Property, Technology and Telecommunications

- Computer Crimes
- Copyright
- Introduction to Intellectual Property Law
- IP Counseling
- IP and Technology Contracting
- Patent Law
- Patent Litigation
- Privacy and Security in the Digital Age
- Telecommunications Law and Policy
- Trademark and Unfair Competition

#### International

- Conflict of Laws
- Law and Development
- Immigration and Citizenship Law
- International Business Transactions
- International Dispute Resolution
- International Environmental Law
- International Human Rights
- International Law
- International Trade Law
- Refugee and Asylum Law

#### Jurisprudence and Perspective

- Class and Law
- Critical Theory Colloquium
- Economic Analysis of Law
- Gender and Law
- Jurisprudence

#### Litigation

- Advanced Appellate Advocacy
- Advanced Evidence
- Complex Civil Litigation
- Federal Litigation: Everything but the Trial
- Motions Advocacy
- Trial Advocacy

**Natural Resources, Energy and Environmental Law**

- American Indian Law I
- American Indian Law II
- Climate Change Law and Policy
- Energy Insecurity and Sustainable Law
- Energy Law and Regulation
- Environmental Law
- Foundations of Natural Resources Law and Policy
- Mining and Energy Law
- Oil and Gas
- Public Land Law
- Toxic and Hazardous Waste
- Water Law
- Wildlife and the Law

**Practice—Clinical**

- American Indian Law Clinic
- Civil Practice Clinic
- Criminal Defense Clinic
- Criminal and Immigration Defense Clinic
- Entrepreneurial Law Clinic
- Extern Program
- Juvenile and Family Law Clinic
- Natural Resources, Energy, and Environmental Law Clinic
- Sustainable Community Development Clinic
- Technology Law and Policy Clinic

**Practice—Simulation**

- Advanced Trial Advocacy
- Alternative Dispute Resolution
- Appellate Advocacy Competition
- Arbitration
- Legal Negotiation
- Mediation
- Motions Advocacy
- Trial Advocacy
- Trial Competition

**Property**

- Advanced Real Estate Transactions
- Construction Law
- Estate Planning
- Land Use Planning
- Real Estate Planning
- Real Estate Transactions
- Wills and Trusts

**Research and Writing**

- Advanced Legal Research
- Advanced Legal Writing
- *Colorado Natural Resources, Energy and Environmental Law Review*
- *Colorado Technology Law Journal*
- *Law Review*
- Judicial Opinion Writing

**Taxation**

- Civil Tax Controversies
- Corporate Taxation
- Estate and Gift Tax  Planning
- Federal Estate and Gift Tax
- Federal Tax Politics
- Income Taxation
- International Taxation
- Partnership Tax
- Seminar: Tax, Law Economics and Policy
- Tax Policy

**Seminars**

- Seminar: Advanced American Indian Law
- Seminar:Advanced Criminal Procedure
- Seminar:Advanced Natural Resources Law
- Seminar: Speech, Religion, and Equality: Constitutional Values in Tension
- Seminar: Class and Law
- Seminar: Comparative Constitutional Law
- Seminar: Computers and the Law
- Seminar: Constitutional Theory
- Seminar: Consumer Empowerment
- Seminar: Counseling Families in Business
- Seminar: Gender Law
- Seminar: Information Privacy
- Seminar: Jurisprudence
- Seminar: Law and Economics of Utility Regulation
- Seminar: Law and Literature
- Seminar: Oil and International Relations
- Seminar: Tax Policy
- Seminar: Theory of Punishment

Note: Not all courses are offered each semester. This is a composite list.

# Dual Degree Programs

Colorado Law students take advantage of an array of rich opportunities for interdisciplinary study through other CU schools and colleges, in addition to the University of Alberta. Students apply separately to and are admitted by the two schools under their respective admissions requirements.

The schools work in cooperation to select courses for the programs that allow students to earn the dual degrees in less time than it takes to earn each degree separately. Only credit hours earned after law school enrollment count toward the JD degree, and the first year of the JD curriculum must be taken exclusively at Colorado Law.

For additional information, see the Dual Degrees and Certificates (https://www.colorado.edu/law/academics/degrees/dual-degrees-and-certifications/) page on the Colorado Law website.

## Dual Degrees with CU Boulder Programs

- Juris Doctor/Master of Business Administration (p. 1490) (JD/MBA) with the Leeds School of Business

- Juris Doctor/Master of Science in Environmental Studies (p. 1256) (JD/MS) with the Environmental Studies Program
- Juris Doctor/Doctorate in Environmental Studies (p. 1261) (JD/PhD) with the Environmental Studies Program

## Dual Degrees with Other CU Programs

- Juris Doctor/Doctor of Medicine (JD/MD) with CU Denver's School of Medicine on the Anschutz Medical Campus in Aurora
- Juris Doctor/Master of Public Administration (JD/MPA) with CU Denver's School of Public Affairs
- Juris Doctor/Master of Urban and Regional Planning (JD/MURP) with CU Denver's College of Architecture and Planning

## Dual Degrees with Other Universities

- Juris Doctor/Bachelor of Laws (JD/LLB) with the University of Alberta Faculty of Law, Canada. This program is currently on hold and not accepting applications.

# Learning Outcomes

Colorado Law's mission is to be an outstanding public law school that provides students with a state-of-the-art legal education and prepares them to serve wisely and with professionalism; advances the development of knowledge through scholarship, testing of new ideas, and challenges to the status quo; and serves as a vehicle and catalyst for meaningful public service, all of which deliver high value to our students and have positive impacts—both locally and globally—on the legal profession and society.

As this mission statement makes clear, we believe that excellence in legal education requires a commitment to a plurality of purposes. To achieve some of those purposes, Colorado Law has identified the following learning outcomes for its students:

- Knowledge and understanding of legal theory and doctrine.
- Related substantive knowledge, including societal context.
- Legal analysis.
- Legal research skills.
- Oral and written communication.
- Professional and ethical responsibilities to clients and the legal system.
- Other professional skills.

# American Indian Law - Graduate Certificate

Colorado Law offers an American Indian law certificate demonstrating the completion of a concentrated course of study in the legal issues facing Native peoples and American Indian tribes. This certificate is attractive to legal, tribal and governmental employers, as well as employers seeking to do business with tribes and tribal members.

## Program Requirements

Students must complete at least 92 credit hours (89 credit hours are required for the JD), at least 18 of which are in designated Indian law and related courses.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Course Requirements** | | |
| *Required courses after the first year (14 credits):* | | |
| LAWS 7725 | American Indian Law I | 3 |
| LAWS 7735 | American Indian Law II | 3 |
| LAWS 7309 | American Indian Law Clinic | 2-4 |
| **Electives** | | |
| Remaining (4) credits may be earned from the following: | | 4 |
| *American Indian Law Curriculum* | | |
| LAWS 8725 | Seminar: Advanced Topics in American Indian Law | |
| LAWS 7715 | Indigenous Peoples in International Law | |
| LAWS 6602 | Cultural Property Law | |
| LAWS 8725 | Seminar: Advanced Topics in American Indian Law | |
| LAWS 7745 | Tribal Law | |
| LAWS 7846 | Independent Legal Research (on an American Indian law topic) [1] | |
| Native American Law Students Association Moot Court Competition | | |
| Externship with an American Indian law focus [1] | | |
| Course from the Native American Indigenous Studies (NAIS) graduate certificate [1] | | |
| Course in American Indian law at another law school on a topic not regularly offered at Colorado Law [1] | | |
| *Environment and Natural Resources Law Curriculum* | | |
| LAWS 6112 | Foundations of American Natural Resources Law | |
| LAWS 7202 | Environmental Law | |
| LAWS 6302 | Water Resources | |
| LAWS 6002 | Public Land Law | |
| LAWS 8112 | Seminar: Advanced Natural Resources Law | |
| LAWS 7232 | Global Energy Justice | |
| LAWS 6712 | Climate Change Law and Policy | |
| LAWS 6702 | Climate Justice | |
| LAWS 7122 | Mining and Mineral Development Law | |
| LAWS 7102 | Oil and Gas | |
| LAWS 8320 | Seminar: Oil and International Relations | |
| LAWS 6722 | Energy Law and Regulation | |
| LAWS 6732 | Renewable Energy Project Finance and Development | |
| *Government and Public Law Curriculum* | | |
| LAWS 7205 | Administrative Law | |
| LAWS 7003 | Federal Courts | |
| LAWS 7025 | Civil Rights | |
| *Litigation, Negotiation and Alternative Dispute Resolution Curriculum* | | |
| LAWS 6353 | Evidence | |
| LAWS 6109 | Trial Advocacy | |
| LAWS 6373 | Federal Litigation: Everything but the Trial | |

| | |
|---|---|
| LAWS 7409 | Legal Negotiation |
| *Business & Commercial Law Curriculum* | |
| LAWS 6201 | Agency, Partnership, and the LLC |
| LAWS 6211 | Corporations |
| LAWS 6007 | Income Taxation |
| LAWS 7629 | Introduction to the In-House Practice of Law |
| *International and Comparative Law Curriculum* | |
| LAWS 6400 | International Law |
| LAWS 7440 | International Human Rights and Humanitarian Law |
| LAWS 6122 | International Natural Resources Law and Policy |
| *Labor & Employment Curriculum* | |
| LAWS 6521 | Employment Law |
| LAWS 6511 | Labor Law |
| LAWS 7541 | Employment Discrimination |
| *Property, Trusts and Estates & Land Use Curriculum* | |
| LAWS 6004 | Real Estate Transactions |
| LAWS 6104 | Wills and Trusts |
| LAWS 7217 | Estate Planning |
| LAWS 7154 | Land Use Planning |
| *Family & Juvenile Justice Curriculum* | |
| LAWS 7105 | Family Law |
| LAWS 7115 | Juvenile Justice |
| LAWS 7513 | Domestic Violence |
| LAWS 7135 | Parent, Child, and State |
| *Legal Theory, Jurisprudence and Social Policy Curriculum* | |
| LAWS 7128 | Jurisprudence |
| LAWS 8608 | Seminar: Power, Ethics, and Professionalism |
| LAWS 7525 | |
| LAWS 7085 | Law and Religion |
| LAWS 8450 | |
| *Research & Writing Curriculum* | |
| LAWS 6856 | Advanced Legal Research |
| LAWS 7051 | Transactional Drafting |
| LAWS 6207 | Writing in the Regulatory State |
| *Intellectual Property, Technology and Telecommunications Curriculum* | |
| LAWS 6301 | Introduction to Intellectual Property Law |
| *Other* | |
| Other courses may be approved by the AILP Director and the Associate Dean for Academic Affairs | |
| **Total Credit Hours** | **12-14** |

[1] Approval of the AILP Director required.

# Civil Rights and Racial Justice - Graduate Certificate

The Civil Rights and Racial Justice Graduate Certificate directly prepares students for a career in civil rights and racial justice law, focuses their education on issues in race and the law and anti-subordination, and seeks to address structural racism by studying its causes and effects.

## Requirements

The Civil Rights and Racial Justice Certificate can be completed through a focused but flexible range of coursework. The certificate requires a participating student to earn no less than 92 semester hours of course credit for graduation (as contrasted with the usual 89 semester hours), and to earn at least 18 of these semester hour credits in the area of civil rights and/or racial justice. The certificate may be completed within the normal three year law degree period if a student takes a somewhat heavier than average load in each semester after completing the first year of law school.

### Minimum Grade Point Average

A student who satisfies all of the course requirements for this certificate program would be awarded the certificate if the student earned a grade of at least a C in each required course. A student who satisfies all of the course requirements for a certificate program would be awarded the certificate "with honors" if the student earned at least an A- average in courses designated by the student as satisfying the certificate requirements.

### Required Courses and Credits

After completion of the first year of law school study, students are required to select from the following courses to meet their 18 credits. However, consistent with other certificate programs, a student may seek permission from the faculty advisor of the certificate program to receive certificate credit for one other course (including a clinic) not listed below, upon a showing that the course/clinic will meaningfully focus on civil rights or racial justice law. Law students who wish to participate in the certificate program should consult the Law School Registrar and the certificate faculty advisor to discuss the certificate requirements, plan their schedule and obtain approval for any non-specified electives courses in advance of taking such courses for certificate credit.

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| Choose one: | | |
| LAWS 7725 | American Indian Law I | |
| LAWS 7025 | Civil Rights | |
| LAWS 7045 | Criminal Procedure: Adjudicative Process | |
| LAWS 7541 | Employment Discrimination | |
| Seminar: Special Topics in International Law (Global Critical Race Theory Subtopic) Immigration Law or International Human Rights | | |
| **Specialized Elective Course** | | |
| Choose from the core course list or from the following courses:[1] | | |
| LAWS 7735 | American Indian Law II | |
| LAWS 7301 | Copyright | |
| or LAWS 7341 | Trademark and Unfair Competition Law | |
| LAWS 6602 | Cultural Property Law | |
| LAWS 6555 | Disability Rights | |
| LAWS 7513 | Domestic Violence | |
| LAWS 7242 | Environmental Justice and Law | |
| or LAWS 8242 | Seminar: Funding Climate Action | |

| | |
|---|---|
| LAWS 6521 | Employment Law |
| LAWS 7003 | Federal Courts |
| LAWS 7015 | First Amendment |
| LAWS 6008 | Foundations of International Legal Thought |
| LAWS 7715 | Indigenous Peoples in International Law |
| LAWS 6511 | Labor Law |
| LAWS 8645 | Seminar: Law and Politics Colloquium: Race in America |
| LAWS 7515 | Poverty Law |
| LAWS 7605 | Refugee and Asylum Law |
| LAWS 7031 | Regulation of Financial Institutions |
| LAWS 8565 | Seminar: Citizenship and Equality |
| LAWS 8505 | |
| LAWS 8035 | Seminar Speech, Religion, and Equality: Constitutional Values in Tension |
| LAWS 8533 | Seminar: Criminal Law in Context: Legal and Social Images of Victims and Perpetrators |
| LAWS 8315 | Seminar: Advanced Criminal Justice |
| LAWS 7525 | |
| LAWS 8728 | Seminar: Critical Theory Colloquium |
| LAWS 8455 | Seminar: Gender and Criminal Justice |
| LAWS 8535 | Seminar: Class and Law |
| LAWS 8095 | Seminar: Problems in Constitutional Law (civil rights focus) |
| LAWS 8440 | Seminar: International Human Rights (cannot be counted if non-seminar version is also taken) |
| LAWS 7505 | Sexuality and the Law |
| **Capstone** | |
| Clinical and/or additional practice requirement as a capstone project, students are required to complete one of the below clinics or externships (or another clinic/externship approved by the faculty advisor) | |
| *Clinics* | |
| LAWS 7309 | American Indian Law Clinic |
| LAWS 6029 | Criminal and Immigration Defense Clinic |
| LAWS 6079 | Criminal Defense Clinic |
| *Externships/Additional Practice Opportunities* | |
| Consistent with the limitations on practice hour credits, participants could dedicate 2 credit hours toward the Certificate credit requirements or the Capstone requirement using the following: | |
| Externships in the field of civil rights, racial justice, international human rights, or American Indian/indigenous peoples law and policy. These placements could be at agencies, non-profits, or law firms focusing on this field, such as the ACLU, the Southern Poverty Law Center, the EEOC, or could include acting as a research assistant for a professor. | |

[1] This list of elective courses may be altered by the certificate advisor(s).

# Entrepreneurial Law - Graduate Certificate

The entrepreneurial law certificate coordinates Colorado Law's strengths and business-law related assets in the areas of entrepreneurial and technology law, such as the Silicon Flatirons Center (https://siliconflatirons.org/), the Entrepreneurial Law Clinic (https://www.colorado.edu/law/academics/clinics/entrepreneurial-law-clinic/) and the *Colorado Technology Law Journal*. It is awarded to law students who complete coursework reflecting a concentrated study of issues typically faced by transaction-side lawyers, and signals to prospective employers that a student possesses a skill set with applicability across issues of transactional law.

# Requirements

Certificate requirements include:

1. at least 92 credit hours (89 is required for the J.D.), and
2. at least 21 of the 92 credit hours in the area of entrepreneurial law.

This includes at least 3 credit hours in a Business School course and participation in an Experiential Offering relevant to the certificate. Visit the Rules of the Law School (https://www.colorado.edu/law/about/rules/) webpage for complete details, including a full list or relevant electives to be used to satisfy the 21 credit-hour requirement.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Doctrinal Core Courses** | | |
| Choose one: | | |
| LAWS 6211 | Corporations | |
| LAWS 6201 | Agency, Partnership, and the LLC | |
| **Venture Capital Courses** | | |
| Choose one: | | |
| LAWS 7271 | Venture Capital and Private Equity | |
| LAWS 7101 | Deals: Engineering Financial Transactions | |
| **Intellectual Property Courses** | | |
| LAWS 7311 | Patent Law | |
| LAWS 7341 | Trademark and Unfair Competition Law | |
| LAWS 7301 | Copyright | |
| LAWS 6301 | Introduction to Intellectual Property Law | |
| **Financial Literacy Courses** | | |
| LAWS 6157 | Corporate Taxation | |
| LAWS 6007 | Income Taxation | |
| LAWS 6117 | | |
| LAWS 6281 | Accounting Issues for Lawyers | |
| LAWS 7261 | | |
| LAWS 6167 | Partnership Taxation | |
| Or any CU Leeds School of Business Finance course | | |
| **Required Skills Courses** | | |
| Choose two or more of the following to complete 4 credit hours: | | |
| LAWS 7051 | Transactional Drafting | |
| LAWS 7061 | | |
| LAWS 7409 | Legal Negotiation | |

| | |
|---|---|
| LAWS 7709 | Advanced Legal Negotiation |
| Any section of a Deals Lab such as LAWS 6271 or LAWS 7004 or those approved and offered by the Law School | |
| **Required Domain Expertise Courses** | |
| Choose one graduate-level course at the Leeds School of Business: [1] | |
| MBAX 6100 | Entrepreneurship |
| MBAX 6110 | Entrepreneurial Finance |
| MBAX 6170 | New Venture Creation |
| **Experiential Offering** | |
| Completion of at least one of the following: (i) participation in the New Venture Challenge; (ii) membership in the Deming Center Venture Fund; (iii) participation in the Transactional LawMeet; (iv) participation in the Venture Capital Investment Competition; or (v) another experiential offering as approved by the Program Advisor. | |
| **Required Professional Practice Course or Transactional Experience** | |
| LAWS 7619 | Entrepreneurial Law Clinic |
| A transactional internship or externship approved by the program advisor. | |

[1] If circumstances warrant, the MBA requirement may be waived after consultation with the program advisor and completion of a substitute course (certificate participants should ensure their compliance with Law School Rule 22 as it applies to Business School offerings).

# Environmental, Natural Resources and Energy Law - Graduate Certificate

The University of Colorado Law School has a proud tradition as a leader in the field of natural resources law, and it consistently ranks among the best programs in that field. The environmental, natural resources and energy law certificate recognizes the strength of the law school's natural resources program by affording law students the opportunity to design an educational program that provides a solid foundation in natural resources law, even while ensuring that they receive a well-rounded legal education. The certificate also offers prospective employers evidence of a student's interest and commitment to the study of natural resources law.

## Requirements

At least 92 total credit hours in law school courses or in graduate-level courses approved for the certificate program by the Dean's Office, in consultation with the environmental, natural resources and energy law certificate advisor.

A student who satisfies all of the course requirements for the environmental, natural resources and energy law certificate will be awarded the certificate with honors if the student earned an average of at least an A- for classes designated by the student that satisfy the requirements for the certificate. A grade of C is required for all certificate courses to count towards completion.

At least 18 credit hours in natural resources law and policy courses, in addition to administrative law, as set forth below.

## Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| LAWS 7205 | Administrative Law | 3 |
| LAWS 8112 | Seminar: Advanced Natural Resources Law (or any other natural resources law-related seminar approved by the Program Advisor for the Environmental, Natural Resources, and Energy Law Certificate.) | 2-3 |
| **Electives** | | |
| Choose at least three of the following: | | 9 |
| LAWS 7202 | Environmental Law | |
| LAWS 6112 | Foundations of American Natural Resources Law | |
| LAWS 6722 | Energy Law and Regulation | |
| LAWS 6002 | Public Land Law | |
| LAWS 6302 | Water Resources | |
| Choose at least two of the following: | | 6 |
| LAWS 6712 | Climate Change Law and Policy | |
| LAWS 7122 | Mining and Mineral Development Law | |
| LAWS 7132 | | |
| LAWS 8320 | Seminar: Oil and International Relations | |
| LAWS 7102 | Oil and Gas | |
| LAWS 7212 | | |
| LAWS 6510 | International Environmental Law | |
| LAWS 7402 | The Law of Toxic and Hazardous Wastes | |
| LAWS 6502 | Wildlife and the Law | |
| LAWS 7154 | Land Use Planning | |
| LAWS 7209 | Natural Resources and Environmental Law Clinic | |
| LAWS 7916 | Colorado Environmental Law Journal | |
| LAWS 7939 | Extern Program (externship with Natural Resources law focus) | |
| Any environmental, natural resources, or energy-related course in a non-law department (e.g. ENVS) approved for the certificate program by the Certificate Advisor. | | |
| Optional fourth and/or fifth course from the first set of elective courses (under "choose at least three" above). | | |
| **Total Credit Hours** | | **20-21** |

# Health Law and Policy - Graduate Certificate

Law students may demonstrate to employers that they are prepared to practice health law and lead in the administration financing, organization policy-making and delivery of health care by earning a health law & policy certificate (HLP).

The HLP certificate not only prepares students to practice law in areas such as health care administration, organization, financing, public interest advocacy and public health, but also allows students to take advantage of the wealth of resources and courses related to health and health care in the Law School and throughout the University of Colorado system. Colorado Law surveyed health law employers and heard from them that

the HLP certificate will move law graduate resumes to the top of the applicant pile.

For more information, contact the program director.

## Requirements

To qualify for the HLP certificate, a student must earn 92 credit hours—three more than required for a regular JD degree—and at least 20 credit hours must be earned in courses approved in the health law and policy curriculum. Students awarded the health law & policy certificate will carry the notation of their concentration on their Law School transcripts. Moreover, students may earn the "Certificate With Honors" notation by earning a cumulative average grade of at least A- in the designated courses.

A full list of the designated courses and HLP certificate requirements may be found in Law School Rules (https://www.colorado.edu/law/about/rules/#_Toc385575490).

| Code | Title | Credit Hours |
|---|---|---|
| **Mandatory Core Courses** | | **9** |
| LAWS 7425 | Health Law and Policy | |
| LAWS 7205 | Administrative Law | |
| *Intermediate Courses* | | |
| Choose one: | | |
| LAWS 7405 | Health Law 2: Medical Malpractice and Quality Regulation | |
| LAWS 7415 | Bioethics and Law | |
| LAWS 7565 | Corporate Transactions in Health Law | |
| LAWS 8045 | | |
| **Mandatory Writing Course** | | **2-3** |
| Choose one: | | |
| LAWS 7051 | Transactional Drafting | |
| LAWS 7061 | | |
| LAWS 6123 | Legislative and Policy Drafting | |
| LAWS 6207 | Writing in the Regulatory State | |
| LAWS 6226 | Advanced Legal Writing | |
| LAWS 6896 | Advanced Legal Research and Writing for Practice | |
| **Elective Courses** | | **5-6** |
| Choose two: | | |
| LAWS 7201 | Antitrust | |
| LAWS 7211 | Business Planning | |
| LAWS 7601 | Business Transactions | |
| LAWS 6221 | Compliance | |
| LAWS 7411 | Mergers, Acquisitions and Reorganizations | |
| LAWS 6201 | Agency, Partnership, and the LLC | |
| LAWS 7021 | Bankruptcy | |
| LAWS 7445 | Insurance Law | |
| LAWS 7251 | Non-Profit Law | |
| LAWS 6157 | Corporate Taxation | |
| LAWS 6117 | | |
| LAWS 6167 | Partnership Taxation | |
| LAWS 6128 | Statutory Interpretation | |
| LAWS 7065 | Immigration and Citizenship Law | |
| LAWS 8535 | Seminar: Class and Law | |
| LAWS 8645 | Seminar: Law and Politics Colloquium: Race in America | |
| LAWS 7515 | Poverty Law | |
| LAWS 6308 | | |
| LAWS 7605 | Refugee and Asylum Law | |
| LAWS 7255 | Local Government | |
| LAWS 8545 | Seminar: Food Law and Policy | |
| LAWS 7513 | Domestic Violence | |
| LAWS 8361 | Seminar: Advanced Information Privacy | |
| LAWS 6702 | Climate Justice | |
| LAWS 7440 | International Human Rights and Humanitarian Law | |
| LAWS 8430 | | |
| LAWS 7409 | Legal Negotiation | |
| LAWS 7439 | Mediation | |
| LAWS 7751 | Arbitration | |
| LAWS 6211 | Corporations | |
| LAWS 7429 | | |
| *Interdisciplinary Electives* | | |
| SOCY 7002 | Social Disparities in Health | |
| Additional elective course options [1] | | |
| **Capstone Course(s) [2]** | | **4** |
| LAWS 7535 | Poverty, Health and Law 1 | |
| LAWS 6009 | Legal Aid Civil Practice 1 [3] | |
| LAWS 7939 | Extern Program | |
| **Total Credit Hours** | | **20** |

1. Additional courses of ANTH 5290, HSMP 6604, ANTH 5300, HBSC 6320, HBSC 7120, HSMP 6606, ANTH 5014 and ANTH 5080 available through Colorado School of Public Health or Health and Behavioral Sciences at CU Denver.
2. At least 4 credits, approvals required.
3. Note that Civil Practice Clinic is a year-long course.

# International Law - Graduate Certificate

The international law certificate program is designed to ratify a student's completion of a concentrated course of study in international law. This certificate will provide students with a grounding in the foundations of private and public international law, and also reflects the interdisciplinary nature of the ever growing international law practice, from international business transactions to international human rights. This certificate signals to potential employers and others that the student has engaged in a sustained course of study regarding international law and practice.

## Requirements

Law students who wish to participate in the international law certificate program should contact the Law School Registrar and the certificate program advisor.

The international law certificate requires completion of the normal requirements for the JD, and the additional 3 credit hours that are required (total of 92 credit hours). The program can be completed within

the normal three-year law degree if a student takes a somewhat heavier than average course load in each semester after the first year of study.

Students must earn a grade of at least a C in each required course. A student who satisfies all of the course requirements for a certificate program would be awarded the certificate "with honors" if the student earned at least an A- average in courses designated by the student as satisfying the certificate requirements.

## Required Courses and Credits

A minimum of 18 credit hours must be obtained in the area of international law as follows:

| Code | Title | Credit Hours |
|---|---|---|
| **Core Courses** | | |
| One of the following: | | 3 |
| LAWS 6008 | Foundations of International Legal Thought | |
| LAWS 6400 | International Law | |
| Three of the following: | | 9 |
| LAWS 6108 | Conflict of Laws | |
| LAWS 7421 | Business and Human Rights | |
| LAWS 6008 | Foundations of International Legal Thought | |
| LAWS 6540 | Global Law & Global Governance | |
| LAWS 7611 | International Business Transactions | |
| LAWS 7310 | International Dispute Settlement | |
| LAWS 6510 | International Environmental Law | |
| LAWS 7440 | International Human Rights and Humanitarian Law | |
| LAWS 6400 | International Law | |
| LAWS 6410 | International Trade Law | |
| LAWS 7617 | International Taxation | |
| LAWS 7450 | Regional Human Rights Protection for JD Students | |
| Other courses approved by the program advisor | | |
| **International Law Seminar** | | |
| One of the following: | | 2 |
| LAWS 8440 | Seminar: International Human Rights | |
| LAWS 8320 | Seminar: Oil and International Relations | |
| LAWS 8400 | Seminar: Special Topics in International Law | |
| LAWS 8450 | | |
| LAWS 8548 | Seminar: Theory of Punishment | |
| Other seminars approved by the program advisor | | |
| **Electives** | | |
| Electives with an international or comparative law component approved by the program advisor | | 4 |
| **Total Credit Hours** | | **18** |

The certificate program advisor may approve additional classes as they reasonably fit within the framework of the program requirements below. In the event that a required course is not taught during an academic year, the program advisor shall have discretion to authorize a reasonable substitute course as satisfying a program requirement.

# Juvenile and Family Law - Graduate Certificate

Juvenile and family law covers a broad range of practice areas, such as marriage, divorce, custody, visitation, family support, child abuse and neglect, delinquency, adoption, estate planning, education law and elder law. The juvenile and family law program (JFLP) provides students with opportunities to acquire specialized knowledge in this field, develop a network of, and foster collaboration between students, academics and practitioners, and engage in interdisciplinary work in the study and practice of the field. The program includes specialized courses, research projects, externships and clinical opportunities.

# Requirements

## Required Courses Credits

Colorado Law offers a juvenile and family law certificate, demonstrating a student's completion of a concentrated course of study in juvenile and family law.

Students must earn 92 total credits, which must include 18 in the field of juvenile and family law.

A student who satisfies all of the course requirements for the certificate will be awarded the certificate if the student earned at least a C in each course designated by the student as satisfying the certificate requirements. A student who satisfies all of the course requirements for the certificate would be awarded the certificate "with honors" if the student earned a cumulative grade point average of at least an A- in courses designated by the student as satisfying the certificate requirements.

Visit Rules of the Law School (http://www.colorado.edu/law/about/rules/) for complete details.

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| LAWS 7105 | Family Law | 3 |
| At least one of: | | 3 |
| LAWS 7115 | Juvenile Justice | |
| LAWS 7513 | Domestic Violence | |
| LAWS 7135 | Parent, Child, and State | |
| One clinic: | | 2-4 |
| LAWS 6099 | Family Law Clinic | |
| LAWS 7449 | Juvenile and Family Law Clinic | |
| Other clinic focusing on juvenile or family issues (approved by the Program Directors) | | |
| **Electives** | | **8** |
| LAWS 6281 | Accounting Issues for Lawyers | |
| LAWS 7429 | | |
| LAWS 7021 | Bankruptcy | |
| LAWS 8115 | | |
| LAWS 8701 | Seminar: Counseling Families in Business | |
| LAWS 7513 | Domestic Violence | |
| LAWS 7055 | Education Law | |
| LAWS 6525 | Elder Law | |

| | |
|---|---|
| LAWS 7217 | Estate Planning |
| LAWS 7440 | International Human Rights and Humanitarian Law |
| LAWS 7115 | Juvenile Justice |
| LAWS 7409 | Legal Negotiation |
| LAWS 7439 | Mediation |
| LAWS 7135 | Parent, Child, and State |
| LAWS 7535 | Poverty, Health and Law 1 |
| LAWS 7515 | Poverty Law |
| LAWS 7505 | Sexuality and the Law |
| LAWS 8235 | Seminar: Advanced Topics In Family Law |
| LAWS 6104 | Wills and Trusts |
| Other course(s) with significant application to the field of juvenile and family law (approved by the Program Directors) | |
| **Additional Practice Opportunities** [1] | **0-2** |
| Externships in the field of juvenile and family law, including acting as a research assistant for a professor working in this field (1-2 credits) | |
| Participation in a national moot court competition (1 credit) | |
| **Total Credit Hours** | **18** |

[1] Consistent with law school limitations on practice credit hours and subject to the approval of the Program Advisor, participants may earn up to 2 credit hours toward the Certificate requirements through additional practice opportunities as defined in this section.

# Tax Emphasis - Graduate Certificate

The Law School offers a program of law study that leads to a Juris Doctor degree with an emphasis in taxation. The program signifies tax law experience beyond that normally obtained by law graduates, but not as extensive as that obtained in a master's of taxation degree program.

# Requirements

## Program Requirements

Students must earn at least 92 credit hours (89 are required for the JD) with at least 18 of the credits in taxation.

### Required Courses and Credits

| Code | Title | Credit Hours |
|---|---|---|
| **Required Courses** | | |
| LAWS 6007 | Income Taxation | 4 |
| LAWS 7207 | Federal Estate and Gift Tax | 3 |
| **Business Entity Taxation** | | **3** |
| Choose at least one: | | |
| LAWS 6157 | Corporate Taxation | |
| LAWS 6167 | Partnership Taxation | |
| LAWS 6117 | | |
| **Planning** | | **2-3** |
| Choose at least one: | | |
| LAWS 7217 | Estate Planning | |
| LAWS 7211 | Business Planning | |
| LAWS 7024 | Real Estate Planning | |
| **Tax Policy** | | **2-3** |
| One course in tax policy at the Law School or the Leeds School (2 or 3 credits), or Public Finance in the Economics Department (3 credits) | | |
| **Additional Electives** | | **2-4** |
| May consist of tax courses (at the Law School) or from graduate tax offerings (at the Leeds School of Business) approved for law credit. [1] | | |
| **Total Credit Hours** | | **18** |

[1] In the event that a required course is not taught during an academic year, the program advisor shall have discretion to authorize a reasonable substitute course as satisfying a program requirement.

Business school and economics department courses taken for Law School credit under the tax emphasis program are limited to 6 semester credit hours and must have received prior approval from the faculty. Students may take more than the required 18 credit hours of tax courses.

Students must receive at least a B in the business school course or in the public finance course to count for Law School credit. The business school or public finance courses will be treated as pass/fail courses for the Law School transcript; that is, these courses will count toward the 92 hours required for the degree, but will not be taken into account in computing a law student's grade point average.

## Graduating in Three Years

Students can complete the program within the normal three-year law degree period if they take a somewhat heavier than average load in each semester after the first year of law study. Law students who wish to participate in the program should submit an online enrollment form to both the program director and the law school registrar. See law school website for details.

# CU BOULDER ONLINE CATALOG

CU Boulder Online (https://online.colorado.edu/) is an extension of the University of Colorado Boulder administered collaboratively by the Division of Continuing Education (http://ce.colorado.edu/) and the Office of Academic and Learning Innovation (https://www.colorado.edu/ali/). The academic programs included under the CU Boulder Online umbrella are extensions of campus programs, vetted and developed by our faculty, in addition to professional development programs that are created in response to industry needs.

CU Boulder Online programs are delivered in different learning management systems, primarily Canvas and Coursera. Explore all CU Boulder Online programs (http://online.colorado.edu).

Due to the variability in program offerings, not every program follows the same standard campus policies. Learn more by reviewing the related academic information section of the CU Boulder Online Catalog or by visiting the CU Boulder Online website (http://online.colorado.edu).

# Academic Calendar

## Academic Calendar

CU Boulder Online operates year round, with varying academic sessions designed for flexibility.

For a complete calendar of academic and financial dates and deadlines, visit the CU Boulder Online website (https://online.colorado.edu/) and specific program pages.

# Academic Integrity

## Why Do We Have a Student Honor Code?

### Mission

The mission of the Honor Code at the University of Colorado Boulder is to secure an environment where academic integrity can flourish.

### Values

The Honor Code recognizes the importance of honesty, trust, fairness, respect, and responsibility and aims to instill these principles as essential features of the University of Colorado Boulder campus. The Honor Code allows all students to have responsibility for, and the ability to attain, appropriate recognition for their academic and personal achievements.

## What is a Violation?

**Academic Misconduct** includes any act in which a student gains or provides, or attempts to gain or provide, an unfair academic advantage over other students. These acts include, but are not limited to the following and also include any attempts to engage in the following:

1. **Cheating:**
   a. Use of prohibited notes, study aids, or other explicitly prohibited course materials;
   b. Allowing another party to do one's work/exam and turning in that work/exam as one's own;
   c. Copying coursework from another student or from an unauthorized source (including but not limited to internet sources);
   d. Collaborating on coursework when prohibited;
   e. Failing to abide by the specific written course instructions including, but not limited to,
      i. the extent artificial intelligence is permitted,
      ii. exams, homework assignments, and syllabi;
   f. Clicker Fraud. Using, or having someone else use, clicker technology improperly in an effort to receive academic credit.
2. **Plagiarism.** This includes, but is not limited to:
   a. Portrayal of another's work or ideas as one's own;
   b. Improper citation of another's work;
   c. Improper citation of one's own previous work;
   d. Use of paper writing services or technology (such as essay bots or other artificial intelligence) whether paid or unpaid.
3. **Resubmission.** Submitting the same or similar work for credit, including, but not limited to, homework more than once without permission from all course faculty involved.
4. **Fabrication.** Falsification or creation of data, research, or resources, or altering graded work without the prior consent of the course faculty.
5. **Lying.** Deliberate falsification with the intent to deceive as it relates to an academic submission.
6. **Bribery.** Providing, offering, or taking rewards in exchange for a grade, an assignment, or in the aiding of Academic Misconduct.
   a. Rewards include, but are not limited to: currency, tangible items, services, or recompense.
7. **Threat.** Acting to intimidate a student, staff, or faculty member for the purpose of affecting a grade or in an effort to prevent the reporting of an Honor Code allegation, or in connection with any other form of Academic Misconduct.
   a. **Retaliation.** Retaliating against or discouraging, directly or through third parties, an individual from participating in the Honor Code process. To be considered retaliation, there must be a causal connection between a materially adverse action and the act of reporting a violation or participating in an Honor Code process. A materially adverse action is one that would dissuade a reasonable person from reporting a violation, and includes, but is not limited to, intimidation, 5 threats, or coercion. A determination of whether an action is materially adverse is a fact-dependent inquiry made on a case-by-case basis by Student Conduct and Conflict Resolution (SCCR) staff.
8. **Unauthorized Access.** Gaining access to, giving access to, or use of, protected academic information including, but not limited to: CU-SIS; a faculty, student, or staff member's computer, files, and/or physical space; and/or secure information on an online server.
9. **Aiding Academic Misconduct.** Facilitating any act which may help a student to gain an unfair academic advantage including, but not limited to, any of the aforementioned acts.
   a. **Sharing course materials,** including but not limited to, personal notes, in an unauthorized online bank or forum, or crowdsourcing site whether for profit or for free, is strongly discouraged and may result in a referral to the Honor Code process.
   b. **Sharing personal authentication credentials/login information** to third party sites is strongly discouraged and may result in a referral to the Honor Code process.

### Resolution Processes

SCCR resolves alleged academic misconduct through the informal resolution process or the formal resolution process. Resolution specialists have the authority and sole discretion to determine the

type of resolution process without Honor Code Advisory Board (HCAB) consultation.

### Informal Resolution

This process may generally include, but is not limited to, a meeting with a resolution specialist, completion of the assigned resolution outcomes and/or participation in the CU Restorative Justice process.

During the meeting, if the resolution specialist determines that the informal resolution process may be appropriate, the resolution specialist will offer it as an option to the responding student and address any questions the responding student may have about the process. If the responding student accepts responsibility for the alleged academic misconduct, agrees to, and completes the agreement developed during the meeting, then SCCR will consider the matter to be resolved informally. In some cases, the HCAB will also review the referrals before a final determination is made.

### Formal Resolution

This process generally includes: i. written notice of the factual allegations and alleged academic misconduct; ii. the opportunity to meet with the resolution specialist to address the allegations and provide information to the resolution specialist; iii. the resolution specialist reviewing the allegations and making factual and violation determinations based on preponderance of the evidence; and iv. written notice to the responding student of the resolution specialist's determinations.

The resolution specialist will consider the following in making this determination: i. the allegations in the Resolution Meeting Notice and the student's response to those allegations; ii. all documents and/or information that the resolution specialist finds relevant, including, without limitation, relevant documents presented by the responding student, reporting party, or any other interested party; iii. the oral or written statements of any witnesses with relevant information, as presented by the responding student, any reporting party, or other interested party, as it appears in a referral, and/or as requested by the resolution specialist; and iv. the recommendations of HCAB regarding responsibility and Resolution Outcomes related to the incident or precedent.

Questions regarding academic integrity should be directed to Student Conduct & Conflict Resolution, studentconduct@colorado.edu, 10 UCB Boulder, CO 80309, phone 303-492-5550.

The full Student Honor Code can also be viewed on the Student Conduct & Conflict Resolution (https://www.colorado.edu/sccr/) website.

# Academic Offerings

## Degrees and Certificates

CU Boulder Online offers online instruction leading to the following degrees and certificates. Degree programs are comprehensive and provide broad and in-depth education in a particular field. They typically require several years to complete. In contrast, certificates provide more specialized knowledge and skills, requiring fewer courses.

### Undergraduate Degrees

- Applied Computer Science - Post-Baccalaureate Bachelor of Science (BSACS) (p. 945)

### Graduate Degrees

- Computer Science - Master of Science (MS) (p. 1674)[1]
- Corporate Communication - Master of Arts (MA) (p. 1512)
- Data Science - Master of Science (MS) (p. 1695)[1]
- Electrical & Computer Engineering - Master of Science (MS) (https://catalog.colorado.edu/graduate/colleges-schools/engineering-applied-science/programs-study/electrical-computer-engineering/electrical-computer-engineering-master-science-online-msee/)[1]
- Engineering Management - Master of Engineering (ME) (p. 1737)[1]
- Organizational Leadership - Master of Science (MS) (p. 1770)
- Outdoor Recreation Economy - Master of Science (MS) (p. 1770)
- Teacher Leadership - Master of Arts (MA) (p. 1584)

[1] Hosted on the Coursera platform.

For a full list of graduate degree programs, please see the Academic Offerings (p. 1106) section of the Graduate Catalog.

### Certificates

Where applicable, students may enroll in graduate certificates offered online (flex, term-based or on Coursera) as either non-degree or degree-seeking students. Each certificate program has unique requirements. Degree-seeking students who have been verified with completed certificate requirements will have the certificate(s) posted to their academic records at the time of graduation.

- Applied Shakespeare (p. 1431)
- Artificial Intelligence (p. 1684)[1]
- Building Resilient Communities (p. 1258)
- Cultivating Compassion and Dignity (p. 1584)[2]
- Data Science (p. 1695)[1]
- Design for the Circular Economy (p. 1738)[1]
- Designing for Learning: Inquiry-Based Pedagogy (p. 1585)[2]
- Embedded Programmable Logic (p. 1718)[1]
- Engineering Management (p. 1739)[1]
- Inclusive and Special Education (p. 1585)[2]
- Inclusivity and Belonging (p. 1259)
- Industrial Internet of Things (p. 1718)[1]
- Introduction to the Outdoor Recreation Economy (p. 1259)
- Leading a Sustainable Business (p. 1260)
- Leading for Change in Science Assessment Practice (p. 1586)[2]
- Power Electronics (p. 1718)[1]
- Public Lands and Natural Resources Policy (p. 1260)
- Semiconductor Photonics (p. 1718)[1]
- Spectrum Engineering (p. 1718)[1]
- Teacher and Social and Emotional Learning (p. 1586)[2]
- Teachers Leading Change (p. 1587)[2]
- Teaching Culturally and Linguistically Diverse Students (p. 1587)[2]

[1] Hosted on the Coursera platform. Automatically conferred, at the end of each session, once student meets requirements.

[2] Flex.

# Academic Records

## Diplomas

A diploma is issued for each degree earned at the University of Colorado Boulder. Diplomas are mailed to graduating students approximately six weeks after the close of the semester or session in which degree

requirements were completed. *Note:* International students must resolve all financial obligations with CU before a diploma is issued.

CU Boulder issues diploma-like certificates to individuals who successfully complete approved academic certificate programs.

In addition, all students earning a degree or certificate are issued a certified electronic diploma or certificate (CeDiploma) (http://www.colorado.edu/registrar/students/graduation/cediploma/) to share and post digitally.

Display diplomas or replacement diplomas may be ordered online after graduation. For more information, visit the Office of the Registrar's Diplomas (http://www.colorado.edu/registrar/alumni/diplomas/)webpage.

# Enrollment & Degree Certification

Through Buff Portal (https://buffportal.colorado.edu/), students may print an official enrollment certification at no charge. Advanced registration enrollment verifications (https://www.colorado.edu/registrar/students/records/info/verifications/#after_you_039_ve_registered_amp_before_the_first_day_of_classes-1771) are available three weeks prior to the term start, and will remain available until the day before the first day of classes, to students enrolled in at least a half-time enrollment status for an upcoming term. Official certification of enrollment is available after the third week of classes of a semester. This certification may be for car insurance, loan deferments, medical coverage, scholarship purposes, etc. The Office of the Registrar can provide written confirmation of registration, enrollment or degree status upon request by current or former students.

Students in CU Boulder on Coursera programs should reach out to reg-specialprograms@colorado.edu with any enrollment or degree certification requests.

CU Boulder has authorized the National Student Clearinghouse (NSC) to act as its agent for purposes of third party enrollment and degree verification. The NSC verifies degrees and enrollment for students who have not placed a privacy restriction on their academic record. The student's name when enrolled, social security number or student ID, and date of birth will be required for identification purposes for enrollment or degree verification. All third parties should contact the National Student Clearinghouse by phone or visit its web site for current enrollment and degree verification information, instructions and fees.

University policy determines the *academic* enrollment status and federal regulation determines the *financial aid* enrollment status. CU Boulder is required to report enrollment based on the financial aid enrollment status to the NSC. Please refer to the Office of the Registrar's enrollment status grid on the Check Your Enrollment Status (https://www.colorado.edu/registrar/students/registration/register/status/) webpage to determine your academic/financial aid enrollment status.

Students may also obtain verification of degree by ordering an official transcript or requesting an official degree certification through the Office of the Registrar.

# Transfer of Credit

Students should refer to individual academic programs on the CU Boulder Online website (http://online.colorado.edu) for specific transfer credit policies.

## Graduate Programs

Credits earned in Canvas and Coursera online programs may be transferred to other CU Boulder graduate degree programs at the discretion of the program and of the Graduate School in accordance with program-specific requirements and Graduate School limits and rules.

# Transcripts

## Official Transcripts

Current and former students may order transcripts online (https://exchange.parchment.com/send/adds/?main_page=login&s_id=7i3anAeWu6K3ErXO); no IdentiKey is required. Official transcripts are available in electronic PDF or paper format. Transcripts may be ordered as either a complete academic record of courses taken at all University of Colorado campuses or as a select career (undergraduate, graduate, law or noncredit) for coursework taken after 1988.

In certain circumstances, transcripts can be withheld for ongoing financial obligations to the university or for disciplinary actions.

Official transcripts bear the signature of the registrar and the official seal of the university (not applicable to noncredit transcripts).

## Unofficial Transcripts

Currently enrolled students and alumni who have access to the student portal may view and print unofficial transcripts free of charge through Buff Portal (https://buffportal.colorado.edu/). Unofficial transcripts display the complete academic record of courses taken at the University of Colorado. However, academic institutions and potential employers generally do not accept the unofficial transcript as evidence of a student's career at CU Boulder, as this transcript does not carry the registrar's signature, the seal of the university or other security features. Unofficial transcripts are primarily used for advising and counseling in offices at University of Colorado campuses.

# Educational Record Changes

Students whose degrees have been conferred are not eligible for retroactive changes to their educational record.

## Graduate Course Load

For graduate students, enrollment status depends on a student's level (doctoral or master's), the type of classes they are taking and (for doctoral students) candidacy status. The status is also based on university policy and state and federal regulations. According to University policy, the academic enrollment status and federal regulation determines the financial aid enrollment status. CU Boulder is required to report enrollment based on the financial aid enrollment status to the National Student Clearinghouse.

For academic purposes, full-time status is determined by university policy. For requirements for your academic load and status, visit the Graduate School Rules (Section 8: Full-time Status and Minimum Registration Requirements) (https://www.colorado.edu/graduateschool/faculty-staff/policies-procedures/rules/graduate-education/full-time-status-minimum-registration/).

Typically in the fall and spring semesters, full time academic status is one of the following:

- 5 credit hours of graduate coursework.
- 8 credit hours of combined graduate/undergraduate coursework.
- 12 credit hours of undergraduate coursework or a varying number of thesis/dissertation credit hours, depending upon the student's status.

Summer course load requirements vary.

For financial aid full time and half time course-load requirements, graduate students should consult the financial aid load columns of the enrollment status grid (https://www.colorado.edu/registrar/sites/default/files/attached-files/enrollmentstatusgrid.pdf) and the Office of Financial Aid (https://www.colorado.edu/financialaid/aid-graduate-professional-students/) website. Students may also refer to Office of the Registrar's enrollment status (https://www.colorado.edu/registrar/students/registration/register/status/) webpage to determine your academic and financial aid enrollment status.

Graduate students may register for a maximum of 15 credit hours per semester toward a degree during the fall and spring semesters.

### Undergraduate Course Load

Full-time status for undergraduate students is 12 or more credit hours for fall, spring and summer semesters for financial aid purposes. For enrollment verification and academic purposes (not related to financial aid), 12 credit hours is considered a full-time load in the fall and spring semester, and 6 credit hours is considered full time in the summer. For further information, please consult the Office of Financial Aid (https://www.colorado.edu/financialaid/apply-aid/) website.

Students who receive financial aid or veterans benefits should check with the appropriate office regarding course-load requirements for eligibility purposes.

Please note: For the Applied Computer Science Post-Baccalaureate Program, a full time course load of 12 or more credits in a term is not recommended for most students due to the demanding nature of the courses and the time commitment required to be successful. Students are encouraged to work with their academic advisor for degree planning before committing to a full time course load.

### CU Boulder on Coursera

Students in programs hosted on the Coursera platform are not required to take a minimum number of credit hours over any given period of time and are not required to apply for a leave of absence when not enrolled in courses. However, students who have not enrolled for two years will be discontinued until they enroll in a new for-credit course. At that point, they will automatically be reinstated.

# Academic Standards & Advising

## Undergraduate Academic Standards

The following standards apply to students enrolled in the online Applied Computer Science Post-Baccalaureate Program

### Grade Point Average

A student is required to maintain a cumulative GPA of 2.0 or higher in order to maintain good academic standing and qualify for graduation.

### Grade Policies

Students in the CSPB program must complete all core courses with a grade of a C- or better. If the minimum grade is not achieved in a core course, the student is required to repeat the course until the minimum acceptable grade has been earned (maximum of 3 graded attempts total to master the subject content at the required level).

The minimum passing grade for a course that is considered a prerequisite for another course is C-, allowing a student to progress through the curriculum and apply these courses towards degree requirements. If the minimum required grade in a prerequisite course is not achieved, the student is required to repeat the course until the minimum acceptable grade has been earned (maximum of 3 graded attempts total to master the subject content at the required level). If a student takes the advanced (post-requisite) course, it does not remove the obligation to meet the prerequisite course minimum grade requirement, even if the grade earned in the advanced course is acceptable.

Elective courses must be passed with a grade of a D- unless serving as a prerequisite, in which case a C- or better will be required. Students must maintain a cumulative GPA of 2.0 or higher in the program.

### Academic Standing and Dismissal

University Academic Standing policies (https://catalog.colorado.edu/undergraduate/academic-records/#academicstandingtext) apply to all degree-seeking undergraduate students at CU Boulder. More details regarding good academic standing, academic alert, academic warning, academic suspension, and academic dismissal are available on the Office of the Registrar's website (https://www.colorado.edu/registrar/students/your-information-records/academic-standing/).

## Graduate Academic Standards (including Canvas-Based Programs)

### Grade Point Average

A student is required to maintain at least a B (3.00) average in all work attempted while enrolled in the Graduate School, and must have at least a 3.00 cumulative average to receive a graduate degree.

### Grade Policies

1. A student who receives a grade of C+ or below in a course may retake the course under the grade replacement policy (https://www.colorado.edu/registrar/students/degree-planning/grade-replacement/), if eligibility standards are met.
2. Courses in which grades below C (2.00) are received are not accepted for master's degree programs or for the removal of academic deficiencies.
3. Courses taken toward the fulfillment of requirements for graduate degrees may not be taken pass/fail.

### Academic Standing and Dismissal

Students are subject to academic requirements and standards for adequate progress placed both by the Graduate School and by their graduate program.

A student whose cumulative GPA falls below 3.00 is placed on academic warning. The student generally has two semesters in which to raise the cumulative GPA to 3.00 or above. If the student's cumulative GPA is at or below 2.50, a dean's administrative stop is placed on the student's

record, and the student may be withdrawn from coursework for upcoming semesters. If there are extenuating circumstances, the department chair/program director may petition the Dean of the Graduate School showing compelling reasons for the student to be granted a chance to continue.

If a student does not earn a 3.0 GPA in all courses taken in the first of two academic warning semesters, or if after the two-semester academic warning period the student's cumulative GPA is still below 3.00 (or if other conditions placed by the major department or Graduate School are not met) a dean's administrative stop will be placed on the student's record and they may be subject to dismissal.

Students are also subject to academic requirements and standards for adequate progress placed by their graduate program. Based upon Regent Law and Regent Policy, an academic dismissal decision is made by the dean of the Graduate School upon the program's recommendation. Should the student be dismissed from the program, a dean's administrative stop is placed on the student's record and the student is withdrawn from classes for any future semesters.

# Student Ethics

## Academic Dishonesty

The University of Colorado Boulder is dedicated to maintaining the highest standards of intellectual honesty. Commitment to these standards is the responsibility of every student, faculty and staff member. The Honor Code (https://www.colorado.edu/sccr/students/honor-code-and-student-code-conduct/) was designed to uphold CU Boulder's standards of academic integrity and intellectual honesty, as well as to provide quick resolution of reports of student academic misconduct. The Honor Code process is supported by the Boulder Faculty Assembly.

All students of the University of Colorado Boulder are subject to the Honor Code for academic matters. Students must sign a statement agreeing to abide by all university policies, including the Honor Code, as a condition of admission to the university. Students who violate may be subject to discipline as set forth by the Honor Code.

## Research Integrity

All research and scholarly/creative work must comply with requirements regarding research integrity. Allegations of plagiarism, fabrication, falsification, and other forms of research misconduct will be investigated by the Standing Committee on Research Misconduct. The Office of Research Integrity (https://www.colorado.edu/researchinnovation/rcr/research-misconduct/) provides further information and clarification on related issues and processes. Students should also review the university policy (https://www.cu.edu/ope/aps/1007/) on Misconduct in Research, Scholarship, and Creative Activities.

# Advising for Canvas-Based Online Programs

CU Boulder Online provides dedicated academic advisors for each of the fully online, Canvas-based programs. Advisors provide expert guidance regarding degree planning, registration, academic policies and procedures, as well as graduation requirements and planning. Academic advisors also provide holistic student success services by orienting all new students to their programs, assisting students with navigating campus departments and resources, and communicating important program updates.

Students can find program-specific advisor contact information on each of the program pages on the CU Boulder Online website (https://online.colorado.edu/.html).

# Admissions

# Admissions

## CU Boulder Online Canvas-Based Programs

Admissions requirements for CU Boulder Online Canvas-Based programs differ by program. Each program has a dedicated Admissions Specialist who can answer program-specific information and guide prospective students through the application process.

For more information and to connect with a program-specific Admissions Specialist, visit the program pages for the program(s) in which you are interested on the CU Boulder Online website (https://online.colorado.edu/).

## CU Boulder on Coursera

CU Boulder on Coursera programs have performance-based admissions criteria and processes. Six times per year, at the end of each session, students who meet all performance-based requirements for their declared program of study are automatically admitted.

Refer to each program for program-specific admissions policies, requirements and processes.

# Registration & Enrollment

# Overview

## Canvas-Based Online Program Registration

Visit the CU Boulder Online website (http://online.colorado.edu) for specific academic and financial dates and deadlines. Students should also consult individual programs for additional information on special requirements and deadlines. The following registration policies are intended to serve as general guidelines.

Students who require accommodations because of a disability should visit the Disability Services (http://www.colorado.edu/disabilityservices/) website or call 303-492-8671.

## Buff Portal

Student registration and other important information and services are available through Buff Portal (https://buffportal.colorado.edu/). Students access the portal using a secure CU login name and IdentiKey password and Duo Multi-Factor Authentication. For more information and registration instructions, visit the Registration (http://www.colorado.edu/registrar/students/registration/) webpage.

## Registering for Classes

All CU Boulder students register for classes through Buff Portal (https://buffportal.colorado.edu/), where they can also check their assigned enrollment dates, view any holds that may prevent registration (see "Holds"), and see to-do lists.

Registration instructions are also available on the Enroll in Classes (http://www.colorado.edu/registrar/students/registration/enroll/) webpage.

## Enrollment Dates

### Canvas-based Online Programs

Each term, students are assigned enrollment dates based on the number of credits they have completed. Accessible in Buff Portal, the enrollment assignment indicates the dates and times during which the student may enroll, as well as the maximum number of credits they can take.

### CU Boulder on Coursera Program

Enrollment opens two weeks prior to the start of each session and closes two weeks prior to the end of each session for all CU Boulder on Coursera students. See the CU Boulder on Coursera Calendar (https://www.colorado.edu/registrar/cu-boulder-coursera-calendar/) for details.

## Holds

A hold may be placed on a student's record for a number of reasons, including but not limited to financial, advising, scholastic, conduct and health. A hold may prevent a student from registering, returning to school, obtaining an official transcript or receiving a diploma. Students should resolve holds as quickly as possible by contacting the appropriate campus office identified in the hold details in Buff Portal.

## University Employees and Dependents

CU Boulder offers a tuition benefit to eligible employees and their dependents for eligible programs. For current benefit information, visit Employee Services' Employee Tuition Waiver Benefit (https://www.cu.edu/employee-services/employee-tuition-benefit/) website and program-specific pages on the CU Boulder online website (http://online.colorado.edu). The Employee Tuition Waiver Benefit is not applicable to CU Boulder courses hosted on the Coursera platform.

## Withdrawing from the Semester

Rules for withdrawing may vary with each college, school, and program. Students anticipating a withdrawal should consult their advisor to understand the potential impacts to their degree requirements and the process for withdrawing.

### Canvas-based Online Programs

Withdrawing students (including students applying for a graduate leave of absence) with Federal Perkins/NDSL loans must complete a loan exit interview and clear all outstanding financial balances before leaving the university. Failure to do so results in a hold on the student's record. This hold prevents registration for future terms. Students can complete a loan exit interview by contacting University Student Loans & Debt Management in the Bursar's Office at 303-492-5571, toll free at 800-925-9844 or TTY 303-492-3528.

**Active Duty:** Students who are military personnel, fire fighters and police officers called to active duty and/or to help with disasters may request to go on a leave of absence. These students should contact the Office of the Registrar. For more information, visit the Withdraw from the Semester (https://www.colorado.edu/registrar/students/withdraw/) webpage.

### CU Boulder on Coursera Programs

For CU Boulder on Coursera programs that have flexible course start dates, all drops, tuition refunds, withdrawals and grades are handled at the individual course level. It is the student's responsibility to monitor these deadlines. CU Boulder and, if applicable, Coursera are not responsible for notifying students of these deadlines.

Students who access a final assessment (or equivalent) are ineligible for a drop, withdrawal, or refund, and are assigned a final grade. For programs housed on the Coursera platform, students who complete some but not all coursework and who do not attempt the final assessment (or equivalent) will be assigned administrative withdrawals (W) after the session end date passes.

For more information, visit the Graduate School policies (https://www.colorado.edu/graduateschool/media/39/) for degrees hosted on the Coursera platform.

## Leaves of Absence

### Canvas-Based Online Programs

Students who do not enroll in the term to which they were admitted will get discontinued at the end of the term. Graduate degree-seeking students who do not maintain continuous enrollment (summer excluded) must apply for a leave of absence or be discontinued from the university. Graduate students who wish to take a leave of absence from the university must submit an application by the published deadline in a given term and get approval from their department and their school, college or program to avoid having to reapply. Certificate students' plans will get discontinued after three (3) terms of non-enrollment. The three terms include summer.

Graduate students taking an approved leave of absence are allowed two inactive semesters (plus summer), and are guaranteed a place in their current college or school and in their current major when they return to the university. Students must not have any disciplinary holds and must be in good academic standing with the university. Students registered for the semester in which they plan to begin their leave of absence must formally withdraw. See the section on withdrawal procedures above.

For an application and more information, visit the Leave of Absence (https://www.colorado.edu/registrar/students/withdraw/leave-of-absence/) webpage.

### CU Boulder on Coursera Programs

Students are not required to take a minimum number of credit hours over any given period of time and are not required to apply for a leave of absence when not enrolled in courses. However, students who have not enrolled for two years will be discontinued until they enroll in a new for-credit course. At that point, the student will automatically be reinstated. For more information, visit the Graduate School policies (https://www.colorado.edu/graduateschool/media/39/) for degrees hosted on the Coursera platform.

# Student Data Privacy

## Annual Notice to Students

As a CU Boulder student, it's important to understand your rights regarding access to and disclosure of information in your education record. The Family Educational Rights and Privacy Act (https://www.colorado.edu/registrar/students/records/ferpa/) (FERPA) affords you the right to:

- Inspect and review your education record
- Request amendment of your education record
- Consent to disclosure of personally identifiable information in your education record
- File a complaint with the U.S. Department of Education (Family Policy Compliance Office, U.S. Department of Education, 400 Maryland Avenue, SW, Washington, DC 20202)

To review or request an amendment to your record, contact the Office of the Registrar or the university office that maintains the record. This does not apply to grade changes, which are at faculty discretion.

Under FERPA, the university may release education record information if the disclosure is:

- To CU Boulder officials who have a legitimate educational interest (https://www.colorado.edu/registrar/students/records/ferpa/glossary/)
- To officials of another institution at which you seek or intend to enroll
- To authorized representatives of federal, state or local educational authorities
- To connection with financial aid you've applied for or received
- To an organization conducting studies for or on behalf of the university
- To your parents or guardians (if you are a dependent student for tax purposes)
- To an accrediting organization
- To comply with a judicial order or lawfully issued subpoena
- In connection with a health or safety emergency or other exception under FERPA (https://www.colorado.edu/registrar/students/records/ferpa/exceptions/)
- To fulfill a request for data that CU Boulder defines as directory information (https://www.colorado.edu/registrar/students/records/ferpa/directory-info/)

Student data that is *not* directory information may only be released with your documented consent.

To authorize third-party access to your non-directory information, see CU Guest Access (https://www.colorado.edu/registrar/students/records/privacy/guest-access/) and FERPA Consent to Release (https://www.colorado.edu/registrar/students/records/privacy/consent/). You may restrict the release of directory information by placing full privacy (https://www.colorado.edu/registrar/students/records/privacy/full/) on your record.

Questions may be directed to the Office of the Registrar.

# Directory Information

The following items of student information have been designated by the University of Colorado Boulder as public or "directory" information:

- student name[1]
- hometown (city, state)
- campus email address[2]
- dates of attendance
- previous educational institutions attended
- school/college or division of enrollment
- majors, minors and fields of study
- classification level (e.g., first-year, sophomore, etc.)
- university-recognized honors and awards
- degree status (e.g., expected graduation date and/or conferral dates/terms)
- enrollment status
- employment related to student status (e.g., teaching assistant, resident assistant or work-study) and dates for positions held
- participation in officially recognized activities/sports, including height and weight of athletes.
- photos and videos taken or maintained by the university

Directory information shall not be provided to anyone outside of the CU community (except to vendors/organizations with which the university has contracted in order to provide goods or services to students). The university retains the discretion to refuse disclosure of directory information if it believes such disclosure would be an infringement on student privacy rights. In an effort to protect student privacy, CU directories may only contain a student's name, email address, class and major field of study.

1 If a student provides a preferred name, the university uses it when communicating directly with the student and in campus systems, rosters, etc., unless there is a documented business or legal reason to use a student's primary name. When communicating with outside third parties, including parents, the university generally uses a student's primary (legal) name. Students may also select a diploma name (https://www.colorado.edu/registrar/students/graduation/) for graduation and commencement materials.

2 Campus email addresses may not be used for solicitation.

## Withholding Directory Information (Full Privacy)

Students have the right to request full privacy which withholds directory information from being released to inquirers. To request full privacy and restrict the release of directory information, students must bring a photo ID to the Office of the Registrar during business hours to complete a privacy form.

## Student Consent for Release of Non-directory (Confidential) Information

Students may authorize the university to release educational records to parents, spouses or other third parties by granting consent in their student portal. The Privacy Settings (http://www.colorado.edu/registrar/students/records/privacy/) webpage has more information about various options for granting and restricting access to student records.

## Release of Disciplinary Information

Provisions of the Family Educational Rights and Privacy Act of 1974, as amended by the Higher Education Amendments of 1998, govern access to a student's academic transcript or conduct file. The student and/or those university officials who demonstrate a legitimate educational need for disciplinary information may have access to the student's conduct file.

Parent(s) who provide proof that a student is a dependent as defined in Section 152 of the Internal Revenue Code of 1954 (i.e., a copy of the last federal income tax return listing the student as a dependent) may have access to the student's conduct file without written consent of the student. In this case, parents may have access to a conduct file, even if the student has requested otherwise.

In addition, parent(s) may be notified if a student under 21 is found responsible for a violation involving use or possession of alcohol and controlled substances. All other inquiries, including but not limited to inquiries from employers, government agencies, news media, family, friends or police agencies, require a written release from the student before access to university conduct files is granted. Exception: information may be released pursuant to a lawfully issued subpoena

and as provided by the Campus Security Act as amended by the Higher Education Amendments of 1992.

The Campus Security Act permits higher education institutions to disclose to alleged victims of any crime of violence (e.g., murder, robbery, aggravated assault, burglary, motor vehicle theft, arson) the results of the conduct proceedings conducted by the institution against an alleged perpetrator with respect to such crime. The Campus Security Act also requires that both the accused and the accuser be informed of campus conduct proceedings involving a sexual assault.

# Student Finances

## Tuition

Tuition is assessed at a linear rate based on credit hours. Refer to the CU Boulder Online website (http://online.colorado.edu) to find program-specific tuition costs.

If a tuition payment does not process successfully, a financial hold is placed on the student's account and the student will be prevented from registering for future courses at CU Boulder until the outstanding amount is paid in full.

### Estimated Costs

Costs for students attending CU Boulder Online vary depending on area of study, college, school or program; residency classification, personal needs and individual interests. Tuition and fees are approved annually by the Board of Regents in accordance with the level of cash fund appropriations set for the university by the Colorado General Assembly. Next year's rates are usually published on the Bursar's Office website (https://www.colorado.edu/bursar/costs/) by June 1. Please check back for current information. Additional costs such as housing, transportation, medical and personal expenses are considered indirect costs and are not charged on the university bill, but should be considered for general planning purposes. Please visit Understand Your Cost of Attendance (https://www.colorado.edu/understand-your-cost-attendance/) for a full description of costs.

Notes:

- Residency classification (http://www.colorado.edu/registrar/students/state-residency/) for tuition is determined by Colorado law.
- Tuition for no-credit (NC) courses (p. 1111) is the same as for courses taken for credit.
- Students simultaneously enrolled in programs leading to two different degrees or two different majors will be assessed tuition for the area of study with the higher tuition rate.

### CU Boulder on Coursera

Students in CU Boulder on Coursera programs are granted access to for-credit components of a course after their tuition has been paid and verified.

Former or current CU Boulder students wishing to enroll in a CU Boulder on Coursera program who have unpaid debts will have these debts automatically deducted from payments made to on Coursera programs and before on Coursera program tuition charges are paid.

If a student enrolled in a CU Boulder on Coursera program wishes to take additional courses on Main Campus or through Continuing Education, they must enroll through the appropriate channels and will be charged separately for those courses.

In consultation with University Counsel and the Chief Financial Officer's office, programs on the Coursera platform are offered as auxiliary programs. This designation allows CU Boulder to charge the same tuition to resident and nonresident students. It also prevents CU Boulder on Coursera enrollments from impacting CU Boulder's mandated resident and nonresident student ratios. The CU Employee Tuition Assistance Benefit cannot be applied toward auxiliary-funded programs per Administrative Policy Statement (APS) 5024 (https://www.cu.edu/ope/aps/5024/). Auxiliaries (fund 2x's) are those funds that account for units and activities that generate their own revenue to support the expenses of the individual program.

## Student Fees

Student fees will be set in accordance with campus policy (https://www.colorado.edu/bfp/fee-planning/mandatory-administrative-fees/institutional-student-fee-plan/).

For additional information regarding tuition and fees, refer to program-specific policies.

## Financial Aid

For information on financial aid for Canvas-based programs, refer to program-specific policies on the CU Boulder Online website (http://online.colorado.edu).

At this time, no federal financial aid will be administered in CU Boulder on Coursera programs.

## Bills & Payments

### Online Bills

The university bill includes tuition, fees, and other direct costs. Costs are billed one semester at a time. Textbooks, digital course materials and supplies up to $1,500 from the CU Book Store can be charged to the student bill. Adjustments made throughout the semester will appear on the student account (e.g. dropping or adding courses).

Bills for fall are available in mid-August. Spring bills are available in mid-January. Emails are sent to students' colorado.edu addresses and to authorized payers when bills are available online. New and unpaid charges are billed each subsequent month. Failure to check email or receive an email notification of the bill does not relieve any student of responsibility for payment by the published deadline. Students can log in to Buff Portal (https://buffportal.colorado.edu) and authorized payers can log in to CUBill&Pay (https://quikpayasp.com/cu/boulder/tuition/authorized.do) at any time to view the bill.

Any student who completes registration agrees to pay CU Boulder according to the payment terms in the Tuition and Fee Agreement and Disclosure (https://www.colorado.edu/bursar/payments/payment-agreement/).

### Payments

Payment due dates are on the 5th of the month. Primary payment deadlines are Sept. 5 for fall semester and Feb. 5 for spring semester. Dates may be subject to change.

### Payment Methods

Payments can be made online from a traditional U.S. checking or savings account via electronic check (eCheck). No fees are associated with this payment method making it the most cost-effective option.

We also accept American Express, Mastercard, Visa and Discover. A nonrefundable 2.85% fee (charged by NelNet Campus Commerce) applies to all credit and debit card transactions. We encourage payment from a checking or savings account to save money and avoid paying the service fee.

We have partnered with Flywire to accept payments from international students worldwide. Students and families can easily and securely make education payments in their own currency, using local payment methods from their home. Flywire offers real-time tracking, 24x7 multilingual support and a best price guarantee on exchange rates.

### Payment Plans

You may be eligible to pay your tuition and fees in installments over the course of the current semester. Optional payment plans are available for students or their authorized payers (https://bursar.colorado.edu/billing/cubillpay/parents/). Re-enrollment is required each semester you choose to participate.

A payment plan is a good option for students who can allow debits from one bank account or credit card to occur on a consistent basis. Payments must be made via automatic deduction (ACH) from a regular United States checking or savings account or credit/debit card. This option is not a good fit if payments will be made from multiple sources because automatic deductions/debits must come from only one bank account or credit card.

Automatic deductions are processed on the 5th of the month. When the 5th falls on a weekend, payments are processed the following business day. Dates and plan terms may be subject to change without notice.

# Policies

## Add/Drop Tuition Adjustment

Adjustment of tuition and fees is made accordingly based on add/drop dates for each specific program. Refer to the CU Boulder Online website (https://online.colorado.edu/) for more information.

## Credit and Debit Card Service Fee

A nonrefundable 2.85% service fee charged by NelNet Campus Commerce applies to all credit and debit card transactions. To avoid paying this fee, we encourage payment from a U.S. checking or savings account via electronic check (eCheck).

## Appeal Rights

To appeal tuition and mandatory fee charges, students must make a formal request by the last day of finals immediately following the one being appealed. Appeals will only be considered under extenuating circumstances, such as university error, recent medical condition, immediate family emergency, recent unanticipated financial problems and verified nonattendance. Official documentation must be provided to substantiate the circumstances. If you disagree with the charges and fail to avail yourself of the appeal process by the end of the semester, you will have waived your right to appeal the charges.

For Canvas-based programs, students must make a formal appeal to CU Boulder Online/Continuing Education. Reach out to cepetitions@colorado.edu (cepetitions@colorado.edu)or your academic advisor for guidance about the process.

For programs offered on the Coursera platform, students must make a formal appeal to the Bursar's Office. Learn more about the process, complete the tuition appeal form and submit the documentation online on the Tuition Appeals (https://www.colorado.edu/bursar/billing/tuition-appeals/) webpage.

## Failure to Make Payment

Failure to make the required payment in accordance with the scheduled payment deadline may result in any or all of the actions described below.

A financial hold may be placed on the student record and remain until the balance is paid in full. The hold may prevent students from being able to:

- Adjust their current schedule (drop or add classes).
- Register for future classes.
- Receive a diploma or certification materials.
- Be re-admitted.

A late payment charge is assessed once per semester based on the amount due.

**Balance Due and Late Charges**

| Balance Due | Late Charge |
|---|---|
| $10–99.99 | $5 |
| $100–299.99 | $10 |
| $300–499.99 | $20 |
| $500–699.99 | $30 |
| $700–899.99 | $40 |
| $900 and over | $50 |

In addition, finance charges of one percent (1%) per month are assessed on the unpaid principal balance. Finance charges are calculated by applying the periodic rate of one percent (1%) per month (annual percentage rate of twelve percent) to the unpaid principal balance less any payments or credits made.

Past due accounts are referred to the university's Student Debt Management department for collection. Students will have an opportunity to establish a university-approved repayment arrangement. Establishing a repayment arrangement does not result in release of financial holds.

If the balance is not paid or a university-approved repayment agreement does not exist after six months, Colorado law requires the university to place all delinquent accounts with a private collection agency at which time the delinquency is reported to national credit bureaus.

Student accounts referred to an outside collection agency may incur collection agency costs, expenses and fees. Such collection costs, expenses and fees may include percentage-based fees charged to the university by the collection agency, including percentage-based fees of up to 30% of the debt collected. Any collection costs stated above are charged in addition to the principal, fees and interest due on the student's account. Students may be responsible for reasonable attorneys' fees and court costs associated with collecting or enforcing payment on the past due account as allowed under Colorado law. Pursuant to Colorado

Revised Statutes § 23-5-115, in the event the student defaults on the amount owed to the university, the university may certify information to the Colorado Department of Revenue as required for the recovery of past due debt.

### Returned Payments

A $20 fee is charged for all payments (regardless of the amount) returned due to insufficient funds, closed account, payment stopped, or for other reasons. A $35 fee is charged by NelNet Campus Commerce for returned payment plan payments. In addition, late and finance charges may be assessed and certified funds may be required when payment is made. An additional financial hold may be placed on the student's account and students may be liable for collection costs and attorneys' fees as allowed by Colorado laws.

### Students Registered on More than One Campus

Students registering for courses on more than one campus during a single semester pay tuition and fees to each campus at the rate appropriate to the number of credit hours for which they are registered on that campus.

### Tuition and Fee Agreement and Disclosure

Any student who completes registration agrees to pay CU Boulder according to the payment terms in the Tuition and Fee Agreement and Disclosure (https://www.colorado.edu/bursar/payments/payment-agreement/).

# Tuition Classification

## Tuition Classification for Canvas-Based Programs

### In-State and Out-of-State Tuition Classification

Tuition classification is governed by state law and by judicial decisions that apply to all public institutions of higher education in Colorado. Since tuition classification is governed by state law (https://www.colorado.edu/registrar/students/state-residency/guidelines/), the University of Colorado cannot alter or waive the eligibility criteria for any reason, including financial hardship or academic excellence.

New students are classified as Colorado residents (in-state) or nonresidents (out-of-state) for tuition purposes based on information provided on their admission application and other relevant information. Applicants may be required to submit evidence substantiating their claim of in-state eligibility.

Current nonresident students who believe they have become eligible for a change to resident classification must submit a petition with documentation to have their eligibility reviewed. The petition requirements, deadlines for submission, explanation of Colorado tuition classification statutes, specific legal residency exceptions and Office of the Registrar contact information are available on the Tuition Classification (http://www.colorado.edu/registrar/students/state-residency/) webpage.

- For undergraduate students who are not yet 23 years old when a term begins, classification is based upon the domicile of a biological parent or court-appointed legal guardian.
- In order for a student to qualify for resident classification through their own domicile information, they must be one of the following: at least 23 years old on the first day of the term, or married for at least one year before the first day of the term, or entering the second year of a graduate program.
- There are rare individuals who may qualify for resident classification as an emancipated minor (under the age of 23) if they are able to prove that they are totally financially and residentially independent.

### Basic Requirements for Establishing Colorado Residency

To become eligible for resident classification, a person must establish legal residence in Colorado. Legal residence, or "domicile," is defined as a person's true, fixed, and permanent home and place of habitation. No person may establish domicile in Colorado solely for the purpose of obtaining in-state tuition benefits.

The qualifying person must demonstrate at least 12 consecutive months of Colorado domicile immediately preceding the beginning of the term for which the student is seeking resident classification. Domicile includes both physical presence and evidence of intent to stay, which is demonstrated by establishing legal ties to Colorado.

To be eligible to begin the 12-month period to establish Colorado domicile, an individual must be at least one of the following:

- 22 years of age or older
- Married
- A graduate student
- An emancipated student
- The parent of a student under the age of 23

### Unemancipated Minors

Students under age 23 who depend on their parents for support may qualify for in-state tuition if either of their parents, regardless of custody, has been domiciled in Colorado for 12 consecutive months preceding the first day of class in a given semester, even if the student resides elsewhere. In certain circumstances, students may qualify through their parents up to age 23.

### Emancipation

An emancipated minor is an individual under age 23 who demonstrates total financial and residential independence. This means the student's parents and all others have entirely surrendered the right to the student's care, custody and earnings, and make no provision for support of any kind. Emancipation is very rare; undergraduates under age 23 who do not have a parent domiciled in Colorado are highly unlikely to be classified as a Colorado resident student.

Students who provide false information to evade payment of out-of-state tuition or who fail to provide timely notice of their loss of in-state eligibility as an emancipated minor are subject to retroactive assessment of out-of-state tuition, as well as disciplinary and legal actions.

### Evidence of Domicile

Establishing Colorado domicile includes actions that would be expected of any permanent resident. Pursuant to Colorado law, the following are actions that may be considered evidence of domicile:

- Filing a tax return in Colorado and, if applicable, payment of Colorado state income tax.
- Colorado driver's license or Colorado ID card within 120 days of move to Colorado.
- Colorado vehicle registration within 180 days of move to Colorado.
- Voter registration in Colorado.
- Graduation from a Colorado high school.
- Lease or deed showing permanent occupancy of residential real property in Colorado.
- Continued residence in Colorado while not enrolled as a student and during semester breaks.
- Permanent employment or acceptance of future employment in Colorado
- Any other factor particular to the individual that tends to establish the necessary intent to make Colorado a permanent home.

No single factor constitutes proof of domicile. All evidence, both positive and negative, is considered. Not all of the listed items are necessary, however individuals should take action on all factors that are applicable to their circumstances. For more information on all requirements, see the Tuition Classification (http://www.colorado.edu/registrar/students/state-residency/) webpage.

### Domicile Exceptions

Colorado tuition law provides the following rare exceptions to the one-year domicile requirement in certain circumstances:

- Colorado National Guard members
- Members of American Indian Tribes with Historical Ties to Colorado
- Active duty military stationed in Colorado and their dependents
- Honorably discharged members of the U.S. Armed Forces and their dependents
- Returning active-duty military members
- Canadian military stationed in Colorado
- ASSET law qualified students with one year Colorado High School attendance (must have attended a Colorado high school for at least one year preceding the date of graduation; also requires Colorado high school graduation/Colorado GED and 12 consecutive months of physical presence in Colorado prior to enrolling at the institution)
- Children of new faculty members at Colorado state colleges and universities
- Employees of companies moving to Colorado receiving government economic incentives
- Western Regional Graduate Program enrollees in specific major fields of study
- Olympic athletes training in Colorado
- Others (see Residency Exceptions for Domicile (http://www.colorado.edu/registrar/students/state-residency/domicile-exceptions/) webpage)

Requirements, including spouse and child eligibility, and a list of qualifying tribes are detailed on the Residency Exceptions for Domicile (http://www.colorado.edu/registrar/students/state-residency/domicile-exceptions/) webpage.

### CU Boulder Degrees on Coursera

Tuition is the same per credit rate for all CU Boulder on Coursera students, regardless of residency status.

CU Boulder courses hosted on the Coursera platform may have different tuition rates. Current rates are published on the Bursar's Office website by credit hour. That website also includes an estimate for each degree program in full based on the current year's rates. Please see the Bursar's Coursera Student Accounts, Payments and Refunds (https://www.colorado.edu/bursar/billing/special-programs/degrees-coursera/) page for details.

# University Policies

## Alcohol and Other Drugs

In order to create the best possible environment for teaching and learning, the University of Colorado Boulder affirms its support for a responsible campus policy that addresses the inappropriate use of alcohol and other drugs.

In compliance with the federal Drug Free Schools and Communities Act, the University of Colorado Boulder prohibits the unlawful manufacture, possession, use or distribution of a controlled substance (illicit drugs and alcohol) of any kind and in any amount. These prohibitions cover any individual's actions that are part of any university activities, including those occurring while on university property or in the conduct of university business away from the campus.

Information on policies, penalties, health effects and resources available to students and staff regarding alcohol and other drugs can be found on the Alcohol & Other Drugs Information (http://www.colorado.edu/aod/) website.

These policies are also described by various university offices in several publications:

- **Campus housing:** See the Residential Handbook (https://www.colorado.edu/living/housing/policies-forms-and-accommodations/#residential_handbook-1317) webpage.
- **Student Code of Conduct:** See the Student Code of Conduct (https://www.colorado.edu/sccr/).
- **Safety:** Annual Security and Fire Safety Report (https://www.colorado.edu/clery/annual-security-fire-safety-report-asfsr/).

Individual and group counseling for students with substance abuse concerns is available through Counseling and Psychiatric Services. For more information, visit the Counseling and Psychiatric Services (https://www.colorado.edu/counseling/services/substance-use-services/) webpage or call 303-492-2277.

### Smoking

For student health and the health of our community, smoking is prohibited in all campus buildings and on all campus grounds.

At this time, the use of smoking products of any sort shall be prohibited on all university-owned and operated campus grounds both indoors and outdoors. This smoking ban does not apply to public rights-of-way (sidewalks, streets) on the perimeter of the campus.

"Smoking," as used in this policy, means smoking any substance, including but not limited to, tobacco, cloves or marijuana. "Smoking products" include, but are not limited to, all cigarette products (cigarettes, bidis, kreteks, e-cigarettes, etc.) and all smoke-producing products (cigars, pipes, hookahs, etc.). University-owned and operated campus grounds include, but are not limited to: all outdoor common and educational areas; all university buildings; university-owned on-campus housing; campus sidewalks; campus parking lots; recreational areas; outdoor stadiums; and university-owned and leased vehicles (regardless of location). In keeping with university policy, the sale, distribution and sampling of all tobacco products and tobacco-related merchandise is prohibited on all university-owned and operated property and at university-sponsored events. Littering campus with remains of smoking products is prohibited.

This policy applies to all employees, students, visitors, contractors and externally affiliated individuals or companies renting university-owned space on university-owned and operated property campus grounds.

## Campus Safety

### Personal Safety on Campus

While the University of Colorado Boulder is a relatively safe place to be, the campus is not a haven from community problems. Through the joint effort of various organizations on campus, CU is committed to providing ample safety resources for faculty, staff and students.

Specific efforts to promote safety on campus include the provision of adequate lighting, police protection, educational programs and special prevention programs, such as the CU NightRide escort services and laptop and bicycle registration programs.

In compliance with the federal Clery Act, students and employees receive information on campus security policies and programs, including crime statistics, in an Annual Security and Fire Safety Report (https://www.colorado.edu/clery/annual-security-fire-safety-report-asfsr/). This report will be sent to CU Boulder affiliates by Oct. 1 of each year. In any emergency or life-threatening situation, always call 9-1-1.

Members of the university community are encouraged to report any incident of threatening or harmful behavior to the CU Boulder Police by calling 9-1-1 in an emergency or the non-emergency line, 303-492-6666. Visit Don't Ignore It (http://www.colorado.edu/dontignoreit/) for more information about the wide range of campus and community resources and reporting options available.

Additional safety information can be found on the CU Police Department (http://www.colorado.edu/police/) website. For information on crime alerts, trends and safety tips, follow the CU Police Department on Twitter (@ (https://twitter.com/cuboulderpolice/)CUBoulderPolice) and Facebook (CUBoulderPolice (https://www.facebook.com/CUBoulderPolice/)).

## Communication

### Student Email

All CU students receive an email account from the university, which is an official means of sending information to students. Students are responsible for maintaining this CU email address. The official email address can be used by professors to contact students and provide course-related information. Administrative offices, such as the Office of the Registrar, use official email addresses to contact students and provide important information. Students are responsible for frequently checking their official CU email address. For more information on the student email policy, visit the Student E-mail Policy (http://www.colorado.edu/policies/student-e-mail-policy/) webpage, call the IT Service Center at 303-735-HELP or email HELP@colorado.edu. To learn more about student email accounts, visit the Office of Information Technology's Messaging and Collaboration webpage (https://oit.colorado.edu/node/237/).

## Copyright & Fair Use

The University of Colorado Boulder community respects the intellectual property of others, regardless of the medium by which it is transmitted. This is a cornerstone of academic integrity. We prohibit the use of unauthorized distribution of copyrighted material, which is subject to both civil and criminal penalties as well as university procedures.

Distributing copyrighted materials using peer-to-peer or file-sharing programs is illegal and the university uses technological solutions to deter this activity. Still, the university regularly receives notices of copyright violations and is required by law to take action. Common consequences include loss of network access and referral to the Office of Judicial Affairs. Guidance on campus fair use and copyright issues is provided on the University Libraries (http://www.colorado.edu/libraries/copyright-information/) website.

## Diversity & Nondiscrimination

### Commitment to Diversity

The Division of Student Affairs supports and contributes to creating and sustaining a diverse, multicultural, socially just and inclusive campus climate by learning about, recognizing and honoring the diverse backgrounds, histories, identities and life experiences of all our students, faculty and staff. Our goal is to create an environment in which all campus community members can thrive while feeling welcomed, safe and at home.

At the University of Colorado Boulder, we are committed to building a campus community in which diversity is a fundamental value. People are different and the differences among us are what we call diversity —a natural and enriching hallmark of life. Diversity includes, but is not limited to, ethnicity, race, gender, age, class, sexual orientation, religion, disability, veteran status, gender identity/expression, veteran status, political affiliation or political philosophy, and health status. A climate of healthy diversity is one in which people value individual and group differences, respect the perspectives of others and communicate openly.

"Diversity is a key to inclusive excellence in education. A diverse learning environment better prepares all students for the world that awaits them. CU Boulder is committed to enriching the lives of our students, faculty and staff by providing a diverse campus where the exchange of ideas, knowledge and perspectives is an active part of learning."—from

the Guidelines for Diversity Planning *(*https://www.colorado.edu/odece/diversity-plan/*)*.

### Nondiscrimination Statement

The University of Colorado Boulder does not discriminate on the basis of race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy in admission and access to, and treatment and employment in, its educational programs and activities. The university takes affirmative action to increase ethnic, cultural, and gender diversity; to employ qualified disabled individuals; and to provide equal access and opportunity to all students and employees.

## Equity & Compliance

The University of Colorado Boulder is committed to maintaining a positive learning, working, and living environment free from discrimination and harassment. The Office of Institutional Equity and Compliance (OIEC) (http://www.colorado.edu/oiec/) addresses all claims of sexual misconduct, harassment and/or discrimination, or related retaliation by students, staff and faculty under the University of Colorado Sexual Misconduct, Intimate Partner Violence and Stalking Policy, the University of Colorado Boulder Policy on Protected-Class Discrimination and Harassment, and the University of Colorado Policy on Conflict of Interest in Cases of Amorous Relationships. The university is committed to addressing concerns and taking appropriate action against those found in violation of these policies.

In response to a report, OIEC determines what immediate and long-term support and safety measures are needed to minimize disruptions to education or employment and to help keep the involved parties and the campus safe. OIEC also provides education and assessment to identify areas in need of improvement to foster a more welcoming and inclusive culture.

To learn more about university policy or the role and programs offered by OIEC, please visit the Office of Institutional Equity and Compliance (https://www.colorado.edu/oiec/) website or call 303-492-2127.

# MICRO-CREDENTIAL PROGRAMS CATALOG

## Programs of Study

## Applied Public Writing - Micro-credential

### Eligibility
CU Boulder Students (including nondegree/ACCESS)

### Delivery Mode
Hybrid of in-person and online delivery.

### Credit Status
Noncredit

### Academic Level
Undergraduate

### Time to Completion
Months

## Fee
No

## Requirements
### Criteria
### Skills
- Community engagement
- Critical thinking
- Experience writing in various public-facing genres
- Information literacy
- Professional development
- Reflection
- Research
- Service learning
- Writing

## Arduino - Design and Implementation Fundamentals - Micro-credential

The Arduino Micro-credential serves as an endorsement that the engineer is able to combine and apply knowledge of Arduino, micro-controller, circuits, and electro-mechanical systems in a meaningful way. Successful completion of this micro-credential also reflects the engineer's ability to explore innovative design paths and justify their design decisions to their peers. It represents a level of intuition and intention behind the engineer's design work that is otherwise unmeasured. Experienced software and embedded systems design engineers know that the syntax and theory behind a design are only part of the design process; both the implementation of best-practices (such as the proper documentation of a CAD model, or the use of error handling in a piece of code) and design intuition are the indicators of an engineer who has cultivated their skills with experience and intention. These are the traits of a valuable teammate in any professional engineering project and traits that students must demonstrate to complete the Arduino Micro-credential.

### Eligibility
- CU Boulder Students (including nondegree/ACCESS)
- CU Boulder Students (Degree Seeking Only)

### Delivery Mode
In-Person

### Credit Status
Noncredit

### Academic Level
- Graduate
- Undergraduate

### Time to Completion
Months

## Fee
Yes

## Requirements
### Criteria
### Skills
- Microcontrollers
- Arduino
- Circuits
- Embedded Systems
- Robotics
- Elector-Mechanical Systems
- Arduino Programming Language
- Coding
- Public Speaking
- Design Documentation
- Soldering
- PCB Design
- Electronics

## Arts Administration - Micro-credential

The Arts Administration micro-credential is a credit-bearing credential for undergraduate music majors who have an interest in gaining knowledge about management, leadership, and administration within arts organizations. Such interest may lead to additional work in the field of arts administration as a career pursuit.

### Eligibility
CU Boulder students (degree seeking only): Active undergraduate music majors

### Delivery Mode
Hybrid of in-person and online delivery.

### Credit Status
For credit

### Academic Level
Undergraduate

## Fee
No

## Requirements
MUSC 4978, Introduction to Arts Administration, 3 credits

MUSC 5938, Arts Management and Leadership, 3 credits [4000-level version of this course is being proposed to the College of Music Curriculum Committee in fall 2021 for formal implementation in fall 2022 at which time MUSC 4938 will replace MUSC 5938]

### Criteria
Learning outcomes and measurements of such competencies will be fulfilled through successful completion of the courses according to the course syllabi.

MUSC 4978: Current Event Briefing, Grant Writing, Arts Industry and Market Analysis, Organizational Evaluation

MUSC 5938: Examination of Concepts and Approaches for leaders of small, medium, and large arts organizations (both the for-profit and nonprofit sectors), Human Resource Management, Problem Solving, Effective Communication and Ethics, Practice and Refine Written Communication Skills, Leader-Member Exchange Theory, Servant, Transformational, Authentic, Adaptive and Team Leadership

### Skills
- Advancement, Development and Fundraising
- Communication
- Community Engagement
- Contract Negotiations
- Governance and Boards
- Grant Writing
- Industry Market Analysis
- Leadership
- Marketing and Publicity
- Mission Planning
- Operations Management
- Organization Structures
- Organizational Assessment
- Ticketing
- Venue Management

# Asynchronous Teaching & Course Design: Foundations - Micro-credential

### Eligibility
This program is designed for graduate students and faculty who are teaching online asynchronous courses for CU.

- CU Boulder employees
- Other, specific population of learners (corporations, community members, etc.)

### Delivery Mode
Online

### Credit Status
Noncredit

### Academic Level
- Graduate
- Professional

### Time to Completion
Months

## Fee
No

## Requirements
### Criteria
### Skills
- AI course policies
- Asynchronous teaching
- Inclusive Pedagogy
- Online course development

# Business Analytics - Micro-credential

### Eligibility
CU Boulder students (degree-seeking only)

### Delivery Mode
In-person

### Credit Status
Includes credit and noncredit components

### Academic Level
Undergraduate

### Time to Completion
Months

## Fee
No

## Requirements
### Criteria

# Caregiving and Collaborative Problem Solving - Micro-credential

## Eligibility

- CU Boulder students (including nondegree/ACCESS)
- CU Boulder students (degree seeking only)
- CU Boulder employees

## Delivery Mode

Hybrid of in-person and online delivery.

## Credit Status

For credit.

## Academic Level

Undergraduate

# Requirements

## Criteria

## Skills

- Collaboration
- Design thinking
- Empathy
- Human-centered design
- Participatory design
- Problem solving

# Climate Action for Business - Micro-credential

## Eligibility

Specific population of learners (corporations, community members, etc.)
Executive Education

## Delivery Mode

Online

## Credit Status

Noncredit

## Academic Level

Other

## Time to Completion

2 days

## URL

Climate Action for Business (https://www.colorado.edu/business/executive-education-leeds/climate-action-business/)

# Requirements

## Criteria

## Skills

- Climate action planning

# Climate Justice Leadership Ally - Micro-credential

## Eligibility

- CU Boulder students (including nondegree/ACCESS)
- CU Boulder students (Degree Seeking Only)
- CU Boulder employees

## Delivery Mode

In-person

## Credit Status

Noncredit

## Academic Level

- Graduate
- Professional
- Undergraduate

# Requirements

## Criteria

## Skills

- Communication
- Community organizing
- Systems change
- Systems thinking
- Teamwork

# College Teaching in Practice - Micro-credential

## Eligibility

All CU Boulder, CU Denver and Anschutz Medical Campus graduate students, post-doctoral fellows, faculty, teaching staff.

## Delivery Mode

Hybrid of in-person and online delivery.

## Credit Status

Noncredit

## Academic Level

Other

## Requirements

### Criteria

### Skills

- College teaching
- Discipline-specific
- Diversity statement
- Evaluation
- Reflective practice
- Teaching statement

# DEI-Informed Dialogic Pedagogy - Micro-credential

The DEI-Informed Dialogic Pedagogy workshop series will be offered to up to 20 graduate student instructors and will meet over the course of 10 weeks. Through in-person sustained dialogue practice, asynchronous activities, and readings, participants will learn about DEI-grounded dialogue, with attention to designing and facilitating dialogic practices that center intersectional equity in classroom practices.

### Eligibility

CU Boulder students (including nondegree/ACCESS).

### Delivery Mode

Hybrid of in-person and online delivery.

### Credit Status

Noncredit

### Academic Level

Other

## Requirements

1. Attend at least eight of 10 synchronous 90 minute workshops. Attendance includes active participation in intergroup dialogue, collaboration in small group activities with peers, designing and offering feedback for student focused activities and reflective sharing.
2. Review and engage with online materials on Canvas prior to workshop sessions.
3. Complete bi-weekly assignments on Canvas.
4. Complete a DEI Informed Dialogic Pedagogy Portfolio.
5. (if possible) Present major learnings and future plans at a summative campus community event.

### Criteria

***Conceptual Understanding***

- Participants will develop a conceptual understanding of the guiding principles and practices of DEI-grounded Dialogue.

***Personal Growth***

- Participants will regularly engage in critical self reflection regarding their own identities, commitments to anti-racism and DEI informed everyday practices and pedagogical commitments in instruction.

***Application to Classroom***

- Participants will implement DEI informed dialogic practices into their forthcoming syllabi, curriculum and lesson design.
- Participants will develop a 'tool box' of dialogically informed instructional practices to integrate in their courses.

***Sense of Belonging/Community***

- Participants will actively participate in multiple facilitated dialogues with peers as part of the workshop series, which may impact their sense of belonging and community at CU.
- Participants will collaborate with and support colleagues from academic departments other than their own.

### Skills

- Critical self-reflection
- DEI-informed dialogic practice toolbox
- DEI-informed dialogue facilitation
- Intergroup dialogue

# Designing and Executing Social Innovations - Micro-credential

### Eligibility

- CU Boulder students (including nondegree/ACCESS)
- CU Boulder students (degree seeking only)
- CU Boulder employees

### Delivery Mode

Synchronous

### Credit Status

For credit

### Academic Level

Undergraduate

## Requirements

### Criteria

### Skills

- Collaboration
- Communication
- Design thinking
- Empathy
- Human-centered design
- Participatory design
- Presentation skills
- Problem solving

# Entrepreneurial Startup Skills - Micro-credential

### Eligibility

- CU Boulder students (including nondegree/ACCESS)
- CU Boulder students (degree seeking only)
- CU Boulder employees

### Delivery Mode

Hybrid of in-person and online delivery

### Credit Status

Noncredit

### Academic Level

- Undergraduate
- Graduate
- Other

## Requirements

### Criteria

### Skills

- Communication
- Creativity
- Critical thinking
- Leadership
- Problem identification
- Problem solving
- Professionalism
- Teamwork

# Equity-Oriented Partnerships - Micro-credential

The Office for Outreach and Engagement and the Renée Crown Wellness Institute are dedicated to the campus's mission of building partnerships with the local community. While the potential for impact is great, there is also risk that university-community partnerships can unintentionally generate harm and reproduce historical patterns of inequity. This micro-credential builds capacity across campus by providing a learning opportunity around how to design university-community partnerships that are oriented towards equity and implemented with a high level of integrity.

This micro-credential provides participants with skills that are broadly transferable to diverse disciplines and that will support them in leading collaborative and equity-oriented work in their respective fields. It will provide them with theoretical and practical tools and resources and skills to prepare them to engage in diverse forms of collaboration and address arising challenges and opportunities in ways that promote equity and justice.

It is imperative that our work force have a deep understanding of both collaboration and equity and justice. This micro-credential will provide learners with an applied learning opportunity that will signify to employers that they are dedicated to the work of developing equity-oriented practices in partnership with stakeholders.

### Eligibility

Current CU Boulder Students

At the current time the only people that will be eligible are graduate students who are cohort members in the Engaged Arts and Humanities Graduate Student Scholars. However, we are seeking to expand eligibility in the future and that may include staff as well as community members that are part of cohorts led by the Office for Outreach and Engagement and/or the Renee Crown Institute.

### Delivery Mode

Hybrid of in-person and online delivery

### Credit Status

Noncredit

### Academic Level

Graduate

### Time to Completion

Months

### URL

Equity Oriented Partnerships (https://www.colorado.edu/outreach/ooe/office-focus-areas/engaged-arts-and-humanities-initiative/engaged-arts-and-humanities-graduate/)

## Requirements

### Criteria

### Skills

- Collaboration
- Community-engaged design
- Community-engaged scholarship
- DEI
- Design thinking
- Diversity
- Equity
- Inclusion
- Justice
- Participatory design
- Partnership development

# Foundations in Compassion & Mindfulness - Micro-credential

### Eligibility

- Graduate
- Professional
- Undergraduate

### Delivery Mode

Hybrid of in-person and online delivery

### Credit Status

Noncredit

### Academic Level
Undergraduate

### Time to Completion
Thirty hours over two semesters

## Requirements
### Criteria
### Skills
- Action
- Community
- Compassion
- Emotional health
- Mindfulness
- Leadership
- Social and emotional learning
- Wellness

# Foundations in High-Performance Computing - Micro-credential

### Eligibility
The micro-credential is open to anyone affiliated with a Rocky Mountain Advanced Computing Consortium (RMACC) institution, including Colorado State University and CU Anschutz.

### Delivery Mode
In-person

### Credit Status
Noncredit

### Academic Level
- Graduate
- Professional
- Undergraduate

### Time to Completion
Four days (16 hours).

## Requirements
### Criteria
### Skills
- High-performance computing
- Linux
- Supercomputing

# Foundations in Research Skills for Community College Students - Micro-credential

### Eligibility
All Colorado community college students are eligible to apply for the RECCS program.

### Delivery Mode
In-person

### Credit Status
Noncredit

### Academic Level
Undergraduate

### Time to Completion
300 hours

## Requirements
### Criteria
### Skills
- Analyzing data
- Collaboration and teamwork
- Creativity
- Critical thinking
- Critiquing
- Data visualizations
- Defending an argument
- Developing a methodology
- Drawing conclusions
- Feedback integration
- Identifying a research question
- Independence
- Interpreting data
- Literature interpretation
- Organization
- Persistence
- Problem solving

# Foundations in Science Communication for Community College - Micro-credential

### Eligibility
All Colorado community college students are eligible to apply for the RECCS programs.

### Delivery Mode
In-person

### Credit Status
Noncredit

### Academic Level
Undergraduate

### Time to Completion
Thirty days

## Requirements
### Criteria
### Skills
- Collaboration and teamwork
- Creativity
- Critical thinking
- Critiquing
- Defend an argument
- Feedback integration
- Independence
- Literature interpretation
- Oral communication
- Organization
- Presentation skills
- Scientific poster design
- Time management
- Written communication

# Foundations in Sustainable Leadership - Micro-credential

### Eligibility
CU Boulder students (including degree-seeking and nondegree/ACCESS)

### Delivery Mode
Hybrid of in-person and online delivery.

### Credit Status
Noncredit

### Academic Level
- Graduate
- Undergraduate

## Requirements
### Criteria
### Skills
- Adaptability
- Change management
- Collaboration
- Communication
- Ethical decision-making
- Influencing and advocacy
- Long-term thinking
- Resilience
- Stakeholder engagement
- Storytelling
- Strategic planning
- Systems thinking

# Foundations of Integrated Water Resources Management for WaSH Professionals - Micro-credential

### Eligibility
Eligible participants are working professionals engaged in water service provision work in low- and middle- income settings.

### Delivery Mode
Synchronous

### Credit Status
Noncredit

### Academic Level
Professional

### Time to Completion
Five weeks

## Requirements
### Criteria
### Skills
- Climate Change Adaptation
- Gender Equity in WaSH
- IWRM
- Participatory WaSH Management
- Sustainable Development
- WaSH Economics
- Water Resources Monitoring

# Girls on Rock: Science, Art and Wilderness Skills - Micro-credential

### Eligibility
The Girls* on Rock program is only open to high school girls. We recruit participants who come from backgrounds traditionally underrepresented in the geosciences, including girls of color, economically disadvantaged girls, and LGBTQ+ girls.

### Delivery Mode
In-person.

### Credit Status
Noncredit.

### Academic Level
Other.

### Time to Completion
Twelve days.

## Requirements
### Criteria
### Skills
- Collaboration & teamwork
- Conflict resolution
- Creativity
- Critical thinking
- Develop and deliver a brief presentation
- Develop a research study methodology
- Draw conclusions
- Identify a research question
- Independence
- Interpret data
- Leadership
- Organization
- Persistence
- Personal responsibility
- Problem-solving

# Inclusive Research Mentoring - Micro-credential

### Eligibility
Graduate students, postdoctoral scholars and faculty.

### Delivery Mode
Hybrid of in-person and online delivery.

### Credit Status
Noncredit

### Academic Level
Intended for graduate students, postdoctoral scholars and faculty.

### Time to Completion
Two semesters.

## Requirements
### Criteria
### Skills
- CIMER
- Inclusive mentoring
- Mentoring

# Innovating Happiness - Micro-credential

### Eligibility
- CU Boulder students (including degree-seeking and nondegree/ACCESS)
- CU Boulder employees

### Delivery Mode
In-person.

### Credit Status
For credit

### Academic Level
Undergraduate

## Requirements
### Criteria
### Skills
- Collaboration
- Design thinking
- Empathy
- Human-centered design
- Participatory design
- Problem solving

# Integrated Project Delivery for Construction - Micro-credential

### Eligibility
CU Boulder students (degree-seeking only)

### Delivery Mode
Hybrid of in-person and online delivery

### Credit Status
Noncredit

### Academic Level
Undergraduate

## Requirements
### Criteria
# Introduction to Environmental Data Science - Micro-credential

### Eligibility
All members of the general public, including those from corporations, community members, and others, are welcome to participate in this micro-credential program.

### Delivery Mode
Online.

### Credit Status
Noncredit

### Academic Level
Professional

### Time to Completion
Weekly meetings for four consecutive weeks.

## Requirements
### Criteria
### Skills
- Coding
- Data science fundamentals
- Data visualization
- Environmental data science
- GitHub
- Jupyter Notebook
- Open science
- Python (pandas, matplotlib, geopandas, rioxarray, folium)
- Science communication

# Just & Equitable Teaching - Micro-credential

The University of Colorado Boulder's Just & Equitable Teaching (JET) micro-credential program focuses on unpacking implicit biases and fostering better understanding of the historical circumstances that led to the marginalization of populations, while also helping participants to build the skills to design and support a culture of equity in their department around teaching and learning. The program includes critical race theory and intersectionality theories coursework, structured community dialogues and workshops on mentoring and equitable course design. This program is open to graduate students, postdoctoral fellows, professional students, teaching staff and faculty.

The credential will expire after 3 years. To renew, participants can complete a short program with workshops and reflection.

---

### Eligibility
- CU Boulder Employees
- Other, specific population of learners (corporations, community members, etc.)
- This program is open to graduate students, postdoctoral fellows, professional students, teaching staff and faculty.

### Credit Status
Noncredit

### Academic Level
Other

### Time to Completion
Semester

### URL
Just & Equitable Teaching (https://www.colorado.edu/center/teaching-learning/programs/microcredentials/just-equitable-teaching/)

## Requirements
### Application Requirements
There is a short application that indicates the requirements of the JET program. Applicants will indicate understanding of the two-semester time requirement **and two capstone project requirements**, and they will choose certain pathways to complete the requirements.

### Program Requirements
#### Foundational Work
Foundation work occurs in the fall semester. This includes:

- Asynchronous Canvas course, required submission of reflections (written or video) and surveys *or*
- CTL Learning community, attending 6 out of 8 sessions and submitting homework assignments

#### Mentoring Workshops
Attendance and reflection (4): Participants will attend at least four workshops during the academic year focused on building effective mentoring relationships and submit a reflection about what they learned. A template with formatting guidelines and reflection questions will be provided.

#### Community Dialogues
Attendance and reflection (4): Participants will attend two community dialogues each semester on topics from the foundational work. Participants will learn communication and facilitation skills, and they will submit a reflection about what they learned. A template with formatting guidelines and reflection questions will be provided.

#### Capstone Project Workshops
Attendance and reflection (2): Participants will attend two spring workshops focused on inclusive pedagogy and how to design a social justice project. They will submit a reflection about what they learned. A template with formatting guidelines and reflection questions will be provided.

#### Individual Consultations/Office Hours
Participants will have the opportunity to meet individually with program facilitators to discuss any aspect of the program. Individual meetings are optional and highly encouraged.

#### Capstone Project
Based on the readings, discussions, and workshops, participants will design an equitable teaching project. This project will have flexibility in design but will address a social justice issue in the classroom.

# Online Teaching Academy - Micro-credential

The Online Teaching Academy strives to increase the online teaching knowledge and skills of those teaching during Summer Session at the University and give participants motivation to continue to improve into the future. Content will cover both online asynchronous and remote synchronous teaching formats.

---

### Eligibility

- CU Boulder Employees
- Faculty, instructors, and lecturers who will teach a CU Summer Session remote, online or hybrid course.

### Delivery Mode

Online

### Credit Status

Noncredit

### Academic Level

Professional

### Time to Completion

30 days

### URL

Online Teaching Academy (https://www.colorado.edu/summer/2021/10/25/summer-session-online-teaching-academy-application-now-live/)

## Requirements

- Faculty, instructors, and lecturers who are assigned to teach in summer will apply in the late fall and be notified before the Spring Semester. Individuals who have not participated in past Summer Session Online Development programs or OTA for Summer Session are eligible.
- Participants accepted into the OTA will complete the four-week Academy.
- Participants and their Instructional Design Cohort Leader will meet at the end of the four-week Academy to review their progress, follow up on any additional feedback or questions on Academy content and assignments, review their course development plan and establish an individualized follow up process to ensure course development is completed.

### Criteria

- Participants will demonstrate knowledge of course development process and options of the technology available for faculty and instructors at the University of Colorado Boulder.
- They will develop at least the first two modules of their upcoming Summer Session course and demonstrate the ability to complete course development by the development timeline.
- They will complete all components of the Online Teaching Academy and become a resource for their department for future online, remote or hybrid courses.
- They will establish connections with other participants and members of the Learning Design Group Instructional Design team for support in future semesters.

### Skills

- Online course development
- Synchronous online teaching
- Asynchronous online teaching
- Remote teaching
- Online teaching

# Principles of College Teaching - Micro-credential

The Center for Teaching & Learning's Principles of College Teaching (PCT) micro-credential offers graduate student instructors, postdoctoral scholars, faculty and staff the opportunity to enhance their teaching skills at the post-secondary level. Participants are required to complete the following requirements: attend 20 hours of CTL training; complete three reflections designed to address the pedagogical theory of three to five of these workshops; submit a teaching portfolio for review at the end of the program and complete an exit interview with a CTL staff member to discuss their process and goals for the future. This badge is no cost for participants at CU Boulder.

Learners will benefit from the micro-credential in many ways. First, participants will have a representation of their level of proficiency in the college classroom to show to potential hiring committees at all levels of institutions across the country and world. Second, job seekers can demonstrate their levels of communication, project management as they balance their teaching, scholarship and outside responsibilities, team work if they were part of a teaching assistant cohort, relationship building with students, fellow teachers and faculty, and skill development to potential recruiters outside of higher education.

### Eligibility

- CU Boulder Students (including nondegree/ACCESS)
- CU Boulder Students (Degree Seeking Only)
- CU Boulder Employees
- Other, specific population of learners (corporations, community members, etc.)

### Delivery Mode

Hybrid of in-person and online delivery

### Credit Status

Noncredit

### Academic Level

Other

### Time to Completion

Months

## Requirements

- Participating in Center for Teaching & Learning approved workshops/trainings (20 hours)
    - Any CTL offering may count towards one hour of the 20 required. When registering and attending events, participants will be given credit.

### Criteria

- Submission of three Teacher Reflections based on themes and ideas from at least three workshops attended.
- Submission of a Teaching Portfolio to the Center for Teaching & Learning

  - Portfolios are submitted only after all other requirements are met. They are read and approved by the CTL Director before an exit survey is sent and the micro credential awarded.
  - Teaching Portfolio Artifact Guide (https://www.colorado.edu/center/teaching-learning/programs-services/graduate-certificates/certificate-college-teaching/#accordion-1392595230-1)
- Exit interview with CTL Staff to discuss the process

### Skills

- College Teaching
- Reflective Practice
- Teaching Statement
- Diversity Statement

# Project Leadership Skills for Quantum Workers - Micro-credential

### Eligibility

- CU Boulder Students (including nondegree/ACCESS)
- CU Boulder Employees
- Other

### Delivery Mode

In-Person

### Credit Status

Noncredit

### Academic Level

Undergraduate

### Time to Completion

Two Semesters

## Fee

No

## Requirements

### Criteria

### Skills

- Conflict resolution
- DEI leadership
- Goal setting
- Professional communication
- Project scheduling
- Project budgeting
- Resource allocation
- Stakeholder identification

# Research Communication & Presentation - Micro-credential

### Eligibility

CU Boulder Students (degree seeking only)

### Delivery Mode

Hybrid of in-person and online delivery.

### Credit Status

Noncredit

### Academic Level

Graduate

## Fee

Yes

## Requirements

### Criteria

### Skills

- Communication Strategy
- Critical Thinking
- Professionalism
- Public Speaking
- Research Communication

# Research Data Foundations - Micro-credential

As data-based research becomes a common practice, skills in data management, data analysis and computational thinking are increasingly important for applied researchers. The Graduate Student Research Data Bootcamp will provide incoming and continuing graduate students with a gentle introduction to data and programming-related research tools that will increase their access to cutting-edge methods as they begin their programs and research. Topics covered include reproducible research (especially using containerization tools such as Docker); collaboration and version control (using Git and Github); data analysis and visualization fundamentals in Python and R; and an overview of publishing platforms, impact and scholarly communication. The micro-credential will document and credential students' basic knowledge and competence in these topics.

### Eligibility

- CU Boulder Students (including nondegree/ACCESS)
- CU Boulder Employees
- Other

### Delivery Mode

Online

### Credit Status

Noncredit

### Academic Level
Graduate

### Time to Completion
Weeks

## Fee
Yes

## Requirements
Students must register for the Graduate Student Research Data Foundations and attend the entire three-day workshop. Then they must complete a series of data and code-related assessments and projects demonstrating their facility with basic computational tools and techniques and compile a public portfolio of these projects and assessments on GitHub (an online code-sharing platform).

### Criteria
The micro-credential will invite students to demonstrate their familiarity with the research data lifecycle (https://www.colorado.edu/crdds/what-we-do/research-lifecycle (https://www.colorado.edu/crdds/what-we-do/research-lifecycle/)) using a series of skills and project-based assessments. In particular, learners must complete instructor-assigned projects, and push these projects to a dedicated Github repository, which will serve as a portfolio of bootcamp-specific assignments and projects. The Bootcamp organizers will review and evaluate these portfolios and ensure that the required tasks specified by the instructors have been completed according to specifications.

### Skills
- Containerization
- Data Analysis
- Data Ethics
- Open Access
- Open Data
- Programming
- Python
- R
- Scholarly Publishing
- Version Control
- Visualization

# Solving Societal Problems - Micro-credential

### Eligibility
- CU Boulder Students (including nondegree/ACCESS)
- CU Boulder Employees

### Delivery Mode
Synchronous

### Credit Status
Credit

### Academic Level
Undergraduate

### Fee
Yes

## Requirements
### Criteria
### Skills
- Collaboration
- Design thinking
- Empathy
- Human-centered design
- Participatory design
- Problem solving

# Sustainability Innovation - Micro-credential

### Eligibility
- CU Boulder Students
- CU Boulder Employees

### Delivery Mode
Hybrid of in-person and online delivery

### Credit Status
Noncredit

### Academic Level
- Graduate
- Professional
- Undergraduate

### Time to Completion
1-2 Semesters

## Fee
No

## Requirements
### Criteria
### Skills
- Change agent
- Concept formulation
- Consensus building
- Creative problem solving
- Data analysis
- Proposal development
- Presentation
- Stakeholder engagement

- Stakeholder mapping
- Systems thinking

# Teaching International Students - Micro-credential

## Eligibility

- CU Boulder Employees
- CU Boulder Students (graduate students, postdoctoral fellows, professional students)

## Delivery Mode

Hybrid of in-person and online delivery.

## Credit Status

Noncredit

## Academic Level

Other

## Time to Completion

Two semesters

# Fee

No

# Requirements

## Criteria

## Skills

- Communication
- Mentoring
- Inclusivity
- Inclusive pedagogy
- Internationalization
- Intercultural competence
- Universal Design for Learning

# Tech Frontiers - Data Science - Micro-credential

Tech Frontiers is the professional development program of the College of Engineering and Applied Science of the University of Colorado Boulder, offering short form learning on contemporary topics in engineering. Through live sessions taught by CU faculty experts, Tech Frontiers courses offer a mixture of classroom content and hands-on project experience. Participants interact with faculty and peers while learning and applying emerging technologies and concepts.

Tech Frontiers provides a unique offering to mid-career professionals who need updated skills in engineering. This program provides a service to the tech community, allowing workers to advance their careers, while positioning CEAS as a primary source for lifelong learning in technical industries. Content includes the ethical implications of the technology studied.

Engineering is continually emerging, and professionals need ways to update their understanding. Through short-form sessions, participants have the unique opportunity to discover or strengthen their skills in emerging or rapidly changing topics under the guidance of faculty experts. The intensives combine lecture and hands-on projects, giving participants insight on both the theory and application of these technologies. In addition, the programs provide networking opportunities so that participants can expand their reach and hear how these topics are applied in various industries.

Engineers must regularly update their skills and understanding as technology evolves. Future employers or academic institutions would see a commitment to continuous improvement and knowledge of increasingly key topics and their ethical implications. The topics are relevant to many industries and prepare participants for the future of technological application.

## Eligibility

Specific population of learners (corporations, community members, etc.)

## Delivery Mode

Hybrid of in-person and online delivery

## Credit Status

Noncredit

## Academic Level

Professional

## URL

Data Science (https://www.colorado.edu/engineering/academics/tech-frontiers-executive-education/)

# Requirements

Register for and attend a Tech Frontiers two-day session, either remotely or in person. Complete the final project synthesizing knowledge gained.

## Criteria

The final project must indicate that participants can ready data for analysis, build a model based on data, test their predictions, and make predictions about data not yet collected.  Learner work will be collected in (and may be shared from) a github repository.

## Skills

- Computing
- Coding
- Data
- Engineering
- Artificial Intelligence
- Ethics in Technology
- Computer Science

# Tech Frontiers - Machine Learning - Micro-credential

Tech Frontiers is the professional development program of the College of Engineering and Applied Science of the University of Colorado Boulder, offering short form learning on contemporary topics in engineering.

Through live sessions taught by CU faculty experts, Tech Frontiers courses offer a mixture of classroom content and hands-on project experience. Participants interact with faculty and peers while learning and applying emerging technologies and concepts.

Tech Frontiers provides a unique offering to mid-career professionals who need updated skills in engineering. This program provides a service to the tech community, allowing workers to advance their careers, while positioning CEAS as a primary source for lifelong learning in technical industries. Content includes the ethical implications of the technology studied.

Engineering is continually emerging, and professionals need ways to update their understanding. Through short-form sessions, participants have the unique opportunity to discover or strengthen their skills in emerging or rapidly changing topics under the guidance of faculty experts. The intensives combine lecture and hands-on projects, giving participants insight on both the theory and application of these technologies. In addition, the programs provide networking opportunities so that participants can expand their reach and hear how these topics are applied in various industries.

Engineers must regularly update their skills and understanding as technology evolves. Future employers or academic institutions would see a commitment to continuous improvement and knowledge of increasingly key topics and their ethical implications. The topics are relevant to many industries and prepare participants for the future of technological application.

### Eligibility
Specific population of learners (corporations, community members, etc.)

### Delivery Mode
Hybrid of in-person and online delivery

### Credit Status
Noncredit

### Academic Level
Professional

### Time to Completion
Days

## Requirements
Register for and attend a Tech Frontiers two-day session, either remotely or in person. Complete the final project synthesizing knowledge gained.

### Criteria
The final project must indicate that they can apply learnings to a classification task and defend their choices for high accuracy in classifying the test set. Learner work will be collected in (and may be shared from) a github repository.

### Skills
- Computing
- Coding
- Data
- Engineering
- Artificial Intelligence
- Ethics in Technology
- Computer Science

# The CHANGE Collective - Micro-credential

### Eligibility
CU Boulder Students (degree seeking only)

### Delivery Mode
Hybrid of in-person and online delivery

### Credit Status
Noncredit

### Academic Level
Undergraduate

### Time to Completion
Two Semesters

## Fee
No

## Requirements
### Criteria
Learning outcomes and measurements of such competencies will be fulfilled through successful completion of the courses according to the course syllabi.

MUSC 4978: Current Event Briefing, Grant Writing, Arts Industry and Market Analysis, Organizational Evaluation

MUSC 5938: Examination of Concepts and Approaches for leaders of small, medium, and large arts organizations (both the for-profit and nonprofit sectors), Human Resource Management, Problem Solving, Effective Communication and Ethics, Practice and Refine Written Communication Skills, Leader-Member Exchange Theory, Servant, Transformational, Authentic, Adaptive and Team Leadership

### Skills
- Adaptability
- Audience engagement
- Career awareness
- Change making
- Collaboration
- Communication
- Community building
- Constructive feedback
- Creativity
- Critical reflection
- Design thinking
- Emotional intelligence
- Empathy
- Facilitation

- Goal setting
- Growth mindset
- Inclusion
- Inclusive leadership
- Innovation
- Introspection
- Leadership
- Listening
- Personal growth
- Problem solving
- Public speaking
- Reflection
- Relationship building
- Science communication
- Teamwork
- Verbal communication
- Well-being
- Written communication

# Universal Design for Learning - Micro-credential

## Eligibility

- CU Boulder Students (including nondegree/ACCESS)
- CU Boulder Employees

## Delivery Mode

Online

## Credit Status

Noncredit

## Academic Level

- Graduate
- Other
- Professional
- Undergraduate

## Time to Completion

Hours

# Fee

No

# Requirements

## Criteria

## Skills

- Design for Everyone
- Inclusive Practices
- Universal Design for Learning
- Universal Design

# Values-Based Leadership - Micro-credential

The Presidents Leadership Class (PLC) is a multidisciplinary, co-curricular leadership program for specially selected undergraduate students. PLC includes four required courses, mandatory service requirement, and participation in both community events and experiential learning. PLC establishes a learning community of diverse scholars who have shared values. This unique environment helps every student fulfill their potential through a proven approach to leader development.

## Eligibility

CU Boulder Students (Degree Seeking Only)

## Delivery Mode

Hybrid or in-person and online delivery

## Credit Status

Includes for-credit and noncredit

## Academic Level

Undergraduate

## Time to Completion

Semesters

## URL

Value-Based Leadership (https://www.colorado.edu/plc/)

# Requirements

Unless approved for substitute pathways, learners pursuing the Values-Based Leadership micro-credential must be accepted into the Presidents Leadership Class. All applicants are reviewed by alumni, faculty, staff and current students, followed by an interview process. Each year, approximately 600-800 students apply, and approximately 40 students are admitted.

## PLC Credit Requirements

As a prerequisite for the micro-credential, eligible learners must first fulfill PLC credit requirements in Leadership Foundations & Applications, Multi-Level Leadership, Multi-Level Leadership, and Global Leadership (or course substitutes, when applicable).

Each PLC scholar must provide 10 hours of service each year in the program, totaling 40 hours of meaningful, philanthropic service. Proof of service is provided to and verified by the supervisor, and submitted via the MyPLC app.

## Applied Leadership Experience

The Applied Leadership Experience (ALE) unveils the utility and necessity of experiential learning as a life skill/endeavor, by guiding and supporting students through the reflection on the learning process. Learners identify personal, professional, and leadership growth moments that can be translated into skills to be applied to future experiences and placements. They are exposed to professional development lessons, seminars, and workshops to help them navigate current and future placements.

Learners complete an Applied Leadership Experience reflection paper and interview with a supervisor. They are assessed on a rubric

for intermediate and advanced demonstration of competencies in: Respectful Communication, Resilience, Development Orientation, Service for Change, Diversity, Equity and Inclusion.

### Skills

- Respectful Communication
- Resilience
- Service
- DEI
- Growth Mindset

# Workplace Skills for Student Employees - Micro-credential

This micro-credential is comprised of several stackable badges:

### Communication
### Leadership
### Onboarding

---

### Delivery Mode

Hybrid of in-person and online delivery

### Credit Status

Noncredit

### Academic Level

- Graduate
- Professional
- Undergraduate

### Time to Completion

Semesters

### URL

Workplace Skills for Student Employees (https://www.colorado.edu/registrar/)

# Requirements

### Criteria

### Skills

#### Communication

- Active Listening
- Communication Skills
- Critical Thinking and Problem Solving
- De-Escalation and Conflict Resolution
- Emotional Intelligence
- Equity and Inclusion

#### Leadership

- Career and Self-Development
- Creativity and Innovation
- Critical Thinking and Problem Solving
- Integrity and Responsibility
- Equity and Inclusion
- Mentorship
- Teamwork

#### Onboarding

- Equity and Inclusion
- Hiring
- Interviewing
- Onboarding
- Mentorship

# COURSES A-Z

## About the Course Descriptions

The courses listed here are included in the Boulder campus catalog during the 2025–26 academic year. This listing does not constitute a guarantee that any particular course will be o#ered during this year. Consult specific programs and major requirements within each school and college for more information. Also visit CU Boulder Class Search (http://classes.colorado.edu) for details about specific class offerings and schedules.

### Course Numbering

Consult specific departments and programs within schools and colleges for restrictions, requirements and permissions. (http://www.colorado.edu/catalog/node/448/)

- **1000–2000 courses** are usually intended for lower-division students (freshmen and sophomores).
- **3000–4000 courses** are intended for upper-division students (juniors and seniors), and may require instructor consent.
- **5000 courses** usually require graduate-student status, but may be open to qualified undergraduates with instructor consent. Consult the program or department.
- **6000, 7000 and 8000 courses** are usually open to graduate students only.

### Abbreviations

| | |
|---|---|
| Coreq. | Corequisite |
| Lab. | Laboratory |
| Lect. | Lecture |
| Prereq. | Prerequisite |
| Rec. | Recitation |
| CE/SL | Civic engagement/service learning component |

### Course Credits

Course credits are stated in semester units.

## Subjects

## Accounting (ACCT)

## Courses

**ACCT 3220 (3) Corporate Financial Reporting 1**
First of a two-course sequence intended to provide students with increased fluency in the language of business. Focuses on U.S. and international accounting concepts and methods that underlie financial statements and the related implications for interpreting financial accounting information.
**Requisites:** Requires prerequisite of BASE 2104 (minimum grade D-).

**ACCT 3225 (6) Corporate Financial Reporting**
Intended to provide students with increased fluency in the language of business. Focuses on U.S. and international accounting concepts and methods that underlie financial statements and the related implications for interpreting financial accounting information. Builds and extends detailed knowledge of preparation, analysis, and use of financial statements. No credit granted for this course and ACCT 3220 and ACCT 3230.
**Requisites:** Requires prerequisite of BASE 2104 (minimum grade of D-), or BCOR 2000 (minimum grade of D-), and BCOR 2200

**ACCT 3230 (3) Corporate Financial Reporting 2**
Second in a two-course sequence building and extending detailed knowledge of preparation, analysis and use of financial statements.
**Requisites:** Requires a prerequisite course of ACCT 3220 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**ACCT 3320 (3) Cost Management**
Provides cost analysis for the support of management decision making. Analyzes activities, cost behavior, role of accounting in planning, financial modeling,and managerial uses of cost data.
**Requisites:** Requires prerequisite of BASE 2104 (minimum grade D-).

**ACCT 3440 (3) Income Taxation of Individuals**
Provides an overview of individual US federal income tax law. Topics covered include tax formula and tax determination, filing status, gross income and exclusions, deductions, tax credits, and payment procedures.
**Requisites:** Requires prerequisite of BASE 2104 (minimum grade D-).

**ACCT 3700 (3) Accounting in a Global Economy**
This London-based global seminar introduces undergraduate students to transfer pricing, International Financial Reporting Standards (IFRS) and the impact of foreign exchange rates on financial reporting. Includes an IASB headquarter experience and presentations from multinational corporations and public accounting firms. It also includes experiential-based accounting learning in continental Europe.
**Requisites:** Requires a prerequisite course of ACCT 3220 (minimum grade D-). Restricted to Business (BUSN) majors only.

**ACCT 4240 (3) Advanced Financial Accounting**
Examines advanced financial accounting theory and practice, emphasizing U.S. and international accounting for business combinations, consolidated financial statements, and accounting for partnerships, not-for-profits and governments.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 5240
**Requisites:** Requires prerequiste course of ACCT 3220 and ACCT 3230 or ACCT 3225 (minimum grade D-). Restricted to Accounting (ACCT) or Finance (FNCE) majors with 52-180 units completed.

**ACCT 4250 (3) Financial Statement Analysis**
Focuses on the use of U.S. and international accounting information by decision-makers external to the firm. Considers judgments made by investors, security analysts, bank lending officers, and auditors. Emphasizes impact of changes to financial statement elements, equity valuation and profitability analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 5250
**Requisites:** Requires a prerequisite course of ACCT 3220 or 3225 and ACCT 3230 (minimum grade D-). Restricted to Accounting (ACCT), Finance (FNCE) or Accounting Concurrent Degree majors only with 52-180 units completed.

**ACCT 4540 (3) Accounting Information Systems**
Considers the interaction of accountants with information systems and the role of accounting information systems in business processes. Focuses on the tools used by accountants and provides an understanding of accounting as an information system.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 5540
**Requisites:** Requires a prerequsite course of ACCT 3220 or ACCT 3225 (minimum grade D-). Restricted to Accounting (ACCT) majors with 52-180 units completed.

**ACCT 4620 (3) Auditing and Assurance Services**
Emphasizes the value of assurance services, including the market for financial-statement audits, and the audit decision process, from obtaining a client through planning and testing, to issuance of the audit report. Focuses on making judgments and decisions under conditions of uncertainty and continually evaluating the substance of business transactions over their form.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 5620
**Requisites:** Requires a prerequsite course of ACCT 3230 (minimum grade D-). Restricted to Accounting (ACCT) majors 52-180 units completed.

**ACCT 4821 (3) Experimental Seminar: Financial Report for Complex Transactions**
Focuses on topics related to major financial events in the life of an organization (IPOs, mergers and acquisitions). Enhance the ability to understand the economic essence of important complex business transactions as linked to the financial reporting and tax issues surrounding these deals. Many fascinating and recent transactions will be examined in depth.
**Requisites:** Requires a prerequisite course of ACCT 3230 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**ACCT 4828 (3) ESG Reporting: Accounting for a Changing World**
Introduces students to the current state of corporate sustainability reporting through the lens of accounting and financial reporting concepts. The course has three basic elements. We will cover (1) data and measurement issues associated with corporate sustainability reporting, (2) current disclosure frameworks and the evolving regulatory landscape, and (3) other accounting-related topics including the intersection of sustainability and US GAAP and ESG Assurance.
**Requisites:** Requires prerequisite course of BCOR 2203 (minimum grade D-). Restricted to Business majors with 52-180 units completed.

**ACCT 4850 (3) Senior Seminar - Accounting Ethics**
Examines the nature of accounting theory and practice from perspectives of economics, law, globalization, accounting, ethics, and moral reasoning. Explores issues including implications of institutional factors, such as Sarbanes-Oxley, SEC, FASB, IFRS, and capital markets.
**Requisites:** Requires prerequisite course of ACCT 3230 or ACCT 3225 (minimum grade D-). Restricted to Accounting (ACCT) majors with 90-180 units completed.

**ACCT 4900 (1-3) Independent Study**
Requires prior consent of dean and instructor under whose direction study is taken. Intended only for exceptionally well-qualified business seniors. Departmental form required.

**ACCT 5100 (3) Oil and Gas Accounting**
This course introduces students to the oil and gas industry and its unique accounting and finance issues. The course will introduce oil and gas terminology, analyze the components of an income statement, present book and tax accounting differences and enable you to prepare an economic purchase evaluation for oil and gas producing assets. We will review, discuss and debate current issues relating to the energy industry. Previously offered as a special topics course.
**Recommended:** ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.
**Grading Basis:** Letter Grade

**ACCT 5120 (3) Business Analytics**
Teaches cutting-edge tools and approaches to the analysis of data, including "big data" for effective decision-making. Creates data connoisseurs through hands-on exposure to exploratory and predictive analytics. Application areas covered include Web Marketing, the Internet of Things, Biometric Monitoring, as well as data integration and analysis for online marketing, human resources and operations.
**Requisites:** Restricted to MS Accounting (ACCT-MS) and MS Taxation (ACTX-MS) students
**Grading Basis:** Letter Grade

**ACCT 5240 (3) Advanced Financial Accounting**
Examines advanced financial accounting theory and practice, emphasizing U.S. and international accounting for business combinations, consolidated financial statements, and accounting for partnerships, not-for-profits and governments.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 4240
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.

**ACCT 5250 (3) Financial Statement Analysis**
Focuses on the use of U.S. and international accounting information by decision-makers external to the firm. Considers judgments made by investors, security analysts, bank lending officers, and auditors. Emphasizes impact of changes to financial statement elements, equity valuation and profitability analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 4250
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.

**ACCT 5450 (3) Income Taxation of Business Entities**
Provides an overview of the taxation of business entities. Examines the tax consequences of forming and operating regular corporations, partnerships, limited liability companies, and S corporations.
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.

**ACCT 5540 (3) Accounting Information Systems**
Considers the interaction of accountants with information systems and the role of accounting information systems in business processes. Focuses on the tools used by accountants and provides an understanding of accounting as an information system.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 4540
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.

**ACCT 5550 (3) Data Analytics for Accounting**
Exploration of key components of Data Analytics that are of particular utility to accountants. This course has 2 primary elements to it: (1) Describe the Analytics process using an established data analytics model called the IMPACT cycle, and (2) Illustrate the process in audit, managerial accounting, and financial reporting.
**Requisites:** Requires prerequisite or corequisite course of ACCT 4620 or ACCT 5620 (minimum grade D-). Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.
**Grading Basis:** Letter Grade

**ACCT 5620 (3) Auditing and Assurance Services**
Emphasizes the value of assurance services, including the market for financial-statement audits, and the audit decision process, from obtaining a client through planning and testing, to issuance of the audit report. Focuses on making judgments and decisions under conditions of uncertainty and continually evaluating the substance of business transactions over their form.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 4620
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.

**ACCT 5820 (3) Topics in Business**
Offered irregularly to provide opportunity for investigation of new frontiers in accounting.
**Equivalent - Duplicate Degree Credit Not Granted:** MSBX 5820
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-FNCEACCT or C-FNCEACTX or C-ACCT or C-ACCTACTX graduate students only.
**Grading Basis:** Letter Grade

**ACCT 5827 (3) Integrated Reporting for Socially Responsible Strategies**
Explores the growing global trend of companies to measure, disclose and report for socially responsible initiatives. Integrated reporting combines financial, environmental, social and governance information into a single report. Current practices in sustainability and integrated reporting in the US and across the world will be examined through case studies, guest speakers, current literature and projects. Can be taken concurrently with ACCT 3220.
**Equivalent - Duplicate Degree Credit Not Granted:** MBAX 6827
**Requisites:** Restricted to students with one of the following plans: ACCT-MS, ACTX-MS; or subplan: C-ACCT, C-ACCTACTX, C-FNCEACCT, C-FNCEACTX

**ACCT 6000 (1-3) Academic Internship in Accounting**
Offers students the opportunity to gain professional work experience in an accounting or tax position while still in school. Provides academically relevant work experience that complements students' studies and enhances their career potential. Includes lectures and a course paper. Students may not preregister for this course, and they must contact the Director of the concurrent degree program in accounting for approval. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with one of the following plans: ACCT-MS, ACTX-MS; or subplan: C-ACCT, C-ACCTACTX, C-FNCEACCT, C-FNCEACTX

**ACCT 6250 (3) Financial Statement Analysis**
Focuses on the use of accounting information by decision makers external to the firm. Considers judgments made by security analysts, bank lending officers and auditors. Emphasizes impact of changes to financial statement elements, profitability analysis and equity valuation.
**Equivalent - Duplicate Degree Credit Not Granted:** MBAX 6710
**Requisites:** Requires prerequisite course of ACCT 5250 or MBAC 6020 (minimum grade D-).

**ACCT 6260 (3) Seminar: Managerial Accounting**
Explores cost management, especially as related to organizational decision making, planning, and control. Emphasizes case analysis and applications.
**Requisites:** Requires prerequisite course of MBAC 6020 (minumum grade D-).

**ACCT 6290 (3) Textual Analysis in Business**
This course will discuss basic ideas around natural language processing (NLP) in research in different "dismal science" disciplines, from Economics to Psychology and Political Science, with a bent/focus on financial markets and accounting statements. The course is meant for graduate students as an introductory course on textual analysis, with an emphasis on methods and applications in Finance and Accounting. The language of choice for the course will be R. The course will be multilingual in that both the faculty and students can use other languages than R (python/perl/C).
**Equivalent - Duplicate Degree Credit Not Granted:** MSBX 6290
**Recommended:** restricted to ACCT-MS and ACTX-MS students.
**Grading Basis:** Letter Grade

**ACCT 6350 (3) Current Issues in Professional Accounting--Accounting Ethics**
Examines the nature of accounting theory and practice from perspectives of economics, law, globalization, accounting, ethics, and moral reasoning. Also explores issues including implications of institutional factors, such as Sarbanes-Oxley, SEC, FASB, IFRS, and capital markets. Counts as senior seminar for Concurrent degree students.
**Requisites:** Restricted to Accounting, Taxation, Finance/Accounting, or Accounting/Taxation students only.

**ACCT 6420 (3) Research and Writing in Income Taxation**
Provides a working knowledge of online tax research methodology. Examines the sources of tax authority in researching a tax question. Develops legal writing skills using the CREAC form of writing.
**Requisites:** Requires a prerequisite course of ACCT 5450 (minimum grade D-). Restricted to MS-ACTX or C-ACCTACTX or C-FNCEACTX students only.

**ACCT 6430 (3) Taxation of Partnerships**
Studies federal income taxation of pass-through entities such as those used by most small businesses in the U.S. Includes creation, operation, distributions, sale of interests and liquidation.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 6167
**Requisites:** Requires prerequisite course of ACCT 5450 (min grade D-). Restricted to MS-ACCT or MS-ACTX or C-ACCTACTX or C-FNCEACTX students only.

**ACCT 6450 (3) Taxation of Corporations**
Studies federal income taxation related to taxable corporations, the entities through which a large part of the economic activity in the U.S. is conducted. Includes creation, operation, distributions, sale of interests and liquidation.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 6157
**Requisites:** Restricted to ACCT-MS or ACTX-MS or C-ACCTACTX or C-FNCEACTX students only. Requires prerequisite course of ACCT 5450 (min grade D-).

**ACCT 6620 (3) Advanced Auditing: Business Risk and Decision Analysis**
Explores contemporary issues, historical developments, and selected topics pertinent to business assurance services by independent accountants. Emphasizes improving both the decision behavior of decision makers and the quality of information, or its context, for decision makers.
**Requisites:** Requires a prereq course of ACCT 5620 (min grade C). Restricted to Acct, Fnce/Acct, Infor Syst/Acct, Syst/Acct Concurrent Degree students or Acct, Acct/Tax or Busn Admin (BUAD) graduate students only.

**ACCT 6700 (4) Income Taxation**
Emphasizes the fundamentals of the federal income tax system and examines its impact on the individual.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 6007
**Requisites:** Restricted to Accounting, Taxation, Fin Acct Tax-Concurrent Degree or Acct Acct Tax-Concurrent Degree students only.

**ACCT 6780 (3) US International Taxation**
This course will provide an overview of the United States federal income taxation of persons engaged in international transactions.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 7617
**Requisites:** Restricted to students with one of the following plans: ACTX-MS; or subplan: C-ACCTACTX, C-FNCEACTX
**Recommended:** Prerequisite ACCT 5450.
**Grading Basis:** Letter Grade

**ACCT 6900 (1-6) Independent Study**
Prior department consent required of instructor under whose direction study is taken. Departmental form required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Accounting, Taxation, Fin Acct Tax-Concurrent Degree or Acct Acct Tax-Concurrent Degree students only.

**ACCT 6940 (1-6) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree. Departmental form required.
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 6950 (1-4) Master's Thesis**
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 7300 (3) Doctoral Seminar: Introduction to Accounting Research**
Discusses the nature of scientific investigation and how accounting theory relates to theories in economics and finance. Introduces students to major areas of accounting research and research methods. Provides students with instruction and experience in evaluating and critiquing research papers as well as generating original and viable research ideas.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 7320 (3) Doctoral Seminar: Accounting and Capital Markets I**
Focuses on research evaluating the usefulness of accounting information for valuing equity securities. The seminar builds a foundation for conducting accounting-related capital markets research.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 7330 (3) Doctoral Seminar: Accounting and Capital Markets 2**
Focuses on how managers strategically communicate with capital market participants (e.g., investors and equity analysts). Students develop an understanding of how information enhances the efficiency of stock markets, why managers voluntarily disclose information, and how market participants react to strategic disclosure.
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 7340 (3) Doctoral Seminar: Managerial Accounting Research**
Survey of managerial accounting research, emphasizing a variety of methodologies including economics-based archival empirical and experimental approaches. Topics include: management performance measurement; management incentives; non-financial performance measures; management control systems; cost behavior and cost structure; intra-firm transfer pricing; inter-firm relations and knowledge sharing; risk preferences; risk taking and risk sharing; strategic performance measurement; agency theory; and budgetary slack and performance.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequsite course of ACCT 6710 (minimum grade D-). Restricted to graduate students only.

**ACCT 7800 (3) Doctoral Seminar: Accounting Theory**
Follows the evolution of game-theoretical analytical research and application of analytical methods to topics including: accounting-based valuation, discretionary disclosure, stewardship role of accounting, insider trading and imperfect capital market models, signaling through accounting choice, deferred tax accounting, audit sampling, auditor rotation, and low balling. Describes implications of analytical results for primarily economics-based empirical research designs.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 7830 (3) Doctoral Seminar: Accounting Research**
Designed to assist the doctoral student in integrating courses and fields of study in order to be able to apply knowledge and skills to problems in accounting. Special attention given to the development of thesis topics.

**ACCT 8820 (1-6) Graduate Seminar**
Provides opportunity for investigation of new frontiers in accounting through an experimental seminar. Department enforced prereq.: varies
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ACCT 8900 (1-3) Independent Study**
Instructor consent required and departmental form (taught as doctoral seminar).
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ACCT 8990 (1-10) Doctoral Dissertation**
**Requisites:** Restricted to Business (BUSN) graduate students only.

# Advertising, PR and Media Design (APRD)

## Courses

**APRD 1003 (3) Principles of Strategic Communication**
Introduces the foundations, nature, and practices of advertising and public relations and the various industry functions - including account management, market research, account planning, media planning, creative strategy, creative execution, branding, image reputation and crisis management. This course offers historical, organizational, financial, creative and critical perspectives concerning strategic communication.
**Requisites:** Restricted to students with 65 units or less completed.
**Grading Basis:** Letter Grade

**APRD 1004 (1) Fundamentals of Grammar**
Teaches students the basic rules of grammar, punctuation, word choice and sentence structure so that they can write clear and concise messages that convey a desired meaning, apply punctuation in an accurate and effective manner, and differentiate between style conventions.
**Grading Basis:** Letter Grade

**APRD 2001 (3) Strategic Thinking in Advertising and Public Relations**
Reviews historical and contemporary views of critical and strategic thinking, as well as strategic practices utilized in advertising, branding, and public relations through the use of readings, exploration of case studies, lectures, individual and group exercises, and client projects.
**Requisites:** Requires a prerequisite course of APRD 1003 (minimum grade C-). Restricted to students with Strategic Communication (STCM) plan (Majors) or who are On-Track admitted to STCM.
**Grading Basis:** Letter Grade

**APRD 2004 (3) Introduction to Research Methods and Insights**
Provides students with the fundamental skills necessary to develop research-based strategies to address challenges faced by advertising, public relations, and marketing professionals in their efforts to address client communication needs.
**Requisites:** Requires a prerequisite course of APRD 1003 (minimum grade C-). Restricted to students with Strategic Communication (STCM) plan (Majors) or who are On-Track admitted to STCM.
**Grading Basis:** Letter Grade

**APRD 2005 (3) Strategic Communication Writing**
Introduces students to strategic writing across multiple media platforms and demonstrates the different forms of writing used in the strategic communication subfields. Students will learn strategies for crafting and delivering effective messages to target audiences.
**Requisites:** Requires prerequisite courses of APRD 1004 and APRD 2001 and APRD 2004 (all minimum grade C-). Restricted to Strategic Communication (STCM) majors only.
**Grading Basis:** Letter Grade

**APRD 2006 (3) Software and Design Applications**
Equips students with the practical knowledge and critical skills necessary to effectively employ visual design in advertising and public relations practice. Students will be introduced to both the fundamental principles of graphic design and the technical tools used to bring design ideas to life.
**Requisites:** Requires prerequisite courses of APRD 1004 and APRD 2001 and APRD 2004 (all minimum grade C-). Restricted to Strategic Communication (STCM) majors only.
**Grading Basis:** Letter Grade

**APRD 3001 (3) Visual Design 1**
Students are introduced to design elements and principles, research and visual storytelling. They are challenged to communicate intellectual, sensory and emotional concepts by learning a visual vocabulary of type, color, and form expressed in a variety of mediums and dimensions.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 3002 (3) Communication and Media Planning**
Concentrates on strategies and tactics advertisers and marketers use to communicate their brand stories to their desired audiences. These include traditional media planning and placement - TV, print, radio, and out-of-home - as well as new areas like digital, social, and experiential approaches to communications. Students will learn how to create, develop, and present communication plans and campaigns in an interactive and fast-paced environment.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Advertising (ADV) subplan only.
**Grading Basis:** Letter Grade

**APRD 3003 (3) Strategic Communication Research Methods**
Provides an opportunity to use and master quantitative and qualitative research methods. Students conduct research and analyze data to determine the target audience¿s relationship with specific product categories and identify the emotional and practical needs that create brand relationships.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Advertising (ADV) or Public Relations (PRL) subplans only.
**Grading Basis:** Letter Grade

**APRD 3004 (3) Account Management**
Examines managerial and decision making processes of advertising and related brand communication functions. Emphasis on determining opportunities, integrating with other elements of the promotion mix, setting objectives, establishing budgets, and measuring advertising and communication effectiveness.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Advertising (ADV) subplan only.
**Grading Basis:** Letter Grade

**APRD 3005 (3) Content Strategy and User Engagement**
Explore and understand the importance of content as a brand building tool. Students will gain the ability to use analytics to create strategy that allows the brand to have meaningful and cohesive conversation with its community.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Advertising (ADV) or Public Relations (PRL) subplans only.
**Grading Basis:** Letter Grade

**APRD 3006 (3) History of Advertising**
Explores the critical moments in advertising history from the start of the Industrial Revolution through the current post digital era.
**Grading Basis:** Letter Grade

**APRD 3009 (3) Brand Building**
Explains the value of a brand in a marketing and advertising environment: how to build, manage, and protect a brand. Specific areas covered include what a brand is and why it matters, how a brand creates value, ways to measure and understand the value of a brand, managing new and established brands, and the role of consumer insight in managing a brand.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all with minimum grade C-). Restricted to Strategic Communication (STCM) majors with Advertising (ADV) subplan only.
**Grading Basis:** Letter Grade

**APRD 3010 (3) Consumer Insights**
Students will learn how to leverage insights for the purposes of creative strategy and creative brief writing.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all with minimum grade C-). Restricted to Strategic Communication (STCM) majors with Advertising (ADV) subplan only.
**Grading Basis:** Letter Grade

**APRD 3011 (3) Visual Design 2**
This advanced-level course is a continuation of "Visual Design I". Through hands-on studio exercises, interactive lectures, and critiques, students will learn to utilize the fundamentals of design, creative thinking, and storytelling to create practical and advanced projects that can be added to their portfolio. They will also learn to articulate the qualities of a visual design system and the strategies behind them.
**Requisites:** Requires prerequisite of APRD 3001 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 3100 (3) UX and UI Design Workflows**
Explores how to create and produce effective and engaging designs for dynamic information across a variety of screens while maintaining brand identity. Extending the design principles learned in previous classes, the student will concept for user interfaces (UI) and navigational frameworks that optimize usability and accessibility.
**Requisites:** Requires prerequisite course of APRD 3001 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 3102 (3) Copywriting 1**
Explores the development of interactive concepts that meet a strategic brief's brand objectives. Emphasis is placed on developing strong digital ideals and mastering and applying the styles appropriate for different digital media.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all with minimum grade C-). Restricted to Strategic Communication (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 3103 (3) Public Relations Writing**
Emphasizes communication tactics: How to plan, write, and produce public relations tools; select audience and media; utilize print and electronic media. Focuses on Associated Press style and advanced writing techniques.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Public Relations (PRL) subplan only.
**Grading Basis:** Letter Grade

**APRD 3104 (3) Digital Storytelling for Public Relations**
Provides students a new skill set in digital storytelling ideas, production, and analysis. Students will develop the skills to produce creative online stories that will reach strategic audiences. We will look at the changing roles of the storyteller in news, promotion, and public relations while discussing and analyzing media consumption habits that encourage a seamless transition from consumer to creator. This course is designed for public relations students within the strategic communication major.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Public Relations (PRL) subplan only.
**Grading Basis:** Letter Grade

**APRD 3105 (3) Public Relations Strategy and Implementation**
Exposes students to concepts in strategic planning and implementation of public relations efforts. Students will come to understand the organization's internal and external communications and identify potential crises in the development of public relations strategy. This class provides an overview of the public relations process and its application to the development of strategy. Students will also understand implementation and evaluation of strategy.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Public Relations (PRL) subplan only.
**Grading Basis:** Letter Grade

**APRD 3112 (3) International Public Relations**
Introduces students to the cultural, social and economic issues relevant to strategic communication in the global arena. Provides students with the foundational tools necessary to both understand and effectively navigate the often complex world of strategic intercultural communication. Specific topics will include exploration of the contextual factors that influence public relations practice in different nations/regions, discussion of the various theoretical models that govern global PR practice and critical evaluation of international PR case studies/campaigns.
**Requisites:** Requires a prerequisite course of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Public Relations (PRL) subplan only.
**Grading Basis:** Letter Grade

**APRD 3300 (3) Crisis Communication in Public Relations**
Explores theories and research related to public relations communication before, during and after a crisis; examines the fundamentals of organizational communication, crisis management and strategic planning.
**Requisites:** Requires prerequisite course of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Public Relations (PRL) subplan only.
**Grading Basis:** Letter Grade

**APRD 3301 (3) Social Media Strategies**
Emphasis on how social media and internet marketing influence public relations; understand the fundamentals and best practices in social media management, visual communication and mobile applications.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all minimum grade C-). Restricted to Strategic Communication (STCM) majors with subplans of Advertising (ADV) or Public Relations (PRL) only.
**Grading Basis:** Letter Grade

**APRD 3302 (3) Case Studies in Public Relations**
Designed to help develop and refine critical thinking in selecting, creating and applying tools, techniques and principles of public relations to a variety of managerial cases and problem situations.
**Requisites:** Requires prerequisite course of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Public Relations (PRL) subplan only.
**Grading Basis:** Letter Grade

**APRD 3400 (3) Creative Concepting 1**
Introduces students to Design Thinking and the techniques for designing ideas into concepts. The course leads students through the design thinking process of 1) Empathize, 2) Define, 3) Ideate, 4) Concept, 5) Prototype, 6) Test. Most emphasis is placed on the first four steps.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all with minimum grade C-). Restricted to Strategic Communications (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 3401 (3) Creative Concepting 2**
Building on the fundamentals mastered in APRD 3400, this course takes design thinking for strategic communication purposes to the next level. Students tackle projects of greater complexity, designing concepts for, among others, mobile applications, social platforms, and interactive experiences. This class prepares the foundation for - and ladders into - APRD 4600.
**Requisites:** Requires prerequisite course of APRD 3400 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 3402 (3) Content Creation**
Focused on rapid content creation, this course will teach students how to develop and produce social content for strategic communication by combining message, concept and execution into consumer-facing touchpoints. Strategic Communication majors with the Creative (CTV) subplan have priority; others may enroll on a space-available basis.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all with minimum grade C-). Restricted to Strategic Communication (STCM) majors.
**Recommended:** Prerequisites APRD 3500 or APRD 3001.
**Grading Basis:** Letter Grade

**APRD 3500 (3) Copywriting 2**
Explores the uses of story and how the design of story must adapt to different platforms and genres, including both short and long-form narratives, visual narrative, film, personal essay and advertising copy writing.
**Requisites:** Requires prerequisite course of APRD 3102 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 3501 (1) Software Applications 2**
Equips students with the critical skills necessary to effectively employ intermediate design software skills in advertising and public relations practice. Students will expand upon existing creative software skills and explore concepts and techniques when working with visual design and media content, motion design, animated compositions, audio and video production, and additional intermediate level topics.
**Requisites:** Requires prerequisite of APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 3504 (1) Software Applications 3**
Equips students with the critical skills necessary to effectively employ advanced design software skills in advertising and public relations practice. Students will expand upon prior creative software skills and explore advanced concepts and techniques when working with general visual media design, 3D compositing, interactive motion design, user interface design, animation concepts, data-driven visuals, and will explore additional media platforms not covered in previous courses.
**Requisites:** Requires prerequisite of APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 4000 (3) Event Planning and Management**
Introduces students to the planning and management of experiential events. Specifically, the course will locate experiential and event planning within the broader context of organizational strategy and will introduce students to project management through proposal development, scheduling, budgeting, and evaluation components that underlie successful event production.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all with minimum grade C-). Restricted to Strategic Communication (STCM) majors with Public Relations (PRL) subplan only.
**Grading Basis:** Letter Grade

**APRD 4010 (3) Strategic Health Communication**
Introduces students to theory, research and contemporary concerns in health communication. Focuses on strategic communication for public service and public education campaigns related to health. Includes advertising and health promotion, community relations, public service programs, advocacy, online communities and social media management.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all with minimum grade C-). Restricted to Strategic Communication (STCM) majors with Public Relations (PRL) subplan only.
**Grading Basis:** Letter Grade

**APRD 4100 (3) Brands and Culture**
Explores the intersection between culture and marketing communication. Students will examine brand communities, brand and category culture as well as popular culture and the impact on and within marketing communication. The goal is for students to become more aware of the importance of culture in the ability of communication to disrupt the status quo within a market.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all minimum grade C-). Restricted to Strategic Communications (STCM) majors with Advertising (ADV) or Public Relations (PRL) subplans only and at least 70 credits.
**Grading Basis:** Letter Grade

**APRD 4102 (3) Sustainable Brand Practices: Ethics Cases in Advertising and PR**
Explore contemporary issues and ethics cases in advertising and public relations and how these practices impact the long-term success of a brand. Students will explore branding concepts and theories of ethics to examine some of the current controversies in which advertising and public relation campaigns are involved and how these issues can be dealt with in an ethical and socially responsible manner.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all minimum grade C-). Restricted to Strategic Communications (STCM) majors with Advertising (ADV) or Public Relations (PRL) subplans only and at least 70 credits.
**Grading Basis:** Letter Grade

**APRD 4300 (3) Strategic Communication Analytics and Metrics**
Provide students with a base knowledge of analytics and metrics used in strategic communication. Students will learn how to obtain and clean big data, how to analyze and turn it into insights and how to present and communicate insights into actionable recommendations.
**Requisites:** Requires a prerequisite course of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with a minimum of 70 hours and a subplan of Advertising (ADV) or Public Relations (PRL) only..
**Grading Basis:** Letter Grade

**APRD 4301 (3) Social Media Listening**
Provides the practical understanding and application of strategic social media listening from the brand perspective in advertising and public relations, focusing on critical thinking and the ethics of using social media data. Provides students with hands-on experience in industry leading listening tools including Brandwatch, Social Studio, Meltwater and Hootsuite. Equips students with the skills needed to find relevant conversations, uncover insights then apply their perspectives to management for business impact.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all with minimum grade C-). Restricted to Strategic Communications (STCM) majors with Advertising (ADV) or Public Relations (PRL) subplans only.
**Grading Basis:** Letter Grade

**APRD 4302 (3) Marketing Data Visualization**
Teaches students how to use data visualization to tell business stories based upon the analysis of marketing and business data. Students will learn basic data concepts, types, and uses. They will explore, summarize, and analyze the data using various techniques and best practices with Tableau Software.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communications (STCM) majors with Advertising (ADV) or Public Relations (PRL) subplans only.
**Grading Basis:** Letter Grade

**APRD 4303 (3) Search Advertising Strategies**
Build, manage and evaluate digital advertising campaigns for a non-profit organization. Teams of students are assigned a local non-profit and will evaluate, develop, and execute search advertising campaigns for their use. The course also provides a general overview of the search advertising landscape, "paid search." Course prepares students for careers in advertising agencies, media agencies, marketing departments and search consultancies.
**Requisites:** Requires prerequisite courses of APRD 2005, APRD 2006, and APRD 3002 (all with minimum grade C-). Restricted to Strategic Communication (STCM) majors with Advertising Strategy (ADV) subplan only.
**Recommended:** Prerequisite APRD 4300.
**Grading Basis:** Letter Grade

**APRD 4404 (3) Advanced Ad Campaigns NSAC**
Work and design an ad campaign for a real-world client through the National Student Advertising Competition (NSAC). Students in the course commit to both the fall and spring semesters in the same academic year for 6 total credit hours (4 hours of capstone credit plus 2 hours of upper-division elective credit). This two-semester course is equivalent to APRD 4405, and credit cannot be given for both. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires a prerequisite course of APRD 3001 or APRD 3010 or APRD 3105 (minimum grade C-). Restricted to Strategic Communication (STCM) majors only with a minimum of 80 hours completed.
**Grading Basis:** Letter Grade

**APRD 4405 (4) Strategic Communication Capstone**
Puts into practice knowledge from previous coursework to plan and execute a strategic communication campaign. Students work with others, operating as an agency. Students will develop one or more strategic communication campaigns. In addition, students will practice organizational and leadership skills; design and layout skills; produce a plans book; and pitch the proposed campaigns to the class and the client.
**Requisites:** Requires prerequisite courses of APRD 3001 or APRD 3010 or APRD 3105 or APRD 4506 (minimum grade C-). Restricted to Strategic Communications (STCM) majors with 85 or more credits.
**Grading Basis:** Letter Grade

**APRD 4406 (3) Advanced PR Campaigns BATEMAN COMPETITION**
Offers students the opportunity to develop and implement a PR campaign for a real-world client through the Bateman Competition, PRSSA's national case study competition for public relations students. Students in the course commit to both the fall and spring semesters in the same academic year for 6 total credit hours (4 hours of capstone credit plus 2 hours of upper-division elective credit). This two-semester course is equivalent to APRD 4405, and credit cannot be given for both. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of APRD 3103 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Public Relations (PRL) subplan only and who have completed at least 80 credit hours.
**Grading Basis:** Letter Grade

**APRD 4501 (3) Design for Social Innovation**
Provides an introduction to design thinking as a means to drive social change and solve real-world problems. This studio class is project based and asks students to experiment with new behaviors of work and learning, including: collaboration, iteration, prototyping, empathizing, craft and inference. Field work and collaboration with teammates are required.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (all with minimum grade C-). Restricted to Strategic Communications (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 4543 (3) Strategic Brand Management**
Examines the theory of branding: what brands are, how brands are created and measured, as well as strategies for managing brands and brand communication.
**Requisites:** Requires prerequisite courses of APRD 2005 and APRD 2006 (minimum grade C-). Restricted to Strategic Communication (STCM) majors with Advertising (ADV) or Public Relations (PRL) subplans and a minimum of 85 credits only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Advertising Media Design

**APRD 4600 (3) Creative Portfolio 1**
Develop a variety of design concepts and execute them at a professional level. Students are assigned projects to demonstrate their ability in areas such as branding, product design, advertising creativity, and interaction design. Students will also design their own online portfolio. Creative work is presented in a juried show at the end of the semester.
**Requisites:** Requires a prerequisite course of APRD 3001 (minimum grade C-). Restricted to Strategic Communications (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 4601 (3) Creative Portfolio 2**
Drawing on creative skills and knowledge developed in previous courses, students produce a final creative portfolio ready for professional viewing. There will be an opportunity to enter work into the International One Show advertising and design awards competition.
**Requisites:** Requires a prerequisite course of APRD 4600 (minimum grade C-). Restricted to Strategic Communications (STCM) majors with the Creative (CTV) or Media Design (DSN) subplan only.
**Grading Basis:** Letter Grade

**APRD 4800 (3) Seminar in Honors Writing and Research**
Supports seniors accepted into the APRD Honors Program in developing the research foundation for their projects, whether scholarly, creative, or hybrid. Topics include topic development, primary and secondary source research, and the writing of a scholarly literature review. Project and time management, planning for creative and scholarly field research, and peer support and editing are emphasized. In the spring, students take an independent study with their faculty advisor to complete their honors project.
**Grading Basis:** Letter Grade

**APRD 4841 (1-6) Undergraduate Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**APRD 4873 (1-4) Special Topics**
Special Topics.
**Repeatable:** Repeatable for up to 16.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Strategic Communication (STCM) majors only with 57-180 credits (Juniors or Seniors)
**Additional Information:** Departmental Category: Advertising Media Design

**APRD 4931 (1-6) Internship**
Internship course
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of APRD 3001 or APRD 3002 or APRD 3103 or APRD 3503 (all minimum grade C-).

**APRD 5001 (3) Foundations of Brand Design**
Focuses on the challenges of designing brands targeted at customer needs and desires. Working through a series of projects, students learn both the theory and practice of identifying brand opportunities, idea generation, global design strategies, testing, and brand launch. Graduate students from other departments who have the appropriate background may be allowed to register on a space-available basis with consent of the Program Director.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5002 (3) Foundations of Experience Design**
Introduces the mindset, skills, and methodologies that are core to the practice of human-centered design in digital environments. By applying different design methods and applications across UX, UI, and IxD capabilities, students will learn to design a holistic experience and develop creative problem-solving skills using interaction design principles, design thinking, and customer journey mapping. Graduate students from other departments who have the appropriate background may be allowed to register on a space-available basis with consent of the Program Director.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5003 (3) Advanced Brand Design**
Builds on core concepts introduced in APRD 5001 by expanding executional skillsets and conceptual frameworks through the development of a unified theory of branding. This course encourages students to establish their core principles as art directors and visual designers. They will learn how to create opportunities for complex, meaning-centered relationships between people and products through research, strategic definition, identity development, expression, communication, and behavioral analysis.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5004 (3) Designing the Customer Journey**
Focuses on bridging the gap between designing digital products and understanding the customer journey as they utilize those products. Using concepts and applications introduced in APRD 5002, students will learn to integrate prototyping activities, along with research and testing techniques, into every stage of the design process to quickly adapt designs based on customer feedback and testing insights. Topics include journey mapping, user research methods and high/low fidelity prototyping.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5006 (3) Design for Startups**
Introduces the basic concepts of entrepreneurship as a discipline, with special emphasis given to the ways that design and creativity impact the entrepreneurial process and how designers can meaningfully engage in a startup studio environment. With a broad overview of early-stage entrepreneurial activities, this course prepares students to create a new business, work for a startup, or launch a new venture within an existing organization. Graduate students from other departments who have the appropriate background may be allowed to register on a space-available basis with consent of the Program Director.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5008 (3) Designing for Scale**
Tailored specifically for designers and creative professionals, this course highlights the role that design plays in driving measurable business results for organizations. With the ROI-driven strategic mindset required in today's competitive landscape, students learn essential business skills needed to deliver not only exceptional design but also measurable impacts for brands and businesses.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5009 (3) Principles of Visual Design**
Examines essential principles that drive innovation and creativity in the design field. Through hands-on projects and critical analysis of historical and contemporary creative communication trends, students work on developing their own design philosophy and visual aesthetic. By the end of the course, students should have the expertise needed to craft compelling, impactful visual design solutions that make branding more engaging and effective. Graduate students from other departments who have the appropriate background may be allowed to register on a space-available basis with consent of the Program Director.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5011 (3) Digital Design Portfolio**
Dedicated to the meticulous curation of an industry-ready professional portfolio. Students receive guidance in crafting their online digital portfolios and fostering professional development tailored to their post-graduation career aspirations. Interaction with industry professionals and successful program alumni allows students to gain valuable advice, tips, and feedback to enhance their portfolios.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5012 (3) Entrepreneurial Design**
Equips students with the tools, strategies, and knowledge necessary to thrive in entrepreneurial business environments. Students will develop a practical understanding of how to validate business strategies by applying the principles of human-centered design and iterative design culture. Practical skills, especially business prototyping, are honed to ensure that students can apply their knowledge in real-world situations and make a profound impact on startup success.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5014 (3) Advanced Tools for Interaction Design**
Introduces advanced practices and tools of the digital design profession with an emphasis on preparing students for the increasingly sophisticated nature of modern digital product design. Students get an overview of the architecture of design systems, gain an understanding of what a design system means across different industries and design practices, and learn to build their own design system.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5015 (3) Brand Design for Sustainable Futures**
An in-depth look at the challenges of designing for sustainability by moving students beyond the confines of a standard project brief to examine the purpose and implications of a brand or service's existence. Immersed in design ethics and the power of visual communication, students will gain the expertise to design with purpose and intention, and to align with circular economy principles to reduce waste and pollution.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5018 (3) Innovative Technologies for Design**
Explores the fusion of design, technology, and coding. The course aims to prepare students to seamlessly integrate technology into design work that addresses real-world challenges. Topics covered in this course include virtual reality, augmented reality, data visualization, and foundational skills in web development using JavaScript, HTML and CSS, and contemporary AI capabilities.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5020 (3) Design Leadership**
Explores the art of using design to drive innovation, impact, and change. Through collaboration and empathy, students will discover the power of design to bring people together to create meaningful solutions to real world problems. From managing design teams, project management processes, product development models, and organizational design, students will gain the skills needed for managing design in today's complex world and discover how to work effectively with others across disciplines and sectors to create impact at scale.
**Requisites:** Restricted to graduate students in Strategic Communication Design (STCM-MAP)
**Grading Basis:** Letter Grade

**APRD 5841 (1-3) Graduate Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**APRD 5851 (1-6) Graduate Professional Project**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**APRD 5931 (1-3) Internship**
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**APRD 6871 (1-3) Special Topics**
Graduate special topics. Topics vary by instructor and semester.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**APRD 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.

**APRD 6951 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**APRD 7001 (3) ProSeminar in Mass Communication Theory 1**
Discusses prominent theoretical and methodological points of view in journalism studies and strategic communication that range from social science to critical studies to the humanities. The premise is that methods are driven by research questions, so there is no best way to conduct research. You should leave this course with an understanding of how to address various mass communication phenomena.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7001
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7002 (3) Research Design**
Adopts a holistic and creative approach to bridging theory with method for the purpose of research design. Students learn how to bridge theory and method, exploring research designs that effectively address research questions and hypotheses through elaboration of theoretical and operational linkages.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7002
**Requisites:** Requires prerequisite courses of APRD 7001, APRD 7003, APRD 7051 and APRD 7061 (all minimum grade C-). Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7003 (3) ProSeminar in Mass Communication Theory II**
Continues introducing and discussing theoretical and methodological points of view in areas of communication, journalism and persuasion. Discusses the most important qualitative and quantitative methodological points of view, and from theoretical viewpoints that range from social science to critical studies. The idea is to develop an appreciation for theories and methodologies that can be employed depending upon the research question.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL7003
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7004 (1) Doctoral Professionalization Seminar**
Introduces you to the university and gives you a chance to think out loud about what your academic future might look like. The course is designed to be responsive to your needs regarding your career, getting a job, getting tenure and teaching. In short, the course prepares you for a career in academia.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7004
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7010 (3) Qualitative Interviewing as a Research Method**
Develops the necessary skills to conceptualize, plan, and execute interview-based research projects. Covers topics such as brainstorming and implementing a research idea, formulating research questions, designing a thorough research plan, navigating the IRB, recruiting participants, creating the interview guide, conducting interviews, and analyzing and writing up data. Course also examines reflexivity and ethical issues that are inherent in interview studies, especially ones involving certain populations.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7010

**APRD 7011 (3) Seminar in Strategic Public Relations**
Analyzes the various dimensions of public relations based on scholarship. The seminar seeks to expose students to key public relations specialties such as issues management, risk and crisis communication, corporate social responsibility, communication campaigns, public diplomacy. It also aims to train students to recognize public relations as a strategic practice that can contribute significantly to organizational effectiveness and social good.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7011
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7012 (3) Ethnography and Media**
Provides a ¿how to¿ concerning the intersection of ethnography and the media. During which, the course examines the epistemology of fieldwork. We will critically examine aspects and approaches to doing and writing ethnography, including with and without social science theory. We will discuss the challenges of entering, being in, and leaving the field. And we will explore data collection techniques.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7012
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7013 (3) Mixed Research Methods**
Examines the practice of mixed-methods research in the social sciences with an emphasis on the pragmatic considerations necessary for such projects. The class will discuss the development and execution, the analyses of data obtained, and the practical tools required for such studies. Throughout the course, students will examine and discuss specific applications of mixed methods research.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7013
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7014 (3) Experimental Design**
Introduces all facets of experimental design for studies of forms of communication. This course study experiments, both for your own research and to help you evaluate the work of others, and provide an overview of research in the field and the various ways in which media can be utilized in experimental research. This is a hands-on, nuts-and-bolts methods course. You will not only learn about the various theories and methodologies, but also implement your own.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7014
**Requisites:** Requires prerequisite course of JRNL 7061 or APRD 7061 (minimum grade D-). Restricted to graduate students only.

**APRD 7020 (3) The Public Sphere**
Investigates the role media play in the public sphere and democratic practices. Does media facilitate support or opposition to political and economic policies and cultural frames that become part of publics? Which institutions best inform publics and why? This course traces the development of U.S. and selected international media institutions. We analyze and debate the relationship of differing media content to political power, freedom of critical inquiry, and the facilitation or inhibition of democratic practices.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7020
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7021 (3) Science Communication**
Focuses on mass communication of issues related to science and follows two lines of inquiry. The seminar takes a cultural perspective, and explores the concept of scientific uncertainty in media. It will use these as a springboard for examining how we use media to conceptualize science, environment, health, etc., and how that impacts the way we live on this planet.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7021
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7030 (3) Media Sociology**
Examines a range of theories for how media messages and media institutions turn out the way they do. `Media sociology¿ refers to theorizing about the media as the `dependent variable;¿ even though many of the `independent variables¿ explored are not narrowly sociological. It connects media actors, organizations, and institutions to sociological concepts such as socialization, interaction, roles, and structures.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7030
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7031 (3) Media Ethics**
Explores the psychological structures and processes that come into play as individuals interpret moral problems, and formulate, select and execute a moral action in response. The seminar will explore the work of Jean Piaget, Lawrence Kohlberg, and James Rest, among others, and apply moral psychology theories and methods to contemporary issues and cases in media professions.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7031
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7034 (3) Health Communication**
Advanced seminar that examines and critiques the literature on health communication in two specific areas: news about health and its impact on individuals, and health promotion campaigns.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7034
**Requisites:** Restricted to graduate students only.

**APRD 7051 (3) Qualitative Research Methods**
Provides a survey of various qualitative modes of inquiry, attending to the philosophical, conceptual, and practical foundations of qualitative research in media, communication, and information. The course is designed to support students in developing a critical understanding of the different considerations in and stages of qualitative research, including the development of research questions, theoretical and conceptual frameworks, methodological approaches, data collection, data analysis, and assessment of reliability and validity of qualitative data. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7051
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APRD 7061 (3) Quantitative Research Methods**
Introduces graduate students to concepts and applications in quantitative research methods. The course prepares students fordissertation writing through hands-on experience in developing research designs and conducting independent quantitative research.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7061
**Grading Basis:** Letter Grade

**APRD 7062 (3) Advanced Statistical Analysis for Mass Communication**
Provides instruction on the following topics: ordinary least squares regression, statistical mediation and moderation, path analysis, count and categorical data modeling, and factor analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7062
**Requisites:** Requires prerequisite course of APRD 7061 or JRNL 7061 (minimum grade D-).
**Grading Basis:** Letter Grade

**APRD 7063 (3) Text Analytics for Computational Mass Communication Research**
This course tackles advanced advertising and marketing analytics through three advanced methods aimed at solving these problems: text classification, text topic modeling, and semantic network analysis. Each key area will involve a deep dive into the leading computer science methods aimed at solving these methods using Python. Students will walkthrough conceptual overviews of the methods, and dive into real-world datasets through instructor-led tutorials. Students will also conduct a major project for each of the 3 key methods.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7063
**Requisites:** Requires prerequisite course of APRD 7061 or JRNL 7061 (minimum grade D-).
**Grading Basis:** Letter Grade

**APRD 7133 (3) Digital Games**
Seminar that explores digital games, analog games, and play, and looks at the relatively new field of game studies; the field has moved toward issues of culture and social justice.
**Requisites:** Restricted to doctoral students.

**APRD 7841 (1-3) Independent Study**
Provides opportunities for independent study and research on the graduate level. Students perform independent research under faculty supervision.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to APRD doctoral students only.
**Grading Basis:** Letter Grade

**APRD 7871 (3) Special Topics**
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**APRD 7880 (3) Persuasion Theory**
This seminar acts as an overview of psychological knowledge as it pertains to capturing consumer insight, and includes a consideration of how the brain works, what factors influence consumer choice, and a critical evaluation of psychological assessment tools.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 7880
**Requisites:** Restricted to graduate students only.

**APRD 8991 (1-10) Doctoral Dissertation**
Dissertation research and writing. A minimum of 30 hours is required.
**Repeatable:** Repeatable for up to 40.00 total credit hours.
**Requisites:** Restricted to PhD students only.

# Aerospace Engineering (ASEN)

## Courses

**ASEN 1000 (1) Introduction to Aerospace Engineering Sciences**
Introduces aerospace history, curriculum, ethics, and the many areas of emphasis within aerospace engineering. Academic and industry speakers are invited to address various aerospace topics.
**Requisites:** Restricted to students with 0-26 credits (Freshmen) Aerospace Engineering (ASEN) or Engineering Open Option majors only.
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 1009 (1) Undergraduate Aerospace Seminar**
Introduce aerospace undergraduate students to world-class aerospace researchers and technical, policy, and/or current events topics.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to Undergraduate Aerospace (ASEN-BSAE) or Undergraduate Engineering Open Option majors only.

**ASEN 1022 (3) Materials Science for Aerospace Engineers**
Covers prerequisite chemistry topics for materials science and introduces material types, properties and behavior for aerospace engineers. Topics include review of chemistry; atomic bonding; crystals; diffusion; mechanical/thermal properties; phase diagrams; heat treatment; failure mechanisms; materials selection; and a general introduction to modern materials for aerospace engineering applications including composites and materials with engineered properties. Lab project or tensile testing is included.
**Requisites:** Requires pre/co-reqs APPM 1350 or MATH 1300 or APPM 1340 or APPM 1345 ASEN 1320 or CHEN 1310 or CSCI 1300 or CSCI 1310 or CSCI 1320 or ECEN 1310 (all min grade C-). Restricted to ASEN mjs, IDEN-BSIDE mjrs w/ Aero emphasis, IUT On Track students.
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 1030 (3) Introduction to Computing for Aerospace Engineering**
Develop a foundational understanding of computational thinking required to approach engineering challenges with systematic problem-solving skills. By the end of this class, students will be able to apply computational thinking principles to design, implement, and debug programs using a high-level programming language. Additionally, students will demonstrate proficiency in fundamental programming concepts, including variables, control structures, arrays, and functions, while also showcasing the ability to analyze problems, decompose them into smaller tasks, and devise algorithmic solutions.
**Requisites:** Requires a prerequisite or corequisite course APPM 1340 or APPM 1345 or APPM 1350 or MATH 1300 or MATH 1310 (all minimum grade C-). Restricted to College of Engineering majors IUT On Track applicants.

**ASEN 1400 (3) Gateway to Space**
Introduces the basics of atmosphere and space sciences, space exploration, spacecraft design, rocketry and orbits. Students design, build, and launch a miniature satellite on a high altitude balloon. Explores the current research in space through lectures from industry.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 2500, GEEN 1400, ASEN 1403 and ECEN 1400
**Requisites:** Restricted to College of Engineering students with 75 credit hours or less completed.
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 1403 (3) Introduction to Rocket Engineering**
Introduces students to the engineering profession through completion of a team-based project. Students design, build, and static test-fire a liquid-solid hybrid rocket motor. Topics explored include: pressure vessels, combustion, ideal fluid behavior, systems engineering, data acquisition, and model verification. Learned skills will include technical writing, teamwork, computer modelling and analysis tools, 3D printing and prototyping technologies.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 2500, GEEN 1400, ASEN 1400 and ECEN 1400
**Requisites:** Restricted to College of Engineering students with 75 credits or less completed.

**ASEN 1969 (3) Pathway to Space**
Explore the many paths one can take to be a part of a space-related career in a unique, engaging and interactive course. Students will learn about the following topics: space science and exploration, human spaceflight and life sciences, aeronautics and near space, launch and spacecraft systems, climate and environment, space business, policy and politics, space arts, media, and history.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 2012 (2) Experimental and Computational Methods in Aerospace Engineering Sciences**
Introduces statistical, experimental, and computational methods used in aerospace engineering sciences. Usage of MatLab is extensive.
**Requisites:** Requires prereqs ASEN 1320 or CSCI 1300 or CHEN 1310 or ECEN 1310 PHYS 1110 (all min grade C-). Requires pre/co-req APPM 2360 or MATH 2130 MATH 3430 (min grade C-). Restricted to ASEN mjrs, IDEN-BSIDE mjrs w Aero emphasis, IUT On Track students.
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 2401 (3) Statics**
Introduces applied vector mechanics with an emphasis on static equilibrium. Focuses on vectors, free body diagrams, and static equilibrium in 2D and 3D. Covers analysis of trusses, frames, and machines. Examines internal forces in structures and the development of shear and bending moment diagrams.
**Requisites:** Requires prerequisite courses APPM 1360 or MATH 2300 and PHYS 1110 (all minimum grade C-).

**ASEN 2402 (3) Thermodynamics**
Introduces the fundamental concepts and principles of thermodynamics with an emphasis on understanding how these basic physical principles can be used to solve numerical problems. Covers the properties of pure substances, control volume analysis, first law of thermodynamics, ideal gas law, second law of thermodynamics, and thermodynamic cycles. Synthesizes as a primary goal basic science (physics) and mathematics for the analysis and design of thermodynamic systems.
**Requisites:** Requires prerequisite courses APPM 1360 or MATH 2300 and PHYS 1110 (all minimum grade C-).
**Recommended:** Corequisites MCEN 1024 or CHEN 1201 or CHEN 1211 or CHEM 1113 or CHEM 1400.

**ASEN 2403 (3) Dynamics**
Provides students with essential concepts in dynamics, serving as a prerequisite for advanced courses that build upon these foundational principles, including those focused on the dynamics and control of air and space vehicles.¿
**Requisites:** Requires prerequisite courses ASEN 1030 or ASEN 1320 or CSCI 1300 or CHEN 1310 or ECEN 1310 and ASEN 2401 or MCEN 2023 or CVEN 2121 or GEEN 2851 (all minimum grade C-). Requires corequisites APPM 2360 or MATH 2130 and MATH 3430.

**ASEN 2501 (3) Introduction to Astronautics**
Introduces spacecraft mission topics such as orbital mechanics, spacecraft design, rocket propulsion, communications, remote sensing, and the space environment. Utilizes active and problem-based learning techniques to expose students to the space industry.
**Requisites:** Requires prerequisite courses ASEN 1030 or ASEN 1320 or CSCI 1300 or CHEN 1310 or ECEN 1310 and APPM 1360 or MATH 2300 and PHYS 1110 (all minimum grade C-).

**ASEN 2502 (3) Introduction to Aeronautics**
Introduces theory and methods for the design and performance analysis of aeronautical vehicles with a focus on fixed wing aircraft. Emphasizes systems engineering aspects, touching upon relevant subdisciplines including: the standard atmosphere and air transport environment, aerodynamics, propulsion, stability and control, and structural dynamics. Incorporates hands-on laboratory and design components throughout the semester.
**Requisites:** Requires prerequisite courses ASEN 1030 or ASEN 1320 or CSCI 1300 or CHEN 1310 or ECEN 1310 and APPM 1360 or MATH 2300 and PHYS 1110 (all minimum grade C-).

**ASEN 2519 (1-3) Special Topics**
Studies specialized aspects of the aerospace engineering sciences or innovative treatment of required subject matter at the lower-division level. Course content is indicated in the online Schedule Planner. Department enforced prerequisites: varies.
**Repeatable:** Repeatable for up to 10.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 2701 (3) Introduction to Statics, Structures, and Materials**
Introduces the fundamental analytical tools for statics and structural analysis in the context of the physics of aerospace materials. Topics include force/moment equilibrium, truss analysis, beam theory, stress and strain, stiffness and strength of material, and aerospace structural design.
**Requisites:** Requires prereqs APPM 1360 or MATH 2300 PHYS 1110 (all min grade C-). Requires pre/co-req of APPM 2360 or MATH 2130 MATH 3430 (all min grade C-). Restricted to Aero(ASEN) mjrs, Integ Dsgn Engr(IDEN-BSIDE) mjrs w Aero emphasis, IUT OnTrack students

**ASEN 2702 (3) Introduction to Thermodynamics and Aerodynamics**
Introduces the fundamental principles and concepts of thermodynamics and aerodynamics. Topics include the first law of thermodynamics, properties of pure substances, control volume analysis, one-dimensional incompressible and compressible flows, two-dimensional lift and drag, and introduction to viscous flows.
**Requisites:** Requires prereqs APPM 1360 or MATH 2300 PHYS 1110 (all min grade C-). Requires pre/co-req of APPM 2360 or MATH 2130 MATH 3430 (all min grade C-). Restricted to Aero(ASEN) mjrs, Integ Dsgn Engr(IDEN-BSIDE) mjrs w Aero emphasis, IUT OnTrack students

**ASEN 2703 (3) Introduction to Dynamics and Systems**
Introduces the principles of particle and planar rigid body dynamics, systems, and controls. Topics include kinematics, kinetics, momentum and energy methods, system modeling, and simple feedback control.
**Requisites:** Requires prerequisite courses ASEN 2701 and APPM 2360 or MATH 2130 MATH 3430 (all min grade C-). Requires prerequisite or corequisite course of APPM 2350 or MATH 2400 (min grade C-). Restricted to ASEN majors and IDEN majors with an Aerospace emphasis

**ASEN 2704 (3) Introduction to Aerospace Vehicle Design and Performance**
Introduction to the theory and methods for design and performance analysis of aircraft and spacecraft. Aircraft topics include wing design, propulsion, aircraft performance, and stability and control. Spacecraft topics include mission design, rocket performance, orbital mechanics and spacecraft subsystems. Emphasis is placed on introducing systems engineering aspects of design and analysis for aerospace vehicles.
**Requisites:** Requires prerequisite courses ASEN 2702 and APPM 2360 or MATH 2130 MATH 3430 (all min grade C-). Requires prerequisite or corequisite course of APPM 2350 or MATH 2400 (min grade C-). Restricted to ASEN majors and IDEN majors with an Aerospace emphasis

**ASEN 2802 (1) Aerospace Sciences Lab I**
Provides an introductory laboratory experience in aerospace sciences, with a focus on statics, structural mechanics, thermodynamics, and aerodynamics. Emphasizes model-based design, experimental data collection, and interpretation of experimental data.
**Requisites:** Requires prereq ASEN 1320 or CHEN 1310 or CSCI 1300 or 1310 or 1320 or ECEN 1310 (min grade C-). Requires pre/co-reqs ASEN 2012 ASEN 2701 ASEN 2702 (min grade C-). Restricted to ASEN mjrs, IDEN-BSIDE mjrs w Aero emphasis, IUT On Track students.

**ASEN 2803 (1) Dynamics and Controls Lab**
Experimental and design laboratory exercises for aerospace applications of dynamics, systems, and controls principles.
**Requisites:** Requires prereqs ASEN 1320 or CHEN 1310 or CSCI 1300 or 1310 or 1320 or ECEN 1310 (min. grade C-). Requires pre/co-req ASEN 2012 and ASEN 2703. Restricted to Aerospace (ASEN) majors and IDEN majors with Aero emphasis.

**ASEN 2804 (2) Aerospace Vehicle Design Lab**
Design lab focused on integrating knowledge of 2000-level aerospace course concepts towards the open-ended exploration of conceptual and preliminary designs of an aerospace vehicle.
**Requisites:** Requires prereq ASEN 1320 or CHEN 1310 or CSCI 1300 or 1310 or 1320 or ECEN 1310 (min. grade C-). Requires pre or coreqs ASEN 2012 and ASEN 2704 (min. grade C-). Restricted to Aerospace Eng (ASEN) mjrs IDEN mjrs w/Aerospace emphasis.

**ASEN 2849 (1-3) Independent Study**
Study of special projects agreed upon by student and instructor. Department consent required.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 3036 (3) Introduction to Human Spaceflight**
Introduces students to the challenges of human space flight. Historical and current space programs and spacecraft are discussed with emphasis on those systems specific to sustaining human crews. Other topics include space environment with respect to sustaining human life and health, physiological and psychological concerns in a space habitat, astronaut selection and training, anomalies, mission operations motivation, costs rationale for human space exploration, and future program directions. Not accepted as a Professional Area Elective for ASEN majors.
**Additional Information:** Departmental Category: Bioastronautics and Microgravity Science

**ASEN 3046 (3) Introduction to Humans in Aviation**
Investigates the history of crewed aviation accomplished through a review of the history of flight, the physiological and psychological limitations facing aviators, and investigates the human related causal factors in aviation accidents. The course also looks at the social and economic impacts of aviation in modern society. Not accepted as a Professional Area Elective for ASEN majors.
**Additional Information:** Departmental Category: Bioastronautics and Microgravity Science

**ASEN 3300 (4) Aerospace Electronics and Communications**
Provides the fundamentals of electronics and communications widely used in aerospace engineering. Includes analog instrumentation electronics, data acquisition, digital electronics and radio communication.
**Requisites:** Requires prerequisite courses ASEN 2703 and PHYS 1120 and APPM 2350 or MATH 2400 and APPM 2360 or MATH 2130 MATH 3430 (all minimum grade C-). Restricted to Aerospace Engineering (ASEN) majors and Integrated Design Eng majors with an Aerospace emphasis
**Additional Information:** Departmental Category: Systems and Control

**ASEN 3401 (3) Aerospace Structures**
Introduces concepts of stress and strain; axial loading, torsion, simple bending, transverse shear, and deflections of beams; analysis of stress and strain in 2-D and 3-D; failure analysis of structural components; and criteria for designing structural elements to meet requirements for aerospace structures.
**Requisites:** Requires prerequisite course of ASEN 2401 or MCEN 2023 or CVEN 2121 or GEEN 2851 (minimum grade C-).
**Recommended:** Prerequisites APPM 2350 or MATH 2400 and APPM 2360 or MATH 2130 & MATH 3430.

**ASEN 3402 (3) Aerospace Heat Transfer**
Introduces the fundamental concepts and principles of heat transfer in aerospace contexts. Covers the mechanisms of heat transfer by conduction, convection, and radiation. Emphasizes problem formulation and selection of appropriate solution techniques, with applications to modern aerospace engineering systems.
**Requisites:** Requires prerequisite courses of ASEN 2402 or MCEN 3012 or GEEN 3852 or AREN 2110 or EVEN 3012 and APPM 2360 or MATH 2130 MATH 3430 (all minimum grade C-). Requires corequisite course of APPM 2350 or MATH 2400.

**ASEN 3403 (3) Aerodynamics**
Introduces models for the analysis of subsonic, transonic, and supersonic flow. Teaches methodologies for the prediction of aerodynamics forces and moments experienced by aerospace vehicles and systems. Develops a fundamental understanding of gas dynamics in nozzles with application to wind tunnels and rocket propulsion.
**Requisites:** Requires prerequisite courses of ASEN 2402 or MCEN 3012 or GEEN 3852 or AREN 2110 or EVEN 3012 and APPM 2350 or MATH 2400 and APPM 2360 or MATH 2130 MATH 3430 (all minimum grade C-).

**ASEN 3404 (3) Aerospace Dynamics and Control**
Provides an overview of fundamental topics for aerospace vehicle dynamics and control. Introduces 3D rigid body dynamics, attitude representations, environmental forces and moments, linearization, modal responses and stability, control analysis and design, and attitude determination with examples from aircraft and spacecraft throughout.
**Requisites:** Requires prereqs ASEN 2403 or MCEN 2043 or CVEN 3111 and APPM 2350 or MATH 2400 and APPM 2360 or MATH 2130 MATH 3430.

**ASEN 3405 (3) Astrodynamics**
Provides a foundational knowledge of astrodynamics with a focus on spacecraft traveling near a single central body.
**Requisites:** Requires prerequisite course of ASEN 2501 (minimum grade C-). Requires corequisite course of ASEN 3404.

**ASEN 3406 (3) Aircraft Dynamics**
Provides a framework and methods for analyzing aircraft dynamics and designing aircraft control systems building on fundamental dynamics and control theory.
**Requisites:** Requires prerequisite courses of ASEN 2502 and ASEN 3403 (all minimum grade C-).

**ASEN 3501 (3) Aerospace Experimental Methods**
Introduces the essential aspects of hands-on experimentation for aerospace engineering applications, allowing students to learn the practical skills required for designing and conducting experiments in addition to analyzing results and quantifying confidence and uncertainty. Explores the importance of systematically analyzing experimental data, emphasizing the application of basic statistical methods and validation of fundamental engineering models.¿
**Requisites:** Requires prerequisite courses of ASEN 2402 or MCEN 3012 or GEEN 3852 or AREN 2110 or EVEN 3012 and ASEN 2403 or MCEN 2043 or CVEN 3111 and APPM 2350 or MATH 2400 and APPM 2360 or MATH 2130 MATH 3430 (all minimum grade C-).
**Recommended:** Prerequisites ASEN 2501 and ASEN 2502.

**ASEN 3502 (3) Aerospace Computational Methods**
Introduces computational methods commonly employed in the aerospace industry, emphasizing computational cost, accuracy, and error control.¿ Covers numerical solution of systems of algebraic and differential equations, numerical optimization, and regression.¿ Explores application to modeling, simulation, design, and control of aerospace systems.
**Requisites:** Requires prerequisite courses of ASEN 2402 or MCEN 3012 or GEEN 3852 or AREN 2110 or EVEN 3012 and ASEN 2403 or MCEN 2043 or CVEN 3111 and APPM 2350 or MATH 2400 and APPM 2360 or MATH 2130 MATH 3430 (all minimum grade C-).
**Recommended:** Prerequisites ASEN 2501 and ASEN 2502.

**ASEN 3503 (3) Aerospace Electronics**
Provides an overview of the fundamentals of analog and digital electronics widely used in aerospace engineering. Covers DC and AC circuits, frequency domain analysis, operational amplifiers, digital logic circuits, and computer interfaces.
**Requisites:** Requires prereqs ASEN 2403 or MCEN 2043 or CVEN 3111 and APPM 2360 or MATH 2130 MATH 3430 and PHYS 1120

**ASEN 3519 (1-3) Special Topics**
Studies specialized aspects of the aerospace engineering sciences or innovative treatment of required subject matter at the upper-division level. Course content is indicated in the online Schedule Planner. Department enforced prerequisite: varies.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 3700 (3) Orbital Mechanics/Attitude Dynamics and Control**
Presents the fundamentals of orbital mechanics, 3D rigid body dynamics and satellite attitude dynamics and controls.
**Requisites:** Requires prerequisite courses of ASEN 2703 and ASEN 2704 and APPM 2350 or MATH 2400 (all minimum grade C-). Restricted to Aerospace Engineering (ASEN) majors and IDEN majors with an Aerospace emphasis.

**ASEN 3711 (3) Aerodynamics**
Introduces models for the analysis of subsonic, transonic, and supersonic flow. Teaches methodologies for the prediction of aerodynamics forces and moments experienced by aircraft. Develops a fundamental understanding of gas dynamics in nozzles with application to aircraft and rocket propulsion.
**Requisites:** Requires prerequisite courses of ASEN 2704 and APPM 2350 or MATH 2400 (all minimum grade C-). Restricted to Aerospace Engineering (ASEN) majors and IDEN majors with an Aerospace emphasis.

**ASEN 3712 (3) Structures**
Teaches Mechanics of Materials methods of stress and deformation analysis applicable to the design and verification of aircraft and space structures. It offers an introduction to matrix and finite element methods for truss structures, and to mechanical vibrations.
**Requisites:** Requires prerequisite courses of ASEN 2703 and APPM 2350 or MATH 2400 (all minimum grade C-). Restricted to Aerospace Engineering (ASEN) majors and IDEN majors with an Aerospace emphasis.

**ASEN 3713 (3) Thermodynamics and Heat Transfer**
Focuses on the applications of the first and second laws of thermodynamics and teaches the fundamental concepts of different modes of energy and heat transfer, with applications of these concepts in gas dynamics, high-speed vehicle and spacecraft design, environmental systems, and energy analysis.
**Requisites:** Requires prerequisite courses ASEN 2702 and APPM 2350 or MATH 2400 and APPM 2360 or MATH 2130 MATH 3430 (all minimum grade C-). Restricted to ASEN majors and IDEN majors with an Aerospace emphasis.

**ASEN 3728 (3) Aircraft Dynamics**
Develops the fundamental concepts of aircraft dynamics. Covers flight mechanics, performance, dynamics and control of aircraft and how they impact aircraft design.
**Requisites:** Requires prerequisite courses of ASEN 2703 and ASEN 2704 and APPM 2350 or MATH 2400 (all minimum grade C-). Restricted to Aerospace Engineering (ASEN) majors and IDEN majors with an Aerospace emphasis.

**ASEN 3801 (1) Aerospace Vehicles Dynamics and Controls Lab**
Emphasizes applications of engineering dynamics and control principles for modeling, simulating, designing, analyzing, and evaluating aerospace vehicle systems. Experimental and computational focus on problems in aircraft flight stabilization and spacecraft attitude control.
**Requisites:** Requires prerequisite courses ASEN 2803 and ASEN 2804 (all minimum grade C-).Requires prerequisite or corequisite ASEN 3700 and ASEN 3728 (all minimum grade C-).Restricted to Aerospace Engineering (ASEN) majors and IDEN majors with an Aerospace emphasis

**ASEN 3802 (1) Aerospace Sciences Lab II**
Provides an intermediate laboratory experience in aerospace sciences, with a focus on aerodynamics, structural mechanics, thermodynamics, and heat transfer. Emphasizes design and analysis of experiments, processing and analysis of experimental data, and model validation using experimental data.
**Requisites:** Requires prerequisite courses ASEN 2012 and ASEN 2802 (min grade C-). Requires prerequisite or corequisite courses ASEN 3711, ASEN 3712 and ASEN 3713 (min grade C-). Restricted to Aerospace Engineering (ASEN) majors and IDEN majors w/ Aerospace emphasis

**ASEN 3930 (6) Aerospace Engineering Cooperative Education**
Students will participate in a previously arranged, department-sponsored cooperative education program with a government agency or industry. 0.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Aerospace Engineering (ASEN) majors only.
**Recommended:** Prerequisite GPA above 3.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 4013 (3) Foundations of Propulsion**
Describes aerothermodynamics and design of both rocket and air-breathing engines. Includes ramjets, turbojets, turbofans, and turboprop engines, as well as liquid, solid, and hybrid rockets.
**Requisites:** Requires prerequisite courses of ASEN 3711 and ASEN 3713 (all minimum grade C-). Restricted to Aerospace Engineering (ASEN), Aerospace Engineering Concurrent Degree (C-ASEN) or IDEN-BSIDE majors with Aerospace emphasis.
**Additional Information:** Departmental Category: Thermodynamics and Propulsion

**ASEN 4018 (4) Senior Projects 1: Design Synthesis**
Focuses on the synthesis of technical knowledge, project management, design process, leadership, and communications within a team environment. Students progress through the design process beginning with requirements development, then preliminary design and culminating with critical design. Offered fall only.
**Requisites:** Restricted to ASEN mjrs w/ prereqs ASEN 1022, 3711, 3712, 3713, 3728, 3700, 3300, 3801 and 3802 (all min grade C-). OR restricted to IDEN majors with an Aero emphasis w/ prereqs GEEN 2400, 3400, ASEN 1022, 3713, and 3300 (all min grade C-).
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 4028 (4) Senior Projects 2: Design Practicum**
Focuses on the fabrication, integration, verification and validation of designs produced in ASEN 4018. Students work within the same teams from ASEN 4018. Offered spring only.
**Requisites:** Requires prerequisite course of ASEN 4018 (minimum grade C-). Restricted to Aerospace Engineering (ASEN) majors and Integrated Design Engineering majors with an Aerospace emphasis.
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 4057 (3) Aerospace Software**
Provides an overview of prevalent software and hardware computing concepts utilized in practice and industry. Establishes the background necessary to tackle programming projects on different computing platforms with various software tools and programming languages.
**Requisites:** Requires prerequisite course of ASEN 1320 or CSCI 1300 or ECEN 1310 or CHEN 1310 (minimum grade C-). Restricted to Aerospace Engineering (ASEN) or Aerospace Engineering Concurrent Degree (C-ASEN) majors only.
**Recommended:** Prerequisite CSCI 2270 or instructor consent.
**Additional Information:** Departmental Category: Computational and Analytic Methods

**ASEN 4067 (3) Microavionics: Introduction to PIC Microcontrollers for Aerospace Systems**
Provide students an introduction into embedded systems that teaches a basic understanding about the fundamental architecture of a microcontroller and how it operates and interfaces with both sensors and actuators applicable to aerospace engineering. Students will learn how to interface sensors to a PIC microcontroller, collect input, make decisions and take an action in real-time. To gain a full appreciation about how microcontrollers work, students develop their own software code using MPLAB X to program the development board hardware, which uses the Microchip PIC18F87K22 microcontroller as the foundation of the course. Students learn-by-doing through lab assignments and a semester final project. This includes programming in assembly language and then C, to collect data from external sources such as a serial terminal, temperature and rotary sensors, etc. and outputting results to a liquid crystal display (LCD), and sending commands to an actuator such as a servo.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 5067
**Requisites:** Requires prereq courses ASEN 1320 or CSCI 1300 or CSCI 1310 or CHEN 1310 or ECEN 1310 and ASEN 3300 (all minimum grade C-).

**ASEN 4090 (3) Global Positioning Systems Applications**
Focuses on GPS technology, software development, and applications. Lectures will cover the principal concepts used in GPS, and weekly laboratories will apply that knowledge. Culminates in student design projects using GPS.
**Requisites:** Requires prerequisite courses of APPM 2360 and CHEN 1310 (all minimum grade C).
**Recommended:** Prerequisite junior/senior standing in engineering.
**Additional Information:** Departmental Category: Global Positioning Systems

**ASEN 4114 (3) Automatic Control Systems**
Methods of analysis and design of feedback control for dynamic systems. Covers nyquist, bode and linear quadratic methods based on frequency domain and state space models. Laboratory experiments provide exposure to computation for simulation and real time control, and typical control system sensors and actuators. Degree credit not granted for MCEN 4138 and MCEN 5138 and ECEN 4138 and ECEN 5138.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 5114
**Requisites:** Requires prereq courses ASEN 3128 or ASEN 3728 and ASEN 3200 or ASEN 3700 (all minimum grade C-). Restricted to Aerospace Engineering (ASEN) majors only.
**Additional Information:** Departmental Category: Systems and Control

**ASEN 4123 (3) Vibration Analysis**
Highlights free and forced vibration of discrete and continuous systems. Examines Lagrange's equation, Fourier series, Laplace transforms, and matrix and computational methods. Applies knowledge to practical engineering problems.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4123
**Requisites:** Requires prerequisite course of ASEN 3112 or MCEN 3030 (minimum grade C). Restricted to Aerospace Engineering (ASEN) majors only.
**Additional Information:** Departmental Category: Thermodynamics and Propulsion

**ASEN 4128 (3) Human Factors in Engineering and Design**
Introduces the field of human factors engineering and investigates human psychological, physiological and performance limitations in complex systems and why it is vital for engineers to understand human operational limitations when designing complex systems. Course includes studies of real accidents caused by human error, good and bad designs, latent conditions and accident-producing designs. Goal is an understanding of how to conduct engineering design with consideration of human factors.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 4138 (3) Aircraft Design**
Two lectures and one lab per week. Examines principles of aircraft configuration and design to meet given performance specifications, taking into account aerodynamic, stability and control, and flying quality considerations, as well as airworthiness regulations. Includes preliminary design of the major elements of an aircraft.
**Requisites:** Requires prerequisite course of ASEN 3128 or ASEN 3728 (minimum grade C-). Restricted to Aerospace Engineering (ASEN) or Aerospace Engineering Concurrent Degree (C-ASEN) majors only.
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 4218 (3) Large Space Structures Design**
Develops the necessary structural analysis skills for conducting conceptual and preliminary designs of large space structures with a practical emphasis on structures considered by NASA over the past 20 years. Applies analysis skills to a broad range of space missions requiring large space structures, emphasizing low cost and practical design.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 5218
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Aerospace Engineering (ASEN) or Mechanical Engineering (MCEN) majors only.
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 4338 (3) Computer Analysis of Structures**
Covers basic structural design concepts and finite element modeling techniques. Emphasizes use of finite element static and dynamic analysis to validate and refine an initial design. Introduces basic design optimization and tailoring. Proficiency in Matlab required.
**Requisites:** Requires prerequisite course of ASEN 3112 (minimum grade C). Restricted to Aerospace Engineering (ASEN) majors only
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 4401 (3) Aerospace Communication Systems**
Provides students with an understanding of basic wireless communication concepts relevant to aerospace systems and the near-earth atmosphere as well as an understanding of space-environment conditions that impact wireless aerospace communication systems.
**Requisites:** Requires prerequisite courses of ASEN 2501 and ASEN 3503 (all minimum grade C-)

**ASEN 4402 (3) Aerospace Materials and Structural Analysis**
Reviews essential concepts normally covered in undergraduate solid mechanics or mechanics of materials courses, such as concepts of stress and strain in two dimensions and three-dimensional systems. Covers more advanced topics such as structural instabilities and vibrations, materials classification and basic properties, viscoelastic and plastic material behavior and commonly used ductile failure theories. Introduces the finite-element (FE) method to analyze complex geometries and exposes students to methods utilized extensively by companies engaged in structural design.
**Requisites:** Requires prerequisite courses of ASEN 3401 and MCEN 1024 or CHEN 1201 or CHEN 1211 or CHEM 1113 or CHEM 1400 (all minimum grade C-).

**ASEN 4519 (1-3) Special Topics**
Studies specialized aspects of the aerospace engineering sciences or innovative treatment of required subject matter at the upper-division level. Course content is indicated in the online Schedule Planner. Department enforced prerequisite varies.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 4849 (1-3) Independent Study**
Special projects agreed upon by student and instructor. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 4859 (1-6) Undergraduate Research**
Assigns a research problem on an individual basis. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 5007 (3) Introduction to Finite Elements**
Introduces finite element methods used for solving linear problems in structural and continuum mechanics. Covers modeling, mathematical formulation, and computer implementation.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite matrix algebra.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 5010 (3) Spacecraft Attitude Dynamics and Control**
Includes rigid body kinematics and spacecraft attitude descriptions, torque-free attitude dynamics, static attitude determination, motion and stability due to gravity gradient torque and spinning craft, passive and active methods of attitude control, nonlinear regulator and attitude tracking feedback controlaws.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 3200, ASEN 3700, or equivalent and good knowledge of linear algebra, vector calculus, basics of ordinary differential equations.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Astrodynamics and Orbital Mechanics

**ASEN 5012 (3) Mechanics of Aerospace Structures**
Applies fundamental concepts of continuum mechanics, theory of elasticity and energy methods to the analysis of structures.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5023
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisites APPM 2360 and ASEN 2001 or 2701 and ASEN 2003 or 2703 and ASEN 3112 or 3712 or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 5014 (3) Linear Control Systems**
Introduces the theory of linear systems, including vector spaces, linear equations, structure of linear operators, state space descriptions of dynamic systems, and state feedback control methods.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5448 and MCEN 5448
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 3200, ASEN 3700, or equivalent or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Systems and Control

**ASEN 5016 (3) Space Life Sciences**
Familiarizes students with factors affecting living organisms in the reduced-gravity environment of space flight. Covers basic life support requirements, human physiological adaptations, and cellular-level gravity dependent processes with emphasis on technical writing and research proposal preparation.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Bioastronautics and Microgravity Science

**ASEN 5018 (3) Graduate Projects I**
Exposes MS and PhD students to project management and systems engineering disciplines while working a complex aerospace engineering project as part of a project team. The project team may perform some or all of the following project activities during this first semester of the two-semester course sequence: requirements, definition, design and design review, build, test, and verification.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN) majors only.
**Recommended:** Prerequisite ASEN 4138 or ASEN 5148 or ASEN 5158 or instructor consent required.

**ASEN 5022 (3) Dynamics of Aerospace Structures**
Applies concepts covered in undergraduate dynamics, structures and mathematics to the dynamics of aerospace structural components, including methods of dynamic analysis, vibrational characteristics, vibration measurements and dynamic stability.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 5012 or ASEN 5227 or MATH 2130 or APPM 3310 or equivalent or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 5034 (3) Stochastic Methods for Systems Engineering**
Development of stochastic models used in aerospace and other systems engineering and optimization problems. Review of probability theory, stochastic models used in decision theory, random processes, queuing theory, information theory, reliability and quality control. Computer solutions required.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN) majors only.
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 5044 (3) Statistical Estimation for Dynamical Systems**
Introduces theory and methods of statistical estimation for general linear and nonlinear dynamical systems, with emphasis on aerospace engineering applications. Major topics include: review of applied probability and statistics; optimal parameter and dynamic state estimation; theory and design of Kalman filters for linear systems; extended/unscented Kalman filters and general Bayesian filters for non-linear systems.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Systems and Control

**ASEN 5047 (3) Probability and Statistics for Aerospace Engineering Sciences**
Considers probability concepts and theory for better design and control of aerospace engineering systems. Includes descriptive and inferential statistical methods for experimental analysis. Covers discrete and continuous random variable distributions, estimators, confidence intervals, regression, analysis of variance, hypothesis testing, nonparametric statistics, random processes and quality control, including software models of same.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN) majors only.
**Additional Information:** Departmental Category: Computational and Analytic Methods

**ASEN 5050 (3) Space Flight Dynamics**
Includes celestial mechanics, space navigation, and orbit determination; trajectory design and mission analysis trajectory requirements; and orbital transfer and rendezvous.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 5052
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 3200 or ASEN 3700 or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Astrodynamics and Orbital Mechanics

**ASEN 5051 (3) Fundamentals of Fluid Dynamics**
Highlights physical properties of gases and liquids; kinematics of flow fields; and equations describing viscous, heat-conducting Newtonian fluids. Emphasizes exact solutions and rational approximations for low and high speed dissipative flows, surface and internal waves, acoustics, stability, and potential flows.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 3111 or ASEN 3711 (minimum grade B) or an equivalent course.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerodynamics and Fluid Mechanics

**ASEN 5052 (3) Analytical Astrodynamics**
Introduction to astrodynamics with an emphasis on analytical approaches. The primary subjects covered are the general solution of the 2-body problem; orbital trajectories, transfers, targeting, and time of flight; orbit perturbations and averaging analysis; and the restricted 3-body problem. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 5050
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 3200 or 3700 or instructor consent required.
**Grading Basis:** Letter Grade

**ASEN 5053 (3) Space Propulsion**
This course is designed to teach the theory, analysis and design of modern space propulsion systems. Lectures describe the thermodynamics of rocket propulsion and nozzle flow theory, followed by in¿depth study of cold gas thrusters, monopropellant and bipropellant liquid rockets, solid and hybrid rockets, electric propulsion, nuclear rockets, and solar sails. If time permits, other exotic propulsion technologies will be dealt with.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Thermodynamics and Propulsion

**ASEN 5067 (3) Microavionics: Introduction to PIC Microcontrollers for Aerospace Systems**
Provide students an introduction into embedded systems that teaches a basic understanding about the fundamental architecture of a microcontroller and how it operates and interfaces with both sensors and actuators applicable to aerospace engineering. Students will learn how to interface sensors to a PIC microcontroller, collect input, make decisions and take an action in real-time. To gain a full appreciation about how microcontrollers work, students develop their own software code using MPLAB X to program the development board hardware, which uses the Microchip PIC18F87K22 microcontroller as the foundation of the course. Students learn-by-doing through lab assignments and a semester final project. This includes programming in assembly language and then C, to collect data from external sources such as a serial terminal, temperature and rotary sensors, etc. and outputting results to a liquid crystal display (LCD), and sending commands to an actuator such as a servo.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 4067
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors only.
**Grading Basis:** Letter Grade

**ASEN 5090 (3) Introduction to Global Navigation Satellite Systems**
Global Navigation Satellite Systems (GNSS) are important tools for navigation, science, and engineering. Introduces GNSS hardware, signal structure, algorithms, error sources, and modeling techniques. Programming experience is required.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Global Positioning Systems

**ASEN 5098 (3) System Engr and Design**
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 5111 (3) Introduction to Aeroelasticity**
Introduces static and dynamic aeroelasticity of airfoils and wings. Covers the classical aeroelasticity theory and introduces computational methods for aeroelastic problems.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 3111 or ASEN 3711 and MATH 2130 or APPM 3310 and MATH 3430 or equivalent or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 5114 (3) Automatic Control Systems**
Methods of analysis and design of feedback control for dynamic systems. Covers nyquist, bode and linear quadratic methods based on frequency domain and state space models. Laboratory experiments provide exposure to computation for simulation and real time control, and typical control system sensors and actuators. Degree credit not granted for MCEN 4138 and MCEN 5138 and ECEN 4138 and ECEN 5138.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 4114
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN) majors only.
**Recommended:** Prerequisites Undergraduate systems or control course or instructor consent (ASEN 3128 or ASEN 3728 or ASEN 3200 or ASEN 3700).
**Additional Information:** Departmental Category: Systems and Control

**ASEN 5121 (3) Boundary Layers and Convection**
This course presents an introduction to the principles of viscous fluid flow and methods for performing engineering calculations of quantities such as skin friction and heat transfer rates in boundary layers. The first portion of the course material will focus on basic principles of fluid mechanics. We will derive the Navier-Stokes equations and discuss some simple solutions to these equations. The second portion of the course will concentrate on the application of these principles to boundary layers. We will derive the boundary layer equations and discuss their approximate and almost exact solutions. Formerly offered as a special topics course.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 3111 and/or ASEN 5051.
**Grading Basis:** Letter Grade

**ASEN 5122 (3) Control of Aerospace Structures 1**
Introduces the basic problems in dynamic modeling and active control of large spacecraft and satellites. Includes system descriptions, model reduction, controller design, and closed-loop stability analysis.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN) majors only.
**Recommended:** Prerequisite ASEN 3200 or equivalent or instructor consent required.
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 5128 (3) Small Uncrewed Aircraft System Guidance, Navigation, and Control**
Introduce students to advanced techniques for guidance, navigation, and control of the emerging class of small uncrewed aircraft systems (SUAS), which are informally defined as aircraft that weight less than 55 lbs.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisites ASEN 5014 Linear Systems or similar OR ASEN 5044 Estimation or similar.
**Grading Basis:** Letter Grade

**ASEN 5131 (3) Introduction to Hypersonics**
Introduces key elements of hypersonic vehicles, including trajectories, surface heating, propulsion, and thermal protection systems. Provides the necessary background on fluid dynamics and boundary layers, so students from a variety of disciplines are welcome. Also covers thermochemical nonequilibrium, surface pressure, and aerodynamic forces. Includes a mix of empirical techniques and computational analyses. Requires basic programming experience and exposure to partial differential equations.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade

**ASEN 5137 (3) Experimental Design and Statistical Methods**
Examines the applied issues of designing experiments and performing statistical analysis to reach justified scientific conclusions. Approaches are integrated to enable application to real-world research questions, with a focus on the unique challenges of human subject experiments.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** to Aerospace and Biomedical Engineering students.
**Grading Basis:** Letter Grade

**ASEN 5148 (3) Spacecraft Design**
Integrates the design elements and fundamental analyses necessary to complete the conceptual (Phase A) design of an unmanned spacecraft. Lecture and discussion explore mission design, propulsion, power, structure, thermal, attitude control, communication, command, and data handling and attitude control systems. The role of project management and systems engineering are examined. Resource estimating and lessons learned in satellite programs are reviewed.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 5151 (3) Fundamentals of Gas Dynamics**
Presents the fundamental topics of gas dynamics, focusing on compressible flows but providing connections to incompressible topics. Topics include analysis of quasi-one-dimensional flow, the partial differential equations governing inviscid compressible flows, linearized flow theory, supersonic flow around cones, and the method of characteristics applied to both steady two-dimensional supersonic flows, and unsteady one-dimensional flows.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 3111 or equivalent.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerodynamics and Fluid Mechanics

**ASEN 5158 (3) Space Habitat Design**
Utilize systems engineering methods to design and analyze a spacecraft intended for human occupancy with functional knowledge of the technologies used to sustain life. Emphasis placed on deriving requirements from stated mission goals and objectives, developing integrated functional schematics into a conceptual design, and analyzing design options by mass/volume estimation, including launch vehicle selection.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 5212 (3) Composite Structures and Materials**
Develops the macromechanical and micromechanical theory of the elastic behavior and failure of composite laminates. Applies basic theory to a broad range of practical problems including the buckling and vibration of composite plates, columns, and shells.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 5218 (3) Large Space Structures Design**
Develops the necessary structural analysis skills for conducting conceptual and preliminary designs of large space structures with a practical emphasis on structures considered by NASA over the past 20 years. Applies analysis skills to a broad range of space missions requiring large space structures, emphasizing low cost and practical design.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 4218
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 5222 (3) Materials Science for Composite Manufacturing**
Studies common matrix materials and the modificationsand improvements of properties which can be achieved by adding second phase reinforcements. Properties will be significantly affected by the design approach and by requirements, and by the procedure of adding reinforcements. Investigates polymer, ceramic and metallic materials. Explores manufacturing, fabrication and processing techniques. Evaluates future developments.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 4222
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors only.
**Recommended:** Prerequisites ASEN 3112 or ASEN 3712 and ASEN 4012 or equivalent or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 5226 (3) Medicine in Space and Surface Environments**
Introduces concepts of space medicine and provides a focused analysis on exploration medical capabilities. This course provides a unique learning opportunity to understand the medical challenges of human spaceflight. This is done both in the classroom and in an immersive field simulation that allows students to engage in medical care in simulated planetary surface environments. As such, it also introduces students to important concepts in human spaceflight operations which are difficult to teach in the classroom.

**ASEN 5235 (3) Introduction to Atmospheric Radiative Transfer and Remote Sensing**
Examines fundamentals of radiative transfer and remote sensing with primary emphasis on the Earth's atmosphere; emission, absorption and scattering by molecules and particles; multiple scattering; polarization; radiometry and photometry; principles of inversion theory; extinction- and emission-based passive remote sensing; principles of active remote sensing; lidar and radar; additional applications such as the greenhouse effect and Earth's radiative energy budget.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors only.
**Recommended:** Prerequisite one year of calculus-based physics and math up through differential equations.
**Additional Information:** Departmental Category: Remote Sensing

**ASEN 5245 (3) Radar and Remote Sensing**
Examines active techniques of remote sensing, with emphasis on radar fundamentals, radar wave propagation, scattering processes, and radar measurement techniques and design. Examines specific radar systems and applications, such as synthetic aperture radar phased arrays for atmosphere, space, land, and sea applications.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Remote Sensing

**ASEN 5251 (3) Molecular Thermodynamics and Kinetics**
Provides an introduction to chemical kinetics and theories of molecular collisions and chemical reactions. Draws on quantum mechanics, statistical mechanics, and thermodynamics to help understand the magnitude of chemical reaction rates and how they vary with macroscopic parameters, such as temperature, and with microscopic parameters, such as molecular size, structure, and energy spacing.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite general chemistry, general physics, multivariable calculus.
**Grading Basis:** Letter Grade

**ASEN 5254 (3) Algorithmic Motion Planning**
Overview of the lessons learned by the robot motion planning community in the recent years. Examines approaches based on potential functions, graphs, sampling methods, task and motion planning, and basic approaches to planning under uncertainty. Provides a set of tools to tackle new problems and enables the pursuit of complex research questions such as planning for autonomous systems.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisites or corequisites: ASEN 5014 or equivalent, knowledge of how to plot 2-D/3-D functions, arrays and other data structures, standard constructs (loops, functions, etc), C++, Python or MATLAB, and knowledge of differential equations and linear algebra.
**Grading Basis:** Letter Grade

**ASEN 5264 (3) Decision Making under Uncertainty**
Covers algorithms for optimal sequential decision making in the presence of uncertainty. Mathematical formalisms include the Markov decision process (MDP), partially observable Markov decision process (POMDP), and Games. Solution techniques include exact dynamic programming, Monte Carlo tree search, deep reinforcement learning, and alpha vector value approximation for POMDPs. Assignments require programming in a high level language (Julia as of 2023). Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5264
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite fluency in a high-level programming language, willingness to learn another language if required for homework assignments and basic understanding of probability.
**Grading Basis:** Letter Grade

**ASEN 5307 (3) Engineering Data Analysis Methods**
Gives students broad exposure to a variety of traditional and modern statistical methods for filtering and analyzing data. Topics include estimation methods, principal component analyses and spectral analyses. Introduces these methods and provides practical experience with their use. Students carry out problem assignments.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Computational and Analytic Methods

**ASEN 5325 (3) Small Scale Processes in Geophysical Fluids**
Provides an overview of mixing and wave processes in the oceans and the atmosphere. Topics include turbulent boundary layers in the lower atmosphere and the upper ocean, air-sea interactions, and surface and internal waves.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Atmospheric, Oceanic, and Space Sciences

**ASEN 5335 (3) Aerospace Environment**
Examines the components of the solar-terrestrial system and their interactions to provide an understanding of the re-entry and orbital environments within which aerospace vehicles operate. Includes the sun, solar wind, magnetospere, ionosphere, thermosphere, radiation belts, energetic particles, comparative environments (Mars, Venus, etc.), orbital debris, spacecraft charging, particle effects on systems, shielding, and satellite drag.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite Senior or graduate standing in engineering or related physical sciences.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Atmospheric, Oceanic, and Space Sciences

**ASEN 5347 (3) Math Methods in Dynamics**
Two-part graduate-level course on dynamics. Covers both flexible and rigid multibody analytical dynamics and finite element method for dynamics. Emphasizes formulations that naturally lead to easy computer implementation and stability, linearization, and modern rotational kinematics. Department consent required.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 5440 (3) Mission Design and Development for Space Sciences**
Brings science and engineering students together to develop the multidisciplinary skills required to create a successful proposal to develop a NASA-funded small space mission. Goals: 1) develop the proposal science objectives based on scientific community priorities and NASA Announcement of Opportunity. 2) Understand how science requirements lead to the design of instrumentation. 3) Understand practical aspects of mission development.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 5780
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Department of Astrophysical and Planetary Sciences graduate students or Aerospace Engineering Concurrent Degree (C-ASEN and ASEN-P) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 5506 (1-2) Bioastronautics Seminar**
Focuses on current topics related to space habitat systems design and research aimed at understanding the effects of spaceflight on living organisms ranging from humans down to microbes. Literature analysis and scientific presentations are expected. Emphasis is on biophysical mechanisms, comprehensive models, and related technology development.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN) majors only.
**Additional Information:** Departmental Category: Bioastronautics and Microgravity Science

**ASEN 5519 (1-3) Special Topics**
Reflects upon specialized aspects of aerospace engineering sciences. Course content is indicated in the online Class Search.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors only.
**Recommended:** Prerequisite varies.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 5550 (3) Designing for Defense 1**
Designing for Defense/Hacking for Defense is a national service program running at leading research universities across the country. Interdisciplinary teams¿chosen by competitive selection¿work on real-world national security challenges, in close contact with national security agencies. Teams employ the Lean Launchpad entrepreneurship methodology to develop engineering and business concepts to solve real-world challenges for special operations forces, the intelligence community, and other government agencies. Winning teams are eligible for real-world capital investment. The first semester of a two-course sequence. Students take this course, ASEN/CSCI/CYBR 5550, and ASEN/CSCI/CYBR 5580 contiguously as the sequence spans the academic year.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4550 and CYBR 5550 and CSCI 5550
**Grading Basis:** Letter Grade

**ASEN 5580 (3) Designing for Defense 2**
This course allows teams to continue their D4D journey from semester 1 guiding students in launching a business entity that will deploy agile development tools to refine and enhance their first semester MVP, seek funding for that development work, deliver a functioning solution to their sponsor, and extract real value for the members of the business unit.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5580 and CYBR 5580 and CSCI 4580
**Requisites:** Requires prerequisite course of ASEN 5550 or CSCI 5550 or CYBR 5550 (minimum grade B). Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ASEN 5849 (1-6) Independent Study**
Study of special projects.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 5940 (1-3) Engineering Research Internship**
Grants credit to foreign visiting graduate students for conducting research within the Aerospace Engineering Sciences department. Credits can be transferred to the student's home institution. CU-Boulder students may also receive credit for conducting research outside of the university, either overseas or in the US.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 6008 (3) Interplanetary Mission Design**
Exploration of principles and methods related to the design and construction of trajectories for interplanetary mission design. Some topics covered include: two-and three-body motion, gravity assists, maneuver computation, navigation, numerical integration, and construction of orbits. The main focus is on simple ballistic mission designs, such as Galileo or Cassini, however, libration point trajectories will also be covered.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 5050 or ASEN 5052.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Astrodynamics and Orbital Mechanics

**ASEN 6009 (1-2) Special Topics Seminar**
Presents research and developments in each department's focus areas.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN) majors only.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 6010 (3) Advanced Spacecraft Dynamics and Control**
Studies the dynamic modeling and control of spacecraft containing multiple momentum exchange devices, and/or flexible spacecraft components. Will develop nonlinear feedback control algorithms, explore singularity avoidance strategies. The second half of the course derives analytical methods (D'Alembert's equations, Lagrange's equations, Boltzmann Hamel equations) to model a hybrid rigid/flexible spacecraft system.
**Requisites:** Requires prerequisite course of ASEN 5010 (minimum grade D-). Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Astrodynamics and Orbital Mechanics

**ASEN 6011 (3) Experimental Fluid Mechanics**
This course presents an intermediate level introduction into the theory and practice of performing experimental measurements in fluid mechanics. The fundamental principles and definitions associated with instrumentation, measurement procedures, data analysis, and uncertainty quantification will be discussed. A specific focus will be placed on the application of a variety of measurement techniques in low-speed aerodynamic environments. A selection of measurement techniques will be extensively studied and applied including: classical pressure and temperature measurements, thermal (hot-wire) anemometry, laser doppler anemometry, particle image velocimetry, surface and field flow visualization techniques, schlieren and shadowgraph photography techniques. Undergraduates may enroll with instructor permission. Previously offered as a special topics course.
**Requisites:** Requires prerequisite or corequisite course of ASEN 5051 (minimum grade D-). Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade

**ASEN 6013 (3) High Speed Propulsion**
Covers air-breathing and rocket propulsion cycles, their relative performance trade-offs, and how they fit within the context of a vehicle system. Specific emphasis will be placed on fundamental cycle analyses, component level design, and propulsion/airframe integration for rockets, turbojets, ramjets, scramjets, combined cycles, and other advanced propulsion concepts.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 4013 or equivalent or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Thermodynamics and Propulsion

**ASEN 6014 (3) Spacecraft Formation Flying**
Studies the dynamic modeling and control of spacecraft formations orbiting about a planet. Investigate linear and nonlinear relative motion descriptions, rectilinear and curvilinear coordinates, orbit element difference based descriptions, J2-invariant relative orbits, as well as Lyapunov-based relative motion control strategies.
**Requisites:** Requires prerequisite course of ASEN 5050 or ASEN 5052 (minimum grade B-). Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Systems and Control

**ASEN 6015 (3) Space Vehicle Guidance and Control**
The course gives a comprehensive view of guidance systems used in space vehicles, and methods for analyzing the performance of these systems. The types of guidance systems that will be covered are launch vehicle ascent, intercept/rendezvous, interplanetary, orbit station-keeping, atmospheric re-entry, lander, and low-thrust. The mathematical foundation of these systems will be derived and discussed. Real world applications will be presented by reviewing selections from published literature. Course work will emphasize the analysis of the guidance system performance to achieve stated goals. Previously offered as a special topics course.
**Requisites:** Requires prereqs ASEN 5014 and ASEN 5050 (min. grade D-). Restricted to Engineering graduate students, Aero Concurrent Degree (C-ASEN and C-ASENP) mjrs, Aero graduate certificate students.
**Grading Basis:** Letter Grade

**ASEN 6020 (3) Optimal Trajectories**
Introduces the theory and practice of trajectory optimization. The general theory behind optimization and optimal control will be introduced with an emphasis on the properties of optimal trajectories. The main application will be to space trajectories, but other applications will also be considered.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisites ASEN 5050 and ASEN 5014 or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Astrodynamics and Orbital Mechanics

**ASEN 6024 (3) Nonlinear Control Systems**
Introduces the analysis and control design methods for nonlinear systems, including Lyapunov, Describing Function, and Feedback Linearization methods.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5738 and ECEN 5738
**Requisites:** Requires prereq of ASEN 5014 (min. grade C). Restricted to Engineering graduate students, Aerospace Concurrent Degree (C-ASEN and C-ASENP) mjrs, Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Systems and Control

**ASEN 6028 (3) Graduate Projects II**
Exposes MS and PhD students to leadership positions in project management and systems engineering while working a complex aerospace engineering project as part of a project team. The project team may perform some or all of the following project activities during this second semester of the two-semester course sequence: requirements definition, design and design review, build, test, and verification.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors only.
**Recommended:** Prerequisite ASEN 4138 or ASEN 5148 or ASEN 5018 or ASEN 5158 or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 6037 (3) Turbulent Flows**
Studies turbulent closure methods and computational procedures used to solve practical turbulent flows. Emphasizes multi-equation models used with time-averaged equations to calculate free-turbulent shear-flows and turbulent boundary layers. Employs spectral methods in direct and large-eddy simulation of turbulence. Formerly ASEN 5037.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 5051 or equivalent or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerodynamics and Fluid Mechanics

**ASEN 6044 (3) Advanced State Estimation**
Introduces principles and techniques for designing, implementing, and analyzing probabilistic state estimators for dynamical systems that require going beyond traditional least-squares and Kalman filtering approaches. Emphasis on development of practical discrete-time Bayesian state space filtering algorithms for systems characterized by partial observability and non-Gaussian uncertainties, which arise in many applications governed by complex non-linear stochastic dynamics and measurement processes.
**Requisites:** Requires prerequisite ASEN 5044 (min grade B+). Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade

**ASEN 6050 (3) Space Instrumentation**
Provides an overview of the relevant space environment and process, the types of instruments flown on recent mission and the science background of the measurement principles.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 6050 and GEOL 6050
**Requisites:** Requires prerequisite course of ASEN 5335 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 6055 (3) Data Assimilation and Inverse Methods for Earth & Geospace Observations**
Covers a selection of topics in probability theory, spatial statistics, estimation theory, numeric optimization, and geophysical nonlinear dynamics that form the foundation of commonly used data assimilation and inverse methods in the Earth and Space Sciences. Hands-on computational homework and projects provide opportunities to apply classroom curricula to realistic examples in the context of data assimilation.
**Requisites:** Requires prerequisite course of ASEN 5044 (minimum grade B-). Program requirement of CEAS graduate students OR Aerospace Graduate Certificate student.
**Grading Basis:** Letter Grade

**ASEN 6060 (3) Advanced Astrodynamics**
Covers Lagrangian and Hamiltonian formalisms for astrodynamics problems, the computation and characterization of space trajectories in highly dynamic environments, computation of periodic orbits, stability analysis of orbital motion, and development of analytical theories for dynamics.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 5050 or equivalent or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Astrodynamics and Orbital Mechanics

**ASEN 6061 (3) Molecular Gas Dynamics and DSMC**
Describes the composition and flow of gases on a microscopic level to examine the behavior of the molecules that make up a macroscopic flow system. Thermodynamic properties, transport phenomena, and the governing Boltzmann Equation are derived from molecular collision dynamics and the kinetic theory. The Direct Simulation Monte Carlo method is introduced with applications.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerodynamics and Fluid Mechanics

**ASEN 6070 (3) Satellite Geodesy**
Focuses on the measurement of the Earth's gravitational field, rotational characteristics, and shape using Earth and space-based tracking of artificial satellites. Particular emphasis on satellite altimetry and satellite gravity measurements.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 3200, ASEN 3700, or equivalent or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Astrodynamics and Orbital Mechanics

**ASEN 6080 (3) Statistical Orbit Determination**
Course on orbit and advanced estimation techniques. Emphasizes orthogonal transformation techniques such as Givens and Householder, square root filtering and smoothing and considers covariance analysis. Also nonlinear filters and dynamic model compensation techniques. Requires term project that involves the application of many of the techniques required for precise orbit determination.
**Requisites:** Requires prerequisite course of ASEN 5044 (minimum grade D-). Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN) majors and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Astrodynamics and Orbital Mechanics

**ASEN 6084 (3) Optical Multi-Target Tracking**
This course focuses on exploiting sensor information to detect, track, and characterize unresolved objects using optical sensors. This course will cover phenomenological modeling, error statistics, image processing, detection methods, and several multi-object tracking frameworks. Assignments and projects will incorporate both simulated and empirical data generation / collection and reduction.
**Requisites:** Requires prereq ASEN 5044 (min. grade D-). Restricted to Engineering graduate students, Aero Concurrent Degree (C-ASEN and C-ASENP) mjrs, Aero graduate certificate students.
**Grading Basis:** Letter Grade

**ASEN 6090 (3) Advanced Global Navigation Satellite Systems: Software and Applications**
Focuses on high-precision applications of Global Navigation Satellite Systems (GNSS) and the software tools that are needed to achieve these precisions. Topics include precise orbital determination, reference frames, atmospheric delays, relativity, clock models, ambiguity resolution, and scientific applications.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 5090 or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Global Positioning Systems

**ASEN 6091 (3) Global Navigation Satellite System (GNSS) Receiver Architecture**
Investigates the overall architecture of satellite navigation receivers: including both the analog radio frequency conditioning (antenna to the analog-to-digital converter) and the various signal processing algorithms. Such treatment of the operation of the receiver will provide insight into the trade-offs that go into GNSS as well as the more broad generic spread spectrum receiver design.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 5090.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Global Positioning Systems

**ASEN 6092 (3) GNSS for Remote Sensing of the Atmosphere, Ionosphere, and Earth Surface**
Covers technologies that rely on GNSS signals for remote sensing applications. GNSS receiver signal processing techniques and GNSS signal propagation effects due to interactions with the ionosphere, neutral atmosphere, and Earth surface are addressed. Students will learn techniques to process GNSS measurements and to infer ionospheric, atmospheric, and Earth surface properties from real GNSS measurements collected by ground-based receivers and LEO satellites.
**Requisites:** Requires prerequisite course of ASEN 5090 (minimum grade D-). Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade

**ASEN 6107 (3) Nonlinear Finite Element Methods**
Continuation of ASEN 5007. Covers the formulation and numerical solution of nonlinear static structural problems by finite element methods. Emphasizes the treatment of geometric nonlinearities and structural stability.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 5007 or equivalent or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 6114 (3) System Identification for Control**
Explores methods for identification of models for physical processes which will be part of a feedback control system. Focuses on the interplay between robustness of control laws and the performance of identification methods. Covers time-domain and frequency-domain identification methods, using experimental simulations of control systems of interest to the class.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite ASEN 5014 or ASEN 5114.
**Grading Basis:** Letter Grade

**ASEN 6116 (3) Spacecraft Life Support Systems**
Study the environmental control and the life support systems and technologies that keep people alive and healthy in spacecraft and habitats. Students will learn about thermal control systems, air revitalization processes, water reclamation and treatment, waste handling and the reuse of materials, and food and nutrition. Expect to develop analytical models from first principles and perform hands-on laboratory experiments. Formerly ASEN 5116.
**Requisites:** Requires prereq ASEN 5158 (min. grade D-). Requires coreq ASEN 5016. Restricted to Engineering grad students, Aero Concurrent Degree (C-ASEN and C-ASENP) mjrs, Aero graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Bioastronautics and Microgravity Science

**ASEN 6216 (3) Human Operation of Aerospace Vehicles**
Examines the role, capabilities, and limitations of human operators in aerospace vehicles. Topics include theoretical models of human information processing and decision-making, physiological limitations of the human (particularly spatial orientation illusions), the design of display and control interfaces, and the evaluation of those interfaces for human interaction with complex aerospace systems.
**Requisites:** Requires prerequisite or corequisite course of ASEN 5158 (minimum grade D-). Restricted to College of Engineering (ENGR) graduate students.
**Recommended:** for aerospace and biomedical engineering students.
**Grading Basis:** Letter Grade

**ASEN 6265 (3) Fundamentals of Spectroscopy for Optical Remote Sensing**
Provides a comprehensive overview of the fundamentals of quantum physics, atomic spectroscopy, molecular spectroscopy and laser spectroscopy. Exposes students to the spectroscopy applications in modern optical and laser remote sensing. Assists students to develop the fundamental knowledge and skills for independent learning.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade

**ASEN 6316 (3) Extravehicular Activity**
Expose students to all aspects of extravehicular activity (EVA) to enable them to design systems to facilitate EVA for future human exploration. This course will draw upon the academic elements of design, engineering, technology development, physiology, operations, human-machine interaction, and geology to provide an interdisciplinary look at this topic.
**Requisites:** Requires prerequisite course of ASEN 5158 or ASEN 5016 (minimum grade D-). Restricted to College of Engineering (ENGR) graduate students and Aerospace graduate certificate students.
**Recommended:** aerospace or biomedical engineering students with a focus in bioastronautics.
**Grading Basis:** Letter Grade

**ASEN 6331 (3) Computational Fluid Dynamics**
Focuses on computational approaches to solve the Navier-Stokes equations. Assumes a basic knowledge of the solution of partial differential equations with numerical methods with focus finite element/volume methods (FEM/FVM but primarily FEM). These issues include: the discrete formulation, non-linear equation iterator, linear equation formation, boundary condition prescription and linear equation solution.
**Requisites:** Requires pre or coreqs ASEN 5007 and ASEN 5051 (minimum grade C). Restricted to Engineering graduate students, Aero Concurrent Degree (C-ASEN and C-ASENP) mjrs, Aero graduate certificate students.
**Recommended:** instructor permission required if pre/co requisite of ASEN 5007 and ASEN 5051 haven¿t been met.
**Grading Basis:** Letter Grade

**ASEN 6337 (3) Remote Sensing Data Analysis**
Covers some of the most commonly used machine learning techniques in remote sensing data analysis, specifically for clustering, classification, feature extraction and dimensionality reduction, and inverse methods used to retrieve geophysical information from remote sensing data. Hands-on computational homework and group and individual projects provide opportunities to apply classroom curricula to real remote sensing data.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Remote Sensing

**ASEN 6365 (3) Lidar Remote Sensing**
Provides a comprehensive, yet easily understandable, up-to-date understanding of lidar principles, technologies and applications. Contains approaches for quantitative lidar simulation, lidar sensitivity and error analysis, lidar data retrieval, lidar system design and performance analysis. Gives students opportunities to see and operate real state-of-the-art lidar systems and make connections to lidar experts in the nation and world.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Aerospace Design and System Engineering

**ASEN 6412 (3) Uncertainty Quantification**
This advanced topics course provides an exploration of techniques for representation and propagation of uncertainty in PDE/ODE-based systems.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisites APPM 5570 and ECEN 5612 (all minimum grade B) or equivalent courses with instructor consent.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Structures, Materials, and Structural Dynamics

**ASEN 6519 (1-3) Special Topics**
Reflects upon specialized aspects of aerospace engineering sciences. Course content is indicated in the online Schedule Planner.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students, Aerospace Engineering Concurrent Degree (C-ASEN and C-ASENP) majors, and Aerospace graduate certificate students.
**Recommended:** Prerequisite varies.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 6800 (3) Master of Engr Project**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 6849 (1-6) Independent Study**
Studies special projects agreed upon by student and instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 6949 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 6950 (1-6) Master's Thesis**
**Additional Information:** Departmental Category: Specialized Courses

**ASEN 8990 (1-10) Doctoral Dissertation**
**Additional Information:** Departmental Category: Specialized Courses

# Air Force Aerospace Studies - ROTC (AIRR)

## Courses

**AIRR 1010 (1) Heritage and Values I**
This course provides an introduction to the Air & Space Forces, encourages students to pursue an AF career or seek additional information to be better informed about the role of the USAF. The course allows students to examine general aspects of the Department of the Air Force, AF Leadership, Air Force benefits, and opportunities for AF officers. The course also lays the foundation for becoming an Airman by outlining our heritage and values.
**Additional Information:** Departmental Category: Air Force Aerospace Studies

**AIRR 1020 (1) Heritages and Values II**
A continuation of AIRR 1010. This course provides a historical perspective including lessons on war and the US military, AF operations, principles of war, and airpower. This course also provides students with an understanding for the employment of air and space power, from an institutional, doctrinal, and historical perspective. The students are introduced to the Air Force way of life and gain knowledge on what it means to be an Airman.
**Additional Information:** Departmental Category: Air Force Aerospace Studies

**AIRR 1947 (0) Air Force ROTC Leadership Laboratory**
All AFROTC cadets must attend leadership lab (two hours per week). The laboratory involves a study of Air Force customs and courtesies, drill and ceremonies, career opportunities and the life and work of an Air Force junior officer. Students (cadets) seeking a commission must take this lab in conjunction with their AIRR lecture/course. "Special Students" NOT seeking a commission, are not required or allowed to attend LLAB (Leadership Lab).

**AIRR 2010 (1) Team and Leadership Fundamentals 1**
This course is designed to provide a fundamental understanding of both leadership and team building. This course teaches students that there are many layers to leadership, including aspects that are not always obvious. Such things include listening, understanding themselves, being a good follower, and problem solving efficiently.
**Additional Information:** Departmental Category: Air Force Aerospace Studies

**AIRR 2020 (1) Team and Leadership Fundamentals 2**
A continuation of AIRR 2010. This course is designed to discuss different leadership perspectives when completing team building activities and discussing things like conflict management. This course also provides students with the ability of demonstrating their basic verbal and written communication skills. Active cadets will apply these lessons at Field Training, which follows the AS200 level.
**Additional Information:** Departmental Category: Air Force Aerospace Studies

**AIRR 3010 (3) Leading People and Effective Communication 1**
This course is designed to build on the leadership fundamentals taught in the AS200 level. The cadets will have the opportunity to utilize their skills as they begin a broader leadership role in the detachment. The goal is for cadets and students to have a more in-depth understanding of how to effectively lead people and provide them with the tools to use throughout their detachment leadership roles.
**Additional Information:** Departmental Category: Air Force Aerospace Studies

**AIRR 3020 (3) Leading People and Effective Communication 2**
A continuation of AIRR 3010. This course is designed to help cadets hone their writing and briefing skills. The course continues into advanced skills and ethics training that will prepare them for becoming an officer and a supervisor.
**Additional Information:** Departmental Category: Air Force Aerospace Studies

**AIRR 4010 (3) National Security, Leadership Responsibilities/ Commissioning Preparation 1**
This course is designed to address the basic elements of national security policy and process. The cadet will comprehend the air and space power operations as well as understand selected roles of the military in society and current domestic and international issues affecting the military profession.
**Additional Information:** Departmental Category: Air Force Aerospace Studies

**AIRR 4020 (3) National Security/Leadership Responsibilities/ Commissioning Preparation 2**
A continuation of AIRR 4010. This course is designed to prepare cadets for life as a second lieutenant. Cadets should comprehend the responsibility, authority, and functions of an Air Force commander and selected provisions of the military justice system.
**Additional Information:** Departmental Category: Air Force Aerospace Studies

# Anthropology (ANTH)

## Courses

**ANTH 1030 (3) Principles of Anthropology 1**
Evolution of humanity and culture from beginnings through early metal ages. Covers human evolution, race, prehistory, and rise of early civilizations. This course is taught through Continuing Education.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Social Science

**ANTH 1040 (3) Principles of Anthropology 2**
Surveys the world's major culture areas. Covers components of culture, such as subsistence, social organization, religion, and language. This course is taught through Continuing Education.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
MAPS Course: Social Science

**ANTH 1105 (3) Exploring a Non-Western Culture: Tibet**
Introduction to Tibetan culture, history, religion, and society from an anthropological perspective, including traditional as well as contemporary dimensions. Topics will include Tibetan Buddhism, politics, nomadism, gender, refugee issues, and the global Tibetan diaspora, all framed within the larger methods and concepts of cultural anthropology.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**ANTH 1110 (3) Anthropology of Japan: Culture, Diversity, and Identity**
Focusing on diverse facets of lived experience, this course introduces students to the cultural anthropology of contemporary Japan. Students will gain an understanding of the anthropological fieldwork process, theoretical issues within cultural anthropology, and key debates in Japanese studies about Japanese identity and internal diversity.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 1120 (3) Exploring a Non-Western Culture: Pueblo Indians of the Southwest**
Examines the geography, kinship, politics and religious values of Pueblo Indian peoples of the US Southwest in historical and contemporary context through an anthropological perspective. Specific details of Pueblo Indian languages, cultures, and histories are used to illustrate basic ideas and debates in anthropology including: the concept of culture, the influence of language on thought, the grounding of culture in human biology, religion and reason, the nature of oral traditions, and archaeological interpretation.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ANTH 1121 (3) Indigenous Cultures of the Eastern U.S.: From the Pleistocene to Present Day**
Anthropology, the field of study that explores culture relativistically and holistically, is uniquely positioned to teach us about how social differences shape and have been shaped by political, economic, and cross-cultural relationships within the U.S. We will do so in this class by examining topics through the disciplinary frameworks of Indigenous archaeology, post- colonial anthropology, and decolonization. We will explore the cultures of several Indigenous societies in Eastern North America from their first arrival in the region to today. We will examine past and present societies and their connections through archaeology, ethnohistory, and ethnography. We will also focus on three consistent themes: diversity, colonization, and resilience.
**Additional Information:** Arts Sci Gen Ed: Diversity-U.S. Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 1125 (3) Exploring Cultural Diversity in the U.S.**
Examines the geography, kinship, politics and religious values of various cultures in the United States in historical and contemporary context through an anthropological perspective. Check with department for semester offerings.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ANTH 1140 (3) Exploring a Non-Western Culture: The Maya**
Explores the culture of the Maya of Central America, emphasizing their material adaptations, social organizations, ideals and values, and artistic achievements in the past and the present.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 1141 (3) Indigenous Imperialism on the Andes: The Inca Realm and its People**
Uses archaeological and anthropological approaches to the study of non-Western imperialism examining the origins of inequality and marginalization in Indigenous pre-European empires and their maintenance during European colonialism. We will use the Inca Empire, the largest Indigenous political system of the American continent by 1530 AD. Learning about the Indigenous and Spanish cultural heritage of South America will equip the students to appreciate present-day Latin America societies with an anthropological perspective.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 1143 (3) Civilization, The Early Years: Ancient Mesopotamia in the Second Millennium BC**
Introduces you to the peoples and cultures of ancient Mesopotamia during the second millennium B.C. In conjunction with the political history of shifting dynasties, wars, and power struggles, we will examine a number of issues in various cultural contexts. These include the interplay of texts and archaeological data in reconstructing the past; societal `collapse¿-what it is and what it isn¿t; legitimation of power; Mesopotamian mythology, and the role of women. Previously offered as a special topics course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 1145 (3) Indigenous Imperialism in Pre-Columbian Mexico: The Aztecs**
Explores the culture of the Aztec people of Central Mexico: their subsistence, society, religion, and achievements, as well as the impact of the Aztec empire in Mesoamerica. Also reviews the clash of a non-western society with the western world with the arrival of the Spanish conquistadors.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 1155 (3) Exploring Global Cultural Diversity**
Examines the geography, kinship, politics and religious values of various cultures globally in historical and contemporary context through an anthropological perspective. Check with department for semester offerings.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 1156 (3) Class and Consumption: Global Cultures of Inequality, Anxiety, and Shopping**
Introduces students to the cultural contours of the political and economic conditions that generate social class. Students learn about classical theories of social class that have traditionally focused on labor, production, education or status, and adds consumption to these analyses. By inviting students to think anthropologically about how consumption facilitates and generates class differentiation, the course equips them to recognize and analyze the ways that class is experienced and reproduced.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective

**ANTH 1157 (3) Global Politics of Reproduction**
How do experiences of reproduction differ around the world? What are the ways that cultural, socio-economic, and political conditions shape questions about who can reproduce and how? What constitutes ¿reproduction,¿ anyway? Taking reproduction as a central way to think about how social life is organized over generations, this class explores how reproduction is not only an individual biological but also a social process shaped by cultural values, inequalities, and regulations across multiple spheres of influence.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-Global Perspective

**ANTH 1170 (3) Exploring Culture and Gender through Film**
Explores the concepts of culture and gender from an anthropological perspective, using films and other media, as well as written texts. By analyzing media about other ways of life, students will learn the basic concepts of cultural anthropology and be able to apply them to any society. In addition, students will learn to think critically about documentary and ethnographic media.
**Equivalent - Duplicate Degree Credit Not Granted:** CMDP 2820
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 1180 (3) Maritime People: Fishers and Seafarers**
Explores important milestones in the development of human societies and cultures that live from the sea. Emphasizes the evolution of maritime adaptations associated with fishing and seafaring from more than 10,000 years ago through the present.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 1190 (3) Origins of Ancient Civilizations**
Examines origins of the world's first civilizations in Mesopotamia, Egypt, the Indus Valley, Mesoamerica, and the Andes. Covers archaeology of ancient cities, trade, economy, politics, warfare, religion, and ideology. Seeks insights into general processes of cultural evolution.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 1200 (3) Culture and Power**
Compares contemporary sociopolitical systems across cultures, from non-Western tribal groups to modern states. Introduces students to anthropological approaches for understanding and analyzing political forces, processes, and institutions that affect cultures such as colonialism, warfare, violence,ethnicity, migration, and globalization.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 2010 (3) Introduction to Biological Anthropology 1**
Detailed consideration of human biology, the place of humans in the animal kingdom, primate ecology and fossil evidence for human evolution. Required for ANTH majors.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**ANTH 2020 (3) Human Biological Variation and Adaptation**
Introduction to human biology, variation, and adaptation. Explores humans as a species through an understanding of biological variation and adaptation.
**Recommended:** Prerequisite ANTH 2010.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 2030 (1) Laboratory in Biological Anthropology 1**
Lab in human osteology and musculoskeletal system emphasizing comparative primate morphology, adaptation, and the fossil record documenting the natural history of primates. Meets the MAPS requirement for natural science: lab, when taken with ANTH 2010.
**Recommended:** Corequisite ANTH 2010.
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science Lab or Lab/Lec

**ANTH 2040 (1) Laboratory in Human Biological Variation and Adaptation**
Experiments and hands-on exercises designed to enhance understanding of human genetics, anatomy, and function of the principles and concepts presented in ANTH 2020. One two-hour class per week.
**Recommended:** Corequisite ANTH 2020.
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 2070 (3) Bones, Bodies, and Disease**
Studies the human skeleton and introduces techniques used to evaluate demographic variables. Applies techniques through evaluation of photographic images of an excellently preserved mummified skeletal population from ancient Nubia to reconstruct prehistoric patterns of adaptation and biocultural evolution. Offered through Continuing Education only.
**Recommended:** Prerequisite ANTH 2010.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 2100 (3) Introduction to Cultural Anthropology**
Covers current theories in cultural anthropology and discusses the nature of field work. Explores major schools of thought and ethnographic fieldwork in a range of cultures studied by anthropologists. Required for Anthropology majors.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 2200 (3) The Archaeology of Human History**
Where do we come from? This course provides a brief introduction to the practice of archaeology and then emphasizes the evidence for major events/transitions in human history over the last 2.5 million years. Required for ANTH majors.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 2210 (1) Laboratory Course in Archaeological Methods**
Studies analytical methods in archaeological research including those employed both in the field and in the laboratory. Deals with practical exercises illustrating many of the theoretical principles covered in ANTH 2200.
**Recommended:** Corequisite ANTH 2200.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 2525 (3) Environmental Anthropology**
Examines the impacts of human impacts on the planet from a cross-cultural perspective. This course will explore how different cultures have impacted their environments, and the diverse responses that cultures make to ecosystem changes. Also studies what different human groups have done, and are doing, to mitigate and adapt to ecological degradation, biodiversity loss, and climate change.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 2600 (3) Plagues and the Human Response from Past to Present**
This course uses an anthropological perspective to explore important infectious diseases in human history. We will learn about how human behavior affects the emergence, spread, and control of disease, how human culture, social inequalities, and demography influence the variety of diseases we are exposed to, and how diseases have shaped human biology and culture. We will emphasize the ways in which the study of disease in the past may benefit people today and in the future.

**ANTH 3000 (3) Primate Behavior**
Surveys naturalistic primate behavior. Emphasizes social behavior, behavioral ecology, and evolution as they lead to an understanding of human behavior.
**Requisites:** Requires a prerequisite course of ANTH 2010 or EBIO 1220 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 3009 (3) Modern Issues, Ancient Times**
Considers issues of vital importance to humans, both now and in ancient times. Topics such as food, death, sex, family, literacy, or power are explored to consider how ancient societal norms and attitudes evolved and how they relate to modern culture. Draws on material and literary evidence to develop an understanding of the complexities of ancient life.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 3009
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 3010 (3) The Human Animal**
Identifies genetic, anatomical, physiological, social, and behavioral characteristics humans share with other mammals and primates. Explores how these characteristics are influenced by modern culture.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2010.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 3100 (3) Africa: Peoples and Societies in Change**
Examines culture and politics in Africa through works by anthropologists and historians, as well as novels, films, and journalistic accounts. Special attention is devoted to the ways in which various African cultures have creatively and resiliently responded to the slave trade, European colonialism, and post-colonialism.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 3110 (3) Ethnography of Mexico and Central America**
A broad overview, focusing on Mexico and Guatemala. Major topics include ethnohistory, indigenous and mestizo peoples, and contemporary problems and issues.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 3119 (3) The Archaeology of Death**
Consider Death. It is a universal human phenomenon. Humans across time and space have caused, planned for, reacted to, and carried out death practices in extraordinarily different ways. Mortuary practice provides a fascinating insight into human history and culture in both the modern and ancient world.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 3119
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 3160 (3) Peoples of the South Pacific**
Surveys traditional island cultures and contemporary changes in the Pacific, focusing on how the Pacific Islands were first settled, some of the great anthropologists who studied the islanders, and how current environmental changes, such as global warming, threaten the future existence of the islands.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 3170 (3) America: An Anthropological Perspective**
Historical and contemporary aspects of American life are considered from an anthropological perspective.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 3180 (3) Gender, Culture, and Sexuality**
Focuses on gender, that is, the making of men and women, and how gender is culturally constructed in different societies. Gender describes many areas of behavior, feelings, thoughts, and fantasies that cannot be understood as primarily biologically produced. Sexuality and sexual systems are sometimes viewed as products of particular genderizing practices, but recent theories suggest that sexual systems themselves constitute gender.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 3300 (3) Elements of Religion**
Explores universal components of religion, as inferred from religions of the world, ranging from smaller-scale oral to larger-scale literate traditions.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 3301
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 3505 (3) Our World Heritage: The Archaeology of Cultural and Digital Heritage**
Introduces students to the concept and management process of World Heritage Sites (WHS) and how the discipline of archaeology is involved in this management which involves a diverse range of actors, including local stakeholders and indigenous groups. Students will be given five case studies of prominent World Heritage Sites where these concepts and practices are worked out in detail, and where impacts upon the local communities and indigenous groups are examined.
**Recommended:** junior or senior level.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 3760 (3) Exploring Culture and Media in Southeast Asia**
Introduces students to the ethnographic method and critical media practices through immersion in the cultural politics of Indonesia. Students will learn to conduct ethnographic research and to use media-making as a research method. Students will learn the ethnography of Southeast Asia by focusing on the cultural diversity of Indonesia, with special attention to religious and political issues among marginalized groups.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 3770 (3) Primates of Vietnam: Conservation in a Rapidly Developing Country**
Immersive global seminar that will take place in southern and central Vietnam. We will travel to Ho Chi Minh City to begin an exploration into the conservation of primates in this country. Vietnam is home to 25 primate species and a rapidly growing human population. This course will examine challenges, success, and failures in the conservation of these creatures within the context of development within the historical context of Vietnam.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 4000 (3) Quantitative Methods in Anthropology**
Surveys ways of deriving meaning from anthropological data by numerical means, including but not confined to basic statistical procedures.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5000
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites ANTH 2010 and ANTH 2020.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4020 (3) Explorations in Anthropology**
Special topics in cultural and physical anthropology, as well as archaeology. Check with the department for semester offerings.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5020
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4045 (3) Introduction to Museum Anthropology**
Traces the development of Anthropology and museums in America from late 19th century to present day. Students are encouraged to: explore museum theory and practice; think critically about the history of relations among Native Americans, Anthropology, and museums; consider the legacy of collecting and challenges of representing others; and, examine the interplay of Anthropology, material culture, and colonialism.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5045 and MUSM 5045
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4050 (3) Anthropology of Jews and Judaism**
Explores topics in Jewish anthropology. Uses the lens of anthropological inquiry to explore, discover and analyze different concepts within Jewish culture. Topics explored will include customs, religious practices, languages, ethnic and regional subdivisions, occupations, social composition, and folklore. Explores fundamental questions about the definition of Jewish identity, practices and communities.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4050
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ANTH 4060 (3) Nutrition and Anthropology**
Overview of the evolution of human diet and ecological and cultural factors shaping modern diets. Introduces fundamentals of nutrition and analysis of nutritional status. Analyzes ecological, social, and cultural factors leading to hunger and undernutrition, as well as biological and behavioral consequences of undernutrition.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5060
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites ANTH 2010 and ANTH 2020 or EBIO 1210 and EBIO 1220 or EBIO 1030 and EBIO 1040.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 4070 (3) Methods in Biological Anthropology**
Provides laboratory-based research experience in selected areas of biological anthropology. Research designs, methods and applications will be used to develop research skills. Students will read original research papers and carry out a research project of their own design. Area of emphasis within biological anthropology will depend on instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5070
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisites ANTH 2010 and ANTH 2020 and ANTH 2030 and ANTH 2040 and ANTH 4000 and students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 4080 (3) Anthropological Genetics**
Considers data and theory of human genetics. Emphasizes analytical techniques relating to a genetic analysis of individual, family, and populations.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5080
**Requisites:** Requires prerequisite courses of ANTH 2010 and 2020 or EBIO 1210 and 1220 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4110 (3) Human Evolutionary Biology**
Detailed consideration of the fossil evidence for human evolution. Covers the discovery of important fossils and interpretations; descriptive information about the fossils; and data and theory from Pleistocene studies relating to ecology, ecological and behavioral data on modern apes and molecular studies that have bearing on the study of human evolution.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5110
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 4120 (3) Advanced Biological Anthropology**
Selected topics in physical anthropology emphasizing faculty specialties. Topics may include population genetics and its application to understanding modern human diversity, human population biology, and primate ecology and evolution. Check with department for semester offerings.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5120
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2010 or ANTH 2020 or EBIO 1210 or EBIO 1220.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 4125 (3) Evolution and the Human Life Cycle: A Primate Life History Perspective**
Surveys primate biology, behavior and ecology using a life history approach. Using a comparative approach, explores life history as mammals, as primates and as humans by focusing on evolutionary decisions that occur during different life stages.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5125
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 4129 (3) Aegean Art and Archaeology**
Detailed study of the cultures of prehistoric Greece, the Cycladic Islands and Crete, their art and archaeology and their history within the broader context of the eastern Mediterranean, from earliest human settlement to the collapse of the Bronze Age at about 1100 B.C.E. Emphasis is on palace states.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5129 and ARTH 4129 and CLAS 4129 and CLAS 5129
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ANTH 4130 (3) Advanced Osteology**
Detailed study of the human skeleton with special attention to health and demographic conditions in prehistoric cultures and the evaluation of physical characteristics and genetic relationships of prehistoric populations.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5130
**Recommended:** Prerequisites ANTH 2010 and ANTH 2020 and ANTH 4000 and students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 4135 (3) Skeletons in the Closet: Curation and Care of Human Remains**
This project-based course will examine how human skeletal collections are curated universities, including here at CU Boulder. We will also explore politics and practices of care surrounding human remains, both historically and as new generations inherit responsibility for these collections. We will discuss the roles of marginalization, racism, colonialism, and structural violence in the formation of many of these collections, and possible futures of repatriation, descendant community involvement, respectful use, and purposeful care. Recommended restrictions: Jr/Sr standing.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5135
**Recommended:** Prerequisites ANTH 4130/5130 Advanced Osteology.
**Grading Basis:** Letter Grade

**ANTH 4160 (3) Early Hominin Paleoecology**
Explores current thinking about the diets, environments and lives of early human ancestors and their close kin. Strong emphasis on the methods used to construct such knowledge.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5160
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 4170 (3) Primate Evolutionary Biology**
Focuses on the fossil record of primates excluding the Hominini). Special emphasis is placed on delineating the origins of the order Primates, the origins of the primate suborders Strepsirhini and Haplorhini and the adaptations of extinct primates in light of our understanding of the modern primate adaptive radiations.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5170
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2010 or EBIO 1210.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 4180 (3) Anthropological Perspectives: Contemporary Issues**
Students read, discuss, and write critical evaluations of contemporary publications in anthropology. Identifies basic themes that inform major anthropological perspectives. Students then bring these perspectives to bear on issues currently facing the human species.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4210 (3) Southwestern Archaeology**
Explores the prehistory of the American Southwest from the earliest entry of humans into the area to the Spanish entrada. Focuses on important themes in cultural development: the adoption of agricultural strategies, sedentism, population aggregation, population movement, and social complexity.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5210
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2200.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4220 (3) From Olmec to Aztec: The Archaeology of Mexico**
Examines the archaeology of Mexico from the initial peopling of the Americas to the Spanish conquest of the Aztec empire. Studies origins of complex societies; ancient Mexican cities, states and empires; religion and politics; trade and interaction; ecology and economy; and social organization.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5220
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2200.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4224 (3) Archaeology of the Maya and Their Neighbors**
Begins with the environment and describes the earliest inhabitants and the Olmec civilization, then shifts to the earliest Maya and the emergence and collapse of classic Maya civilization. Compares and contrasts the societies of lower Central America.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5224
**Recommended:** Prerequisite ANTH 2200.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4235 (3) Landscape Archaeology**
Explores how humans and the environment have influenced each other throughout history. Considers what landscapes are, how archaeologists study them, and why such study is important. Examines the most prominent theoretical and methodological approaches to the study of landscapes and explores a series of different types of landscapes, including sacred landscapes, political landscapes, and landscapes of movement. Previously offered as a special topics course.
**Recommended:** Prerequisite ANTH 2200.

**ANTH 4240 (3) Geoarchaeology**
Applies geological principles and instruments to help solve archaeological problems. Focuses on site formation processes, soils, stratigraphy, environments, dating, remote sensing and geophysical exploration. Environmental and ethical considerations are included.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5240
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2200.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ANTH 4245 (3) Ceramics in Archaeology**
Examines how archaeologists use ceramics to reconstruct the past. Topics include: the relationship between form and function; typology and classification; chronology and seriation; compositional analysis; production and exchange; social, cognitive and ideological aspects of style; and ethnoarchaeological studies of pottery use in contemporary societies. Includes two hours of lecture and two-hours of hands-on laboratory practicum per week.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5245
**Requisites:** Requires prerequisite of ANTH 2200 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4270 (3) Plains Archaeology**
Archaeological evidence for Native American ways of life on the North American Great Plains from the initial peopling of the region into the 19th century.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5270
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2200.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4300 (3) From Cloud People to the Land of the Sky: The Archaeology of Oaxaca**
Examines the prehispanic and colonial history of the Zapotec, Mixtec, and Chatino peoples of Oaxaca, Mexico. Explores their diverse histories and cultures from Ice Age arrival to the Spanish Conquest in the 1520s. A major feature will be trips to archaeological sites, museums, and Indigenous markets as well as colonial-period churches and Mixtec palaces. Students will need passports.
**Recommended:** Prerequisite ANTH 2200: The Archaeology of Human History.

**ANTH 4320 (3) Tourism, Development, and Belonging in Costa Rica**
This course introduces students to ethnographic methods through immersion and study in Costa Rica. We will apply cultural anthropology research methods to the overlapping fields of tourism and development with a focus on what it means to belong. Topics will include: the "culture" concept, particularly in relation to Costa Rican national identity and belonging; tourism as a field of study; development politics and practices; and ethnographic methods, ethics, and techniques of anthropological research and fieldwork.
**Requisites:** Restricted to students with 27-180 credits (Sophomore, Junior or Senior) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Arts Sci Gen Ed: Diversity-Global Perspective

**ANTH 4330 (3) Human Ecology: Archaeological Aspects**
Surveys archaeological approaches to ecology, economy and landscape: glaciation, geomorphology and other physical processes creating and affecting sites and regions; environmental reconstruction; theories of human-environment interaction; landscape formation by forager, agricultural and complex societies; and ideologically structured landscapes.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5330
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2200.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4340 (3) Archaeological Method and Theory**
Surveys archaeological theories and methods within the context of the history of archaeology. Includes archaeological approaches to data recovery, analysis, and interpretation as well as an overview of cultural resources management and ethical issues in contemporary archaeology.
**Recommended:** Prerequisites ANTH 2200 and students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4350 (2-6) Archaeological Field and Laboratory Research**
Students participate in archaeological field research or conduct laboratory analysis of archaeological materials and data. Students work with faculty on archaeological research projects with a field or lab focus, depending on the project undertaken.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5350
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisites ANTH 2200 and students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4380 (3) Lithic Analysis and Replication**
Uses diversity of approaches to the analysis of ancient stone tools, including fracture mechanics, lithic technology, materials, heat treatment and functional analysis. Percussion and pressure-flaking experiments are performed.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5380
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2200.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4390 (3) Research Methods in Archaeology I**
Method and theory of archaeology, emphasizing the interpretation of materials and data and the relationship of archaeology to other disciplines. Instructor consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5390
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2200.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4465 (3) The Archaeology of Inequality**
Examines the theoretical and archaeological literature to understand how inequality develops, how it is maintained over time, and how it is negated. Presents an understanding of, and critically evaluates, the most prominent paradigms for understanding socially unequal relationships, and considers the vital role archaeology plays in understanding inequality.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4470 (3) Collections Research Practicum in Cultural Anthropology**
Designed as a practicum, introduces students to research and practice in museum anthropology, utilizing the extensive anthropology collections at CU-Boulder Museum. Students will gain skills in primary and secondary research, collections and object research and narrative story development for the exhibition of anthropological material culture.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5470 and MUSM 4912 and MUSM 5912
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4500 (3) Cross-Cultural Aspects of Socioeconomic Development**
Examines goals of international agencies that support development in underdeveloped countries. Anthropological perspective is provided for such issues as urban planning, health care and delivery, population control, rural development and land reform.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5500
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4505 (3) Globalization and Transnational Culture**
Covers the historical foundations for contemporary global change, addressing colonialism, global outsourcing, and cultural imperialism, with a particular emphasis on gender, class, and consumerism.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Asia Content

**ANTH 4525 (3) Global Islams**
Examines the historical formation of Islam in Indonesia and Southeast Asia so as to situate contemporary Islamic practices in a global context.
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4530 (3) Theoretical Foundations of Sociocultural Anthropology**
Critically examines the pivotal schools of 20th century social theory that have shaped modern sociocultural anthropology, including the ideas of cultural evolutionism, Marxism, Durkheim, Weber, Freud, structuralism, postmodernism and contemporary anthropological approaches. Includes primary readings and seminar-style discussion.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5530
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4570 (3) Anthropology of Fishing**
Examines fishing methods, peoples, societies and cultures, emphasizing anthropology's role in shaping fisheries management and development policy.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5570
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4580 (3) The Holocaust: An Anthropological Perspective**
Focuses on the Holocaust during the Third Reich, which involved the murder of millions of people, including six million Jews. Reviews the Holocaust's history, dynamics and consequences as well as other genocides of the 20th century, using an anthropological approach.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4580
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ANTH 4605 (3) Anthropology of Neuroscience**
Examines the connections between the production and social uptake of neuroscientific knowledge, and explores how transformations in neuroscience shape understandings of human nature. Focusing on anthropological, philosophical, and popular literature, this course addresses the following themes through a cultural and anthropological lens: subjectivity and neuroimaging, "disability" and "neurodiversity," child development, gender, "risk" and neoliberal governance, and the production of scientific expertise.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5605
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4610 (3) Medical Anthropology**
Examines health, illness, disease and treatment across a diversity of cases, all of which involve political economic inequalities, individual and collective experiences of medical systems and the historical and contemporary treatment of distinct populations. A demanding upper-level cultural anthropology course in the field of Medical Anthropology, a subfield of cultural anthropology, designed for advanced undergraduate students and early graduate students with an emphasis on the intersections of science, medicine and populations.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5610
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4615 (3) Kinship: Being and Belonging**
Explores interpersonal relationships as foundational objects of analysis. This course takes a comparative approach to examine both large-scale social movements and intimate practices, examining how the ideologies and practices of relatedness intersect with and are shaped by gender and sexuality, national identity and state building, race and ethnicity, embodiment, ways of understanding signs in the world (semiotics), the law, and economic relationships. Previously offered as a special topics course.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite ANTH 2100.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4620 (3) Nationalism and Cultural Citizenship**
Explores the nature of ethnic conflict, nationalism, and cultural citizenship in different contexts, including the United States. Is the nation-state dead? What effect do extranational and transnational organizations/institutions (e.g., European Union) have on the development of nationalism? Through the exploration of contemporary theory and case studies, this class will address these important contemporary concerns.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4630 (3) Nomadic Peoples of East Africa**
Examines the issues of current concern in the study of East African pastoral peoples. First half of the course is devoted to historical perspectives and the second half explores the transition from subsistence to market oriented economies.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5630
**Recommended:** Prerequisite students with 57-180 credits (Junior or Senior) Anthropology (ANTH) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4690 (3-6) Anthropology of Tibet**
Explores the culture of Tibet in both historical and thematic manners, considering the long-term development of Tibetan cultural practices and institutions as well as many of the abrupt changes introduced to Tibet in the 20th century. Topics covered include region, politics, gender, warfare, poetry and literature, and life under Chinese rule and as refugees around the world.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Anthropology (ANTH) majors only.
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Asia Content

**ANTH 4700 (3) Practicing Anthropology**
Learn ethnographic methods in the classroom and implement these skills in placements with community organizations, where students pursue an applied research project. This course teaches students how to use anthropological theory and methods to investigate social problems, and to consider how ethnographic research techniques can be applied to positively impact society.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5700
**Requisites:** Requires prerequisite course of ANTH 2100 (minimum grade B). Restricted to students with 87-180 credits (Junior or Senior) Anthropology (ANTH) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4710 (3) Departmental Honors in Anthropology 1**
Course work built around theme of research design as a means of integrating previous training in the field of anthropology as well as providing an opportunity to perform creative scientific investigations. Prepares students to write an honors thesis in ANTH 4720. Required of students doing Anthropology departmental honors.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sciences Honors Course

**ANTH 4720 (3) Departmental Honors in Anthropology 2**
Continuation of ANTH 4710.
**Recommended:** Prerequisite ANTH 4710.
**Additional Information:** Arts Sciences Honors Course

**ANTH 4730 (3) Latin American Politics and Culture through Film and Text**
Introduces students to the political cultures and societies of Latin America. Through historical and ethnographic text and documentary and non-documentary cinema, this course will explore class relations, ideology and resistance from the conquest to the present.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5730
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4735 (3) Contemporary Cuban Culture: Race, Gender and Power**
Ground students' understanding of contemporary Cuba within the global context. How do those outside the island imagine Cuba and why? What are the realities? In a world of U.S. dominated globalization, only recently have we relaxed a forceful economical blockade on the island: what does the U.S. mean in the Cuban imaginary, both in the past and present? To attend to global processes as they affect local (Cuban) experience, texts from anthropology, history, policy, literature, film and music will be drawn upon. Students will learn how long-standing patterns regarding race, color, class and gender relations have evolved into the socialist and now the "post-socialist" context.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5735
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4740 (3) Peoples and Cultures of Brazil**
Thematically surveys theoretical and ethnographic issues that have been important in understanding Brazil. Read and write critically about textual and visual representations of Brazil presented in the course.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites ANTH 2100 and three or more cultural anthropology courses.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4745 (3) Science, Technology and Society**
Explores the cultural work of science and technology in contemporary societies. The course will focus on anthropological studies of technoscientific works ranging from high-energy particle physics and marine biology to hackathons and space exploration. Discussion topics include the relationship between science, technology and political power; scientific controversies; paradigm shifts and scientific revolutions; and ideas of objectivity, representation and abstraction.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5745
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4750 (3) Culture and Society in South Asia**
Intensive analysis of major issues in anthropological research on South Asia (India, Pakistan, Bangladesh, Nepal and Sri Lanka), including kinship, gender, marriage, caste system, religion and ritual, ethnic conflict and social change.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5750
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**ANTH 4755 (3) Cultures of Expertise: Science, Power and Knowledge**
Examines the expertise as a cultural category. Students will consider the historical and cultural contexts of various forms of expertise and the social roles of experts from car mechanics to civil engineers, doctors and scientists. Students will be given opportunities to reflect analytically on their own experiences with increasingly specialized education as they develop "professional vision" in their chosen fields.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5755
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4760 (3) Ethnography of Southeast Asia and Indonesia**
Introduces the historical, political, and cultural dimensions of Southeast Asia, focusing primarily on Malaysia, the Philippines, Singapore and Indonesia, with some coverage of mainland Southeast Asia.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5760
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**ANTH 4770 (3) Anthropology of Tourism**
Introduces students to anthropological theories on tourism and considers those theories in the contexts of the varied sites and forms of tourism practiced around the world today. We will ask: why do people tour? Where do they go? And most centrally: how do the hosts to tourism feel about these outside visitors? Having been exposed to questions of globalization, development, belonging, race, gender, and desire, students will then be asked to reflect upon and theorize their own touristic experiences.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4800 (3) Language and Culture**
Principles of language structure and how language and culture interrelate, how language and language use are affected by culture and how culture may be affected by use of, or contact with, particular languages.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4800
**Recommended:** Prerequisites ANTH 2100 or LING 1000 or LING 2400 and students with 57-180 credits (Junior or Senior) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ANTH 4840 (1-8) Independent Study**
For upper-division undergraduate students.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**ANTH 4910 (1-3) Teaching Anthropology**
Practicum by special arrangement only. Students learn to teach anthropology by serving as recitation leaders or tutors in introductory courses or as small group leaders in advanced courses.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**ANTH 4919 (3) Collections Research Practicum: Archaeology**
Focuses on Museum collections management from archaeological sites mainly in the American Southwest and Mongolia. The course involves readings, discussion, and collections analysis and archival documentation. Extra time outside of class is required for the practicum aspect of this course. Each student will need to schedule with the professor an additional 3 hours each week when they will focus on an aspect of their project, to be discussed below under grading criteria.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 5919 and ANTH 5919
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**ANTH 4930 (1-6) Anthropology Internship**
Provides academically supervised opportunities for junior and senior anthropology majors to work in public and private sectors on projects related to students' career goals. Relates classroom theory to practice. Requires at least 48 hours on the job per credit hour and evidence (paper, employer evaluation, work journal) of significant learning.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 5930
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Recommended:** Prerequisites ANTH 2010 and ANTH 2100 and ANTH 2200 and students with 57-180 credits (Junior or Senior) Anthropology majors, with a minimum 3.25 GPA.

**ANTH 5000 (3) Quantitative Methods in Anthropology**
Surveys ways of deriving meaning from anthropological data by numerical means, including but not confined to basic statistical procedures.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4000
**Requisites:** Restricted to graduate students only.

**ANTH 5020 (3) Explorations in Anthropology**
Special topics in cultural and physical anthropology, as well as archaeology. Check with the department for semester offerings.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4020
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ANTH 5045 (3) Introduction to Museum Anthropology**
Traces the development of Anthropology and museums in America from late 19th century to present day. Students are encouraged to: explore museum theory and practice; think critically about the history of relations among Native Americans, Anthropology, and museums; consider the legacy of collecting and challenges of representing others; and, examine the interplay of Anthropology, material culture, and colonialism.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4045 and MUSM 5045
**Requisites:** Restricted to graduate students only.

**ANTH 5060 (3) Nutrition and Anthropology**
Overview of the evolution of human diet and ecological and cultural factors shaping modern diets. Introduces fundamentals of nutrition and analysis of nutritional status. Analyzes ecological, social, and cultural factors leading to hunger and undernutrition, as well as biological and behavioral consequences of undernutrition.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4060
**Requisites:** Restricted to graduate students only.

**ANTH 5070 (3) Methods in Biological Anthropology**
Provides laboratory-based research experience in selected areas of biological anthropology. Research designs, methods and applications will be used to develop research skills. Students will read original research papers and carry out a research project of their own design. Area of emphasis within biological anthropology will depend on instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4070
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ANTH 5080 (3) Anthropological Genetics**
Considers data and theory of human genetics. Emphasizes analytical techniques relating to a genetic analysis of individual, family, and populations.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4080
**Requisites:** Restricted to graduate students only.

**ANTH 5110 (3) Human Evolutionary Biology**
Detailed consideration of the fossil evidence for human evolution. Covers the discovery of important fossils and interpretations; descriptive information about the fossils; and data and theory from Pleistocene studies relating to ecology, ecological and behavioral data on modern apes and molecular studies that have bearing on the study of human evolution.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4110

**ANTH 5120 (3) Advanced Biological Anthropology**
Selected topics in physical anthropology emphasizing faculty specialties. Topics may include population genetics and its application to understanding modern human diversity, human population biology, and primate ecology and evolution. Check with department for semester offerings.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4120
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ANTH 5125 (3) Evolution and the Human Life Cycle: A Primate Life History Perspective**
Surveys primate biology, behavior and ecology using a life history approach. Using a comparative approach, explores life history as mammals, as primates and as humans by focusing on evolutionary decisions that occur during different life stages.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4125
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ANTH 5129 (3) Aegean Art and Archaeology**
Detailed study of the cultures of prehistoric Greece, the Cycladic Islands and Crete, their art and archaeology and their history within the broader context of the eastern Mediterranean, from earliest human settlement to the collapse of the Bronze Age at about 1100 B.C.E. Emphasis is on palace states.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4129 and ARTH 4129 and CLAS 4129 and CLAS 5129

**ANTH 5130 (3) Advanced Osteology**
Detailed study of the human skeleton with special attention to health and demographic conditions in prehistoric cultures and the evaluation of physical characteristics and genetic relationships of prehistoric populations.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4130

**ANTH 5135 (3) Skeletons in the Closet: Curation and Care of Human Remains**
This project-based course will examine how human skeletal collections are curated universities, including here at CU Boulder. We will also explore politics and practices of care surrounding human remains, both historically and as new generations inherit responsibility for these collections. We will discuss the roles of marginalization, racism, colonialism, and structural violence in the formation of many of these collections, and possible futures of repatriation, descendant community involvement, respectful use, and purposeful care.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4135
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites ANTH 4130/5130 Advanced Osteology.
**Grading Basis:** Letter Grade

**ANTH 5150 (3) Human Ecology: Biological Aspects**
Discusses role of human populations in local ecosystems, factors affecting population growth, and human adaptability to environmental stress. Detailed consideration of case studies of small-scale societies in different ecosystems.

**ANTH 5160 (3) Early Hominin Paleoecology**
Explores current thinking about the diets, environments and lives of early human ancestors and their close kin. Strong emphasis on the methods used to construct such knowledge.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4160
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ANTH 5170 (3) Primate Evolutionary Biology**
Focuses on the fossil record of primates excluding the Hominini). Special emphasis is placed on delineating the origins of the order Primates, the origins of the primate suborders Strepsirhini and Haplorhini and the adaptations of extinct primates in light of our understanding of the modern primate adaptive radiations.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4170

**ANTH 5210 (3) Southwestern Archaeology**
Explores the prehistory of the American Southwest from the earliest entry of humans into the area to the Spanish entrada. Focuses on important themes in cultural development: the adoption of agricultural strategies, sedentism, population aggregation, population movement, and social complexity.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4210

**ANTH 5220 (3) From Olmec to Aztec: The Archaeology of Mexico**
Examines the archaeology of Mexico from the initial peopling of the Americas to the Spanish conquest of the Aztec empire. Studies origins of complex societies; ancient Mexican cities, states and empires; religion and politics; trade and interaction; ecology and economy; and social organization.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4220
**Requisites:** Restricted to graduate students only.

**ANTH 5224 (3) Archaeology of the Maya and Their Neighbors**
Begins with the environment and describes the earliest inhabitants and the Olmec civilization, then shifts to the earliest Maya and the emergence and collapse of classic Maya civilization. Compares and contrasts the societies of lower Central America.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4224
**Requisites:** Restricted to graduate students only.

**ANTH 5240 (3) Geoarchaeology**
Applies geological principles and instruments to help solve archaeological problems. Focuses on site formation processes, soils, stratigraphy, environments, dating, remote sensing and geophysical exploration. Environmental and ethical considerations are included.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4240
**Requisites:** Restricted to graduate students only.

**ANTH 5245 (3) Ceramics in Archaeology**
Examines how archaeologists use ceramics to reconstruct the past. Topics include: the relationship between form and function; typology and classification; chronology and seriation; compositional analysis; production and exchange; social, cognitive and ideological aspects of style; and ethnoarchaeological studies of pottery use in contemporary societies. Includes two hours of lecture and two-hours of hands-on laboratory practicum per week.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4245

**ANTH 5270 (3) Plains Archaeology**
Archaeological evidence for Native American ways of life on the North American Great Plains from the initial peopling of the region into the 19th century.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4270

**ANTH 5330 (3) Human Ecology: Archaeological Aspects**
Surveys archaeological approaches to ecology, economy and landscape: glaciation, geomorphology and other physical processes creating and affecting sites and regions; environmental reconstruction; theories of human-environment interaction; landscape formation by forager, agricultural and complex societies; and ideologically structured landscapes.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4330
**Requisites:** Restricted to graduate students only.

**ANTH 5345 (3) Archaeological Theory**
Provides an advanced introduction to the history of archaeological theory from the late 19th century to the present. Topics include culture history, cultural evolution, systems ecology, behavioral archaeology, analogy and middle range theory, collective action, ecology, agency, practice, gender, identity, landscape, epistemology, materiality and memory.
**Requisites:** Restricted to graduate students only.

**ANTH 5350 (2-6) Archaeological Field and Laboratory Research**
Students participate in archaeological field research or conduct laboratory analysis of archaeological materials and data. Students work with faculty on archaeological research projects with a field or lab focus, depending on the project undertaken.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4350
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ANTH 5380 (3) Lithic Analysis and Replication**
Uses diversity of approaches to the analysis of ancient stone tools, including fracture mechanics, lithic technology, materials, heat treatment and functional analysis. Percussion and pressure-flaking experiments are performed.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4380
**Requisites:** Restricted to graduate students only.

**ANTH 5390 (3) Research Methods in Archaeology I**
Method and theory of archaeology, emphasizing the interpretation of materials and data and the relationship of archaeology to other disciplines.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4390
**Requisites:** Restricted to graduate students only.

**ANTH 5400 (3) Research Methods in Archaeology 2**
Focuses on the design of research including constructing empirical arguments and testing them, data gathering, site formation processes, field strategies (archival resources, mapping, field survey, surface collecting/recording, excavation and preliminary analysis) and artifact analysis as it relates to research design.

**ANTH 5455 (3) Epistemology in Archaeology**
Examines the logic of scientific inference in general and important issues in inference in archaeology specifically. It focuses on the fundamental problem of arguing from evidence based on the things people left behind to the lives those people led, the fundamental problem in archaeology. We examine general topics to start, including analytic bias, constructing and borrowing theory, and the development of archaeological interpretation over time, using recent and older literature. We then turn to analysis of published case studies and finish with cases from specific research topics the students are working on. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ANTH 5460 (3) Archaeology and Contemporary Society**
Explores the intellectual climate in which archaeology is practiced and how it influences archaeological research and reconstruction, laws, regulations, and ethical issues. Explores public use of and engagement with archaeology.
**Requisites:** Restricted to graduate students only.

**ANTH 5470 (3) Collections Research Practicum in Cultural Anthropology**
Designed as a practicum, introduces students to research and practice in museum anthropology, utilizing the extensive anthropology collections at CU-Boulder Museum. Students will gain skills in primary and secondary research, collections and object research and narrative story development for the exhibition of anthropological material culture.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4470 and MUSM 4912 and MUSM 5912
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade

**ANTH 5500 (3) Cross-Cultural Aspects of Socioeconomic Development**
Examines goals of international agencies that support development in underdeveloped countries. Anthropological perspective is provided for such issues as urban planning, health care and delivery, population control, rural development and land reform.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4500
**Requisites:** Restricted to graduate students only.

**ANTH 5530 (3) Theoretical Foundations of Sociocultural Anthropology**
Critically examines the pivotal schools of 20th century social theory that have shaped modern sociocultural anthropology, including the ideas of cultural evolutionism, Marxism, Durkheim, Weber, Freud, structuralism, postmodernism and contemporary anthropological approaches. Includes primary readings and seminar-style discussion.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4530
**Requisites:** Restricted to graduate students only.

**ANTH 5570 (3) Anthropology of Fishing**
Examines fishing methods, peoples, societies and cultures, emphasizing anthropology's role in shaping fisheries management and development policy.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4570
**Requisites:** Restricted to graduate students only.

**ANTH 5605 (3) Anthropology of Neuroscience**
Examines the connections between the production and social uptake of neuroscientific knowledge, and explores how transformations in neuroscience shape understandings of human nature. Focusing on anthropological, philosophical, and popular literature, this course addresses the following themes through a cultural and anthropological lens: subjectivity and neuroimaging, "disability" and "neurodiversity," child development, gender, "risk" and neoliberal governance, and the production of scientific expertise.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4605
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ANTH 5610 (3) Medical Anthropology**
Examines health, illness, disease and treatment across a diversity of cases, all of which involve political economic inequalities, individual and collective experiences of medical systems and the historical and contemporary treatment of distinct populations. A demanding upper-level cultural anthropology course in the field of Medical Anthropology, a subfield of cultural anthropology, designed for advanced undergraduate students and early graduate students with an emphasis on the intersections of science, medicine and populations.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4610

**ANTH 5630 (3) Nomadic Peoples of East Africa**
Examines the issues of current concern in the study of East African pastoral peoples. First half of the course is devoted to historical perspectives and the second half explores the transition from subsistence to market oriented economies.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4630
**Requisites:** Restricted to graduate students only.

**ANTH 5700 (3) Practicing Anthropology**
Learn ethnographic methods in the classroom and implement these skills in placements with community organizations, where students pursue an applied research project. This course teaches students how to use anthropological theory and methods to investigate social problems, and to consider how ethnographic research techniques can be applied to positively impact society.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4700
**Requisites:** Restricted to Anthropology (ANTH) graduate students only.
**Grading Basis:** Letter Grade

**ANTH 5730 (3) Latin American Politics and Culture through Film and Text**
Introduces students to the political cultures and societies of Latin America. Through historical and ethnographic text and documentary and non-documentary cinema, this course will explore class relations, ideology and resistance from the conquest to the present.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4730

**ANTH 5735 (3) Contemporary Cuban Culture: Race, Gender and Power**
Ground students' understanding of contemporary Cuba within the global context. How do those outside the island imagine Cuba and why? What are the realities? In a world of U.S. dominated globalization, only recently have we relaxed a forceful economical blockade on the island: what does the U.S. mean in the Cuban imaginary, both in the past and present? To attend to global processes as they affect local (Cuban) experience, texts from anthropology, history, policy, literature, film and music will be drawn upon. Students will learn how long-standing patterns regarding race, color, class and gender relations have evolved into the socialist and now the "post-socialist" context.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4735
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ANTH 5745 (3) Science, Technology and Society**
Explores the cultural work of science and technology in contemporary societies. The course will focus on anthropological studies of technoscientific works ranging from high-energy particle physics and marine biology to hackathons and space exploration. Discussion topics include the relationship between science, technology and political power; scientific controversies; paradigm shifts and scientific revolutions; and ideas of objectivity, representation and abstraction.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4745
**Grading Basis:** Letter Grade

**ANTH 5750 (3) Culture and Society in South Asia**
Intensive analysis of major issues in anthropological research on South Asia (India, Pakistan, Bangladesh, Nepal and Sri Lanka), including kinship, gender, marriage, caste system, religion and ritual, ethnic conflict and social change.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4750
**Additional Information:** Departmental Category: Asia Content

**ANTH 5755 (3) Cultures of Expertise: Science, Power and Knowledge**
Examines the expertise as a cultural category. Students will consider the historical and cultural contexts of various forms of expertise and the social roles of experts from car mechanics to civil engineers, doctors and scientists. Students will be given opportunities to reflect analytically on their own experiences with increasingly specialized education as they develop "professional vision" in their chosen fields.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4755
**Grading Basis:** Letter Grade

**ANTH 5760 (3) Ethnography of Southeast Asia and Indonesia**
Introduces the historical, political, and cultural dimensions of Southeast Asia, focusing primarily on Malaysia, the Philippines, Singapore and Indonesia, with some coverage of mainland Southeast Asia.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4760
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Asia Content

**ANTH 5770 (3) Core Course---Archaeology**
Provides a graduate-level overview of analytic issues relevant to all phases of archaeological research and of the diversity of theoretical perspectives within the field as a whole. Course is required for all first-year graduate students in anthropology.
**Requisites:** Restricted to Anthropology (ANTH) graduate students only.

**ANTH 5780 (3) Core Course-Cultural Anthropology**
Provides an intense, graduate-level introduction to the discipline of cultural anthropology, with an emphasis upon critically assessing those methods, theories, and works that have shaped the field from the 19th century to the present time. Required of all first-year graduate students in anthropology.
**Requisites:** Restricted to Anthropology (ANTH) graduate students only.

**ANTH 5785 (3) Advanced Seminar in Cultural Anthropology**
Details the history of theory and practice in contemporary cultural anthropology, considering the development of major theoretical schools of thought and the integration of general social theory within anthropology. Required of masters students in cultural anthropology.
**Requisites:** Restricted to Anthropology (ANTH) graduate students only.

**ANTH 5790 (3) Core Course---Biological Anthropology**
Discusses how biological anthropologists use evidence and concepts from evolutionary theory, human biology, and ecology to understand the evolution, diversification, and adaptation of human populations. Required of all first-year graduate students in anthropology.
**Requisites:** Restricted to Anthropology (ANTH) graduate students only.

**ANTH 5795 (3) Proseminar in Anthropology**
Introduces incoming first-year graduate students to the history and current state of scholarship in anthropology from across the subdisciplines, through introduction to the research of individual faculty in the department. Required of all incoming graduate students.
**Requisites:** Restricted to graduate students only.

**ANTH 5840 (1-6) Guided Study**
Directed individual research based on a specific area of specialization.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**ANTH 5919 (3) Collections Research Practicum: Archaeology**
Focuses on Museum collections management from archaeological sites mainly in the American Southwest and Mongolia. The course involves readings, discussion, and collections analysis and archival documentation. Extra time outside of class is required for the practicum aspect of this course. Each student will need to schedule with the professor an additional 3 hours each week when they will focus on an aspect of their project, to be discussed below under grading criteria. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4919 and MUSM 5919
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**ANTH 5930 (1-6) Anthropology Internship**
Provides academically supervised opportunities graduate students to work in public and private sectors on projects related to students' career goals. Relates classroom theory to practice. Requires at least 48 hours on the job per credit hour and evidence (paper, employer evaluation, work journal) of significant learning.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4930
**Repeatable:** Repeatable for up to 9.00 total credit hours.

**ANTH 6320 (3) Linguistic Anthropology**
Serves as an advanced introduction to the empirical and theoretical foundations of contemporary linguistic anthropology, with special emphasis on the ways in which culture and society emerge semiotically through language and discourse.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 6320
**Requisites:** Restricted to graduate students only.

**ANTH 6500 (3) Issues in Indigenous Languages**
Addresses socio-cultural issues concerning indigenous languages, including human rights, intellectual property, language endangerment and maintenance, identity, linguistic relativity, sense of place.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 6500
**Grading Basis:** Letter Grade

**ANTH 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.

**ANTH 6950 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ANTH 7000 (3) Seminar: Current Research Topics in Cultural Anthropology**
Discusses current research and theoretical issues in the field of cultural anthropology.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ANTH 7010 (3) Seminar: Contemporary Theory in Cultural Anthropology**
Addresses current theoretical perspectives in cultural anthropology and controversies surrounding them. Discusses science, history, interpretation, and postmodernism. Includes the relationship between theory and method as well as the production of ethnography.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ANTH 7015 (3) Kinship: Being and Belonging**
Explores interpersonal relationships as foundational objects of analysis. This course takes a comparative approach to examine both large-scale social movements and intimate practices, examining how the ideologies and practices of relatedness intersect with and are shaped by gender and sexuality, national identity and state building, race and ethnicity, embodiment, ways of understanding signs in the world (semiotics), the law, and economic relationships. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.

**ANTH 7020 (3) Seminar: Biological Anthropology**
In-depth discussion of selected topics in physical anthropology with emphasis on recent research.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ANTH 7030 (3) Seminar: Archaeology**
Intensive examination of selected theoretical or methodological topics in archaeology. Topics vary with current research emphasis.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ANTH 7140 (3) Seminar: Archaeology of Selected Areas**
Considers archaeology of a specified area, either geographical or topical. Areas selected in accordance with current research interests. May be repeated upto 9 total credit hours.
**Repeatable:** Repeatable for up to 9.00 total credit hours.

**ANTH 7200 (3) Bridging Seminar**
Addresses important topics with current theoretical perspectives from at least two anthropological subdisciplines. This provides an interdisciplinary approach across the sub-disciplines of Anthropology: Archaeology, Biological, and Cultural enabling students to better understand and appreciate a holistic approach to anthropological inquiry. Graduate students from other departments may be allowed to take the course if room permits and they have an appropriate background by instructor's permission.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Anthropology (ANTH) graduate students only.
**Grading Basis:** Letter Grade

**ANTH 7300 (3) Seminar: Research Methods in Cultural Anthropology**
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ANTH 7500 (3) Anthropological Ethics**
As the AAA Statement on Ethics notes, ¿Anthropology¿that most humanistic of sciences and scientific of humanities¿is an irreducibly social enterprise.¿ Anthropologists confront an array of ethical issues as they engage in research, requiring a synthesis of both professional and personal ethics. In this course, we will examine our responsibilities to people and animals with whom we work and whose lives we study as well as our obligations to the broader discipline, the public, and the environment. We will also explore the history and origins of our discipline and how these legacies have shaped the ethical landscapes of our field.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ANTH 7600 (3) Human Ecology: Cultural Aspects**
Reviews and critically examines the major theoretical perspectives for understanding the relationship between human social behavior and the environment developed in the social sciences, especially anthropology, over the last 100 years. Formerly ANTH 5600.

**ANTH 7620 (3) Seminar: Ethnography and Cultural Theory**
Explores how ethnographic writing has evolved over the past century to incorporate different forms of cross-cultural representation and to accommodate new theoretical paradigms. Includes ethnographic authority and reflexivity, as well as embedded theories and blurred genres of cultural research.

**ANTH 7840 (1-6) Independent Research**
Research aimed at developing a solution to an originally conceived research problem.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**ANTH 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the graduate school section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.

# Applied Math (APPM)

## Courses

**APPM 1235 (4) Pre-Calculus for Engineers**
Prepares students for the challenging content and pace of the calculus sequence required for all engineering majors. Covers algebra, trigonometry and selected topics in analytical geometry. Prepares students for the calculus courses offered for engineering students. Requires students to engage in rigorous work sessions as they review topics that they must be comfortable with to pursue engineering course work. Structured to accustom students to the pace and culture of learning encountered in engineering math courses. For more information about the math placement referred to in the "Enrollment Requirements", please contact your academic advisor. Formerly GEEN 1235.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 1021 or MATH 1150
**Requisites:** Requires an ALEKS math exam taken in 2016 or earlier, or placement into pre-calculus based on your admissions data and/or CU Boulder coursework.

**APPM 1236 (1) Precalculus Work Group**
Develops and enhances problem solving skills for students enrolled in APPM 1235. Course is conducted in a collaborative learning environment with students working in groups under the guide of a facilitator.
**Requisites:** Requires enrollment in corequisite course of APPM 1235.

**APPM 1340 (4) Calculus 1 with Algebra, Part A**
Studies selected topics in analytical geometry and calculus: rates of change of functions, limits, derivatives and their applications. This course and APPM 1345 together are equivalent to APPM 1350. The sequence of this course and APPM 1345 is specifically designed for students whose manipulative skills in the techniques of high school algebra and precalculus may be inadequate for APPM 1350. For more information about the math placement referred to in the "Enrollment Requirements", please contact your academic advisor.
**Requisites:** Requires prerequisite course of APPM 1235 or MATH 1021 or MATH 1150 or MATH 1160 (minimum grade C-) or an ALEKS math exam taken in 2016 or earlier, or placement into pre-calculus based on your admissions data and/or CU Boulder coursework.
**Additional Information:** Arts Sci Gen Ed: Quantitative Reasoning Math

**APPM 1345 (4) Calculus 1 with Algebra, Part B**
Continuation of APPM 1340. Studies selected topics in calculus: derivatives and their applications, integration, differentiation and integration of transcendental functions. Algebraic and trigonometric topics are studied throughout, as needed.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1350 or ECON 1088 or MATH 1081 or MATH 1300 or MATH 1310 or MATH 1330
**Requisites:** Requires prerequisite course of APPM 1340 (minimum grade C-).

**APPM 1350 (4) Calculus 1 for Engineers**
Topics in analytical geometry and calculus including limits, rates of change of functions, derivatives and integrals of algebraic and transcendental functions, applications of differentiations and integration. Students who have already earned college credit for calculus 1 are eligible to enroll in this course if they want to solidify their knowledge base in calculus 1. For more information about the math placement referred to in the "Enrollment Requirements", contact your academic advisor.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1345 or ECON 1088 or MATH 1081 or MATH 1300 or MATH 1310 or MATH 1330
**Requisites:** Requires prerequisite course of APPM 1235 or MATH 1021 or MATH 1150 or MATH 1160 or MATH 1300 (minimum grade C-) or an ALEKS math exam taken in 2016 or earlier, or placement into calculus based on your admissions data and/or CU Boulder coursework.
**Additional Information:** GT Pathways: GT-MA1 - Mathematics
Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**APPM 1351 (1) Calculus 1 Work Group**
Provides problem-solving assistance to students enrolled in APPM 1350. Student groups work in collaborative learning environment. Student participation is essential.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Requires enrollment in corequisite course of APPM 1350 or APPM 1345.

**APPM 1360 (4) Calculus 2 for Engineers**
Continuation of APPM 1350. Focuses on applications of the definite integral, methods of integration, improper integrals, Taylor's theorem, and infinite series.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 2300
**Requisites:** Requires prerequisite course of APPM 1345 or APPM 1350 or MATH 1300 (minimum grade C-).

**APPM 1361 (1) Calculus 2 Work Group**
Provides problem solving assistance for students enrolled in APPM 1360. Conducted in a collaborative learning environment. Student work groups solve calculus problems with assistance of facilitator.
**Requisites:** Requires enrollment in corequisite course of APPM 1360.

**APPM 1390 (1) A Game for Calculus**
Coaches students to implement study strategies geared specifically toward APPM Calculus in a structured, supportive, small group environment. Department consent required.
**Repeatable:** Repeatable for up to 3.00 total credit hours.

**APPM 1650 (4) Python for Math and Data Science Applications**
Uses Python to teach the fundamentals of computer programming with an emphasis on mathematical and statistical applications. Topics will include data types, data structures, iteration, visualization, and simulations. Techniques covered will be applicable to many scientific and technical fields. No prior programming experience is required. Formerly offered as a special topics course.
**Requisites:** Requires prerequisite or corequisite courses of APPM 1350 or APPM 1345 or MATH 1300 or MATH 1310 (all minimum grade C-).

**APPM 2340 (4) Calculus 3 for Statistics and Data Science**
Covers vectors and vector analysis, partial derivatives and the multivariable Taylor theorem, and multiple integrals. Introduces matrices and statistical applications.
**Requisites:** Requires prerequisite courses APPM 1360 or MATH 2300 (both minimum grade C-).

**APPM 2350 (4) Calculus 3 for Engineers**
Covers multivariable calculus, vector analysis, and theorems of Gauss, Green, and Stokes.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 2400
**Requisites:** Requires prerequisite course of APPM 1360 or MATH 2300 (minimum grade C-).

**APPM 2351 (1) Calculus 3 Work Group**
Provides problem solving assistance to students enrolled in APPM 2350. Conducted in a collaborative learning environment. Student work groups solve calculus problems with the assistance of a facilitator.
**Requisites:** Requires enrollment in corequisite course of APPM 2350.

**APPM 2360 (4) Introduction to Differential Equations with Linear Algebra**
Introduces ordinary differential equations, systems of linear equations, matrices, determinants, vector spaces, linear transformations, and systems of linear differential equations.
**Equivalent - Duplicate Degree Credit Not Granted:** both MATH 2130 and MATH 3430
**Requisites:** Requires prerequisite course of APPM 1360 or MATH 2300 (minimum grade C-).

**APPM 2361 (1) Differential Equations Work Group**
Provides problem solving assistance to students enrolled in APPM 2360. Conducted in a collaborative learning environment. Student work in groups solve ordinary differential equations and linear algebra problems with the assistance of a facilitator.
**Requisites:** Requires corequisite course of APPM 2360.

**APPM 2450 (1) Calculus 3 Computer Lab**
Selected topics in analytic geometry and calculus with a focus on symbolic computation using Mathematica.
**Requisites:** Requires a corequisite course of APPM 2350.

**APPM 2460 (1) Differential Equations Computer Lab**
Selected topics in differential equations and linear algebra with a focus on symbolic computation using MATLAB.
**Requisites:** Requires enrollment in a corequisite course of APPM 2360.

**APPM 2720 (1-3) Open Topics in Lower Division Applied Mathematics**
Provides a vehicle for the development and presentation of new topics that are accessible to lower division Applied Mathematics students. These topics have the potential to be incorporated into the core APPM curriculum.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of APPM 1350 or MATH 1300 (minimum grade C-).
**Grading Basis:** Letter Grade

**APPM 2750 (4) Java: Training, Mathematical Algorithms, and Mobile Apps**
Preparatory course for Java programming. Provides necessary background for Java language: basic object-oriented concepts, analysis, and design. Learn to create Java applets, applications and mobile apps, create graphic context, and identify the key features of Java foundation classes as well as other Java-related technology. Material is taught in the context of mathematical algorithms from calculus. Department enforced requisite, knowledge of a programming language.
**Requisites:** Requires prerequisite course of APPM 1350 or MATH 1300 (minimum grade C-).

**APPM 3010 (3) Chaos in Dynamical Systems**
Introduces undergraduate students to chaotic dynamical systems. Topics include smooth and discrete dynamical systems, bifurcation theory, chaotic attractors, fractals, Lyapunov exponents, synchronization and networks of dynamical systems. Applications to engineering, biology and physics will be discussed.
**Requisites:** Requires prerequisite course of APPM 2360 or MATH 3430 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 3050 (3) Scientific Computing in Matlab**
Topics covered include: approximations in computing, computer arithmetic, interpolation, matrix computations, nonlinear equations, optimization, and initial-value problems with emphasis on the computational cost, efficiency, and accuracy of algorithms. The problem sets are application-oriented with examples taken from orbital mechanics, physics, genetics, and fluid dynamics.
**Requisites:** Requires prerequisite course of APPM 2360 or MATH 3430 (minimum grade C-).

**APPM 3170 (3) Discrete Applied Mathematics**
Introduces students to ideas and techniques from discrete mathematics that are widely used in science and engineering. Mathematical definitions and proofs are emphasized. Topics include formal logic notation, proof methods; set theory, relations; induction, well-ordering; algorithms, growth of functions and complexity; integer congruences; basic and advanced counting techniques, recurrences and elementary graph theory. Other selected topics may also be covered.
**Requisites:** Requires a prerequisite of APPM 1360 or MATH 2300 (all minimum grade C-).

**APPM 3310 (3) Matrix Methods and Applications**
Introduces linear algebra and matrices with an emphasis on applications, including methods to solve systems of linear algebraic and linear ordinary differential equations. Discusses vector space concepts, decomposition theorems, and eigenvalue problems.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 2130 and MATH 2135
**Requisites:** Requires prerequisite course of APPM 2340 or APPM 2350 or APPM 2360 or MATH 2400 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 3311 (1) Matrix Methods Workgroup**
Provides problem-solving assistance to students enrolled in APPM 3310. Student groups work in collaborative learning environment. Student participation is essential.
**Requisites:** Requires enrollment in corequisite course of APPM 3310.

**APPM 3350 (3) Advanced Engineering Calculus**
Extends the treatment of engineering mathematics beyond the topics covered in Calculus 3 and differential equations. Topics include non-dimensionalization, elementary asymptotics and perturbation theory, Reynold's transport theorem and extensions of Leibnitz's rule, as applied to continuum conservation equations, Hamiltonian formulations, Legendre and Laplace transforms, special functions and their orthogonality properties.
**Requisites:** Requires prerequisite course of APPM 2350 or MATH 2400 and APPM 2360 (all minimum grade C-).

**APPM 3570 (3) Applied Probability**
Studies axioms, counting formulas, conditional probability, independence, random variables, continuous and discrete distribution, expectation, joint distributions, moment generating functions, law of large numbers and the central limit theorem.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3810 or MATH 4510 STAT 3100
**Requisites:** Requires a prerequisite or corequisite course of APPM 2350 or APPM 2340 or MATH 2400 (prereq minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 3650 (3) Algorithms and Data Structures in Python**
Covers data structures (stacks, queues, linked lists, hash tables, heaps), algorithms (divide and conquer, sorting, greedy, graph, dynamic programming), and asymptotic complexity with an emphasis on applied math topics. Assignments will include programming projects written in Python
**Requisites:** Requires prerequisite courses of APPM 1650 and (APPM 1360 or MATH 2300) (minimum grade C-) or instructor consent.

**APPM 4120 (3) Introduction to Operations Research**
Studies linear and nonlinear programming, the simplex method, duality, sensitivity, transportation and network flow problems, some constrained and unconstrained optimization theory, and the Kuhn-Tucker conditions, as time permits.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5120 and MATH 4120 and MATH 5120
**Requisites:** Requires a prerequisite course of APPM 3310 or MATH 2130 or MATH 2135 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4320 (3) Introduction to Dynamics on Networks**
Introduces modern approaches to model and analyze dynamical processes on complex networks. Many dynamical processes such as epidemic propagation, opinion formation, synchronization, and cascading processes take place on complex social or technological networks. This course will introduce the tools to understand the interplay between network structure and the outcome of these dynamical processes. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5320
**Requisites:** Requires prerequisite courses of APPM 2360 and APPM 3310 (all minimum grade C-).
**Grading Basis:** Letter Grade

**APPM 4350 (3) Methods in Applied Mathematics: Fourier Series and Boundary Value Problems**
Reviews ordinary differential equations, including solutions by Fourier series. Physical derivation of the classical linear partial differential equations (heat, wave, and Laplace equations). Solution of these equations via separation of variables, with Fourier series, Fourier integrals, and more general eigenfunction expansions.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5350
**Requisites:** Requires prerequisite courses of APPM 2350 or MATH 2400 and APPM 2360 (all minimum grade C-) and a prerequisite or corequisite course of APPM 3310 (prereq minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4360 (3) Methods in Applied Mathematics: Complex Variables and Applications**
Introduces methods of complex variables, contour integration and theory of residues. Applications include solving partial differential equations by transform methods, Fourier and Laplace transforms and Reimann-Hilbert boundary-value problems, conformal mapping to ideal fluid flow and/or electrostatics.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5360
**Requisites:** Requires prerequisite courses of APPM 2350 or MATH 2400 and APPM 2360 (all minimum grade C-) and a prerequisite or corequisite course of APPM 3310 (prereq minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4370 (3) Computational Neuroscience**
Applies mathematical and computational methods to neuroscience. Techniques from linear algebra, differential equations, introductory dynamical systems, probability, stochastic processes, model validation, and machine learning will be learned and used. Neuroscience topics include neural spiking, network dynamics, probabilistic inference, learning, and plasticity. Will learn how the brain uses computational principles to enact decision making, vision, and memory. Recommended background includes linear algebra, differential equations, probability, and programming. Students will hone programming skills in MATLAB/Python and TensorFlow.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5370
**Requisites:** Requires prerequisite courses of APPM 2360 and APPM 3310 (all minimum grade C-).
**Recommended:** Prerequisite APPM 3570/STAT 3100, STAT 2600 or CSCI 3022.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4380 (3) Modeling in Applied Mathematics**
An exposition of a variety of mathematical models arising in the physical and biological sciences. Students' modeling projects are presented in class. Topics may include: GPS navigation, medical imaging, ocean waves, and computerized facial recognition.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5380
**Requisites:** Requires prerequisite courses of APPM 2350 or MATH 2400 and APPM 2360 (all minimum grade C-).
**Recommended:** Prerequisites APPM 3310 and APPM 4350 and APPM 4650.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4390 (3) Modeling in Mathematical Biology**
Investigates how complex systems in biology can be studied using applied mathematics. Examines several case studies which include topics from microbiology, enzyme reaction kinetics, neuroscience, ecology, epidemiology, physiology and bioengineering.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5390
**Requisites:** Requires prerequisite courses of APPM 2360 and APPM 3310 or MATH 3130 or MATH 3135 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4440 (3) Undergraduate Applied Analysis 1**
Provides a rigorous treatment of topics covered in Calculus 1 and 2. Topics include convergent sequences; continuous functions; differentiable functions; Darboux sums, Riemann sums, and integration; Taylor and power series and sequences of functions.
**Requisites:** Requires prerequisite courses of APPM 2350 or MATH 2400 and APPM 2360 (all minimum grade C-) and a prerequisite or corequisite course of APPM 3310 (prereq minimum grade C-).

**APPM 4450 (3) Undergraduate Applied Analysis 2**
Continuation of APPM 4440. Study of multidimensional analysis including n-dimensional Euclidean space, continuity and uniform continuity of functions of several variables, differentiation, linear and nonlinear approximation, inverse function and implicit function theorems, and a short introduction to metric spaces.
**Requisites:** Requires prerequisite course of APPM 4440 or MATH 3001 (minimum grade C-).

**APPM 4490 (3) Theory of Machine Learning**
Presents the underlying theory behind machine learning in proofs-based format. Answers fundamental questions about what learning means and what can be learned via formal models of statistical learning theory. Analyzes some important classes of machine learning methods. Specific topics may include the PAC framework, VC-dimension and Rademacher complexity.
**Requisites:** Requires prerequisite course of APPM 4440 (minimum grade C-).
**Recommended:** Prerequisite CSCI 5622 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4510 (3) Data Assimilation in High Dimensional Dynamical Systems**
Develops and analyzes approximate methods of solving the Bayesian inverse problem for high-dimensional dynamical systems. After briefly reviewing mathematical foundations in probability and statistics, the course covers the Kalman filter, particle filters, variational methods and ensemble Kalman filters. The emphasis is on mathematical formulation and analysis of methods.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5510, STAT 4250 and STAT 5250
**Requisites:** Requires prerequisite courses of APPM 3310 and (STAT 4520 or MATH 4520). All minimum grade C-.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4515 (3) High-Dimensional Probability for Data Science**
Provides students with an exposition of the most recent methods of high-dimensional probability for the analysis of high dimensional datasets. Applications include randomized algorithms and high-dimensional random models of datasets.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5515
**Requisites:** Requires prerequisite courses of APPM 3310 and APPM 3570 (minimum grade C-).

**APPM 4530 (3) Stochastic Analysis for Finance**
Studies mathematical theories and techniques for modeling financial markets. Specific topics include the binomial model, risk neutral pricing, stochastic calculus, connection to partial differential equations and stochastic control theory.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5530, STAT 4230 and STAT 5230
**Requisites:** Requires prerequisite courses of APPM 3310 and APPM 3570, or STAT 3100, or MATH 4510 (all minimum grade C-).

**APPM 4560 (3) Markov Processes, Queues, and Monte Carlo Simulations**
Brief review of conditional probability and expectation followed by a study of Markov chains, both discrete and continuous time, including Poisson point processes. Queuing theory, terminology and single queue systems are studied with some introduction to networks of queues. Uses Monte Carlo simulation of random variables throughout the semester to gain insight into the processes under study.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5560 and STAT 4100
**Requisites:** Requires prerequisite courses of APPM 3570 or STAT 3100 or MATH 4510 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**APPM 4565 (3) Random Graphs**
Introduces mathematical techniques, including generating functions, the first- and second-moment method and Chernoff bounds to study the most fundamental properties of the Erdos-Renyl model and other celebrated random graph models such as preferential attachment, fixed degree distribution, and stochastic block models.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5565
**Requisites:** Requires prerequisite APPM 3570 or MATH 4510 (both minimum grade C).

**APPM 4600 (4) Numerical Methods and Scientific Computing**
Provides an introduction to numerical analysis and scientific computing. Numerical analysis topics include root finding, interpolation, quadrature, linear system solution techniques, and techniques for approximating eigenvalues. Scientific computing topics include code development and repository management in addition to an introduction to shared and distributed memory computing. Involves hands-on learning with weekly group interactions and a final project including a report and in-class presentation.
**Requisites:** Requires prerequisite course of APPM 3310 (minimum grade C-).
**Recommended:** Prerequisite knowledge of a programming language such as Python, and C++.

**APPM 4610 (3) Numerical Differential Equations**
Provides an introduction to the most commonly used techniques for numerically solving boundary value problems and time dependent problems and the corresponding linear systems. Topics include finite difference methods, the finite element method, the spectral method, spectral collocation methods, Euler and Runge-Kutta methods. Scientific computing skills such as advanced code and memory management will be developed. Involves hands-on learning with weekly group interactions and a final project. Department enforced prerequisite: Knowledge of a programming language such as Python, and C++ is required.
**Requisites:** Requires prerequisite courses of APPM 2360 and APPM 4600 (all minimum grade C-).

**APPM 4650 (3) Intermediate Numerical Analysis 1**
Focuses on numerical solution of nonlinear equations, interpolation, methods in numerical integration, numerical solution of linear systems, and matrix eigenvalue problems. Stresses significant computer applications and software. Department enforced prerequisite: knowledge of a programming language.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4650
**Requisites:** Requires a prerequisite course of MATH 3430 or APPM 2360 and APPM 3310 (minimum grade C-).

**APPM 4720 (1-3) Open Topics in Applied Mathematics**
Provides a vehicle for the development and presentation of new topics that may be incorporated into the core courses in applied mathematics. Department enforced prerequisite: variable, depending on the topic, see instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5720
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.

**APPM 4840 (1-3) Reading and Research in Applied Mathematics**
Introduces undergraduate students to the research foci of the Department of Applied Mathematics. Department enforced prerequisite: variable depending on the topic.
**Repeatable:** Repeatable for up to 9.00 total credit hours.

**APPM 4950 (1-3) Seminar in Applied Mathematics**
Introduces undergraduate students to the research foci of the program in applied mathematics. It is also designed to be a capstone experience for the program's majors. Department enforced prerequisite: variable depending on the topic.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**APPM 5120 (3) Introduction to Operations Research**
Studies linear and nonlinear programming, the simplex method, duality, sensitivity, transportation and network flow problems, some constrained and unconstrained optimization theory, and the Kuhn-Tucker conditions, as time permits.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4120 and MATH 4120 and MATH 5120
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites APPM 3310 OR MATH 2130 OR MATH 2135 or equivalent.

**APPM 5320 (3) Introduction to Dynamics on Networks**
Introduces modern approaches to model and analyze dynamical processes on complex networks. Many dynamical processes such as epidemic propagation, opinion formation, synchronization, and cascading processes take place on complex social or technological networks. This course will introduce the tools to understand the interplay between network structure and the outcome of these dynamical processes. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4320
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APPM 5350 (3) Methods in Applied Mathematics: Fourier Series and Boundary Value Problems**
Department enforced prerequsite courses: APPM 2350 or MATH 2400 and APPM 2360 and a prerequisite or corequisite course: APPM 3310 or MATH 2130 or MATH 2135.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4350
**Requisites:** Restricted to graduate students only.

**APPM 5360 (3) Methods in Applied Mathematics: Complex Variables and Applications**
Introduces methods of complex variables, contour integration and theory of residues. Applications include solving partial differential equations by transform methods, Fourier and Laplace transforms and Reimann-Hilbert boundary-value problems, conformal mapping to ideal fluid flow and/or electrostatics. Department enforced prerequisites: APPM 2350 or MATH 2400 and APPM 2360 and a prerequisite or corequisite course of APPM 3310 or MATH 3130 or MATH 3135.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4360
**Requisites:** Restricted to graduate students only.

**APPM 5370 (3) Computational Neuroscience**
Applies mathematical and computational methods to neuroscience. Techniques from linear algebra, differential equations, introductory dynamical systems, probability, stochastic processes, model validation, and machine learning will be learned and used. Neuroscience topics include neural spiking, network dynamics, probabilistic inference, learning, and plasticity. Will learn how the brain uses computational principles to enact decision making, vision, and memory. Recommended background includes linear algebra, differential equations, probability, and programming. Students will hone programming skills in MATLAB/Python and TensorFlow.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4370
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites APPM 2360 and APPM 3310 and STAT 4000 or equivalent courses.

**APPM 5380 (3) Modeling in Applied Mathematics**
An exposition of a variety of mathematical models arising in the physical and biological sciences. Students' modeling projects are presented in class. Topics may include: GPS navigation, medical imaging, ocean waves, and computerized facial recognition. Department enforced prerequisites: APPM 2350 or MATH 2400 and APPM 2360.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4380
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites APPM 3310 and APPM 4350 and APPM 4650.

**APPM 5390 (3) Modeling in Mathematical Biology**
Investigates how complex systems in biology can be studied using applied mathematics. Examines several case studies which include topics from microbiology, enzyme reaction kinetics, neuroscience, ecology, epidemiology, physiology and bioengineering. Department enforced prerequisites: APPM 2360 and APPM 3310 or MATH 2130 or MATH 2135 or instructor consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4390
**Requisites:** Restricted to graduate students only.

**APPM 5430 (3) Methods in Applied Mathematics: Applications of Complex Variables**
Reviews basic ideas of complex analysis, including solutions of ODEs and PDEs of physical interest via complex analysis; conformal mapping, including Schwarz-Christoffel transformations and generalizations; computational methods; Riemann-Hilbert problems; topics in asymptotic methods. Department enforced prerequisite: APPM 4360 or APPM 5360.
**Requisites:** Restricted to graduate students only.

**APPM 5440 (3) Applied Analysis 1**
Discusses the elements of basic real and complex analysis, Banach spaces, Lp spaces and many relevant inequalities. Includes applications of existence and uniqueness of solutions to various types of ordinary differential equations, partial differential equations, and integral equations. Department enforced prerequisites: APPM 4440 and APPM 4450.
**Requisites:** Restricted to graduate students only.

**APPM 5450 (3) Applied Analysis 2**
Continuation of APPM 5440. Department enforced prerequisite: APPM 5440.
**Requisites:** Restricted to graduate students only.

**APPM 5460 (3) Methods in Applied Mathematics: Dynamical Systems and Differential Equations**
Introduces the theory and applications of dynamical systems through solutions to differential equations. Covers existence and uniqueness theory, local stability properties, qualitative analysis, global phase portraits, perturbation theory and bifurcation theory. Special topics may include Melnikov methods, averaging methods, bifurcations to chaos and Hamiltonian systems. Department enforced prerequisites: APPM 2360 and APPM 3310 and APPM 4440.
**Requisites:** Restricted to graduate students only.

**APPM 5470 (3) Methods of Applied Mathematics: Partial Differential and Integral Equations**
Studies properties and solutions of partial differential equations. Covers methods of characteristics, well-posedness, wave, heat and Laplace equations, Green's functions and related integral equations. Department enforced prerequisites: APPM 4350 or MATH 4470 and APPM 4360 or MATH 3450.
**Requisites:** Restricted to graduate students only.

**APPM 5480 (3) Methods of Applied Mathematics: Approximation Methods**
Covers asymptotic evaluation of integrals (stationary phase and steepest descent), perturbation methods (regular and singular methods, and inner and outer expansions), multiple scale methods and applications to differential and integral equations. Department enforced prerequisite: APPM 5470.
**Requisites:** Restricted to graduate students only.

**APPM 5490 (3) Theory of Machine Learning**
Presents the underlying theory behind machine learning in proofs-based format. Answers fundamental questions about what learning means and what can be learned via formal models of statistical learning theory. Analyzes some important classes of machine learning methods. Specific topics may include the PAC framework, VC-dimension and Rademacher complexity.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites APPM 4440 and CSCI 5622.

**APPM 5510 (3) Data Assimilation in High Dimensional Dynamical Systems**
Develops and analyzes approximate methods of solving the Bayesian inverse problem for high-dimensional dynamical systems. After briefly reviewing mathematical foundations in probability and statistics, the course covers the Kalman filter, particle filters, variational methods and ensemble Kalman filters. The emphasis is on mathematical formulation and analysis of methods.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4510, STAT 4250 and STAT 5250
**Requisites:** Restricted to graduate students only.

**APPM 5515 (3) High-Dimensional Probability for Data Science**
Provides students with an exposition of the most recent methods of high-dimensional probability for the analysis of high dimensional datasets. Applications include randomized algorithms and high-dimensional random models of datasets.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4515
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites APPM 3310 and APPM 3570, or equivalent.

**APPM 5530 (3) Stochastic Analysis for Finance**
Studies mathematical theories and techniques for modeling financial markets. Specific topics include the binomial model, risk neutral pricing, stochastic calculus, connection to partial differential equations and stochastic control theory.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4530, STAT 5230 and STAT 4230
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to that of APPM 3310 and one of APPM 3570, STAT 3100 or MATH 4510; all with minimum grade of C-.

**APPM 5560 (3) Markov Processes, Queues, and Monte Carlo Simulations**
Brief review of conditional probability and expectation followed by a study of Markov chains, both discrete and continuous time, including Poisson point processes. Queuing theory, terminology and single queue systems are studied with some introduction to networks of queues. Uses Monte Carlo simulation of random variables throughout the semester to gain insight into the processes under study.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4560, STAT 4100 and STAT 5100
**Requisites:** Restricted to graduate students only.

**APPM 5565 (3) Random Graphs**
Introduces mathematical techniques, including generating functions, the first- and second-moment method and Chernoff bounds to study the most fundamental properties of the Erdos-Renyl model and other celebrated random graph models such as preferential attachment, fixed degree distribution, and stochastic block models.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4565
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APPM 5600 (3) Numerical Analysis 1**
Solution of nonlinear algebraic equations, interpolation, integration, approximation, and numerical linear algebra. Department enforced prerequisite: APPM 3310 or MATH 2130 and experience with a scientific programming language.
**Requisites:** Restricted to graduate students only.

**APPM 5610 (3) Numerical Analysis 2**
Numerical linear algebra, eigenvalue problems, optimization problems, and ordinary and partial differential equations. Department enforced prerequisite: APPM 5600 or MATH 5600.
**Requisites:** Restricted to graduate students only.

**APPM 5620 (3) Numerical Linear Algebra**
Develops and analyzes methods for the solution of square nonsingular linear systems, linear least squares problems, eigenvalue problems, and rank estimation. Direct and iterative methods are covered, as well as methods for dense and sparse problems. Requires solid background in linear algebra and proficiency with scientific computing.
**Requisites:** Restricted to graduate students only.

**APPM 5650 (3) Randomized Algorithms**
Investigates modern randomized methods that are used in scientific and numerical computing, in particular randomized matrix approximation methods. Other topics may include stochastic gradient methods and variance reduced versions, compressed sensing, and locality sensitive hashing.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5650
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite APPM 4440 or equivalent.

**APPM 5720 (1-3) Open Topics in Applied Mathematics**
Provides a vehicle for the development and presentation of new topics that may be incorporated into the core courses in applied mathematics. Department enforced prerequisite: variable, depending on the topic, see instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4720
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**APPM 6470 (3) Advanced Partial Differential Equations**
Continuation of APPM 5470. Advanced study of the properties and solutions of elliptic, parabolic, and hyperbolic partial differential equations. Topics include the study of Sobolev spaces and variational methods as they relate to PDEs, and other topics as time permits. Department enforced prerequisite: APPM 5470.
**Requisites:** Restricted to graduate students only.

**APPM 6520 (3) Mathematical Statistics**
Emphasizes mathematical theory of statistics. Topics include distribution theory, estimation and testing of hypotheses, multivariate analysis, and nonparametric inference, all with emphasis on theory. Department enforced prerequisite: APPM 5520 or MATH 5520.
**Requisites:** Restricted to graduate students only.

**APPM 6550 (3) Introduction to Stochastic Processes**
Systematic study of Markov chains and some of the simpler Markov processes including renewal theory, limit theorems for Markov chains, branching processes, queuing theory, birth and death processes, and Brownian motion. Applications to physical and biological sciences. Department enforced prerequisite: MATH 4001 or MATH 4510 or APPM 3570 or APPM 4560 or instructor consent.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 6550
**Requisites:** Restricted to graduate students only.

**APPM 6560 (3) Measure-Theoretic Probability**
Introduces a series of fundamental concepts and results in probability theory, using rigorous measure-theoretic language. Provides a solid foundation for further studies and research in probability, stochastic processes, statistics, and data science.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites Undergraduate analysis at the level of APPM 4440.

**APPM 6570 (3) Stochastic Differential Equations**
Devoted to a comprehensive investigation of stochastic differential equations, as well as their important applications in Finance, Physics, and Engineering. Consists of three main topics: stochastic integration, the theory of stochastic differential equations (SDEs), and applications of SDEs.
**Recommended:** Prerequisite APPM 6560 or MATH/APPM 6550.

**APPM 6610 (3) Introduction to Numerical Partial Differential Equations**
Covers finite difference, finite element, finite volume, pseudo-spectral, and spectral methods for elliptic, parabolic, and hyperbolic partial differential equations. Department enforced prerequisite: APPM 5600.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite APPM 5610 or graduate numerical linear algebra.

**APPM 6640 (3) Multigrid Methods**
Develops a fundamental understanding of the principles and techniques of the multigrid methodology, which is a widely used numerical approach for solving many problems in such diverse areas as aerodynamics, astrophysics, chemistry, electromagnetics, hydrology, medical imaging, meteorology/oceanography, quantum mechanics, and statistical physics.
**Requisites:** Restricted to graduate students only.

**APPM 6900 (1-6) Independent Study**
Introduces graduate students to research foci of the Department of Applied Mathematics.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**APPM 6920 (1-3) Professional Internship**
This class provides a structure for Applied Mathematics graduate students to receive academic credit for internships with industry partners that have an academic component to them suitable for graduate-level work. Participation in the program will consist of an internship agreement between a student and an industry partner who will employ the student in a role that supports the academic goals of the internship. Instructor participation will include review of internship agreement, facilitation of mid-term and final assessments of student performance, and support for any academic-related issues that may arise during the internship period.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Applied Mathematics (APPM) graduate students only.
**Grading Basis:** Letter Grade

**APPM 6930 (1-3) Professional Master's Culminating Experience**
Provides an opportunity for an Applied Mathematics Professional Master¿s student to complete their Culminating Experience (CE) project with an advisor. Before enrolling, the student is expected to have an advisor who has agreed to guide a proposed CE project.
**Requisites:** Restricted to Applied Mathematics professional master's degree (AMEN-MSAM) students only.
**Grading Basis:** Letter Grade

**APPM 6940 (1) Master's Candidate for Degree**
**Requisites:** Restricted to graduate students only.

**APPM 6950 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**APPM 7100 (3) Mathematical Methods in Dynamical Systems**
Covers dynamical systems defined by mappings and differential equations. Hamiltonian mechanics, action-angle variables, results from KAM and bifurcation theory, phase plane analysis, Melnikov theory, strange attractors, chaos, etc.
**Requisites:** Requires prerequisite course of APPM 5460 (minimum grade D-). Restricted to graduate students only.

**APPM 7300 (3) Nonlinear Waves and Integrable Equations**
Includes basic results associated with linear dispersive wave systems, first-order nonlinear wave equations, nonlinear dispersive wave equations, solitons, and the methods of the inverse scattering transform. Department enforced prerequisites: APPM 4350 and APPM 4360.
**Requisites:** Restricted to graduate students only.

**APPM 7400 (1-3) Topics in Applied Mathematics**
Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the core courses in applied mathematics.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**APPM 7900 (1-3) Independent Study**
Introduces graduate students to research foci of the Department of Applied Mathematics.
**Requisites:** Restricted to graduate students only.

**APPM 8000 (1) Colloquium in Applied Mathematics**
Introduces graduate students to the major research foci of the Department of Applied Mathematics.
**Requisites:** Restricted to Applied Mathematics (APPM) graduate students only.

**APPM 8100 (1) Seminar in Dynamical Systems**
Introduces advanced topics and research in dynamical systems.
**Requisites:** Restricted to Applied Mathematics (APPM) graduate students only.

**APPM 8300 (1-3) Nonlinear Waves Seminar**
Introduces the core methods in the analysis of nonlinear partial differential and integral equations or systems to graduate students. Provides a vehicle for the development, presentation, and corporative research of new topics in PDE and analysis.
**Requisites:** Requires prerequisite course of APPM 5440 (minimum grade D-). Restricted to Applied Mathematics (APPM) graduate students only.

**APPM 8400 (1) Mathematical Biology Seminar**
Introduces advanced topics and research in mathematical and computational biology. Instructor consent required.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APPM 8500 (1) Statistics, Optimization and Machine Learning Seminar**
Research-level seminar that explores the mathematical foundations of machine learning, in particular how statistics and optimization give rise to well-founded and efficient algorithms.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APPM 8600 (1) Seminar in Computational Mathematics**
Introduces advanced topics and research in computational mathematics.
**Requisites:** Restricted to Applied Mathematics (APPM) graduate students only.

**APPM 8700 (1) Mathematical Geosciences Seminar**
Research-level seminar that explores applications of mathematical and statistical modeling, analysis, and computation in the geosciences. Provides a vehicle for the development, presentation, and dissemination of new topics in the mathematical geosciences. Formerly offered as a special topics course.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**APPM 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. No more than 10 credit hours may be taken in any one semester.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.

# Arabic Languages (ARAB)

## Courses

**ARAB 1010 (4) Beginning Arabic 1**
Introduces students to speaking, listening, reading, and writing skills in the standard means of communication in the Arab world. This course is proficiency-based. All activities within the course are aimed at placing the student in the context of the native-speaking environment from the very beginning.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic
Departmental Category: Asia Content

**ARAB 1011 (3) Introduction to Arab and Islamic Civilizations**
Provides an interdisciplinary overview of the cultures of the Arabic-speaking peoples of Southwest Asia and North Africa from the rise of Islam in the 7th century to the present. Readings include historical, religious, literary and cultural texts from both the medieval and modern eras. Taught in English.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Arabic Courses in English
Departmental Category: Asia Content

**ARAB 1020 (4) Beginning Arabic 2**
Continuation of ARAB 1010.
**Requisites:** Requires prerequisite course of ARAB 1010 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic
Departmental Category: Asia Content

**ARAB 2110 (4) Intermediate Arabic 1**
Proficiency-based course emphasizes speaking, listening, reading, and writing. Covers a variety of topics. Students give classroom presentations and write short essays in Arabic. Speaking ability is assessed through an oral proficiency interview.
**Requisites:** Requires prerequisite course of ARAB 1020 (minimum grade C).
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Arabic
Departmental Category: Asia Content

**ARAB 2120 (4) Intermediate Arabic 2**
Continuation of ARAB 2110.
**Requisites:** Requires prerequisite course of ARAB 2110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic
Departmental Category: Asia Content

**ARAB 2231 (3) Love, Loss and Longing in Classical Arabic Literature**
Surveys Arabic literature from the sixth through the eighteenth centuries. It offers an introduction to Arabic literature, namely prose and poetry, through its key texts as well as the range of themes and techniques found in this literature, and it lays the groundwork for contextualizing the literature in the framework of other literary traditions. Taught in English.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic Courses in English
Departmental Category: Asia Content

**ARAB 2320 (3) The Muslim World, 600-1250**
Focusing on the history of the Muslim World in the age of the caliphates, this course takes an interdisciplinary, comparative approach to the development of Islamicate society, focusing on social structure, politics, economics and religion. Students will use primary and secondary sources to write a research paper, and make in-class presentations to cultivate critical thinking, research and writing skills. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 2320
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Arabic Courses in English
Departmental Category: Asia Content

**ARAB 3110 (4) Advanced Arabic 1**
Designed to train students further in the four language skills (writing, speaking, reading, listening/comprehension) at an advanced level. Enables students to acquire a better and broader understanding of Arabic culture and texts drawn from various genres of Arabic letters.
**Requisites:** Requires prerequisite course of ARAB 2120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic
Departmental Category: Asia Content

**ARAB 3120 (4) Advanced Arabic 2**
Continues training in the four language skills (writing, speaking, reading, listening/comprehension) at an advanced level. Enables students to acquire a better and broader understanding of Arabic culture and texts drawn from various genres of Arabic letters.
**Requisites:** Requires prerequisite course of ARAB 3110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic
Departmental Category: Asia Content

**ARAB 3220 (3) Arabian Nights, Arabian Days: Popular Literature in the Arab World and Beyond**
Explores the development of popular literature in Arabic, studying the Arabian Nights and related genres including tribal epics, poetry, and plays. We will interrogate the cultural, class, and textual boundaries between popular literature and courtly, elite works across time. We will also explore the modern, Western enterprise of ¿discovering¿ and engaging with Arabic literary works, examining how global excitement for texts like the Nights has created new possibilities for cultural production and exchange.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ARAB 3221 (3) The Making of Middle Eastern Identities: Arabs and Their ¿Others¿**
Who is ¿Arab,¿ anyway? When did Arabs first develop a sense of ethnic identity, and out of what raw materials did it grow and take shape? How did this identity play off of, merge with, or get challenged by contact with different peoples as the horizons of the Arab world grew and changed, and how does this manifest in literature and the historical record? This course offers a discussion-oriented, upper-level seminar that focused on sources in which the author, protagonists, or intended audience engage with ethno-racially non-Arab cultures.
**Recommended:** Prerequisite Intro to Religion or other course focusing on Islam and/or Middle Eastern history or culture.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ARAB 3230 (3) Islamic Culture and the Iberian Peninsula**
Examines Islamic, especially Arab, culture and history as it relates to the Iberian Peninsula from 92 Ah/711 Ce to the present. Taught in English.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic Courses in English
Departmental Category: Asia Content

**ARAB 3231 (3) In the Footsteps of Travelers: Travel Writing in Arabic Lit**
Offers an excursion into the role and significance of travel and travel writing in Arabic literature in translation. We will read and discuss a range of literary works written by, about, and for travelers. More broadly, this course will offer an opportunity for undergraduates to expand their understanding of literature and the arts. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic Courses in English
Departmental Category: Asia Content

**ARAB 3241 (3) Art in Islamic Cultures**
Offers an overview of art in Islamic cultures. Discusses a range of literary texts and images in order to understand these cultures. Offers an opportunity for undergraduates to expand their understanding of literature and art history. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 3241
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic Courses in English

**ARAB 3251 (3) Language in Arab Society**
This course introduces the multilingual situation of Arab societies and presents fundamental concepts in sociolinguistics. Students study the major theories and frameworks of language variation and change and the influence of variables such as gender, social class, religion, and colonization on language choice. Students will understand the relationship between language, identity and ideology revealing power dynamics in Arab communities. The course is taught in English and no prior knowledge of Arabic language is required.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 3251
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ARAB 3330 (3) The Arabic Novel**
Focusing on the origins and development of the novel genre in the Arabic tradition, this course examines both the aesthetic qualities of the genre as an artistic form and the ways that it has depicted and intervened in the modern social, political, and cultural upheavals that have shaped the Arab world in the 20th century. Authors include Najib Mahfuz, Abd al Rahman Munif, Hanan al-Shaykh, and Ghassan Kanafani. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic Courses in English
Departmental Category: Asia Content

**ARAB 3331 (3) Arabic Poetry**
Introduces students to the vibrant world of Arabic poetic production, which has defined the cultural landscape of the Arab world and the broader Middle East for over one thousand years and continues to play a central part in the Arabic literary scene today. Some of this poetry has been translated into English, and translated Arabic poetry will serve as our gateway to better understanding why poetry is the diwan, or record, of the Arabs.

**ARAB 3340 (3) Representing Islam**
Explores the cultural politics of representations of the Arab and Islamic worlds both with an emphasis on literary representations of the Islamic world in travel narratives and novels from both the West and the Arab world. Examines historical, anthropological, and visual texts to consider how Islam has been narrated in colonial European imaginings about the Islamic world as well as contemporary representations. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic Courses in English
Departmental Category: Asia Content

**ARAB 3350 (3) Narrating the City: Literary Mappings of the Urban Landscape**
Examines literary narratives primarily from the Arabic tradition through focusing on the relationship of literature to the development and transformations of cities and urban spaces in the modern period. Begins with readings of 19th century European narratives that chronicle the changing space of the modern city followed by urban narratives from the Arabic literary tradition in order to comparatively examine how "universal" processes of modernization, development, and globalization in the modern world have been narrated. Writers include Mahfouz, Munif, al-Takarli, al-Aswani, Celik, Abu Lughod. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic Courses in English
Departmental Category: Asia Content

**ARAB 3360 (3) Truth and Prophecy in Islam**
Introduces students to the Islamic genre of hadith, or Prophetic traditions. The main concern of the course is to develop an understanding of how prophetic religious authority was understood and communicated in written form and what the relationship of the hadith form has been to alternative claims on prophetic authority in Islam. Finally, the course examines the role that the Prophetic hadith -- and their contestation -- have played in Islamic reform movements during the modern period.
**Recommended:** Prerequisite ARAB 1011.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ARAB 3410 (3) Gender, Sexuality and Culture in the Modern Middle East**
Examines the issues of gender and sexuality in the modern Middle East and North Africa from the colonial period to the present, focusing on how feminist movements, Arab women's writing, and constructions of gender and sexuality have been shaped by local, national and international factors. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3410
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Arabic Courses in English
Departmental Category: Asia Content

**ARAB 4200 (3) Advanced Readings in Arabic**
Develops student proficiency and communication in modern standard Arabic at the advanced (4th year) level. Emphasis placed on developing reading comprehension, speaking, and writing skills.
**Requisites:** Requires prerequisite course of ARAB 3120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic
Departmental Category: Asia Content

**ARAB 4250 (3) Arabic Media**
Designed to provide students with advanced Arabic language skills for use in the media. By negotiating authentic materials in Arabic, students will gain a perspective on global issues in the Arab and Islamic world and will attain a better awareness of Arab and Islamic culture.
**Requisites:** Requires prerequisite course of ARAB 3120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arabic
Departmental Category: Asia Content

**ARAB 4840 (1-3) Independent Study**
Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Arabic
Departmental Category: Asia Content

# Architectural Engineering (AREN)

## Courses

**AREN 1027 (3) Engineering Drawing**
Introduces engineering drawing including sections and dimensioning, print readings, computer 3D, and building information modeling (BIM).
**Requisites:** Restricted to Engineering Physics (EPEN), Architectural (AREN), Integrated Design Engineering (IDEN) or Civil (CVEN) Engineering majors only and to IUT On Track students.
**Additional Information:** Departmental Category: Miscellaneous

**AREN 1316 (1) Introduction to Architectural Engineering**
Surveys the broad subject of architectural engineering and professional practices. Includes professional design services, design documents, methods of construction delivery, materials for construction, codes and standards, life safety, professional ethics, structural systems, mechanical systems, electrical systems, and building systems integration.
**Requisites:** Restricted to students with 0-56 (Freshmen or Sophomore) College of Engineering majors only.
**Additional Information:** Departmental Category: Miscellaneous

**AREN 2050 (3) Building Materials and Systems**
Covers the broad subject of building materials and systems. Includes a practical approach to assembly details, methods of construction, codes, foundations, steel, concrete, masonry, cladding, doors and windows, interiors, finishes, mechanical, plumbing, electrical, life safety and conveyance. Includes investigation of an existing facility along with a team presentation trends in commercial building construction.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) Civil (CVEN) or Architectural (AREN) or Integrated Design Engineering (IDEN) or Applied Mathematics (AMEN) majors or IUT On Track students only.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 2110 (3) Thermodynamics**
Explores fundamental principles of thermodynamics, including first and second law of thermodynamics, thermophysical properties, power and refrigeration cycles, gas mixtures and psychrometrics.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 3012 or GEEN 3852
**Requisites:** Requires a prereq course of PHYS 1110 (min grade C-) and a prereq or coreq course of APPM 1360 or MATH 2300 (min grade C-). Restricted to AREN, CVEN, EVEN, IDEN, or AMEN majors or to IUT On Track students only.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Building Systems Engineering

**AREN 2120 (3) Fluid Mechanics and Heat Transfer**
Explores fundamental principles of fluid mechanics and heat transfer. Topics include fluid statics, momentum and energy conservations; laminar and turbulent viscous flows; conduction, convection and radiation heat transfer. Emphasizes topics and problems that are important to Architectural Engineers including flow of fluids in pipes and ducts, heat transfer in buildings and building systems.
**Requisites:** Requires prereq or coreq of (APPM 2350 or MATH 2400) (APPM 2360 or (MATH 2130 3430)) prereq course (AREN 2110 or GEEN 3852 or MCEN 3012 or ASEN 2002 or ASEN 2702) (all min grade C-).Restricted to Coll of Engineering mjrs IUT on track students onl
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 2121 (1) Heat Transfer**
This is an elective course for students who want to obtain an AREN BS degree and have taken Fluid Mechanics course but not heat transfer. This course will fulfill their curriculum requirement and allow them to take the following courses that require heat transfer knowledge. Previously offered as a special topics course.
**Requisites:** Requires prereq or coreq courses (APPM 2350 or MATH 2400) (APPM 2360 or (MATH 2130 3430)) prerequisite course (AREN 2110 or GEEN 3852 or MCEN 3012 or ASEN 2002 or ASEN 2702) (all minimum grade C-). Restricted to College of Engineering majors only

**AREN 2830 (1-3) Special Topics**
Supervised study of special topics of interest to students under instructor guidance.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: Special Topics

**AREN 3010 (3) Energy Efficient Buildings**
Lecture course on the analysis and design of buildings and their systems to satisfy the requirements for a comfortable and healthy indoor environment. Examines psychometrics, thermal comfort, building heating and cooling loads, fluid flow basics, and HVAC components and systems.
**Requisites:** Requires prerequisite courses of AREN 2050 and (AREN 2120 or ((MCEN 3022 or AREN 2121) and (CVEN 3313 or MCEN 3021 or CHEN 3200))) (all minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 3040 (3) Circuits for Architectural Engineers**
This course will cover the basics of DC and AC circuit theory relevant to the modeling, design, and control of residential and commercial building systems, including Kirchoff's laws, Thevenin/Norton theorems, transient analysis of DC systems, three phase analysis, induction and synchronous motors, AC power (including real and reactive power analysis), power factor correction, and transformers.
**Requisites:** Requires prerequisite courses of (APPM 2360 or (MATH 2130 and 3430)) and PHYS 1120 (all minimum grade C-). Restricted to AREN, CVEN, and EVEN majors only.

**AREN 3080 (3) Architectural Design Studio 1**
Learn about the fundamentals of architectural design and the ways in which it compliments architectural engineering. This introductory studio welcomes students to explore the strategies and techniques through which architects design and communicate. As a studio, the course culminates in a small-scale architecture project through which students will explore and become trained in the architectural design process.
**Requisites:** Requires prerequisite of AREN 1027 (minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) College of Engineering majors only.

**AREN 3140 (3) Illumination Laboratory**
Introduces the measurement of photometric and psychophysical quantities used in lighting. Experience is acquired in using light measurement instruments to evaluate lighting equipment and luminous environments. Taught intermittently.
**Requisites:** Requires prerequisite course of AREN 3540 (minimum grade C-).
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 3430 (3) Architectural (Interior) Lighting Design**
Studies the fundamentals of architectural illumination with an emphasis in design and application. Introduces and applies basic principles and vocabulary to problems in the lighting of interior environments for the performance of visual work, the proper interaction with architecture, and compliance of energy requirements.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only. College of Engineering majors are excluded from this course.

**AREN 3440 (3) Architectural Daylighting Design**
Enables students to develop sufficient working facility with the core principles and practices of architectural daylighting to allow for meaningful integration into future design work. Students work in active project-based environments to explore both quantitative and qualitative aspects of primary daylighting issues and precepts. Previously offered as a special topics course.
**Requisites:** Restricted to junior and above non-engineering majors only.
**Recommended:** Prerequisite AREN 3430.

**AREN 3540 (3) Illumination I**
Studies the fundamentals of architectural illumination. Introduces and applies basic principles and vocabulary to elementary problems in the lighting of environments for the performance of visual work and the proper interaction with architecture.
**Requisites:** Requires prerequisite courses of (CSCI 1200 or CHEN 1310 or CSCI 1300 or ASEN 1320 or ECEN 1310) and (APPM 2350 or MATH 2400) (all minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4010 (3) Energy System Modeling and Control**
Engineering course devoted to building automation and control systems. Topics include HVAC control technology and strategies, measurement and device technologies, analysis and modeling of dynamic systems, simulation of conventional and advanced control approaches, assessment of control loop performance and hands-on direct digital control (DDC) programming exercises as used in current building control practice.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5010
**Requisites:** Requires prerequisite course of AREN 4110 (minimum grade C-).
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4040 (3) Building Energy Audits**
Provides students with the fundamental tools and procedures required to perform energy audits of building systems typically required for energy efficiency projects including performance contracting and retro-commissioning projects.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5020
**Requisites:** Requires prerequisite course of AREN 3010 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).

**AREN 4061 (3) Distributed Electricity Generation**
Introduces basic distributed generation (DG) technologies including fuel-based systems and renewable energy technologies and overview approaches to conduct energy, economical, and environmental analysis of selected DG technologies using state-of-the-art analysis tools to evaluate optimal hybrid distributed generation systems to meet required electrical loads specific to urban centers, campuses, and residential communities.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5061
**Requisites:** Requires prerequisite course of AREN 3010 (minimum grade C-). Restricted to juniors and seniors.
**Grading Basis:** Letter Grade

**AREN 4110 (3) Building Energy Systems Engineering**
Prepares students for professional practice in building energy systems engineering, i.e., analysis and design of residential and commercial buildings, including district energy systems. Upon completion, students possess the skills to calculate heating, cooling, and ventilation requirements, as well as analyze, design, and evaluate integrated building energy systems to meet the following goals: indoor environmental health, safety, and productivity (codes and standards); economic drivers (affordability, life cycle cost), and societal needs (environmental equity, energy justice, decarbonization).
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5110
**Requisites:** Requires prerequisite course of AREN 3010 (minimum grade C-).
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4130 (3) Optical Design for Illumination and Solid State Lighting**
Covers the optical design process for illumination-based optics, emphasis on applications in architectural lighting. In-depth coverage of luminaire photometry, lamps, materials, manufacturing methods, product performance requirements. Projects utilize optical design software and include a variety of lamp types including LEDs using both reflector/lens optics.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5130
**Requisites:** Requires prerequisite course of AREN 3540 (minimum grade C-). Restricted to Architectural (AREN) or Civil (CVEN) Engineering majors only.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4315 (3) Design of Masonry Structures**
Covers modern masonry construction; properties and behavior of the reinforced masonry component materials, clay and concrete masonry units, mortar, grout, and steel reinforcement; vertical and lateral load types and intensities; and design of reinforced masonry walls, beams and columns by the strength design method.
**Requisites:** Requires prerequisite course of CVEN 3525 (minimum grade C-).
**Additional Information:** Departmental Category: Structures

**AREN 4318 (5) Architectural Engineering Design 1**
Provides a capstone experience to AREN students. Students design a modest commercial building and complete an integrated engineering design of the building systems executed for the conceptual and schematic design phases. Students' teams work on structural, mechanical, electrical/lighting, and construction engineering management design. Each stage produces a professional-quality design document. Faculty and industry mentors participate in the teaching and evaluation.
**Requisites:** Requires prerequisites of AREN 3080, AREN 4110, AREN 4506 and AREN 4550. Requires prerequisite or corequisite of AREN 4570 and (CVEN 4545 or 4555) (all minimum grade C-).

**AREN 4319 (2) Architectural Engineering Design 2**
Continues the capstone experience for AREN students. Student teams continue their design of a modest commercial building through the Design Development phase with support from faculty and industry mentors. Additionally, topics of professionalism, engineering ethics, and life-long learning are covered.
**Requisites:** Requires prerequisites of AREN 4318 (minimum grade C-).

**AREN 4440 (3) Lighting Design Capstone**
Synthesizes and applies knowledge and skills from previous lighting design courses in the Lighting Design Certificate. Students work on a real-world lighting design project following industry-standard phases of design while learning about lighting design professional practice, current design topics, trends, and industry issues.
**Requisites:** Requires prerequisites of AREN 3430 and (AREN 4530 or AREN 4620 or THTR 3055) (all minimum grade C-). Restricted to students in the Lighting Design Certificate (LGHT-CERU plan).

**AREN 4506 (3) Pre-construction Estimating and Scheduling**
Covers project management estimating and scheduling methods with an emphasis on the techniques used to create pre-construction estimates and schedules for architectural and civil engineering projects.
**Requisites:** Requires prerequisite course of CVEN 3246 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Architectural (AREN), Civil (CVEN) or Integrated Design (IDEN) Engineering majors only.
**Additional Information:** Departmental Category: Construction

**AREN 4540 (3) Architectural Exterior and Landscape Lighting Design**
Introduces the fundamentals of nighttime illumination for architectural exteriors and landscapes. Students will learn about the interaction of light and human vision at night; lighting technologies used in outdoor settings; societal, environmental and ecological issues related to the application of light at night; lighting design principles and techniques that use light and darkness both creatively and responsibly.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5540
**Requisites:** Requires prerequisite course of AREN 3430 (minimum grade C-). Restricted to junior and above non-engineering majors only.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4550 (3) Illumination 2**
Applies the principles studied in Illumination 1. Provides further study in architectural lighting design methods. Uses lighting studio work to develop a broad knowledge of lighting equipment, design methods, and their application in a series of practical design problems in modern buildings.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5550
**Requisites:** Requires prerequisite course of AREN 3540 (minimum grade C-).
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4560 (3) Luminous Radiative Transfer**
Teaches fundamentals of radiative exchange as applied to illumination engineering. Describes and uses principal numerical techniques for radiative transfer analysis. Applies techniques to lighting design and analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5560
**Requisites:** Requires prerequisite course of AREN 3540 (minimum grade C-).
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4570 (3) Building Electrical Systems Design 1**
Introduces the generation and distribution of electrical power. Focuses on understanding the loads, control, and protection of secondary electrical distribution systems in building. Applies the national electric code to residential and commercial buildings.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5570
**Requisites:** Requires prerequisite of AREN 3040 or ECEN 2250 or MCEN 3017 or GEEN 3010 (all minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4580 (3) Daylighting**
Applies the fundamental principles of illumination engineering to architectural daylighting design, exploring the quantitative methods and tools used to develop daylighting designs and evaluate their performance. Topics include solar resource models, energy transfer models, design methods, and controls for integration with electric lighting systems.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5580
**Requisites:** Requires prerequisite courses of AREN 4130 and AREN 4550 (minimum grade C-).
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4590 (3) Computer Graphics in Lighting Engineering**
Studies the numerical methods and computer implementation of computer graphics visualization for architectural lighting engineering and design. Implements finite element radiative transfer and ray-tracing in computer programs. Studies the use of computer graphics visualization in lighting analysis. Taught intermittently.
**Requisites:** Requires prerequisite courses of AREN 3540 and AREN 4560 (minimum grade C-).
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4606 (3) Construction Project Execution and Control**
Integrates project execution and control techniques for construction scope, cost and schedule. Includes progress measurement, resource planning, earned value methods, productivity, risk management methods and key contract clauses.
**Requisites:** Requires prerequisite courses of CVEN 3246 and AREN 4506 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Civil (CVEN), Architectural (AREN) or Integrated Design (IDEN) Engineering majors only.
**Additional Information:** Departmental Category: Construction

**AREN 4620 (3) Adaptive Lighting Systems**
Builds on architectural lighting principles studied in Illumination 1 and 2. Explores quantitative methods and the design process to develop architectural lighting control solutions. Topics include adaptive lighting applications such as daylight integration and occupant well-being, as well as control system architecture and components, codes and standards, and design implementation.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5620
**Requisites:** Requires prerequisites AREN 3540 and AREN 4550 (both minimum grade C-), or prerequisite of AREN 3430 (minimum grade C-) for students in the LGHT-CERU program.
**Recommended:** Prerequisite AREN 4130.

**AREN 4630 (3) Advanced Lighting Design**
Intended to help students understand light as a medium in design, begin the formulation of a philosophical perspective for its application, and continue to develop the skills required to design and implement lighting systems. Knowledge from previous lighting classes (Illumination I and Illumination II) is essential to this course. Formerly AREN 4530.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5630
**Requisites:** Requires prerequisite courses of (AREN 3540 and AREN 4550) (all minimum grade C-) or AREN 3430 (minimum grade C-). Restricted to AREN majors or students in the Lighting Design Certificate (LGHT-CERU).
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4830 (1-3) Special Topics for Seniors/Grads**
Supervised study of special topics of interest to students under instructor guidance.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: Special Topics

**AREN 4849 (1-3) Independent Study**
Offers an independent, in-depth study, research or design in a selected area of architectural engineering. Offerings are coordinated with individual faculty. Students should consult the Department of Civil, Environmental, and Architectural Engineering.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Special Topics

**AREN 4890 (3) Sustainable Building Design**
Introduces green building design procedure/approach and provides insight into evolving design principles; explores aspects of building thermal/energy performance, indoor/outdoor environmental quality, occupant comfort and climate relevant to building design (structures not covered); emphasizes both comprehensive understanding and practical applications of sustainable building design strategies; applies prevailing simulation tools to assist green building design.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5890
**Requisites:** Requires a prerequisite course of AREN 3010 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) College of Engineering students only.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 4990 (3) Compu Fluid Dynamics (CFD) Analysis for Built/Natural Envmnts**
Explores the fundamentals of simulating/analyzing civil and architectural environments with Computational Fluid Dynamics (CFD) method.
Run with two parallel sessions: fundamentals and applications, with fundamental lectures presenting the principles of CFD technologies, and application sessions demonstrating the application of CFD for resolving building and environmental engineering problems (different than MCEN/ASEN) with hands-on exercises.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 5990
**Requisites:** Requires prerequisite courses of AREN 2120 and (APPM 2360) or (MATH 2130 and 3430)) (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) College of Engineering majors only.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 5001 (3) Building Science and Engineering I**
Prepares graduate students with general knowledge and skills that are required by advanced AREN technical courses. Covers two parts of materials: Building Lighting Systems and Building Electrical Systems.
**Requisites:** Restricted to graduate students in the College of Engineering.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 5002 (3) Building Science and Engineering II**
Introduces AREN fundamentals to new graduate students entering the Architectural Engineering Program (AREN) but without general Civil or Architectural Engineering background. This course is part of a two-course set with AREN 5001: Building Science and Engineering I. This course covers two parts: (1) building thermal science and engineering; (2) building material science and engineering.
**Requisites:** Restricted to graduate students in the College of Engineering.
**Grading Basis:** Letter Grade

**AREN 5010 (3) Energy System Modeling and Control**
Engineering course devoted to building automation and control systems. Topics include HVAC control technology and strategies, measurement and device technologies, analysis and modeling of dynamic systems, simulation of conventional and advanced control approaches, assessment of control loop performance and hands-on direct digital control (DDC) programming exercises as used in current building control practice.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4010
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Recommended:** Prerequisite AREN 4110 or AREN 5110.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 5020 (3) Building Energy Audits**
Analyzes and measures performance of HVAC systems, envelopes, lighting and hot water systems, and modifications to reduce energy use. Emphasizes existing buildings.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4040
**Requisites:** Restricted to graduate students or concurrent degree students with sub-plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisite AREN 3010 or AREN 5002.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 5030 (3) Data Science for Energy and Buildings**
Establishing hands-on skills along with understanding of underlying mathematical concepts of current machine learning approaches including: ordinary least squares, quantile, logistic, and local regression; unsupervised methods including principal component analysis and clustering; tree-based models such as regression trees and random forests; kernel-based methods such as support vector and Gaussian process regression; Bayesian inference; as well as shallow and deep neural networks. Numerous examples and case studies applicable to thermal/building/renewable/district energy systems will be used. Undergraduate seniors will be allowed with instructor consent.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN).

**AREN 5061 (3) Distributed Electricity Generation**
Introduces basic distributed generation (DG) technologies including fuel-based systems and renewable energy technologies and overview approaches to conduct energy, economical, and environmental analysis of selected DG technologies using state-of-the-art analysis tools to evaluate optimal hybrid distributed generation systems to meet required electrical loads specific to urban centers, campuses, and residential communities. Formerly AREN 5060.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4061
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisite AREN 3040 or AREN 5001.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 5080 (3) Computer Simulation of Building Energy Systems**
Introduces major simulation programs for analysis of building energy loads and system performance. Focuses on one hourly simulation program to develop capability for analysis of multizone structure.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisite AREN 3010 or AREN 5002.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 5090 (3) Optimizing Grid Connected Systems**
Address the challenges that the electric power grid is facing from a technical perspective, using grid modeling, mathematics (optimization and linear algebra) and programming (Python). The course will also touch on a variety of topics such as electricity markets, renewable energy integration, and distributed energy resources, including how buildings can help the broader electrical grid. Students will gain skills that will help them prepare for careers in building controls, renewable energy, energy policy, and more. Do not take this class if you have already taken a power systems optimization course.
**Requisites:** Restricted to College of Engineering graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisites students should have prior experience/coursework in programming (beyond Excel) and linear algebra before taking this course.
**Grading Basis:** Letter Grade

**AREN 5110 (3) Building Energy Systems Engineering**
Prepares students for professional practice in building energy systems engineering, i.e., analysis and design of residential and commercial buildings, including district energy systems. Upon completion, students possess the skills to calculate heating, cooling, and ventilation requirements, as well as analyze, design, and evaluate integrated building energy systems to meet the following goals: indoor environmental health, safety, and productivity (codes and standards); economic drivers (affordability, life cycle cost), and societal needs (environmental equity, energy justice, decarbonization).
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4110
**Requisites:** Requires prerequisite of (AREN 5001 and AREN 5002) or AREN 3010, all minimum grade C-. Restricted to graduate and students accepted in the Bachelor Accelerated Masters (BAM) program.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 5130 (3) Optical Design for Illumination and Solid State Lighting**
Covers the optical design process for illumination-based optics, emphasis on applications in architectural lighting. In-depth coverage of luminaire photometry, lamps, materials, manufacturing methods, product performance requirements. Projects utilize optical design software and include a variety of lamp types including LEDs using both reflector/lens optics.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4130
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisite AREN 3540.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 5510 (3) Architectural Lighting I**
Teaches the fundamentals of architectural lighting systems and the human responses to those systems. Describes the properties of light sources, how light interacts with architectural elements, and how light affects human visual and non-visual responses. Provides a broad overview of the holistic effects of light on building occupants, as well as the implications for building energy use and sustainability. Previously offered as a special topics course.
**Requisites:** Restricted to non-degree (NDGR) graduate students only.

**AREN 5520 (3) Architectural Lighting II**
Builds on the fundamentals taught in AREN 5500 with a detailed look at how technical information about lighting systems can be used for design concepts and analyses. Provides an examination of daylighting in buildings. Describes the latest research and design standards for color rendering, glare, flicker, circadian rhythms, and alerting effects. Concludes by considering case studies of various project types.
**Requisites:** Open to Non-degree, Non sponsored Students only.

**AREN 5530 (3) Architectural Lighting Capstone**
Concludes the nine-credit Professional Graduate Certificate in Architectural Lighting with an immersive hands-on experience. Concepts learned in the two prior online courses will be demonstrated and experienced using facilities and equipment available on the CU Boulder campus. A culminating, comprehensive project submittal that includes content developed during the entire three-course sequence will be submitted following the on-campus experience.
**Requisites:** Requires prerequisite courses of AREN 5510 and AREN 5520 (all minimum grade C-). Restricted to non-degree (NDGR) graduate students only.

**AREN 5540 (3) Architectural Exterior and Landscape Lighting Design**
Introduces the fundamentals of nighttime illumination for architectural exteriors and landscapes. Students will learn about the interaction of light and human vision at night; lighting technologies used in outdoor settings; societal, environmental and ecological issues related to the application of light at night; lighting design principles and techniques that use light and darkness both creatively and responsibly.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4540
**Requisites:** Requires prerequisite course of AREN 4550 or (AREN 5001 and AREN 5550), all minimum grade C-. Restricted to graduate students and students accepted in the Bachelor Accelerated Masters (BAM) program.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 5550 (3) Illumination 2**
Applies the principles studied in Illumination 1. Provides further study in architectural lighting design methods. Uses lighting studio work to develop a broad knowledge of lighting equipment, design methods, and their application in a series of practical design problems in modern buildings.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4550
**Requisites:** Requires corequisite course of AREN 5001 for graduate students. Restricted to graduate students and students in the Bachelor Accelerated Masters (BAM) program.
**Grading Basis:** Letter Grade

**AREN 5560 (3) Luminous Radiative Transfer**
Teaches fundamentals of radiative exchange as applied to illumination engineering. Describes and uses principal numerical techniques for radiative transfer analysis. Applies techniques to lighting design and analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4560
**Requisites:** Requires prerequisite course of AREN 3540 or AREN 5001 (minimum grade C-). Restricted to graduate students and students in the Bachelor Accelerated Masters (BAM) program.

**AREN 5570 (3) Building Electrical Systems Design 1**
Introduces the generation and distribution of electrical power. Focuses on understanding the loads, control, and protection of secondary electrical distribution systems in building. Applies the national electric code to residential and commercial buildings. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4570
**Requisites:** Requires prerequisite course of AREN 5001 or AREN 3040 or ECEN 2250 or MCEN 3017 or GEEN 3010 (all minimum grade C-). Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.

**AREN 5580 (3) Daylighting**
Applies the fundamental principles of illumination engineering to architectural daylighting design, exploring the quantitative methods and tools used to develop daylighting designs and evaluate their performance. Topics include solar resource models, energy transfer models, design methods, and controls for integration with electric lighting systems.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4580
**Requisites:** Requires prerequisite course of AREN 3540 or AREN 5001 (minimum grade C-). Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.

**AREN 5620 (3) Adaptive Lighting Systems**
Builds on architectural lighting principles studied in Illumination 1 and 2. Explores quantitative methods and the design process to develop architectural lighting control solutions. Topics include adaptive lighting applications such as daylight integration and occupant well-being, as well as control system architecture and components, codes and standards, and design implementation. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4620
**Requisites:** Requires prerequisite course of AREN 4550 or AREN 5550 (minimum grade C-).
**Recommended:** Prerequisite AREN 4130 or AREN 5130.

**AREN 5630 (3) Advanced Lighting Design**
Intended to help students understand light as a medium in design, begin the formulation of a philosophical perspective for its application, and continue to develop the skills required to design and implement lighting systems. Knowledge from previous lighting classes (Illumination I and Illumination II) is essential to this course.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4630
**Requisites:** Requires prerequisite course of AREN 4550 for BAM students or AREN 5001 and AREN 5550 for graduate students (all minimum grade C-). Restricted to graduate students and students in the Bachelor Accelerated Masters (BAM) program.
**Grading Basis:** Letter Grade

**AREN 5650 (3) Forensic Engineering**
Identify and explore the physical, chemical, mechanical, and biological deterioration mechanisms in the most common construction materials; concrete, masonry, metals, wood, polymers, and fiber-reinforced composites. Course topics include an introduction to failure analysis; materials science; ion diffusion; electrochemistry (corrosion); fracture, fatigue, and creep; and diagnostic, retrofit, and rehabilitation strategies for extended service life.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.

**AREN 5660 (3) Embodied Carbon in Buildings**
Introduces students to whole building life cycle assessment (LCA) and embodied carbon in buildings. Topics include LCA methodologies, whole-building LCA tools, materials science of low-carbon and carbon-storing building materials, and strategies for reducing embodied carbon.
**Requisites:** Restricted to graduate students only, or BAM students with C-AREN, C-CVEN, or C-ARENCVEN subplan.
**Recommended:** Prerequisite AREN 5002.

**AREN 5830 (1-3) Architectural Engineering Special Topic**
Supervised study of special topics of interest to students under instructor guidance.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.

**AREN 5849 (1-3) Independent Study in Architectural Engineering**
The topics and the goals of this course are tailored to fit the needs of the student in various areas related to the Architectural Engineering program. These topics and goals, documented in the course agreement form at the start of the semester, include but are not limited to areas of building energy engineering, building illumination systems, construction engineering and management, building materials and resources, and building electrical systems.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**AREN 5890 (3) Sustainable Building Design**
Introduces green building design procedure/approach and provides insight into evolving design principles; explores aspects of building thermal/energy performance, indoor/outdoor environmental quality, occupant comfort and climate relevant to building design (structures not covered); emphasizes both comprehensive understanding and practical applications of sustainable building design strategies; applies prevailing simulation tools to assist green building design.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4890
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisite AREN 3010 or AREN 5002.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 5990 (3) Compu Fluid Dynamics (CFD) Analysis for Built/Natural Envmnts**
Explores the fundamentals of simulating/analyzing civil and architectural environments with Computational Fluid Dynamics (CFD) method.
Run with two parallel sessions: fundamentals and applications, with fundamental lectures presenting the principles of CFD technologies, and application sessions demonstrating the application of CFD for resolving building and environmental engineering problems (different than MCEN/ASEN) with hands-on exercises.
**Equivalent - Duplicate Degree Credit Not Granted:** AREN 4990
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisites AREN 2120 and APPM 2360.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 6950 (1-6) Master's Thesis**
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 6960 (1-3) Master's Report**
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Additional Information:** Departmental Category: Building Systems Engineering

**AREN 8990 (1-10) Doctoral Dissertation**
A minimum of 30 credit hours is required.
**Additional Information:** Departmental Category: Building Systems Engineering

# Architecture (ARCH)

## Courses

**ARCH 2100 (6) Studio 1: Foundations of Architecture**
Provides a framework for students to learn the basic strategies and techniques of architectural design. This project-based studio focuses on concepts of medium-scale building design, site, and climate. Through multiple design exercises, students learn how these factors assist in shaping our buildings.
**Requisites:** Requires prerequisite course of ENVD 1120 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite ARCH 2115.
**Grading Basis:** Letter Grade

**ARCH 2115 (3) Architecture Materials and Methods**
Exposes students to the elements and processes used in constructing buildings. Through lectures, technical drawing, material research and exposure to practicing professionals, students build a foundation of knowledge necessary to approach the specification and design of materials and to foster a curiosity in the innovative frontiers of assembly, aesthetics and sustainable life-cycle considerations.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite ARCH 2100.
**Grading Basis:** Letter Grade

**ARCH 3100 (6) Studio 2: Intermediate Architecture**
Emphasizes the interaction of form, programmatic use, human behavior and context in creating structure. May include a client-based community engaged project, real world applications, and result in a physical product. Students work across analog and digital platforms to produce designs that provide solutions to contemporary challenges.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite course of ARCH 2100 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite ARCH 3114.
**Grading Basis:** Letter Grade

**ARCH 3114 (3) History and Theory of Architecture 1**
Focusing on buildings, surveys the built environment starting with some of the first structures built by humans and moving through time to the Industrial Revolution. The course focuses on the development of major styles, influential people, and the drivers of building form.
**Requisites:** Requires prerequisite course of ENVD 1024 (minimum grade C-) and restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) or Architectural Engineering (AREN) majors only with 57-180 credits (Junior or Senior).
**Recommended:** Corequisite ARCH 3100.
**Grading Basis:** Letter Grade

**ARCH 3214 (3) History and Theory of Architecture 2**
Picking up after the Industrial Revolution and continuing through to today¿s Contemporary Architecture, history is taught thematically to cover important structures, key figures, and movements that have shaped our modern world.
**Requisites:** Requires prerequisite course of ENVD 1024 (minimum grade C-) and restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) or Architectural Engineering (AREN) majors only with 57-180 credits (Junior or Senior).
**Recommended:** Prerequisite ARCH 3114 with a C- or better.
**Grading Basis:** Letter Grade

**ARCH 4100 (6) Studio 3: Capstone in Architecture**
Engages students in complex design challenges such as integrating building technology, structural systems, user experiences, and environmental sustainability. Students will focus on contemporary architectural issues within the profession and produce design proposals that address key topics such as climate-resilient, human-centric, and systematically responsive design solutions.
**Requisites:** Requires prerequisite course of ARCH 3100 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite ARCH 4115.
**Grading Basis:** Letter Grade

**ARCH 4115 (3) Architecture Building Technology**
Presents the fundamentals of building physics and climate science through experimentation and testing. Students learn the concepts related to structural and mechanical systems necessary for proper building function by first studying and then implementing the key systems through hypothetical building assignments. This class covers active and passive green building systems that are necessary when designing structures for an evolving climate.
**Requisites:** Requires prerequisite course of ARCH 2115 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

# Art Film Studies (ARTF)

## Courses

**ARTF 5000 (3) Advanced Digital Postproduction**
The world of video changes with blinding speed. This class lays the groundwork to keep up with the changing technology and all the technical details of working in commercial post. We will look at distributed rendering, color grading, film scanning, multi-editor collaboration, live production virtual reality and distribution. Every week students will have a technological challenge and work as a team to solve it. Strong familiarity with Adobe, Avid and DaVinci is recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4000
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5003 (3) Film and Literature**
Explores similarities and differences between literature and film as narrative arts. Studies novels, short stories and plays and films made from them. Examines problems in point of view, manipulation of time, tone, structure, and setting.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4003
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5004 (3) Topics in Film Theory**
Provides topic-centered analyses of controversial areas in film theory. Students read extensive materials in the topic area, analyze and summarize arguments as presented in the literature, write "position" papers and make oral presentations in which they elaborate their own arguments about specific assigned topic, establishing critical dialogue with the primary materials.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4004 and HUMN 4004
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of CINE 3051 (minimum grade D-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5010 (1-3) Topics in Film Production**
Prepares students for advanced cinema production courses. Subject matter varies each semester.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4010
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5013 (3) Film, Photography and Modernism**
Provides interdisciplinary study of film, photography and modernism, focusing on issues such as dystopia, alienation, sexuality, subjectivity and self-referentiality. Photographs by Stieglitz, Strand, Weston, Evans, Cartier-Bresson, Kertesz and Moholy-Nagy. Films by Dziga-Vertov, Eisenstein, Resnais, Antonioni, Bergman, Bunuel and Bertolucci.
**Equivalent - Duplicate Degree Credit Not Granted:** FILM 4013
**Requisites:** Requires prerequisite course of FILM 1502 (minimum grade D-).
**Recommended:** Prerequisite FILM 3051.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5020 (3) Analog Alternatives**
Introduction to small gauge analog moving image formats and technologies with a focus on process and experimentation through hands-on exploration and demonstrations. This process-oriented class will utilize DIY methods and Alternative Process Photography approaches to work creatively with silver based holographic mediums. Students will create moving image works with Super 8mm and 16mm film while exploring the implications and possibilities of working with these mediums within our current digital paradigm.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4020
**Requisites:** Restricted to graduate students only.

**ARTF 5021 (3) Directing/Acting for the Camera**
Offers an intensive workshop that provides students with experience directing dramatic material, acting before a camera, and interpreting or adopting dramatic material for film. No experience in directing or acting required. Attendance, research, and papers required.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4021
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5023 (3) Topics in International Cinema**
Focuses on major international filmmakers who have had a decisive impact on world cinema. Students will learn how directors create their own innovative body of work with specific formal and thematic patterns and will also learn to place such work within multiple frameworks that will cover film history, theory, aesthetics, philosophy and social and cultural analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4023
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade D-). Restricted to graduate students only.
**Recommended:** Prerequisites CINE 3051 and CINE 3061.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5024 (3) Advanced Research Seminar**
Focuses on a specific topic, director, or genre chosen by the professor. Research skills and critical thinking are emphasized. With faculty guidance, students determine individual projects and present them to the class. Class participation is mandatory. Each student submits a thorough and original research paper for a final grade.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4024
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CINE 3051 and CINE 3061.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5040 (3) Advanced Analog Alchemy**
Investigating, developing, and re-interpreting historical approaches and processes involved in the creation of Analog motion picture works. Students will work with Analog mediums in alternative modes and unestablished ways and develop their personal process towards the goal of producing a unique moving image work to be presented in a final analog format for exhibition.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4040
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Art Practices (ARTF) students only.

**ARTF 5043 (1-3) Topics in Cinema Critical Studies**
Prepares students for advanced Cinema Studies critical studies courses. Subject matter varies each semester.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4043
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5105 (3) Advanced Screenwriting**
Introduces professional screenwriting, in the form of a creative writing workshop. Admission by portfolio (see film department). Students write scenes and scripts for short films, feature treatments, etc., and are graded on a final portfolio. Department enforced prerequisite: approved writing sample.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4105
**Recommended:** Prerequisites CINE 3051 and CINE 3061.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5200 (3) Flow Visualization**
Explores techniques for the visualization of the physics of fluid flows including seeding with dyes, particles and bubbles, and shadowgraphy and schlieren. Reviews optics and fluid physics, especially atmospheric clouds. Assignments are student-driven, to individuals and mixed teams of graduates, undergraduates, engineering majors and photography/video majors.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4200, MCEN 4151, MCEN 5151, ATLS 4151 and ATLS 5151
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5211 (3) History of Russian and Soviet Cinema**
Surveys Russian cinema in historical and cultural context from early 20th century to the present. Taught in English. Formerly RUSS 5211.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5211 and REES 4211 and CINE 4211
**Requisites:** Restricted to graduate students only.

**ARTF 5400 (3) Digital Post-Production**
Through projects, discussions, and screenings, this class explores the practices and aesthetics of computer-based moving-image art editing.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4400
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5453 (3) History of Avant-Garde Film**
Traces the history and aesthetics of avant-garde/experimental films in light of similar ideas found in the other arts, particularly painting, poetry, photography and music. Topics covered include Dada and the early avant-garde; surrealism and psychodramas; Brakhage and abstract expressionism; feminist arts and film since the 1980s; the idea of the sublime in painting, music and film; landscape in painting, photography and film; post-modernism and the cinema; queer theory, gender/identity politics and aesthetics of recent films; and specific multiple disciplinary artists such as Andy Warhol, Michael Snow, Helen Levitt and Gunvor Nelson.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4453
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5500 (3) Cinema Production 2**
Advanced exploration of creative cinema production through short production and post-production projects. Course focuses on the tactics and strategies of independent cinema production exploring either documentary, experimental, or narrative genres.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4500
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5604 (3) Colloquium in Film Aesthetics**
Seminar for the serious round table discussion and critique of film as an art form, emphasizing development of appropriate verbal and written language skills for description of film.
**Equivalent - Duplicate Degree Credit Not Granted:** FILM 4604
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5610 (3) Image-makers Graduate Seminar**
Explores advanced graduate studio work in a seminar setting. Focuses on the development of ideas and activities which advance creative image making.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5717 (1-3) Graduate Studio Critique**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5846 (1-3) Graduate Independent Study-Video**
Participate in graduate independent study.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 5857 (1-3) Graduate Independent Study**
Participate in graduate independent study.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

**ARTF 6959 (1-6) Master's Thesis**
Preparation, research, writing of critical studies Master's thesis in fulfillment of concurrent BAM in Cinema Studies.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTF 5004 (minimum grade D-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Film Courses

# Art History (ARTH)

## Courses

**ARTH 1500 (3) Global Art and Visual Culture**
Introduces critical issues in the study and interpretation of the arts and visual cultures of Africa, the Americas, Asia, Europe, and Oceania. This course serves as a complement to U.S. Art Across Cultures (ARTH 1600). Themes explored include the conceptual and social status of the artist, cultural exchange, the environment, gender, and power. In lecture and in recitations sections, you will be introduced to methods of object-based research and principles of museum exhibition curation. You will leave this class with an understanding of key concepts and methods in the history of art, as well as familiarity with an array of global visual cultures.
**Recommended:** Corequisite ARTH 1600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**ARTH 1509 (3) Trash and Treasure, Temples and Tombs: Art and Archaeology of the Ancient World**
Introduces the art and archaeology of ancient Egypt, Mesopotamia, Greece and Rome, examining various ancient approaches to power, religion, death and the human body. Analyzes art, architecture and everyday trash to learn about ancient humanity.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 1509
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Art History

**ARTH 1600 (3) U.S. Art Across Cultures**
Examines historical and contemporary issues in American arts and visual culture, emphasizing issues of race, gender, class, cross-cultural interactions, diversity of artistic traditions, and the global position of the United States in the modern world. We will focus on key monuments, objects, artists, and concepts relevant to the American context and impactful across geopolitical borders, ethnic groups, and genders.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ARTH 1709 (3) Critical Introduction to Art History**
Provides a broad introduction to understanding and appreciating art and art history within a critical lecture seminar and discussion format. The focus of this course is a selected Particularly directed to nonmajors.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 2029 (3) Art and Archaeology of Ancient Egypt**
Emphasizes the origin of the Egyptian culture, its importance and its impact on other cultures. In addition, the different points of view of various scholars are discussed with a comparative study of the ancient Egyptian culture and modern culture of Egypt and the Middle East. Formerly ANTH 1160.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 2029
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Art History

**ARTH 2039 (3) Greek Art and Archaeology**
Covers prehistoric Aegean through the fourth century B.C.E., considering architecture, pottery, painting, sculpture and personal ornament. Societal customs such as use of space and burial patterns are considered as well as art and its uses, to help understand developments in Greek culture. Formerly CLAS 3039.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 2039
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 2049 (3) Introduction to Roman Art and Architecture**
Introduces the monuments and sites of the ancient Roman world from the foundation of Rome (753 B.C.E.) to Constantine (306-307 C.E.). Emphasizes the relationship of art, architecture, and artifacts to the political, social, and religious institutions of Italy and the provinces.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 2049
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 2409 (3) Intro to Asian Art**
Designed for those having no previous experience in the study of Asian art. Traces development of sculpture, painting, architecture, and the other visual arts of South Asia, the Far East, and Southeast Asia, with a synopsis of developments from 1453 through the 18th century.
**Additional Information:** GT Pathways: GT-AH1 - Arts Hum: Arts Expression
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History
Departmental Category: Asia Content

**ARTH 3009 (3) Critical Thinking in Art History**
Through structured discussions, selected readings, and written assignments provides an understanding of how art history has evolved as an academic discipline and how art historians evaluate complex issues of style, form, content, and theory in the visual arts.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3019 (3) Pompeii and the Cities of Vesuvius**
Introduces the towns and villas buried by the eruption of Mt. Vesuvius in 79 C.E. Explores the layout and decoration of ancient Roman houses, the variety of artifacts uncovered as evidence for daily life and the history of the excavations.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 3019
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3079 (3) Medieval Art Survey**
Surveys the history of Western art from Constantine to around the year 1300, including Carolingian, Ottonian, Anglo-Saxon, Romanesque, and Gothic. Considers "Barbarian," Byzantine, and Islamic influences.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3109 (3) Art in Contemporary Society**
Examines writings by philosophers and art critics as they address the question: What is art for? Readings focus on the 19th and 20th centuries, including current theories and some non-Western theories. Students are encouraged to develop their own responses to the question.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3241 (3) Art in Islamic Cultures**
Offers an overview of art in Islamic cultures. Discusses a range of literary texts and images in order to understand these cultures. Offers an opportunity for undergraduates to expand their understanding of literature and art history. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** ARAB 3241
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3301 (3) Modern Art and Design at the Bauhaus**
Introduces the art, architecture, and design of the Bauhaus, the most influential European art school in the twentieth century. Examines the Bauhaus as a utopian project to design a new modern lifestyle. The course explores the relation of the Bauhaus to its cultural, political, gendered, and economic contexts.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 3301

**ARTH 3329 (3) Art in France: Revolution to 1870**
Covers major art movements and theories in France from 1793 to 1870 on location in Paris. Students study ceramics, painting, sculpture, photography and some architecture. Political and cultural events are considered for their influence on art: excavations at Pompeii, colonial expansion in Middle East and Africa, influx of Asian art, exploration of Americas and various technical inventions.
**Recommended:** Prerequisites ARTH 1500/1600 and second semester sophomore, junior or senior standing.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3339 (3) Art in France: 1870-1970**
Covers major art movements and theories in France from the Paris Commune through 1970 on location in Paris. Students study ceramics, painting, sculpture, photography and some architecture. Political and cultural events are considered for their influence on art: excavations at Pompeii, colonial expansion in Middle East and Africa, influx of Asian art, exploration of Americas and various technical inventions.
**Recommended:** Prerequisite ARTH 1500/1600 and second semester sophomore, junior or senior standing.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3359 (3) Art in Spain: Goya to 1900**
Explores the scope of Goya's works in context of his contemporaries and antecedent, Velazquez; Moorish influences, genre painting costumbrismo, Romanticism and historical narratives are considered in relation to Enlightenment ideals, French Neoclassicism, Romanticism, Orientalism and the Napoleonic invasion. Teaching occurs mostly on site: Alhambra, Prado, Bellas Artes, Palacio Real, Museo de Romanticismo; seminars and tests are in Madrid classrooms.
**Recommended:** Prerequisite ARTH 1500/1600.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3369 (3) Art in Spain: 1900-1990**
Covers Gaudi, Picasso and artists of Modernismo movement as well as Dali are studied in Barcelona; Dada and Surrealism are explored through works of Picasso, Gonzalez, Gris, Varo, Dali, Bunuel and others. Photography and film of Spanish Civil War and thereafter are studied in seminar in Madrid classroom; students experience flamenco performances and Q&A with performers. Tests administered in class.
**Recommended:** Prerequisite ARTH 1500/1600.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3419 (3) Modern Art Survey**
Surveys the loss of beauty in art and discusses whether or not that loss is regrettable. Questions the function and historical meaning of modern and postmodern art: is it all hype and strategic positioning by artists for fame and fortune? Is it serious? Are the fine arts still fine?
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3429 (3) Native North American Art I**
This course is the first half of a two-semester survey of historic Native American art of North America. We explore the historical arts of Indigenous peoples of the Southwest, Northwest Coast, and Arctic regions of North America. As a survey of the arts of these regions, the aim of the course is to engage students with Native North American art forms in their richness, diversity, and temporal depth, from arts known through the archaeological record to arts of the twentieth and twenty-first centuries.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ARTH 3439 (3) Native North American Art II**
This course explores the historical and contemporary arts of Indigenous peoples of the Southeast, Eastern Woodlands, Great Plains, and California, in their richness, diversity, and temporal depth. We will explore the value and role of these art forms to Indigenous nations and communities. We will address issues of DEI and colonial histories, and themes of cultural continuity, survivance, and gender.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ARTH 3509 (3) American Art**
Surveys American art and material culture from the precolonial era to the present day. Considers cultural and artistic interaction, ethnic expressions, patronage, European and non-Western influences, and the struggle to develop a uniquely American artistic identity.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3519 (3) Modern Architecture, 1780--1960**
Introduces the major movements and developments in European and American architecture from Neoclassicism to Postmodernism. Considers the impact of exhibitions, expositions, and vernacular architecture.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3529 (3) Black Art in America**
The course explores the work of Black artists in the United States, from the late nineteenth century to the present. Lectures will cover a range of visual media, including painting, sculpture, prints, photography, video, and performance.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ARTH 3539 (3) Contemporary Art**
Examines contemporary art and theory in the transition from modern to postmodern expression. Discusses painting, sculpture, installations, performance, video, photography, and architecture with attention to historical context and criticism. Considers neoexpressionist, feminist, minority, political, and public art.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3619 (3) The Arts of China**
Surveys Chinese painting, sculpture, architecture, and other arts from neolithic to modern times.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History
Departmental Category: Asia Content

**ARTH 3629 (3) The Arts of Japan**
Offers an appreciation and chronological development of the arts of Japan. Emphasizes the arts of Shintoism and Buddhism as well as the particular Japanese aesthetic from prehistoric times to the present.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History
Departmental Category: Asia Content

**ARTH 3719 (3) History of Media Arts**
Surveys the development of technological media both as sources of information and as art. Photography and related media, film, video, holography, and electronic imaging systems are surveyed as art and as technologies, emphasizing major artists, movements, exhibitions, and other productions in the 19th and 20th centuries.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3729 (3) Foundations in Latin American Art**
Examines Latin America's cultural pluralism and visual production beginning in Pre-Colombian times and following through to the present day. Considers the various functions of art as well as the relationship between objects, artists, and the cultures from which they come. Focuses on how visual objects and images communicate across cultures including in times of political and social conflict. Provides students with a broad frame of reference for many historical periods, cultural/ethnic groups, and equips students to evaluate images and objects and their proper cultural contexts.
**Recommended:** Prerequisites ARTH 1500 and/or ARTH 1600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 3919 (3) Seminar: Topics in Art History**
Seminar course dealing with selected areas or problems within the history of art. Consult current online Schedule Planner for seminar topic.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**ARTH 3929 (1-3) Special Topics in Art History**
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4029 (1) Art History Research Methods**
In this class we will investigate how art scholarship is formed and organized; learn to expertly navigate the vast array of art research resources; and explore advanced techniques for searching both online and offline sources of art information. We will work to develop a critical understanding of our own research processes and reflect on the tools and techniques that lead to both expert research and successful participation in art discourse.
**Equivalent - Duplicate Degree Credit Not Granted:** LIBR 4029 and ARTH 5029
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Art History

**ARTH 4069 (3) Medieval Manuscripts**
Surveys decorated books from late antiquity to the advent of the printing press. Examines the various roles manuscripts played within different medieval communities.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Art History

**ARTH 4079 (3) Early Medieval Art**
Addresses critical issues in art and architecture from the late Roman Empire (approximately 250 CE) to approximately 1000 CE. The course covers a broad geographic range, including Byzantium, the early Islamic empires, and the Silk Road, in addition to Western Europe. The course will consider the religious, social, and economic roles of art and architecture and will explore the process of creating art and the agency of artists in the early middle ages.
**Recommended:** Prerequisite ARTH 1500 or ARTH 3079.

**ARTH 4089 (3) Romanesque and Gothic Art**
Examines major artistic trends in Europe between the years 1000 and 1300, a period that witnessed, among others, the development of gothic cathedrals and the rise of the professional artist. Particular attention will be given to exchange with other cultures.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Art History

**ARTH 4099 (3) Ancient Greek Sculpture**
Understanding that Greek sculpture, like all visual media, was part of the fabric of ancient Greek life and expressed the values of its creators and audience is a valuable way to gain insights into the social, economic, and political world of ancient Greece. This course will examine the work of Greek sculptors from the Archaic to the Hellenistic period. Key stylistic and technical developments, as well as significant works of art, sculptors and workshops will be discussed in detail. Some issues we will consider are the physical, religious and/or socio-historical context of individual freestanding sculptures and how specific sculptural programs illustrate aspects of Greek culture. Iconographic and narrative choices made by artists working in stone, compared to other material, will also be addressed.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5099, CLAS 4099 and ARTH 5099

**ARTH 4109 (3) Ancient Italian Painting**
Explores the problems, theories and methods for understanding the iconography, styles, topologies, contexts and techniques of fresco wall painting in ancient Italy from the 6th century B.C.E. to the 4th century C.E. Topics covered include Etruscan tomb paintings, late Republican and early imperial fresco paintings from Rome and Campania and later Roman wall paintings, including the painted images in ancient catacombs. Previous coursework on ancient Italy or the history of pre-modern art is highly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 5109 and CLAS 4109 and CLAS 5109
**Recommended:** Prerequisite CLAS 1509 or ARTH 1509 or CLAS 2049 or ARTH 2049.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Art History

**ARTH 4119 (3) Roman Sculpture**
Examines ancient Roman sculpture, emphasizing the display, iconography, and production of private and public monuments in the Roman Empire. Explores sculpture as evidence for historical developments, societal and gender attitudes, and state ideologies in the ancient Roman world.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 5119 and CLAS 4119 and CLAS 5119
**Recommended:** Prerequisite ARTH 1500/1600 or CLAS 2049.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Art History

**ARTH 4129 (3) Aegean Art and Archaeology**
Detailed study of the cultures of prehistoric Greece, the Cycladic Islands and Crete, their art and archaeology and their history within the broader context of the eastern Mediterranean, from earliest human settlement to the collapse of the Bronze Age at about 1100 B.C.E. Emphasis is on palace states.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4129 and ANTH 5129 and CLAS 4129 and CLAS 5129
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Art History

**ARTH 4139 (3) Greek Vase Painting**
A comprehensive overview of Greek vase painting, from prehistoric through the fourth century B.C.E. Emphasis is on learning the development of primary decorative styles and on refining skills of visual analysis, scholarly research, critical thinking, oral commentary and written presentation.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 5139 and CLAS 4139 and CLAS 5139
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Art History

**ARTH 4149 (3) Greek Cities and Sanctuaries**
Examines Greek architecture in context, from the ninth century B.C.E. into the Hellenistic period, considering the use of space, both in religious and in civic settings and using texts as well as material culture. Emphasis is on developing analytical skills.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4149 and CLAS 5149
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Art History

**ARTH 4169 (3) Topics in Ancient and Classical Art and Archaeology**
In-depth consideration of an aspect of ancient Mediterranean culture. Topics vary and may include ancient wall painting, Greek sculpture, artists and patrons, the ancient Near East, Egyptian art and archaeology, or Etruscan art and archaeology.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5169 and CLAS 4169 and ARTH 5169
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4189 (3) Medieval Art**
Focuses on one area of medieval art. Topics vary, but may include Carolingian, Ottonian, Romanesque, or Gothic art. Emphasizes critical thinking, methods of scholarly research, and development of writing skills.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4199 (3) Roman Architecture**
Examines the designs, functions and construction methods of ancient Roman towns, temples, baths, houses and civic structures, as well as utilitarian structures including roads and aqueducts. Emphasizes Roman architectural forms and spaces as vehicles for political propaganda and empire consolidation.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4199 and CLAS 5199
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4209 (6) Classical Archaeological Field Methods**
Offers experiential learning in theories and methods of archaeological fieldwork in the western Argolid in Greece. Applies methods for extensive survey, stratigraphic excavation, GIS modeling, ceramic analysis, numismatic analysis, architectural studies, artifact and data processing and documentation. Offered abroad only.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4209 and CLAS 5209
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Recommended:** Prerequisites CLAS 1509 or ARTH 1509 or CLAS/ARTH 2039 or CLAS/ARTH 2049.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4229 (3) Ancient Egyptian Art and Archaeology**
Archaeology of ancient Egypt in light of recent excavations; the history of excavations of the different sites; and the art of ancient Egypt through time. Formerly ANTH 4420.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 5229 and CLAS 4229 and CLAS 5229
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4259 (3) Afrofuturism**
This course will introduce students to core concepts of Afrofuturism and demonstrate how the artistic works associated with this movement offers a distinct form of black cultural knowledge. Together we will engage visual art, visual culture, film, and other media to explore how artists and other cultural producers have deployed science fiction, speculative fiction, and fantasy to imagine alternative futures as well as to interrogate current racial formations.

**ARTH 4269 (3) Art and Archaeology of the Ancient Near East**
Examines the diverse multicultural civilizations of the Iran-Iraq region and Anatolia from the rise of urbanism in Mesopotamia through the era of the first 'world empire,' Achaemenid Persia. Emphasizes the material record of religious and state institutions of the ancient Near East, especially monuments that illustrate concepts of power and communication. Explores notions of style, symbolism, visual rhetoric, text-image synthesis, patronage, creativity, trade, religion, gender, identity and roles of artists. How do inter-communal relations, cross-cultural exchange, innovation and artistic production, movement and migration, relate to the development and expression of hegemonic power and of empire, and the marginalization of some? What is the role of economics and commerce in these processes? May be repeated twice for credit if the topic is different.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5269 and CLAS 4269 and ARTH 5269
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite CLAS 1509 or ARTH 1509.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Art History
Departmental Category: Asia Content

**ARTH 4279 (3) Michelangelo (1475-1564)**
Focuses on Michelangelo's long career, marked by outstanding achievements in sculpture, painting, architecture and poetry. Emphasizes his projects and achievements in light of 16th century artistic theory, including relationships to his contemporaries in the arts and literature.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4309 (3) Neoclassicism and Romanticism: 1760-1840**
Surveys painting and sculpture in England and France from the last quarter of the 18th century through the first half of the 19th century.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4319 (3) European Art from 1830 to 1886**
Surveys the major movements in painting in France and England from the Revolution of 1830 to the impressionist crisis of 1886. Emphasizes and discusses painting and major expressions in sculpture and architecture.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4329 (3) Modern Art 1**
Provides an in-depth study of the fin de siecle, stressing postimpressionism, art nouveau and symbolism. Concludes with fauvism in France and the expressionist movement in Germany.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4339 (3) Modern Art 2**
Begins with early Picasso and cubism, including analytic and synthetic cubism and emphasizing the various isms of the 20th century. Also studies Italian futurism, de Stijl and the Bauhaus, dada and surrealism.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4419 (3) The Arts of Colonial Mexico and Peru**
Examines important works, artists, and themes that comprise the artistic production of colonial Mexico and Peru. Focuses on the intermingling, convergence, and conflict of European, Amerindian, Creole, mestizo, and African groups, which established the foundation of Latin America's cultural pluralism.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 4419
**Recommended:** Prerequisites ARTH 1500, ARTH 1600, ARTH 3729.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4449 (3) Arts of India and Southeast Asia**
Surveys Indian painting, sculpture and architecture from its earliest phases in the Indus Valley through the Mughal Empire. Encompasses Hindu, Buddhist and Islamic art of the subcontinent and Southeast Asia, as well as Himalayan cultures directly impacted by India's artistic legacies. Department enforced prerequisite: one 3000-level art history course (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4459 (3) Precolumbian Art of Mesoamerica**
Introduces students to the art, architecture, and cultures of Mesoamerica, a region that encompasses modern-day Mexico, Guatemala, Belize, and parts of El Salvador, and Honduras. Focuses on major Pre-Columbian art objects and monuments to learn about the societies and cultures from which they came. Also considers the various roles that the visual arts and architecture played in these societies. Covers Olmec through Aztec civilizations.
**Recommended:** Prerequisite ARTH 3729.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4559 (3) Twentieth-Century Architecture**
Examines the major movements and development in European and American architecture, 1900-1960's. Considers the major styles, as well as cultural interactions, race/ethnicity, gender and class concerns as they relate to both the practice and profession of architecture.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4569 (3) United States Architecture**
Examines architecture as it developed in the area now defined as the continental United States from early cultures to the present. Considers the major styles and issues of cultural interaction, race/ethnicity, gender and class concerns as they relate to the practice, theory, and profession of architecture.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4599 (3) Contemporary Architecture**
Examines the history and theory of contemporary architecture. In the field of architecture, theory and history differ in that the former describes and analyzes past work, while theory offers alternative solutions or new strategies for approaching the discipline. Both of these components are key to understanding contemporary architecture, and this course will work between the two modes of understanding.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4609 (3) Critical Issues in Photography**
Examines the history and theory of photography and the relationship of photography to the other arts, as well as to literary, political, social and philosophical issues. Analyzes the critical issues that inform photography through the writings of critics, historians, and photographers using both thematic and chronological approaches.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4639 (3) Manet Seminar**
Introduces current Manet studies and research methods by drawing upon recent books, exhibition catalogues, and scholarly journal articles. Fulfills requirement for ARTH 4919, Capstone Seminar.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4649 (3) Impressionism & Post-Impressionism**
Fosters creative study of the background and foundation in modern art. Considers 19th-century European painting and, to a lesser degree, sculpture, in relation to social, cultural, and political history from 1863 to 1900. Focuses on France, but gives attention to other countries as well.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4669 (3) Romanticism & Realism**
Fosters creative study of the background and foundation of modern art. Considers 19th-century European (and, to a lesser degree, American) painting and sculpture in relation to social, cultural, and political history from 1789 (the French Revolution) to 1863 (the Salon des refuses). Focuses on France, but gives attention to other countries as well.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4689 (3) Post-Impressionism Seminar**
Introduces current Post-Impressionism studies and research methods by drawing upon recent books, exhibition catalogues, and scholarly journal articles.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4699 (3) The Idea of Art**
Studies contemporary critiques of historical ideas about the twin institutions of the university and the museum and the role of art history in the cultural mission of both. Explores fundamental questions about the role of art in society through weekly discussions of readings, a class presentation, and final research. Fulfills ARTH 4919 capstone seminar required for art history majors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4739 (3) The Intellectual Roots of Italian Renaissance Art**
Studies critical issues raised in the literature on art, focusing on Renaissance interpretations of key historical themes such as imitation and decorum. Carefully examines the language used in primary sources (available in English).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4749 (3) Italian Renaissance Art: Studies in the Exchange between Theory and Practice**
Addresses how artists developed new compositional procedures, graphic techniques and audiences, and how these procedures were theorized in an age when artists' intellectual and social status rose dramatically. Explores reception of new graphic technology. Studies specific commissions and primary texts in depth.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4769 (3) Gender Studies in Early Modern Visual Culture**
Examines 15th and 16th century European ideas about women from a variety of feminist perspectives. Focuses on recent contributions to history of women as they intersect with the visual arts.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4769
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Art History

**ARTH 4909 (1-3) Independent Study---Art History**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Art History

**ARTH 4919 (3) Capstone Seminar: Topics in Art History**
Seminar course dealing with selected areas or problems within the history of art. Consult current online Schedule Planner for seminar topic.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4929 (1-3) Special Topics in Art History**
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 5929
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art History

**ARTH 4939 (3-6) Art Museum Internship**
Focuses on opportunities at the Denver Art Museum, working with individual curators and master teachers in selected areas, such as audience interpretation, interpretive research files, and public school curriculums. Introduces students to the professional culture and activities of art museums.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 5939
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Art History

**ARTH 4959 (3) Art History Honors Thesis**
May be elected during the final semester. Consists of a substantial, original written thesis. Requires faculty sponsorship. Does not guarantee a student will receive honors.
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Art History

**ARTH 5029 (1) Art History Research Methods**
In this class we will investigate how art scholarship is formed and organized; learn to expertly navigate the vast array of art research resources; and explore advanced techniques for searching both online and offline sources of art information. We will work to develop a critical understanding of our own research processes and reflect on the tools and techniques that lead to both expert research and successful participation in art discourse.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 4029 and LIBR 4029
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art History

**ARTH 5099 (3) Ancient Greek Sculpture**
Understanding that Greek sculpture, like all visual media, was part of the fabric of ancient Greek life and expressed the values of its creators and audience is a valuable way to gain insights into the social, economic, and political world of ancient Greece. This course will examine the work of Greek sculptors from the Archaic to the Hellenistic period. Key stylistic and technical developments, as well as significant works of art, sculptors and workshops will be discussed in detail. Some issues we will consider are the physical, religious and/or socio-historical context of individual freestanding sculptures and how specific sculptural programs illustrate aspects of Greek culture. Iconographic and narrative choices made by artists working in stone, compared to other material, will also be addressed.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 4099, CLAS 4099, and CLAS 5099
**Grading Basis:** Letter Grade

**ARTH 5109 (3) Ancient Italian Painting**
Explores the problems, theories and methods for understanding the iconography, styles, topologies, contexts and techniques of fresco wall painting in ancient Italy from the 6th century B.C.E. to the 4th century C.E. Topics covered include Etruscan tomb paintings, late Republican and early imperial fresco paintings from Rome and Campania and later Roman wall paintings, including the painted images in ancient catacombs. Previous coursework on ancient Italy or the history of pre-modern art is highly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5109 and ARTH 4109 and ARTH 5109
**Additional Information:** Departmental Category: Art History

**ARTH 5119 (3) Roman Sculpture**
Examines ancient Roman sculpture, emphasizing the display, iconography, and production of private and public monuments in the Roman Empire. Explores sculpture as evidence for historical developments, societal and gender attitudes, and state ideologies in the ancient Roman world.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 4119 and CLAS 4119 and CLAS 5119
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art History

**ARTH 5139 (3) Greek Vase Painting**
A comprehensive overview of Greek vase painting, from prehistoric through the fourth century B.C.E. Emphasis is on learning the development of primary decorative styles and on refining skills of visual analysis, scholarly research, critical thinking, oral commentary and written presentation.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 4139 and CLAS 4139 and CLAS 5139
**Additional Information:** Departmental Category: Art History

**ARTH 5159 (3) Hellenistic Art and Archaeology**
Examines art and archaeology from the period following the death of Alexander the Great (late fourth century B.C.E.) to the conquest of Greece by the Romans (middle second century B.C.E.).
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5159
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art History

**ARTH 5169 (3) Topics in Ancient and Classical Art and Archaeology**
In-depth consideration of an aspect of ancient Mediterranean culture. Topics vary and may include ancient wall painting, Greek sculpture, artists and patrons, the ancient Near East, Egyptian art and archaeology, or Etruscan art and archaeology.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4169 and ARTH 4169 and CLAS 5169
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Art History

**ARTH 5229 (3) Ancient Egyptian Art and Archaeology**
Archaeology of ancient Egypt in light of recent excavations; the history of excavations of the different sites; and the art of ancient Egypt through time. Formerly ANTH 5420.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 4229 and CLAS 4229 and CLAS 5229
**Additional Information:** Departmental Category: Art History

**ARTH 5269 (3) Art and Archaeology of the Ancient Near East**
Examines the diverse multicultural civilizations of the Iran-Iraq region and Anatolia from the rise of urbanism in Mesopotamia through the era of the first 'world empire,' Achaemenid Persia. Emphasizes the material record of religious and state institutions of the ancient Near East, especially monuments that illustrate concepts of power and communication. Explores notions of style, symbolism, visual rhetoric, text-image synthesis, patronage, creativity, trade, religion, gender, identity and roles of artists. How do inter-communal relations, cross-cultural exchange, innovation and artistic production, movement and migration, relate to the development and expression of hegemonic power and of empire, and the marginalization of some? What is the role of economics and commerce in these processes? May be repeated twice for credit if the topic is different.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5269 and CLAS 4269 and ARTH 4269
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Art History Departmental Category: Asia Content

**ARTH 5909 (1-3) Graduate Independent Study---Art History**
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art History

**ARTH 5929 (1-3) Special Topics in Art History**
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 4929
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or Art History Concurrent Degree (C-AAAH) or Film Art History Concurrent Degree (C-FILMAAAH) students only.
**Additional Information:** Departmental Category: Art History

**ARTH 5939 (3-6) Art Museum Internship**
Focuses on opportunities at the Denver Art Museum, working with individual curators and master teachers in selected areas, such as audience interpretation, interpretive research files, and public school curriculums. Introduces students to the professional culture and activities of art museums.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 4939
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Art History

**ARTH 5949 (3) Visiting Scholars Seminar**
Brings speakers to campus to work with seminar students, usually four guest scholars per semester, subjects vary. Students read scholar's work and discuss methodological issues. Focuses on the research and insight of scholars who are currently shaping the field and defining research agendas. Required for all MA art history students, open to others.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art History

**ARTH 5959 (3) Introduction to Critical Theory for Visual Studies**
Provides overview for critical theory from Marx to contemporary writers with emphasis on their relevance to visual studies. Addresses issues that underlie a wide range of academic discussion in arts and sciences. Foucault, Derrida, Said, Lacan and other authors will be subject to weekly discussions leading to research papers, presentations, and projects. Class fulfills critical theory requirement for MFA and MA students.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art History

**ARTH 6429 (3) The Black Female Body**
This seminar explores the history and discourses of the Black female body as a contested site of representation and identity in visual culture. We will consider how constructions of womanhood represent Black women as physically and socially other to the ideal woman. We will also examine how Black female artists from across the diaspora grapple with the ways the Black female body vexes the visual field.
**Grading Basis:** Letter Grade

**ARTH 6439 (3) Afro-Atlantic Imaginaries**
This seminar explores the history and visual production of what has come to be known as the Black Atlantic. Our goal will be to think through the histories of slavery and emancipation in this Atlantic world and the way they have shaped our visual culture and politics. Our reading will range widely, including works of history and theory as well as poetry and memoir.
**Grading Basis:** Letter Grade

**ARTH 6559 (3) Power & Visuality After the Conquest**
Examines how artistic production was informed by, and participated in, Latin America¿s colonial experience (16th to 19th centuries). With a critical eye and decolonial approach, students examine the complex strategies and objectives of visual culture in an ethnically/racially diverse colonial setting. Focus on historiography, visual culture, artists, patrons, hybridity, extinction, conquest, conversion, materiality, literacy, and global networks. Emphasis on colonial Mexico and Peru and their Indigenous populations. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.

**ARTH 6779 (3) Visualizing Gender Before and After the Conquest**
Examines issues of gender and power in Pre-Columbian and Colonial Latin American visual culture. Special focus on women¿s social roles and the nature and function of their images in pre-Hispanic and colonial times. Course readings and discussions draw from a variety of art-historical, ethnohistorical, literary, and anthropological sources. The interdisciplinary scope provides an intellectually diverse framework that accounts for historical and contemporary assumptions about art, representation, race/ethnicity, and gender.
**Requisites:** Restricted to graduate students only.

**ARTH 6929 (3) Seminar: Methods/Theories of Art History**
Provides a systematic critical overview of the development of art history as a discipline beginning with 18th century theories of aesthetics and ending with current interdisciplinary models of critical interpretation. Weekly readings, discussions, reports, and written papers constitute the format of this seminar in methodology. Topics vary from semester to semester. Required for MA (art history) students.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or Art History Concurrent Degree (C-AAAH) or Film Art History Concurrent Degree (C-FILMAAAH) students only.
**Additional Information:** Departmental Category: Art History

**ARTH 6939 (3) Graduate Seminar: Open Topics in Art History**
Subjects and topics vary.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or Art History Concurrent Degree (C-AAAH) or Film Art History Concurrent Degree (C-FILMAAAH) students only.
**Additional Information:** Departmental Category: Art History

**ARTH 6949 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art History

**ARTH 6959 (1-6) Master's Thesis**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art History

**ARTH 6969 (1-6) Master's Project (Art History)**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Art History

**ARTH 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 60.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students in the AAAH-PHD program, and who have completed a minimum of 30 credit hours.

# Art Studio and Non-Studio (ARTS)

## Courses

**ARTS 1003 (3) Printmaking for Non-Majors**
An introduction to basic printmaking processes. The course will focus on two projects using drypoint methods and two projects focused on relief methods to introduce concepts used in the field of printmaking. This course encourages further study into other printmaking courses.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Printmaking

**ARTS 1010 (3) Introduction to Studio Art**
Presents creative activity conceptually, and art history thematically, with an interdisciplinary, experimental, and multicultural focus. Fine arts majors explore visual literacy and culture through presentations and student-centered projects that emphasize individual development.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Foundations

**ARTS 1012 (3) Drawing for Non-Majors**
Explores varied drawing techniques and media. Introduces concepts relevant to the understanding of drawing and the creative process. May not be repeated.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Painting/Drawing

**ARTS 1020 (3) Introduction to Studio Art 2**
Presents creative activity conceptually and art history thematically, with an interdisciplinary, experimental, and multicultural focus. Art and art history majors explore visual literacy and culture through presentations and student-centered projects that emphasize individual development.
**Requisites:** Requires prerequisite course of ARTS 1010 (minimum grade C-). Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Foundations

**ARTS 1030 (3) Principles of Color**
Introduces the relative effects of color as used by the artist. Emphasizes the practice of color relations including basic characteristics, mixtures, illusions, optical mixture, color intervals, and color quantity. May not be repeated.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Foundations

**ARTS 1171 (3) Photography for Non-Majors**
An introduction to contemporary photographic practice. The course introduces photographic technique, history, and image evaluation while emphasizing visual literacy, conceptual development and personal expression.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 2171
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Photography

**ARTS 1212 (3) Painting for Non-Majors**
Explores varied painting techniques. Introduces concepts relevant to the understanding of painting and the creative process. May not be repeated.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Painting/Drawing

**ARTS 1514 (3) Sculpture for Non-Majors**
Offers an orientation involving three-dimensional form and application. Studies expressive and conceptual problems based on non-objective form relationships in various sculptural materials. May not be repeated.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 1875 (3) Ceramics for Non-Majors**
Encompasses broad and fundamental uses of clay. Basic instruction and demonstration of throwing, hand building, and other clay forming methods. Investigates utility, function, and ceramics in the broader context of contemporary art. Slide presentations explore historical and contemporary attitudes involving ceramics.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ceramics

**ARTS 2004 (3) Participatory Objects (Sculpture and Post-Studio Practice)**
Looks at the tendency in contemporary sculpture to create interactive objects and experiences for the viewer. Students in this course are required to create hands-on projects, participate in group critiques and develop presentations and research projects.
**Recommended:** Prerequisite ARTS 1010 with (minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 2022 (3) Beginning Drawing**
Emphasizes proportion and perspective through observation based drawing. Students are introduced to various drawing materials and learn to translate what they see into drawing media using two basic subjects: still-life and the figure.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Painting/Drawing

**ARTS 2085 (3) Ceramics 2: Handbuilding**
Introduces techniques of hand-built clay forms as they relate to functional and sculptural projects. Various conceptual themes, as well as construction, glazing and firing methods are explored. Emphasizes ceramic art making within the broader context of historical ceramic traditions and contemporary art practices. May not be repeated. Priority registration will be given to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Recommended:** Prerequisites ARTS 1010, ARTS 1020, ARTH 1500, and ARTH 1600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ceramics

**ARTS 2095 (3) Ceramics 2: Wheelthrowing**
Introduces techniques of wheel-thrown forms as they relate to functional and nonfunctional vessel making. Various conceptual themes, as well as construction, glazing and firing methods are explored. Emphasizes ceramic art making within the broader context of historical ceramic traditions and contemporary art practices. May not be repeated. Priority registration will be given to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Recommended:** Prerequisites ARTS 1010, ARTS 1020, ARTH 1500, and ARTH 1600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ceramics

**ARTS 2104 (3) Colossal Objects (Sculpture and Post-Studio Practice)**
Focuses on the conception, design and production of art works that are larger than human scale. Each object will be the result of individual and team design collaboration. Primarily focuses on sculpture constructed and engineered from metal although other materials are welcome.
**Recommended:** Prerequisite ARTS 1010 (with a minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 2126 (3) Digital Art 1**
An introductory course in the use of the personal computer to create and process images in the visual arts.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Media Arts

**ARTS 2171 (3) Photography 1**
An introduction to contemporary photographic practice. The course introduces photographic technique, history, and image evaluation while emphasizing visual literacy, conceptual development and personal expression.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 1171
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Photography

**ARTS 2191 (3) Photography 2**
Explores more sophisticated technical and conceptual skills to the creative process.
**Requisites:** Requires prerequisite course of ARTS 1171 or ARTS 2171 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Photography

**ARTS 2194 (3) Nothing Flat: Project a Week (Sculpture and Post-Studio Practice)**
Provides students the opportunity to work with a range of sculptural materials through a series of quick projects (e.g. installation, objects, writing). Students will learn to generate ideas quickly, engage issues and formats particular to sculpture, and produce a wide range of work over 15 weeks.
**Requisites:** Requires prerequisite course of ARTS 1010 (minimum grade C-).
**Grading Basis:** Letter Grade

**ARTS 2222 (3) Beginning Painting**
Emphasizes color and descriptive mark making through observation based painting. Students are introduced to various painting materials and learn to translate what they see into painting media using two basic subjects: still-life and the figure.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Painting/Drawing

**ARTS 2244 (3) Drawing for Sculpture (Sculpture and Post-Studio Practice)**
Explores and examines many relationships between sculpture and drawing. Projects will explore 2-D drawing and mixed media projects through the lens of sculptural practice. Scale, materials and styles will be researched along with topics such as the artists proposal, investigative processes, drawing and sculptural installations.
**Recommended:** Prerequisite ARTS 1010 (with a minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 2284 (3) Nothing Flat 1: Project a Week (Sculpture & Post-Studio Practice)**
Provides students the opportunity to work with a range of sculptural materials through a series of quick projects (e.g. installation, objects, writing). Students will learn to generate ideas quickly, engage issues and formats particular to sculpture, and produce a wide range of work over 15 weeks.
**Requisites:** Requires prerequisite course of ARTS 1010 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ARTS 2303 (3) Beginning Relief**
Emphasis on introductions to the concepts and techniques of relief processes, including white line, black line and four color reductive processes. Students will gain a working knowledge of fundamental relief processes, plus safe and appropriate use of all materials and equipment in the studio.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Printmaking

**ARTS 2384 (3) Fleeting and Found 1: Ephemeral Sculpture 1**
Focuses on introductory level processes of creating sculpture projects which are ephemeral and temporary. Themes of process, lifespan, migration, tension, entropy, and degradation will be explored. This course will include lectures, readings and discussions, writing assignments, studio projects, and visual presentations.
**Requisites:** Requires prerequisite course of ARTS 1010 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 2403 (3) Beginning Intaglio**
Introduction to techniques of Intaglio and a focus on working with copper and ferric chloride. Historical approaches and use through contemporary materials/concepts. Emphasizes interrelationship of process, materials, and ideas/aesthetics.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Printmaking

**ARTS 2413 (3) Beginning Lithography**
Exploration into stone lithography and aluminum plate is presented in this class. Individual direction and development of conceptual focus and studio techniques are important objectives in this class. Safer ways to make lithographs is highlighted and the toxic traditional methods are left behind.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Printmaking

**ARTS 2423 (3) Beginning Screenprinting**
Exploration into screenprinting at the basic level, using stencil-making processes for screenprinting with acrylic-based screenprinting inks. Emphasis is placed on exploring and developing challenging concepts, mastering basic techniques and creating compositions and visual images that successfully convey your concept and challenge the viewer. Course is focused on the art of fine art printing on paper.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Printmaking

**ARTS 2433 (3) Beginning Alternative Printmaking**
Presents creative development of concepts in printmaking beyond the traditional two-dimensional image on paper that is contained in a portfolio or frame. Focus will be made on expanding the concept of what is a print will be explored in relation to each student's studio practice and interests.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Printmaking

**ARTS 2453 (3) Beginning Monotype**
Introduces the monoprint and monotype methods. Students will learn the about making non-editioned prints using a variety of four or more technical approaches. These processes will be discussed and demonstrated in depth. Students will develop a portfolio of finished prints during the semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Printmaking

**ARTS 2504 (3) Basic Sculpture: Materials and Techniques**
Introduces the basic properties of metal, wood and mold making. Students will explore and demonstrate an understanding of basic fabrication methods involved in each element. Students will investigate both traditional and non-traditional working methods and will consider how materials and techniques inform sculptural concepts.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 2524 (3) Visual Thinking (Sculpture and Post-Studio Practice)**
Explores ideas concerning the structure and nature of visual thinking and their relationship to the creative thought process. Investigates form in terms of the organizing principles of three-dimensional design and its application to contemporary sculpture. Includes lecture and studio projects.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 3004 (3) Land and Environmental Art (Sculpture and Post-Studio Practice)**
Covers land and environmental art, providing an historical survey along with hands on projects in the landscape. Focusing on themes of site, environment, landforms, weather and earth materials, students will design and realize art projects on the land. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 3012 (3) Figure Drawing**
Explores varied drawing techniques and media. Introduces concepts relevant to the understanding of drawing and the creative process. May not be repeated. Formerly ARTS 2002.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Students are also eligible to take this class with instructor permission if they have taken a non-majors class in Drawing.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Painting/Drawing

**ARTS 3014 (3) Art and Social Practice (Sculpture and Post-Studio Practice)**
Covers social art practice, providing an historical survey along with hands on projects in social environments. Focusing on issues of public space, economic and cultural marginalization and political causes, this course provides students a forum for expressions of social reality. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 3017 (1-3) Special Topics in Studio Arts**
Introduces timely subjects in studio arts courses that cannot be offered on a regular basis. Information concerning the topics in any given semester is available prior to pre-registration from the department of Art and Art History.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Requires prerequisite courses of ARTS 1010 and ARTS 1020 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Seminars/Special Topics

**ARTS 3020 (3) Color Theory**
Color Theory is a 3000-level stand-alone course that is far more involved and complex than the brief color segments offered in a traditional foundations program. The implications are consequential to painting specifically, but also any other media that involves color. Color will be investigated from three main vantage points--theoretical: students will learn the underlying properties and relationships that exist within a complete palette of color; phenomenological: students will learn how color is observed in the world on a 3-dimensinoal object and on a flat surface; and psychological: students will learn various techniques for understanding the emotional interpretation and symbolic meaning of an array of colors.
**Requisites:** Requires perquisite courses of ARTS 1010 or ARTS 1020 or ARTS 1212 or ARTS 1012 (min grade C-).
**Grading Basis:** Letter Grade

**ARTS 3022 (3) Intermediate Drawing**
In addition to being a continuation of Beginning Drawing, Intermediate Drawing will focus on a non-traditional approach to making images encouraging conceptual development, experimentation and research. Moving beyond observation based drawings multiple thematic possibilities will be explored. Emphasis will be placed equally on ideas and technical execution.
**Requisites:** Requires prerequisite courses of ARTS 1010, 1020 and 2022 (all minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Painting/Drawing

**ARTS 3054 (3) Sculpture: Modules and Multiples 2**
Exposes students to the practice of creating large works through smaller multiples and modules. By learning about the practices of artists such as Andy Warhol, Joseph Beuys, Rachel Whlteread and Robert Gober, along with many others, students will generate an understanding and appreciation for the module and multiple in contemporary art practice. Students will learn to cast using plaster and other type of molds, will be introduced to jigs as a way to streamline production of multiple objects and will work with found objects. Students will be required to complete 3 projects, participate in group critiques of projects, produce a slide presentation on a contemporary artist whose work/practice fits within the theme of the course and prepare a final portfolio. Studio work and demonstrations will be augmented by readings and discussions on contemporary art.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisite ARTS 2504.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 3075 (3) Ceramics 2: Wheelthrowing**
Introduces techniques of wheel-thrown forms as they relate to functional and nonfunctional vessel making. Various conceptual themes, as well as construction, glazing and firing methods are explored. Emphasizes ceramic art making within the broader context of historical ceramic traditions and contemporary art practices. May not be repeated. Priority registration will be given to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Recommended:** Prerequisites ARTS 1010, ARTS 1020, ARTH 1500, and ARTH 1600.

**ARTS 3085 (3) Ceramics 3**
Further exploration of techniques approached in ARTS 2085 and ARTS 3075. Students are encouraged to develop personal concentration in relation to ceramic medium. More advanced technical concepts are introduced such as slip-casting, mold making and glaze palette development. Research, reading and writing addressing contemporary ceramic art is required. Must be taken twice before registering for ARTS 4085 - Advanced Ceramics.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of (ARTS 2085 or ARTS 1875) and ARTS 3075 (all minimum grade C-). Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ceramics

**ARTS 3097 (1-3) Special Topics - Non-Studio**
Introduces timely subjects in fine arts that cannot be offered on a regular basis. Information concerning the topics offered in any given semester is available prior to preregistration from the Department of Art and Art History.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Requires prerequisite courses of ARTS 1010 and ARTS 1020 (all minimum grade C-). Restricted to Studio Arts (AASA) or Fine Arts-Studio (BASA and BFAS) or Fine Arts-Art History (BAAH) or Art History (AAAH) majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Seminars/Special Topics

**ARTS 3124 (3) Intervention, Exchange, and Duration (Sculpture & Post-Studio Practice)**
Focuses on the production of works of art outside of the traditional studio, museum and gallery. Projects will be designed to interrupt, intervene, co-opt, provide a service, exist for a defined amount of time, or engage a site, community or situation. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisite ARTS 2504.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 3171 (3) Photography 2**
Explores more sophisticated technical and conceptual skills to the creative process.
**Requisites:** Requires prerequisite course of ARTS 1171 or ARTS 2171 (minimum grade C-).

**ARTS 3184 (3) Nothing Flat: Project a Week (Sculpture & Post-Studio Practice)**
Provides students the opportunity to work with a range of sculptural materials through a series of quick projects (e.g. installation, objects, writing). Students will learn to generate ideas quickly, engage issues and formats particular to sculpture, and produce a wide range of work over 15 weeks. Formerly ARTS 2184.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisite ARTS 2504.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 3191 (3) Photography 3**
Continues the exploration of the possibility of individual photographic expression. Students are encouraged to discover and develop a personal position in relation to the medium.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 3171 (minimum grade C-). Restricted to Studio Arts (AASA) or Art History (AAAH) majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Photography

**ARTS 3212 (3) Figure Painting**
Explores varied painting techniques. Introduces concepts relevant to the understanding of painting and the creative process. Student is also eligible to take this class if they have taken a Non-Majors class in Drawing. Please contact the instructor for permission. May not be repeated. Formerly ARTS 2202.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Painting/Drawing

**ARTS 3222 (3) Intermediate Painting**
In addition to being a continuation of Beginning Painting, this course focuses on a non-traditional approach to making paintings encouraging conceptual development, experimentation and research. Moving beyond observation based painting multiple thematic possibilities will be explored. Emphasis will be placed equally on ideas and technical execution.
**Requisites:** Requires prerequisite courses of ARTS 1010 and ARTS 1020 and ARTS 2222 (all minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Painting/Drawing

**ARTS 3224 (3) Picturing Sculpture**
Explores the many ways photography and other forms of imagery have been utilized in the field of sculpture. Students will start from the sculptural, but those objects and installations will function as an intermediary to creating final work that will rest in the image. Include lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 3284 (3) Nothing Flat 2: Project a Week (Sculpture and Post-Studio Practice)**
Provides students the opportunity to work with a range of sculptural materials through a series of quick projects (e.g. installation, objects, writing). Students will learn to generate ideas quickly, engage issues and formats particular to sculpture, and produces a wide range of work over 15 weeks. This course builds on ideas introduced in Nothing Flat 1.
**Requisites:** Requires prerequisite course of ARTS 1020 and prerequisite or corequisite course of ARTS 2504 (all minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ARTS 3303 (3) Relief 1**
Continued exploration of relief processes: various techniques of the collage process in combination with the art and process of the collograph. Examining the collage aesthetic, creating collages and collograph prints from found materials and objects. Other skills to be focused on include registration methods, blend rolls and the experimentation with rubbings.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of ARTS 1010 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Recommended:** Prerequisite ARTS 1020.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Printmaking

**ARTS 3354 (3) Bend, Build, Burn: Sculpture in Wood**
Focuses on the production of works of art in wood. Class projects explore building, bending, and burning with wood. Focuses on sculptural constructed objects although possibilities of installation, site-specific and public art will also be explored.
**Requisites:** Requires prerequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 3384 (3) Fleeting and Found 2: Ephemeral Sculpture 2**
Focuses on creating sculpture projects which are ephemeral and temporary. Themes of process, lifespan, migration, tension, entropy and degradation will be explored. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite course of ARTS 1010 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 3403 (3) Intaglio 1**
Intaglio 1 is a continued exploration of techniques of intaglio processes, including non-acid and ferric chloride techniques with copper as the main plate being used. Focus on the following methods such as line etch, aquatint, soft ground and an introduction to multiple plate printing.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of ARTS 1010 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Recommended:** Prerequisite ARTS 1020.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Printmaking

**ARTS 3413 (3) Lithography 1**
Introduces the study of stone and metal plate lithography, emphasizing individual creative development in black and white and further development in color printing processes. Not available to freshmen.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of ARTS 1010 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Recommended:** Prerequisite ARTS 1020.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Printmaking

**ARTS 3423 (3) Screen Printing 1**
Introduces the study of silkscreen techniques, emphasizing creativity, individual development, and experimentation in contemporary silkscreen processes.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 1010 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Recommended:** Prerequisite ARTS 1020.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Printmaking

**ARTS 3433 (3) Alternative Printmaking 1**
Continued exploration into the development of alternative techniques and materials, methods of extending the print beyond 2-dimensions and expanding the concept of what is a print will be explored in relation to each student's studio practice and interests.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of ARTS 1010 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Recommended:** Prerequisite ARTS 1020.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Printmaking

**ARTS 3434 (3) Collaboration: Art and Collective Action**
Covers both historical background and hands on projects that are collaborative in nature. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 3453 (3) Monotype 1**
A continued exploration in the monoprint and monotype methods. Use of a varied grouping of matrixes will be the focus of this class. Students will develop a portfolio of finished prints during the semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of ARTS 1010 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Recommended:** Prerequisite ARTS 1020.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Printmaking

**ARTS 3604 (3) Beyond the Studio: Post-Studio Art Practice**
Overview of post-studio art practice and covers the historical landscape of artists and projects that have pushed "beyond the studio" since 1970. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 3614 (3) Lost in Space: Installation Art**
Students learn how to develop ideas in relation to installation art, exhibition spaces, and explore practical skills to help carry out their ideas. Includes lectures, readings and discussion, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 3714 (3) Experimental Structures (Sculpture and Post-Studio Practice)**
Explores the interface of sculpture and architecture. Looks at individuals and collectives that have become renowned for their work with experimental structures and students will have the opportunity to build hands-on experiments. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 3841 (1-3) Undergraduate Independent Study---Photography**
Reserved only for special projects in photography, not offered in the curriculum. Requires a detailed proposal, instructor's signature and departmental approval.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 3191 or ARTS 4161 (minimum grade C-).
**Additional Information:** Departmental Category: Photography

**ARTS 3842 (1-3) Undergraduate Independent Study---Painting**
Reserved for special projects in painting not offered in the curriculum. Requires a detailed proposal, instructor's sponsorship, and departmental approval.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 3202 (minimum grade C-).
**Additional Information:** Departmental Category: Painting/Drawing

**ARTS 3845 (1-3) Undergraduate Independent Study---Ceramics**
Reserved for special projects in ceramics not offered in the curriculum. Requires a detailed proposal, instructor's sponsorship, and departmental approval.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of ARTS 3085 (minimum grade C-).
**Additional Information:** Departmental Category: Ceramics

**ARTS 3847 (1-3) Independent Study**
Reserved for special projects not offered in the curriculum. Department enforced prerequisite: detailed proposal, instructor sponsorship, and departmental approval.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Seminars/Special Topics

**ARTS 3906 (1-3) Undergraduate Independent Study---Video**
Reserved for special projects in video not offered in the curriculum. Requires a detailed proposal, instructor's sponsorship, and departmental approval.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 4246 (minimum grade C-).
**Additional Information:** Departmental Category: Media Arts

**ARTS 3937 (1-6) Internship**
Gives upper-division students the opportunity to work in public or private organizations on assignments relating to their career goals, and allows them to explore the relationship between theory and practice in their major.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Additional Information:** Departmental Category: Seminars/Special Topics

**ARTS 4002 (3) Advanced Drawing/Portfolio**
Continuation of Drawing 3. Advanced studio class in drawing for creative expression and individual portfolio development. Emphasis varies by semester;contact individual instructor for more information.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite courses of ARTS 1020 and ARTS 2022 and ARTS 3022 (all minimum C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Painting/Drawing

**ARTS 4004 (3) Land and Environmental Art (Sculpture and Post-Studio Practice)**
Covers land and environmental art, providing an historical survey along with hands on projects in the landscape. Focusing on themes of site, environment, landforms, weather, and earth materials, students will design and realize art projects on the land. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 4014 (3) Art and Social Practice (Sculpture and Post-Studio Practice)**
Covers social art practice, providing an historical survey along with hands on projects in social environments. Focusing on issues of public space, economic and cultural marginalization and political causes, provides students a forum for expressions of social reality. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 4017 (1-3) Special Topics in Studio Arts**
Introduces timely subjects in studio art courses that cannot be offered on a regular basis. Information on topics in any given semester is available prior to pre-registration in departmental office.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5017
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Seminars/Special Topics

**ARTS 4024 (3) Public Art**
Focuses on the two areas 1) lecture/discussion, both based on political, historical and the aesthetic evolution regarding examples of public art and 2) current practice, in reference to how to use such information to generate new more innovative and original ideas regarding public art and its application. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5024
**Requisites:** Requires prerequisite or corequisite course of ARTS 1020 (minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524 and ARTS 3504.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 4050 (3) Writing Across the Arts: Culture Writing in the 21st c**
In this culture writing class, we¿ll listen in on and contribute to the conversation, touching on many forms of expression, from fine art to pop culture. Art, of course, does not exist solely in a museum or gallery, and we will consider¿both in our reading and in written assignments-- its social context as well as, more personally, art¿s capacity to challenge us, to incite empathy or self-scrutiny, to provoke and inspire.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5050 and AHUM 4050
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Written Communication-Upper

**ARTS 4060 (3) Art Writing As Practice**
This seminar is designed for visual artists (MFA/Phd candidates), supporting them in building a regular writing practice that will allow them to reflect upon and lend critical context to their creative work. Through written prompts, presentations and discussions--as well as looking to the example of artists we count as influences--we'll craft a narrative about our work and where it fits into larger conversations about art, identity, history, and our own times. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5060
**Grading Basis:** Letter Grade

**ARTS 4085 (3) Ceramics 4**
Develop a personal creative practice through self-generated, independent projects. The focus is on developing an individual studio discipline through experimentation, research, reading and writing and examining the work in individual critiques.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 3085 (minimum grade C-). Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ceramics

**ARTS 4087 (3) Selected Topics in Contemporary Art**
Selectively studies significant areas of visual art of the last decade including major critical opinions.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5087
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Seminars/Special Topics

**ARTS 4095 (3) Special Topics in Ceramics**
Designed for students majoring in studio arts or art history. Covers many subjects related to contemporary art practice and ceramics. The topics change from semester to semester from the raw material science behind ceramics to the relation between object making and poetic practice, to food and contemporary art explorations, to political and social art movements, to many other relevant subjects for those interested in the arts. May be repeated for up to 9 total credit hours.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5095
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 3085 (minimum grade C-). Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ceramics

**ARTS 4097 (1-3) Special Topics-Non-Studio**
Introduces timely subjects in the visual arts that cannot be offered on a regular basis. Information concerning the topics offered in any given semester is available prior to preregistration from the fine arts department.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5097
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Seminars/Special Topics

**ARTS 4104 (3) Performance/Installation**
Primarily focuses upon personal imagery as a live situation occurring in either an invented constructed reality or real environment. Work may be individual or group configuration and may also take on the visual linguistic form of a solo performance or of a multimedia presentation.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5104
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 4126 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 4107 (1-3) Special Topics**
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Seminars/Special Topics

**ARTS 4117 (3) BFA Seminar**
For students intending to pursue graduate work and/or a professional career in art. Emphasizes the development of a critical overview of their work and interests and how they relate to the problems of professional activity. This is typically offered in the Spring Semester only.
**Requisites:** Restricted to Studio Arts (AASF) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Seminars/Special Topics

**ARTS 4118 (3) Visiting Artist Program**
Artists of national and international reputation, interacting with graduate and advanced undergraduate students, discuss their studio work at seminar meetings and at public lectures or events. Provides continuous input of significant developments and a comprehensive view of contemporary issues in the arts. Permission from Instructor is required. Department enforced prerequisite: portfolio review.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5118
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 87-180 credits (Senior) Studio Arts (AASA or AASF) or Art History (AAAH) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Visiting Artist Program

**ARTS 4126 (3) Digital Art 2**
Offers studio experience using personal computer in the generation and processing of imagery in the visual arts.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5126
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 2126 (minimum grade C-). Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Media Arts

**ARTS 4130 (3) Integrated Media**
Encourages experimentation with media and integration of traditional areas of drawing, painting, sculpture and photography. Covers two- and three-dimensional collage/assemblage, correspondence art, artist's books, site-specific, performance, audio and video art.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5130
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Integrated Arts

**ARTS 4154 (3) Metalsmithing 1**
Introduces students to the fundamental techniques used in metalsmithing, including cold and hot fabrication techniques, forming and coloring. Through projects, discussions, readings and demonstrations, students will learn how to create, analyze, understand and critique contemporary metalwork. Projects will focus on design and concept development, while enhancing students' technical and problem-solving skills.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5154
**Requisites:** Requires prerequisite courses of ARTS 1010, 1020, at least one 2000-level ARTS course, and at least one 3000-level ARTS course (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Sculpture

**ARTS 4161 (3) Photography 4**
Explores advanced techniques and concepts of photography as art. Emphasizes photography as a means to formal and expressive ends.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 3191 (minimum grade C-). Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Photography

**ARTS 4171 (3) New Directions in Photography**
Investigates the use of the photographic image in new, antique, or nonstandard ways including nonsilver, photosculpture, various color processes, photolanguage, photoinstallations, electronic media, performance, filmmaking, electrostatic art (copy machine), photobooks, photocollage, and audio/visual art. Course content changes each semester.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5171
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of ARTS 3191 (minimum grade C-). Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Photography

**ARTS 4176 (3) New Directions in Digital Art**
Explores the integration of digital art across diverse contexts, including digital narrative, conceptual art, and visual literacy, while engaging with the most cutting-edge tools and technologies in the field. This includes video AI, Virtual Reality, Augmented Reality, and other emerging technologies with open-ended possibilities for future innovations. This course may be repeated for up to 9 total credit hours.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5176
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite courses of ARTS 2126 and ARTS 4126 (minimum grade C-). Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Media Arts

**ARTS 4202 (3) Advanced Painting/Portfolio**
Continuation of Painting 3. Advanced studio class in painting for creative expression and individual portfolio development. Emphasis varies by semester;contact individual instructor for more information.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite course of ARTS 1010 and 1020 and 2222 and 3222 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Painting/Drawing

**ARTS 4222 (3) Drawing + Painting Specialized Investigation**
This course is a concentrated study of a narrow topic (rotating) chosen by a Drawing & Painting faculty member. Experiments in the expanded field of drawing and painting will allow students to study course materials that defy conventional academic course classifications and approaches. This intermittent course is intended to compliment the Drawing & Painting area¿s continuously offered 4000 level courses (Advanced Drawing and Advanced Painting) and 5000 level course (Graduate Painting Seminar). For non-ARTS or non-ARTH Grads, permission of instructor required.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5222
**Requisites:** Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.

**ARTS 4246 (3) Beginning Video Production**
Presents a studio course on basic single camera video production strategies and concepts. Through class screenings, projects, demonstrations, discussions, and readings, students gain an introductory familiarity with camera, lighting, sound, editing and the organization and planning involved in a video project. Explores a basic theoretical understanding of video as an art form and its relationship to television, film, art, history, culture.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5246
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Media Arts

**ARTS 4303 (3) Relief 2**
Continued exploration into the expressive/formal aesthetics of relief processes. Studio practice/investigation of artistic attitudes as exemplified through historical perspectives, traditional/contemporary usages.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite or corequisite courses of ARTS 1010 and any 3000 level printmaking course. ARTS 3303, 3403, 3413, 3423, 3433 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Printmaking

**ARTS 4316 (3) History and Theory of Digital Art**
Explores the history and theory of digital art. Discussion topics include the emergence of Internet art, hypertext, new media theory, online exhibitions, web publishing, virtual reality and the networked interface. Includes collaborative and individual projects.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5316
**Requisites:** Requires prerequisite course of ARTS 2126 (minimum grade C-). Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors and minors.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Media Arts

**ARTS 4403 (3) Intaglio 2**
Intaglio 2 is a continued exploration of techniques of intaglio processes, including non-acid and ferric chloride techniques with copper as the main plate being used. Possible processes focused on photo etching using solar plates and introduction to printing ala poupee wiping, chine colle and basic color. Building a unified body of work is the main focus.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite or corequisite courses of ARTS 1010 and any 3000 level printmaking course: ARTS 3303, or 3403, or 3413, or 3423, or 3433 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Printmaking

**ARTS 4413 (3) Lithography 2**
Continues the study of stone and metal plate lithography, emphasizing individual creative development in black and white and further development in color printing processes. Digital imaging and nontoxic processes are emphasized as much as possible.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite or corequisite courses of ARTS 1010 and any 3000 level printmaking course: ARTS 3303, or 3403, or 3413, or 3423, or 3433 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Printmaking

**ARTS 4423 (3) Screen Printing 2**
Introduces advanced screen printing technology, emphasizing individual creativity and the ability to resolve problems of two-dimensional form.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite or corequisite courses of ARTS 1010 and any 3000 level printmaking course: ARTS 3303, or 3403, or 3413, or 3423, or 3433 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Printmaking

**ARTS 4433 (3) Alternative Printmaking 2**
Continued research into developing a sharper critical response, both aesthetically and conceptually, to their own work, as well as the work of other artists. Various alternative printmaking methods will be introduced and each student is expected to explore and examine these processes through a body of work. Emphasis is put on the interrelationship of processes, materials and ideas/aesthetics.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite or corequisite courses of ARTS 1010 and any 3000 level printmaking course: ARTS 3303, or 3403, or 3413, or 3423, or 3433 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Printmaking

**ARTS 4434 (3) Collaboration: Art & Collective Action**
Covers both historical background and hands on projects that are collaborative in nature. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite courses of ARTS 1010 and ARTS 1020 (all minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 4444 (6) Art and Environments Field School**
Puts students in touch with various landscapes in Colorado. Takes place off campus each summer. Focuses on site-based approaches to art creation and is designed as an experiential course, meaning that students learn through the experience of place and then by the process of making. After introductions to each site, students will be responsible for a site interpretation piece utilizing various mediums including photography, drawing, land art and collaboration.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5444
**Requisites:** Requires prerequisite courses of ARTS 1010 and ARTS 1020 (all minimum grade C-).
**Recommended:** Prerequisite ARTS 2504.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 4453 (3) Monotype 2**
Continued research into developing techniques of using a varied grouping of matrixes will be the focus of this class. Students will be expected to develop sharper critical responses both aesthetically and conceptually, to their own work, as well as the work of other artists.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite or corequisite courses of ARTS 1010 and any 3000 level printmaking course: ARTS 3303, or 3403, or 3413, or 3423, or 3433 (minimum grade C-). Restricted to Studio Arts (AASA/AASF) or Art History (AAAH) majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Printmaking

**ARTS 4457 (3) Sound Art Seminar**
Covers the history of sound art from Luigi Russolo and his noise machine during the Futurist Movement to today's experimental music/sound art contributions. Students will listen to sound art works by artists in all areas of sound art, as well as read about theoretical views on sound art.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5457
**Requisites:** Requires prerequisite courses of ARTH 1500 and ARTH 1600 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Seminars/Special Topics

**ARTS 4504 (3) Advanced Sculpture Studio**
Students in this course will be required to complete projects, participate in group critiques of projects, produce a slide presentation on a contemporary artist whose work/practice fits within the theme of the course and prepare a final portfolio. Studio work and demonstrations will be augmented by readings and discussions on contemporary art.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Prereq of ARTS 3004, ARTS 3014, ARTS 3054, ARTS 3124, ARTS 3184, ARTS 3224, ARTS 3354, ARTS 3384, ARTS 3434, ARTS 3604, ARTS 3614, or ARTS 3714 (min grade C-). Restricted to Studio Arts (AASA or AASF) or Art History (AAAH) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 4604 (3) Beyond the Studio: Post-Studio Art Practice**
Overview of Post-Studio art practice and covers the historical landscape of artists and projects that have pushed "beyond the studio" since 1970. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite courses of ARTS 1010 and ARTS 1020 (all minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 4641 (3) String Instrument Building**
As a prelude to sculptural art making processes, this course explores a variety of materials, methods and techniques and their application to the making of a musical string instrument, i.e. planning, designing, material selection and a wide variety of woodworking processes. We will also cover theoretical discussions into what is being made.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5641
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 4714 (3) Experimental Structures (Sculpture and Post Studio Practice)**
Explores the interface of sculpture and architecture. Looks at individuals and collectives that have become renowned for their work with experimental structures and students will have the opportunity to build hands-on experiments. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Requires prerequisite courses of ARTS 1010 and ARTS 1020 (all minimum grade C-).
**Recommended:** Prerequisites ARTS 2504 and ARTS 2524.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Sculpture

**ARTS 4717 (1-3) Studio Critique**
Consists of consultations with faculty on individual studio problems and projects. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Seminars/Special Topics

**ARTS 4934 (3) Art, Design, and Engineering: Thinking and Making**
Examines the aesthetics, design, and engineering of sculpture, installation, and public art. Through research presentations, readings, and field trips, students learn about the process of making art. In addition to classroom learning, students engage in internships with artists and art fabricators. Highlights national and international hybrid art, design, and engineering advanced degree programs and additional art-related internships and job opportunities. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5934 and COEN 4934
**Requisites:** Restricted to Art History (AAAH) or Engineering and Applied Science (COEN) majors or minors with a minimum of 50 credits only.
**Recommended:** Prerequisites ARTS 1010, ARTS 1020, ARTH 1500, ARTH 1600, COEN 1400, COEN 3930.
**Grading Basis:** Letter Grade

**ARTS 5004 (3) Land and Environmental Art (Sculpture and Post-Studio Practice)**
Covers land and environmental art, providing an historical survey along with hands on projects in the landscape. Focusing on themes of site, environment, landforms, weather, and earth materials, students will design and realize art projects on the land. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Requisites:** Restricted to graduate students only.

**ARTS 5017 (1-3) Special Topics in Studio Arts**
Introduces timely subjects in studio art courses that cannot be offered on a regular basis. Information on topics in any given semester is available prior to pre-registration in departmental office.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4017
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Seminars/Special Topics

**ARTS 5024 (3) Public Art**
Focuses on the two areas 1) lecture/discussion, both based on political, historical and the aesthetic evolution regarding examples of public art and 2) current practice, in reference to how to use such information to generate new more innovative and original ideas regarding public art and its application. Includes lectures, readings and discussions, writing assignments, studio projects and visual presentations.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4024
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Sculpture

**ARTS 5050 (3) Writing Across the Arts: Culture Writing in the 21st c**
In this culture writing class, we¿ll listen in on and contribute to the conversation, touching on many forms of expression, from fine art to pop culture. Art, of course, does not exist solely in a museum or gallery, and we will consider¿both in our reading and in written assignments-- its social context as well as, more personally, art¿s capacity to challenge us, to incite empathy or self-scrutiny, to provoke and inspire.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4050 and AHUM 4050
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ARTS 5060 (3) Art Writing As Practice**
This seminar is designed for visual artists in pre-thesis, supporting them in building a regular writing practice that will allow them to reflect upon and lend critical context to their creative work. Through written prompts, presentations and discussions--as well as looking to the example of artists we count as influences--we'll craft a narrative about our work and where it fits into larger conversations about art, identity, history, and our own times. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4060
**Grading Basis:** Letter Grade

**ARTS 5075 (3) Graduate Ceramics**
Seminar includes group and individual critiques and individual studio visits. Explores different approaches to studio and post studio art practices, research, reading and writing as it relates to your own art practice and contemporary art. May be repeated for up to 18 total credit hours.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to ARTS or ARTH graduate students only.
**Additional Information:** Departmental Category: Ceramics

**ARTS 5087 (3) Selected Topics in Contemporary Art**
Selectively studies significant areas of visual art of the last decade including major critical opinions.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4087
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Seminars/Special Topics

**ARTS 5095 (3) Special Topics in Ceramics**
Designed for graduate students in art practices or art history. Covers many subjects related to contemporary art practice and ceramics. Topics change from semester to semester from the raw material science behind ceramics to the relation between object making and poetic practice, to food and contemporary art explorations, to political and social art movements, to many other relevant subjects for those interested in the arts. May be repeated for up to 9 total credit hours.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4095
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Ceramics

**ARTS 5097 (1-3) Special Topics-Non-Studio**
Introduces timely subjects in the visual arts that cannot be offered on a regular basis. Information concerning the topics offered in any given semester is available prior to preregistration from the fine arts department.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4097
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Seminars/Special Topics

**ARTS 5104 (3) Performance/Installation**
Primarily focuses upon personal imagery as a live situation occurring in either an invented constructed reality or real environment. Work may be individual or group configuration and may also take on the visual linguistic form of a solo performance or of a multimedia presentation.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4104
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Sculpture

**ARTS 5107 (1-3) Special Topics**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Seminars/Special Topics

**ARTS 5117 (3) Graduate Art Seminar**
For students intending to pursue a professional career in Art. Emphasizes the development of a critical overview of their work and interests. For non-ARTS or non-ARTH Grads, permission of instructor required.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Seminars/Special Topics

**ARTS 5118 (3) Visiting Artist Program**
Artists of national and international reputation, interacting with graduate and advanced undergraduate students, discuss their studio work at seminar meetings and at public lectures or events. Provides continuous input of significant developments and a comprehensive view of contemporary issues in the arts.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4118
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Visiting Artist Program

**ARTS 5126 (3) Digital Art 2**
Offers studio experience using personal computer in the generation and processing of imagery in the visual arts.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4126
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Media Arts

**ARTS 5130 (3) Integrated Media**
Encourages experimentation with media and integration of traditional areas of drawing, painting, sculpture and photography. Covers two- and three-dimensional collage/assemblage, correspondence art, artist's books, site-specific, performance, audio and video art.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4130
**Additional Information:** Departmental Category: Integrated Arts

**ARTS 5140 (3) Integrated Arts Studio**
Explores the creative process through a series of conceptually-based studio exercises. Students are encouraged to work across traditional media boundaries as they address themes such as identity, place, spirituality, politics, and consumerism. Includes individual and collaborative studio projects, as well as reading and writing about the course themes.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Integrated Arts

**ARTS 5150 (3) Graduate Integrated Arts**
Investigates the conjunction of interdisciplinary concepts in the creation of art. Looks beyond traditional media to new sources for art-making. a curious intellect, combined with exceptional research skills, will be the basis for original writing and rigorous discussion.
**Repeatable:** Repeatable for up to 18.00 total credit hours.
**Additional Information:** Departmental Category: Integrated Arts

**ARTS 5154 (3) Metalsmithing 1**
Introduces students to the fundamental techniques used in metalsmithing, including cold and hot fabrication techniques, forming and coloring. Through projects, discussions, readings and demonstrations, students will learn how to create, analyze, understand and critique contemporary metalwork. Projects will focus on design and concept development, while enhancing students' technical and problem-solving skills.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4154
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Sculpture

**ARTS 5161 (3) Graduate Photography**
Explores the creative process through lens-based conceptual work with a concentration on individual critique. Students are encouraged to work across traditional media boundaries as they address themes such as identity, place, spirituality, politics, and consumerism. Possibilities include individual and collaborative studio projects, as well as relevant readings and writings. May be repeated for up to 18 total credit hours. For Non-ARTS or Non ARTH Grads, permission of instructor required.
**Repeatable:** Repeatable for up to 18.00 total credit hours.
**Additional Information:** Departmental Category: Photography

**ARTS 5171 (3) New Directions in Photography**
Investigates the use of the photographic image in new, antique, or nonstandard ways including nonsilver, photosculpture, various color processes, photolanguage, photoinstallations, electronic media, performance, filmmaking, electrostatic art (copy machine), photobooks, photocollage, and audio/visual art. Course content changes each semester.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4171
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Photography

**ARTS 5176 (3) New Directions in Digital Art**
Explores the integration of digital art across diverse contexts, including digital narrative, conceptual art, and visual literacy, while engaging with the most cutting-edge tools and technologies in the field. This includes video AI, Virtual Reality, Augmented Reality, and other emerging technologies with open-ended possibilities for future innovations. This course may be repeated for up to 9 total credit hours.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4176
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Media Arts

**ARTS 5202 (3) Graduate Drawing and Painting**
This course is an intense inquiry into contemporary studio practices. Students will be expected to consider and communicate the context (social, political, personal, philosophical, etc.) underpinning studio work as well as the decisions that go into making that work. Specific themes of inquiry will vary by semester, depending on the instructor. Coursework may include readings, group discussions, group and individual critiques, written assignments, and projects. For non-ARTS or non-ARTH Grads, permission of instructor required. May be repeated for up to 18 total credit hours.
**Repeatable:** Repeatable for up to 18.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Painting/Drawing

**ARTS 5222 (3) Drawing & Painting Specialized Investigation**
This course is a concentrated study of a narrow topic (rotating) chosen by a Drawing & Painting faculty member. Experiments in the expanded field of drawing and painting will allow students to study course materials that defy conventional academic course classifications and approaches. This intermittent course is intended to compliment the Drawing & Painting area¿s continuously offered 4000 level courses (Advanced Drawing and Advanced Painting) and 5000 level course (Graduate Painting Seminar). For non-ARTS or non-ARTH Grads, permission of instructor required.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4222
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite if not a graduate student, undergraduates must have completed either Advanced Drawing or Advanced Painting.

**ARTS 5246 (3) Graduate Beginning Video Production**
Presents a studio course on basic single camera video production strategies and concepts. Through class screenings, projects, demonstrations, discussions, and readings, students gain an introductory familiarity with camera, lighting, sound, editing and the organization and planning involved in a video project. Explores a basic theoretical understanding of video as an art form and its relationship to television, film, art, history, culture. For non-ARTS or non-ARTH Grads, permission of instructor required.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4246
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Media Arts

**ARTS 5303 (3-18) Graduate Relief**
Continues the study of the expressive/formal aesthetics of relief processes. Studio practice/investigation of artistic attitudes as exemplified through historical perspectives, traditional/contemporary usages. Students with limited experience in relief processes will be given an overview in those practices.
**Repeatable:** Repeatable for up to 18.00 total credit hours.
**Requisites:** Restricted to Studio Arts or Art History (AASA or AAAH) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Printmaking

**ARTS 5316 (3) History and Theory of Digital Art**
Explores the history and theory of digital art. Discussion topics include the emergence of Internet art, hypertext, new media theory, online exhibitions, web publishing, virtual reality and the networked interface. Includes collaborative and individual projects.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4316
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Media Arts

**ARTS 5346 (3) Graduate Intermediate Video Production**
Continuation of beginning video production. Extends the knowledge of single camera video production strategies and concepts. Expands the concept of montage (editing) and strategies to develop a video project through class screenings, projects, discussions and readings. Furthers theoretical understanding of video as an art form.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4346 and FILM 4340
**Requisites:** Requires prerequisite course of ARTS 4246 or ARTS 5246 (minimum grade D-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Media Arts

**ARTS 5403 (3) Graduate Intaglio**
Intaglio for creative expression with a focus on studio practice. Developing personal visual language/aesthetics. Historical/contemporary awareness, evolving technologies and strategies. An exploration of techniques of intaglio processes, including non-acid and ferric chloride techniques with copper as the main plate being used. Students with limited experience in intaglio processes will be given an overview in those practices.
**Repeatable:** Repeatable for up to 18.00 total credit hours.
**Requisites:** Restricted to Studio Arts or Art History (AASA or AAAH) graduate students only.
**Additional Information:** Departmental Category: Printmaking

**ARTS 5413 (3) Graduate Lithography**
Graduate students are expected to edition Lithographs that are conceptually relevant and technically proficient. Projects are proposed and developed with the instructor. Students with limited experience in aluminum plate or stone lithography will be given an overview in those practices. The development of concepts and personally significant imagery leading to thesis work is required. For non-ARTS or non-ARTH Grads, permission of instructor required. May be repeated for up to 9 total credit hours. Taught with ARTS 3413 and ARTS 4413.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Printmaking

**ARTS 5423 (3) Graduate Screen Printing**
Screen print for creative expression with a focus on studio practice. Developing personal visual language/aesthetics. Focus on the complexities and multi-disciplinary activities of printmaking. Development of concepts leading to thesis work is a focus. Historical/contemporary awareness, evolving technologies/strategies. Students with limited experience in screen print processes will be given an overview in those practices. May be repeated for up to 9 total credit hours.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Printmaking

**ARTS 5433 (3) Graduate Alternative Printmaking**
Continued research into developing a sharper critical response, both aesthetically and conceptually, to their own work, as well as the work of other artists. Various alternative printmaking methods will be introduced and each student is expected to explore and examine these processes through a body of work. Emphasis is put on the interrelationship of processes, materials and ideas/aesthetics.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Printmaking

**ARTS 5444 (6) Art and Environments Field School**
Puts students in touch with various landscapes in Colorado. Takes place off campus each summer. Focuses on site-based approaches to art creation and is designed as an experiential course, meaning that students learn through the experience of place, and then by the process of making. After introductions to each site, students will be responsible for a site interpretation piece utilizing various mediums including photography, drawing, land art and collaboration.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4444
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Sculpture

**ARTS 5453 (3) Graduate Monotype**
Continued research into developing techniques of using a varied grouping of matrixes will be the focus of this class. Students will be expected to develop sharper critical responses both aesthetically and conceptually, to their own work, as well as the work of other artists.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Printmaking

**ARTS 5457 (3) Sound Art Seminar**
Covers the history of sound art from Luigi Russolo and his noise machine during the Futurist Movement to today's experimental music/sound art contributions. Students will listen to sound art works by artists in all areas of sound art, as well as read about theoretical views on sound art.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4457
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Seminars/Special Topics

**ARTS 5500 (3) Art, Design, and Engineering: Thinking and Making**
Examines the aesthetics, design, and engineering of sculpture, installation, and public art. Through research presentations, readings, and field trips, students learn about the process of making art. In addition to classroom learning, students engage in internships with artists and art fabricators. Highlights national and international hybrid art, design, and engineering advanced degree programs and additional art-related internships and job opportunities.
**Requisites:** Restricted to Art History (AAAH) or Engineering and Applied Science (COEN) graduate students only.
**Recommended:** Prerequisite Prior courses or real-life experience in conceptualizing and creating objects, products, or art.
**Grading Basis:** Letter Grade

**ARTS 5504 (3) Graduate Sculpture**
Through readings, discussions, critiques, and one-on-one meetings, Graduate Sculpture will provide a forum for students to explore and develop their work and practice. Additionally, when possible, students will plan a research-based class field excursion in consultation with the faculty teaching the course.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Sculpture

**ARTS 5540 (3) Generative Art**
Attends to the interdisciplinary pursuits of scientists, humanists and anyone interested in creating works of visual art according to step by step procedures as in musical compositions, mathematical formulae, linguistic rules, computer programs, etc. Includes collaborative and individual projects.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Integrated Arts

**ARTS 5641 (3) String Instrument Building**
As a prelude to sculptural art making processes, this course explores a variety of materials, methods and techniques and their application to the making of a musical string instrument, i.e. planning, designing, material selection and a wide variety of woodworking processes. We will also cover theoretical discussions into what is being made.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4641
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Sculpture

**ARTS 5717 (1-3) Graduate Studio Critique**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Seminars/Special Topics

**ARTS 5857 (1-3) Graduate Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Seminars/Special Topics

**ARTS 5901 (1-3) Graduate Independent Study---Photography**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Photography

**ARTS 5934 (3) Art, Design, and Engineering: Thinking and Making**
Examines the aesthetics, design, and engineering of sculpture, installation, and public art. Through research presentations, readings, and field trips, students learn about the process of making art. In addition to classroom learning, students engage in internships with artists and art fabricators. Highlights national and international hybrid art, design, and engineering advanced degree programs and additional art-related internships and job opportunities. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 4934 and COEN 4934
**Requisites:** Restricted to Art History (AAAH) or Engineering and Applied Science (COEN) graduate students only.
**Recommended:** Prerequisite Prior courses or real-life experience in conceptualizing and creating objects, products, or art.
**Grading Basis:** Letter Grade

**ARTS 6957 (1-6) Master of Fine Arts Creative Thesis**
**Additional Information:** Departmental Category: Seminars/Special Topics

# Arts & Humanities (AHUM)

**AHUM 1000 (3) Topics in Arts and Humanities**
Explores a topic in the arts and humanities that exceeds the boundaries of a single department or program. This introductory course encourages experimentation and introduces students to interdisciplinary approaches that characterize innovative research.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.

**AHUM 1240 (3) Planetarity**
Focuses on post-WWII American writing and thought about the planet and humanity. We explore how postwar efforts to transform the terrestrial environmental and conquer outer space raise questions about humanity, technology, and nature. We also study how earth and space serve novelists, artists, and film-makers as environments to confront large-scale questions about culture, identity, and power.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 1240

**AHUM 1825 (3-4) Inclusive Interdisciplinary Data Science for All**
Team-taught module-based course merges data science and the humanities without requiring prior experience in either one. Students will synthesize qualitative and quantitative approaches to urgent research questions and practice putting data to work in the world. They will learn to use data analysis, statistics, and basic programming skills to answer questions of human importance, while applying the central humanities skills of source critique, attention to human motives, contextualization, and argument.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Quantitative Reasoning Math

**AHUM 1880 (3) The Zombie in History and Popular Culture**
Discusses the emergence of the zombie figure in the Caribbean and its evolution from colonial Haiti to present-day popular culture having passed through Hollywood. Through movies and literary, historical, and scientific documents, students will study critically how this mass-media icon came to represent deep-rooted anxieties about the modern world.
**Equivalent - Duplicate Degree Credit Not Granted:** FREN 1880

**AHUM 2000 (3) Topics in Arts and Humanities**
Explores a topic in the arts and humanities that exceeds the boundaries of a single department or program. This introductory course encourages experimentation and introduces students to interdisciplinary approaches that characterize innovative research.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.

**AHUM 2006 (3) American Comics and Graphic Novels: An Ambivalent Art**
Immerse yourself in comics. Spanning all media platforms, comics are a global force in the twenty-first century culture. This course is an introduction to comics history and a headlong dive into comics today. It covers superheroes, movies, novels, as well as making comics. It proposes that comics help us understand ourselves in the world today. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 2006

**AHUM 2030 (3) The Ancient Roots of Modern Medicine**
Students learn the meaning and use of the Greek and Latin roots in modern medical terminology; they gain an appreciation of ancient Roman and Greek medicine history and culture in their relation to the modern practice of Western medicine and the sciences; they become familiar with common ancient bioethical principles that govern the ancient practice of medicine and the sciences and learn to appreciate how these principles inform and influence modern medicine and the sciences.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 2030 and LING 2030
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Distribution-Social Sciences

**AHUM 2036 (3) Introduction to Media Studies in the Humanities**
Serves as an introduction to media studies specifically from a humanities perspective. Studies both histories and theories of media from the 20th and 21st centuries. Touches on methodologies for undertaking media studies (including distant ready and media archaeology). Objects of study may include such topics as film, radio, social media platforms and games, as well as digital art and literature.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 2036 and ENGL 2036
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**AHUM 2311 (3) Energy Cultures: Oil, Coal, and Atoms in Modern Literature and Film**
Explores the concept of energy and its influence in world culture from the 19th century to the present, paying particular attention to how writers and filmmakers from the United States, Russia, and elsewhere have responded to the accelerating production and consumption of fossil fuels and nuclear power. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 2311 and HUMN 2311
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**AHUM 2800 (3) Brazil: Past and Present**
Discusses contemporary Brazil through the lenses of its literary, as well as socio-political movements. Students acquire a broader perspective of the country's current dynamics based on the formation of its national identity from 1500 to today. History serves as background to analyze literature and arts and critically understand Brazilian culture. Taught in English. Does not count toward Portuguese minor or Spanish and Portuguese major.
**Equivalent - Duplicate Degree Credit Not Granted:** PORT 2800
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**AHUM 3000 (3) Topics in Arts and Humanities**
Explores a topic in the arts and humanities that exceeds the boundaries of a single department or program. This upper-division course encourages experimentation and introduces students to the interdisciplinary approaches that characterize innovative research.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.

**AHUM 3036 (3) Artist Books in Theory and Practice**
This course will introduce students to an exciting but neglected body of work: artist books. Beginning in the twentieth century, artist books joined the ranks of developed art forms, appearing in every major artistic movement. The first half of the course will introduce students to the wide diversity of styles and materials artist books employ. The second half will be a workshop, in which students will create their own unique books based on research projects.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 3036
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**AHUM 3046 (3) Literature and Architecture**
This course explores the role of storytelling in literature and architecture. It is part seminar and part studio/workshop. Stories invite readers to dwell in them. Buildings tell stories. Stories and buildings are hence sequential arts. Students study examples of narrative architecture from different periods and cultures and analyze literary and philosophical works that explore the connection between buildings and stories. Students also create literary adaptations of works of architecture and translate literary texts into three-dimensional structures.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 3046
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**AHUM 3106 (3) Introduction to Literary Study with Data Science**
Introduces students to the use of data science methods in literary criticism. This course explores how computers and data science methods can provide insight into literature while also developing the necessary coding skills to perform such analysis. Students will learn both to perform and to think critically about computationally-based literary scholarship.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 3106

**AHUM 3400 (3) Race and Epistemic Justice**
This course will study the visual construction of race in the United States from the slavery era to the digital age. Through analyses of diverse media (photography, cinema, television, and digital platforms), we will interrogate testimony, witnessing, and visual self-creation as long-standing forms of political agency in the United States. Finally, we will test the hypothesis that epistemic justice ¿ equal treatment of one another as knowers and documenters ¿ is an inseparable component of racial justice.
**Equivalent - Duplicate Degree Credit Not Granted:** WRTG 3400

**AHUM 3681 (3) Refugees in German Culture**
Introduces the diversity of refugee migration in German culture through artistic and cultural "texts," including those created by or in collaboration with refugees (film, comic journalism, literature, blogs, hashtag campaigns, music, etc). These texts are discussed in relationship to theories of racism, precarity, and biopolitics together and contextualized by work from other disciplines. This interdisciplinary course is methodologically informed by the theory and practice of cultural studies. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3681, JWST 3681 and GRMN 3681
**Recommended:** for students with sophomore standing or higher.

**AHUM 4000 (3) Topics in Arts and Humanities**
Explores a topic in the arts and humanities that exceeds the boundaries of a single department or program. This upper-division course encourages experimentation and introduces students to the interdisciplinary approaches that characterize innovative research.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**AHUM 4050 (3) Writing Across the Arts: Culture Writing in the 21st c**
In this culture writing class, we¿ll listen in on and contribute to the conversation, touching on many forms of expression, from fine art to pop culture. Art, of course, does not exist solely in a museum or gallery, and we will consider¿both in our reading and in written assignments-- its social context as well as, more personally, art¿s capacity to challenge us, to incite empathy or self-scrutiny, to provoke and inspire.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5050 and ARTS 4050
**Grading Basis:** Letter Grade

**AHUM 4301 (3) Gender, Race and Immigration in Germany and Europe**
Introduces students to debates surrounding migration and race in contemporary Germany with comparisons to other European contexts. Emphasis on reading texts in context using tools of cultural studies, integrating analyses of gender, race, nation, and sexuality. Texts may include film, literature, television, social media, news media, political posters, etc. Topics include: race and racisms, Black and women of color feminisms, Roma feminisms, Muslim feminisms, notions of integration and citizenship, and more. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4301 and GRMN 4301 and GRMN 5301

**AHUM 4419 (3) The Arts of Colonial Mexico and Peru**
Examines important works, artists, and themes that comprise the artistic production of colonial Mexico and Peru. Focuses on the intermingling, convergence, and conflict of European, Amerindian, Creole, mestizo, and African groups, which established the foundation of Latin America's cultural pluralism.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 4419
**Recommended:** Prerequisites ARTH 1500, ARTH 1600, ARTH 3729.

**AHUM 4700 (3) Encountering Animals: Contemporary Discourse and the Dialog of Species**
Explores the Western tradition of thinking about animals as well as recent challenges to our beliefs in human exceptionality and radical animal difference. Themes include the ¿animal machine,¿ nature-culture dualism, animal representations in today¿s culture, philosophy and science, interspecies relations, post-humanism. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** FREN 4700

**AHUM 5000 (3) Topics in Arts and Humanities**
Explores a topic in the arts and humanities that exceeds the boundaries of a single department or program. This graduate course encourages experimentation and introduces students to the interdisciplinary approaches that characterize innovative research.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.

# Arts and Sciences Courses (ARSC)

## Courses

**ARSC 1000 (3-4) Expository Writing**
Develops college-level reading, writing, and thinking. Students are asked to read critically, then construct written responses that are revised and crafted into more formal essays and position papers. Offered through the Student Academic Services Center. Department enforced prerequisite: program coordinator consent required.
**Additional Information:** Departmental Category: Writing

**ARSC 1080 (4) College Writing and Research**
Introduces academic and professional genres through the research and inquiry process. Students practice close reading, oral presentation, drafting, synthesis, analysis and research skills in discussion, writing workshops, and one-on-one conferences.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Lower
Departmental Category: Writing
MAPS Course: English

**ARSC 1081 (1) SASC Coseminar: College Writing and Research**
One-credit seminar provides extended instruction in written composition for students enrolled in ARSC 1080. Graded assignments enrich students' understanding of genre, organization, research skills, and grammar. Department enforced corequisite: ARSC 1080.
**Additional Information:** Departmental Category: Writing

**ARSC 1150 (3) Writing in Arts and Sciences**
Emphasizes the development of effective writing skills with instruction provided in expository and analytical writing. Reviews basic elements of grammar, syntax,and composition as needed.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Lower
Departmental Category: Writing
MAPS Course: English

**ARSC 1200 (1-3) Topics in Arts and Sciences**
Various topics from within the College of Arts and Sciences.
**Additional Information:** Departmental Category: Special Curricula

**ARSC 1400 (1) SASC Coseminar: Chemistry 1 & 2**
Supplements and strengthens student experiences in chemistry. Allows particularly gifted students an opportunity to extend their understanding of the subject and to explore possible careers in science.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Departmental Category: Miramontes Arts and Sciences Program (MASP)

**ARSC 1420 (1) SASC Coseminar: Introduction to EEB**
Designed to supplement and strengthen student experiences in EBIO 1210 and EBIO 1220. Allows particularly gifted students an opportunity to extend their understanding of the subject and possible careers in science.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Departmental Category: Miramontes Arts and Sciences Program (MASP)

**ARSC 1432 (1) SASC Coseminar: Economics**
Designed to supplement and strengthen student experiences in microeconomics. Allows particularly gifted students an opportunity to extend their understanding of the subject and to explore possible careers in social science.
**Repeatable:** Repeatable for up to 2.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miramontes Arts and Sciences Program (MASP)

**ARSC 1440 (1) SASC Coseminar: Mathematics**
Offers an unusual and essential opportunity for students to receive small-group enrichment and reinforcement. Supplements and strengthens student experiences in mathematics, allowing particularly gifted students an opportunity to extend their understanding of the subject in a supportive environment, and to explore possible careers inscience.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Departmental Category: Miramontes Arts and Sciences Program (MASP)

**ARSC 1450 (3) Intro to STEM Research Method: In the Field and at the Bench**
Uses experiential learning as a strategy to teach STEM science concepts. Lectures in STEM sciences provide background information on science concepts while the hands-on, inquiry-based and research-based lab activities are designed to allow students to explore the scientific method as it is applied to CU STEM research. Topics will highlight the interdisciplinary aspect of STEM research.
**Additional Information:** Departmental Category: Miramontes Arts and Sciences Program (MASP)

**ARSC 1460 (1) SASC Coseminar: Biology**
Supplements and strengthens student experiences in introductory IPHY courses. Students work through course material that cannot be covered in detail during lecture.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Additional Information:** Departmental Category: Miramontes Arts and Sciences Program (MASP)

**ARSC 1470 (1) MASP Natural Science Seminar**
Enhances students' knowledge and appreciation of the natural sciences. Readings, discussions, cooperative learning exercises and outside activities explore the richness of scientific discovery related to core natural science concepts. Emphasizes the scientific method and the history and people making scientific discoveries. Department consent required.
**Repeatable:** Repeatable for up to 4.00 total credit hours.

**ARSC 1480 (1) MASP Social Science Seminar**
Fosters an appreciation of the social sciences. Readings, discussions, cooperative learning exercises, and outside activities illustrate the interconnections between different bodies of knowledge. Emphasizes relationships between the social sciences and the real world. Department consent required.
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miramontes Arts and Sciences Program (MASP)

**ARSC 1490 (1) MASP Humanities Seminar**
Enhances students' knowledge and appreciation of the humanities. Readings, discussions, cooperative learning exercises, workshopping papers and presentation, guest speakers, and outside activities are designed to enhance both students' appreciation of the subject matter and their performance in their regular courses. Emphasis is on actively using knowledge of humanities in a variety of ways. Department consent required.
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miramontes Arts and Sciences Program (MASP)

**ARSC 1492 (1-3) MASP Research Seminar**
Enhances students' knowledge and appreciation of the humanities, the social sciences or STEM-related fields. The course's readings, discussions, cooperative learning exercises, work-shopping papers and presentations, guest speakers, and outside activities are designed to enhance both students' appreciation of the subject matter and their performance in their regular courses. Emphasis will be placed on actively using knowledge of humanities, social sciences or STEM fields in a variety of ways. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Miramontes Arts and Sciences Program (MASP)

**ARSC 1520 (1) Health, Society, and Wellness in COVID-19 Times**
The novel coronavirus pandemic has disrupted nearly every aspect of society around the world. The pandemic has resulted in the infection of millions and death of hundreds of thousands of people worldwide. The economic, social, and mental health impacts of the pandemic are unprecedented and have laid bare and exacerbated long standing inequalities and disparities.¿ College students will benefit from an academic course that provides scientific, humanistic, and social scientific perspectives on disease and society broadly and the coronavirus crisis in particular. The course will offer students empirically proven strategies for maintaining wellness, which is especially important at a moment of pervasive uncertainty, heightened anxiety, and mental health vulnerability.

**ARSC 1550 (1) Making the Self: Tools for Well-Being and Success in College**
Helps first-year Arts and Sciences students build the skills, learning techniques and agency needed for success at CU and beyond. Taught in an experiential, workshop-format, this course focuses on developing a student¿s critical and analytical skills along with their practices of investigation and creative problem-solving. Using materials in a variety of media (text, visual, moving image, etc.), the course will explore different ways of knowing and learning. In an active small-group setting, students you will examine and define the concepts that lay the foundation for their college education.
**Requisites:** Restricted to Arts and Sciences students.

**ARSC 1600 (1) The University of Colorado Experience**
Provides an effective transition to the university by giving students a solid base for developing scholarship, citizenship, decision making, and involvement in their university community. Topics include academic and campus resources, safety, health, and diversity.
**Additional Information:** Departmental Category: Special Curricula

**ARSC 1710 (1) SASC Coseminar: Mathematics**
Provides motivated pre-calculus students with more in-depth and more challenging coverage of material assumed in calculus. Students complete advanced problems that cannot be covered in pre-calculus courses due to time constraints. Mastery of material is emphasized. Department enforced prerequisite: proficiency in high school mathematics.
**Additional Information:** Departmental Category: Special Curricula

**ARSC 1720 (1) SASC Coseminar: Calculus Work Group**
This 1-credit seminar provides motivated calculus students with more in-depth and more challenging coverage of material assumed in calculus. Students complete advanced problems that cannot be covered in calculus courses due to time constraints. Mastery of material is emphasized. Department enforced requisites: proficiency in pre-calculus mathematics and an A/B average in pre-calculus sequence. Department enforced corequisite: MATH 1300.
**Additional Information:** Departmental Category: Special Curricula

**ARSC 1800 (3) Methods of Inquiry**
Introduces students to methodologies used in different academic disciplines, e.g., how a paleographer dates a manuscript. Course is team-taught. Students must also enroll in two of four corequisite course sections, all in different areas of the core curriculum. The corequisite course sections are listed in the online Schedule Planner.
**Additional Information:** Departmental Category: Special Curricula

**ARSC 2000 (3) Ways of Knowing: Constructions of Knowledge in the Academy and Beyond**
This course asks students to interrogate natural learning tendencies, how they know what they know, and how to cultivate other ways of knowing beyond intellectual. They analyze how knowledge is created, discovered, and interpreted. They¿ll explore what faculties are involved in learning, seeing, understanding and knowing; how revolutions in knowledge arise; the relationship between knowledge and power; and what wisdom is. Students draw on different ways of expressing knowledge, including the intellect, intuition, and more. Department consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** NRLN 2000
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Special Curricula

**ARSC 2274 (3) Peer Counseling**
Introduction to basic peer education and counseling theory and techniques. Students learn experientially by practicing a variety of skills in an informal atmosphere. The material learned is valuable to students professionally (as employee or supervisor in any field or as helping professional) regardless of career path. Students increase self-awareness and apply it to their own lives. Offered Fall semesters only.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Departmental Category: Special Curricula

**ARSC 2400 (1) SASC Coseminar: Organic Chemistry**
Supplements and strengthens student experiences in organic chemistry. Allows gifted students an opportunity to extend their understanding of the subject and to explore possible careers in science.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Departmental Category: Miramontes Arts and Sciences Program (MASP)

**ARSC 2470 (1) SASC Coseminar: Physics 1 and 2**
Supplements and strengthens student experiences in physics. Allows particularly gifted students an opportunity to extend their understanding of the subjects and to explore possible careers in science.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Departmental Category: Miramontes Arts and Sciences Program (MASP)

**ARSC 3100 (3) Multicultural Perspective and Academic Discourse**
Teaches students how to write academic papers related to race, class, gender, sexuality, and other areas of cultural identity. Students acquire expertise on issues through readings, guided discussion, and research and practice oral presentation skills, drafting, and workshopping of papers. Department enforced prerequisite: lower level writing course(s) or waiver.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper
Departmental Category: Writing

**ARSC 3200 (3) CU in DC, Science Policy**
In this course, we will examine the intersections of science, policy, funding, government, and society. The Science Policy course will include interaction with scientific societies and organizations from the Washington D.C. metro area; and science funders such as NASA, the National Institutes of Health., NSF, etc. Students will be expected to be highly engaged and to participate in class discussion, and a large portion of the course grade will be based on their level of engagement. This course is part of the CU in DC program. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 3000

**ARSC 3600 (3) Diversity Issues: Higher Education**
Uses Internet dialogue, computing, and media technology to improve communication and develop research and inquiry skills and critical thinking. Race, class, gender, and sexual orientation issues are addressed to foster understanding of university codes of inquiry and modes of interaction in scholarly communities. Department enforced prerequisite: admission to McNair Program, junior standing, minimum GPA of 2.50, and strong interest in graduate school.
**Additional Information:** Departmental Category: Special Curricula

**ARSC 3650 (3) Diversity Issues in Graduate Education**
Guides students through research on diversity and retention issues in graduate education. Participants use Tinto's work on academic and social integration as a conceptual framework. Further, students investigate how specific institutions support diversity goals in their graduate programs. Department enforced prerequisite: admission to McNair Program (minimum 2.50 GPA, three recommendation letters, personal statement, strong interest in graduate school).
**Additional Information:** Departmental Category: Special Curricula

**ARSC 3700 (1-5) McNair Seminar: Research Design**
Multidisciplinary course guiding critical thinking asstudents design a formal investigation. Includes presenting and writing a prospectus. Students revise the prospectus, creating a proposal for funding the research as well as HRC proposals. Department enforced prerequisite: admission to McNair Program (junior standing, minimum GPA of 2.50, and a strong interest in graduate school).
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Special Curricula

**ARSC 3935 (1-6) Internship**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Special Curricula

**ARSC 4000 (3) Multimedia Applications in Foreign/Second Language Education**
Focuses on knowledge and skills in accessing, evaluating and integrating technology assisted, mediated material in the teaching and learning of foreign languages. Focuses on hands-on design and production of instructional software for foreign languages.
**Equivalent - Duplicate Degree Credit Not Granted:** ARSC 5000
**Recommended:** Prerequisite a language-teaching methodology course.
**Additional Information:** Departmental Category: Special Curricula

**ARSC 4040 (1-3) Arts and Sciences Special Topics**
**Equivalent - Duplicate Degree Credit Not Granted:** ARSC 5040
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Special Curricula

**ARSC 4700 (1-5) The McNair Seminar: Research Practices and Procedures**
Within the range of scholarly modes, student researchers examine discipline-specific rationales for evidence and analysis. Lecturers distinguish popular concepts of investigation from scholarly research. Students learn to take great care describing and discussing methods, findings, interpretations, assertions, and conclusions. Department enforced prerequisite: admission to McNair Program (junior standing, meeting TRIO guidelines, strong interest in graduate school).
**Repeatable:** Repeatable for up to 10.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Special Curricula

**ARSC 4750 (3) CU in DC Seminar**
Seminar with varying Arts and Sciences topics that students take while participating in the CU in DC program in Washington D.C. Seminar takes place in the nation's capital and is taken in conjunction with a professional internship. Restricted to CU in D.C. program participants.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Special Curricula

**ARSC 4909 (2-6) Senior Thesis for Individually Structured Major**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Special Curricula

**ARSC 4910 (1) McNair Practicum: Principles and Practices of University Teaching**
Teaches the core principles of pedagogy at the university level and provides students guidance and feedback on constructing a teaching session in collaboration with a faculty mentor. Using the instructional practices of their discipline, students discuss issues university faculty encounter in their quest toward teaching excellence. The expertise of the Graduate Teacher Program, the Preparing Future Faculty Network and the Faculty Teaching Excellence Program will be drawn upon for supplemental resources, seminars and workshops. Department enforced prerequisite: ARSC 4700 and restricted to McNair Program Students.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Additional Information:** Departmental Category: Special Curricula

**ARSC 4930 (3-6) CU in DC Internship**
Arts and Sciences internship course that students are required to take when participating in the CU in DC program in Washington D.C. Internships take place in the nation's capital, and internship students take a CU in DC Seminar course(s) simultaneously. Restricted to CU in D.C. program participants.

**ARSC 5000 (3) Multimedia Applications in Foreign/Second Language Education**
Focuses on knowledge and skills in accessing, evaluating and integrating technology assisted, mediated material in the teaching and learning of foreign languages. Focuses on hands-on design and production of instructional software for foreign languages.
**Equivalent - Duplicate Degree Credit Not Granted:** ARSC 4000
**Recommended:** Prerequisite a language-teaching methodology course.
**Additional Information:** Departmental Category: Graduate-Level Courses

**ARSC 5040 (1-3) Arts and Sciences Special Topics**
**Equivalent - Duplicate Degree Credit Not Granted:** ARSC 4040
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate-Level Courses

**ARSC 5050 (3) Graduate Seminar on Applied Behavior Science 1**
The first part of a two-semester sequence designed to introduce graduate students in the social sciences to interdisciplinary theory, concepts, and methods as applied to important social problems. Department enforced prerequisite: completion of first year of graduate work in a social science department.
**Additional Information:** Departmental Category: Graduate-Level Courses

**ARSC 5060 (3) Graduate Seminar on Applied Behavior Science 2**
The second part of a two-semester sequence designed to introduce graduate students in the social sciences to interdisciplinary theory, concepts, and methods as applied to important social problems. Department enforced prerequisite: ARSC 5050.
**Additional Information:** Departmental Category: Graduate-Level Courses

# Asian Studies (ASIA)

## Courses

**ASIA 1000 (3) Origins of Contemporary Southeast Asia**
Explores the dynamic present of Southeast Asia in light of its complex past. Introduces the shared historical experiences that have shaped diverse Southeast Asian societies, with a focus on the continuing effects of colonialism, nationalism, and globalization in the region. Examines key issues facing contemporary Southeast Asian communities, including current debates around gender, faith, human rights, democracy, development, etc. Engages with Southeast Asian literature, film, art, journalism, and museum collections from a transdisciplinary perspective.
**Recommended:** Prerequisite students may find some prior coursework in history, anthropology, or Asian Studies to be helpful, but this is not required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**ASIA 1700 (3) Introduction to Tibetan Civilization**
Surveys the dynamic history of Tibet from its earliest known origins to the present. Offers interdisciplinary perspectives on Tibetan civilization, including religion and politics, society and culture, arts, and literature. Topics include the role of Buddhism in Tibetan society, from the early empire through the rule of the Dalai Lamas; diverse narratives that inform the memory of Tibet¿s past and construct a shared cultural identity; civil war, sectarian conflict, and ecumenical projects; and modern Tibetan responses to Chinese policies, both domestically and in diaspora abroad.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ASIA 2000 (3) Gateway to Modern Asia: Exploring Regional Connections**
Introduces main themes, intellectual approaches used in Asian Studies through a transdisciplinary perspective that focuses on interactions and links between geographic regions and national boundaries. Presents Asia as a concept, a powerful imaginary geography, and historically dynamic construct that has shaped / been shaped by global patterns of economic development, nation building, war and diplomacy, colonialism and aspirations for better lives.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**ASIA 2300 (3) Himalayan Arts of Enlightenment**
Incorporating experiential learning and contemplative practice, this course explores Himalayan art and iconography informed by doctrinal, devotional, and philosophical principles grounded in historical context. These forms benefit from the diverse, cross-cultural transmission and innovation of techniques, materials, and aesthetics. At its heart Himalayan art acts as functional support for contemplative practice and devotional inspiration, but the act of creating art itself can be contemplative practice as a path to awakening. This course introduces the deeply interconnected and transnational history of the Himalayas as exemplified by its art forms and investigates their modern practice, economy, and innovation. Students are taught secular contemplative techniques to enhance their analysis.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ASIA 2500 (3) Catastrophe and Resilience: Asia's Experiences of Climate Change**
This course introduces Asia¿s battle with climate change and explores scholarship related to climate change and its impacts on Asia, particularly from a community perspective. Explores the resilience and strategies that different parts of Asia have developed in response to a changing climate. This interdisciplinary course will survey ideas from climate sciences, paleoclimate, anthropology, environmental studies, archeology, geography, and history.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ASIA 2852 (3) Contemporary Southeast Asia: Environmental Politics**
Examines globally pressing questions of environmental sustainability, regional inequality and development in the dynamic and heterogeneous landscapes of contemporary Southeast Asia. Focuses on interactions between histories of uneven development and contemporary debates over energy and infrastructure, food security, governance and access to land, forest and water-based resources.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 2852
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**ASIA 3300 (3) Sex and Gender in Asian Film and Literature**
Explores issues of sex and gender in traditional and contemporary Asian cultures by looking at how sex and gendered roles are configured and play out in Asian cultures. Employs film and literary sources which reflect, subvert and act as agents of change in the dominant cultures.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**ASIA 3550 (3) Tibetan Buddhism**
Explores Tibetan Buddhism through literature and film, including sacred biographies, treatises on the Buddhist path and films providing a visual window into Tibetan life worlds. We examine different kinds of Tibetan journeys: moving through the life cycle, treading the path of self-cultivation, embarking on solitary retreat, traversing from death to rebirth and traveling on pilgrimage and into exile.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 3550

**ASIA 3900 (3) Discovering Urban China: Tradition, Modernity, Nostalgia**
Explores the ways Chinese cities, especially Beijing and Shanghai, are depicted in scholarly articles, films, literature and population culture in terms of tradition, modernity and nostalgia. Begins by defining the terms then discusses texts dealing with these themes. Discussions are linked to what the students observe first-hand as they explore the cities. Takes place in China.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**ASIA 4001 (1) Advanced Language Co-Seminar Arts and Humanities**
Acts as a Co-Seminar for advanced Asian Studies students.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Pass/Fail
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ASIA 4002 (1) Advanced Language Co-Seminar Social Sciences**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ASIA 4100 (3) China's Space Dream: Long March to the Moon and Beyond**
This class will explore the history of China's interest in and development of space technology from the Mao era through today. China became the third country ever to launch a human into space in 2003 and has been expanding its space program ever since. Beijing has poured billions into its military-run space program, with hopes of having a crewed space station by 2022 and eventually sending humans to the Moon. Tracing the development of China's space industry chronologically, this class will consider the long-term policy and industry implications of the growing U.S. - China Space rivalry. Course texts will draw on primary source documents, policy analysis, business case analyses, and contemporary Chinese science fiction to understand the current context for this rivalry and make policy recommendations for the future.
**Recommended:** Prerequisites ASIA 2000 and/or ASEN 1969.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Distribution-Arts Humanities

**ASIA 4200 (3) Politics of Memory and Heritage in Asia**
Explores the uses of memory and heritage in the present-day politics of Asia. Examines how the past ¿ historical events, heritage sites, shared memories ¿ fuels nationalist movements, diplomatic disputes, grassroots activism, nostalgic tourism, and popular media. Delves especially into the legacies of colonialism and conflict in the region, highlighting how communities today seek justice and reconciliation in the wake of historical trauma. Engages with films, graphic novels, public art, photography, museums, monuments, archaeological sites, and more.
**Recommended:** Prerequisite Familiarity with Asian history, social science or humanities courses.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ASIA 4300 (3) Open Topics in Asian Studies**
Examines selected texts on a particular topic in the Arts & Humanities. Taught by regular or visiting faculty. Topics change each term.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**ASIA 4400 (3) Open Topics in Asian Studies**
Explores special social science topics in Asian Studies, including, but not limited to, social, political, economic, cultural, and international relations topics. Taught by regular or visiting faculty. Topics change each term.
**Equivalent - Duplicate Degree Credit Not Granted:** ASIA 5400
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ASIA 4448 (3) Wars of Liberation in Southeast Asia**
Uses the contemporary nations of Indonesia, Myanmar, and Singapore as case studies to examine the making and unmaking of European and Japanese colonialism in Southeast Asia in the years surrounding World War II. In what ways did diverse communities understand and narrate imperialism and independence? How can we understand wars of liberation as local, regional, and global experiences, with legacies for today?
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5448 and HIST 4448
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**ASIA 4500 (3) Urban Asia: Tradition, Modernity, Challenges**
Explores change in urban Asia, the representation of Asian cities, and the challenges of urban life through a transdisciplinary and thematic approach using academic articles, documentaries, and literary materials. The class discusses the role of tradition, concepts of modernity, the impact of tourism, rural to urban migration, poverty, the effects of war, legacies of colonialism, and environmental challenges.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Asia Content

**ASIA 4600 (3) Encounters: Tibet, the Himalayas, and the West**
Provides a history of encounters and interactions between Tibet and the West from the classical times till the twentieth century. Explores the early medieval European knowledge about Tibet, followed by the historical accounts of various western missionaries, travelers, imperialists, and spiritualists to Tibet and the Himalayas including the growth of Tibetan Buddhism in the West from the last century, and Tibetan diaspora and migration to the West.
**Recommended:** Prerequisite ASIA 1700.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ASIA 4650 (3) Art and Science of Meditation**
Broadly interdisciplinary and skill-based, this course offers an in-depth theoretical, practical, and experiential exploration of meditation informed by cutting-edge scientific studies. Students read traditional contemplative masterworks in translation, survey current neuroscientific and psychological research on meditation, and employ critical subjectivity in the application of evidence-based contemplative techniques. That is, students train in secularized meditation that is proven to develop three specific skillsets: relaxation and stress reduction; attentional focus and distraction reduction; and compassion and emotional resilience.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ASIA 4700 (3) Enlightened Visionaries, Dirty Tricksters and Warrior Heroes: Masterworks of Tibetan Literature**
This course surveys an array of Tibetan literary masterworks from ancient times to the present. Students read English Translations of Tibetan materials that are informed and contextualized by modern scholarship. Rather than focus on doctrinal works that comprise the majority of Tibet¿s textual corpus, this course explores Tibet¿s great narrative traditions, in both prose and verse, from folktales and trickster stories to heroic warrior epics to the aftermath of enlightenment in Buddhist biographies. Through this literature, students become familiar with the various cultural, intellectual, and historical movements that have shaped the Tibetan literary landscape. This is a discussion-based seminar where students take active roles in directing the conversation towards the topics of their greatest interest.
**Recommended:** Prerequisite ASIA 1700.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ASIA 4830 (3) Senior Seminar in Asian Studies**
Participates in a discussion seminar on topics in Asian Studies, conducts research and writes a final paper or creates a final project on an approved Asian Studies topic, following guidelines established by the program director. Required for Asian Studies majors but open to non-Asian Study majors.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**ASIA 4840 (1-3) Independent Study**
Provides an independent study opportunity, by special arrangement with Asian Studies faculty, for students with particular Asian Studies interests.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Asian Studies (ASIA) majors only.
**Additional Information:** Departmental Category: Asia Content

**ASIA 4842 (3) Global Frontiers in Southeast Asia**
Uses the theme of the global frontier to examine and compare three key moments in the modern history of Southeast Asia: the colonial encounter, the rise of the modern territorial state, and the age of contemporary globalization. Examines case studies from earlier eras to analyze emerging global frontiers at the junction of state territoriality and transnational economic expansion.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5842 and GEOG 4842
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**ASIA 4930 (1-6) Engage Asia: Internship in Asian Studies**
Matches students with supervised internships relevant to academic topics in Asian studies. Students work with CAS faculty and internship supervisors, i.e., intern with companies or non-profits doing Asia-related business or project.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Requisite Asian language and culture courses.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Asia Content

**ASIA 5400 (3) Open Topics in Asian Studies**
Explores special social science topics in Asian Studies, including, but not limited to, social, political, economic, cultural, and international relations topics. Taught by regular or visiting faculty. Topics change each term.
**Equivalent - Duplicate Degree Credit Not Granted:** ASIA 4400
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

# Astrophysical and Planetary Sciences (ASTR)

## Courses

**ASTR 1000 (3) The Solar System**
Introduction to the night sky, planets, moons and the life in our solar system. Highlights the latest discoveries from space. For non-science majors. Some lectures may be held at Fiske Planetarium. Offers opportunities for nighttime observations at Sommers-Bausch Observatory.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 1010, but without lab ASTR 1010 or ASTR 1030
**Requisites:** Restricted to non- Astronomy (ASTR) majors only.
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**ASTR 1010 (4) Introductory Astronomy: The Solar System w/Lab**
Introduction to the night sky, planets, moons and the life in our solar system. Highlights the latest discoveries from space. For non-science majors. Some lectures may be held at Fiske Planetarium. Requires nighttime observations at Sommers-Bausch Observatory. Degree credit granted for only one of ASTR 1000 or ASTR 1010.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 1000, but with additional lab
**Requisites:** Restricted to non- Astronomy (ASTR) majors only.
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science Lab or Lab/Lec

**ASTR 1020 (4) Introductory Astronomy: Stars & Galaxies w/Recitation**
Non-science majors learn the nature and workings of the Sun, stars, neutron stars, black holes, galaxies, quasars, structure and origins of the universe. Some lectures may be held at Fiske Planetarium. Offers opportunities for nighttime observations at Sommers-Bausch Observatory. Includes recitation.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 1040 or ASTR 1200
**Requisites:** Restricted to non-Astronomy (ASTR) majors only.
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 1030 (4) Accelerated Introductory Astronomy 1**
Covers principles of modern astronomy summarizing our present knowledge about the Earth, Sun, moon, planets and origin of life. Requires nighttime observation sessions at Sommers-Bausch Observatory. Required in ASTR major/minor. Like ASTR 1000 and 1010, but taught at a higher intellectual level, including a significant amount of quantitative analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 1000 or ASTR 1010
**Requisites:** Requires prerequisite or corequisite course of MATH 1300 or APPM 1350 or APPM 1340 and APPM 1345 (all minimum grade C-).
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 1040 (4) Accelerated Introductory Astronomy 2**
Covers principles of modern astronomy summarizing our present knowledge about the Sun, stars, birth and death of stars, neutron stars, black holes, galaxies, quasars, and the organization and origins of the universe. May require nighttime observing sessions at Sommers-Bausch Observatory. Required in ASTR major/minor. Includes a recitation. Taught at a higher intellectual level including a significant amount of quantitative analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 1020 or ASTR 1200
**Requisites:** Requires prerequisite course of ASTR 1010 or ASTR 1030 and MATH 1300 or APPM 1350 or APPM 1340 and APPM 1345 (all minimum grade C-).
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 1200 (3) Stars and Galaxies**
Non-science majors are introduced to the nature and workings of the Sun, stars, neutron stars, black holes, interstellar gas, galaxies, quasars, plus structure and origins of the universe. Some lectures may be held at Fiske Planetarium. Offers opportunities to attend nighttime observation sessions at Sommers-Bausch Observatory.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 1020 or ASTR 1040
**Requisites:** Restricted to non- Astronomy (ASTR) majors only.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**ASTR 2000 (3) Ancient Astronomies of the World**
Documents the numerous ways in which observational astronomy and cosmology have been features of ancient cultures. Includes naked eye astronomy, archaeoastronomy, ethnoastronomy, concepts of time, calendrics, cosmogony, and cosmology.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**ASTR 2010 (3) Modern Cosmology-Origin and Structure of the Universe**
Introduces modern cosmology to nonscience majors. Covers the Big Bang; the age, size, and structure of the universe; and the origin of the elements and of stars, galaxies, the solar system, and life.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**ASTR 2020 (3) Space Astronomy and Exploration**
Covers physical principles of performing astronomy from space for science and exploration. The basic design of launch vehicles and spacecraft, orbital dynamics, and instruments will be described in the context of specific space missions (e.g. Hubble Telescope, Mars rovers) as well as prospects for future space observatories in orbit and on the Moon.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**ASTR 2030 (3) Black Holes**
Black holes are one of the most bizarre phenomena of nature. Students are introduced to the predicted properties of black holes, astronomical evidence for their existence and formation, and modern ideas about space, time, and gravity.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**ASTR 2040 (3) The Search for Life in the Universe**
Introduces the scientific basis for the possible existence of life elsewhere in the universe. Includes origin and evolution of life on Earth and the search for evidence of life in our solar system, including Mars and Jupiter's moon Europa. Discusses the conditions necessary for life and whether they might arise on planets around other stars. Credit only for this course or ASTR 3300.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 2040
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 2050 (3) The Sun and Society: Living with an Active Star**
Introduces non-science majors to the many ways out Sun influences life and society. Covers how the Sun generates energy, how it evolves over billions of years, how it affects Earth's climate and biology, how it produces dangerous "space weather", how we can harness its power and how life in other solar systems would depend on the properties of their Suns.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences MAPS Course: Natural Science

**ASTR 2100 (3) Fundamental Concepts in Astrophysics**
Covers topics in modern physics required for upper-level astrophysics and planetary science courses, including quantum mechanics, electromagnetic spectra, atomic and nuclear physics, and thermodynamics, in the context of astrophysics, planetary and space sciences. Also introduces key topics in mathematics to support these topics.
**Requisites:** Requires prerequisite course of PHYS 1120 or PHYS 1125 and APPM 1360 or MATH 2300 (minimum grade C-).
**Grading Basis:** Letter Grade

**ASTR 2500 (3) Gateway to Space**
Introduces the basics of atmosphere and space sciences, space exploration, spacecraft design, rocketry and orbits. Students design, build, and launch a miniature satellite on a high altitude balloon. Explores the current research in space through lectures from industry.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 1400, ASEN 1403, ECEN 1400 and GEEN 1400
**Requisites:** Restricted to Astronomy (ASTR) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 2600 (3) Introduction to Scientific Programming**
Introduces principles, methods and tools of scientific programming commonly used in research. Topics include an introduction to programming in Python, data structures, numerical methods for calculus and data manipulation/visualization. Techniques covered are relevant to many technical fields but emphasis is placed on application to problems in astronomy and planetary science. Class time is split between lectures and in-lab tutorials.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 2600
**Requisites:** Requires prerequisite course of MATH 1300 or APPM 1350 and PHYS 1110 or PHYS 1115 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 2840 (1-3) Independent Study**
Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ASTR 3300 (3) Extraterrestrial Life**
Discusses the scientific basis for the possible existence of extraterrestrial life. Includes origin and evolution of life on Earth; possibility of life elsewhere in the solar system, including Mars; and the possibility of life on planets around other stars. Department enforced prerequisite: one-year sequence in a natural science. Credit only for this course or ASTR 2040.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 3300
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3400 (3) Research Methods in Astronomy**
Introduces research methods in astronomy and engages students in an active research project. The research projects will vary and may include astronomical observations, data analysis, scientific programming, theoretical models and statistical inference. As part of their research, students will read scientific papers, attend local seminars and prepare oral and written research proposals and reports. Elective for ASTR majors.
**Requisites:** Requires prerequisite courses of ASTR 1040 and PHYS 1125 or 1120 (all minimum grade C-). Requires co-requisite or prerequisite of ASTR 2600 or PHYS 2600 (minimum grade C-). Restricted to ASTR majors.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3510 (4) Observations and Instrumentation 1**
Lab course in astronomical observation and instrumentation. Hands-on exercises include obtaining and analyzing multi-wavelength data, basic optical design and instrumentation and statistical analysis of data, with emphasis on imaging applications. A significant number of night time observation sessions are required. Practical Python knowledge required (ASTR/PHYS 2600 or equivalent strongly recommended.) Elective for APS majors. Elective for APS minors on space available basis.
**Requisites:** Requires a prerequisite or corequisite core of APPM 1360 or MATH 2300 and ASTR 1020 or ASTR 1040 and PHYS 1120 (all minimum grade C-). Restricted to Astronomy (ASTR) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3520 (4) Observations and Instrumentation 2**
Lab course in observation and instrumentation. Hands-on exercises include obtaining and analyzing multi-wavelength data, optical design and instrumentation, and statistical analysis, with emphasis on spectroscopy. A significant number of night time observation sessions are required. Elective for APS majors. Elective for APS minors on space available basis.
**Requisites:** Requires a prerequisite course of ASTR 3510 (minimum grade C-). Restricted to Astrophysics (ASTR) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3560 (3) Astronomical Instrumentation Laboratory**
Teaches students aspects of astronomical instrument design in a hands-on setting. Students will learn elementary principles of geometrical optics, diffraction, light detection, signal conditioning, data acquisition and motion control, and mechanical design. Students will apply these principles working in groups to design and build optical spectrometers.
**Requisites:** Requires prerequisite courses of ASTR 1040 and (PHYS 2130 or PHYS 2170 or ASTR 2100) (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3710 (3) Formation & Dynamics of Planetary Systems**
Covers the origin of planetary systems and their dynamical evolution. Topics include the physics and chemistry of planetary formation, orbital mechanics and extrasolar planets. This course and ASTR 3720 and ASTR 3750 may be taken in any order. Elective for APS major and minor.
**Requisites:** Requires prerequisite course of PHYS 1120 and MATH 2300 or APPM 1360 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3720 (3) Planets and Their Atmospheres**
Explores the physics and chemistry of the atmospheres of Mars, Venus, Jupiter, Saturn, and Titan. Examines evolution of the atmospheres of Earth, Venus, and Mars; and the escape of gases from the Galilean satellites, Titan and Mars; the orbital characteristics of moons, planets, and comets. Uses recent results of space exploration. Elective for APS major and minor.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 3720
**Requisites:** Requires prerequisite courses of PHYS 1120 and (APPM 1360 or MATH 2300) and prerequisite or corequisite course of ASTR 2100 or MATH 2400 or APPM 2350 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3730 (3) Astrophysics 1 - Stellar and Interstellar**
Provides a quantitative introduction to the radiative and gravitational physics relevant to stellar and galactic astrophysics, as applied to understanding observations of tars, stellar evolution, stellar remnants and the structure of the Milky Way. Elective for APS major and minor.
**Requisites:** Requires prerequisite courses of PHYS 2130 or PHYS 2170 or ASTR 2100 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3740 (3) Cosmology and Relativity**
Special and general relativity as applied to astrophysics, cosmological models, observational cosmology, experimental relativity and the early universe. Elective for APS major and minor.
**Requisites:** Requires prerequisite courses of PHYS 2130 or PHYS 2170 or ASTR 2100 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3750 (3) Planets, Moons, and Rings**
Approaches the physics of planets, emphasizing their surfaces, satellites, and rings. Topics include formation and evolution of planetary surfaces, history of the terrestrial planets, and dynamics of planetary rings. This course and ASTR 3720 may be taken for credit in any order. Elective for APS major and minor.
**Requisites:** Requires prerequisite courses of PHYS 1120 and (APPM 1360 or MATH 2300) and prerequisite or corequisite course of ASTR 2100 or MATH 2400 or APPM 2350 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3760 (3) Solar and Space Physics**
Explores the physical processes linking the Sun and planets, emphasizing solar radiative and particulate variability and the response of planetary atmospheres and magnetospheres. Topics include the solar dynamo, solar wind, coronal mass ejections, cosmic ray modulation, magnetospheres, aurora, the space environment, and climate variability. Elective for APS major and minor.
**Requisites:** Requires prerequisite courses of PHYS 2130 or PHYS 2170 or ASTR 2100 (all minimum grade C-).
**Recommended:** Prerequisite PHYS 3310.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3800 (3) Introduction to Scientific Data Analysis and Computing**
Introduces scientific data analysis from a practical perspective. Covers statistical analysis, model fitting, error analysis, theoretical compliance and image analysis with examples from space-based and ground-based astronomy. Elective for APS major. Opened to qualified non-majors with instructor consent.
**Requisites:** Requires prerequisite course of (ASTR 2600 or PHYS 2600) and prerequisite or corequisite courses of (ASTR 1020 or ASTR 1040) and PHYS 1120 and (APPM 1360 or MATH 2300) (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 3830 (3) Astrophysics 2 - Galactic and Extragalactic**
The second semester of a year-long introduction to astrophysical processes. The physical processes developed in ASTR 3730 are applied to topics in extragalactic astronomy, including galaxies, supermassive black holes, galaxy clusters and cosmology. Elective for APS major and minor.
**Requisites:** Requires prerequisite course of ASTR 3730 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 4330 (3) Cosmochemistry**
Investigates chemical and isotopic data to understand the composition of the solar system: emphasis on the physical conditions in various objects, time scales for change, chemical and nuclear processes leading to change, observational constraints, and various models that attempt to describe the chemical state and history of cosmological objects in general and the early solar system in particular.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5330 and GEOL 4330 and ASTR 5330
**Requisites:** Requires prerequisite courses of (CHEM 1113 or CHEM 1400 or CHEN 1211) and (PHYS 1110 or PHYS 1115); all minimum grade C-.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 4500 (1-3) Special Topics in Astrophysical and Planetary Sciences**
Topics vary each semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 4800 (3) Space Science: Practice and Policy**
Exposes students to current controversies in science that illustrate the scientific method and the interplay of observation, theory, and science policy. Students research and debate both sides of the issues, which include strategies and spin-offs of space exploration, funding of science, big vs. small science, and scientific heresy and fraud.
**Recommended:** Prerequisite one year of college level astronomy or physics.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ASTR 4840 (1-3) Independent Study**
Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ASTR 4841 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**ASTR 5110 (3) Atomic and Molecular Processes**
Explores the application of quantum physics and statistical mechanics to problems in astrophysics, space physics and planetary science, with an emphasis on radiative processes and spectroscopy of atoms and molecules.
**Requisites:** Restricted to graduate students only.

**ASTR 5120 (3) Radiative and Dynamical Processes**
An introduction to radiative and dynamical processes aimed at graduate students in astrophysics, space physics and planetary science. Covers transport phenomena, the macroscopic treatment of radiation fields, magnetohydrodynamics and dynamical processes associated with planetary orbits and N-body systems.
**Requisites:** Restricted to graduate students only.

**ASTR 5140 (3) Astrophysical and Space Plasmas**
Teaches magnetohydrodynamics and a few related areas of plasma physics applied to space and astrophysical systems, including planetary magnetospheres and ionospheres, stars, and interstellar gas in galaxies.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5141
**Requisites:** Restricted to Physics (PHYS) or Astronomy (ASTR) graduate students only.

**ASTR 5150 (3) Introductory Plasma Physics**
Includes basic phenomena of ionized gases, static and dynamic shielding, linear waves, instabilities, particles in fields, collisional phenomena, fluid equations, collisionless Boltzman equations, Landau damping, scattering and absorption of radiation in plasmas, elementary nonlinear processes, WKB wave theory, controlled thermonuclear fusion concepts, astrophysical applications and experimental plasma physics (laboratory).
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5150
**Requisites:** Restricted to graduate students only.

**ASTR 5300 (3) Introduction to Magnetospheres**
Introduces solar and stellar winds, and planetary and stellar magnetospheres. Acquaints students with the guiding center theory for particle motion, magnetospheric topology, convection, radiation belts, magnetic storms and substorms, and auroras.
**Requisites:** Restricted to graduate students only.

**ASTR 5330 (3) Cosmochemistry**
Investigates chemical and isotopic data to understand the composition of the solar system: emphasis on the physical conditions in various objects, time scales for change, chemical and nuclear processes leading to change, observational constraints, and various models that attempt to describe the chemical state and history of cosmological objects in general and the early solar system in particular. Department enforced prerequisite: graduate standing in physical science and graduate chemistry or physics or math courses.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 4330 and GEOL 4330 and GEOL 5330
**Requisites:** Restricted to graduate students only.

**ASTR 5400 (3) Introduction to Fluid Dynamics**
Covers equations of fluid motion relevant to planetary atmospheres and oceans and stellar atmospheres; effects of rotation and viscosity; and vorticity dynamics, boundary layers and wave motions. Introduces instability theory, nonlinear equilibration and computational methods in fluid dynamics. Department enforced prerequisite: partial differential equations or equivalent.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5400 and PHYS 5400
**Requisites:** Restricted to graduate students only.

**ASTR 5410 (3) Fluid Instabilities, Waves, and Turbulence**
Involves linear and nonlinear analyses of small-scale waves and instabilities in stratified fluids, with effects of rotation. Studies internal gravity and acoustic waves with terrestrial, planetary and astrophysical applications. Studies thermal and double-diffusive convection, homogeneous and stratified shear flow instabilities. Examines these topics from the onset of small amplitude disturbances to their nonlinear development and equilibration. Department enforced prerequisite: ASTR 5400 or ATOC 5060.
**Requisites:** Restricted to graduate students only.

**ASTR 5540 (3) Mathematical Methods**
Presents an applied mathematics course designed to provide the necessary analytical and numerical background for courses in astrophysics, plasma physics, fluid dynamics, electromagnetism, and radiation transfer. Topics include integration techniques, linear and nonlinear differential equations, WKB and Fourier transform methods, adiabatic invariants, partial differential equations, integral equations, and integrodifferential equations. Draws illustrative examples from the areas of physics listed above.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5540
**Requisites:** Restricted to graduate students only.

**ASTR 5550 (3) Observations, Data Analysis and Statistics**
Introduces multi-wavelength observational techniques,their limitations and effects of various noise sources. Describes basic data handling, error analysis, and statistical tests relevant to modeling. Topics include probability distributions, model-fitting algorithms, confidence intervals, correlations, sampling and convolution. Students derive physical measurements and uncertainties with hands-on analysis of real datasets. Department enforced prerequisite: senior level undergraduate physics or instructor consent will be required.
**Requisites:** Restricted to graduate students only.

**ASTR 5560 (3) Radiative Processes in Planetary Atmospheres**
Application of radiative transfer theory to problems in planetary atmospheres, with primary emphasis on the Earth's atmosphere; principles of atomic and molecular spectroscopy; infrared band representation; absorption and emission of atmospheric gases; radiation flux and flux divergence computations; radiative transfer and fluid motions; additional applications such as the greenhouse effect, inversion methods and climate models. Department enforced prerequisite or corequisite: ASTR 5110.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5560
**Requisites:** Restricted to graduate students only.

**ASTR 5700 (3) Stellar Astrophysics**
Explores stellar interiors, evolution and atmospheres, with the Sun and its heliosphere being used as the closest and best-studied example of a star. Covers energy generation, transport, principles of stellar structure, stellar rotation, pulsation and evolution to supernova and compact object stages. Includes radiation transport in stellar photospheres, chromospheres, coronas, winds. Department enforced prerequisite: senior level undergraduate physics.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ASTR 5120.

**ASTR 5710 (3) High-Energy Astrophysics**
Studies astrophysics of UV, x-ray, gamma-ray and cosmic-ray sources, including fundamentals of radiative and particle processes, neutron stars, black holes, pulsars, quasars, supernovas and their remnants; stellar flares; accretion disks; binary x-ray sources; and other cosmic x-ray sources. Department enforced prerequisite: senior level undergraduate physics.
**Requisites:** Restricted to graduate students only.

**ASTR 5720 (3) Galaxies**
Highlights the classification, structure, content, dynamics, and other observational properties of galaxies, active galaxies, and clusters of galaxies. Discusses Hubble's Law, the cosmic distance scale,and the intergalactic medium. Department enforced prerequisite: senior level undergraduate physics.
**Requisites:** Restricted to graduate students only.

**ASTR 5730 (3) Stellar Atmospheres and Radiative Transfer**
Explores stellar atmospheres: basic stellar atmospheres, spectral line formation, interpretation of stellar spectra and model atmospheres. Examines solar physics: the Sun as a star, solar cycle, chromospheric and coronal structure, energy balance, magnetic field and solar wind. Department enforced prerequisites: ASTR 5110 and undergraduate physics.
**Requisites:** Restricted to graduate students only.

**ASTR 5740 (3) Interstellar Astrophysics**
Highlights structure, dynamics and ecology of the interstellar medium, stressing the physical mechanisms that govern the thermal, ionization and dynamic state of the gas and dust; observations at all wavelengths; star formation; relation to external galaxies. Department enforced prerequisite: ASTR 5110.
**Requisites:** Restricted to graduate students only.

**ASTR 5760 (3) Astrophysical Instrumentation**
Covers the fundamentals underlying the design, construction and use of instrumentation used for astrophysical research ranging from radio-wavelengths to gamma rays. Topics include Fourier transforms and their applications, optical design concepts, incoherent and coherent signal detection, electronics and applications, and signal acquisition and processing. Department enforced prerequisite: senior level undergraduate physics.
**Requisites:** Restricted to graduate students only.

**ASTR 5770 (3) Cosmology**
Studies the smooth universe, including Friedmann-Robertson-Walker metric, Friedmann equations, cosmological parameters, inflation, primordial nucleosynthesis, recombination, and cosmic microwave background. Also studies the lumpy universe, including linear growth of fluctuations, power spectra of CMB and galaxies, dark matter, and large scale flows. Covers galaxy formation and intergalactic medium. Department enforced prerequisite: senior level undergraduate physics or instructor consent will be required.
**Requisites:** Restricted to graduate students only.

**ASTR 5780 (3) Mission Design and Development for Space Sciences**
Brings science and engineering students together to develop the multidisciplinary skills required to create a successful proposal to develop a NASA-funded small space mission. Goals: 1) develop the proposal science objectives based on scientific community priorities and NASA Announcement of Opportunity. 2) Understand how science requirements lead to the design of instrumentation. 3) Understand practical aspects of mission development.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 5440
**Grading Basis:** Letter Grade

**ASTR 5800 (3) Planetary Surfaces and Interiors**
Examines processes operating on the surfaces of solid planets and in their interiors. Emphasizes spacecraft observations, their interpretation, the relationship to similar processes on Earth, the relationship between planetary surfaces and interiors and the integrated geologic histories of the terrestrial planets and satellites.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5800
**Requisites:** Restricted to graduate students only.

**ASTR 5810 (3) Planetary Atmospheres**
Covers the structure, composition, and dynamics of planetary atmospheres. Also includes origin of planetary atmospheres, chemistry and cloud physics, greenhouse effects, climate, and the evolution of planetary atmospheres past and future.
**Requisites:** Restricted to graduate students only.

**ASTR 5820 (3) Origin and Evolution of Planetary Systems**
Considers the origin and evolution of planetary systems, including proto-planetary disks, condensation in the solar nebula, composition of meteorites, planetary accretion, comets, asteroids, planetary rings and extrasolar planets. Applies celestial mechanics to the dynamical evolution of solar system bodies.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5820
**Requisites:** Restricted to graduate students only.

**ASTR 5830 (3) Topics in Planetary Science**
Examines current topics in planetary science, based on recent discoveries, spacecraft observations and other developments. Focuses on a specific topic each time the course is offered, such as Mars, Venus, Galilean satellites, exobiology, comets or extrasolar planets. Department enforced prerequisite: restricted to graduate students in the physical sciences.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5830 and GEOL 5830
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ASTR 5835 (1) Seminar in Planetary Science**
Studies current research on a topic in planetary science. Students and faculty give presentations. Subjects may vary each semester. Department enforced prerequisite: senior level undergraduate physics.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5835 and GEOL 5835
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ASTR 5920 (1-6) Reading and Research in Astrophysical and Planetary Sciences**
Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ASTR 6000 (1) Seminar in Astrophysics**
Studies current research and research literature on an astrophysical topic. Students and faculty give presentations. Subjects vary each semester. May be repeated for a total of 4 credit hours to meet candidacy requirements.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ASTR 6050 (3) Space Instrumentation**
Provides an overview of the relevant space environment and process, the types of instruments flown on recent mission and the science background of the measurement principles.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 6050 and GEOL 6050
**Grading Basis:** Letter Grade

**ASTR 6610 (3) Earth and Planetary Physics 1**
Examines mechanics of deformable materials, with applications to earthquake processes. Introduces seismic wave theory. Other topics include inversion of seismic data for the structure, composition and state of the interior of the Earth.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 6610 and PHYS 6610
**Requisites:** Restricted to graduate students only.

**ASTR 6620 (3) Earth and Planetary Physics 2**
Covers space and surface geodetic techniques as well as potential theory. Other topics are the definition and geophysical interpretation of the geoid and of surface gravity anomalies; isostasy; post-glacial rebound; and tides and the rotation of the Earth.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 6620 and PHYS 6620
**Requisites:** Restricted to graduate students only.

**ASTR 6630 (3) Earth and Planetary Physics 3**
Examines the solar system, emphasizing theories of its origin and meteorites. Highlights distribution of radioactive materials, age dating, heat flow through continents and the ocean floor, internal temperature distribution in the Earth, and mantle convection. Also covers the origin of the oceans and atmosphere.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 6630 and PHYS 6630
**Requisites:** Restricted to graduate students only.

**ASTR 6650 (1-3) Seminar in Geophysics**
Advanced seminar studies in geophysical subjects for graduate students.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 6650 and PHYS 6650
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ASTR 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.

**ASTR 6950 (1-6) Master's Thesis**

**ASTR 7160 (3) Intermediate Plasma Physics**
Topics vary yearly but include nonlinear effects such as wave coupling, quasilinear relaxation, particle trapping, nonlinear Landau damping, collisionless shocks, solutions; nonneutral plasmas; kinetic theory of waves in a magnetized plasma; anisotropy; inhomogeneity; radiation-ponderomotive force, parametric instabilities, stimulated scattering; plasma optics; kinetic theory and fluctuation phenomena.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 7160
**Recommended:** Prerequisite PHYS 5150.

**ASTR 7500 (1-3) Special Topics in Astrophysical and Planetary Sciences**
Acquaints students with current research in astrophysical and planetary sciences. Topics vary each semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ASTR 7920 (1-6) Reading and Research in Astrophysical and Planetary Sciences**
Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ASTR 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.

# ATLAS (ATLS)

## Courses

**ATLS 1100 (3) Design Foundations**
Introduces foundational principles, practices and methods of design. Emphasizes design as an expressive and creative problem solving tool. This course engages with design from a broad perspective including visual, computational, physical and auditory design practices. Through lectures, discussions and creative projects, students will gain a familiarity with the diverse applications of creative technology through design.

**ATLS 1300 (4) Computational Foundations 1**
Explores computation as a powerful tool for creative design and expression in a project-based studio environment. Students learn the fundamentals of creative coding, computational thinking, and object-oriented programming. Hands-on topics include generative art and design, interactivity, animation, and visualization.
**Requisites:** Restricted to Creative Technology and Design majors (TMEN) and (MTAM) minors and IUT On Track applicants.

**ATLS 1350 (3) Computational Foundations for Non-Majors**
Explores computation as a powerful tool for creative design and expression in a project-based studio environment. Students learn the fundamentals of creative coding, computational thinking, and object-oriented programming. Hands-on topics include generative art and design, interactivity, animation, and visualization.

**ATLS 2000 (3) The Meaning of Information Technology**
A survey of the mutual influence of technology, media, and society. Equips students with an understanding of technological transformations in interpersonal, organizational, and mass communication. Emphasis is on the technological, social and political changes that underlie the movement toward a digital society. As such, the class acts as a survey of various technologies and their relationship to socio-political issues. We not only address ¿how does it work¿ and ¿where does this come from¿ but ¿why is it here¿ and ¿how does it impact us as individuals and as a society¿.

**ATLS 2001 (3) Design Technologies: Toolkit**
Introduces students to the fundamentals of creative design through digital media production. Throughout the semester, students explore a number of disciplines related to digital media including imaging, web development, animation, video production, and more. Class sessions are in lecture format and are aimed at helping students attain a strong conceptual and technical understanding of creative design.
**Requisites:** Requires prerequisite or corequisite course of ATLS 2000 (minimum grade C-). Restricted to PATL students.
**Grading Basis:** Letter Grade

**ATLS 2002 (3) Design Technologies: Process**
Introduces foundational principles, practices and methods relating to the process of creative design. Emphasis on the pre-production process as a creative problem-solving tool in order to produce innovative and interesting creative work. Through lectures, discussion and creative projects, students will gain a familiarity with diverse applications and practices related to creative technology and design
**Requisites:** Requires prerequisite or corequisite courses of ATLS 2000. Restricted to PATL students.

**ATLS 2036 (3) Introduction to Media Studies in the Humanities**
Serves as an introduction to media studies specifically from a humanities perspective. Studies both histories and theories of media from the 20th and 21st centuries. Touches on methodologies for undertaking media studies (including distant ready and media archaeology). Objects of study may include such topics as film, radio, social media platforms and games, as well as digital art and literature.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 2036 and AHUM 2036
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Creative Technology Design (TMEN) majors and (MTAM) minors, or the ATLAS (PATL) student group only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ATLS 2100 (3) Image**
Introduces techniques, technologies and concepts of digital image making and manipulation through lectures, projects and critiques. Focuses on digital photography, digital animation and digital video as a means to formal and expressive ends. This course also contextualizes practices and methodologies of digital imaging with historical and critical perspectives.
**Requisites:** Requires prereq courses of ATLS 1100. Requires prereq or coreq of ATLS 1300 or ATLS 1350 or INFO 1701 or CSCI 1300, and ATLS 2000 or ENES 2020 (all min grade C-).
**Grading Basis:** Letter Grade

**ATLS 2200 (3) Web**
Introduces techniques, technologies and concepts of web design and development through lectures, projects and critiques. Focuses technically on HTML, CSS and JavaScript as the primary web technologies. Contextualizes the technical and societal implications of the Internet through historical and critical perspectives.
**Requisites:** Requires prereq courses ATLS 1100 ATLS 1300 or ATLS 1350 or INFO 1701 or CSCI 1300 (all min grade C-). Requires prereq or coreq course ATLS 2000 or ENES 2020.

**ATLS 2270 (4) Computational Foundations 2**
Builds on the fundamental programming concepts introduced in ATLS 1300. Students will learn to write sophisticated programs that employ efficient means of representing and manipulating information. They will learn to analyze algorithms in terms of complexity, gain an understanding of fundamental data structures (lists, stacks, queues, trees), and acquire practical experience implementing algorithms to solve common problems (sorting, graph traversal).
**Requisites:** Requires prerequisite courses of ATLS 1300 or CSCI 1300 or INFO 1701 or ASEN 1320 (all minimum grade C-). Requires prerequisite or corequisite course ATLS 2000 or ENES 2020.

**ATLS 2300 (3) Text**
Introduces technologies, terminology and histories related to the design of text within digital and analogue media. Students will learn the fundamentals of design, typography and layout through lectures, projects and critiques. The curriculum surveys significant theoretical perspectives, historical periods and significant practitioners that influence the practice of typographic design.
**Requisites:** Requires prereq of ATLS 1100. Requires prereq or coreq ATLS 1300, ATLS 1350, INFO 1701 or CSCI 1300. Requires prereq or coreq ATLS 2000 or ENES 2020 (all min grade C-).

**ATLS 2519 (1-4) Special Topics in Creative Technology and Design**
Analyzes special interest areas of creative technology and design research and practice.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Creative Technology Design (TMEN) majors and (MTAM) minors, or the ATLAS (PATL) student group only.
**Grading Basis:** Letter Grade

**ATLS 3040 (3) Introduction to Games and Play**
Introduces students to foundational concepts, culture, history, and creation of games and playful experiences. Through readings, playing games, and completing design exercises, students will learn to analyze how various formal elements of play function to make successful games.
**Requisites:** Requires prerequisite or corequisite course of ATLS 1100 (minimum grade C-).

**ATLS 3100 (3) Form**
Teaches the fundamentals of 3D modeling, 3D animation and 3D printing / rapid prototyping from a conceptual and sculptural perspective. Through topical lectures, technical demonstrations and creative projects the course will introduce students to the potentials of thinking and working within 3-dimensional spaces.
**Requisites:** Requires prereq course of ATLS 1100. Requires prereq or coreq of courses ATLS 1300 or ATLS 1350 or INFO 1701 or CSCI 1200 or CSCI 1300 or CSCI 1320, and ATLS 2000 or ENES 2020 (all min grade C-).

**ATLS 3110 (3) Motion Design**
An animation-based projects course that advances student understanding of motion design in today's culture. Through active production and critical analysis, students will create new media projects and critically examine the history, social implications, and impacts of these forms of mass media.
**Requisites:** Requires prerequisite course of ATLS 2100 (minimum grade C-).

**ATLS 3120 (3) Creative Web Development**
An Internet-based projects course that advances student understanding of Internet culture. Through active production and critical analysis, students will explore their individual roles in the digital landscape and critically examine the social implications and impacts of digital communities.
**Requisites:** Requires prerequisite courses of ATLS 2000 and ATLS 2200 (all minimum grade C-). Restricted to Creative Technology and Design (TMEN) majors and (MTAM) minors.

**ATLS 3150 (3) Universal Design for Digital Media**
Focusing on the concepts of universal design and Web Standards, this course will address issues that occur at the nexus of web standards, Universal Design and the needs of persons with disabilities. Students will gain the expertise and skills to create media and web sites which are accessible, usable and effective for all users and device platforms.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3150
**Requisites:** Requires prerequisite course of ATLS 1300 or CSCI 1300 (minimum grade C-).
**Recommended:** Prerequisite some knowledge of creating web pages with either direct HTML coding or with web design software.

**ATLS 3173 (3) Creative Climate Communication**
We generate multimodal compositions on the subject of climate change and engage with various dimensions of issues associated with sustainability. We work to deepen our understanding of how issues associated with climate change are or can be communicated, by analyzing previously created expressions from a variety of media (interactive theatre, film, fine art, television programming, blogs, performance art, for example) and then be creating our own work.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3173 and THTR 4173
**Recommended:** Prerequisite ENVS 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Distribution-Social Sciences

**ATLS 3200 (3) Sound**
Introduces techniques, technologies and concepts of digital sound through lectures, projects and critiques. Focuses technically on digital sound creation, production, synthesis and interactivity. Explores various approaches to digital sound production through historical and conceptual perspectives.
**Requisites:** Requires prereq course of ATLS 1100. Requires prereq or coreq course of (ATLS 2000 or ENES 2020) and (ATLS 1300 or ATLS 1350 or INFO 1701 or CSCI 1200 or CSCI 1300 or CSCI 1320) (all min grade C-).

**ATLS 3300 (3) Object**
Introduces the fundamentals of physical computing. This class is an exploration of computing that starts from the perspective that humans are fundamentally physical beings. Students will design projects that interact with humans and the physical world and will learn to integrate sensors, motors, and simple electronics into creative projects. Projects will include interactive installations, art projects, games, and audio controllers.
**Requisites:** Requires prereq courses of ATLS 1100 ATLS 1300 or (ATLS 1350 or INFO 1701 or CSCI 1200 or CSCI 1300 or CSCI 1320 or ASEN 1320) (all min grade C-). Requires prereq or coreq course of ATLS 2000 or ENES 2020 (all min grade C-).
**Grading Basis:** Letter Grade

**ATLS 3500 (1-3) Client Projects in Creative Technology and Design**
Allows undergraduate students to work on collaborative projects with faculty and with external organizations under faculty supervision. Focuses on teamwork, conceptual planning, technical design and development and working within real-world client environments. Critical skills include project research, planning, design, development, trouble-shooting and presentation.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ATLS 2000 or HUEN 2020 or ENES 2020 (all min grade C-).

**ATLS 3519 (1-3) Special Topics**
Analyzes special interest areas of multidisciplinary creative technology and design research and practice.
**Repeatable:** Repeatable for up to 21.00 total credit hours. Allows multiple enrollment in term.

**ATLS 3523 (3) The Art and Strategy of Science Communication: Branding Climate Change**
Integrating the science of climate change and science communication with the research, strategy and execution practices of strategic communication (e.g., advertising and public relations).
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 3523
**Grading Basis:** Letter Grade

**ATLS 3529 (1-3) Critical Topics**
Analyzes critical perspectives in creative technology and design. Within these courses, students will develop vocabularies, theoretical perspectives and critical approaches relevant to technology and its effects on culture and society.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**ATLS 3539 (1-3) Topics: How-to**
Analyzes special interest areas of multidisciplinary creative technology and design research and practice.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**ATLS 3710 (3) Material Studies and Practice**
Surveys the broad array of physical materials used in design and practically applies this knowledge via hands-on projects that introduce basic tools and techniques for fabrication in the domains of woods, plastics, ceramics, concrete, fibers and metals. Practical work is complemented with inquiry into the social, aesthetic, and ecological significance of materials used in design.
**Requisites:** Requires prerequisite course of ATLS 1100 (minimum grade C-).

**ATLS 4000 (3) Research Methods and Professional Practice**
Research Methods and Professional Practice lays the foundation for students to produce culminating work in their major. In this course, students will engage in domain exploration, learn to define a research problem, utilize tools and methods for professional design research, refine presentation skills, and engage in iterative and collaborative work. This course is focused on domain research, idea validation, and prototyping in order to prepare students for a culminating semester-long Capstone project based on this research. Formerly offered as a special topics course.
**Requisites:** Requires prerequisite courses of ATLS 3100 and ATLS 3300 (all min grade C-). Restricted to Creative Technology and Design (TMEN) majors.

**ATLS 4010 (4) Capstone Projects**
Focuses on the development of an individual thesis project. Specific class sessions will feature a combination of lectures, demonstrations, guest speakers, lab sessions, and critiques. This course also entails group work, portfolio development, critical theoretical readings, and a significant written component.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Requires prerequisite course of ATLS 4000 (minimum grade C-). Restricted to Creative Technology and Design (TMEN) majors only.

**ATLS 4040 (3) Game Design**
Introduces students to game design, development, history, theory and culture through readings, discussion, game analysis and the iterative design process of non-digital games.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5040
**Requisites:** Requires prerequisite course of ATLS 1100 (minimum grade C-).

**ATLS 4050 (3) Alt Arcade Interfaces**
In this project-based studio course, students will move beyond conventional button and joystick interfaces into the design of bespoke interfaces for game control, with an emphasis on games designed for public exhibition. Students will, both individually and in groups, design and develop multiple games, and build custom control interfaces for them.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5050
**Requisites:** Requires prerequisite ATLS 1300 or ATLS 1350 or CSCI 1300 (all minimum grade C-).
**Recommended:** Prerequisite ATLS 3300 (Object), and ATLS 4050 (Game Development).

**ATLS 4060 (3) Tiny Games**
Guides students into fluency across a suite of technical tools (Bitsy, PuzzleScript, Pico-8, and others) to construct tiny games: short games with tight technical constraints, created in relatively brief amounts of time, and built around singular ideas.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5060
**Recommended:** Prerequisite ATLS 1100 (Design Foundations) and ATLS 1300 (Computational Foundations), or ATLS 1350, or CSCI 1300.

**ATLS 4112 (3) Neurohacking**
Explores psychotechnologies for developing high level metacognition and individual sovereignty. We investigate the optimization of conscious human experience, mindfulness, and creativity through the lenses of neuroscience, cognitive science, evolutionary psychology, and philosophy. Students will learn to critique primary literature, experimental design, and be guided in developing a set of practices to enhance cognition and achieve various desired mental states.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5112
**Requisites:** Requires prereq or coreq course of ATLS 2000 or HUEN 2020 or ENES 2020 (minimum grade C-).

**ATLS 4120 (3) Mobile Application Development**
Provides a comprehensive overview of developing mobile applications using a range of technologies including software developers' kits, object-oriented programming and human interface design principles. Students incorporate leading edge technologies with their own academic pursuits and personal interests to develop mobile applications. Explores the social and cultural effects of app and mobile-based computing.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5120
**Requisites:** Requires prerequisite course of ATLS 1300 or CSCI 1300 or CSCI 1320 (minimum grade C-).

**ATLS 4130 (3) Experimental Typography**
This course is an advanced investigation of typography for visual communication and expression. Emphasis is placed on the analysis of meaning as conveyed through materials, technology, and design. Projects are experimental and are designed to challenge you to expand your understanding of the function of typography in communication, design, art, and culture.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5130
**Requisites:** Requires prerequisites ATLS 2200 and ATLS 2300 (all minimum grade C-). Restricted to Creative Technology and Design (TMEN) majors and (MTAM) students.

**ATLS 4140 (3) Game Development**
Builds on concepts and processes learned in ATLS 4040/5040. Reinforces game design principles through analysis and discussion of digital games, and introduces students to key practices in the development of digital game experiences, including game flow, mechanics, 2D and 3D graphics, and artificial intelligence.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5140
**Requisites:** Requires prerequisite ATLS 4040 (minimum grade C-).

**ATLS 4141 (3) Color**
Examines the generation and perception of colors in the context of physics, chemistry, biology, and psychology as a foundation for making. Explores the synthesis and applications of color dyes and pigments in art and design through lectures, readings, experiments, and projects.
**Requisites:** Requires prerequisite course of ATLS 2000 or HUEN 2020 or ENES 2020 (all min grade C-).

**ATLS 4151 (3) Flow Visualization**
Explores techniques for the visualization of the physics of fluid flows including seeding with dyes, particles and bubbles, and shadowgraphy and schlieren. Reviews optics and fluid physics, especially atmospheric clouds. Assignments are student-driven, to individuals and mixed teams of graduates, undergraduates, engineering majors and photography/video majors.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5200, MCEN 5151, MCEN 4151 and ATLS 5151
**Requisites:** Restricted to students with 57+ credits (juniors and above) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ATLS 4201 (3) Biodesign**
This class covers basic design techniques, together with essential wetlab skills. Students will learn how to culture and work with various types of organisms, such as bacteria, algae (dynoflagellates, cyanobacteria) and fungus. These organisms will become the living media or processed biomaterials that the students will design with. This is a lab-based class.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5201

**ATLS 4202 (3) Computational Fabrication**
This course will explore techniques, representations, and workflows for computational fabrication. Digital fabrication machines like 3D printers and laser-cutters bring complicated designs into physical form, and computer programming helps overcome design challenges that are difficult or nearly impossible. Blending these two tools, students will use computational fabrication techniques to design and build functional, creative objects leveraging existing computer-aided design (CAD) tools, programming languages and digital fabrication machinery.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5202
**Requisites:** Required prerequisites: ATLS 1300 or CSCI 1300.
**Recommended:** Prerequisites Prior programming experience in Python/C ++ and ATLS 1300 (Form) or prior CAD/3D Modeling experience.

**ATLS 4203 (3) Light and Perception**
Traces human and camera vision in close detail. Students explore visual perception between two and three dimensions by exploring advanced experiments in designing light. Starting with different analog illustration exercises, students explore how light informs the perception of three dimensional space and objects. Students then explore techniques to play with visual perception, using advanced technologies like Augmented and Virtual Reality, Interactive Sculpture, Digital Games, and Immersive Media.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5203
**Recommended:** Prerequisite ATLS 2100.

**ATLS 4214 (3) Big Data Architecture**
Provides students with a comprehensive survey of technologies used today in the collection, storage, processing, analytics and display of big data. Focuses on cultivating real world skills with students working on semester long projects to execute on a group project.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5214, CSCI 5214, and CSCI 4214
**Requisites:** Requires prerequisite course of ATLS 2270 or CSCI 2270 or CSCI 2275 (all minimum grade C-). Restricted to Creative Technology and Design (TMEN) majors or (MTAM) minors and CSEN majors and CSCI majors.

**ATLS 4221 (3) Interactive Sound**
Interactive Sound explores generative coding to produce unique audio design systems that can be employed in a wide array of interactive projects. Students will learn to use Max (a visual programing tool) to combine and control sound, video, OpenGL 3D objects, and microcontrollers. Example inputs: real time video, data scraping for the sonification of natural phenomena, or environmental sensor data collected via Arduino. Example outputs: reactive audio-visual installations, immersive projection, or multichannel spatial sound systems.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5221
**Recommended:** Prerequisite ATLAS 3200 Sound, or have equivalent music technology experience.

**ATLS 4230 (3) Case Studies in Social Impact**
Students will evaluate case studies across a range of technologies and applications. Students will learn how to match available technologies to human and environmental needs and resources, be introduced to the seminal work and leaders in the field, and discuss the future of Creative Technology Design as an emerging area of academic focus.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5230
**Requisites:** Restricted to Creative Technology and Design (TMEN) majors and (MTAM) minors.

**ATLS 4244 (3) Empathy and Technology**
Explores how the creative integration of empathy and compassion with design and technology can benefit society. Reviews foundational neuroscience and evolution of empathy. Through readings, discussion, and reflection students will develop personal practices for fostering empathy and critically investigate: empathy as a finite resource, tribalism/polarization, the weaponization of empathy, and principles for designing social systems that promote well-being. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5244
**Requisites:** Requires prerequisite course of ATLS 2000 or HUEN 2020 or ENES 2020 (all min grade C-).
**Grading Basis:** Letter Grade

**ATLS 4279 (3) Aesthetics in Design**
Focuses on aesthetic aspects of design via hands-on design-build experiences. Students individually create dynamic artifacts of their own choice with the assistance of teammates. Content includes major design movements since 1900, constructive critique practice, hand sketching techniques and other selected industrial design topics. Students publish their design work on an archival public blog which provides a professional portfolio element.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4279 and MCEN 5279 and ATLS 5279

**ATLS 4320 (3) Mobile Application Development: Advanced Topics**
Explores advanced topics in mobile application design and development, including examining different approaches to information design and the various user interaction models associated with them. Understanding how data is structured, accessed, stored and flows through apps is a core theme of the course. Explores the interaction with external data sources and storage models.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5320
**Requisites:** Requires a prerequisite course of ATLS 4120 (minimum grade C-). Restricted to College of Engineering (ENGRU) undergraduates only.

**ATLS 4330 (3) Wearable Technologies**
Introduces elements of embedding electronic and computational behaviors into clothing and accoutrements such as watches, handbags, and other wearable accessories. In weekly exercises students build, test, and demonstrate canonical wearable projects. Readings and video viewings survey past and current trends in wearable technologies, including materials, components, fashion and social acceptability. Participants design, develop, debug and document a wearable technology term project.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5330
**Requisites:** Requires prerequisite course of ATLS 3300 (minimum grade C-).

**ATLS 4340 (3) Experimental Textiles**
Introduces students to the design and creation of soft interactive objects using textile techniques with a focus on weaving. Specifically, students are guided through exercises intended to cultivate and embodied a sense of textile structures and the mechanical and aesthetic effects they afford. Then, students learn the state of the art of integrating electronics into these soft/deformable textiles structures. With applications from sports, medicine, fashion, architecture, and soft robotics, smart/interactive textiles require a unique set of understandings and design considerations. Students learn about textile structure development, surface design, material sourcing, and electronics integration through project-based assignments.

**ATLS 4519 (1-4) Advanced Special Topics**
Analyzes special interest areas of multidisciplinary creative technology and design research and practice.
**Repeatable:** Repeatable for up to 32.00 total credit hours. Allows multiple enrollment in term.

**ATLS 4529 (1-3) Adv Critical Topics**
Analyzes critical perspectives in technology, art and media. Within these courses, students will develop vocabularies, theoretical perspectives and critical approaches relevant to technology and its effects on culture and society.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5529
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**ATLS 4539 (1-4) AdvTopics: How-to**
Analyzes special interest areas of multidisciplinary creative technology and design research and practice.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**ATLS 4606 (3) Critical Technical Practice**
Surveys design theory and methods that can be used to question relationships between technology, culture, and the environment. Students will discuss readings and synthesize those readings through design exercises. The course will equip students with resources for thinking more critically and creatively about design and possible future human-technology relationships.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5606, INFO 4606, and ATLS 5606
**Grading Basis:** Letter Grade

**ATLS 4616 (3) Introduction to Virtual Reality**
Introduces students to the field of virtual reality (VR). Covers the historical development of virtual reality technologies and virtual reality as a research field, the mathematics of 3D coordinate systems, fundamental principles, algorithms, and design patterns in developing interactive virtual environments, the perceptual science behind mixed reality technologies, and libraries and tools for creating VR experiences.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4616
**Requisites:** Requires prerequisite course of ATLS 2270 or CSCI 2270 (minimum grade C-). Restricted to Creative Technology and Design (TMEN) majors and (MTAM) minors.

**ATLS 4620 (3) User-Experience Design 1**
Teaches the end-to-end UX Design process. Through lectures, industry illustrations and hands-on projects students will develop a professional design portfolio piece, understand contemporary UX design methodologies, and learn how to innovate when designing at scale.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5620
**Requisites:** Restricted to Creative Technology and Design (TMEN) majors and (MTAM) minors.

**ATLS 4630 (3) Web Front-End Development**
Explores interactivity on the web using front-end web development concepts and technologies. Students will work with a range of technologies including JavaScript, jQuery, HTML5, APIs and user interface design methods to create interactive web applications. Individual and group projects will include animations, games, interactive narratives and web applications.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5630
**Requisites:** Requires prerequisite courses of ATLS 2200 and ATLS 1300 or ATLS 3000 or CSCI 1300 or CSCI 1320 (all minimum grade C-).

**ATLS 4720 (3) User-Experience Design 2**
Expands on techniques and opportunities presented in User-Experience Design 1 with a deeper dive into research and prototyping practices as means to insight into user desires and preference, adoption, and execution of product and branded experiences in a variety of contexts and locations within the global experience economy.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5720
**Requisites:** Requires prerequisite course of ATLS 4620 (minimum grade C).

**ATLS 4809 (3) Computer Animation**
Develops a firm understanding of the general principles of computer animation. Lectures cover the creation of models, materials, textures, surfaces, and lighting. Path and key frame animation, particle dynamics, and rendering are introduced. Students are assigned a number of animation tutorials to carry out.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5809 and CSCI 4809 and CSCI 5809

**ATLS 4900 (1-3) Undergraduate Independent Study**
Provides opportunities for independent study at the upper-division undergraduate level. Students work on research or a creative project guided by faculty. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of ATLS 1100 and ATLS 1300 (minimum grade C-).

**ATLS 5040 (3) Game Design**
Introduces students to game design, development, history, theory and culture through readings, discussion, game analysis and the iterative design process of non-digital games.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4040
**Requisites:** Restricted to students in the Atlas student group (PATL) only.

**ATLS 5050 (3) Alt Arcade Interfaces**
In this project-based studio course, students will move beyond conventional button and joystick interfaces into the design of bespoke interfaces for game control, with an emphasis on games designed for public exhibition. Students will, both individually and in groups, design and develop multiple games, and build custom control interfaces for them.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4050
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5060 (3) Tiny Games**
Guides students into fluency across a suite of technical tools (Bitsy, PuzzleScript, Pico-8, and others) to construct tiny games: short games with tight technical constraints, created in relatively brief amounts of time, and built around singular ideas.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4060
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5112 (3) Neurohacking**
Explores psychotechnologies for developing high level metacognition and individual sovereignty. We investigate the optimization of conscious human experience, mindfulness, and creativity through the lenses of neuroscience, cognitive science, evolutionary psychology, and philosophy. Students will learn to critique primary literature, experimental design, and be guided in developing a set of practices to enhance cognition and achieve various desired mental states.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4112
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5120 (3) Mobile Application Development**
Provides a comprehensive overview of developing mobile applications using a range of technologies including software developers' kits, object-oriented programming and human interface design principles. Students incorporate leading edge technologies with their own academic pursuits and personal interests to develop mobile applications. Explores the social and cultural effects of app and mobile-based computing.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4120
**Grading Basis:** Letter Grade

**ATLS 5130 (3) Experimental Typography**
This course is an advanced investigation of typography for visual communication and expression. Emphasis is placed on the analysis of meaning as conveyed through materials, technology, and design. Projects are experimental and are designed to challenge you to expand your understanding of the function of typography in communication, design, art, and culture.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4130
**Requisites:** Restricted to graduate students only.

**ATLS 5140 (3) Game Development**
Builds on concepts and processes learned in ATLS 4040/5040. Reinforces game design principles through analysis and discussion of digital games, and introduces students to key practices in the development of digital game experiences, including game flow, mechanics, 2D and 3D graphics, and artificial intelligence.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4140

**ATLS 5150 (1) Managing Effectively in a Changing Telecommunications Environment**
Provides students with an opportunity to join international managers and policy makers from around the world in an intensive seminar focused on the challenges of managing in a telecommunications environment in an era of technological change. Guest lecturers provide an effective overview of the cutting-edge issues managers face in telecom and technology companies around the world.
**Equivalent - Duplicate Degree Credit Not Granted:** TLEN 5150
**Requisites:** Restricted to CYBR/TLEN graduate students.

**ATLS 5151 (3) Flow Visualization**
Explores techniques for the visualization of the physics of fluid flows including seeding with dyes, particles and bubbles, and shadowgraphy and schlieren. Reviews optics and fluid physics, especially atmospheric clouds. Assignments are student-driven, to individuals and mixed teams of graduates, undergraduates, engineering majors and photography/video majors.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4200, MCEN 4151, ARTF 5200, ATLS 4151 and MCEN 5151

**ATLS 5201 (3) Biodesign**
This class covers basic design techniques, together with essential wetlab skills. Students will learn how to culture and work with various types of organisms, such as bacteria, algae (dynoflagellates, cyanobacteria) and fungus. These organisms will become the living media or processed biomaterials that the students will design with. This is a lab-based class.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4201
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5202 (3) Computational Fabrication**
This course will explore techniques, representations, and workflows for computational fabrication. Digital fabrication machines like 3D printers and laser-cutters bring complicated designs into physical form, and computer programming helps overcome design challenges that are difficult or nearly impossible. Blending these two tools, students will use computational fabrication techniques to design and build functional, creative objects leveraging existing computer-aided design (CAD) tools, programming languages and digital fabrication machinery.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4202
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5203 (3) Light and Perception**
Traces human and camera vision in close detail. Students explore visual perception between two and three dimensions by exploring advanced experiments in designing light. Starting with different analog illustration exercises, students explore how light informs the perception of three dimensional space and objects. Students then explore techniques to play with visual perception, using advanced technologies like Augmented and Virtual Reality, Interactive Sculpture, Digital Games, and Immersive Media.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4203
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5210 (3) Global Development I**
Introduces students to the theories and policy of international development. Examines the role of multilateral agencies, foundations, aid organizations, corporate entities and academia in development as both an industry and a research field. Focuses on development movements and their outcomes, the inter-related nature of development and its effect on policies and programs, and critiques.
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5214 (3) Big Data Architecture**
Provides students with a comprehensive survey of technologies used today in the collection, storage, processing, analytics and display of big data. Focuses on cultivating real world skills with students working on semester long projects to execute on a group project.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4214, CSCI 5214, and CSCI 4214
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ATLS 5220 (3) Global Development II**
Explores the impact of economic, geographical and social/cultural conditions on development outcomes through standalone course components taught by subject matter experts in region and in residency at ATLAS. Components may include, but are not limited to, development economics, environmental sustainability, public health, climate change, globalization and migration, religion, and gender as these broad themes relate to development.
**Requisites:** Requires prerequisite courses of ATLS 5210 (minimum grade D-). Restricted to graduate students only.

**ATLS 5221 (3) Interactive Sound**
Interactive Sound explores generative coding to produce unique audio design systems that can be employed in a wide array of interactive projects. Students will learn to use Max (a visual programing tool) to combine and control sound, video, OpenGL 3D objects, and microcontrollers. Example inputs: real time video, data scraping for the sonification of natural phenomena, or environmental sensor data collected via Arduino. Example outputs: reactive audio-visual installations, immersive projection, or multichannel spatial sound systems.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4221
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5230 (3) Case Studies in Social Impact**
Serves as foundation course for MS-Social Impact program. Students will evaluate case studies across a range of technologies and applications. Students will learn how to match available technologies to human and environmental needs and resources, be introduced to the seminal work and leaders in the field, and discuss the future of Social Impact as an emerging area of academic focus.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4230
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5240 (3) Technology for Social Impact Laboratory**
Prepares students for the semester-long practicum. Students work in teams to design interventions that address unique socio-economic and environmental development issues. Teams will design a variety of interventions, including telehealth and distance education programs, communication networks, and pro-development policies. Topics will be chosen by teams and guided by program faculty and external domain experts.
**Requisites:** Requires prerequisite courses of ATLS 5230 (minimum grade D-). Restricted to graduate students only.

**ATLS 5244 (3) Empathy and Technology**
Explores how the creative integration of empathy and compassion with design and technology can benefit society. Reviews foundational neuroscience and evolution of empathy. Through readings, discussion, and reflection students will develop personal practices for fostering empathy and critically investigate: empathy as a finite resource, tribalism/polarization, the weaponization of empathy, and principles for designing social systems that promote well-being. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4244
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ATLS 5250 (3) Fieldwork Methods**
Introduces methods and models that can be employed in program development and deployment. Examines the applications of participatory research, value-centric design, program scale, cross-disciplinary work, and appropriate monitoring and evaluation. The goal is to build student confidence around existing evaluation toolkits and methods, while advancing multi-method approaches to designing and analyzing initiatives.
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5279 (3) Aesthetics in Design**
Focuses on aesthetic aspects of design via hands-on design-build experiences. Students individually create dynamic artifacts of their own choice with the assistance of teammates. Content includes major design movements since 1900, constructive critique practice, hand sketching techniques and other selected industrial design topics. Students publish their design work on an archival public blog which provides a professional portfolio element.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5279 and MCEN 4279 and ATLS 4279

**ATLS 5320 (3) Mobile Application Development: Advanced Topics**
Explores advanced topics in mobile application design and development, including examining different approaches to information design and the various user interaction models associated with them. Understanding how data is structured, accessed, stored and flows through apps is a core theme of the course. Explores the interaction with external data sources and storage models.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4320
**Requisites:** Requires prerequisite course of ATLS 5120 (minimum grade C).
**Grading Basis:** Letter Grade

**ATLS 5330 (3) Wearable Technologies**
Introduces elements of embedding electronic and computational behaviors into clothing and accoutrements such as watches, handbags, and other wearable accessories. In weekly exercises students build, test, and demonstrate canonical wearable projects. Readings and video viewings survey past and current trends in wearable technologies, including materials, components, fashion and social acceptability. Participants design, develop, debug and document a wearable technology term project.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4330
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5402 (3) Research Methods in Human-Robot Interaction**
Introduces students to the field of human-robot interaction (HRI). Covers HRI theory, principles, methodologies, and applications with links to robotics, artificial intelligence, human factors, human-computer interaction, design, cognitive psychology, education and other domains. Coursework includes readings from state-of-the-art in HRI research, team exercises and problem-solving sessions, and implementation and evaluation of a human-robot interaction systems for specific applications.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5402
**Requisites:** Restricted to graduate students only.

**ATLS 5410 (3) Creative Technologies**
This course gives students hands-on exposure to a wide range of technologies, including 3D printing, laser cutting, microcontrollers, sensors and programming. Through rapid prototyping and problem solving, students gain technical fluency and competence while identifying technology skills they wish to develop further.
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5420 (3) Professional Seminar: Business of Creativity**
This course was designed specifically to prepare students to make the most of their time in the CTD Master¿s Program, and to prepare them for a career within the creative technology and design professional landscape. The course helps students identify career goals and mentors, and helps them position themselves for industry through course-selection, portfolio development, and projects. There is also a survey element to the course which exposes students to creative technology professionals who discuss their career paths, offer advice, and provide insight into their individual design process.
**Requisites:** Restricted to Atlas (ATLS) graduate students only.
**Grading Basis:** Letter Grade

**ATLS 5430 (3) Design Methods**
In this course, students will learn to develop sense-making techniques as designers. This includes framing and structuring design research, making representations to generate insights, as well as documenting and communicating processes and outcomes. The class is structured around weekly discussions and activities anchored in real-world design challenges; and it will also offer tutorials on key design skills such as rapid prototyping and visual communication.
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5440 (3) Design Studio**
In this course students work with both faculty and industry expert mentors on developing a semester-long group project. In small teams, students learn to develop an interactive experience that combines project design and technical execution. The class is designed to reflect a ¿real world¿ interactive design project experience, in which students must present and deliver a large scale completed project for demonstration/exhibition at the end of the semester.
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5519 (1-3) Adv Topics**
Analyzes special interest areas of multidisciplinary creative technologies and design research and practice.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ATLS 5529 (1-3) Adv Critical Topics**
Analyzes critical perspectives in technology, art and media. Within these courses, students will develop vocabularies, theoretical perspectives and critical approaches relevant to technology and its effects on culture and society.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4529
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ATLS 5606 (3) Critical Technical Practice**
Surveys design theory and methods that can be used to question relationships between technology, culture, and the environment. Students will discuss readings and synthesize those readings through design exercises. The course will equip students with resources for thinking more critically and creatively about design and possible future human-technology relationships.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5606, ATLS 4606 and INFO 4606
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ATLS 5610 (6) Startup Practicum**
Presumes that entrepreneurism can be learned through the conception, build, and launch of an original product or service by student teams within a single semester. Immerses students in the daily leadership and innovation challenges of the startup environment and serves as a clinic in thinking, decision making and mental agility that will benefit any area of business--not just startups.
**Requisites:** Restricted to graduate students only.

**ATLS 5616 (3) Introduction to Virtual Reality**
Introduces students to the field of virtual reality (VR). Covers the historical development of virtual reality technologies and virtual reality as a research field, the mathematics of 3D coordinate systems, fundamental principles, algorithms, and design patterns in developing interactive virtual environments, the perceptual science behind mixed reality technologies, and libraries and tools for creating VR experiences. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4616, ATLS 4616, CSCI 5616

**ATLS 5620 (3) User-Experience Design 1**
Through lecture, industry illustrations, and hands-on projects students will learn the end-to-end UX Design process. Through this course students will learn how to craft a professional design portfolio piece, understand contemporary UX design methodologies, and be shown how to innovate when designing at scale.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4620
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5630 (3) Web Front-End Development**
Explores interactivity on the web using front-end web development concepts and technologies. Students will work with a range of technologies including JavaScript, jQuery, HTML5, APIs and user interface design methods to create interactive web applications. Individual and group projects will include animations, games, interactive narratives and web applications.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4630
**Requisites:** Restricted to graduate students only.

**ATLS 5640 (4) Design Thinking**
Explores design thinking and how it can be applied conceptually and practically to innovation in areas as diverse as business organization and product development to topics and areas including but not limited to, story, design, UX, interaction design, communication strategy and presentation. Fast-paced, project-based, and immersive, students will work in small teams to discover solutions to real-world problems.
**Requisites:** Restricted to graduate students only.

**ATLS 5650 (3) Introduction to Programming**
Explores computation as a powerful tool for creative design and expression in a project-based studio environment. Students learn the fundamentals of creative coding, computational thinking, and object-oriented programming. Hands-on topics include generative art and design, interactivity, animation, and visualization. This class is a mix of technical instruction (both inside and outside the classroom), readings, viewings, lectures, workdays, and critiques. This is a projects-based class, but projects will vary.
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 5660 (3) Creative Code**
Exposes students to front-end, web-based design and development processes and best practices. WordPress will be used as the back end CMS. Students will learn how to design and develop using WordPress as a framework. At the end of the semester, students will present a final project to illustrate what they have learned and the logic of their build.
**Requisites:** Restricted to Atlas (ATLS) graduate students only.
**Recommended:** Prerequsites: exposure to HTML, CSS, JavaScript, PHP and MySQL and previous experience with WordPress for blogging and/or content publication.

**ATLS 5680 (3) Creative Tech Studio**
Emphasizes fundamentally, theoretically, and practically that technology and creativity are not opposing disciplines but rather a dynamic and complementary blending of idea and execution that is iterative and evolving through the dynamic exchange and interaction of ideas and tools. Each Studio will offer a different conceptual challenge, such as using technology to bridge physical and digital environments, game design, or storytelling.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Grading Basis:** Letter Grade

**ATLS 5720 (3) User-Experience Design 2**
Expands on techniques and opportunities presented in User-Experience Design 1 with a deeper dive into research and prototyping practices as means to insight into user desires and preference, adoption, and execution of product and branded experiences in a variety of contexts and locations within the global experience economy.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4720
**Requisites:** Requires prerequisite course of ATLS 5620 (minimum grade C).

**ATLS 5730 (3) Front-End Development 2**
Requires that students are proficient in front-end environment and ready for advanced front-end development using these tools - HTML 5, CSS3, JS - on weekly projects, a mid-term project, and a final project. This course develops more robust and elegant uses of the semantic use of elements as well as the benefits of using standards-based, valid code, CSS efficiencies, and JS and its libraries.

**ATLS 5809 (3) Computer Animation**
Develops a firm understanding of the general principles of computer animation. Lectures cover the creation of models, materials, textures, surfaces, and lighting. Path and key frame animation, particle dynamics, and rendering are introduced. Students are assigned a number of animation tutorials to carry out.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4809 and CSCI 4809 and CSCI 5809
**Requisites:** Restricted to graduate students only.

**ATLS 5880 (3) Interactive Machine Learning for Customizable and Expressive Interfaces**
Introduces students to techniques for applying machine learning in the development of customizable human-computer interfaces. Students will learn to process a wide variety of input data (e.g. video and accelerometer streams), using different machine learning algorithms to detect semantically meaningful events that can afford the construction of new interactive systems. They will complete substantial projections within the domains of assistive or creative technologies. Does not fulfill Breadth Requirement for CSEN graduate students.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4889, CSCI 4889 and CSCI 5880
**Requisites:** Requires prereqs (CSCI 3022 or APPM 4570 or APPM 3570 or APPM 4520 or CVEN 3227 or MATH 3510 or MATH 4510 or ECEN 3810 or ECON 3818 or MCEN 4120) (CSCI 3002 or CSCI 3202 or CSCI 4448) all min grade C-. Restricted to grad students in the ATLAS program.
**Grading Basis:** Letter Grade

**ATLS 5900 (1-6) Masters Level Independent Study**
Provides opportunities for independent study and research at the Masters level. Students work on research project guided by faculty.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ATLS 6519 (1-3) Advanced Special Topics in Creative Technology and Design**
Analyzes special interest areas of multidisciplinary in creative technology and design research and practice.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ATLS 6900 (1-3) Professional Internship**
The objective of this course is for students to receive academic credit for internships with industry partners that have an academic component to them suitable for graduate-level work. Participation in the program will consist of an internship agreement between a student and an industry partner who will employ the student in a role that supports the academic goals of the internship. Instructor participation will include facilitation of mid-term and final assessments of student performance as well as support for any academic-related issues that may arise during the internship period.
**Repeatable:** Repeatable for up to 3.00 total credit hours.

**ATLS 6910 (3-6) Social Impact Practicum**
This practicum allows Social Impact MS students to synthesize what they have learned and test their readiness for a career in Social Impact. Practicum assignments are arranged under the supervision of the MS Program Director and involve work with a non-governmental organization, development agency or technology/policy entity. Successful completion is required for graduation from the Social Impact MS Program.
**Requisites:** Requires prerequisite courses of ATLS 5210 and ATLS 5220 and ATLS 5230 and ATLS 5240 and ATLS 5250 (all minimum grade D-).

**ATLS 6920 (3) Creative Industries Final Project**
This course allows MS-CTD students to synthesize what they have learned and test their readiness for a career in the creative technologies and design field. Through this class students work with an academic and/or industry mentor to create a capstone final project emblematic of their focus during their master degree studies. Students learn to propose and scope work, adhere to budget constraints and time schedules, communicate their work, and create a final end deliverable that is presented to the larger ATLAS community. This final project is meant to serve as a culminating portfolio project that helps position students for industry after graduation. Successful completion is required for graduation from the MS-CTD Program.
**Requisites:** Restricted to Tech, Media and Society (ATLS) master's degree students only.

**ATLS 7000 (1) ATLAS Colloquium**
Each week during the fall and spring semesters, the ATLAS Colloquium features dynamic speakers from academia and industry who work in fields of interest to the creative technology and design community. Whether artists, creatives, scientists, researchers, entrepreneurs or free spirits, these speakers share their interdisciplinary experience and knowledge in an intimate, small-group setting. Topics may include programmable matters, do-it-yourself technologies, new design medium, robotic teleoperations, virtual/augmented/mixed reality, information visualization, games, design computation, creativity and cognition, personal health informatics, addictive fabrication, cyber security, ethics, education, human computer interaction and others. The ATLAS Colloquium promotes rigorous, curiosity-driven investigation in a thriving academic community that is supportive, energetic and playful.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ATLS 7500 (3) ATLAS Graduate Research Methods**
The objective of this course is to provide a primer for key methodological approaches used in the field. Students will investigate a broad set of techniques for conducting theoretical, design, and experimental research. They will explore how to formulate and investigate research questions using these methods. Topics covered will include basic research ethics, research project design, approaches to constructing theory, research through design techniques, and methods for experimental study.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ATLS 7900 (1-6) Doctoral Level Independent Study**
Provides opportunities for independent study and research at the Doctoral level. Students perform independent research under faculty supervision.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

**ATLS 8990 (1-10) Doctoral Dissertation**
Approved research conducted under the supervision of members of the graduate faculty. Investigates some specialized topic or field in the area of interdisciplinary information and communication technology. All doctoral students must register for at least 30 hours of dissertation credit as part of the requirement for the ATLAS doctoral degree.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to Atlas (ATLS) graduate students only.

# Atmospheric and Oceanic Sciences (ATOC)

## Courses

**ATOC 1050 (3) Weather and the Atmosphere**
Introduces principles of modern meteorology for nonscience majors, with emphasis on scientific and human issues associated with severe weather events. Includes description, methods of prediction, and impacts of blizzards, hurricanes, thunderstorms, tornadoes, lightning, floods, and firestorms.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**ATOC 1060 (3) Our Changing Environment: El Nino, Ozone, and Climate**
Discusses the Earth's climate for nonscience majors, focusing on the role of the atmosphere, oceans, cryosphere and land surface. Describes the water cycle, atmospheric circulations and ocean currents, and how they influence global climate, El Nino and the ozone hole. Discusses human impacts from climate change.
**Recommended:** Prerequisite ATOC 1050.
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 1070 (1) Weather and the Atmosphere Laboratory**
Illustrates fundamentals of meteorology with laboratory experiments. Covers collection, analysis and discussion of data related to local weather. Uses computers for retrieval and interpretation of weather data from Colorado and across the U.S. Optional lab for ATOC 1050.
**Recommended:** Prerequisite or corequisite ATOC 1050.
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science Lab or Lab/Lec

**ATOC 2050 (3) Introduction to Atmospheric Research**
Uses real world data to investigate the basic physical processes that drive the coupled atmosphere-ocean system (e.g., energy distribution, phase changes, stability, winds and currents). Students will apply logic to predict how processes are impacted as different environmental characteristics change and develop skills in graphical literacy, investigative thinking, societal and personal relevancy, and communication.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 2500 (1-3) Special Topics in Atmospheric and Oceanic Sciences - Lower Division**
Acquaints students at the lower division level with current research in atmospheres, oceans and climate (Topics may vary each semester). Students may register for more than one section of this course in the same semester. Recommended restriction: students with 0-56 credits (Freshmen or Sophomores).
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite or corequisite will vary depending on topic.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 3050 (3) Principles of Weather**
Explores the processes that influence middle latitude weather including atmospheric thermodynamics, cloud and precipitation processes, atmospheric dynamics, air masses and fronts, and mid-latitude cyclones. Recitations and homework assignments will allow students to apply these concepts to real weather data through analysis of weather maps, thermodynamics diagrams and conceptual models.
**Recommended:** Prerequisites ATOC 1050 or ATOC major.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 3070 (3) Introduction to Oceanography**
Explores Earth's dynamic oceans. Discusses the disciplines of oceanography including marine geology, chemistry, biology and physical oceanography with emphasis on global change. Specific topics may include: tectonics, currents, biogeochemical cycles, ecology and global warming.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 3070
**Recommended:** Prerequisite any 1000-level ATOC or GEOL course or ATOC major.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 3180 (3) Aviation Meteorology**
Familiarizes students with a wide range of atmospheric behavior pertinent to air travel: rudiments of aerodynamics; aircraft stability and control; atmospheric circulation, vertical motion, turbulence and wind shear; fronts, clouds and storms.
**Recommended:** Prerequisite ATOC 1050 or ATOC major.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 3300 (3) Analysis of Climate and Weather Observations**
Discusses instruments, techniques and statistical methods used in atmospheric observations. Covers issues of data accuracy and analysis of weather maps. Provides application to temperature and precipitation records, weather forecasting and climate change trends. Uses computers to access data sets and process data.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 3301
**Recommended:** Prerequisites ATOC 1050 or ATOC 1060 or ATOC 3600 or GEOG 3601 or ENVS 3600 or GEOG 1001 and one semester calculus.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 3500 (3) Air Chemistry and Pollution**
Examines the composition of the atmosphere and sources of gaseous and particulate pollutants: their chemistry, transport and removal from the atmosphere. Applies general principles to acid rain, smog and stratospheric ozone depletion.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 3151
**Recommended:** Prerequisite one semester of college-level chemistry or one year of high school chemistry.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 3600 (3) Principles of Climate**
Describes the basic components of the climate system: the atmosphere, ocean, cryosphere and lithosphere. Investigates the basic physical processes that determine climate and link the components of the climate system. Covers the hydrological cycle and its role in climate, climate stability and global change.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 3601 and ENVS 3600
**Recommended:** Prerequisites one semester of calculus and ATOC 1060 or ATOC 3300 or GEOG 3301 or GEOG 1001 or ATOC major.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 3700 (3) Course-Based ATOC Research Experience**
In this course-based research experience in Atmospheric and Oceanic Sciences, students will learn about how scientific research works as well as gain first research experience in Atmospheric and Oceanic Sciences by working on an authentic research project. Specifically, students will learn how to understand scientific articles, how to develop subject-matter expertise, how to design a scientific research project, how to analyze and interpret data, and how to present their results to other scientists. Formerly offered as a special topics course.
**Recommended:** Prerequisite ATOC 1060 or ATOC 3600, and 1 semester of programming or equivalent self-study before the beginning of the class is required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 3720 (3) Planets and Their Atmospheres**
Explores the physics and chemistry of the atmospheres of Mars, Venus, Jupiter, Saturn, and Titan. Examines evolution of the atmospheres of Earth, Venus, and Mars; and the escape of gases from the Galilean satellites, Titan and Mars; the orbital characteristics of moons, planets, and comets. Uses recent results of space exploration. Elective for APS major and minor.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 3720
**Requisites:** Requires prerequisite courses of PHYS 1120 and (APPM 1360 or MATH 2300) and prerequisite or corequisite course of ASTR 2100 or MATH 2400 or APPM 2350 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4020 (1) Seminar in Atmospheric and Oceanic Sciences**
Explores current research areas; students read selected papers, give presentations and participate in discussions; fellowship and internship opportunities; discussion on practical skills necessary for academic and professional life; career-building activities with outside speakers from academia and industry. May be repeated for a total of 6 credit hours within the degree as long as the topic is different. May be repeated for a total of 3 credit hours within a semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**ATOC 4200 (3) Biogeochemical Oceanography**
Provides a large-scale synthesis of the processes impacting ocean biogeochemistry. Transforms theoretical understanding into real-world applications using oceanographic data and models. Topics include: chemical composition, biological nutrient utilization and productivity, air-sea gas exchange, carbonate chemistry, ocean acidification, ocean deoxygenation, iron fertilization, biogeochemical climate feedbacks and more.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5200
**Recommended:** Prerequisites one semester of calculus and one semester of chemistry.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4215 (3) Descriptive Physical Oceanography**
Introduces descriptive and dynamical physical oceanography, focusing on the nature and dynamics of ocean currents and their role in the distribution of heat and other aspects of ocean physics related to the Earth's climate. Dynamical material limited to mathematical descriptions of oceanic physical systems.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4500 (1-3) Special Topics in Atmospheric and Oceanic Sciences - Upper Division**
Acquaints students at the upper division level with current research in atmospheres, oceans, and climate. Topics may vary each semester. Students may register for more than one section of this course in the same semester.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4550 (3) Mountain Meteorology**
Investigating main processes that control weather and climate in the western United States and other mountain ranges around the world is the emphasis of this course. Provides an advanced survey of synoptic, mesoscale, and microscale meteorology in complex terrain including orographically modified cyclone evolution, front-mountain interactions, terrain and thermally driven flows, mountain waves, downslope winds, and orographic precipitation.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5550
**Recommended:** Prerequisite ATOC 1050 or ATOC major.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4700 (3) Weather Analysis & Forecasting**
Utilizing a range of operational weather observations to analyze current weather conditions, providing hands-on experience interpreting observations and relating those observations to the physical principles that govern atmospheric behavior is the course emphasis. It focuses on how to read weather reports, analyze observations, and how to prepare weather maps to analyze current conditions and how to interpret numerical weather forecasts.
**Recommended:** Prerequisite ATOC 1050 or ATOC 1060 or ATOC 4720 or ATOC major.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4710 (3) Introduction to Atmospheric Physics**
Provides a fundamental overview of the physics of Earth's atmosphere. Topics include atmospheric composition and structure, atmospheric radiation and optics (rainbows, halos and other phenomena), atmospheric thermodynamics, cloud physics and atmospheric electricity and lightning. Including both descriptive and quantitative approaches to the subject material. Where applicable, observations from the ATOC Skywatch Observatory will be introduced.
**Recommended:** Prerequisite one year of calculus and one year of physics with calculus.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4720 (3) Atmospheric Dynamics**
Introduces the fundamental physical principles that govern the atmospheric circulations across a range of spatial and temporal scales and provides a quantitative description and interpretation of a wide range of atmospheric phenomena. Topics include atmospheric forces, governing equations, balanced and unbalanced flows, atmospheric waves and mid-latitude cyclones.
**Recommended:** Prerequisite one year of calculus and one semester of physics with calculus.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4730 (3) Physical Oceanography and Climate**
Introduces the field of physical oceanography, with emphasis on the ocean's interaction with the global atmosphere. Analysis of the ocean's heat, salt, and momentum budgets, wind-driven and thermohaline circulations, climate cycles including El Nino, and the ocean's role in climate change. Theory complemented by state-of-the-art observations and models. Department recommended prerequisites: ATOC 1060 or ATOC 3070 or ATOC 3600 and one semester of calculus.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5730
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4740 (3) Dynamics of Past Climate Changes: Lessons for the Future**
Studies past changes in the Earth¿s climate and their application to predict future climate changes. Combines theoretical understanding of the climate system, computer models, and records of past changes from geological archives to understand drivers of past and future changes in climate. Emerging and inter-disciplinary area in climate research including paleoclimatology, climate theory, and modelling. Students work individually and in groups to formulate hypotheses that ca be tested using paleoclimate records and model simulations. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5720
**Recommended:** Prerequisite Prior college-level coursework in Chemistry and Physics, and least two of the following courses - ATOC 1060, ATOC 4730, ATOC 5730, GEOL 3040, GEOL 3070, GEOL 3820, GEOL 4060, or GEOL 4070.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4750 (3) Desert Meteorology and Climate**
Introduces students to the dynamic causes of deserts in the context of atmospheric processes and land-surface physics. Discusses desert severe weather, desert microclimates, human impacts and desertification, inter-annual variability in aridity (drought), the effects of deserts on global climate and the impact of desert climate on humans.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5750
**Recommended:** Prerequisites one semester of calculus and ATOC 1050 or ATOC 1060 or ATOC 3600 or ATOC major.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4760 (3) Physics and Chemistry of Clouds and Aerosols**
Clouds and aerosols are important components of the climate system, impact remote sensing, affect human health, and are tightly coupled to radiation, chemistry and dynamics. This class covers the basic concepts in cloud and aerosol physics and chemistry in the context of the leading problems in climate, Earth history, air pollution, and weather. Examples include: dust storms; volcanic eruptions and climate; the extinction of the dinosaurs; nuclear winter; clouds and climate; thunderstorms, and lightning.
**Recommended:** junior and senior level students.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4770 (3) Renewable Energy Meteorology**
Explores the complex interactions of the atmosphere and wind energy generation. Surveys wind turbine designs. Explores planetary boundary layer dynamics, traditional and novel wind measurement methods, forecasting methods, wind turbine and wind farm wakes, wind farm optimization, sound propagation from wind plants, climate change impacts on wind resources and the impacts of wind plants on local environments.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5770
**Recommended:** Prerequisite ATOC 1050 or ATOC major.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4780 (3) Ice Sheets and Climate**
Covers the role of ice sheets in the climate system over a range of time (millions of years ago to the long-term future) scales, and presents the interactions between ice sheets, the ocean, and the atmosphere. Students will be introduced to, and work with, observational and modeling methods and data that conceptualize ice sheet climate and related topics.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5780
**Recommended:** Prerequisite Basic programming experience (python, Matlab, or equivalent), basic knowledge of calculus, basic knowledge of algebra and at least one ATOC course at the 1000, 2000, or 3000 level with a grade of C- or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4800 (3) Policy Implications of Climate Controversies**
Examines controversial issues related to the environment, including climate change. Covers scientific theories and the intersection between science and governmental policy. Includes discussion, debate and critical reading of textual materials. Department enforced prerequisite: ATOC 1060 or ATOC 3600.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5000 and ENVS 5830
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4815 (3) Scientific Programming, Data Analysis and Visualization Laboratory**
Teaches programming in python, as well as analysis skills for accessing, analyzing and visualizing data that are commonly used in the atmospheric and oceanic sciences. Basic data analysis includes curve fitting and re-gridding/aggregation of satellite observations or meteorological data for global climatologies. The course content is primarily conveyed through hands-on code development. A final project, involving the independent analysis and visualization of a scientific data set, integrates skills acquired throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5815
**Recommended:** Requisites prior experience with Python or a basic programming course such as CSCI 1300 or equivalent, basic knowledge of calculus and algebra.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4830 (3) Remote Sensing Lab**
Fundamentals of remote sensing of the atmosphere and ocean including fundamentals of atmospheric radiation and inverse methods for deriving geophysical variables from measurements. Principles of satellite and ground-based active (lidar and radar) and passive remote sensing methods, instrumentations, and applications. Lectures will include both descriptive and quantitative approaches to the subject material and include in-class demonstrations and measurements and data from the ATOC Skywatch Observatory and NASA satellites.
**Recommended:** Prerequisites one year of calculus and one year of physics with calculus.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4840 (3) Field Observations and Measurements Laboratory**
This course introduces students to all aspects of observing the atmospheric state including issues associated with observational and instrument errors, planning and executing measurement campaigns and analyzing and presenting results based on data collected during field campaigns. During the semester students will plan, conduct and analyze data from two atmospheric field campaigns conducted near Boulder, CO using a suite of meteorological sensors.
**Recommended:** Prerequisites ATOC 1050 or ATOC 3050.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4850 (3) Numerical Methods Laboratory**
Teach students how to convert physical descriptions of the earth system into numerical models. Students will learn how to make assumptions to simplify complex systems, how to discretize and code mathematical equations so they can be solved on a computer, and how to assess if the results are reasonable. The course content is primarily conveyed through hands-on code development in python. A final project integrates skills acquired throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5850
**Recommended:** Prerequisites ATOC 4815 or ATOC 5815, Calculus 1, Calculus 2, Differential Equations, Linear Algebra, and a basic knowledge of/interest in atmospheric, oceanic, climatic, or cryospheric physics.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4860 (3) Data Science Lab**
The goals of this course are twofold: 1) providing a working knowledge of basic data science methods used for temporal and spatial analysis of atmospheric and oceanic data, to turn the data into clear insights via a computer program, 2) develop skills to work in a group and explain data science techniques to an audience with a broad range of expertise. The course covers: probability distributions and statistical indices; hypothesis testing; linear and multilinear regression; an intro to machine learning; an intro to Gaussian processes. This ¿learning-by-doing¿ course is recommended for senior level students. Formerly offered as a special topics course.

**ATOC 4870 (3) Climate Modeling Laboratory**
Climate models solve equations describing the earth system. This course provides an overview of climate modeling. Standard climate model approaches and experiments are presented, and then used in companion exercises. This course will provide students with real-world experience running a climate model used internationally for climate science and policy. This course is aimed at upper level undergraduate students. Recommended restriction: Junior or Senior ATOC students.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5870
**Recommended:** Prerequisite Experience with programming, Calculus, Differential Equations and Linear Algebra.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Arts Sci Gen Ed: Distribution-Natural Sci Lab

**ATOC 4875 (3) Weather Modeling Laboratory**
In this laboratory course, students simulate the atmosphere using a numerical weather prediction model (WRF) and explore the physical and numerical basis of the system of equations that underpin numerical weather prediction models. In addition to developing technical skills with WRF and visualizing its output with python, students explore applications of numerical modeling of the atmosphere, such as land-sea breezes, hurricanes, mesoscale convective systems, and the daily cycle of the boundary layer. Recommended restriction: Junior or Senior class standing. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5875
**Requisites:** Requires prerequisite course of ATOC 1050 or ATOC 3050 or ATOC 4700 or ATOC 4710 or ATOC 4720 (all minimum grade C-).
**Recommended:** Prerequisite Experience with computer science and data visualization such as ATOC 4815 and some experience with Unix/Linux.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4880 (3) Mesoscale Meteorology**
Provides a comprehensive study of the structure, evolution, and dynamics of atmospheric phenomena on the mesoscale, which have horizontal scales ranging from a few to several hundred kilometers. Topics include land/sea breezes, horizontal convective rolls, drylines, deep convective storms, outflow boundaries, tornadoes, mesoscale convective systems, terrain induced airflows, mountain waves and the mesoscale aspects of extratropical cyclones. Previously offered as a special topics course. Recommended restriction: Senior or Fifth-Year Senior standing.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5880
**Recommended:** Prerequisites One year of Calculus, one year of Physics with Calculus, and at least one ATOC fundamental or core course, preferably ATOC 3050 or ATOC 4720.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ATOC 4890 (3) Synoptic Dynamic Meteorology**
Weather conditions at middle latitudes are characterized by complex interactions between air masses, fronts, cyclones, and anticyclones. These interactions are governed by a set of elegant mathematical equations that describe the behavior of the atmosphere. Students will manipulate and apply these equations in real time in order to diagnose the development and evolution of a variety of synoptic-scale weather systems, including fronts, jet streams, and extratropical cyclones. Recommended restriction: Junior and Senior-level students. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5890
**Recommended:** Prerequisite ATOC 3050, ATOC 4720, one year of Calculus, and one semester of Physics with Calculus.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Arts Sci Gen Ed: Distribution-Natural Sci Lab

**ATOC 4900 (1-3) Independent Study**
Department enforced prerequisite: instructor consent.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ATOC 4950 (1-3) Honors Thesis**
Students work independently on a research topic under the guidance of a faculty member. A written thesis and an oral presentation of the work are required. Registration by arrangement and with consent of faculty mentor. Department enforced prerequisite: minimum 3.00 GPA.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sciences Honors Course

**ATOC 4990 (1-3) Internship**
This course is designed to provide junior and senior ATOC majors with the opportunity to work hands-on in the community and to gain practical knowledge and experience in both research and industry. Participation in the program requires both on-site and academic work. 0.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Students should have junior or senior standing (at the time of the internship) and have a minimum cumulative GPA of 2.

**ATOC 5000 (3) Critical Issues in Climate and the Environment**
Discusses current issues such as ozone depletion, global warming and air quality for graduate students in nonscientific fields. Provides the scientific background necessary to understand, follow scientific developments and critically evaluate these issues.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4800 and ENVS 5830
**Requisites:** Restricted to graduate students only.

**ATOC 5050 (3) Atmospheric Thermodynamics and Dynamics**
Covers atmospheric thermodynamics and dynamics and the underlying governing laws and mathematical and physical principles. Topics include atmospheric composition and thermodynamics, conservation laws and atmospheric governing equations, geostrophic balance and balanced flows, vorticity dynamics and boundary layers. ATOC graduate core course.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite one year of calculus-based physics and math through differential equations.

**ATOC 5051 (3) Introduction to Physical Oceanography**
Provides fundamental knowledge of observations,, theory, dynamics and modeling in physical oceanography. Promotes critical thinking and the development of skills for data analysis and interpretation. ATOC graduate core course.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites one year of calculus-based physics and math up through differential equations.

**ATOC 5060 (3) Dynamics of the Atmosphere and Oceans**
Examines large-scale motions in a stratified rotating atmosphere and ocean, and quasi-geostrophic flow, barotropic and baroclinic instabilities, cyclogenesis, global circulations and boundary layer processes. Ageostrophic motions, including Kelvin waves, internal gravity waves and the theory of frontogenesis are also considered. ATOC graduate core course.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ATOC 5050, one year of calculus-based physics and math up through differential equations.

**ATOC 5061 (3) Advanced Ocean Dynamics and Air-Sea Coupled ENSO Mechanisms**
Explores the existing theories of the El Niño and Southern Oscillation (ENSO) ocean-atmosphere coupled mechanisms, theory of the thermocline in a quasi-geostrophic system, and dynamics of the Atlantic Meridional Overturning Circulation (AMOC). Covers physical mechanisms, associated mathematical equations, and numerical model simulations. Discusses their direct research applications in understanding the past, present and future climate variability and change. Offered once per year.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites ATOC 5400, ATOC 5051 or ATOC 5060 and one year of calculus-based physics and math including differential equations.

**ATOC 5151 (3) Atmospheric Chemistry**
Reviews basic kinetics and photochemistry of atmospheric species and stratospheric chemistry with emphasis on processes controlling ozone abundance. Tropospheric chemistry focusing on photochemical smog, acid deposition, oxidation capacity of the atmosphere and global climate change. ATOC graduate core course.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 5151
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite one semester of college-level chemistry.

**ATOC 5152 (3) Advanced Atmospheric Chemistry**
Follows Graduate Atmospheric Chemistry (ATOC 5151) and explores advanced topics in atmospheric chemistry, such as secondary aerosol formation, oxidant formation, the chemistry of global climate change and/or design of advanced laboratory experiments.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 5152
**Recommended:** Prerequisite CHEM 5151 or ATOC 5151.
**Grading Basis:** Letter Grade

**ATOC 5200 (3) Biogeochemical Oceanography**
Provides a large-scale synthesis of the processes impacting ocean biogeochemistry. Transforms theoretical understanding into real-world applications using oceanographic data and models. Topics include: chemical composition, biological nutrient utilization and productivity, air-sea gas exchange, carbonate chemistry, ocean acidification, ocean deoxygenation, iron fertilization, biogeochemical climate feedbacks and more.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4200
**Requisites:** Restricted to graduate students only.

**ATOC 5215 (3) Descriptive Physical Oceanography**
Introduces descriptive and dynamical physical oceanography, focusing on the nature and dynamics of ocean currents and their role in the distribution of heat and other aspects of ocean physics related to the Earth's climate. Dynamical material limited to mathematical descriptions of oceanic physical systems.
**Requisites:** Restricted to graduate students only.

**ATOC 5235 (3) Introduction to Atmospheric Radiative Transfer and Remote Sensing**
Examines fundamentals of radiative transfer and remote sensing with primary emphasis on the Earth's atmosphere; emission, absorption and scattering by molecules and particles; multiple scattering; polarization; radiometry and photometry; principles of inversion theory; extinction- and emission-based passive remote sensing; principles of active remote sensing; lidar and radar; additional applications such as the greenhouse effect and Earth's radiative energy budget. ATOC graduate core course. Department enforced prerequisites: one year of calculus-based physics, and math up through differential equations.
**Requisites:** Restricted to graduate students only.

**ATOC 5300 (3) The Global Carbon Cycle**
Covers the role of the ocean, terrestrial biosphere, and atmosphere in the global carbon cycle. Specific topics include marine carbonate chemistry, biological production, terrestrial fluxes, anthropogenic emissions, and the evolution of the global carbon cycle in a changing climate.
**Requisites:** Restricted to graduate students only.

**ATOC 5400 (3) Introduction to Fluid Dynamics**
Covers equations of fluid motion relevant to planetary atmospheres and oceans and stellar atmospheres; effects of rotation and viscosity; and vorticity dynamics, boundary layers and wave motions. Introduces instability theory, nonlinear equilibration and computational methods in fluid dynamics. Department enforced prerequisite: partial differential equations or equivalent.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 5400 and PHYS 5400
**Requisites:** Restricted to graduate students only.

**ATOC 5500 (1-3) Special Topics in Atmospheric and Oceanic Sciences**
Acquaints students with current research in atmospheres, oceans, and climate. Topics may vary each semester. Students may register for more than one section of this course in the same semester. Formerly ATOC 7500.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ATOC 5540 (3) Mathematical Methods**
Applied mathematics course; provides necessary analytical background for courses in plasma physics,fluid dynamics, electromagnetism, and radiative transfer. Covers integration techniques, linear and nonlinear differential equations, WKB and Fourier transform methods, adiabatic invariants, partial differential equations, integral equations, and integrodifferential equations.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 5540
**Requisites:** Restricted to graduate students only.

**ATOC 5550 (3) Mountain Meteorology**
Investigating main processes that control weather and climate in the western United States and other mountain ranges around the world is the emphasis of this course. Provides an advanced survey of synoptic, mesoscale, and microscale meteorology in complex terrain including orographically modified cyclone evolution, front-mountain interactions, terrain and thermally driven flows, mountain waves, downslope winds, and orographic precipitation.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4550
**Requisites:** Restricted to graduate students only.

**ATOC 5560 (3) Radiative Processes in Planetary Atmospheres**
Application of radiative transfer theory to problems in planetary atmospheres, with primary emphasis on the Earth's atmosphere; principles of atomic and molecular spectroscopy; infrared band representation; absorption and emission of atmospheric gases; radiation flux and flux divergence computations; radiative transfer and fluid motions; additional applications such as the greenhouse effect, inversion methods and climate models. Department enforced prerequisite: ATOC 5235.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 5560
**Requisites:** Restricted to graduate students only.

**ATOC 5600 (3) Physics and Chemistry of Clouds and Aerosols**
Examines the physics and chemistry of clouds and aerosols in the planetary atmospheres, where they impact climate, atmospheric chemistry, remote sensing and weather. Applies basic microphysical, radiative and chemical processes affecting particles to issues in current literature. ATOC graduate core course.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite one semester of college-level chemistry and calculus-based physics and math up through differential equations.

**ATOC 5730 (3) Physical Oceanography and Climate**
Introduces the field of physical oceanography, with emphasis on the ocean's interaction with the global atmosphere. Analysis of the ocean's heat, salt, and momentum budgets, wind-driven and thermohaline circulations, climate cycles including El Nino, and the ocean's role in climate change. Theory complemented by state-of-the-art observations and models. Department recommended prerequisites: ATOC 1060 or ATOC 3070 or ATOC 3600 and one semester of calculus.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4730
**Requisites:** Restricted to graduate students only.

**ATOC 5740 (3) Dynamics of Past Climate Changes: Lessons for the Future**
Studies past changes in the Earth¿s climate and their application to predict future climate changes. Combines theoretical understanding of the climate system, computer models, and records of past changes from geological archives to understand drivers of past and future changes in climate. Emerging and inter-disciplinary area in climate research including paleoclimatology, climate theory, and modelling. Students work individually and in groups to formulate hypotheses that ca be tested using paleoclimate records and model simulations. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4740
**Recommended:** Prerequisites At least two of the following courses - ATOC 5050, ATOC 5051, ATOC 5060, ATOC 5300, ATOC 5730, ATOC 5870, GEOL 5060, GEOL 5305, GEOL 5430, or GEOL 5675.

**ATOC 5750 (3) Desert Meteorology and Climate**
Introduces students to the dynamic causes of deserts in the context of atmospheric processes and land-surface physics. Discusses desert severe weather, desert microclimates, human impacts and desertification, inter-annual variability in aridity (drought), the effects of deserts on global climate and the impact of desert climate on humans.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4750
**Requisites:** Restricted to graduate students only.

**ATOC 5770 (3) Wind Energy Meteorology**
Explores the complex interactions of the atmosphere and wind energy generation. Surveys wind turbine designs. Explores planetary boundary layer dynamics, traditional and novel wind measurement methods, forecasting methods, wind turbine and wind farm wakes, wind farm optimization, sound propagation from wind plants, climate change impacts on wind resources and the impacts of wind plants on local environments.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4770
**Requisites:** Restricted to graduate students only.

**ATOC 5780 (3) Ice Sheets and Climate**
Covers the role of ice sheets in the climate system over a range of time (millions of years ago to the long-term future) scales, and presents the interactions between ice sheets, the ocean, and the atmosphere. Students will be introduced to, and work with, observational and modeling methods and data that conceptualize ice sheet climate and related topics.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4780
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites Basic knowledge of calculus, algebra and programming experience (python, Matlab, or equivalent).

**ATOC 5815 (3) Scientific Programming, Data Analysis and Visualization Laboratory**
Teaches programming in python, as well as analysis skills for accessing, analyzing and visualizing data that are commonly used in the atmospheric and oceanic sciences. Basic data analysis includes curve fitting and re-gridding/aggregation of satellite observations or meteorological data for global climatologies. The course content is primarily conveyed through hands-on code development. A final project, involving the independent analysis and visualization of a scientific data set, integrates skills acquired throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4815
**Requisites:** Restricted to graduate students only.

**ATOC 5830 (3) Topics in Planetary Science**
Examines current topics in planetary science, based on recent discoveries, spacecraft observations and other developments. Focuses on a specific topic each time the course is offered, such as Mars, Venus, Galilean satellites, exobiology, comets or extrasolar planets. Department enforced prerequisite: restricted to graduate students in the physical sciences.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5830 and ASTR 5830
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ATOC 5835 (1) Seminar in Planetary Science**
Studies current research on a topic in planetary science. Students and faculty give presentations. Subjects may vary each semester. Department enforced prerequisite: senior level undergraduate physics.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 5835 and GEOL 5835
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ATOC 5850 (3) Numerical Methods Laboratory**
Teach students how to convert physical descriptions of the earth system into numerical models. Students will learn how to make assumptions to simplify complex systems, how to discretize and code mathematical equations so they can be solved on a computer, and how to assess if the results are reasonable. The course content is primarily conveyed through hands-on code development in python. A final project integrates skills acquired throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4850
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites ATOC 4815 or ATOC 5815, Calculus 1, Calculus 2, Differential Equations, Linear Algebra, and a basic knowledge of/interest in atmospheric, oceanic, climatic, or cryospheric physics.

**ATOC 5860 (3) Objective Data Analysis Laboratory**
Teaches the extraction of information from data using statistical methods via a computer program. The goals of this course are: 1) to learn and apply tools to objectively analyze atmospheric and oceanic data, 2) to critically evaluate research using these tools. The course covers hypothesis testing, compositing, regression, principal component analysis, time series analysis, filtering, and data assimilation. This ¿learning-by-doing¿ course is aimed at advanced graduate students conducting ATOC-related research.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ATOC 4810 or 5810, and familiarity with linear algebra, basic calculus, github and jupyter.

**ATOC 5870 (3) Climate Modeling Laboratory**
Climate models solve equations describing the earth system. This course provides an overview of climate modeling. Standard climate model approaches and experiments are presented, and then used in companion exercises. This course will provide students with real-world experience running a climate model used internationally for climate science and policy.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4870
**Requisites:** Restricted to graduate students only.

**ATOC 5875 (3) Weather Modeling Laboratory**
In this laboratory course, students simulate the atmosphere using a numerical weather prediction model (WRF) and explore the physical and numerical basis of the system of equations that underpin numerical weather prediction models. In addition to developing technical skills with WRF and visualizing its output with python, students explore applications of numerical modeling of the atmosphere, such as land-sea breezes, hurricanes, mesoscale convective systems, and the daily cycle of the boundary layer. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4875
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite Experience with computer science and data visualization and some experience with Unix/Linux is recommended.

**ATOC 5880 (3) Mesoscale Meteorology**
Provides a comprehensive study of the structure, evolution, and dynamics of atmospheric phenomena on the mesoscale, which have horizontal scales ranging from a few to several hundred kilometers. Topics include land/sea breezes, horizontal convective rolls, drylines, deep convective storms, outflow boundaries, tornadoes, mesoscale convective systems, terrain induced airflows, mountain waves and the mesoscale aspects of extratropical cyclones. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4880
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites One year of Calculus, one year of Physics with Calculus, and at least one fundamental ATOC course.

**ATOC 5890 (3) Synoptic Dynamic Meteorology**
Weather conditions at middle latitudes are characterized by complex interactions between air masses, fronts, cyclones, and anticyclones. These interactions are governed by a set of elegant mathematical equations that describe the behavior of the atmosphere. Students will manipulate and apply these equations in real time in order to diagnose the development and evolution of a variety of synoptic-scale weather systems, including fronts, jet streams, and extratropical cyclones. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4890
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ATOC 3050, ATOC 4720, one year of Calculus, and one semester of Physics with Calculus.

**ATOC 5900 (1-6) Independent Study**
Students may register for more than one section of this course in the same semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ATOC 5930 (1-3) Internship**
This course is designed to offer ATOC graduate students with the opportunity to work hands-on in the community and to gain practical knowledge and experience in both research and industry. Participation in the program requires both on-site and academic work.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite Minimum of 3.00 cumulative GPA.

**ATOC 6020 (1) Seminar in Atmospheric and Oceanic Sciences**
Studies an area of current research in the atmospheric and oceanic sciences. Students read selected papers from the literature. Students and faculty give presentations and participate in discussions. May be repeated for a total of 6 credit hours within the degree. May be repeated for a total of 3 credit hours within a semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ATOC 6100 (3) Modeling Weather and Climate**
Discusses background theory and procedures used for modeling climate on a variety of space and time scales. Includes numerical simulation of weather and climate with models in a hierarchy of complexity, assessments of error growth, prediction of circulations and impact of radiative and other influences. Explores various numerical methods, develops core computing skills and considers data handling and visualization. Consists of a combination of lectures and laboratory.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ATOC 5050 or calculus.

**ATOC 6700 (1) Weather Forecasting and Discussion**
Explores the techniques used to make short-term weather forecasts in the mid-latitudes using real-time weather observations, numerical forecast model output and conceptual models of mid-latitude weather phenomena. Students will be required to develop and defend conceptual models of the short-term evolution of the weather and will conduct detailed post-forecast analysis of successful and unsuccessful forecasts.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ATOC 5050.

**ATOC 6800 (3) Scientific Writing**
Writing is the core of how we communicate our scientific findings. Successful science writing tells a compelling story and makes it easy for the reader to understand our results and their implications. In this hand-on class, student use their own research results to work on developing scientific writing skills that will increase the impact of their papers as well as make writing more enjoyable by learning how to approach the writing and editing process. Department enforced requisite: Students need to have their own research results first and at least one main conclusion from it in order to take this class.
**Requisites:** Restricted to graduate students only.

**ATOC 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ATOC 6950 (1-6) Master's Thesis**
**Requisites:** Restricted to graduate students only.

**ATOC 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Requisites:** Restricted to graduate students only.

# Baker Residential Academic Program (BAKR)

## Courses

**BAKR 1500 (3) Colorado: History, Ecology, and Environment**
Studies the Colorado environment from multiple aspects of history and ecology. Presents historical events in their environmental context and examines lingering environmental consequences. Presents major habitats within Colorado and relates their historical and present uses. Lecture and field trips.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**BAKR 1600 (3) Creating a Sustainable Future**
Explores opportunities for moving toward a sustainable 21st century U.S. society. Evaluates socio-economic institutions, values and forces in late 20th century U.S. society that are unsustainable, given 21st century environmental, economic and social challenges. Contemplates societal progress from reflective perspectives and leading visionaries, including CU-generated documents. Explores actions you can adopt now that empower you to live a more sustainable lifestyle.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences

**BAKR 1800 (3) Exploring Opportunities in the Natural and Environmental Sciences**
Engaging students to explore and discover exciting internships, careers, and research opportunities in fields associated with natural science and environmental studies. The class will include seminars, lectures, student presentations, and the exploration of places like the Denver Zoo, natural science museums (Denver and CU campus), Mountain Research Station, Campus Greenhouse, Butterfly Pavillion and Rocky Mountain National Park.

# BCOR Applied Semester Experience (BASE)

## Courses

**BASE 2104 (6) BCOR Applied Semester Experience**
Focuses on major business decisions integrating across business functional areas. Students complete multiple business projects drawing on knowledge and tools from previous BCOR courses.
**Requisites:** Requires prereq or coreq of BCOR 1030. Requires prereq of BCOR 2201, BCOR 2202, BCOR 2203, BCOR 2204, BCOR 2205 BCOR 2206 (all min grade D-). Requires prereq or coreq of BCOR 2301, 2302, 2303, 2304. Restricted to BUSN majors with 26-180 units complete
**Grading Basis:** Letter Grade

# Biochemistry (BCHM)

## Courses

**BCHM 1020 (1) A Path to Success: Introduction to the Biochemistry Major**
This course will help students navigate their first year of college and develop the skills needed for academic success as Biochemistry majors. Students will improve academic strategies (i.e. time management, problem-solving and study skills), identify available campus resources, learn how to get involved in clubs and gain research experience, and explore career opportunities as a biochemistry graduate. This is a first-year elective course specifically designed for first year and other students exploring their educational and career opportunities.
**Recommended:** New BCHM majors.

**BCHM 1041 (3) Biotechnology and Society**
Covers recent advances in biotechnology and how those impact society. Content and discussion will focus on both the science behind technological advances, their impact on society, and the ethical issues raised by new technologies. Topics change each semester but can include: GMO crops, genome editing, drug discovery and development, stem cell therapies, development and use of new cancer treatments, human genome sequencing and its impact on diagnosis and treatments, human microbiome, neurodegenerative diseases. Formerly CHEM 1041.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 1701 (1) Biochemistry Program for Research Exploration and Planning**
Biochem PREP is focused on developing first and second year student interest and engagement in undergraduate research. The program is designed to present participants with mentorship and opportunities to identify whether research is an opportunity students wish to participate in, and if so, get students connected to potential research opportunities. Participants will be provided with a cohort of their peers to explore and plan for research together through preparation workshops, research information sessions, and mentorship. The ultimate goal of the program is for participants to understand their research interests, possess the necessary skills to identify and obtain a research opportunity, and develop community with their peers and the Department of Biochemistry at large.
**Requisites:** Restricted to Biochemistry (BCHM) majors and minors only.

**BCHM 2700 (4) Foundations of Biochemistry**
Covers chemistry of aqueous solutions; energetics in biology; structure of proteins, nucleic acids, carbohydrates, and membranes; protein evolution; macromolecular interactions; enzyme kinetics, mechanism and regulation. Will be taught from a strong chemical perspective and mastery of basic concepts of general and organic chemistry will be required. Familiarity with basic concepts of molecular and cellular biology encouraged.
**Requisites:** Requires prerequisite course of CHEM 3311 or CHEM 3451 (minimum grade C-). Restricted to Biochemistry (BCHM) majors and minors only.

**BCHM 3100 (2) Engineering RNA Aptamers**
Provides laboratory experience working on an RNA sensor research project. Students will generate libraries of RNA aptamers and select and isolate aptamers that bind a novel ligand of interest. Topics covered include principles of RNA molecular recognition, polymerase chain reaction and molecular cloning, bacterial transformation, fluorescence reporter assays and high throughput screening.
**Requisites:** Requires prerequisite or corequisite course of BCHM 2700 or BCHM 4611 (minimum grade C-).

**BCHM 3110 (1) Literature-based Co-seminar for BCHM 3100 CURE Laboratory Course**
This course involves reading and discussion of primary literature. Each week students will read a scientific research article, and engage in a class discussion about the significance and impact, the scientific merits, the underlying premise of the research question and experimental plan, and whether data support conclusions of the paper. Papers will be focused on RNA structure and function, RNA molecular recognition, RNA aptamers, RNA engineering, RNA as a drug target, and fluorescent probes for RNA. Students will be responsible for reading each paper, one student will prepare a powerpoint and lead a class discussion each week, and all students are expected to participate in the discussion.
**Requisites:** Requires corequisite course of BCHM 3100. Requires prerequisite or corequisite course of BCHM 2700 or BCHM 4611 (minimum grade C-).

**BCHM 3300 (3) Genetic Engineering: Science, Technology, and Society**
This course explores the frontiers of genetic engineering, starting with a brief historical perspective and moving forward through time to current and future technologies. Students will learn how CRISPR-Cas and other gene editing methodologies are used to engineer proteins, bacteria, viruses, fungi, plants, animals, and humans. The course includes critical analysis of social, environmental, and economic implications of genetic engineering, including discussions on bioethics, regulatory frameworks, and sustainability. Students will gain a nuanced understanding of how this technology shapes our world and will emerge prepared to engage in the ongoing dialogue about its impact on society and our environment.
**Requisites:** Prerequisite course of: MCDB 2150, MCDB 2222, or EBIO 2070 (minimum grade C-).

**BCHM 3400 (3) Mechanisms of Cancer**
This course is devoted to the mechanisms that drive cancer, with an emphasis on how the biochemistry of normal cells teaches us how regulation goes awry in cancer cells. The course will include an analysis of historical and current developments in cancer biology. Topics covered: principles of transformation, viral and cellular oncogenes, tumor suppressor genes, signal transduction, cell cycle, cell death, DNA damage and repair, cancer genetics, cancer genomics, cancer risk factors, carcinogens, chemotherapies, targeted therapies, drug resistance, modern technologies in cancer research.
**Requisites:** Requires prerequisite course of MCDB 2150 or MCDB 2222 or EBIO 2070 or BCHM 4740 (all minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 3450 (3) Principles of Pharmacology and Toxicology**
This is an introductory course presenting the fundamentals of Pharmacology and Toxicology. This course will be divided into four sections. Section I introduces the mechanisms of drug action, their cellular targets, their absorption and distribution, and elimination pharmacokinetics. Section II will discuss the interaction of drugs with physiological systems via the role of chemical mediators and how this affects major organ systems. This will introduce broad principles of pharmacology, pharmacokinetics, pharmacodynamics, toxicology, membrane transporters, metabolism, cell signaling, and an introduction to pharmacogenetics. Section III will focus on specific cases of drugs used for the treatment of cancer, antibacterials, and antifungals. Section IV will discuss the harmful nature of drugs, their use in lifestyle and in sports.
**Requisites:** Requires prerequisite course of CHEM 1133 or CHEM 1400 (minimum grade C-).
**Grading Basis:** Letter Grade

**BCHM 3491 (4) Organic Chemistry 2 for Biochemistry Majors**
Covers amines, alkylation reactions, additions to unsaturated C-C bonds, aromaticity and aromatic reactivity, organic materials, biomolecules, nomenclature of organic compounds, reaction mechanism. Department enforced corerquisite: CHEM 3341 or CHEM 3381. Formerly CHEM 3491.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 3471 and CHEM 3331
**Requisites:** Requires prerequisite courses of CHEM 3451 and CHEM 3321 or CHEM 3361 (all minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 4312 (3) Quantitative Optical Imaging**
Explores the fundamentals of optical imaging in biology, especially molecular and cellular biology. Covered topics include an introduction to optics and microscopes, fluorescence microscopy and image analysis, and biological applications. MATLAB will be taught at the beginning of the course and used throughout for image processing. Prior experience with MATLAB (or Python) is highly recommended but not required.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4312, MCDB 5312 and BCHM 5312
**Grading Basis:** Letter Grade

**BCHM 4400 (4) Core Concepts in Physical Chemistry for Biochemists**
Introduces thermodynamics, kinetics and spectroscopy, emphasizing macromolecule and biochemical applications. Includes thermodynamics, chemical and physical equilibriums, solution chemistry, rates of chemical and biochemical reactions, chemical bonds and principles and selected examples of spectroscopies applied to biological systems. Department enforced prerequisite or corequisite: PHYS 1120 or PHYS 2020. Formerly CHEM 4411.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 5400 CHEM 4511
**Requisites:** Requires prerequisite courses BCHM 2700 or BCHM 4611 and PHYS 1110 or PHYS 2010 and MATH 2300 or APPM 1360 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 4491 (3) Modern Biophysical Methods**
Covers the basic theory of biophysical methods widely employed in biochemistry and biology, including: electrophoresis, mass spec, calorimetry, evanescent waves, plasmon resonance, Xray diffraction, absorbance and fluorescence spectroscopy, magnetic resonance, electron and optical microscopy and single molecule methods. Discusses ways to maximize rigor and reproducibility in biophysical studies. Department enforced prerequisites: undergraduate chemistry (general, organic physical); physics; calculus. Formerly CHEM 4491.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 5491
**Requisites:** Requires prerequisite courses of PHYS 1110 or PHYS 2010 and MATH 2300 or APPM 1360 and BCHM 2700 or BCHM 4611 (all minimum grade C-).
**Recommended:** Prerequisite or corequisite BCHM 4400 or CHEM 4531.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 4611 (3) Principles of Biochemistry**
One-semester overview of the main themes of modern biochemistry: biomolecular structure/function, metabolism, biosynthesis, DNA from genome to proteome and cellular signaling. For biology and engineering majors and others wanting an overview of biochemistry. Formerly CHEM 4611.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 5611
**Requisites:** Requires prerequisite course of CHEM 3311 or CHEM 3451 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 4631 (3) Computational Genomics Lab**
Designed as an inquiry based computational genomics laboratory course. Students will learn fundamental principles of BASH, R, NEXTFLOW, GIT and more by applying these skills to publicly available genomic data. The course aims to mimic a real world genomics research project. Overall this course aims to provide students with key skills needed for future research and career opportunities.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 4720 (4) Metabolic Pathways and Human Disease**
Covers energy metabolism and anabolic/catabolic pathways; metabolism of carbohydrates, lipids, amino acids, and nucleic acids; photosynthesis; special topics on human diseases with pathologies and metabolic pathways. Formerly CHEM 4720.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 5720
**Requisites:** Requires prerequisite courses of BCHM 2700 and CHEM 3331 or CHEM 3471 or BCHM 3491 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 4740 (4) Biochemistry of Gene Transmission, Expression and Regulation**
Covers biosynthesis and function of macromolecules including DNA, RNA and proteins; molecular basis of replication, transcription and translation; biochemistry of subcellular systems; signaling and regulation of gene expression in eukaryotes; and special topics. Formerly CHEM 4740.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 5740
**Requisites:** Requires a prerequisite course of BCHM 2700 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 4751 (3) Current Topics in Biochemical Research**
Lec. Covers current topics in modern biochemical research through lectures, reading recent research articles, critical thinking and class discussion. Topics include protein and nucleic acid structure and function, biomolecular interactions, enzyme function and cellular signaling and regulation. Formerly CHEM 4751.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 5751
**Requisites:** Requires prerequisite courses of MCDB 3135 or BCHM 4700 or BCHM 2700 and BCHM 4740 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 4761 (3) Biochemistry Laboratory**
Two 4-hour periods per week. Introduction to modern biochemical techniques. Topics include enzymology, spectrophotometry, electrophoresis, multi-step protein purification, recombinant DNA techniques and molecular cloning. Formerly CHEM 4761.
**Requisites:** Requires prerequisite courses of BCHM 2700 or CHEM 4700 and CHEM 3341 or 3381 (all minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**BCHM 4850 (3) Therapeutic and Diagnostic Nucleic Acids**
A comprehensive course in topics of the application of nucleic acids to the advancement of human health. Topics will include an introduction to the basic principles of pharmacology and drug development, action of small molecule therapeutics based upon nucleosides and nucleotides, antisense oligonucleotides and emerging CRISPR-based therapeutics, gene therapy, application of nucleic acids in commonly used diagnostics and emerging applications of nucleic acids.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 5850
**Requisites:** Requires prerequisite course of BCHM 2700 or BCHM 4611 (minimum grade C-).
**Grading Basis:** Letter Grade

**BCHM 4901 (1-6) Independent Study in Biochemistry**
For undergraduate study. Department consent required.
**Repeatable:** Repeatable for up to 8.00 total credit hours.

**BCHM 4906 (1-3) Internship in Biochemistry**
Provides an opportunity for Biochemistry majors to gain real world experience by performing research in a company or institute outside of the CU Boulder academic environment. May be repeated for 6 total credit hours.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Biochemistry (BCHM) majors only.

**BCHM 5312 (3) Quantitative Optical Imaging**
Explores the fundamentals of optical imaging in biology, especially molecular and cellular biology. Covered topics include an introduction to optics and microscopes, fluorescence microscopy and image analysis, and biological applications. MATLAB will be taught at the beginning of the course and used throughout for image processing. Prior experience with MATLAB (or Python) is highly recommended but not required.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5312, MCDB 4312 and BCHM 4312
**Grading Basis:** Letter Grade

**BCHM 5341 (3) Chemical Biology and Drug Design**
Develop knowledge base and skills in the interdisciplinary field of chemical biology, including aspects of chemistry and biology, and integrating both with respect to hierarchical levels of structure (atomic, molecular, cellular). Students will receive training that helps to develop their careers in biotech, pharmaceutical and other research-oriented industries as well as in academia. Department enforced prerequisites: introductory organic chemistry and general biochemistry. Formerly CHEM 5341.
**Requisites:** Restricted to graduate students only.

**BCHM 5400 (4) Core Concepts in Physical Chemistry for Biochemists**
Introduces thermodynamics, kinetics and spectroscopy, emphasizing macromolecule and biochemical applications. Includes thermodynamics, chemical and physical equilibriums, solution chemistry, rates of chemical and biochemical reactions, chemical bonds and principles and selected examples of spectroscopies applied to biological systems. Formerly CHEM 5400.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 4400
CHEM 4511
**Requisites:** Restricted to graduate students only.

**BCHM 5491 (3) Modern Biophysical Methods**
Covers the basic theory of biophysical methods widely employed in biochemistry and biology, including: electrophoresis, mass spec, calorimetry, evanescent waves, plasmon resonance, Xray diffraction, absorbance and fluorescence spectroscopy, magnetic resonance, electron and optical microscopy and single molecule methods. Discusses ways to maximize rigor and reproducibility in biophysical studies. Department enforced prerequisites: undergraduate chemistry (general, organic, physical), biochemistry, physics, calculus.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 4491
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**BCHM 5611 (3) Principles of Biochemistry**
One-semester overview of the main themes of modern biochemistry: biomolecular structure/function, metabolism, biosynthesis, DNA from genome to proteome and cellular signaling. For biology and engineering majors and others wanting an overview of biochemistry.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 4611
**Requisites:** Restricted to graduate students only.

**BCHM 5631 (3) Computational Genomics Lab**
Designed as an inquiry based computational genomics laboratory course. Students will learn fundamental principles of BASH, R, NEXTFLOW, GIT and more by applying these skills to publicly available genomic data. The course aims to mimic a real world genomics research project. Overall this course aims to provide students with key skills needed for future research and career opportunities.
**Requisites:** Restricted to graduate students only.

**BCHM 5661 (3) Advances in Molecular Biophysics**
Discuss recent literature concerning biophysical studies of macromolecular structure and mechanism, including DNA, RNA, proteins, and their interactions.
**Recommended:** Prerequisites one year of physical chemistry or quantum mechanics, one year of biology, graduate standing, or instructor consent.

**BCHM 5720 (4) Metabolic Pathways and Human Disease**
Covers energy metabolism and anabolic/catabolic pathways; metabolism of carbohydrates, lipids, amino acids, and nucleic acids; photosynthesis; special topics on human diseases with pathologies and metabolic pathways. Formerly CHEM 5720.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 4720
**Requisites:** Restricted to graduate students only.

**BCHM 5740 (4) Biochemistry of Gene Transmission, Expression and Regulation**
Covers biosynthesis and function of macromolecules including DNA, RNA and proteins; molecular basis of replication, transcription and translation; biochemistry of subcellular systems; signaling and regulation of gene expression in eukaryotes; and special topics. Formerly CHEM 5740.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 4740
**Requisites:** Restricted to graduate students only.

**BCHM 5751 (3) Current Topics in Biochemical Research**
Lec. Covers current topics in modern biochemical research through lectures, reading recent research articles, critical thinking and class discussion. Topics include protein and nucleic acid structure and function, biomolecular interactions, enzyme function and cellular signaling and regulation. Department consent required. Formerly CHEM 5751.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 4751
**Requisites:** Restricted to graduate students only.

**BCHM 5770 (3) Fundamentals of Biochemistry I**
Introduction to conducting research in Biochemistry, including covering foundational topics in Biochemistry that include concepts such as protein structure and function, experimental approaches to study biochemical processes, and analysis and interpretation of data. Topics will be taught through the perspective of the scientific literature with an emphasis on critical analysis of research. Additional subject areas will include discussions of aspects of conducting biochemical research in academic and industrial settings. Intended for entering Biochemistry graduate students. Formerly CHEM 5770.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**BCHM 5771 (5) Advanced General Biochemistry 1**
Lect. In-depth analysis of DNA structure and replication, RNA synthesis and processing, protein synthesis, enzyme function and mechanism, protein structure, protein dynamics, and physical chemistry of macromolecules. Intended as a comprehensive treatment of areas central to modern biochemistry for entering graduate students. Formerly CHEM 5771.

**BCHM 5772 (1) Quantitative Reasoning in Biochemistry**
An introduction to quantitative reasoning used by Biochemists. Intended for entering Biochemistry graduate students.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**BCHM 5774 (1) Introduction to your Biochemistry PhD**
This course provides an introduction to various aspects of the Biochemistry Ph.D. program. Students will be introduced to various research programs conducted by Biochemistry faculty in preparation to choose a Ph.D. dissertation research laboratory and mentor. Various topics related to successful navigation of the graduate program and career pathways after graduation will be discussed.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**BCHM 5776 (1) Scientific Ethics and Responsible Conduct in Research**
Lect. Advanced discussion of topics in scientific ethics, including requirements for responsible conduct of research, case histories of fraud, research misconduct, ethical misconduct and development of professional values and ethical standards.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5776
**Requisites:** Requires prerequisite course of BCHM 5771 or CHEM 5271 (minimum grade B-). Restricted to graduate students only.

**BCHM 5780 (3) Fundamentals of Biochemistry II**
Analysis of topics in biochemistry including protein structure, methods of structure determination and prediction, protein folding, and protein dynamics. Intended as a comprehensive treatment of areas central to modern biochemistry for entering graduate students. Lectures concurrent with CHEM 5781, covering the same topics except for the requirement of a written research proposal. Formerly CHEM 5780.
**Requisites:** Requires prerequisite course of BCHM 5770 (minimum grade B-). Restricted to graduate students only.

**BCHM 5781 (5) Advanced General Biochemistry 2**
Detailed consideration of contemporary topics in biochemistry. Formerly CHEM 5781.
**Requisites:** Requires prerequisite course of BCHM 5770 or BCHM 5771 (minimum grade B-). Restricted to graduate students only.
**Grading Basis:** Letter Grade

**BCHM 5801 (3) Advanced Signal Transduction and Cell Cycle Regulation**
Lect. Advanced discussion of current research and literature in signal transduction, including ligands, receptors, and intracellular signaling pathways, as well as control on transcription, chromatin structure, DNA replication, mitosis, and cell cycle progression. Formerly CHEM 5801.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CHEM 5771 and CHEM 5781 and MCDB 5210 or MCDB 5220.

**BCHM 5811 (3) Advanced Methods in Protein Sequencing and Analysis**
Lect. Advanced discussion of current methods in protein sequencing, sequence analysis, and posttranslational modifications, emphasizing techniques of mass spectrometry, use of protein databases, sequence alignment and motifs, structure prediction, and modeling of signaling pathways. Department consent required. Formerly CHEM 5811.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CHEM 5771 and CHEM 5781 and MCDB 5210.

**BCHM 5821 (1) Special Topics in Signaling and Cell Regulation**
Lect. Reviews and evaluates literature on subjects of current interest in signal transduction transcription, cell cycle progression, and cell regulation. Primarily for graduate level presentation of special topics by students, faculty, and research staff. Department consent required. Formerly CHEM 5821.
**Repeatable:** Repeatable for up to 5.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 5830 (1) Scientific Communication in Biochemistry**
This course focuses on the development and writing of NIH- and NSF-style grant proposals in the field of Biochemistry and the oral communication of scientific ideas and results before fellow scientists.
**Requisites:** Requires prerequisite courses of BCHM 5770 and BCHM 5772 and BCHM 5781 (all minimum grade C-). Restricted to graduate students only.
**Grading Basis:** Letter Grade

**BCHM 5850 (3) Therapeutic and Diagnostic Nucleic Acids**
A comprehensive course in topics of the application of nucleic acids to the advancement of human health. Topics will include an introduction to the basic principles of pharmacology and drug development, action of small molecule therapeutics based upon nucleosides and nucleotides, antisense oligonucleotides and emerging CRISPR-based therapeutics, gene therapy, application of nucleic acids in commonly used diagnostics and emerging applications of nucleic acids.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 4850
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**BCHM 6601 (1) Biophysics Seminar**
Restricted to and required for all currently funded NIH/CU Biophysics trainees and current NIH/CU Biophysics affiliates. Credit is deferred until presentation of satisfactory seminar. Formerly CHEM 6601.
**Requisites:** Restricted to graduate students only.

**BCHM 6711 (3-6) Advanced Topics in Biochemistry**
Detailed study of current literature relative to one main topic is undertaken each semester. Topics covered on a rotating basis include enzyme kinetics and mechanisms; lipids and lipoproteins; chemistry and enzymology of nucleic acids; biochemistry of nucleic acids in eukaryotic cells; protein chemistry. Presentations include faculty lectures and student reports. Department enforced prerequisite: one year of biochemistry courses. Department consent required. Formerly CHEM 6711.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 6731 (3-6) Advanced Topics in Biochemistry**
Detailed study of current literature relative to one main topic is undertaken each semester. Topics covered on a rotating basis include enzyme kinetics and mechanisms; lipids and lipoproteins; chemistry and enzymology of nucleic acids; biochemistry of nucleic acids in eukaryotic cells; protein chemistry. Presentations include faculty lectures and student reports. Department enforced prerequisite: one year of biochemistry courses. Department consent required. Formerly CHEM 6731.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 6901 (1-6) Research in Biochemistry**
**Repeatable:** Repeatable for up to 15.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 6941 (1) Master's Candidate for Degree**
Students are not admitted for the master's degree but may be transferred to the MS plan if they are unable to meet the demands of the PhD program.
**Requisites:** Restricted to graduate students only.

**BCHM 6951 (1-6) Master's Thesis**
Students are not admitted for the master's degree but may be transferred to the MS plan if they are unable to meet the demands of the PhD program.
**Requisites:** Restricted to graduate students only.

**BCHM 7601 (2) Seminar: Nucleic Acid Chemistry**
Topics in various aspects of current research; emphasizes student readings and presentations. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 7611 (1) Seminar: Structures and Dynamics of Biopolymers in Solution**
Discussion of experimental and theoretical approaches for probing structures and dynamics of proteins, peptides, and nucleic acids; and computations in molecular dynamics simulation, modeling, and geometry. Department consent required. Formerly CHEM 7611.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 7621 (1) Seminar: Biochemistry and Molecular Biology of Signal Transduction**
Discusses and reviews the current literature and experimental results in signal transduction, cell cycle and tumor suppressor gene regulation. Emphasizes the understandings of molecular and biochemical mechanisms of the origin of human tumor cells. Formerly CHEM 7621.
**Requisites:** Restricted to graduate students only.

**BCHM 7651 (2) Seminar: Environmental Biochemistry**
Topics in various aspects of current biochemical and environmental research. Department consent required. Formerly CHEM 7651.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 7661 (1) Structure/Function of Human Mediator Transcription Complexes**
Study of the mechanisms of eukaryotic gene expression with an emphasis on the structure and function of human mediator transcription complexes. Formerly CHEM 7661.
**Requisites:** Restricted to graduate students only.

**BCHM 7671 (1) Seminar: Topics in Designing Probes for Signaling Reactions**
Discussion of advances and developments in biomolecular dynamics, with emphasis on experimental studies via ultrafast laser spectroscopy. The connection of protein dynamics with function will also be considered. Formerly CHEM 7671.
**Requisites:** Restricted to graduate students only.

**BCHM 7691 (1) Seminar: Protein Dynamics and the Mechanism of Sensory Proteins**
Discusses recent results and current literature in the areas of the mechanism of sensory proteins, internal motions of proteins, and protein folding. Department consent required. Formerly CHEM 7691.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 7701 (1) Seminar: Enzyme Mechanisms and Kinetics**
Studies experimental approaches to understand the mechanisms of enzymic catalysis. Techniques include steady-state and pre-steady-state kinetics, isotope trapping and partitioning, inhibition by substrate analogues, and covalent modification of proteins. Department consent required. Formerly CHEM 7701.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 7711 (1) RNA Mediated Inorganic and Organic Reactions**
Discussion of advances and developments in biomolecular dynamics, with emphasis on experimentalstudies via ultrafast laser spectroscopy. The connection of protein dynamics with function will also be considered. Formerly CHEM 7711.
**Requisites:** Restricted to graduate students only.

**BCHM 7741 (1) Seminar: Signal Transduction and Protein Phosphorylation**
Devoted to experimental methods for understanding mechanisms of signal transduction in mammalian cells through pathways involving regulation of protein phosphorylation. Department consent required. Formerly CHEM 7741.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 7751 (1) Seminar: Protein Structure and Folding**
Studies structure and folding of proteins and protein complexes using biophysical methods, including nuclear magnetic resonance (NMR), circular dichroism, and fluorescence spectroscopies. Department consent required. Formerly CHEM 7751.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 7761 (1) Seminar: Eukaryotic Transcriptional Regulation**
Studies the regulation of transcription by RNA Polymerase II from human promoters. Department consent required. Formerly CHEM 7761.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BCHM 7781 (1) Seminar: Topics in Structural Biology**
Discussion of advances and developments in structural biology with emphasis on new methods for protein expression, purification and crystallization; and structure solution implementation. Formerly CHEM 7781.
**Requisites:** Restricted to graduate students only.

**BCHM 7791 (1) Seminar: Topics in Ribonucleoprotein Assemblies**
Studies aspects of the biochemical and structural analysis of ribonucleic acid (RNA) and its interactions with proteins and assemblies into functional ribonucleoprotein (RNP) enzymes. Techniques focus on x-ray crystallography, spectroscopic methods, and biochemical probing. Formerly CHEM 7791.
**Requisites:** Restricted to graduate students only.

**BCHM 8991 (1-10) Doctoral Dissertation**
All doctoral students must register for 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.

# Biological Engineering (BIEN)

**BIEN 2810 (3) Biology for Engineers**
Develops a basic understanding of the science of biology, including an introduction to the disciplines of biochemistry, cell organization, metabolism, genetics, genomics, molecular biology, recombinant DNA technology and evolution. Provides a basic introduction to several key techniques used in biological engineering laboratories. Uses examples of complex and creative structures engineered by natural processes. Formerly CHEN 2820.
**Requisites:** Requires prereq or coreq course of CHEN 1201 or CHEN 1211 or CHEM 1113 or MCEN 1024 (minimum grade C-). Restricted to College of Engineering (ENGRU) undergraduates and IUT On Track applicants only.

**BIEN 2840 (1-4) Independent Study**
Available to sophomores with approval of Department of Chemical and Biological Engineering. Subject arranged to fit needs of student.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**BIEN 3800 (3) Fundamentals of Biotechnology**
Surveys the five areas of modern biotechnology (human, industrial, agricultural, animal, environmental), highlighting engineering principles in biology in all five areas. Delves into how biology is used to create useful materials and medicines. Imparts a working knowledge of synthetic DNA technology, including recombinant DNA, genome editing, DNA synthesis, and DNA sequencing.
**Requisites:** Requires prerequisite courses of BIEN 2810 or MCDB 1150 or EBIO 1220 and APPM 1350 or MATH 1300 and CHEN 1201 or CHEN 1211 or CHEM 1113 or MCEN 1024 (all minimum grade C-).

**BIEN 3840 (1-4) Independent Study**
Available to juniors with approval of the Department of Chemical and Biological Engineering. Subject arranged to fit needs of the student.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**BIEN 4010 (2) Biological Engineering Senior Thesis 1**
Provides an opportunity for advanced students to conduct exploratory research in biological engineering.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**BIEN 4020 (2) Biological Engineering Senior Thesis 2**
Continuation of BIEN 4010.
**Requisites:** Requires prerequisite course of BIEN 4010 (minimum grade C-). Restricted to College of Engineering students only.

**BIEN 4520 (3) Biological Process and Product Design**
Provides a team-based capstone design experience for biological engineering students. The design synthesis activities, the considerations of numerous options, and the practical application of the fundamentals all need to be integrated from first year courses through to this senior design course. The sequence provides a culmination for all previous chemical and biological engineering courses (transport processes, thermodynamics, reaction kinetics, unit operations, etc.). Students are expected to know the basics of fluids, heat transfer, bioseparations, and reactor engineering (kinetics). In BIEN 4520, students will be exposed to design of equipment used for separations and reactions. Students will be taught how to select process units and interconnect them in an overall process flowsheet with the primary goal being to find the optimal design conditions for the best possible design scenario among various conceptualized alternatives. With the exception of cost estimation, process economics, heat integration, se
**Requisites:** Requires prerequisite courses of CHEN 3010 and BIEN 4820 and BIEN 4830 and BIEN 3800 or MCDB 2150 (all minimum grade C-). Restricted to College of Engineering majors only.

**BIEN 4530 (2) Biological Engineering Design Project**
This is the 2nd course in the team-based capstone biodesign sequence of classes. Projects are sponsored by industry and student design teams collaborate with industrial consultants. Projects consider biological process and product design with emphasis on economic analysis. Deliverables include an oral mid-project design review, a final oral presentation and a final written design report.
**Requisites:** Requires prerequisite course of BIEN 4520 (minimum grade C-). Restricted to College of Engineering majors only.

**BIEN 4801 (3) Pharmaceutical Biotechnology**
Focuses on the engineering needed to bring therapeutic products derived from living organisms (e.g., proteins, peptides, DNA, RNA) from the production plant to the patient. Covers the challenges of keeping these products "active" as they are stored, shipped, and administered to patients. Formerly CHEN 4801.
**Requisites:** Requires prerequisite courses of CHEN 3320 and prerequisite or corequisite courses of BIEN 4830 or CHEN 4330 (all minimum grade C-). Restricted to College of Engineering majors only.

**BIEN 4802 (3) Tissue Engineering and Biofabrication**
Tissue engineering demonstrates enormous potential for improving human health and the field of biofabrication has advanced our ability to position cells and materials into 3D configurations for the engineering of new tissues. This course explores principles of tissue engineering and biofabrication, drawing upon diverse fields such as cell biology, material science, and chemical and biological engineering. Current and developing methods of tissue engineering, as well as specific applications will be discussed in the context of these principles. The course will involve review of current literature within this developing field, as well as focus on translational concepts of tissue engineering. Formerly known as CHEN 4802.
**Equivalent - Duplicate Degree Credit Not Granted:** BIEN 5802
**Requisites:** Requires prerequisite course of BIEN 2810 or MCDB 1150 or EBIO 1210 and EBIO 1220 and prerequisite or corequisite of BIEN 4520 or CHEN 4520 or BMEN 4010 (minimum grade C-). Restricted to College of Engineering students only.

**BIEN 4803 (3) Metabolic Engineering**
Introduces basic concepts in metabolic engineering and explores modern approaches in metabolic and strain engineering. Application areas that will be discussed will include the use of metabolic engineering approaches in biofuels and biorefining as well as biopharmaceutical production. Formerly CHEN 4803.
**Equivalent - Duplicate Degree Credit Not Granted:** BIEN 5803
**Requisites:** Requires prerequisite course of BCHM 4611 (minimum grade C-). Restricted to College of Engineering majors only.

**BIEN 4804 (3) Protein and Enzyme Engineering**
This course reviews various applications of protein and enzyme engineering and covers key concepts in protein and enzyme design, including protein structure-function relationships; rational and evolutionary engineering approaches; genetic code expansion; cell-free protein synthesis; computational design; and biophysical methods for protein characterization. Additionally, students gain valuable experience reading, analyzing, and interpreting research results from scientific literature, as well as drafting an original research proposal.
**Equivalent - Duplicate Degree Credit Not Granted:** BIEN 5804
**Requisites:** Requires prerequisite courses of CHEN 3320 and BIEN 2810 and BCHM 4611 (minimum grade C-). Restricted to College of Engineering undergraduates only.

**BIEN 4805 (3) Biomaterials**
Provides an overview of biomaterials. Covers major classes of materials used in medical applications, properties, degradation mechanisms, and characterization methods, foreign body response, methods to control physiological response to biomaterial surfaces, biocompatibility, biomaterials used in soft and hard tissue replacements, drug delivery devices and tissue engineering, and design criteria for developing a material for a given biological application.
**Requisites:** Requires prerequisite courses of BIEN 2810 or MCDB 1150 or EBIO 1220 and CHEM 3311 (all minimum grade C-). Restricted to College of Engineering students only.
**Recommended:** Prerequisite CHEM 3331.

**BIEN 4806 (3) Immunoengineering**
Examines the fundamentals of immunology and covers engineering approaches to study and control immune reactions and their applications in therapy and diagnostics for infectious disease, cancer, allergy, and autoimmune disease.
**Equivalent - Duplicate Degree Credit Not Granted:** BIEN 5806
**Requisites:** Requires prerequisite course of BIEN 2810 and prerequisite or corequisite of CHEN 4330 or BIEN 4830 or BMEN 3010 (minimum grade C-). Restricted to College of Engineering students only.

**BIEN 4810 (3) Biological Engineering Laboratory**
Involves planning and execution of chemical engineering experiments on mass transfer operations, bioseparations, and biological reactors. Interprets experimental data with theoretical principles and statistical analysis. Emphasizes communication with written memos, full reports and oral presentations.
**Requisites:** Requires prerequisite courses of BIEN 2810 or MCDB 1150 or (EBIO 1210 and EBIO 1220) and CHEN 3010 and BIEN 4820 and BIEN 4830 (all minimum grade C-). Restricted to College of Engineering majors only.

**BIEN 4820 (3) Biochemical Separations**
Lect. and lab. Presents purification methods, mass transfer coefficients, problems specific to biologicals, and scale-up of processes. Also covers chromatography, phase extraction, supercritical fluids, sedimentation, precipitation, electrophoresis, dialysis, affinity techniques, cell separation, application of separations to bioreactors, and comparison of batch and continuous processes. Formerly CHEN 4820.
**Requisites:** Requires prerequisite course of CHEN 3210 and prereq or coreq of CHEN 4330 or BIEN 4830 (all minimum grade C-). Restricted to College of Engineering majors only.

**BIEN 4830 (3) Biokinetics and Reactor Design**
Introduces chemical kinetics, chemical reactor design, and biological kinetics. Involves mass and energy balances for steady-state and transient reactor systems. Also covers residence time distribution, mass transfer, catalytic reactions, multiple steady states in reactors, enzyme kinetics, metabolic networks, and cell growth kinetics.
**Requisites:** Requires prerequisite courses of CHEN 3320 and CHEN 3210 and (CHEN 4521 or CHEM 4531) (all minimum grade C-). Restricted to College of Engineering majors only.

**BIEN 4838 (1-3) Special Topics in Biological Engineering**
Examines a special topic in Biological Engineering.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**BIEN 4840 (1-4) Independent Study**
Available to seniors with approval of Chemical and Biological Engineering department. Subject arranged to fit needs of student.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**BIEN 5802 (3) Tissue Engineering and Biofabrication**
Tissue engineering demonstrates enormous potential for improving human health and the field of biofabrication has advanced our ability to position cells and materials into 3D configurations for the engineering of new tissues. This course explores principles of tissue engineering and biofabrication, drawing upon diverse fields such as cell biology, material science, and chemical and biological engineering. Current and developing methods of tissue engineering, as well as specific applications will be discussed in the context of these principles. The course will involve review of current literature within this developing field, as well as focus on translational concepts of tissue engineering. Formerly known as CHEN 5802.
**Equivalent - Duplicate Degree Credit Not Granted:** BIEN 4802
**Requisites:** Restricted to graduate students only.

**BIEN 5803 (3) Metabolic Engineering**
Introduces basic concepts in metabolic engineering and explores modern approaches in metabolic and strain engineering. Application areas that will be discussed will include the use of metabolic engineering approaches in biofuels and biorefining as well as biopharmaceutical production.
**Equivalent - Duplicate Degree Credit Not Granted:** BIEN 4803
**Requisites:** Requires prerequisite courses of APPM 2360 and BCHM 4611 (all minimum grade C-). Restricted to graduate students only.

**BIEN 5804 (3) Protein and Enzyme Engineering**
This course reviews various applications of protein and enzyme engineering and covers key concepts in protein and enzyme design, including protein structure-function relationships; rational and evolutionary engineering approaches; genetic code expansion; cell-free protein synthesis; computational design; and biophysical methods for protein characterization. Additionally, students gain valuable experience reading, analyzing, and interpreting research results from scientific literature, as well as drafting an original research proposal.
**Equivalent - Duplicate Degree Credit Not Granted:** BIEN 4804
**Requisites:** Requires prerequisite courses of CHEN 3320 and BIEN 2810 and BCHM 4611 (minimum grade C-). Restricted to graduate students only.
**Grading Basis:** Letter Grade

**BIEN 5806 (3) Immunoengineering**
Examines the fundamentals of immunology and covers engineering approaches to study and control immune reactions and their applications in therapy and diagnostics for infectious disease, cancer, allergy, and autoimmune disease.
**Equivalent - Duplicate Degree Credit Not Granted:** BIEN 4806
**Requisites:** Restricted to graduate students only.

**BIEN 5838 (1-3) Special Topics in Biological Engineering**
Graduate-selected topics courses offered upon demand.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

# Biomedical Engineering (BMEN)

## Courses

**BMEN 1000 (1) Exploring Biomedical Engineering**
Introduces the biomedical engineering profession, curriculum, career pathways, ethics and responsibilities, and research opportunities. Academic and industry speakers are invited to address various biomedical engineering topics.
**Requisites:** Restricted to Biomedical Engineering (BMEN) and Open Option Engineering (XXEN) majors only.

**BMEN 1025 (4) Computer-Aided Design & Fabrication**
Introduces engineering drawing techniques through modern computer aided design (CAD) software, and fabrication of some of these designs. The course will begin with an introduction of spatial visualization skills, then an in-depth introduction to Solidworks, an industry standard CAD software tool, along with introduction to fabrication processes including laser cutting, and 3D printing. Additional topics include geometric design and tolerancing techniques and design for manufacturing.
**Requisites:** Restricted to Biomedical Engineering (BMEN) majors only.

**BMEN 1035 (1) Introduction to Fabrication for Biomedical Engineering**
The purpose of this course is to provide biomedical and other engineering students with an introduction to fabrication processes and rapid prototyping techniques including laser cutting, 3D printing, and 3D scanning. Additional topics include geometric design and tolerancing (GD&T) techniques and design for manufacturing (DFM) methods. Provides additional fabrication experience for students in CEAS who have already taken CAD courses and do not want to duplicate material by taking BMEN 1025.
**Equivalent - Duplicate Degree Credit Not Granted:** the fabrication component of BMEN 1025
**Requisites:** Requires prerequisite course of GEEN 1017 (minimum grade C-).

**BMEN 2000 (3) Introduction to Biomedical Engineering**
Reviews concepts from molecular and cellular biology. Establishes important aspects of human physiology and engineering principles to develop a basic understanding of the biomedical engineering field. Introduces topics such as biomechanics, bioinstrumentation, bioimaging and biotechnology.
**Requisites:** Requires prerequisite or co-requisite Biology course MCDB 1150 or BIEN 2810 or EBIO 1210 (min grade C-). Requires prerequisite Chemistry course CHEN 1201 or CHEN 1211 or CHEM 1113 or MCEN 1024 (min grade C-). Restricted to BMEN minors.

**BMEN 2010 (3) Biomaterials**
Introduces the science and engineering of biomaterials, with an emphasis on biomechanical aspects. Addresses the design, fabrication, testing, applications and performance of synthetic and natural materials that are used in a wide variety of biomedical prosthetics, implants and devices. In addition to attending lectures, students will conduct a laboratory experiment and a case study.
**Requisites:** Requires prerequisite course of CHEN 1201 or CHEN 1211 or CHEM 1113 (minimum grade C-). Restricted to Biomedical Engineering (BMEN) majors only.
**Recommended:** for students in fourth semester of Biomedical Engineering curriculum or higher.

**BMEN 2100 (3) Biomedical Engineering Principles and Methods**
This course is an introduction to the fundamental principles and mathematical methods of biomedical engineering. Core conservation equations are applied to mass, energy, charge, and momentum transfer in biomedical systems. Additional topics may cover a breadth of exposure in diagnostics and analytical techniques, statistical analysis of biomedical data, bioinformatics, bioinstrumentation.
**Requisites:** Required prereqs (APPM 1350 or Math 1300 or APPM 1345) and (CHEN 1201 or CHEN 1211 or CHEM 1113) and (PHYS 1110 or PHYS 1115) and (MCDB 1150 or BIEN 2810 or EBIO 1210) (all min grade C-). Restricted to BMEN majors, minors IUT On Track applicants.

**BMEN 3010 (3) Biotransport**
An introduction to the modeling of complex biological systems using principles of transport phenomena and biochemical kinetics. Includes the conservation of mass and momentum; rheology of Newtonian and non-Newtonian fluids; steady and transient diffusion in reacting systems; dimensional analysis; homogeneous versus heterogeneous reaction systems; and physiological transport systems, including receptor-mediated endocytosis and oxygen and drug transport.
**Requisites:** Requires prereq courses BMEN 2100 or BMEN 2000; CHEN 1310 or ASEN 1320 or CSCI 1300 or ECEN 1310; PHYS 1100 or PHYS 1115; and coreq of APPM 2360 or MATH 3430 (min grade C-). Restricted to Biomedical Engineering (BMEN) majors.
**Recommended:** for students in fifth semester of Biomedical Engineering curriculum or higher.

**BMEN 3030 (3) Bioinstrumentation**
This course will provide an overview of instrumentation systems used in clinical medicine and biomedical research. Systems for measuring biologic signals will be discussed including biopotentials, stress and strain, pressure, temperature, and optical properties to interpret data from living systems. There will be applications to engineering design, including a semester-long design project that incorporates the interactions between living and non-living systems. There will also be discussion of ethical and regulatory issues related to bioinstrumentation.
**Requisites:** Requires prerequisite courses of BMEN 2000 or BMEN 2100 and ECEN 2260 and ECEN 2270 (all minimum grade C-). Restricted to Biomedical Engineering (BMEN) major students.
**Recommended:** for students in sixth semester of Biomedical Engineering curriculum or higher.

**BMEN 4010 (3) Biomedical Engineering Capstone Design I**
Offers the first in a two-course sequence of capstone design. Project supervisors and teams are paired through a pitch process, wherein teams pitch their design ideas to meet an existing need on a project. Project is in an area of biomedical engineering, such as biomedical instrumentation, biosensors, tissue engineering, biological signal processing, biological modeling and simulation, clinical imaging or informational systems, etc. Projects will be conducted by teams of typically three to five students, and projects must include significant design experience. The first semester focuses on research of background, planning, crafting of needs statement, and initial work on senior design project . Formal proposal must be approved by technical advisor.
**Requisites:** Prereq of (BMEN 1025 or MCEN 1025) and BMEN 2010 and BMEN 3010. Pre or coreq of ENES 1010 or ENES 3100 or ENLP 3100 or PHYS 3050 or WRTG 3030 or WRTG 3035 (all min. grade C-). Restricted to BMEN majors w 87-180 credits.

**BMEN 4020 (3) Biomedical Engineering Capstone Design II**
Continues BMEN 4010. Teams continue to develop, construct, and evaluate prototypes with consideration of real-world fiscal, regulatory, and safety conditions. Progress is monitored through a series of oral presentations and peer review of teamwork and team dynamics. Requires students to complete a working prototype or simulation as appropriate, and a final written report with oral presentation at the semester Design Expo. Written final report must be approved by the faculty.
**Requisites:** Requires prerequisite course of BMEN 4010 (minimum grade C-). Restricted to Biomedical Engineering (BMEN) majors.

**BMEN 4110 (3) Regenerative Biology and Tissue Repair**
Presents the regenerative biology behind tissue systems, along with the regenerative medicine of that tissue with an emphasis on engineering principles, using the assigned reading as a guideline. Follows lectures with class discussions of current papers on the regenerative biology of the same tissue system. In the final 1 ¿ 2 classes assigned to this topic, individual graduate students give 20 min presentations on a relevant regenerative medicine/engineering-focused paper.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4110, BMEN 5110, and MCEN 5110
**Requisites:** Restricted to Biomedical Engineering majors with 57+ credits only.

**BMEN 4111 (3) Introduction to Microfluidics**
Microfluidics deals with the behavior of fluids in small scale. It is a highly multidisciplinary field at the intersection of engineering, physics, chemistry, biology, medicine, nanotechnology, and biotechnology. This course covers the fundamentals and fabrication of microfluidic devices and their applications, particularly in lab-on-a-chip. Includes lectures, literature discussion, team presentations, and possibly one lab on microfluidic devices. Enhances your understanding of microfluidic technologies and their broad applications.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5111 and MCEN 4111 and BMEN 5111
**Requisites:** Requires prerequisite course of MCEN 3021 or CHEN 3200 or CVEN 3313 (all minimum grade C-). Restricted to Biomedical Engineering majors only.

**BMEN 4113 (3) Mechanics of Cancer**
Cancer is considered to be an organ or an ecosystem, in which a critical component of the tumor microenvironment is mechanical forces. This course will cover the role of mechanics in cancer and cancer-related processes, with a focus on solid mechanics and fluid mechanics. In this course, you will apply engineering principles to come away with an appreciation of how mechanics influence cancer and its etiology as well as the development of future treatments.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4113 and MCEN 5113 and BMEN 5113
**Requisites:** Requires prerequisite course of MCEN 3021 or CHEN 3200 or CVEN 3313 or MCEN 2063 or CVEN 3161 (all minimum grade C-). Restricted to Biomedical Engineering majors with 57+ credits only.

**BMEN 4117 (3) Anatomy and Physiology for Biomedical Engineering**
The main objective of this multidisciplinary course is to explore human physiological function from the viewpoint of an engineer. It provides an introduction to human anatomy and physiology with a focus on learning anatomical structures, biological signaling, physiological and pathological conditions, as well as fundamental biomedical engineering concepts that apply quantitative analyses (mass transfer, fluid dynamics, mechanics, modeling) and engineering concepts (e.g., device design to restore defective physiological functions) to understand physiology and pathology.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4117 or MCEN 5117 BMEN 5117
**Requisites:** Requires prerequisite of BMEN 2000 or BMEN 2100 (minimum grade C-). Restricted to Biomedical Engineering (BMEN) and Mechanical Engineering (MCEN) majors.
**Recommended:** Prerequisites BMEN 2010 or BMEN 3010 (all minimum grade C-).

**BMEN 4127 (3) Biomedical Ultrasound**
Covers the design of ultrasound systems for medical imaging and therapy, including the physics of wave propagation, transducers, pulse-echo imaging, flow, tissue characterization, and microbubble contrast, with an emphasis on current topics in biomedical ultrasound. Includes lectures on theory, practice and special topics; a laboratory on wave propagation; oral presentations on current literature; signal processing exercises; and a team project. Some experience with MATLAB is strongly encouraged for exercises throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4127 and BMEN 5127 and MCEN 5127
**Requisites:** Requires prerequisite course of ECEN 3300 or ECEN 3301 or MCEN 4043. Restricted to Biomedical Engineering majors with 87+ credits only.

**BMEN 4157 (3) Modeling of Human Movement**
Human movement analysis is used in physical rehabilitation, sport training, human-robot interaction, animation, and more. Course provides a systematic overview of human movement on multiple levels of analysis, with an emphasis on the phenomenology amenable to computational modeling. Covers muscle physiology, movement-related brain areas, musculoskeletal mechanics, forward and inverse dynamics, optimal control and Bayesian inference, learning and adaptation. Inspires students to see and appreciate the complexities of movement control in all aspects of daily life.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4157 and MCEN 5157 and BMEN 5157
**Requisites:** Requires prerequisite of (MCEN2043 or GEEN 3024 or ASEN 1022) and (APPM2360 or MATH2130 or MATH3130) all minimum grade C-. Restricted to students with 57-180 credits (Jrs/Srs) Biomedical Engineering (BMEN) majors only.

**BMEN 4171 (3) Biofluids on the Micro Scale**
Introduces fundamental physical concepts and basic mechanisms of biological fluids in microscale. Elaborates on the application of fluid mechanics principles to major biological systems, including human organ systems and animal locomotion in microscale. Covers physiologically relevant fluid flow phenomena on the cellular level and the underlying physical mechanisms from an engineering perspective. Related state-of-art technologies such as organ-on-a-chip and micro/nano fabrication will be emphasized. Will enhance your understanding of organ-on-a-chip technologies and their broad applications.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4171 and MCEN 5171 and BMEN 5171
**Requisites:** Requires prerequisite course of MCEN 3021 or CHEN 3200 or CVEN 3313 (all minimum grade C-). Restricted to Biomedical Engineering majors only.

**BMEN 4195 (3) Bioinspired Robotics**
Bioinspired design views the process of how we learn from nature as an innovation strategy translating principles of function, performance, and aesthetics, from biology to human technology. The creative design process is driven by interdisciplinary exchange among engineering, biology, medicine, art, architecture and business. Diverse teams of students will collaborate on, create, and present original bioinspired design projects in the ITLL.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5195, BMEN 5195 and MCEN 4195
**Requisites:** Requires prerequisite courses of MCEN 3017 and MCEN 3025 (minimum grade C-). Restricted to students with 57+ credits, BMEN majors only.

**BMEN 4231 (3) Computational Fluid Dynamics**
This course is an in-depth introduction to the basic principles and applications of computational fluid dynamics (CFD). Students learn about fundamental CFD concepts such as discretization, meshing, error and accuracy; and focus on computational solutions of flow and transport problems using the finite element method. Students conduct multiple hands-on simulation-based activities and exercises on canonical and realistic engineering flow/transport problems. Final project for the course culminates in a mini-conference/symposium where students present their work.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4231 and MCEN 5231 and BMEN 5231
**Requisites:** Requires prerequisite courses of MCEN 3021 or CHEN 3200 or CVEN 3313 and MCEN 3030 or APPM 4650 or CSCI 3656 (all minimum grade C-). Restricted to Biomedical Engineering majors only.

**BMEN 4292 (3) Materials and Devices in Medicine**
The main objective of this multidisciplinary course is to provide students with a broad survey of biomaterials and their use in medical devices for restoring or replacing the functions of injured, diseased, or aged human tissues and organs. The topics to be covered include: evolution in the medical device industry, a broad introduction to the materials used in medicine and their chemical, physical, and biological properties, discovery of medical problems, potential impacts of treatment innovations, existing devices and design considerations for several major physiological systems (cardiovascular, neuromuscular, skeletal, pulmonary, renal, dermal), materials interaction with the human body, basic mechanisms of wound healing, biocompatibility issues, testing methods and techniques in accordance with standards and relevant regulations, biofunctionalities required for specific applications, as well as state-of-the-art approaches for the development of new regenerative materials targeting cellular mechanisms. Sam
**Requisites:** Requires prerequisite courses of MCEN 2024 and MCEN 4117 or MCEN 5117 (all minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) BMEN majors only.

**BMEN 4519 (1-3) Special Topics in Biomedical Engineering**
Credit hours and subject matter to be selected from topics of current interest.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits. Biomedical Engineering (BMEN) majors only.

**BMEN 4840 (1-3) Independent Study**
Provides opportunities for independent study at the undergraduate level. Subject and/or project agreed upon by the student and instructor to fit the needs of the student.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Biomedical Engineering (BMEN) majors only.

**BMEN 5110 (3) Regenerative Biology and Tissue Repair**
Presents the regenerative biology behind tissue systems, along with the regenerative medicine of that tissue with an emphasis on engineering principles, using the assigned reading as a guideline. Follows lectures with class discussions of current papers on the regenerative biology of the same tissue system. In the final 1 ¿ 2 classes assigned to this topic, individual graduate students give 20 min presentations on a relevant regenerative medicine/engineering-focused paper.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5110, BMEN 4110, and MCEN 4110
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Biomedical Engineering undergraduate majors only.

**BMEN 5111 (3) Introduction to Microfluidics**
Microfluidics deals with the behavior of fluids in small scale. It is a highly multidisciplinary field at the intersection of engineering, physics, chemistry, biology, medicine, nanotechnology, and biotechnology. This course covers the fundamentals and fabrication of microfluidic devices and their applications, particularly in lab-on-a-chip. Includes lectures, literature discussion, team presentations, and possibly one lab on microfluidic devices. Enhances your understanding of microfluidic technologies and their broad applications.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5111 and MCEN 4111 and BMEN 4111
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Biomedical Engineering undergraduate majors only.

**BMEN 5113 (3) Mechanics of Cancer**
Cancer is considered to be an organ or an ecosystem, in which a critical component of the tumor microenvironment is mechanical forces. This course will cover the role of mechanics in cancer and cancer-related processes, with a focus on solid mechanics and fluid mechanics. In this course, you will apply engineering principles to come away with an appreciation of how mechanics influences cancer and its etiology as well as the development of future treatments.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5113 and BMEN 4113 and MCEN 4113
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Biomedical Engineering undergraduate majors only.

**BMEN 5117 (3) Anatomy and Physiology for Biomedical Engineering**
The main objective of this multidisciplinary course is to explore human physiological function from the viewpoint of an engineer. It provides an introduction to human anatomy and physiology with a focus on learning anatomical structures, biological signaling, physiological and pathological conditions, as well as fundamental biomedical engineering concepts that apply quantitative analyses (mass transfer, fluid dynamics, mechanics, modeling) and engineering concepts (e.g., device design to restore defective physiological functions) to understand physiology and pathology. Graduate students will be required to present a primary literature review and lead discussion during a class period, as well as take the lead on the final project: a mock NIH grant proposal.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4117 or MCEN 5117 BMEN 4117
**Requisites:** Restricted to graduate Biomedical Engineering students only.

**BMEN 5127 (3) Biomedical Ultrasound**
Covers the design of ultrasound systems for medical imaging and therapy, including the physics of wave propagation, transducers, pulse-echo imaging, flow, tissue characterization, and microbubble contrast, with an emphasis on current topics in biomedical ultrasound. Includes lectures on theory, practice and special topics; a laboratory on wave propagation; oral presentations on current literature; signal processing exercises; and a team project. Some experience with MATLAB is strongly encouraged for exercises throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5127 and MCEN 4127 and BMEN 4127
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**BMEN 5133 (3) Intro to Tissue Biomechanics**
Focuses on developing an understanding of the fundamental mechanical principles that govern the response of hard and soft biological tissue to mechanical loading. Specifically, covers mechanical behavior of biological materials/tissues, classical biomechanics problems in various tissues, the relationship between molecular, cellular and physiological processes and tissue biomechanics and critical analysis of related journal articles.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4133 and MCEN 5133
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Biomedical Engineering undergraduate majors only.

**BMEN 5157 (3) Modeling of Human Movement**
Human movement analysis is used in physical rehabilitation, sport training, human-robot interaction, animation, and more. Course provides a systematic overview of human movement on multiple levels of analysis, with an emphasis on the phenomenology amenable to computational modeling. Covers muscle physiology, movement-related brain areas, musculoskeletal mechanics, forward and inverse dynamics, optimal control and Bayesian inference, learning and adaptation. Inspires students to see and appreciate the complexities of movement control in all aspects of daily life.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5157 and MCEN 4157 and BMEN 4157
**Requisites:** Restricted to graduate students in the College of Engineering and Applied Science or undergraduate Biomedical Engineering (BMEN) majors with 57+ credits (Junior or Senior).

**BMEN 5171 (3) Biofluids on the Micro Scale**
Introduces fundamental physical concepts and basic mechanisms of biological fluids in microscale. Elaborates on the application of fluid mechanics principles to major biological systems, including human organ systems and animal locomotion in microscale. Covers physiologically relevant fluid flow phenomena on the cellular level and the underlying physical mechanisms from an engineering perspective. Related state-of-art technologies such as organ-on-a-chip and micro/nano fabrication will be emphasized. Will enhance your understanding of organ-on-a-chip technologies and their broad applications.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5171 and MCEN 4171 and BMEN 4171
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Biomedical Engineering undergraduate majors only.

**BMEN 5195 (3) Bioinspired Robotics**
Bioinspired design views the process of how we learn from nature as an innovation strategy translating principles of function, performance, and aesthetics, from biology to human technology. The creative design process is driven by interdisciplinary exchange among engineering, biology, medicine, art, architecture and business. Diverse teams of students will collaborate on, create, and present original bioinspired design projects in the ITLL.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4195, BMEN 4195, and MCEN 5195
**Requisites:** Restricted to graduate students in the College of Engineering and Applied Science or undergraduate Biomedical Engineering (BMEN) majors with 57+ credits (Junior or Senior).

**BMEN 5231 (3) Computational Fluid Dynamics**
This course is an in-depth introduction to the basic principles and applications of computational fluid dynamics (CFD). Students learn about fundamental CFD concepts such as discretization, meshing, error and accuracy; and focus on computational solutions of flow and transport problems using the finite element method. Students conduct multiple hands-on simulation-based activities and exercises on canonical and realistic engineering flow/transport problems. Final project for the course culminates in a mini-conference/symposium where students present their work.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5231 and MCEN 4231 and BMEN 4231
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Biomedical Engineering undergraduate majors only.

**BMEN 5292 (3) Materials and Devices in Medicine**
The main objective of this multidisciplinary course is to provide students with a broad survey of biomaterials and their use in medical devices for restoring or replacing the functions of injured, diseased, or aged human tissues and organs. The topics to be covered include: evolution in the medical device industry, a broad introduction to the materials used in medicine and their chemical, physical, and biological properties, discovery of medical problems, potential impacts of treatment innovations, existing devices and design considerations for several major physiological systems (cardiovascular, neuromuscular, skeletal, pulmonary, renal, dermal), materials interaction with the human body, basic mechanisms of wound healing, biocompatibility issues, testing methods and techniques in accordance with standards and relevant regulations, biofunctionalities required for specific applications, as well as state-of-the-art approaches for the development of new regenerative materials targeting cellular mechanisms. Sam
**Requisites:** Requires prerequisite course of MCEN 4117 or MCEN 5117 (minimum grade C-). Restricted to any College of Engineering and Applied Science graduate students or to BMEN undergraduate majors only.

**BMEN 5840 (1-6) Independent Study**
Provides opportunities for independent study at the graduate level. Subject and/or project agreed upon by the student and instructor to fit the needs of the student.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate Biomedical Engineering students only.

**BMEN 5939 (1-6) Biomedical Engineering Internship**
Grants credit to international graduate students for conducting research via professional research opportunities in the biomedical engineering field. Students are responsible for securing their own internships.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**BMEN 6519 (1-3) Special Topics in Biomedical Engineering**
Credit hours and subject matter to be arranged.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.

**BMEN 6949 (1) Master's Candidate for Degree**
Credit hours and subject matter to be arranged.

**BMEN 6950 (1-6) Master's Thesis**
Work with a faculty advisor on a masters thesis.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate Biomedical Engineering students only.

**BMEN 7840 (1-6) Independent Study**
Provides opportunities for independent study at the graduate (PhD) level. Subject and/or project agreed upon by the student and instructor to fit the needs of the student.
**Repeatable:** Repeatable for up to 10.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Biomedical Engineering BMEN-PhD students only.

**BMEN 8990 (1-10) Doctoral Dissertation**
Work with a faculty advisor on a doctoral dissertation.
**Repeatable:** Repeatable for up to 60.00 total credit hours.
**Requisites:** Restricted to Biomedical Engineering (BMEN) Ph.D. graduate students only.

# Business Administration (BADM)

## Courses

**BADM 1250 (1.5) Designing Your Leeds**
Designing Your Leeds is a class about customizing your college experience to get the most out of it. Using a process rooted in Design Thinking, the course equips students with tools to design and prototype a college experience that best aligns with who they are and what they hope to get from college. Students will explore the purpose of college, reflect on personal values and strengths, learn about educational and career opportunities, and create a prototype of their 4 year experience. Through in-class activities and out of class assignments, students will also learn and practice professional and self-leadership skills.
**Requisites:** Restricted to Business (BUSNU) majors only.

**BADM 1260 (2) First-Year Global Experience**
In today's world of increased mobility, globally aware students have more choices for employment upon graduation and are immediately ready to contribute in global environments. They are aware of global issues and cultural differences, and their global mindset allows them to recognize good ideas from whenever they might come and new market/product opportunities wherever they might exist. This course is the first step toward the development of a global mindset. It provides a meaningful global experience to first-year business students through an in-depth perspective of a specific country or region outside the United States and a short academic trip to the region.
**Requisites:** Restricted to Business (BUSNU) majors only.

**BADM 2010 (1) Excel in Business**
Teaches beginner to intermediate level Excel skills, emphasizing efficient use of Excel to make sense of substantial data sets. The course is designed to increase students' proficiency with Excel through a series of hands-on workshops. The workshops have a business problem solving orientation and use real data from Leeds' corporate partners. The workshops emphasize the most important skills that employers value.
**Requisites:** Restricted to Business (BUSNU) Majors or students with a Business Minor (BUSM-MIN)

**BADM 2020 (3) Fundamentals of Quantitative Analysis**
Focuses on the application of calculus and statistics in financial analysis with emphasis on theory and problem solving in excel. Calculus topics covered in the class will include: series, limits and continuity, calculating derivatives, graphing and optimization. Descriptive statistics will be reviewed in the context of financial data. Applications to finance will include portfolio optimization, calculation and graphing of historical stock returns, along with calculation of bond prices, returns, and duration.
**Requisites:** Restricted to students with the Business Minor (BUSM-MIN) plan.

**BADM 2050 (3) Honors/Special Topics**
Variable topics in business, drawing from a variety of disciplines.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** At least a 3.50 cumulative GPA is required.
**Additional Information:** Arts Sciences Honors Course

**BADM 2880 (1-3) Special Topics**
Explores historical developments, contemporary issues, industry trends and best practices pertinent to the business of sports. Designed to provide sufficient background for educated consumption of this literature and pursuit of further study if desired.
**Requisites:** Restricted to Business (BUSN) majors.

**BADM 2900 (1-3) Independent Study**
Department consent and departmental form required.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Business (BUSNU) majors only.

**BADM 3020 (3) Written Communication for Business Leaders**
This course focuses on business writing for professionals in an organizational setting, especially those in leadership roles. While the course focuses principally on writing, it builds on a number of skills addressed in BCOR 1030: Communication Strategy¿a prerequisite for this class emphasizing oral communication. In this course, students will revisit such topics as communication channels, storytelling, persuasion, and audience analysis, but specifically in the context of writing.
**Requisites:** Requires prerequisite course of BCOR 1030 (minimum grade D-). Restricted to Business (BUSN) majors with 52 units completed.

**BADM 3100 (1) Professional Development**
Designed to provide opportunities to understand and develop professional competencies for successful careers in business. Designed to increase knowledge of job search strategies and formulate a career management plan for transitioning to the worksplace. Topics such as resumes, cover letters, personal branding, job search strategies, internships, career choices, networking and social media will be covered. A Self-Marketing Plan will be developed to help focus on long-term career goals.
**Requisites:** Restricted to Leeds School of Business majors only.

**BADM 3200 (1.5) Internship Accelerator**
Seminar focused on developing competencies critical to a successful transition into the workplace. Apply what you have learned in the classroom to business problems. Practice problem framing, decision making, and synthesizing complex information. Reflect on which professional communication skills are the most essential complements to your classroom skills and knowledge. Craft ways to improve those most essential skills. Reflect on when to ask for help and when not to. Through hands-on projects, learn about adaptability in the workplace and deciphering professional expectations.
**Requisites:** Restricted to Business (BUSN) majors.

**BADM 3880 (3) Special Topics**
Introduces students to the many facets of the marketing of sport and marketing through sport. Theoretical and practical applications of marketing sport are examined. Provides students with an understanding of current marketing concepts and best business practices, related to sports enterprises and a foundation for pursuit of further study and work in sports and event marketing.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**BADM 3900 (1) Independent Study**
Department consent and departmental form required.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Business (BUSNU) majors only.

**BADM 3930 (1-6) Internship - London Seminar**
Student training and participation in government or industry environment under faculty supervision. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of BASE 2104 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).

**BADM 4030 (3) Crisis Communication**
In today¿s highly volatile, uncertain, complex, and ambiguous (VUCA; Johansen, 2012) world, successful business leaders understand that experiencing an organizational crisis is a matter of when, not if. Organizational leaders¿ communication and actions before, during, and after a crisis determine if the organization survives, is able to recover, and ultimately utilize the crisis as an opportunity for growth. This course takes a message-centered approach to the study of crisis communication. The purpose of this course is to explore the role of communication and strategic communication practices throughout the three stages of crisis management. Both theoretical and applied research areas are considered to provide an overview of the established and emerging perspectives on risk and crisis from the communication perspective.
**Requisites:** Restricted to Business (BUSN) majors with 52-180 units completed.

**BADM 4820 (1-6) Special Topics**
Variable topics in business drawing from a variety of business disciplines.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Business (BUSN) majors with 52-180 units completed.

**BADM 4830 (1-3) Special Topics**
Various topics in business and society drawing from a variety of business disciplines.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Business (BUSNU) majors only.

**BADM 4900 (1-3) Independent Study**
Intended only for exceptionally well qualified business seniors. Department form required.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Business (BUSNU) majors only.

**BADM 4910 (2) VITA-Volunteer Tax Assistance**
Offers students the opportunity to gain professional work experience in an accounting position while still in school. Provides academically relevant work experience that complements students' studies and enhances their career potential.
**Requisites:** Requires prerequsite courses of BCOR 2000 and ACCT 3440 or ACCT 5440 (all minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**BADM 6820 (1-3) Topics in Business Administration**
Offered irregularly to provide opportunity to investigate new topics in business administration.

**BADM 6940 (3) Land Use Law**
Examines Federal, state and local regulations governing land use in the U.S. and surveys the basic principles of urban planning and public finance. Describes basic tools governments use to control land use: Euclidean zoning, nuisance law, police power, eminent domain and takings, Planned Urban Developments, historic preservation, wetlands and flood zones, airports, endangered species, view restrictions, and environmental law.
**Requisites:** Restricted to Master of Business Administration (MBAD), MBA with dual degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA (PMBA) or MS Real Estate (REAL-MS) students only.
**Grading Basis:** Letter Grade

# Business Core (BCOR)

## Courses

**BCOR 1015 (3) The World of Business**
Provides an overview of the nature business in a global economy. In addition to exploring the economic, governmental, social and environmental context in which businesses operate, students will discover how business creates value and takes advantage of opportunities and challenges. Using examples, cases and projects, students will learn about the business functions in an integrated format. Weekly discussion of current events will focus on entrepreneurship, ethics, international business, business and society, and other topics.
**Requisites:** Restricted to Leeds School of Business majors or students in the On Track to IUT to Business student group.

**BCOR 1025 (3) Statistical Analysis in Business**
Covers sampling concepts, graphical and numerical data summaries, basic probability theory, discrete and continuous probability models, sampling distributions, hypothesis testing, correlation and both simple and multiple regression analysis. Students learn decision making and solving business problems by using data. Uses statistical features of Excel. Course requirements: laptop with Microsoft Excel; iClickers.
**Requisites:** Requires a prerequisite or corequisite course of MATH 1112 (minimum grade D-). Restricted to Business (BUSN) majors only.

**BCOR 1030 (3) Communication Strategy**
Helps develop basic communication skills to prepare you for success in the business world. This communication and social science theory-based, skill-building course is framed in Fiske and Cuddy's person perception theory that all people are perceived on two dimensions, competence and warmth. You will learn how to use communication skills to strategically demonstrate those dimensions.
**Requisites:** Restricted to Business (BUSN) majors with 0 - 59 units completed or students in the On Track to IUT to Business student group.

**BCOR 2201 (1.5) Principles of Marketing**
Focuses on developing a core marketing toolkit for future business professionals. The tools help identify, reach, motivate, and satisfy customers. The course includes both the strategic perspective and the tactical execution of the 4 Ps-place, price, product, and promotion. Students will learn about the breadth of what marketers do to facilitate exchange between buyers and sellers and about the quantitative analysis that supports those exchanges.
**Equivalent - Duplicate Degree Credit Not Granted:** BCOR 2400, BCOR 2001
**Requisites:** Requires prereqs ECON 2010 BCOR 1025 or MATH 2510 or PSYC 2111 or PSCI 2075 or SOCY 2061 (all min grade D-). Requires prereq or coreq of BCOR 1015. Restricted to BUSN majors w 26-180 units or students who have received On Track status to IUT to Leeds

**BCOR 2202 (1.5) Principles of Organizational Behavior**
Focuses on the fundamentals of management from an organizational behavior perspective. Students will learn the basic concepts and best practices in the behavioral sciences that can improve their abilities to lead and manage in organizations. Frameworks for individual, team, and organizational behavior are presented and discussed. Topics include personality traits, culture, decision making, teams, planning, motivation, leadership, and well-being. A semester-long team project provides practice in teamwork and in applying the course concepts.
**Requisites:** Requires prereqs ECON 2010 BCOR 1025 or MATH 2510 or PSYC 2111 or PSCI 2075 or SOCY 2061 (all min grade D-). Requires prereq or coreq of BCOR 1015. Restricted to BUSN majors w 26-180 units or students who have received On Track status to IUT to Leeds

**BCOR 2203 (1.5) Principles of Accounting I**
The course builds a basic understanding of how information regarding a firm's resources and obligations is conveyed to decision makers outside the firm. Students will be exposed to both a user-perspective (how to read and analyze financial accounting reports) and a preparer-perspective (how business transactions affect the financial statements). Particular emphasis will be placed on understanding the accounting cycle, or the system with which businesses process and record their business events to create the financial statements.
**Equivalent - Duplicate Degree Credit Not Granted:** BCOR 2000, BCOR 2002
**Requisites:** Requires prereqs ECON 2010 BCOR 1025 or MATH 2510 or PSYC 2111 or PSCI 2075 or SOCY 2061 (all min grade D-). Requires prereq or coreq of BCOR 1015. Restricted to BUSN majors w 26-180 units or students who have received On Track status to IUT to Leeds

**BCOR 2204 (1.5) Principles of Financial Management**
Will develop student' understanding of the role of finance in business venture. Effective financial management, whether performed by the general manager in a small business or by a finance professional in a large corporation, is necessary for a venture to succeed and grow. Topics covered include financial statement analysis, time value or money, bonds and stocks (both their markets and their valuation), capital budgeting analysis, and investor expectations regarding risk and return.
**Equivalent - Duplicate Degree Credit Not Granted:** BCOR 2200, BCOR 2002
**Requisites:** Requires prereqs ECON 2010 BCOR 1025 or MATH 2510 or PSYC 2111 or PSCI 2075 or SOCY 2061 (all min grade D-). Requires prereq or coreq of BCOR 1015. Restricted to BUSN majors w 26-180 units or students who have received On Track status to IUT to Leeds

**BCOR 2205 (1.5) Introduction to Information Management and Analytics**
Focuses on the fundamentals of managing information in a data driven business environment. Students will learn the basic concepts and best practices in Information Management that can improve their abilities to lead and manage in organizations. The class teaches cutting-edge tools and approaches to the analysis of data, including "big data," for effective decision-making.It creates data connoisseurs through hands-on exposure to supervised machine learning. Application areas covered include human resources, marketing, finance, and supply chain. At the end of class, all students should be able to formulate common business problems in terms addressable through machine learning, and use automated machine learning tools to conduct the analysis and present deep insights to business leaders. Course requirements: clickers.
**Equivalent - Duplicate Degree Credit Not Granted:** BCOR 2500
**Requisites:** Requires prereqs ECON 2010 BCOR 1025 or MATH 2510 or PSYC 2111 or PSCI 2075 or SOCY 2061 (all min grade D-). Requires prereq or coreq of BCOR 1015. Restricted to BUSN majors w 26-180 units or students who have received On Track status to IUT to Leeds

**BCOR 2206 (1.5) Principles of Operations Management**
Introduces the student to the common activities performed by an operations manager and sets the stage for the student to operate as a member of a cross-functional team responsible for adding value for the customer. These common activities include planning and designing goods and services, sourcing materials and supplies, producing the goods and delivering the services, and dealing with product end-of-life requirements.
**Equivalent - Duplicate Degree Credit Not Granted:** BCOR 2500, BASE 2101
**Requisites:** Requires prereqs ECON 2010 BCOR 1025 or MATH 2510 or PSYC 2111 or PSCI 2075 or SOCY 2061 (all min grade D-). Requires prereq or coreq of BCOR 1015. Restricted to BUSN majors w 26-180 units or students who have received On Track status to IUT to Leeds

**BCOR 2301 (1.5) Business Law**
Provides an introduction to the U.S. legal system including its various sources of law and their interplay. Additionally, the court system, both its structure and process, is explored. Finally, contract law and its role in business is examined in detail.
**Equivalent - Duplicate Degree Credit Not Granted:** BCOR 3000, BCOR 2003
**Requisites:** Requires prerequisite courses of BCOR 2201, BCOR 2202, BCOR 2203, BCOR 2204, BCOR 2205, and BCOR 2206 (all min grade D-). Prereq or coreq of BCOR 2302, 2303 and 2304 (min grade D-). Restricted to BUSN majors with 26-180 units completed.

**BCOR 2302 (1.5) Business Ethics and Social Responsibility**
Throughout this course students will consider the interconnectedness of law, ethics, values, public policy and regulation. Emphasis will be placed on the importance of individual and organizational responsibility for business. Allows students to consider the relationship between business and ethics in the broader social context, which is necessary to successfully navigate an increasingly complex, global business environment. Duplicate degree credit not granted for BCOR 3010, BCOR 2003.
**Requisites:** Requires prerequisite courses of BCOR 2201, BCOR 2202, BCOR 2203, BCOR 2204, BCOR 2205, and BCOR 2206 (all min grade D-). Prereq or coreq of BCOR 2301, 2303 and 2304 (min grade D-). Restricted to BUSN majors with 26-180 units completed.

**BCOR 2303 (1.5) Principles of Accounting II**
This course provides an introduction to various uses of accounting information that are available to managers. Specifically, students will be exposed to decision-making models aimed at assisting managers in planning, operating, and controlling business functions. Topics include job costing, cost-volume analysis, budgeting, cash flows, performance evaluation/compensation, break-even analysis, and relevant costs.
**Equivalent - Duplicate Degree Credit Not Granted:** BCOR 2000
**Requisites:** Requires prerequisite courses of BCOR 2201, BCOR 2202, BCOR 2203, BCOR 2204, BCOR 2205, and BCOR 2206 (all min grade D-). Prereq or coreq of BCOR 2301, 2302 and 2304 (min grade D-). Restricted to BUSN majors with 26-180 units completed.

**BCOR 2304 (1.5) Strategic and Entrepreneurial Thinking**
Provides students with a set of critical thinking skills and theoretical tools to enhance students' abilities at strategic and entrepreneurial thinking. We examine the following topics: (1) What is Strategy and Entrepreneurship, (2) External Analysis and Porter's 5 Forces, (3) Internal Analysis and the Resource Based View, (4) SWOT Analysis, (5) Differentiation, Cost Leadership, and Blue Ocean Strategy.
**Equivalent - Duplicate Degree Credit Not Granted:** BASE 2101
**Requisites:** Requires prerequisite courses of BCOR 2201, BCOR 2202, BCOR 2203, BCOR 2204, BCOR 2205, and BCOR 2206 (all min grade D-). Prereq or coreq of BCOR 2301, 2302 and 2303 (min grade D-). Restricted to BUSN majors with 26-180 units completed.

# Business Environment and Policy (BPOL)

## Courses

**BPOL 6950 (1-6) Master's Thesis**
**Requisites:** Restricted to graduate students only.

**BPOL 7500 (1-3) Doctoral Seminar: Special Topics in Strategic Management**
Focuses on the theoretical foundations and methodological challenges of conducting research in strategy and management. The course provides an introduction to the unique characteristics of strategic management and the strategic decisions that firms make. It offers an overview of the theoretical foundations of, and contemporary empirical research in, this area. The course exposes students to fundamental issues of strategy (e.g., how firms differ, what determines their scope, how they compete and organize themselves, etc.) and examines these topics in contemporary competitive and organizational contexts. The course provides an introduction to complex issues that empirical research needs to contend with as a consequence, such as causality, multiple levels of analysis, heterogeneity of firms, multiple decision makers, uncertainty, and temporal considerations for firms¿ decisions. It covers key theoretical traditions from the disciplines as well as theoretical perspectives developed within the field itself. In
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**BPOL 7510 (1.5) Strategy I**
This 1.5 credit course in a sequence focuses on the theoretical foundations and methodological challenges of conducting research in competitive strategy. Topics include what is strategy, the locus of competitive advantage and the persistence of performance, IO foundations of strategy, the resource-based view, the knowledge-based view, firm capabilities, and organizational learning. It offers an overview of the theoretical foundations of, and contemporary empirical research in, this area. It covers key theoretical traditions from the disciplines as well as theoretical perspectives developed within the field itself. In addition to reviewing this broad literature, the course seeks to identify research gaps and promising areas for future research. May be repeated for up to 3 total credit hours.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Business Administration (BUAD) graduate students only.

**BPOL 7520 (1.5) Strategy II**
This 1.5 credit course in a sequence focuses on the theoretical foundations and methodological challenges of conducting research in corporate strategy. Topics include the overall plan for a diversified company, boundaries of the firm, expansion modes including alliances and M&A, and international expansion. It offers an overview of the theoretical foundations of, and contemporary empirical research in, this area. It covers key theoretical traditions from the disciplines as well as theoretical perspectives developed within the field itself. In addition to reviewing this broad literature, the course seeks to identify research gaps and promising areas for future research. May be repeated for up to 3 total credit hours.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Business Administration (BUAD) graduate students only.

**BPOL 7530 (1-3) Doctoral Seminar: Special Topics in Innovation**
Focuses on the management of innovation and technology in organizations. The course provides an introduction to the theoretical foundations of, and contemporary empirical research in, this area. The examination of the literature is organized around several broad topics including the nature and timing of technological innovations, the manner in which technological innovations alter the competitive landscape, the links between organizational structure and innovation, the role of alliances and collaboration in supporting innovation activities, innovation, intellectual property and markets for technology, and issues of knowledge search and recombination. In addition to reviewing this broad literature, the course will also seek to identify gaps and promising areas for future research.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequsite course of BPOL 7500 (minimum grade D-). Restricted to Business Administration (BUAD) graduate students only.

**BPOL 7540 (1.5) Innovation I**
This 1.5 credit course in the sequence focuses on the management of innovation and technology in organizations. The course provides an introduction to the theoretical foundations of, and contemporary empirical research in, this area. The examination of the literature is organized around several broad topics. This course covers the foundational literature on the economics and management of innovation, including the nature and timing of technological innovations, the manner in which technological innovations alter the competitive landscape, the links between organizational structure and innovation, the evolving landscape of digital innovation. In addition to reviewing this broad literature, the course will also seek to identify gaps and promising areas for future research. May be repeated for up to 3 total credit hours.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Business Administration (BUAD) graduate students only.

**BPOL 7550 (1.5) Innovation II**
This 1.5 credit course in the sequence focuses on the management of innovation and technology in organizations. The course provides an introduction to the theoretical foundations of, and contemporary empirical research in, this area. The examination of the literature is organized around several broad topics. This course covers the role of collaboration in supporting innovation activities, intellectual property rights and markets for technology, issues of knowledge search and recombination, and the latest development in digital innovation and organizational forms. In addition to reviewing this broad literature, the course will also seek to identify gaps and promising areas for future research. May be repeated for up to 3 total credit hours.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Business Administration (BUAD) graduate students only.

**BPOL 7560 (1-3) Doctoral Seminar - Special Topics in Entrepreneurship**
Provides an introduction to the theoretical foundations of, and empirical research on, entrepreneurship. Our initial examination of the literature is organized around several broad topics associated with the identification, evaluation, and exploitation of opportunities and the creation of new organizations. Special topics in entrepreneurship that highlight recent advances in the field will also be addressed. The course will focus on the main questions that currently define the field and attempt to critically examine how, using a range of theoretical lens and methodologies, researchers have approached these questions.
**Requisites:** Requires prerequsite courses of BPOL 7500 and BPOL 7530 (all minimum grade D-).

**BPOL 7570 (1.5) Entrepreneurship I**
This 1.5 credit course in a sequence focuses on the theoretical foundations and methodological challenges of conducting research in entrepreneurship. Topics include the identification, evaluation, and exploitation of opportunities and the creation of new organizations. It provides an introduction to the theoretical foundations of, and empirical research on, entrepreneurship. The course will focus on the main questions that currently define the field and attempt to critically examine how, using a range of theoretical lens and methodologies, researchers have approached these questions. May be repeated for up to 3 total credit hours.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Business Administration (BUAD) graduate students only.

**BPOL 7580 (1.5) Entrepreneurship II**
This 1.5 credit course in a sequence focuses on the theoretical foundations and methodological challenges of conducting research in entrepreneurship. Topics include strategic entrepreneurship, innovation and entrepreneurship, social entrepreneurship, environmental entrepreneurship and other special topics in entrepreneurship that highlight recent advances in the field. In addition to reviewing this broad literature, the course seeks to identify research gaps and promising areas for future research. May be repeated for up to 3 total credit hours.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Business Administration (BUAD) graduate students only.

**BPOL 8900 (1-3) Independent Study**
Requires consent of instructor under whose direction study is taken. Departmental form required.

**BPOL 8990 (1-10) Doctoral Dissertation**

# Business Law (BSLW)

## Courses

**BSLW 4120 (3) Advanced Business Law**
Continuation of BCOR 3000. Covers sales and lease transactions, negotiable instruments, creditor rights and bankruptcy, secured transactions, agency, business organizations, protection of property, and other advanced topics in legal and regulatory environments. This course and BCOR 3000 cover the business law topics tested on the CPA exam.
**Equivalent - Duplicate Degree Credit Not Granted:** BSLW 5120
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**BSLW 4820 (1-3) Topics in Business Law**
Experimental course offered irregularly for purpose of presenting new subject matter in business law.

**BSLW 4900 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 3.00 total credit hours.

**BSLW 5120 (3) Advanced Business Law**
Covers sales and lease transactions, negotiable instruments, creditor rights and bankruptcy, secured transactions, agency, business organizations, protection of property, and other advanced topics in legal and regulatory environments. This course and BCOR 3000 cover the business law topics tested on the CPA exam.
**Equivalent - Duplicate Degree Credit Not Granted:** BSLW 4120
**Requisites:** Restricted to concurrent degree subplans of Accounting (C-ACCT), Finance and Accounting (C-FNCEACCT), Accounting and Acct Tax (C-ACCTACTX), Fin Acct Tax (C-FNCEACTX), or Accounting (ACCT) and Taxation (ACTX) graduate students only.

**BSLW 6900 (1-6) Independent Study**
**Requisites:** Restricted to Business (BUSN) graduate students only.

# Business Minor (BUSM)

## Courses

**BUSM 2010 (1.5) Principles of Marketing**
Introduces students to marketing concepts used in many types of organizations. Marketing activities are useful throughout business and society, for identifying, reaching, motivating, and satisfying people. The course covers both strategy and tactics. Marketing tactics include the well-known 4 P's framework: place, price, product, and promotion.
**Equivalent - Duplicate Degree Credit Not Granted:** BUSM 2001
**Requisites:** Requires corequisite of BUSM 2011. Restricted to Business Minors (BUSM-MIN).

**BUSM 2011 (1.5) Principles of Management**
Focuses on the knowledge and skills needed to effectively lead and manage in the workplace.
**Equivalent - Duplicate Degree Credit Not Granted:** BUSM 2001
**Requisites:** Requires corequisite of BUSM 2010. Restricted to Business Minors (BUSM-MIN).

**BUSM 2020 (1.5) Principles of Accounting**
Focuses on the development and interpretation of external financial reports. Topics range from the fundamentals of bookkeeping, to more complex accounting issues such as intangible assets, impairments and stock-based compensation.
**Equivalent - Duplicate Degree Credit Not Granted:** BUSM 2002
**Requisites:** Requires prerequisites or corequisites of BUSM 2010 and BUSM 2011 (all minimum grade D-). Requires corequisite of BUSM 2021. Restricted to Business Minors (BUSM-MIN).

**BUSM 2021 (1.5) Principles of Finance**
Focuses on the role of finance in large and small businesses. Topics include financial statement analysis, time value of money, stocks and bonds, capital budgeting analysis and investor expectations regarding risk and return.
**Equivalent - Duplicate Degree Credit Not Granted:** BUSM 2002
**Requisites:** Requires prerequisites or corequisites of BUSM 2010 and BUSM 2011 (all minimum grade D-). Requires corequisite of BUSM 2020. Restricted to Business Minors (BUSM-MIN).

**BUSM 3006 (3) Leading and Managing Across Cultures in Northern Europe**
Explains cultural differences in international management as it covers communication, organizational culture, strategy, negotiation and more in a multidisciplinary context. Gives students the opportunity to understand these topics through visits to companies, organizations and institutions in this region of Europe. These activities will be supplemented by formal lectures before and after meeting with international professionals.
**Equivalent - Duplicate Degree Credit Not Granted:** INBU 3333
**Requisites:** Requires prerequisite courses of BUSM 2001 and BUSM 2002 (all minimum grade D-). Restricted to Business Minors (BUSM-MIN) with a cumulative GPA of 2.50.

**BUSM 3007 (3) Business Solutions for the Developing World**
Conducted in Panama, the role of large and small businesses, the government, non-profit organizations and social enterprises, including those that support small businesses in developing countries as a means of eliminating poverty will be studied. Students will become immersed in the culture through home stays which will expedite their understanding of community culture, needs and opportunities.
**Requisites:** Requires prerequisite courses of BUSM 2001 and BUSM 2002 (all minimum grade D-). Restricted to Business Minors (BUSM-MIN) with a cumulative GPA of 2.50.

**BUSM 3010 (1.5) Product Development I**
Examines structures that support organizational innovation and change. Focuses on effective teamwork and tools needed during new product development to improve success.
**Equivalent - Duplicate Degree Credit Not Granted:** BUSM 3001
**Requisites:** Requires prerequisite of BUSM 2010, 2011, 2020 and 2021 (all minimum grade D-). Requires corequisite of BUSM 3011. Restricted to Business Minors (BUSM-MIN).

**BUSM 3011 (1.5) Product Development II**
Examines structures that support organizational innovation and change. Focuses on effective teamwork and tools needed during new product development to improve success.
**Requisites:** Requires prerequisite of BUSM 2010, 2011, 2020 and 2021 (all minimum grade D-). Requires corequisite of BUSM 3010. Restricted to Business Minors (BUSM-MIN).

**BUSM 3020 (1.5) Business and Financial Analytics I**
Focuses on the use of quantitative tools to interpret and solve important problems in business and finance. Makes use of spreadsheet modeling, analysis and mini-cases to present material. Ideal for those interested in quantitative methods and modeling.
**Equivalent - Duplicate Degree Credit Not Granted:** BUSM 3002
**Requisites:** Requires prerequisite of BUSM 2010, 2011, 2020 and 2021 (all minimum grade D-). Or if transferring in business credits, BCOR 2201, 2202, 2203 and 2204. Requires corequisite of BUSM 3021. Restricted to Business Minors (BUSM-MIN).

**BUSM 3021 (1.5) Business and Financial Analytics II**
Focuses of quantitative tools to interpret and solve important problems in business and finance. Makes use of spreadsheet modeling, analysis and mini cases to present material. Ideal for those interested in quantitative methods and modeling.
**Equivalent - Duplicate Degree Credit Not Granted:** BUSM 3002
**Requisites:** Requires prerequisite of BUSM 2010, 2011, 2020 and 2021 (all minimum grade D-). Or if transferring in business credits, BCOR 2201, 2202, 2203 and 2204. Requires corequisite of BUSM 3020. Restricted to Business Minors (BUSM-MIN).

**BUSM 3031 (3) Business Leadership**
This course is about leaders, leading and you. It is designed to help you think broadly about leadership and prepare you for leadership positions in a variety of careers. The course introduces management theories and how to apply them in the real world. We also engage in conversations about how generation shifts, technology changes, and recent economic and political trends influence the workplace. To translate theoretical concepts into practice, we use a mix of learning activities to ultimately provide useful guidelines for how best to lead throughout your career.
**Requisites:** Requires prerequisite courses of BUSM 2010, 2011, 2020 and 2021 (all minimum grade D-). Or if transferring in business credits, BCOR 2201, 2202, 2203 and 2204. Restricted to Business Minors (BUSM-MIN).

**BUSM 3040 (3) Doing Business in Europe**
Provides a meaningful global experience through an in-depth perspective of local business practices. Must apply through CU Education Abroad.
**Requisites:** Requires prerequisite courses of BUSM 2010, 2011, 2020 and 2021 (all minimum grade D-). Or if transferring in business credits, BCOR 2201, 2202, 2203 and 2204. Restricted to Business Minors (BUSM-MIN) with minimum cumulative GPA of 2.5 or greater.

**BUSM 3050 (3) Introduction to Real Estate**
Surveys a variety of real estate topics including real estate transaction law, real estate markets and valuation, real estate finance and investments, real estate development, real estate sustainability and real property and asset management. Concentrates on applying economic and finance concepts to real estate problems. Students comfortable with fundamental economic principles and with the mathematics of finance will do well in this class.
**Equivalent - Duplicate Degree Credit Not Granted:** REAL 2010 or REAL 3000
**Requisites:** Requires prerequisites of BUSM 2010, 2011, 2020 and 2021 (all minimum grade D-). Or if transferring in business credits, BCOR 2201, 2202, 2203 and 2204. Restricted to Business Minors (BUSM-MIN).

**BUSM 3060 (3) Environmental Sustainability in a Globalized World**
Rigorous survey of contemporary environmental sustainability problems that define, constrain and propel the business world. Apply lessons learned to real-world business problems in order to understand the broader social and ethical implications, think critically about the role business and science should have in creating policy, and develop a sense of civic responsibility to promote environmental sustainability and social justice.
**Requisites:** Requires prerequisite courses of BUSM 2010, 2011, 2020 and 2021 (all minimum grade D-). Or if transferring in business credits, BCOR 2201, 2202, 2203 and 2204. Restricted to Business Minors (BUSM-MIN).

**BUSM 4010 (3) Entrepreneurship and Innovation**
The Business Minor capstone focuses on the development of an entrepreneurial business plan using principles learned in earlier Business Minor courses. The course supplements business plan development with segments on professionalism and corporate social responsibility.
**Equivalent - Duplicate Degree Credit Not Granted:** BUSM 4001
**Requisites:** Requires prereq BUSM 2010/2011/2020 2021.Requires pre or coreq BUSM 3010/3011 or BUSM 3020/3021 or BUSM 3030 or 3031 or 3040 or 3050 or 3060(min grade D-).Or if transferring in BUSN credits, BCOR 2201/2202/2203 2204.Restricted to BUSN Minors (BUSM-MIN

# Business of Nonprofit (BUSO)

## Courses

**BUSO 2100 (3) No-Stress Leadership**
Equips students with the essential skills, knowledge, and mindset required to become effective leaders in today's fast-paced and challenging world. This course emphasizes a holistic approach to leadership that integrates personal well-being, emotional intelligence, and strategic decision-making to foster a productive and low-stress leadership style. The course will provide students with ways to help them manage their own stress to become leaders who can model well-being to their team members.

**BUSO 2200 (3) Sports Entrepreneurship**
Provides the tools necessary to think and act like an entrepreneur within the sports industry. The course covers the questions of how ventures are created within the sports industry and how founders and athletes can take advantage of the new Name, Image & Likeness opportunities. Other topics include the process to building a strong brand and how founders and athletes can leverage a strong brand.

**BUSO 3100 (3) The Business of Nonprofits**
Teaches students about the nonprofit sector, where they may eventually find themselves as volunteers, donors, board members, staff, leaders, or founders. This course takes students through the key issues in the lifecycle of a nonprofit organization: establishment of the legal entity, board and fund development, marketing, impact measurement, mission alignment, scaling and replicating, and sun-setting. Team project experience applying these key issues to a nonprofit organization.

**BUSO 3200 (3) Financial Markets and Institutions**
Surveys the fundamental classes of financial activity that underlie the economy. The course links financial markets to the financial institutions that regulate these markets. Topics include central banks, commercial banks, stock exchanges, interest rates, government bonds, mortgages, and cryptocurrencies. The course equips students to better understand contemporary events in financial markets and the economy in general.

# Career Services (CSVC)

## Courses

**CSVC 1000 (1) Work Internship**
Open to students in good academic standing, whose internship employers require that they receive course credit. The student must first seek to obtain academic credit through their major department. Will not count toward degree requirements in any UCB school or college. No appeals for credit toward degrees or for letter grades in the course will be entertained.
**Repeatable:** Repeatable for up to 3.00 total credit hours.

**CSVC 5000 (1-3) Work Internship**
Variable-credit course open to students in good academic standing, whose internship employers require that they receive course credit. The student must first seek to obtain academic credit through their major department. Will not count toward degree requirements in any UCB school or college. No appeals for credit toward degrees or for letter grades in the course will be entertained.
**Repeatable:** Repeatable for up to 3.00 total credit hours.

# Center for Western Civilization (CWCV)

## Courses

**CWCV 2000 (3) The Western Tradition**
Encourages a historical and critical investigation into the formative influences on what is often called Western culture, including religious, political, social and economic factors, and contemporary interpretations and critiques of these developments and concepts. Designed as the foundation course for the Center for Western Civilization.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arts Sciences Special Courses

**CWCV 2010 (3) Topics in Western Civilization**
Offers in-depth consideration of one or more foundational traditions in Western civilization.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.

**CWCV 2840 (1-3) Independent Study**
Requires sophomore standing.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).

**CWCV 3840 (1-3) Independent Study**
Requires junior standing.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-86 credits (Junior).

**CWCV 4000 (3) Foundations of Western Civilization**
Offers in-depth consideration of one or more foundational traditions in Western civilization.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Arts Sciences Special Courses

**CWCV 4840 (1-3) Independent Study**
Requires senior standing.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior).

# Center of the American West (CAMW)

## Courses

**CAMW 2001 (3) The American West**
Students tour the cultural, social, and natural features of the American West, based on readings and presentations by guest speakers from the CU faculty and from important professions and positions in the West. Designed as the foundation course in the Western American Studies certificate program.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomores).
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**CAMW 3939 (1-3) Center of the American West Internship**
Work for public and private organizations on projects that enhance the understanding of various Western American topics and issues (environmental, cultural, public policy, etc.), and which foster students' development as community leaders working for a sustainable West.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite CAMW 2001.

**CAMW 4840 (1-4) Independent Study: The American West**
Independent Study for Western American Studies certificate program
**Requisites:** Requires prerequisite course of CAMW 2001 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior).

# Central and East European Studies (CEES)

## Courses

**CEES 1623 (3) Introduction to Central and East European History since 1770**
Examines major themes and events in the history of East-Central Europe from the late 1700s to the present. Themes include the impacts of nationalism, fascism, liberal democracy and communism in shaping the history of the region. Topics include World War I, World War II and the Holocaust, the Cold War, the fall of Communism, the Ukrainian revolution and more.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 1623
**Additional Information:** Arts Sci Core Curr: Historical Context
Departmental Category: Arts Sciences Special Courses

# Chemical Engineering (CHEN)

## Courses

**CHEN 1000 (3) Creative Technology**
Delve into cutting-edge topics such as the science of climate change, biotechnology, biomedical devices, advanced materials, renewable energy, and environmental sustainability! This course will introduce undergraduate students to the most recent concepts in technology and how these concepts impact all aspects of life, including human health and the health of the planet.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEN 1100 (3) Gourmet Science: Exploring Chemistry, Biology, and Technology through Food**
This course explores chemistry, biology, and technology fundamentals through food. Ingredients utilized in cooking and baking processes demonstrate a breadth of key science and engineering concepts, intertwined with social significance and historical context. Students will learn about the chemical behaviors and biological interactions of molecules in food, understand critical ratios and reactions in baking and cooking, survey techniques and relevant technology, evaluate industrial and agricultural developments, and analyze global impacts of trade and policy on food science and engineering.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEN 1201 (4) General Chemistry for Engineers 1**
Designed to meet the general chemistry requirement for some engineering students and serve as part one for students whose academic plans require advanced work in chemistry. Topics include components of matter, stoichiometry, electron configuration, chemical bonding, molecular shapes, covalent bonding, classes of reactions, thermochemistry, gases, atomic structure, organic compounds, intermolecular forces, and phase equilibria. Examples and problems illustrate the application of chemistry to engineering sub-disciplines. Department enforced prerequisites: High school Algebra, one year of high school Chemistry or CHEM 1021 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 1211, CHEM 1113, CHEM 1400 and MCEN 1024
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates and IUT On Track applicants only.
**Recommended:** Not recommended for students with grade below B- in CHEM 1021.

**CHEN 1203 (2) General Chemistry for Engineers 2**
Designed for students whose academic plans require advanced work in chemistry. Topics include kinetics, solubility/solubility equilibria, acid-bases, buffers and titrations, thermodynamics, and electrochemistry. Examples and problems illustrate the application of chemistry to engineering sub-disciplines. AP Chemistry credit not accepted in lieu of any of these prereq classes.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 1211 or CHEM 1133 or CHEM 2100
**Requisites:** Requires prerequisite courses of CHEN 1201 or CHEM 1113 or MCEN 1024 (all minimum grade C-). Restricted to College of Engineering undergraduates (ENGRU) and IUT On Track applicants only.
**Recommended:** Corequisite CHEM 1221.

**CHEN 1211 (4) Accelerated Chemistry for Engineers**
One-semester lecture and recitation course designed for engineering students with more advanced chemistry backgrounds. Topics include stoichiometry; thermodynamics; gases, liquids, and solids; equilibrium; acids and bases; bonding concepts; kinetics; reactions; and materials science. Examples and problems illustrate the application of chemistry to engineering sub-disciplines. Department enforced prerequisite of 3, 4 or 5 on the AP Chemistry exam or equivalent IB scores or a passing score on the "Chemistry Readiness Exam for Engineers." Degree credit not granted for this course and CHEM 1113 and CHEM 1400 and CHEN 1201 and MCEN 1024.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates and IUT On Track applicants only.
**Recommended:** Corequisite CHEM 1221.

**CHEN 1300 (1) Introduction to Chemical and Biological Engineering**
Meets for one lecture per week. Examines the different fields of chemical engineering and chemical & biological engineering including energy, materials, pharma, and biomedical; addresses how to be successful in college and engineering; and showcases some of the opportunities here at CU.
**Requisites:** Restricted to Chemical Engineering, Chemical Biological Engineering, Biological Engineering, and open option (XXEN) majors only with a maximum of 50 credit hours.

**CHEN 1310 (3) Introduction to Engineering Computing**
Introduces the use of computers in engineering problem solving, including elementary numerical methods. Teaches programming fundamentals, including data and algorithm structure, and modular programming. Software vehicles include Excel/Vba and Matlab. Formerly GEEN 1300 and COEN 1300.
**Requisites:** Requires prerequisite or corequisite course of APPM 1340 or 1345 or 1350 or GEEN 3830 or MATH 1300 (all minimum grade C-). Restricted to College of Engineering majors and IUT On Track applicants only

**CHEN 1400 (3) Drugs, Driving and Dynamic Processes**
Project-based course that applies the principles of chemistry, biology, mechanics and electronics to the production and application of sustainable commodities (fuels, drugs, chemicals, and energy). Examples include student-developed green vehicles, sustainable nutraceuticals, or renewable electrical generation.
**Requisites:** Restricted to Chemical Engineering (CHEN) and Chemical and Biological Engineering (CBEN), and open option (XXEN) majors only with a maximum of 70 credit hours.

**CHEN 2120 (3) Chemical Engineering Material and Energy Balances**
Provides a basic understanding of chemical engineering calculations involving material and energy balances around simple chemical processes.
**Requisites:** Requires prerequisite courses of CHEN 1211 or CHEN 1201 or CHEM 1400 or CHEM 1113 or MCEN 1024 (all min grade C-). Requires corequisite courses of CHEN 1310 (CHEN 1203 or CHEM 1133). Restricted to Coll of Engineering mjrs IUT On Track applicants onl

**CHEN 2840 (1-4) Independent Study**
Available to sophomores with approval of Department of Chemical Engineering. Subject arranged to fit needs of student.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**CHEN 3010 (3) Applied Data Analysis**
Teaches students to analyze and interpret data. Topics include engineering measurements, graphical presentation and numerical treatment of data, statistical inference, and regression analysis.
**Requisites:** Requires prerequisite course of CHEN 1310 and APPM 2360 or MATH 2130 and MATH 3430 (all minimum grade C-). Restricted to College of Engineering students only.

**CHEN 3200 (3) Chemical Engineering Fluid Mechanics**
Introduces fluid mechanics and momentum transfer, emphasizing the application of these principles to chemical engineering systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 3313 and MCEN 3021
**Requisites:** Requires prereq courses of PHYS 1110 and (APPM 2350 or MATH 2400) and (CHEN 2120 or CVEN 2121 or GEEN 2851 or MCEN 2023) (all min grade C-).Requires prereq or coreq courses of APPM 2360 or (MATH 2130 and MATH 3430) (min grade C-). Restricted to ENGR mjr

**CHEN 3210 (4) Chemical Engineering Heat and Mass Transfer**
Examines conservation and transfer of mass and thermal energy. Focuses on conduction and convection of heat in the context of chemical processes and heat exchangers. Addresses radiation. Also studies mass transfer rate processes, including diffusion, microscopic material balances, and correlations for mass transfer coefficients.
**Requisites:** Requires prerequisite courses of (CHEN 3200 or MCEN 3021) and (APPM 2360 or MATH 3430) (minimum grade C-). Restricted to College of Engineering majors only

**CHEN 3211 (1) Chemical Engineering Mass Transfer**
Study of mass-transfer rate processes, including diffusion, convection, microscopic material balances, and correlations for mass-transfer coefficients. Requires department approval and a department-approved heat transfer course.
**Requisites:** Requires prerequisite course of either CHEN 3200 or MCEN 3021 (minimum grade C-). Restricted to College of Engineering (ENGRU) undergraduates only.

**CHEN 3220 (3) Chemical Engineering Separations**
Studies separation methods including distillation, absorption, extraction, and membranes, and graphical and computer-based solutions to separation problems. Applies mass transfer rate theory to packed and tray columns.
**Requisites:** Requires prerequisite courses of CHEN 3210 and CHEN 3320 and (CHEN 4521 or a prerequisite or corequisite of CHEM 4531) (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 3320 (3) Chemical Engineering Thermodynamics**
Applies thermodynamic principles to nonideal systems, phase equilibrium, chemical equilibrium, power generation, refrigeration, and chemical processes.
**Requisites:** Requires prerequisite courses of CHEN 2120 and (CHEN 4521 or a prerequisite or corequisite of CHEM 4531) and (APPM 2360 or MATH 3430) (all minimum grade C-). Restricted to College of Engineering majors only

**CHEN 3660 (3) Energy Fundamentals**
Explains the most important energy technologies and systems; provides tools to analyze performance using science and engineering principles. This course will investigate important energy concepts from sources and extraction to utilization, storage and efficiency. Topics include fossil fuels, hydropower, renewable energy, biofuels, carbon capture and waste disposal.
**Requisites:** Requires prerequisite courses of CHEN 1201 or CHEN 1211 or CHEM 1113 or MCEN 1024 and PHYS 1110 and APPM 1360 or MATH 2300 (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 3670 (3) Sustainable Design of Chemical and Materials Systems**
Explains the principles of green engineering and provides tools to analyze sustainability of engineered processes and materials. This course will investigate important sustainability concepts from utilization of renewable feedstocks for chemicals and materials manufacturing to recycling, waste elimination, and toxicology. Topics include analysis of environmental effects of chemical processes and products, mechanical and chemical recycling of plastics and other materials, minimizing fossil energy demands in manufacturing processes, and approaches to life cycle assessment of candidate technologies.
**Requisites:** Requires prerequisite courses of PHYS 1110 and (CHEN 1211 or CHEN 1201 or CHEM 1113 or MCEN 1024) and (APPM 1360 or MATH 2300) (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 3840 (1-4) Independent Study**
Available to juniors with approval of the Department of Chemical Engineering. Subject arranged to fit needs of the student.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**CHEN 3930 (6) Chemical Engineering Cooperative Education**
Students enrolled in this course participate in a previously arranged, department-sponsored cooperative education program.
**Requisites:** Requires prerequisite course of CHEN 2120 (minimum grade C-). At least a 2.85 cumulative GPA is required. Restricted to College of Engineering majors only.
**Recommended:** Prerequisite 3.00 GPA or higher.

**CHEN 4010 (2) Chemical Engineering Senior Thesis 1**
Provides an opportunity for advanced students to conduct exploratory research in chemical engineering.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**CHEN 4020 (2) Chemical Engineering Senior Thesis 2**
Continuation of CHEN 4010. This course and CHEN 4020 can substitute for CHEN 4130.
**Requisites:** Requires prerequisite course of CHEN 4010 (minimum grade C-). Restricted to College of Engineering students only.

**CHEN 4090 (1) Undergraduate Seminar**
Provides chemical engineering career and professional information, facilitates contact with faculty and industry representatives, and improves communication and leadership skills. Consists of a series of seminars and field trips and requires a research project involving a written and oral report.
**Requisites:** Restricted to Chemical (CHEN) Engineering or Chemical and Biological (CBEN) Engineering or Biological (BIEN) Engineering majors only.

**CHEN 4130 (3) Chemical Engineering Laboratory**
Involves planning and execution of chemical engineering experiments on mass transfer operations, separations, and chemical reactors. Interprets experimental data with theoretical principles and statistical analysis. Emphasizes communication with written memos, full reports, and oral presentations.
**Requisites:** Requires prerequisite courses of CHEN 3010 and CHEN 3220 and CHEN 3320 and CHEN 4330 (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 4330 (3) Kinetics and Reactor Design**
Introduces chemical kinetics and chemical reactor design. Involves mass and energy balances for steady-state and transient reactor systems. Also covers residence time distribution, mass transfer,catalytic reactions, and multiple steady states in reactors.
**Requisites:** Requires prerequisite courses of CHEN 3320 and CHEN 3210 and (CHEN 4521 or CHEM 4531) (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 4440 (3) Chemical Engineering Materials**
Introduces materials engineering, including properties of polymers, metals, ceramics, and semiconductors, especially as related to chemical engineering processes.
**Requisites:** Requires prerequisite courses of CHEN 3320 and CHEM 3311 (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 4450 (3) Polymer Chemistry**
Introduces polymer science with a focus on polymer chemistry and polymerization reactions. Focuses on polymerization reaction engineering and how polymer properties depend on structure.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 5450
**Requisites:** Requires prerequisite courses of CHEN 4830 or CHEN 4330 and CHEM 3311 (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 4460 (3) Polymer Engineering**
Introductory polymer engineering course reviewing basic terminology and definitions; the properties and synthetic routes of important industrial polymers; and processing of polymers and their applications.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 5460
**Requisites:** Requires prerequisite courses of CHEM 3311 and CHEN 3320 (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 4480 (3) Solar Cells and Optical Devices for Sustainable Buildings**
This course assumes no background in electronic materials and explains how silicon and cutting-edge metal halide perovskite solar cells are designed, fabricated and characterized. Topics will include optics, band diagrams, wafer fabrication, most thin film deposition techniques, module design and economics. Other optical devices that can help the world rapidly reduce its carbon emissions, such as light-emitting diodes and energy saving windows with dynamic tinting, will also be covered.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 5480
**Recommended:** Prerequisite a course in materials science (for example CHEN 4440), the physics of electromagnetism and optics at a very basic level.

**CHEN 4490 (3) Electrochemical Engineering**
This course discusses fundamentals and applications of electrochemical systems from an engineering perspective. Aspects of thermodynamics, reaction kinetics, and transport phenomena relevant to the description of electrode/electrolyte interfaces and charge transfer reactions are covered. Topics include cell equilibrium (Nernst equation), reactions rates within Butler-Volmer and Marcus theory, electrochemical double layer structure, ion transport (Poisson-Nernst-Planck equation), potential and current distributions in electrochemical cells, and experimental electroanalytical techniques. Applications include fuel cells, electrolyzers, batteries, sensors, and corrosion. Contact instructor to request to take prerequisites as corequisites.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 5490
**Requisites:** Requires prerequisite courses of (CHEN 4330 or CHEN 4830) and PHYS 1120 (minimum grade C-). Restricted to College of Engineering (ENGRU) undergraduates only.

**CHEN 4520 (3) Chemical Process Design**
Studies applied chemical process design including equipment specification and economic evaluation.
**Requisites:** Requires prerequisite courses of CHEN 3010 and CHEN 3210 and CHEN 3220 and CHEN 4330 or CHEN 4830 (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 4521 (3) Physical Chemistry for Engineers**
Examines the laws of classical thermodynamics followed by physical transformations of pure substances, the thermodynamics of simple mixtures and chemical equilibrium. Applies quantum theory to atomic and molecular structure. Presents the concepts and applications of statistical thermodynamics. Introduces rates of chemical reactions, reaction dynamics and catalysis.
**Requisites:** Requires prereq courses of APPM 2350 or MATH 2400 and CHEN 1211 or CHEN 1203 or CHEM 1133 (all min. grade C-). Requires a prereq or coreq course of APPM 2360 or MATH 2130 and MATH 3430 (min. grade C-). Restricted to College of Engineering majors only.

**CHEN 4530 (2) Chemical Engineering Design Project**
Provides a team-based capstone design experience for chemical engineering students. Projects are sponsored by industry and student design teams collaborate with industrial consultants. Projects consider chemical process and product design with emphasis on economic analysis. Deliverables include an oral mid-project design review, a final oral presentation and final written design report.
**Requisites:** Requires prerequisite course of CHEN 4520 (minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 4570 (4) Process Dynamics and Control**
Examines principles of controls theory and controls application to chemical processes. Focuses on feedback, feedforward and distributed control systems. Laboratory sessions cover measurement fundamentals, signal transmission, dynamic testing, control system synthesis, and implementation and adjustment.
**Requisites:** Requires prerequisite courses of CHEN 3220 and CHEN 4330 or BIEN 4830 and PHYS 1120 and APPM 2360 or MATH 2130 and MATH 3430 (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 4630 (1) Intellectual Property Law and Engineering**
Learn the fundamentals of the various types of intellectual property, obtain the ability to search the USPTO database for patents, learn the difference between provisional patents, utility patents and foreign patents and learn the timing requirements related to the filing of patents and public disclosure, use, and/or sale of an invention.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 5630
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) College of Engineering majors only.

**CHEN 4650 (3) Particle Technology**
Aims to identify the important physical mechanisms occurring in processes involving particles, formulate and solve mathematical descriptions of such processes, and analyze experimental and theoretical results in both a qualitative and quantitative manner. Teaches students to apply this knowledge to the design of particulate systems. Conveys the breadth and depth of natural and industrial applications involving particulates.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 5650
**Requisites:** Requires prerequisite courses of APPM 2360 or MATH 2130 and MATH 3430 and CHEN 3200 or MCEN 3021 (all minimum grade C-). Restricted to College of Engineering majors only.

**CHEN 4831 (1) Biokinetics and Bioreactors Module**
Study of biokinetics of enzyme reactions, cell growth and bioproduct formation. Design of batch, semi-batch and continuous bioreactors. Overview of biotechnology industry. Introduction to pharmacokinetics and drug delivery. Requires department approval and a department-approved kinetics and reactor design course.
**Requisites:** Requires prerequisite course CHEN 3210 (minimum grade C-). Restricted to College of Engineering (ENGRU) undergraduates only.

**CHEN 4836 (3) Nanomaterials**
Presents fundamental chemical and physical concepts that give rise to the unique optical, electronic and magnetic properties of nanoscale materials. Introduces important synthetic routes for producing nanomaterials, and interparticle forces governing colloidal behavior and self-assembly. Discusses current and potential applications in catalysis, biomedicine, renewable energy, and other fields.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 5836
**Requisites:** Require prerequisite or corequisite of CHEN 3320 (minimum grade C-). Restricted to College of Engineering students only.

**CHEN 4838 (1-3) Special Topics in Chemical Engineering**
Examines a special topic in Chemical Engineering.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**CHEN 4840 (1-4) Independent Study**
Available to seniors with approval of chemical engineering department. Subject arranged to fit needs of student.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) College of Engineering majors only.

**CHEN 5090 (1) Seminar in Chemical Engineering**
Required of all chemical engineering graduate students. Includes reports on research activities and on special current topics.
**Requisites:** Restricted to graduate students only.

**CHEN 5128 (3) Applied Statistics In Research and Development**
Students learn current and emerging statistical methods that are appropriate to experimentation in research and development activities. Statistical design of experiments and model fitting is emphasized. Department enforced prereq.: one introductory probability/statistics course.

**CHEN 5150 (3) Biomolecular Kinetics, Transport, and Thermodynamics**
Required for the Biological Engineering PhD. This course covers aspects of kinetics, transport, and thermodynamics as they relate to interactions between biomolecules and cells. These core subjects will be introduced within concepts common to cell biology, protein/genetic engineering, and signaling, among others. Undergraduate enrollment with instructor consent only.
**Recommended:** Prerequisites Introductory biology and/or biochemistry, linear algebra, differential equations, thermodynamics, organic chemistry.

**CHEN 5160 (3) Systems Analysis of Cells and Tissues**
Required for the Biological Engineering PhD. This course explores how to describe signaling and regulation networks present at the cell and tissue level. Topics include gene expression, stem cell differentiation, homeostasis, and others.
**Requisites:** Restricted to Chemical Engineering (CHEN) or Biological Engineering (BIEN) graduate students only.
**Recommended:** Prerequisite prior experience in introductory biology and/or biochemistry, linear algebra, differential equations, thermodynamics, and organic chemistry.

**CHEN 5210 (4) Transport Phenomena**
Considers continuum mechanics, emphasizing fundamental relationships for fluid mechanics and heat and mass transfer and their applications to engineering problems. Department enforced prerequisites: undergraduate courses in fluid mechanics, heat transfer, and differential equations.
**Requisites:** Restricted to students with 87-180 credits (Seniors) or graduate students only.

**CHEN 5360 (3) Catalysis and Kinetics**
Studies principles of chemical kinetics and catalytic reactions, emphasizing heterogeneous catalysis.
**Requisites:** Requires corequisite course of CHEN 4330. Restricted to Chemistry (CHEM) or Chemical Engineering (CHEN) graduate students only.

**CHEN 5370 (3) Intermediate Chemical Engineering Thermodynamics**
Reviews fundamentals of thermodynamics, application to pure fluids and mixtures, and physical equilibrium and changes of state. Examines the equation of state and computation of fluid properties for pure fluids, mixtures and solutions. Also looks at relations between thermodynamics and statistical mechanics. Department enforced prerequisite: an undergraduate course in chemical thermodynamics.
**Requisites:** Restricted to graduate students only.

**CHEN 5390 (3) Chemical Reactor Engineering**
Studies ideal and nonideal chemical reactors, including unsteady state behavior, mixing effects, reactor stability, residence time distribution and diffusion effects. Department enforced prerequisite: undergraduate course in chemical reactor design/kinetics.
**Requisites:** Restricted to graduate students only.

**CHEN 5420 (3) Physical Chemistry and Fluid Mechanics of Interfaces**
Covers thermodynamics of interfaces and surface tension measurement; adsorption at liquid-gas, liquid-liquid, and solid-gas interfaces; monolayers; conservation equations for a fluid interface; rheology of interfaces; surface tension driven flows; contact angle and wettability; and double layer phenomena.
**Requisites:** Requires prerequisite course of CHEN 3200 (minimum grade D-).

**CHEN 5440 (3-4) Design of Materials**
The course content includes introduction and study of important concepts in solid state physics (particularly those relevant for design of materials); origin, characterization and design of mechanical, electronic, optical, magnetic, thermal and electrochemical properties of materials; design of bulk and nanostructured composites; introduction to polymers and soft materials; fundamentals of colloids and interfaces; and nanoscale chemistry and physics for design or desired material properties.
**Grading Basis:** Letter Grade

**CHEN 5450 (3) Polymer Chemistry**
Introduces polymer science with a focus on polymer chemistry and polymerization reactions. Focuses on polymerization reaction engineering and how polymer properties depend on structure.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 4450
**Requisites:** Restricted to graduate students only.

**CHEN 5460 (3) Polymer Engineering**
Introductory polymer engineering course reviewing basic terminology and definitions; the properties and synthetic routes of important industrial polymers; and processing of polymers and their applications.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 4460
**Requisites:** Restricted to graduate students only.

**CHEN 5470 (3) Functional Materials Chemistry**
The synthesis, organization, and processing of materials can enable functional performance. Curriculum will overview the synthesis and design of functional organic and inorganic materials. A particular emphasis will be placed on structure-performance correlations between chemistry and materials organization. Topical foci will include polymers, biomaterials, and materials for energy.
**Recommended:** Prerequisite Introductory course(s) in materials or organic chemistry.

**CHEN 5480 (3) Solar Cells and Optical Devices for Sustainable Buildings**
This course assumes no background in electronic materials and explains how silicon and cutting-edge metal halide perovskite solar cells are designed, fabricated and characterized. Topics will include optics, band diagrams, wafer fabrication, most thin film deposition techniques, module design and economics. Other optical devices that can help the world rapidly reduce its carbon emissions, such as light-emitting diodes and energy saving windows with dynamic tinting, will also be covered.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 4480
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite a course in materials science (for example CHEN 4440), the physics of electromagnetism and optics at a very basic level.

**CHEN 5490 (3) Electrochemical Engineering**
This course discusses fundamentals and applications of electrochemical systems from an engineering perspective. Aspects of thermodynamics, reaction kinetics, and transport phenomena relevant to the description of electrode/electrolyte interfaces and charge transfer reactions are covered. Topics include cell equilibrium (Nernst equation), reactions rates within Butler-Volmer and Marcus theory, electrochemical double layer structure, ion transport (Poisson-Nernst-Planck equation), potential and current distributions in electrochemical cells, and experimental electroanalytical techniques. Applications include fuel cells, electrolyzers, batteries, sensors, and corrosion. Contact instructor to request to take prerequisites as corequisites.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 4490
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite courses of (CHEN 4330 or CHEN 4830) and PHYS 1120 or equivalents.
**Grading Basis:** Letter Grade

**CHEN 5630 (1) Intellectual Property Law and Engineering**
Learn the fundamentals of the various types of intellectual property, obtain the ability to search the USPTO database for patents, learn the difference between provisional patents, utility patents and foreign patents and learn the timing requirements related to the filing of patents and public disclosure, use, and/or sale of an invention.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 4630
**Requisites:** Restricted to graduate students only.

**CHEN 5650 (3) Particle Technology**
Aims to identify the important physical mechanisms occurring in processes involving particles, formulate and solve mathematical descriptions of such processes, and analyze experimental and theoretical results in both a qualitative and quantitative manner. Teaches students to apply this knowledge to the design of particulate systems. Conveys the breadth and depth of natural and industrial applications involving particulates. Extra work required for graduate course.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 4650
**Requisites:** Restricted to graduate students only.

**CHEN 5670 (3) Environmental Separations**
Lect. Covers traditional, as well as new, chemical separations processes that have environmental applications. Includes chemically benign processing (pollution prevention) as well as approaches to address existing pollution problems.

**CHEN 5730 (1) Mathematical Methods Short Course for Chemical Engineers**
Determine and apply appropriate analytical methods, which may include linear and nonlinear algebraic equations, ordinary differential equations and partial differential equations, to solve an array of chemical engineering problems. Identify and interpret the differences between model predictions and experimental results.
**Grading Basis:** Letter Grade

**CHEN 5740 (3) Analytical Methods in Chemical Engineering**
Presents applied analytical and numerical mathematical methods in the context of chemical engineering problems. Topics include modeling techniques, algebraic equations, and ordinary and partial differential equations. Department enforced requisite: working knowledge of computing, calculus, differential equations, linear algebra, and vector operations; and undergraduate courses in physics, fluid mechanics, heat transfer, and reaction engineering.
**Requisites:** Restricted to students with 87-180 credits (Seniors) or graduate students only.

**CHEN 5750 (3) Numerical Methods in Chemical Engineering**
Covers numerical methods for solving ordinary differential, partial differential, and integral equations. These principles are employed to develop, test, and assess computer programs for solving problems of interest to chemical engineers.
**Requisites:** Restricted to graduate students only.

**CHEN 5800 (3) Bioprocess Engineering**
Reviews the recent developments in the fields of microbiology, molecular genetics, and genetic engineering that are of commercial value and benefit to mankind. Covers engineering implementation of such biological processes.

**CHEN 5805 (3) Biological Interactions to Biomaterials**
Covers major classes of materials used in medical applications. Provide an in-depth view of advanced biomaterial concepts with a focus on biological interactions with materials that relate to protein and cell interactions, the innate and acquired immune response, blood interactions and infection.
**Requisites:** Restricted to graduate students only.

**CHEN 5830 (1) Introduction to Modern Biotechnology**
Introduces students to the biotechnology enterprise. Topics include the biotechnology industry and profession, the various academic disciplines of biotechnology, intellectual property, financing, and ethics.

**CHEN 5831 (2) Biotechnology Case Studies**
Capstone course required of all graduate students in the interdisciplinary graduate biotechnology certificate program. Reviews molecular genetics, product synthesis and purification, economics, intellectual property, and business planning. Working in teams, students present a biotechnology product plan.
**Requisites:** Requires prerequisite course of CHEN 5830 (minimum grade D-).

**CHEN 5835 (3) Colloids and Interfaces**
Provides a deep exploration of the fundamental principles of colloid and interface science and of related applications. Core topics include fundamental equations of interfacial science, capillary phenomena, interfacial thermodynamics interfaces, molecular monolayers, electrical surface properties, and interfacial a forces. Advanced topics include wetting phenomena, adsorption isotherms, dynamic interfacial behavior, surface modification, tribiology, surfactant self-assembly, and foams/emulsions among others.
**Requisites:** Requires prerequisite course of CHEN 3320 (minimum grade C-).

**CHEN 5836 (3) Nanomaterials**
Presents fundamental chemical and physical concepts that give rise to the unique optical, electronic and magnetic properties of nanoscale materials. Introduces important synthetic routes for producing nanomaterials, and interparticle forces governing colloidal behavior and self-assembly. Discusses current and potential applications in catalysis, biomedicine, renewable energy, and other fields.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 4836
**Requisites:** Restricted to graduate students only.

**CHEN 5838 (1-3) Special Topics in Chemical Engineering**
Graduate-selected topics courses offered upon demand.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**CHEN 5840 (1-4) Independent Study**
Allows multiple enrollment in term.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**CHEN 5900 (3) Pharmaceutical Biotechnology**
Incorporates biochemistry, pharmaceutical science, and engineering for application in the pharmaceutical industry. Emphasizes microscale mechanisms affecting drug delivery, bioavailability, and stability. Specific topics include thermodynamics of macromolecular conformational stability, crystallization kinetics, interfacial phenomena, and industrial protein folding.
**Requisites:** Restricted to graduate students only.

**CHEN 5919 (1-5) Special Topics in CHBE**
**Repeatable:** Repeatable for up to 5.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEN 5930 (1-3) Professional Internship**
This class provides a structure for CHEN and BIEN graduate students to receive academic credit for participating in internship experiences with industry partners that have an academic component consistent with graduate-level education in the engineering arts and sciences. Participation in this class requires an internship agreement between the student and the employment (industry) partner, detailing the academic goals of the internship experience. Instructor participation will include facilitation of mid-term and final assessment of student performance as well as additional educational opportunities during the internship period. May be taken during any term following initial enrollment and participation in CHEN or BIEN graduate programs.
**Requisites:** Restricted to graduate students only.

**CHEN 6210 (3) Microhydrodynamics of Suspensions and Colloids**
Focuses on fluid mechanics and colloid science of suspensions of particles, cells, and drops. Covers fundamentals, applications, and research frontiers.
**Requisites:** Requires prerequisite course of CHEN 5210 (minimum grade D-).

**CHEN 6820 (3) Biochemical Engineering Fundamentals**
Covers design and operation of fermentation processes, microbial and enzyme kinetics, multiple substrate and multiple species of fermentation, regulation of enzyme activity, energetics of cellular growth, immobilized enzyme and cell reactors, and transport phenomenain microbial systems and downstream processing.
**Requisites:** Restricted to Chemistry (CHEM), Chemical Engineering (CHEN), Biological Engineering (BIEN), or Biological Sciences (MCDB) graduate students only.

**CHEN 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.

**CHEN 6950 (1-6) Master's Thesis**

**CHEN 8990 (1-10) Doctoral Dissertation**

# Chemistry (CHEM)

## Courses

**CHEM 1011 (3) Environmental Chemistry 1**
Introduces basic principles of chemistry with applications to current environmental issues including toxic chemicals, air and water pollution, energy sources and their environmental impact, and climate change resulting from the greenhouse effect. No credit given to chemistry or biochemistry majors for this course if students already have credit in any college-level chemistry course numbered 1113/1114 or higher.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Chemistry
MAPS Course: Natural Science
MAPS Course: Physics

**CHEM 1021 (4) Introductory Chemistry**
For students with no high school chemistry or a very weak chemistry background. Remedies a deficiency in natural science MAPS requirements and prepares students for CHEM 1113 and CHEM 1114 or CHEM 1400 and CHEM 1401. No credit given to chemistry or biochemistry majors for this course if students already have credit in any college-level chemistry course numbered 1113/1114 or higher. Department enforced prerequisite: one year high school algebra or concurrent enrollment in MATH 1011.
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science Lab or Lab/Lec

**CHEM 1031 (4) Environmental Chemistry 2**
Applications of chemical principles to current environmental issues including acid rain, stratospheric ozone depletion, the Antarctic ozone hole, solar energy conversion and fuel cells, and the environmental consequences of nuclear war. Laboratory experience is included. No credit given to chemistry or biochemistry majors this course if students already have credit in any college-level chemistry course numbered 1113/1114 or higher.
**Requisites:** Requires prerequisite course of CHEM 1011 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 1113 (4) General Chemistry 1**
Intended for first-semester students whose academic plans require advanced work in chemistry. Subjects: components of matter, stolchiometry, classes of reactions, gases, thermochemistry, atomic structure, electron configuration, chemical bonding, molecular shapes, covalent bonding, organic compounds, intermolecular forces, equilibrium. Department enforced prerequsites: one year high school chemistry or CHEM 1021 (min grade C-); high school math through pre-calculus. Not recommended for students with grades below B- in CHEM 1021. Department enforced corequsite: CHEM 1114. Not open to engineering students with exception of EPEN majors.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 1400 and CHEN 1211 and MCEN 1024 and CHEN 1201
**Requisites:** AMEN, AREN, ASEN, CHEN, CSEN, CVEN, ECEN, EEEN, EVEN, MCEN, OPEN or CBEN majors are not allowed to take this class.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 1114 (1) Laboratory in General Chemistry 1**
Lab. Intended for first-semester students whose academic plans require advanced work in chemistry. Instruction in experimental techniques which coordinate with lecture topics in CHEM 1113. Department enforced prerequisites: one year high school chemistry or CHEM 1021 (min grade C-); high school math through pre-calculus. Not recommended for students with grades below B- in CHEM 1021. Department enforced corequisites: CHEM 1113 or CHEN 1201.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 1401 or CHEM 1221
**Requisites:** ASEN, ECEN, EEEN, EVEN, and MCEN majors may not enroll in this course.
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 1133 (4) General Chemistry 2**
Intended for second-semester students whose academic plans require advanced work in chemistry. Subjects: acid-base equilibria, buffers and titrations, thermodynamics, redox reactions, electrochemistry, transition elements and their coordination compounds, solubility/solubility equilibria, crystal field theory, kinetics, nuclear chemistry. Department enforced corequisite: CHEM 1134.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 2100
**Requisites:** Requires prerequisite courses of CHEM 1113 and CHEM 1114 or CHEM 1400 and CHEM 1401 or CHEN 1211 and CHEM 1221 or CHEN 1201 and CHEM 1114 or CHEN 1203 and CHEM 1221 (all minimum grade C-).
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 1134 (1) Laboratory in General Chemistry 2**
Intended for second-semester students whose academic plans require advanced work in chemistry. Instruction in experimental techniques which coordinate with lecture topics in CHEM 1133. Department enforced corequisite: CHEM 1133.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 2101
**Requisites:** Requires prerequisite courses of CHEM 1113 and CHEM 1114 or CHEM 1400 and CHEM 1401 or CHEN 1211 and CHEM 1221 or CHEN 1201 and CHEM 1114 or CHEN 1203 and CHEM 1221 (all minimum grade C-).
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 1221 (1) Engineering General Chemistry Lab**
Meets general chemistry laboratory requirement for engineering students. Designed to illustrate chemical concepts and introduce basic techniques in chemical measurement and synthesis. Department enforced prerequisites: one year of high school chemistry or CHEM 1021 (min. grade C-) and high school algebra; B- in CHEM 1021 recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 1114 or CHEM 1401
**Requisites:** Requires prerequisite course of CHEN 1211 or CHEM 1133 (minimum grade C-), or corequisite course of CHEN 1211 or CHEM 1133. Restricted to undergraduate engineering students and IUT On Track applicants.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 1400 (4) Foundations of Chemistry**
Covers core concepts in chemistry: nature of matter (atomic and molecular structure, bonding and macroscopic properties), transformations of matter (chemical reactivity), and quantifying chemical transformations (thermochemistry, thermodynamics and kinetics). Emphasizes critical thinking and cultivate core problem solving skills utilized by scientists. Intended for first semester CHEM/BCHM majors. Department enforced prerequisites: one year high school chemistry or CHEM 1021 (minimum grad C-) and high school math through pre-calculus. Not recommended for students with grades below B- in CHEM 1021. Department enforced corequisite: CHEM 1401.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 1113 and MCEN 1024 and CHEN 1211 and CHEN 1201
**Requisites:** Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 1401 (1) Foundations of Chemistry Lab**
Coordinates with lecture topics in CHEM 1400. Intended for first-semester CHEM and BCHM majors. Emphasizes the development of hands-on practical laboratory skills, experimental design, data interpretation, problem solving and open inquiry. Department enforced prerequisites: one year high school chemistry or CHEM 1021 (minimum grad C-) and high school math through pre-calculus. Not recommended for students with grades below B- in CHEM 1021. Department enforced corequsite: CHEM 1400.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 1114 or CHEM 1221
**Requisites:** Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 2100 (4) Foundations of Chemistry 2**
Covers the energetic principles that determine when chemical reactions occur and the dynamic principles that determine how rapidly they will occur. Applications include ionic equilibria in solution (acids and bases, buffers and titrations), oxidation-reduction reactions, electrochemistry and chemical kinetics. These applications will be situated in a context of current research problems in areas such as renewable energy and atmospheric chemistry. Department enforced corequisite: CHEM 2101.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 1133
**Requisites:** Requires prerequisite courses of CHEM 1400 and CHEM 1401 (minimum grade C-) or CHEM 1113 and CHEM 1114 (minimum grade B) and prerequisite or corequisite of MATH 2300 or APPM 1360 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 2101 (1) Laboratory in Foundations of Chemistry 2**
Coordinates with the lectures topics in CHEM 2100. Emphasizes the acquisition of more advanced laboratory skills, experimental design, data interpretation and analysis. Department enforced corequisite: CHEM 2100.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 1134
**Requisites:** Requires prerequisite courses of CHEM 1400 and CHEM 1401 (minimum grade C-) or CHEM 1113 and CHEM 1114 (minimum grade B) and prerequisite or corequisite of MATH 2300 or APPM 1360 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 3151 (3) Air Chemistry and Pollution**
Examines the composition of the atmosphere, and sources of gaseous and particulate pollutants: their chemistry, transport and removal from the atmosphere. Applies general principles to acid rain, smog and stratospheric ozone depletion. Department enforced prerequisite: two semesters of chemistry.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 3500
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 3251 (3) Sustainable Energy from a Chemistry Perspective**
Explores qualitative and quantitative chemical aspects of energy systems (production, transmission, storage, utilization) including fossil, wind, solar, nuclear and biomass energy. Applies chemical principles including composition, structure, bonding, physical properties, thermodynamics, equilibrium and kinetics to energy systems and sustainability, especially environmental implications. Describes the importance of energy to the chemical industries and society as a whole.
**Requisites:** Requires prerequisite course of CHEM 1133 and 1134 or CHEM 2100 and 2101 or CHEN 1211 and CHEM 1221 (all minimum grade C-).

**CHEM 3311 (4) Organic Chemistry 1**
Intended primarily for nonmajors. Topics include structure and reactions of alkanes, alkenes, alkynes, alkyl halides, and aromatic molecules; nomenclature of organic compounds; stereochemistry; reaction mechanisms and dynamics. Department enforced corequisite: CHEM 3321.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 3451
**Requisites:** Requires prerequisite course of (CHEM 1133 and CHEM 1134) or (CHEM 1400 and CHEM 1401) or (CHEM 2100 and CHEM 2101) or (CHEN 1211 and CHEM 1221) or (CHEN 1203 and CHEM 1221) (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 3321 (1) Laboratory in Organic Chemistry 1**
Instruction in experimental techniques of modern organic chemistry emphasizing chemical separations and reactions of alkanes, alkenes, and aromatic compounds. Stereochemical modeling and the identification of organic unknowns by spectroscopic and chemical methods are also introduced. Department enforced corequsite: CHEM 3311 or CHEM 3451.
**Requisites:** Requires prerequisite course of (CHEM 1133 and CHEM 1134) or (CHEM 1400 and CHEM 1401) or (CHEM 2100 and CHEM 2101) or (CHEN 1211 and CHEM 1221) or (CHEN 1203 and CHEM 1221) (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 3331 (4) Organic Chemistry 2**
Lect. and rec. Intended primarily for nonmajors. Topics include structure and reactions of alkyl halides, alcohols, ethers, carboxylic acids, aldehydes, ketones, and amines; introduction to the chemistry of heterocycles, carbohydrates, and amino acids; nomenclature of organic compounds; synthesis; and reaction mechanisms. Department enforced corequsite: CHEM 3341 or CHEM 3381.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 3471 or BCHM 3491
**Requisites:** Requires prerequisite courses of (CHEM 3311 or CHEM 3451) and CHEM 3321 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 3341 (1) Laboratory in Organic Chemistry 2**
Lab. Instruction in experimental techniques of modern organic chemistry emphasizing reactions involving alcohols, ketones, carboxylic acids, and their derivatives. Department enforced corequsite: CHEM 3331 or CHEM 3471 or BCHM 3491.
**Requisites:** Requires prerequisite courses of (CHEM 3311 or CHEM 3451) and CHEM 3321 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 3381 (2) Laboratory in Advanced Organic Chemistry**
Lab. Instruction in experimental techniques of modern organic chemistry, emphasizing chemical literature, advanced spectroscopy, and reactions involving organometallic compounds, microwave chemistry, and column chromatography. Multistep syntheses are also introduced, including an independent synthesis project.
**Requisites:** Requires prerequisite courses of (CHEM 3331 or CHEM 3471 or BCHM 3491) and CHEM 3341 (all minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 3451 (4) Organic Chemistry 1 for Chemistry and Biochemistry Majors**
Covers bonding, acidity, reaction mechanisms, nomenclature of organic compounds; stereochemistry; structure and reactions of aldehydes, ketones, and carboxylic acids and derivatives. Department enforced corequisite: CHEM 3321.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 3311
**Requisites:** Requires prerequisite courses of (CHEM 1133 and CHEM 1134) or (CHEM 1400 and CHEM 1401) or (CHEM 2100 and CHEM 2101) or (CHEN 1211 and CHEM 1221) or (CHEN 1203 and CHEM 1221) (all min grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) mjrs
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 3471 (4) Organic Chemistry 2 for Chemistry Majors**
Covers Amines, alkylation reactions, additions to unsaturated C-C bonds, aromaticity, and aromatic reactivity, organic materials, biomolecules, nomenclature of organic compounds, reaction mechanisms. Department enforced corequsite: CHEM 3341.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 3331 or BCHM 3491
**Requisites:** Requires prerequisite courses of (CHEM 3311 or CHEM 3451) and CHEM 3321 (all minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4011 (3) Modern Inorganic Chemistry**
Required course for chemistry majors. Introduces modern inorganic chemistry for undergraduates. Includes atomic structure, chemical periodicity, structure and bonding in molecules and crystals, reaction mechanisms, chemistry of selected main group and transition elements, and emphasis on catalyst, materials, bioinorganic, and organometallic systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 5011
**Requisites:** Requires prerequisite course of CHEM 3331 or CHEM 3471 or CHEM 3491 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4021 (3) Inorganic Laboratory**
One lect. and two 3-hour labs per week. Instruction in experimental techniques of modern inorganic chemistry. Includes syntheses and spectroscopic characterizations of transition metal and main group compounds, experience in manipulation of air sensitive compounds, and techniques involving unusual conditions of pressure or temperature.
**Requisites:** Requires prerequisite course of CHEM 4011 (minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4141 (3) Environmental Water and Soil Chemistry**
Application of basic chemical principles to understanding the processes that determine the chemical composition of oceans, lakes, rivers, soils and sediments. Topics include air-water exchange; acid-base, redox, coordination, precipitation and dissolution, ion exchange and sorption reactions; nutrient chemistry; and the use of simple equilibrium and kinetic models for describing the chemistry of inorganic and organic species in air-water-soil systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 5141
**Requisites:** Requires prerequisite course of CHEM 2100 and CHEM 2101 or CHEM 1133 and CHEM 1134 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4171 (3) Instrumental Analysis - Lecture and Laboratory 1**
Two Lect. and 3 hours of lab per week. Instruction and experience in using instrumental methods of chemical analysis to address problems in chemistry, biochemistry, industrial chemistry and environmental chemistry.
**Requisites:** Requires prerequisite course of CHEM 3331 or CHEM 3471 or CHEM 3491 and CHEM 3341 or CHEM 3381 and PHYS 1140 or CHEM 4400 or CHEM 4511 (minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4181 (3) Instrumental Analysis - Lecture and Laboratory 2**
Two lect. and 3 hours of lab per week. Instruction and experience in using instrumental methods of chemical analysis. Builds on material learned in CHEM 4171.
**Requisites:** Requires prerequisite course of CHEM 4171 (minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4251 (3) Materials Chemistry and Properties**
Lec. Understanding of materials from chemistry perspective including metals, oxides, semiconductors and polymers. Basic description of chemical preparation of materials. Overview of fundamental properties of materials including structural, chemical, mechanical, thermal, electrical, and optical properties. Description of behavior of materials and various applications in modern technology. Discussion of materials characterization methods.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 5251
**Requisites:** Requires prerequisite course of CHEM 3331 or CHEM 3471 or CHEM 3491 and CHEN 4521 or CHEM 4531 (all minimum grade grade C-).

**CHEM 4261 (3) Organic Materials: Structures and Functions**
Overview of the preparation and functioning mechanism of novel organic materials that have recently been developed, including conductive polymers, 2-D macrocyclic structures, 3-D molecular cages, molecular machines/muscles/switches, fullerene derivatives and carbon nanotube composites. Emphasizes the use of organic and physical chemistry as tools to develop novel materials and probe their structure-property relationship.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 5261
**Requisites:** Requires prerequisite courses of CHEM 3331 or CHEM 3471 or CHEM 3491 and CHEM 4531 (all minimum grade grade C-).

**CHEM 4271 (3) Chemistry of Solar Energy**
Chemical principles of conversion of solar energy into electricity and fuels in molecular and semiconductor-based systems. Overview of solid-state electronic structure of materials and interfaces, light-matter interactions, principles of harvesting photoexcited currents and useful chemical species. Description of processes utilized in established and emerging solar energy technologies.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 5271
**Requisites:** Requires prerequisite courses of CHEM 3331 or CHEM 3471 or CHEM 3491 and CHEM 4531 (all minimum grade grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4511 (3) Physical Chemistry 1**
Chemical thermodynamics and kinetics. Includes study of laws of thermodynamics, thermochemistry, entropy, free energy, chemical potential, chemical equilibriums, and the rates and mechanisms of chemical reactions. Department enforced prereq or coreq., PHYS 1120 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 4400 and BCHM 5400
**Requisites:** Requires prereq courses of CHEM 1133 CHEM 1134 or CHEM 2100 CHEM 2101 or CHEN 1211 CHEM 1221 and MATH 2400 or APPM 2350 and PHYS 1110 or PHYS 1115 or PHYS 2020 (all minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4531 (3) Physical Chemistry 2**
Lect. Introduces the quantum theory of atoms, molecules and chemical bonding, and statistical thermodynamics. Includes principles of quantum mechanics and their application to atomic structure, molecular spectroscopy, symmetry properties, and the determination of molecular structure. Also includes principles of statistical mechanics and their applications to properties of gases, liquids, and solids.
**Requisites:** Requires prerequisite courses of CHEM 4511 and PHYS 1120 or PHYS 2020, and MATH 2400 or APPM 2350 (all minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4555 (4) Theoretical and Computational Chemistry**
Explores computational methods to understand chemical systems. Topics include: atomic and molecular electronic structure calculations, Monte Carlo and molecular dynamics simulations and thermodynamic calculations. Not recommended for students with a grade below B- in the prerequisite course.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 5555
**Requisites:** Requires prerequisite course of CHEM 4531 (minimum grade C-).
**Grading Basis:** Letter Grade

**CHEM 4581 (1) Physical Chemistry Lab 1**
One 3-hour lab per week. Instruction in experimental techniques of modern physical chemistry. Experiments illustrate the fundamental principles of thermodynamics and chemical kinetics. Illustrates the material discussed in CHEM 4511.
**Requisites:** Requires prerequisite or corequisite course of CHEM 4511 (minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4591 (2) Physical Chemistry Lab 2**
One lect. and one 3-hour laboratory every two weeks. a continuation of CHEM 4581, but may be taken concurrently with CHEM 4531. Experiments illustrate the principles of quantum chemistry and spectroscopy discussed in CHEM 4531.
**Requisites:** Requires prerequisite courses of CHEM 4511 and CHEM 4581 (all minimum grade C-). Requires prerequisite or corequisite course of CHEM 4531 (minimum grade C-). Restricted to Chemistry (CHEM) or Biochemistry (BCHM) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**CHEM 4901 (1-6) Independent Study in Chemistry**
For undergraduate study. Department consent required. Repeatable up to 8 total credit hours.
**Repeatable:** Repeatable for up to 8.00 total credit hours.

**CHEM 5011 (3) Advanced Inorganic Chemistry 1**
Inorganic chemistry based on principles of bonding, structure, reaction mechanisms, and modern synthetic methods. Chemistry and general properties of representative and transition elements and their compounds.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 4011
**Requisites:** Requires prerequisite courses of CHEM 4011 and CHEM 4531 (all minimum grade B-) or graduate standing.

**CHEM 5061 (3) Advanced Inorganic Chemistry 2**
Lectures in physical inorganic chemistry with an emphasis on topics for understanding modern solar energy conversion to electricity and fuels. Includes a description of bonding and properties of coordination compounds in terms of the ligand field and molecular orbital theories. The primary research literature will be used to motivate exploration of relevant themes including spectroscopy, electron transfer, energy transfer, bioenergetic conversion, and small-molecule activation.
**Requisites:** Requires prerequisite course of CHEM 4011 (minimum grade C-) or graduate standing.

**CHEM 5121 (3) Practical Laboratory Skills for Analytical Chemistry**
Practical laboratory skills for research in experimental analytical and atmospheric chemistry (and related fields such as physical chemistry). Short lectures followed by hands-on laboratory practice and discussion. Topics covered include gases and flows; electricity and signals; key environmental measurements; data acquisition and other advanced topics.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CHEM 5131 (3) Computer Programming and Data Analysis for Chemists**
Provides an introduction to computer programming and data analysis skills that are a fundamental part of graduate research. The programming section of the course introduces the coding skills necessary for simulating, analyzing and visualizing data using IGOR Pro and for acquiring data and analyzing data using LabVIEW. Basic concepts in statistics and error analysis are also covered.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CHEM 4511 or CHEM 4171.
**Grading Basis:** Letter Grade

**CHEM 5141 (3) Environmental Water and Soil Chemistry**
Application of basic chemical principles to understanding the processes that determine the chemical composition of oceans, lakes, rivers, soils and sediments. Topics include air-water exchange; acid-base, redox, coordination, precipitation and dissolution, ion exchange and sorption reactions; nutrient chemistry; and the use of simple equilibrium and kinetic models for describing the chemistry of inorganic and organic species in air-water-soil systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 4141
**Requisites:** Restricted to graduate students only.

**CHEM 5151 (3) Atmospheric Chemistry**
Lect. Basic kinetics and photochemistry of atmospheric species. Stratospheric chemistry with emphasis on processes controlling ozone abundance. Tropospheric chemistry focusing on photochemical smog, acid deposition, oxidative capacity of the atmosphere and global climate change.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5151
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite one semester of college-level chemistry.

**CHEM 5152 (3) Advanced Atmospheric Chemistry**
Follows Graduate Atmospheric Chemistry (CHEM 5151) and explores advanced topics in atmospheric chemistry, such as secondary aerosol formation, oxidant formation, the chemistry of global climate change and/or design of advanced laboratory experiments.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5152
**Recommended:** Prerequisite CHEM 5151 or ATOC 5151.

**CHEM 5161 (3) Analytical Atmospheric Spectroscopy**
Optical spectrochemical analysis, atmospheric transmittance, including atomic and molecular spectroscopy, line-by-line spectral databases such as HITRAN, absorption, emission, fluorescence, scattering processes of gases, surface enhancements, aerosols, optical spectroscopic instrument components, and techniques, and their applications to atmospheric, and environmental problems. Department enforced prereq., undergraduate physical chemistry or instructor consent.
**Requisites:** Restricted to graduate students only.

**CHEM 5171 (3) Electroanalytical Chemistry**
Lect. Establishes a background for understanding electrochemical systems through a review of the relevant thermodynamic, kinetic and electronic principles. Compares classical and modern electrochemical methods of analysis. Several special topics are discussed in depth. Department enforced prerequisite: undergraduate physical chemistry or instructor consent.
**Requisites:** Restricted to graduate students only.

**CHEM 5181 (3) Mass Spectrometry, Chromatography, and Computer Programming**
Covers mass spectrometry, including instrumentation, ionization techniques, and interpretation of spectra. Analytical separation methods such as gas and liquid chromatography, ion mobility, and capillary electrophoresis. Introduction to atmospheric chemistry applications. Computer programming (Igor and LabVIEW) and simulation of instrumentation and processes. Department prerequisite: basic computer programming (or willingness to work hard on it), and undergraduate physics, statistics, and physical chemistry.
**Requisites:** Restricted to graduate students only.

**CHEM 5251 (3) Materials Chemistry and Properties**
Lec. Understanding of materials from chemistry perspective including metals, oxides, semiconductors and polymers. Basic description of chemical preparation of materials. Overview of fundamental properties of materials including structural, chemical, mechanical, thermal, electrical, and optical properties. Description of behavior of materials and various applications in modern technology. Discussion of materials characterization methods.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 4251
**Requisites:** Requires prerequisite course of CHEM 4431 or CHEM 4531 (all minimum grade C-) or graduate standing.

**CHEM 5261 (3) Organic Materials: Structures and Functions**
Overview of the preparation and functioning mechanism of novel organic materials that have recently been developed, including conductive polymers, 2-D macrocyclic structures, 3-D molecular cages, molecular machines/muscles/switches, fullerene derivatives and carbon nanotube composites. Emphasizes the use of organic and physical chemistry as tools to develop novel materials and probe their structure-property relationship.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 4261
**Requisites:** Requires prerequisite course of CHEM 4431 or CHEM 4531 (all minimum grade C-) or graduate standing.

**CHEM 5271 (3) Chemistry of Solar Energy**
Chemical principles of conversion of solar energy into electricity and fuels in molecular and semiconductor-based systems. Overview of solid-state electronic structure of materials and interfaces, light-matter interactions, principles of harvesting photoexcited currents and useful chemical species. Description of processes utilized in established and emerging solar energy technologies.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 4271
**Requisites:** Requires prerequisite course of CHEM 4431 or CHEM 4531 (all minimum grade C-) or graduate standing.

**CHEM 5281 (3) Semiconductor Processing and Device Fabrication**
Understanding of semiconductor processing and device fabrication from chemistry perspective. Overview of processing steps used to fabricate inorganic semiconductor devices including deposition, patterning and etching techniques. Description of process integration during device fabrication. Discussion of key issues facing advanced semiconductor fabrication.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CHEM 5311 (3) Advanced Synthetic Organic Chemistry**
Lect. Surveys synthetic transformations emphasizing important functional group transformations and carbon-carbon, bond-forming reactions. Required of all organic chemistry graduate students. Department enforced prerequisite: one year of organic chemistry or graduate standing.

**CHEM 5321 (3) Advanced Physical Organic Chemistry**
Lect. Modern concepts of physical organic chemistry and their use in interpreting data in terms of mechanisms of organic reactions and reactivities of organic compounds. Required of all organic chemistry graduate students.
**Recommended:** Prerequisite One year of organic chemistry, one year of physical chemistry, or graduate standing in chemistry or equivalent.

**CHEM 5331 (3) Advanced Spectroscopic Techniques in Organic Chemistry**
Lect. Advanced spectroscopic techniques for structure and determination in organic chemistry. Emphasizes proton and carbon-13 NMR spectroscopy. Department enforced prerequisites: one year of organic chemistry and one year of physical chemistry or graduate standing.

**CHEM 5501 (3) Advanced Topics in Physical Chemistry**
Covers various topics in physical chemistry focusing on their mathematical and physical background. Topics include the application of classical mechanics and electrodynamics in chemistry, the classical mechanics background for the description of atoms and molecules, the use of vector spaces in wave mechanics and quantum mechanics and the classical description of spectroscopy in terms of interaction of light and matter. Department enforced prerequisites: undergraduate physical chemistry, graduate standing or instructor consent.
**Requisites:** Restricted to graduate students only.

**CHEM 5531 (3) Statistical Mechanics**
Lect. Fundamental concepts of quantum and classical statistical mechanics. Applications to properties ofgases, liquids, solids, spin and polymer systems. Reaction, fluctuation, nucleation and relaxation phenomena. Department enforced prerequisite: undergraduate physical chemistry.
**Requisites:** Restricted to graduate students only.

**CHEM 5541 (3) Chemical Dynamics**
Lect. Discussion of mechanism and rate of chemical reactions from a fundamental point of view. Discusses nature of collision and develops concepts of cross section and rate constant. Theories of elementary bimolecular and decay processes are critically examined. Department enforced prerequisite: undergraduate physical chemistry.
**Requisites:** Restricted to graduate students only.

**CHEM 5555 (4) Theoretical and Computational Chemistry**
Explores computational methods to understand chemical systems. Topics include: atomic and molecular electronic structure calculations, Monte Carlo and molecular dynamics simulations and thermodynamic calculations.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 4555
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CHEM 5571 (3) Surface Science**
Lect. Principles of surface science with emphasis on fundamental surface phenomena, surface techniques and surface chemistry. Basic description of surfaces, adsorbate-surface interactions, surface kinetics and methods of surface analysis. Surface science of heterogeneous catalysis, semiconductor processing, and environmental interfaces. Department enforced prerequisites: undergraduate physical chemistry and graduate standing or instructor consent.
**Requisites:** Restricted to graduate students only.

**CHEM 5581 (3) Introductory Quantum Chemistry**
Lect. Basic principles and techniques of quantum mechanics with applications to questions of chemical interest. Quantum dynamics of atoms, molecules and spin; electronic structure of atoms and molecules. Department enforced prerequisite: two semesters of physical chemistry and graduate standing or instructor consent.
**Requisites:** Restricted to graduate students only.

**CHEM 5591 (3) Advanced Molecular Spectroscopy**
Lect. Rotational, vibrational and electronic spectra of molecules, and their interpretation in terms of the quantum theory of molecular structure. Department enforced prerequisites: two semesters of physical chemistry and graduate standing or instructor consent.
**Requisites:** Restricted to graduate students only.

**CHEM 6001 (1) Seminar: Inorganic Chemistry**
Student, faculty, and guest presentations and discussions of current research in inorganic chemistry and related topics (transition element and main group element compound properties, inorganic compound in biological, industrial, and materials applications). Required of all inorganic chemistry graduate students. Credit deferred until presentation of satisfactory seminar.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 6021 (1-3) Special Topics in Inorganic Chemistry**
Lect. Subjects of current interest in inorganic chemistry. Primarily used for graduate-level presentations of special topics by visiting and resident faculty. Variable class schedule.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 6031 (3) Special Topics in Nanoscience**
Introduces the synthesis, physical properties, and applications of nanometer-scale materials and devices. Includes synthesis of metal and semiconductor nanoparticles and nanowires, optical and electronic properties of nanoscale systems, and applicationsin biotechnology and energy.
**Requisites:** Requires prerequisite course of CHEM 4431 or CHEM 4511 (all minimum grade B-) or graduate standing.

**CHEM 6101 (1) Seminar: Analytical Chemistry**
Student, faculty, and guest presentations and discussions of current research in analytical chemistry. Required of all analytical chemistry graduate students. Credit deferred until presentation of satisfactory seminar.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 6111 (1-3) Special Topics in Analytical Chemistry**
Lect. Subjects of current interest in analytical chemistry. Used for graduate-level presentations of special topics by visiting and resident faculty. Variable class schedule.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 6301 (1-3) Seminar in Organic Chemistry**
Discussions principally concerned with recent literature in organic chemistry. Required of all organic chemistry graduate students.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 6311 (1-3) Special Topics in Synthetic Organic Chemistry**
Lect. Selected topics in synthetic organic chemistry, encompassing both methods and/or total synthesis of complex molecules.
**Requisites:** Requires prerequisite course of CHEM 5311 (minimum grade B-). Restricted to graduate students only.

**CHEM 6321 (1-3) Special Topics in Physical Organic Chemistry**
Lect. Selected topics in physical organic chemistry, which may include photochemistry, carbene chemistry, free radical chemistry, molecular orbital methods, organic materials, or gas phase ion chemistry.
**Requisites:** Requires prerequisite course of CHEM 5321 (minimum grade B-). Restricted to graduate students only.

**CHEM 6401 (1-3) Seminar: Physical Chemistry**
Student, faculty, and guest presentations of current research in physical chemistry. Discussion of research topics related to the subject of weekly physical chemistry/chemical physics seminar and appropriate journal articles.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 6411 (1-3) Advanced Topics in Physical Chemistry**
Lect.
**Requisites:** Restricted to graduate students only.

**CHEM 6801 (0) Departmental Research Seminar**
Lectures by visiting scientists and occasionally by staff members and graduate students on topics of current research. Meets once a week. Required for all graduate students in chemistry.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 6901 (1-6) Research in Chemistry**
**Repeatable:** Repeatable for up to 15.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 6941 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.

**CHEM 6951 (1-6) Master's Thesis**
**Requisites:** Restricted to graduate students only.

**CHEM 7021 (2) Seminar: Structural Inorganic Chemistry**
Current research in the area of structural inorganic chemistry. Concerns topics related to electronic and molecular structure of transition metal complexes. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7101 (2) Seminar: Chromatography and Trace Analysis**
Student and faculty discussions and reports on research advances in chromatography, trace analysis and environmental chemistry. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7111 (2) Seminar: Electrochemistry**
Student and faculty discussions and reports on research advances in electrochemistry. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7131 (1) Seminar in Atmospheric Aerosol Chemistry**
Discusses advances in atmospheric aerosol chemistry, with emphasis on new methods for analysis and their application to laboratory and field studies.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CHEM 5151 and CHEM 5181.

**CHEM 7161 (1) Seminar: Heterogeneous Atmospheric Chemistry**
Topics in atmospheric chemistry emphasizing the structure and reactivity of atmospheric particulates. Presentations on current research and critical evaluations of recent literature. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7201 (1) Seminar: Synthetic and Bioorganic Chemistry**
Seminar in organic and bioorganic chemistry, particularly the synthesis of complex organic molecules and their interactions with biopolymers. Included is the study of the synthesis and biological functions of carbohydrates, peptides, proteins and related molecules. Prereq., instructor consent.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**CHEM 7211 (1) Seminar: Topics in Synthetic Methodology and Natural Product Synthesis**
Discussion of contemporary synthetic organic chemistry with a focus on new methodology and total synthesis of natural products.
**Requisites:** Restricted to graduate students only.

**CHEM 7221 (1) Seminar: Photochemistry and Free Radical Chemistry**
Current research in areas of organic free radical chemistry, photochemistry, and related topics are presented and discussed. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7231 (1) Seminar: Reactive Intermediates**
Application of contemporary ideas of chemical physics to organic molecules. Special attention to structures and bonding in organic ions and radicals. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7241 (1) Seminar: Synthetic Organic Chemistry**
Series of seminars on directed total synthesis. Emphasizes modern synthetic methodology and applications to total synthesis of natural products. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7251 (1) Selected Topics in Chemical Genetics**
Discusses the brief history of the emerging field of chemical genetics, and focuses on the recent development of concepts, techniques, applications, and its impact on both science and human health.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7271 (1) Seminar: Picosecond Dynamics of Reactions**
Includes development and application of picosecond laser spectroscopy to organic and organometallic reactions. Emphasizes relationship between current theoretical developments and experiments. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7281 (1) Seminar: Molecular Self-Assembly**
Discusses current topics and recent advances in molecular self-assembly, with emphasis on new liquid crystal designs and applications.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7291 (1) Seminar: Physical Organic Chemistry**
Modern experimental techniques and theoretical models in physical organic chemistry are discussed in relation to the development of new materials, such as molecular size tinkertoys to the development of novel photochemical systems and their spectroscopies. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7301 (1) Seminar: Synthetic and Mechanistic Chemistry**
Discusses particularly the synthesis of complex organic molecules and the mechanism of reagents used in organic synthesis. Includes a study of transition metal mediated organic reactions. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7311 (1) Selected Topics in Organic Materials**
Current research in the area of organic/materials chemistry. Concerns topics related to organic materials synthesis, carbon nanotube functionalization, artificial photosynthesis, gas storage and catalysis.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7401 (1) Seminar in Photochemical Reaction Control**
Discusses progress towards control of molecular reactivity using light, including synthetic methods for creating control subjects. Emphasizes new methods to achieve coherent control.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7421 (2) Seminar: Negative Ion Chemistry**
Chemistry of negative ions; experimental methods and designs; laser spectroscopy of ions; theoretical methods; reactive dynamics of ions in the gas phase. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7431 (1) Seminar: Topics in Theoretical Chemical Physics**
Seminars presented on a variety of topics in theoretical chemical physics. Molecular collisions and unimolecular dynamics predominantly featured. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7441 (2) Research Seminar: Theoretical Chemistry**
Studies theoretical description of molecular dynamicsas related to rate processes. Focuses on chemical reactions in liquids, absorption-desorption on surfaces, nucleation reactions, and energy flow in molecules. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7461 (1) Seminar: Gas Phase Ion Chemistry**
Studies gas phase ion chemistry relevant to thermochemical measurements and atmospheric, interstellar, and biomedical applications.
**Requisites:** Restricted to graduate students only.

**CHEM 7471 (1) Seminar in Ultrafast Spectroscopy of Proteins**
Discusses advances and developments in biomolecular dynamics, and considers the connection of protein dynamics with function. Emphasizes experimental studies via ultrafast laser spectroscopy.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7481 (2) Seminar: Molecular Spectroscopy and Photochemistry**
Discussion and presentation of current research in spectroscopy and photochemistry of organic as well as organometallic systems. Reviews state of the art techniques available for the theoretical and experimental characterization of excited states. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7491 (1) Seminar: Molecular Vibrational Dynamics**
Topics pertaining to vibrational dynamics of small molecules are discussed, with particular emphasis upon IR laser spectroscopy, van der Waals' clusters, vibrationally induced dipole moments, and predissociation. Discussion of current research and recently published literature. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7501 (1) Seminar: Theoretical Molecular Dynamics**
Variety of topics in theoretical chemical physics, emphasizing dynamics of molecules in dissipative environments or in radiation fields. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7511 (1) Seminar: Reaction Dynamics in Condensed Phases**
Studies elementary steps in chemical reactions and their observation by ultrafast spectroscopy. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7521 (1) Seminar: Atmospheric Kinetics and Photochemistry**
Discusses laboratory studies of degradation mechanisms. Applies these studies to atmospheric phenomena such as global warming and stratospheric ozone loss. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7531 (1) Seminar: Surface Chemistry and Thin Film Growth**
Topics in surface chemistry and thin film growth with focus on atomic layer deposition (ALD) and molecular layer deposition (MLD). Properties of thin films grown using ALD and MLD. Applications of thin films in areas including flexible displays, energy storage and catalysis. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 7551 (1) Selected Topics in Ion Spectroscopy**
Treats current topics in the spectrocscopy of ions. Seminar lectures are given by graduate students on their research and on literature topics, and the results of both in-house and external research groups are studied. Additionally, ideas for interesting directions of research and new experiments are proposed and discussed.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CHEM 8991 (1-10) Doctoral Dissertation**
All doctoral students must register for 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.

# Chinese (CHIN)

## Courses

**CHIN 1010 (5) Beginning Chinese 1**
An introduction to the fundamentals of modern standard Chinese (Mandarin), including pronunciation, Chinese characters, grammar, and conversation. Students develop all four skills (listening, speaking, reading, and writing) with an emphasis on oral communication. Texts are in simplified characters with vocabulary in both simplified and traditional characters. Students with pre-existing competence in Chinese must take a placement exam or consult with the language coordinator before enrollment.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 1012 (4) Introduction to Chinese Civilization**
An interdisciplinary introduction from ancient to modern times. Arts, literature, politics, social relations, religion, and material culture are studied in terms of significant themes and ideas pertaining to the civilization of China. Taught in English.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 1020 (5) Beginning Chinese 2**
Continuation of CHIN 1010. Students with pre-existing competence in Chinese must take a placement exam or consult with the language coordinator before enrollment.
**Requisites:** Requires prerequisite course of CHIN 1010 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 1051 (3) Masterpieces of Chinese Literature in Translation**
Surveys Chinese thought and culture through close reading and discussion of selected masterworks of Chinese literature in translation. Texts include significant works of poetry, fiction, and drama, as well as philosophical and historical writings from various eras. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 2110 (5) Intermediate Chinese 1**
This course continues the training in all four skills as developed in the first year. Students enhance communicative skills in listening and speaking and expand reading and writing vocabulary in modern Chinese. Texts are in simplified characters with vocabulary in both simplified and traditional characters. Students with competence in Chinese obtained from a program, institution, or experiences external to CU must take a placement exam or consult with the language coordinator before enrollment.
**Requisites:** Requires prerequisite course of CHIN 1020 (minimum grade C).
**Additional Information:** Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 2120 (5) Intermediate Chinese 2**
Continuation of CHIN 2110. Students with pre-existing competence in Chinese must take a placement exam or consult with the language coordinator before enrollment.
**Requisites:** Requires prerequisite course of CHIN 2110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 2441 (3) Film and the Dynamics of Chinese Culture**
Through studying a group of Chinese films in light of modern Chinese history and literature, students examine a series of cultural dilemmas and issues in 20th century China and develop skills in analyzing literary and filmic texts. Taught in English.
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 2442 (3) Modern Chinese Media Cultures**
An introduction Chinese media cultures of the 20th century, with an emphasis on photography, cinema, popular music, and print. The course places these productions in context, examining the complex intertwinement of culture, technology, and politics in China, Hong Kong, and Taiwan from the turn of the last century to the beginning of the twenty-first. We will be thinking about the ways in which media inscribe or problematize global racial hierarchies, gender dynamics, and membership in collectivities. Students will also be introduced to a number of methodologies in media historiography and cultural studies.
**Recommended:** Prerequisite CHIN 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**CHIN 3110 (5) Advanced Chinese 1**
Surveys a variety of authentic language materials, including films, plays, newspaper articles, essays, and short stories. Texts are studied with an emphasis on more sophisticated grammar structures and an attention to issues of social and cultural background. Texts and vocabulary are in both simplified and traditional characters. Students with competence in Chinese obtained from a program, institution, or experiences external to CU must take a placement exam or consult with the language coordinator before enrollment.
**Requisites:** Requires prerequisite course of CHIN 2120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 3120 (5) Advanced Chinese 2**
Continuation of CHIN 3110. Students with pre-existing competence in Chinese must take a placement exam or consult with the language coordinator before enrollment.
**Requisites:** Requires prerequisite course of CHIN 3110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 3200 (3) Adv Wrtg Topics on Chinese & Japanese Literature and Civilization**
Provides an introduction to the academic study of Chinese and Japanese literature and culture with a focus on writing skills in English through a survey of standard academic writing conventions. Review and assessment of selected textual materials, class presentation, critique, and revision. Recommended for majors. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** JPNS 3200
**Requisites:** Restricted to students with a minimum of 45 credits completed.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Upper
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**CHIN 3321 (3) Political Thought in Ancient China**
Focuses on the political, religious, philosophical and literary aspects of ancient Chinese civilization (1500 B.C.-A.D. 200). Special attention is paid to foundational works that influenced later developments in Chinese culture. All readings are in English and taught in English. Recommended restriction: students with 57-180 credits (Juniors or Seniors).
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3321
**Recommended:** Prerequisite CHIN 1012 or CHIN 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 3331 (3) Urban Entertainment Culture in Early Modern China**
The early modern period was marked by growth of metropolitan areas, expanded entertainments, and vibrant popular culture. The course focuses on aspects of the popular literature and culture of this era and how defenders of traditional culture and state power reacted to it. May also consider growing contacts with the West and the transition to the modern period. All readings are in English. Taught in English. Recommended restrictions: for students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite CHIN 1012 or CHIN 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 3333 (3) Race and Ethnicity in Chinese Literature: Sinophone Culture, Diaspora, and Identity**
Surveys Sinophone thought and culture through close reading and discussion of selected works of Chinese-language fiction in translation. Students will learn about the historical contexts of migration, racial and ethnic conflict, and colonialism in which this literature was produced. Hyphenate identities such as Chinese-Malaysian and Asian-American will take center stage as we bring more complexity to the idea of "Chineseness." Taught in English. Recommended restrictions: for students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite CHIN 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**CHIN 3334 (3) Premodern Chinese Fiction**
Examines the major works of Chinese narrative tradition from the fourth to the nineteenth century. Emphasizes the reading and analysis of selected texts and understanding of the cultural and social contexts of text production and circulation. Text selections vary from year to year. Taught in English. Recommended restrictions: for students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite CHIN 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 3341 (3) Literature and Popular Culture in Modern China**
Surveys 20th century Chinese literature and popular culture against the historical background of rebellion, revolution and reform. Emphasizes close and critical reading skills and an understanding of how aesthetic texts reflect and critically engage with historical and cultural experiences. Assignments include novels, essays, short stories, poems, plays, songs, films and scholarly articles. Taught in English. Recommended restrictions: for students with 57-180 credits (Juniors or Seniors).
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3341
**Recommended:** Prerequisite CHIN 1012 or CHIN 1051.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 3342 (3) Sinophone Literature in the Contemporary World**
A survey of Chinese literature with a focus on exiled, diaspora, colonial, and semi-colonial writers. Students will be asked to discern how Chinese literature has made an intervention in world literature and how it has engaged with the world. Emphasizes close and critical reading skills and an understanding of how aesthetic texts critically engage within historical and cultural experiences. Assignments include novels, essays, short stories, poems, plays, songs, films, and scholarly articles. Taught in English. Recommended restrictions: for students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite CHIN 1012 or CHIN 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 3343 (3) Chinese Science Fiction**
This is a survey course on Chinese science fiction in literature, comics, and film. 21st century Chinese sci-fi has recently gained prominence in world literature, and this course will introduce its genealogies going back to the 19th century. We will explore concepts such as futurism, civilizational discourse, techno-orientalism, utopian thought, dystopian critique, genre, and translation. Students will be encouraged to think in a cross-cultural context about diverse visions of the future. Recommended restrictions: for students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite CHIN 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**CHIN 3351 (3) Reality and Dream in Chinese Literature**
Explores the role of dreams in Chinese literature and culture. Sources may range from religious, philosophical, medical and historical writings to poetry to genres of fiction in various media. Taught in English. Recommended restrictions: for students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite CHIN 1012 or CHIN 1051.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 3361 (3) Women and the Supernatural in Chinese Literature**
Explores the relationship between the worlds of women and the supernatural in Chinese literature, from ancient to modern times. Focuses on selected significant works of classical and vernacular fiction, religious texts, and poetry. Taught in English. Recommended restrictions: for students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite CHIN 1012 or CHIN 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 3371 (3) Topics in Chinese Film**
Offers in-depth, critical analysis of key issues in Chinese culture as represented in Chinese film. Focuses on various topics, such as specific directors, regions, representation of gender in Chinese film, historical periods, etc. Varies from year to year. Requires no knowledge of Chinese. Taught in English.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisite CHIN 1012 or CHIN 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**CHIN 3372 (3) Chinese Media and the Environment**
This course works through Chinese literature and film to deal with ecological crisis and media environment from a Chinese perspective. We will ask: how do contemporary authors and filmmakers present a distinctly Chinese ecopoetics? Furthermore, how does the Chinese media ecology change the world both within and outside of China? Our methodological points of entry will include ecocriticism, environmental philosophy, animal studies, architecture and urban studies, infrastructure, sound studies, media archaeology, and spatial and information theory. Recommended restrictions: for students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite CHIN 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**CHIN 3381 (3) Chinese Travel Literature: Journeys Within and Without, Real and Imaginary**
Explores the world of travel writing in Chinese literature and culture. Widely different forms of real and imaginary travel have inspired a broad spectrum of travel literature in China. We will read and discuss different examples, from landscape poetry describing a hike through ragged mountains to travelogues about officials moving across the country, from factual geographical and environmental reports to fantastical novels about intercultural and interspecies encounters of the strangest kind. Taught in English. Formerly offered as a special topics course.
**Recommended:** for students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**CHIN 4041 (3) Introduction to Classical Chinese**
Develops basic competence in the Classical Chinese, the language in which the foundational texts of Chinese culture are written. Classical Chinese forms the basis for the literary language used in China until the early 20th century. We will begin to read parts of early Chinese philosophical texts, such as Laozi and the Analects of Confucius. Formerly CHIN 4210.
**Equivalent - Duplicate Degree Credit Not Granted:** CHIN 5041
**Requisites:** Requires prerequisite course of CHIN 2120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 4042 (3) Readings in Classical Chinese**
Introduces a wide spectrum of texts from pre-modern China: philosophical, historical, ghost stories, and poems (including the Ballad of Mulan). We will read these texts closely, focusing on their linguistic and literary features and on their cultural background. Formerly CHIN 4220.
**Equivalent - Duplicate Degree Credit Not Granted:** CHIN 5042
**Requisites:** Requires prerequisite course of CHIN 4041, formerly CHIN 4210 (minimum grade C) or instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 4110 (3) Advanced Readings in Modern Chinese 1**
Surveys a wide variety of 20th- and 21st-century texts that are of recognized literary or cultural importance. Focuses on translation, including discussion of content and style.
**Requisites:** Requires prerequisite course of CHIN 3120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 4120 (3) Advanced Readings in Modern Chinese 2**
Surveys a wide variety of 20th- and 21st-century texts that are of recognized literary or cultural importance. Focuses on translation, including discussion of content and style.
**Requisites:** Requires prerequisite course of CHIN 3120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 4300 (3) Open Topics: Readings in Chinese Literature**
Studies selected texts on a particular topic taught by regular or visiting faculty. Topics change each term.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 4900 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 4950 (3) Honors Thesis**
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5010 (3) Sinological Methods**
Provides training in research methods for graduate work in Sinology. Regular exercises require students to use standard bibliographic sources and tools, such as leishu, congshu, specialized dictionaries, dynastic histories, geographical treatises, gazetteers, and private historiography.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CHIN 4042/5042 or instructor consent.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5030 (3) Readings in Pre-Modern Chinese Literary Theory**
Introduces the field of pre-modern Chinese literary theory and its relevance in Chinese intellectual history. Based on the close reading of primary sources, i.e. typically on selected core texts of Chinese literary thought, as well as on the reading of secondary literature. Texts and topics vary from year to year.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5041 (3) Introduction to Classical Chinese**
Develops basic competence in the Classical Chinese, the language in which the foundational texts of Chinese culture are written. Classical Chinese forms the basis for the literary language used in China until the early 20th century. We will begin to read parts of early Chinese philosophical texts, such as Laozi and the Analects of Confucius.
**Equivalent - Duplicate Degree Credit Not Granted:** CHIN 4041
**Requisites:** Restricted to graduate students only.

**CHIN 5042 (3) Readings in Classical Chinese**
Introduces a wide spectrum of texts from pre-modern China: philosophical, historical, ghost stories, and poems (including the Ballad of Mulan). We will read these texts closely, focusing on their linguistic and literary features and on their cultural background.
**Equivalent - Duplicate Degree Credit Not Granted:** CHIN 4042
**Requisites:** Restricted to graduate students only.

**CHIN 5070 (1) Graduate Academic Writing**
Considers the act of academic writing in the fields of East Asian studies both in terms of mechanics and in terms of habits of effective writers themselves, so that students, building upon a base knowledge of the expectations of the academy, develop approaches to help themselves gain the confidence to excel at the writing required of them in graduate school and beyond.
**Requisites:** Restricted to graduate students only.

**CHIN 5130 (3) History of Chinese Literature from the Tenth to the Nineteenth Century**
Survey of Chinese literature from the tenth to the nineteenth century, with readings in primary and secondary sources. Focuses on the major literary works, genres, figures, and movements of the Song through the Qing dynasties.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5210 (3) Ancient Literature**
Studies selected pre-imperial and Han prose texts important in their own time and for the influence they exercised on the later development of Chinese literary history. Focuses on works such as the Lun yu, Mengzi, Zhuangzi, Huainanzi, Shiji, Hanshu, and Lunheng.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CHIN 4042/5042 or instructor consent.
**Additional Information:** Departmental Category: Chinese Departmental Category: Asia Content

**CHIN 5280 (3) Topics in Ancient Culture**
Examines a specific problem or issue in ancient Chinese literature, e.g., early views of language's relationship to reality, or the commentary tradition and the emergence of allegorical and metaphysical approaches to interpreting texts. Topics vary from year to year.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CHIN 4042/5042 or instructor consent.
**Additional Information:** Departmental Category: Chinese Departmental Category: Asia Content

**CHIN 5410 (3) Medieval Prose**
Studies works of early medieval (ca. 200-600 AD) and/or late medieval (600-900 AD) prose that played an important role in development of Chinese literature. Writers and topics vary, ranging from surveys of specific genre, literary essays, proto-fiction, or historical writings, to focused studies of major figures Liu Zhiji, Han Yu, or Liu Zongyuan. Knowledge of Classical Chinese at the level of CHIN 4220 is required.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese Departmental Category: Asia Content

**CHIN 5480 (3) Topics in Medieval Literature**
Examines a specific problem or issue in medieval literature, e.g., the role of encyclopedias and anthologies in literary training, or the place and forms of literary composition at the imperial court. Topics vary from year to year. Knowledge of Classical Chinese at the level of CHIN 4220 is required.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese Departmental Category: Asia Content

**CHIN 5610 (3) Early Modern Prose**
Studies Song, Ming, and Qing prose texts selected for their inherent literary merit and for their significance in the Chinese literary tradition. Typically focuses on works by major authors such as Ouyang Xiu, Su Shi, and Yuan Hongdao. Texts and selections vary from year to year. Knowledge of Classical Chinese at the level of CHIN 4220 is required.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese Departmental Category: Asia Content

**CHIN 5630 (3) Early Modern Fiction**
Explores selected vernacular and classical fiction of the Ming and Qing periods. Normally focuses on long novels such as Xiyou ji, Sanguo yanyi, Shuihu zhuan, Jin Ping Mei, as well as short stories by Feng Menglong and Ling Mengchu. Texts and selections vary from year to year.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CHIN 4042/5042 or instructor consent.
**Additional Information:** Departmental Category: Chinese Departmental Category: Asia Content

**CHIN 5680 (3) Topics in Early Modern Culture**
Examines a specific problem or issue in early modern culture (e.g., the relationships among religion, folklore, and early fiction; the issue of genre and traditional fiction); the role of elite versus popular cultures in the composition of fiction; or the relationship of the state and censorship and the southern philosophical schools to the publication of fiction. Topics vary from year to year.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CHIN 4042/5042 or instructor consent.
**Additional Information:** Departmental Category: Chinese Departmental Category: Asia Content

**CHIN 5810 (3) Modern Literature**
Examines selected texts in various genres of Chinese literature from the May Fourth period (beginning 1917) to the establishment of the People's Republic of China (1949). Focuses on major and influential works produced in this fertile period of experimentation with Western, modernist types of literature. Texts and selections vary from year to year. Knowledge of Modern Chinese at the level of CHIN 4120 is required.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese Departmental Category: Asia Content

**CHIN 5820 (3) Contemporary Literature**
Examines selected texts in various genres of Chinese literature from 1949 (the establishment of the People's Republic of China) to the present. Focuses on major works from the very different literary worlds of Taiwan and mainland China. Texts and selections vary from year to year. Knowledge of Modern Chinese at the level of CHIN 4120 is required.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese Departmental Category: Asia Content

**CHIN 5830 (3) History of Chinese Film**
Examines the development of narrative film in China from the early twentieth century to today, covering the major periods, styles, and themes developed in Chinese cinema. Texts and selections vary from year to year. Knowledge of Modern Chinese at the level of CHIN 4120 is required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese Departmental Category: Asia Content

**CHIN 5880 (3) Topics in Modern and Contemporary Culture**
Examines a specific topic in 20th century literature, film and media, or cultural history. Topics vary from year to year. Knowledge of Modern Chinese at the level of CHIN 4120 is required. Topics vary from year to year. Knowledge of Modern Chinese at the level of CHIN 4120 is required.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5890 (3) Topics in Chinese Film**
Examines a specific problem or issue in Chinese film, e.g. 5th generation filmmakers, early film, genre (martial arts, melodrama, Hong Kong action, etc.), Taiwan New Cinema, Hollywood crossover. Topics vary from year to year. Knowledge of Modern Chinese at the level of CHIN 4120 is required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5900 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 5980 (1) Practical Issues in Chinese Language Pedagogy**
Focuses on practical issues in Chinese language pedagogy for students who will serve as teaching assistants in Chinese language courses. Examines the connection between theory and practice as well as practical methods for teaching Chinese. Equips students with basic Chinese linguistic knowledge. Discusses the use of Communicative Approach in teaching Chinese as a second language. Knowledge of Modern Chinese at the level of CHIN 4120 is required.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 6900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 6950 (1-6) Master's Thesis**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

**CHIN 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chinese
Departmental Category: Asia Content

# Cinema Studies & Moving Image Arts (CINE)

## Courses

**CINE 1002 (3) Film Analysis for Non-Majors**
Introduces the critical study of film, exploring theoretical, historical and technical concerns while presenting a survey of important film periods and genres. Students will hone critical-thinking, close-analysis,and writing skills. Covers a wide variety of films, approaching them from numerous perspectives, considering both the effects films have on individual viewers and their ability to reflect culture. Formerly FILM 1002.
**Additional Information:** Departmental Category: Genre and Movements

**CINE 1502 (3) Introduction to Cinema Studies**
Introduces basic media literacy by exploring the technical and aesthetic principles behind the production, analysis and interpretation of films. Explores comprehension and thinking about movies critically as technological, cultural and artistic products. Study of films in different social and historical contexts and discussion of the importance of movies as cultural products. Formerly FILM 1502.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Genre and Movements

**CINE 2000 (3) Moving Image Foundations I**
Introduces students to basic image making technology, aesthetics and methods. Students will investigate the qualities of the medium of cinema: light, time, motion, sound, and structure. Through these explorations, they will develop a personal relationship to artistic filmmaking through individual projects and in-class workshops. Formerly FILM 2000.
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade C-). Restricted to Cinema Studies (FILM/CINE) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 2001 (3) Space Odysseys: Astrophys/Astronomy via Cinema/Arts**
Understanding representation of space in cinematic arts, as well as the underlying science. What are the political, societal, scientific and commercial motives in attempting to show our species venturing beyond Earth? These adventures highlight our hopes and fears for the future, while simultaneously clarifying contemporary anxieties. From the director G. Melies to the screenwriter B. Marling. Formerly FILM 1003.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**CINE 2002 (3) Recent International Cinema**
Familiarizes students with current trends and major directors in international cinema. Students attend specific films screened in class and/or offered in the International Film Series, and read and write about these films. Formerly FILM 2002.
**Recommended:** Prerequisite CINE 1502 or 6 hours humanities courses involving critical writing.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Genre and Movements

**CINE 2003 (3) Film Topics**
Varying topics on important individuals, historical developments, groupings of films, film directors, critical and theoretical issues in film. Formerly FILM 2003.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Topics

**CINE 2004 (3) CU Cinema Studies Seminar: Film Festival Cultures**
Offers students a unique first-hand understanding of the significance of the film festival circuit in the context of global film culture and scholarship. Students will attend Telluride Film Festival screenings, discussions and Q&A sessions. Restricted to Cinema Studies majors and minors. Formerly FILM 2004.
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade C-). Restricted to Cinema Studies majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Intensive and Small Courses

**CINE 2005 (3) Form, Structure, and Narrative Analysis**
Analyzes the form and structure of narrative, experimental non-narrative, and documentary films. Familiarizes students with the general characteristics of the classic three-act structure, principles of adaptation, form and content of experimental films, structural approaches, and the basic formal, narrative, and rhetorical strategies of documentary filmmaking. Formerly FILM 2005.
**Requisites:** Requires prerequisite or corequisite course of CINE 1502 (minimum grade C-). Restricted to Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Workshops

**CINE 2010 (3) Moving Image Computer Foundations**
Provides students with artistic foundational hands-on experience in integrated use of media software in both the PC and Mac creative imaging making digital working environments. Includes fundamentals in general computer maintenance, creative and practical audio editing, image management and manipulation, and creative moving image practice. Formerly FILM 2010.
**Requisites:** Requires prerequisite course of CINE 1502 (minium grade C-). Restricted to Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 2105 (3) Introduction to the Screenplay**
Explores, through close reading and original student work, the form and structure of the screenplay. Students will learn to analyze structural and character elements of classic screenplays, and breaking down such elements as character, motivation, and arc. Students may learn some very basics of screenwriting form, develop a treatment, explore formal and technical issues, etc. Formerly FILM 2105.
**Requisites:** Requires prerequisite or corequisite course of CINE 1502 (minimum grade C-). Restricted to Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Workshops

**CINE 2203 (3) American Indians in Film**
Surveys representations of American Indians in American (especially Hollywood) film with an emphasis on "revisionist," or ¿breakthrough¿ films. It follows the creation of "the Hollywood Indian" from early literature to contemporary motion pictures. Films are analyzed within historical, social, and artistic contexts, and examined in terms of the impact their images have exerted upon American society at large, as well as Native communities. Near the end of the course we will look at what happens when Native Americans write, direct, and act in independent films or streaming television series.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 2203

**CINE 2300 (3) Beginning Filmmaking - Aesthetics**
This course explores the aesthetics of film in the Avant-garde genre. Students will look at films, make films using their phones and any simple editing apps they may have access to. There will be discussions on the unique aspects of moving visual images as an art form. A few brief papers will be required, as well as several short experimental films made by each student. Formerly FILM 2300.
**Requisites:** Restricted to Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 2302 (3) Nazis on Screen: Hollywood, War, Propaganda**
Explores representations of Nazism in Hollywood films from the early 1940s until today. How does the film image of the Nazi change from World War II through the Cold War era and beyond? From Chaplin's "The Great Dictator" to "Star Wars" and Tarantino's "Inglorious Basterds," this course focuses on how representations of Nazism and fascism informed American self-conceptions and strengthened the belief and trust in democratic institutions. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 2302

**CINE 2312 (3) Film Trilogies**
Study of films designed as trilogies, drawing on a wide range of international cinema. Films include Satyajit Ray's Apu Trilogy (India), Krzysztof Kieslowski's Three Colors Trilogy (Poland), Francois Truffaut's Antoine Doinel cycle (France), and Abbas Kiarostami's Iran Trilogy (Iran). Restricted to CINE majors and minors. Non-majors/minors will need instructor's consent. Formerly FILM 2312.
**Requisites:** Restricted to Cinema Studies majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Genre and Movements

**CINE 2500 (3) Moving Image Foundations II**
Instructs students in developing a technical and aesthetic understanding of complex camera, lighting, sound, and editing moving image production. Students will explore interpretive cinematography, sound design and mixing, preproduction workflows, and move deeper into the mechanics of editing through individual projects and in-class workshops. Formerly FILM 2500.
**Requisites:** Requires prerequisite courses of CINE 1502 and CINE 2000 (all minimum grade C-). Restricted to Cinema Studies majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 2513 (3) Major Asian Filmmakers**
Surveys the major Asian directors from China, India, Japan, Taiwan, and Vietnam. Restricted to CINE majors and minors. Non-majors/minors will need instructor's consent. Formerly FILM 2513.
**Requisites:** Restricted to Cinema Studies majors and minors.
**Recommended:** Prerequisite CINE 1502.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Topics
Departmental Category: Asia Content

**CINE 2521 (3) Classics of the Foreign Cinema: 1960s to Present**
Surveys the classics of international cinema from the 1960s to the present. Restricted to CINE majors/minors. Non-majors/minors will need instructor's consent. Formerly FILM 2521.
**Requisites:** Restricted to Cinema Studies majors and minors.
**Recommended:** Prerequisite CINE 1502.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: History

**CINE 2610 (3) Animation Production**
Includes analysis of independent and experimental animation and an introduction to various animation techniques (object, line, collage, sand or paint on glass, Xerox, cameraless, pixellation, etc.). Students produce exercise films and a final film exploring these techniques. Formerly FILM 2610.
**Requisites:** Requires prerequisite course of CINE 2000 or CINE 2300 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 2900 (3) Lighting**
Covers the basics of "why you need lighting", color temp, as well as camera techniques, lighting theory, and lighting set-ups for still and motion picture film video. Emphasizes hands on as well as theory. Formerly FILM 2900.
**Requisites:** Requires prerequisite course of CINE 2000 or CINE 2300 (minimum grade C-). Restricted to Cinema Studies majors only.
**Recommended:** Prerequisite CINE 1502.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 3002 (3) Major Film Movements**
Historical-aesthetic survey dealing with various styles, movements, genres or national cinemas. Can be taught in conjunction with the appropriate language department. Typical offers are in the French, the German or the Russian films, etc. Also offers detailed approaches to specific styles, subjects or genres: film comedy, melodrama, the Western, women filmmakers, German expressionist cinema, Italian neorealism, etc. Formerly FILM 3002. Restricted to Cinema Studies majors and minors. Non-majors/minors may be admitted with instructor's consent.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Cinema Studies majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Genre and Movements

**CINE 3003 (3) Major Film Directors**
Focuses on the work of a single director or a group of related directors. Course content varies each semester. Consult the online Schedule Planner for specific topic. Non-majors/minors need instructor consent. Formerly FILM 3003.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Cinema Studies majors and minors.
**Recommended:** Prerequisite students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Topics

**CINE 3004 (3) Alfred Hitchcock: The American Films**
Intensive survey of Hitchcock's American films from 1940 (Rebecca) to 1964 (Marnie). We will concentrate on in-depth analysis of the most influential and significant films made by the most important movie director of the Hollywood era. We will pay special attention to Hitchcock's deep understanding of the intricacies of film language, style and form in relation to the themes and subjects that interested him: guilt, sex, gender relations, crime and punishment, "mothers". Restricted to CINE majors and minors. Non-majors will need instructor's consent. Formerly FILM 3004.
**Requisites:** Restricted to Cinema Studies majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Intensive and Small Courses

**CINE 3010 (1-3) Film Production Topics**
Offers students both theoretical and practical experience in various specialized areas of cinematic production. Topics vary but include production in the documentary, fictional narrative, animation, computer animation, and experimental genres. Formerly FILM 3010.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of CINE 2000 or CINE 2300 (minimum grade C-). Restricted to Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 3012 (3) Documentary Film**
Provides a historical and theoretical introduction tothe documentary film. Examines the historical beginnings of documentary film as well as exploring contemporary documentary practice. Canonical moments of documentary history and lesser known examples of documentary film work will be explored. Formerly FILM 3012.
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade D-).
**Recommended:** Prerequisite CINE 3051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Genre and Movements

**CINE 3013 (3) Women and Film**
Examines the representation of women in film, the role of women in the filmmaking process, and the contributions made by women as critics and scholars of the cinema. Its orientation is therefore both historical and theoretical. Organized chronologically, the course examines how women have been addressed and "constructed" as spectators in and through cinema over the last 120 years, the relationship between cinema and social history, how films express ideology, and how feminist films scholarship has changed from the 1970's to the present day. The course focuses on American and international narrative, documentary, and experimental films from 1895 to present directed by or about women. Formerly FILM 3013.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Topics

**CINE 3014 (3) Black Radical Cinema**
This class will cover historical and theoretical radical film concepts of Black Cinema from Oscar Micheaux, Melvin Van Peeples, Julie Dash, Haile Gerima, Djibril Diop Mambety to Ousmane Sembene and Merawi Gerima. This class will include creating two video essays. Student participation during class is crucial. Two essay films, and one end of the semester paper per student is required.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite CINE 1502.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**CINE 3020 (3) Filmmaking Abroad: Acting & Directing Internationally**
Offers an intensive three-week production seminar to realize a short narrative film. Students immerse themselves in a city abroad, in collaboration with fellow CU students and the host population, as they scout locations and film their projects. Requires production responsibilities on both sides of the camera. A Global Seminar offered during Maymester through CU International Education.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 3020

**CINE 3041 (3) Environmental Cinema**
Interrogates how fiction and nonfiction filmmakers, writers, cinematographers, and moving-image editors have creatively responded to discoveries made In the field of environmental science. Using books by Rachel Carson and Scott MacDonald as a framework, we will examine a broad spectrum of filmmakers (e.g. Wes Anderson, Todd Haynes, Jennifer Baichwal, Bruce Conner, Percy Smith) alongside the most pressing environmental issues. Formerly FILM 3041.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) Cinema Studies majors/minors or Environmental Studies (ENVS) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: History

**CINE 3042 (3) Horror Film: History, Contexts, Aesthetics**
Surveys the most exemplary and significant films in the Horror film genre from the 1920s to the present. With a historical emphasis, the course explores the ways in which the Horror genre has evolved in response to shifting social anxieties and cultural developments, and its reflections on society in various national or international contexts. Expect disturbing content and images. Formerly FILM 3042. Non-majors will need department consent to enroll.
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade C-). Restricted to Cinema Studies majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Genre and Movements

**CINE 3043 (3) Topics in Critical Film Studies**
Prepares students for advanced Film Critical Studies work. Subject matter varies from semester to semester. Formerly FILM 3043.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite CINE 1502.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Topics

**CINE 3045 (3) I Saw the TV Glow: Voyeurism, Surveillance and Obsession in American Cinema**
This course will track the increasingly fractured, panoptical state of image culture, which has been explosively fueled by the internet. We will track how the hybridization of cinema¿beginning with the post-war introduction of television to the multi-platform present day¿has impacted the aesthetic form and political content of film viewing, pivoting on the work of director Jane Schoenbrun, as well as that of Elia Kazan, Sidney Lumet, Penny Lane, and more.
**Requisites:** Requires prerequisite course of CINE 1502 and CINE 3051 (minimum grade C-). Restricted to CINE Majors and Minors. Non-majors allowed with instructor permission.

**CINE 3051 (4) Film History 1**
Intensive introduction to film history from 1895 to 1959. Topics covered include the beginnings of motion picture photography, the growth of narrative complexity from Lumiere to Griffith, American silent comedy, Soviet theories of montage, German expressionist films, and the transition to sound. Formerly FILM 3051.
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: History

**CINE 3061 (4) Film History 2**
Starts in 1959 and follows the historical growth and evolution of film aesthetics to the present. Studies Italian neorealist, French new wave, and recent experimental films, as well as the films of major auteur figures such as Bergman, Kurosawa, Fellini, Hitchcock, Bunuel, Antonioni, and Coppola. Formerly FILM 3061.
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade D-).
**Recommended:** Prerequisite CINE 3051 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: History

**CINE 3081 (3) Contemporary American Cinema: 1980 to Present**
Examines the relationship between American films from 1980 to the present and their cultural and historical context. Includes films by Bigelow, Fincher, Scorsese, Lee, Linklater, Lynch, Stone, the Coen brothers, and Jenkins. This course is open to Cinema Studies majors: juniors and seniors. Non-majors need instructor consent to enroll. Formerly FILM 3081.
**Requisites:** Restricted to Cinema Studies majors only. Restricted to students with 57-180 credits (Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 3104 (3) Film Criticism and Theory**
Surveys the range and function of film criticism, introduces major positions and concepts of film theory and focuses on students' abilities to write about film.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3104
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Cinema Studies or Humanities (HUMN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Intensive and Small Courses

**CINE 3400 (4) Cinema Production I**
Exploration of creative cinema production through short production and post-production projects. A short final project will be required. Focuses on the tactics and strategies of independent cinema production, examining a variety of approaches to genre. Explores a range of film and digital technologies. Formerly FILM 3400.
**Requisites:** Requires prerequisites courses of CINE 1502 and CINE 2000 and CINE 2500 (all min grade C-). Restricted to Cinema Studies majors only.
**Recommended:** Prerequisites CINE 2005 or 2105.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 3402 (3) European Film and Culture**
Studies the relationships between European film, art and culture. Offered each summer in a different European city (Rome, Paris, London, Athens, Barcelona). There will be regular in-class lectures, film screenings, field trips and on-site teaching. Formerly FILM 3402.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Recommended:** Prerequisite introductory film and art history courses.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Genre and Movements

**CINE 3422 (3) The Hollywood Musical**
Second only to jazz, some critics regard the Hollywood musical as the greatest American popular art form of the 20th century. Proposes a historical, formal and theoretical approach to the musical through its several iterations, from the classical, to the revisionist, to the unusual, placing the changes in the genre's form, structure, and ideology in the context of America's changing social, political and religious values. Non-majors/minors require instructor consent. Formerly FILM 3422.
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade C-). Restricted to Cinema Studies majors and minors.
**Recommended:** Prerequisite CINE 3051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Genre and Movements

**CINE 3503 (3) German Film Through World War II**
History and theory of Weimar and Nazi film with sociocultural emphasis. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 3503
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Topics

**CINE 3513 (3) German Film and Society 1945-1989**
Introduces issues in German society through film during the Cold War. Focus on East and West Germany, though some other German language films may be included. Emphasis is on reading films in their social, historical and political contexts. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 3513
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Topics

**CINE 3514 (3) German Film & Society After 1989**
Introduces post-1989 German culture through film. Emphasizes films in their socio-historical contexts and explores developments in German culture during and after the unification. Formerly known as FILM 3514.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 3514
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Intensive and Small Courses

**CINE 3515 (3) Lights, Camera, Action**
In this practical and technical lecture course, students will gain an understanding of a variety of models for creative use of camera, lighting, and sound equipment. A broad survey of production topics, including mise-en-scene, single-camera cinematography, multi-camera cinematography, cinematic lighting design, and sync-sound capture will be introduced/outlined in support of CINE 3400. Formerly FILM 3515.
**Requisites:** Requires prerequisites courses of CINE 1502 and CINE 2000 (all min grade C-). Restricted to Cinema Studies majors only.
**Recommended:** Prerequisites CINE 2005 or 2105.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Workshops

**CINE 3525 (3) Post Production Lecture**
Covers the essentials of working with captured material to produce crafted art and messages in conjunction with CINE 3400. We will look at: the technical aspects of managing a wide range of digital formats; how to balance and mix audio; how to work with color and picture adjustments and how to use graphics and animation. The class leads students through all the steps to produce technically proficient material and gives students the tools, concepts and workflows to understand how to solve common production problems in filmmaking and video. Formerly FILM 3525.
**Requisites:** Requires prerequisites courses of CINE 1502 and CINE 2000 (all min grade C-). Restricted to Cinema Studies majors only.
**Recommended:** Prerequisites CINE 2005 or 2105.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Workshops

**CINE 3563 (3) Producing the Independent Film**
Introduces the role of the producer from development through production and sales, distribution. Students will practice pitching, develop pitch decks and apply for funding for one project. The role of labs, residencies, markets and film festivals will be addressed as well as modes of financing including crowd funding, tax incentives, equity finance, pre-sales, co-productions and gap financing. Formerly FILM 3563.
**Requisites:** Requires prerequisite courses of CINE 1502 and CINE 2000 or CINE 2300 and CINE 2500 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Topics

**CINE 3620 (3) Experimental Digital Animation**
Explores boundaries of traditional animation construction and delve into contemporary animation history. Small projects will involve experimentation with animation techniques that integrate with analog animation, frame-by-frame digital processes and live-action footage. Ideal for students who have taken CINE 2010 or CINE 2610 or CINE 3525. Students familiar with animation and digital imaging or those eager to explore the process are encouraged to enroll. Formerly FILM 3620.
**Requisites:** Restricted to Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Production

**CINE 3700 (3) Cinema Audio Design**
Studies and applies Pro Tools as a post-production audio toolbox. Applied techniques include sound recording, field recording, foley, vocal recording and editing, plug-in generated sound creation, MIDI, basic scoring principles, audio sweetening and audio mixing. Students will be required to complete regular editing assignments in addition to a final soundscape project. Formerly FILM 3700.
**Requisites:** Requires prerequisite course of CINE 2010 or CINE 2500 (minimum grade C-). Restricted to Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Production

**CINE 3900 (1-3) Independent Study (Production)**
Limit of 3 credit hours per semester. Formerly FILM 3900.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Production

**CINE 3901 (1-3) Independent Study (Critical Study)**
Limit of 3 credit hours per semester. Formerly FILM 3901.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: History

**CINE 3920 (1-3) Professional Seminar**
Learning aspects of professional development in the field of cinema. Through workshops and assignments students will learn of the many opportunities found within all areas of production. Guests will help inform the students of professional options and expectations. Topics will include: crew work, fund raising, marketing festivals, low budget filmmaking, and alternative venues. Students may have an internship concurrently with this course. Formerly FILM 3920.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of CINE 2500 (minimum grade C-).
**Recommended:** Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Production

**CINE 3940 (1-6) Cinema Studies Internship**
Provides students with professional internship experiences with film, video, new media production companies, governmental agencies, production units, audio recording studios and new media industries. Students will be responsible for securing their own internship position. Formerly FILM 3940.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to Cinema Studies majors only.
**Recommended:** Prerequisite CU GPA of at least 2.00 and upper-division standing and a 3.00 GPA as a BA or BFA Cinema Studies major.
**Additional Information:** Departmental Category: Production

**CINE 3990 (1) Film Practicum**
Offers creative and technical experience in aspects of film, video and media production for students in the BFA track and BA production emphasis. Students earn credit by working in any number of "crew" positions for Upper Division Production, MFA productions or faculty projects under the supervision of the course instructor. Formerly FILM 3990.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Production

**CINE 4000 (3) Advanced Digital Postproduction**
The world of video changes with blinding speed. This class lays the groundwork to keep up with the changing technology and all the technical details of working in commercial post. We will look at distributed rendering, color grading, film scanning, multi-editor collaboration, live production virtual reality and distribution. Every week students will have a technological challenge and work as a team to solve it. Strong familiarity with Adobe, Avid and DaVinci is recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5000
**Requisites:** Requires prerequisite courses CINE 1502 and CINE 2000 or CINE 2300 and CINE 2500 and CINE 3525 or CINE 4400 (all minimum grade C-). Restricted to Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Production

**CINE 4001 (3) Screening Race, Class & Gender in the U.S. and the Global Borderland**
Engaging with the ways in which racial, class, gender and sexual oppression intersect, this class examines several film productions by and about diasporic and subaltern subjects (especially children and women) in the U.S./Mexico borderlands, and the urban ethnic metropoles of the global borderlands.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4001 and ETHN 5001
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: History

**CINE 4003 (3) Film and Literature**
Explores similarities and differences between literature and film as narrative arts. Studies several novels, short stories and plays and films made from them. Examines problems in point of view, manipulation of time, tone, structure, and setting. Restricted to juniors and seniors.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5003
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Topics

**CINE 4004 (3) Topics in Film Theory**
Provides topic-centered analyses of controversial areas in film theory. Students read extensive materials in the topic area, analyze and summarize arguments as presented in the literature, write "position" papers and make oral presentations in which they elaborate their own arguments about specific assigned topic, establishing critical dialogue with the primary materials.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 4004 and ARTF 5004
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Cinema Studies or Humanities (HUMN) majors only.
**Recommended:** Prerequisite CINE 3051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Intensive and Small Courses

**CINE 4005 (3) Screenwriting Workshop: Short Form**
A writing intensive course that focuses on the art of the short form screenplay. Students will complete regular writing exercises, presentations, and several short scripts. Formerly FILM 4005.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of CINE 1502 and CINE 2005 or CINE 2105 (all minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Workshops

**CINE 4010 (1-3) Topics in Film Production**
Prepares students for advanced Cinema Studies production courses. Subject matter varies each semester. Formerly FILM 4010.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5010
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of CINE 1502 and CINE 2000 or CINE 2300 and CINE 2500 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 4020 (3) Analog Alternatives**
Introduction to small gauge analog moving image formats and technologies with a focus on process and experimentation through hands-on exploration and demonstrations. This process-oriented class will utilize DIY methods and Alternative Process Photography approaches to work creatively with silver based holographic mediums. Students will create moving image works with Super 8mm and 16mm film while exploring the implications and possibilities of working with these mediums within our current digital paradigm.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5020
**Requisites:** Requires prerequisite courses of CINE 1502 and CINE 2000 (all minimum grade C-).

**CINE 4021 (3) Directing/Acting for the Camera**
Offers an intensive production seminar to prepare actors and directors to work collaboratively and effectively for the medium of the camera. Directing vocabulary, script interpretation, film terminology and acting techniques are applied. Explores situations in which actors and directors interact, from auditions to rehearsals to filming. Requires attendance, textbook readings, research and production responsibilities on both sides of the camera. Formerly FILM 4021.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5021
**Recommended:** Prerequisite CINE 1502.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: History

**CINE 4023 (3) Topics in International Cinema**
Focuses on major international filmmakers who have had a decisive impact on world cinema. Students will learn how directors create their own innovative body of work with specific formal and thematic patterns and will also learn to place such work within multiple frameworks that will cover film history, theory, aesthetics, philosophy and social and cultural analysis. Formerly FILM 4023.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5023
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade C-). Restricted to Cinema Studies (CINE) majors and minors or Fine Arts - Creative Arts (ARTC) majors only.
**Recommended:** Prerequisite CINE 3051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Topics

**CINE 4024 (3) Advanced Research Seminar**
Focuses on a specific topic, director, or genre chosen by the professor. Research skills and critical thinking are emphasized. With faculty guidance, students determine individual projects and present them to the class. Class participation is mandatory. Each student submits a thorough and original research paper for a final grade. Department enforced requisite: restricted to students with 57-180 credits (Juniors or Seniors) with a minimum GPA of 3.0. Formerly FILM 4024.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5024
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisites CINE 3051 and CINE 3061.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Intensive and Small Courses

**CINE 4040 (3) Advanced Analog Alchemy**
Investigating, developing, and re-interpreting historical approaches and processes involved in the creation of Analog motion picture works. Students will work with Analog mediums in alternative modes and unestablished ways and develop their personal process towards the goal of producing a unique moving image work to be presented in a final analog format for exhibition.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5040
**Requisites:** Requires prerequisite course of CINE 4020, formerly CINE 3030 (minimum grade C-). Restricted to Cinema Studies majors only.

**CINE 4043 (1-3) Topics in Cinema Critical Studies**
Prepares students for advanced Cinema Studies critical studies courses. Subject matter varies each semester. Formerly FILM 4043.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5043
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Cinema Studies majors and minors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Topics

**CINE 4105 (3) Advanced Screenwriting**
Introduces professional screenwriting in the form of a creative writing workshop. Admission by portfolio (see film department). Students write scenes and scripts for short films, feature treatments, etc., and are graded on a final portfolio.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5105
**Requisites:** Requires prerequisite course of CINE 4005 (minimum grade C-).
**Recommended:** Prerequisites CINE 3051 and CINE 3061 and an approved writing sample.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Workshops

**CINE 4200 (3) Flow Visualization**
Explores techniques for the visualization of the physics of fluid flows including seeding with dyes, particles and bubbles, and shadowgraphy and schlieren. Reviews optics and fluid physics, especially atmospheric clouds. Assignments are student-driven, to individuals and mixed teams of graduates, undergraduates, engineering majors and photography/video majors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 4211 (3) History of Russian and Soviet Cinema**
Explores groundbreaking works of Russian and Soviet cinema in historical context and with an emphasis on the connections between politics and cinematic form. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4211 and REES 5211 and ARTF 5211
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade D-).
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 4400 (3) Digital Post-Production**
Through projects, discussions, and screenings, this class explores the practices and aesthetics of computer-based moving-image art editing. Formerly FILM 4400.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5400
**Requisites:** Requires prerequisite course of CINE 3525 (minimum grade C-). Restricted to Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 4453 (3) History of Avant-Garde Film**
Surveys the history, aesthetics, and contexts of the American avant-garde cinema from its 1920s roots in Europe to the highlights of the 1940s, `50s, `60s and beyond. May cover a variety of periods, developments, filmmakers, and movements up to and including contemporary experimental film, multimedia, installation, etc. Formerly FILM 4453.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5453
**Requisites:** Requires prerequisite course of CINE 1502 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Topics

**CINE 4500 (3) Cinema Production 2**
Advanced exploration of creative cinema production through short production and post-production projects. Course focuses on the tactics and strategies of independent cinema production leading to the completion of a BFA thesis project exploring either documentary, experimental, or narrative genres. Formerly FILM 4500.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5500
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of CINE 3400 and CINE 3515 and CINE 3525 (all minimum grade C). Restricted to Cinema Studies majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**CINE 4505 (3) Screenwriting Workshop: Long Form**
Creative writing workshop in which students plan and write a feature-length screenplay with emphasis on format, dialogue, characterization, and story.
**Requisites:** Requires prerequisite course of CINE 1502 and CINE 2000 (all minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Workshops

**CINE 4604 (3) Colloquium in Film Aesthetics**
Seminar for the serious round table discussion and critique of film as an art form, emphasizing development of appropriate verbal and written language skills for description of film. Department enforced prerequisite: restricted to students with 57-180 credits (Juniors or Seniors) with a minimum GPA of 3.0 or instructor consent required. Formerly FILM 4604.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5604
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Intensive and Small Courses

**CINE 4959 (3-6) Honors Senior Thesis**
For exceptional Film Studies majors who wish to write an honors thesis based on independent research or creative work under the direction of a faculty member. Formerly FILM 4959.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Intensive and Small Courses

# Civil Engineering (CVEN)

## Courses

**CVEN 1027 (3) Civil Engineering Drawing**
Develops drawing and drafting skills for civil engineering projects in both hand drawing and software tools. Students will learn to read and interpret design and construction drawings.
**Requisites:** Restricted to Civil Engineering (CVEN) majors and IUT on track students only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 1317 (1) Introduction to Civil and Environmental Engineering**
Surveys the broad subject of civil and environmental engineering and professional practice. Includes the subdisciplines of structures, water resources, geotechnics, transportation, environment, and construction. Discusses professional ethics, important skills for engineers, and the engineering design process as it fulfills multiple objectives.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) College of Engineering majors only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 1837 (1-3) Special Topics**
Supervised study of special topics of interest to student under instructor guidance.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 2012 (3) Introduction to Geomatics**
Presents basic techniques of land and construction surveying, including measurement of position, elevation, orientation and length of lines, area, volume and layout calculations. Optical, GPS and GIS equipment and methods are included.
**Requisites:** Restricted to Architectural (AREN) or Civil (CVEN) or Integrated Design (IDEN) Engineering majors and IUT on track students only.
**Additional Information:** Departmental Category: Surveying and Transportation

**CVEN 2017 (1) Excel Matlab R Primer**
Introduces basic usage of Excel, Matlab, and R software programs. Includes overview of fundamental operations such as data input and output, arithmetic, graphics, and programming syntax; more specific operations such as algebraic functions, linear algebra, plotting, loops, conditional statements, statistics and data analysis. Students will complete a final programming project with one of the software programs.
**Requisites:** Requires prerequisite course of CSCI 1200 or CHEN 1310 or CSCI 1300 or ECEN 1310 (all minimum grade C-). Restricted to College of Engineering majors or IUT on track students only.
**Recommended:** Corequisite APPM 2360.

**CVEN 2121 (3) Analytical Mechanics 1**
Applies mechanics to the study of static equilibrium of rigid and elastic bodies. Includes composition/resolution of forces; moments/couples; equivalent force systems; free-body diagrams; equilibrium of particles and rigid bodies; forces in trusses/beams; frictional forces; first/second moments of area; moments and products of inertia.
**Equivalent - Duplicate Degree Credit Not Granted:** GEEN 2851 and MCEN 2023
**Requisites:** Requires a prereq course of PHYS 1110 (min grade C-). Requires a prereq or coreq course of APPM 2350 or MATH 2400 (min grade C-). Restricted CVEN or EVEN or AREN or AMEN or EPEN or IDEN majors with a CIV, ENR or ARC subplan or IUT on track students.
**Additional Information:** Departmental Category: Mechanics

**CVEN 2545 (3) Construction Materials**
Introduce material science of engineering materials, such as atomic and crystal structures, defects, and phase diagrams; discusses in details three construction materials: Portland cement concrete, metals, and asphalts including classification and composition, engineering properties, and testing methods. Covers basic information of two materials: fiber reinforced polymers and wood.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) College of Engineering students only.
**Recommended:** Prerequisite CVEN 2121.
**Grading Basis:** Letter Grade

**CVEN 2837 (1-3) Special Topics**
Supervised study of special topics of interest to student under instructor guidance.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 2909 (3) Introduction to Global Sustainability**
This course introduces engineering and non-engineering students to basic definitions and principles of sustainability (i.e., environment, economy, society) and the historical context regarding modern social and technical sustainability challenges as they pertain to population growth and climate change. The course places an emphasis on identifying the drivers, determinants and solutions favoring equitable access to water, sanitation, energy, food, transportation and shelter. Topics include technology development and validation, data collection and impact evaluation.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 2909

**CVEN 2919 (3) Sustainability in Action**
Using contemporary case studies, this course introduces students to real-world applications of sustainability principles in developing and deploying social and technological solutions to sustainability challenges in climate change, energy, water, oceans, buildings, air quality, human health, food and agriculture, environmental justice, ethics, business, policy, and education. This course answers the following question: Given that sustainability challenges persist, what can we do about it?
**Recommended:** Prerequisite CVEN 2909.

**CVEN 3022 (3) Construction Surveying**
Studies construction and highway surveying, horizontal and vertical curves, earthwork, and analysis of data.
**Requisites:** Requires prerequisite course of CVEN 2012 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Surveying and Transportation

**CVEN 3032 (3) Photogrammetry**
Familiarizes students with characteristics of aerial photographs. Measures and interprets aerial photos for planimetric, topographic, hydrological, soil, and land use surveys. Analyzes and presents field measurements over extensive reaches.
**Additional Information:** Departmental Category: Surveying and Transportation

**CVEN 3042 (3) Advanced Engineering Drawing for Infrastructure**
Applying drawing and drafting skills for infrastructure projects using advanced CAD software tools. This course will provide an overview of general CAD standards related to civil engineering. Students will create and modify 3D infrastructure CAD models. Students will learn advanced topics, including terrain surface modeling and grading, earthwork calculations, horizontal and vertical alignment design, subsurface pipe design, and development of construction plans.
**Requisites:** Requires prerequisite course of CVEN 1027 (minimum grade C-). Restricted to College of Engineering students only.
**Grading Basis:** Letter Grade

**CVEN 3111 (3) Analytical Mechanics 2**
Studies the motion (kinematics) of particles and rigid bodies, and the forces that cause the motion (kinetics). Newton's laws as well as energy methods are used to study the motion of particles and rigid bodies in two and three dimensions.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 2043
**Requisites:** Requires prerequisite courses of CVEN 2121 or GEEN 2851 or MCEN 2023 or ASEN 2001 or ASEN 2701 (all minimum grade C-). Restricted to AREN, CVEN, EVEN, or IDEN majors only.
**Additional Information:** Departmental Category: Mechanics

**CVEN 3141 (2) Engineering Materials Lab**
**Additional Information:** Departmental Category: Mechanics

**CVEN 3161 (3) Mechanics of Materials 1**
Addresses concepts of stress and strain; material properties, axial loading, torsion, simple bending, and transverse shear; analysis of stress and strain; and deflections of beams. Includes selected experimental and computational laboratories.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 2063
**Requisites:** Requires prereq of (CVEN 2121 or GEEN 2851 or MCEN 2023 or ASEN 2001 or ASEN 2701) and prereq or coreq of (APPM 2360 or (MATH 2130 and 3430)) (all min grade C-). Restricted to AREN, CVEN, EVEN, or IDEN majors with CIV, ENR or ARC subplan.
**Additional Information:** Departmental Category: Mechanics

**CVEN 3227 (3) Probability, Statistics and Decision**
Introduces uncertainty based analysis concepts and applications in the planning and design of civil engineering systems emphasizing probabilistic, statistics, and design concepts and methods.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 3246 (3) Introduction to Construction**
Provides a broad view of concerns, activities, and objectives of people involved in construction: the owner, architect/engineer, contractor, labor and inspector. Interactive gaming situation relates these people to the construction contract, plans/specifications, estimates/bids, scheduling, law and financial management. Students with a Business School Real Estate emphasis may be considered for this course.
**Requisites:** Restricted to junior or senior Civil (CVEN) or Architectural (AREN), Environmental (EVEN) or Integrated Design (IDEN) Engineering majors only.
**Additional Information:** Departmental Category: Construction

**CVEN 3256 (3) Construction Equipment and Methods**
Integrated study of construction equipment, methods, and economics. Topics include equipment productivity, equipment selection, and construction engineering design within economic constraints. Examples include earthmoving, concrete formwork, and temporary construction.
**Requisites:** Requires prerequisite course of CVEN 3246 (minimum grade C-). Restricted to Architectural (AREN) or Civil (CVEN) or Integrated Design (IDEN) Engineering majors only.
**Additional Information:** Departmental Category: Construction

**CVEN 3313 (3) Theoretical Fluid Mechanics**
Basic principles of fluid mechanic. Covers fluid properties, hydrostatics, fluid flow concepts, including continuity, energy, momentum, dimensional analysis and similitude and flow in closed conduits.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 3200 and MCEN 3021
**Requisites:** Requires prerequisite course of CVEN 2121 or GEEN 2851 or ASEN 2001 or ASEN 2701 or MCEN 2023 (all min grade C-). Restricted to Civil (CVEN) or Environmental (EVEN) majors, or Integrated Design Engineering (IDEN-BSIDE) majors with a CIV or ENR subplan.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 3323 (3) Hydraulic Engineering**
Studies hydraulic engineering theory and applications. Topics include incompressible flow in conduits, pipe system analysis and design, open channel flow, flow measurement, analysis and design of hydraulic machinery.
**Requisites:** Requires prerequisite course of CVEN 3313 or MCEN 3021 or AREN 2120 or CHEN 3200 (all minimum grade C-). Restricted to Civil (CVEN), Environmental (EVEN), Architectural (AREN) or Integrated Design (IDEN) Engineering majors only.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 3414 (3) Fundamentals of Environmental Engineering**
Emphasizes chemical, ecological and hydrological fundamentals and importance of mass and energy balances in solving environmental engineering problems related to water quality, water and wastewater treatment, air pollution, solid and hazardous waste management, sustainability and risk assessment.
**Requisites:** Requires prereq courses CHEN 1201 or CHEN 1211 or CHEM 1113 or MCEN 1024 and APPM 1360 or MATH 2300 (all min grade C-). Restricted to CVEN, AREN, EVEN, MCEN, CHEN, IDEN or AMEN majors only.
**Additional Information:** Departmental Category: Environmental

**CVEN 3424 (3) Water and Wastewater Treatment**
Introduces design and operation of facilities for treatment of municipal water supplies and wastewater. Provides an engineering application of physical, chemical, and biological unit processes and operations for removal of impurities and pollutants. Involves an integrated design of whole treatment systems combining process elements.
**Requisites:** Requires prerequisite course of CVEN 3414 (minimum grade C-).
**Additional Information:** Departmental Category: Environmental

**CVEN 3434 (3) Introduction to Applied Ecology**
Emphasizes the integration of physical, chemical and biological processes in controlling terrestrial and aquatic ecosystems. Ecosystem concepts are applied to current environmental and water quality problems. Includes field trips and a group project.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3434
**Requisites:** Requires prereq courses of (CHEN 1201 or CHEN 1211 or CHEM 1113 or CHEM 1400 or MCEN 1024) and (CHEM 1114 or CHEM 1221) (all min grade C-).Restricted to students w/ 57-180 credits (Jr or Sr) Civil (CVEN), Environ (EVEN) or Arch Eng (AREN) or (IDEN) mjrs
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Departmental Category: Environmental

**CVEN 3525 (3) Structural Analysis**
Studies structural analysis of statically determinate and indeterminate systems, deflections, energy methods, and force and stiffness methods.
**Requisites:** Requires prerequisite course of CVEN 3161 or MCEN 2063 (minimum grade C-). Restricted to Civil (CVEN), Environmental (EVEN), Architectural (AREN), Integrated Design (IDEN) or Applied Mathematics (AMEN) majors only.
**Additional Information:** Departmental Category: Structures

**CVEN 3602 (3) Transportation Systems**
Introduces the principles of transportation systems with a focus on highway engineering and traffic analysis. Provides the basic skill set that will allow students to solve transportation problems related with highway design and traffic control and analysis. Provides an introduction to technology, operating characteristics, and relative merits of highway, airway, waterway, railroad, pipeline, and convey or transportation systems.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: Surveying and Transportation

**CVEN 3698 (3) Engineering Geology**
Highlights the role of geology in engineering minerals; rocks; surficial deposits; rocks and soils as engineering materials; distribution of rocks at and below the surface; hydrologic influences; geologic exploration of engineering sites; geologic hazards; mapping; and geology of underground excavations, slopes, reservoirs and dam sites.
**Requisites:** Requires prereq or coreq courses of (CVEN 2121 or GEEN 2851 or ASEN 2001 or ASEN 2701 or MCEN 2023) and (APPM 2350 or MATH 2400) (all minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 3708 (3) Geotechnical Engineering 1**
Covers basic engineering characteristics of geological materials; soil and rock classifications; site investigation; physical, mechanical, and hydraulic properties of geologic materials; the effective stress principle; soil and rock improvement; seepage analysis; stress distribution; and consolidation and settlement analyses. Selected experimental and computational laboratories.
**Requisites:** Requires prerequisite course of CVEN 3161 or MCEN 2063 (minimum grade C-). Restricted to Civil (CVEN), Environmental (EVEN), Architectural (AREN), Integrated Design (IDEN) or Applied Mathematics (AMEN) majors only.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 3718 (3) Geotechnical Engineering 2**
Covers stress analysis and plastic equilibrium, sheer strength of soil, bearing capacity, lateral earth pressures, slope stability and underground construction. Analysis and design of shallow and deep foundations, retaining walls and other earth and rock structures. Selected experimental and computational laboratories.
**Requisites:** Requires prerequisite course of CVEN 3708 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 3837 (1-3) Special Topics**
Supervised study of special topics of interest to student under instructor guidance.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 4122 (3) The Colorado River Water Crisis: Water Policy, Hydrological Variability, and Climate Change**
Analyzes the physical basis and policy origins for today¿s Colorado River water crisis. Surveys the history of Colorado River water development, and allocation. Examines political and policy decisions that have occurred. Unravels the physical drivers for the river¿s flow, its variability, and change. Places timelines of policy choices into context of emerging scientific understanding of Colorado River hydro-climate. Integrates evolving policy and physical factors to address today¿s water crisis that informs pathways for solutions.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5122
**Requisites:** Restricted to students in College of Engineering and Applied Science (ENGR) and students in ATOC, HIST, CAMW, ENVS, GEOG, PSCI, Law School, Getches-Wilkinson Law Center, Ecology and Evolutionary Biology, Journalism, or Environmental Journalism.
**Recommended:** Prerequisite physical hydrology; This is a multi-disciplinary upper division lecture course open to both undergraduate and graduate students with interest in history, policy, politics, humanities, geography, hydrology, and meteorology.

**CVEN 4133 (3) Land Use and Water Quality**
Principles, processes, and control of nonpoint source pollution. Particular emphasis is placed on non-point source (NPS) problems associated with urban runoff, agricultural influences on water quality, and impacts of mining and forestry. Surface and ground water pollution in diverse aquatic systems including stream, river, lake, reservoir, estuarine environments are considered. Students are exposed to a variety of structural and non-structural management principles.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5133
**Requisites:** Restricted to students in College of Engineering and Applied Science (ENGR) only.
**Recommended:** Prerequisite CVEN 4333, Engineering Hydrology.

**CVEN 4147 (3) Civil Engineering Systems**
Theory and application of the principles of engineering economics and classical and metaheuristic optimization techniques for evaluating problems in civil and environmental engineering.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5147
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) College of Engineering majors only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 4157 (3) A Systems Approach to Global Engineering**
Introduces engineering students to the global context in which engineers are asked to operate in the 21st century using system dynamics tools and other decision-making tools (network analysis, agent based modeling, etc.) necessary to analyze the uncertainty and complexity inherent in global projects.
**Equivalent - Duplicate Degree Credit Not Granted:** EDEN 4147, CVEN 5157 and EDEN 5147
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**CVEN 4161 (3) Mechanics of Materials 2**
Covers advanced topics in the mechanics of solids. Some topics such as asymmetric bending of beams, torsion of non-circular cross-sections, are extensions of topics seen in CVEN 3161. Others like 3-D stress and strain analysis, failure theories and stability of columns and frames are new. Includes selected laboratory experiments.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5161
**Requisites:** Requires prerequisite course of CVEN 3161 (minimum grade C-).
**Additional Information:** Departmental Category: Mechanics

**CVEN 4303 (3) Analysis of Urban Water Systems**
Examines water systems in the urban environment in an integrated manner. Focus is placed on analyzing the behavior of urban water distribution and collection systems using model applications. Students completing this course will be able to understand local urban water resources problems, effectively use complementary urban water models, and examine the interactions between water supply, drainage systems, surface water, and groundwater.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5303
**Requisites:** Requires prerequisite course of CVEN 3313 or MCEN 3021 or CHEN 3200 or AREN 2120 (minimum grade C-). Restricted to College of Engineering students only.
**Recommended:** Prerequisite CVEN 3323 (Hydraulic Engineering).

**CVEN 4323 (3) Water Resources Engineering Design**
Studies principles and techniques of water resources engineering design. Introduces environmental modeling under uncertainty, stormwater design, precipitation estimation and flow routing. Surveys hydropower, reservoir management and water resources economics.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5423
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 4333 (3) Engineering Hydrology**
Studies engineering applications of principles of hydrology, including hydrologic cycle, rainfall and runoff, groundwater, storm frequency and duration studies, stream hydrography, flood frequency, and flood routing.
**Requisites:** Requires prerequisite course of CVEN 3313 or AREN 2120 or CHEN 3200 or MCEN 3021 (all minimum grade C-). Requires prerequisite or corequisite course of CVEN 3227 or MCEN 3047 or CHEN 3010 or GEEN 3853 (all minimum grade C-).
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 4353 (3) Groundwater Engineering**
Studies the occurrence, movement, extraction for use,and quantity and quality aspects of groundwater. Introduces and uses basic concepts to solve engineering and geohydrologic problems.
**Requisites:** Requires prerequisite course of CVEN 3313 or MCEN 3021 or CHEN 3200 or AREN 2120 (minimum grade C-).
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 4383 (3) Applied Groundwater Modeling**
Studies analytical and numerical methods for solving problems of groundwater flow and chemical transport. Emphasizes fundamental modeling techniques and the relationship between the physical system and the model results. Applies models and modeling techniques to solve problems in ground water hydrology using contemporary software. Include computer laboratory sessions.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5383
**Requisites:** Requires prerequisite course of CVEN 3313 or MCEN 3021 or CHEN 3200 or AREN 2120 (minimum grade C-).
**Recommended:** Prerequisite CVEN 4353 (minimum grade C-).
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 4404 (3) Water Chemistry**
Introduces chemical fundamentals of inorganic aqueous compounds and contaminants in lecture and laboratory. Lecture topics include thermodynamics and kinetics of acids and base reactions, carbonate chemistry, air-water exchange, precipitation, dissolution, complexation, oxidation-reduction and sorption.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 4404
**Requisites:** Requires prerequisite course of (CHEN 1203 or CHEN 1211 or CHEM 1133) and (CHEM 1221 or CHEM 1134) (all minimum grade C-). Requires corequisite course of CVEN 3414.
**Additional Information:** Departmental Category: Environmental

**CVEN 4414 (1) Water Chemistry Laboratory**
Reinforces chemical fundamentals of inorganic aqueous compounds and contaminants from CVEN/EVEN 4404 in laboratory experiments and reports. Topics include acids and bases, carbonate chemistry (alkalinity) and other water chemistry characteristics (hardness, dissolved oxygen); precipitation, complexation and oxidation-reduction reactions; and laboratory techniques and reporting.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 4414
**Requisites:** Requires prerequisite courses of CHEN 1201, CHEN 1203, CHEM 1221 or CHEN 1211 or CHEM 1113 and CHEM 1133 (all minimum grade C-). Requires corequisite course of CVEN 4404. Restricted to Civil (CVEN) or Environmental (EVEN) Engineering majors only.
**Additional Information:** Departmental Category: Environmental

**CVEN 4424 (3) Environmental Organic Chemistry**
Examines the fundamental physical and chemical transformations affecting the fate and transport of organic contaminants in natural and treated waters. Emphasizes quantitative approach to solubility, vapor pressure, air-water exchange, sorption, hydrolysis and redox reactions, and photodegradation.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 4424
**Requisites:** Requires prerequisite course of (CHEN 1211 or CHEN 1203 or CHEM 1133 or CHEM 2100) and CVEN 4404 (minimum grade C-).
**Additional Information:** Departmental Category: Environmental

**CVEN 4434 (4) Environmental Engineering Design**
Examines the design of facilities for the treatment of municipal water and wastewater, hazardous industrial waste, contaminated environmental sites and sustainable sanitation in developing countries. Economic, societal and site specific criteria impacting designs are emphasized.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 4434
**Requisites:** Requires prerequisite course of CVEN 3414 and CVEN 4464 or CVEN 3424 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environmental

**CVEN 4464 (3) Environmental Engineering Processes**
Develops and utilizes analytic solutions for environmental process models that can be used in a) reactor design for processes used in the treatment of water, wastewater and hazardous waste and b) process analysis of natural systems, such as streams and groundwater flow. Models facilitate the tracking of contaminants in engineered and natural systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5464 and EVEN 4464
**Requisites:** Requires prerequisite courses of (CVEN 3313 or CHEN 3200 or MCEN 3021 or AREN 2120) and CVEN 3414 (all minimum grade C-).
**Additional Information:** Departmental Category: Environmental

**CVEN 4474 (3) Hazardous and Industrial Waste Management**
Evaluates processes used for treatment of wastes requiring special handling and disposal: toxic organic chemicals, heavy metals, acidic, caustic and radioactive waste material. Discusses techniques for destruction, immobilization and resource recovery and assessment of environmental impact of treatment process end products.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5474
**Requisites:** Requires prerequisite course of CVEN 3414 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Environmental

**CVEN 4484 (3) Integrative Environmental and Molecular Microbiology**
Surveys microbiology topics germane to modern civil and environmental engineering. Provides fundamentals needed to understand microbial processes and ecology in engineered and natural systems and reviews applications emphasizing the interface between molecular biology and classical civil engineering.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 4484, CVEN 5484, and EVEN 5484
**Requisites:** Requires prerequisite courses of CHEN 1211 or CHEN 1201 or CHEM 1113 and CHEM 1221 and APPM 1350 or MATH 1300 (all minimum grade C-).
**Additional Information:** Departmental Category: Environmental

**CVEN 4511 (3) Introduction to Finite Element Analysis**
Covers systematic formulation of finite element approximation and isoparametric interpolation (weighted residual and energy methods, triangular and quadrilateral elements). Includes computation applications to the solution of one- and two-dimensional stress-deformation problems and steady and transient heat conduction.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5511
**Requisites:** Requires prerequisite courses of CVEN 3161, CVEN 3525 and (APPM 2360 or (MATH 2130 and 3430)) (all minimum grade C-).
**Additional Information:** Departmental Category: Mechanics

**CVEN 4525 (3) Computational Structural Analysis 1**
Covers the principles and formulations of the direct stiffness method and its transition to the finite element method with the computational modelling and analysis of framed structures in 2D plane and 3D space. The dynamic analysis and the introduction to the nonlinear structural problems are provided. Familiarity with the modern computing and programming environments is increased to address the needs in the structural engineering and mechanics area. Computer programming is applied to the solution of problems in structural analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5525
**Requisites:** Requires prerequisite course of CVEN 3525 (minimum grade C-).
**Additional Information:** Departmental Category: Structures

**CVEN 4537 (3) Numerical Methods in Civil Engineering**
Introduces the use of numerical methods in the solution of civil engineering problems, emphasizing obtaining solutions with high-speed electronic computers. Applies methods to all types of civil engineering problems.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5537
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) College of Engineering majors only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 4545 (3) Steel Design**
Applies basic principles of structural engineering and mechanics to design of steel structures; design of tension members, columns, beams, open-web joists, steel decks, bolts, bolted connections, welding processes, and welded connections.
**Requisites:** Requires prerequisite course of CVEN 3525 (minimum grade C-).
**Additional Information:** Departmental Category: Structures

**CVEN 4554 (3) Fundamentals of Air Quality Management**
Introduces engineering methods for the study of air quality. Topics include: indoor air quality, greenhouse gases, dispersion modeling, source apportionment modeling, chemistry of combustion, pollution sources and controls, human exposure to air pollutants. A focus on Engineering for Developing Communities runs throughout. Elective for the EVEN air quality track or an environmental concentration course for CVEN.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5554
**Requisites:** Requires prerequisite courses of APPM 2360 or MATH 2130 and MATH 3430 and CVEN 3313 or CHEN 3200 or MCEN 3021 (all minimum grade C-).
**Additional Information:** Departmental Category: Environmental

**CVEN 4555 (3) Reinforced Concrete Design**
Applies basic principles of structural engineering and mechanics to the design of reinforced concrete structures, including design of beams, columns, slabs, and footings; continuous beams and frames; cast-in-place buildings.
**Requisites:** Requires prerequisite course of CVEN 3525 (minimum grade C-).
**Additional Information:** Departmental Category: Structures

**CVEN 4565 (3) Design of Wood Structures**
Applies basic principles of structural engineering and mechanics to the design of wood structures, including the design and analysis of columns, trusses, beams and connections using dimensional lumber, glulam and cross-laminated timber.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5565
**Requisites:** Requires prerequisite course of CVEN 3525 (minimum grade C-).
**Additional Information:** Departmental Category: Structures

**CVEN 4594 (3) Water Reuse and Reclamation**
Explores development of a safe, reliable and acceptable program for reusing impaired waters. As fresh water becomes scarcer around the world, communities are looking for security through development of new water resources. Reuse of impaired water is one solution to the growing water crisis. Focus is on advanced treatment technologies with emphasis on public perception, economics and regulations.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5594
**Requisites:** Requires prerequisite course of CVEN 3414 (minimum grade C-). Restricted to College of Engineering students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite CVEN 3424.
**Additional Information:** Departmental Category: Environmental

**CVEN 4718 (3) Mechanics and Dynamics of Glaciers**
Develops a quantitative physical basis for understanding the functions of snow, ice and glaciers in the environment, with emphasis on developing an understanding of continuum mechanics and thermodynamics and their application to Earth systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5718
**Requisites:** Requires prereq course of (APPM 2350 or MATH 2400) and (APPM 2360 or (MATH 2130 and 3430)) and (AREN 2110 or GEEN 3852 or MCEN 3012 or ASEN 2002) and (CHEN 1310 or CSCI 1200 or CSCI 1300 or ASEN 1320 or ECEN 1310) (all min. grade C-).
**Additional Information:** Departmental Category: Geotechnical

**CVEN 4728 (3) Foundation Engineering**
Focuses on geotechnical design of shallow and deep foundations, including spread footings, mats, driven piles and drilled piers. Coverage includes bearing capacity, settlement, group effects and lateral load capacity of the various foundation types. The application of lower and upper bound plasticity analyses for the structural and geotechnical design of foundation systems, and how these relate to design codes, is additionally covered.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5728
**Requisites:** Requires prerequisite course of CVEN 3718 (minimum grade C-).
**Additional Information:** Departmental Category: Geotechnical

**CVEN 4833 (1-3) Special Topics**
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 4834 (1-3) Special Topics**
Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: Environmental

**CVEN 4835 (1-3) Special Topics**
Supervised study of special topics of interest to students under instructor guidance.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students in College of Engineering and Applied Science (ENGR) only.
**Additional Information:** Departmental Category: Structures

**CVEN 4836 (1-3) Special Topics**
Offers a supervised study of special topics, under instructor guidance.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**CVEN 4837 (1-3) Special Topics**
Supervised study of special topics of interest to students under instructor guidance.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) CVEN, AREN, or EVEN students only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 4838 (1-3) Special Topics**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 4839 (3-6) Special Topics for Seniors**
Offers a supervised study of special topics, under instructor guidance. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Special Topics

**CVEN 4849 (1-3) Independent Study**
Involves an independent, in-depth study, research, or design in a selected area of civil or environmental engineering. Offerings are coordinated with individual faculty. Students should consult the Department of Civil, Environmental, and Architectural Engineering.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Special Topics

**CVEN 4897 (2) Professional Issues in Civil Engineering**
Educates students about the knowledge and skills required for professional civil engineers. Students learn about the path to a professional license, prepare for the FE exam, analyze a situation involving multiple conflicting ethical interests, identify aspects of sustainability in civil engineering projects, and understand the role of project management, public policy, business and public administration, and leadership in civil engineering.
**Requisites:** Restricted to students with 87-180 credits (Seniors) Civil (CVEN), Environmental (EVEN), or Architectural Engineering (AREN) majors only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 4899 (4) Civil Engineering Senior Project Design**
Provides a simulated real world design and construction planning experience where teams integrate across multiple civil engineering sub-disciplines to create a solution that satisfies multiple constraints, including design, client requirements, budget, schedule, technical, regulatory, and societal. Final deliverables include: detailed design drawings, specifications, cost estimate, project schedule, construction plan, oral and written presentation.
**Requisites:** Restricted to students with 87-180 credits (Senior) Civil (CVEN) or Integrated Design (IDEN) engineering majors only.
**Additional Information:** Departmental Category: Special Topics

**CVEN 4969 (3) Water and Sanitation in Developing Countries**
Studies the design and fundamentals behind effective treatment processes and engineering solutions targeted for developing countries. Approaches to clean water and sanitation in lesser industrialized countries often demand alternative solutions to those developed for industrialized societies. Explores issues and solutions developed to tackle these problems.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 4969
**Requisites:** Requires prerequisite course of CVEN 3414 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Environmental

**CVEN 5006 (3) Construction Engineering and Management Fundamentals**
Provides an overview of the construction industry to establish a foundation for subsequent graduate courses in construction engineering and management. Students will be exposed to projects of varying funding sources, contracts, scope and complexity. Project phases will be established including planning, funding, design, construction, turnover, operation and maintenance. The course will focus on fundamental construction cost estimating, scheduling, delivery systems, contractual relationships, key contract clauses, risk allocation, building materials/ systems and project controls. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Grading Basis:** Letter Grade

**CVEN 5109 (1) Introduction to Environmental and Development Economics for Engineers**
Addresses main development topics and their environmental implications based on a theoretical framework applied to practical real-life examples. Students will be introduced to the history of economic thought, the process of economic reform, agricultural and industrial development, income distribution, health, education, and international economic relations. Students analyze how these apply to economic development and how this impacts poverty and environmental degradation in the global south. Furthermore, students will examine how engineering intersects the solutions space.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** of EVEN 2909 or CVEN 5919 or CVEN 5909.
**Grading Basis:** Letter Grade

**CVEN 5111 (3) Structural Dynamics**
Focuses on the response of single- and multi-degree of freedom structures subjected to harmonic, impulsive and arbitrary loads (including earthquake base excitation). Sources and modeling of damping will be discussed. Analytical and numerical solutions will be considered for both linear and nonlinear structural systems. Elastic and inelastic response spectra will be discussed.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or seniors or students with concurrent degree sub plans C-AREN, C-CVEN, C-MCEN or C-ASEN.
**Additional Information:** Departmental Category: Mechanics

**CVEN 5119 (1) Introduction to Global Health for Engineers**
Global Health, a multidisciplinary academic and professional discipline, works to address the unequal distribution of disease determinants and burden in low income communities. In this course, engineering students engaged in Global Engineering, poverty reduction efforts, technology and intervention design will be introduced to the conditions, context, and professional activities and standards of global health practice.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** of enrollment in Mortenson Center graduate program or instructor approval.
**Grading Basis:** Letter Grade

**CVEN 5122 (3) The Colorado River Water Crisis: Water Policy, Hydrological Variability, and Climate Change**
Analyzes the physical basis and policy origins for today¿s Colorado River water crisis. Surveys the history of Colorado River water development, and allocation. Examines political and policy decisions that have occurred. Unravels the physical drivers for the river¿s flow, its variability, and change. Places timelines of policy choices into context of emerging scientific understanding of Colorado River hydro-climate. Integrates evolving policy and physical factors to address today¿s water crisis that informs pathways for solutions.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4122
**Requisites:** Restricted to students in ENGR, ATOC, HIST, CAMW, ENVS, GEOG, PSCI, Law School, Getches-Wilkinson Natural Resources Law Center, Ecology and Evolutionary Biology, Journalism, or Environmental Journalism.
**Recommended:** Prerequisite physical hydrology; This is a multi-disciplinary upper division lecture course open to both undergraduate and graduate students with interest in history, policy, politics, humanities, geography, hydrology, and meteorology.
**Grading Basis:** Letter Grade

**CVEN 5129 (1) Program and Project Management**
Covers the principles, practice, and phases of international development program and project management including design, implementation, monitoring and evaluation, exit strategy, and scaling up. Emphasis will be posed on challenges and constrains related to the multidisciplinary, dynamic, and complex nature of global development projects. Students will be exposed to several methodologies and tools commonly used to identify needs and promote social change, including the Theory of Change and the Logical Framework Approach.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** of EVEN 2909 or CVEN 5919 or CVEN 5909.
**Grading Basis:** Letter Grade

**CVEN 5131 (3) Continuum Mechanics and Elasticity**
Provides foundation for advanced study of structural, mechanical and geo-material behavior and continuum theories in mechanics. Topics: Cartesian tensors, formulation of continuum mechanics for small and large deformation, constitutive laws for elastic solids, energy principles, methods of potentials, formulations and solutions of 2D and 3D elastostatic and elastodynamic problems, analytical and numerical formulations.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or seniors or students with concurrent degree sub plans C-AREN, C-CVEN, C-MCEN or C-ASEN.
**Recommended:** Prerequisite CVEN 3161.
**Additional Information:** Departmental Category: Mechanics

**CVEN 5133 (3) Land Use and Water Quality**
Principles, processes, and control of nonpoint source pollution. Particular emphasis is placed on non-point source (NPS) problems associated with urban runoff, agricultural influences on water quality, and impacts of mining and forestry. Surface and ground water pollution in diverse aquatic systems including stream, river, lake, reservoir, estuarine environments are considered. Students are exposed to a variety of structural and non-structural management principles.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4133
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisite CVEN 4333, Engineering Hydrology.

**CVEN 5139 (1) Solution Identification and Proposal Development**
Presents an overview of strategies and best practices to develop effective grant proposals for international development interventions, as well as major funding mechanisms and processes. This is a project-based course, students will work in teams with an NGO to develop a concept note for a current request for proposal. The proposal will have to respect priorities and requirements of the target population, principles and goals of the proposing NGO, and guidelines of the donor.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** of EVEN 2909 or CVEN 5919 or CVEN 5909.
**Grading Basis:** Letter Grade

**CVEN 5147 (3) Civil Engineering Systems**
Theory and application of the principles of engineering economics and classical and metaheuristic optimization techniques for evaluating problems in civil and environmental engineering.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4147
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 5151 (3) Wave Methods for Design and Characterization of Advanced Materials**
Covers key theoretical concepts and applications of wave propagation with the focus on ultrasonic scattering. The course material includes: (i) dispersion analysis for design and characterization of materials with random and periodic microstructure, and (ii) advanced elastodynamic formulations rooted in 2D and 3D boundary integral equations for the purpose of inverse scattering and imaging. The course is intended to be self-contained, research-oriented and accessible for multidisciplinary audience.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.

**CVEN 5157 (3) A Systems Approach to Global Engineering**
Introduces engineering students to the global context in which engineers are asked to operate in the 21st century using system dynamics tools and other decision-making tools (network analysis, agent based modeling, etc.) necessary to analyze the uncertainty and complexity inherent in global projects.
**Equivalent - Duplicate Degree Credit Not Granted:** EDEN 4147, CVEN 4157 and EDEN 5147
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.

**CVEN 5161 (3) Advanced Mechanics of Materials I**
Covers advanced topics in the mechanics of solids. Some topics such as asymmetric bending of beams, torsion of non-circular cross-sections, are extensions of topics seen in CVEN 3161. Others like 3-D stress and strain analysis, failure theories and stability of columns and frames are new. Includes selected laboratory experiments.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4161
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Mechanics

**CVEN 5206 (3) Design Development**
Provides an overview of the development process and proforma, investigates the interrelationship between design decisions and building costs, and evaluates the impact of each major building system on the development budget and schedule. Provides a simulated development experience where students respond to a Request for Proposal, including proformas, design, estimates and outline specifications. Department consent required. Taught intermittently.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Construction

**CVEN 5226 (3) Construction Safety**
Comprehensively studies construction safety in the construction industry. Focuses on advanced safety management issues such as accident causation theory, economic modeling, safety risk quantification and analysis, design for safety, predictive analytics and learning. Skills developed in this course will prepare graduate students to be effective quality and safety managers or researchers.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Construction

**CVEN 5246 (3) Legal Aspects of Construction**
Applies law in engineering practice; contracts, construction contract documents, construction specification writing, agency, partnership, and property; types of construction contracts; and legal responsibilities and ethical requirements of the professional engineer. Taught intermittently.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** graduate standing or department consent required.
**Additional Information:** Departmental Category: Construction

**CVEN 5276 (3) Engineering Risk and Decision Analysis**
Acquaints students with the fundamental principles and techniques of risk and decision analysis. Oriented toward project-level decisions in which risk or uncertainty plays a central role. Introduces students to Monte Carlo analyses, and various types of multicriteria decision analyses. Culminates in a larger term project.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisite CVEN 3227 and graduate standing or instructor consent required.
**Additional Information:** Departmental Category: Construction

**CVEN 5286 (3) Design Construction Operations**
Considers effective/efficient design of construction operations. Front end planning; construction labor relations; productivity management. Emphasizes construction productivity improvement by group field studies and discrete event simulation modeling. How overtime, changes, weather, and staffing levels influence productivity. Industrial engineering techniques are applied to the construction environment to improve the use of equipment, human, and material resources.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** graduate standing or department consent required.
**Additional Information:** Departmental Category: Construction

**CVEN 5303 (3) Analysis of Urban Water Systems**
Examines water systems in the urban environment in an integrated manner. Focus is placed on analyzing the behavior of urban water distribution and collection systems using model applications. Students completing this course will be able to understand local urban water resources problems, effectively use complementary urban water models, and examine the interactions between water supply, drainage systems, surface water, and groundwater.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4303
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.

**CVEN 5313 (3) Environmental Fluid Mechanics**
Analysis of viscous incompressible flows, with first-principle solutions for environmental fluid flows in oceans, rivers, lakes and the atmosphere. Topics include the Navier-Stokes equations, kinematics, vorticity dynamics, geophysical fluid dynamics, and density stratification.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisites APPM 2350 and APPM 2360 and CVEN 3313.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 5323 (3) Applied Stream Ecology**
Emphasizes the integration of hydrologic, chemical, and biological processes in controlling river, stream, and reservoir ecosystems at several spatial scales. Students apply ecosystem concepts to current environmental and water quality problems and learn field methods in field trips and a team project.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Additional Information:** Departmental Category: Environmental

**CVEN 5333 (3) Physical Hydrology**
Introduces hydrology as a quantitative science describing the occurrence, distribution and movement of water at and near the surface of the earth. Develops a quantitative understanding of atmospheric water, infiltration, evapotranspiration and surface runoff. Studies global climatology and large scale climate drivers of regional hydrology at interannual time scales. Solves engineering problems related to water resources.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisite CVEN 4333.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 5343 (3) Transport and Dispersion in Surface Water**
Studies transport and dispersion of introduced contaminants in turbulent surface water flows. Emphasizes developing a physical understanding of fluid processes responsible for turbulent dispersion. Includes analytical development, numerical modeling, and experimental approaches to the problem.
**Requisites:** Restricted to graduate students and Engineering Management BAM students only.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 5346 (3) Managing Construction and Engineering Projects and Organizations**
Explores organizational and managerial issues and concerns facing executives in engineering and construction organizations. Through readings, case studies, simulation exercises, and projects, students are introduced to and apply concepts of strategy, core competencies, vision, innovation, team dynamics, interpersonal influence, organizational design issues, and global projects to engineering and construction organizations.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Construction

**CVEN 5353 (3) Groundwater Hydrology**
Studies the occurrence, movement, extraction for use, and quantity and quality aspects of groundwater. Introduces and uses basic concepts to solve engineering and geohydrologic problems.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisites CVEN 3313 or AREN 2120 or CHEN 3200 or GEEN 3853 or MCEN 3021 and APPM 2360.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 5363 (3) Modeling of Hydrologic Systems**
Introduces students to modeling techniques. Focus areas include physical hydrology and hydrometeorology; measurement and inference; climate change impacts; role of scale in hydrology; uncertainty analysis; and a case study project. Projects will examine hydrologic impacts of various drivers such as climate warming or land cover change, utilizing an assessment of historic conditions to better understand and model future disturbance scenarios.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 5373 (3) Water Law, Policy, and Institutions**
Discusses contemporary issues in water management based on legal doctrine. Identifies legal issues in water resources problems and discusses in close relationship with technical, economic, and political considerations.
**Requisites:** Restricted to students with 87-180 credits (Seniors), graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 5383 (3) Applied Groundwater Modeling**
Studies analytical and numerical methods for solving problems of groundwater flow and chemical transport. Emphasizes fundamental modeling techniques and the relationship between the physical system and the model results. Applies models and modeling techniques to solve problems in ground water hydrology using contemporary software. Includes computer laboratory sessions.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4383
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisites APPM 2360 and CVEN 4353 or CVEN 5353.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 5393 (3) Water Resources System and Management**
Introduces water resources planning and management as an integrated systems problem that satisfies multiple competing obejctives under constraints and uncertainty. Includes problem formulation and solution using decision support systems, optimization with and without uncertainty, stochastic simulation, and multiobjective optimization. Introduces water resources economics and planning under uncertainties such as climate change and increasing urbanization.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 5404 (3) Water Chemistry**
Introduces chemical fundamentals governing the chemistry of natural and treated waters. Topics include thermodynamics and kinetics of acid and base reactions, carbonate chemistry, air-water exchange, precipitation, dissolution, complexation, oxidation-reduction, and sorption.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Additional Information:** Departmental Category: Environmental

**CVEN 5414 (3) Water Chemistry Laboratory**
Uses experimental and analytical laboratory techniques to develop a better understanding of the concepts of aquatic chemistry and to investigate water chemistry in treated and natural water systems. Techniques include titration, spectrophotometry, gas chromatography, other advanced instrumentation, sampling, portable analyses, and basic statistics and experimental design. Course focuses on water chemistry of Boulder Creek and other local waters.
**Requisites:** Requires prerequisite course of CVEN 5404 or GEOL 5280 (minimum grade C-). Requires corequisite course of CVEN 5424. Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Environmental

**CVEN 5423 (3) Water Resources Engineering Design**
Studies principles and techniques of water resources engineering design. Introduces environmental modeling under uncertainty, stormwater design, precipitation estimation and flow routing. Surveys hydropower, reservoir management and water resources economics.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4323
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 5424 (3) Environmental Organic Chemistry**
Examines the fundamental physical and chemical processes that impact the fate and transport of organic contaminants in natural and engineered systems. Emphasizes both equilibrium and kinetic aspects, including solubility, vapor pressure, air-water exchange, sorption, abiotic redox reactions, and photodegradation.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Additional Information:** Departmental Category: Environmental

**CVEN 5434 (3) Environmental Engineering Design**
Team-based design of facilities or processes for water or wastewater or solid waste treatment or remediation under multiple real-world constraints. Department consent required.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Recommended:** Prerequisite CVEN 5524 or CVEN 5534 or CVEN 5474.
**Additional Information:** Departmental Category: Environmental

**CVEN 5444 (3) Municipal Des Proj**
**Additional Information:** Departmental Category: Environmental

**CVEN 5446 (3) Infrastructure Asset Management**
Introduces a framework that combines engineering principles with economic theory to facilitate a more organized and logical approach to decision-making in the management of infrastructure. Topics covered include asset valuation, modeling infrastructure deterioration, life-cycle cost analysis, and optimization. Although the concepts introduced in this course are applicable to different infrastructure systems, especial emphasis will be given to transportation projects.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CVEN 5454 (3) Statistical Methods for Natural and Engineered Systems**
Applies traditional and modern probability and statistical methods to environmental, hydrological, climatological and engineering data analysis. Topics include: basic probability, data visualization, fitting univariate and multivariate distributions, Monte Carlo simulations, extreme value distributions, confidence intervals and hypothesis testing, nonparametric density estimators, linear regression, and Bayesian analysis. The data analysis tool, R, is used throughout the course.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Environmental

**CVEN 5464 (3) Environmental Engineering Processes**
Develops and utilizes analytic solutions for environmental process models that can be used in a) reactor design for processes used in the treatment of water, wastewater and hazardous waste and b) process analysis of natural systems, such as streams and groundwater flow. Models facilitate the tracking of contaminants in engineered and natural systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4464 and EVEN 4464
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Additional Information:** Departmental Category: Environmental

**CVEN 5474 (3) Hazardous and Industrial Waste Management**
Evaluates processes used for treatment of wastes requiring special handling and disposal: toxic organic chemicals, heavy metals, acidic, caustic and radioactive waste material. Discusses techniques for destruction, immobilization and resource recovery and assessment of environmental impact of treatment process end products.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4474
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Environmental

**CVEN 5484 (3) Integrative Environmental and Molecular Microbiology**
Surveys microbiology topics germane to modern civil and environmental engineering. Provides fundamentals needed to understand microbial processes and ecology in engineered and natural systems and reviews applications emphasizing the interface between molecular biology and classical civil engineering.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4484, EVEN 4484, and EVEN 5484
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Environmental

**CVEN 5494 (3) Surface Water Quality Modeling**
Examines the relationships among air, water, and landpollution, water quality, and beneficial uses. Using models, develops the ability to quantify and predict the impacts of pollutants in the aquatic environment, and to develop approaches to minimize unfavorablewater quality conditions. Department consent required.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Environmental

**CVEN 5511 (3) Introduction to Finite Element Analysis**
Covers systematic formulation of finite element approximation and isoparametric interpolation (weighted residual and energy methods, triangular and quadrilateral elements). Includes computation applications to the solution of one- and two-dimensional stress-deformation problems and steady and transient heat conduction.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4511
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or seniors or students with concurrent degree sub plans C-AREN, C-CVEN, C-MCEN or C-ASEN.
**Additional Information:** Departmental Category: Mechanics

**CVEN 5514 (3) Bioremediation**
Advanced study on biological processes used to treat toxic organic and inorganic compounds contained in contaminated water, air, and soil; design and evaluation of in situ toxic compound biotransformation; fundaments of phytoremediation; critical reviews of current literature on bioremediation.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 5514
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisite CVEN 4484 or CVEN 5424 or CVEN 5484.
**Additional Information:** Departmental Category: Environmental

**CVEN 5524 (3) Drinking Water Treatment**
Provides advanced study on theory-of-treatment processes, including design and operation of municipal water supplies.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Recommended:** Prerequisite CVEN 4464 or CVEN 5464 or graduate standing or instructor consent required.
**Additional Information:** Departmental Category: Environmental

**CVEN 5525 (3) Computational Structural Analysis 1**
Covers the principles and formulations of the direct stiffness method and its transition to the finite element method with the computational modelling and analysis of framed structures in 2D plane and 3D space. The dynamic analysis and the introduction to the nonlinear structural problems are provided. Familiarity with the modern computing and programming environments is increased to address the needs in the structural engineering and mechanics area. Computer programming is applied to the solution of problems in structural analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4525
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Structures

**CVEN 5534 (3) Wastewater Treatment**
Covers the processes used to treat municipal wastewater, focusing on biological processes. Includes: design of aerobic, anoxic, anaerobic and suspended growth technologies to remove and transform pollutants; design and assessment of treatment approaches that recover energy, nutrients and water from wastewater; application of fundamental concepts of aquatic chemistry, environmental microbiology and computational models.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Recommended:** Prerequisites CVEN 5404 and CVEN 5484 and CVEN 5464.
**Additional Information:** Departmental Category: Environmental

**CVEN 5537 (3) Numerical Methods in Civil Engineering**
Introduces the use of numerical methods in the solution of civil engineering problems, emphasizing obtaining solutions with high-speed electronic computers. Applies methods to all types of civil engineering problems.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4537
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 5544 (3) Solid Waste Management and Resource Recovery**
Covers the scope of the nonhazardous solid waste problem and regulations that drive its management; discussions of nonengineering factors that impact waste management and recycling; design of incinerators, composting facilities, and landfills used to treat and dispose of solid waste.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 5544 and EVEN 4544
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisite CVEN 3414.
**Additional Information:** Departmental Category: Environmental

**CVEN 5554 (3) Fundamentals of Air Quality Management**
Introduces engineering methods for the study of air quality. Topics include: indoor air quality, greenhouse gases, dispersion modeling, source apportionment modeling, chemistry of combustion, pollution sources and controls, human exposure to air pollutants. A focus on Engineering for Developing Communities runs throughout. Required for CVEN environmental engineering graduate students.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4554
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Environmental

**CVEN 5564 (3) Water Profession: Communication and Utility Finance**
Develops and improves the skills and tools needed for graduate students and young professionals. Focusing on highly effective leaders; leadership with impact; effective communication tools; and communicating with teams, city councils, governing boards, and the public.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environmental

**CVEN 5565 (3) Design of Wood Structures**
Applies basic principles of structural engineering and mechanics to the design of wood structures, including the design and analysis of columns, trusses, beams and connections using dimensional lumber, glulam and cross-laminated timber.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4565
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Structures

**CVEN 5574 (3) Water Utility Management: Current Issues and Future Challenges**
Develops the skills and tools for graduate students and young professionals to work in the water profession. Focuses on management, leadership, communication and utility financial in the new water profession era. Undergraduate seniors may contact instructor for permission to enroll.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Environmental

**CVEN 5575 (3) Advanced Topics in Steel Design**
Covers steel structure design and analysis. Includes plate girders, moment connections for beams, design of multistory frames, and other topics determined by class interest. Undergraduate may enroll with permission of the instructor.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisite CVEN 4545.
**Additional Information:** Departmental Category: Structures

**CVEN 5584 (3) Water Profession: Leadership and Management**
Develops the skills and tools for graduate students and young professionals to work in the water profession. Focuses on financing water services, capital planning, rates, management planning, staffing and organization and critical thinking. Undergraduates may request instructor permission to enroll.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Environmental

**CVEN 5585 (3) Advanced Topics in Reinforced Concrete Design**
Covers design and analysis topics for prestressed concrete and/or reinforced concrete structures. Includes review of the current ACI design code, slabs, prestressed concrete, seismic design, folded plates and shells, finite element analysis, and other topics determined by class interest. Undergraduates may enroll with the permission of the instructor.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisite CVEN 4555.
**Additional Information:** Departmental Category: Structures

**CVEN 5594 (3) Water Reuse and Reclamation**
Explores development of a safe, reliable and acceptable program for reusing impaired waters. As fresh water becomes scarcer around the world, communities are looking for security through development of new water resources. Reuse of impaired water is one solution to the growing water crisis. Focus is on advanced treatment technologies with emphasis on public perception, economics and regulations.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4594
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Recommended:** Prerequisites CVEN 3141 and CVEN 3424.
**Additional Information:** Departmental Category: Environmental

**CVEN 5604 (3) UV Disinfection and Advanced Oxidation**
Provides a fundamental basis for design of UV processes in water and wastewater treatment. Includes principles of photochemistry and photobiology. Applications to disinfection of water and degradation of chemical compounds in the environment. Design of UV disinfection systems and reactors and advanced oxidation processes. Environmental UV-based decay of pollutants.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisites CVEN 3414 and CVEN 3424.
**Additional Information:** Departmental Category: Environmental

**CVEN 5614 (3) Bioenergy & Bioresource Recovery**
Introduces fundamental theories and applied technologies used in production and conversion of renewable biomass including waste materials into bioenergy and other value-added products. Conducts quantitative evaluations on conversion processes such as renewable biogas production, electricity generation, liquid fuels, metal and nutrients recovery and organic chemical production.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisite CVEN 4484.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environmental

**CVEN 5628 (3) Seepage and Slopes**
Covers fundamental principles of seepage in soils under both saturated and unsaturated conditions and limit equilibrium solution to slope stability problems. The seepage effects on slope stability are analyzed in detail and both conventional slope stability method and the finite element technique are applied to solving the engineering problems.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisites CVEN 3708 and CVEN 3718.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5678 (3) Soil Improvement and Reinforcement**
Provides students with principles and working knowledge of design and construction procedures in soil stabilization, retaining structures, geosynthetics, and soil reinforcement.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisite CVEN 3718.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5688 (3) Environmental Geotechnics**
Provides an understanding of the use of geotechnical concepts in the analysis and design of environmental systems. Focus is placed on the evaluation of waste containment facilities. Including relevant saturated, unsaturated, and multiphase flow machanisms in cover and liner systems. Includes stability analyses for landfills and geosynthetic interface shear strength. Covers relevant aspects of mining geotechnics and remediation technologies of contaminated sites.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5708 (3) Soil Mechanics**
Offers an advanced course in soil mechanics. Coverage includes basic principles of continuum mechanics; elasticity, viscoelasticity, and plasticity theories applied to soils; effective stress principle; consolidation; shear strength; critical state concepts; and constitutive, numerical, and centrifuge modeling.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5718 (3) Mechanics and Dynamics of Glaciers**
Develops a quantitative physical basis for understanding the functions of snow, ice and glaciers in the environment, with emphasis on developing an understanding of continuum mechanics and thermodynamics and their application to Earth systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4718
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5728 (3) Foundation Engineering**
Focuses on geotechnical design of shallow and deep foundations, including spread footings, mats, driven piles and drilled piers. Coverage includes bearing capacity, settlement, group effects and lateral load capacity of the various foundation types. The application of lower and upper bound plasticity analyses for the structural and geotechnical design of foundation systems, and how these relate to design codes, is additionally covered.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4728
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5738 (3) Centrifuge Modeling for Sustainable Infrastructure: Advanced Experimental Methods in Engineering**
Studies the application of advanced experimental methods used in physical modeling for civil engineering research and practice. Topics include acquisition and analysis techniques of experimental data including filtering in the frequency domain, wavelet transforms and digital image correlation techniques to obtain displacement and strain fields. Centrifuge modeling considerations are theoretically and practically introduced, including scaling laws, boundary conditions and modeling errors for static and dynamic test design towards improving the sustainability of civil engineering infrastructure.
**Requisites:** Restricted to graduate students or (students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs and requires prerequisite of CVEN 3718 (minimum grade C-)).
**Recommended:** Prerequisite Advanced Mechanics of Materials (CVEN 4161/5161) or Foundations Engineering (CVEN 4728/5728).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5748 (3) Design of Earth Structures**
Covers theory, design, and construction of earth embankments and waste facilities, including isolation systems. Uses published data, field exploration, and laboratory tests on soils and rock in investigating foundations and construction materials. Involves principles of compaction and settlement, permeability analysis, landslide recognition and control, use of composite clay, and liner systems.
**Requisites:** Requires a prerequisite course of CVEN 5708 (minimum grade C-). Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5758 (3) Flow Processes in Soils**
Examines fundamental principles of flow through porous media and related engineering problems. Topics include the saturated seepage theory and flow nets; the unsaturated flow theory; suction-saturation and saturation-hydraulic conductivity relationships; nonlinear finite strain consolidation and desiccation theory; laboratory and field testing methods for determining material characteristics; and numerical models for flow-related engineering problems.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisite CVEN 3718.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5768 (3) Introduction to Rock Mechanics**
Nature of rocks and rock masses; engineering properties rock and rock mass; rock mass classifications; planes of weakness; application of rock mechanics to design of rock slopes, underground excavations, and foundations.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisites CVEN 3708 and CVEN 3718.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5788 (3) Computational Modeling in Geotechnical Engineering**
Introduces computational modeling for geotechnical engineering applications such as the Discrete Element Method (DEM) for granular materials, nonlinear Finite Element Analysis (FEA) of seepage, coupled soil elastoplastic consolidation, elastoplasicity models for soil and rock, and advanced computational methods for failure in soil and rock. Uses DEM, FEA, and other software programs for analysis. Recommended Prereq: CVEN 5708
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5798 (3) Dynamics of Soils and Structures**
Covers fundamental characterization of soils, foundations and structures under general dynamic and earthquake loads. Principles of vibrations and wave propagation for 1D, 2D, 3D. In-situ and laboratory determination of dynamic soil properties; methods for site response analysis, foundation vibrations, dynamic soil-structure interaction and liquefaction problems.
**Requisites:** Restricted to College of Engineering (ENGR) graduate students or seniors or students with concurrent degree sub plans C-AREN, C-CVEN, C-MCEN or C-ASEN.
**Recommended:** Prerequisite CVEN 3708.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5818 (3) Geotechnical Earthquake Engineering**
Familiarizes students with the fundamentals of engineering seismology, soil and structural dynamics, and the modern practice of geotechnical earthquake engineering. Focuses on describing earthquake hazards and methods for seismic analysis and design.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisite CVEN 5798.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5822 (3) Geographical Information Systems for Civil and Environmental Systems**
Theory and use of geographical information systems in civil engineering, environmental studies, natural resources and other related disciplines. Topics include spatial data models, data capture, global positioning system, database linkage, use in design, analysis and implementation. Laboratory work includes applications of Arc-View and Arc-GIS software.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Surveying and Transportation

**CVEN 5830 (1-3) Special Topics for Seniors/Grads**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Building Systems

**CVEN 5831 (3) Special Topics**
Supervised study of special topics of interest to students under instructor guidance. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Mechanics

**CVEN 5833 (1-3) Special Topics**
Supervised study of special topics of interest to students under instructor guidance.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 5834 (1-3) Special Topics**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Additional Information:** Departmental Category: Environmental

**CVEN 5835 (1-3) Special Topics for Seniors/Grads**
Supervised study of special topics of interest to students under instructor guidance.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Structures

**CVEN 5836 (1-3) Special Topics for Seniors/Grads**
Supervised study of special topics of interest to students under instructor guidance. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Additional Information:** Departmental Category: Construction

**CVEN 5837 (1-3) Special Topics for Seniors/Grads**
Supervised study of special topics of interest to students under instructor guidance.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 5838 (1-3) Special Topics**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 5849 (1-6) Independent Study**
Available only through approval of graduate advisor. Subject arranged to fit needs of student.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Special Topics

**CVEN 5899 (1) Graduate Engineering Internship Experience**
An academically supervised graduate-level engineering experience that is integral to the students' graduate research and study by connecting classroom instructions to professional practice. Requires a pre-approved written plan of the proposed graduate-level work experience and a signed cooperative agreement or offer letter from employer. The 1-unit course will count toward the graduate student¿s degree together with the required minimum of 30 credit hours of regular core and elective courses in the student¿s major.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CVEN 5909 (3) Hazards, Resilience, and Sustainability for the Natural and Built Environments**
Introduces students to the effects of global climate change on natural and built environments, including its impact on the frequency and intensity of hazards and climatic extremes, social inequalities, and opportunities in engineering design for adaptation and mitigation, providing a survey approach to understanding major hazards and emerging engineering solutions.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** of enrollment in Mortenson Center graduate program or instructor approval.
**Grading Basis:** Letter Grade

**CVEN 5919 (3) Global Development for Engineers**
Focuses on the fundamental tools necessary to address sustainable community development projects in low-income communities (LICs). Topics include: human development, sustainable development, and presentation of an integrative and participatory framework for development projects in LICs. The framework consists of a combination of development and engineering project management tools. Framework is illustrated through case studies and student-driven team projects.
**Requisites:** Restricted to students with sub-plan of Engineering Developing Communities (EDC) or certificate (ENDC-CERG) only.
**Additional Information:** Departmental Category: Special Topics

**CVEN 5929 (3) Sustainable Community Development 2**
Covers the principles, practices and strategies of appropriate technology as part of an integrated and systems approach to community-based development. Course content areas include technical issues in development, environmental health and communicable disease, appropriate and sustainable technologies with hands-on workshops, and global cooperation in development.
**Requisites:** Requires prerequisite course of CVEN 5919 (minimum grade C-). Restricted to students with Engineering Developing Commnities (EDC) sub-plan or EDC certificate (ENDC-CERG).
**Additional Information:** Departmental Category: Special Topics

**CVEN 5939 (3) Global Engineering and Hazard Resilience Practicum**
Provides students with a field-based and/or team project-based opportunity to synthesize and integrate knowledge acquired in Mortenson Center courses and other learning experiences, and to apply theory and principles in a situation that approximates professional practice in global engineering and hazard resilience.
**Requisites:** Requires prerequisite course CVEN 5919 or CVEN 5909 (minimum grade C-). Restricted to students with sub-plan of Global Engineering/Engineering Developing Communities (EDC) or certificate (ENDC-CERG) only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 5969 (1-3) Water, Sanitation, and Hygiene**
Studies the fundamentals behind effective hygiene and remediation processes and engineering solutions developed/designed for specific international problems. Approaches to hygiene, clean water and sanitation in lesser industrialized countries often demand alternative solutions to those developed for industrialized societies. Explores issues and solutions developed to tackle these problems.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisites CVEN 3424 and CVEN 3414.
**Additional Information:** Departmental Category: Environmental

**CVEN 5979 (1) Community Appraisal**
Provides conceptual and methodological tools that can be employed in different phases of international development projects and studies. Community appraisal methods will be presented with emphasis on participatory research approaches, need assessment tools, and ethnographic methods; related cultural, ethical, and personal issues will be also discussed. Students will be introduced to secondary data gathering, and the usage of the main data resources on food and water security, energy access, and health status.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** of EVEN 2909 or CVEN 5919 or CVEN 5909.
**Grading Basis:** Letter Grade

**CVEN 5989 (1) Study Design and Impact Evaluation**
Covers the characteristics of the different study designs that can be used to assess the impact of international development interventions. Students will be introduced to the main types of study design, including randomized controlled trials, quasi-experimental studies, and interrupted time series. Ethical considerations faced when conducting research on human subjects and the compliance process to obtain approval from the Institutional Review Board will be presented.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** EVEN 2909 or CVEN 5919 or CVEN 5909.
**Grading Basis:** Letter Grade

**CVEN 5999 (1) Data Analytics for Development**
Provides students with skills in using the collection of R tidyverse packages as a tool for data analysis, reproducible research and communication. Lectures will be delivered through participatory live coding for students to learn how to write code in code-along exercises. We will use publicly available data related to waste management, air quality, water, and sanitation. Students will learn how to build upon the obtained skills to apply them to their data analysis projects.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisites of EVEN 2909 or CVEN 5919 or CVEN 5909.
**Grading Basis:** Letter Grade

**CVEN 6161 (3) Advanced Mechanics of Materials 2**
Fundamentals of continuum mechanics, finite deformations, Lagrangian finite strains, Cauchy and Piola Kirchoff stress tensors, plasticity and thermo-elasticity, elements of damage mechanics, elements of fracture mechanics, rehological and visoelastic theories, and modern experimental techniques.
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisite CVEN 5161.
**Additional Information:** Departmental Category: Mechanics

**CVEN 6333 (3) Introduction to Multi-Scale Variability and Scaling in Hydrology**
Provides a foundational physical understanding of channel networks, runoff, precipitation, and evapotranspiration at multiple spatial scales of drainage basins using modern analytical concepts for understanding non-linear phenomena, e.g., fractals, multifractals, statistical scaling, criticality, and renormalization.
**Requisites:** Requires a prerequisite course of CVEN 5333 (minimum grade C-).
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 6383 (3) Flow and Transport through Porous Media**
Studies basic physics of flow and transport of water, air, and other fluid mixtures through a porous medium. Course topics are relevant to applications in contaminant hydrology, contaminant transport in aquifers, hazardous waste management, geohydrology, soil physics, and geoenvironmental engineering.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 6393 (1) Hydrologic Sciences and Water Resources Engineering Seminar**
Provides a broad introduction to a variety of research topics from hydrologic sciences and water resources engineering. Offered as a one-hour weekly seminar by the departmental water faculty, graduate students,and external speakers.
**Requisites:** Restricted to graduate student Civil (CVEN) Engineering students only.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 6414 (3) Aquatic Surfaces and Particles**
Examines the role of surfaces and particles in the fate and transport of contaminants in the aquatic environment. Emphasizes modeling of absorption, dissolution, precipitation, surface-catalyzed reactions, and coagulation and filtration kinetics.
**Requisites:** Requires prerequisite course of CVEN 5404 or GEOL 5280 (minimum grade C-).
**Additional Information:** Departmental Category: Environmental

**CVEN 6511 (3) Nonlinear Finite Element Analysis of Solids and Porous Media**
Covers constitutive modeling, multiphase mechanics, and finite element implementation of constitutive models and coupled solid-fluid mechanical governing equations for inelastic porous media at small strain. Considers transient and steady state conditions. Analyzes structural, geotechnical, geological, mechanical, biomechanical, and other related modern engineering problems. Uses general purpose finite element software program for implementation and analysis.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Mechanics

**CVEN 6525 (3) Computational Structural Analysis 2**
Covers theoretical underpinnings of nonlinear analysis of framed structure in terms of the direct stiffness method along with its transition to the finite element method. Computational modelling and nonlinear analysis of geometric and material nonlinearities are explored. Familiarity with the modern computing and programming environments is increased to address the needs in the structural engineering and mechanics area. Computer programming is applied to the solution of problems in nonlinear structural analysis.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Structures

**CVEN 6595 (3) Earthquake Engineering**
Analyzes and designs structures for earthquake load covering: properties of earthquake ground motions, ground motion prediction equations, seismic hazard analysis, response spectra, response of linear and nonlinear structures, construction of design spectra, seismic design methods, and building code requirements.
**Requisites:** Requires prerequisite course of CVEN 5111 (minimum grade of C-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Structures

**CVEN 6708 (3) Constitutive Modeling of Soils and Materials**
Train students to interpret and develop constitutive models for soils and other materials. Cover the basics of tensors, stress strain, and balance laws to set up the mathematical background for describing continuums. Review failure criteria, elastic and elastoplastic models for materials. The concept of critical state and the Cam-Clay Model will be discussed as a unified description of soils. Poroelasticity, viscoelasticity, viscoplasticity, and energy principles in constitutive modeling will be discussed as advanced topics.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CVEN 5708 and corequisite or prerequisite of CVEN 5131 Continuum Mechanics and Elasticity.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Geotechnical

**CVEN 6830 (3) Special Topics**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Building Systems

**CVEN 6831 (3) Special Topics**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Mechanics

**CVEN 6833 (1-3) Special Topics**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Fluid Mechanics and Water Resources

**CVEN 6834 (1-3) Special Topics**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Environmental

**CVEN 6835 (3) Special Topics**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Structures

**CVEN 6836 (3) Special Topics**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Construction

**CVEN 6837 (3) Sp Tpcs Comp Graphics**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Miscellaneous

**CVEN 6838 (3) Special Topics**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 6839 (1-3) Special Topics**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Special Topics

**CVEN 6949 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Additional Information:** Departmental Category: Special Topics

**CVEN 6959 (1-4) Master's Thesis**
**Additional Information:** Departmental Category: Special Topics

**CVEN 6969 (1-3) Masters Report**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Special Topics

**CVEN 7111 (3) Advanced Structural Dynamics**
Includes general vibrations of civil engineering structures and their response to various types of time-dependent loads.
**Requisites:** Requires prerequisite course of CVEN 5111 (minimum grade C-).
**Additional Information:** Departmental Category: Mechanics

**CVEN 7141 (3) Plates and Shells**
Teaches mathematical theories of plate and shell structures and their applications. Involves numerical finite element solutions of plates and shells of various shapes under static and dynamic loadings.
**Requisites:** Requires prerequisite courses of CVEN 5131 or CVEN 5161 (minimum grade C-).
**Additional Information:** Departmental Category: Mechanics

**CVEN 7161 (3) Fracture Mechanics**
Includes three parts: 1) fundamentals through rigorous mathematical formulations of linear/nonlinear elastic fracture mechanics, 2) materials' theoretical strength, including metals, granular materials, polymers and steel, 3) numerical (finite element) methods in fracture mechanics. Heavy emphasis on project and independent work.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Additional Information:** Departmental Category: Mechanics

**CVEN 7511 (3) Computational Finite Inelasticity and Multiphase Mechanics**
Covers kinematics, thermodynamics, coupled balance equations and constitutive models, numerical time integration, and finite element implementation of finite strain inelasticity and multiphase mechanics. Kinematics of multiplicative decomposition, and finite strain mixture theory. Linearization for global nonlinear Newton-Raphson and solution algorithm of nonlinear constitutive models and coupled balance equations.
**Requisites:** Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, or C-EVENCVEN) only.
**Recommended:** Prerequisites CVEN 5131 and CVEN 5511 and CVEN 6511.
**Additional Information:** Departmental Category: Mechanics

**CVEN 7788 (3) Soil Behavior**
Topics include soil mineralogy, formation of soils through sedimentary processes and weathering, determination of soil composition, soil water, colloidal phenomena in soils, fabric property relationships, analysis of mechanical behavior including compressibility, strength and deformation, and conduction phenomena in terms of physicochemical principles. Involves applications for stabilization and improvement of soils, and disposal of waste materials.
**Recommended:** Prerequisite CVEN 3718.
**Additional Information:** Departmental Category: Geotechnical

**CVEN 7831 (1-3) Sp Tpc-Constitutive Mech**
**Repeatable:** Repeatable for up to 10.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Mechanics

**CVEN 7838 (3) Special Topics**
**Additional Information:** Departmental Category: Geotechnical

**CVEN 7849 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Special Topics

**CVEN 8999 (1-10) Doctoral Dissertation**
**Additional Information:** Departmental Category: Special Topics

# Classics (CLAS)

## Courses

**CLAS 1010 (3) The Study of Words**
Study of English words of Latin and Greek origin, focusing on etymological meaning by analysis of component parts (prefixes, bases, suffixes) and on the ways in which words have changed and developed semantically. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 1010
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Literature, Culture, and Thought

**CLAS 1020 (3) Argument from Evidence: Critical Writing about the Ancient World**
Introduces students to writing about the ancient world, with special attention to the possibilities and the limitations of ancient source-material. Taught as a writing workshop, with emphasis on critical thinking, analysis, argument and inquiry. While the course reads foundational ancient texts, the skills acquired will be broadly useful among humanities disciplines.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Lower
Departmental Category: Literature, Culture, and Thought
MAPS Course: English

**CLAS 1030 (3) Introduction to Western Philosophy: Ancient**
Introduces major philosophical ideas originating in ancient Greece, including the concepts of eudaimonia (happiness), sophia (knowledge), philosophia, psychê (soul), aretê (virtue), erôs (love), and democracy, placing these in historical context and relating them to subsequent philosophical developments. Topics may include the nature of happiness; why philosophy and democracy flourished in ancient Greece; the ancient Greek origins of science; whether being a virtuous person makes you happier; and ancient Greek thinking about life, love, and death.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 1010
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 1051 (3) The World of the Ancient Greeks**
Surveys of the emergence, major accomplishments, failures and the decline of the ancient Greeks, from the Bronze Age civilizations of the Minoans and Mycenaeans through the Hellenistic Age (2000-30 B.C.). No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 1051
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 1061 (3) The Rise and Fall of Ancient Rome**
Surveys the rise of ancient Rome in the eighth century B.C. to its fall in the fifth century A.D. Emphasizes political institutions, foreign policy, leading personalities, and unique cultural accomplishments. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 1061
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 1071 (3) Ancient Sport and Spectacle**
Surveys the development, evolution and impact of sport and spectacle in the Greco-Roman world through the deconstruction of games during the Christian era of the Roman Empire. Examines, among other relevant topics, games in the Homeric tradition, the development of the Greek Olympics and Roman spectacles including the circus, amphitheaters and gladiators.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**CLAS 1100 (3) Greek and Roman Mythology**
Covers Greek and Roman myths as expressions of religious experience and imagination, of Greek and Roman culture and society, and as part of the fabric of Western cultural tradition. Of particular interest to students of literature and the arts, psychology, anthropology, and history. No Greek or Latin required.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 1110 (3) Gods, Monsters and Mortals: Literature of Ancient Greece**
Read about mythological heroes and historical individuals from Achilles to Socrates. Explore why Greek authors told stories the way they did and what those stories might have meant to them and might mean to us. Ancient texts in English translation.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 1115 (3) Masterpieces of Greek Literature in Translation**
Students read about mythological heroes and historical individuals from Achilles to Socrates in Greek literature. Class discusses why the Greeks told stories the way they did and what those stories might have meant to them and might mean to us.
**Additional Information:** Arts Sciences Honors Course
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Honors

**CLAS 1120 (3) Power and Passion in Ancient Rome**
Read about mythological heroes and historical individuals from Romulus to Catiline and the emperors Augustus and Nero. Explore why Roman authors told stories the way they did and what those stories might have meant and might mean to us. Ancient texts in English translation.
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 1140 (3) Bread and Circuses: Society and Culture in the Roman World**
Surveys the outstanding achievements of Roman culture and society as reflected in literature; philosophy and art; private and official religion; and legal and political thought. No Greek or Latin required.
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 1509 (3) Trash and Treasure, Temples and Tombs: Art and Archaeology of the Ancient World**
Introduces the art and archaeology of ancient Egypt, Mesopotamia, Greece and Rome, examining various ancient approaches to power, religion, death and the human body. Analyzes art, architecture and everyday trash to learn about ancient humanity.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 1509
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Art and Archaeology

**CLAS 2020 (3) Science in the Ancient World**
Covers the development of scientific modes of thought, theory, and research from mythological origins (e.g., Hesiod's poetry) through pre-Socratic philosophers. Culminates in theories and research of Plato and Aristotle, including the Roman Empire. Students read original sources in translation. No Greek or Latin required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 2029 (3) Art and Archaeology of Ancient Egypt**
Emphasizes the origin of the Egyptian culture, its importance and its impact on other cultures. In addition, the different points of view of various scholars are discussed with a comparative study of the ancient Egyptian culture and modern culture of Egypt and the Middle East. Formerly ANTH 1160.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 2029
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Art and Archaeology

**CLAS 2030 (3) The Ancient Roots of Modern Medicine**
Students learn the meaning and use of the Greek and Latin roots in modern medical terminology; they gain an appreciation of ancient Roman and Greek medicine history and culture in their relation to the modern practice of Western medicine and the sciences; they become familiar with common ancient bioethical principles that govern the ancient practice of medicine and the sciences and learn to appreciate how these principles inform and influence modern medicine and the sciences.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 2030 and LING 2030
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**CLAS 2039 (3) Greek Art and Archaeology**
Covers prehistoric Aegean through the fourth century B.C.E., considering architecture, pottery, painting, sculpture and personal ornament. Societal customs such as use of space and burial patterns are considered as well as art and its uses, to help understand developments in Greek culture. Formerly CLAS 3039.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 2039
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 2041 (3) War and Society in Ancient Greece**
Studies Greek warfare in its cultural, social and economic contexts, in the light of anthropological comparisons and modern theories. No Greek or Latin required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 2049 (3) Introduction to Roman Art and Architecture**
Introduces the monuments and sites of the ancient Roman world from the foundation of Rome (753 B.C.E.) to Constantine (306-307 C.E.). Emphasizes the relationship of art, architecture, and artifacts to the political, social, and religious institutions of Italy and the provinces. Formerly CLAS 3049.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 2049
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 2100 (3) Gender and Sexuality in Ancient Greece**
Examines evidence of art, archaeology, and literature of Greek antiquity from a contemporary feminist point of view. Focuses on women's roles in art, literature, and daily life. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 2100
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Literature, Culture, and Thought

**CLAS 2110 (3) Gender and Sexuality in Ancient Rome**
Uses art, archaeology, and literature to study, from a contemporary feminist point of view, the status of women in works of Roman art and literature, the development of attitudes expressed toward them, and their daily life. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 2110
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Literature, Culture, and Thought

**CLAS 2610 (3) Paganism to Christianity**
Offers a cultural history of Greek and Roman religion. Students read ancient texts in translation and use evidence from archaeology to reconstruct the shift from paganism to Christianity in antiquity. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 2614
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 3009 (3) Modern Issues, Ancient Times**
Considers issues of vital importance to humans, both now and in ancient times. Topics such as food, death, sex, family, literacy, or power are explored to consider how ancient societal norms and attitudes evolved and how they relate to modern culture. Draws on material and literary evidence to develop an understanding of the complexities of ancient life.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 3009
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Art and Archaeology

**CLAS 3019 (3) Pompeii and the Cities of Vesuvius**
Introduces the towns and villas buried by the eruption of Mt. Vesuvius in 79 C.E. Explores the layout and decoration of ancient Roman houses, the variety of artifacts uncovered as evidence for daily life and the history of the excavations.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 3019
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 3119 (3) The Archaeology of Death**
Consider Death. It is a universal human phenomenon. Humans across time and space have caused, planned for, reacted to, and carried out death practices in extraordinarily different ways. Mortuary practice provides a fascinating insight into human history and culture in both the modern and ancient world.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 3119
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Art and Archaeology

**CLAS 3400 (3) Special Topics in Classics**
Topics in Greek, Latin or Classical civilization. Note that the topics "Classics and Film", and "Swords and Sandals on Screen" cannot both be taken for credit.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 4021 (3) Athens and Greek Democracy**
Studies Greek history from 800 B.C. (the rise of the city-state) to 323 B.C. (the death of Alexander the Great). Emphasizes the development of democracy in Athens. Readings are in the primary sources.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5021 and HIST 4021
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 4031 (3) Alexander the Great and the Rise of Macedonia**
Covers Macedonia's rise to dominance in Greece under Philip II and the reign and conquests of Alexander the Great.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5031 and HIST 4031
**Recommended:** Prerequisite one of the following CLAS 1051, 1509, 2039, 2041, 4021, 4041, 4071, 4139, 4149, GREK 3113, HIST 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 4040 (3) Seminar in Classical Antiquity**
Examines an advanced topic in classical language, literature, history, philosophy, art, or culture. Combines the techniques of philology with a critical approach to the literary and material legacy of the past.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Requisite second-year proficiency in Greek or Latin.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 4041 (3) Classical Greek Political Thought**
Studies main representatives of political philosophy in antiquity (Plato, Aristotle, Cicero) and of the most important concepts and values of ancient political thought. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5041 and HIST 4041 and PHIL 4210
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 4061 (3) Twilight of Antiquity**
Explores the reasons for the fall of the Roman Empire in the western Mediterranean and its survival in the East as Byzantium. Emphasizes Christianity; barbarians; social, economic and cultural differences; contemporary views of Rome; and modern scholarship. No Greek or Latin is required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5061 and HIST 4061 and HIST 5061
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 4071 (3) Seminar in Ancient Social History**
Considers topics ranging from demography, disease, family structure, and the organization of daily life to ancient slavery, economics, and law. Focuses either on Persia, Greece, or Rome and includes a particular emphasis on the methodology required to reconstruct an ancient society, especially the interpretation of problematic literary and material evidence and the selective use of comparisons with better known societies. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5071 and HIST 4071
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 4081 (3) The Roman Republic**
Studies the Roman Republic from its foundation in 753 B.C. to its conclusion with the career of Augustus. Emphasizes the development of Roman Republican government. Readings are in the primary sources. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5081 and HIST 4081
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 4091 (3) The Roman Empire**
Intense survey of Imperial Rome from the Roman revolution to the passing of centralized political authority in the western Mediterranean. Emphasizes life, letters and personalities of the empire. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5091 and HIST 4091
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 4099 (3) Ancient Greek Sculpture**
Understanding that Greek sculpture, like all visual media, was part of the fabric of ancient Greek life and expressed the values of its creators and audience is a valuable way to gain insights into the social, economic, and political world of ancient Greece. This course will examine the work of Greek sculptors from the Archaic to the Hellenistic period. Key stylistic and technical developments, as well as significant works of art, sculptors and workshops will be discussed in detail. Some issues we will consider are the physical, religious and/or socio-historical context of individual freestanding sculptures and how specific sculptural programs illustrate aspects of Greek culture. Iconographic and narrative choices made by artists working in stone, compared to other material, will also be addressed.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5099, ARTH 4099 and ARTH 5099
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 4101 (3) Greek and Roman Slavery**
Surveys slavery in ancient Greece and Rome beginning with its growth, economics and political effects, moving to the life experiences of slaves, resistance and revolt, and finishing with the ideology of slavery. Focuses throughout on the challenge of understanding classical slavery on the basis of scattered and biased evidence and on the controversies that have surrounded this topic.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4101 and CLAS 5101
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**CLAS 4109 (3) Ancient Italian Painting**
Explores the problems, theories and methods for understanding the iconography, styles, topologies, contexts and techniques of fresco wall painting in ancient Italy from the 6th century B.C.E. to the 4th century C.E. Topics covered include Etruscan tomb paintings, late Republican and early imperial fresco paintings from Rome and Campania and later Roman wall paintings, including the painted images in ancient catacombs. Previous coursework on ancient Italy or the history of pre-modern art is highly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5109 and ARTH 4109 and ARTH 5109
**Recommended:** Prerequisite CLAS 1509 or ARTH 1509 or CLAS 2049 or ARTH 2049.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 4110 (3) Greek and Roman Epic**
Students read in English translation the major epics of Graeco-Roman antiquity such as the Iliad, Odyssey, Argonautica, Aeneid, and Metamorphoses. Topics discussed may include the nature of classical epic, its relation to the novel, and its legacy. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5110 and HUMN 4110
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 4119 (3) Roman Sculpture**
Examines ancient Roman sculpture, emphasizing the display, iconography, and production of private and public monuments in the Roman Empire. Explores sculpture as evidence for historical developments, societal and gender attitudes, and state ideologies in the ancient Roman world.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 5119 and ARTH 4119 and CLAS 5119
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 4120 (3) Greek and Roman Tragedy**
Intensive study of selected tragedies of Aeschylus, Sophocles, Euripides and Seneca in English translation. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5120 and HUMN 4120
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 4129 (3) Aegean Art and Archaeology**
Detailed study of the cultures of prehistoric Greece, the Cycladic Islands and Crete, their art and archaeology and their history within the broader context of the eastern Mediterranean, from earliest human settlement to the collapse of the Bronze Age at about 1100 B.C.E. Emphasis is on palace states.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5129 and ANTH 4129 and ANTH 5129 and ARTH 4129
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 4130 (3) Greek and Roman Comedy**
Studies Aristophanes, Plautus, and Terence in English translation. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5130 and HUMN 4130
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 4139 (3) Greek Vase Painting**
A comprehensive overview of Greek vase painting, from prehistoric through the fourth century B.C.E. Emphasis is on learning the development of primary decorative styles and on refining skills of visual analysis, scholarly research, critical thinking, oral commentary and written presentation.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5139 and ARTH 4139 and ARTH 5139
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 4140 (3) The Greek and Roman Novel**
Studies a number of complete Greek and Roman novels from Classical Antiquity and their predecessors and contemporary neighbors in the genres of Greek prose fiction. Ancient texts in English translation.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5140 and HUMN 4131
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Literature, Culture, and Thought

**CLAS 4149 (3) Greek Cities and Sanctuaries**
Examines Greek architecture in context, from the ninth century B.C.E. into the Hellenistic period, considering the use of space, both in religious and in civic settings and using texts as well as material culture. Emphasis is on developing analytical skills.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5149 and ARTH 4149
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 4169 (3) Topics in Ancient and Classical Art and Archaeology**
In-depth consideration of an aspect of ancient Mediterranean culture. Topics vary and may include ancient wall painting, Greek sculpture, artists and patrons, the ancient Near East, Egyptian art and archaeology, or Etruscan art and archaeology.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5169 and ARTH 4169 and ARTH 5169
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 4199 (3) Roman Architecture**
Examines the designs, functions and construction methods of ancient Roman towns, temples, baths, houses and civic structures, as well as utilitarian structures, including roads and aqueducts. Emphasizes Roman architectural forms and spaces as vehicles for political propaganda and empire consolidation.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5199 and ARTH 4199
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 4209 (6) Classical Archaeological Field Methods**
Offers experiential learning in theories and methods of archaeological fieldwork in the western Argolid in Greece. Applies methods for extensive survey, stratigraphic excavation, GIS modeling, ceramic analysis, numismatic analysis, architectural studies, artifact and data processing and documentation. Offered abroad only.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 4209 and CLAS 5209
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Recommended:** Prerequisites CLAS 1509 or ARTH 1509 or CLAS/ARTH 2039 or CLAS/ARTH 2049.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 4229 (3) Ancient Egyptian Art and Archaeology**
Archaeology of ancient Egypt in light of recent excavations; the history of excavations of the different sites; and the art of ancient Egypt through time. Formerly ANTH 4420.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5229 and ARTH 4229 and ARTH 5229
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Art and Archaeology

**CLAS 4269 (3) Art and Archaeology of the Ancient Near East**
Examines the diverse multicultural civilizations of the Iran-Iraq region and Anatolia from the rise of urbanism in Mesopotamia through the era of the first 'world empire,' Achaemenid Persia. Emphasizes the material record of religious and state institutions of the ancient Near East, especially monuments that illustrate concepts of power and communication. Explores notions of style, symbolism, visual rhetoric, text-image synthesis, patronage, creativity, trade, religion, gender, identity and roles of artists. How do inter-communal relations, cross-cultural exchange, innovation and artistic production, movement and migration, relate to the development and expression of hegemonic power and of empire, and the marginalization of some? What is the role of economics and commerce in these processes? May be repeated twice for credit if the topic is different.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5269 and ARTH 4269 and ARTH 5269
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite CLAS 1509 or ARTH 1509.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Art and Archaeology
Departmental Category: Asia Content

**CLAS 4761 (3) Roman Law**
Studies the constitutional and legal history of ancient Rome; emphasizes basic legal concepts and comparisons with American law. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5761 and HIST 4761 and HIST 5761
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Ancient History

**CLAS 4840 (1-4) Independent Study**
No Greek or Latin required.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Literature, Culture, and Thought

**CLAS 4849 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 4852 (1-6) Honors Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Classical Philology

**CLAS 5021 (3) Athens and Greek Democracy**
Studies Greek history from 800 B.C. (the rise of the city-state) to 323 B.C. (the death of Alexander the Great). Emphasizes the development of democracy in Athens. Readings are in the primary sources.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4021 and HIST 4021
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Ancient History

**CLAS 5031 (3) Alexander the Great and the Rise of Macedonia**
Covers Macedonia's rise to dominance in Greece under Philip II and the reign and conquests of Alexander the Great.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4031 and HIST 4031
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Ancient History

**CLAS 5041 (3) Classical Greek Political Thought**
Studies main representatives of political philosophy in antiquity (Plato, Aristotle, Cicero) and of the most important concepts and values of ancient political thought. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4041 and HIST 4041 and PHIL 4210
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Ancient History

**CLAS 5061 (3) Twilight of Antiquity**
Explores the reasons for the fall of the Roman Empire in the western Mediterranean and its survival in the East as Byzantium. Emphasizes Christianity; barbarians; social, economic and cultural differences; contemporary views of Rome; and modern scholarship. No Greek or Latin is required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4061 and HIST 4061 and HIST 5061
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Ancient History

**CLAS 5071 (3) Seminar in Ancient Social History**
Considers topics ranging from demography, disease, family structure, and the organization of daily life to ancient slavery, economics, and law. Focuses either on Persia, Greece, or Rome and includes a particular emphasis on the methodology required to reconstruct an ancient society, especially the interpretation of problematic literary and material evidence and the selective use of comparisons with better known societies. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4071 and HIST 4071
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Ancient History

**CLAS 5081 (3) The Roman Republic**
Studies the Roman Republic from its foundation in 753 B.C. to its conclusion with the career of Augustus. Emphasizes the development of Roman Republican government. Readings are in the primary sources. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4081 and HIST 4081
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Ancient History

**CLAS 5091 (3) The Roman Empire**
Intense survey of Imperial Rome from the Roman revolution to the passing of centralized political authority in the western Mediterranean. Emphasizes life, letters and personalities of the empire. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4091 and HIST 4091
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Ancient History

**CLAS 5099 (3) Ancient Greek Sculpture**
Understanding that Greek sculpture, like all visual media, was part of the fabric of ancient Greek life and expressed the values of its creators and audience is a valuable way to gain insights into the social, economic, and political world of ancient Greece. This course will examine the work of Greek sculptors from the Archaic to the Hellenistic period. Key stylistic and technical developments, as well as significant works of art, sculptors and workshops will be discussed in detail. Some issues we will consider are the physical, religious and/or socio-historical context of individual freestanding sculptures and how specific sculptural programs illustrate aspects of Greek culture. Iconographic and narrative choices made by artists working in stone, compared to other material, will also be addressed.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4099, ARTH 4099 and ARTH 5099
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5101 (3) Greek and Roman Slavery**
Surveys slavery in ancient Greece and Rome beginning with its growth, economics and political effects, moving to the life experiences of slaves, resistance and revolt, and finishing with the ideology of slavery. Focuses throughout on the challenge of understanding classical slavery on the basis of scattered and biased evidence and on the controversies that have surrounded this topic.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4101 and HIST 4101

**CLAS 5109 (3) Ancient Italian Painting**
Explores the problems, theories and methods for understanding the iconography, styles, topologies, contexts and techniques of fresco wall painting in ancient Italy from the 6th century B.C.E. to the 4th century C.E. Topics covered include Etruscan tomb paintings, late Republican and early imperial fresco paintings from Rome and Campania and later Roman wall paintings, including the painted images in ancient catacombs. Previous coursework on ancient Italy or the history of pre-modern art is highly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4109 and ARTH 4109 and ARTH 5109
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5110 (3) Greek and Roman Epic**
Students read in English translation the major epics of Graeco-Roman antiquity such as the Iliad, Odyssey, Argonautica, Aeneid, and Metamorphoses. Topics discussed may include the nature of classical epic, its relation to the novel, and its legacy. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4110 and HUMN 4110
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Literature, Culture, and Thought

**CLAS 5119 (3) Roman Sculpture**
Examines ancient Roman sculpture, emphasizing the display, iconography, and production of private and public monuments in the Roman Empire. Explores sculpture as evidence for historical developments, societal and gender attitudes, and state ideologies in the ancient Roman world.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4119 and ARTH 4119 and ARTH 5119
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5120 (3) Greek and Roman Tragedy**
Intensive study of selected tragedies of Aeschylus, Sophocles, Euripides and Seneca in English translation. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4120 and HUMN 4120
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Literature, Culture, and Thought

**CLAS 5129 (3) Aegean Art and Archaeology**
Detailed study of the cultures of prehistoric Greece, the Cycladic Islands and Crete, their art and archaeology and their history within the broader context of the eastern Mediterranean, from earliest human settlement to the collapse of the Bronze Age at about 1100 B.C.E. Emphasis is on palace states.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4129 and ANTH 4129 and ANTH 5129 and ARTH 4129
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5130 (3) Greek and Roman Comedy**
Studies Aristophanes, Plautus, and Terence in English translation. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4130 and HUMN 4130
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Literature, Culture, and Thought

**CLAS 5139 (3) Greek Vase Painting**
A comprehensive overview of Greek vase painting, from prehistoric through the fourth century B.C.E. Emphasis is on learning the development of primary decorative styles and on refining skills of visual analysis, scholarly research, critical thinking, oral commentary and written presentation.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4139 and ARTH 4139 and ARTH 5139
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5140 (3) The Greek and Roman Novel**
Studies a number of complete Greek and Roman novels from Classical Antiquity and their predecessors and contemporary neighbors in the genres of Greek prose fiction. Ancient texts in English translation.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4140 and HUMN 4131
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Literature, Culture, and Thought

**CLAS 5149 (3) Greek Cities and Sanctuaries**
Examines Greek architecture in context, from the ninth century B.C.E. into the Hellenistic period, considering the use of space, both in religious and in civic settings and using texts as well as material culture. Emphasis is on developing analytical skills.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4149 and ARTH 4149
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5159 (3) Hellenistic Art and Archaeology**
Examines art and archaeology from the period following the death of Alexander the Great (late fourth century B.C.E.) to the conquest of Greece by the Romans (middle second century B.C.E.).
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 5159
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5169 (3) Topics in Ancient and Classical Art and Archaeology**
In-depth consideration of an aspect of ancient Mediterranean culture. Topics vary and may include ancient wall painting, Greek sculpture, artists and patrons, the ancient Near East, Egyptian art and archaeology, or Etruscan art and archaeology.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4169 and ARTH 4169 and ARTH 5169
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5199 (3) Roman Architecture**
Examines the designs, functions and construction methods of ancient Roman towns, temples, baths, houses and civic structures, as well as utilitarian structures including roads and aqueducts. Emphasizes Roman architectural forms and spaces as vehicles for political propaganda and empire consolidation.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4199 and ARTH 4199
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5209 (6) Classical Archaeological Field Methods**
Offers experiential learning in theories and methods of archaeological fieldwork in the western Argolid in Greece. Applies methods for extensive survey, stratigraphic excavation, GIS modeling, ceramic analysis, numismatic analysis, architectural studies, artifact and data processing and documentation. Offered abroad only.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4209 and ARTH 4209
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CLAS 1509 or ARTH 1509 or CLAS 2049 or ARTH 2049.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5229 (3) Ancient Egyptian Art and Archaeology**
Archaeology of ancient Egypt in light of recent excavations; the history of excavations of the different sites; and the art of ancient Egypt through time. Formerly ANTH 5420.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4229 and ARTH 4229 and ARTH 5229
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 5269 (3) Art and Archaeology of the Ancient Near East**
Examines the diverse multicultural civilizations of the Iran-Iraq region and Anatolia from the rise of urbanism in Mesopotamia through the era of the first 'world empire,' Achaemenid Persia. Emphasizes the material record of religious and state institutions of the ancient Near East, especially monuments that illustrate concepts of power and communication. Explores notions of style, symbolism, visual rhetoric, text-image synthesis, patronage, creativity, trade, religion, gender, identity and roles of artists. How do inter-communal relations, cross-cultural exchange, innovation and artistic production, movement and migration, relate to the development and expression of hegemonic power and of empire, and the marginalization of some? What is the role of economics and commerce in these processes? May be repeated twice for credit if the topic is different.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 5269 and CLAS 4269 and ARTH 4269
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology Departmental Category: Asia Content

**CLAS 5761 (3) Roman Law**
Studies the constitutional and legal history of ancient Rome; emphasizes basic legal concepts and comparisons with American law. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4761 and HIST 4761 and HIST 5761
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Ancient History

**CLAS 5840 (1-3) Graduate Independent Study**
No Greek or Latin required.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Literature, Culture, and Thought

**CLAS 6119 (1-3) Graduate Independent Study in Classical Art and Archaeology**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 6952 (1-6) Master's Thesis**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Classical Philology

**CLAS 7011 (3) Seminar in Ancient History**
Examines topics in ancient Greek and Roman history at an advanced seminar level.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Ancient History

**CLAS 7012 (3) Graduate Seminar**
Topic specified in online Schedule Planner.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Classical Philology

**CLAS 7109 (3) Graduate Seminar in Ancient and Classical Art and Archaeology**
Topics vary. Emphasis is on gaining expertise in using archaeological reports in tandem with (or contradiction to) textual sources, on reading and using critical theory, on improving analytical skills and discussion, and on honing discussion leadership abilities.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Art and Archaeology

**CLAS 7840 (1-3) Graduate Independent Study**
No Greek or Latin required.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Literature, Culture, and Thought

**CLAS 8992 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Additional Information:** Departmental Category: Classical Philology

# College of Communication, Media, Design & Information (CMDI)

## Courses

**CMDI 1000 (1-3) Special Introductory Topics in CMDI**
Investigates special introductory topics in communication, media, design and information. Formerly CMCI 1000.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**CMDI 1010 (4) Concepts and Creativity 1: Communication, Media, Design, Information**
Engages key principles and practices in the fields of communication, media, design and information. Emphasizes the analyses of new and old media, information technologies, verbal and visual literacies, communicative interactions and cultural practices through process-based learning and hands-on projects utilizing multiple modes of expression. First course in two semester sequence required for all first-year CMDI students. Requires a grade of C- or better to count toward degree. Formerly CMCI 1010.
**Requisites:** Restricted to College of Communication, Media, Design, and Information (CMDI) undergraduate students with 35 or fewer hours or approval of CMDI Dean's Office.

**CMDI 1020 (4) Concepts and Creativity 2: Communication, Media, Design, Information**
Engages key principles and practices in the fields of communication, media, design and information. Emphasizes the analyses of new and old media, information technologies, verbal and visual literacies, communicative interactions and cultural practices through process-based learning and hands-on projects utilizing multiple modes of expression. Second course in two semester sequence required for all first-year CMDI students. Requires a grade of C- or better to count toward degree. Formerly CMCI 1020.
**Requisites:** Requires prerequisite course of CMDI 1010 (minimum grade C-). Restricted to College of Communication, Media, Design and Information (CMDI) students with 35 or fewer credit hours.

**CMDI 1040 (4) Foundational Concepts and Creativity in Communication, Media, Design and Information**
Provides first-year students with an understanding of key principles and practices used in the fields of media, communication and information. Develops insight into processes of storytelling, conversation, information, design and images as foundational to learning in communication, media, design and information, and supports students in learning to use creativity and multiple modes of expression to produce projects relevant to a range of disciplines across the college. Formerly CMCI 1040.
**Requisites:** Restricted to College of Communication, Media, Design and Information (CMDI) undergraduate students with 35 or fewer credit hours.

**CMDI 2001 (2) Introduction to Sports Media Practices**
Introduces students to the practices and responsibilities of producing sports-focused content across a variety of industries and media forms. Students will learn best practices involved in the art of storytelling utilizing text, video, audio, social media and more. The class provides a framework for how to produce sports content in line with the demands and intents of various media industries. Formerly CMCI 2001.
**Requisites:** Restricted to non-CMDI students.
**Grading Basis:** Letter Grade

**CMDI 2030 (4) Thinking Across Disciplines in Communication,Media, Design and Information**
Engages key principles and practices in the fields of communication, media, design and information. Emphasizes the analyses of new and old media, information technologies, verbal and visual literacies, communicative interactions and cultural practices through process-based learning and hands-on projects utilizing multiple modes of expression. Enhanced, one-semester version of the introductory CMDI course for transfer students to CMDI. Requires a grade of C- or better to count toward degree. Formerly CMCI 2030.
**Requisites:** Restricted to College of Communication, Media, Design and Information (CMDI) undergraduate students only.
**Grading Basis:** Letter Grade

**CMDI 3000 (1-3) Special Topics in CMDI**
Investigates special topics in communication, media, design and information at the upper-division level. Formerly CMCI 3000.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**CMDI 3201 (3) The Politics of Media**
Explores the evolution of contemporary media from a non-partisan perspective addressing questions that include: what is media today, what shapes it, what role does it play in our democracy, and where is it going. Formerly CMCI 3201.
**Grading Basis:** Letter Grade

**CMDI 3202 (3) Entrepreneurial Media**
Learn how to start and build your own business from concept to execution. This class will dive into the big ideas of business and the process of developing a product. By the end of class, students will know how to put an idea through the wringer, pivot (if needed), and execute their own concept at a high level. Formerly CMCI 3202.
**Grading Basis:** Letter Grade

**CMDI 3910 (1-6) CMDI Practicum**
Provides students with hands-on experience working on communication, media, design and information campaigns for the college or in a professional context. Department consent required. Formerly CMCI 3910.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade

**CMDI 4021 (3) Prime Time: Public Performance and Leadership**
Intercollegiate athletics and the college athlete experience are undergoing fundamental transformations as athletes gain control of their name, image and likeness and begin monetizing their personal brands for the first time. This course considers collegiate and professional athletes as a special kind of public figure, whose public personas can create opportunities to earn income from sponsors and commercial interests, but also as influential advocates for social justice and cultural influence. Formerly CMCI 4021.
**Requisites:** Restricted to CMDI majors and minors with 45 credit hours or more, or requires prerequisite course of CMDI 2001 (minimum grade D-).

**CMDI 4073 (1) Communication and Improvisation**
Introduces students to the world of improvisation, learning games and techniques that apply and directly translate into the fields of advertising, media, communication, journalism, and business. Students will improve communication, listening, and presentation skills, and most importantly creativity in problem solving. Students will learn to think on their feet and recognize opportunities that arise by implementing the concepts of improv. Formerly CMCI 4073.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**CMDI 4841 (1-4) Undergraduate Independent Study**
Considers topics in communication, media, design and information in an independent study mode. Formerly CMCI 4841.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**CMDI 4931 (1-6) Internship**
Internship experience in CMDI areas. Formerly CMCI 4931.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**CMDI 5931 (1-3) Graduate Internship**
Provides academically supervised opportunities for CMDI graduate students to work in public, private, and/or commercial organizations on projects related to student research and career goals. Formerly CMDI 5931.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Minimum cumulative GPA: 3.0. Restricted to CMDI graduate students.
**Grading Basis:** Letter Grade

**CMDI 6301 (3) The Public Sphere**
Focuses on concepts of the public as used in media and cultural politics. Surveys empirical claims about the history of the public sphere in Western liberal democracies; critical perspectives on neoliberal capitalism¿s influence on the quality of public life through national policies and the behavior of private corporations; international governance organizations; and the role media for mobilizing and sustaining ¿global civil society¿ in the form of cultural diasporas, social movements, and humanitarian aid organizations. Formerly offered as a special topics course. Formerly CMCI 6301.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 6301
**Requisites:** Restricted to graduate students only.

**CMDI 6311 (3) Freedom of Expression**
Studies free-speech issues in the context of current and historical philosophical foundations for freedom of expression. Formerly CMCI 6311.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**CMDI 6331 (3) Political Communication**
Explores therelationships involving media and politics. Incorporates normative and empirical perspectives on the media-politics complex. Areas covered include media effects on public opinion and policy, uses of media ingovernance, journalism sociology, coverage of elections, and implications of interactive media for governance and civic participation. Formerly CMCI 6331.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**CMDI 6661 (3) Media Ethics and Responsibility**
Develops a theoretical framework with which to recognize and analyze ethical issues as they arise in the media. Formerly CMCI 6661.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**CMDI 6871 (3) Special Topics**
Special topics in CMDI. Formerly CMCI 6871.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**CMDI 7841 (1-3) Independent Study**
Topical studies in CMDI areas, in independent study modes. Formerly CMCI 7841.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**CMDI 7871 (3) Special Topics**
Special Topics in CMDI areas. Formerly CMCI 7871.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**CMDI 8991 (1-10) Doctoral Dissertation**
Doctoral dissertation.
**Repeatable:** Repeatable for up to 40.00 total credit hours.
**Requisites:** Restricted to graduate students only.

# College of Engineering and Applied Science (COEN)

## Courses

**COEN 1015 (3) Everyday Excel**
Microsoft Excel is one of the most popular software tools worldwide, used in industries such as project management, office administration, engineering, science, business, finance, and data analysis. In this unique, thought-provoking course, you will learn how to create and manage Excel spreadsheets, sort and filter data, present and interpret data in graphical format, and perform a variety of mathematical, logical, and statistical calculations. A laptop computer with Microsoft Excel is mandatory.

**COEN 1500 (1) CEAS First Year Seminar**
The CEAS First Year Seminar is a small, discussion-based course designed to provide incoming first-year students a foundation to thrive as university scholars, meeting with them from their first day of classes through getting back the results of their first round of midterms. The seminar is a combination of a common curriculum (40% ) exploring texts concerning creating an engineering identity, the purpose of an engineering education and the larger values of the college community (mattering, belonging, agency, ownership, inclusivity and service) and a unique curriculum (60%) in which faculty members cultivate these values through their own areas of expertise and interest. This seminar represents the commitment of dedicated faculty to help incoming first-year students become an active and contributing part of the intellectual, inclusive, healthy, inquisitive, diverse, sustainable and socially engaged culture of the College of Engineering.
**Requisites:** Restricted to Fall incoming first year students living in Engineering Connections from College of Engineering Applied Science.

**COEN 1510 (1) Self Management and Leadership Principles 1**
Prepares first-year students for personal and academic success in their transition to college. Focuses on academic success strategies, time and stress management, study skills, S.M.A.R.T. goal setting and developing self-awareness. Students identify their strengths and participate in peer-to-peer interaction to foster collaboration and community. Students will also explore leadership capabilities, professional development, and insights into career interests. Speakers provide students with unique insights into academic and engineering experiences.
**Requisites:** Restricted to Engineering Goldshirt (PENG) students only.

**COEN 1515 (1) Essential Strategies for Engineering Success**
This course will support students in developing financial knowledge and skills related to financial wellness, academic success, and personal well-being, as CU Engineering students. In learning about financial wellness, students will explore, share, and discuss experiences and beliefs that have shaped their attitudes and behaviors related to money, and they will develop financial goals for the future while learning and practicing financial wellness skills. In addition to financial wellness, students will learn about resources and practice skills and strategies they can use to support their academic success and personal well-being in and beyond their academic experience. Students will learn and work toward achieving the course outcomes through interactive discussion, activities, and personal reflection, where students¿ own experiences, knowledge, skills, and goals are critically important to the learning process.

**COEN 1520 (1) Self Management and Leadership Principles 2**
Continuation of COEN 1510. Self-management and student development is reiterated. Includes time and stress management, study skills and S.M.A.R.T. goal setting. Leadership skills are explored through group projects. Students complete professional development activities and assignments geared toward preparing students for engineering internships and research opportunities.
**Requisites:** Requires prerequisite course of COEN 1510 (minimum grade C-). Restricted to Engineering Goldshirt (PENG) students only.

**COEN 1550 (1) Fundamentals of Undergraduate Research (FUTURE)**
Exposes first or second year undergraduate students to engineering research careers through a partner program (Fundamentals of Undergraduate Research), panel discussions with researchers in academics and industry, and exposure to research labs. Department consent required.

**COEN 1830 (1-3) Special Topics**
Explores topics of interest in engineering. Content varies by instructor and semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**COEN 2830 (1-3) Special Topics**
Explores topics of interest in engineering. Content varies by instructor and semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**COEN 2850 (1-3) Independent Study**
Provides opportunities for independent study at the lower-division undergraduate level. Subject and/or project agreed upon by the student and the instructor to fit the needs of the student.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**COEN 2880 (1) Fresh Start for Success**
Fresh Start is a class for students in the College of Engineering who want to work toward a Fresh Start! This course focuses on learning the mindsets and skills necessary to achieve academic and personal change goals. Topics include the science of learning (metacognition) and the use of metacognition in everyday life, including strategies supporting mastery of the material in engineering, effective study planning and test-taking, maintaining balance throughout the semester, and the science and creation of sustainable change through habits, support, and resiliency. This class focuses on the actions necessary to reflect deeply and develop awareness and skills to help create change. Enrolled students must engage in the class and commit to applying knowledge and skills acquired during lessons and reflection to their other classes and aspects of their student experience. This course is best suited for students looking for support in the pursuit of success in achieving academic goals.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to Engineering Fresh Start (PEEA) students only.

**COEN 3051 (2) Leadership Seminar 1: Launching the Leadership Experience**
Practicing needs assessment, decision-making and planning skills, students take this seminar to prepare for their Leadership Experience (required for completion of the Engineering Leadership Certificate). Students work in collaboration with each other, their Engineering Leadership Program mentors and campus/community organizations and leaders to lay the foundation for and launch their individually unique Leadership Experiences.
**Requisites:** Requires a prerequisite course of COEN 2050 (minimum grade C-). Restricted to Engineering Leadership Program (PENL) students only.

**COEN 3053 (2) Leadership Seminar 3: ELP Synthesis and Final ePortfolio**
Progressing through this course, students complete the ePortfolio that demonstrates fulfillment of the requirements of the Engineering Leadership Certificate, reflecting upon synthesizing and discerning practical applications of the leadership experiences tackled throughout throughout their time at CU.
**Requisites:** Restricted to Engineering Leadership Program (PENL) students only.

**COEN 3100 (1) Engineering Transfer Student Success Seminar**
Designed to aid in a successful transition to CU Engineering for students transferring from another two- or four-year institution. Through this course students will learn about college, campus and academic resources, evaluate their skills, explore relevant engineering transfer student issues, build on their strengths and education related to overall career goals, and establish a supportive transfer student community.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**COEN 3210 (3) Climate Change and Engineering**
Explores the fundamentals of climate change science, but from an engineering perspective. After learning the fundamentals, the relationship between climate change and different engineering disciplines will be discussed. Topics covered include geoengineering, renewable energy, sustainable engineering, coastal engineering, building design, etc. Career options and entrepreneurial opportunities will also be discussed.
**Requisites:** Requires prerequisite courses of PHYS 1110 and APPM 1350 (minimum grade D-).

**COEN 3930 (1-6) Engineering Internship/Co-op**
Students enrolled in this course participate in a pre-approved internship or cooperative education program with an employer that allows them to explore the relationship between theory and practice and demonstrate evidence of significant learning (e.g., academic assignments and employer/sponsor evaluations). Credits may apply towards BS or BA degree program in CEAS, please check with the department for specifics (even if student has multiple enrollments in this course and/or COEN 4950).
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only (minimum GPA 2.0).

**COEN 4000 (1-3) Global Intensive Studies**
Provides a hands-on exploration of a particular engineering/applied science subject area in an overseas setting. Serves as a complement to an existing engineering or applied science course taught at CU. Topic areas will vary.
**Equivalent - Duplicate Degree Credit Not Granted:** ENES 3844 COEN 5000
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**COEN 4830 (1-3) Special Topics**
Explores topics of interest in engineering. Content varies by instructor and semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**COEN 4850 (1-3) Independent Study**
Provides opportunities for independent study at the upper-division undergraduate level. Subject and/or project agreed upon by the student and the instructor to fit the needs of the student.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**COEN 4934 (3) Art, Design, and Engineering: Thinking and Making**
Examines the aesthetics, design, and engineering of sculpture, installation, and public art. Through research presentations, readings, and field trips, students learn about the process of making art. In addition to classroom learning, students engage in internships with artists and art fabricators. Highlights national and international hybrid art, design, and engineering advanced degree programs and additional art-related internships and job opportunities. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTS 5934 and ARTS 4934
**Grading Basis:** Letter Grade

**COEN 4950 (1-6) Global Engineering Internship**
Students enrolled in this course participate in a pre-approved global internship with an employer that allows them to explore the relationship between theory and practice and demonstrate evidence of significant learning (e.g., academic assignments and employer/sponsor evaluations). Up to 3 credits may apply towards BS degree program's Free Electives (even if student has multiple enrollments in this course and/or COEN 3930). Students may also earn COEN 4950 credit for international internship facilitated through CU-approved providers that contract with CU's Education Abroad Office. These placements must be pre-approved by the student's department/program to be eligible for credit.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only (minimum GPA 2.0).

**COEN 5000 (1-3) Global Intensive Studies**
Provides a hands-on exploration of a particular engineering/applied science subject area in an overseas setting. Serves as a complement to an existing engineering or applied science course taught at CU. Topic areas will vary.
**Equivalent - Duplicate Degree Credit Not Granted:** ENES 3844 COEN 4000
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**COEN 5830 (1-6) Special Topics**
Explores topics of interest in engineering. Content varies by instructor and semester. May be repeated for up to 9 total credit hours.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering graduate students only.
**Grading Basis:** Letter Grade

**COEN 5850 (1-6) Independent Study**
Provides opportunities for independent study at the graduate level. Subject and/or project agreed upon by the student and the instructor to fit the needs of the student.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Engineering graduate students only.

# Communication (COMM)

## Courses

**COMM 1210 (3) Perspectives on Human Communication**
Surveys communication in a variety of contexts and applications. Topics include basic concepts and general models of communication, ethics, language and nonverbal communication, personal relationships, group decision making, organizational communication, and impact of technological developments on communication. Required for COMN majors and minors.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
MAPS Course: Social Science

**COMM 1300 (3) Public Speaking**
Develops confidence and competence in writing and delivering presentations. Examines public speaking in a variety of personal, civic and professional settings. Required for COMM or COMN majors.

**COMM 1600 (3) Group Interaction**
Learn communication skills to be a better group member and enhance group effectiveness in a variety of professional and civic contexts. Practice group communication skills through an innovative group project and online simulation. Focuses on topics such as group development & socialization, decision making, conflict management, technology & virtual group work, difference & diversity, planning & coordination, leadership & management, and ethics. Required for COMM and COMN majors.
**Requisites:** Restricted to Communication (COMN) majors only.

**COMM 2000 (3) Topics in Communication**
Investigates select topics in communication. Does not count toward the 2000-level courses required for the major, unless explicitly stated in the course schedule.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisites COMM 1210 and COMM 1600.

**COMM 2320 (3) The Craft of Argument**
Focuses on the practice of argumentation in public life with attention to how the process of critical thinking leads to the invention of arguments. Students use argumentation theory to craft ethical and well-reasoned appeals and to critically evaluate the arguments of others. Formerly COMM 3310. Students who took this course previously as COMM 3310 cannot re-take it for credit.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**COMM 2400 (3) Discourse, Culture and Identities**
Considers how communication is central to constructing who people are and examines social controversies related to talk and identities. Students learn to analyze and understand discourse, defined as everyday talk and conversation, through the practice of discourse analysis.
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**COMM 2410 (3) The Practice of Intercultural Communication**
Prepares students to approach intercultural communication as interaction across cultural difference. Teaches the discovery of how culturally variable communication practices (e.g., word and language choice, speech acts, personal address, silence, nonverbal communication, etc.) can lead to the breakdown of coordinated interaction, and how coordination can be restored. Examines broader social, cultural, and political contexts in which intercultural interactions occur.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**COMM 2500 (3) Interpersonal Communication**
Examines how communication processes such as language and nonverbal behavior shape perceptions of self, influence identity, and impact interpersonal roles and relationships. Students learn theories of human interaction and consider how this can be used to improve relational communication.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisites COMM 1210 and COMM 1600.

**COMM 2650 (3) Business and Professional Communication**
Develops knowledge of concepts and skills required for successful participation in contemporary workplace communication. Focuses on communication processes associated with contexts such as sales, leadership, diversity, teamwork, customer service, and conflict. Facilitates students conduct of self-assessment, networking, interviewing, and other career-development strategies. Provides students training in informative and persuasive business presentations.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisites COMM 1300 and COMM 1600.
**Grading Basis:** Letter Grade

**COMM 3000 (3) Issues in Communication**
Explores select issues in communication.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites COMM 1210 and COMM 1600.

**COMM 3210 (3) Communication Theory**
Reviews multiple theories of communication and how they address a variety of personal, relational, group, organizational, and social problems. Develops new approaches to understanding and improving human communication.
**Requisites:** Requires prerequisite courses of COMM 1210 and COMM 1600 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Communication (COMM or COMN) majors/minors or On-Track IUT students admitted to COMN.

**COMM 3220 (3) The Art of Listening**
Investigates the entwined phenomena of listening and sound as fundamental but overlooked dimensions of embodied experience, communication, culture, and the living and material environments of the world. The course explores ways to understand, critically analyze, and practice listening as an embodied process of human responsiveness, social leadership, unequal power differentials, and creative possibility. It aims to retune how we listen to people, places, technologies, and the world at large.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites COMM 1210 and COMM 1600.
**Grading Basis:** Letter Grade

**COMM 3300 (3) Rhetorical Thinking**
Reviews the classical tradition of rhetoric and its relevance to current events and public issues. Students learn how rhetorical perspectives help us create new ways of thinking, speaking, and acting through practicing creative message design.
**Requisites:** Requires prerequisite courses of COMM 1210 and COMM 1600 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Communication (COMM or COMN) majors/minors or On-Track IUT students admitted to COMN.

**COMM 3320 (3) Persuasion in Society**
Learn personal and professional skills to become more persuasive in a variety of communication contexts, and develop a broader and more critical understanding of the culture of persuasion that pervades all aspects of society.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors). Requires prerequisite of COMM 1210 and COMM 1600 (all minimum grade C-).

**COMM 3330 (3) Social Movements**
Introduces concepts in rhetoric and argumentation that are used to explain significant social and political changes in our society. The goal is to show how social actors use rhetoric to promote some social goals and hinder others. Formerly COMM 2360.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites COMM 1210 and COMM 1600.

**COMM 3340 (3) Political Communication**
Explores the role of communication in politics, emphasizing how language drives policies and campaigns. Students learn communication strategies in order to craft innovative campaign messaging.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites COMM 1210 and COMM 1600.

**COMM 3370 (3) Environmental Communication**
Introduces the growing field of environmental communication, including historical events, key concepts, legal landmarks, technological developments and public controversies at the intersection of the environment, economics and social justice. Focuses on persuasive communication in the public sphere, as well as the constitutive power of communication to name and redefine what has been and might become possible in our environmental imaginations.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**COMM 3380 (3) Advanced Topics in Storytelling, Culture, & Climate Justice**
Examines how we communicate about the intersections of climate change and social justice within specific cultural contexts, as well as how we can change narratives about climate justice through a culture-centered framework. Will focus on storytelling topics, such as food justice or energy justice.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**COMM 3410 (3) Intercultural Communication**
Explores complex relationships between culture and communication processes from various conceptual perspectives. Considers the important role of context (e.g., social, historical, and cultural) in intercultural interactions. Recommended Prerequisites: COMM 1210 and COMM 1600.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**COMM 3420 (3) Gender and Communication**
Examines gender as a social practice that remains vital to identities, relationships, and institutions in contemporary society. Treats gender as something we do or enact through communication, rather than as something we are or have, and explores the implications of this shift in perspective. Investigates how gender interacts with sexuality, race, class, nation, age, ability, and other aspects of identity.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**COMM 3430 (3) Communication, Culture and Sport**
Examines the communicative, historical and cultural aspects of sport in contemporary American society including the intersections of power, gender/sexuality, race and class.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**COMM 3510 (3) Family Communication**
Explores communication in families from various theoretical perspectives, such as social constructionism, systems theory, and dialectical theory. Communication patterns and processes created and sustained by family members are examined, including rules, roles, stories, rituals, myths, metaphors, themes, and cycles.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites COMM 1210 and COMM 1600.

**COMM 3610 (3) Communication, Technology, and Society**
Examines how electronic media influence our communication in relationships and communities. Focuses on how we use technology to create shared meanings, express identities, and coordinate interaction, and why such efforts succeed and fail. Also focuses on political and ethical questions concerning the development of communication technology in a global society characterized by conflict and inequality.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites COMM 1210 and COMM 1600.

**COMM 3620 (3) Advanced Teamwork and Collaboration**
Explores communication and collaboration in complex situations (e.g., extreme environments e.g., space travel; cross-sector collaborations). Reviews and applies key processes of team/group communication and collaboration to the context of extreme teams to identify communication issues and interventions relevant in complex organizing or dangerous situations.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**COMM 3630 (3) Organizational Communication**
Learn to understand and critique organizations and organizing from a communication perspective. Addresses topics such as organizational theory, organizational culture, power, technology, decision making, teamwork, leadership, diversity, gender, socialization, and ethics.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites COMM 1210 and COMM 1600.
**Grading Basis:** Letter Grade

**COMM 3700 (3) Communication and Conflict Management**
Examines communication concepts and theories related to interpersonal and organization conflict. Enables students to better understand different types of conflict, sources of conflict, and communication patterns that serve to create, maintain and transform conflict by teaching conflict management and collaboration.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite COMM 1600 and COMM 2500 or COMM 2650.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**COMM 3740 (3) Qualitative Research Methods**
Learn to collect and analyze qualitative data (interviews, observations, focus groups) in order to answer research questions about communication and society. Focuses on research that investigates meaning, understanding, process, and interpretation in order to enhance our knowledge of human interaction.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Communication (COMM or COMN) majors or minors only.
**Recommended:** Prerequisites COMM 1210 and COMM 1600.

**COMM 3750 (3) Quantitative Research Methods**
Introduces empirical communication research. Students develop skills in collecting data and analyzing statistical research. Students conduct an original research project applying numerical analysis to communication behavior.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Communication (COMM or COMN) majors or minors only.
**Recommended:** Prerequisites COMM 1210 and COMM 1600.

**COMM 3760 (3) Rhetorical Research Methods**
Considers what it means to do rhetorical research. Explores various methods for analyzing all forms of public discourse, such as political speeches, advertising, activist campaigns, and popular entertainment, to better understand their effects and influence.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Communication (COMM or COMN) majors or minors only.
**Recommended:** Prerequisites COMM 1210 and COMM 1600 and COMM 3300.

**COMM 4000 (1-6) Advanced Topics in Communication**
Analyzes special interest areas of communication theory, research, and practice. Course format involves lecture, discussion, investigative analysis, and practical application.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites COMM 3210 and COMM 3300.

**COMM 4100 (3) Seminar in Honors Thesis Writing and Research**
Provides the opportunity for students writing an honors thesis to develop their understanding of the research process and to improve their research and writing skills.
**Requisites:** Restricted to students with 80-180 credits (Senior) Communication (COMM or COMN) majors only.
**Additional Information:** Arts Sciences Honors Course

**COMM 4220 (3) Senior Seminar: Functions of Communication**
Topical seminar on the functions of communication across interpersonal, group, organizational, and public contexts. Reviews current theory and research on topics such as communication and conflict, persuasion, and ethical dimensions of communication practices.
**Requisites:** Requires prerequisite course of COMM 3210 (minimum grade C-). Restricted to students with 80-180 credits (Senior) Communication (COMM or COMN) majors only.

**COMM 4300 (3) Senior Seminar: Rhetoric**
Reviews current theory and research on rhetoric and culture on topics such as environmental rhetoric, rhetoric of racism, and rhetoric of storytelling.
**Requisites:** Requires prerequisite course of COMM 3300 (minimum grade C-). Restricted to students with 80-180 credits (Senior) Communication (COMM or COMN) majors only.
**Grading Basis:** Letter Grade

**COMM 4510 (3) Senior Seminar: Interpersonal Communication**
Reviews current theory and research on topics such as communication in intimate relationships, the darkside of relationships, and online relationship management.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of COMM 3210 (minimum grade C-). Restricted to students with 80-120 credits (Senior) Communication (COMM or COMN) majors only.

**COMM 4600 (3) Senior Seminar: Organizational Communication**
Reviews current theory and research on topics such as communication and organizational decision making, organizational culture, gender relations, communication technology, and power and control in organizations.
**Equivalent - Duplicate Degree Credit Not Granted:** COMM 5600
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of COMM 3210 (minimum grade C-). Restricted to students with 80-120 credits (Senior) Communication (COMM or COMN) majors only.

**COMM 4610 (3) Senior Seminar: Communication Studies of Science and Technology**
Requires students to synthesize and demonstrate what they¿ve learned in the major. Please refer to the specific description listed for the current semester. Each seminar will vary greatly in format and content.
**Requisites:** Requires prerequisite course of COMM 3210 (minimum grade C-). Restricted to students with 80-180 credits (Senior) Communication (COMM or COMN) majors only.

**COMM 4840 (1-6) Undergraduate Independent Study**
Note that the 14-hour limit in the major applies to any combination of independent study and internship credit. This course does not count toward the 36 credit hours required for the major.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Communication (COMM or COMN) majors only.
**Recommended:** Prerequisites COMM 3210 and COMM 3300.

**COMM 4930 (1-6) Internship**
Studies are pursued in communication-related work experience projects that generally require 40 hours on the job per credit hour and evidence (e.g., journal, paper and employer evaluation) of significant learning. The 14-hour limit in the major applies to any combination of independent study and internship credit and does not count toward the 36 hours required for the major.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Communication (COMM or COMN) majors only. Requires 2.5 or higher cumulative GPA
**Recommended:** Prerequisite 57 hours of overall course work, 18 hours of communication course work completed, 2.50 overall GPA and a faculty sponsor.

**COMM 4950 (1-6) Senior Thesis: Honors**
For exceptional communication majors who wish to graduate with department honors and receive credit for writing an honors thesis. For students accepted into COMN Honors program and currently completing COMN Honors Thesis project.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sciences Honors Course

**COMM 5000 (3) Organizational Culture**
Focuses on theory and practice associated with the successful development of organizational culture. Topics covered include symbolic artifacts, beliefs, and assumptions that distinguish organizational, corporate, and occupational/professional identities. Related coverage of the communication practices (e.g., performance, ritual, etc.) through which the cultural elements of organizing are created, maintained and transformed. Special emphasis placed on issues of cultural leadership, cultural control, and cultural change in the contexts of contemporary globalization and technological innovation.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**COMM 5210 (3) Readings in Communication Theory**
Provides a critical overview of influential theoretical traditions in communication studies. Emphasizes the discipline¿s social scientific and humanistic heritage, while also considering emerging trends. Introduces standards for evaluating and critiquing communication theories.
**Requisites:** Restricted to graduate students only.

**COMM 5220 (3) Seminar: Functions of Communication**
Topical seminar on the functions of communication across interpersonal, group, organizational, and public contexts. Reviews current theory and research on topics such as communication and conflict, persuasion, and ethical dimensions of communication practices.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**COMM 5225 (3) Environmental Communication**
Investigates key concepts in environmental communication and considers which theoretical frameworks and practical actions can inform the effects of various constituents to address environmental issues.
**Requisites:** Restricted to graduate students only.

**COMM 5230 (3) Applied Communication**
Examines the study of applications of communication concepts, theories, methods, interventions, and other practices to address real-world issues and problems. Discusses conceptual issues framing applied communication, examines purposes and methods informing such scholarship, and provides opportunity to evaluate and propose research.
**Requisites:** Restricted to graduate students only.

**COMM 5300 (3) Seminar: Rhetoric**
Reviews current theory and research on topics such as rhetoric and publics, rhetoric as an interpretive social science, and rhetoric of social movements and political campaigns.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**COMM 5310 (3) Contemporary Rhetorical Criticism**
Advanced critical analysis of rhetorical texts in terms of how they shape issues and appeals for judgment, create identities for speakers and their audiences, and construct perceptions of time, space, and the human condition.
**Requisites:** Restricted to graduate students only.

**COMM 5320 (3) Readings in Rhetoric**
Survey of classical and contemporary readings in rhetoric. Required for doctoral students in communication; optional for master's students.
**Requisites:** Restricted to graduate students only.

**COMM 5435 (3) Readings in Community and Social Interaction**
Focuses on how everyday communication practices shape and are shaped by community contexts. Contains theoretical and empirical readings that illustrate how interactions among group members negotiate and maintain distinct communities and how group communication practices reflect shared norms among community members. Also reviews methods to study everyday interactions among community members (e.g., discourse analysis, qualitative coding, surveys and applied approaches/methods).
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**COMM 5600 (3) Seminar: Organizational Communication**
Reviews current theory and research on topics such as communication and organizational decision making, organizational culture, gender relations, communication technology, and power and control in organizations.
**Equivalent - Duplicate Degree Credit Not Granted:** COMM 4600
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**COMM 5610 (3) Organizational Ethnography**
Focuses on the historical influence of the ethnographic tradition in organizational communication studies. Reviews landmark studies of organizational culture and power/control, emphasizing issues of ethics and politics associated with the writing and reading of organizational ethnography. Reviews trends in contemporary organizing such as neoliberal globalization and the adoption of artificial intelligence, and their implications for the future of ethnography.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**COMM 5620 (3) Readings in Organizational Communication**
Survey of historical and contemporary readings in organizational communication. Treats theory, research, and application from a variety of perspectives.
**Requisites:** Restricted to graduate students only.

**COMM 5720 (3) Readings in Communication and Technology**
Survey of multidisciplinary research that examines various relationships between communication and technology. Students are encouraged to develop critical skills in perceiving assumptions and perspectives that motivate major theories in this area, and to examine how these phenomena have changed over time.
**Requisites:** Restricted to graduate students only.

**COMM 5930 (1-6) Graduate Internship**
Offers opportunities for graduate-level communication related work projects. Limited to 3 hours in spring and fall semesters, 6 hours in summer. The 6-hour limit at MA level and 9-hour limit at PhD level applies to any combination of independent study and internship credit.
**Repeatable:** Repeatable for up to 9.00 total credit hours.

**COMM 6010 (3) Communication Research and Theory**
Provides an introduction to graduate study of communication, offering an overview of the discipline and its scholarship. Required for MA and Ph.D. communication students.
**Requisites:** Restricted to Communication (COMM or COMN) graduate students only.

**COMM 6020 (3) Quantitative Research Methods**
Introduces students to the practice of quantitative research in communication: conceptualization and critique of research projects, measurements, methods (e.g., experimental and survey), statistical data analysis, and written reports.
**Requisites:** Restricted to graduate students only.

**COMM 6030 (3) Qualitative Research Methods**
Introduction to the epistemology, methodology, and representational practices associated with qualitative communication research. Fieldwork methods emphasized include participant observation, interviewing, and document/artifact analysis.
**Requisites:** Restricted to graduate students only.

**COMM 6200 (3) Seminar: Selected Topics**
Facilitates understanding of current and past theory and research on a selected topic in communication and the ability to develop new theory and research on that topic.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**COMM 6310 (3) Advanced Rhetorical Criticism**
Reviews current critical methods and issues related to rhetorical criticism and rhetorical field methods.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites COMM 5310 and COMM 5320.

**COMM 6320 (3) Rhetorical Theory**
Reviews current theory and research on topics such as contemporary rhetorical theory, rhetoric and public life, rhetoric as an interpretive social science, and rhetoric of social movements and political campaigns.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite COMM 5320.

**COMM 6330 (3) Rhetoric of Inquiry**
Surveys foundational texts and contemporary research in the rhetoric of inquiry. Focuses on the role of persuasion in the production of knowledge. Critical analysis of major theoretical and methodological traditions and topics, with an emphasis on social dimensions of inquiry.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite COMM 5320.

**COMM 6340 (3) Rhetoric and Civic Community**
Considers performances of public life as rhetorical inducements of civitas. Topics include negotiation of self-regulation among interdependent partners, rhetorical exclusions and/or counterpublics, and dialectical tensions of public/private as these contribute to and have civic consequences for publicness, community, and social will.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite COMM 5320.

**COMM 6350 (3) Seminar in Argumentation**
Surveys foundational texts and contemporary research in argumentation. Analysis of distinctions between philosophical and rhetorical approaches to argument. Critical analysis of major theoretical and methodological traditions and topics with an emphasis on social dimensions of argument.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite COMM 5320.

**COMM 6360 (3) Social and Cultural Theory**
Traces select traditions in social and/or cultural theory, emphasizing how those traditions affect and are affected by the field of rhetoric studies. Examines the origins and resolutions of major debates in social and/or cultural theory from a rhetorical perspective.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite COMM 5320.

**COMM 6370 (3) Rhetorics of Transgression and Resistance**
This course examines contemporary philosophies, analyses, and practices of transgression and resistance. Overall, it encourages greater reflexivity about why, how, and for what ends we study the intersections of rhetoric, culture, and social change, including but not limited to choices about naming, stories, discourses, tactics, coalitions, and movements.
**Recommended:** graduate students only.
**Grading Basis:** Letter Grade

**COMM 6410 (3) Discourse Analysis**
Acquaints students with the main types of discourse analysis: conversation analysis, critical discourse analysis, and rhetorically informed discourse approaches. Teaches how to conduct discourse analysis, including transcribing, selecting excerpts, documenting inferences, and linking findings to scholarly controversies.
**Requisites:** Restricted to graduate students only.

**COMM 6420 (3) Interaction Analysis**
Educates students in one of a selected set of methodological specializations used in the study of human interaction.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**COMM 6425 (3) Writing, Reporting, and Publishing**
Helps students hone their abilities to write, report, and publish a scholarly article in the field of communication and beyond. Students gain familiarity with the genre of the scholarly article, engage with theories of writing genres, delve into the politics of scholarly publishing, and learn various strategies for crafting a scholarly article. Students are expected to develop a manuscript for submission to a peer-reviewed journal or other scholarly forum.
**Grading Basis:** Letter Grade

**COMM 6440 (3) Grounded Practical Theory**
Examines theory, method, and application of grounded practical theory, an approach to building normative theory through description, critique, and theoretical reconstruction of situated communicative practices. Semester project involves analysis of a sample of discourse from a public or field observation setting.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite COMM 5210.

**COMM 6445 (3) Intercultural Communication**
Focuses on cultural foundations of social interaction, with a special emphasis on ideology (including potentially contested cultural norms, values and premises) as a basic condition of meaningful interaction. Identities are discussed as culturally variable, historically embedded interactional accomplishments, constructed from communicative resources such as language and other types of signs, that serve the purpose of participation in communal life.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**COMM 6455 (3) Community-based Research Methods**
Facilitates and supports graduate student-led community-based research. Working from multiple CBR traditions, students develop a thoughtful rationale for conducting CBR and practice a repertoire of CBR methods (e.g., group decision-making, managing ethical dilemmas, collaborative data collection and analysis, and communicating findings).
**Grading Basis:** Letter Grade

**COMM 6460 (3) Ethnography of Communication**
Introduces graduate students to the theory, methodology, and practice of the ethnography of communication. Students read existing literature in the tradition, and design and implement a field-based project that centers on culturally patterned forms and styles of communicative conduct. Prior graduate-level coursework in basic qualitative research methods is required.
**Grading Basis:** Letter Grade

**COMM 6470 (3) Public Deliberation and Dialogue**
Explores the theory, research and practices of deliberative democracy and dialogue. Considers "ideal" communicative conduct and common interactional troubles, cross-cultural differences and routine communication practices.
**Requisites:** Restricted to graduate students only.

**COMM 6730 (3) Constitutive Approaches to Organizational Communication**
Explores theory and research that explain how organizing processes are constituted through communication. Course themes might include collaboration, authority, identity, knowledge, risk/resilience, or socio-material arrangements.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites COMM 5620 and COMM 6010.

**COMM 6740 (3) Theory and Philosophy of Organizing and Organizations**
Reviews theory and philosophy of organizations and organizing where communication processes are seen as constitutive. Focuses on discursive and material practices in the formation and change of organizational structure, culture, and operation.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite COMM 5620.

**COMM 6750 (3) Critical-Cultural Approaches to Organizational Communication**
Addresses critical and cultural approaches to communicating and organizing. Topics include relations of culture, power, resistance, identity, and difference as theorized in and around organizational life. Major theoretical works on these topics are highlighted throughout, although specific themes may vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite COMM 5620.
**Grading Basis:** Letter Grade

**COMM 6780 (3) Roles, Relationships, and Identities in Interaction**
Examines how social roles influence communicative practices, the development of relationships, and the impact of relationships on identity. Considers these processes in contexts, such as personal relationships and institutional settings. Topic varies.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**COMM 6840 (1-3) Master's Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**COMM 6910 (1) Communication Research and Theory Practicum**
Focuses primarily on the professionalization of graduate students new to CU's Department of Communication. Introduces them to the department, university, and discipline; develops practical skills related to professionalization (e.g., submitting to conferences, publishing research, and mentoring students); and considers the politics of professionalization. Runs concurrently with COMM 6010, "Communication Research and Theory.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**COMM 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Repeatable:** Repeatable for up to 3.00 total credit hours.

**COMM 6950 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**COMM 7118 (3) Foundations of Environmental Justice**
Examines environmental justice movements, policies, institutions, objectives, and scholarship. Identifies factors that contribute to environmental inequality, and efforts to reduce it. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 7118, ENVS 7118 and PSCI 7118
**Requisites:** Restricted to graduate students only.

**COMM 8840 (1-6) Doctoral Independent Study**
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.

**COMM 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.

# Communication Residential Academic Program (COMR)

## Courses

**COMR 1000 (1-2) Communication and Community**
Introduction to how communication builds community by creating and sharing meaning. Examination of communication practices at the interpersonal level (friends and family), the group level (teams, classrooms and organizations) and the societal level (citizenship, social change, mass media).
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to students in the Communication and Society Residential Academic Program (PCMS).

**COMR 1800 (3) Visual Literacy: Images and Ideologies**
Explores the relationship between visual images and cultural values, including how we process visual information, the evolution of conventions in various media, common visual portrayals, and ethical issues.
**Requisites:** Restricted to students in the Communication and Society Residential Academic Program (PCMS).
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

# Comparative Literature (COML)

## Courses

**COML 8990 (1-10) Doctoral Dissertation**
**Requisites:** Restricted to graduate students only.

# Computer Science (CSCI)

## Courses

**CSCI 1000 (1) Computer Science as a Field of Work and Study**
Introduces curriculum, learning techniques, time management and career opportunities in Computer Science. Includes presentations from alumni and others with relevant educational and professional experience.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 1000
**Requisites:** Restricted to students with 0-26 credits (Freshmen) Computer Science (CSEN-BSCS or CSEN-BA) or Engineering Open Option (XXEN) majors only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 1200 (3) Introduction to Computational Thinking**
Teaches computational thinking and techniques for writing computer programs using the Python programming language. Intended for students who realize that computational skills are beneficial to all fields of study, but who have little or no experience in programming or are not Computer Science majors. Students will be expected to create computer programs to solve problems in a range of disciplines. Does not count as Computer Science credit for the Computer Science BA, BS, or minor.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 1200 or INFO 1701

**CSCI 1300 (4) Computer Science 1: Starting Computing**
Teaches techniques for writing computer programs in higher level programming languages to solve problems of interest in a range of application domains. Appropriate for students with little to no experience in computing or programming.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 1310 CSPB 1300
**Requisites:** Requires a prerequisite or corequisite course of APPM 1235 or APPM 1340 or APPM 1345 or APPM 1350 or MATH 1150 or MATH 1300 or MATH 1310 (all minimum grade C-).

**CSCI 2270 (4) Computer Science 2: Data Structures**
Studies data abstractions (e.g., stacks, queues, lists, trees, graphs, heaps, hash tables, priority queues) and their representation techniques (e.g., linking, arrays). Introduces concepts used in algorithm design and analysis including criteria for selecting data structures to fit their applications. Knowledge of C++ is highly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 2275 CSPB 2270
**Requisites:** Requires prerequisite course of ((CSCI 1300 or CSCI 1320 or ECEN 1310 minimum grade C-) or (ASEN 1320 minimum grade B-)) and prerequisite or corequisite course of (MATH 1300 or MATH 1310 or APPM 1345 or APPM 1350 minimum grade C-).
**Additional Information:** Departmental Category: General Computer Science

**CSCI 2275 (4) Programming and Data Structures**
Combines the content in CSCI 1300 and CSCI 2270 and is intended for students with experience with at least one object oriented programming language. Assumes knowledge of programming constructs- data types, conditionals, loops and classes. Students must pass a programming competency exam administered by the computer science department to take this class. The course includes an expedited instruction in the C++ programming language and then primarily focuses on the content in CSCI 2270: data abstractions (e.g., stacks, queues, lists, trees, graphs, heaps, hash tables, priority queues) and their representation techniques (e.g., linking, arrays). Introduces concepts used in algorithm design and analysis including criteria for selecting data structures to fit their applications.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 2270 or CSPB 2270
**Requisites:** Requires prerequisite or co-requisite of MATH 1300 or MATH 1310 or APPM 1345 or APPM 1350 (all minimum grade C-).

**CSCI 2400 (4) Computer Systems**
Covers how programs are represented and executed by modern computers, including low-level machine representations of programs and data, an understanding of how computer components and the memory hierarchy influence performance.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 2400
**Requisites:** Requires prerequisite of CSCI 2270 or CSCI 2275 (minimum grade C-).
**Additional Information:** Departmental Category: General Computer Science

**CSCI 2750 (3) Computing, Ethics and Society**
Satisfies the ethics requirement for computer science BA and BS majors. This course is intended to provide students with perspectives which help them deal with ethical and societal implications in their careers as computing professionals. Examines ethical ramifications of current and future computing systems and technologies and reflects upon the broad implications of computing upon our society. Student work consists of reading, participation in class discussions and presentations, essays, and a final project. Students from outside computer science also are welcome. Necessary background is basic familiarity with computing. Does not count as Computer Science elective credit for the Computer Science BA, BS, or minor.
**Recommended:** Sophomore standing or beyond, and a basic familiarity with computing.

**CSCI 2820 (3) Linear Algebra with Computer Science Applications**
Introduces the fundamentals of linear algebra in the context of computer science applications. Includes vector spaces, matrices, linear systems, and eigenvalues. Includes the basics of floating point computation and numerical linear algebra.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 2820
**Requisites:** Requires prerequisite courses of (CSCI 2270 or CSCI 2275) and (APPM 1360 or MATH 2300) (all minimum grade C-).
**Additional Information:** Departmental Category: General Computer Science

**CSCI 2824 (3) Discrete Structures**
Covers foundational materials for computer science that is often assumed in advanced courses. Topics include set theory, Boolean algebra, functions and relations, graphs, propositional and predicate calculus, proofs, mathematical induction, recurrence relations, combinatorics, discrete probability. Focuses on examples based on diverse applications of computer science.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 2824
**Requisites:** Requires prerequisite courses of (ASEN 1320 or CSCI 1200 or CSCI 1300 or CSCI 1320 or CSCI 2275 or ECEN 1310 or MCEN 1030) and (APPM 1345 or APPM 1350 or MATH 1300 or MATH 1310) (all minimum grade C-).
**Recommended:** Prerequisite Calc 2 (APPM 1360 or MATH 2300) is strongly recommended.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 2830 (1-4) Special Topics in Computer Science**
Covers topics of interest in computer science at the sophomore level. Content varies from semester to semester. Does not count as Computer Science credit for the Computer Science BA, BS or minor.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 2834 (1) Discrete Structures Workgroup**
Provides additional problem-solving practice and guidance for students enrolled in CSCI 2824. Students work in a collaborative environment to further develop their problem-solving skills with the assistance of facilitators. Does not count as Computer Science credit for the Computer Science BA, BS, or minor.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires corequisite course of CSCI 2824.

**CSCI 2897 (3) Calculating Biological Quantities**
Master practical mathematical techniques for representing and analyzing biological quantities of different kinds. Develop mathematical intuition about biological calculations. Learn to model and solve simple feedback processes. Learn to model and solve simple accumulation processes. Learn to model and decompose simple vector spaces. Learn standard approximation and optimization strategies. Adapt and combine methods to solve real-world problems. Background in biology not required. This course is intended for students who are interested in Computational Biology, but will not take Differential Equations (APPM 2360/MATH 3430) as part of their degree plan. Does not count as Computer Science credit for for the Computer Science BA, BS or minor.
**Requisites:** Requires prerequisite course of APPM 1345 or APPM 1350 or MATH 1300 or MATH 1310 (minimum grade C-)

**CSCI 2900 (1-3) Lower Division, Undergraduate Level Independent Study**
Offers selected topics at the elementary level for students with little or no previous computing experience. Does not count as Computer Science credit for the Computer Science BA, BS or minor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 3002 (4) Fundamentals of Human Computer Interaction**
Introduces the practice and research of human-computer interaction, including its history, theories, the techniques of user-centered design, and the development of interactive technologies. Covers computing in society at large with respect to domains such as health, education, assistive technology, ethics, environment, and more.
**Requisites:** Requires prerequisite course of CSCI 2270 or CSCI 2275 (both minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 3010 (3) Intensive Programming Workshop**
Explores concepts and techniques for design and construction of larger, reliable, and maintainable software systems in the context of object-oriented programming. Covers various topics including: object-oriented programming paradigms, scope, inheritance, program structure and design, practical use of version control, working with established code bases, and building graphical user interfaces. Emphasizes coding individually and in pairs and includes in class lab work, smaller coding assignments, and multiple weeks-long projects. Not intended for students in their final year of the Computer Science BA or BS degree. Formerly offered as a special topics course.
**Requisites:** Requires a prerequisite course of (CSCI 2270 or CSCI 2275) and a prerequisite or co-requisite course of CSCI 3308 (all minimum grade C-).

**CSCI 3022 (3) Introduction to Data Science with Probability and Statistics**
Introduces students to the tools, methods and theory behind extracting insights from data. Covers algorithms of cleaning and munging data, probability theory and common distributions, statistical simulation, drawing inferences from data, and basic statistical modeling.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 3022
**Requisites:** Requires prerequisite course of (CSCI 2270 or CSCI 2275) and (APPM 1360 or MATH 2300) and (CSCI 2824 or ECEN 2703 or APPM 3170 or MATH 2001) (all minimum grade C-).
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 3090 (3) Introduction to Quantum Computing**
Covers the basics of quantum computation, including the basics of quantum information; axioms of quantum mechanics; quantum circuits and universality; the relationship between quantum and classical complexity classes; simple quantum algorithms such as the quantum Fourier transform; Shor factoring algorithm; Grover search algorithm; physical implementation of quantum computation; error correction and fault tolerance.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 3090 and ECEN 3090
**Requisites:** Requires prerequisite course of APPM 2360 or APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135 (minimum grade C-).

**CSCI 3100 (1) Software and Society**
Provides students with an understanding of the professional, ethical, legal and social issues and responsibilities of software developers, as well as providing them with the ability to analyze the local and global impacts of computing on individuals, organizations and society. Required for, and restricted to, Computer Science majors completing a Senior Thesis. Department consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4308 and CSCI 4328 and CSCI 4338 and CSCI 4348
**Requisites:** Restricted to Computer Science majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Computer Science

**CSCI 3104 (4) Algorithms**
Covers the fundamentals of algorithms and various algorithmic strategies, including time and space complexity, sorting algorithms, recurrence relations, divide and conquer algorithms, greedy algorithms, dynamic programming, linear programming, graph algorithms, problems in P and NP, and approximation algorithms.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 3104
**Requisites:** Requires prerequisite courses of (CSCI 2270 or CSCI 2275) and (APPM 1360 or MATH 2300) and (one of the following: CSCI 2824 or ECEN 2703 or APPM 3170 or MATH 2001) (all minimum grade C-).
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 3112 (1) Professional Development in Computer Science**
Supports students in developing professional skills and practices in computing, including: preparing for technical and behavioral interviews, professional networking, mastering new technologies not addressed in the curriculum, presenting work, the role of graduate study, and exploring career and research directions.
**Requisites:** Requires prerequisite course of CSCI 2270 or CSCI 2275 (minimum grade C-). Restricted to Computer Science majors, Computer Science minors, and Computational Biology minors.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 3150 (3) Universal Design for Digital Media**
Focusing on the concepts of universal design and Web Standards, this course will address issues that occur at the nexus of web standards, Universal Design and the needs of persons with disabilities. Students will gain the expertise and skills to create media and web sites which are accessible, usable and effective for all users and device platforms.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 3150
**Requisites:** Requires prerequisite course of CSCI 1300 (minimum grade C-).
**Recommended:** Prerequisite some knowledge of creating web pages with either direct HTML coding or with web design software.

**CSCI 3155 (4) Principles of Programming Languages**
Studies principles governing the design and analysis of programming languages and their underlying execution models. Explores values, scoping, recursion, higher-order functions, type systems, control structures, and objects. Introduces formal semantics as a framework for understanding programming features. Introduces advanced programming concepts such as functional programming, higher-order functions, immutable values and structures, inductive types, functors, continuation-passing; and object-oriented programming using inheritance, generics and covariance/contravariance in a functional programming language such as Scala.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 3155
**Requisites:** Requires prerequisite courses of (CSCI 2270 or CSCI 2275) and (CSCI 2400 or ECEN 2360 or ECEN 3350) and (CSCI 2824 or ECEN 2703 or APPM 3170 or MATH 2001) (all minimum grade C-).
**Additional Information:** Departmental Category: Programming Languages

**CSCI 3202 (3) Introduction to Artificial Intelligence**
Surveys artificial intelligence techniques of search, knowledge representation and reasoning, probabilistic inference, machine learning, and natural language. Knowledge of Python is strongly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 3202
**Requisites:** Requires prereqs (CSCI 2270 or CSCI 2275) (APPM 3170 or CSCI 2824 or ECEN 2703 or MATH 2001) (APPM 3570 or CHEN 3010 or CSCI 3022 or CVEN 3227 or ECEN 3810 or ECON 3818 or MATH 3510 or MATH 4510 or STAT 3100 or STAT 4000) (all min grade C-).
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 3287 (3) Design and Analysis of Database Systems**
Introduces the fundamental concepts of database requirements analysis, database design, and database implementation with emphasis on the relational model and the SQL programming language. Introduces the concepts of Big Data and NoSQL systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 3287
**Requisites:** Requires prerequisite course of CSCI 2270 or CSCI 2275 (minimum grade C-).
**Additional Information:** Departmental Category: Database Systems

**CSCI 3302 (3) Introduction to Robotics**
Introduces students to fundamental concepts in autonomous robotics: mechanisms, locomotion, kinematics, control, perception and planning. Consists of lectures and lab sessions that are geared toward developing a complete navigation stack on a miniature mobile robotic platform.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3303 and CSPB 3302
**Requisites:** Requires prerequisite courses of (CSCI 2270 or CSCI 2275) and (APPM 3170 or CSCI 2824 or ECEN 2703 or MATH 2001) and (APPM 2360 or APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135) (all minimum grade C-).
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 3308 (3) Software Development Methods and Tools**
Covers tools and techniques for successful software development with a strong focus on best practices used in industry. Students work in small teams to complete a semester-long application development project. Students learn front-end design and construction using HTML & CSS, back-end database design and construction, and full-stack integration. Students gain exposure to agile methodologies, web services, distributed version control, requirements definition, automated integration testing, and cloud-based application deployment.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 3308
**Requisites:** Requires prerequisite course of CSCI 2270 or CSCI 2275 (both minimum grade C-).
**Additional Information:** Departmental Category: Software Engineering

**CSCI 3352 (3) Biological Networks**
This course examines the computational representation and analysis of biological phenomena through the structure and dynamics of networks, from molecules to species. Attention focuses on algorithms for clustering network structures, predicting missing information, modeling flows, regulation, and spreading-process dynamics, examining the evolution of network structure, and developing intuition for how network structure and dynamics relate to biological phenomena.
**Requisites:** Prereqs(1 of APPM3650/CSCI2270/2275/INFO2201/PHYS2600) (1 of APPM1345/1350/MATH1300/1310) (1 of APPM3570/CHEN3010/CSCI3022/CVEN3227/EBIO4410/ECEN3810/ECON3818/IPHY3280/MATH3510/4510/4520/MCDB3450/MCEN3047/PSYC2111/STAT2600/3100/4000/4520)(min C-)

**CSCI 3403 (4) Introduction to CyberSecurity for a Converged World**
Introduces core concepts in cybersecurity including confidentiality, integrity, authentication, risk management, and adversarial thinking. The concepts will be applied to both traditional information technology (IT) systems and cyber physical systems (CPS). At the conclusion of the course students should have a solid foundation in cybersecurity and hands-on experience.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 3403
**Requisites:** Requires prerequisite course of CSCI 2400 or ECEN 2360 or ECEN 3350 (minimum grade C-).
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 3434 (3) Theory of Computation**
Introduces the foundations of formal language theory, computability, and complexity. Shows relationship between automata and various classes of languages. Addresses the issue of which problems can be solved by computational means, and studies complexity of solutions.
**Requisites:** Requires prerequisite course of CSCI 3104 (minimum grade C-).
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 3593 (3) Computer Organization**
Studies computer design at the microarchitecture level. Discusses instruction set architecture design, arithmetic and logic unit design, control logic, memory design and caches, simple pipelining, I/O and peripheral devices. Briefly covers aspects of modern computer architecture, such as multicore processors and hardware security.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3593 ECEN 5590
**Requisites:** Requires prerequisite course of ECEN 2360 or ECEN 3350 or CSCI 2400 (minimum grade C-).
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 3656 (3) Numerical Computation**
Covers development, computer implementation, and analysis of numerical methods for applied mathematical problems. Explores topics such as floating point arithmetic, numerical solution of linear systems of equations, root finding, numerical interpolation, differentiation, and integration.
**Requisites:** Requires prerequisite courses of (ASEN 1320 or CSCI 1300 or CSCI 1320 or CSCI 2275 or ECEN 1310) and (APPM 1360 or MATH 2300) and (APPM 2360 or APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135) (all min. grade C-).
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 3702 (3) Cognitive Science**
Introduces cognitive science, drawing from psychology, philosophy, artificial intelligence, neuroscience, and linguistics. Studies the linguistic relativity hypothesis, consciousness, categorization, linguistic rules, the mind-body problem, nature versus nurture, conceptual structure and metaphor, logic/problem solving and judgment. Emphasizes the nature, implications and limitations of the computational model of mind.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3702 and LING 3005 and PHIL 3310 and PSYC 3005 and SLHS 3003 and CSPB 3702
**Recommended:** Prerequisites two of the following CSCI 1300 or CSCI 2275 or LING 2000 or PHIL 2440 or PSYC 2145.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Distribution-Social Sciences

**CSCI 3753 (4) Design and Analysis of Operating Systems**
Analyzes the software that extends hardware to provide a computing environment, including the role of linkers, file systems, resource sharing, security and networking. Studies the history of operating system organization and design and their influence on security, functionality and reliability.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 3753
**Requisites:** Requires prerequisite courses of (CSCI 2270 or CSCI 2275) and (CSCI 2400 or ECEN 2360 or ECEN 3350) (all minimum grade C-).
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 3832 (3) Natural Language Processing**
Explores the theoretical and practical issues that arise in getting computers to perform useful and interesting tasks with human languages. Topics include information extraction, dialog systems and machine translation. Focus is on the use of language data and machine learning algorithms to build robust systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 3832
**Requisites:** Requires prerequisite courses of (CSCI 2270 or CSCI 2275) and (CSCI 2824 or MATH 2001 or ECEN 2703 or APPM 3170) (all minimum grade C-).
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 4022 (3) Advanced Data Science**
Introduces students to advanced tools, methods, and theory for extracting insights from data. Covers computational tools for storing and working with large data sets and computational techniques for common big data scenarios like graph data, recommender systems, and dimensionality reduction. Emphasizes both the efficient implementation of algorithms as well as the mathematical foundations behind techniques.
**Requisites:** Prereqs of (APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135) (CSCI 3022 or APPM 3570 or CHEN 3010 or CVEN 3227 or MATH 3510 or MATH 4510 or ECEN 3810 or ECON 3818 or STAT 3100 or STAT 4000 or 4520) CSCI 3104 (all min grade C-).
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 4113 (3) Linux System Administration**
Introduces Linux Unix system administration and related topics. Includes hardware and software installation, storage management, configuration of user accounts and system services, development of automation and monitoring tools, and the provisioning of common network services. This laboratory-focused course will provide significant exposure to the network security concerns of Internet connected hosts. Students will build a network of Linux servers from the ground up using provided computing resources and must maintain and secure these servers themselves.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5113 and CYBR 5113 CSCI 5030 and CYBR 5030
**Requisites:** Requires prerequisite course of CSCI 3753 (minimum grade C-).
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 4114 (3) Practical Algorithmic Complexity**
When coming across an algorithmic problem, how do we think about how hard it is? Beyond just how much time or memory it takes, computational complexity offers a plethora of concepts for understanding this fundamental question. This leads to the appropriate choice of algorithm for the job, the development of new algorithms, and understanding the role of algorithmic complexity in natural settings such as biology and physics.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5114
**Requisites:** Requires a prerequisite course of CSCI 3104 (minimum grade C-).

**CSCI 4118 (3) Software Engineering for Scientists**
Learn the core principles of software engineering to develop scientific software that is robust and reproducible. This class targets quantitative scientists in any discipline who have programming skills (any language) and want to use software to further their research. The course covers version control, testing, benchmarking, data structures, algorithms, and pipelines. Instructor approval is required for CS majors and CS minors.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 6118
**Requisites:** Restricted to non-Computer Science majors and non-Computer Science minors only.
**Recommended:** Prerequisites ASEN 1320 or CSCI 1200 or CSCI 1300 or CSCI 2275 or ECEN 1310 or INFO 1201 and knowledge of a programming language, preferably Python.

**CSCI 4122 (3) Information Visualization**
Studies interactive visualization techniques that help people analyze data. This course introduces design, development, and validation approaches for interactive visualizations with applications in various domains, including the analysis of text collections, software visualization, network analytics, and the biomedical sciences. It covers underlying principles, provides an overview of existing techniques, and teaches the background necessary to design innovative visualizations.
**Requisites:** Requires prerequisite courses (CSCI 2270 or CSCI 2275) and (CSCI 2824 or ECEN 2703 or APPM 3170) (all minimum grade C-).

**CSCI 4133 (3) Fundamentals of Computer Security**
Practice thinking like an attacker by exploring several modern computer security attacks and defenses through hands-on programming projects. Topics include applied cryptography (encryption, authentication), web security (XSS, CSRF, SQL Injection), network security (TLS, MITM attacks), application security (shell injection, buffer overflows), and other current events and trends (government surveillance, botnets, cryptocurrencies).
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4133
**Requisites:** Requires prerequisites: (CSCI 2270 or CSCI 2275) and (CSCI 2400 or ECEN 2360 or ECEN 3350) (all minimum grade C-).
**Recommended:** Corequisite CSCI 4593 (soon to be CSCI 3593).
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 4200 (3) Introduction to Wireless Systems**
Overviews the distinctive characteristics of the wireless communications medium. Topics covered include: Analog signals, Antennas and Propagation, Digital Signals, Sampling, Quadrature Signals, Digital Modulation, SNR and SINR Concepts, Channel Models, Channel Statistics, and Link Budgets. The course includes an introduction to MIMO and beam-forming as implemented in modern communication systems. Software Defined Radio (SDR) is introduced to facilitate student hands-on learning of radio operation. Recommended: Familiarity with basic programming, statistics, and computer networking concepts. Formerly CYBR 4200.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5200 and CSCI 5200
**Requisites:** Requires prerequisites (CSCI 2400 or ECEN 2360 or ECEN 3350) and (APPM 3570 or CHEN 3010 or CSCI 3022 or CVEN 3227 or ECEN 3810 or ECON 3818 or MATH 3510 or MATH 4510 or MCEN 3047 or STAT 3100 or STAT 4000 or STAT 4520) and PHYS 1120 (all min grade C-).

**CSCI 4214 (3) Big Data Architecture**
Provides students with a comprehensive survey of technologies used today in the collection, storage, processing, analytics and display of big data. Focuses on cultivating real world skills with students working on semester long projects to execute on a group project.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5214, CSCI 5214, and ATLS 4214
**Requisites:** Requires prerequisite course of CSCI 2270 or CSCI 2275 (minimum grade C-).

**CSCI 4229 (3) Computer Graphics**
Studies design, analysis and implementation of computer graphics techniques. Topics include interactive techniques, 3D viewing and models, clipping, transformations, projection, removal of hidden surfaces, lighting, textures and shadows. Knowledge of basic linear algebra is required.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5229
**Requisites:** Requires prerequisite course of CSCI 2270 or CSCI 2275 (minimum grade C-).
**Additional Information:** Departmental Category: Graphics

**CSCI 4239 (3) Advanced Computer Graphics**
Studies design, analysis and implementation of advanced computer graphics techniques. Topics include shaders, using the GPU for high performance computing, graphics programming on embedded devices such as mobile phones; advanced graphics techniques such as ray tracing.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5239
**Requisites:** Requires prerequisite course of CSCI 4229 (minimum grade C-).
**Additional Information:** Departmental Category: Graphics

**CSCI 4240 (3) Introduction to Blockchain**
Examines an emerging technology known as blockchain. Blockchain refers to the distributed and decentralized database technology behind popular cryptocurrencies such as Bitcoin and Ethereum. However, it can be used to record and transfer any digital asset, not just currency. This course explores the fundamentals of blockchain technology and its application from three key perspectives: policy and governance, technology, and application. Students gain an understanding of key concepts and how to apply them in the industry.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5240 and CSCI 5240
**Requisites:** Requires prerequisite courses of (CSCI 2270 or CSCI 2275) and (CSCI 2824 or ECEN 2703 or APPM 3170 or MATH 2001) (all minimum grade C-).

**CSCI 4250 (3) History of Computing**
Explores the multifaceted histories of computing as punctuated by "great works" of computer science within the context of historical and social changes influencing and influenced by computing. We will consider people, institutions, and innovations starting with mechanical calculation and mathematical frameworks such as by Lovelace, Pascal, and Turing; early computers such as ABC and ENIAC; the pivotal role of military funding; the founding and development of fields transforming our lives such as artificial intelligence and the internet; and ways other fields, from engineering to cognitive science, interweave in the evolution of computing. Does not count as CS credit for the Computer Science BA, BS or minor.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: General Computer Science

**CSCI 4253 (3) Datacenter Scale Computing - Methods, Systems and Techniques**
Covers the primary problem solving strategies, methods and tools needed for data-intensive programs using large collections of computers typically called "warehouse scale" or "data-center scale" computers. Examines methods and algorithms for processing data-intensive applications, methods for deploying and managing large collections of computers in an on-demand infrastructure and issues of large-scale computer system design.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5253
**Requisites:** Requires prerequisite course of CSCI 3753 (minimum grade C-).
**Recommended:** Prerequisite CSCI 4273.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 4273 (3) Network Systems**
Focuses on design and implementation of network programs and systems, including topics in network protocols, file transfer, client-server computing, remote procedure call and other contemporary network system design and programming techniques. Familiarity with C and Unix or Linux is required.
**Requisites:** Requires prerequisite course of CSCI 3753 (minimum grade C-).
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 4302 (3) Advanced Robotics**
An intensive exploration of major challenges in robotics, providing a hands-on review of current research topics in the context of a "robotics grand challenge" problem. Topics include online planning and control, state estimation, simultaneous localization and mapping, and operating under partial observability.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5302
**Requisites:** Requires prerequisite course of CSCI 3302 (minimum grade C-).
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 4303 (1) Cybersecurity Club Companion Course**
Gives students hands-on experience applying practical security skills and adversarial thinking to real-world problems. Students will work in small teams on internal challenges, lab development, open source contributions, and will represent the university in larger teams for external challenges at the national and global level, such as those hosted by Collegiate Cyber Defense Competition (CCDC), Wicked6, DOE CyberForce, etc. Students will be expected to participate in both internal and external challenges, attend meetings, and present short presentations to the group when appropriate. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5303 and CSCI 5303
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires prerequisite course of CSCI 3403 (minimum grade C-).

**CSCI 4308 (4) Software Engineering Project 1**
Senior capstone course in which students design, implement, document and test software systems for use in industry, non-profits, government and research institutions. Also offers extensive experience in oral and written communication throughout the development process. Department consent required. Department-enforced prerequisites differ for BS and BA degrees. Contact academic advisor for details. Senior Capstone courses are optional for BA students. BA students interested in taking this course should contact their advisor early in their major. Students must take this course and CSCI 4318 contiguously as the project spans the entire academic year. Duplicate degree
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4328
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Computer Science (CSEN) majors only.
**Additional Information:** Departmental Category: Software Engineering

**CSCI 4313 (3) Concurrent Programming**
Introduces the theory and practice of multicore programming. The first part of the course presents foundations of concurrent programming: mutual exclusion, wait-free and lock-free synchronization, spin locks, monitors, memory consistency models. The second part presents a sequence of concurrent data structures and techniques used in their implementations (coarse-grained, fine-grained, optimistic and lock-free synchronization).
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4313 and ECEN 5313 and CSCI 5313
**Requisites:** Requires prerequisite course of CSCI 2400 (minimum grade C-).
**Recommended:** Prerequisite ECEN 3593 or CSCI 3593.

**CSCI 4314 (3) Dynamic Models in Biology**
Surveys computational and mathematical modeling to illuminate biological processes. Students work together to learn to build and analyze models using a variety of numerical tools, tackle meaningful biological problems, and communicate effectively across disciplines. Specific topics: Langevin dynamics of protein folding, agent-based models, finite difference models of organismal growth, stochastic and deterministic cellular automata game of life, models of behavior.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5314
**Requisites:** Requires prerequisite of APPM 3650 or ASTR 2600 or CSCI 2270 or CSCI 2275 or INFO 2201 or PHYS 2600 (minimum grade C-).
**Recommended:** Prerequisite Linear Algebra (CSCI 2820 or CSCI 2897 or MATH 2130 or MATH 2135 or APPM 2360 or APPM 3310), and intended for students in their third or fourth years of Computing or other majors.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 4318 (4) Software Engineering Project 2**
Second semester of a senior capstone course in computer science. Students must take this course and CSCI 4308 or 4328 contiguously as the project spans the entire academic year.
**Requisites:** Requires prerequisite course of CSCI 4308 or CSCI 4328 (minimum grade C-).
**Additional Information:** Departmental Category: Software Engineering

**CSCI 4328 (4) Software Project Management and Mentoring**
Review software project management and discuss the latest approaches, methodologies and standards of software development. Learn to develop software quality, documentation, testing and prototype goals. Study project risk management and cost estimation approaches. Students will mentor other Senior Software Project Teams. Intended for students with professional software development experience. Department consent required, see Senior Project Director for permission.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4308
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Computer Science (CSEN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Software Engineering

**CSCI 4338 (2) Software Project Management**
Intended for double majors doing interdisciplinary projects in other departments. Not intended for students who will be enrolling in CSCI 4368. Review software project management and discuss the latest approaches, methodologies and standards of software development. Learn to develop software quality, documentation, testing, and prototype goals. Study project risk management and cost estimation approaches. Department consent required, see Senior Project Director for permission.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Computer Science (CSEN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Software Engineering

**CSCI 4348 (4) Startup Essentials: Entrepreneurial Projects in Computing**
Provide students with the tools to be successful technical co-founders of their own startups. Explores the initial stages of founding a startup, including team formation, idea validation, pivoting and pitching, while employing an iterative methodology. Student teams will develop a minimum viable product, pitch their final startup concept, and be evaluated on product/market fit. Department consent required. Department-enforced prerequisites differ for BS and BA degrees. Contact academic advisor for details. Senior Capstone courses are optional for BA students. BA students interested in taking this course should contact their advisor(s) early in their major. Students must take this course and CSCI 4358 contiguously as the project spans the entire academic year.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5340
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Computer Science (CSEN) majors only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 4358 (4) Entrepreneurial Projects II**
Follows CSCI 4348. In the second semester of this entrepreneurial project capstone, student teams will seek to find market traction for a high-fidelity Minimum Viable Product (MVP), software and/or hardware, that they will develop as part of their startup project. Teams will further learn to incorporate principles of marketing, business finance and legal issues into the business model for their startup concept. Students must take this course and CSCI 4348 contiguously as the project spans the entire academic year.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5350
**Requisites:** Requires a prerequisite course of CSCI 4348 (minimum grade C-).
**Additional Information:** Departmental Category: General Computer Science

**CSCI 4368 (4) Multidisciplinary Design Project 1**
Design, develop, test, and deploy software that is integrated into a mechanical system. Participate as a member of a multi-disciplinary team that could include students from computer science, mechanical, and electrical disciplines. Develop project management and communication skills as they pertain to a multi-disciplinary team. Support the project team through self-directed study. First semester of a senior capstone course. Students must take this course and CSCI 4378 contiguously as the project spans the entire academic year. Department-enforced prerequisites differ for BS and BA degrees. Contact academic advisor for details. Senior Capstone courses are optional for BA students. BA students interested in taking this course should contact their advisor(s) early in their major.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Computer Science (CSEN) majors only.

**CSCI 4378 (4) Multidisciplinary Design Project 2**
Design, develop, test, and deploy software that is integrated into a mechanical system. Participate as a member of a multi-disciplinary team that could include students from computer science, mechanical, and electrical disciplines. Develop project management and communication skills as they pertain to a multi-disciplinary team. Support the project team through self-directed study. Second semester of a senior capstone course. Students must take this course and CSCI 4368 contiguously as the project spans the entire academic year.
**Requisites:** Requires prerequisite course of CSCI 4368 (minimum grade C-).

**CSCI 4413 (3) Computer Security and Ethical Hacking**
Teaches basic exploit design and development through hands-on experimentation and testing. Uses a controlled environment to give students a "playground" in which to test penetration skills that are normally not allowed on live networks.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5413
**Requisites:** Requires prerequisite course of CSCI 4273 (minimum grade C-).
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 4444 (3) Algorithms and Data Structures for Analyzing DNA**
Covers the basic concepts of genetics and genomics and how DNA analysis problems translate into computational problems. Covers core algorithms such as genome assembly, string matching, string indexing, and string set comparisons. Covers core data structures such as suffix trees and tries, FM index, and Bloom Filters.
**Requisites:** Requires prerequisite courses: (one of APPM 3650 or ASTR 2600 or CSCI 2270 or CSCI 2275 or INFO 2201 or PHYS 2600) and ((one of APPM 1350 or MATH 1300 or MATH 1310) or (APPM 1340 and APPM 1345)) (all minimum grade C-).

**CSCI 4446 (3) Chaotic Dynamics**
Explores chaotic dynamics theoretically and through computer simulations. Covers the standard computational and analytical tools used in nonlinear dynamics and concludes with an overview of leading-edge chaos research. Topics include time and phase-space dynamics, surfaces of section, bifurcation diagrams, fractal dimension and Lyapunov exponents.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5446 and ECEN 4423 and ECEN 5423
**Requisites:** Requires prerequisite course of (ASEN 1320 or CSCI 1300 or CSCI 1320 or CSCI 2275 or ECEN 1310) and (APPM 2350 or MATH 2400) (all minimum grade C-).
**Recommended:** Prerequisites PHYS 1120 and CSCI 3656 and (APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135 or MATH 3130 or MATH 3135).
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 4448 (3) Object-Oriented Analysis and Design**
An applied analysis and design class that addresses the use of object-oriented techniques. Topics include domain modeling, use cases, architectural design and modeling notations. Students apply the techniques in analysis and design projects.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5448
**Requisites:** Requires prerequisite course of CSCI 3308 (minimum grade C-).
**Additional Information:** Departmental Category: Software Engineering

**CSCI 4502 (3) Data Mining**
Introduces basic data mining concepts and techniques for discovering interesting patterns hidden in large-scale data sets, focusing on issues relating to effectiveness and efficiency. Topics covered include data preprocessing, data warehouse, association, classification, clustering, and mining specific data types such as time-series, social networks, multimedia, and Web data.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5502 and CSPB 4502
**Requisites:** Requires prerequisite course of CSCI 2270 or CSCI 2275 (minimum grade C-).
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 4550 (3) Designing for Defense 1**
Designing for Defense/Hacking for Defense is a national service program running at leading research universities across the country. Interdisciplinary teams¿chosen by competitive selection¿work on real-world national security challenges, in close contact with national security agencies. Teams employ the Lean Launchpad entrepreneurship methodology to develop engineering and business concepts to solve real-world challenges for special operations forces, the intelligence community, and other government agencies. Winning teams are eligible for real-world capital investment. The first semester of a two-course sequence. Students take CSCI 4550 in the fall and CSCI 4580 contiguously in the spring as the sequence spans the academic year.
**Recommended:** D4D is open to students from any discipline or major; Enrollment is limited; Application and one Info Session required; See Class Notes for course website and application link.

**CSCI 4555 (3) Compiler Construction**
Introduces the principles and techniques for compiling high-level programming languages to assembly code. Topics include parsing, instruction selection, register allocation, and compiling high-level features such as polymorphism, first-class functions, and objects. Students build a complete compiler for a simple language.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5523 and ECEN 4553 and CSCI 5525
**Requisites:** Requires prerequisite course of CSCI 3155 (minimum grade C-).
**Additional Information:** Departmental Category: Programming Languages

**CSCI 4576 (4) High-Performance Scientific Computing**
Introduces computing systems, software and methods used to solve large-scale problems in science and engineering. Students use high-performance workstations and a supercomputer.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5576
**Recommended:** Prerequisite APPM 4600 or APPM 4650 or CSCI 3656 or MATH 4650 or MCEN 3030.
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 4580 (3) Designing for Defense 2**
This course allows teams to continue their D4D journey from semester one (CSCI 4550), guiding students in launching a business entity that will deploy agile development tools to refine and enhance their first semester MVP, seek funding for that development work, deliver a functioning solution to their sponsor, and extract real value for the members of the business unit. The second semester of a two-course sequence. Students take CSCI 4550 in the fall and CSCI 4580 contiguously in the spring as the sequence spans the academic year.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5580 and CYBR 5580 and ASEN 5580
**Requisites:** Prerequisite of CSCI 4550 (minimum grade B).

**CSCI 4616 (3) Introduction to Virtual Reality**
Introduces students to the field of virtual reality (VR). Covers the historical development of virtual reality technologies and virtual reality as a research field, the mathematics of 3D coordinate systems, fundamental principles, algorithms, and design patterns in developing interactive virtual environments, the perceptual science behind mixed reality technologies, and libraries and tools for creating VR experiences.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4616
**Requisites:** Requires prerequisite course of CSCI 2270 or CSCI 2275 (minimum grade C-).

**CSCI 4622 (3) Machine Learning**
Introduces students to tools, methods, and theory to construct predictive and inferential models that learn from data. Focuses on supervised machine learning techniques including practical and theoretical understanding of the most widely used algorithms (decision trees, support vector machines, ensemble methods, and neural networks). Emphasizes both efficient implementation of algorithms and understanding of mathematical foundations.
**Equivalent - Duplicate Degree Credit Not Granted:** CSPB 4622
**Requisites:** Requires prereqs (CSCI2270 or 2275) (1 of APPM2360/3310,CSCI2820,MATH2130/2135) (1 of CSCI2824,ECEN2703,APPM3170,MATH2001) (1 of APPM3570,CHEN3010,CSCI 3022,CVEN 3227,ECEN 3810,ECON 3818,MATH 3510/4510,MCEN 3047,STAT 3100/4000/4520) (all min C-)
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 4722 (3) Computer Vision**
Explores algorithms that can extract information about the world from images or sequences of images. Topics covered include: imaging models and camera calibration, early vision (filters, edges, texture, stereo, optical flow), mid-level vision (segmentation, tracking), vision-based control and object recognition.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5722
**Requisites:** Requires prerequisite courses of (APPM 2360 or APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135) and CSCI 3104 (all minimum grade C-).
**Recommended:** Prerequisite CSCI 3022 or APPM 3570 or STAT 4520 or STAT 4000 or CHEN 3010 or CVEN 3227 or MATH 3510 or MATH 4510 or ECEN 3810 or ECON 3818.

**CSCI 4753 (3) Computer Performance Modeling**
Presents a broad range of system measurement and modeling techniques, emphasizing applications to computer systems. Covers topics including system measurement, workload characterization and analysis of data; design of experiments; queuing theory and queuing network models; and simulation.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5753 and ECEN 4753 and ECEN 5753
**Requisites:** Requires prerequisites of (APPM 1360 or MATH 2300) and CSCI 3753 (all minimum grade C-).
**Recommended:** Prerequisite a course in statistics.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 4802 (1) Data Science Team Companion Course**
Gives students hands-on experience applying data science techniques and machine learning algorithms to real-world problems. Students work in small teams on internal challenges, many of which will be sponsored by local companies and organizations and will represent the university in larger teams for external challenges at the national and global level, such as those hosted by Kaggle. Students will be expected to participate in both internal and external challenges, attend meetings and present short presentations to the group when appropriate.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5802
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires a prerequisite course of (APPM 3310, CSCI 2820, MATH 2130, MATH 2135) OR (APPM 3570, CHEN 3010, CSCI 3022, CVEN 3227, ECEN 3810, ECON 3818, MATH 3510, MATH 4510, MCEN 3047, STAT 3100, STAT 4000, STAT 4520) (min grade C-).
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 4809 (3) Computer Animation**
Develops a firm understanding of the general principles of computer animation. Lectures cover the creation of models, materials, textures, surfaces, and lighting. Path and key frame animation, particle dynamics, and rendering are introduced. Students are assigned a number of animation tutorials to carry out.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5809 and ATLS 4809 and CSCI 5809
**Additional Information:** Departmental Category: Graphics

**CSCI 4830 (1-4) Special Topics in Computer Science**
Covers topics of interest in computer science at the senior undergraduate level. Content varies from semester to semester. Only 9 credit hours from CSCI 4830 and/or CSCI 4831 can count toward Computer Science BS or BA.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of CSCI 2400 or ECEN 2360 or ECEN 3350 (minimum grade C-).
**Additional Information:** Departmental Category: General Computer Science

**CSCI 4831 (1-4) Special Topics in Algorithms**
Covers topics of interest in computer science at the upper-division undergraduate level. Content varies from semester to semester. Only 9 credit hours from CSCI 4830 and/or CSCI 4831 can count toward Computer Science BS or BA.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of CSCI 3104 and (APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135) (all minimum grade C-).
**Additional Information:** Departmental Category: General Computer Science

**CSCI 4849 (3) Input, Interaction, and Accessibility**
Explores input and interaction techniques with an emphasis on universal design and alternative interfaces. Students explore traditional input methods such as keyboard and mouse input, and alternative techniques such as voice and eye gaze. Students conduct performance evaluations of existing techniques, and prototype new interaction methods. Students design technologies to support people with varying abilities and disabilities.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5849
**Requisites:** Requires prerequisite of CSCI 3002 (minimum grade C-).

**CSCI 4897 (3) Computational and Mathematical Modeling of Infectious Diseases**
Explores the ways we model infectious diseases using math and computing, from the dynamic spread of infectious diseases between humans, to a pathogen's growth within the body. Learning goals include (i) gaining a mastery of both classic and modern infectious disease models (ii) learning about a variety of infectious diseases, and (iii) engaging with the ethics of infectious disease modeling. Requires beginner or advanced-beginner skill in Python or R.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5897
**Requisites:** Prereqs:(One of MATH1300/1310/APPM1345/50) (One of APPM3650/CSCI2270/2275/INFO2201) (One of APPM3570/CHEN3010/CSCI3022/CVEN3227/EBIO4410/ECEN3810/ECON3818/IPHY3280/MATH3510/4510/4520/MCDB3450/MCEN3047/PSYC2111/STAT2600/3100/4000/4520) min C-
**Recommended:** Prerequisites Calculus 2 and Intermediate skill in Python or R.

**CSCI 4900 (1-3) Upper Division, Undergraduate Level Independent Study**
Provides opportunities for independent study at the upper-division undergraduate level. Students work on a small research problem. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of ASEN 1320 or CSCI 1300 or CSCI 1320 or CSCI 2275 (all minimum grade C-).
**Additional Information:** Departmental Category: General Computer Science

**CSCI 4950 (2-4) Senior Thesis**
Provides an opportunity for senior computer science majors to conduct exploratory research in computer science as an option for the capstone requirement. Department enforced prerequisites: 35 hours of Computer Science coursework including Foundation courses, Upper-Division writing, CS GPA 3.0. Department consent required, contact academic advisor for details. Senior Capstone courses are optional for BA students. BA students interested in taking this course should contact their advisor early in their major.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Requires a prerequisite or corequisite course of CSCI 3100 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior).
**Additional Information:** Departmental Category: General Computer Science

**CSCI 4960 (2-4) Computer Science Honors Thesis**
Provides an opportunity for senior Computer Science BA majors to conduct exploratory research in computer science and complete an Honors Thesis as part of the Arts and Sciences Honors Program. Department-enforced prerequisites: 35 hours of Computer Science coursework including Foundation courses, Upper-Division writing, CS GPA 3.0. Department consent required, contact academic advisor for details.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior).
**Additional Information:** Departmental Category: General Computer Science

**CSCI 5000 (1) Introduction to the Computer Science Research-Based MS Program**
Instructs new research-based MS students in Computer Science how to become an effective member in terms of research, teaching, and presentation, and potentially advancing to the PhD program. Makes students aware of formal requirements, educational objectives, and research themes. Provides evaluative criteria and guidelines for all objectives to be achieved.
**Requisites:** Restricted to Computer Science (CSCI) MS students only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 5010 (3) Fundamentals of Data Communication**
Combining conceptual knowledge about data communications and core Internet technologies with hands-on labs that reinforce the conceptual knowledge, this course provides students with the ability to create innovative technology solutions in their discipline. Learning how the Internet works and being able to evaluate and operate an Internet network is a valuable skill; students in this course will have a competitive advantage in this foundational field.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5010
**Requisites:** Restricted to Computer Science Network Engineering MS Majors.

**CSCI 5020 (3) Fundamentals of Network Programming**
This course provides an immersion into the foundation theories of network programming and software development for emerging technologies. Students will gain direct experience with real-world programming lab experiments and demonstrations that will relate to the prolific increase of cross-discipline programming.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5020
**Requisites:** Restricted to Computer Science Network Engineering MS Majors.

**CSCI 5030 (3) Fundamentals of System Administration and Virtualization**
Introduces the basic use and administration of Unix and Linux systems. Topics include booting and system management, scripting, storage and logical volume management, filesystem configuration, account management and password security, process control, software installation, event logging and system auditing. Students will also develop familiarity with virtualization platforms such as VirtualBox and VMware to implement and test their system configurations.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5030 CSCI 5113 and CYBR 5113 and CSCI 4113
**Requisites:** Restricted to Computer Science Network Engineering MS Majors.

**CSCI 5040 (3) Professional Masters Project 1**
First class in a two semester cycle. Focuses on applied best practice in all facets of software engineering in industry and the application of those practices. Students are part of a development team involved in a two-semester project. Each student has a specific role on the project, and all will be responsible for some level of actual software development. The first semester focuses on design, requirements, and prototyping and is based on common waterfall project practices with gate reviews and project artifacts. Testing, soft skills for teamwork, project management, and other supporting aspects will be driven throughout the semester. The outcome of the two-semester cycle is a final project delivery of a software product for an institutional or industrial partner and/or for entry into software development competitions.
**Requisites:** Restricted to Computer Sciences Professional Masters (CSEN-MSCPS) graduate students only.

**CSCI 5050 (3) Professional Masters Project 2**
Second class in a two-semester cycle. Focuses on applied best practice in all facets of software engineering in industry and the application of those practices. Students are part of a development team involved in a two-semester project. Each student has a specific role on the project, and all will be responsible for some level of actual software development. The second semester focuses on development, code construction, and delivery, using agile-based project management for development. Students work in both Scrum and Kanban agile project cycles. Testing, soft skills for teamwork, project management, and other supporting aspects will be driven throughout the semester. The outcome of the two-semester cycle is a final project delivery of a software product for an institutional or industrial partner and/or for entry into software development competitions.
**Requisites:** Requires prerequisite course of CSCI 5040 (minimum grade of B). Restricted to CSEN-MSCPS graduate students only.

**CSCI 5100 (1) Computer Science Colloquium**
Learn about innovative research and teaching in computer science by attending talks and discussions by leading researchers and educators. Learn professional presentation skills and etiquette of participating in scientific research presentations. Students can attend during any term even if they are not enrolled
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to Computer Science (CSCI) MS students only.

**CSCI 5113 (3) Linux System Administration**
Introduces Linux system administration and related topics. Includes hardware and software installation, storage management, configuration of user accounts and system services, development of automation and monitoring tools, and the provisioning of common network services. This laboratory focused course will provide significant exposure to the network security concerns of Internet connected hosts. Students will build a network of Linux servers from the ground up, using provided computing resources, and must maintain and secure these servers themselves. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5113 and CSCI 4113 CYBR 5030 and CSCI 5030
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 3753 (minimum grade B).

**CSCI 5114 (3) Practical Algorithmic Complexity**
When coming across an algorithmic problem, how do we think about how hard it is? Beyond just how much time or memory it takes, computational complexity offers a plethora of concepts for understanding this fundamental question. This leads to the appropriate choice of algorithm for the job, the development of new algorithms, and understanding the role of algorithmic complexity in natural settings such as biology and physics.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4114
**Requisites:** Restricted to graduate students only.

**CSCI 5122 (3) Neural Networks and Deep Learning for Data Science**
Explores neural networks and their application to real-world data science and AI problems. Covers neural network theory, algorithms, programming, and applications across various data formats.
**Recommended:** Prerequisites Python programming, college algebra, and differential, integral, and multivariate calculus.

**CSCI 5135 (3) Computer-Aided Verification**
Covers two-level and multilevel minimization, optimization via expert systems, algebraic and Boolean decomposition, layout methodologies, state assignment, encoding and minimization, silicon compilation.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5139
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites ECEN 2703 and general proficiency in discrete mathematics and programming.
**Additional Information:** Departmental Category: Programming Languages

**CSCI 5140 (2) CLASIC Capstone**
In this capstone to the Computational Linguistics, Analytics, Search and Informatics (CLASIC) professional master¿s program, we will review each student¿s internship project and prepare presentations and technical reports based on those internships. Students will present their work on the annual Industry Day or at an Advisory Board meeting to industry representatives. They will also submit a paper to a relevant conference or workshop. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5140
**Requisites:** Restricted to students in the Computational Linguistics, Analytics, Search and Informatics (CLSI) program only.
**Recommended:** It is recommended that this course be taken after the CLASIC internship has been completed.

**CSCI 5160 (3) Introduction to Enterprise Networks**
Provides direct experience with networking functions and equipment through experiments and demonstrations. Students learn the fundamental principles and techniques of voice and data switching and routing within an enterprise environment. Procedures require the use of actual commercial equipment (including Cisco, Juniper, and Arista) plus network services and observation using packet analyzers. Weekly experiments and exams are designed to reflect real-world networking scenarios and require an additional hours of lab work. Most lab exercises involve activities which require physical access to the hardware and cannot be done remotely. Students are expected to spend 6 hours per week in the lab. In addition to the lab time, students should also anticipate up to 6 additional hours of time for homework, reading, lab preparation and studying for exams. Recommended restriction: students are expected to know the OSI Model, principles of Ethernet Switching, IP Addressing and operation of protocols such as ARP, DHCP, DN
**Requisites:** Restricted to graduate students only.

**CSCI 5170 (3) IP Routing Protocols and Policies**
Explores practical usage and conceptual underpinnings of link state and distance vector routing protocols. The course further explores a holistic view of how the Internet works from a technical routing aspect as well as policy and economics. The course is supplemented with frequent labs to fully explore the specific workings of the routing protocols RIP, OSPF, and BGP and the relationships between them in practical lab based routing scenarios.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 5010 or CYBR 5010 or CSCI 4273 or CSCI 5273 or ECEN 5273.

**CSCI 5180 (3) Network Management and Automation**
Teaching both technical and soft skills, this course incorporates best practices and the key theories behind them such as understanding common services needed for network functionality, maintenance, and troubleshooting. The goal of this course is to equip students with the valuable skills and tools they need to hit the ground running in most network management, operation, automation, and DevOps roles within a company. By the end of the course, students will be competent in the technologies, services, and tools used to manage and automate complex networks.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite background in Linux system administration, Python programming and computer network engineering/data communications.

**CSCI 5190 (3) Voice Over IP: Voice Network Design and Implementation**
Provides an in-depth immersion into the foundational theories and technologies of Voice Over IP (VoIP). This course supplements these theories with direct experience through real-world, hands-on lab experiments and demonstrations. The fundamentals of voice technologies, services, and tools used in industry to design, deploy and troubleshoot VoIP networks will be explored in detail, providing the student with a competitive advantage in the job market.
**Requisites:** Requires prerequisite course of CSCI 5170 or CSCI 5160 or CSCI 5180 (minimum grade B). Restricted to graduate students.

**CSCI 5200 (3) Introduction to Wireless Systems**
Overviews the distinctive characteristics of the wireless communications medium. Topics covered include: Analog signals, Antennas and Propagation, Digital Signals, Sampling, Quadrature Signals, Digital Modulation, SNR and SINR Concepts, Channel Models, Channel Statistics, and Link Budgets. The course includes an introduction to MIMO and beam-forming as implemented in modern communication systems. Software Defined Radio (SDR) is introduced to facilitate student hands-on learning of radio operation. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5200 and CSCI 4200
**Recommended:** Prerequisites CYBR 5010 and CYBR 5012.

**CSCI 5202 (3) Introduction to Robotics**
Introduction to Robotics prepares graduate students in the Robotics graduate program to be equipped with fundamental methods and tools in the field. This involves both a theoretical and a practical component, which are offered in a lecture and laboratory format.
**Equivalent - Duplicate Degree Credit Not Granted:** ROBO 5000
**Requisites:** Restricted to graduate students only.

**CSCI 5214 (3) Big Data Architecture**
Provides students with a comprehensive survey of technologies used today in the collection, storage, processing, analytics and display of big data. Focuses on cultivating real world skills with students working on semester long projects to execute on a group project.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4214, ATLS 5214, and CSCI 4214
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CSCI 5220 (3) Wireless Local Area Networks**
Emphasis on the IEEE P802.11 family of WLAN standards. Students learn the legacy versions of the standard (802.11DS/b), the current generation of WLAN systems (802.11a/g/n/ac), and will to analyze and critique upcoming versions (802.11ax/ba), and gain insight into proposals for new research in WLAN. Exposure to the interoperability and certification process for WLAN by the Wi-Fi Alliance, study the newest Wi-Fi Certified¿ programs, and will learn how to model and analyze WLAN traffic using industry standard tools.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5220 and ECEN 5122
**Requisites:** Requires prerequisite course of CYBR 5010 or CSCI 5010 or CSCI 5273 (minimum grade B).
**Recommended:** Prerequisite CYBR 5200 or CSCI 5200.

**CSCI 5229 (3) Computer Graphics**
Studies design, analysis and implementation of computer graphics techniques. Topics include interactive techniques, 3D viewing and models, clipping, transformations, projection, removal of hidden surfaces, lighting, textures and shadows. Knowledge of basic linear algebra is required.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4229
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graphics

**CSCI 5230 (3) Wireless Systems Lab**
This Wireless Solutions Architecture course is designed to examine the core concepts of wireless architecture, design and implementation. The course will focus on architecting solutions unlicensed technology, specifically enterprise Wi-Fi networks. Students will learn how to design, implement, troubleshoot and operate enterprise wireless networks.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5230
**Requisites:** Requires prerequisite course of CSCI 5200 or CYBR 5200 (minimum grade B).

**CSCI 5239 (3) Advanced Computer Graphics**
Studies design, analysis and implementation of advanced computer graphics techniques. Topics include shaders, using the GPU for high performance computing, graphics programming on embedded devices such as mobile phones; advanced graphics techniques such as ray tracing.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4239
**Requisites:** Requires prerequisite course of CSCI 5229 (minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: Graphics

**CSCI 5240 (3) Introduction to Blockchain**
Examines an emerging technology known as blockchain. Blockchain refers to the distributed and decentralized database technology behind popular cryptocurrencies such as Bitcoin and Ethereum. However, it can be used to record and transfer any digital asset, not just currency. This course explores the fundamentals of blockchain technology and its application from three key perspectives: policy and governance, technology, and application. Students gain an understanding of key concepts and how to apply them in the industry. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5240 and CSCI 4240
**Requisites:** Restricted to graduate students only.

**CSCI 5244 (3) Quantum Computation and Information**
This course will introduce to students basic and important quantum algorithms, complexity classes, error correction and fault-tolerant computing, quantum communication, quantum optimization, and quantum learning.
**Recommended:** Prerequisite Calculus, Linear Algebra and Quantum mechanics, introduction to quantum computing for undergraduates.

**CSCI 5253 (3) Datacenter Scale Computing - Methods, Systems and Techniques**
Covers the primary problem solving strategies, methods and tools needed for data-intensive programs using large collections of computers typically called "warehouse scale" or "data-center scale" computers. Examines methods and algorithms for processing data-intensive applications, methods for deploying and managing large collections of computers in an on-demand infrastructure and issues of large-scale computer system design.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4253 and CSPB 4253 and ECEN 5253
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 5273.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 5254 (3) Convex Optimization and Its Applications**
Discuss basic convex analysis (convex sets, functions and optimization problems), optimization theory (linear, quadratic, semidefinite and geometric programming; optimality conditions and duality theory), some optimization algorithms (descent methods and interior-point methods), basic applications (in signal processing, control, communications, networks, statistics, machine learning, circuit design and mechanical engineering, etc.), and some advanced topics (distributed decomposition, exact convex relaxation, parsimonious recovery).
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 5260 (3) Datacenter Networks**
Covers design and configuration principles required to build highly scalable and highly redundant network solutions used by datacenters. Class makes use of commercial grade equipment to build network toplogies and services. Students will work in teams to build a virtualized cluster, load balance application traffic between multiple server blades, assure high availability in Ethernet and IP layers, and able to prioritize important services using QoS. This lab-based course requires an average of 6 hours per week where the students are physically present in the CU Network Engineering Lab. Most lab exercises involve activities which require physical access to the hardware and cannot be done remotely. In addition to the lab time, students should also anticipate up to 6 additional hours of time for homework, reading, lab preparation and studying for exams.
**Requisites:** Requires prerequisite course of CSCI 5160 (minimum grade B). Restricted to graduate students.

**CSCI 5264 (3) Decision Making under Uncertainty**
Covers algorithms for optimal sequential decision making in the presence of uncertainty. Mathematical formalisms include the Markov decision process (MDP), partially observable Markov decision process (POMDP), and Games. Solution techniques include exact dynamic programming, Monte Carlo tree search, deep reinforcement learning, and alpha vector value approximation for POMDPs. Assignments require programming in a high level language (Julia as of 2023). Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 5264
**Grading Basis:** Letter Grade

**CSCI 5270 (3) IP Network Design**
Focuses on the design and implementation of network solutions according to the needs of a client. The course helps students develop skills to be a consultant and walks them through the complete life cycle of network project development as a member of a professional services team. Implement fundamentals of IP Routing Protocols and apply them directly to design based networking problems. Design scenarios will incorporate physical and logical design, financial analysis, and laboratory configuration.
**Requisites:** Requires prerequisite course of CSCI 5170 or CSCI 5160 (minimum grade B). Restricted to graduate students.
**Recommended:** Prerequisite strong familiarity with network protocol operation and implementation.

**CSCI 5273 (3) Network Systems**
Focuses on design and implementation of network programs and systems, including topics in network protocols, architectures, client-server computing, software-driven networking, and other contemporary network hardware-software system design and programming techniques. Familiarity with C and Unix is required.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5273
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CSCI 4273 and CSCI 4573.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 5280 (3) Software-Defined Networking**
Provides an in-depth immersion into the foundational theories and technologies of Software-Defined Networking (SDN), Network Functions Virtualization (NFV), and emerging technologies for computer networks. Supplements the theoretical knowledge learned through direct experience with real-world lab experiments and demonstrations. This knowledge will give students an advantage in the job market for this in-demand, constantly changing subject.
**Requisites:** Requires prerequisite course of CSCI 5180 (minimum grade B). Restricted to graduate students.

**CSCI 5302 (3) Advanced Robotics**
Exposes students to current research topics in the field of robotics and provides hands-on experience in solving a grand challenge program.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4302 and ROBO 5302
**Requisites:** Restricted to graduate students only. Prerequisite of CSCI 5202 or ROBO 5000.
**Recommended:** Prerequisite CSCI 3302 or instructor consent required.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 5303 (1) Cybersecurity Club Companion Course**
Gives students hands-on experience applying practical security skills and adversarial thinking to real-world problems. Students will work in small teams on internal challenges, lab development, open source contributions, and will represent the university in larger teams for external challenges at the national and global level, such as those hosted by Collegiate Cyber Defense Competition (CCDC), Wicked6, DOE CyberForce, etc. Students will be expected to participate in both internal and external challenges, attend meetings, and present short presentations to the group when appropriate. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5303 and CSCI 4303
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Recommended:** Prerequisites CSCI 5403 or CSCI 3403.

**CSCI 5313 (3) Concurrent Programming**
Introduces the theory and practice of multicore programming. The first part of the course presents foundations of concurrent programming: mutual exclusion, wait-free and lock-free synchronization, spin locks, monitors, memory consistency models. The second part presents a sequence of concurrent data structures and techniques used in their implementations (coarse-grained, fine-grained, optimistic and lock-free synchronization).
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5313 and ECEN 4313 and CSCI 4313
**Requisites:** Requires prerequisite courses of CSCI 2270 and ECEN 2360 or CSCI 2400 (minimum grade C). Restricted to graduate students only.
**Recommended:** Prerequisite ECEN 3593.

**CSCI 5314 (3) Dynamic Models in Biology**
Surveys computational and mathematical modeling to illuminate biological processes. Students work together to learn to build and analyze models using a variety of numerical tools, tackle meaningful biological problems, and communicate effectively across disciplines. Specific topics: Langevin dynamics of protein folding, agent-based models, finite difference models of organismal growth, stochastic and deterministic cellular automata game of life, models of behavior.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4314
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite comfort with mathematics and/or programming experience, and more advanced understanding (upper undergraduate level) of any relevant discipline.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 5322 (3) Algorithmic Human-Robot Interaction**
Creating autonomous systems that interact with humans requires the synthesis of insights from a variety of disciplines. This course aims to provide students with the algorithms, models, and frameworks that form the building blocks required for developing intelligent autonomous systems that perform useful tasks while interacting with, coordinating with, co-existing with, or otherwise assisting humans. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.

**CSCI 5340 (3) Startup Essentials: Entrepreneurial Projects in Computing**
Provides students with the tools to be successful technical co-founders of their own startups. Explores the initial stages of founding a startup, including team formation, idea validation, pivoting and pitching, while employing an iterative methodology. Student teams will develop a minimum viable product, pitch their final startup concept and be evaluated on product/market fit. CS coding concepts relevant for startups, including potentially cloud programming, mobile programming and agile software engineering, will be taught. Does not satisfy breadth requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4348
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 5350 (3) Entrepreneurial Projects II**
Follows CSCI 5340. In the second semester of this entrepreneurial project capstone, student teams will seek to find market traction for a high-fidelity Minimum Viable Product (MVP), software and/or hardware, that they will develop as part of their startup project. Teams will further learn to incorporate principles of marketing, business finance and legal issues into the business model for their startup concept. Does not satisfy breadth requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4358
**Requisites:** Requires a prerequisite course of CSCI 5340 (minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 5352 (3) Network Analysis and Modeling**
Examines modern techniques for analyzing and modeling the structure and dynamics of complex networks. Focuses on statistical algorithms and methods, and emphasizes model interpretability and understanding the processes that generate real data. Applications are drawn from computational biology and computational social science. No biological or social science training is required.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CSCI 3104 and APPM 3570.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 5360 (3) Internet Service Provider Networks**
This course presents advanced networking design and implementation techniques through experiments with network measurement equipment, switches, router, and management interfaces. The course primarily focuses on Service Provider Transport technologies for capacity, scalability and fault tolerance. Students learn the essential network architectures of last mile and long haul network solutions used for public and private network traffic transport; implementation of SLAs, load balancing, first hop redundancy, and MPLS transport and L2/L3 VPN solutions. This course requires an average of 6 hours per week in the lab. Most lab exercises involve activities which require physical access to the hardware and cannot be done remotely. In addition to the lab time, students should also anticipate up to 6 additional hours of time for homework, reading, lab preparation and studying for exams.
**Requisites:** Requires prerequisite course of CSCI 5160 (minimum grade B). Restricted to graduate students.
**Recommended:** Prerequisite CSCI 5170.

**CSCI 5380 (3) Network Virtualization and Orchestration**
Provides an advanced, in-depth immersion into the theories and technologies of Software-Defined Networking (SDN), Network Functions Virtualization (NFV), network virtualization/orchestration, and emerging technologies for computer networks. Expands on the real-world lab experiments and theoretical demonstrations learned from the course pre-requisite. The knowledge and critical thinking skills learned from this course will arm students with an advantage in the job market for this in-demand, constantly changing subject.
**Requisites:** Requires prerequisite of CSCI 5280 (minimum grade B). Restricted to graduate students.

**CSCI 5402 (3) Research Methods in Human-Robot Interaction**
Introduces students to the field of human-robot interaction (HRI). Covers HRI theory, principles, methodologies, and applications with links to robotics, artificial intelligence, human factors, human-computer interaction, design, cognitive psychology, education and other domains. Coursework includes readings from state-of-the-art in HRI research, team exercises and problem-solving sessions, and implementation and evaluation of a human-robot interaction systems for specific applications.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5402
**Requisites:** Restricted to graduate students only.

**CSCI 5403 (3) Introduction to Computing Security**
Introduces core concepts in cybersecurity including confidentiality, integrity, authentication, risk management, and adversarial thinking. The concepts will be applied to both traditional information technology (IT) systems and cyber physical systems (CPS). At the conclusion of the course, students should have a solid foundation in cybersecurity and hands-on experience. Students must have access to either native or virtual machines running on Windows OR Linux (Parrot, Kali, Ubuntu).
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5300
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite This course requires programming ability, a number of computing courses, mathematical maturity, some familiarity with Unix operating systems (command-line experience, system administration OR Operating Systems OR Computer Architecture), and programming/scripting ability in a high-level language (basic programming).

**CSCI 5413 (3) Computer Security and Ethical Hacking**
Teaches basic exploit design and development through hands-on experimentation and testing. Uses a controlled environment to give students a "playground" in which to test penetration skills that are normally not allowed on live networks.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4413
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 5423 (3) Biologically-inspired Multi-Agent Systems**
Explores the principles and emergent properties of collective dynamics through computational modeling and theory. Focuses on multi-agent systems using insights from biology, like the self-assemblage of cells and insect colony behavior. Topics include designing swarm intelligence, networked agents, cellular computing and self-assembly, optimization, synchronization, and evolutionary computation. Uses cross-discipline research developments to practice applied techniques. Biology background is not required.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 2270 and basic knowledge of programming.

**CSCI 5434 (3) Probability for Computer Science**
This course will introduce computer science students to topics in probability and statistics that will be useful in other computer science courses. Basic concepts in probability will be taught from an algorithmic and computational point of view, with examples drawn from computer science.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite courses of APPM 1360 or MATH 2300 and CSCI 2824 or MATH 2001 or ECEN 2703 (all minimum grade B).

**CSCI 5444 (3) Introduction to Theory of Computation**
Reviews regular expressions and finite automata. Studies Turing machines and equivalent models of computation, the Chomsky hierarchy, context-free grammars, push-down automata, and computability.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 5446 (3) Chaotic Dynamics**
Explores chaotic dynamics theoretically and through computer simulations. Covers the standard computational and analytical tools used in nonlinear dynamics and concludes with an overview of leading-edge chaos research. Topics include time and phase-space dynamics, surfaces of section, bifurcation diagrams, fractal dimension and Lyapunov exponents.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4446 and ECEN 4423 and ECEN 5423
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 5448 (3) Object-Oriented Analysis and Design**
An applied analysis and design class addressing the use of object-oriented techniques. Topics include domain modeling, use cases, architectural design and modeling notations. Students apply the techniques in analysis and design projects.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4448
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Software Engineering

**CSCI 5454 (3) Design and Analysis of Algorithms**
Techniques for algorithm design, analysis of correctness and efficiency; divide and conquer, dynamic programming, probabilistic methods, advanced data structures, graph algorithms, etc. Lower bounds, NP-completeness, intractability.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 2270 or equivalent.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 5502 (3) Data Mining**
Introduces basic data mining concepts and techniques for discovering interesting patterns hidden in large-scale data sets, focusing on issues relating to effectiveness and efficiency. Topics covered include data preprocessing, data warehouse, association, classification, clustering, and mining specific data types such as time-series, social networks, multimedia, and Web data.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4502
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 5514 (3) Algorithms for Whole Genome Sequence Analysis**
Explore the algorithms that have been developed to assemble and analyze genome sequencing data. Genome sequencing produces vast and complex data that are intractable without efficient algorithms. This course covers the core data structures and algorithms which form the basis for research in topics ranging from evolution to the cause and treatment of many diseases, including cancer. Topics include string matching, indexing, compression, and succinct data structures. No prior knowledge of biology, DNA, or genetics is required.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite basic understanding of complexity analysis, core algorithms (for example, sort) and data structures (for example, graphs).

**CSCI 5523 (3) Modern Offense and Defense in Cybersecurity**
Introduce students to the modern techniques used in cyber-attacks and defenses. Topics covered: Stack canary, ASLR, SMEP/SMAP, CFI, Program Misusing, ROP, JOP, ret2lib, off-by-one, unsafe-unlink, UAF, ptmalloc, t-cache, Race condition, Kernel Exploitation.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CSCI 2400, ECEN 4133.

**CSCI 5525 (3) Compiler Construction**
Introduces the principles and techniques for compiling high-level programming languages to assembly code. Topics include parsing, instruction selection, register allocation, and compiling high-level features such as polymorphism, first-class functions, and objects. Students build a complete compiler for a simple language.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4555 and ECEN 4553 and ECEN 5523
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CSCI 3155 and CSCI 2400 or ECEN 3350 (or ECEN 2360).
**Additional Information:** Departmental Category: Programming Languages

**CSCI 5526 (3) Computational Tools for Multiscale Problems**
Discusses state-of-the-art methods and software for the fast and accurate numerical solution of problems with features on multiple scales. This course starts from the fundamentals of numerical computation (linear solve, interpolation, differentiation, quadrature) and builds up to hybrid ODE solvers and boundary integral equation methods. Methods for developing scientific computing software will be discussed and practiced in-class and via assignments.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 3656 Numerical Computation, CSCI 5636 Numerical Solution of Partial, Differential Equations, Knowledge of a programming language (eg Python, C++, MATLAB), Linear algebra, and Calculus, including vector calculus, Complex analysis.

**CSCI 5535 (3) Fundamental Concepts of Programming Languages**
Considers concepts common to a variety of programming languages--how they are described (both formally and informally) and how they are implemented. Provides a firm basis for comprehending new languages and gives insight into the relationship between languages and machines.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5533
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 3155 or instructor consent required.
**Additional Information:** Departmental Category: Programming Languages

**CSCI 5550 (3) Designing for Defense 1**
Designing for Defense/Hacking for Defense is a national service program running at leading research universities across the country. Interdisciplinary teams¿chosen by competitive selection¿work on real-world national security challenges, in close contact with national security agencies. Teams employ the Lean Launchpad entrepreneurship methodology to develop engineering and business concepts to solve real-world challenges for special operations forces, the intelligence community, and other government agencies. Winning teams are eligible for real-world capital investment. The first semester of a two-course sequence. Students take this course, ASEN/CSCI/CYBR 5550, and ASEN/CSCI/CYBR 5580 contiguously as the sequence spans the academic year.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4550 and ASEN 5550 and CYBR 5550
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CSCI 5573 (3) Advanced Operating Systems**
Intended to create a foundation for operating systems research or advanced professional practice. Examines the design and implementation of a number of research and commercial operating systems and their components, system organization and structure, threads, communication and synchronization, virtual memory, distribution, file systems, security and authentication, availability and Internet services.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5573
**Requisites:** Requires prerequisite course of CSCI 2400 and CSCI 3753 (all minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 5576 (4) High-Performance Scientific Computing**
Introduces computing systems, software and methods used to solve large-scale problems in science and engineering. Students use high-performance workstations and a supercomputer.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4576
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 5580 (3) Designing for Defense 2**
This course allows teams to continue their D4D journey from semester 1 guiding students in launching a business entity that will deploy agile development tools to refine and enhance their first semester MVP, seek funding for that development work, deliver a functioning solution to their sponsor, and extract real value for the members of the business unit.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 5580 and CYBR 5580 and CSCI 4580
**Requisites:** Requires prerequisite course of ASEN 5550 or CSCI 5550 or CYBR 5550 (minimum grade B). Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CSCI 5593 (3) Advanced Computer Architecture**
Provides a broad-scope treatment of important concepts in the design and implementation of high-performance computer systems. Discusses important issues in the pipelining of a processor, out-of-order instruction issue and superscalar designs, design of cache memory systems and architectural features required for multicore processor designs. Also studies current and historically important computer architectures, including hardware security concepts.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5593 and ECEN 4693
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 4593 or instructor consent required.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 5606 (3) Principles of Numerical Computation**
Highlights computer arithmetic, solution of linear systems, least-squares approximations, nonlinear algebraic equations, interpolation, and quadrature.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CSCI 3656 and three semesters of calculus or equivalent.
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 5612 (3) Machine Learning for Data Science**
Explores the data science lifecycle with a focus on machine learning. Topics include data preparation, unsupervised and supervised analyses, ensemble methods, results illustration, and data communication. Unsupervised methods include clustering, association rule mining, and dimensionality reduction. Supervised models include regression, tree-based models, Bayesian models, and support vector machines. Recommended restrictions: This course is specific to Data Science students and the MS-DS degree program, this course would not be suitable for CSCI majors to meet CS degree requirements.
**Recommended:** Prerequisites probability, statistics, multivariate calculus, and linear algebra.

**CSCI 5616 (3) Introduction to Virtual Reality**
Introduces students to the field of virtual reality (VR). Covers the historical development of virtual reality technologies and virtual reality as a research field, the mathematics of 3D coordinate systems, fundamental principles, algorithms, and design patterns in developing interactive virtual environments, the perceptual science behind mixed reality technologies, and libraries and tools for creating VR experiences. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4616, ATLS 4616, ATLS 5616
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 2270 or CSCI 2275 (minimum grade B).

**CSCI 5620 (3) Advanced Wireless Lab**
Provides a comprehensive, hands-on set of laboratory exercises for the teaching and demonstration of key technical skills required to understand, build, test, and analyze both analog and digital wireless communications concepts. In conjunction with lecture-based content to provide a solid foundation in digital communication theory, SDR-based laboratory exercises enable the synthesis of several fundamental concepts utilizing the latest, modern communications systems technologies.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5620
**Requisites:** Requires prerequisite course of CSCI 5200 or CYBR 5200 (minimum grade B).
**Recommended:** Prerequisites CSCI 5630 or CYBR 5630 and CSCI 5220 or CYBR 5220.

**CSCI 5622 (3) Machine Learning**
Trains students to build computer systems that learn from experience. Includes the three main subfields: supervised learning, reinforcement learning and unsupervised learning. Emphasizes practical and theoretical understanding of the most widely used algorithms (neural networks, decision trees, support vector machines, Q-learning). Covers connections to data mining and statistical modeling. A strong foundation in probability, statistics, multivariate calculus, and linear algebra is highly recommended.
**Requisites:** Prereqs:(APPM 3310 or CSCI 2820 or MATH 2130 or 2135 or 3130 or 3135) OR (APPM 3570 or 4570 or CHEN 3010 or CSCI 3022 or CVEN 3227 or ECEN 3810 or ECON 3818 or MATH 3510 or 4510 or MCEN 3047 or STAT 3100 or 4000 or 4520) (min grade B) Grad students only
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 5630 (3) Wireless and Cellular Systems**
Studies technologies and architectures employed in modern cellular wireless systems. Major topics include radio propagation, multiple access techniques, analog and digital cellular telephony, and personal communications systems. Presents the necessary tools to understand the wireless industry, its technical details, and its business drivers. Topics include modeling, spectrum, weather, multipath, Doppler effect, and shadowing and covers important aspects of multiple access technologies such as CDMA and OFDMA. introduces modern radio standards including LTE.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5630
**Requisites:** Requires prerequisite course of CSCI 5200 or CYBR 5200 (minimum grade B).

**CSCI 5636 (3) Numerical Solution of Partial Differential Equations**
Focuses on discretization techniques such as finite difference, finite element and finite volume methods, and parallel solution algorithms such as Krylov subspace methods, domain decomposition and multilevel methods.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites (CSCI 2820 or APPM 2360 or APPM 3310 or MATH 2130 or MATH 2135 or MATH 3130 or MATH 3135) AND (CSCI 3656 or APPM 4650 or MATH 4650 or MCEN 3030 or PHYS 2600) (all minimum grade B).
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 5646 (3) Numerical Linear Algebra**
Offers direct and iterative solutions of linear systems. Also covers eigen value and eigenvector calculations, error analysis, and reduction by orthogonal transformation. A sound knowledge of basic linear algebra, experience with numerical computation, and programming experience is required.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 5654 (3) Linear Programming**
Presents algorithms, simplex and modifications. Examines theory-duality and complementary slackness. Involves network flow algorithms. Introduces integer programming.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite linear algebra.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 5673 (3) Distributed Systems**
Examines systems that span multiple autonomous computers. Topics include system structuring techniques, scalability, heterogeneity, fault tolerance, load sharing, distributed file and information systems, naming, directory services, resource discovery, resource and network management, security, privacy, ethics and social issues.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5673
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 5573 or a course in computer networks.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 5676 (3) Numerical Optimization**
Focuses on computational methods for solution of unconstrained and some constrained optimization problems, nonlinear least-squares problems and systems of nonlinear equations. Formerly CSCI 6676.
**Recommended:** Prerequisite (CSCI 2820 or APPM 2360 or APPM 3310 or MATH 2130 or MATH 2135 or MATH 3130 or MATH 3135) AND (CSCI 3022 or CSCI 3656 or APPM 4650 or MATH 4650 or MCEN 3030 or PHYS 2600) (all minimum grade B), and restricted to grad students.
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 5714 (3) Formal Languages**
Explores context-free languages: pumping lemma and variants, closure properties, and decision properties. Involves parsing algorithms, including general and special languages, e.g., LR. Additional topics chosen by instructor.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 5444 or instructor consent required.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 5722 (3) Computer Vision**
Explores algorithms that can extract information about the world from images or sequences of images. Topics covered include: imaging models and camera calibration, early vision (filters, edges, texture, stereo, optical flow), mid-level vision (segmentation, tracking), vision-based control and object recognition.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4722
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite probability, multivariate calculus and linear algebra.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 5753 (3) Computer Performance Modeling**
Presents a broad range of system measurement and modeling techniques, emphasizing applications to computer systems. Topics include system measurement, work load characterization and analysis of data; design of experiments; simulation; and queuing theory and queuing network models.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4753 and ECEN 4753 and ECEN 5753
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 5802 (1) Data Science Team Companion Course**
Gives students hands-on experience applying data science techniques and machine learning algorithms to real-world problems. Students work in small teams on internal challenges, many of which will be sponsored by local companies and organizations and will represent the university in larger teams for external challenges at the national and global level, such as those hosted by Kaggle. Students will be expected to participate in both internal and external challenges, attend meetings and present short presentations to the group when appropriate. Instructor consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4802
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 5809 (3) Computer Animation**
Develops a firm understanding of the general principles of computer animation. Lectures cover the creation of models, materials, textures, surfaces, and lighting. Path and key frame animation, particle dynamics, and rendering are introduced. Students are assigned a number of animation tutorials to carry out.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4809 and ATLS 4809 and ATLS 5809
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graphics

**CSCI 5817 (3) Database Systems**
Provides an advanced treatment of basic database concepts.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 3753.
**Additional Information:** Departmental Category: Database Systems

**CSCI 5822 (3) Probabilistic and Causal Modeling in Computer Science**
Introduces a set of modeling techniques that have become a mainstay of modern artificial intelligence and machine learning research. These techniques combine graphical models, Bayesian analysis, and multivariate statistics for probabilistic and causal inference and for interpreting the statistical structure of large data sets. Applications include healthcare, economics, marketing, social sciences, and more.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite undergraduate course in probability and statistics.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 5828 (3) Foundations of Software Engineering**
Provides an introduction to software engineering concepts and techniques. Topics include the history of software engineering, fundamental software engineering principles and theory, software life cycles, software testing, and the design and implementation of concurrent and large-scale software systems.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Software Engineering

**CSCI 5832 (3) Natural Language Processing**
Explores the field of natural language processing as it is concerned with the theoretical and practical issues that arise in getting computers to perform useful and interesting tasks with natural language. Covers the problems of understanding complex language phenomena and building practical programs.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5832
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 5839 (3) User-Centered Design and Development 1**
Develops the skills and practices necessary to apply user-centered approaches to software requirements analysis, and the design and evaluation of computer applications.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graphics

**CSCI 5840 (3) Advanced Network Automation**
Combining lectures, lab experiments, and demonstrations, students in this course will develop advanced skills and knowledge in network automation technologies, services, and tools. They will learn to analyze, evaluate, and apply historical and future services needed for network functionality, maintenance, and troubleshooting. The course will cover a range of topics, from technical to soft skills, including best practices and key theories.
**Requisites:** Requires prerequisite course of CSCI 5180 (minimum grade B). Restricted to Network Engineering students only.

**CSCI 5849 (3) Input, Interaction, and Accessibility**
Explores input and interaction techniques, with an emphasis on universal design and alternative interfaces. Students will explore traditional input methods such as keyboard and mouse input, and alternative techniques such as voice and eye gaze. Students will conduct performance evaluations of existing techniques, and prototype new interaction methods. Students will design technologies to support people with varying abilities and disabilities.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4849
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 3002 or CSCI 5839 (minimum grade B).

**CSCI 5854 (3) Theoretical Foundations of Autonomous Systems**
Covers techniques for modeling, design and verification of autonomous systems and application domains including automotive systems, robotics and medical devices. Modeling topics include timed systems, differential equations, switched systems, hybrid dynamical systems. Verification topics: reachability and stability verification. Temporal specifications. Synthesis of controllers. Applications: automotive systems, medical devices.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 5880 (3) Interactive Machine Learning for Customizable and Expressive Interfaces**
Introduces students to techniques for applying machine learning in the development of customizable human-computer interfaces. Students will learn to process a wide variety of input data (e.g. video and accelerometer streams), using different machine learning algorithms to detect semantically meaningful events that can afford the construction of new interactive systems. They will complete substantial projections within the domains of assistive or creative technologies. Does not fulfill Breadth Requirement for CSEN graduate students.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4889, ATLS 4889 and ATLS 5880
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 5897 (3) Computational and Mathematical Modeling of Infectious Diseases**
Explores the ways we model infectious diseases using math and computing, from the dynamic spread of infectious diseases between humans, to a pathogen's growth within the body. Learning goals include (i) gaining a mastery of both classic and modern infectious disease models (ii) learning about a variety of infectious diseases, and (iii) engaging with the ethics of infectious disease modeling. Requires beginner or advanced-beginner skill in Python or R.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4897
**Recommended:** Prerequisites Data structures (CSCI 2270) or equivalents (ASTR 2600, CSCI 2275, INFO 2201, PHYS 2600, as well as APPM 3650) and Prob/Stats (APPM3570/CHEN3010/CSCI3022/CVEN3227/EBIO4410/ECEN3810/ECON3818/IPHY3280/MATH3510/4510/4520/MCDB3450/MCEN3047/PSYC2111/STAT2600/3100/4000/4520, Calc 1, Beginner or Advanced Beginner skill in Python or R, Calc 2).

**CSCI 5900 (1-6) Master's Level Independent Study**
Provides opportunities for independent study at the master's level.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Computer Science (CSEN) graduate students or Computer Science Concurrent Degree majors only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 5919 (3) HCC Survey and Synthesis: Foundations and Trajectories**
Examines the interdisciplinary field of human-centered computing through a comprehensive content and historical survey. Considers new trajectories of inquiry and how the field merges with others. Social computing, is emphasized as a central topic. Students across disciplines will find the course foundational for understanding human-centered technology matters, including computer scientists, information scientists, social scientists, and business and media arts students.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5919
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graphics

**CSCI 5922 (3) Fundamentals of Neural Networks and Deep Learning**
This course covers the fundamentals of neural networks and deep learning as well as how they are used to address many artificial intelligence problems in society. Students will learn to design and implement multi-layered neural network architectures, train them on large amounts of data, and evaluate their performance. Included will be examination of popular architectures such as fully connected networks, convolutional neural networks, recurrent neural networks, and transformers, alongside learning strategies such as backpropagation, initialization, and regularization. Students will also gain practical, hands-on experience by applying learned skills to analyze visual data (computer vision) and textual data (natural language processing).
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 5929 (3) HCC Survey and Synthesis: New Disciplinary Directions**
Studies recent advances in human-computer interaction through critical analysis of influential papers and self-guided research. Examines new paradigms in input, output, and visualization for technology design and interaction. Considers innovative methods to assess various population design and technological needs. Studies in computer-related fields, social science, business, media arts and communications benefit learning about human-centered computing research.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 5919.
**Additional Information:** Departmental Category: Graphics

**CSCI 6000 (1) Introduction to the Computer Science PhD Program**
Instructs new Ph.D students in Computer Science how to obtain a Ph.D and how to become an effective member of the computer science research community. Makes students aware of formal requirements, educational objectives, and research themes. Provides evaluative criteria and guidelines for all objectives to be achieved.
**Requisites:** Restricted to Computer Science (CSCI) PhD. students only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 6100 (1) Computer Science Colloquium**
Learn about innovative research and teaching in computer science by attending talks and discussions by leading researchers and educators. Learn professional presentation skills and etiquette of participating in scientific research presentations. Not repeatable for credit. Students can attend during any term even if they are not enrolled.
**Requisites:** Restricted to Computer Science (CSCI) PhD. students only.

**CSCI 6110 (1) Graduate Writing Workshop**
Covers fundamentals of writing, editing, revising, and presenting. Students are encouraged to embrace the writing and editing processes as means not only to lively and impactful papers, but even better science. Focus given to clarity and simplicity of writing; multiple angles of editing; impact of content; and writing as a conversation. Ready participation in each class is expected.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CSCI 6114 (3) Computational Complexity Theory**
Covers standard complexity classes including: time-bounded, space-bounded, nondeterministic, randomized, quantum, parallel, counting, and nonuniform classes. Covers standard relationships between these complexity classes, as well as landmark results in complexity theory. Additional topics may be covered depending on time and interest.
**Requisites:** Requires prerequisite course of CSCI 5454 (minimum grade B). Restricted to graduate students only.
**Recommended:** Corequisite CSCI 5444.

**CSCI 6118 (3) Software Engineering for Scientists**
Learn the core principles of software engineering and design to make scientific software more robust and reproducible. This class targets quantitative scientists with programming skills (in any language) who want to use software in their research. We will cover the version control, testing, benchmarking, data structures, algorithms, and pipelines. This course opens computing to a variety of student disciplines, and is an advanced course in computing geared toward STEM. Instructor approval required for CS majors and CS minors. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4118
**Requisites:** Restricted to graduate students. Restricted to Non-Computer Science students only.
**Recommended:** Prerequisites ASEN 1320 or CSCI 1200 or CSCI 1300 or CSCI 2275 or ECEN 1310 or INFO 1201, knowledge of a programming language, preferably Python, and upper division STEM course recommended.

**CSCI 6166 (3) Validation and Uncertainty Quantification for Computational Models**
Assesses the reliability of computational models, which are used to describe physical and engineering systems in nearly every aspect of our lives, from an airplane wing interacting with turbulent air to the human heart pumping blood. But for various reasons model results might not be reliable. This course formulates and analyzes representations of uncertainty and validation tests for computational models.
**Recommended:** Prerequisites probability, linear algebra, calculus.

**CSCI 6200 (1) Computer Science PhD Career Development**
Learn how to make the most of your CS PhD by understanding and preparing for a career as a computer science research in academia, industry, and government. Students need to take this class once they complete Preliminary Exam and before their proposal defense.
**Requisites:** Requires prerequisite course of CSCI 6000 (minimum grade B). Restricted to Computer Science (CSCI) MS and PhD students only.

**CSCI 6214 (3) Randomized Algorithms**
Randomization is a powerful tool to design and analyze algorithms, and one that has played, and continues to play, a key role in the theory of algorithms and complexity. This course will give a technical foundation in common probabilistic tools to design and analyze algorithms, and use this foundation to cover several important randomized algorithms.
**Requisites:** Requires prerequisite course of CSCI 5454 (minimum grade B). Restricted to graduate students only.

**CSCI 6254 (3) Advanced Data Structures**
Learn about data structures beyond trees, heaps, and hashtables that are covered in introductory classes on algorithms and data structures. Key topics will include hashtables and their applications, amortized analysis and data structures using amortization, important balanced tree data structures including B-trees, treaps and skip lists, mergeable heaps: binomial and Fibonacci heaps, persistent data structures, tries, suffix tries, suffix automata and spatial data structures.
**Requisites:** Requires prerequisite course of CSCI 5454 (minimum grade B).
**Recommended:** Prerequisite CSCI 5434.

**CSCI 6268 (3) Foundations of Computer and Network Security**
Studies methods to protect information, and the ability to process and move information, from theft, misuse, tampering, destruction and unauthorized access. Introduces foundational topics of computer and network security, including security models, cryptography and authentication protocols.
**Equivalent - Duplicate Degree Credit Not Granted:** TLEN 5550
**Requisites:** Requires prerequisite course of CSCI 5273 (minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: Software Engineering

**CSCI 6302 (3) Speech Recognition and Synthesis**
Introduction to automatic speech recognition and understanding, conversational agents, dialogue systems, and speech synthesis/text-to-speech. Topics include the noisy channel model, Hidden Markov Models, A* and Viterbi decoding, language modeling (N-grams, entropy), concatenative synthesis, text normalization, dialogue and conversation modeling.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites CSCI 5832 or LING 5200 or instructor consent required.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 6314 (3) Algorithmic Economics**
This course will survey the frontier of algorithmic economics: the study of incentives and strategic behavior through a computational lens. It will show how microeconomic theory applies to the design of algorithms, and conversely, how algorithmic thinking applies to economics. Other topics may include game theory, mechanism design / auction theory, forecasting mechanisms, and voting / social choice theory.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 5454.

**CSCI 6402 (3) Issues and Methods in Cognitive Science**
Interdisciplinary introduction to cognitive science, examining ideas from cognitive psychology, philosophy, education, and linguistics via computational modeling and psychological experimentation. Includes philosophy of mind; learning; categorization; vision and mental imagery; consciousness; problem solving; decision making, and game-theory; language processing; connectionism. No background in Computer Science will be presumed.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 6504 and LING 6200 and PHIL 6310 and PSYC 6200 and SLHS 6402
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 6414 (3) Information theory, statistical inference, and experimental design**
Introduces key concepts in information theory (entropy, compression, Shannon¿s source coding theorem) and presents these as a foundation for Bayesian inference. Covers statistical modeling approaches and Markov Chain Monte Carlo techniques. Concludes with a unit on designing maximally informative scientific experiments.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite Calc 1 (MATH 1300 or APPM 1350 or similar); introductory probability (APPM 3570 or similar).

**CSCI 6454 (3) Advanced Algorithms**
Topics include matching and network flows, matroids, computational geometry, parallel computation (PRAM, hypercube, mesh). Also includes Vlsi, database theory, distributed computation, cryptography, robotics, scheduling, probabilistic algorithms, approximation algorithms, average case, and amortized analysis, time permitting.
**Requisites:** Requires prerequisite course of CSCI 5454 (minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 6502 (3) Big Data Analytics: Systems, Algorithms, and Applications**
This course studies state-of-the-art practice and research on efficient and effective systems and algorithms design for managing and exploring massive amounts of digital data in various application domains. The course takes an integrated approach that studies all three aspects of big data analytics: systems, algorithms, and applications. Specifically, this course covers big data systems for MapReduce, NoSQL, stream processing, deep learning, mobile/wearable/IoT sensing, as well as practical use of indexing, sketching, recommendation, graph, and deep learning algorithms. Domain-specific data management and analysis, such as those in online social networks, scientific discovery, business intelligence, health informatics, urban computing, are also covered.
**Requisites:** Restricted to graduate students only.

**CSCI 6622 (3) Advanced Machine Learning**
Covers advanced theoretical and practical topics in machine learning and latest developments in the field. Students conduct original research, either applied or theoretical, and present their results.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 5622 or instructor consent required.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 6644 (1) Theory of Computing Reading Group**
Exposition of key results in major areas of Theory of Computing presented by graduate students. The topics are selected every semester by voting. Examples of topics from previous semesters include: Hardness of Approximation and PCPs, Unique Games Conjecture, and Optimal Inapproximability Results for Max Cut. Previously offered as a special topics course.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites Graduate-level courses in Algorithms and Complexity Theory.

**CSCI 6686 (3) Numerical Methods for Constrained Optimization**
Covers computational methods for constrained optimization. Topics include basic theory, methods for quadratic programming, active set strategies for linear constraints, and penalty and successive quadratic programming methods for nonlinearly constrained problems.
**Requisites:** Requires prerequisite course of CSCI 5606 (minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 6712 (3) Data-Centric Computer Vision**
This course will cover core and new problems in computer vision through examination of the types of algorithms commonly used as well as the data employed to train and evaluate those algorithms. The course is taught in a seminar style, with students expected to regularly read and critique research papers from premiere computer vision conferences.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite Machine Learning experience (CSCI 5622 of CSCI 5922).

**CSCI 6810 (1) Seminar in Computational Biology**
Provides an overview of current research topics in computational biology and health informatics, with a focus on research conducted on campus. Each week students will attend an on-campus seminar or a presentation by an on-campus research group. Prepares students to participate in a research project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4810
**Additional Information:** Departmental Category: General Computer Science

**CSCI 6930 (1-3) Professional Internship**
This class provides a structure for CS graduate students to receive academic credit for internships with industry partners that have an academic component to them suitable for graduate-level work. Participation in the program will consist of an internship agreement between a student and an industry partner who will employ the student in a role that supports the academic goals of the internship. Instructor participation will include facilitation of mid-term and final assessments of student performance as well as support for any academic-related issues that may arise during the internship period. May be taken during any term following initial enrollment and participation in CS graduate programs.
**Requisites:** Restricted to graduate students only.

**CSCI 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to Computer Science (CSEN) graduate students or Computer Science Concurrent Degree majors only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 6950 (1-6) Master's Thesis**
**Requisites:** Restricted to Computer Science (CSEN) graduate students or Computer Science Concurrent Degree majors only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 7000 (1-4) Current Topics in Computer Science**
Covers research topics of current interest in computer science that do not fall into a standard subarea.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 7114 (1) Seminar in Algorithms and Computational Complexity**
Research-level topics in algorithms and computational complexity that are not covered in standard courses and often not covered in textbooks.
**Repeatable:** Repeatable for up to 40.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite Algorithms (or Advanced Algorithms or similar) and one course in complexity theory (Theory of Computation, Computational Complexity, or Practical Algorithmic Complexity).

**CSCI 7123 (3) Topics in Operating Systems**
Topics selected by instructor. Possible topics are system design, measurement and evaluation, simulation, mathematical modeling, and parallelism.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of CSCI 5573 (minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 7135 (1-3) Topics in Programming Languages**
Topics selected by instructor. Possible topics are syntax, semantics, metacompilers, compiler design, and translator writing systems. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Programming Languages

**CSCI 7143 (3) Topics in Computer Systems**
Topics selected by instructor. Possible topics are online systems, multiprocessing, microprogramming, architecture, data communications, and computing networks. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Operating Systems and Hardware

**CSCI 7154 (3) Topics in Theory of Computation**
Selected topics of current interest in theory of computation.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of CSCI 5454 (minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: Theory of Computation

**CSCI 7176 (3) Topics in Numerical Computation**
Topics selected by instructor. Possible topics are numerical linear algebra, solution of differential equations, nonlinear algebra and optimization, data fitting, linear and nonlinear programming, and solution of large problems. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Numerical Computation

**CSCI 7222 (3) Topics in Nonsymbolic Artificial Intelligence**
Topics vary from year to year. Possible topics include human and machine vision, signal and speech processing, artificial life, mathematical foundations of connectionism, and computational learning theory.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 5622 or instructor consent required.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 7314 (1) Seminar on Algorithmic Economics and Machine Learning**
Current research topics in algorithms economics, algorithmic game theory, and theoretical machine learning.
**Repeatable:** Repeatable for up to 40.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CSCI 7412 (2) Cognitive Science Research Applications Seminar 1**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 7415 and EDUC 6506 and LING 7415 and PHIL 7415 and SLHS 7418
**Requisites:** Requires a prerequisite course of CSCI 6402 or EDUC 6504 or LING 6200 or PHIL 6310 or PSYC 6200 (minimum grade B). Restricted to graduate students only.
**Recommended:** Prerequisite EDUC 6505.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 7422 (2) Cognitive Science Research Applications Seminar 2**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 7425 and EDUC 6516 and LING 7425 and PHIL 7425 and SLHS 7428
**Requisites:** Requires a prerequisite course of LING 7415 or PSYC 7415 or CSCI 7412 or EDUC 6506 (minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 7565 (3) Computational Phonology and Morphology**
Surveys of the main approaches and central questions related to computational modeling and learning of morphology and phonology. We consider questions related to learnability of phonology/morphology, machine learning implementations, and linguist-driven grammar modeling.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 7565

**CSCI 7575 (3) Computational Lexical Semantics**
Computational semantics has recently been upended by the advent of language models trained on vast amounts of text. These have proven to be very effective as a starting point for building robust downstream applications, although their ability to appropriately take context and world knowledge into account is still open to question. At the same time, rich representational schemes such as Abstract Meaning Representation (AMR) have been improving performance on numerous semantic tasks, including information extraction, question-answering, co-reference, and entailment. This class will explore the theory and practice behind these two advances, examine their respective strengths and weaknesses, and brainstorm about ways of combining them.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 7575
**Recommended:** Graduate students only.
**Grading Basis:** Letter Grade

**CSCI 7585 (3) Computational Models of Discourse and Dialogue**
This course is an introduction to computational models, corpora, and processing methods for discourse and dialogue. The course will introduce students to the foundational concepts and approaches, building a base from which students can go on to do research in these areas. Recommended restriction: Graduate students only.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 7585
**Recommended:** Prerequisite CSCI 5832 Natural Language Processing.
**Grading Basis:** Letter Grade

**CSCI 7717 (3) Topics in Database Systems**
Studies topics such as distributed databases, database interfaces, data models, database theory, and performance measurement in depth.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of CSCI 5817 (minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: Database Systems

**CSCI 7772 (1) Topics in Cognitive Science**
Reading of interdisciplinary innovative theories and methodologies of cognitive science. Students participate in the ICS Distinguished Speakers series that hosts internationally recognized cognitive scientists who share and discuss their current research. Session discussions include analysis of leading edge and controversial new approaches in cognitive science.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 7775 and LING 7775 and PHIL 7810 and PSYC 7775 and SLHS 7775
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Artificial Intelligence

**CSCI 7818 (3) Topics in Software Engineering**
Studies selected topics of current interest in software engineering. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Software Engineering

**CSCI 7900 (1-6) Doctoral Level Independent Study**
For doctoral students.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Computer Science

**CSCI 8990 (1-10) Doctoral Dissertation**
Investigates some specialized field of computer science. Approved and supervised by faculty members.
**Repeatable:** Repeatable for up to 30.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Computer Science

# Computer Science Online (CSCA)

## Courses

The following courses are only available through CU Boulder on Coursera program offerings. Please refer to the Online Programs (p. 1895) section of the catalog for more information.

**CSCA 5002 (1) Intelligent Agents and Search Algorithms**
This course introduces the concepts of intelligent agents and search algorithms that are foundational in artificial intelligence. Students will explore agent architectures, environment types, and the design of rational behavior. Topics include uninformed and informed search strategies, such as breadth-first, depth-first, and A* search. Through assignments that include analysis and programming, students will compare algorithm performance and implement solutions to real-world problems.
**Grading Basis:** Letter Grade

**CSCA 5008 (1) Fundamentals of Software Architecture for Big Data**
Intended for individuals looking to understand the basics of software engineering as they relate to building large software systems that leverage big data. Students will be introduced to software engineering concepts necessary to build and scale large, data intensive, distributed systems. Starting with software engineering best practices and loosely coupled, highly cohesive data microservices, the course takes students through the evolution of a distributed system over time. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5507
**Grading Basis:** Letter Grade

**CSCA 5012 (1) Knowledge Representation and Reasoning Under Uncertainty**
This course explores how to represent, organize, and reason with knowledge in uncertain environments. Topics covered include logic-based representation (propositional and first-order logic), probabilistic reasoning, Bayesian networks, and decision-making under uncertainty. Students will learn to model intelligent behavior in dynamic domains using structured knowledge and inference techniques. Through theoretical analysis and practical implementation, students explore AI systems that can reason when there is incomplete or ambiguous information.
**Grading Basis:** Letter Grade

**CSCA 5018 (1) Software Architecture Patterns for Big Data**
Intended for individuals looking to understand the architecture patterns necessary to take large software systems that leverage big data to production. Students will transform big data prototypes into high quality tested production software. After measuring the performance characteristics of distributed systems, they will identify trouble areas and implement scalable solutions to improve performance. Upon completion of the course they will know how to scale production datastores to perform under load, designing load tests to ensure applications meet performance requirements. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5508
**Grading Basis:** Letter Grade

**CSCA 5022 (1) Introduction to Learning**
This course introduces foundational concepts in learning, with emphasis on how intelligent agents learn from experience. Students will explore supervised and unsupervised learning methods, reinforcement learning, hidden Markov models (HMMs) for modeling sequential data, and population-based algorithms such as genetic algorithms. The course provides theoretical coverage of the algorithms, as well as hands-on practice implementing and evaluating the algorithms.
**Grading Basis:** Letter Grade

**CSCA 5028 (1) Applications of Software Architecture for Big Data**
Intended for individuals who want to build a production-quality software system that leverages big data. Students will apply the basics of software engineering and architecture to create a production-ready distributed system that handles big data. Students will build and scale a large, data intensive, distributed system, composed of loosely coupled, highly cohesive data microservices.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5714
**Grading Basis:** Letter Grade

**CSCA 5063 (1) Network Systems Foundation**
In this course, students will learn the most important principles in network systems. This will center on the layered design of networks, and cover the link layer (Ethernet), network layer (IP), transport layer (TCP, UDP), and application layer (HTTP, gRPC). With those as a foundation, student will learn about network security problems and how some current solutions work at different layers.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEA 5370
**Grading Basis:** Letter Grade

**CSCA 5073 (1) Network Principles in Practice: Linux Networking**
In this course students will learn how networking is designed and used in the Linux operating system. This will be learned in the context of networking principles and the application to real modern uses ¿ building network operating systems (that power network appliances) and using Linux to support connectivity in modern containerized and virtualized applications (such as a Kubernetes network plugin).
**Equivalent - Duplicate Degree Credit Not Granted:** ECEA 5371
**Grading Basis:** Letter Grade

**CSCA 5083 (1) Network Principles in Practice: Cloud Networking**
In this class, students will learn about the networking abstractions and services for building applications in the cloud, and the technology underlying cloud networking. Students will be able to architect complex applications in the cloud. In understanding how the cloud providers created their networks, students will be in a better position to troubleshoot applications and analyze different possible ways of architecting applications, and even help design the next generation of networking for cloud providers.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEA 5372
**Grading Basis:** Letter Grade

**CSCA 5112 (1) Introduction to Generative AI**
This course introduces the core concepts and architectures behind generative AI, including GANs, VAEs, diffusion models, and transformers. Students will explore how generative models produce text, images, and other outputs, and will gain foundational understanding of prompt design, and common limitations such as hallucinations. The course also includes an overview of AI literacy to support responsible use and prepares learners for applied work in generative AI systems.
**Grading Basis:** Letter Grade

**CSCA 5113 (1) Users, Permissions and Command Line Use**
Introduction to Linux/Unix system administration. Effectively using commands, shells and scripting. Managing local and remote user access to systems and file permissions.
**Grading Basis:** Letter Grade

**CSCA 5122 (1) Modern Applications of Generative AI**
This course explores how generative AI is applied across domains including code generation, art and media, business innovation, and accessibility. Students will expand prompt engineering skills, examine advanced prompting techniques such as few-shot, chain-of-thought prompting, and explore tuning output parameters such as temperature, top-p, and top-k. The course also introduces retrieval-augmented generation (RAG) and discusses ethical considerations, including bias, misuse, and hallucinations. Learners will gain practical insights into the use of generative AI tools.
**Grading Basis:** Letter Grade

**CSCA 5123 (1) Installing and Maintaining Software and Hardware**
Selecting, installing and maintaining system software and storage subsystems. Troubleshooting configurations and reading system logs.
**Grading Basis:** Letter Grade

**CSCA 5132 (1) Advances in Generative AI**
This course examines advanced topics and emerging trends in generative AI, including foundational model architectures, their use in scientific discovery, and expanding capabilities such as reinforcement learning, fine-tuning and agent-based systems. Students will explore concepts related to benchmarking, model evaluation, and societal impacts. The course equips learners to understand and interpret ongoing advancements in generative AI and potential applications.
**Grading Basis:** Letter Grade

**CSCA 5133 (1) Networking and Security**
Configuring Linux/Unix networking, routing, network services and firewalls. Troubleshooting connectivity, analyzing and countering threat vectors, security in depth.
**Grading Basis:** Letter Grade

**CSCA 5204 (1) Current Issues in Ethics and AI**
Artificial intelligence, particularly with the introduction of generative AI, is fundamentally impacting a huge spectrum of human experience. This ranges from education to the vast majority of jobs and professions, to healthcare, media and entertainment, and much more. These rapid advances have been accompanied by a huge array of fundamental and greatly impactful ethical challenges, including bias and even hallucination in AI systems, where AI systems should and shouldn¿t replace humans, and potential benefits and harms from various types of autonomous systems, and existential issues including the future of human work and the possibility of AI systems whose intelligence exceeds that of humans. This course provides students with a broad exposure to the ethical issues arising from AI, along with the experience and ethical tools to analyze them. It is intended to help students recognize and deal with these issues in their professional careers and their lives. It is based in good part on current research papers
**Grading Basis:** Letter Grade

**CSCA 5214 (1) Computing, Ethics, and Society Foundations**
Computing systems and technologies fundamentally impact the lives of most people in the world, including how we communicate, get information, socialize, and receive healthcare. This course is the first of a three course sequence that examines ethical issues in the design and implementation of computing systems and technologies, and reflects upon the broad implication of computing on our society. It covers ethical theories, privacy, security, social media, and misinformation.
**Grading Basis:** Letter Grade

**CSCA 5222 (1) Introduction to Computer Vision**
This course guides students through the essential algorithms and methods to help computers 'see' and interpret visual data. Students learn the core concepts and techniques that have been traditionally used to analyze images. Then, students learn modern deep learning methods, such as neural networks and specific models designed for image recognition, can be used to perform more complex tasks like object detection and image segmentation. Additionally, students will learn the creation and impact of AI-generated images and videos, exploring the ethical considerations of such technology.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5512
**Grading Basis:** Letter Grade

**CSCA 5224 (1) Ethical Issues in AI and Professional Ethics**
Computing systems and technologies fundamentally impact the lives of most people in the world, including how we communicate, get information, socialize, and receive healthcare. This course is the second of a three course sequence that examines ethical issues in the design and implementation of computing systems and technologies, and reflects upon the broad implication of computing on our society. It covers algorithmic bias in machine learning methods, professional ethics, and issues in the tech workplace.
**Grading Basis:** Letter Grade

**CSCA 5234 (1) Ethical Issues in Computing Applications**
Computing systems and technologies fundamentally impact the lives of most people in the world, including how we communicate, get information, socialize, and receive healthcare. This course is the third of a three course sequence that examines ethical issues in the design and implementation of computing systems and technologies, and reflects upon the broad implication of computing on our society. It covers medical applications, uses of robotics, autonomous vehicles, and the future of work.
**Grading Basis:** Letter Grade

**CSCA 5274 (1) AI Regulation**
As artificial intelligence becomes more integrated into society, it is increasingly shaped by forms of regulation, including law, standards bodies, social norms, and even technical architecture. This course equips students to navigate the complex regulatory ecosystem with a focus on public policy. The course covers broad categories of legal frameworks worldwide, deep dives into specific legal obligations and complications such as data privacy and intellectual property, and examines emerging mandates aimed at societal protections for AI such as civil rights safeguards, safety standards, and labor and environmental concerns. Students will also learn to consider the role of regulation beyond law, including how market forces, architecture, and norms can steer the direction of technology. Through analyzing research and policy documents as well as current events, students will learn to identify emerging governance issues, critique proposed solutions, and design strategies for responsible AI development.
**Grading Basis:** Letter Grade

**CSCA 5284 (1) AI and the Future of Society**
Artificial intelligence has the potential to rewrite many aspects of society, including what it means to work, create, learn, and connect. This course prepares students to analyze the implications of these changes, anticipate future moves, and craft thoughtful responses. The course will cover topics around labor, including a historical perspective on how technology reshapes industries and what AI might mean for the future of work; the impact of AI on human creativity and notions of authorship; how AI could transform learning and education, and what risks those transformations might pose; and companionship and social connection in the context of AI systems such as chatbots and social robots. Students will also engage with speculative methods, envisioning both near- and long-term AI trajectories and how we might design value-aligned pathways.
**Grading Basis:** Letter Grade

**CSCA 5303 (1) Security and Ethical Hacking: Attacking the Network**
This course explains the science and art behind offensive security techniques used in penetration testing of networks and systems. A review of networking concepts is given. Students will utilize low-level programming through network interfaces, in executing a variety of network attacks, while learning to use essential auxiliary tooling. An introduction to cryptogpahy for pentesters is provided. An understanding of python programming and networking basics is required. Course assessments are practical work and exams.
**Grading Basis:** Letter Grade

**CSCA 5312 (1) Basic Robotic Behaviors and Odometry**
Introduction to autonomous mobile robots, including forward kinematics (¿odometry¿), basic sensors and actuator, and simple reactive behavior. The course is centered around two laboratory exercises in the realistic, physics-based simulator ¿Webots¿ in which students will experiment with simple reactive behaviors for collision avoidance and line following, state machines, and basic forward kinematics of non-holonomic systems. An overarching objective of this course is to understand the role of the physical system on algorithm design and its role as source of uncertainty that makes robots non-deterministic.
**Grading Basis:** Letter Grade

**CSCA 5313 (1) Security and Ethical Hacking: Attacking Unix and Windows**
This course in the sequence examines attacks on computer systems, with particular attention to Unix Security Model and Windows for memory corruption and binary exploitation. Students can expect to learn about, and apply offensive techniques against, Unix in general. We will demonstrate lateral movement and privilege escalation attacks, as well as buffer overflow and other memory exploitation primitives. Course assessments are through quizzes, hands-on exercises and an exam.
**Grading Basis:** Letter Grade

**CSCA 5322 (1) Deep Learning for Computer Vision**
This course introduces students to the core principles of neural networks and deep learning, focusing on their application in computer vision. Covering advanced CNN architectures like ResNet, Inception, and DenseNet, along with techniques in object detection (R-CNN, SSD, YOLO) and semantic segmentation (FCN, SegNet, U-Net), this course offers a comprehensive overview of theory and practical skills.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5513
**Grading Basis:** Letter Grade

**CSCA 5323 (1) Security and Ethical Hacking: Attacking Web and AI**
In this last course of the sequence, students will learn how web application and server attacks are conducted against a variety of web technologies and frameworks. In addition, we will introduce the topic of Adversarial Machine Learning and attacks in the Artifical Intelligence domain, including Language Model systems. Students will gain an elementary understanding of the science and techniques behind these attacks, with an appropriate introduction to the AI world. Course assessments are through quizzes, hands-on exercises and an exam.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5739
**Grading Basis:** Letter Grade

**CSCA 5332 (1) Robotic Mapping and Trajectory Generation**
Building upon the course ¿Basic Robotic Behaviors and Odometry¿, students will learn how to perform basic inverse kinematics of (non-)holonomic systems using a feedback control approach and how to process multi-dimensional sensor signals such as laser range scanners to create discrete representations of the environment (mapping). Also in this course, the overarching focus is mechanisms and sensors as sources of uncertainty and techniques to model and control for them.
**Grading Basis:** Letter Grade

**CSCA 5342 (1) Robotic Path Planning and Task Execution**
Building upon the courses ¿Basic Robotic Behaviors and Odometry¿ and ¿Robotic Mapping and Trajectory Generation¿, students will learn how implement high-level reasoning for generating trajectories (path planning) and sequencing tasks under uncertainty of sensing and actuation. As a first cap stone in the robotics specialization, this course will also lead toward the implementation of a complex mobile manipulation system, combining behaviors, sensing, control and planning developed in previous modules.
**Grading Basis:** Letter Grade

**CSCA 5414 (1) Dynamic Programming, Greedy Algorithms**
This course covers basic algorithm design techniques such as divide and conquer, dynamic programming, and greedy algorithms. It concludes with a brief introduction to intractability (NP-completeness) and using linear/integer programming solvers for solving optimization problems.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5503
**Grading Basis:** Letter Grade

**CSCA 5422 (1) Modern AI Models for Vision and Multimodal Understanding**
This course delves into the cutting-edge realm of generative models for images and videos, including GANs and Diffusion Models. It will teach about multimodal foundational models such as CLIP, as well as applications for text-to-image and text-to-video generation. The course also addresses the issue of DeepFakes. Through both practical exercises and theoretical discussion, students will explore the ethical considerations, privacy concerns, and future trends in computer vision.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5514
**Grading Basis:** Letter Grade

**CSCA 5424 (1) Approximation Algorithms and Linear Programming**
Covers ideas surrounding approximation algorithms including a rigorous mathematical analysis of the approximation guarantees provided by these algorithms. Teaches the use of linear/integer programming formulations for common algorithmic problems and the relation between integer optimization problems and their linear programming relaxations. Introduces key mathematical concepts needed to analyze these algorithms and explores the application of algorithmic concepts to real-world problems.
**Grading Basis:** Letter Grade

**CSCA 5428 (1) Object-Oriented Analysis and Design: Foundations and Concepts**
An applied analysis and design class that addresses the use of object-oriented techniques. Topics include domain modeling, use cases, architectural design and modeling notations. Students apply techniques in analysis and design projects. Focus is on key object-oriented elements and concepts.
**Grading Basis:** Letter Grade

**CSCA 5433 (1) When to Regulate? The Digital Divide and Net Neutrality**
This is the first of three courses exploring Internet Policy: Principles and Problems, which is part of CU Boulder¿s Masters of Science in Data Science and Master of Science in Computer Science programs on Coursera. This course builds an interdisciplinary policy framework to critique and develop regulatory approaches to real-world problems on the Internet. Learners then use the framework to develop a definition of broadband to improve the Digital Divide and to evaluate net neutrality regulations.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5736
**Grading Basis:** Letter Grade

**CSCA 5438 (1) Object-Oriented Analysis and Design: Patterns and Principles**
An applied analysis and design class that addresses the use of object-oriented techniques. Topics include domain modeling, use cases, architectural design and modeling notations. Students apply techniques in analysis and design projects. Focus is on key object-oriented design patterns and principles.
**Grading Basis:** Letter Grade

**CSCA 5443 (1) Protecting Individual Privacy on the Internet**
This is the second of three courses exploring Internet Policy: Principles and Problems, which is part of CU Boulder¿s Master of Science in Data Science and Master of Science in Computer Science programs on Coursera. This course critiques and develops regulatory approaches to real-world privacy problems created by the Internet. Learners will create a privacy brief based upon the exposure of their own private information when surfing the web. Successful completion of the first course in this series is recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5737
**Recommended:** Prerequisite DTSA 5736/CSCA 5433.
**Grading Basis:** Letter Grade

**CSCA 5448 (1) Object-Oriented Analysis and Design: Practice and Architecture**
An applied analysis and design class that addresses the use of object-oriented techniques. Topics include domain modeling, use cases, architectural design and modeling notations. Students apply techniques in analysis and design projects. Focus is on key object-oriented practices and architectural design.
**Grading Basis:** Letter Grade

**CSCA 5453 (1) Cybersecurity in Crisis: Information and Internet Security**
This is the third of three courses exploring Internet Policy: Principles and Problems, which is part of CU Boulder¿s Master of Science in Data Science and Master of Science in Computer Science programs on Coursera. This course examines policy approaches to real-world cybersecurity problems occurring on the Internet. Learners will develop a privacy brief on a cybersecurity government policy, law or regulation of their choice. Successful completion of the first course in this series is recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5738
**Recommended:** Prerequisites DTSA 5736/CSCA 5433 and DTSA 5737/CSCA 5443.
**Grading Basis:** Letter Grade

**CSCA 5454 (1) Advanced Data Structures, RSA and Quantum Algorithms**
Covers advanced ideas in data structures such as B-Trees and Fibonacci heaps while presenting further applications of amortized analyses. Introduces number theoretic algorithms that form the basis of RSA public-key cryptography. Provides a brief introduction to quantum computing/algorithms by teaching the basics of quantum computation and two important examples of efficient quantum algorithms. Introduces key mathematical concepts needed to analyze these algorithms and explores the application of algorithmic concepts to real-world problems.
**Grading Basis:** Letter Grade

**CSCA 5502 (1) Data Mining Pipeline**
This course introduces the key steps involved in the data mining pipeline, including data understanding, data preprocessing, data warehouse, data modeling, interpretation and evaluation, and real-world applications.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5504
**Grading Basis:** Letter Grade

**CSCA 5512 (1) Data Mining Methods**
This course covers core techniques used in data mining, including frequent pattern analysis, classification, clustering, outlier detection, as well as time-series mining and graph mining.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5505
**Grading Basis:** Letter Grade

**CSCA 5522 (1) Data Mining Project**
This course offers step-by-step guidance and hands-on experience of designing and implementing a real-world data mining project, including problem formulation, literature survey, proposed work, evaluation, discussion and future work.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5506
**Grading Basis:** Letter Grade

**CSCA 5622 (1) Introduction to Machine Learning: Supervised Learning**
This course introduces various supervised ML algorithms and prediction tasks applied to different data. Specific topics include linear and logistic regression, KNN, Decision trees, ensemble methods such as Random Forest and Boosting, and kernel methods such as SVM. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5509
**Grading Basis:** Letter Grade

**CSCA 5632 (1) Unsupervised Algorithms in Machine Learning**
Students will learn selected unsupervised learning methods for dimensionality reduction, clustering, finding latent features, and application cases such as recommender systems with hands-on examples of product recommendation algorithms. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5510
**Grading Basis:** Letter Grade

**CSCA 5642 (1) Introduction to Deep Learning**
Course will cover the basics of deep learning, such as multilayer perceptron, convolutional neural network, recurrent neural network, how to build and train neural network models, optimization methods, and application examples. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5511
**Grading Basis:** Letter Grade

**CSCA 5702 (1) Fundamentals of Data Visualization**
Explores the design, development, and evaluation of information visualizations. Combine aspects of design, computer graphics, HCI, and data science, to gain hands-on experience with creating visualizations, using exploratory tools, and architecting data narratives. Topics include user-centered design, web-based visualization, data cognition and perception, and design evaluation.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5304
**Grading Basis:** Letter Grade

**CSCA 5832 (1) Fundamentals of Natural Language Processing**
The field of natural language processing aims at getting computers to perform useful and interesting tasks with human language. This course introduces students to the fundamental problems in NLP, the fundamental techniques that are used to solve those problems and lays the foundation for understanding state-of-art methods. At the end of the course, students will be able to implement and analyze text classifiers, sequence labelers, discrete probabilistic models, and vector-based approaches to word meaning.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5747
**Grading Basis:** Letter Grade

**CSCA 5834 (1) Modeling of Autonomous Systems**
This course will explain the core structure in any autonomous system which includes sensors, actuators, and potentially communication networks. Then, it will cover different formal modeling frameworks used for autonomous systems including state-space representations (difference or differential equations), timed automata, hybrid automata, and in general transition systems. It will describe solutions and behaviors of systems and different interconnections between systems.
**Grading Basis:** Letter Grade

**CSCA 5842 (1) Deep Learning for Natural Language Processing**
Deep learning has revolutionized the field of natural language processing and led to many state-of-the-art results. This course introduces students to neural network models and training algorithms frequently used in natural language processing. At the end of this course, learners will be able to explain and implement feedforward networks, recurrent neural networks, convolutional neural networks, and transformers. They will also have an understanding of transfer learning, the paradigm behind popular models such as BERT and GPT-3.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5748
**Grading Basis:** Letter Grade

**CSCA 5844 (1) Requirement Specifications for Autonomous Systems**
This course will discuss different ways of formally modeling requirements of interest for autonomous systems. Examples of such requirements include stability, invariance, reachability, regular languages, omega-regular languages, and linear temporal logic properties. In addition, it will introduce non-deterministic finite and büchi automata for recognizing, respectively, regular languages and omega-regular languages.
**Grading Basis:** Letter Grade

**CSCA 5852 (1) Model and Error Analysis for Natural Language Processing**
Understanding the performance of natural language processing models goes beyond simply computing measures like accuracy. In this course we will learn methods for analyzing the strengths and weaknesses of NLP systems, both neural and non-neural. We will also learn about problematic biases in NLP data and systems. Methods covered include standard benchmarks, qualitative error analysis, confusion matrices, contrastive and diagnostic evaluation, and probing experiments.
**Equivalent - Duplicate Degree Credit Not Granted:** DTSA 5749
**Grading Basis:** Letter Grade

**CSCA 5854 (1) Verification and Synthesis of Autonomous Systems**
This course will provide different techniques on the verification of autonomous systems against stability, regular, or omega-regular properties. Such techniques include Lyapunov theories, reachability analysis, barrier certificates, and model checking. Finally, it will introduce several techniques on designing controllers enforcing properties of interest over the original autonomous systems.
**Grading Basis:** Letter Grade

**CSCA 5859 (1) Ideating and Prototyping Interfaces**
User interfaces are a core part of everyday work, learning, and entertainment. To learn how to create a successful user interface is key behind the most successful products we use on our phones and the web. This course is the first in a series of three in this specialization on Human-Computer Interaction (HCI). It covers the fundamental methods in conducting HCI research and practice. During this course, you will practice core skills related to HCI work, such as brainstorming, sketching, prototyping. By examining prominent examples of past HCI successes and failures, you will identify design practices that help you create great user experiences. By the end of the course, you will know how to ideate, design and create user interfaces through practical examples and have started a portfolio of example designs for your future practice. Please note, to complete this course, you will need access to a computer or laptop, a camera or similar device (such as a webcam), and paper and pen/pencils.
**Grading Basis:** Letter Grade

**CSCA 5869 (1) User Interface Testing and Usability**
This course is the second in a series of three in this specialization on Human-Computer Interaction (HCI). This course focuses on evaluating user interfaces to develop new user interface ideas or improve existing ones. You will learn how to understand the users¿ needs, their abilities, the context that they operate in and their unique challenges through theory and practical methods. You will practice how to evaluate a user interface through standard industry practices and how to communicate the outcome to your peers. You will also compare between different low-cost methods to rapidly evaluate alternative user interface ideas as you iterate on your interface ideas. By the end of this course, you will be able to successfully assess a user interface and generate actionable insights through user testing. Please note, to complete this course, you will need access to a computer or laptop, a camera or similar device (such as a webcam), and paper and pen/pencils.
**Grading Basis:** Letter Grade

**CSCA 5879 (1) Emerging Topics in HCI: Designing for VR, AR, AI**
Human-Computer Interaction (HCI) is rapidly moving beyond the standard graphical user interface that has long dominated how we engage with computers. In this final course in the specialization on Human-Computer Interaction (HCI), you will be introduced to emerging HCI topics like voice assistants, virtual and augmented reality, and embodied computing interfaces. Throughout the course, you will learn how to prototype and user test these emerging interfaces. Please note, to complete this course, you will need access to a computer or laptop, a camera or similar device (such as a webcam), and paper and pen/pencils.
**Grading Basis:** Letter Grade

**CSCA 5902 (1) Mastering Classic Reinforcement Learning Algorithms**
This course introduces the fundamentals of tabular reinforcement learning (RL), with a focus on finite Markov decision processes (MDPs) with scalar rewards. Students will delve into the theoretical foundations of RL, exploring MDP optimization techniques such as value iteration, policy iteration, and linear programming. Additionally, the course covers the optimization of unknown MDPs using tabular RL algorithms like Q-learning, along with their convergence guarantees.
**Grading Basis:** Letter Grade

**CSCA 5912 (1) Deep Reinforcement Learning: From Theory to Practice**
This course introduces the fundamental concepts of deep reinforcement learning (RL), combining sampling-based RL optimization with deep neural networks. Topics include function approximation using neural networks, value-function-based methods (e.g., Deep Q-Networks), policy-gradient methods (e.g., REINFORCE), and hybrid approaches such as actor-critic methods. The course covers advanced algorithms like Trust Region Policy Optimization (TRPO), Proximal Policy Optimization (PPO), Deep Deterministic Policy Gradient (DDPG), and Soft Actor-Critic (SAC).
**Grading Basis:** Letter Grade

**CSCA 5922 (1) Reward Programming: Optimizing RL Efficiency and Safety**
This course examines the role of reward engineering in reinforcement learning (RL). Students will explore advanced techniques in reward specification, reward elicitation, and reward shaping. Key topics include formal methods such as logic and automata for reward specification, approaches for learning reward functions from demonstrations, and strategies for modifying rewards to enhance learning efficiency and ensure safety.
**Grading Basis:** Letter Grade

**CSCA 7000 (1) Special Topics**
Examines a special topic in Computer Science.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

.

# Computer Science Post-Baccalaureate (CSPB)

## Courses

**CSPB 1000 (1) Computer Science as a Field of Work and Study**
Introduces curriculum, learning techniques, time management and career opportunities in Computer Science. Includes presentations from alumni and others with relevant educational and professional experience.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 1000
**Requisites:** Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 1300 (4) Computer Science 1: Starting Computing**
Teaches techniques for writing computer programs in higher level programming languages to solve problems of interest in a range of application domains. Appropriate for students with little to no experience in computing or programming.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 1310 CSCI 1300
**Requisites:** Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 2270 (4) Computer Science 2: Data Structures**
Studies data abstractions (e.g., stacks, queues, lists, trees, graphs, heaps, hash tables, priority queues) and their representation techniques (e.g., linking, arrays). Introduces concepts used in algorithm design and analysis including criteria for selecting data structures to fit their applications. Knowledge of C++ is highly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 2275 CSCI 2270
**Requisites:** Requires prerequisite course of (ASEN 1320 minimum grade B-) or (CSCI 1300 or CSCI 1310 or CSPB 1300 or ECEN 1310 (minimum grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 2400 (4) Computer Systems**
Covers how programs are represented and executed by modern computers, including low-level machine representations of programs and data, an understanding of how computer components and the memory hierarchy influence performance.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 2400
**Requisites:** Requires corequisite course of CSPB 2270 or CSCI 2270 or CSCI 2275. Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 2820 (3) Linear Algebra with Computer Science Applications**
Introduces the fundamentals of linear algebra in the context of computer science applications. Includes vector spaces, matrices, linear systems, and eigenvalues. Includes the basics of floating point computation and numerical linear algebra.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 2820
**Requisites:** Requires prerequisite courses of CSPB 2824 or CSCI 2824 or APPM 1345 or APPM 1350 or MATH 1300 or MATH 1310 (all minimum grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 2824 (3) Discrete Structures**
Covers foundational materials for computer science that is often assumed in advanced courses. Topics include set theory, Boolean algebra, functions and relations, graphs, propositional and predicate calculus, proofs, mathematical induction, recurrence relations, combinatorics, discrete probability. Focuses on examples based on diverse applications of computer science.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 2824
**Requisites:** Requires prerequisite or corequisite course of ASEN 1320 or CSCI 1300 or CSPB 1300 or ECEN 1310 (all minimum grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 3022 (3) Introduction to Data Science with Probability and Statistics**
Introduces students to the tools, methods and theory behind extracting insights from data. Covers algorithms of cleaning and munging data, probability theory and common distributions, statistical simulation, drawing inferences from data, and basic statistical modeling.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3022
**Requisites:** Requires prereq or coreq of (ASEN 1320 or CSCI 1300 or CSPB 1300 or ECEN 1310) (APPM 3170 or CSCI 2824 or CSPB 2824 or ECEN 2703 or MATH 2001) (min grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) onl

**CSPB 3104 (4) Algorithms**
Covers the fundamentals of algorithms and various algorithmic strategies, including time and space complexity, sorting algorithms, recurrence relations, divide and conquer algorithms, greedy algorithms, dynamic programming, linear programming, graph algorithms, problems in P and NP, and approximation algorithms.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3104
**Requisites:** Requires prereq course (APPM 3170 or CSCI 2824 or CSPB 2824 or ECEN 2703 or MATH 2001) prereq or coreq course of (CSCI 2270 or CSPB 2270) (all min grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only

**CSPB 3112 (1) Professional Development in Computer Science**
Supports students in developing professional skills and practices in computing, including: preparing for technical and behavioral interviews, professional networking, mastering new technologies not addressed in the curriculum, presenting work, the role of graduate study, and exploring career and research directions.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Requires prerequisite course of CSPB 2270 or CSCI 2270 or CSCI 2275 (minimum grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 3155 (4) Principles of Programming Languages**
Studies principles governing the design and analysis of programming languages and their underlying execution models. Explores values, scoping, recursion, higher-order functions, type systems, control structures, and objects. Introduces formal semantics as a framework for understanding programming features. Introduces advanced programming concepts such as functional programming, higher-order functions, immutable values and structures, inductive types, functors, continuation-passing; and object-oriented programming using inheritance, generics and covariance/contravariance in a functional programming language such as Scala.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3155
**Requisites:** Requires prerequisite courses of (CSCI 2270 or CSPB 2270 or CSCI 2275) and (APPM 3170 or CSCI 2824 or CSPB 2824 or ECEN 2703 or MATH 2001) (all min grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 3202 (3) Introduction to Artificial Intelligence**
Surveys artificial intelligence techniques of search, knowledge representation and reasoning, probabilistic inference, machine learning, and natural language. Knowledge of Python is strongly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3202
**Requisites:** Req. prereq of (CSPB/CSCI2270 or CSCI2275) (APPM3170 or CSPB/CSCI2824 or ECEN2703 or MATH2001) one of: (APPM3570/4570/CHEN3010/CSCI3022/CSPB3022/CVEN3227/ECEN3810/ECON3818/MATH3510/4510/STAT4520) (all min C-). Rstr to AppCompSci post-bac(CSAP).

**CSPB 3287 (3) Design and Analysis of Database Systems**
Introduces the fundamental concepts of database requirements analysis, database design, and database implementation with emphasis on the relational model and the SQL programming language. Introduces the concepts of Big Data and NoSQL systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3287
**Requisites:** Requires prerequisite course of CSCI 2270 or CSCI 2275 or CSPB 2270 (minimum grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 3302 (3) Introduction to Robotics**
Introduces students to fundamental concepts in autonomous robotics: mechanisms, locomotion, kinematics, control, perception and planning. Consists of lectures and lab sessions that are geared toward developing a complete navigation stack on a miniature mobile robotic platform.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3303 and CSCI 3302
**Requisites:** Requires prereqs of (CSCI 2270 or CSPB 2270 or CSCI 2275) (APPM 3170 or CSCI 2824 or CSPB 2824 or ECEN 2703 or MATH 2001) (CSCI 2820 or CSPB 2820)(all min grade C-). Restricted to students in the Applied Computer Science Post-bac program(CSAP) only

**CSPB 3308 (3) Software Development Methods and Tools**
Covers tools and techniques for successful software development with a strong focus on best practices used in industry. Students work in small teams to complete a semester-long application development project. Students learn front-end design and construction using HTML & CSS, back-end database design and construction, and full-stack integration. Students gain exposure to agile methodologies, web services, distributed version control, requirements definition, automated integration testing, and cloud-based application deployment.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3308
**Requisites:** Requires prerequisite or corequisite course of CSPB 2270 or CSCI 2270 or CSCI 2275 (minimum grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 3403 (4) Introduction to CyberSecurity for a Converged World**
Introduces core concepts in cybersecurity including confidentiality, integrity, authentication, risk management, and adversarial thinking. The concepts will be applied to both traditional information technology (IT) systems and cyber physical systems (CPS). At the conclusion of the course students should have a solid foundation in cybersecurity and hands-on experience.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3403
**Requisites:** Requires prerequisite course of CSCI 2400 or ECEN 2360 or ECEN 3350 (minimum grade C-).

**CSPB 3702 (3) Cognitive Science**
Introduces cognitive science, drawing from psychology, philosophy, artificial intelligence, neuroscience, and linguistics. Studies the linguistic relativity hypothesis, consciousness, categorization, linguistic rules, the mind-body problem, nature versus nurture, conceptual structure and metaphor, logic/problem solving and judgment. Emphasizes the nature, implications and limitations of the computational model of mind.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3702 and LING 3005 and PHIL 3310 and PSYC 3005 and SLHS 3003 and CSCI 3702
**Requisites:** Requires prerequisite or corequiste of ASEN 1320 or CSCI 1300 or CSCI 2275 or CSPB 1300 or ECEN 1310 (minimum grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.
**Recommended:** Prerequisites LING 2000 or PHIL 2440 or PSYC 2145.

**CSPB 3753 (4) Design and Analysis of Operating Systems**
Analyzes the software that extends hardware to provide a computing environment, including the role of linkers, file systems, resource sharing, security and networking. Studies the history of operating system organization and design and their influence on security, functionality and reliability.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3753
**Requisites:** Requires prerequisite courses of (CSCI 2270 or CSPB 2270 or CSCI 2275) and (CSCI 2400 or CSPB 2400 or ECEN 3350) (all minimum grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 3832 (3) Natural Language Processing**
Explores the theoretical and practical issues that arise in getting computers to perform useful and interesting tasks with human languages. Topics include information extraction, dialog systems and machine translation. Focus is on the use of language data and machine learning algorithms to build robust systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3832
**Requisites:** Requires prerequisite courses of (CSPB 2270 or CSCI 2270 or CSCI 2275) and (CSPB 2824 or CSCI 2824 or MATH 2001 or ECEN 2703 or APPM 3170) (all minimum grade C-). Restricted to students in the Applied Computer Science Post-bacc program (CSAP) only.

**CSPB 4122 (3) Information Visualization**
Studies interactive visualization techniques that help people analyze data. This course introduces design, development, and validation approaches for interactive visualizations with applications in various domains, including the analysis of text collections, software visualization, network analytics, and the biomedical sciences. It covers underlying principles, provides an overview of existing techniques, and teaches the background necessary to design innovative visualizations.
**Requisites:** Requires prerequisite or corequisite courses CSCI 1300 or CSPB 1300 and CSCI 2824 or CSPB 2824 (all minimum grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 4502 (3) Data Mining**
Introduces basic data mining concepts and techniques for discovering interesting patterns hidden in large-scale data sets, focusing on issues relating to effectiveness and efficiency. Topics covered include data preprocessing, data warehouse, association, classification, clustering, and mining specific data types such as time-series, social networks, multimedia, and Web data.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5502 and CSCI 4502
**Requisites:** Requires prerequisite course of CSPB 2270 or CSCI 2270 or CSCI 2275 (minimum grade C-). Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 4622 (3) Machine Learning**
Introduces students to tools, methods, and theory to construct predictive and inferential models that learn from data. Focuses on supervised machine learning techniques including practical and theoretical understanding of the most widely used algorithms (decision trees, support vector machines, ensemble methods, and neural networks). Emphasizes both efficient implementation of algorithms and understanding of mathematical foundations.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4622
**Requisites:** Prereqs: (CSCI/CSPB2270 or CSCI2275)(1 of APPM3310,CSCI/CSPB2820,MATH2130/2135)(1 of CSCI2824,CSPB2824,ECEN2703,APPM3170,MATH2001) (1 of APPM3570,CSCI/CSPB3022,CVEN3227,ECEN3810,ECON3818,MATH3510,MCEN3047,STAT3100/4000 (all min C-). CSAP students only

**CSPB 4830 (1-4) Special Topics in Applied Computer Science**
Covers topics of interest in applied computer science at the undergraduate level. Content varies from semester to semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students in the Applied Computer Science Post-baccalaureate program (CSAP) only.

**CSPB 4900 (1-3) Upper Division, Undergraduate Level Independent Study**
Provides opportunities for independent study at the upper-division undergraduate level. Students work on a small research problem or tutor lower-division computer science students. Department consent required.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires prerequisite course of CSPB 1300 or CSCI 1300 (minimum grade C-).

# Critical Media Practices (CMDP)

## Courses

**CMDP 1400 (4) Introduction to Critical Media Practices**
Prepares students for critical practices in contemporary media cultures in a global context. Explores the diversity of media practices, including narrative and non-narrative forms, emphasizing aesthetics and visual studies. In lectures and recitations students will explore video, sound, the internet and other multi-media platforms of expression.

**CMDP 2010 (3) Information, Media and Technology**
Surveys the intertwined histories of information, media, and technology production and use through exploration of a shared topic. Examines the political, social, economic, and cultural contexts that underlie the movement toward a digital society. Enhances students¿ abilities to do research, write for multiple audiences, and create publicly-facing digital projects.

**CMDP 2100 (3) Approaches to Historical Media Practices**
Investigate historical and cultural discourses in the formation of media practices. Examines practices such as performance media; cinematic media, media art, and their aesthetic alignment to cognate movements throughout history.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**CMDP 2500 (3) Media Practices I**
Working in design groups, students will explore the expressive potential of media through the production of short projects, discussions, readings, formal analysis, and critique. Provide a basic introduction to media practices as an extension of "visual thinking" and through approaches to storytelling, and hybrid media forms.
**Requisites:** Requires a prerequisite course of CMDP 1400 (minimum grade C-). Restricted to CMDI majors and minors and IUT On-Track students.

**CMDP 2510 (1-3) Critical Media Practices Workshop I**
Training in narrow topics of media practices.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires a prerequisite course of CMDP 2500 (minimum grade C-).

**CMDP 3050 (3) Research/Remix**
This Composition and Expression seminar develops information literacy practices: self-motivated, reflective discovery; critical source evaluation; and responsible, ethical knowledge creation. Encourages the seeking of multiple perspectives and diverse viewpoints through critically informed research, reflection, and creative work. Provides hands-on training in advanced searching, fact-checking, citation, and licensing. Enhances understanding of creators¿ rights and responsibilities. Formerly CMDP 3550.
**Requisites:** Restricted to CMDI majors with 57 or more credit hours.

**CMDP 3110 (3) Electronic Arts Survey**
Explores the development of electronic media art through screenings, readings, lectures and discussions.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 3150 (3) Sonic Histories**
Introduces students to the history and theory of sound, through aesthetic, conceptual, and technological, developments. This course explores the physicality of sound, what sound can do inside and outside the artistic sphere, investigate sounding and listening as cultural and social acts, and study major developments in radio, electronic music, sound art, science and technology studies, and sound studies.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 3210 (3) Immersive and Emergent Media Histories**
Introduces students to the histories and theories of virtual and augmented reality and associated technologies. Examines how interactive media have changed the classical dynamics of human communication, allowing multidirectional, non-linear and multimedia practices. In this course, students will study the various aesthetic, narrative, emotional and cultural elements of VR, AR, and other emergent media.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 3250 (3) Histories of Animation**
This course provides an overview of animation by exploring this form through conceptual, historical, cross-cultural, and technical histories.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**CMDP 3310 (3) Performance Media Cultures**
Reflect on the cultural construction of old and new performance media through the lens of emerging practices and contemporary discourse. From ancient theatre to cinema, interactive television to YouTube, and multi-media dance performances to computer games, this course explores how media shape, and are shaped by, various historical and contemporary audiences and contexts.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 3350 (3) Modes of Documentary Media History**
Introduces students to the variety of practices by examining their emergence, evolution and cultural impact in the global sphere. Students discover the major themes and genres in documentary work from photography, cinema, audio, hypermedia and the public debates they have engendered. Through lectures, screenings and research, develop critical perspectives on the international and transcultural dimensions of documentary media history.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 3400 (3) Media Aesthetics**
Builds students' ability to watch, reflect on, and write about media images. The course will be grounded in the analysis of media practices with special focus on media style and storytelling techniques. Explores media aesthetics from formal, cultural, and theoretical perspectives. Formerly CMDP 2400.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**CMDP 3450 (3) Critical Perspectives in Media Practices**
Examines the contemporary landscape of media practices across platforms, such as film, social media, painting, video, and web art. This integrative exploration focuses on production contexts, circulation and reception through the lens of critical and interpretive frameworks. Drawing from key texts by major scholars and the works of media practitioners, students develop globally informed, critical perspectives for understanding.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 3510 (1-3) Critical Media Practices Workshop II**
Training in narrow topics of media practices. Open to CMDI students and by permission of the instructor.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 3600 (3) Media Practices II**
Focus on developing an understanding of the principles, forms and aesthetics of media production. Working in design groups on small-scale media preproduction and production exercises, screenings and critiques, students learn creative solutions to problems in realizing expressive media projects. Formerly CMDP 2600.
**Requisites:** Requires prerequisite of CMDP 2500 (minimum grade C-). Restricted to CMDI majors and minors and IUT On-Track students.

**CMDP 3610 (3) Intro to Digital Image Making Practices**
Intro to Digital Image Making Practices provides students the technical skills for in depth exploration of the evolving principles and strategies of digital image making. Students will create small-scale projects with the primary emphasis on cinematographic experimentation and innovative visual techniques.
**Requisites:** Requires prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 3620 (3) Images and Stories**
Learn and apply innovative non-traditional approaches to scripting and storytelling, including automatic thinking, idea sketches, visual notes, outlines and storyboards, serials, aleatoric methods, diagrams, locations, photographs and short stories. Focuses on methods of exploring scripting methods outside of the fixed and rule-bound traditional model of storytelling as a means of introducing students to discover their own scripting techniques.
**Requisites:** Requires prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 3700 (3) Digital Photographic Practices**
Explores the creative possibilities of photography; students work on projects that combine concepts and techniques with contemporary practice and current modalities of exhibition and social distribution. Emphasis is placed on the student's personal growth through aesthetic and intellectual development in relation to current technologies. Formerly CMDP 3500.
**Requisites:** Requires prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 3710 (3) Audio/Vision 360**
Introduces techniques, software and related concepts of digital design and image making through individual and group projects. Emphasizes digital animation, digital audio, digital video and website design and development as a means to formal and expressive ends. Introduces students to critical readings and theories related to digital media practice.
**Requisites:** Requires prerequisite course of CMDP 3750 (minimum grade C-).

**CMDP 3720 (3) Multimedia Composition**
Combine writing with media such as video, music, animation and podcasting on the computer. Includes a unit on web-site design and ends with each student creating their own website and positing on it the project they created for the course.
**Requisites:** Requires prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 3730 (3) Media Production Methods and Ideas**
Explores creative approaches to idea formation, conceptualization, and organization for the moving image employing critical thinking, improvisation and visual storytelling techniques. Includes forms of creative writing, storytelling and preproduction techniques and strategies. Previously CMDP 2710.
**Requisites:** Requires prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 3750 (3) Intro to Immersive and Emergent Media**
This course serves at the gateway to the Immersive & Emergent Media concentration. Introduces concepts and practices associated with immersive & emergent media production. Emphasizes hands-on experience such as basic 3D modeling, the fundamentals of coding and interactivity, creating fully immersive extended reality experiences, and experimental applications of microcontrollers.
**Requisites:** Requires CMDP 3600 as either a prerequisite (minimum grade C-) or a corequisite; or MUSC 2081.

**CMDP 3800 (3) Documentary Media Poetics**
This course serves as the gateway to the Documentary Media concentration. Investigates documentary cinema and media practices through class discussions, research papers, hands on exercises and screenings. Cross-references documentary photography and moving-image documentary in the production of short digital projects. Explores the distinctive contributions of digital technologies to documentary image making.
**Requisites:** Requires CMDP 3600 as either a prerequisite (minimum grade C-) or a corequisite; or MUSC 2081.

**CMDP 3820 (3) Performance Media Practices**
Develop a performance vocabulary within the context of various media platforms. Through creating individual and collaborative performance projects, students will explore performance design issues such as movement, blocking and staging with projection, sensors, sound and other media tools.
**Requisites:** Requires a prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 3830 (3) Advanced Performance Media Workshop**
Study practical, technical and theoretical strategies of performing with and through media. This is an in-depth course that investigates a narrow scope drawn from topics that may include dance/movement, the illustrated lecture, projection environments, digital sensing, responsive lighting or acoustic strategies for performance.
**Requisites:** Requires prerequisite course of CMDP 3820 (minimum grade C-).

**CMDP 3840 (3) Sound Practices**
This course serves as the gateway to the Sound Practices concentration. Explores the aesthetics of sound through the study of sound art and sound culture. Reading and discussion covers theories technologies, and histories that drive the medium. Students apply concepts by designing and building their own soundscapes, Class will be organized around hands-on activities, lectures, and discussion of readings.
**Requisites:** Requires CMDP 3600 as either a prerequisite (minimum grade C-) or a corequisite; or MUSC 2081.

**CMDP 3860 (3) Sonic Arts I**
Surveys the various tools and techniques in the field of music technology. Topics include an introduction to basic synthesis, digital signal processing, MIDI and audio sequencing, music notation and a historical perspective on electronic music.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 2061 and MUEL 2061
**Requisites:** Requires prerequisite course of CMDP 3840 (minimum grade C-).

**CMDP 3880 (3) Hearing Image, Seeing Sound**
Explores how artists, filmmakers, composers, and others have forged connections between sound and image, and how we might learn from them to create our own meaningful creative work. Readings and screenings will dig deep into the geneologies of film sound, and students will create their own imaginative combinations of sound and image throughout the semester.
**Requisites:** Requires prerequisite course of CMDP 3840 (minimum grade C-).

**CMDP 3890 (3) Sound Art**
This studio course provides an overview of contemporary sound art and installation, facilitates the development of sonic artwork, and encourages a critical approach to sound and audio practice. How can sound, uniquely powerful in triggering memory and connecting us to the present moment, be used to engage with or challenge specific sites and histories? Class projects might include audio collages, audiovisual works, headphone tours, interactive installations, and public interventions.
**Requisites:** Requires prerequisite course of CMDP 3840 (minimum grade C-).

**CMDP 3910 (3) Media Production Topics**
Rotating topics in media production techniques.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires a prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 3990 (3) Media Professional Seminar**
Learn aspects of professional development in media production. Through workshops, class trips and assignments students will learn of the many opportunities found within media production.
**Requisites:** Requires a prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 4110 (3) Cultures of Digital Sound**
Introduces students to a variety of critical scholarship and debates about our sonic environment through an examination of how sound interfaces with different facets of media production. Consisting of listening, analyzing and differentiating sound in different contexts, students will deepen their understanding of the relationship between sight and sound in cultural production.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 4220 (3) Digital Archives in Media Practices**
Examine the theories and methods underpinning the use of archival materials in non-fiction media production while simultaneously exploring questions of ethics, truth and representation that the use and manipulation of archives raises. Through weekly lectures, seminars, readings and screenings, students will discover the theories and interpretive approaches to understanding the archive and its uses.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 4310 (3) Screen Culture and Globalization**
Examine the formation of screen cultures (narrative, experimental, documentaries and multi-media video art) in the context of the cultural globalization of the moving image. Through lectures, seminars and research projects students explore the formation and evolution of screen cultures on various platforms such as digital cinema, web environments, video art, multi-channel installations and the moving image on mobile interfaces.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 4320 (3) Media Engagement in Digital Diasporas**
Offers students critical and interpretive frameworks for understanding the cultural and historical significance of digital diasporas and these communities' use of digital technologies for communication, community building and the creation of digital documents about migration and connectivity with the homeland.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 4410 (3) Topics in Contemporary Media Technologies**
Focus on the development and application of media technologies in moving image aesthetics and emergent media practices. Topics rotate according to faculty expertise, but may include new imaging technologies for small screen and mobile devices, web-specific media or emerging modes of production. Through lectures, screenings and seminars, students explore the work of contemporary thinkers and practitioners in the field.
**Requisites:** Requires prerequisite course of CMDP 1400 (minimum grade C-).

**CMDP 4610 (3) Small Screen Storytelling**
Shoot footage on or for mobile screens including narratives, microdocumentaries, music videos, short stories and collaborative exquisite corpse projects. Students will complete work and distribute through various outlets on the internet.
**Requisites:** Requires a prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 4620 (3) Media Environments**
Explore the design and implementation of multimedia environments. Students will develop strategies for creating media exhibitions and/or performance environments with projection and sounds activated by sensors. This course is ideal for performers, dancers and media artists as well as those desiring to present information in novel ways, such as working with archival or non-fiction materials.
**Requisites:** Requires prerequisite course of CMDP 3820 (minimum grade C-).

**CMDP 4630 (3) Introduction to Computational Media**
Develop the technical and conceptual skills for computational media practices. Through individual and collaborative projects, students will explore the creative use of electronics and microcontrollers (including wearable and other embedded systems) through relevant programming environments. Introduces visual programming with a focus on signal processing for image and sound.
**Requisites:** Requires a prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 4640 (3) Multimedia Sound**
Learn what sound is and where it comes from; how to create, analyze, alter, mix, and record it digitally in the studio and in the field; and how it can interact creatively with other media. In addition to analyzing how professionals use sound, students will create five sound-based projects of their own.
**Requisites:** Requires prerequisite course of CMDP 3840 (minimum grade C-).

**CMDP 4650 (3) Collaborative Performance Media Making**
Explores the potential of collaborative performance media making through interdisciplinary, collaborative, media-for-live-performance production. Students create their own original performative works, reflect on both their own and their peers' works, and revise and revisit their creative work.
**Requisites:** Requires prerequisite course of CMDP 3820 (minimum grade C-).

**CMDP 4660 (3) Dance for Camera**
Explores the practices and techniques of moving-image production course with an emphasis on capturing human movement. The class develops skills in the areas of camera usage, digital editing, choreography, sound, and visual composition.
**Requisites:** Requires prerequisite course of CMDP 3820 (minimum grade C-).

**CMDP 4710 (3) Projection Practices**
Design and implement projection-based media projects and explore projection practice as a distinct field. Through individual and collaborative projects, this course explores projection for live events, installation, moving images and site-specific or community-based projects. Students will be introduced to emergent software and hardware for projection design.
**Requisites:** Requires a prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 4730 (3) Digital Art and Emergent Technologies**
Explores digital artistic practices across contexts and disciplines in various contexts. Emphasizes web and networked media as it applies to digital practices in sound, image, language, spatial and time-based arts.
**Requisites:** Requires a prerequisite course of CMDP 3600 (minimum grade C-).

**CMDP 4740 (3) Augmented Reality**
Builds on concept and principles learned in CMDP 3750. Introduces more advanced AR technologies and modes of production. Hands-on work allows students to apply theoretical knowledge by designing interactive digital experiences that blend the virtual and physical worlds. Examines ethical and societal implications of AR technology via critical practice and challenges students to evaluate its impact on privacy, accessibility, and cultural norms. Students work independently or in small teams on one semester-long AR project.
**Requisites:** Requires prerequisite course of CMDP 3750 (minimum grade C-).

**CMDP 4750 (3) Virtual Reality**
This course provides technical training in the arena of virtual reality (VR), as well as an in-depth perspective on the history of VR, its practical and artistic applications as well as its societal implications. Throughout the semester students also engage in discussions centered around best practices for immersive storytelling and user experience.
**Requisites:** Requires prerequisite course of CMDP 3750 (minimum grade C-).

**CMDP 4760 (3) Topics in Immersive and Emergent Media**
Apply individual and collaborative skills developed in previous coursework to rotating special topics in immersive & emergent media practices. In this production course, students will investigate and employ specific theories, methods, and techniques to create I+E works. Some topics may prioritize hands-on engagement with new tools and technologies. Areas of focus may include virtual reality, augmented reality, creative coding, AI, and others.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of CMDP 3750 (minimum grade C-).

**CMDP 4810 (3) Advanced Documentary Practices**
Combine research and production to produce short documentary media projects, which explore the world we live in. Focusing on practice, this course explores stylistic options employed on documentaries that give voice to different perspectives on the world. Students will be able to identify the tactics and strategies of documentaries in a variety of media, and will include visits with professional documentary makers. Students will complete a final documentary project.
**Requisites:** Requires prerequisite course of CMDP 3800 (minimum grade C-).

**CMDP 4830 (3) Topics in Documentary Media Practices**
Apply individual and collaborative skills developed in previous coursework to rotating special topics in advanced documentary media arts practice. In this production course, students will investigate and employ specific theories, methods, and techniques for making documentaries. Areas of focus may include documentary cinematography, producing, and postproduction or themes such as engaged documentary, ethnographic media, environmental documentary, social documentary, archival documentary, etc.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of CMDP 3800 (minimum grade C-).

**CMDP 4841 (1-6) Undergraduate Independent Study**
Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**CMDP 4860 (3) Sonic Arts II**
Learn strategies and techniques for generating and manipulating sound with computer-specific tools. Students' projects will include compositions, soundscapes, ambient environments and soundtracks for multimedia and performance projects.
**Requisites:** Requires prerequisite course of CMDP 3860 (minimum grade C-). Restricted to Department of Critical Media Practices (DCMP) undergraduate majors and minors only.

**CMDP 4865 (3) Multimedia Performance and Installation**
Multimedia Performance and Installation is a hands-on introduction to creating live multimedia performances, media art installations, and more. Students will learn to use visual software environments such as Max to patch sounds, data, images, and other media together in exciting ways. These ideas will be synthesized in ongoing workshops, group discussions, and weekly projects, culminating in the creation of a media installation or live performance. No programming knowledge is required, but basic audio skills are recommended.
**Requisites:** Requires prerequisite course of CMDP 3840 (minimum grade C-).
**Recommended:** Prerequisite CMDP 3860 Sonic Arts I (minimum grade C-).

**CMDP 4870 (3) Sound and Technology**
Exploration of issues, techniques and tools of music and sound technology. Topics vary and may include: interactive systems for performance; music and mobile media; electronic music instrument design; digital synthesis and signal processing; music in multimedia; sound practices and analysis. Lecture during work sessions will support student projects.
**Requisites:** Requires prerequisite course of CMDP 3840 or MUEL 2061 (minimum grade C-).

**CMDP 4880 (3) Topics in Sound Practices**
Apply skills developed in previous coursework to rotating special topics in advanced sound practices. In this production course, students will investigate and employ specific theories, methods, and techniques for making sonic arts projects, alone or in conjunction with other media. Areas of focus may include sound installation, electronic music, film sound, podcasting, radio, or other advanced topics.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of CMDP 3840 (minimum grade C-).

**CMDP 4900 (3) Media Practices Capstone**
This Media Production capstone course explores the application of new media technologies in depth and engages students in an ongoing dialogue about the cultural context of new media technologies and their own work. Students will produce a major media project that synthesizes methods of media making into modes of communication and expression. Students are encouraged to take this course during their final semester.
**Requisites:** Requires prerequisite course of CMDP 3600 (minimum grade C-) and a minimum of 95 credit hours. Restricted to Media Production (DCMP) majors (not minors).

**CMDP 4931 (1-6) Internship**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite of CMDP 3600 (minimum grade C-). Restricted to MDPD majors.

**CMDP 5100 (3) Research and Methodologies Seminar**
Explores documentary media preproduction tactics and strategies, including basic research approaches, planning, pre-visualization, stylistic approaches, scheduling, working with archive and documentary materials, and documentary ethics.
**Requisites:** Restricted to graduate students only.

**CMDP 5370 (3) Choreography, Cinematograph: Writing in Motion**
Examine media and moving image aesthetics, tactic and strategies by creating work involving movement and expanded notions of choreography. Within this course students compose images and sounds, structuring them temporally as they explore narrative and non-narrative forms.
**Requisites:** Restricted to graduate students only.

**CMDP 5450 (3) Contemporary Documentary Media**
Explores cross platform documentary media practices and contemporary debates in documentary through a study of documentary history, genre, ethics and changing forms. It develops skills in critically analyzing documentary media.
**Requisites:** Restricted to graduate students only.

**CMDP 5500 (3) Documentary Production Workshops**
Workshopping and developing technical skills in documentary media production.
**Requisites:** Restricted to graduate students only.

**CMDP 5600 (3) Documentary Lab Seminar**
Explores and workshops documentary media projects and ideas from a variety of disciplines. A team-taught course, with affiliated faculty working in design groups within the documentary lab in one or more areas, such as Art and Art History, Anthropology or Geography. A total of 12 hours is required for IDMP MFA candidates.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**CMDP 5650 (3) Documentary Field Work**
Explores distinctive and varied approaches to documentary field work and the uses of media for creative ethnography and other nonfiction practices. A team-taught course, with affiliated faculty from one or more areas such as Art and Art History, Anthropology and Geography.
**Requisites:** Requires a prerequisite course of CMDP 5100 (minimum grade C-). Restricted to graduate students only.

**CMDP 5900 (3) Documentary Production Topics**
Incorporates reflective study and practice in a course that consists of rotating topics in contemporary documentary practices, such as media essays, observation and participation, personal histories and voices, emergent technologies and documentary media, and interpretive ethnography.
**Repeatable:** Repeatable for up to 12.00 total credit hours.

**CMDP 5910 (3) Individual Project Study**
Requires students to conduct self-directed research and production in a seminar setting. Topics relate to individual projects
**Repeatable:** Repeatable for up to 15.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CMDP 6500 (5) Producing Practicum**
Explores advanced producing principles through the preproduction of the MFA thesis project, including the development of a professional project proposal.
**Requisites:** Requires a prerequisite course of CMDP 5650 (minimum grade C-).
**Grading Basis:** Letter Grade

**CMDP 6600 (5) Documentary MFA Thesis Seminar I**
Explores production of MFA thesis product. Focus is on production strategies, ethical challenges and other practical production issues.
**Requisites:** Requires a prerequisite course of CMDP 6500 (minimum grade C-).
**Grading Basis:** Letter Grade

**CMDP 6650 (5) Documentary MFA Thesis Seminar II**
Explores editing and post-production of the MFA thesis project. Emphasizes aesthetic choices (structure, narration and music), distribution, contracts and audience.
**Requisites:** Requires a prerequisite course of CMDP 6600 (minimum grade C-).
**Grading Basis:** Letter Grade

**CMDP 6841 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CMDP 6871 (3) Special Topics**
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**CMDP 7100 (3) Historical Overview of Media Arts and Technology**
Explores a survey of historical trends in art and technology from the Renaissance to the contemporary global scene. Students investigate how artistic disciplines inform one another and how parallel developments in technology have played a significant role in the history of the arts. This course locates media arts within this broader historical context.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CMDP 7150 (3) Theoretical Overview of Media Arts and Technology**
Surveys major theories of art, culture and technology formulated by both practitioners and theoreticians and examines conversations among technology studies, media theory and artistic practice. Students will investigate a variety of approaches, locating media arts within a broad range of theoretical perspectives.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CMDP 7200 (3) Research and Methodologies I**
Introduces students to modalities of research and methodological practices in the context of media arts and technology. Strategies from a variety of academic disciplines will be critically engaged to provide a foundation for future work.
**Grading Basis:** Letter Grade

**CMDP 7300 (3) Theories of the Avant-Garde**
Explores various manifestations of avant-garde and experimental literature, art and media performance in the 20th century such as Cubism, Futurism, Dada, Surrealism, Theatre of the Absurd, the Situationists, Fluxus, Oulipo and others. Media forms analyzed will include manifestos, sound poetry, theatre, the novel, happenings, cinema, installation and other forms of historical avant-garde art practices.
**Grading Basis:** Letter Grade

**CMDP 7400 (3) Contemporary Practices**
Provides students with access to contemporary practices and discourses in media art and culture. The class engages professional practitioners through performances, field work and workshop encounters that may be open to the public. Students research, coordinate and present on biweekly guest presentations, with alternating weeks for reflection and discussion. Readings complement guest presentations.
**Grading Basis:** Letter Grade

**CMDP 7450 (3) Comprehensive Exam Seminar**
Designed in a seminar format, this course reviews literature and concepts in all prior coursework and guides studies in their preparation for comprehensive exams. All ETMAP students must demonstrate their understanding of the fundamental concepts explored and developed in prior coursework in relation to individual areas of research.
**Requisites:** Requires prerequisites of CMDP 7100, CMDP 7200, CMDP 7300, and 6 credit hours of CMDP 7500 (all with a minimum grade of C-).
**Grading Basis:** Letter Grade

**CMDP 7500 (3) Production Methods I**
Provides technical resources for students to work with emergent technologies in a media arts context. This is a team-taught, practice-based course addressing various production methods, from moving image and video to web and network media to computational media.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CMDP 7560 (3) Emergent Technologies: Theory and Practice**
Explores how discreet modalities of media arts practices and their underpinning theoretical perspectives inform each other through the use of technology. Students investigate and develop theoretical perspectives on the exchange between art, technology and theory within their own research and the broader context of the contemporary social and cultural landscape.
**Grading Basis:** Letter Grade

**CMDP 7841 (1-9) Independent Study**
Independent Study
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**CMDP 7871 (3) Special Topics**
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**CMDP 8100 (3) Dissertation Development**
Designed in a seminar format, this course guides students through the development of a practice-based dissertation in which constant critical thinking is required. Through intensive workshopping and close reading, this class guides students from the dissertation proposal to the opening stages of tangible, original research.
**Grading Basis:** Letter Grade

**CMDP 8500 (3) Collaborative Studio Practice I**
Explores approaches to media arts collaboration across disciplines. Through technological and social systems, students investigate the role of the artist. In analyzing contemporary work in an ongoing cycle of discussion, reading and art practice, students will respond to projects, texts and media in form of creative practice.
**Requisites:** Requires a prerequisite course of CMDP 7450 (minimum grade C-).
**Grading Basis:** Letter Grade

**CMDP 8600 (1-6) Independent Studio Critique**
Work under faculty supervision with individual and group critiques focusing on the development of a practice-based dissertation. Designed to be taken in conjunction with CMDP 8100.
**Grading Basis:** Letter Grade

**CMDP 8991 (1-10) Doctoral Dissertation**
**Repeatable:** Repeatable for up to 40.00 total credit hours.
**Requisites:** Restricted to graduate students only.

# Curriculum Emphasis in Social Responsibility (CESR)

## Courses

**CESR 3025 (3) Essential Management Skills**
The course takes as its starting point the fact that not all students will be leaders. A student may end up as an individual contributor, or manager of a small group of people, or an owner of a sole-proprietorship. Students can have a tremendous impact on these roles and the questions becomes, how can they become the best they can be? Formerly MGMT 3025.
**Equivalent - Duplicate Degree Credit Not Granted:** ORGN 3025
**Requisites:** Restricted to Business (BUSNU) majors only.

**CESR 3040 (3) Fundamentals of Socially Responsible Leadership**
Designed to build on the learning from ORGN 3030 and the rest of the management track curriculum, while adding more depth and breadth around the context managers operate within. Techniques used by current business leaders and seminal leadership scholars to prepare students to handle various leadership situations will be explored. Students will engage in oral and written presentations.
**Equivalent - Duplicate Degree Credit Not Granted:** ORGN 3040
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**CESR 3050 (3) Sustainable Space Governance**
As more countries and companies develop extraterrestrial ambitions, the sustainability of space activities is at risk. While outer space is vast, Earth¿s orbit is facing debris, satellite congestion, and radiofrequency interference. Following lessons from exploring Antarctica and the Deep Sea, the course surveys international outer space law and the role of private and public actors in exploration of the final frontier. Students will also consider prospective questions in space governance like planetary settlement and asteroid mining.
**Requisites:** Restricted to Business (BUSN) majors with 52-180 units completed, OR students with the SPAC-Min designation.

**CESR 3060 (3) Our Sustainable Future CU-in-DC Seminar**
Taught in Washington, D.C., this seminar combines traditional classroom learning with diverse site visits with sustainability practitioners, analysts, regulators, and business and community leaders. Students will engage complex and interdependent problems of regional and global sustainability, they will critically explore what role business and science should have in creating environmental policies, and they will learn how stakeholders across the private, non-profit, and public sectors can work collaboratively to achieve a more socially-equitable and environmentally-sustainable world.
**Equivalent - Duplicate Degree Credit Not Granted:** ENLP 3060
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Recommended:** preference will be given to Engineering and Business students.

**CESR 4000 (3) Leadership Challenges**
Focuses on values and leadership at all levels of an organization. High-level executive guest speakers share stories about critical business dilemmas faced in their careers and evaluate student prepared responses to an ethical dilemma they present.
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**CESR 4005 (3) Business Solutions for Global Development**
Explores business opportunities to meet the needs of those living at the base of the economic pyramid. By partnering with organizations such as the Peace Corps and businesses with a social mission, students will learn how business (for-profit, social business, NGOs, social entrepreneurs, etc.) can meet the needs of the poor and operate sustainably.
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 90-180 units completed.

**CESR 4130 (3) Sustainable Operations**
In the last 20 years or so, there has been a revolution in the way that people think about the planet and the roles that business, industry, and individuals have in maintaining it. Sometimes it¿s called sustainability, sometimes the triple-bottom-line ¿ but whatever the terminology, the realities of expanding economies, a growing population, and global warming are prying open our minds and forcing/enabling us to work in a way that is anything but business-as-usual. The challenges are numerous, complex, and daunting. But in the final analysis, business is such a powerful engine that, when fueled by the strategies of sustainability, it presents us with a realistic and hopeful path forward. This course, 4130, Sustainable Operations, will explore the new and rapidly evolving field of sustainability within the context of business operations in sectors like energy, transportation, food, sports and fashion, and will equip students with real-world examples, tools, and new ways to think about work.
**Equivalent - Duplicate Degree Credit Not Granted:** MGMT 413
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**CESR 4430 (3) Corporate Boards in Action**
Allows students from any functional area of business to appreciate the difficulties modern boards and management face. Issues addressed include financial strategy; board composition; executive succession, tenure and compensation; management through crisis; sustainability and corporate social responsibility; the challenges and opportunities presented by globalization and international governance issues.
**Equivalent - Duplicate Degree Credit Not Granted:** ORGN 4430
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**CESR 4440 (3) Privacy in Big Data Analytics**
Privacy = the new currency. In a time where technology allows unprecedented aggregation of personal information use of "private" information is moving faster than social norms and laws can follow. We will dissect the technologies and social trends related primarily to privacy and use of information about individuals to reap profits. A good complement to business intelligence and analytics classes.
**Equivalent - Duplicate Degree Credit Not Granted:** MGMT 4440
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**CESR 4821 (3) Values & Power of the Consumer in Society**
As a critical stakeholder group, consumers have substantial power to shape business behavior. Students will develop an understanding of the roles business can play in society and the options and limitations that consumers have to influence business by exerting their purchasing power. This class is restricted to non-business majors and will not count toward the business major or business minor.
**Requisites:** Open to Non Business and Non Sponsored Students.

**CESR 4825 (3) Experimental Seminar**
Offered irregularly to provide opportunity for investigation of new frontiers in Social Responsibility.

**CESR 4828 (3) Experimental Seminar: Corporate Boards in Action**
Explores the complexity of corporate boards and the need for values-driven leadership. Students will consider corporate governance topics including: financial strategy, international challenges, ethics, corporate social responsibility, board composition, compensation and crisis management. Throughout the course, students will evaluate their own leadership and decision making abilities as they work together in student-run boards to address issues presented in a variety of case studies.
**Equivalent - Duplicate Degree Credit Not Granted:** MGMT 4828
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**CESR 4850 (3) The Sustainable Firm: ESG Strategies and Practice**
Explores the growing global trend of companies to measure, disclose and report for socially responsible initiatives. Integrated reporting combines financial, environmental, social and governance information into a single report. Current practices in sustainability and integrated reporting in the US and across the world will be examined through case studies, guest speakers, current literature and projects. Formerly CESR 4827.
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 90-180 units completed.

**CESR 4900 (1-3) Independent Study**
Intended only for exceptionally well qualified business juniors and seniors. Departmental form required. Department enforced prerequisite: dean and instructor consent.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

# Dance (DNCE)

## Courses

**DNCE 1000 (2) Beginning Contemporary Dance Technique**
Introduces students to the dynamic capabilities of the body as an articulate means of expression. Presents basic concepts and skills from contemporary dance forms that may include Afro-modern, floor work, inversion, classical modern and improvisation. Classwork develops efficient alignment, strength, flexibility, coordination, rhythm, dynamics and spatial awareness. No experience necessary.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nonmajor Technique

**DNCE 1012 (2) Dance Production**
Provides the dancer with an introduction to the types of performance venues available today, and their technical systems and equipment. It will also establish an awareness of how technical theatre design arts may be utilized by a choreographer.
**Requisites:** Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Production

**DNCE 1013 (2) Dance Improvisation**
An opportunity for students to develop skills of dance improvisation through the exploration of structured movement problems. Students study selected contemporary dance artists whose work stresses improvisation in performance and/or as a training vehicle. Department consent required for dance minors.
**Requisites:** Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Creative Process

**DNCE 1017 (3) Dance in Popular Culture and Media**
Explores and contextualizes contemporary popular culture and dance. Introduces methods of critical analysis that reveal the rich heritage hidden within and around the dances students commonly encounter at the club, on the street, on television, on the big screen and elsewhere in everyday life. Through watching, reading, and discussion, students discover new meaning in their lived cultural experience.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Dance and Cultural Studies

**DNCE 1020 (1) Beginning Contemporary Dance with Experience**
Invites students to deepen their somatic awareness, efficient athleticism, and creative voice through the medium of contemporary dance. Continues the investigation of contemporary dance forms that may include Afro-modern, floor work, inversions, classical modern, and improvisation. Classwork will deepen students' alignment, strength, flexibility, coordination, rhythm, dynamics and spatial awareness.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Recommended:** Prerequisite DNCE 1000 or previous dance experience.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nonmajor Technique

**DNCE 1027 (3) Dance in Cultural Perception and Expression**
Explores how the practice of dance can reflect, disrupt, subvert, support, and reinforce cultural expectations, norms and practices. Introduces international and domestic dance traditions and provides context for an interdisciplinary examination. Comparative readings from sociology, anthropology, gender studies, history, post-colonial studies, and political science provide a foundation to understand how cultural identities are negotiated and represented through movement.
**Additional Information:** GT Pathways: GT-AH1 - Arts Hum: Arts Expression
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Dance and Cultural Studies
Departmental Category: Asia Content

**DNCE 1091 (1) Modern 1**
Introduces basic skills of modern dance. In-class technique work increases muscle strength, flexibility, and coordination.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Major Technique

**DNCE 1100 (1) Beginning Ballet**
Introduces beginning students to fundamental aspects of classical ballet technique; no previous experience required. Basic principles of alignment, rotation, and movement quality are introduced as the building blocks for success in advanced material. Foundational movements and ballet vocabulary are learned and refined. Students work toward mastery of simple combinations and rhythmic patterns.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nonmajor Technique

**DNCE 1120 (1) Beginning Ballet with Experience**
Relies on a demonstrated comprehension of kinesthetic and conceptual principles mastered at the beginning level. New movements from the classical ballet vocabulary are introduced with continued emphasis on alignment, rotation, and movement quality. Ballet sequences are longer and more complex.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Recommended:** Prerequisite DNCE 1100 or previous ballet experience.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nonmajor Technique

**DNCE 1190 (1) Ballet 1**
Beginning ballet covering the basic vocabulary of classical ballet technique.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nonmajor Technique

**DNCE 1200 (1) Beginning Jazz Dance**
Introduces various styles of movement unique to jazz dance including improvisation, isolations, and African-influenced polyrhythms. Working within a range of dynamic performance styles, students will learn fundamental dance skills and jazz vocabulary, from which more advanced skills can be developed. Designed for students will little or no dance experience.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nonmajor Technique

**DNCE 1220 (1) Beginning Jazz with Experience**
Digs deeper into syncopated movement style of the jazz vernacular by continuing the embodied investigation of the Africanist influence on the form. Demands a rigorous awareness of efficient alignment while engaging with complex movement and challenging rhythmic structures.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Recommended:** Prerequisite DNCE 1200 or previous dance experience.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nonmajor Technique

**DNCE 1290 (1) Jazz 1**
Introduces jazz dance, consisting of a technique warm-up, locomotion across the floor, and a series of dance phrases developed into a short dance combination.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nonmajor Technique

**DNCE 1301 (2) Hip-Hop Dance Technique 1**
Introduces students to Hip-Hop dance as a culturally significant form. Students learn history, the social and political forces at work, and the fundamental techniques (Campbell Locking, Popping, Breaking etiquette/movements, Hip-Hop Party Dance and House). Intellectual challenge is offered through the lens of critical race theory and historical context. Training addresses flexibility, sequencing, coordination, and performance skills.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Technique

**DNCE 1401 (1) Transnational Fusion Dance: USA and Middle East/North Africa**
Introduces a fusion form popularized in 2000: secular dance traditions of the Middle East/North African (MENA) communities in dialog with popular dances of the hip-hop and underground electronic dance music communities. Stretching, hip work, spinal undulations and poly-rhythmic orientations are covered. Educational highlights include discourse regarding cultural appropriation and gender coding in human movement.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**DNCE 1411 (2) Aerial Dance Technique**
Study of basic technique skills in aerial dance on single point, low-flying trapeze. Additional skills include choreographic techniques, improvisation, and a historical overview of aerial dance. Through theoretical readings and discussions, this course defines the place of aerial dance in the lineage of modern dance and addresses aesthetics, philosophical approaches to teaching, and safety issues.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**DNCE 1501 (1) Tap Technique**
Introduces students to the basic steps and timing of tap technique to develop rhythm, style and clear tap sounds. Exercises focus on building flexibility of the knee and ankles, coordination and speed of movement. A variety of tap styles from Broadway to Rhythm tap will be taught.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Technique

**DNCE 1849 (1-3) Independent Study**
Involves creative or scholarly investigation of an area of interest to the student not addressed in the curriculum. Work must be arranged with and advised by a faculty member. Freshman level course.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Independent Study

**DNCE 1901 (1-3) Technique Practicum**
Broadens students' exposure to a range of diverse movement material. Topical course in dance technique, see subtopic for specific form.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Technique

**DNCE 1908 (1) First Year Dance Seminar**
Designed for new dance majors as an introduction to the place of dance within academia and the professional/public spheres. Through the practice of descriptive dance writing, theoretical and physical exploration of discrete pedagogical and choreographic procedures, and interactions with in-class guest artists of different disciplines, students will engage in independent research and physical experimentation, culminating in a final personal presentation and group performance.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**DNCE 2021 (2) Major Technique**
Designed for Dance majors. Enrollment by audition only.
**Repeatable:** Repeatable for up to 16.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Major Technique

**DNCE 2091 (1) Modern 2**
Continuation of Modern 1. a developmental sequence of modern dance technique designed to refine the technical/expressive skills required of the professional dancer.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Major Technique

**DNCE 2098 (1) Performance/Repertory**
Students learn and perform dances from the repertory of guest artists. Offered summers only.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Performance

**DNCE 2141 (1) Low Intermediate Ballet**
Builds on an existing understanding of alignment, rotation, and movement quality to introduce more mentally and physically difficult movements and enchainements of the classical ballet vocabulary. Students must be able to demonstrate an embodied familiarity with all traditional barre exercises on the first day of class.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Recommended:** Prerequisite DNCE 1120 or previous ballet experience.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Technique

**DNCE 2191 (1) Ballet 2**
Intermediate ballet, covering the complete vocabulary of classical ballet technique. Enchainements are of complex structure.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Major Technique

**DNCE 2290 (1) Jazz 2**
Continuation of Jazz 1. Studies coordination, rhythm, style, and advanced body part isolation in depth.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Nonmajor Technique

**DNCE 2501 (2) African Dance**
Explores the technique, styles, and rhythms of regional and national cultures of Africa. Areas of concentration may vary each semester (e.g. Ghana, Mali, Guinea, etc.). Introduces signature attributes common to different countries' dance traditions and features discussions of the musical traditions, histories, cosmologies, philosophies and aesthetics to contextualize and increase familiarity.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Technique

**DNCE 2701 (2) Contact Improvisation 1**
Investigates movement vocabulary and kinesthetic understanding through physical contact and weight-sharing between two or more dancers. Fundamental skills of contact will be introduced and employed in duets and larger group improvisations: rolling, falling, giving and receiving weight, and the use of momentum and gravity.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Major Technique

**DNCE 2849 (1-3) Independent Study**
Involves creative or scholarly investigation of an area of interest to the student not addressed in the curriculum. Work must be arranged with and advised by a faculty member. Sophomore level course.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Independent Study

**DNCE 2901 (1-3) Technique Practicum 2**
Topical course (second level) in dance technique, see subtopic for specific form. May require an audition.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Major Technique

**DNCE 2909 (1-4) Special Topics**
Explores topics and research in relation to areas such as technology, environment, teaching methods, performance, world dance, arts in society, and/or criticism that the normal sequence of offerings may not allow.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 4909 and DNCE 5909
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Independent Study

**DNCE 3001 (2) Intermediate/Advanced Contemporary Dance Technique**
Challenges intermediate and advanced students to refine their understanding and personal approach to the study of international contemporary dance. Demands a deep sense of somatic awareness, efficient athleticism, and creative voice. Floor work, inversions, and improvisation may be included. No audition required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisite DNCE 1000 or DNCE 1020 or any major technique course ending in "1" or previous dance experience.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Technique

**DNCE 3005 (3) Movement Awareness and Injury Prevention for the Dancer**
Advances safe and effective dance practices supporting longevity and wellness. Areas explored include experiential anatomy, conditioning, alignment, nutrition, injury prevention, care of common dance injuries, and experience with various somatic practices. Instructor approval required to enroll if outside dance major or minor. Formerly DNCE 2005.
**Requisites:** Restricted to Dance (DNCE or DBFA) majors or minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Somatic Awareness

**DNCE 3014 (2) Inside the Groove: Developing Rhythmic Skills**
Enhances rhythmic acuity through intensive rhythmic drills, analytical listening, drumming, notating and creating rhythm-based performance work. Course material explores non-Western rhythmic paradigms, irregular meters, mixed meters, polyrhythms, etc., and how to communicate clearly with a live accompanist in technique class.
**Requisites:** Restricted to Dance (DNCE or DBFA) majors or minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Music

**DNCE 3024 (2) SOUND Choices: Enhancing the Music/Dance Relationship**
Examines how musical choices can profoundly affect audiences, dancers and the creative process. Surveys historic and contemporary music styles and influential artists through guided listening and experimentation. Deepens understanding of music, including vocabulary, technology, collaboration skills, ethics, and copyright issues.
**Requisites:** Restricted to Dance (DNCE or DBFA) majors or minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Music

**DNCE 3033 (3) Choreographic Resources**
Explores movement invention and strategies of choreographic manipulation of body, space and time. Students add to their toolbox of compositional resources through solo and duet studies. Class interrogates and supports the students' developing language for addressing, critiquing and comprehending compositional choices and structures through verbal and written feedback practice. Can be taken out of sequence with DNCE 3043. Formerly DNCE 2033.
**Requisites:** Requires a prerequisite course of DNCE 1013 and DNCE 2021 or DNCE 3041 or DNCE 4061 (minimum grade C-). Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Creative Process

**DNCE 3035 (1) Production Practicum**
Practical production activities and projects within a designated area of dance design, stage technology, or stage management, normally related to the department's season. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Production

**DNCE 3041 (2) Major Technique**
Designed for dance majors. Enrollment by audition only.
**Repeatable:** Repeatable for up to 16.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Major Technique

**DNCE 3043 (3) Choreographic Process**
Examines physical and spatial relationships via group and site specific work. New methods of creative problem solving unearth and mine one's imagination and inspiration, cultivating the individual's unique process of dance-making. Class interrogates and supports students' developing language for addressing, critiquing and comprehending compositional choices and structures through verbal and written feedback practice. Can be taken out of sequence with DNCE 3033.
**Requisites:** Requires prerequisite courses of DNCE 1013 and DNCE 2021 or DNCE 3041 or DNCE 4061 (all minimum grade C-). Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Creative Process

**DNCE 3101 (1-3) Ballet Practicum**
Practical studio training in ballet at the advanced/professional level with a professional company. Designed for dance majors. Enrollment by audition only.
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of DNCE 2141 or DNCE 3161 or DNCE 4181 (minimum grade C-).
**Additional Information:** Departmental Category: Major Technique

**DNCE 3161 (1) Intermediate Ballet**
Surveys a wide range of the intermediate-level classical ballet vocabulary, focusing on an anatomically sound approach to the material. Students must work efficiently to execute the technique with rhythmic accuracy, clarity of line, propriety of style, and fluency in translating names of steps. Enrollment by audition only.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Technique

**DNCE 3241 (1) Intermediate Jazz**
Expands student's performance of the syncopated movement style of the jazz vernacular. Designed for the experienced jazz dancer. Includes dance techniques that further improves alignment, strength, flexibility, and coordination within the jazz idiom through an emphasis on style, rhythm, and more challenging dance combinations.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Recommended:** Prerequisite DNCE 1220 or previous dance experience.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Technique

**DNCE 3301 (2) Hip-Hop Dance Technique 2**
Builds on fundamentals established in Hip-Hop Dance Technique 1. Students deepen their understanding of Hip-Hop history through fundamental movement techniques, specifically, House, and study the social/political forces at work. The course focuses on increasing dancers' capacity for variation, sequencing, musicality and free-styling in Hip-Hop dance. Enrollment by audition only. Meets with DNCE 5331.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Technique

**DNCE 3601 (2) Alexander Technique for Actors and Dancers**
Studies how human reaction, coordination, and movement play a role in all activities. Through in-depth class discussions, movement, exploration, and individualized hands-on lessons, actors and dancers gain an understanding of the technique and its benefits to performance. Meets with DNCE 5601.
**Requisites:** Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) or Theatre (THTR or TBFA, excludes THTR-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Technique

**DNCE 3849 (1-3) Independent Study**
Involves creative or scholarly investigation of an area of interest to the student not addressed in the curriculum. Work must be arranged with and advised by a faculty member. Junior level course.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Independent Study

**DNCE 3901 (1-3) Technique Practicum**
Topical course (intermediate level) in dance technique. See subtopic for specific form. May require an audition.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Technique

**DNCE 3909 (1-4) Special Topics**
Explores topics and research in relation to areas such as technology, environment, teaching methods, performance, world dance, arts in society, and/or criticism that the normal sequence of offerings may not allow.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**DNCE 4012 (1) Concert Production**
Provides practical experience in producing formal and informal dance concerts. Introduces basic familiarity with production and promotional responsibilities, backstage and front-of-house duties and procedures. Meets with DNCE 5012.
**Requisites:** Requires a prerequisite course of DNCE 1012 (minimum grade C-). Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Major Technique

**DNCE 4015 (3) Movement Analysis**
Introduces Rudolf Laban's theories of movement and exposes several body therapies to heighten students' awareness of movement as a multifaceted (neuromuscular/spatial/dynamic) event. Emphasizes refinement of movement, observation skills, and improvement of performance. Meets with DNCE 5015.
**Requisites:** Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Movement Awareness Injury Prevent for the Dancer

**DNCE 4016 (3) Creative Dance for Children**
Methods course for prospective teachers of creative dance for children. Lectures, readings and laboratory experiences are followed by observation and teaching in primary grades.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 5016
**Requisites:** Requires a prerequisite course of DNCE 2033 (minimum grade C-). Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Pedagogy

**DNCE 4017 (3) Dancing Histories: Sex, Gender and Race in U.S. Concert Dance**
Traces the evolution of American concert dance through roots in select dance forms, including dances of the African Diaspora, Ballet, Social Dance, Jazz, Modern, and Folklorico. Studies specific dance artists against the backdrop of social, political, economic, and environmental issues.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 5017
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Dance and Cultural Studies

**DNCE 4023 (2) Performance Improvisation Techniques**
Explores movement and vocal improvisational techniques to enhance creative, interdisciplinary, collaborative and performance skills. Helps individuals expand their definition of performance, discover and access the diversity of the human instrument and employ improvisation to create personal and social commentary.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 5023
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Creative Process

**DNCE 4036 (2) Dance Teaching Practices: Inclusive Approaches to Instruction**
Examines legal, practical, pedagogical and philosophical issues in current dance education. Goals and content of professional and recreational dance training are considered and strategies for effective teaching practice are discussed. All genres of dance may be utilized depending on the specialities of participants.
**Requisites:** Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Pedagogy

**DNCE 4037 (3) Contemporary Concert Dance: Shifting Perspectives in Performance**
Focuses on the development of perceptual, descriptive, and analytical skills as well as the ability to apply cultural and critical theory to 20th and 21st century concert dance. Specific pieces of choreography are looked at from a broad range of perspectives.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite or corequisite a Human Diversity core requirement course.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Dance and Cultural Studies

**DNCE 4038 (1-3) Dance Repertory**
Learning and performing dances from the repertory of current faculty members, artists-in-residence and upon occasion from the repertory of historic modern dancers. Dance majors may repeat up to 9 total credit hours with different instructors. Enrollment by audition only.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 5038
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**DNCE 4046 (1) Teaching Practicum**
Designed to give students supervised practical teaching skills through practice teaching, discussion, observation (in-person and video), reflection and feedback. Students will develop age appropriate lesson plans, define and refine principles of classroom management and understand the needs of diverse groups of students in a community, academic (K-12) and/or studio setting. All genres of dance are topic relevant.
**Requisites:** Requires a prerequisite course of DNCE 4036 (minimum grade C-). Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Departmental Category: Pedagogy

**DNCE 4047 (3) Hip-Hop Dance History**
Addresses the origin and evolution of American Hip-Hop dance rooted in a theoretical structure that springs from the elemental nature of the African Diaspora. Emphasis placed on the social, political, and economic environment in which it was fashioned. Pioneers, innovators, terminology, and styles will be identified. Course includes lectures, readings, audio/video analysis and discussion. Meets with DNCE 5047.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Dance and Cultural Studies

**DNCE 4053 (3) Advanced Dance Composition**
Focuses on deepening the artistic voice and engaging with other art forms. Students explore the integration of technology and collaboration in creative projects and continue to engage in an objective critical process of their own work and the work of others. Meets with DNCE 5053.
**Requisites:** Requires a prerequisite course of DNCE 3043 (minimum grade C-). Restricted to Dance (DNCE or DBFA, excludes DNCE-MIN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Creative Process

**DNCE 4061 (2) Major Technique**
Designed for dance majors. Enrollment by audition only.
**Repeatable:** Repeatable for up to 16.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Major Technique

**DNCE 4128 (1) Ballet Repertory**
Develops understanding of the ballet canon through practice of major solos from Romantic, Classical, and New-Classical ballets. For the advanced classical ballet student. Enrollment by audition only. Meets with DNCE 5128.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Performance

**DNCE 4181 (1) Advanced Ballet**
Investigates the full range of the advanced-level classical ballet vocabulary, focusing on an anatomically sound approach to the material. Exercises require strength and a deeply subtle understanding of principles of alignment, rotation, epaulement, and movement quality. Class moves quickly through enchainements of complex structure. Enrollment by audition only.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Technique

**DNCE 4261 (1) Advanced Jazz Dance Technique**
Refines advanced students' approach to the nuances and virtuosity of jazz idiom. Emphasis is placed on efficient use of alignment, complex polyrhythmic explorations and improvisations, and dynamic performance style. Class moves quickly through material and demands a high level of proficiency. Enrollment by audition only. Meets with DNCE 5261.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Technique

**DNCE 4701 (2) Contact Improvisation 2**
Builds upon skills introduced in DNCE 2701 and moves into more rigorous exploration of weight sharing principles. Emphasis will be placed on ease and efficiency in partnering, and integrating this work into choreography and performance. Meets with DNCE 5701.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Requires a prerequisite course of DNCE 2701 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Major Technique

**DNCE 4849 (1-3) Independent Study**
Involves creative or scholarly investigation of an area of interest to the student not addressed in the curriculum. Work must be arranged with and advised by a faculty member. Senior level course.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Independent Study

**DNCE 4909 (1-4) Special Topics**
Explores topics and research in relation to areas such as technology, environment, teaching methods, performance, world dance, arts in society, and/or criticism that the normal sequence of offerings may not allow.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 2909 and DNCE 5909
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Independent Study

**DNCE 4919 (1-3) Dance Practicum**
Project in dance under supervision of senior faculty.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 5919
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Independent Study

**DNCE 4939 (1-3) Dance Internship**
Provides an opportunity for upper-division dance majors to serve apprenticeships in the community in work areas related to their major interests and career goals. Internships are available in areas such as arts administration, dance therapy, and technical production. Instructor consent rquired.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Independent Study

**DNCE 5001 (1-2) Graduate Technique**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Major Technique

**DNCE 5012 (1) Concert Production**
Meets with DNCE 4012.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Production

**DNCE 5014 (2) Inside the Groove: Developing Rhythmic Skills for Graduates**
Enhances rhythmic acuity through intensive rhythmic drills, analytical listening, drumming, notating and creating rhythm-based performance work. Course material explores non-Western rhythmic paradigms, irregular meters, mixed meters, poly-meter, polyrhythms, etc., and how to communicate clearly with a live accompanist in technique class. Meets with DNCE 3014.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Music

**DNCE 5015 (3) Movement Analysis**
Introduces Rudolf Laban's theories of movement and exposes several body therapies to heighten students' awareness of movement as a multifaceted (neuromuscular/spatial/dynamic) event. Emphasizes refinement of movement, observation skills, and improvement of performance. Meets with DNCE 4015.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Movement Awareness Injury Prevent for the Dancer

**DNCE 5016 (3) Creative Dance for Children**
Methods course for prospective teachers of creative dance for children. Lectures, readings and laboratory experiences are followed by observation and teaching in primary grades.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 4016 (with addition of readings and a paper)
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Pedagogy

**DNCE 5017 (3) Dancing Histories: Sex, Gender and Race in U.S. Concert Dance**
Traces the evolution of American concert dance through roots in select dance forms, including dances of the African Diaspora, Ballet, Social Dance, Jazz, Modern, and Folklorico. Studies specific dance artists against the backdrop of social, political, economic, and environmental issues.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 4017, with addition of graduate papers and/or a project
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Dance and Cultural Studies

**DNCE 5023 (2) Performance Improvisation Techniques**
Explores movement and vocal improvisational techniques to enhance creative, interdisciplinary, collaborative and performance skills. Helps individuals expand their definition of performance, discover and access the diversity of the human instrument and employ improvisation to create personal and social commentary.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 4023 (with the addition of written analysis and creative assignments)
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Creative Process

**DNCE 5024 (2) SOUND Choices: Enhancing the Music/Dance Relationship**
Examines how musical choices can profoundly affect audiences, dancers, and the creative process. Surveys historic and contemporary music styles and influential artists through guided listening and experimentation. Deepens understanding of music, including vocabulary, technology, collaboration skills, ethics, and copyright issues. Meets with DNCE 3024.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Music

**DNCE 5036 (3) Dance Teaching Practices: Inclusive Approaches to Instruction**
Examines legal, practical, pedagogical and philosophical issues in current dance education. Goals and content of professional and recreational dance training are considered and strategies for effective teaching practice are discussed. All genres of dance may be utilized depending on the specialities of participants.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Pedagogy

**DNCE 5038 (1-3) Dance Repertory**
Learning and performing dances from the repertory of current faculty members, artists-in-residence and upon occasion from the repertory of historic modern dancers. Graduate students are required to keep a log of the learning process involved in repertory to document and analyze each work in terms of stylistic differences, musical/sound accompaniment and trends. Dance majors may repeat up to 9 total credit hours with different instructors. Enrollment by audition only.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 4038
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Performance

**DNCE 5047 (3) Hip-Hop Dance History**
Addresses the origin and evolution of American Hip-Hop dance rooted in a theoretical structure that springs from the elemental nature of the African Diaspora. Emphasis placed on the social, political, and economic environment in which it was fashioned. Pioneers, innovators, terminology, and styles will be identified. Course includes lectures, readings, audio/video analysis and discussion. Meets with DNCE 4047.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Dance and Cultural Studies

**DNCE 5048 (3) Performance and Community Engagement**
Engages students in the power of performance for effecting positive social change. Students research collaboratively to create performances and workshop experiences to intentionally author the future they want. Readings provide theoretical foundations that serve as the basis for creative work. Students engage in creative explorations. Open to all forms of performance.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Performance

**DNCE 5052 (1-3) Studio Concert**
Provides the opportunity for choreographic and performative synthesis and experimentation via the execution of a project related to the student's major area of creative research. Project must be approved by the student's first reader.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Production

**DNCE 5053 (3) Advanced Dance Composition**
Meets wtih DNCE 4053.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Creative Process

**DNCE 5056 (2) Graduate Teaching Seminar**
Examines practical, pedagogical, philosophical, and legal issues in current dance education. The goals and content of professional and recreational dance training are considered and strategies for effective teaching practice are discussed. Provides practice in practical application of theoretical material. All genres of dance may be utilized.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Pedagogy

**DNCE 5064 (2) Music and Dance Seminar: Collaboration**
Investigates music in relation to dance performance, choreography, and teaching. Topics may include: a survey of musical styles and composers; direct experimentation with composition and recording techniques; enhancement of rhythmic versatility; work with accompanist/composers; and/or improvement of analytical listening and writing skills.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Music

**DNCE 5101 (1) Intermediate Graduate Ballet**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Major Technique

**DNCE 5128 (1) Ballet Repertory**
Develops understanding of the ballet canon through practice of major solos from Romantic, Classical, and Neo-Classical ballets. For the advanced classical ballet student. Enrollment by audition only. Meets with DNCE 4128.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Performance

**DNCE 5261 (1) Advanced Jazz Dance Technique**
Refines advanced students' approach to the nuances and virtuosity of the jazz idiom. Emphasis is placed on efficient use of alignment, complex polyrhythmic explorations and improvisations, and dynamic performance style. Class moves quickly through material and demands a high level of proficiency. Enrollment by audition only. Meets with DNCE 4261.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Major Technique

**DNCE 5301 (2) Graduate Hip-Hop Technique 1**
Introduces students to Hip-Hop dance as a culturally significant form. Students learn history, the social and political forces at work and the fundamental techniques (Campbell Locking, Popping, Breaking etiquette/ movements, Hip-Hop Party Dance and House). Intellectual challenge is offered through the lens of critical race theory and historical context. Training addresses flexibility, sequencing, coordination and performance skills.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Major Technique

**DNCE 5331 (2) Graduate Hip-Hop Technique 2**
Students deepen their understanding of Hi-Hop history through fundamental movement techniques, specifically, House, and study the social/political forces at work. Focuses on increasing dancers' capacity for variation, sequencing, musicality and free-styling in Hip-Hop dance. Enrollment by audition only. Meets with DNCE 3301.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**DNCE 5339 (1-3) Hip-hop Practicum**
Design and implement an experiential, action¿based learning project that connects to local innovators in the Boulder/Denver Hip-hop community who are engaged in one of Hip-hop culture¿s five elements: mcing, djing, breaking/street dance, graffiti, knowledge. Projects might range from creating a piece of graffiti with a local crew to organizing an academic panel or workshop with a Hip-hop pioneer.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**DNCE 5411 (2) Aerial Dance Technique**
Study of basic technique skills in aerial dance on single point, low-flying trapeze. Additional skills include choreographic techniques, improvisation, and an historical overview of aerial dance. Through the theoretical readings and discussion, this course defines the place of aerial dance in the lineage of modern dance and addresses aesthetics, philosophical approaches to teaching, and safety issues.
**Requisites:** Restricted to graduate students only.

**DNCE 5501 (2) Graduate African Dance**
Explores the technique, styles and rhythms of regional and national cultures of Africa by introducing signature attributes common to different countries' dance traditions. Features discussions of the musical traditions, histories, cosmologies, philosophies and aesthetics to contextualize and increase familiarity. Areas of concentration may vary by each semester (e.g. Ghana, Guinea, Intermediate).
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Major Technique

**DNCE 5601 (2) Alexander Technique for Graduate Students**
Studies how human reaction, coordination, and movement play a role in all activities. Graduate students will explore direct application to dance training, performance, choreography, and teaching. Through in-depth class discussions, movement exploration, and individualized hands-on lessons, actors and dancers gain an understanding of the technique and its benefits to performance. Meets with DNCE 3601.
**Requisites:** Restricted to Dance (DNCE) or Theatre (THTR) graduate students only.
**Additional Information:** Departmental Category: Major Technique

**DNCE 5701 (2) Contact Improvisation 2**
Moves into rigorous exploration of weight sharing principles. Emphasis will be placed on ease and efficiency in partnering, and integrating this work into choreography and performance. Meets with DNCE 4701.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Major Technique

**DNCE 5849 (1-3) Independent Study**
Involves creative or scholarly investigation of an area of interest to the student not addressed in the curriculum. Work must be arranged with and advised by a faculty member.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**DNCE 5901 (1-3) Graduate Technique Practicum**
Offers special courses in the technique series. Course may meet at the same time with an undergraduate studio course and includes the practical movement experience with an additional scholarly study of specially chosen issues in dance.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Major Technique

**DNCE 5909 (1-4) Special Topics**
Explores topics and research in relation to areas such as technology, environment, teaching methods, performance, world dance, arts in society, and/or criticism that the normal sequence of offerings may not allow.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 2909 and DNCE 4909
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**DNCE 5919 (1-3) Dance Practicum**
Project in dance under supervision of senior faculty.
**Equivalent - Duplicate Degree Credit Not Granted:** DNCE 4919
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**DNCE 6016 (2) Teaching Lab-Contemporary Dance**
Provides opportunity to apply principles and skills introduced in DNCE 5056. Participating students share the responsibility for teaching a lab class that meets twice a week. Focuses on development, analysis and evaluation of teaching skills.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Pedagogy

**DNCE 6017 (3) Cultural Collisions and Ethics in Dance and Movement Performance**
Explores the inevitable transformation of traditions in dance/movement performance, using hip-hop and transnational fusion as foundation studies. As students expand their application of ethical inquiry, we will investigate what responsibility artists have as ambassadors in a digital culture. Films, readings and discussions will address personal integrity, ethics, industry practices, values and distortions imparted by history and socialization.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Dance and Cultural Studies

**DNCE 6047 (3) Dance Studies**
Studies current dance trends, mostly in the United States, with particular attention paid to dance's intersection with philosophy, theory, technology, politics, current events and the other arts.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Dance and Cultural Studies

**DNCE 6056 (2) Professional Development**
Examines current trends and issues in dance education and the professional dance world. Explores curriculum development, administration, and job opportunities along with other topics such as grant writing, community engagement, dance advocacy, and working as an independent artist.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Pedagogy

**DNCE 6073 (3) Choreography**
Covers in-depth practical and theoretical approaches to dance composition for graduate students; solo and group forms; and analysis of historical and contemporary dance works.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Creative Process

**DNCE 6101 (1) Advanced Graduate Ballet**
Open only to graduate dance majors.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Major Technique

**DNCE 6849 (1-3) Independent Study**
Involves creative or scholarly investigation of an area of interest to the student not addressed in the curriculum. Work must be arranged with and advised by a faculty member.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**DNCE 6919 (1-3) Directed Studies**
Explores advanced topics in dance not regularly covered in the curriculum of the graduate program.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**DNCE 6949 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**DNCE 6959 (1-6) Master's Thesis**
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**DNCE 6969 (1-6) The Graduate Project**
Provides the opportunity for synthesizing the graduate experience through the execution of a project related to the student's major area of interest. Project must be approved by the graduate faculty advisor.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Dance (DNCE) graduate students only.
**Additional Information:** Departmental Category: Independent Study

# Danish (DANE)

## Courses

**DANE 1010 (4) Beginning Danish 1-DILS**
Provides practical, communicative language skills for use in a variety of situations. Examines basic language structure and grammatical forms. Introduces students to Danish history and contemporary culture and society.
**Additional Information:** Departmental Category: Danish Courses

**DANE 1020 (4) Beginning Danish II-DILS**
Provides practical, communicative language skills for use in a variety of situations. Examines basic language structure and grammatical forms. Introduces students to Danish history and contemporary culture and society. Department enforce prerequisite: DANE 1010 (min grade C-).
**Additional Information:** Departmental Category: Danish Courses

**DANE 2010 (4) Intermediate Danish I - DILS**
Building on the skills that the students have acquired in Beginners Danish I-II, this course offers additional reading, writing, speaking and verbal comprehension. Students will learn to conduct business at a government office, talk about holidays and festivals and discuss conservation and environmental protection. They will read and write small texts, becoming exposed to differences between written and spoken Danish.
**Requisites:** Requires prerequisite course of DANE 1020 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Danish Courses

**DANE 2020 (4) Intermediate Danish II - DILS**
Offers extensive reading, writing, speaking and verbal comprehension skills in Danish. The students will discuss Danish history, cultural differences and stereotypes, politics, social groups, learn how to write letters and email in Danish, read short texts and write short essays on the above topics.
**Requisites:** Requires prerequisite course of DANE 2010 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Danish Courses

# Data Science Online (DTSA)

## Courses

The following courses are only available through CU Boulder on Coursera program offerings. Please refer to the Online Programs (p. 1895) section of the catalog for more information.

**DTSA 5001 (1) Probability Foundations for Data Science and AI**
Probability Theory covers the foundations of probability and its relationship to statistics and data science. Calculate a probability, independent and dependent outcomes, and conditional events. Understand discrete and continuous random variables and see how this fits with data collection. Learn Gaussian (normal) random variables and the Central Limit Theorem and understand it¿s fundamental importance for statistics and data science.
**Equivalent - Duplicate Degree Credit Not Granted:** APPA 5001
**Grading Basis:** Letter Grade

**DTSA 5002 (1) Statistical Estimation for Data Science and AI**
Introduction to statistical inference, sampling distributions, and confidence intervals. Learn how to define and construct good estimators, method of moments estimation, maximum likelihood estimation, and methods of constructing confidence intervals that will extend to more general settings.
**Equivalent - Duplicate Degree Credit Not Granted:** APPA 5003
**Grading Basis:** Letter Grade

**DTSA 5003 (1) Hypothesis Testing for Data Science**
This course will focus on theory and implementation of hypothesis testing, especially as it relates to applications in data science. Students will learn to use hypothesis tests to make informed decisions from data. Special attention will be given to the general logic of hypothesis testing, error and error rates, power, simulation, and the correct computation and interpretation of p-values. Attention will also be given to the misuse of testing concepts, especially p-values, and the ethical implications of such misuse.
**Grading Basis:** Letter Grade

**DTSA 5011 (1) Modern Regression Analysis in R**
Modern Regression Analysis in R provides foundational statistical modeling tools for data science. Introduction to methods, theory, and applications of linear statistical models, covering the topics of parameter estimation, residual diagnostics, goodness of fit, and various strategies for variable selection and model comparison. Attention will also be given to the misuse of statistical models and ethical implications of such misuse.
**Grading Basis:** Letter Grade

**DTSA 5012 (1) ANOVA and Experimental Design**
Introduction to the analysis of variance (ANOVA), analysis of covariance (ANCOVA), and experimental design. ANOVA and ANCOVA, presented as a type of linear regression model, provide mathematical basis for designing experiments for data science applications. Emphasis placed on important design-related concepts, such as randomization, blocking, factorial design, and causality. Attention will also be given to ethical issues raised in experimentation.
**Grading Basis:** Letter Grade

**DTSA 5013 (1) Generalized Linear Models and Nonparametric Regression**
Generalized Linear Models and Nonparametric Regression teaches generalized linear models (GLMs), which provide an introduction to classification (through logistic regression); nonparametric modeling, including kernel estimators, smoothing splines; and semi-parametric generalized additive models (GAMs). Emphasis will be placed on a firm conceptual understanding of these tools. Attention will also be given to ethical issues raised by using complicated statistical models.
**Grading Basis:** Letter Grade

**DTSA 5020 (1) Statistical Learning for Data Science: Regression and Classification**
Consists of the foundational framework & application of simple and multiple linear regression and classification methods.
**Grading Basis:** Letter Grade

**DTSA 5021 (1) Statistical Learning for Data Science: Resampling, Selection and Splines**
Consists of the foundational framework & application of cross-validation, bootstrapping, dimensionality reduction, ridge regression, lasso, GAMs and splines.
**Grading Basis:** Letter Grade

**DTSA 5022 (1) Statistical Learning for Data Science: Trees, SVM and Unsupervised Learning**
Consists of the foundational framework & application of tree-based methods, support vector machines, and unsupervised learning.
**Grading Basis:** Letter Grade

**DTSA 5301 (1) Data Science as a Field**
This course provides a general introduction to the field of Data Science. It is designed for aspiring data scientists, content experts who work with data scientists, or anyone interested in learning about what Data Science is and what it¿s used for. Topics include the past, present, and future of the field; the academic disciplines that both practice and make use of Data Science; collaboration between data scientists and content experts; and the practice of Data Science in the professional world. This course is part of CU Boulder¿s Master¿s of Science in Data Science and was collaboratively designed by both academics and industry professionals to provide learners with an insider¿s perspective on this exciting, evolving, and increasingly vital discipline.
**Grading Basis:** Letter Grade

**DTSA 5302 (1) Cybersecurity for Data Science**
This course aims to help anyone interested in data science understand the cybersecurity risks and the tools/techniques that can be used to mitigate those risks. We will cover the distinctions between confidentiality, integrity, and availability, introduce learners to relevant cybersecurity tools and techniques including cryptographic tools, software resources, and policies that will be essential to data science. We will explore key tools and techniques for authentication and access control so producers, curators, and users of data can help ensure the security and privacy of the data.
**Grading Basis:** Letter Grade

**DTSA 5303 (1) Ethical Issues in Data Science**
This course examines ethical issues related to data science, with the objective of making data science professionals aware of and sensitive to ethical considerations that may arise in their careers. It focuses on ethical frameworks, data science applications that lead to ethical considerations, current media and scholarly articles, and the perspectives and experiences of fellow students and computing professionals.
**Grading Basis:** Letter Grade

**DTSA 5304 (1) Fundamentals of Data Visualization**
Explores the design, development, and evaluation of information visualizations. Combine aspects of design, computer graphics, HCI, and data science, to gain hands-on experience with creating visualizations, using exploratory tools, and architecting data narratives. Topics include user-centered design, web-based visualization, data cognition and perception, and design evaluation.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5702
**Grading Basis:** Letter Grade

**DTSA 5501 (1) Algorithms for Searching, Sorting, and Indexing**
This course covers basics of algorithm design and analysis, as well as algorithms for sorting arrays, data structures such as priority queues, hash functions, and applications such as Bloom filters.
**Grading Basis:** Letter Grade

**DTSA 5502 (1) Trees and Graphs: Basics**
Basic algorithms on tree data structures, binary search trees, self-balancing trees, graph data structures and basic traversal algorithms on graphs. This course also covers advanced topics such as kd-trees for spatial data and algorithms for spatial data.
**Grading Basis:** Letter Grade

**DTSA 5503 (1) Dynamic Programming, Greedy Algorithms**
This course covers basic algorithm design techniques such as divide and conquer, dynamic programming, and greedy algorithms. It concludes with a brief introduction to intractability (NP-completeness) and using linear/integer programming solvers for solving optimization problems.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5414
**Grading Basis:** Letter Grade

**DTSA 5504 (1) Data Mining Pipeline**
This course introduces the key steps involved in the data mining pipeline, including data understanding, data preprocessing, data warehouse, data modeling, interpretation and evaluation, and real-world applications.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5502
**Grading Basis:** Letter Grade

**DTSA 5505 (1) Data Mining Methods**
This course covers core techniques used in data mining, including frequent pattern analysis, classification, clustering, outlier detection, as well as time-series mining and graph mining.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5512
**Grading Basis:** Letter Grade

**DTSA 5506 (1) Data Mining Project**
This course offers step-by-step guidance and hands-on experience of designing and implementing a real-world data mining project, including problem formulation, literature survey, proposed work, evaluation, discussion and future work.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5522
**Grading Basis:** Letter Grade

**DTSA 5507 (1) Fundamentals of Software Architecture for Big Data**
Intended for individuals looking to understand the basics of software engineering as they relate to building large software systems that leverage big data. Students will be introduced to software engineering concepts necessary to build and scale large, data intensive, distributed systems. Starting with software engineering best practices and loosely coupled, highly cohesive data microservices, the course takes students through the evolution of a distributed system over time. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5008
**Grading Basis:** Letter Grade

**DTSA 5508 (1) Software Architecture Patterns for Big Data**
Intended for individuals looking to understand the architecture patterns necessary to take large software systems that leverage big data to production. Students will transform big data prototypes into high quality tested production software. After measuring the performance characteristics of distributed systems, they will identify trouble areas and implement scalable solutions to improve performance. Upon completion of the course they will know how to scale production datastores to perform under load, designing load tests to ensure applications meet performance requirements. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5018
**Grading Basis:** Letter Grade

**DTSA 5509 (1) Introduction to Machine Learning: Supervised Learning**
This course introduces various supervised ML algorithms and prediction tasks applied to different data. Specific topics include linear and logistic regression, KNN, Decision trees, ensemble methods such as Random Forest and Boosting, and kernel methods such as SVM. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5622
**Grading Basis:** Letter Grade

**DTSA 5510 (1) Unsupervised Algorithms in Machine Learning**
Students will learn selected unsupervised learning methods for dimensionality reduction, clustering, finding latent features, and application cases such as recommender systems with hands-on examples of product recommendation algorithms. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5632
**Grading Basis:** Letter Grade

**DTSA 5511 (1) Introduction to Deep Learning**
Course will cover the basics of deep learning, such as multilayer perceptron, convolutional neural network, recurrent neural network, how to build and train neural network models, optimization methods, and application examples. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5642
**Grading Basis:** Letter Grade

**DTSA 5512 (1) Introduction to Computer Vision**
This course guides students through the essential algorithms and methods to help computers 'see' and interpret visual data. Students learn the core concepts and techniques that have been traditionally used to analyze images. Then, students learn modern deep learning methods, such as neural networks and specific models designed for image recognition, can be used to perform more complex tasks like object detection and image segmentation. Additionally, students will learn the creation and impact of AI-generated images and videos, exploring the ethical considerations of such technology.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5222
**Grading Basis:** Letter Grade

**DTSA 5513 (1) Deep Learning for Computer Vision**
This course introduces students to the core principles of neural networks and deep learning, focusing on their application in computer vision. Covering advanced CNN architectures like ResNet, Inception, and DenseNet, along with techniques in object detection (R-CNN, SSD, YOLO) and semantic segmentation (FCN, SegNet, U-Net), this course offers a comprehensive overview of theory and practical skills.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5322
**Grading Basis:** Letter Grade

**DTSA 5514 (1) Modern AI Models for Vision and Multimodal Understanding**
This course delves into the cutting-edge realm of generative models for images and videos, including GANs and Diffusion Models. It will teach about multimodal foundational models such as CLIP, as well as applications for text-to-image and text-to-video generation. The course also addresses the issue of DeepFakes. Through both practical exercises and theoretical discussion, students will explore the ethical considerations, privacy concerns, and future trends in computer vision.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5422
**Grading Basis:** Letter Grade

**DTSA 5701 (1) Introduction to High Performance and Parallel Computing**
This course introduces the fundamentals of high-performance and parallel computing, and the software skills necessary for work in parallel software environments. These skills include big-data analysis, machine learning, parallel programming, and optimization. It covers the basics of Linux environments and bash scripting all the way to high throughput computing and parallelizing code.
**Grading Basis:** Letter Grade

**DTSA 5702 (1) Efficient Programming**
This course teaches learners the skills needed to develop software to run efficiently in high-performance computing environments or in the cloud. Students will have understand how to find bottlenecks in their programs as well as how to address those bottlenecks. The course will provide a high-level introduction to modern compute node architectures of high-performance and cloud computing instances.
**Grading Basis:** Letter Grade

**DTSA 5703 (1) Parallel Computing with MPI**
Provides a high-level introduction to modern computer node architectures of high-performance and cloud computing instances. This course is targeted to scientists, engineers, scholars, or anyone seeking to develop the software that needs to run efficiently on high-performance computing environments or in the cloud. For this course, students need basic programming skills in either C++, Fortran 90, or Python in addition to basic Linux skills. Students completing this course will have a basic understanding of how to find bottlenecks in their programs as well as how to address those bottlenecks. The course will provide a high-level introduction to modern compute node architectures of high-performance and cloud computing instances.
**Grading Basis:** Letter Grade

**DTSA 5704 (1) Managing, Describing, and Analyzing Data**
This course teaches the fundamentals of understanding data and the importance of correctly classifying data. This course covers how to describe data using descriptive statistics and R software, the four probability distributions commonly used in data analysis, steps for analyzing data sets using the appropriate probability distribution, and the basics of sampling error, sampling distributions, and errors in decision-making.
**Grading Basis:** Letter Grade

**DTSA 5705 (1) Stability and Capability in Quality Improvement**
Students will learn to analyze data in terms of process stability and statistical control and why having a stable process is imperative prior to performing statistical hypothesis testing. Students will create statistical process control charts for both continuous and discrete data using R software. Students will analyze data sets for statistical control using control rules based on probability. Additionally, students will learn how to assess a process with respect to how capable it is of meeting specifications, either internal or external, and make decisions about process improvement.
**Grading Basis:** Letter Grade

**DTSA 5706 (1) Measurement Systems Analysis**
Students will learn to analyze measurement systems for process stability and statistical control and why having a stable measurement process is imperative prior to performing any statistical analysis. Students will analyze continuous measurement systems and statistically characterize both accuracy and precision using R software. Students will perform measurement systems analysis for potential, short term and long term statistical control and capability.
**Grading Basis:** Letter Grade

**DTSA 5707 (1) Deep Learning Applications for Computer Vision**
Students will learn about Computer Vision as a field of study and research. They explore several Computer Vision tasks and suggested approaches, from the classic Computer Vision perspective. They'll be introduced to Deep Learning methods and apply them to some of the same problems. They will analyze the results and discuss advantages and drawbacks of both types of methods. Examples of Computer Vision tasks where Deep Learning can be applied include: image classification, image classification with localization, object detection, object segmentation, facial recognition, and activity or pose estimation.
**Grading Basis:** Letter Grade

**DTSA 5714 (1) Applications of Software Architecture for Big Data**
Intended for individuals who want to build a production-quality software system that leverages big data. Students will apply the basics of software engineering and architecture to create a production-ready distributed system that handles big data. Students will build and scale a large, data intensive, distributed system, composed of loosely coupled, highly cohesive data microservices.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5028
**Grading Basis:** Letter Grade

**DTSA 5718 (1) Computing, Ethics, and Society 1 - Foundations**
Computing systems and technologies fundamentally impact the lives of most people in the world, including how we communicate, get information, socialize, and receive healthcare. This course is the first of a three course sequence that examines ethical issues in the design and implementation of computing systems and technologies, and reflects upon the broad implication of computing on our society. It covers ethical theories, privacy, security, social media, and misinformation.
**Grading Basis:** Letter Grade

**DTSA 5719 (1) Computing, Ethics, and Society 2 - Algorithmic Bias and Professional Ethics**
Computing systems and technologies fundamentally impact the lives of most people in the world, including how we communicate, get information, socialize, and receive healthcare. This course is the second of a three course sequence that examines ethical issues in the design and implementation of computing systems and technologies, and reflects upon the broad implication of computing on our society. It covers algorithmic bias in machine learning methods, professional ethics, and issues in the tech workplace.

**DTSA 5720 (1) Computing, Ethics, and Society 3 - Applications**
Computing systems and technologies fundamentally impact the lives of most people in the world, including how we communicate, get information, socialize, and receive healthcare. This course is the third of a three course sequence that examines ethical issues in the design and implementation of computing systems and technologies, and reflects upon the broad implication of computing on our society. It covers medical applications, uses of robotics, autonomous vehicles, and the future of work.
**Grading Basis:** Letter Grade

**DTSA 5721 (0.7) Neural Networks and Deep Learning**
In the first course of the Deep Learning Specialization, you will study the foundational concept of neural networks and deep learning. By the end, you will be familiar with the significant technological trends driving the rise of deep learning; build, train, and apply fully connected deep neural networks; implement efficient (vectorized) neural networks; identify key parameters in a neural network¿s architecture; and apply deep learning to your own applications.
**Grading Basis:** Letter Grade

**DTSA 5722 (0.5) Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization**
In the second course of the Deep Learning Specialization, you will open the deep learning black box to understand the processes that drive performance and generate good results systematically. By the end, you will learn the best practices to train and develop test sets and analyze bias/variance for building deep learning applications; be able to use standard neural network techniques such as initialization, L2 and dropout regularization, hyperparameter tuning, batch normalization, and gradient checking; implement and apply a variety of optimization algorithms, such as mini-batch gradient descent, Momentum, RMSprop and Adam, and check for their convergence; and implement a neural network in TensorFlow.
**Grading Basis:** Letter Grade

**DTSA 5723 (0.4) Structuring Machine Learning Projects**
In the third course of the Deep Learning Specialization, you will learn how to build a successful machine learning project and get to practice decision-making as a machine learning project leader. By the end, you will be able to diagnose errors in a machine learning system; prioritize strategies for reducing errors; understand complex ML settings, such as mismatched training/test sets, and comparing to and/or surpassing human-level performance; and apply end-to-end learning, transfer learning, and multi-task learning. This is also a standalone course for learners who have basic machine learning knowledge. This course draws on Andrew Ng¿s experience building and shipping many deep learning products. If you aspire to become a technical leader who can set the direction for an AI team, this course provides the "industry experience" that you might otherwise get only after years of ML work experience.
**Grading Basis:** Letter Grade

**DTSA 5724 (0.7) Convolutional Neural Networks**
In the fourth course of the Deep Learning Specialization, you will understand how computer vision has evolved and become familiar with its exciting applications such as autonomous driving, face recognition, reading radiology images, and more. By the end, you will be able to build a convolutional neural network, including recent variations such as residual networks; apply convolutional networks to visual detection and recognition tasks; and use neural style transfer to generate art and apply these algorithms to a variety of image, video, and other 2D or 3D data.
**Grading Basis:** Letter Grade

**DTSA 5725 (0.7) Sequence Models**
In the fifth course of the Deep Learning Specialization, you will become familiar with sequence models and their exciting applications such as speech recognition, music synthesis, chatbots, machine translation, natural language processing (NLP), and more. By the end, you will be able to build and train Recurrent Neural Networks (RNNs) and commonly-used variants such as GRUs and LSTMs; apply RNNs to Character-level Language Modeling; gain experience with natural language processing and Word Embeddings; and use HuggingFace tokenizers and transformer models to solve different NLP tasks such as NER and Question Answering.
**Grading Basis:** Letter Grade

**DTSA 5726 (1) Introduction to Bayesian Statistics for Data Science**
This course introduces the theoretical, philosophical, and mathematical foundations of Bayesian Statistical inference. Students will learn to apply this foundational knowledge to real-world data science problems. Topics include the use and interpretations of probability theory in Bayesian inference; Bayes¿ theorem for statistical parameters; conjugate, improper, and objective priors distributions; data science applications of Bayesian inference; and ethical implications of Bayesian statistics.
**Grading Basis:** Letter Grade

**DTSA 5727 (1) Computational Bayesian Statistics for Data Science**
This course introduces students to the theoretical underpinnings and applications of computational algorithms in Bayesian statistics. Topics include maximum a posteriori estimation; rejection sampling; and Markov chain Monte Carlo algorithms, such as the Gibbs sampler and several variations of the Metropolis-Hastings algorithm. This course also provides an introduction to the Stan computing environment.
**Grading Basis:** Letter Grade

**DTSA 5728 (1) Bayesian Statistical Modeling for Data Science Applications**
This course introduces students to applied Bayesian statistical modeling. Topics include Bayesian linear regression, Bayesian generalized linear models, and an introduction to Bayesian hierarchal modeling. Special emphasis will be placed on the application of maximum a posterior estimation and Markov chain Monte Carlo algorithms on Bayesian statistical models. This course also demonstrate Bayesian statistical modeling in the Stan computing environment.
**Grading Basis:** Letter Grade

**DTSA 5733 (1) Relational Database Design**
This course will prepare students with the tools needed to design a Relational Database System. Formerly offered as a special topics course.
**Grading Basis:** Letter Grade

**DTSA 5734 (1) The Structured Query Language (SQL)**
In this course students will thoroughly learn the Structured Query Language. Study includes all ANSI standard SQL commands and syntax. Lectures are supplemented with thorough hands-on lab assignments and exercises. Formerly offered as a special topics course.
**Grading Basis:** Letter Grade

**DTSA 5735 (1) Advanced Topics and Future Trends in Database Technologies**
The course will have an overview of future trends in databases, including non-relational databases (NoSQL) and Big Data. Formerly offered as a special topics course.
**Grading Basis:** Letter Grade

**DTSA 5736 (1) When to Regulate? The Digital Divide and Net Neutrality**
This is the first of three courses exploring Internet Policy: Principles and Problems, which is part of CU Boulder¿s Masters of Science in Data Science and Master of Science in Computer Science programs on Coursera. This course builds an interdisciplinary policy framework to critique and develop regulatory approaches to real-world problems on the Internet. Learners then use the framework to develop a definition of broadband to improve the Digital Divide and to evaluate net neutrality regulations.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5433
**Grading Basis:** Letter Grade

**DTSA 5737 (1) Protecting Individual Privacy on the Internet**
This is the second of three courses exploring Internet Policy: Principles and Problems, which is part of CU Boulder¿s Master of Science in Data Science and Master of Science in Computer Science programs on Coursera. This course critiques and develops regulatory approaches to real-world privacy problems created by the Internet. Learners will create a privacy brief based upon the exposure of their own private information when surfing the web. Successful completion of the first course in this series is recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5443
**Recommended:** Prerequisite DTSA 5736/CSCA 5433.
**Grading Basis:** Letter Grade

**DTSA 5738 (1) Cybersecurity in Crisis: Information and Internet Security**
This is the third of three courses exploring Internet Policy: Principles and Problems, which is part of CU Boulder¿s Master of Science in Data Science and Master of Science in Computer Science programs on Coursera. This course examines policy approaches to real-world cybersecurity problems occurring on the Internet. Learners will develop a privacy brief on a cybersecurity government policy, law or regulation of their choice. Successful completion of the first course in this series is recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5453
**Recommended:** Prerequisites DTSA 5736/CSCA 5433 and DTSA 5737/CSCA 5443.
**Grading Basis:** Letter Grade

**DTSA 5739 (1) Security and Ethical Hacking: Attacking Web and AI**
In this last course of the sequence, students will learn how web application and server attacks are conducted against a variety of web technologies and frameworks. In addition, we will introduce the topic of Adversarial Machine Learning and attacks in the Artifical Intelligence domain, including Language Model systems. Students will gain an elementary understanding of the science and techniques behind these attacks, with an appropriate introduction to the AI world. Course assessments are through quizzes, hands-on exercises and an exam.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5323
**Grading Basis:** Letter Grade

**DTSA 5740 (1) Global Climate Policies and Analysis**
This course explores and critically analyzes historical and contemporary climate policies (e.g. Kyoto Protocol and the Paris Agreement). Political issues pertaining to energy sources, such as nuclear energy, will be reviewed. The course will focus on understanding key climate principles and terms surrounding policy development, specifically for low-income or developing countries/communities. Further, this course explores up-to-date technologies that are used in climate analysis. This course also introduces the Python programming language.
**Grading Basis:** Letter Grade

**DTSA 5741 (1) Modeling Climate Anomalies with Statistical Analysis**
This course introduces the use of statistical analysis in Python programming to study and model climate data, specifically with the SciPy and NumPy package. Topics include data visualization, predictive model development, simple linear regression, multivariate linear regression, multivariate linear regression with interaction, and logistic regression. Strong emphasis will be placed on gathering and analyzing climate data with the Python programming language.
**Recommended:** Prerequisite DTSA 5740 - Global Climate Change Policies and Analysis.
**Grading Basis:** Letter Grade

**DTSA 5742 (1) Predicting Extreme Climate Behavior with Machine Learning**
This course reviews current global climate policies with the goal of gathering data and applying machine learning algorithms to predict extreme climate behaviors, specifically in developing countries. Topics include multivariate linear regression, time-series analysis, and numerical weather prediction. The use of monte carlo simulations to forecast extreme weather events will be analyzed. Strong emphasis will be placed on application in the Python programming language.
**Recommended:** Prerequisites DTSA 5740 and DTSA 5741.
**Grading Basis:** Letter Grade

**DTSA 5743 (1) Cryptography and Information Theory**
This course combines cryptography (the techniques for protecting information from unauthorized access) and information theory (the study of information coding and transfer). More specifically, the course studies cryptography from the information-theoretical perspectives and discusses he concepts such as information entropy and the adversary¿s knowledge capability, e.g., Kerckhoff¿s Principle. It also contrasts the information-theoretic security and computational security to highlight the different train of thoughts that drive the cryptographic algorithmic construction and security analyses.
**Grading Basis:** Letter Grade

**DTSA 5744 (1) Symmetric Cryptography**
This course teaches the principles, requirements, constructions, and applications of symmetric cryptography based on the shared secret key. The course describes substitution and transposition techniques which have been invented before computers. Then, we build on the product ciphers to learn about the modern block ciphers and review the popular cipher algorithms of DES, 3-DES, and AES. We also describe the block cipher operation modes to enable the block cipher to support variable data length.
**Recommended:** Prerequisite DTSA 5743.
**Grading Basis:** Letter Grade

**DTSA 5745 (1) Asymmetric Cryptography and Key Management**
This course will teach the principles of asymmetric cryptography (a.k.a. public-key cryptography) and describe how the key-pair use can enable different security properties/applications. We will study the popular ciphers, e.g., RSA and the Diffie-Hellman Exchange, and learn how/why they work to secure networking, including the mathematical problems anchoring their security. We will learn about the key distribution and management and digital certificates. Required for this course is a working knowledge of discrete mathematics.
**Recommended:** Prerequisites DTSA 5743, DTSA 5744.
**Grading Basis:** Letter Grade

**DTSA 5746 (1) Cryptographic Hash and Integrity Protection**
This course describes the cryptographic hash functions and explains their security properties enabling their use for integrity protection. The course will also describe hash chain and Merkle tree. We will study message authenticity and the message authentication code (MAC) based on symmetric keys. Then, we will discuss digital signatures based on asymmetric cryptography, providing security objectives of non-repudiation which were unavailable in the symmetric-cryptography-based MAC.
**Recommended:** Prerequisites DTSA 5743, DTSA 5744, DTSA 5745.
**Grading Basis:** Letter Grade

**DTSA 5747 (1) Fundamentals of Natural Language Processing**
The field of natural language processing aims at getting computers to perform useful and interesting tasks with human language. This course introduces students to the fundamental problems in NLP, the fundamental techniques that are used to solve those problems and lays the foundation for understanding state-of-art methods. At the end of the course, students will be able to implement and analyze text classifiers, sequence labelers, discrete probabilistic models, and vector-based approaches to word meaning.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5832
**Grading Basis:** Letter Grade

**DTSA 5748 (1) Deep Learning for Natural Language Processing**
Deep learning has revolutionized the field of natural language processing and led to many state-of-the-art results. This course introduces students to neural network models and training algorithms frequently used in natural language processing. At the end of this course, learners will be able to explain and implement feedforward networks, recurrent neural networks, convolutional neural networks, and transformers. They will also have an understanding of transfer learning, the paradigm behind popular models such as BERT and GPT-3.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5842
**Grading Basis:** Letter Grade

**DTSA 5749 (1) Model and Error Analysis for Natural Language Processing**
Understanding the performance of natural language processing models goes beyond simply computing measures like accuracy. In this course we will learn methods for analyzing the strengths and weaknesses of NLP systems, both neural and non-neural. We will also learn about problematic biases in NLP data and systems. Methods covered include standard benchmarks, qualitative error analysis, confusion matrices, contrastive and diagnostic evaluation, and probing experiments.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5852
**Grading Basis:** Letter Grade

**DTSA 5798 (1) Supervised Text Classification for Marketing Analytics**
Marketing data often requires categorization, or labeling. In today¿s age, marketing data can also be very big, or larger than what humans can reasonably tackle. In this course students will learn how to use supervised deep learning to train algorithms to tackle text classification tasks. Students will walk through a conceptual overview of supervised machine learning, and dive into real-world datasets through instructor-led tutorials in Python. The course will conclude with a major project.
**Grading Basis:** Letter Grade

**DTSA 5799 (1) Unsupervised Text Classification for Marketing Analytics**
Marketing data is often so big that humans cannot read or analyze a representative sample of it to understand what insights might lie within. In this course students will learn how to use unsupervised deep learning to train algorithms to extract topics and insights from text data. Students will walk through a conceptual overview of unsupervised machine learning, and dive into real-world datasets through instructor-led tutorials in Python. The course will conclude with a major project.
**Grading Basis:** Letter Grade

**DTSA 5800 (1) Network Analysis for Marketing Analytics**
Network analysis is a long-standing methodology used to understand the relationships between words and actors in the broader networks in which they exist. This course will cover network analysis at it pertains to marketing data, specifically text datasets and social networks. Students will walk through a conceptual overview of network analysis, and dive into real-world datasets through instructor-led tutorials in Python. The course will conclude with a major project.
**Grading Basis:** Letter Grade

**DTSA 5840 (1) Data Science Applied Capstone Project**
The Data Science Applied Capstone Project course will allow you to apply the knowledge and skills from the MS-DS degree to a real-world data set provided by industry collaborators and connections. This project will allow you to work independently on a data set that will test your skills in acquiring, cleaning, modeling data, and analyzing a dataset using data mining and machine learning techniques. By the end of this course, you will have a project that you can add to your data science portfolio to show off to employers and demonstrate your data science expertise. It is strongly recommended that you take the Data Science Applied Capstone Project course as one of your final courses in the program as you will work with real-world data sets that will use MS-DS core concepts. In order to be successful in this course, only students who have completed the following specializations should register for the Capstone Project: Data Science Foundations: Data Structures and Algorithms, Data Science Foundations: Statistic
**Grading Basis:** Letter Grade

**DTSA 5841 (1) IBM Capstone Project**
The IBM Capstone Project course will allow you to apply the knowledge and skills from the MS-DS degree to a real-world data set provided by IBM. This project will allow you to work independently on a data set that will test your skills in acquiring, cleaning, modeling data, and analyzing a dataset using data mining and machine learning techniques. By the end of this course, you will have a project that you can add to your data science portfolio to show off to employers and demonstrate your data science expertise. This course uses the IBM dataset from the IBM Applied Data Science Capstone course, part of the IBM Data Science Professional Certificate, and provides additional instruction and assessments in order to apply this capstone as an elective for the MS-DS Coursera degree at the University of Colorado Boulder. Because CU is collaborating with IBM on this course, all students will have full access to the IBM Applied Data Science Capstone Course while taking DTSA 5841. It is strongly recommended that you t
**Grading Basis:** Letter Grade

**DTSA 5842 (1) Effective Communication: Writing, Design, and Presentation**
This course teaches students how to present themselves effectively through writing, design, and presentation. Students will focus on how to write well-organized, clear business documents; to design elegant presentation slides, reports, and posters; and to present and speak with confidence and power. More broadly, the course charts a journey toward each student¿s best professional self. This course is a prerequisite for the Effective Communication Capstone.
**Grading Basis:** Letter Grade

**DTSA 5843 (1) Effective Communication Capstone Project**
In this course students will create a portfolio of work that demonstrates their mastery of writing, design, and presentation skills. The portfolio includes three elements¿a memo, a slide deck, and deliver presentation¿integrated around a single topic. The capstone allows learners to engage meaningfully in their world by choosing a project relevant to their job. Effective Communication: Writing, Design, and Presentation is a prerequisite for this course.
**Grading Basis:** Letter Grade

**DTSA 5900 (1) Special Topics**
Examines a special topic in Data Science.
**Repeatable:** Repeatable for up to 23.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**DTSA 5901 (1) Special Topics**
Examines a special topic in Data Science.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Grading Basis:** Letter Grade

# Digital Humanities (DHUM)

## Courses

**DHUM 5000 (3) Introduction to Digital Humanities: Movements, Methods, and Tools**
Introduces the histories, conversations, and methodological approaches of the Digital Humanities, a transdisciplinary field and community of practice that leverages and critically engages with technology to explore, analyze, and present humanities data. Participants will gain foundational knowledge of Digital Humanities and humanities data curation, and they will apply computational and multimodal research methods towards their own research interests and pedagogy. No programming experience is necessary, only an openness to experiment and collaborate. Serves as the core course for the Digital Humanities Graduate Certificate Program (http://colorado.edu/crdds/dhgc).
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**DHUM 6840 (1-3) Capstone Project: Digital Humanities Graduate Certificate**
Working with a faculty member in the Digital Humanities Graduate Certificate program, the optional capstone provides graduate students with an opportunity to showcase their digital research skills and develop and implement a Digital Humanities project to include in their portfolios. Declared students are required to develop a project proposal the preceding semester in consult with certificate director. This course may not be used to substitute for the required and elective courses to complete the Digital Humanities Graduate Certificate.
**Requisites:** Requires prerequisite course of DHUM 5000 (minimum grade B).
**Recommended:** Prerequisite Completion of two electives required for the Digital Humanities Graduate Certificate.

# Ecology and Evolutionary Biology (EBIO)

## Courses

**EBIO 1010 (3) Introduction to Statistics and Quantitative Thinking for Biologists**
Focuses on the collection, visualization and analysis of data that are relevant for advancing critical thinking, student-directed learning, and the development of quantitative analysis skills, with an emphasis on using R and examples from ecology and evolutionary biology.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Arts Sci Gen Ed: Quantitative Reasoning Math

**EBIO 1020 (1) Introduction to Ecology and Evolutionary Biology**
Introduces students to EBIO. Provides an overview of the major and how it differs from other biology programs; how to get involved in clubs, research, and/or internship opportunities; strategies for succeeding in EBIO courses; and career options. This is a first-year colloquium course specifically designed for freshman and other students exploring their educational and career opportunities.

**EBIO 1100 (3) Biology and Society**
Lect. Studies the dynamic relationships between the biological sciences and society. Areas of inquiry include interconnections between ecological and evolutionary theory and concepts and emergent questions being raised on a societal level. Students will explore topics such as human populations and sexual reproduction; biological factors affecting sociability and social patterns; environmental change with a focus on global biodiversity and the services to people; natural resource management; and public health. Recommended for majors and non-majors.
**Requisites:** Requires corequisite course of EBIO 1110.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 1110 (1) Biology and Society Laboratory**
One two-hour lab per week. Provides experiments and exercises relating to concepts presented in EBIO 1100. Recommended for majors and non-majors. When taken with EBIO 1100, meets the MAPS requirement for natural science: lab.
**Requisites:** Requires corequisite course of EBIO 1100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 1210 (3) General Biology 1**
Lect. Provides a concentrated introduction to molecular, cellular, genetic, and evolutionary biology. Emphasizes fundamental principles, concepts, facts, and questions. Intended for science majors.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**EBIO 1220 (3) General Biology 2**
Provides a concentrated introduction to organisms, homeostasis, development, behavior, and ecology. Emphasizes fundamental principles, concepts, facts,and questions. Intended for science majors.
**Recommended:** Prerequisite EBIO 1210 (minimum grade C-).
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 1230 (1) General Biology Laboratory 1**
One 3-hour lab per week. Consists of experiments and exercises to provide an extension of basic concepts and scientific approaches presented in General Biology 1. Intended for science majors.
**Recommended:** Prerequisite or corequisite EBIO 1210 (minimum grade C-).
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science Lab or Lab/Lec
MAPS Course: Natural Science

**EBIO 1240 (1) General Biology Laboratory 2**
One 3-hour lab per week. Consists of experiments and exercises to provide an extension of basic concepts and scientific approaches presented in General Biology 2. Intended for science majors.
**Recommended:** Prerequisite or corequisite EBIO 1220 (minimum grade C-).
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 1250 (4) Introduction to Ecology and Evolutionary Biology Research**
Introduces students to research in ecology and evolutionary biology topics in the context of investigations about Boulder¿s local historic apple trees. Students will learn about the genetics, physiology, and urban ecology of the trees in the lecture and have the opportunity to research one of these topics more in depth in the laboratory courses. Results from the research on Boulder¿s Apples will be reported back to the Boulder community by student researchers.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 1300 (1-3) Topics in Biological Sciences**
Covers special topics in biology for freshmen or nonmajors. Introduces scientific methods and principles in biology, as well as issues of current interest in biology. Does not count toward the major in EBIO.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 1500 (3) Introduction to Marine Biology**
This course introduces students to marine ecosystems, with particular emphasis on how marine species interact with one another and with their physical environment, and how knowledge of these relationships can inform marine conservation. This course also introduces students to foundational principles of marine biology research, current research topics in marine biology, and the processes involved in conducting scientific research in marine ecosystems.
**Recommended:** Prerequisites EBIO 1210 and/or 1220 and/or 1100 and/or 1250.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 1940 (3) Introduction to Scientific Writing**
Introduces first- and second-year science majors to genres and strategies for communicating science in academic writing. Directs learning activities toward developing academic research projects, reading and analyzing published science journal articles, and writing to professional and lay audiences.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Lower

**EBIO 2010 (1-3) Environmental Issues and Biology**
Lect. Describes how the natural environment is currently stressed by a variety of human actions. Examines the nature of these environmental problems and their impact on living organisms, both human and nonhuman species.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 2040 (4) Principles of Ecology**
Lecture and laboratory. Introduces principles of ecology, emphasizing patterns and processes at various levels of biological organization. Scope global, but examples often from local environment. Laboratory emphasizes techniques of field biology. Uses animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 2640 and ENVS 2000
**Recommended:** Prerequisites EBIO 1030 and EBIO 1040 and EBIO 1050 or EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 2070 (4) Genetics: Molecules to Populations**
Lect. and rec. Covers principles of genetics and developmental biology at levels of molecules, cellular organelles, individuals and populations; asexual and sexual life cycles; heredity. Recitations allow discussion of genetics problems and implications of genetic principles and provide demonstrations and simulations of genetic processes. Intended for sophomore majors in EBIO.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 2640
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 2090 (3) Tropical Island and Marine Ecology**
Examines fundamental concepts of marine ecology, emphasizing organismal diversity, species interactions, dispersal, colonization, physiology and adaptations. Includes study of beach and coral formation, island organisms and their population dynamics. Students may also register for an optional 1 credit, one week, tropical island and coral reef trip that complements the lecture portion of the class but has an additional cost.
**Recommended:** Prerequisite EBIO 1220 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 2091 (3) Field Studies in Marine and Island Ecology and Oceanography**
Investigates tropical island and marine ecology as well as all four disciplines of oceanography. A three-credit course focused on a tropical island ecology and oceanography field trip that complements the lecture portion of EBIO 2090 and ATOC 3070 with an additional cost. Examines fundamental concepts of marine ecology, emphasizing organismal diversity, species interactions, study of beach and coral formation, island formation, organisms and their population dynamics. The course consists of a one-week field trip to the Keys Marine Laboratory in the Florida Keys and once-weekly class room meeting (of variable duration from 1-4 hours) throughout the semester.
**Requisites:** Requires a corequisite course of EBIO 2090 or ATOC 3070 or GEOL 3070.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 2640 (5) Honors Principles of Ecology**
Lect., lab, and rec. Introduces principles of ecology, emphasizing patterns and processes at various levels of biological organization. Scope global, but examples often from local environment. Laboratory emphasizes techniques of field biology. Uses animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 2040 and ENVS 2000
**Recommended:** Prerequisites EBIO 1030 and EBIO 1040 and EBIO 1050 or EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sciences Honors Course
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 2840 (1-6) Independent Study: Lower Division**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**EBIO 3000 (3) Basic Cannabis Science**
A comprehensive course that organizes its content around three key aspects: the plant, the people, and the culture. This course is designed to provide enthusiasts with or without a scientific background a foundational understanding of Cannabis sativa.
**Recommended:** Prerequisite basic biology.
**Grading Basis:** Letter Grade

**EBIO 3010 (1-2) Teaching Biology**
Provides an opportunity to assist in teaching of specific lecture or laboratory section in EBIO under direct faculty supervision. Students must first make arrangements with the appropriate faculty member and turn in a form to the EBIO office.
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.

**EBIO 3020 (1) Next Steps: Preparing for Life After Graduation**
Helps upper-division students prepare for what comes after graduation. Topics include exploring careers; how to write a resume or CV; interviewing tips; how to build your portfolio; asking for letters of recommendations. This course is specifically designed for juniors starting to prepare for the next stage post-graduation.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 3020 and MCDB 3020
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Pass/Fail

**EBIO 3040 (4) Conservation Biology**
Applies principles of population ecology, population genetics, biogeography, animal behavior, and paleobiology to the maintenance of biodiversity and natural systems. The resulting theory is then applied to conservation policy and management techniques.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3040
**Recommended:** Prerequisite EBIO 2040 or EBIO 2640 or ENVS 2000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3080 (4) Evolutionary Biology**
Lect. and lab. Emphasizes the fundamental evolutionary concepts that provide explanations for the diversification of life on Earth. Specific topics include the evidence for evolution, adaptation by natural selection, speciation, systematics, molecular and genome evolution, and macroevolutionary patterns and processes. Recitations allow students to explore specific topics in more depth and smaller groups.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 3680
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3110 (3) Population and Community Ecology**
Presents principles of ecology that relate to the niche, population growth, metapopulations, population interactions (within and between trophic levels), community structure and development, landscape ecology and species diversity.
**Recommended:** Prerequisite EBIO 1240 or EBIO 2640 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3170 (3) Mountain Ecology and Conservation**
Focuses on the ecology of mountain environments around the world, including climatic gradients, plant and animal diversity and distributions, habitat zonation, evolutionary processes, and various aspects of montane conservation from habitat change to climate change.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 2040 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3180 (3) Global Ecology**
Lect. Involves study of ecological principles and problems at the biosphere level. Presents a worldwide approach to populations, biotic resources, ecologic interactions, land use, deforestation, desertification, species extinctions, pollution, environmental quality, global change, and environmental ethics.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3190 (3) Tropical Marine Ecology**
Lect. Examines the biology and ecology of marine ecosystems, emphasizing those occurring in tropical regions such as coral reefs. Studies how these ecosystems are changing and the future impact of human stress on the marine environment.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite any two-semester introductory biology course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3240 (4) Animal Behavior**
Lect. and lab. Topics include basic concepts and history, methods of study, ethical issues, neurobiology, behavior, the development of behavior, predator-prey relationships, communication, aggression and dominance, mating systems, cognitive ethology, and parental care. When possible, life-history strategies, the evolution of behavior, and behavioral ecology are stressed. Uses animals and animal tissues.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3400 (3) Microbiology**
Surveys distinguishing characteristics of microorganisms based on structural-functional relationships, taxonomy, growth and physical-chemical agents of control including antibiotics, metabolism and genetics. Introduces applied microbiology emphasizing infectious diseases, basic concepts of immunology and microbial ecology. Uses animals and/or animal tissues.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3410 (2) Microbiology Lab**
Accompanies EBIO 3400.
**Requisites:** Requires a prerequisite or corequisite course of EBIO 3400 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3523 (3) The Art and Strategy of Science Communication: Branding Climate Change**
Integrating the science of climate change and science communication with the research, strategy and execution practices of strategic communication (e.g., advertising and public relations).
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 3523
**Grading Basis:** Letter Grade

**EBIO 3590 (4) Plants and Society**
A writing intensive course for majors and non-majors which acquaints students with the history of plant use in our society. Topics center on the evolving relationship between humans and plants as food sources, medicines, fuel, and other products, such as fibers and dyes.
**Recommended:** Prerequisite EBIO 1100 or EBIO 1210 or EBIO 1220 or EBIO 1250 (minimum grade C).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3630 (4) Parasitology**
Lect. and lab. Surveys animal parasites, including life histories; emphasizes parasites of humans. Uses animals and/or animal tissues.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3680 (5) Honors Evolutionary Biology**
Lect., rec., and co-sem. Emphasizes the fundamental evolutionary concepts that provide explanation for the diversification of life on Earth. Specific topics include the evidence for evolution, adaptation by natural selection speciation, systematics, molecular and genome evolution, and macroevolutionary patterns and process. Recitations allow students to explore specific topics in more depth and smaller groups.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 3080
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 and EBIO 2070 (minimum grade C-).
**Additional Information:** Arts Sciences Honors Course
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3850 (4) Animal Diversity: Invertebrates**
Lect. and lab. Offers a broad study of the biology of the most diverse group of organisms on Earth. Areas include ecology, physiology, evolution and morphology of aquatic and terrestrial forms. Uses animals and/or animal tissues.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 3930 (1-6) Internship**
Provides course credit for upper-division students¿ experiential learning while employed in paid and non-paid positions associated with ecology and life sciences, including wildlife rehabilitation/reintroduction, STEM outreach/education, and lab/field research assistantships. Course credit dependent upon work hours. Repeatable for up to 6 total credit hours.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**EBIO 3940 (3) Written Communication in the Sciences**
Focuses upon written communication commonly practiced by scientists. Directs learning activities toward reporting and proposing research via the strategic use of typified genres, arguments, and visual representations. Prepares students for communication tasks within advanced study and science careers.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite Completion of two 2000-level classes and one 3000-level class in the student¿s science major or minor (all minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**EBIO 3980 (2) Seminar: Introduction to EBIO Honors**
Offers an opportunity for students who are either exploring the option of writing an Honors thesis, or are in the process of conducting Honors research, to receive guidance on the process of thesis writing, evaluation and presentation of research results and thesis defense. Thesis requirements and the role of the A&S Honors Council will be discussed. Also offers the opportunity to hear practice defense talks from the graduating Honors candidates.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sciences Honors Course

**EBIO 3990 (1-3) EBIO Honors Thesis Research**
Provides an introduction to the departmental Honors program. Consists of individual library research on a potential Honors thesis topic under the guidance of a faculty mentor.
**Requisites:** Restricted to Ecology and Evolutionary Biology (EBIO) majors only.
**Recommended:** Prerequisites minimum 3.2 GPA and approval by departmental honors committee.

**EBIO 4010 (3) Spatial Ecology: Concepts and Data Analysis**
Deals with the examination and modeling of the fundamental role of space in ecological patterns and process. Explicitly accounting for space is important for virtually all questions in basic and applied in ecology.
**Recommended:** Prerequisites EBIO 1010 (3) Introduction to Statistics and Quantitative Thinking for Biologists, EBIO 2040 (4) Principles of Ecology, Recommended: EBIO 4060 (3) Landscape Ecology.

**EBIO 4030 (3) Limnology**
Examines the ecology of inland waters, including a detailed consideration of physical, chemical and biological properties of freshwater ecosystems: origins and major characteristics of lakes and streams, survey of chemical and nutrient cycles in freshwater habitats and survey of biotic composition of freshwater environments. Important themes in modern freshwater ecology are considered, including energy flow, trophic structure, eutrophication and management of freshwater ecosystems.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5030
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4040 (3) Speciation**
The process by which new species arise is fundamental to understanding life¿s diversity, with implications for how we define and protect species. In this class, we will explore models of adaptive and non-adaptive speciation and how we test, find evidence for, and distinguish among these. Each class will include both a short lecture and discussion. Students will be able to choose and work on independent projects on any area of speciation research.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5040
**Recommended:** Prerequisite EBIO 1220 and EBIO 3080.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4050 (4) Fish Biology**
Explores the tremendous diversity of this group, which includes eyeless catfish named after Satan and cast out of underground aquifers by artesian wells, loaches that cling to rocks in mountain torrents with fin-derived suction cups, lungfish in mud cocoons that metabolize their own muscles while waiting for the rains to return, degenerate male anglerfish that parasitize their mates in the blackness of ocean depths, and flying fish that glide above the surface of the open sea to escape the slashing bills of sailfish below. Lectures will cover form and function, evolution, the fossil record, reproduction and development, genetics, behavior, ecology, distribution, and conservation of fishes. The laboratory will stress fish identification, anatomy, and development.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5050
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Arts Sci Gen Ed: Distribution-Natural Sci Lab

**EBIO 4060 (3) Landscape Ecology**
Studies distributional patterns of communities and ecosystems, ecological processes that affect those patterns, and changes in pattern and process over time. Consideration of spatial and temporal scales in ecological analyses is required to understand and predict response to broad-scale environmental change.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5060
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 and EBIO 2040 or EBIO 2640 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4080 (4) Freshwater Phycology**
Algae are a non-monophyletic group of organisms that play critical roles in ecosystem structure and function. They have a long history of being used in a variety of ways by the human species, but are increasingly being applied to modern issues of understanding water quality and climate change, engineering at the nano scale and in the production of renewable biofuels.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5080
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4090 (4) Coral Reef Ecology**
Combines classroom-based instruction in the Fall semester with an international, field-based SCUBA diving expedition to learn about the incredible coral reef ecosystems of the Caribbean, Curacao (in early January). Students learn about and observe a variety of organisms that make the reef their home. The course covers threats to coral reefs worldwide as well as ongoing efforts aimed at conservation. Scuba certification required.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite any ecology course is a highly recommended.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4100 (3) Advanced Ecology**
Emphasizes specific aspects of ecology based on specialties of faculty. One or more courses are offered most semesters. Topics have included dynamics of mountain ecosystems, tundra ecology, ethnoecology, population dynamics, tropical and insular biology, ecology of fishes, quantitative plant ecology, and arctic and alpine environments. May use animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5100
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 and EBIO 2040 or EBIO 2640 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4120 (2-4) Advanced Ecology**
Emphasizes specific aspects of ecology based on specialties of faculty. One or more courses are offered most semesters. Topics have included dynamics of mountain ecosystems, tundra ecology, ethnoecology, population dynamics, tropical and insular biology, ecology of fishes, quantitative plant ecology and arctic and alpine environments. May use animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5120
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 and EBIO 2040 or EBIO 2640 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4130 (3) Behavioral Ecology**
This course explores the general themes and important questions in the fascinating field of behavioral ecology. How do animals behave and why do they behave as they do? Students will come to understand both the historical foundations of the field and current research. Specific topics include cognition, learning, foraging strategies, mating systems, parenting, social behavior, and more. Formerly offered as a special topics course.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 (all minimum grade C-).

**EBIO 4140 (3) Plant Ecology**
Examines the relationships between plants and their physical and biological environments, encompassing physiology, competition, plant-soil and plant-animal interactions, population dynamics, diversity, and influence on ecosystem function.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4145 (4) Restoration Ecology**
Examines ecological theories that inform the practice of ecological restoration, with particular emphasis on grassland ecosystems near Boulder and linkages with social, political and economic factors. In conjunction with local partner organizations, students work on a current management challenge, generate novel data using accepted field techniques, and formulate a professional restoration management plan.
**Requisites:** Requires prerequisite EBIO 2040 or ENVS 3434 or CVEN 3434 (all minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4150 (1-2) Techniques in Ecology**
Emphasizes application of modern ecological techniques, such as stream biology, aquatic biology, environmental measurement and control, and techniques in geoecology.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5150
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 and EBIO 2040 or EBIO 2640 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4155 (4) Ecosystem Ecology**
Integrates information from physics (energetics), chemistry (element properties) and biology (evolutionary traits, photosynthetic pathways) to understand the structure and functioning of ecosystems. Provides an analysis of biotic community responses and feedbacks to environmental change drivers. Strong focus on water, nutrient cycling and carbon dynamics of diverse terrestrial and aquatic landscapes.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 4155, EBIO 5155 and ENVS 5155
**Recommended:** Prerequisites general biology, EBIO 2040 or equivalent.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4160 (3) Introduction to Biogeochemistry**
Covers fundamentals of biogeochemical cycling, emphasizing water, carbon and nutrient dynamics in terrestrial ecosystems; chemical interactions of atmosphere, biosphere, lithosphere and hydrosphere; natural and human-managed environments.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 4160 and GEOL 4160
**Recommended:** Prerequisites GEOL 3320 or EBIO 3270 and CHEM 1011 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4175 (3) The Scientific Basis for Ecosystem Management of Public Lands**
An advanced field ecology course emphasizing measurements, statistical procedures and biotic data information management relevant to land management issues. Develops concepts of adaptive ecosystem management using ongoing field studies on public land in the Colorado Front Range.
**Recommended:** Prerequisites EBIO 3270 and EBIO 4500 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4200 (4) Marine Ecological Research**
Examines marine community ecology and species interactions in tropical coral reef systems immersing students in field research, from conceptualization to final products. This course includes a significant writing component engaging students in original research experiences at an international research station. Weekly 1 hour meetings during the semester followed by an 18-day field international research trip immediately following finals week.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 and EBIO 2040 and EBIO 3080.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Arts Sci Gen Ed: Distribution-Natural Sci Lab

**EBIO 4220 (3) Advanced Cannabis Science**
This course provides a thorough exploration of Cannabis sativa, covering its phenotype, biochemistry, genetics, evolution, breeding, biotechnology, and intellectual property protection. Aimed at individuals with some knowledge about C. sativa, it delves deeper into recent scientific advancements. Topics include C. sativa biochemistry, genetics, modern cultivation techniques, sustainable practices, plant patents, and biotechnological applications. While no strict prerequisites exist, a background in science, biology, and chemistry is recommended. The course builds on EBIO 3000, and although not a requirement it is highly recommended. EBIO 4220 welcomes students with diverse backgrounds, provided they have exposure or experience in biology, genetics, and chemistry.
**Recommended:** of EBIO 3000.
**Grading Basis:** Letter Grade

**EBIO 4270 (4) Population Genetics**
Provides an in-depth applied introduction to population genetics. Lectures, discussions and labs will focus on exploring how evolutionary processes shape genetic variation through time and space and how population-level evolutionary processes can be inferred from patterns of genetic variation. While learning basic population genetic theory we will investigate current topics in the field and work with simulated and real data.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5270
**Requisites:** Requires prerequisite courses of EBIO 2070 and EBIO 3080 (all minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4290 (4) Phylogenetics and Comparative Biology**
Reviews the principles and methodology of phylogenetic inference using molecular data. Emphasizes the application of comparative approaches to hypothesis testing in evolution, ecology and medicine and provides a broad foundation in both theory and practice of phylogenetics.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5290
**Recommended:** Prerequisite EBIO 3080 (minimum grade C-) or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4300 (3) Ecology and Evolution in Ecuador: From the Amazon to the Galapagos**
This is a field¿based, experiential course that takes place in the Amazon Rainforest, the Ecuadorian Cloud Forest, and selected islands of the Galápagos Archipelago. Additionally, we meet 7 times during the fall semester on campus. The course is designed to introduce students to ecology and evolution in rainforests and islands; the value of field observations and keeping a notebook as a record of your observations and thoughts; the value of islands for understanding human influences on populations of plants and animals; the use of illustration for making observations of the characteristics, distribution, and abundance of animals and plants.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite EBIO 1220 (General Biology 2), EBIO 2040 (Principles of Ecology) and EBIO 3080 (Evolutionary Biology).
**Grading Basis:** Letter Grade

**EBIO 4320 (4) Conservation Planning and Structured Decision Making**
We are impacting our planet at unprecedented rates, creating policy challenges to conserve biological diversity, ecosystems, and the benefits that ecosystems provide to people (e.g., clean water, recreation, climate stabilization). But, how do we best tackle these challenges, given limited resources (time, money) for conservation, and multiple stakeholders with different objectives? This course will provide foundational knowledge in conservation planning and a tool-box to formulate and solve complex problems in ecosystem management and in life.
**Recommended:** Prerequisites (EBIO 1220 and EBIO 1240) or (EBIO 1250 and/or EBIO 1100 and EBIO 1110) or EBIO 2040.

**EBIO 4340 (4) Conservation Biology and Practice in Brazil's Atlantic Forest**
Field Studies. Examines the application of conservation principles in the Atlantic Forest of Brazil, a 'biodiversity-in-crisis' setting. Explores successful conservation strategies integrated with efforts to alleviate socioeconomic issues. Three-week Maymester, Study Abroad Global Seminar.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5340 and ENVS 4340 and ENVS 5340
**Recommended:** Prerequisite EBIO 2040 or ENVS 2000 or 2000/higher-level course in ANTH, EBIO, ENVS, EVEN, GEOG, IAFS or other discipline related to ecology or sustainability.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4360 (3) Lifestyle Medicine**
Student will self-select a semester-long personalized project for researching and learning about a topic they are passionate about in the context of the impact of environment and lifestyle on human health and wellbeing. Students will have continuous access to one-on-one instructor support and feedback, and credit will be given for completion of specific milestones throughout the semester.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5360

**EBIO 4370 (3) Genetically Engineered Organisms**
Explores the genetic engineering of microorganisms, fungi, plants, animals, coral reefs, and humans from the many demonstrated and anticipated benefits to the various concerns that have been raised by the explosive growth of research in this area. The course will be largely student-driven, in that each student will pursue different areas to research and present to the class. Students are encouraged to pursue a topic about which an interest and/or passion can be developed! Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5370

**EBIO 4410 (4) Biological Statistics**
Lect. and lab. Offers a demanding, problems-oriented methods course in statistical inference procedures, assumptions, limitations, and applications emphasizing techniques appropriate to realistic biological problems. Includes data file management using interactive computing techniques.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5410
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Arts Sci Gen Ed: Quantitative Reasoning Math

**EBIO 4420 (3) Computational Biology**
Covers a wide range of techniques for simulating biological systems, developing computer programs and scripts to interact with data and making research shareable and reproducible.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5420
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4440 (4) Animal Developmental Diversity**
Surveys development in a range of vertebrate and invertebrate systems to reconstruct the common bilatorian ancestor, and elucidate the developmental genetic changes underlying animal diversification. Lab focuses on vertebrate embryos and explores key methods in evolutionary developmental biology including in situ hybridization, embryo microinjection, and transgenesis.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5440 and MCDB 4441 and MCDB 5441
**Recommended:** Prerequisites MCDB 1150 or EBIO 1210 and MCDB 2150 or EBIO 2070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4460 (1-5) Special Topics**
Familiarizes students with specialized areas of biology.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5460
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4500 (4) Plant Biodiversity and Evolution**
Surveys plant types emphasizing diagnostic features of plants in general and major taxa in particular. Focuses on identity, morphology, anatomy, reproduction, ecology, geography, evolution, fossil record, and economic use of taxa.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5500
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4510 (4) Plant Anatomy and Development**
Lect. and lab. Introduces structures of seed plants, especially angiosperms, and developmental history of these structures. Studies cell types, and their location and function in plant tissues and organs. The laboratory provides an opportunity to examine plant tissues and to prepare tissues for examination by the light microscope. Stresses role of plant structures in the living plant.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5510
**Recommended:** Prerequisites, EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4511 (3) Microbial Ecology**
Aims to gain an understanding of the critical roles that microbes play in the biosphere, and why they play those roles. We start with with fundamental concepts (e.g. microbial physiology and evolution) and build up to an understanding of how the biosphere functions (e.g. biogeochemistry and nutrient dynamics at the ocean-sediment interface) by reading both current and classical literature in the field.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5511
**Requisites:** Requires prerequisite courses of EBIO 2040, EBIO 3080 and EBIO 3400 (all minimum grade C-).

**EBIO 4520 (4) Flowering Plant Diversity**
Emphasizes the morphology, evolution, classification, phylogeny, natural history, identification, and economic importance of plants, with a focus on flowering plants (angiosperms). Because flowering plants are dominant and keystone features of both our natural and developed world, capacity to understand them from an evolutionary and ecological perspective is an important skill for anyone interested in field biology, ecology, evolution, environmental resource management, or simply in being a good steward to the land and to your society.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5520 and MUSM 5520
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4560 (4) The Lichen Biome**
Focuses on lichens as biologically diverse hubs of interactions, and will cover numerous dimensions of diversity within the symbiosis (algae, bacteria, and ecological and evolutionary relationships therein) and beyond it (diversity of lichen symbioses in nature, their functions, and conservation).
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5560
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4590 (3) Soil Ecology**
This course explores soil ecology in both natural and managed systems, focusing on the biology of soils and the role of soil biota in nutrient cycling, soil formation, and the maintenance of soil fertility. Goal is to provide students with an appreciation of the soil system and build a comprehensive understanding of the relevance of soil biota to agriculture, global change, and ecosystem health, with a focus on the key issues/ unanswered questions in the field of soil ecology.

**EBIO 4600 (4) Evolutionary Ecology**
Evaluates how interactions within species, among species and between species and the environment evolve over time. Emphasizes the development of scientific skills, including ecological, genetic and statistical tools for testing hypotheses in evolutionary ecology. Lab activities include research projects that quantify natural selection, gene flow and phenotypic plasticity in natural systems, and a semester-long class experiment examining plant dispersal.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5600
**Requisites:** Requires prerequisite courses of EBIO 2040 and EBIO 3080 (all minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4620 (4) Mycology: the Biology of Fungi**
A broad taxonomic and biological survey of fungi. This is an upper division lecture, field, and lab-based course designed for biology majors interested in microbial science. Field and Laboratory components include two lab practicals in which students identify macro- and micro-fungi, preparation of a fungal specimen collection, and the use of light microscopy for identification and visualization of fungal structures. Formerly offered as a special topics course.
**Requisites:** Requires prerequisite course of (EBIO 1220 and EBIO 1240) or MCDB 2150 (all minimum grade C-).
**Recommended:** Prerequisites EBIO 2070 and EBIO 3080.
**Grading Basis:** Letter Grade

**EBIO 4640 (3) Plant Field Studies**
Includes field-oriented courses offered at irregular intervals during the academic year or during summer sessions.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of EBIO 2040 or EBIO 2640 or ENVS 2000 (all minimum grade C-).
**Recommended:** Prerequisites EBIO 2040 and EBIO 2640 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4660 (4) Insect Biology**
Lect. and lab. Introduction to evolution, ecology, physiology, and behavior of insects. Emphasizes how insects have solved problems, such as maintaining water balance or finding food, that are shared by all animals but for which there may be unique solutions among the insects. Agricultural and human health problems relative to entomology are discussed. Uses animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5660
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4700 (3) Quantitative Genetics**
Explores how the differences at the DNA level impact variability within and among individuals, and how that variation is shaped by interactions with environments. Quantitative genetics covers a range of topics, but in this course we will focus on the methods and approaches to investigate complex traits, those influenced by many genes and environmental factors, emphasizing the evolutionary forces that shape variation. We will analyze real genetic data (human, plant, mouse, etc.), and prepare our findings as written manuscripts or oral presentations. Some familiarity with basic genetic principles is assumed. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5700
**Requisites:** Prerequisite of EBIO 2070 or MCDB 2150 (min grade of C-).

**EBIO 4740 (3) Biology of Amphibians and Reptiles**
Comparative morphology, taxonomy, ecology, behavior and geographic distribution of amphibians and reptiles. Uses animals and animal tissue.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5740
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4750 (4) Ornithology**
Lect., lab, and field trips. Presents origin, evolution, ecology, physical and behavioral characteristics and taxonomy of orders and families of birds of North America; field work with local species emphasizing avian ecology. Uses animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5750
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 1230 and EBIO 1240 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4760 (4) Mammalogy**
Lect., lab, and field studies. Discusses origin, evolution and adaptation, geographic distribution, ecology and taxonomy of mammals; field and laboratory study of Coloradan species. Uses animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5760 and MUSM 5760
**Recommended:** Prerequisites EBIO 1210 and EBIO 1220 and EBIO 2040 and EBIO 2640 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4800 (3) Critical Thinking in Biology**
Lect. and discussion. Explores controversial issues, historical themes, or emerging developments in biology. Consult the EBIO Undergraduate Advising Center for current listings.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 5800
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite minimum of 14 hours of EBIO course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EBIO 4811 (3) Teaching and Learning Biology**
Provides an introduction to recent research into student learning on the conceptual foundations of modern biology, together with pedagogical methods associated with effective instruction and its evaluation. Students will be involved in active research into conceptual and practical issues involved in biology education, methods to discover student preconceptions, and the design, testing and evaluation of various instructional interventions.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 6811 and MCDB 4811 and MCDB 5811 and EDUC 4811

**EBIO 4840 (1-6) Independent Study: Upper Division**
.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**EBIO 4860 (1-2) Critical Thinking in Biology - Lab**

**EBIO 4870 (1-6) Independent Research: Upper Division**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**EBIO 4900 (1-6) Public Health Practicum**
Offers practical experience in Public Health with direct supervision.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4900 and MCDB 4900
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**EBIO 4940 (3) Honors Thesis Writing for Science Majors**
In this course, students will plan, write, and edit an Honors thesis based on a pre-approved Honors research project in the life sciences. The thesis will adhere to discipline-specific expectations and follow the format of a manuscript for submission to a non-specialty scientific journal. Following the thesis defense, students will continue to extend their writing into areas that will support them in persuading future employers or graduate programs of their ability to communicate, evaluate, and conduct scientific research.
**Recommended:** Students must be approved for an Honors thesis project and be planning to defend their Honors thesis by the end of the semester they are enrolled in the class.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Written Communication-Upper

**EBIO 4980 (2) Seminar: EBIO Honors Thesis**
Offers guidance to graduating Honors students during the process of thesis writing, evaluation and presentation of their research results and thesis defense. Thesis requirements and the role of the A&S Honors Council will be discussed. All graduating candidates will present a practice defense talk for peer feedback and will be expected to offer feedback to their peers.
**Recommended:** Prerequisites minimum 3.3 GPA and a declared EBIO major and approval by departmental honors committee.
**Additional Information:** Arts Sciences Honors Course

**EBIO 4990 (1-3) EBIO Honors Thesis Research**
To be taken during the final academic year prior to graduation. Consists of the final phase of honors research and thesis preparation under the guidance of a faculty mentor.
**Requisites:** Restricted to Ecology and Evolutionary Biology (EBIO) majors only.
**Recommended:** Prerequisites minimum 3.3 GPA and a declared EBIO major and approval by departmental Honors program.
**Additional Information:** Arts Sciences Honors Course

**EBIO 5000 (1) EBIO Colloquia**
All first year EBIO graduate students are required to attend the EBIO Colloquia Series. Speakers from around the world and within the department cover topics in all areas of biology.
**Grading Basis:** Letter Grade

**EBIO 5030 (3) Limnology**
Examines the ecology of inland waters, including a detailed consideration of physical, chemical and biological properties of freshwater ecosystems: origins and major characteristics of lakes and streams, survey of chemical and nutrient cycles in freshwater habitats and survey of biotic composition of freshwater environments. Important themes in modern freshwater ecology are considered, including energy flow, trophic structure, eutrophication and management of freshwater ecosystems.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4030
**Requisites:** Restricted to graduate students only.

**EBIO 5040 (3) Speciation**
The process by which new species arise is fundamental to understanding life¿s diversity, with implications for how we define and protect species. In this class, we will explore models of adaptive and non-adaptive speciation and how we test, find evidence for, and distinguish among these. Each class will include both a short lecture and discussion. Students will be able to choose and work on independent projects on any area of speciation research.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4040
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites EBIO 1220 and EBIO 3080.

**EBIO 5050 (4) Fish Biology**
Explores the tremendous diversity of this group, which includes eyeless catfish named after Satan and cast out of underground aquifers by artesian wells, loaches that cling to rocks in mountain torrents with fin-derived suction cups, lungfish in mud cocoons that metabolize their own muscles while waiting for the rains to return, degenerate male anglerfish that parasitize their mates in the blackness of ocean depths, and flying fish that glide above the surface of the open sea to escape the slashing bills of sailfish below. Lectures will cover form and function, evolution, the fossil record, reproduction and development, genetics, behavior, ecology, distribution, and conservation of fishes. The laboratory will stress fish identification, anatomy, and development.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4050
**Requisites:** Restricted to graduate students only.

**EBIO 5060 (3) Landscape Ecology**
Studies distributional patterns of communities and ecosystems, ecological processes that affect those patterns, and changes in pattern and process over time. Consideration of spatial and temporal scales in ecological analyses is required to understand and predict response to broad-scale environmental change.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4060
**Requisites:** Restricted to graduate students only.

**EBIO 5080 (4) Freshwater Phycology**
Algae are a non-monophyletic group of organisms that play critical roles in ecosystem structure and function. They have a long history of being used in a variety of ways by the human species, but are increasingly being applied to modern issues of understanding water quality and climate change, engineering at the nano scale and in the production of renewable biofuels.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4080
**Requisites:** Restricted to graduate students only.

**EBIO 5100 (3) Advanced Ecology**
Emphasizes specific aspects of ecology based on specialties of faculty. One or more courses are offered most semesters. Topics have included dynamics of mountain ecosystems, tundra ecology, ethnoecology, population dynamics, tropical and insular biology, ecology of fishes, quantitative plant ecology, and arctic and alpine environments. May use animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4100
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EBIO 5120 (2-4) Advanced Ecology**
Emphasizes specific aspects of ecology based on specialties of faculty. One or more courses are offered most semesters. Topics have included dynamics of mountain ecosystems, tundra ecology, ethnoecology, population dynamics, tropical and insular biology, ecology of fishes, quantitative plant ecology and arctic and alpine environments. May use animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4120
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**EBIO 5150 (1-2) Techniques in Ecology**
Emphasizes application of modern ecological techniques, such as stream biology, aquatic biology, environmental measurement and control, and techniques in geoecology.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4150
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**EBIO 5155 (4) Ecosystem Ecology**
Integrates information from physics (energetics), chemistry (element properties) and biology (evolutionary traits, photosynthetic pathways) to understand the structure and functioning of ecosystems. Provides an analysis of biotic community responses and feedbacks to environmental change drivers. Strong focus on water, nutrient cycling and carbon dynamics of diverse terrestrial and aquatic landscapes.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4155, ENVS 5155 and ENVS 4155
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**EBIO 5190 (1) Diversity and Inclusion**
Topics have included: implicit bias, privilege, inclusive pedagogy, inclusive hiring practices, inclusive mentoring, barriers facing undergraduate students, barriers facing graduate students, fairness of the GRE.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**EBIO 5240 (3) Advanced Topics in Animal Behavior**
Covers special areas of ethology such as sociobiology, animal communication, cognitive ethology, human ethology, moral and ethical issues.
**Recommended:** Prerequisite EBIO 3240.

**EBIO 5270 (3) Population Genetics**
Provides an in-depth introduction to population genetics. Lectures, discussions and labs will focus on exploring how evolutionary processes shape genetic variation through time and space and how population-level evolutionary processes can be inferred from patterns of genetic variation. While learning basic population genetic theory we will investigate current topics in the field and work with simulated and real data.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4270
**Grading Basis:** Letter Grade

**EBIO 5290 (4) Phylogenetics and Comparative Biology**
Reviews the principles and methodology of phylogenetic inference using molecular data. Emphasizes the application of comparative approaches to hypothesis testing in evolution, ecology and medicine and provides a broad foundation in both theory and practice of phylogenetics.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4290
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**EBIO 5320 (3) Current Topics in Evolutionary Biology**
Examines six major themes on contemporary evolutionary research: population genetics, natural selection and adaptation, molecular evolution, evolution and development, phylogenetic systematics, and macroevolution. Emphasizes recent primary literature and sophisticated mastery.
**Requisites:** Restricted to graduate students only.

**EBIO 5340 (4) Conservation Biology and Practice in Brazil's Atlantic Forest**
Field Studies. Examines the application of conservation principles in the Atlantic Forest of Brazil, a 'biodiversity-in-crisis' setting. Explores successful conservation strategies integrated with efforts to alleviate socioeconomic issues. Three-week Maymester, Study Abroad Global Seminar.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4340 and ENVS 4340 and ENVS 5340
**Recommended:** Prerequisite EBIO 2040 or ENVS 2000 or 2000/higher-level course in ANTH, EBIO, ENVS, EVEN, GEOG, IAFS or other discipline related to ecology or sustainability.
**Grading Basis:** Letter Grade

**EBIO 5360 (3) Lifestyle Medicine**
Student will self-select a semester-long personalized project for researching and learning about a topic they are passionate about in the context of the impact of environment and lifestyle on human health and wellbeing. Students will have continuous access to one-on-one instructor support and feedback, and credit will be given for completion of specific milestones throughout the semester.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4360

**EBIO 5370 (3) Genetically Engineered Organisms**
Explores the genetic engineering of microorganisms, fungi, plants, animals, coral reefs, and humans from the many demonstrated and anticipated benefits to the various concerns that have been raised by the explosive growth of research in this area. The course will be largely student-driven, in that each student will pursue different areas to research and present to the class. Students are encouraged to pursue a topic about which an interest and/or passion can be developed! Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4370

**EBIO 5410 (4) Biological Statistics**
Lect. and lab. Offers a demanding, problems-oriented methods course in statistical inference procedures, assumptions, limitations, and applications emphasizing techniques appropriate to realistic biological problems. Includes data file management using interactive computing techniques.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4410
**Requisites:** Restricted to graduate students only.

**EBIO 5420 (3) Computational Biology**
Covers a wide range of techniques for simulating biological systems, developing computer programs and scripts to interact with data and making research shareable and reproducible.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4420
**Grading Basis:** Letter Grade

**EBIO 5440 (4) Animal Developmental Diversity**
Surveys development in a range of vertebrate and invertebrate systems to reconstruct the common bilatorian ancestor, and elucidate the developmental genetic changes underlying animal diversification. Lab focuses on vertebrate embryos and explores key methods in evolutionary developmental biology including in situ hybridization, embryo microinjection, and transgenesis.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4440 and MCDB 4441 and MCDB 5441
**Requisites:** Restricted to graduate students only.

**EBIO 5460 (1-5) Special Topics**
Familiarizes students with specialized areas of biology.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4460
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EBIO 5500 (4) Plant Biodiversity and Evolution**
Surveys plant types emphasizing diagnostic features of plants in general and major taxa in particular. Focuses on identity, morphology, anatomy, reproduction, ecology, geography, evolution, fossil record, and economic use of taxa.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4500

**EBIO 5510 (4) Plant Anatomy and Development**
Lect. and lab. Introduces structures of seed plants, especially angiosperms, and developmental history of these structures. Studies cell types, and their location and function in plant tissues and organs. The laboratory provides an opportunity to examine plant tissues and to prepare tissues for examination by the light microscope. Stresses role of plant structures in the living plant.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4510

**EBIO 5511 (3) Microbial Ecology**
Aims to gain an understanding of the critical roles that microbes play in the biosphere, and why they play those roles. We start with with fundamental concepts (e.g. microbial physiology and evolution) and build up to an understanding of how the biosphere functions (e.g. biogeochemistry and nutrient dynamics at the ocean-sediment interface) by reading both current and classical literature in the field.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4511

**EBIO 5520 (4) Flowering Plant Diversity**
Emphasizes the morphology, evolution, classification, phylogeny, natural history, identification, and economic importance of plants, with a focus on flowering plants (angiosperms). Because flowering plants are dominant and keystone features of both our natural and developed world, capacity to understand them from an evolutionary and ecological perspective is an important skill for anyone interested in field biology, ecology, evolution, environmental resource management, or simply in being a good steward to the land and to your society.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4520 and MUSM 5520
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**EBIO 5560 (4) The Lichen Biome**
Focuses on lichens as biologically diverse hubs of interactions, and will cover numerous dimensions of diversity within the symbiosis (algae, bacteria, and ecological and evolutionary relationships therein) and beyond it (diversity of lichen symbioses in nature, their functions, and conservation).
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4560
**Requisites:** Restricted to graduate students only.

**EBIO 5600 (4) Evolutionary Ecology**
Evaluates how interactions within species, among species and between species and the environment evolve over time. Emphasizes the development of scientific skills, including ecological, genetic and statistical tools for testing hypotheses in evolutionary ecology. Lab activities include research projects that quantify natural selection, gene flow and phenotypic plasticity in natural systems, and a semester-long class experiment examining plant dispersal.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4600
**Grading Basis:** Letter Grade

**EBIO 5620 (4) Mycology: the Biology of Fungi**
A broad taxonomic and biological survey of fungi. This is an upper division lecture, field, and lab-based course designed for biology majors interested in microbial science. Field and Laboratory components include two lab practicals in which students identify macro- and micro-fungi, preparation of a fungal specimen collection, and the use of light microscopy for identification and visualization of fungal structures.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4620
**Recommended:** Prerequisite graduate students with background in General Biology (equivalent of EBIO 1210, EBIO 1230, EBIO 1220, EBIO 1240), Ecology (equivalent of EBIO 2040), Evolution (equivalent of EBIO 3080) and Genetics (equivalent of EBIO 2070).
**Grading Basis:** Letter Grade

**EBIO 5660 (4) Insect Biology**
Lect. and lab. Introduction to evolution, ecology, physiology, and behavior of insects. Emphasizes how insects have solved problems, such as maintaining water balance or finding food, that are shared by all animals but for which there may be unique solutions among the insects. Agricultural and human health problems relative to entomology are discussed. Uses animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4660
**Requisites:** Restricted to graduate students only.

**EBIO 5700 (3) Quantitative Genetics**
Explores how the differences at the DNA level impact variability within and among individuals, and how that variation is shaped by interactions with environments. Quantitative genetics covers a range of topics, but in this course we will focus on the methods and approaches to investigate complex traits, those influenced by many genes and environmental factors, emphasizing the evolutionary forces that shape variation. We will analyze real genetic data (human, plant, mouse, etc.), and prepare our findings as written manuscripts or oral presentations. Some familiarity with basic genetic principles is assumed. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4700
**Requisites:** Restricted to graduate students only.

**EBIO 5740 (3) Biology of Amphibians and Reptiles**
Comparative morphology, taxonomy, ecology, behavior and geographic distribution of amphibians and reptiles. Uses animals and animal tissue.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4740

**EBIO 5750 (4) Ornithology**
Lect., lab, and field trips. Presents origin, evolution, ecology, physical and behavioral characteristics and taxonomy of orders and families of birds of North America; field work with local species emphasizing avian ecology. Uses animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4750

**EBIO 5760 (4) Mammalogy**
Lect., lab, and field studies. Discusses origin, evolution and adaptation, geographic distribution, ecology and taxonomy of mammals; field and laboratory study of Coloradan species. Uses animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4760 and MUSM 5760
**Requisites:** Restricted to graduate students only.

**EBIO 5800 (3) Critical Thinking in Biology**
Lect. and discussion. Explores controversial issues, historical themes, or emerging developments in biology. Consult the EBIO Undergraduate Advising Center for current listings.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4800
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite minimum of 14 hours of EBIO course work.

**EBIO 5820 (1) Graduate Writing Seminar**
Enhances writing proficiency, using graduate writing projects to implement the course concepts. Offers understanding of conventions and strategies used in scientific writing to prepare students for academic and professional communication. Department enforced requisite, basic proficiency in English as a written language.
**Requisites:** Restricted to graduate students only.

**EBIO 5840 (1-6) Independent Study (Master's Level)**
Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EBIO 6000 (1) Seminar: Introduction to Biological Research**
Discusses areas of biological research represented in EBIO. Required of all first-year graduate students in EBIO.
**Requisites:** Restricted to graduate students only.

**EBIO 6100 (1-3) Seminar in Environmental Biology**
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 6120
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EBIO 6120 (1-3) Seminar in Environmental Biology**
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 6100
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**EBIO 6200 (1-3) Seminar in Population Biology**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EBIO 6210 (1-3) Seminar in Population Biology**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**EBIO 6300 (1-3) Seminar in Organismic Biology**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EBIO 6840 (1-7) Independent Research (Master's Level)**
Instructor consent required.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EBIO 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree. Instructor consent required.
**Requisites:** Restricted to graduate students only.

**EBIO 6950 (1-6) Master's Thesis**
Instructor consent required.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EBIO 7840 (1-6) Independent Study (Doctoral Level)**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EBIO 8840 (1-6) Independent Research (Doctoral Level)**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EBIO 8990 (1-10) Doctoral Dissertation**
Instructor consent required.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.

# Economics (ECON)

## Courses

**ECON 1010 (1-3) Economics in Action**
Applies foundational concepts from microeconomics and microeconomics to current events to exemplify economic decision-making. Topics vary each term, and may include trade, environment, discrimination, government policy, technology, money, education, entrepreneurship, health, employment, immigration, inequality, or development. Credit given in this course is not included in the calculation of an economics major GPA.

**ECON 1078 (3) Mathematical Tools for Economists 1**
This course is the first of a two-course sequence (ECON 1078 and ECON 1088) designed to introduce a variety of mathematical concepts that will be used extensively in subsequent economics coursework. The fundamental skills covered in this class are essential for economic analysis. Topics include algebra, graphs, functions, and logic.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
Departmental Category: Quantitative Economics

**ECON 1088 (3) Mathematical Tools for Economists 2**
Continuation of ECON 1078. Teaches mathematical skills for use in economics. Topics include derivatives, optimization and integration. These skills are used on "real world" problems and illustrated with computer assignments. For more information about the math placement referred to in the "Enrollment Requirements", contact your academic advisor.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1345 or APPM 1350 or MATH 1081 or MATH 1300 or MATH 1310 or MATH 1330
**Requisites:** Requires prereq ECON 1078 or MATH 1011 or MATH 1071 or MATH 1150 or MATH 1160 or APPM 1235 (minimum grade C-) or an ALEKS math exam taken in 2016 or earlier, or placement into pre-calculus based on your admission data and/or CU Boulder coursework.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
Departmental Category: Quantitative Economics

**ECON 2010 (4) Principles of Microeconomics**
Examines basic concepts of microeconomics or the behavior and the interactions of individuals, firms and government. Topics include determining economic problems, how consumers and businesses make decisions, how markets work, and how they fail and how government actions affect markets.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Theory and History of Economic Thought
MAPS Course: Social Science

**ECON 2020 (4) Principles of Macroeconomics**
Provides an overview of the economy, examining the flows of resources and outputs and the factors determining the levels of income and prices. Explores policy problems of inflation, unemployment and economic growth.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Theory and History of Economic Thought
MAPS Course: Social Science

**ECON 3070 (4) Intermediate Microeconomic Theory**
Explores theory and application of models of consumer choice, firm and market organization, and general equilibrium. Extensions include intertemporal decisions, decisions under uncertainty, externalities, and strategic interaction.
**Requisites:** Requires prereq courses of ECON 2010 and (ECON 1088 or MATH 1081 or MATH 1300 or MATH 1310 or MATH 1330 or MATH 2300 or MATH 2400 or (APPM 1340 and 1345) or APPM 1350 or FNCE 2010) (all min grade C-). Restricted to students with 22-180 units completed.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Theory and History of Economic Thought

**ECON 3080 (3) Intermediate Macroeconomic Theory**
Introduces theories of aggregate economic activity including the determination of income, employment, and prices; economic growth; and fluctuations. Macroeconomic policies are explored in both closed and open economy models. ECON 3070 ECON and 3080 may be taken in any order; there is no recommended sequence.
**Requisites:** Requires prerequisite courses of ECON 2020 and (ECON 1088 or (APPM 1340 and APPM 1345) or APPM 1350 or FNCE 2010 or MATH 1081 or MATH 1300 or MATH 1310 or MATH 2300 or MATH 2400) (all min grade C-). Restricted to students with 22-180 units completed.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Theory and History of Economic Thought

**ECON 3403 (3) International Economics and Policy**
Examines national and supranational policies that affect the international economy, with attention to trade barriers, economic nationalism and regionalism, international political economy, exchange market intervention, and international transmission of economic perturbations. Economics (ECON) majors may be approved to enroll with advisor & instructor approval and count towards the major GPA. Majors must consult with assigned ECON advisor to determine eligibility to be enrolled. May not be taken after either ECON 4413 or ECON 4423.
**Requisites:** Requires prerequisite courses of ECON 2010 and ECON 2020 (all minimum grade C-). ECON minors are allowed to be enrolled.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Trade and Finance

**ECON 3535 (3) Natural Resource Economics**
Integrates economic analysis with life science aspects of natural resource systems to develop social policies for use of natural resources. Studies economists' approaches to resources policy analysis and applies them to energy, forestry, fisheries, mineral and water systems. Economics (ECON) majors may be approved to enroll with advisor & instructor approval and count towards the major GPA. Majors must consult with assigned ECON advisor to determine eligibility to be enrolled.
**Equivalent - Duplicate Degree Credit Not Granted:** ECON 4535
**Requisites:** Requires prerequisite course of ECON 2010 (minimum grade C-). ECON minors are allowed to be enrolled.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Natural Resources and Environmental Economics

**ECON 3545 (3) Environmental Economics**
Highlights causes of excessive environmental pollution and tools for controlling it through economic analysis, values of preservation and distribution of costs and benefits from environmental protection programs. Economics (ECON) majors may be approved to enroll with advisor & instructor approval and count towards the major GPA. Majors must consult with assigned ECON advisor to determine eligibility to be enrolled.
**Equivalent - Duplicate Degree Credit Not Granted:** ECON 4545
**Requisites:** Requires prerequisite course of ECON 2010 (minimum grade C-). ECON minors are allowed to be enrolled.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Natural Resources and Environmental Economics

**ECON 3616 (3) Employment, Wages and the Future of Work**
Examines how automation, globalization and information technology are changing which jobs get done, by whom and how much they pay. Illustrates how basic labor supply and demand theory helps predict the impact of technological progress on occupational composition, income inequality and the nature of work itself. These theoretical tools also guide our search for appropriate public policy responses. Economics (ECON) majors may be approved to enroll with advisor & instructor approval and count towards the major GPA. Majors must consult with assigned ECON advisor to determine eligibility to be enrolled.
**Requisites:** Requires a prerequisite course of ECON 2010 (minimum grade C-). ECON minors are allowed to enroll.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Labor and Human Resources

**ECON 3784 (3) Economic Development and Policy**
Introductory course in Economic Development, designed for non-majors. Students are introduced to the major issues in development economics. Explores empirical, theoretical and policy issues in economic development. Emphasis is placed on the controversial issues in this literature, requiring students to explore competing, and often conflicting, perspectives of these issues. Economics (ECON) majors may be approved to enroll with advisor & instructor approval and count towards the major GPA. Majors must consult with assigned ECON advisor to determine eligibility to be enrolled.
**Requisites:** Requires prerequisite courses of ECON 2010 and ECON 2020 (all minimum grade C-). ECON minors are allowed to be enrolled.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Economic Development

**ECON 3818 (4) Introduction to Statistics with Computer Applications**
Introduces statistical methods and their applications in quantitative economic analysis.
**Requisites:** Requires prerequisite courses of ECON 1088 or MATH 1081 or MATH 1300 or MATH 1310 or MATH 1330 or MATH 2300 or MATH 2400 or (APPM 1340 and 1345) or APPM 1350 or FNCE 2010 (all minimum grade C-). Restricted to students with 22-180 units completed.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Quantitative Economics

**ECON 4050 (3) Market Design**
Develops foundations for the modern market design practices. Economists are increasingly involved in studying and designing practical market mechanisms. Includes topics such as designing efficient matching markets (students to schools, doctors to hospitals), designing auction mechanisms (Google, Facebook, government) and designing market platforms (eBay, Amazon).
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Theory and History of Economic Thought

**ECON 4060 (3) Choice Theory**
How do individuals make choices? In economics, it is standard to assume that individuals are rational utility maximizers. This standard model usually provides a good approximation to people¿s behaviors. However, we will see in this course that sometimes the standard model fails to explain people¿s choices. The goal of this course is to understand how individuals make choices and their implications.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior).
**Recommended:** Prerequisite ECON 3080.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Theory and History of Economic Thought

**ECON 4070 (3) Topics in Microeconomics**
Studies utility maximization under uncertainty, risk, game theory, moral hazard, and adverse selection. Applications include insurance markets and the theory of contracts.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Theory and History of Economic Thought

**ECON 4080 (3) Economics in Action: Game Theory**
Game theory studies how individuals make decisions in situations where there are strategic interactions between decision makers. It plays an important role in modern economic analysis. This course explores game theory and its applications in economics. It will review and develop methods of game theoretical analysis. Students will learn how to model and analyze economic problems in various strategic settings to gain fundamental economic insights.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Recommended:** Prerequisite It will be expected that all students in this course are familiar with the differentiation and integration of simple functions, if you are on the waiting list and intend to enroll in the course you must attend the first-week of classes to learn whether you meet the prerequisites.

**ECON 4090 (3) Markets and Morality**
Examines concepts underlining the combined study of philosophy, politics, and economics. Provides an introduction to core areas of knowledge and methodologies used to understand individual behavior and the interactions that make up the social world. Topics include the moral and political dimensions of exchange and property, markets and competition, and economic growth.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).

**ECON 4111 (3) Money and Banking Systems**
Discusses money, financial institutions and the monetary-financial system in a modern economy.
**Requisites:** Requires prerequisite course of ECON 3080 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Money and Banking

**ECON 4211 (3) Public Economics: the Economics of the Government Sector**
Focuses on taxation and public expenditures. Topics include economic rationale for government action, economic theory of government behavior, and effects of government policies on allocation of resources and distribution of income.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Public Economics

**ECON 4221 (3) Political and Public Choice Economics**
Explores decision-making in non-traditional market settings, specifically political market settings, using economic models. We investigate policy outcomes as the product of interactions among individuals in politial markets, and analyze how governmental decisions are the result of rational optimizing behavior, even if they do not lead to policies that maximize national welfare.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Public Economics

**ECON 4231 (3) Applied Economic Analysis and Public Policy**
Applies economic analysis to current issues of public policy. Reviews basic public finance and economic justifications for government action. Examines structure and procedures of Colorado State Legislature. Chooses current legislative issues, reviews relevant economic literature and applies implications through briefing papers and testimony at legislative hearings. Explores the challenges of integrating informed economic analysis into legislative process.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Public Economics

**ECON 4242 (3) Urban Economics: The Economics of Cities**
Considers the economic forces which drive households and jobs to congregate in metropolitan areas. It then considers the forces within the city which determine how the established cities "look" - how rents vary with location, the distribution of jobs and households within a city, urban sprawl, and the sorting of households between neighborhoods. Finally it considers some government policies relating to land use and housing.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Urban and Regional Economics

**ECON 4262 (3) Economics of Crime and Corruption**
Focuses on economic models of crime and punishment, and on empirical evidence that evaluates the models. The first part of the course will introduce economic models of crime and study what factors motivate and deter criminal behavior. Then we will turn to empirical evidence and will discuss the role of higher fines, imprisonment, death penalty, abortion, drugs, guns and other factors in deterring crime. In the end of the course we will discuss corruption and whether it is harmful or beneficial to society.
**Requisites:** Requires prerequisite courses of (ECON 3070 and ECON 3818) or one of the following: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000 or STAT 4520 (all minimum grade C-).

**ECON 4292 (3) Migration, Immigrant Adaptation, and Development**
Examines historical and current patterns of migration with an emphasis in international movement. Looks at leading migration theories related to both origin- and destination-based explanations while critically looking at the role of development as a potential cause and consequence of population movement. Finally, covers some aspects of immigrants' social and economic adaptation to their host society.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Urban and Regional Economics

**ECON 4309 (3) Economics Honors Seminar 1**
For information consult the department's director of honors. Open only to qualified seniors.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3080 and ECON 3818 (all minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sciences Honors Course
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Independent Study and Other Courses

**ECON 4339 (3) Economics Honors Seminar 2**
For information consult the department's director of honors. This course does not count toward major requirements.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3080 and ECON 3818 (all minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Independent Study and Other Courses

**ECON 4413 (3) International Trade**
Focuses on theories of international trade and its impacts on economic welfare. Analyzes commercial policy, including tariffs, non-tariff barriers, retaliation, regional integration, and factor migration.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Trade and Finance

**ECON 4423 (3) International Finance**
Covers balance of payments; foreign exchange market, income, trade, and capital flows; asset markets adjustment mechanisms; stabilization policies in an open economy; and problems of international monetary systems.
**Requisites:** Requires prerequisite course of ECON 3080 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Trade and Finance

**ECON 4504 (3) The New Institutional Economics: Institutions, Contracts and Economic Outcomes**
Understand the conceptual tool kit of the New Institutional Economics. The concepts include transaction costs, property rights, credible commitment, and most importantly the roles of formal and informal institutions. We will examine the impact of institutions on contracting and organizations. The goal is to understand how the underlying institutions determine the degree to which societies improve their economic performance.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Economic History

**ECON 4514 (3) Economic History of Europe**
Covers evolution of modern economic growth and development in Europe, emphasizing institutional change.
**Requisites:** Requires prerequisite course of ECON 3070 or ECON 3080 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Economic History

**ECON 4524 (3) Economic History of the United States**
Evolution of modern economic growth and development in the U.S. from colonial times to the present emphasizing institutional change.
**Requisites:** Requires prerequisite courses of ECON 3070 or ECON 3080 (all minimum grade C-).
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Economic History

**ECON 4534 (3) Chinese Economic History in Comparative Perspective**
Surveys the economic history of China in a comparative perspective, to understand the history of economic development in China in terms of existing economic theories of growth. The approximate timeline is from the 18th century to the 20th century.
**Requisites:** Requires prerequisite courses of ECON 3070 or ECON 3080 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Economic History
Departmental Category: Asia Content

**ECON 4535 (3) Natural Resource Economics**
Analysis of problems associated with socially optimal use of renewable and nonrenewable natural resources over time. Problems of common property resources, irreversible forms of development, and preservation of natural areas.
**Equivalent - Duplicate Degree Credit Not Granted:** ECON 3535
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Natural Resources and Environmental Economics

**ECON 4545 (3) Environmental Economics**
Examines the effects of economic growth on the environment; application of economic theory of external diseconomies, cost-benefit analysis, program budgeting, and welfare economics to problems of the physical environment.
**Equivalent - Duplicate Degree Credit Not Granted:** ECON 3545
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Natural Resources and Environmental Economics

**ECON 4555 (3) Transportation Economics and Policy**
This is a course in transportation economics and policy for undergraduates. Students will combine large real-world data sets with economic theory and advanced artificial intelligence tools to analyze transportation markets and policies. The course combines topics from environmental economics and industrial organization including: aggregate demand for transportation; disaggregate demand and mode choice; externality theory; intercity passenger and freight transportation; and policies such as price regulation, fuel taxes and congestion pricing. Instruction will emphasize the current literature and examples from recent policies.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Natural Resources and Environmental Economics

**ECON 4616 (3) Labor Economics**
Examines the influence of markets, unions, and government on labor allocation and remuneration. Analyzes human capital, discrimination, mobility and migration, productivity, unemployment, and inflation. Compares outcomes under competition with those in a world marked by shared market power and bargaining.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Labor and Human Resources

**ECON 4626 (3) The Economics of Inequality and Discrimination**
Examines the unique insights available through economic analysis regarding the causes, mechanisms, and consequences of inequality and discrimination. Examines the extent of inequality, the varieties and extents of discrimination, and explores the economic models that suggest explanations.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Labor and Human Resources

**ECON 4646 (3) Topics in Health Economics**
Growth in health expenditures worldwide over the past three decades has led to an increase in research in health economics and its importance in public policy in developed and developing countries. The purpose of this course is to encourage students to read, think, and do research on issues in health economics. This course will cover issues that are pertinent to the US, other developed and developing countries. It will cover the basics of health economics such as health production functions and the role for government as well as touching on topical issues such as health care reform.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Recommended:** Prerequisites ECON 3818 or CSCI 3022.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Labor and Human Resources

**ECON 4697 (3) Industrial Organization and Regulation**
Explores neoclassical theory of the firm, the determinants of industrial structure, and the purposes and institutions of public policy to control or maintain a competitive environment.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Industrial Organization

**ECON 4705 (3) Managerial Economics**
Application of microeconomic principles and tools to business problems faced by decision makers. Examines decisions related to pricing, products and production, location of firms, vertical and horizontal integration, marketing, uncertainty, market structure, and government regulations and introduces key business communication, accounting and finance principles.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).

**ECON 4717 (3) Economics of Entrepreneurship**
Introduces economic analysis of entrepreneurship, its financing, performance and public policy issues. We will investigate in depth the business of venture capital and start-ups. Aims to understand both academic and practical implications from the burgeoning literature on economics of entrepreneurship and private equity.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Industrial Organization

**ECON 4727 (3) Economics of Organizations**
Introduces students to the economic analysis of relationship between firms and incentives within firms. The first part covers classical theories of firm boundaries and contractual relationship between firms. The second part focuses on compensation and incentive issues within firms.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Industrial Organization

**ECON 4774 (3) Topics in Economic Development, History and Political Economy**
Sustained economic growth is a relatively recent economic phenomenon that came about due to the Industrial Revolution and as a result of which the standards of living improved dramatically in the Anglo-Saxon West since the 18th century. However, global inequality has also risen to unprecedented levels because other parts of the world still significantly lag the West in economic, social and political terms. In this class, we shall study the comparative development paths of Anglo-Saxon Europe and the Middle East. In doing so, we shall primarily focus on an expansive list of influential and relevant articles published and the four books required for the class.
**Requisites:** Requires prerequisite course of ECON 3070 or ECON 3080 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Economic Development
Departmental Category: Asia Content

**ECON 4784 (3) Economic Development**
Explores empirical, theoretical, and policy issues in economic development. Examines topics with reference to the developing countries: income distribution and poverty, demographic change, labor force employment and migration, human capital, physical capital, natural resources and the environment, industrial structure, international trade, and finance.
**Requisites:** Requires prerequisite course of ECON 3070 or ECON 3080 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Economic Development
Departmental Category: Asia Content

**ECON 4794 (3) Economic Growth**
Introduces the latest theoretical tools and synthesizes the leading explanations for economic growth processes. We examine investment, inequality, population growth, returns to education, health, technological change, and efficiency. The course also explores how fundamentals of culture, institutions, geography, history, and human characteristics may underlie the differences in comparative economic development across countries.
**Requisites:** Requires prerequisite course of ECON 3070 or ECON 3080 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Economic Development

**ECON 4797 (3) Antitrust and Regulation**
Explores two major branches of Industrial Organization--antitrust and regulation. Focus is on developing qualitative and quantitative skills for the legal-economic analysis of issues and problems across a variety of industries. Case studies are used to illustrate concepts, including mergers, collusive agreements, monopolization, and networks. Individual and group projects help develop advocacy and public speaking skills.
**Requisites:** Requires prerequisite course of ECON 3070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Industrial Organization

**ECON 4808 (3) Introduction to Mathematical Economics**
Introduces the use of mathematics in economics. Topics include vectors and matrices, differential calculus, and optimization theory, with economic applications.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Quantitative Economics

**ECON 4818 (3) Introduction to Econometrics**
Provides undergraduate economics majors with an introduction to econometric theory and practice. Develops the multiple regression model and problems encountered in its application in lecture and individual applied projects.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Quantitative Economics

**ECON 4838 (3) Microcomputer Applications in Economics**
Teaches basic concepts in Java programming applied to economic models. Development of Web pages and dynamic modeling will be introduced. Students will gain a foundation that can be applied to creating advanced applications relating to analysis of statistical data and custom projects.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Quantitative Economics

**ECON 4848 (3) Applied Econometrics**
Introduces students to the practice of applied regression analysis. Summarizes and reviews the regression technique, explores U.S. census data sources, introduces an advanced statistical software package and provides structured exercises in regression analysis of census data. Concludes with independent research projects analyzing social and economic issues using regression analysis and census data.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or STAT 4520 or APPM 4570 or CHEN 3010 or CSCI 3022 or CVEN 3227 or MATH 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Quantitative Economics

**ECON 4858 (3) Financial Econometrics**
Introduces statistical models, estimation and testing procedures used in analyzing financial data for advanced undergraduates. Topics include the modeling of returns, portfolio theory, the capital asset pricing model, options pricing and fixed income securities.
**Requisites:** Requires prerequisite course: ECON 4818.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Quantitative Economics

**ECON 4868 (3) Simulation Modeling in Microeconomics**
Computer simulation modeling translates theory into computer code to examine questions numerically; for example, the effects of taxes or emissions permits on welfare and income distribution. We use GAMS (general algebraic modeling system); a version may be downloaded for free. Students must have access to a computer (not needed in the classroom).
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Quantitative Economics

**ECON 4909 (3-4) Independent Study**
Department enforced prerequisites: completion of at least 12 hours of ECON classes and a minimum GPA of 3.00. Department consent required.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of ECON 2010 and ECON 2020 and ECON 3070 or ECON 3080 (all minimum grade C-).
**Additional Information:** Departmental Category: Independent Study and Other Courses

**ECON 4929 (3) Special Topics In Economics**
This course number is assigned to upper-level Economics electives that become available on an incidental basis. Refer to the Economics Department for a detailed description of current content. Formerly ECON 4999.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3080 (all minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Independent Study and Other Courses Departmental Category: Asia Content

**ECON 4939 (2-6) Internship/Seminar**
Offers students the opportunity to integrate theoretical concepts of economics with practical experience in economics-related institutions. The theoretical portion arises from seminars and readings, the practical from activities in organizations related to the economics field. A maximum of 3 credit hours counts toward major requirements. Department consent required.
**Requisites:** Requires prerequisite courses of ECON 3070 and ECON 3080 and ECON 3818 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Economic (ECON) majors or minors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Independent Study and Other Courses

**ECON 7010 (3) Microeconomic Theory 1**
This course applies mathematical methods and optimization theory to study the foundation of modern microeconomic theory. The topics covered include theory of demand, theory of the firm, choice under uncertainty, equilibrium under alternative market structures, and welfare economics. Instructor consent required.
**Additional Information:** Departmental Category: Theory and History of Economic Thought

**ECON 7020 (3) Macroeconomic Theory 1**
This course applies the mathematical methods of continuous-time and discrete-time dynamic optimization theory and dynamical systems to study the foundation of modern macroeconomic theory. The topics covered include economic growth, the business cycle, and the determinants of consumption and investment. Instructor consent required.
**Additional Information:** Departmental Category: Theory and History of Economic Thought

**ECON 7030 (3) Microeconomic Theory 2**
Continuation of ECON 7010. Develops mathematical foundations of game theory and models of asymmetric information. Analyzes classical game-theoretic settings using analytical optimization techniques with emphasis on methodology, equilibrium concepts, theory of adverse selection and moral hazard, and principal-agent framework. Instructor consent required.
**Additional Information:** Departmental Category: Theory and History of Economic Thought

**ECON 7040 (3) Macroeconomic Theory 2**
Continuation of ECON 7020. Develops the mathematical foundations of dynamic optimization and applies numerical methods to study dynamic and stochastic general equilibrium macroeconomic models. Topics covered include the business cycle, real and nominal rigidities, search and matching frictions, and financial frictions. Instructor consent required.
**Additional Information:** Departmental Category: Theory and History of Economic Thought

**ECON 7818 (3) Introduction to Probability and Asymptotic Theory**
Introduces fundamental concepts and results from probability and asymptotic theory needed for a rigorous study of the limiting behavior of estimators and test statistics that emerge from the study of statistical/econometric models. Topics include the construction of probability measures, abstract integration, conditional expectation, stochastic convergence, laws of large numbers and central limit theorems. Instructor consent required.
**Additional Information:** Departmental Category: Quantitative Economics

**ECON 7828 (3) Econometrics**
An introduction to estimation and inference for linear and nonlinear parametric models of regression, including least squares, method of moments and maximum likelihood estimation. Instructor consent required.
**Additional Information:** Departmental Category: Quantitative Economics

**ECON 8010 (3) Economics of Risk and Time**
Develops the mathematical tools necessary to analyze optimal decision-making by individual households and firms over time and in the face of risk. This is a building block for general equilibrium models, statistical models of behavior and theoretical analyses of economic policy.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Theory and History of Economic Thought

**ECON 8015 (3) Behavioral Economics**
Behavioral economics is the intersection of economics with psychology. Topics may include: (1) the effects of cognitive limitations on economic decisions, (2) the effects of internal conflict, (3) nonmarket goods, including internal mental states, such as happiness, (4) survey research, including survey design and the survey measurement of preference parameters from hypothetical choices, (5) theoretical modeling of nonstandard preferences and imperfect decision-making, and (6) welfare-theoretic consequences of nonstandard preferences and imperfect decision-making.

**ECON 8020 (3) Business Cycle Theory and Monetary and Fiscal Policy**
Develops key skills for understanding monetary, fiscal and financial stability policy: (a) deep mathematical analysis of business cycle models, including the mechanisms within models, their comparative statics and comparative dynamics, and the difference parameter values make to the behavior of business cycle models, (b) comparing model predictions to statistical data analyses, and (c) understanding real-world policy debates.
**Requisites:** Restricted to graduate students only.

**ECON 8030 (3) Advanced Economic Theory**
This course introduces students to recent advances in economic theory. Topics include foundations of price theory, pass-through, price discrimination, differential pricing, non-linear pricing, vertical price control, imperfect information, platform markets, and consumer search. The course will focus on developing the intuition and skills to formulate research questions and to build/analyze economic models. Formerly ECON 7050.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Theory and History of Economic Thought

**ECON 8209 (3) Economics Research Methods Workshop 1**
Assists students starting their doctoral thesis by discussing methodology and evaluation of economic research. Presents and discusses student research proposals.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Independent Study and Other Courses

**ECON 8211 (3) Public Economics 1**
This course studies the theory of public economics. It presents the fundamental principles of public goods, externalities, public choice, excess burden, optimal taxation, and tax incidence. Emphasis will be placed on optimization and the development of mathematical models required for public policy analysis. The course can be taken independently or in conjunction with 8221 to make a two-semester sequence in public economics.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Public Economics

**ECON 8219 (3) Economics Research Methods Workshop 2**
Continuation of ECON 8209. Assists students starting their doctoral thesis by discussing relevant economic research. Presents and discusses research papers.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Independent Study and Other Courses

**ECON 8221 (3) Public Economics 2**
This course introduces the fundamental quantitative and econometric methods required for research in public economics. It explores advanced topics in public economics such as decentralization, state and local government, program analysis, cost/benefit analysis, taxation, international tax issues, political economy issues, and market failure. The course can be taken independently or in conjunction with 8211 to make a two-semester sequence in public economics.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Public Economics

**ECON 8413 (3) International Economics 1**
This course introduces students to the theories of international trade using an optimization approach. We discuss core trade theories and their empirical applications. We also explore recent advances that focus on the firm's decision to export and investigate the role of heterogeneity in firm productivity on patterns of trade. The course can be taken independently or in conjunction with 8433 to make a two-semester sequence in international economics.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: International Trade and Finance

**ECON 8423 (3) International Macroeconomics**
Explores recent advances in international macroeconomics and international finance. The course focuses on the application of the mathematical tools and quantitative analysis of dynamic macroeconomics to examine the role of international ¿nancial markets for the behavior of the current account, the international transmission of the business cycle, and the determination of exchange rates.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: International Trade and Finance

**ECON 8433 (3) International Economics 2**
Explores advanced quantitative topics in international economics. The course focuses on statistical analysis and structural estimation of several classes of models in international trade. The models are calibrated to the data and solutions are obtained using tools from optimization theory. The students are introduced to quantitative evaluation of trade policy instruments and welfare analysis. The course can be taken independently or in conjunction with 8413 to make a two-semester sequence in international economics.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: International Trade and Finance

**ECON 8534 (3) History of Economic Growth - US**
This course covers topics in the economic history of the United States. The course focuses on applying the tools of modern empirical economics to understand the growth of the American economy. This includes using applied econometrics and quantitative models to analyze income growth and inequality, demographic change, industrialization, international trade, capital and labor mobility, infrastructure, and technological change. The course can be taken independently or in conjunction with 8554 to make a two-semester sequence in economic history.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Economic History

**ECON 8535 (3) Environmental Economics 1**
Considers the allocation of society's scarce environmental resources and government attempts to achieve more ef¿cient and equitable allocations. It is a course in applied welfare economics with an emphasis on market failure and valuation. Incorporates static and dynamic optimization techniques to formally model environmental and resource outcomes and policy instrument choice. The course can be taken independently or in conjunction with 8545 to make a two-semester sequence in environmental economics.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Natural Resources and Environmental Economics

**ECON 8545 (3) Environmental Economics 2**
Provides advanced study of current research in environmental economics and explores opportunities for new research. Instruction in empirical research including experimental design, numerical analysis, econometric and statistical approaches. Theoretical analysis of economic problems including optimization, cost/benefit analysis and economic modeling of current environmental policies. The course can be taken independently or in conjunction with 8535 to make a two-semester sequence in environmental economics.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Natural Resources and Environmental Economics

**ECON 8554 (3) History of Economic Growth - World**
Examines economic growth over the long run. Topics include the industrial revolution, the demographic transition, the great divergence, the importance of institutional change, the impacts of trade & technology diffusion, and trends in inequality & social mobility. The course highlights the use of economic modeling, the creation of new datasets, and the implementation of empirical analysis for hypothesis testing. The course can be taken independently or in conjunction with 8534 to make a two-semester sequence in economic history. Formerly ECON 8764.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Economic History Departmental Category: Asia Content

**ECON 8676 (3) Labor Economics 1**
This course focuses on 1) deriving testable and quantifiable hypotheses from mathematical economic models relating to prominent policy-relevant issues in the labor market; 2) ascertaining the statistical patterns that permit identification of the parameters that govern these models; and 3) forming estimators that permit statistical inference of these parameters. The models considered are drawn from a variety of labor market contexts: static and dynamic labor supply and demand decisions, human capital investment decisions, spatial equilibrium in labor markets, and worker-firm matching with heterogeneous workers and firms.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Labor and Human Resources

**ECON 8686 (3) Labor Economics 2**
This course focuses on using state-of-the-art econometric techniques, often identified by natural experiments, to 1) quantify causal effects predicted by economic models of the labor market and 2) evaluate the causal impact of labor market policies. Topics include the economics of immigration, the minimum wage, the economics of discrimination, and information constraints and bounded rationality in human capital investment. As a final project, students gather data and perform initial statistical analysis to determine whether a proposed data analysis strategy will successfully lead to a credible answer to a novel causal question in labor economics.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Labor and Human Resources

**ECON 8747 (3) Industrial Organization 1**
This course studies the theory of industrial organization. Topics include research method in industrial organization, monopoly, oligopoly competition, vertical organization, markets with search and switching costs, online platforms, and innovation economics. Emphasis will be placed on the development of mathematical models for industry and policy analysis. The course can be taken independently or in conjunction with 8757 to make a two-semester sequence in industrial organization.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Industrial Organization

**ECON 8757 (3) Industrial Organization 2**
This course introduces the fundamental quantitative and econometric methods required for empirical research in industrial organization. The emphasis is on using theory to construct testable hypotheses and specifying empirical models for estimating structural parameters. Topics include differentiated products, market power, collusion, merger analysis and regulation. The course can be taken independently or in conjunction with 8747 to make a two-semester sequence in industrial organization.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Industrial Organization

**ECON 8774 (3) Economic Development 1**
Focuses on microeconomic issues surrounding economic development from a largely empirical perspective, emphasizing applied econometric techniques. Topics covered in the two sections will vary to keep up with the current research but this course will cover a variety of papers covering different research design and program evaluation methods on topical areas including, but not limited to, human capital development and long-run effects, environment and health, labor markets and migration, social capital and networks, micro-credit, and women's empowerment. The course can be taken independently or in conjunction with 8784 to make a two-semester sequence in economic development.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Economic Development

**ECON 8784 (3) Economic Development 2**
Focuses on microeconomic issues surrounding economic development from a largely empirical perspective, emphasizing applied econometric techniques. Topics covered in the two sections will vary to keep up with the current research but this course will cover a variety of papers covering different research design and program evaluation methods on topical areas including, but not limited to, distribution of resources within households, environmental and natural resources, as well as migration and gender issues relevant for developing countries. The course can be taken independently or in conjunction with 8774 to make a two-semester sequence in economic development.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Economic Development

**ECON 8828 (3) Econometric Theory 1**
Estimation and inference for micro-econometric models. Topics may include semi- and non-parametric econometric/statistical models; Bayesian estimation and inference; models for high dimensional data; simulation-based estimation methods. The course can be taken independently or in conjunction with 8838 to make a two-semester sequence in econometric theory.
**Requisites:** Requires prerequisite courses of ECON 7818 and ECON 7828 (all min grade B-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Quantitative Economics

**ECON 8838 (3) Econometric Theory 2**
Estimation and inference for models for dependent data. Topics may include linear and non-linear time series, spatial and network models. The course can be taken independently or in conjunction with 8828 to make a two-semester sequence in econometric theory.
**Requisites:** Requires prerequisite courses of ECON 7818 and ECON 7828 (all min grade B-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Quantitative Economics

**ECON 8848 (3) Applied Microeconometrics**
Presents a "user's guide" to conducting empirical research and program evaluation in applied microeconomics. Begins with a primer on an industry-standard econometric software package and a review of linear regression as a statistical technique for summarizing conditional mean relationships in data. Discusses multiple advanced econometric techniques as alternative research strategies including matching methods, difference-in-differences, panel data methods, IV, and regression discontinuity. Concludes with a research project requiring a replication and extension of an existing published paper that uses one or more of these statistical techniques.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Quantitative Economics

**ECON 8858 (3) Computational and Structural Estimation Methods**
Presents a ¿user¿s guide¿ to conducting quantitative research in computational economics. Teaches students to construct a variety of applied economic models, obtain parameter values through calibration or structural estimation techniques, and employs the resulting models to conduct policy simulations.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Quantitative Economics

**ECON 8909 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Independent Study and Other Courses

**ECON 8999 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Independent Study and Other Courses

# Education (EDUC)

## Courses

**EDUC 1001 (1) Humanities Teaching for Equity: Naming**
Critically frames learning to teach for equity and justice. Focuses on naming and examining students' identities and positionalities. Orients students to the School of Education's mission and guiding principles of the Secondary Humanities program. Meets weekly on CU campus.
**Requisites:** Restricted to teacher licensure students with an EDEN-LICU, EDSS-LICU, or EDSP-LICU plan
**Grading Basis:** Letter Grade

**EDUC 1020 (1) First Year Success at CU**
Introduces first-year majors to campus resources and academic success strategies. Students learn about a wide range of topics, including time management, research, and student involvement. This course also serves as a forum for continued conversations about concepts from EDUC 3013: School in Society, as well as the social justice implications for emerging leaders and educators.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to Education (EDUC) or Leadership/Community Engagement (LDCE) majors only.

**EDUC 1080 (3) Decolonizing Education: Design for New Futures**
What does critical pedagogy mean? What does it mean to be a transformative educator? What does emancipatory, critical, culturally sustaining education praxis, actually look like? These are the central questions that guide this course. In this course, students will have the opportunity to explore the intersection of curriculum design, critical pedagogy, and learning theory through conversations with scholars, teaching sample lessons, reflective writing, practice-based pedagogical activities, and examinations of current-events related to critical pedagogy. Formerly offered as a special topics course.
**Grading Basis:** Letter Grade

**EDUC 1500 (1) Success Strategies in Higher Education**
Introduces students to learning theories and a range of college success strategies to deepen their engagement with their academic work. Students will learn metacognitive practices to identify the values and aims driving their academic ambitions and craft their most successful path through their undergraduate experience.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Education

**EDUC 1580 (3) Energy and Interactions**
Engages non-physics majors in hands-on, minds-on activities and labs to investigate the physical world, the nature of science, and how science knowledge is constructed. This introductory course is especially relevant for future elementary and middle school teachers although it will meet the needs of most non-physics and non-science majors. Physics content focuses on interactions and energy.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 1580
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: General Education
MAPS Course: Chemistry
MAPS Course: Natural Science
MAPS Course: Physics

**EDUC 2001 (2) Humanities Teaching for Equity: Noticing**
Critically frames learning to teach for equity and justice. Focuses on noticing classroom and school spaces. Orients students to the School of Education's mission and guiding principles of the Secondary Humanities program. Meets weekly on CU campus. Includes 4 hours of middle school practicum each week.
**Requisites:** Requires prerequisite or corequisite course of EDUC 1001 (minimum grade C-). Restricted to teacher licensure students with an EDEN-LICU, EDSS-LICU, or EDSP-LICU plan.
**Grading Basis:** Letter Grade

**EDUC 2015 (1) Elementary Mathematics and Science Teaching for Social Justice**
Working for social justice is central to teaching mathematics and science with elementary-aged children. This course engages prospective elementary teachers with a multitude of early math and science experiences that children draw upon to understand their worlds. Participants will develop interest-driven, culturally sustaining, and inclusive action plans for teaching math and science for social justice with young learners.
**Requisites:** Restricted to Elementary Education (EDEL) majors only.
**Grading Basis:** Letter Grade

**EDUC 2020 (2) Step 1: Inquiry Approaches to Teaching STEM**
Invites science, mathematics and engineering students to explore teaching as a career by providing first-hand experiences teaching science/math lessons in local elementary classrooms. Introduces theory and practice necessary to design and deliver excellent instruction. Master teachers provide ongoing support and feedback. Meets weekly on CU campus (1.5 hours/week) and involves five visits to an elementary school.
**Additional Information:** Departmental Category: General Education

**EDUC 2025 (1) Step 1: Inquiry Approach to Teaching in Informal Settings**
Invites science, mathematics and engineering students to explore teaching and learning in informal K-12 environments. Introduces theory and practice necessary to design and deliver excellent instruction. Meets weekly on CU campus (1.5 hours/week) and requires participants to work a minimum of five hours with K-12 students at STEM-related special events such as science fairs, after school programs, and science camps.
**Requisites:** Restricted to AMEN, ASTR, BCHM, CHEM, EBIO, GEOL, IPHY, MATH, MCDB, PHYS, IDEN, NRSC, Arts and Sciences Open Option majors, Exploratory Studies or College of Engineering majors, or Education minors only.
**Additional Information:** Departmental Category: General Education

**EDUC 2030 (2) Step 2: Inquiry-Based Lesson Design**
Builds on EDUC 2020 and further develops lesson design and inquiry-based teaching practice. Offers opportunity to explore teaching career and learn about middle school culture. Master teacher provides support as students design and deliver lessons in middle school classrooms. Emphasizes assessment of student learning. Meets weekly on CU campus (1.5 hours/week) and involves five visits to a local middle school.
**Requisites:** Requires prerequisite of EDUC 2020 or EDUC 4610 (all minimum grade C).
**Additional Information:** Departmental Category: General Education

**EDUC 2035 (3) Designing STEM Learning Environments and Experiences**
This introductory course to the CU Teach licensure program will facilitate students exploring secondary STEM teaching as a career and provide foundational knowledge for the design of learning environments. Following an introduction to the theory and practice behind research-based and equity-seeking STEM instruction, students will observe and team-teach lessons in a middle school classroom to obtain introductory, firsthand experience in the design of learning environments and experiences.

**EDUC 2050 (1) Step Up to Social Justice Teaching**
Engages students in theory and practice for justice-centered teaching. This first required course for majors introduces the principles guiding the elementary program and provides opportunities for students to enact those principles in collaboration with children and teachers in public school classrooms. Meets weekly on CU campus (1.25 hours/week). Involves additional visits to local schools.
**Requisites:** Restricted to School of Education (EDUC) undergraduates only
**Additional Information:** Departmental Category: General Education

**EDUC 2060 (3) Step Up to Social Justice Teaching**
Engages students in theory and practice for justice-centered teaching. This first required course for majors introduces the principles guiding the elementary education program in connection to teaching literacy, mathematics, and science. This semester-long inquiry space provides opportunities for students to observe, explore, and enact the guiding principles in collaboration with children and teachers in public school classrooms and/or other community spaces. Teacher candidates will learn how schooling can open up, sustain, and/or close down opportunities for children to be seen, heard, and regarded as knowers and do-ers.
**Requisites:** Restricted to Elementary Education (ELED-BA) majors only.

**EDUC 2125 (3) History of American Public Education**
Provides an overview of the history of American education by exploring major reforms efforts from the common school movement to "Nation at Risk." Examines what intellectuals were thinking about public schools and what ordinary people experienced in them. Assesses how differences in race/ethnicity, class, gender, and power shaped public schools.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: General Education

**EDUC 2130 (3) Teaching and Learning Math: Calculus, Trig and Adv Functions**
This course focuses on the design and facilitation of mathematics experiences that embody more active approaches to learning advanced mathematics topics, including advanced algebra, trigonometry, and calculus. The parallel investigation of mathematics content, task design, and issues of teaching and learning occur throughout the course; this intertwining of perspectives is accomplished through the use of various instructional materials, readings, activities, and mathematics curricula. One overarching goal is to engage participants in advanced mathematical reasoning, to reflect on their own knowledge of mathematical relationships, and to examine pedagogical ideas that can foster productive mathematical teaching and learning.
**Additional Information:** Arts Sci Gen Ed: Quantitative Reasoning Math

**EDUC 2150 (3) Education in Film**
Provides opportunities to view and analyze how facets of education are represented (or misrepresented) in film. Considers narratives constructed about education and how those stories fuel popular conceptions of and assumptions about students, teachers, and schools. Examines how issues of race, class, and gender are embedded in how films represent schools, teachers, students, and communities.
**Additional Information:** Departmental Category: General Education

**EDUC 2311 (3) Children's Literature and Literacy Engagement in Elementary Schools**
Focuses on teaching children's literature in elementary schools & youth organizations. Participants will understand theoretical and developmental processes associated with literary learning, methods for teaching literature in a diverse society, and the integration of classroom instruction with the Colorado Academic Content Standards that foster such processes.
**Additional Information:** Departmental Category: Elementary Education

**EDUC 2400 (3) Cultural Diversity and Awareness**
Enhances students' self-awareness in a variety of educational and cultural settings. Investigates self within a cultural context, inviting students to engage more deeply with their cultural assumptions and lenses, as well as the cultural practices and beliefs of other distinct groups. Explores themes relating to diversity through works of fiction, cultural contexts, contemplative practices, poetry, music and experiential activities.
**Additional Information:** Departmental Category: General Education

**EDUC 2411 (3) Educational Psychology for Elementary Schools**
Integrates theories and ideas from elementary school child development, educational psychology and the learning sciences. Explores theories of learning and child development and considers implications for teaching, student engagement and the design of equitable and effective learning environments. Students are required to attend a practicum off-site for this class.
**Additional Information:** Departmental Category: General Education

**EDUC 2425 (3) Foundations of Bilingual/Multicultural Education**
Provides the conceptual, linguistic, sociological, historical, political, and legal foundations that have shaped bilingual education policies, program models, and teaching and assessment practices of bilingual and multicultural education in the U.S. Designed for undergraduate elementary teacher education majors, the course presents an overview of the types of bilingual education programs and the principles that anchor equitable and quality bilingual and multicultural education for emergent bilingual students, including those identified as English learners. Can be taken concurrently with EDUC 2615 (but should not be taken after).

**EDUC 2490 (3) Educational Psychology for Elementary Schools**
This course integrates theories and ideas from human development, educational psychology, and the learning sciences. Together, we will explore theories of learning and human development and consider implications for teaching, student engagement, and the design of equitable and effective learning environments.
**Recommended:** Prerequisite EDUC 3013 School and Society.

**EDUC 2500 (3) Strategies for Social Change**
Examines strategies for social change locally and internationally. Critically explores a range of social change case studies including: community organizations, social movements, social entrepreneurship, philanthropy, political and legal advocacy and technology. Students will develop their own proposal for a social change initiative.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Education

**EDUC 2615 (3) Foundations of Language Acquisition for Bilingual Learners**
This course provides an overview of the processes associated with bilingual and biliteracy development with a focus on children who are learning and living in two (or more) languages in their homes, communities, and schools. Designed for undergraduate elementary teacher education majors and preservice teachers, the course examines the complexity of bilingualism and biliteracy in school-age children, including the roles of language and culture in schooling.
**Recommended:** Corequisite EDUC 2425.

**EDUC 2625 (3) Teaching English Language Development**
Exposes students to strategies used to teach English Language Development. Covers both theoretical and applied aspects of language learning and teaching. Exposes students to techniques, activities, strategies and resources to plan instruction for students learning English Language Development. Emphasizes oral language development, literacy and content-area instruction for teaching K-12 students.
**Additional Information:** Departmental Category: General Education

**EDUC 2800 (1-3) Special Topics**
Designed to meet needs of students with topics of interest.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General Education

**EDUC 2910 (1-3) Field Practicum 1**
Offers supervised campus and off-campus experiences tied to course work in the INVST program. See also EDUC 2920.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General Education

**EDUC 2919 (3) Renewing Democracy in Communities and Schools**
Examines curriculum theory, K-12 reform, and the concepts of citizenship, democracy, power, and diversity through classroom discussion and participation in a school-based Public Achievement program. Students will dialogue with diverse groups of people; identify multiple perspectives around controversial issues; and learn to use research and writing to articulate public problems and advocate for their solutions.
**Equivalent - Duplicate Degree Credit Not Granted:** INVS 2919
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: General Education

**EDUC 2920 (1-3) Field Practicum 2**
Offers supervised campus and off-campus experiences tied to course work in the INVST program. See also EDUC 2910.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General Education

**EDUC 3001 (2) Humanities Teaching for Equity: Negotiating**
Critically frames learning to teach for equity and justice. Focuses on how relationships are negotiated in classroom spaces. Orients students to the School of Education's mission and guiding principles of the Secondary Humanities program. Meets weekly on CU campus. Includes 4 hours of high school practicum each week.
**Requisites:** Requires prerequisite or corequisite course of EDUC 1001 (minimum grade C-). Restricted to teacher licensure students with an EDEN-LICU, EDSS-LICU, or EDSP-LICU plan.
**Grading Basis:** Letter Grade

**EDUC 3013 (3) School and Society**
Introduces students - both future teachers and those simply interested in education - to pressing issues surrounding education within the United States. The course reveals the complex relationship between schools and the larger society of which they are a part. Examines issues of diversity and equity from different disciplinary lenses, including history, philosophy, sociology and anthropology.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: General Education

**EDUC 3030 (3) Race, Class, and Gender in Young Adult Literature**
This course is designed for students who are interested in learning more about how race, class, and gender appear in literature for young people, ages 10-18, and how literary explorations of these intersecting elements of identity might enrich, complicate, and/or challenge how we see ourselves, others, and our world. Together and independently, we will read and share in conversation around several multicultural young adult texts across multiple genres, including novels, short stories, poetry, drama, and nonfiction.
**Grading Basis:** Letter Grade

**EDUC 3190 (3) Introduction to Teaching and Learning**
This course engages students in questions about what it means to teach and what it means to learn. Through readings, video, and illustrations of teaching and learning in and outside of schools, the course builds understandings about some key areas of teaching, learning, and schooling that will complement the content from other courses in the program. The course is centered in a framework of educational equity and justice that is threaded through the modules. The course is designed to support students in their post-degree goals across career contexts in which knowledge of teaching learning will enhance their work.
**Grading Basis:** Letter Grade

**EDUC 3320 (3) Literacy in the Elementary Classroom 1**
Over the two-course sequence in literacy, students in the elementary major develop a foundational knowledge of core aspects of literacy learning and instruction and apply this knowledge in practica settings, working at individual, small group, and whole-class levels. Literacy 1 focuses primarily on the structure and components of equitable and robust reading instruction in K-5 classrooms, the five pillars of the reading process (phonics, phonemic awareness, fluency, vocabulary, and comprehension), and the analysis and implementation of evidence-based reading instruction practices, with some connections to writing development and assessment and writing instruction.
**Requisites:** Requires corequisite courses of EDUC 3350 and EDUC 4535 and EDUC 4595. Restricted to Elementary Education (ELED-BA) majors only.
**Grading Basis:** Letter Grade

**EDUC 3321 (3) Literacy in the Elementary Classroom 2**
Over the course of the two-course sequence in literacy, students in the elementary major develop a foundational knowledge of core aspects of literacy learning and instruction and apply this knowledge in practica settings, working at individual, small group, and whole-class levels. Literacy 2 builds on the goals of the first course in the sequence and provides a central focus on the structure and components of equitable and robust writing instruction in K-5 classrooms. The course addresses the skills and processes of writing, how to support and engage writers, writing assessment, and the analysis and enactment of evidence-based writing instruction practices. In addition, the course includes content area literacy and continues building students¿ facilities with digital and multimodal literacy in elementary classrooms.
**Requisites:** Requires prerequisite courses of EDUC 3320 and EDUC 3350 and EDUC 4535 and EDUC 4595 (all minimum grade B-). Requires corequisite courses of EDUC 4205 and EDUC 4435 and EDUC 4455. Restricted to Elementary Education (ELED-BA) majors only.
**Grading Basis:** Letter Grade

**EDUC 3350 (3) Dis/Ability in Contemporary Classrooms**
Examines major issues in special education focusing on a) developing an inclusive stance to teaching all students; b) understanding laws, responsibilities and RTI/MTSS; c) planning for and delivering differentiated instruction in a universally designed classroom environment; e) the social construction and identification of dis/abilities; f) understanding potential variations across federal disabilities categories; g) teaching students with gifts and talents and; h) collaborating with families and professionals.
**Requisites:** Requires corequisite courses of EDUC 3320 and EDUC 4535 and EDUC 4595. Requires prerequisite or corequisite courses of EDUC 2425 and EDUC 2615 (minimum grade D-). Restricted to Elementary Education (ELED-BA) majors only.

**EDUC 3570 (3) Learning With Technology In and Out of School**
Examines ways digital media are changing the way young people learn, play, make friends, and participate in civic life. Studies widely implemented digital tools intended to support literary, math, and science learning of children ages 4-18. Involves brief internship (5 hours outside class) and design projects that integrate these tools to transform in either a classroom or after-school program.
**Additional Information:** Departmental Category: General Education

**EDUC 3621 (1-3) Art for the Elementary Teacher**
Introduces elementary education students to art education. Introduces many visual art techniques, art media and processes used in art education. Includes hands-on studio art experiences in a format that supports subjects such as literature, writing, music and social studies. Emphasizes the role of art education and materials in supporting the artistic development and visual literacy of children. Department enforced prerequisite: completion of 30 hours of course work.
**Requisites:** Restricted to School of Education (EDUC) undergraduates only
**Additional Information:** Departmental Category: Elementary Education

**EDUC 4001 (3) Framing Equity and Justice in the Humanities Classroom**
Critically frames learning to teach for equity and justice within schools as systems. Orients students to the School of Education's mission and guiding principles of the Secondary Humanities program. Provides opportunities for students to enact those principles with mentor teachers in local classrooms. Meets weekly on CU campus and involves a minimum of 50 hours in local schools.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5001
**Requisites:** Restricted to EDEN-LICU, EDSS-LICU or EDSP-LICU students.
**Grading Basis:** Letter Grade

**EDUC 4010 (3) Race and Equity in Higher Education**
This course introduces students to recent research and theory surrounding race, ethnicity, access, inclusion, and equity in higher education. It focuses on the development of knowledge, skills and awareness that is crucial in becoming an engaged scholar and practitioner in the areas of diversity, equity, and inclusion. We discuss the responsibilities, tensions, and opportunities one must have in creating and maintaining a pluralistic and inclusive campus for all. We also discuss ways in which themes of identity and diversity operate far beyond one-on-one relationships but rather extend to systems and structures that comprise a college and/or university environment.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5010

**EDUC 4015 (3) International / Comparative Education**
Comparatively studies education in other countries, emphasizing its role in developing nations, with an emphasis on successful models in basic literacy, primary education, secondary curriculum and teacher education. Analyzes political, social and economic policies and ideologies for their relevance to the development process, including the role of international organizations: World Bank, UNICEF, UNESCO, Peace corps and Volunteer Agencies.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5015
**Additional Information:** Departmental Category: General Education

**EDUC 4023 (3) Differentiating Instruction in Diverse Secondary Classrooms**
Focuses on teaching culturally and linguistically diverse students, special education students, and differentiation in the classroom. Emphasizes evidence-based teaching practices and programmatic interventions that support student learning. Includes practicum.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4351
**Requisites:** Restricted to EDEN, EDFR, EDGR, EDIT, EDJP, EDLT, EDMA, EDMU, EDSC, EDRU, EDSP, EDSS or MMED majors only.
**Additional Information:** Departmental Category: Secondary Education

**EDUC 4035 (3) Family and Community Engagement**
Supports teachers to develop, improve and maintain positive relationships between families, communities, and schools. Discusses theories of family/community engagement with focus on embracing an assets-orientation. Explores the impacts families and communities can have in education, policies that impact family/community engagement in schools, and other potential bridges and barriers to meaningful partnerships. Challenges students to understand and embrace community-driven systemic education reform.
**Requisites:** Requires prerequisite courses of EDUC 3321 and EDUC 4205 and EDUC 4435 and EDUC 4455 (all minimum grade B-). Requires corequisite courses of EDUC 4215 and EDUC 4331 and EDUC 4710. Restricted to Elementary Education (ELED-BA) majors only.
**Grading Basis:** Letter Grade

**EDUC 4050 (3) Knowing and Learning in Mathematics and Science**
Explores current theories of learning in mathematics and science at the secondary level. This course focuses on learners' opportunities to learn mathematics and science in a classroom context from the perspective of different theoretical orientations. Students examine their own assumptions about learning, and critically examine the needs of a diverse student population in the classroom. Includes a weekly two hour field component.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5050
**Requisites:** Restricted to AMEN, ASTR, BCHM, CHEM, EBIO, GEOL, IPHY, MATH, MCDB, PHYS, IDEN, NRSC, Arts and Sciences Open Option majors, Exploratory Studies or College of Engineering majors, or Education minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Secondary Education

**EDUC 4060 (3) Classroom Interactions**
Students design and implement instructional activities informed by what it means to know and learn mathematics and science, and then evaluate the outcomes of those activities on the basis of classroom artifacts. Students examine how content and pedagogy combine to make effective teaching. Students are required to work in a classroom 4 hours per week.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5060
**Requisites:** Restricted to School of Education (EDUC), Mathematics-Secondary Education (EDMA) or Science-Secondary Education (EDSC) majors only.
**Additional Information:** Departmental Category: Secondary Education

**EDUC 4110 (1-3) Cultural Mentoring with Dual Language Learners**
Introduces students to cultural mentoring, the role of cultural identity in schooling, and culturally responsive pedagogies through a partnership with a local elementary School. Students will be assigned fifth grade mentees to work with throughout the semester and will work with other mentors to plan group activities for the after-school program. Requires 2 hours/per week outside of meeting times for participant-observation at a local elementary school. Mentors can repeat the mentoring component one time for 1-credit. This course is designed for first generation and/or students from minoritized backgrounds who can serve as role models for Elementary students in a Dual Language Program. Interested students should contact the instructor prior to enrolling. Previously offered as a special topics course.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Requires prerequisite of EDUC 3013 (minimum grade C-) or Ethnic Studies (ETHN) majors. Restricted to students with 57-180 credits (Juniors or Seniors).

**EDUC 4112 (3) Adolescent Development and Learning for Teachers**
Examines current theory and research about adolescent learning and development and explore implications for secondary teaching. Topics include human diversity as a resource for learning, adversity and agency, connecting instruction to students' everyday lives, and the role of belonging and relationships in positive youth development. This course is appropriate for masters degree students.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5112
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Departmental Category: Secondary Education

**EDUC 4125 (3) Secondary World Language Methods**
Presents and discusses issues in secondary school curriculum, instruction, and classroom management as they play out in world language classroom. Examines, analyzes, and evaluates a variety of teaching strategies, their effectiveness for students, and teacher dispositions to facilitate learning. Includes in-school experiences.
**Additional Information:** Departmental Category: Secondary Education

**EDUC 4135 (3) Story and Memoir**
Explores narrative theory and the epistemological/stylistic commitments of stories as the basis for writing memoir, as well as for studying the written and spoken memoirs of others. We use the word memoir to mean a story of "how one remembers one's own life." Introduces and discusses narrative theory and selected memoirs. Students engage in reflection on their own narrative-making processes and evaluate their practical and analytic understanding of daily narrative practice.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5135
**Additional Information:** Departmental Category: Secondary Education

**EDUC 4150 (3) Introduction to Qualitative Research Methods**
Introduces students to qualitative research in education. Examines the foundations, design, methods and analysis of qualitative research methods. Readings include texts about the foundations and purposes of qualitative inquiry, and methodological readings about the application of research techniques. Students will complete a variety of small, hands-on projects that introduce major dimensions of qualitative research including observation, interviewing, and document analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5150
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Education

**EDUC 4161 (1-3) Children's Literature**
Addresses reading and evaluation of books, children's, interests, authors and illustrators, folk literature, multicultural literature, modern fanciful tales, and trends.
**Additional Information:** Departmental Category: General Education

**EDUC 4205 (3) Elementary School Mathematics Theory and Methods**
The course focuses on learning theories, different instructional practices, models, and tools that can be utilized to elicit, assess, and build on elementary students¿ mathematical reasoning. The course subscribes to a view of mathematics that (1) all students can learn mathematics, (2) that powerful mathematics learning is an active process that engages students in deep mathematical inquiry, and (3) that equitable and culturally responsive teaching of mathematics requires strong mathematics knowledge for teaching.
**Requisites:** Requires prerequisite courses of EDUC 3320 and EDUC 3350 and EDUC 4535 and EDUC 4595 (all minimum grade B-). Requires corequisite courses of EDUC 3321 and EDUC 4435 and EDUC 4455. Restricted to Elementary Education (ELED-BA) majors only.
**Grading Basis:** Letter Grade

**EDUC 4215 (3) Elementary Science Theory and Methods**
Provides pre-service elementary teachers opportunities to explore contemporary theories of learning, curriculum development, pedagogical strategies, and assessment. Blends scientific content, pedagogy, and practical applications.
**Requisites:** Requires prerequisite courses of EDUC 3321 and EDUC 4205 and EDUC 4435 and EDUC 4455 (all minimum grade B-). Requires corequisite courses of EDUC 4035 and EDUC 4331 and EDUC 4710. Restricted to Elementary Education (ELED-BA) majors only.

**EDUC 4220 (3) Gender Issues in Education**
Provides a strong foundation in the various issues of gender and sexual diversity in education. Stimulates explorations into the ways the construct of "gender" affects and is affected by the educational system and process. Presents theory and research about contemporary educational issues related to sexism, homophobia, and transphobia. Encourages development of well-considered views about the various issues, research, and theories.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite EDUC 3013.

**EDUC 4222 (3) Language Study for Educators**
Focuses on the nature of linguistic development and performance. Examines works that reflect a range of scholarly approaches to language study, explores language use both in and out of school, takes up the relationships between language practices and power and considers implications for classroom teaching.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5222
**Additional Information:** Departmental Category: General Education

**EDUC 4232 (3) Language and Literacy across the Curriculum**
Explores the relationship between language and learning in math and science classrooms with the goal of developing teaching practices that engage students in using language as a tool for understanding and constructing meaning across the curriculum. Explores how language/literacy take on different forms and functions in different social contexts and academic disciplines.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5235
**Requisites:** Restricted to undergraduate Science-Secondary Education (EDSC) or Mathematics-Secondary Education (EDMA) majors only.
**Additional Information:** Departmental Category: Secondary Education

**EDUC 4240 (3) African American Education in the United States**
Explores development of schooling for African Americans in the U.S.. Emphasizes historical and contemporary struggles of this group in their quest to access meaningful educational opportunities. Examines how social, economic, political, and judicial action defined and organized policy and practice for this group. Degree credit not granted for EDUC 4240 and 6240.
**Additional Information:** Departmental Category: General Education

**EDUC 4295 (3) Narrative and Story in the Humanities**
Explores a wide variety of texts that might be used in secondary English and Social Studies classrooms. Examines philosophies and instructional approaches to the teaching of reading and literature. Considers the influence of story and storytelling in the construction of personal and societal meaning.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5295
**Requisites:** Requires corequisite of EDUC 3001 or EDUC 4001. Restricted to teacher licensure students in English (EDEN-LICU).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Secondary Education

**EDUC 4301 (3) Queer(ing) Topics in Education**
Bring critical and queer theoretical perspectives to bear on an inquiry into what's counted as "normal" in social, historical, and political contexts of education in the United States. We'll explore queerness, queer theory, and queer pedagogy, in an effort to examine schooling as a heteronormative institution that has tended toward (re)producing heterosexism, homophobia, and violence against queer bodies and identities.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5301
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Education

**EDUC 4310 (3) Social and Emotional Learning in Schools**
Explore the ways SEL benefits students through investigating its purposes and goals, the competencies it seeks to promote, the characteristics of effective programs, and the range of program formats. We frame these topics through examining ongoing dilemmas in the field. We also conduct in-depth reviews of several programs and the research that supports them.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5310

**EDUC 4315 (3) Perspectives on Science**
Explores contemporary ideas and issues in the history, philosophy and sociology of science education and science, science as a social and cultural activity and how contemporary issues in science relate to and impact educational practice.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5315
**Additional Information:** Departmental Category: General Education

**EDUC 4316 (3) Nature of Social Studies and Social Studies Education**
Prepares teacher education candidates for teaching social studies in a social context. Participants will understand theoretical and developmental processes associated with social studies learning, methods for teaching social studies in a diverse society, andthe integration of classroom instruction with the Colorado Academic Content Standards that foster such processes.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5316
**Requisites:** Restricted to Social Studies Secondary Education (EDSS-LICU or EDSS-LICG) students only.

**EDUC 4317 (3) Perspectives on Mathematics**
Explores the historical development of mathematics as a human construct, and the relationship between the discipline and the contemporary school mathematics curriculum. Focuses on the sociology of mathematics education and how cultural traditions and societal needs influence the school mathematics curriculum and educational practice.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5317

**EDUC 4320 (3) Reading Instruction for Elementary Schools**
Participants will engage theories and processes of literacy learning, reading development, and equity-oriented teaching. Students will learn, develop, and enact instructional strategies and lessons to support all students' successful participation in a range of print and multimodal literacy practices embedded in reading instruction in elementary classrooms.
**Requisites:** Restricted to Elementary Education (EDEL) majors only.
**Additional Information:** Departmental Category: Elementary Education

**EDUC 4321 (3) Writing Instruction for Elementary Schools**
Participants will engage theories and processes of literacy learning, writing development, and equity-oriented teaching. Students will learn, develop, and enact instructional strategies and lessons to support all students' successful participation in a range of multimodal literacy practices embedded in writing instruction in elementary classrooms.
**Requisites:** Requires prerequisite courses of EDUC 3350, EDUC 4320, EDUC 4535 and EDUC 4615 (minimum grade C-). Requires corequisite courses of EDUC 4205, EDUC 4435, EDUC 4455 and EDUC 4595. Restricted to Elementary Education (ELED) majors only.
**Additional Information:** Departmental Category: Elementary Education

**EDUC 4325 (3) Queering Literacy in Secondary Classrooms**
Engages theories and practices of literacy teaching and learning that challenge multiple forms of oppression. Using the tools of queer pedagogy, students will learn, develop, and enact strategies for planning and implementing literacy instruction that moves beyond inclusion of differences in the English/language arts and social studies curriculum.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5325
**Requisites:** Restricted to students with an English-Secondary Education Licensure pan (EDEN-LICU) or Social Studies-Secondary Education Licensure plan (EDSS-LICU).
**Grading Basis:** Letter Grade

**EDUC 4330 (3) Secondary Social Studies Methods I**
Explores effective social studies teaching techniques used to prepare secondary students for success in college, career, and civic life. An emphasis is placed on interpreting sources, understanding multiple perspectives, and employing critical thinking with diverse students.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5330
**Requisites:** Requires a prerequisite of EDUC 3001 or EDUC 4001 (both minimum grade C-). Restricted to teacher licensure students in Social Studies (EDSS-LICU).
**Grading Basis:** Letter Grade

**EDUC 4331 (3) Elementary Social Studies Methods**
Prepares teacher education candidates for teaching social studies in a social justice and equity context. Participants will understand theoretical and developmental processes associated with social studies learning, culturally responsive teaching pedagogy in social studies, methods for teaching social studies in a diverse society, and the integration of classroom instruction with the Colorado Academic Content Standards.
**Requisites:** Requires prerequisite courses of EDUC 3321 and EDUC 4205 and EDUC 4435 and EDUC 4455 (all minimum grade B-). Requires corequisite courses of EDUC 4035 and EDUC 4215 and EDUC 4710. Restricted to Elementary Education (ELED-BA) majors only.
**Additional Information:** Departmental Category: Elementary Education

**EDUC 4340 (3) Advanced Issues of Assessment, Teaching, and Learning in Reading, Mathematics, and Science**
In this course, students engage with theories and practices of assessment and instruction in the key content areas of reading, mathematics, and science. This course is taught in two half-semester modules¿one focused on reading and one on mathematics/science¿and occurs in the fourth and final year of the elementary major. The course addresses issues of assessment, teaching, and learning that build from and extend knowledge and practice from the assessment course and the methods courses in the three focal content areas. Modules will examine the purposes and practices of assessment in reading, mathematics and science education in elementary education. Particular attention will be given to theoretical foundations in assessment, applications of theory in classroom practice, and the design and use of assessment techniques and tools to support teaching for student understanding. While some attention will be given to large-scale assessment, this will be necessarily limited and addressed only as it pertains to the in
**Requisites:** Requires prerequisite courses of EDUC 4035 and EDUC 4215 and EDUC 4331 and EDUC 4710 (all minimum grade B-). Requires corequisite course of EDUC 4720. Restricted to Elementary Education (ELED-BA) majors only.
**Grading Basis:** Letter Grade

**EDUC 4341 (3) Elementary Reading Assessment and Instruction**
Builds on knowledge and teaching practices introduced in EDUC 4320. Addresses five critical components of reading. Refines understanding of research-based practices for diagnostic assessments and intervention, and teaching strategies for elementary age learners. Prepares candidates to deliver a comprehensive reading curriculum in the elementary grades.
**Requisites:** Requires corequisite courses of EDUC 4331 and EDUC 5215. Restricted to Elementary Education (EDEL) majors only.
**Additional Information:** Departmental Category: Elementary Education

**EDUC 4345 (3) Secondary English Methods I**
Explores the underlying principles and philosophies of several approaches to the teaching of English in the areas of language, writing, and speaking and the practical application of these methods in the secondary classroom. Provides support in constructing activities, assignments, assessments, and units that meet the differentiated needs of students given their diverse identities, lives, interests, and needs.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5345
**Requisites:** Requires a prerequisite of EDUC 3001 or EDUC 4001 (both minimum grade C-). Restricted to teacher licensure students in English (EDEN-LICU).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Secondary Education

**EDUC 4351 (3) Language and Equity in Inclusive Learning Environmnents**
Focuses on responsive instructional approaches for elementary school students, including culturally and linguistically diverse students requiring special education services. Addresses relevant educational laws and policies aimed at protecting students' rights to a quality education. Includes practicum experiences in elementary school settings.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4023
**Requisites:** Requires corequisite course of EDUC 5205. Restricted to Music (EDMU) Education majors or Elementary (EDEL) majors only.
**Additional Information:** Departmental Category: Elementary Education

**EDUC 4355 (3) Secondary Social Studies Methods II**
Explores effective techniques associated with reading, processing, and assessing social studies subject area content with an emphasis on developing critical thinking skills and meeting the needs of diverse students.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5355
**Requisites:** Requires prerequisite course of EDUC 4330 (minimum grade C-). Restricted to Social Studies - Secondary Education (EDSS-LICU) students only.

**EDUC 4365 (3) Secondary English Methods II**
Explores the underlying principles and philosophies of several approaches to the teaching of English in the areas of reading, thinking, and viewing and the practical application of these methods in the secondary classroom. Provides support in constructing activities, assignments, assessments, and units that meet the differentiated needs of students given their diverse identities, lives, interests, and needs.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5365
**Requisites:** Requires prerequisite course of EDUC 4345 (minimum grade C-). Restricted to English - Secondary Education (EDEN-LICU) students only.

**EDUC 4375 (3-4) Problem-Based Math Instruction**
Focuses on curriculum, materials, methods and assessment, and related aspects of instruction. Introduces best practices in teaching mathematics in middle and high schools. Students are required to work in a classroom 4 hours per week. Examines the Colorado Academic Content Standards.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5375
**Requisites:** Restricted to EDCI, EDSC, or EDMA majors only.
**Recommended:** Corequisite EDUC 4023.

**EDUC 4385 (4) Phenomenon-Based Science Instruction**
Focuses on curriculum, materials, methods, assessment, and related aspects of instruction. Introduces best practices in teaching science in middle and high schools. Students are required to work in a classroom 4 hours per week. Examines the Colorado Academic Content Standards.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5385
**Requisites:** Requires prerequisite of EDUC 4060.
**Recommended:** Corequisite EDUC 4023.

**EDUC 4390 (3) Teaching for Equity and Justice**
Supports candidates as they continue to develop the skills and stance to teach for equity and justice in public school settings. Explores how educators for equity and justice sustain their commitments through ongoing learning and reflection, care for their students and themselves, and collaboration and advocacy. Supports candidates in making the transition from the university into the profession in a way that allows them to remain true to their vision of who they are and want to be as educators.
**Requisites:** Requires prerequisite course of EDUC 4330 or EDUC 4345 (all minimum grade C-). Restricted to English - Secondary Education (EDEN-LICU) and Social Studies - Secondary Education (EDSS-LICU) students only.
**Grading Basis:** Letter Grade

**EDUC 4425 (3) Introduction to Bilingual/Multicultural Education**
Provides an introduction for education minors and others with an interest in education policy and practice to bilingual and multicultural education programs for emergent bilinguals. Includes an overview of the history and legislation related to the education of emergent bilingual students, identification and placement, as well as the various models, theoretical and philosophical underpinnings, and pedagogical practices that constitute sound educational practices for emergent bilingual students.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5425
**Additional Information:** Departmental Category: General Education

**EDUC 4435 (3) Culturally Sustaining Pedagogies for Bilingual Learners**
Explores multicultural education, critical pedagogy, and culturally sustaining pedagogies, including their underlying theories, curriculum design, and curriculum examples. Students will analyze curriculum with a focus on its representation of different socio-cultural groups, identities, points of view, relationship to different communities, and ideology. Students will also begin planning, teaching, and evaluating instruction anchored in critical, culturally sustaining pedagogies.
**Requisites:** Requires prereq courses of EDUC 3320 and EDUC 3350 and EDUC 4535 and EDUC 4595 (all min B-). Requires coreq courses of EDUC 3321 and EDUC 4205 and EDUC 4455. Requires prereq or coreq courses of EDUC 2425 and EDUC 2615. RSTR to Elem Ed (ELED-BA) mjrs.

**EDUC 4455 (3) Methods of Biliteracy Instruction**
Critique and analyze the linguistic, social, political and cultural factors that influence the acquisition of literacy for emerging bilingual (EB) learners. We will examine and apply evidence-based practices that support the development of reading, writing, speaking and listening in all of the students¿ languages regardless of the program model schools enact to serve them.
**Requisites:** Requires prerequisite courses of EDUC 3320 and EDUC 3350 and EDUC 4535 and EDUC 4595 (all minimum grade B-). Requires corequisite courses of EDUC 3321 and EDUC 4205 and EDUC 4435. Restricted to Elementary Education (ELED-BA) majors only.

**EDUC 4460 (3) Teaching and Learning Physics**
Learn how people understand key concepts in physics. Through examination of physics content, pedagogy and problems, through teaching, and through research in physics education, students will explore the meaning and means of teaching physics. Students will gain a deeper understanding of how education research is done and how people learn. Useful for all students, especially for those interested in physics, teaching, and education research.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5460 and PHYS 4460 and PHYS 5460
**Requisites:** Requires prerequisite courses of PHYS 3210 and PHYS 3310 (all minimum grade C-).
**Additional Information:** Departmental Category: Graduate Education

**EDUC 4490 (3) Blurring Disciplinary Lines in the Humanities**
Explores theories, methods, and materials for building interdisciplinary connections within and across secondary English and Social Studies classrooms. Provides opportunities for collaborative work in building lessons and unit plans that challenge disciplinary boundaries and advocate for complex problem solving.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5490
**Requisites:** Requires prerequisite of EDUC 3001 or EDUC 4001 (minimum grade C-). Restricted to teacher licensure students in English (EDEN-LICU) or Social Studies (EDSS-LICU).
**Grading Basis:** Letter Grade

**EDUC 4500 (3) Community-Based Research for Social Change**
Complete a research project that draws on theories of social change and is developed in partnership with a community or civic agency. Become skilled at doing original research to address complex social problems.
**Requisites:** Requires prerequisite course of EDUC 2500 (minimum grade B-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Education

**EDUC 4513 (2) Education and Practice**
Meets during student teaching assignment. Includes topics of concern to teachers, such as classroom organization and management, lesson planning, assessment, preparation of edTPA, etc.
**Requisites:** Requires corequisite course of EDUC 4691 or 4712 or 4722. Restricted to EDEL, EDEN, EDFR, EDGR, EDJP, EDLT, EDMA, EDRU, EDSC, EDSP or EDSS majors only.
**Additional Information:** Departmental Category: General Teacher Education

**EDUC 4535 (3) Assessment for Bilingual Learners**
Introduce students to the theory, methods, practice, and problems in the testing and assessment of bilingual students at the classroom and large-scale level. Topics include the specification of English Learners as a student population and the assessment of their language proficiency and academic achievement. The course additionally addresses reliability, validity, and fairness in the testing of linguistically diverse populations.
**Requisites:** Requires corequisite courses of EDUC 3320 and EDUC 3350 and EDUC 4595. Restricted to Elementary Education (ELED-BA) majors only.

**EDUC 4595 (3) Practicum for Bilingual/Multicultural and ELD Education**
University supervised, school based field experiences teaching culturally and linguistically diverse students. Accompanies university coursework required for the Colorado endorsement in Culturally and Linguistically Diverse Education.
**Requisites:** Requires corequisite courses of EDUC 3320 and EDUC 3350 and EDUC 4535. Restricted to Elementary Education (ELED-BA) majors only.

**EDUC 4610 (2) Becoming a Learning Assistant**
Introduces undergraduate Learning Assistants (LAs) to education research, active learning, and strategies that support: (1) eliciting student ideas and helping all group members become active and engaged in the class; (2) listening and questioning; (3) building relationships; and (4) integrating learning theories with effective practices. Also "LA Pedagogy Course." Department enforced prequisite: Learning Assistant Program admission. First-semester LAs requirement.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Education

**EDUC 4611 (1) Advanced Topics in Learning Assistant Pedagogy**
Builds on education research and inclusive pedagogical principles discussed in EDUC 4610, and introduces new topics for experienced Learning Assistants to learn and apply to their LA-student interactions. This course is also referred to as Returning LA Professional Development.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of EDUC 4610 (minimum grade C-).

**EDUC 4615 (3) Language Acquisition for Bilingual Learners**
Provides an introduction for education minors and others with an interest in education and human development topics to the variables that interact in the process of bilingual development in emergent bilinguals, from birth to adolescence. These variables include the learner¿s background, motivation, linguistic, cognitive, emotional, social, cultural, and political factors. The course will examine these factors and generate understandings about how they work together to foster or inhibit successful development of bilingualism in community, home, and school contexts.

**EDUC 4620 (2) LA Mentoring I: Becoming a Mentor**
This field-based course is the second in a three-sequence course intended for Learning Assistants. This course provides opportunities for advanced Learning Assistants (LAs) to practice mentoring strategies as they mentor first-time LAs. LA mentors will observe and consult with their LA mentees each week and observe entire contexts in which LAs are used. In the seminar component of the course, LA mentors will discuss their readings about mentoring, skillful teaching, and group facilitation and they will reflect on their work with their LA mentees.
**Requisites:** Requires prerequisite course of EDUC 4610 (minimum grade C-).
**Grading Basis:** Letter Grade

**EDUC 4621 (1) Learning Assistant Mentoring in Practice: Building Inclusive Learning Communities**
Builds on education research and inclusive mentoring and pedagogical principles and practices discussed in EDUC 4610 and EDUC 4620, and creates opportunities for LA Mentors to plan for, receive feedback about, and reflect upon, their individual and group mentoring experiences.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Requires prerequisite course of EDUC 4610 and prerequisite or corequisite course of EDUC 4620 (all minimum grade C-).

**EDUC 4625 (3) Methods of Teaching English Language Development**
Prepares students to teach English as a new language in K-6 U.S. public schools. Grounded in theoretical understandings of language acquisition and development, students develop resources and strategies to plan instruction for emergent bilingual children. Oral language development, literacy, and content-area language instruction are emphasized, with a focus on supporting children¿s linguistic, cognitive, academic and social development.
**Grading Basis:** Letter Grade

**EDUC 4630 (2) LA Mentoring II: Improving the Program**
This is a continuation of EDUC 4620. LA mentors will continue to mentor first-time LAs, but they will also design and test projects intended to address issues with the LA program that they have identified in the field. LA mentors will complete instructional innovation projects through cycles of design, testing, feedback, and revision. In this course, LA mentors enact projects leading to the improvement of the LA program through improved student and faculty experiences.
**Requisites:** Requires prerequisite course of EDUC 4620 (minimum grade D-).
**Grading Basis:** Letter Grade

**EDUC 4691 (10) Student Teaching: Elementary School 1**
Kindergarten through sixth grades. Department enforced prerequisite: completion of all education and content-specific arts and sciences requirements, and passing required licensure exam.
**Requisites:** Requires corequisite course of EDUC 4513. Restricted to Elementary Education (EDEL-LICU or LICG) majors only.
**Additional Information:** Departmental Category: General Teacher Education

**EDUC 4706 (3) Assessment in Mathematics and Science Education**
Examines purposes and practices of assessment in mathematics and science education. Particular attention is given to application of theoretical foundations and contemporary research in the design and use of assessment techniques and tools to support teaching for student understanding. Addresses the role of effective formative assessment in teaching and learning.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5706

**EDUC 4710 (3) Elementary Student Teaching for Cultural and Linguistic Diversity 1**
This course is the first semester of a year-long, elementary classroom-based internship. Building on prior and concurrent Education courses, candidates are expected to design and deliver culturally and linguistically responsive instruction in collaboration with an experienced elementary teacher, as well as independently. Assignments and the required student teaching seminar support candidates to reflect critically on their practice and learning. Recommendation for a Colorado initial teaching license requires excellent performance in both semesters of student teaching.
**Requisites:** Requires prerequisite courses of EDUC 3321 and EDUC 4205 and EDUC 4435 and EDUC 4455 (all minimum grade B-). Requires corequisite courses of EDUC 4035 and EDUC 4215 and EDUC 4331. Restricted to Elementary Education (ELED-BA) majors only.
**Grading Basis:** Letter Grade

**EDUC 4712 (10) Student Teaching: Secondary School**
Student teacher apprentices in a middle/junior or senior high school. Must be admitted to a secondary teacher education program in English, Japanese, Latin, math, Russian, science or social studies. Department enforced prerequisites: completed all education and content-specific artsand sciences courses and passed required licensure exam.
**Requisites:** Requires corequisite course of EDUC 4513. Restricted to EDEN, EDJP, EDLT, EDMA, EDRU, EDSC or EDSS (LICU or LICG) majors only.
**Additional Information:** Departmental Category: General Teacher Education

**EDUC 4715 (3) Elementary Student Teaching Seminar Part 1**
This seminar supports sense making during elementary student teaching through deliberative dialogues, culture circles, and teacher inquiry. During the final year of the Elementary Education program, teacher candidates complete advanced coursework and engage in extended student teaching field experiences in local schools. These activities raise important problems of practice that can fuel teacher learning. This seminar provides structure, support, and guidance from skillful facilitators and peers to support sensemaking during the elementary student teaching experience.
**Requisites:** Requires co-requisite course of EDUC 4710. Restricted to Elementary Education (ELED-BA) majors only.
**Grading Basis:** Letter Grade

**EDUC 4716 (3) Basic Statistical Methods**
Introduces descriptive statistics including graphic presentation of data, measures of central tendency and variability, correlation and prediction, and basic inferential statistics, including the t-test.
**Additional Information:** Departmental Category: General Education

**EDUC 4720 (9) Elementary Student Teaching for Cultural and Linguistic Diversity 2**
This course is the second semester of a year-long, elementary classroom-based internship. Building on prior and concurrent Education courses, candidates are expected to design and deliver culturally and linguistically responsive instruction in collaboration with an experienced elementary teacher, as well as independently. Assignments and the required student teaching seminar support candidates to reflect critically on their practice and learning. Recommendation for a Colorado initial teaching license requires excellent performance in both semesters of student teaching.
**Requisites:** Requires prerequisite courses of EDUC 4035 and EDUC 4215 and EDUC 4331 and EDUC 4710 (all minimum grade B-). Requires corequisite course of EDUC 4340. Restricted to Elementary Education (ELED-BA) majors only.
**Grading Basis:** Letter Grade

**EDUC 4722 (5) Student Teaching: Secondary School 2**
Student teacher apprentices in a middle/junior high or senior high school. Department enforced prerequisites: completed all education and content-specific arts and sciences courses and passed required licensure exam.
**Requisites:** Requires corequisite course of EDUC 4513. Restricted to EDFR, EDGR or EDSP (LICU or LICG) majors only.
**Additional Information:** Departmental Category: General Teacher Education

**EDUC 4725 (3) Elementary Student Teaching Seminar Part 2**
This seminar supports sense making during elementary student teaching through deliberative dialogues, culture circles, and teacher inquiry. During the final year of the Elementary Education program, teacher candidates complete advanced coursework and engage in extended student teaching field experiences in local schools. These activities raise important problems of practice that can fuel teacher learning. This seminar provides structure, support, and guidance from skillful facilitators and peers to support sensemaking during the elementary student teaching experience.
**Requisites:** Requires co-requisite course of EDUC 4720. Restricted to Elementary Education (ELED-BA) majors only.
**Grading Basis:** Letter Grade

**EDUC 4732 (4-12) Student Teaching K-12**
Required experience for music students seeking education at both elementary and secondary levels. Department enforced prerequisites: completed all education and content-specific music courses and passed required licensure exam.
**Requisites:** Requires corequisite course of MUSC 4193. Restricted to EDMU (LICU or LICG) majors only.
**Additional Information:** Departmental Category: General Teacher Education

**EDUC 4742 (9) Student Teaching: Secondary for Engineers**
Student teacher apprentices in a middle/junior or senior high school. Must be admitted to a secondary teacher education program in English, Japanese, Latin, math, Russian, science or social studies. Department enforced prerequisites: completed all education and content-specific arts and sciences courses and passed required licensure exam.
**Requisites:** Requires a prerequisite course of EDUC 4513 or EDUC 4050 (minimum grade C-). Restricted to EDMA or EDSC majors only.
**Additional Information:** Departmental Category: Secondary Education

**EDUC 4800 (1-9) Special Topics**
Designed to meet needs of students with topics of pertinent interest.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General Education

**EDUC 4801 (3) Race and its Implications for Science Education**
Science and science-related professionals have played an important role in supporting and challenging conceptions of ¿race.¿ In this class, we explore historical constructions of race and their implications for teaching and learning in science education. Our goal is to develop a deep understanding of how ¿race¿ manifests in educational contexts. We conclude our class by constructing our own social dream about what science education ought to be. Formerly offered as a special topics course.

**EDUC 4810 (1-9) Special Topics**
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General Education

**EDUC 4811 (3) Teaching and Learning Biology**
Provides an introduction to recent research into student learning on the conceptual foundations of modern biology, together with pedagogical methods associated with effective instruction and its evaluation. Students will be involved in active research into conceptual and practical issues involved in biology education, methods to discover student preconceptions, and the design, testing and evaluation of various instructional interventions.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 6811 and MCDB 4811 and MCDB 5811 and EBIO 4811
**Recommended:** Prerequisite At least two semesters of Biology.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**EDUC 4815 (3) Teaching K-12 Mathematics: Number Sense**
Provides teachers opportunity to explore fundamental mathematical theories and pedagogical perspectives pertaining to the teaching and learning of number and operation. Engages students in explorations of mathematical content underlying number and operations, while highlighting relevant problem solving, reasoning and proof, and mathematical connections. Explores implications of teachers' mathematical learning on their classroom teaching. Develops practices supporting learner's number sense development.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5815

**EDUC 4821 (3) Teaching K-12 Mathematics: Algebraic Thinking**
Uses reform-based mathematics curricula to engage participants in algebraic thinking, to reflect on their own knowledge of algebraic concepts, and to examine pedagogical ideas that can foster K-12 students' algebraic thinking and learning. Algebraic topics include patterning, variable, functions, multiple representations, equality, and solving linear and systems of equations.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5821

**EDUC 4822 (3) Teaching and Learning Chemistry**
Explores issues related to how people learn and teach chemistry. Reviews high school and early college chemistry concepts both from the content and pedagogical perspectives. Delves into the chemistry education research, education, psychology, and cognitive science literature. Provides an opportunity to observe and/or teach K-12 or college chemistry classes.
**Recommended:** Prerequisite of one semester of college-level chemistry.
**Additional Information:** Departmental Category: General Education

**EDUC 4831 (3) Advanced Peer Education**
Second semester of an academic year's training for students interested in peer counseling. Expand upon what you learned in ARSC 2274. Focus on presentations, leadership, and group facilitation. Basic group leadership, facilitation theory, and technique taught. Co-create and co-lead your own small groups/presentations for other CU students. Offered only spring semesters.
**Requisites:** Requires prerequisite course of ARSC 2274 (minimum grade D-).
**Additional Information:** Departmental Category: General Education

**EDUC 4833 (3) Teaching and Learning Earth Systems**
Learn and develop pedagogically effective strategies for teaching and understanding Earth Science concepts. Particular emphasis is placed on understanding the importance of geoscience habits of mind (i.e. spatial/temporal reasoning, multiple working hypotheses, geographic context). Focuses upon inquiry and evaluation of evidence, the importance of background knowledge and misconceptions, and developing effective discourse within and outside the classroom.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5833 and GEOL 4833 and GEOL 5833
**Requisites:** Requires prerequisite course of ATOC 1060 or ENVS 1000 or GEOL 1010 or GEOL 1020 or GEOL 1060 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Teacher Education

**EDUC 4835 (3) Teaching K-12 Mathematics: Geometry & Measurement**
Provides an opportunity to explore how to foster geometric thinking while examining fundamental mathematical theory underlying the content area of geometry and measurement. Emphasizes investigative approach involving problem solving, reasoning, connections, and communication as well as learning mathematics content in a flexible and conceptual way. Challenges participants to apply their understanding to teaching practices that foster geometric thinking in K-12 learners. Also see EDUC 5835.

**EDUC 4840 (1-4) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General Education

**EDUC 4844 (3) Teaching and Learning Computational Thinking**
This course is designed for current and future STEM educators interested in understanding Computational Thinking and how it can be enacted to support student learning. Computational Thinking is the process by which people make sense of problems where computation, or computational tools, could be leveraged to enact the solution. For example, when students are tasked with solving a word problem they engage in computational thinking by identifying important elements in the written problem and then leveraging mathematical or scientific methods that would lead to a solution. During this course, students will engage with research-based theories, conceptualizations, and practices for engaging with Computational Thinking in STEM learning environments and experiences. Following an introduction to Computational Thinking, students will be supported in making sense of the ideas and practices through published research, existing tools, classroom activities, and reflection on experiences of problem solving and overcoming

**EDUC 4850 (3) Teaching K-12 Mathematics: Probability & Statistics**
Focuses on teaching probability, data analysis, and statistics in K-12 classrooms. Explores curriculum and assessment strategies in the areas of probability and statistics. Examines research on students' thinking on stochastic tasks and how this research informs teaching practice. Emphasizes deepening of one's conceptual understanding of probability and statistics and their importance in the current information age.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5850

**EDUC 4901 (3) Student Teaching**
Provides opportunities for practice around classroom community building, instruction, assessment, etc. in partnership with a mentor teacher and public school students. Experiences will vary depending upon the context, grade level, and school/course placement.
**Requisites:** Requires prerequisite of EDUC 5001 (minimum grade C-). Requires corequisite of EDUC 5330 or EDUC 5345. Restricted to MA+ teacher licensure students in English (EDEN-LICG), Mathematics (EDMA-LICG), Science (EDSC-LICG), or Social Studies (EDSS-LICG).
**Grading Basis:** Letter Grade

**EDUC 4902 (4) Student Teaching II**
Provides opportunities for practice around classroom community building, instruction, assessment, etc. in partnership with a mentor teacher and public school students. Although experiences will vary depending upon the context, grade level, and school/course placement, in this practicum students will build upon their work in Student Teaching I and take greater responsibility for teaching.
**Requisites:** Requires prerequisite of EDUC 4901 (minimum grade C-) and corequisite of EDUC 5355 or 5365. Restricted to students with an English-Secondary Education Licensure pan (EDEN-LICU) or Social Studies-Secondary Education Licensure plan (EDSS-LICU).
**Grading Basis:** Letter Grade

**EDUC 4910 (3) Peer Counseling Practicum**
Controlled enrollment. Credit given for peer counseling activities. Students are selected to participate in this class and act as peer counselors or TAs for the peer counseling training. Repeatable up to 9 total credit hours.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Departmental Category: General Education

**EDUC 4912 (1) Practicum in Teacher Education**
Provides in-school practicum experience
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General Teacher Education

**EDUC 5001 (3) Framing Equity and Justice in the Humanities Classroom**
Critically frames learning to teach for equity and justice within schools as systems. Orients students to the School of Education's mission and guiding principles of the Secondary Humanities program. Provides opportunities for students to enact those principles with mentor teachers in local classrooms. Meets weekly on CU campus and involves a minimum of 50 hours in local schools.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4001
**Requisites:** Restricted to Masters-level teacher licensure students with a English-Secondary Education (EDEN-LICG) or Social Studies-Secondary Educ (EDSS-LICG) plan.
**Grading Basis:** Letter Grade

**EDUC 5002 (3) Framing Equity and Justice in the STEM Classroom**
Critically frames learning to teach for equity and justice in Science, Technology, Engineering, and Mathematics [STEM] Classrooms. Orients students to the School of Education's mission and guiding principles of the CU Teach program. Provides opportunities for students to enact those principles with mentor teachers in local classrooms. Meets weekly on CU campus and involves a minimum of 40 hours in local schools.
**Requisites:** Restricted to Mathematics-Secondary Education (EDMA-LICG) or Science-Secondary Educ (EDSC-LICG) students only.
**Grading Basis:** Letter Grade

**EDUC 5005 (3) Advanced Social Foundations of Education**
Critically examines the intellectual and political forces that shape the aims, policies, and practices of K-12 education in the United States.
**Requisites:** Restricted to Educ-Curriculum Instruction (EDCI) graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5010 (3) Race and Equity in Higher Education**
This course introduces students to recent research and theory surrounding race, ethnicity, access, inclusion, and equity in higher education. It focuses on the development of knowledge, skills and awareness that is crucial in becoming an engaged scholar and practitioner in the areas of diversity, equity, and inclusion. We discuss the responsibilities, tensions, and opportunities one must have in creating and maintaining a pluralistic and inclusive campus for all. We also discuss ways in which themes of identity and diversity operate far beyond one-on-one relationships but rather extend to systems and structures that comprise a college and/or university environment.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4010
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5011 (1) College Student Career Development**
Explores the diverse aspects of career development for college students. Examines the different models of career services for students in different schools, colleges and majors.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5012 (1) Higher Education Finance**
Covers the major, basic elements of budgeting and finance in higher education. It is designed to address the budget process in colleges and universities, as well as the impact of budget activities on other areas of planning and operations within an institution. Enhances students' knowledge of both internal and external financial environments facing higher education.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5014 (1) Ethical Dilemmas in Higher Education**
Examines ethical issues involved in higher education and student affairs administration. Uses real and fictional ethical cases to bring to light various moral and ethical tensions relevant for higher education and student affairs professionals.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5015 (3) International / Comparative Education**
Comparatively studies education in other countries, emphasizing its role in developing nations, with an emphasis on successful models in basic literacy, primary education, secondary curriculum and teacher education. Analyzes political, social and economic policies and ideologies for their relevance to the development process, including the role of international organizations: World Bank, UNICEF, UNESCO, Peace Corps and Volunteer Agencies.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4015
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5020 (1) College Academic Advising**
Explores the diverse aspects of academic advising for college students. Examines the different models of advising for students in different schools, colleges and majors.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5021 (1) College Athletic Affairs**
Examines the relationship between student-athletes and the institution and explores how intercollegiate athletics fits into the academic enterprise of higher education. Key questions include: 1) what purpose does athletics serve and 2) for whose benefit? With these questions in mind, we examine the range of issues at the intersection of athletic administration, student development theory, and educational leadership and policy.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5022 (1) LGBTQ+ Topics in Higher Education**
Explores the diverse aspects of college and university life for students, staff, and faculty who identify as LGBTQ+. Examines the different higher education supports and challenges for LGBTQ+ student populations.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5023 (1) College Admissions and Enrollment**
Explores the diverse aspects of college and university student recruitment, outreach, admissions, and enrollment. Examines the different models of admissions processes and systems, with attention to relevant politics and professional practices.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5026 (1) Technology in Higher Education**
Examines impact of technology on higher education and student affairs. Explores impact of technology on students and their development, and teaching and learning. Although technical aspects of technology are discussed in some depth, this is not designed as a 'technical' course; the content revolves around implications of technology as both a driving and a supportive element within higher education
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5027 (1) Institutional Advancement and Development in Higher Education**
Examines the roles of institutional advancement, development, and fundraising in higher education and student affairs. Explores the impact of advancement on students, staff, and faculty, as well as on teaching and learning, research, campus life, and the larger community. The content will revolve around implications of development work as both a driving and a supportive element within higher education.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5028 (1) International Education in Higher Education and Student Affairs**
To provide an introduction to the field of international education. Students pursuing graduate studies in higher education administration will benefit from an overview of global student mobility trends and an exploration of career pathways within the field. In-class discussions, out-of-class readings, and guest speakers will guide student learning.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade

**EDUC 5030 (1) Accessibility and Students with Disabilities in Higher Education**
Provides students with important knowledge about issues of accessibility and development for students with disabilities in higher education. Examines strategies to offer support and guidance to students with disabilities in order to foster a safe and engaging learning and living environment.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5031 (1) Institutional Research & Analytics in Higher Education**
Examines the roles and uses of institutional research and data analytics in higher education and student affairs. Provides students with a foundational understanding of the field of institutional research and data analytics in higher education. Explores the activities in which institutional researchers engage, the tools they need to be successful in their jobs, the topics they study and issues they investigate.
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5032 (1) College Student Leadership Development**
Surveys the study and practice of leadership and provides students with a variety of experiences to wrestle with large leadership questions. What is leadership? Who can be a leader? How is leadership an important aspect of understanding self and others?
**Requisites:** Restricted to Master's in Higher Education (MAHE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5033 (1) Special Topics in Higher Education**
This 1-credit "module" course examines special topics in higher education practice. The course is designed to feature emerging questions of higher education policy and practice. This course satisfies requirements for the MA in Higher Education program, but is also open to other students.
**Repeatable:** Repeatable for up to 4.00 total credit hours.

**EDUC 5035 (3) Family and Community Engagement**
Focuses on models and strategies for improving parent and community involvement in the schools. Discusses administrative concerns, such as parent advisory councils, and instructional concerns, such as helping children with school assignments.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5050 (3) Knowing and Learning in Mathematics and Science**
The course is aimed at providing graduate students the opportunity to engage deeply with theories of mathematics and science learning for the purposes of designing engaging and affirming learning environments. The course is centered around reading deeply and critically in the literature on learning theory, coupled with a youth and community-based research project.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4050
**Requisites:** Restricted to graduate students only.

**EDUC 5060 (3) Classroom Interactions**
Students design and implement instructional activities informed by what it means to know and learn mathematics and science, and then evaluate the outcomes of those activities on the basis of classroom artifacts. Students examine how content and pedagogy combine to make effective teaching. Students are required to work in a classroom 4 hours per week.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4060
**Requisites:** Restricted to Educ-Curriculum Instruction (EDCI) graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5065 (3) Curriculum Theories**
Examines four central curricular traditions: progressive; conservative; radical; and spiritual. Highlights the strengths and weaknesses of various writers within each tradition with attention paid to the conceptual features and the practical implications of each educational view. Encourages students to examine their own educational assumptions.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5070 (3) Spirituality and Religion in Education**
Examines features of religion, spirituality, and a liberal arts education, so as to further understand the constitutional, historical and cultural constraints on, and acceptable approaches to the study of religion and spirituality in American education. Specifically explores aspects of a contemplative orientation and the degree to which such an orientation should/can be pursued in K-12 public and higher education.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5075 (3) Sociology of Education**
In-depth analysis of theories and concepts in sociology and education. Evolution of curriculum, organization, and enrollment characteristics of American schools. Schooling, race, class, culture, gender, stratification, and educational reform in light of paradigmatic change in theories and concepts of sociology.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5085 (3) History of American Education**
Highlights social and intellectual history perspectives of American educational history, major reform movements from the 19th century to Dewey, and assessment of how differences of race, class, ethnicity, religion, power, and gender affected American education.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5105 (3) Teaching for Understanding and Equity**
Addresses perspectives and evidence-based teaching practices that promote equity and access to conceptual understanding. Introduces the knowledge base on effective and socially just teaching practices, and the theories and research that support these practices. Explores the impact of theory and research on classroom instruction.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5112 (3) Educational Psychology and Adolescent Development**
Analyzes fundamental concepts from psychology and the learning sciences to understand how educators can support youth development in and out of school. Includes service learning requirement. This course is not appropriate for in-service teachers.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4112
**Requisites:** Restricted to graduate students only.

**EDUC 5115 (3) Issues in School Change and Reform**
Examines recent developments in teaching, and trends in the philosophy and practice of education. Focuses special attention on a variety of issues central to school reform.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5135 (3) Story and Memoir**
Explores narrative theory and the epistemological/stylistic commitments of stories as the basis for writing memoir, as well as for studying the written and spoken memoirs of others. We use the word memoir to mean a story of "how one remembers one's own life." Introduces and discusses narrative theory and selected memoirs. Students engage in reflection on their own narrative-making processes and evaluate their practical and analytic understanding of daily narrative practice.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4135
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5145 (3) Gender, Literacy, and the K-12 Classroom**
Explores and critiques various conceptions of gender within popular and scholarly publications that have influenced how gender and sexual diversity is approached in classrooms. Builds a theoretical stance toward gender and sexual diversity that supports equity, engagement and achievement for all children and youth. Discusses teaching strategies that thoughtfully take into account gender identities and equity.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5150 (3) Introduction to Qualitative Research Methods**
Introduces students to qualitative research in education. Examines the foundations, design, methods and analysis of qualitative research methods. Readings include texts about the foundations and purposes of qualitative inquiry, and methodological readings about the application of research techniques. Students will complete a variety of small, hands-on projects that introduce major dimensions of qualitative research including observation, interviewing, and document analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4150
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Education

**EDUC 5165 (3) Children's Literature**
Involves reading and evaluation of picture books, and emphasizes children's interests, authors and illustrators, multicultural literature, the components of narrative, and the features of illustrations. Examines connections between children's literature and children's development as writers.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5177 (3) Curriculum and Policy in Mathematics and Science Education**
This course explores the changing curriculum in school mathematics and science. It will examine the history and evolution of K-20 math and science curricula from the late 1890s to current times. It will examine motivations and political forces that have help shape and change math and science curricula.
**Requisites:** Restricted to graduate students only.

**EDUC 5178 (3) Theories of Learning in Math and Science Education**
This course focuses on research on the learning of mathematics and science in the K-12 schooling environment. It serves to introduce students to seminal learning theories that have guided and shaped mathematics & science education over the past thirty years (e.g., constructivist, cognitive, situative/sociocultural and critical perspectives). Core ideas within each of these theoretical perspectives will be explored such as knowledge construction and conceptual change, argumentation and reasoning, classroom discourse processes, participation and identity, and access and power. Implications of these different theoretical perspectives for classroom teaching and learning will also be examined. For example, questions such as the following are considered: What is the purpose of a theory of learning (e.g., for teaching, for education systems)? What constitutes learning within each perspective? What are the implications of a particular theoretical perspective for organizing learning environments? What are the implica
**Requisites:** Restricted to graduate students only.

**EDUC 5179 (3) Seminar on Teaching and Teacher Education in Math and Science Education**
This course examines how scholarship on teaching and teacher learning has been evolving in mathematics and science educational research since the 1980s and 1990s. Students will explore theories of teacher learning and how they relate to designs for teacher preparation and professional development. We will also study common designs and design principles for conducting research to study teaching and teacher learning.
**Recommended:** Prerequisites EDUC 5060 and EDUC 6318.
**Grading Basis:** Letter Grade

**EDUC 5205 (3) Elementary Mathematics Theory and Methods**
Provides pre-service teachers opportunities to explore contemporary theories of learning, curriculum development, and pedagogical strategies pertaining to teaching elementary-level mathematics. Blends exploration in mathematical content with development of sophisticated mathematical models for teaching.
**Requisites:** Requires corequisite course of EDUC 4351. Restricted to Elementary Education (EDEL) majors only.
**Additional Information:** Departmental Category: Elementary Education

**EDUC 5215 (3) Elementary Science Theory and Methods**
Provides pre-service elementary teachers opportunities to explore contemporary theories of learning, curriculum development, pedagogical strategies, and assessment. Blends scientific content, pedagogy, and practical applications.
**Requisites:** Requires corequsite courses of EDUC 4331 and 4341. Restricted to Elementary Education (EDEL) majors only.
**Additional Information:** Departmental Category: Elementary Education

**EDUC 5220 (3) Curating and Evaluating Reading Materials for K-12 Classrooms**
In this course, MA students will explore how educators can curate, evaluate, and use different literacy materials for reading and other classroom instruction. Of particular focus will be Children's and Young Adult Literature, decodable books, trade books, and non-traditional texts (e.g., web resources) spanning fiction and nonfiction genres. Attention will be given to texts' written and illustrative quality, cultural relevance and authenticity, and the impacts of these on readers' development and interest.
**Requisites:** Restricted to graduate students only.

**EDUC 5222 (3) Language Study for Educators**
Focuses on the nature of linguistic development and performance. Examines works that reflect a range of scholarly approaches to language study, explores language use both in and out of school, takes up the relationships between language practices and power and considers implications for classroom teaching.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4222
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5235 (3) Language and Literacy Across the Curriculum**
Explores the relationship between language and learning in math and science classrooms with the goal of developing teaching practices that engage students in using language as a tool for understanding and constructing meaning across the curriculum. Explores how language/literacy take on different forms and functions in different social contexts and academic disciplines.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4232
**Requisites:** Restricted to EDCI, EECD, EFPP, EPSY or REME graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5245 (3) Foundations of Reading Instruction K-12**
In this course, MA students build and expand their understanding of the five pillars of reading instruction: phonemic awareness, phonics, fluency, vocabulary, and comprehension. They will gain in-depth and up-to-date knowledge about the Science of Reading and the Science of Teaching Reading, as well as the language comprehension and word recognition strands that are woven into skilled reading.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5255 (3) Digital & Disciplinary Literacies**
In this course, MA students will analyze current technology integration practices in literacy instruction, and their impact on the building, expanding, and transformation of disciplinary literacies¿the situated and specific literacy practices necessary to engage in a particular discipline or content area. We will explore the intersections between digital literacies and new media, knowledge building, and project-based inquiry perspectives when children and youth read texts in the content areas of literature, science, and social studies.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5265 (3) Processes & Skills in Writing**
In this course, MA students examine processes that writers use from early ages to maturity by investigating current research related to writing curriculum, instruction, and policy. Includes opportunities for students to engage in inquiry related to writing curriculum and instruction in K-12 classrooms. This course will also examine the ways in which the Science of Reading and Writing can be incorporated into writing pedagogy models.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5275 (3) Diagnostic Reading Assessment & Intervention**
In this course, students develop the concept of reading assessment and evaluation for diagnostic purposes, in order to identify supports for students experiencing reading difficulties and to design reading intervention within an MTSS model. Students explore how factors such as psychological, cognitive, and sociocultural perspectives, educational policies, community and school practices, and curricular and teacher expectations influence assessment (data that are collected) and evaluation (interpretive decisions about assessment data).
**Requisites:** Requires a prerequisite course of EDUC 5245 (minimum grade C-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5285 (3) Literacy Coaching & Leadership**
The objective of the course is to extend, synthesize, and apply learning gained throughout the program, and to engage participants with advanced topics in literacy, particularly those related to reading interventions and instructional leadership. In addition, many opportunities are provided for demonstrating and evaluating quality small-group and whole-class literacy lessons.
**Requisites:** Requires a prerequisite course of EDUC 5275 (minimum grade C-). Restricted to graduate students.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5295 (3) Narrative and Story in the Humanities**
Explores a wide variety of texts that might be used in secondary English and Social Studies classrooms. Examines philosophies and instructional approaches to the teaching of reading and literature. Considers the influence of story and storytelling in the construction of personal and societal meaning.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4295
**Requisites:** Requires prerequisite of EDUC 5001 (minimum grade C-). Restricted to teacher licensure students in English (EDEN-LICG).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5301 (3) Queer(ing) Topics in Education**
Bring critical and queer theoretical perspectives to bear on an inquiry into what's counted as "normal" in social, historical, and political contexts of education in the United States. We'll explore queerness, queer theory, and queer pedagogy, in an effort to examine schooling as a heteronormative institution that has tended toward (re)producing heterosexism, homophobia, and violence against queer bodies and identities.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4301
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5310 (3) Social and Emotional Learning in Schools**
Explore the ways SEL benefits students through investigating its purposes and goals, the competencies it seeks to promote, the characteristics of effective programs, and the range of program formats. We frame these topics through examining ongoing dilemmas in the field. We also conduct in-depth reviews of several programs and the research that supports them.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4310
**Requisites:** Restricted to graduate students only.

**EDUC 5315 (3) Perspectives on Science**
Explores contemporary ideas and issues in the history, philosophy and sociology of science education and science, science as a social and cultural activity and how contemporary issues in science relate to and impact educational practice.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4315
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5316 (3) Nature of Social Studies and Social Studies Education**
Prepares teacher education candidates for teaching social studies in a social context. Participants will understand theoretical and developmental processes associated with social studies learning, methods for teaching social studies in a diverse society, and the integration of classroom instruction with the Colorado Academic Content Standards that foster such processes.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4316
**Requisites:** Restricted to Social Studies Secondary Education (EDSS-LICU or EDSS-LICG) students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5317 (3) Perspectives on Mathematics**
Explores the historical development of mathematics as a human construct, and the relationship between the discipline and the contemporary school mathematics curriculum. Focuses on the sociology of mathematics education and how cultural traditions and societal needs influence the school mathematics curriculum and educational practice.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4317
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5325 (3) Queering Literacy in Secondary Classrooms**
Engages theories and practices of literacy teaching and learning that challenge multiple forms of oppression. Using the tools of queer pedagogy, students will learn, develop, and enact strategies for planning and implementing literacy instruction that moves beyond inclusion of differences in the English/language arts and social studies curriculum.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4325
**Requisites:** Restricted to Master's teacher licensure students in English (EDEN-LICG).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5330 (3) Secondary Social Studies Methods I**
Explores effective social studies teaching techniques used to prepare secondary students for success in college, career, and civic life. An emphasis is placed on interpreting sources, understanding multiple perspectives, and employing critical thinking with diverse students.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4330
**Requisites:** Requires prerequisite of EDUC 5001 (minimum grade C-). Requires corequisite of EDUC 4901. Restricted to teacher licensure students in Social Studies (EDSS-LICG).
**Grading Basis:** Letter Grade

**EDUC 5345 (3) Secondary English Methods I**
Explores the underlying principles and philosophies of several approaches to the teaching of English in the areas of language, writing, and speaking and the practical application of these methods in the secondary classroom. Provides support in constructing activities, assignments, assessments, and units that meet the differentiated needs of students given their diverse identities, lives, interests, and needs.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4345
**Requisites:** Requires a prerequisite of EDUC 5001 (minimum grade C-). Requires corequisite of EDUC 4901. Restricted to teacher licensure students in English (EDEN-LICG).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5355 (3) Secondary Social Studies Methods II**
Explores effective techniques associated with reading, processing, and assessing social studies subject area content with an emphasis on developing critical thinking skills and meeting the needs of diverse students.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4355
**Requisites:** Requires prerequisite course of EDUC 4330 or EDUC 5330 (minimum grade C-). Restricted to teacher licensure students in Social Studies (EDSS-LICG).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5365 (3) Secondary English Methods II**
Explores the underlying principles and philosophies of several approaches to the teaching of English in the areas of reading, thinking, and viewing and the practical application of these methods in the secondary classroom. Provides support in constructing activities, assignments, assessments, and units that meet the differentiated needs of students given their diverse identities, lives, interests, and needs.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4365
**Requisites:** Requires prerequisite course of EDUC 4345 or EDUC 5345 (minimum grade C-). Restricted to teacher licensure students in English (EDEN-LICG).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5375 (3-4) Problem-Based Math Instruction**
Focuses on curriculum, materials, methods and assessment, and related aspects of instruction. Introduces best practices in teaching mathematics in middle and high schools. Students are required to work in a classroom 4 hours per week. Examines the Colorado Academic Content Standards.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4375
**Requisites:** Restricted to EDCI, EDSC, or EDMA majors only.
**Recommended:** Corequisite EDUC 4023.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5385 (4) Phenomenon-Based Science Instruction**
Focuses on curriculum, materials, methods, assessment, and related aspects of instruction. Introduces best practices in teaching science in middle and high schools. Students are required to work in a classroom 4 hours per week. Examines the Colorado Academic Content Standards.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4385
**Requisites:** Restricted to EDCI, EDSC, or EDMA majors only.
**Recommended:** Corequisite EDUC 4023.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5390 (3) Seminar: Teaching for Equity and Justice**
Supports candidates as they continue to develop the skills and stance to teach for equity and justice in public school settings. Explores how educators for equity and justice sustain their commitments through ongoing learning and reflection, care for their students and themselves, and collaboration and advocacy. Supports candidates in making the transition from the university into the profession in a way that allows them to remain true to their vision of who they are and want to be as educators.
**Requisites:** Requires prerequisite of EDUC 5330 or EDUC 5345 (both minimum grade C-). Restricted to teacher licensure students in English (EDEN-LICG) or Social Studies (EDSS-LICG).
**Grading Basis:** Letter Grade

**EDUC 5425 (3) Introduction to Bilingual/Multicultural Education**
Provides an introduction for currently practicing K-12 teachers and non-specialists to bilingual and multicultural education programs for emergent bilingual students. Includes an overview of the history and legislation related to the education of emergent bilingual students, identification and placement, as well as the various models, theoretical and philosophical underpinnings, and pedagogical practices that constitute sound educational practices for emergent bilingual students.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4425
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5435 (3) Materials and Methods in Bilingual/ Multicultural Education**
Provides an in-depth study of the curriculum options available for bilingual and ELD programs. Presents, reviews, and critiques specific methods and strategies for teaching language to minority students. Gives the opportunity to develop and present teaching units in Spanish or in ELD methodology, as appropriate.
**Requisites:** Requires a prerequisite course of EDUC 5425 (minimum grade C-).
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5445 (3) Curriculum for Multicultural Education**
Analyzes curriculum programs and examines principles that inform innovation for education of diverse students at all school levels. Includes topics of ethnic, racial, socio-economic, linguistic, and gender diversity.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5455 (3) Literacy for Linguistically Different Learners**
Presents current and emerging philosophies and methods on teaching reading to culturally diverse second-language learners. Includes review of materials, strategies for teaching reading and writing skills, and important considerations for transference from L1 to L2 reading.
**Requisites:** Requires a prerequisite course of EDUC 5425 (minimum grade C-).
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5460 (3) Teaching and Learning Physics**
Learn how people understand key concepts in physics. Through examination of physics content, pedagogy and problems, through teaching, and through research in physics education, students will explore the meaning and means of teaching physics. Students will gain a deeper understanding of how education research is done and how people learn. Useful for all students, especially for those interested in physics, teaching, and education research.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4460 and PHYS 4460 and PHYS 5460
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5465 (3) Introduction to ELD/Bilingual and Special Education**
Provides students with the fundamental information of ELD, bilingual and special education, including theories, assumptions, philosophies, and paradigms of bilingual and special education. Discusses successful teaching techniques and instructional approaches, including individualization, least restrictive environment, transition, and career education.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5485 (3) Differentiation in the Classroom**
Focuses on teaching culturally and linguistically diverse students, special education students, and differentiation in the classroom. Emphasizes evidence-based teaching practices, programmatic interventions that support student learning and using research to inform practice. Includes practicum. Department enforced prerequisite: restricted to MA+ students.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5490 (3) Blurring Disciplinary Lines in the Humanities**
Explores theories, methods, and materials for building interdisciplinary connections within and across secondary English and Social Studies classrooms. Provides opportunities for collaborative work in building lessons and unit plans that challenge disciplinary boundaries and advocate for complex problem solving.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4490
**Requisites:** Requires prerequisite of EDUC 5345 or EDUC 5330 (minimum grade C-). Restricted to teacher licensure students in English (EDEN-LICG) or Social Studies (EDSS-LICG).
**Grading Basis:** Letter Grade

**EDUC 5505 (3) Education of Students with Learning and Behavior Disorders**
Discusses unique learning needs of students with learning and behavior disorders. Emphasizes development of a systems model for diagnosis, programming, and remediation. Stresses data-based individualization of instruction, with emphasis on intervention in inclusive learning environments and developing a culturally responsive system.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5515 (3) Curriculum and Assessment for Special Learners**
Emphasizes assessment of special education students from pre-referral through staffing and placement, including response to intervention, research-based assessment practices, analytic teaching and assessment, curriculum-based assessment and measurement. Selection, administration, and interpretation of formal and informal assessment devices are studied, with particular emphasis on cultural relevance and equity in assessment for special learners with mild to severe needs.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5525 (3) Research Issues in Special Education**
Provides practical experience in the review, critique, conceptualization, and writing of research studies in special education. Also offers experience in design of evaluation systems for classroom practice.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5535 (3) Assessment in Bilingual Communities**
Promotes critical uses of assessment instruments and information. Provides methods for educators to incorporate assessment as a meaningful activity in the classroom intended to support learning among bilingual students. Examines effectiveness, validity, and fairness in the testing of linguistically diverse populations. Provides first-hand experiences developing, selecting, reviewing, and adapting test materials as critical to making informed teaching decisions.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5545 (3) Strategies for Teaching Students with Special Needs**
Provides teachers with specific evidence-based methods and techniques for teaching students with a wide variety of high and low disabilities including learning and language disabilities, hearing and visual impairments, physical disabilities, and health impairments. Emphasizes different teaching methods, instructional materials, and learning strategies that have proven effective working students with cognitive learning needs.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5555 (3-4) Practicum in Bilingual/Special Education**
Offers supervised field experience in elementary and secondary special education class settings. Each credit hour requires 50 contact hours.
**Requisites:** Requires prerequisite courses of EDUC 5465 and EDUC 5505 and EDUC 5515 or EDUC 5545 (all minimum grade C-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5575 (1-4) Workshop in Curriculum and Instruction**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5580 (3) Physics and Everyday Thinking**
Engages non-physics majors in hands-on, minds-on activities and labs to investigate the physical world, the nature of science, and how science knowledge is constructed. This introductory course is especially relevant for future elementary and middle school teachers although it will meet the needs of most non-physics and non-science majors. Physics content focuses on interactions and energy.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5595 (1-4) Practicum for Educators of Linguistically Diverse Communities**
University supervised, school-based field experience teaching linguistically different students, as well as assistance in the completion of EECD portfolio.
**Requisites:** Requires prerequisite courses of EDUC 5425 and EDUC 5435 and EDUC 5535 (all minimum grade C-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5605 (3) Research Issues in Bilingual Education**
Offers practical experience in the review, critique, conceptualization, and writing of research studies in bilingual/ELD education. Provides experience in the design of classroom evaluation systems.
**Requisites:** Requires a prerequisite course of EDUC 5245 (minimum grade C-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5610 (1-3) Math and Science Education**
Introduces learning theory and teaching practices for mathematics and science learning assistants. Presents theoretical issues such as conceptual development, questioning techniques, cooperative learning, nature of math/science, and argumentation in mathematics and science.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5615 (3) Language Acquisition for Bilingual Learners**
Presents a broad survey of second-language acquisition research. Stresses theoretical concerns and research findings and practical applications to teaching second languages. Gives special emphasis to second-language acquisition.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5625 (3) Methods of Teaching English Language Development**
Exposes students to strategies used to teach English Language Development. Covers both theoretical and applied aspects of language learning and teaching. Exposes students to techniques, activities, strategies and resources to plan instruction for students learning English Language Development. Emphasizes oral language development, literacy and content-area instruction for teaching K-12 students.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite EDUC 5615.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5635 (3) Education and Sociolinguistics**
Explores the discipline of sociolinguistics, the study of language variation and use, and its application within education settings. Not designed as an advanced sociology or linguistics course. Areas of study include language variation, speech communities, the ethnography of communication, speech and social identities, and sociolinguistic research related to teaching and learning.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5706 (3) Assessment in Mathematics and Science Education**
Examines purposes and practices of assessment in mathematics and science education. Particular attention is given to application of theoretical foundations and contemporary research in the design and use of assessment techniques and tools to support teaching for student understanding. Addresses the role of effective formative assessment in teaching and learning.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4706
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5716 (3) Basic Statistical Methods**
Introduces descriptive statistics including graphic presentation of data, measures of central tendency and variability, correlation and prediction, and basic inferential statistics, including the t-test.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5726 (3) Introduction to Disciplined Inquiry**
Considers various research approaches and methodologies included in education including experimental and quasi-experimental methods; anthropological and case study methods; evaluative research and field studies; correlational; and sociological, historical, and philosophical research. Topics include library research, research criticism, research design, and proposal writing.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5800 (1-9) Master's Special Topics**
Designed to meet needs of students with topics of pertinent interest. 00 total credit hours. Allows multiple enrollment in term.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5815 (3) Teaching K-12 Mathematics: Number Sense**
Provides teachers opportunity to explore fundamental mathematical theories and pedagogical perspectives pertaining to the teaching and learning of number and operation. Engages students in explorations of mathematical content underlying number and operations, while highlighting relevant problem solving, reasoning and proof, and mathematical connections. Explores implications of teachers' mathematical learning on their classroom teaching. Develops practices supporting learner's number sense development. Formerly EDUC 5810.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4815
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5821 (3) Teaching K-12 Mathematics: Algebraic Thinking**
Uses reform-based mathematics curricula to engage participants in algebraic thinking, to reflect on their own knowledge of algebraic concepts, and to examine pedagogical ideas that can foster K-12 students' algebraic thinking and learning. Algebraic topics include patterning, variable, functions, multiple representations, equality, and solving linear and systems of equations.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4821
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5822 (3) Teaching and Learning Chemistry**
Explores issues related to how people learn and teach chemistry. Reviews high school and early college chemistry concepts both from the content and pedagogical perspectives. Delves into the chemistry education research, education, psychology and cognitive science literature. Provides an opportunity to observe and/or teach K-12 or college chemistry classes.
**Recommended:** Prerequisite of one semester of college-level chemistry is recommended.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5833 (3) Teaching and Learning Earth Systems**
Learn and develop pedagogically effective strategies for teaching and understanding Earth Science concepts. Particular emphasis is placed on understanding the importance of geoscience habits of mind (i.e. spatial/temporal reasoning, multiple working hypotheses, geographic context). The course focuses upon inquiry and evaluation of evidence, the importance of background knowledge and misconceptions and developing effective discourse within and outside the classroom.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4833 and GEOL 4833 and GEOL 5833
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5835 (3) Teaching K-12 Mathematics: Geometry & Measurement**
Provides an opportunity to explore how to foster geometric thinking while examining fundamental mathematical theory underlying the content area of geometry and measurement. Emphasizes investigative approach involving problem solving, reasoning, connections, and communication as well as learning mathematics content in a flexible and conceptual way. Challenges participants to apply their understanding to teaching practices that foster geometric thinking in K-12 learners. Formerly EDUC 5830.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 5844 (3) Teaching and Learning Computational Thinking**
This course is designed for current and future STEM educators interested in understanding Computational Thinking and how it can be enacted to support student learning. Computational Thinking is the process by which people make sense of problems where computation, or computational tools, could be leveraged to enact the solution. For example, when students are tasked with solving a word problem they engage in computational thinking by identifying important elements in the written problem and then leveraging mathematical or scientific methods that would lead to a solution. During this course, students will engage with research-based theories, conceptualizations, and practices for engaging with Computational Thinking in STEM learning environments and experiences. Following an introduction to Computational Thinking, students will be supported in making sense of the ideas and practices through published research, existing tools, classroom activities, and reflection on experiences of problem solving and overcoming

**EDUC 5850 (3) Teaching K-12 Mathematics: Probability & Statistics**
Focuses on teaching probability, data analysis, and statistics in K-12 classrooms. Explores curriculum and assessment strategies in the areas of probability and statistics. Examines research on students' thinking on stochastic tasks and how this research informs teaching practice. Emphasizes deepening of one's conceptual understanding of probability and statistics and their importance in the current information age.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4850
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6110 (3) Student Affairs in Higher Education**
Provides students with a thorough introduction to the field of student affairs administration in higher education. Explores diverse facets of college student affairs administration and its role within US higher education. The course will help students develop a broad foundation for subsequent Higher Education study and practice. Focuses on philosophies, complexities, and futures of the student affairs profession.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6210 (3) Education Policy and the Law**
Approaches education policy issues through the rich history of litigation and current legal challenges facing American K-12 schooling. Builds an understanding of the legal and policy development of the American schooling system, particularly in the 20th century. Laws and legal cases will be used as jumping-off points for broader discussions.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6211 (3) Education Law and Litigation Workshop**
The students in this workshop course will learn through a project-oriented, constructive conversation between legal experts and education policy experts. With elements of community-engaged learning, as well as clinical and street law, the course creates a forum for an iterative process whereby education students, attorneys (adjunct professors) and law students will work together on legal projects of their own choosing. The attorneys and law students will inform the education researchers about how claims for relief or legislation (or a legal argument used in another context) might be shaped, while the researchers would inform the lawyers and law students about whether and how the research supports a potential claim or approach, and about the sorts of remedial orders or interventions that might be beneficial.
**Requisites:** Restricted to graduate students only.

**EDUC 6220 (3) Gender Issues in Education**
Provides a strong foundation in the various issues of gender and sexual diversity in education. Stimulates explorations into the ways the construct of "gender" affects and is affected by the educational system and process. Presents theory and research about contemporary educational issues related to sexism and homophobia. Encourages development of well-considered views about the various issues, research, and theories.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6230 (3) Ethics in Education**
Investigates controversies in education from a self-consciously ethical perspective, drawing as appropriate from moral and political theory as well as law. Focuses on public education's role in fostering democratic citizenship and providing equal educational opportunity. Critically evaluates various education reform policies and curriculum policies. Applies method commonly used in medical ethics to make decisions regarding concrete ethically problematic cases.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6240 (3) African American Education in the United States**
Explores development of schooling for African Americans in the U.S.. Emphasizes historical and contemporary struggles of this group in their quest to access meaningful educational opportunities. Examines how social, economic, political, and judicial action defined and organized policy and practice for this group. Degree credit not granted for EDUC 4240 and 6240.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Education

**EDUC 6245 (3) Latinx Education Across the Americas**
Examines Latinx education across the Americas in comparative perspective, exploring critical issues, themes, and cross-border movements that link Latinx education in the United States and Latin American education. Considers the socio-historical, cultural, and political contexts that shape the education of Latinx communities, with special attention to issues of race, cultural and national identity, and representation as these are negotiated in schools.
**Requisites:** Restricted to graduate students only.

**EDUC 6250 (3) Higher Education in the United States**
Examines major issues in higher education focusing on the sociopolitical contexts in which US universities operate as gatekeepers to opportunities. Topics include the purposes and history of higher education in the United States, college teaching and learning, finance and governance, issues of access and equity related to race, gender, sexual orientation, gender identity, immigration status and class, and student life.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**EDUC 6260 (3) Transnational Migration, Education, and Citizenship**
Examines the education of transnational migrant youth and families in comparative perspective, with a focus on citizenship formation. Compares state-led responses to diversity through education and integration policies with the transnational practices of distinct migrant and diaspora communities in both the United States and Europe. Considers the educational experiences of distinct types of migrants, including undocumented immigrant students and their families and university students studying abroad, and implications for citizenship.
**Requisites:** Restricted to graduate students only.

**EDUC 6318 (3) Psychological Foundations of Education**
Introduces students to theoretical and empirical contributions of educational and developmental psychology and the learning sciences emphasizing applications to educational practices. Topics include learning, development, cognitive processes, social and cultural context, motivation, assessment and individual differences.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6325 (3) Anthropology of Education**
Applies anthropological perspectives to research in educational settings. Focuses on theories of culture, cultural transmission and acquisition, and cultural reproduction and production for understanding schooling and its outcomes.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6328 (3) Advanced Child Growth and Educational Development**
Introduces students to recent theoretical and research advances in the study of children and adolescent's cognitive, social and emotional development, with an emphasis on implications for learning in and out of school.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6368 (3) Adolescent Psychology and Development for Teachers**
Examines current theory and research on adolescent development, learning, motivation, and academic achievement. Emphasizes how theory and research can inform instructional decisions in the secondary classroom.
**Requisites:** Restricted to English-Secondary Education (EDEN), Social Studies-Secondary Educ (EDSS), Mathematics-Secondary Educ (EDMA) or Science-Secondary Educ (EDSC) graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6405 (3) College Student Development and Counseling Theories**
Covers theories of student development in higher education as they apply to the growth of students and the influence of the college environment on growth and development. Examines selected approaches to counseling theory and practice. Theoretical formulations basic to human development and the counseling process are presented including historical and philosophical background. This course explores themes of human development, self-evolution, meaning making, separation and connection, and moral meaning making, and how college students are other adults construct themselves and the meaning they make of their experience.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6504 (3) Issues and Methods in Cognitive Science**
Interdisciplinary introduction to cognitive science, examining ideas from cognitive psychology, philosophy, education, and linguistics via computational modeling and psychological experimentation. Department enforced prerequisite: graduate standing or at least one upper-division course in computer science, linguistics, philosophy, or psychology.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 6402 and LING 6200 and PHIL 6310 and PSYC 6200 and SLHS 6402
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6505 (1-2) Readings and Research in Cognitive Science**
Interdisciplinary reading of innovative theories and methodologies of cognitive science. Share interdisciplinary perspectives through in-class and online discussion and analysis of controversial texts and of their own research in cognitive science. Required for joint PhD in cognitive science.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6506 (2) Cognitive Science Research Practicum**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7412 and LING 7415 and PHIL 7415 and PSYC 7415 and SLHS 7418
**Requisites:** Requires prerequisite course of CSCI 6402 or EDUC 6504 or LING 6200 or PHIL 6310 or PSYC 6200 (minimum grade D-). Restricted to graduate students only.
**Recommended:** Prerequisite EDUC 6505.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6516 (2) Cognitive Science Research Practicum 2**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core disciplineand cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7422 and LING 7425 and PHIL 7425 and PSYC 7425 and SLHS 7428
**Requisites:** Requires prerequisite course of LING 7415 or PSYC 7415 or CSCI 7412 or EDUC 6506 (minimum grade D-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6705 (3) Leadership in Higher Education**
Examines theory and research on leadership and management in higher education, and the structure and governance of colleges and universities. Explores the internal organization and culture of institutions, as well as external and related bodies that affect higher education such as the federal and state governments, accrediting agencies, associations and foundations.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6804 (1-4) Special Topics**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6811 (3) Teaching and Learning Biology**
Provides an introduction to recent research into student learning on the conceptual foundations of modern biology, together with pedagogical methods associated with effective instruction and its evaluation. Students will be involved in active research into conceptual and practical issues involved in biology education, methods to discover student preconceptions, and the design, testing and evaluation of various instructional interventions.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4811 and MCDB 4811 and MCDB 5811
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6844 (1-4) Master's Independent Study**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6855 (1-4) Independent Study in Curriculum and Instruction---Master's Level**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6877 (1-4) Independent Study in Equity, Bilingualism and Biliteracy: Master's Level**
An independent study may be established between a student and a tenure track faculty member if both parties are amenable. The topics, readings and assignments will vary based upon mutually agreed upon goals. The student will be responsible for obtaining and submitting the necessary paperwork from/to the Office of Student Services in the School of Education. This is a variable credit course that ranges from 1 to 4 credits. The number of credits will be determined by the professor based on the workload.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6888 (1-4) Independent Study in Educational and Psychological Studies---Master's Level**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6899 (1-4) Independent Study in Educational Foundations Policy & Practice--Master's Level**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6915 (1-4) Practicum in Curriculum and Instruction**
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6916 (1-4) Practicum in Research and Evaluation Methodology**
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6918 (1-4) Practicum in Educational and Psychological Studies**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6919 (1-4) Practicum in Educational Foundations Policy and Practice**
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6925 (1-4) Readings in Curriculum and Instruction**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6926 (1-4) Readings in Research and Evaluation Methodology**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6927 (1-4) Readings in Equity, Bilingualism and Biliteracy**
Explores topics that are relevant to becoming a scholar and researcher in our field.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6928 (1-4) Readings in Learning Sciences and Human Development**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6929 (1-4) Readings in Educational Foundations Policy and Practice**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6944 (1-3) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6945 (3) MA Capstone Seminar in Foundations of Education**
Supports students completing a summative writing assignment for their Masters degree requirements. Writing assignments will be designed around the professional and academic goals of each student, in collaboration with the student's academic advisor. Students will analyze research studies across different disciplinary and methodological approaches. Through instructor coaching and peer review exercises, students will draft and refine a final assignment.
**Requisites:** Restricted to MA students in Education (EPSY-MA, EFPP-MA, HEDU-MA).
**Recommended:** Students need to meet with their advisor the semester before taking the course to start drafting the capstone project proposal and then department consent to register will be provided when the draft proposal with advisor's approval is submitted to the course instructor.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6954 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 6964 (3) Capstone: Inquiry in the Content Areas**
Supports students in using and building on the ideas and content encountered in previous coursework. Requires students to conceptualize, design and implement an original research project that will serve as exit requirement for the degree. Reads and engages in research and theory associated with Teacher Research (i.e. research conducted by teachers for professional purposes).
**Requisites:** Restricted to Educ-Curriculum Instruction (EDCI) graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7015 (3) Teaching Internship in Teacher Education**
One-semester teaching internship in an undergraduate or graduate foundations course.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7055 (3) Philosophy of Education**
Examines exemplars of educational philosophy from ancient times to the present day, emphasizing their relevance and application to current controversies in education (e.g., free speech, multiculturalism, and affirmative action). Formerly EDUC 5055.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7105 (3) Collaboration to Meet Special Needs**
Covers effective collaboration practices involving the special education teacher, other educational personnel, students, and parents. Bilingual special education considerations in collaboration will be described. Issues regarding inclusion will be explored. Practical application to teaching and learning will be made. Strategies for disseminating information and collaborative activities will be discussed.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7115 (3) Critical Inquiry into Becoming a Teacher Educator**
Designed to support doctoral students¿ development as university level instructors/teacher educators, particularly in relation to undergraduate courses that center equity and justice as central topics, this course will draw on critical perspectives and pedagogies to shape course goals, material/content and pedagogical approach. This will be done in two primary ways: a) through the use of pedagogies adapted from Freirean Culture Circles and Boalian Theater, and b) through the application of practitioner inquiry approaches designed to develop critical, reflective practices/habits of mind among teachers and teacher educators.
**Requisites:** Restricted to PhD students only.

**EDUC 7316 (3) Intermediate Statistical Methods**
Studies sampling theory and inferential statistics; advanced applications for testing of hypotheses regarding central tendency, variability, proportion, correlation, and normality; chi-square and the analysis of frequency data; multiple regression and prediction; introduction to the analysis of variance; and related computer programs for statistical analysis.
**Requisites:** Requires prerequisite course of EDUC 5716 (minimum grade D-).
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7326 (3) Quasi-Experimental Design in Causal Inference in Social Sciences**
Focuses on experimental and quasi-experimental designs in educational research; applications of the general linear mode; power and statistical efficiency; randomization and control; multiple comparisons; factorial experiments and interaction with fixed-factor and mixed design; analysis of covariance; effects of assumption violations; and related computer programs for statistical analysis.
**Recommended:** Prerequisite of a graduate-level introduction to stats course.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7336 (3) Methods of Survey Research and Assessments**
Examines theory and techniques involved in each stage of survey research, including problem formulation, questionnaire development, interview and mailed surveys, assessing reliability and validity, sampling plans, data reduction (e.g., factor analysis), and analysis of continuous and categorical data.
**Requisites:** Requires prerequisite courses of EDUC 5726 and EDUC 7316 (all minimum grade D-).
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7346 (3) Ethnographic Methods in Educational Research**
Explores the history of ethnography and its translation into educational research. Students practice participant observation, interviewing, journal writing, artifact searches, qualitative analysis and interpretation, and styles of reporting.
**Requisites:** Requires a prerequisite course of EDUC 6325 (minimum grade C-).
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7376 (3) Theory and Practice of Educational and Psychological Measurement**
Introduces theories of measurement and applications, and presents classical test theory. Includes quantitative concepts, methods, and computational techniques for the development, application, and evaluation of measurement instruments in social/ behavioral science and education.
**Requisites:** Requires prerequisite course of EDUC 5716 (minimum grade D-).
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7386 (3) Educational Evaluation**
Builds an understanding of the range of approaches taken by educational evaluators, focusing particularly on the evaluation of programs. Explores the nature of different evaluation perspectives and how these disparate views translate into methodological and conceptual models. Students develop a familiarity with the most common and influential approaches to evaluation.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7396 (3) Latent Variable and Structural Equation Modeling**
Introduces contemporary advanced multivariate techniques and their application in social science research. Focus on factor analysis and structural equation modeling. Prior experience with multiple regression is assumed.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite of EDUC 8230, EDUC 8240, EDUC 8710.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7416 (3) Seminar: Research Methodology**
Presents selected topics for advanced study in educational research, statistics, measurement, and evaluation.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7446 (3) Policy Issues in Education**
Explores major policy issues confronting U.S. education and examines the nature and undertaking ofeducational policy studies. Learn to approach policy issues from a contextual perspective that highlights systemic forces and analyzes and applies differing policy instruments. While a wide variety of policies are covered in the course, it particularly emphasizes issues of educational equity.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7456 (3) Multilevel Modeling**
Covers in depth two advanced multivariate models common to social science research: latent variable (structural equation) models and multi-level (hierarchical) models. Topics may be taught with a particular analytic context, such as measurement of change (longitudinal analysis) or experimental design.
**Recommended:** Prerequisite of one year of graduate-level stats course.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 7775 (1) Topics in Cognitive Science**
Reading of interdisciplinary innovative theories and methodologies of cognitive science. Students participate in the ICS Distinguished Speakers series that hosts internationally recognized cognitive scientists who share and discuss their current research. Session discussions include analysis of leading edge and controversial new approaches in cognitive science.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7772 and LING 7775 and PHIL 7810 and PSYC 7775 and SLHS 7775
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8014 (3) Advanced Seminar in Democracy, Diversity and Social Justice**
Addresses the sociopolitical context of multiculturalism and education, and the sociocultural context of learning. Examines critical issues involved in making schooling responsive to an increasingly multicultural and multilingual society.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to EDUC-PHD students.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8025 (3) Seminar: Curriculum Theories**
Examines in depth recent developments in curriculum theory highlighting conceptual, contextual, and normative issues. Substantially explores distinct curricular traditions, corresponding conceptions of the good life along with related approaches to reason and emotion. Focuses on the works of prominent curriculum theorists.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8045 (3) Philosophical Issues in Educational Research**
Familiarizes students with important concepts and issues from the philosophy of science and, to a lesser extent, political theory and ethics; grounds such concepts and issues in the literature (often in terms of primary philosophical sources); and stimulates students to apply this material to the field of educational research in an informed way.
**Requisites:** Restricted to PhD students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8055 (3) Theoretical Issues in Education Policy**
Provides students with an examination of the theories behind education policy analysis. Takes a thematic approach to the study of policy in order to understand how policy agendas are set; how democratic deliberation should be linked with research and policy; and the relationship between politics, media, social structures, research and policies.
**Requisites:** Restricted to PhD students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8100 (3) Historical and Contemporary Issues in Literacy Research**
In this seminar, students read about, discuss, and respond to issues and debates that have shaped and continue to shape literacy research. The course addresses debates in response to research reports, policy and standards in the past 20 years (beginning in the mid 1990s), as well as the emergence of sociocultural and critical approaches to literacy research. The course traces how scholarly debates and reviews of research represent shifts in the field, and help researchers and educators move towards approaches and methods framing social-justice oriented literacy projects.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**EDUC 8101 (3) Theories of Literacy Research and Practice**
This graduate seminar will examine the foundations and central tenets of influential theories that undergird scholarship in literacy studies. The theories explored will include Critical Race Theory (CRT), critical poststructuralist, feminist, queer, literary, affect, and sociocultural theories. Theoretical traditions will be examined through their historical and social movement roots through their current applications, debates, research techniques, and criticisms, always with particular attention to how they have been taken up in literacy research. A key focus of this course is to examine the utility and limitations of frameworks and consider their possible applications to students' own research.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**EDUC 8102 (3) Literacy Research Methods**
This graduate seminar focuses on some of the central research methods and methodologies employed by literacy researchers. The course will examine methodologies such as ethnography, practitioner research, participatory research, reciprocal partnerships, discourse analysis, literary and textual analysis, design research, and case study, along with specific methods of data collection and analysis commensurate with study designs. Students will read articles focused on methodology specifically, as well as have opportunities to discuss research articles through a focus on the methods scholars describe and enact. The course includes attention to humanizing research practices and issues of relationship, responsibility, and ethics in literacy research. In addition, the course will engage discussions and support for IRB proposals, generative writing practices and processes, as well as dissemination of research through various genres and in academic, practice focused, and publicly accessible venues. May be repeated up
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**EDUC 8103 (3) Special Topics in Literacy Research**
This course provides students an opportunity for deep engagement with important topics and specialty areas in the field of literacy studies. Focused on topics of current interest in the field, the course supports students to examine issues of research and practice, which may include historical and current trajectories of an area of research, theories that animate an area of research and practice, and the methods through which researchers investigate questions related to the topic. In addition to readings and discussion, students complete writing and multimodal projects that allow students to engage with content and process related to the topic to demonstrate and share their learning.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**EDUC 8115 (3) History and Policy Issues in Teaching and Teacher Education**
Examine how issues and dilemmas in teacher education are grounded in historical and political contexts. Analyze patterns in preparation of new teachers, in mechanisms used to govern entry into teaching and make determinations of quality of teachers and teaching, and in efforts to professionalize and de-professionalize teachers and teaching. Investigate contemporary teacher education debates to better understand potential research-policy-practice connections.
**Requisites:** Restricted to PhD students only.

**EDUC 8125 (3) Seminar: Radical Education Theories**
Examines radical analyses of schooling, based on class, gender, sexual identity and race, through which U.S. public schooling is said to maintain dynamics of oppression and domination that undermines the schools' democratic premise. Scrutinizes the conceptual framework, interpretive and explanatory adequacy, and ethical justification of radical claims.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8135 (3) Theories and Methodologies for Examining Teacher Learning**
Examines the potential range and roles of theory in analyzing prospective and practicing teachers' learning (experiences). Explores various conceptions of teacher learning, including, but not limited to: teacher learning as a knowledge-centric phenomenon; teacher learning as a process of assembling a repertoire of practice; teacher learning as an identity-work phenomenon; and teacher learning as an activist/action-in-the-world phenomenon.
**Requisites:** Restricted to EDUC-PHD students.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8145 (3) Designing for Teacher Learning and Teacher Education**
Examines questions and issues related to the design of preservice teacher education programs and practicing teachers' professional development/learning opportunities. Analyzes the program and/or learning opportunity conditions, features and approaches that potentially support and/or constrain prospective and practicing teachers' learning, particularly in relation to their development and as asset-oriented teachers.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8155 (3) Advanced Topics in Literacy Education**
Examines special topics in theory and research related to literacy and literacy education. Topics vary each semester.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8165 (3) Advanced Topics in Mathematics Education**
Examines special topics in theory and research related to mathematics education. Topics vary each semester.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8175 (3) Advanced Topics in Science Education**
Engages participants in the process of curriculum development. Principles that guide the development of curricula and learning environments are discussed as they integrate with learning theory. Participants develop and/or test specific activities in the classroom and modify them as a result. There is a particular focus on incorporating the practices of the discipline into each content-based activity.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8177 (3) Advanced Seminar in Curriculum and Policy in Mathematics & Science Education**
This course explores the changing curriculum in school mathematics and science. It will examine the history and evolution of K-20 math and science curricula from the late 1890s to current times. It will examine motivations and political forces that have help shape and change math and science curricula.
**Grading Basis:** Letter Grade

**EDUC 8178 (3) Advanced Seminar on Learning in Math & Science Education**
This course focuses on research on the learning of mathematics and science in the K-12 schooling environment. It serves to introduce students to seminal learning theories that have guided and shaped mathematics & science education over the past thirty years (e.g., constructivist, cognitive, situative/sociocultural and critical perspectives). Core ideas within each of these theoretical perspectives will be explored such as knowledge construction and conceptual change, argumentation and reasoning, classroom discourse processes, participation and identity, and access and power. Pragmatic implications of these different theoretical perspectives will also be examined. For example, questions such as the following are considered: What is the purpose of a theory of learning (e.g., for research, for practice)? What constitutes learning within each perspective? What are the implications of a particular theoretical perspective for organizing and analyzing learning environments? What are the implications for differences
**Grading Basis:** Letter Grade

**EDUC 8179 (3) Advanced Seminar in Mathematics and Science Teaching & Teacher Education**
This course examines how scholarship on teaching and teacher learning has been evolving in mathematics and science educational research since the 1980s and 1990s. Students will explore theories of teacher learning and how they relate to designs for teacher preparation and professional development. We will also study common designs and design principles for conducting research to study teaching and teacher learning.
**Grading Basis:** Letter Grade

**EDUC 8210 (3) Ways of Knowing in Educational Research**
Introduces students to various theoretical perspectives informing educational research and how they are employed to study teaching, learning, and policy in K-12 classrooms. Includes reading and discussion related to the assumptions,questions, methods, and findings associated with theoretical traditions within and across disciplines.
**Requisites:** Restricted to EDUC-PHD students.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8220 (3) Introduction to Educational Research and Policy**
Introduces conceptual and empirical issues and controversies in educational research and policy. Complements other EDUC doctoral courses in quantitative and qualitative methodology.
**Requisites:** Restricted to EDUC-PHD students.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8230 (3) An Introduction to Quantitative Methods in Educational Research**
Explores the use of statistics to formalize study designs in educational research contexts. Introduces causal inference, experimental design, descriptive statistics, linear regression, probability, and the basics of statistical inference. Includes lab-based instruction in the use of statistical software (e.g., R, Excel) to conduct data analysis.
**Requisites:** Restricted to EDUC-PHD students.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8240 (3) Applied Regression Analysis**
Statistical analysis can be a powerful tool for understanding social, educational, psychological, and developmental processes. In this course, we will learn to answer such questions using multiple regression analysis, to develop an understanding of the strengths and limitations of this approach, and practice communicating results clearly and accurately. By the end of the semester, students in this course should be able to critically examine published research using regression and carefully perform their own regression analyses using empirical data.
**Recommended:** Prerequisites of EDUC 8230 or another course in basic statistical methods.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8250 (3) Qualitative Research Methods in Education**
This course has three main goals. First, it introduces students to the purposes of qualitative research methods in education foregrounding issues of equity and justice. Second, it develops students¿ capacity to design consequential qualitative research through consideration of issues including power and ethics. Third, it supports students in reading and analyzing qualitative research with attention to the relationship between theory and data, answerability to communities and contexts, and diverse and creative ways of representing research.
**Requisites:** Restricted to EDUC-PHD students.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8260 (3) Qualitative Methods II**
Builds on EDUC 8250 to develop knowledge and skills in ethnographic and case study research. Second of a two-course sequence covering qualitative research design, theoretical perspectives, and methods.
**Requisites:** Restricted to EDUC-PHD students.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8270 (3) Intermediate and Advanced Application of Quantitative Methods for Behavioral Sciences**
This courses helps students develop the pragmatic skills needed to conduct quantitative analyses in their own research, in which they must apply concepts with novel data and in novel settings. It also provides a formal introduction to a variety of interstitial topics in quantitative analysis that may be assumed knowledge in more advanced methods courses. In addition, students will learn how to teach themselves new quantitative methods as they need them in their future careers.
**Requisites:** Requires prerequisite courses of EDUC 8230 and EDUC 8240 (all minimum grade B-).

**EDUC 8310 (3) Design of Learning Environments for Radical Possibilities**
Design is a tool for imagining radical new possibilities for living together. We will discuss how we can work with community and school partners to leverage cultural and historical resources in design. This course will introduce students to models of design and tools for participatory design used across the Global North and South that can promote individual, social, and institutional change. It will include attention to political, affective, and ethical dimensions of design, as well as explore dilemmas presented by faculty and students engaged in ongoing design projects.
**Requisites:** Restricted to graduate students only.

**EDUC 8348 (3) Human Development in Cultural, Historical, and Sociopolitical Contexts**
This course takes a critical approach to exploring the moral, sociopolitical, and bio-psychosocial dimensions of human development. It will introduce students to different theories and methods for studying human development across the lifespan. Many traditional approaches to developmental research treat development in Western Educated Industrialized Rich and Democratic (WEIRD) contexts as normative for all populations. This course will focus on approaches that reject the notion that processes of human development are universal, examining the ways that social, cultural and geographic environments and histories shape development and life trajectories.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite EDUC 6318 or EDUC 8210 or instructor consent.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8358 (3) Critical Introduction to Learning Theory and Practice, Part 1**
This course introduces historical and contemporary perspectives in the learning sciences. Areas of scholarship explored include cognition, behaviorism, and sociocultural approaches. Special attention is paid to the linked histories of these traditions in order to broadly explore what concepts are foundational for critical understanding of cultural, historical, social, embodied, and political aspects of learning. The course explores critiques of relevant fields while also exploring how new ideas and movements are generative for moving research and development toward liberatory aims.
**Recommended:** Prerequisite EDUC 6318 or EDUC 8210.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8359 (3) Critical Introduction to Learning Theory and Practice, Part 2**
This course builds on content central to Part 1 of Critical Introduction to Learning Theory and Practice, which explores historical and contemporary perspectives in the learning sciences. Special attention is paid to theory and practice which is currently at the leading edge of research and development in the learning sciences, while attending to their roots. This course addresses multiple epistemologies and ways of knowing, including global perspectives and critical theories such as feminist, indigenous, and queer approaches. The course also examines how learning theories can inform transformation of practice toward justice and equity.
**Requisites:** Requires prerequisite course of EDUC 8358 (minimum grade D-).

**EDUC 8605 (3) Research and Professional Ethics for Educational Researchers**
Examines the central issues and venerable theories of philosophical ethics that have historically framed research ethics. Also examines contemporary ethical theory that emphasizes a greater attention to the social sciences. Focuses on research ethics (both research of human subjects and research misconduct), various issues of professional academic ethics, and the AERA ethical code.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8610 (3) Advanced Topics in Educational Equity and Cultural Diversity**
Examines special topics in theory and research related to educational equity and cultural diversity in education. Topics vary each semester.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8615 (3) Designing for Linguistic Diversity in Education Research**
Examines ways in which issues of language can affect the validity of educational research. Discusses how language can be properly addressed with a multidisciplinary perspective through different stages in the process of an investigation, including design, sampling, data collection, and data analysis. Provides the conceptual basis for addressing linguistic diversity from a multidisciplinary perspective.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8620 (3) Language and Power**
Through language we enact positionality and identity. Language has the power to shape our assumptions and beliefs. This course explores the relationship between linguistic nationalism and xenophobia, bilingual education and accent discrimination, multilingualism and youth culture, code-switching and translanguaging, etc. Participants will analyze domestic policies and current events to understand how language serves to maintain or disrupt the status quo.

**EDUC 8630 (3) Bilingual and Biliterate Development in Children and Adolescents**
This advanced doctoral seminar introduces doctoral students to key theories and empirical research on bilingual and biliterate development in school age children (preK ¿ 12). Participants will explore sociolinguistic, sociocultural, and psycholinguistic perspectives of the language and literacy development of children growing up with two or more languages, and critically examine how varying educational contexts and policies impact the schooling experiences of bilingual learners from early childhood to late adolescence.
**Recommended:** Doctoral students only.
**Grading Basis:** Letter Grade

**EDUC 8640 (3) Rethinking Disability**
Students explore the foundations, trends and future directions of disability in education. Disability is socially, historically, and culturally constructed. It is one of multiple identities that make us human, rather than a problem in need of a cure. This course investigates and disrupts disparities in education that relate to the intersections of disability, culture, race, language, and other identities and explores models for success.
**Requisites:** Restricted to graduate students only.

**EDUC 8710 (3) Measurement in Survey Research**
Introduces students to classical test theory and item response theory. Emphasizes the process of developing, analyzing and validating a survey instrument. Focuses on developing a survey instrument with items that derive from a clearly delineated theory for the construct to be measured. Analyzes item responses and put together a validity argument to support the proposed uses of the survey.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8720 (3) Psychometric Modeling: Item Response Theory**
Focuses on psychometric models for measurement and their applications in educational and psychological research. Emphasizes understanding and evaluating the utility of models from item response theory (IRT). Applies and compares measurement models in the context of simulated or empirical data sets.
**Recommended:** Prerequisite EDUC 8710.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8730 (3) Advanced Qualitative Data Analysis**
Requires students begin semester with qualitative data already collected (from class project, pilot study, dissertation). Instructors present diverse methods of analyzing data and writing about interpretations. Instructors customize part of course to address specific topic of expertise, e.g., discourse analysis, video analysis, textual analysis, ethnographic analysis.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8731 (3) Principles and Practices of Community-Based Participatory Research**
The course topics are organized to follow the life cycle of a community-based participatory research project. Topics include: Map the landscape of participatory and community-based approaches to research; Draw on critical social theory to analyze issues of race, power, and coloniality; Examine arguments about rigor, validity, and generalizability; It is recommended that students have a collaborative research project with communities or schools to workshop during the semester, but this is not required. Previously offered as a special topics course.

**EDUC 8732 (3) Critical Approaches to Discourse Analysis in Qualitative Research**
This course will introduce theories and methods related to Critical Discourse Analysis (CDA) in educational settings. The overarching goal of this course is to ground and inspire students to approach their own data with confidence and creativity. We explore key issues in the theory and practice of critical analysis of discourse: study design, data collection, transcription, tools for analysis, and presentation/write-up. The course will explore foundational readings in CDA along with a range of examples.
**Requisites:** Prerequisite: EDUC 8250 Qualitative Methods (or equivalent Intro to Qual course)

**EDUC 8735 (3) Mixed Methods in Educational Research**
Examines the epistemological and methodological issues involved in conducting studies with mixed methods designs in educational settings. Explores the pragmatic foundations of mixed methods research, developing coding systems, calculating interrater reliability statistics, data collection strategies, making inferences, and writing up mixed methods research reports. All students in the course are expected to have a solid background in both qualitative and quantitative approaches to research. Formerly offered as a special topics course.
**Requisites:** Restricted to graduate students only.

**EDUC 8740 (3) Advances in the Assessment of Student Learning**
Focuses on theories underlying traditional and contemporary proposals for assessment of student learning, and design and research of large-scale and classroom-based methods to assess student learning. Explores intersections between large-scale and classroom assessment, although greater attention is given to issues related to classroom assessment.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8750 (3) Research in Teaching and Teacher Education**
Invites students to acquire a deeper understanding of the history of and challenges in teacher education research, strengthen their knowledge of theoretical and methodological approaches to the study of teacher education, and discuss their own potential contributions to the field.
**Requisites:** Restricted to PhD students only.

**EDUC 8804 (3) Special Topics**
Designed to meet needs of graduate students with topics of pertinent interest.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8844 (1-4) Doctoral Independent Study**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8855 (1-4) Independent Study in Curriculum and Instruction: Doctoral Level**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8866 (1-4) Independent Study in Research and Evaluation Methodology: Doctoral Level**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8877 (1-4) Independent Study in Equity, Bilingualism & Biliteracy: Doctoral Level**
An independent study may be established between a doctoral student and a tenure track faculty member if both parties are amenable. The topics, readings and assignments will vary based upon mutually agreed upon goals. The student will be responsible for obtaining and submitting the necessary paperwork from/to the Office of Student Services in the School of Education. This is a variable credit course that ranges from 1 to 4 credits. The number of credits will be determined by the professor based on the workload.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8888 (1-4) Independent Study in Learning and Human Development: Doctoral Level**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8899 (1-4) Independent Study in Educational Foundations Policy and Practice: Doctoral Level**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8935 (1-6) Internship in Curriculum and Instruction**
**Repeatable:** Repeatable for up to 24.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8936 (1-6) Internship in Research and Evaluation Methodology**
**Repeatable:** Repeatable for up to 36.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8938 (1-6) Internship in Learning Sciences and Human Development**
**Repeatable:** Repeatable for up to 24.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8939 (1-6) Internship in Educational Foundations Policy and Practice**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8940 (3) Scholarly Writing for Graduate Students**
Provides graduate students an opportunity to reflect on their current writing process, on their identity as an academic writer, and how their writing is shaping and being shaped by their emerging scholarship. Explores genres of academic writing, processes of peer review, and publication as students engage in weekly writing assignments that build toward a complete manuscript. Students should enter the class with a draft of an existing paper that they intend to work on.

**EDUC 8950 (3) Proposal and Dissertation Writing**
Provides students with ongoing opportunities to write social science research in the context of the design, analysis and data representation, development, and write-up of students' dissertation proposals and dissertations. Students will learn to expand how they think about and use evidence, clarify their ideas and arguments, and improve their writing. Students working on proposals and dissertations should enroll.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to EDUC-PHD students.
**Additional Information:** Departmental Category: Graduate Education

**EDUC 8994 (1-10) Doctoral Dissertation**
**Repeatable:** Repeatable for up to 60.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Education

# Electrical and Computer Engineering (ECEN)

## Courses

**ECEN 1030 (1-4) Special Topics**
Special topics class.

**ECEN 1100 (1) Exploring ECE**
Introduces students to areas of emphasis with the ECE department through seminars presented by faculty and outside speakers. Emphasizes career opportunities, professional ethics and practices, history of the profession, and resources for academic success. Several sessions promote team building and problem solving, and provide opportunities for first year students to meet their classmates.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Additional Information:** Departmental Category: General

**ECEN 1310 (4) Introduction to C Programming**
This introductory programming course teaches fundamental concepts using the C programming language. The class generally meets programming requirements for majors within the engineering school and assumes no prior programming experience. Includes a weekly computer lab session. Covered topics include pointers, control flow, dynamic memory, and abstract data types.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 1300 and CSPB 1300
**Recommended:** Corequisite APPM 1350 or equivalent.
**Additional Information:** Departmental Category: General

**ECEN 1400 (3) Introduction to Digital and Analog Electronics**
This course introduces students to electrical and computer engineering centered around creative projects in a team based setting. Through the design and implementation of functional engineering systems, students gain an understanding of the engineering design process, using real-world design tools such as prototyping, computer-aided design (CAD), 3D printing, laser cutting, printed circuit board (PCB) manufacturing and testing. The projects-based curriculum provides students with a basis in the fundamentals of analog and digital electronics with an emphasis of developing student¿s understanding of how the electronics and software operate within an interdisciplinary context. Students gain hands-on experience with the creation of systems using sensors, actuators, programming microcontrollers, prototyping circuits using breadboards, and designing systems. No prior experience or knowledge of electronics or software is required.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 2500, GEEN 1400, ASEN 1400 and ASE
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) College of Engineering majors only.
**Additional Information:** Departmental Category: General

**ECEN 1500 (3) Sustainable Energy**
Explores how energy is generated and used in today's society. Through collaborative discussion and hands-on data collection, students will analyze the engineering challenges, fundamental limits, and potential solutions to meeting our energy needs sustainably. Students will learn to analyze numerical data, estimate orders of magnitude, and apply mathematical methods in their own lives and in the ongoing energy debate. Basic algebra required.
**Requisites:** College of Engineering majors are excluded from this course.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
Departmental Category: General

**ECEN 1840 (1-6) Independent Study**
Provides an opportunity for freshmen to do independent, creative work. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: General

**ECEN 2000 (1) Electrical and Computer Engineering as a Profession**
Provides an introduction to the profession of electrical and computer engineering. Specific topics addressed include career opportunities in electrical and computer engineering, internship search skills, expectations for professional behavior in the classroom and in industry, and current events/ethics topics relevant to the field. Course format may include additional evening/weekend activities.
**Requisites:** Restricted to students with at least 27 credits (Sophomores, Juniors or Seniors). Electrical and Computer Engineering (ECEN) majors only. Restricted to students in the CMU/CU-Boulder Engineering Partnership Program only.

**ECEN 2010 (1-5) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: General

**ECEN 2020 (1-5) Special Topics**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: General

**ECEN 2050 (1-5) Special Topics**
**Additional Information:** Departmental Category: General

**ECEN 2060 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisite or corequisite PHYS 1140.
**Additional Information:** Departmental Category: General

**ECEN 2250 (3) Introduction to Circuits and Electronics**
Introduces linear circuit analysis and design, including OP-Amps. Presents DC networks, including node and mesh analysis with controlled sources. Analysis of RL and RC circuits for both transient and sinusoidal steady-state responses using phasors.
**Requisites:** Requires prerequisite course of (APPM 1360 or MATH 2300) and PHYS 1120 (all minimum grade C-) and pre OR corequisite course of (APPM 2360 or MATH 3430). Restricted to College of Engineering majors or IUT On Track applicants or Electrical Eng minors.
**Recommended:** Prerequisites ECEN 1310 or CSCI 1300.
**Additional Information:** Departmental Category: General

**ECEN 2260 (3) Circuits as Systems**
Continues basic circuit analysis of ECEN 2250: Laplace transform techniques, transfer functions, frequency response, Bode diagrams, resonant circuits, Fourier series expansions, and convolution.
**Requisites:** Requires prerequisite course of ECEN 2250 and (APPM 2360 or MATH 3430) (minimum grade C-). Restricted to College of Engineering students or Electrical Engineering minors or IUT On Track applicants.
**Recommended:** Corequisite ECEN 2270.
**Additional Information:** Departmental Category: General

**ECEN 2270 (3) Electronics Design Lab**
Provides an introduction to analysis, modeling, design, and testing of analog electronic circuits in a practical laboratory setting. The laboratory is centered around a robot platform and includes design, SPICE simulations, prototyping and testing of circuits necessary to drive and remotely control the robot.
**Requisites:** Requires prerequisite course of ECEN 2260 or corequisite course of ECEN 2260. Restricted to College of Engineering majors or Electrical Engineering minors or IUT On Track applicants.
**Additional Information:** Departmental Category: General

**ECEN 2350 (4) Digital Logic**
Covers the design and applications of digital logic circuits, including both combinational and sequential logic circuits. Introduces hardware descriptive language, simulating and synthesis software, and programming of field programmable arrays (FPGAs). This course is 3 lectures and 1 lab per week.
**Requisites:** Requires prerequisite course of ECEN 1310 or CSCI 1300 or ASEN 1320 (minimum grade C-). Restricted to College of Engineering majors or IUT On Track applicants or Computer Engineering minors.
**Additional Information:** Departmental Category: General

**ECEN 2360 (3) Programming Digital Systems**
Explores how computers and programmable hardware in general are used to implement digital systems by looking at the capabilities of central processing units, the use and control of various input/output (I/O) devices, memory organization, and concurrency management. Topics include computer architecture, instruction sets, I/O device programming, interrupts, data transfer mechanisms, semaphores, and memory management.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3350
**Requisites:** Requires prerequisite course of ECEN 2350 (minimum grade C-). Restricted to College of Engineering majors or Computer Engineering minors.

**ECEN 2370 (3) Embedded Software Engineering**
Introduces digital system design, including system software and hardware building blocks, and system software-hardware integration. Emphasizes hands-on system development and debugging. Uses mainstream electronic system design platforms, featuring ARM processors, embedded and mobile computing platforms, using the C programming language.
**Requisites:** Requires prereq courses of ECEN 1310 or CSCI 1300 and ECEN 2350 and prereq or corequisite course of ECEN 2360 or CSCI 2400 (all minimum grade C-). Restricted to College of Engineering majors or IUT On Track applicants or Computer Engineering minors.

**ECEN 2410 (3) Renewable Sources and Efficient Electrical Energy Systems**
Introduces electrical power generation and renewable energy, including solar, wind, micro, hydro, coal, nuclear and natural gas and some of the issues in integrating renewable energy sources in the grid.
**Requisites:** Requires prerequisite course of PHYS 1120 (minimum grade C-). Requires prerequisite OR corequisite course of ECEN 2250. Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: General

**ECEN 2420 (3) Electronics for Wireless Systems**
Explores fundamental principles behind the operation of a radio, including a practical introduction to circuit elements. Covers the components and operation of a radio (transmitter and receiver) with simple signals. Students learn lab exercises the operation principles behind components of a complete practical radio system.
**Requisites:** Requires prerequisite course of PHYS 1120 and (APPM 1360 or MATH 2300) (all minimum grade C-). Requires prerequisite course of ECEN 2250 (min grade C-). Restricted to Electrical and Computer Engineering (ECEN) or Electrical Engineering (EEEN) majors onl
**Additional Information:** Departmental Category: General

**ECEN 2440 (3) Application of Embedded Systems**
Introduces embedded systems and key computer architecture concepts through a variety of projects involving programming a microcontroller in C. Provides students hands-on projects that combine the knowledge gained in their digital and analog coursework in order to engineer hardware, firmware and application software design solutions. Includes a weekly lecture and two weekly laboratory sessions.
**Requisites:** Requires a prerequisite course of ECEN 1310 or CSCI 1300 or ASEN 1320 (minimum grade C-). Requires prerequisite OR corequisite course of ECEN 2250.
**Additional Information:** Departmental Category: General

**ECEN 2450 (3) Electronic and Semiconductor Device Laboratory**
Explores the operation of electronic and semiconductor devices, including: resistors, transparent conductors, capacitors, inductors, diodes and light emitting diodes, photovoltaics, photodiodes, bipolar junction and field effect transistors, organic electrochemical transistors, and various sensor devices. Laboratories will involve device characterization and implementation into simple circuits, data analysis, and function fitting. Some of the laboratories will involve partial fabrication of the devices. Previously offered as a special topics course. Recommended restriction: sophomores or juniors; seniors cannot enroll in the course.
**Requisites:** Requires prerequisite or corequisite course of ECEN 2250 (minimum grade C-). Restricted to College of Engineering students only.
**Recommended:** Prerequisite PHYS 1140.

**ECEN 2703 (3) Discrete Mathematics for Computer Engineers**
Emphasizes elements of discrete mathematics appropriate for computer engineering. Topics: logic, proof techniques, algorithms, complexity, relations, and graph theory.
**Requisites:** Requires prerequisite courses of ECEN 1310 or CSCI 1300 or ASEN 1320 and APPM 1360 or MATH 2300 (all minimum grade C-). Restricted to College of Engineering students only.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 2830 (1-5) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General

**ECEN 2840 (1-6) Independent Study**
Offers an opportunity for sophomores to do independent, creative work. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: General

**ECEN 3002 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 3003 (3-5) Special Topics**
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 3004 (3-5) Special Topics**
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 3010 (3) Circuits and Electronics for Mechanical Engineers**
Covers analysis of electrical circuits by use of Ohm's law, network reduction, node and loop analysis, Thevenin's and Norton's theorems, DC and AC signals, transient response of simple circuits, transfer functions, basic diode and transistor circuits, and operational amplifiers. Includes introductory digital electronics and microprocessors/microcontrollers.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 3017
**Requisites:** Requires prereq course of PHYS 1120 and a prereq or coreq course of APPM 2360 or APPM 3310 or MATH 3430 (all min grade C-). Restricted to MCEN or EVEN or Integrated Design Engr (IDEN-BSIDE) students.
**Additional Information:** Departmental Category: General

**ECEN 3090 (3) Introduction to Quantum Computing**
Covers the basics of quantum computation, including the basics of quantum information; axioms of quantum mechanics; quantum circuits and universality; the relationship between quantum and classical complexity classes; simple quantum algorithms such as the quantum Fourier transform; Shor factoring algorithm; Grover search algorithm; physical implementation of quantum computation; error correction and fault tolerance.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3090 and PHYS 3090
**Requisites:** Requires prerequisite course of APPM 2360 or APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135 (minimum grade C-).

**ECEN 3103 (3) Automation of Industrial Processes**
Introduces students to Programmable Logic Controller (PLC) architecture, ladder logic programming, and programming Human Machine Interfaces (HMI). Students learn how to automate manufacturing processes and applications of PID control.
**Requisites:** Requires prerequisite course of ECEN 2250 (minimum grade D-). Restricted to students in the CMU/CU-Boulder Engineering Partnership Program only.

**ECEN 3170 (3) Electromagnetic Energy Conversion 1**
Real and reactive power in single phase circuits, power triangle, balanced three-phase circuits, wye and delta connections, introduction to electromagnetic machines, transformers (single and three-phase) and their equivalent circuits, AC-machinery fundamentals, synchronous generator from a magnetic field point of view, synchronous motors and condensers, three-phase induction motors, DC machinery fundamentals, DC motors, single phase motors. Matlab/Simulink will be used.
**Requisites:** Requires prerequisite courses of ECEN 2260 and PHYS 1120 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Power

**ECEN 3250 (3) Microelectronics**
Develops a basic understanding of active semiconductor devices. Focuses on building an understanding of BJT and CMOS devices in both digital and analog applications.
**Requisites:** Requires prerequisite course of ECEN 2250 (minimum grade C-). Restricted to College of Engineering students or Electrical Engineering minors.
**Additional Information:** Departmental Category: General

**ECEN 3300 (3) Linear Systems**
Characterization of linear time-invariant systems in time and frequency domains. Continuous time systems are analyzed using differential equations and Laplace and Fourier transforms. Discrete time systems are analyzed using difference equations, Z-transforms and discrete time Fourier transforms. Sampling and reconstruction of signals using the sampling theorem. Applications of linear systems include communications, signal processing, and control systems.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3301
**Requisites:** Requires prerequisite course of ECEN 2260 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: General

**ECEN 3301 (3) Biomedical Signals and Systems**
Introduces theory and methods to characterize and process biological signals from a variety of sources and engineering applications in the time and frequency domains. This course covers mathematical and computational tools for signal analysis with emphasis on discrete time signals and digital processing. Topics include noise, sampling, Fourier transforms, filter design, LTI systems, and image processing with exercises in MATLAB.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3300
**Requisites:** Requires prerequisite course of ECEN 2260 (minimum grade C-).
**Recommended:** Prerequisite BMEN 3030.

**ECEN 3303 (3) Introduction to Robotics**
Introduces students to fundamental concepts in autonomous robotics: mechanisms, locomotion, kinematics, control, perception and planning. Consists of lectures and lab sessions that are geared toward developing a complete navigation stack on a miniature mobile robotic platform.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3302 and CSPB 3302
**Requisites:** Requires prerequisite courses of (CSCI 2270 or CSCI 2275) and (APPM 3170 or CSCI 2824 or ECEN 2703 or MATH 2001) and (APPM 2360 or APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135) (all minimum grade C-).
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 3320 (3) Semiconductor Devices**
Highlights the fundamentals of semiconductor materials and devices. Topics include the electrical and optical properties of semiconductors, the theory of Pn junctions, bipolar and field-effect transistors, and optoelectronic devices.
**Requisites:** Requires prerequisite course of ECEN 2250 (minimum grade C-). Restricted to College of Engineering students or Electrical Engineering minors.
**Additional Information:** Departmental Category: General

**ECEN 3350 (3) Programming Digital Systems**
Explores how computers and programmable hardware in general are used to implement digital systems by looking at the capabilities of central processing units, the use and control of various input/output (I/O) devices, memory organization, and concurrency management. Topics include computer architecture, instruction sets, I/O device programming, interrupts, data transfer mechanisms, semaphores, and memory management.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 2360
**Requisites:** Requires prerequisite course of ECEN 2350 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 3400 (3) Electromagnetic Fields and Waves**
Electromagnetic fields are covered at an introductory level, starting with electrostatics and continuing with DC current, magnetostatics, time-varying magnetic fields, waves on transmission lines, Maxwell's equations and the basics of plane waves. The use of fields in inductors, capacitors, resistors, transformers, and energy and power concepts are studied.
**Requisites:** Requires prerequisites (APPM 2350 or MATH 2400) and (APPM 2360 or MATH 3430) and PHYS 1120 and ECEN 2250 (all minimum grade C-). Restricted to College of Engineering majors or Electrical Engineering minors.
**Additional Information:** Departmental Category: General

**ECEN 3410 (3) Electromagnetic Waves and Transmission**
Covers reflected and transmitted plane waves in layered media, Poynting's theorem of electromagnetic power, two-conductor transmission line theory and practice, Smith chart usage and impedance matching, waveguides, and elements of antenna theory.
**Requisites:** Requires prerequisite course ECEN 3400 (minimum grade C-). Restricted to College of Engineering majors or Electrical Engineering minors.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 3593 (3) Computer Organization**
Studies computer design at the microarchitecture level. Discusses instruction set architecture design, arithmetic and logic unit design, control logic, memory design and caches, simple pipelining, I/O and peripheral devices. Briefly covers aspects of modern computer architecture, such as multicore processors and hardware security.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3593 ECEN 5590
**Requisites:** Requires prerequisite course of ECEN 2360 or ECEN 3350 or CSCI 2400 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 3730 (3) Practical Printed Circuit Board Design and Manufacture**
This course prepares students with all skills needed to convert a back-of-the-napkin circuit sketch into a working widget with first time success. Students will master the seven steps in every board project: planning, selecting components, schematic entry, layout, assembly, bring up and debug, and documentation. This process will be exercised with three different board design projects with increasing challenge. A commercial EDA tool widely used in the electronics industry will be used for all projects. Previously offered as a special topics course. Formerly ECEN 4730.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4720 or ECEN 5720 or ECEN 5730
**Requisites:** Requires prerequisite courses of ECEN 2250 and ECEN 2260 and ECEN 2270 (all minimum grade C-).

**ECEN 3753 (3) Real-Time Operating Systems**
Today's electronic systems require real-time management and scheduling of hardware resources alongside complex multi-threaded software applications. This course covers what is an Operating Systems, the development of multi-threaded applications, and satisfying real-time system obligations. Real-Time profiling tools will be used to learn and visualize how the operating system is scheduling the software tasks and hardware resources to meet resource constraint embedded system applications. Formerly offered as a special topics course.
**Requisites:** Requires prerequisite course (ECEN 2370 or ECEN 3360) and CSCI 2270 (all minimum grade C-). Restricted to College of Engineering students only.

**ECEN 3763 (3) FPGA Design and HDL**
Build upon the foundations of Digital Logic to learn the theory of FPGA architectures, design practices, and design processes. The emphasis is to architect and design complex FPGA based projects demonstrating overall project organization and creation of milestones, testing requirements, proper use of physical and design constraints, and successful implementation and demonstration. Previously offered as a special topics course.
**Requisites:** Requires prerequisite courses of ECEN 2350 and (ECEN 1310 or CSCI 1300 or ASEN 1320) (minimum grade C-). Restricted to College of Engineering students only.
**Recommended:** Prerequisites ECEN 2360 and ECEN 2370.

**ECEN 3810 (3) Introduction to Probability Theory**
Covers the fundamentals of probability theory, and treats the random variables and random processes of greatest importance in electrical engineering. Provides a foundation for study of communication theory, control theory, reliability theory, and optics.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4510 or APPM 3570
**Requisites:** Requires prerequisite course of APPM 2350 or MATH 2400 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: General

**ECEN 3840 (1-6) Independent Study**
Offers an opportunity for juniors to do independent, creative work. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: General

**ECEN 3841 (1-6) Independent Study**
Offers an opportunity for juniors to do independent, creative work.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: General

**ECEN 3915 (3) Foundations of Quantum Engineering**
Introduces engineers to quantum theory. In this course you will learn how to describe many different physical systems (such as atoms, electrons, light, mechanical oscillators, and tops) mathematically. It also explores different notions of quantumness such as entanglement and non-contextuality. The foundations obtained in this course are important for further study of quantum hardware (sensors), communication, and computing. Formerly ECEN 4915.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5915
**Requisites:** Requires prerequisite courses of (ASEN 1320 OR ECEN 1310 OR ECEN 2310 OR CSCI 1300 OR APPM 3050 OR PHYS 2600) (MATH 3135 OR MATH 2130 OR MATH 2135 OR APPM 2360 OR APPM 3310 OR CSCI 2820) all minimum grade C-.
**Recommended:** Prerequisite MATH 3430 or APPM 2360.

**ECEN 4000 (1-3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General

**ECEN 4001 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Bioengineering

**ECEN 4002 (1-4) Special Topics**
Credit and subject matter to be arranged. Department enforced prerequisite: varies
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 4003 (1-4) Special Topics**
Credit and subject matter to be arranged. Department enforced prerequisite: varies
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.

**ECEN 4004 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**ECEN 4005 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**ECEN 4006 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Departmental Category: Optics

**ECEN 4007 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**ECEN 4009 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: VLSI CAD Methods

**ECEN 4011 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5011
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Departmental Category: Bioengineering

**ECEN 4012 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 4013 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 4016 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Additional Information:** Departmental Category: Optics

**ECEN 4017 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Additional Information:** Departmental Category: Power

**ECEN 4018 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 4021 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) College of Engineering majors only.
**Additional Information:** Departmental Category: Bioengineering

**ECEN 4024 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5024
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 4028 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 4031 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.

**ECEN 4033 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**ECEN 4043 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.

**ECEN 4053 (1-4) Special Topics**
Special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5053
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 4111 (3) Engineering Applications in Biomedicine: Cardiovascular Devices and Systems**
Application of engineering in medicine has grown dramatically in recent years. Engineers enter the clinical and experimental medical arenas with many new devices and procedures emerging as alternatives to conventional surgical and pharmacological treatments. This course, presents general principles of biomedical engineering as applied to the development of a variety of specific devices and techniques for therapy and diagnosis, with a focus on devices and systems for the cardiovascular system. This class will present relevant anatomy and physiology as part of the class discussion, which will be supplemented by a physiology reference text. Questions, exchanges of ideas, and active classroom discussion are encouraged. Biomedical engineering is an emerging field which is highly interdisciplinary- engineers and scientists from all fields are invited and encouraged to participate in this course. There are no formal prerequisites.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5111
**Recommended:** Prerequisite ECEN 2250 or equivalent circuits course.

**ECEN 4114 (3) Automation of Industrial Processes**
Introduces students to Programmable Logic Controller (PLC) architecture, ladder logic programming, and programming Human Machine Interfaces (HMI). Students learn how to automate manufacturing processes and applications of PID control.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4114
**Requisites:** Prerequisite MCEN 3017 Circuits and Electronics for Mechanical Engineers.

**ECEN 4121 (3) Design of Implantable Medical Devices: Neuromodulation**
Application of engineering in medicine has grown dramatically in recent years. Engineers enter the clinical and experimental medical arenas with many new devices and procedures emerging as alternatives to conventional surgical and pharmacological treatments. This course, presents general principles of biomedical engineering as they are applied to the development of a variety of specific implantable devices.It will present relevant anatomy and physiology as part of the class discussion, which will be supplemented by a physiology reference text. Questions, exchanges of ideas, and active classroom discussion are encouraged throughout the course. Biomedical engineering is an emerging field which is highly interdisciplinary- engineers and scientists from all fields are invited and encouraged to participate in this course.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5121
**Recommended:** Prerequisite ECEN 2250 or equivalent circuits course.

**ECEN 4133 (3) Fundamentals of Computer Security**
Practice thinking like an attacker by exploring several modern computer security attacks and defenses through hands-on programming projects. Topics include applied cryptography (encryption, authentication), web security (XSS, CSRF, SQL Injection), network security (TLS, MITM attacks), application security (shell injection, buffer overflows), and other current events and trends (government surveillance, botnets, cryptocurrencies).
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4133
**Requisites:** Requires prerequisite courses of CSCI 2270 and ECEN 2360 or CSCI 2400 or ECEN 3350 (all minimum grade C-).
**Recommended:** Corequisite ECEN 3593 (Computer Organization).

**ECEN 4138 (3) Control Systems Analysis**
Analysis and design of continuous time control systems using classical and state space methods. Laplace transforms, transfer functions and block diagrams. Stability, dynamic response, and steady-state analysis. Analysis and design of control systems using root locus and frequency response methods. Computer aided design and analysis. Department enforced prerequisite: background in Laplace transforms, linear algebra,and ordinary differential equations.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 4114 and ASEN 5114 ECEN 5138 and MCEN 4138 and MCEN 5138
**Requisites:** Requires prerequisite course of ECEN 3300 or MCEN 4043 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 4224 (3) High Speed Digital Design**
Covers fundamentals of high-speed properties of logic gates, measurement techniques, transmission lines, ground planes and layer stacking, terminations, vias, power systems, connectors, ribbon cables, clock distribution and clock oscillators.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5224
**Requisites:** Requires prerequisites of ECEN 2260 and ECEN 3400 (minimum grade C-). Restricted to College of Engineering students only.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 4242 (3) Communication Theory**
Covers modern digital and analog communication systems. Analysis and design of communication signals, transmitters, channels, and receivers. Amplitude and angle modulation and demodulation are treated as well as theory and application of digital data transmission. Emphasis is also placed on the analysis and mitigation of the effects of noise through signal design at the transmitter and signal processing at the receiver.
**Requisites:** Requires prerequisite course of (ECEN 3300 or ECEN 3301) and (ECEN 3810 or APPM 3570 or MATH 4510 or STAT 3100) (all minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 4295 (3) Foundations of Quantum Hardware**
Introduces students to the principles and operation of quantum hardware. In this course you will learn how to describe many different physical systems (trapped Ions, superconducting circuits, and optical systems) mathematically. This will allow you to model quantum sensors, communication systems and computing hardware.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5295

**ECEN 4313 (3) Concurrent Programming**
Introduces the theory and practice of multicore programming. The first part of the course presents foundations of concurrent programming: mutual exclusion, wait-free and lock-free synchronization, spin locks, monitors, memory consistency models. The second part presents a sequence of concurrent data structures and techniques used in their implementations (coarse-grained, fine-grained, optimistic and lock-free synchronization).
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4313 and ECEN 5313 and CSCI 5313
**Requisites:** Requires prerequisite courses of CSCI 2270 and (ECEN 2360 or ECEN 3350 or CSCI 2400) (minimum grade C-). Restricted to College of Engineering students only.
**Recommended:** Prerequisite ECEN 3593 or CSCI 3593.

**ECEN 4322 (3) Data and Network Science**
The course covers the theory and design of algorithms that are used to model, analyze, and extract information from large scale datasets and networks. The course includes a project.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5322
**Requisites:** Prereq of(APPM 2350 or MATH 2400) (APPM 2360 or MATH 3430) (CSCI 1200 or CSCI 1300 or CSCI 1320 or ECEN 1310 or ASEN 1320 or INFO 1201 or ATLS 1300 or CHEN 1310) (ECEN 2703 or CSCI 2824 or APPM 3170 or MATH 2001)(min grade C-).Restricted to ENGR mjrs

**ECEN 4341 (3) Bioelectromagnetics**
Effects of electric and magnetic fields on biological systems are described with applications to therapy and safety. The complexity of biological systems is described to provide a better understanding of the distribution of fields inside the body. Risk analysis is also introduced.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5341
**Requisites:** Requires prerequisite courses of ECEN 3400 and (ECEN 3810 or APPM 3570 or MATH 4510 or STAT 3100) (all minimum grade C-). Restricted to College of Engineering students only.
**Additional Information:** Departmental Category: Bioengineering

**ECEN 4395 (3) Organic Electronic Materials and Devices**
Covers the materials and physics principles of organic electronic devices, including organic light emitting diodes (OLEDs), photovoltaics (OPVs), field effect transistors (OFETs), electrochemical transistors (OECTs), and bioelectronic and neuromorphic devices. The molecular, structural, and electronic properties of organic semiconductors are introduced, and the architectures and operating principles of the devices are then taught. Assignments will require computational solutions and simulations. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5395
**Recommended:** Prerequisite ECEN 5345.

**ECEN 4423 (3) Chaotic Dynamics**
Explores chaotic dynamics theoretically and through computer simulations. Covers the standard computational and analytical tools used in nonlinear dynamics and concludes with an overview of leading-edge chaos research. Topics include time and phase-space dynamics, surfaces of section, bifurcation diagrams, fractal dimension and Lyapunov exponents.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5446 and CSCI 4446 and ECEN 5423
**Requisites:** Requires prerequisite courses of (APPM 1360 or MATH 2300) and (ECEN 1310 or CSCI 1300 or ASEN 1320) and PHYS 1110 (all minimum grade C-). Restricted to College of Engineering students only.
**Recommended:** Prerequisites PHYS 1120 and CSCI 3656 and (APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135 or MATH 3130 or MATH 3135).
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 4517 (3) Power Electronics and Photovoltaic Power Systems Laboratory**
Focuses on analysis, modeling, design and testing of electrical energy processing systems in a practical laboratory setting. Studies power electronics converters for efficient utilization of available energy sources, including solar panels and utility. Experimental projects involve design, fabrication and testing of a solar power system.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5517
**Requisites:** Requires prerequisite course of ECEN 4797 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Power

**ECEN 4532 (3) Digital Signal Processing Laboratory**
Develops experience in code development, debugging and testing of real-time digital signal processing algorithms using dedicated hardware. Applications include filtering, signal synthesis, audio special effects and frequency domain techniques based on the Fast Fourier Transform.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5532
**Requisites:** Requires prerequisite course of ECEN 4632 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 4553 (3) Compiler Construction**
Introduces the principles and techniques for compiling high-level programming languages to assembly code. Topics include parsing, instruction selection, register allocation, and compiling high-level features such as polymorphism, first-class functions, and objects. Students build a complete compiler for a simple language.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5523 and CSCI 4555 and CSCI 5525
**Requisites:** Requires prerequisite courses of (ECEN 2703 or APPM 3170 or CSCI 2824 or MATH 2001) and (ECEN 2360 or ECEN 3350 or CSCI 2400) (all minimum grade C-). Restricted to College of Engineering students or Computer Engineering minors.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 4555 (3) Principles of Energy Systems and Devices**
Develops principles underlying electronic, optical and thermal devices, materials and nanostructures for renewable energy. Provides a foundation in statistical thermodynamics and uses it to analyze the operation and efficiency limits of devices for photovoltaics, energy storage (batteries & ultra-capacitors), chemical conversion (fuel cells and engines), solid state lighting, heat pumps, cooling and potentially harvesting zero-point energy from the vacuum.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5555
**Requisites:** Requires prerequisite courses of (ECEN 3810 or APPM 3570 or MATH 4510 or STAT 3100) and (PHYS 2130 or PHYS 2170) (all minimum grade C-). Restricted to College of Engineering students only.
**Additional Information:** Departmental Category: Nanostructures and Devices

**ECEN 4606 (3) Undergraduate Optics Laboratory**
Introduces fundamental concepts, techniques, and technology of modern optical and photonic systems. Individual labs cover particular fields of optical technology, including light sources such as lasers and Leds, interferometers, fiber-optic communications, photodetection, spectrometers, and holography. Practical skills such as how to align an optical system will also be emphasized.
**Requisites:** Requires prerequisite course of ECEN 3400 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Optics

**ECEN 4610 (3) Capstone Laboratory Part 1**
Hands-on laboratory experience utilizing teams in the systematic proposal, design, integration, and testing of an electronic/computer based system. Results will be the prototype of a stand-alone analog/digital system. Must have completed all required Advanced Analog Core courses for major, except one course may be taken concurrently by petition. Must take ECEN 4620 to complete the sequence. Minimum required grade for this course and ECEN 4620 is C-. IDEN majors follow different requisites and should work with their advisor for requisite planning and enrollment assistance.
**Requisites:** PrereqsECEN 2270,2370(ECEN 2360orCSCI 2400) (ECEN 3250 3300)or(ECEN 3250 3400)or(ECEN 3300 3400)or(ECEN 3753 3250)or(ECEN 3753 3300)or(ECEN 3753 3400)orIDEN-ELE prereq ECEN 2260,2270,GEEN 2400,3400 3 of: ECEN 2360,2370,3250,3300,3400 min grade C
**Additional Information:** Departmental Category: General

**ECEN 4616 (3) Optoelectronic System Design**
Examines optical components and electro-optic devices with the goal of integrating into well design optoelectronic systems. Sample systems include optical storage, zoom lenses and telescopes.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5616
**Requisites:** Requires prerequisite course of ECEN 3400 (minimum grade C-).
**Additional Information:** Departmental Category: Optics

**ECEN 4620 (3) Capstone Lab, Part 2**
Hands-on laboratory experience for teams in the systematic proposal, design, build integration, test and documentation of an electronic/computer based system. Results will be a reliably operating, stand-alone analog/digital system, with publication quality technical documentation. Department enforced prerequisite: advanced analog core courses.
**Requisites:** Requires prerequisite course of ECEN 4610 (minimum grade C-).
**Additional Information:** Departmental Category: General

**ECEN 4632 (3) Introduction to Digital Filtering**
Covers both the analysis and design of FIR and IIR digital filters. Discusses implementations in both software and hardware. Emphasizes use of the FFT as an analysis tool. Includes examples in speech processing, noise canceling, and communications.
**Requisites:** Requires prerequisite course of ECEN 3300 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 4634 (3) Microwave and RF Laboratory**
This course is a hands-on introduction to RF and microwave topics, from fundamentals including vector network analyzer (VNA) calibration and operation, power measurements, and antenna characterization, to system-level topics such as RADAR systems and superheterodyne links. Students work in small groups on weekly experiments based on both coaxial and waveguide setups. An understanding of electromagnetic waves (such as covered in ECEN 3400 and ECEN 3410) is assumed. The graduate version of the course (ECEN 5634) includes additional homework and exam problems and extended laboratory exercises compared to ECEN 4634.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5634
**Requisites:** Requires prerequisite course of ECEN 3410 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 4638 (3) Control Systems Laboratory**
Provides experience in control system design and analysis, using both real hardware and computer simulation. Covers the entire control system design cycle: modeling the system, synthesizing a controller, conducting simulations, analyzing the design to suggest modifications and improvements, and implementing the design for actual testing.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5638, MCEN 4638, and MCEN 5638
**Requisites:** Requires prerequisite course of ECEN 4138 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 4693 (3) Advanced Computer Architecture**
Provides a broad-scope treatment of important concepts in the design and implementation of high-performance computer systems. Discusses important issues in the pipelining of a processor, out-of-order instruction issue and superscalar designs, design of cache memory systems for such systems, and architectural features required for multicore processor designs. Also studies current and historically important computer architectures.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5593 and CSCI 5593
**Requisites:** Requires prerequisite course of ECEN 3593 or CSCI 3593 (minimum grade C-). Restricted to ECEN or EEEN majors and Computer Engineering minors.
**Recommended:** Prerequisite knowledge of C/C++ and Assembly programming languages, and computer organization and experience using a Linux system for programming and its associated capabilities of compilation and debugging.

**ECEN 4720 (1) Practical Printed Circuit Board Design Accelerator**
This course introduces students to the most important skills needed to convert a back-of-the-napkin circuit sketch into a working widget with first time success. Students will learn the seven steps in every board project: planning, selecting components, schematic entry, layout, assembly, bring up and debug, and documentation. This process will be exercised with a custom board design project. A commercial EDA tool widely used in the electronics industry will be used for the project. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5720 ECEN 3730 or ECEN 5730
**Requisites:** Requires prerequisite courses of ECEN 2250 and ECEN 2260 and ECEN 2270 (all minimum grade C-).

**ECEN 4732 (3) Deep Learning and Its Connections to Information Theory**
Provides a hands-on introduction to deep learning using Python and explores related concepts in information theory to guide the design of neural networks. Covers basic and advanced mechanisms and architectures of neural networks such as Transformers, an introduction to related concepts in information theory, and information theory-guided neural network design and optimization.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5732
**Requisites:** Prerequisite or corequisite of ECEN 3810 Introduction to Probability Theory.

**ECEN 4752 (3) Communication Laboratory**
Analysis and design of realistic communication signals in a modern digital signal processing environment. Covers both analog and digital communication signals with and without noise and distortion. Pulse amplitude modulation is used initially at baseband and then combined with amplitude and phase/frequency modulation to produce the kind of bandpass signals that are used in cell phones and wireless data networks. Formerly ECEN 4652.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5752
**Requisites:** Requires prerequisite course of ECEN 4242 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 4753 (3) Computer Performance Modeling**
Presents a broad range of system measurement and modeling techniques, emphasizing applications to computer systems. Covers topics including system measurement, workload characterization and analysis of data; design of experiments; queuing theory and queuing network models; and simulation.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5753 and CSCI 4753 and ECEN 5753
**Requisites:** Requires prerequisite course of CSCI 3753 or ECEN 3753 (minimum grade C-). Restricted to College of Engineering students only.
**Recommended:** Prerequisite a course in statistics.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 4763 (3) Embedded Software Algorithms**
Embedded Systems are defined by resource restrictions that could include computational performance, energy, memory space, and cost. These algorithms need to be evaluated against the targeted end-system constraints. Applications in many areas of real-time decision-making are discussed, from hybrid vehicle battery usage to queue management systems in real-time-priced tollways, aircraft holding patterns, and hard disk drive performance optimization. This is a programming course.
**Requisites:** Requires prerequisite courses of (ECEN 2370 or ECEN 3360) and CSCI 2270 (all minimum grade C-). Restricted to College of Engineering students only.

**ECEN 4797 (3) Introduction to Power Electronics**
An introduction to switched-mode converters. Includes steady-state converter modeling and analysis, switch realization, discontinuous conduction mode and transformer-isolated converters. Ac modeling of converters using averaged methods, small-signal transfer functions, feedback loop design and transformer design.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5797
**Requisites:** Requires prerequisite course of ECEN 3250 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Power

**ECEN 4827 (3) Analog IC Design**
Covers the fundamentals of transistor-level analog integrated circuit design. Starting with motivations from application circuits, the course develops principles of dc biasing, device models, amplifier stages, frequency response analysis and feedback and compensation techniques for multi-stage operational amplifiers.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5827
**Requisites:** Requires prerequisite course of ECEN 3250 (minimum grade C-). Restricted to College of Engineering majors only.
**Additional Information:** Departmental Category: Power

**ECEN 4840 (1-6) Independent Study**
Offers an opportunity for seniors to do independent, creative work. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General

**ECEN 4841 (1-6) Independent Study**
Offers an opportunity for seniors to do independent, creative work.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**ECEN 4925 (3) Foundations of Quantum Hardware**
Introduces students to the principles and operation of quantum hardware. In this course you will learn how to describe many different physical systems (trapped Ions, superconducting circuits, and optical systems) mathematically. This will allow you to model quantum sensors, communication systems and computing hardware.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5295
**Requisites:** Requires prerequisite courses of ECEN 3915 OR (pre-req PHYS 3220 AND co-Req PHYS 4410) (all minimum grade C-). Restricted to College of Engineering students or Quantum Engineering minors.

**ECEN 4933 (3) Engineering Genetic Circuits**
Presents recent research into methods and software tools for the modeling, analysis, and design of genetic circuits that are enabling the new field of synthetic biology. Teaches both biological and engineering principles in order to enable collaborations between engineers and biologists working in the field of synthetic biology.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5933
**Recommended:** Prerequisite some familiarity with genetics, cell biology, molecular biology or biochemistry or familiarity with engineering methods for modeling, analysis and design, but students are not expected to have knowledge in both.

**ECEN 5005 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Nanostructures and Devices

**ECEN 5008 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 5009 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: VLSI CAD Methods

**ECEN 5011 (1-4) Special Topics**
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4011
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Bioengineering

**ECEN 5012 (3) Special Topics**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5013 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Campus section restricted to ECEE graduate students in Academic subplans ESE or C-EEENP or C-ECENEEEP only.
**Grading Basis:** Letter Grade

**ECEN 5016 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Additional Information:** Departmental Category: Optics

**ECEN 5018 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 5021 (1-4) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students in Electrical Engineering (EEEN) or in Electrical/Computer Engineering (ECEN) or to Electrical or Electrical/Computer Engineering BS/MS Concurrent degree students or to Graduate Certificate Engineering (CRTGE) students.
**Additional Information:** Departmental Category: Bioengineering

**ECEN 5023 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering, Embedded Systems.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Campus section restricted to graduate students in EEEN or BS/Professional MS concurrent degree students with BS portion in EEEN or ECEN.
**Additional Information:** Departmental Category: Embedded Systems Engineering

**ECEN 5024 (3) Special Topics**
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4024
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 5028 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 5032 (3) Special Topics**
**Additional Information:** Departmental Category: Bioengineering

**ECEN 5053 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering - Embedded Engineering.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4053
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Campus section restricted to graduate students in Academic sub-plans ESE or C-EEENP or C-ECENEEEP.
**Additional Information:** Departmental Category: Embedded Systems Engineering

**ECEN 5104 (3) Passive Microwave Circuits**
Building on fundamentals taught in a class such as ECEN 3410 (Electromagnetic Waves), this course teaches fundamentals of microwave passive circuit analysis using scattering parameters. Design of impedance matching networks, impedance transformers, couplers, filters, dividers/combiners and other typical circuits used at microwave frequencies are covered. Using an industry-standard CAD tool, design of microstrip circuits is emphasized. Assignments include theoretical and CAD approaches to analysis and design of passive microwave transmission-line circuits.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 5105 (3) Introduction to VLSI Design**
This is an introductory course that will cover basic theories and techniques of digital VLSI (Very Large-Scale Integrated Circuits) design and CMOS technology. The objective of this course is to understand the theory and design of digital systems at the transistor level. The course will cover MOS transistor theory, CMOS processing technology, techniques to design fast digital circuits, techniques to design power efficient circuits, standard CMOS fabrications processes, CMOS design rules, and static and dynamic logic structures.
**Requisites:** Prerequisite of ECEN 2350 (C- or better) and Instructor Consent.

**ECEN 5110 (1-3) Graduate Teaching Practicum**
Provides training and hands-on experience in teaching of ECEE courses. Students will work with an instructor of an ECEE course to carry out teaching activities such as lecturing, leading discussion sessions, writing homework and examination problems, and relevant grading.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**ECEN 5111 (3) Engineering Applications in Biomedicine: Cardiovascular Devices and Systems**
Application of engineering in medicine has grown dramatically in recent years. Engineers enter the clinical and experimental medical arenas with many new devices and procedures emerging as alternatives to conventional surgical and pharmacological treatments. This course, presents general principles of biomedical engineering as applied to the development of a variety of specific devices and techniques for therapy and diagnosis, with a focus on devices and systems for the cardiovascular system. This class will present relevant anatomy and physiology as part of the class discussion, which will be supplemented by a physiology reference text. Questions, exchanges of ideas, and active classroom discussion are encouraged. Biomedical engineering is an emerging field which is highly interdisciplinary- engineers and scientists from all fields are invited and encouraged to participate in this course. There are no formal prerequisites.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4111

**ECEN 5114 (3) Electromagnetic Theory**
This course covers theory and applications of Maxwell's equations at the graduate level, including various electromagnetic wave types. Additionally, fundamental electromagnetic theorems such as Poynting, equivalence, duality, reciprocity and compensation, are studied through examples across the electromagnetic spectrum.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 5121 (3) Design of Implantable Medical Devices: Neuromodulation**
Application of engineering in medicine has grown dramatically in recent years. Engineers enter the clinical and experimental medical arenas with many new devices and procedures emerging as alternatives to conventional surgical and pharmacological treatments. This course, presents general principles of biomedical engineering as they are applied to the development of a variety of specific implantable devices.It will present relevant anatomy and physiology as part of the class discussion, which will be supplemented by a physiology reference text. Questions, exchanges of ideas, and active classroom discussion are encouraged throughout the course. Biomedical engineering is an emerging field which is highly interdisciplinary- engineers and scientists from all fields are invited and encouraged to participate in this course.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4121

**ECEN 5122 (3) Wireless Local Area Networks**
Emphasis on the IEEE P802.11 family of WLAN standards. Students learn the legacy versions of the standard (802.11DS/b), the current generation of WLAN systems (802.11a/g/n/ac), and will to analyze and critique upcoming versions (802.11ax/ba), and gain insight into proposals for new research in WLAN. Exposure to the interoperability and certification process for WLAN by the Wi-Fi Alliance, study the newest Wi-Fi Certified¿ programs, and will learn how to model and analyze WLAN traffic using industry standard tools.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5220 and CYBR 5220
**Requisites:** Requires prerequisite course of ECEN 3810 or APPM 3570 or MATH 4510 (minimum grade D-).
**Recommended:** Prerequisite CYBR 5430.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5126 (3) Computational Optical Imaging**
Covers the fundamentals of computational optical imaging modalities, namely systems in which the hardware (optics, sensors, illumination) is designed in conjunction with algorithms (implemented optically, electronically and via software) to deliver information about a scene. Students learn the analysis and design of modern imaging systems. Covers a variety of applications including biomedical imaging, nanoscopy, photography and space imaging.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ECEN 5133 (3) Fundamentals of Computer Security**
Practice thinking like an attacker by exploring several modern computer security attacks and defenses through hands-on programming projects. Topics include applied cryptography (encryption, authentication), web security (XSS, CSRF, SQL Injection), network security (TLS, MITM attacks), application security (shell injection, buffer overflows), and other current events and trends (government surveillance, botnets, cryptocurrencies).
**Grading Basis:** Letter Grade

**ECEN 5134 (3) Electromagnetic Radiation and Antennas**
This course is introduction to antenna theory and antenna applications in applied electromagnetics. Elements of electromagnetic theory are first reviewed through the discussion of fundamental antenna parameters. Topics such as input impedance, radiation pattern, gain, radar cross section, near- and far-field, antenna temperature, and others are discussed first. The theory of operation of electric and magnetic dipoles, small and large dipoles, monopoles, and loops, as well as impact of different grounds on their parameters are discussed next. Other antennas such as bicones, helices, Yagi-Uda, microstrip patches, horns, reflectors, slots, spirals, log-periodics, etc. are also discussed. The fundamentals of array theory inclusive of linear, planar and circular topologies, coupling, beamforming, as well as elements of array synthesis are also discussed. Students will be exposed to the commercial software tools used to design antennas and will work individually or in teams to accomplish different project assignme
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 5138 (3) Control Systems Analysis**
Introduction to fundamental principles and techniques for analysis and synthesis of feedback control systems in the time and frequency domains. Laplace transforms, transfer functions and block diagrams. Stability, dynamic response, and steady-state analysis. Analysis and design of control systems using root locus and frequency response methods. Computer aided design and analysis. Introduction to state space representations and state feedback control.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 4114 and ASEN 5114 MCEN 4138 and ECEN 4138 and MCEN 5138
**Requisites:** Restricted to graduate students in Electrical Engineering (EEEN) or in Electrical/Computer Engineering (ECEN) or to Electrical or Electrical/Computer Engineering BS/MS Concurrent degree students or to Graduate Certificate Engineering (CRTGE) students.
**Recommended:** Prerequisite ECEN 3300.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 5139 (3) Computer-Aided Verification**
Covers theoretical and practical aspects of verification of finite-state systems (hardware) and infinite-state systems (programs). Model checking: temporal logics, explicit-state and symbolic search, BDDs. Constraint solvers: SAT solvers, decision procedures. Program verification: invariants, partial vs. total correctness, abstraction. Department enforced requisite: general proficiency in discrete mathematics and programming.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5135
**Requisites:** Restricted to Electrical/Computer Engineering (EEEN) graduate students or Concurrent Degree students in Electrical Engineering (C-EEEN) or Electrical/Computer Engineering (C-ECENEEEN) or to Graduate Certificate Engineering (CRTGE) students.
**Recommended:** Prerequisite CSCI 2824.
**Additional Information:** Departmental Category: VLSI CAD Methods

**ECEN 5154 (3) Computational Electromagnetics**
This course is introduction to the frequency domain methods used in computational electromagnetics (CEM) for solving complex radio-frequency (RF) problems. The course starts with the review of electromagnetic theory and mathematical concepts used in CEM, followed by the introduction to the partial differential and integral equation based methods. Specifically, the fundamentals behind the finite difference method, finite element method, and method of moments are discussed and implemented to solve problems such as shielded microstrip line, charge distribution on metallic objects, waveguide modes, wire antennas, etc. Students will work independently and in teams to develop their own codes to solve given boundary value problems. The implementation of different methods in commercial software tools is continuously emphasized. An understanding of electrostatics and electromagnetic waves (such as covered in ECEN 3400 and ECEN 3410) is assumed.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 5156 (3) Physical Optics**
Covers the application of Maxwell's equations to optical wave propagation in free space and in media.Topics include polarization, dispersion, geometrical optics, interference, partial coherence, and diffraction.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ECEN 3410.
**Additional Information:** Departmental Category: Optics

**ECEN 5164 (3) Electromagnetic Metamaterials**
Enables students to design engineered structures to realize materials with desired electromagnetic properties that are difficult or impossible to achieve using conventional materials. Exact and approximate techniques are explored to develop an intuitive understanding of the electromagnetic response of these structures.
**Recommended:** Prerequisite ECEN 3410 (EM Waves and Transmissions) or equivalent course in fundamental electromagnetic theory.

**ECEN 5224 (3) High Speed Digital Design**
Covers fundamentals of high-speed properties of logic gates, measurement techniques, transmission lines, ground planes and layer stacking, terminations, vias, power systems, connectors, ribbon cables, clock distribution and clock oscillators.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4224
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 5244 (3) Applied Stochastic Signal Processing**
Provides a baseline understanding for research and development in signal processing and analytics for environmental and other data-intensive applications. Topics include parameter estimation, transforms, linear and nonlinear estimation, data assimilation and detection. Applications include numerical weather prediction, GNSS sensing, ionospheric sounding, radar, radiometry, surveillance, target detection and tracking. Previous coursework in linear systems and electromagnetic waves recommended.
**Grading Basis:** Letter Grade

**ECEN 5253 (3) Datacenter Scale Computing - Methods, Systems and Techniques**
Covers the primary problem solving strategies, methods and tools needed for data-intensive programs using large collections of computers typically called "warehouse scale" or "data-center scale" computers. Examines methods and algorithms for processing data-intensive applications, methods for deploying and managing large collections of computers in an on-demand infrastructure and issues of large-scale computer system design.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4253 and CSPB 4253 and CSCI 5253
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite CSCI 5273 or ECEN 5273.

**ECEN 5254 (3) Remote Sensing Signals and Systems**
Examines passive and active techniques for remote sensing with emphasis on fundamental noise and detection issues from radio to optical frequencies. Emphasis is placed on electromagnetic wave detection, statistical signal and noise analysis, remote sensing system architecture, and hardware for remote sensing systems. Systems studied include radiometers, radars (real and synthetic aperture), interferometers, and lidars. Applications to detection and surveillance, Earth remote sensing, astronomy, and imaging systems are covered.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 5264 (3) Electromagnetic Absorption, Scattering, and Propagation**
Electromagnetic waves in communication, navigation, and remote sensing systems from radio to optical frequencies, including propagation in deterministic and random media. Topics include absorption and refraction by gases, discrete scattering by precipitation, clouds, and aerosols, continuous scattering by refractivity fluctuations, earth-space propagation and Faraday rotation in plasmas, and radiative transfer theory.
**Recommended:** Prerequisites ECEN 3400 and ECEN 3410.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 5273 (3) Network Systems**
Focuses on design and implementation of network programs and systems, including topics in network protocols, architectures, client-server computing, software-driven networking, and other contemporary network hardware-software system design and programming techniques. Familiarity with C and Unix is required.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5273
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 5295 (3) Foundations of Quantum Hardware**
Introduces students to the principles and operation of quantum hardware. In this course you will learn how to describe many different physical systems (trapped Ions, superconducting circuits, and optical systems) mathematically. This will allow you to model quantum sensors, communication systems and computing hardware.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4295

**ECEN 5313 (3) Concurrent Programming**
Introduces the theory and practice of multicore programming. The first part of the course presents foundations of concurrent programming: mutual exclusion, wait-free and lock-free synchronization, spin locks, monitors, memory consistency models. The second part presents a sequence of concurrent data structures and techniques used in their implementations (coarse-grained, fine-grained, optimistic and lock-free synchronization).
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5313 and ECEN 4313 and CSCI 4313
**Requisites:** Requires prerequisite courses of CSCI 2270 and ECEN 2360 or CSCI 2400 (minimum grade C). Restricted to graduate students only.
**Recommended:** Prerequisite ECEN 3593.

**ECEN 5322 (3) Data and Network Science**
The course covers the theory and design of algorithms that are used to model, analyze, and extract information from large scale datasets and networks. The course includes a project.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4322
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5341 (3) Bioelectromagnetics**
Effects of electric and magnetic fields on biological systems are described with applications to therapy and safety. The complexity of biological systems is described to provide a better understanding of the distribution of fields inside the body. Risk analysis is also introduced.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4341
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Bioengineering

**ECEN 5345 (3) Introduction to Solid State Physics**
Provides an introduction to the electronic, photonic and phononic properties of solid state materials and devices. Covers optical constants, free electron gas, plasmons, energy bands, semiconductors and doping, excitons, quantum wells, phonons and electrooptical effects. Makes use of quantum mechanical methods. Department enforced prerequisite: basic quantum mechanics.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Nanostructures and Devices

**ECEN 5355 (3) Principles of Electronic Devices 1**
Relates performance and limitations of solid state devices to their structures and technology. Examines semiconductor physics and technology. Includes Pn-junction, Mos, and optoelectronic devices. For both advance circuit and device engineers.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ECEN 3320.
**Additional Information:** Departmental Category: Nanostructures and Devices

**ECEN 5385 (3) Optical Properties of Materials**
Surveys optical properties of materials important in optoelectronic and optical devices. Covers the relationships between optical constants, optical properties of semiconductors, dielectrics, ferroelectrics, liquid crystals, and metals.
**Additional Information:** Departmental Category: Nanostructures and Devices

**ECEN 5395 (3) Organic Electronic Materials and Devices**
Covers the materials and physics principles of organic electronic devices, including organic light emitting diodes (OLEDs), photovoltaics (OPVs), field effect transistors (OFETs), electrochemical transistors (OECTs), and bioelectronic and neuromorphic devices. The molecular, structural, and electronic properties of organic semiconductors are introduced, and the architectures and operating principles of the devices are then taught. Assignments will require computational solutions and simulations. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4395
**Recommended:** Prerequisite ECEN 5345.

**ECEN 5407 (3) Renewable Energy and the Future Power Grid**
This course will begin with an introduction to the power grid including planning and operations for the transmission and distribution level power grid. The course will reflect that while many of the solutions to the integration of variable generation are technical in nature, policy and economics play a large role in the changes that are occurring within the power system. After examining the technological specifications of the most important variable generation sources (wind power, solar photovoltaics, and solar thermal power), as well as traditional power generation sources, other aspects of power system planning and operations in the future power grid will be examined in detail.
**Requisites:** Restricted to students in College of Engineering and Applied Science (ENGR) only.
**Grading Basis:** Letter Grade

**ECEN 5414 (3) Essential Principles of Signal Integrity**
Designing a robust and cost-effective product is about following a process that helps apply your engineering intuition to balance cost and design tradeoffs specific to your product. This class introduces essential principles of signal integrity, including principles of transmission lines, reflections, inductance, ground bounce, differential pairs, losses, terminations, routing, discontinuities, impedance, PDN design and EMC with respect to optimized design.
**Recommended:** Prerequisite students are expected to have completed an electromagnetics course during their undergraduate curriculum; in the CU curriculum it would be ECEN3400.

**ECEN 5417 (3) Power System Analysis**
This course covers the basics of power system analysis techniques. Students will be introduced to the concepts behind the fundamental principles of traditional bulk power systems. The difference between single and three phase powers will be discussed. Students will learn how to model bulk power system components and the per unit system. Understanding the flow of power in the system will be examined in detail as students will learn about and apply both AC and DC powerflow formulations.
**Recommended:** Corequisite ECEN 5407.
**Grading Basis:** Letter Grade

**ECEN 5423 (3) Chaotic Dynamics**
Explores chaotic dynamics theoretically and through computer simulations. Covers the standard computational and analytical tools used in nonlinear dynamics and concludes with an overview of leading-edge chaos research. Topics include time and phase-space dynamics, surfaces of section, bifurcation diagrams, fractal dimension and Lyapunov exponents.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4423 and CSCI 4446 and CSCI 5446
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 5424 (3) High Speed Channel Design for Signal Integrity**
Designing a robust and cost-effective product is about following a process that helps apply your engineering intuition to balance cost and design tradeoffs specific to your product. This class introduces design principles for advanced gigabit channel design. Four primary interconnect problems are identified and material and technology solutions to reduce these problems to acceptable levels are explored.
**Requisites:** Requies prerequisite course of ECEN 5414 (minimum grade C).

**ECEN 5427 (3) Power System Planning & Operations**
This course will focus on bulk power system planning and operations, with special emphasis on systems with high variable renewable energy penetrations. Electricity markets will also be presented, and the differences with vertically integrated utilities will be discussed. Students will develop an understanding of electricity market dynamics in one of the course projects by participating in an electricity market game. The application of optimization problems in bulk power system operations will be discussed and applied by the students in another course project. They will develop a production cost model to simulate bulk power system operations of a test system under different scenarios.
**Requisites:** Requires prerequisite course ECEN 5407 (minimum grade B-).
**Recommended:** Prerequisite ECEN 5417.
**Grading Basis:** Letter Grade

**ECEN 5434 (3) S-Parameters for Signal Integrity in High Speed Digital Engineering**
Designing a robust and cost-effective product is about following a process that helps apply your engineering intuition to balance cost and design tradeoffs specific to your product. This class introduces design principles obtained by understanding S-Parameter results for complex PCB structures. Single-ended and Differential Transmission lines are analyzed and four common S-Parameter patterns are identified.
**Requisites:** Requires prerequisite ECEN 5414 ECEN minimum grade C.
**Recommended:** Prerequisite students are expected to have completed an electromagnetics course during their undergraduate curriculum; in the CU curriculum it would be ECEN 3400.

**ECEN 5437 (3) Distribution System Analysis**
Fundamental aspects of the analysis of power distributions systems, including the traditional distribution grid, loads, components, topologies, operational aspects, and power flow analysis. Includes how the distribution system is changing with the introduction of distributed energy resources.
**Requisites:** Requires corequisite course of ECEN 5407.
**Recommended:** Corequisite ECEN 5417.
**Grading Basis:** Letter Grade

**ECEN 5444 (3) Electromagnetic Compatibility (EMC) for High-Speed Digital Engineering**
Understanding and applying the theoretical principles of electromagnetics to high speed digital engineering with respect to electromagnetic compatibility (EMC). Faster data rates and shorter rise times make signal integrity in high-speed digital engineering (HSDE) increasingly difficult. Signal distortion has adverse effects on EMC. This course covers understanding the radiation mechanisms and susceptibility of PCB circuits in HSDE.
**Recommended:** Prerequisite students are expected to have completed an electromagnetics course during their undergraduate curriculum; in the CU curriculum it would be ECEN 3400.

**ECEN 5447 (3) Power System Dynamics with Renewable Energy**
To introduce the current and future electrical power systems dynamics coupled with inverter based renewable generators. Fundamentals of renewable generators dynamic models, power system dynamics will be introduced. Previously offered as a special topics course.
**Recommended:** Prerequisites ECEN 5417: Power systems analysis, ECEN 5407: Renewable Energy and the Future Power Grid, and graduate standing in the College of Engineering and Applied Science.

**ECEN 5448 (3) Linear Control Systems**
Offers a state space approach to analysis and synthesis of linear systems, state transition matrix, controllability and observability, system transformation, minimal realization, and analysis and synthesis of multi-input and multi-output systems.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5448 and ASEN 5014
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites ECEN 3300 and ECEN 4138.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 5457 (3) Energy Systems Optimization**
Covers basic elements of power system modeling; optimization tasks at the transmission level such as economic dispatch and DC optimal power flow (OPF); and essential techniques for formulating linear, second-order cone, and semidefinite programming approximations to AC OPF problems for transmission and distribution systems. Distributed optimization approaches are covered and tied to future architectural frameworks for smart power systems. Previously offered as a special topics course.
**Recommended:** graduate standing in the College of Engineering and Applied Science.

**ECEN 5458 (3) Sampled Data and Digital Control Systems**
Provides an analysis and synthesis of discrete-time systems. Studies sampling theorem and sampling process characterization, z-transform theory and z-transferfunction, and stability theory. Involves data converters (A/D and D/A), dead-beat design, and digital controller design.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites ECEN 3300 and ECEN 4138.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 5467 (3) Data Analytics and Data-Driven Decision Making for Modern Power and Energy Systems**
Focuses on modern power and energy systems with high penetration of distributed energy resources (solar, batteries, electrical vehicles). Analytical methods for inference and decision making in such systems will be covered, including state estimation, forecasting, and optimal control. The emphasis is on data-driven methods, rooted in machine-learning techniques, such as kernel-based regression and reinforcement learning.
**Recommended:** Prerequisite ECEN 5407 and graduate standing in the College of Engineering and Applied Science.

**ECEN 5478 (3) Online Convex Optimization and Learning**
Covers basics of convex optimization, online learning, time-varying optimization, online first-order methods, learning problems over networks, zeroth-order methods, bandit optimization, projection-free methods, distributed methods for online convex optimization. Application domains considered in the course include Machine Learning, Signal Processing, and Data-driven Control. Specific application examples include the Internet of Things, recommendation systems, power systems, sensor networks, and transportation systems. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ECEN 5448.

**ECEN 5488 (3) Geometric Control Theory**
Introduce geometric approaches to study dynamical control systems over manifolds. Cover fundamental control-theoretical results, such as controllability, observability, feedback stabilizability, symmetries and group actions, that are beyond linear control systems. Establish connections between control theory and mathematics, especially topology, differential geometry, Lie groups and Lie algebras. Final project focuses on engineering applications related to students¿ own research interests.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5488
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites a solid foundation in Linear Algebra and ECEN 4138/5138 and ECEN 5448.

**ECEN 5498 (3) Stochastic Control Theory**
Introduce a toolbox for dealing with stochastic control systems. Cover topics such as stochastic calculus, linear and nonlinear filtering, and dynamic programming. Discuss system theoretic issues and derive optimal control laws for a variety of stochastic control problems, including, e.g., the separation principle for Linear-quadratic-Gaussian problems. Final project focuses on engineering applications related to students¿ own research interests.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5498
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites a solid foundation in Probability Theory and ECEN 4138/5138, ECEN 5448 and ECEN 5612.

**ECEN 5514 (3) Principles of Electromagnetics for High-Speed Digital Engineering**
Teaches understanding and application of the theoretical principals of electromagnetics to printed circuit board design. Students learn to apply advanced concepts related to Maxwell¿s equations for SI and PI and High-Speed applications. Some topics covered include: skin effect, surface roughness, non-uniform dielectric constant, coupling, reflection, and losses; boundary conditions and boundary value problems; displacement and conduction currents.
**Recommended:** Prerequisite students are expected to have completed an electromagnetics course during their undergraduate curriculum; in the CU curriculum it would be ECEN 3400.

**ECEN 5517 (3) Power Electronics and Photovoltaic Power Systems Laboratory**
Focuses on analysis, modeling, design and testing of electrical energy processing systems in a practical laboratory setting. Studies power electronics converters for efficient utilization of available energy sources, including solar panels and utility. Experimental projects involve design, fabrication and testing of a solar power system.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4517
**Requisites:** Requires prerequisite course of ECEN 5797 (minimum grade C-).
**Additional Information:** Departmental Category: Power

**ECEN 5523 (3) Compiler Construction**
Introduces the principles and techniques for compiling high-level programming languages to assembly code. Topics include parsing, instruction selection, register allocation, and compiling high-level features such as polymorphism, first-class functions, and objects. Students build a complete compiler for a simple language.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4555 and ECEN 4553 and CSCI 5525
**Requisites:** Restricted to Electrical/Computer Engineering (EEEN) graduate students or Concurrent Degree students in Electrical Engineering (C-EEEN) or Electrical/Computer Engineering (C-ECENEEEN) or to Graduate Certificate Engineering (CRTGE) students.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 5524 (3) Principles of Computational Electromagnetics for Signal and Power Integrity**
Introduces students to practical computational electromagnetics (CEM) and numerical methods concepts necessary for solving SI/PI problems. Fundamentals behind finite difference, finite element, and method of moments are studied to solve problems like a microstrip line and others related to SI-PI applications. Students will study the concepts of accuracy, stability, convergence and boundary conditions as they apply to commercial EM tools.
**Recommended:** Prerequisite students are expected to have completed an electromagnetics course during their undergraduate curriculum; in the CU curriculum it would be ECEN 3400.

**ECEN 5527 (3) Power Electronics Design Laboratory**
Create, build, and debug an original design of a power converter to meet given a specification, project schedule, and related requirements. Lectures provide supporting information. Compliance to the specification is shown through a formal test report and demonstration to an instructor.
**Requisites:** Requires prerequisite courses of ECEN 5517 and ECEN 5797 (all minimum grade B-).
**Grading Basis:** Letter Grade

**ECEN 5532 (3) Digital Signal Processing Laboratory**
Develops experience in code development, debugging and testing of real-time digital signal processing algorithms using dedicated hardware. Applications include filtering, signal synthesis, audio special effects and frequency domain techniques based on the Fast Fourier Transform.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4532
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5533 (3) Fundamental Concepts of Programming Languages**
Considers concepts common to a variety of programming languages--how they are described (both formally and informally) and how they are implemented. Provides a firm basis for comprehending new languages and gives insight into the relationship between languages and machines.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5535
**Requisites:** Requires prerequisite course CSCI 3155 (minimum grade D-).
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 5534 (3) Signal Integrity Measurements for High Speed Digital Engineering**
Taking accurate measurements are the anchor to reality in all HSDE analysis. This course introduces the three important high speed measurement instruments; the VNA, the TDR and the high-speed oscilloscope. Measurements above 200 MHz bandwidth require special considerations. Topics covered include S-parameter analysis of interconnects, de-embedding, probing methods, measurement-simulation correlation and building circuit topology models from S-parameters.
**Requisites:** Requires prerequisites ECEN 5224 and ECEN 5730 (all minimum grade C).
**Recommended:** Prerequisite students are expected to have completed an electromagnetics course during their undergraduate curriculum; in the CU curriculum it would be ECEN 3400.

**ECEN 5544 (3) EM Signal Modeling for HSDE using Ansys HFSS and Q3D**
Doing high speed digital engineering using HFSS from Ansys. This is a one semester hands-on capstone design course for the high-speed digital engineering professional master¿s program. Students will deepen their understanding of EM signal modeling for HSDE applications while learning how to correctly use HFSS to do a variety of high-speed designs for PCBs.
**Recommended:** Prerequisite students are expected to have completed an electromagnetics course during their undergraduate curriculum; in the CU curriculum it would be ECEN 3400.

**ECEN 5554 (3) Designing PCB Memory Systems using Keysight ADS**
Doing high speed digital engineering using ADS from Keysight. This is a one semester hands-on capstone design course for the high-speed digital engineering professional master¿s program. Students will deepen their understanding of EM signal modeling for HSDE PCB memory applications while learning how to correctly use ADS to do a variety of high-speed memory designs for PCBs.
**Requisites:** Requires prerequisite course of ECEN 5524 (minimum grade C).
**Recommended:** Prerequisite students are expected to have completed an electromagnetics course during their undergraduate curriculum; in the CU curriculum it would be ECEN 3400.

**ECEN 5555 (3) Principles of Energy Systems and Devices**
Develops principles underlying electronic, optical and thermal devices, materials and nanostructures for renewable energy. Provides a foundation in statistical thermodynamics and uses it to analyze the operation and efficiency limits of devices for photovoltaics, energy storage (batteries & ultra-capacitors), chemical conversion (fuel cells and engines), solid state lighting, heat pumps, cooling and potentially harvesting zero-point energy from the vacuum.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4555
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors) or Graduate students only.
**Additional Information:** Departmental Category: Nanostructures and Devices

**ECEN 5565 (3) Advanced Network Systems**
Provides an advanced study of network architecture, across the end hosts, the network elements, and the people and systems that manage the network. The course provides the foundation for modern network systems, beyond the basic understanding of the OSI layers, and into the system which make networks work.
**Requisites:** Requires prerequisite of CSCI 4273 or CSCI 5273 or ECEN 5273 (minimum grade C). Restricted to graduate students in the College of Engineering.
**Grading Basis:** Letter Grade

**ECEN 5573 (3) Advanced Operating Systems**
Intended to create a foundation for operating systems research or advanced professional practice. Examines the design and implementation of a number of research and commercial operating systems and their components, system organization and structure, threads, communication and synchronization, virtual memory, distribution, file systems, security and authentication, availability and Internet services.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5573
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 5590 (3) Computer Organization**
Studies computer design at the microarchitecture level. Discusses instruction set architecture design, arithmetic and logic unit design, control logic, memory design and caches, simple pipelining, I/O and peripheral devices. Briefly covers aspects of modern computer architecture, such as multicore processors and hardware security.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3593 or CSCI 3593

**ECEN 5592 (3) Modern Signal Processing**
Presents a mathematical tour of modern signal processing focusing on sparse signal representations and their applications. Extends classical Fourier transform and traditional digital signal processing techniques to enable various types of computational harmonic analysis. Covers time-frequency and wavelet analysis, filter banks, nonlinear approximation of functions, compression, signal restoration, compressive sensing, and convolutional neural networks.
**Recommended:** Prerequisites familiarity with Fourier transforms, z-transforms, filters, linear algebra, bases, norms, inner products, eigendecompositions, singular value decomposition (SVD) and MATLAB.

**ECEN 5593 (3) Advanced Computer Architecture**
Provides a broad-scope treatment of important concepts in the design and implementation of high-performance computer systems. Discusses important issues in the pipelining of a processor, out-of-order instruction issue and superscalar designs, design of cache memory systems and architectural features required for multicore processor designs. Also studies current and historically important computer architectures, including hardware security concepts.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5593 and ECEN 4693
**Recommended:** Prerequisite ECEN 3593, ECEN 5090.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 5603 (3) Software Project Management**
Presents topics and techniques critical to the management of software product development, including estimating, planning, quality, tracking, reporting, team organization, people management and legal issues. Gives special attention to problems unique to software projects.
**Requisites:** Requires prerequisite courses ECEN 4583 and ECEN 5543 and CSCI 4318 (all minimum grade D-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 5606 (3) Optics Laboratory**
Provides advanced training in experimental optics. Consists of optics experiments that introduce the techniques and devices essential to modern optics, including characterization of sources, photodetectors, modulators, use of interferometers, spectrometers,and holograms and experimentation of fiber optics and Fourier optics. Department enforced prerequisite: undergraduate optics course (e.g. PHYS 4510).
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5606
**Additional Information:** Departmental Category: Optics

**ECEN 5607 (3) Power Electronics for Electrified Transportation**
Covers analysis, modeling, control, simulations, and design of electric-drive vehicles and the charging infrastructure. Vehicle system architectures and dynamics are used to determine the requirements and to validate the performance of electric-vehicle drivetrain subsystems. Analysis, modeling, and design of the subsystems are addressed, including battery systems, battery management electronics, dc-dc converters, dc-ac inverters, motor drives, and chargers.
**Requisites:** Restricted to Electrical/Computer Engineering (EEEN) graduate students or Concurrent Degree students in Electrical Engineering (C-EEEN) or Electrical/Computer Engineering (C-ECENEEEN) or to Graduate Certificate Engineering (CRTGE) students.

**ECEN 5612 (3) Random Processes for Engineers**
Deals with random time-varying functions and is therefore useful in the broad range of applications where they occur. Topics include review of probability, convergence of random sequences, random vectors, minimum mean-square error estimation, basic concepts of random processes, Markov processes, Poisson processes, Gaussian processes, linear systems with random inputs, and Wiener filtering. Applications range from communications, communication networks, and signal processing to random vibration/stress analysis, mathematical finance, physics, etc.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5613 (3) Embedded System Design**
Introduces system hardware and firmware design for embedded applications. Students independently design and develop a hardware platform encompassing a microcontroller and peripherals. Firmware is developed in C and assembly. A significant final project is designed, developed, documented and presented. Prioritized for EEEN graduate students with ESE (Embedded Systems Engineering) sub-plan.
**Additional Information:** Departmental Category: Embedded Systems Engineering

**ECEN 5616 (3) Optoelectric System Design**
Examines optical components and electro-optic devices with the goal of integrating into well design optoelectronic systems. Sample systems include optical storage, zoom lenses and telescopes.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4616
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Optics

**ECEN 5622 (3) Information Theory and Coding**
Covers fundamental limits of data compression, reliable transmission of information and information storage. Topics include information measures, typicality, entropy rates of information sources, limits and algorithms for lossless data compression, mutual information, and limits of information transmission over noisy wired and wireless links. Optional topics include lossy data compression, limits of information transmission in multiple-access and broadcast networks, and limits and algorithms for information storage.
**Requisites:** Restricted to Electrical/Computer Engineering, Computer Science, Applied Math or Physics graduate students only.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5623 (3) Real-Time Embedded Systems**
Design and build a microprocessor-based embedded system application requiring integration of sensor/actuator devices, a real-time operating system and application firmware and software. Real-time rate monotonic theory and embedded architecture are covered. Prioritized for EEEN graduate students with ESE (Embedded Systems Engineering) sub-plan.
**Additional Information:** Departmental Category: Embedded Systems Engineering

**ECEN 5626 (3) Active Optical Devices**
Analysis of active optical devices such as semiconductor laser, detector and flat panel display by clearly defining and interconnecting the fundamental physical mechanism, device design and operating principles and device performance.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ECEN 5355.
**Additional Information:** Departmental Category: Optics

**ECEN 5632 (3) Theory and Application of Digital Filtering**
Digital signal processing and its applications are of interest to a wide variety of scientists and engineers. The course covers such topics as characterization of linear discrete-time circuits by unit pulse response, transfer functions, and difference equations, use of z-transforms and Fourier analysis, discrete Fourier transform and fast algorithms (FFT), design of finite and infinite impulse response filters, frequency transformations, study of optimized filters for deterministic signals.
**Requisites:** Prereq of ECEN 3300 (minimum grade C-). Restricted to EEEN graduate students or Concurrent Degree students in Electrical Engineering (C-EEEN) or Electrical/Computer Engineering (C-ECENEEEN) or to Graduate Certificate Engineering (CRTGE) students.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5634 (3) Microwave and RF Laboratory**
This course is a hands-on introduction to RF and microwave topics, from fundamentals including vector network analyzer (VNA) calibration and operation, power measurements, and antenna characterization, to system-level topics such as RADAR systems and superheterodyne links. Students work in small groups on weekly experiments based on both coaxial and waveguide setups. An understanding of electromagnetic waves (such as covered in ECEN 3400 and ECEN 3410) is assumed.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4634
**Requisites:** Restricted to any graduate students or Electrical/Computer Engineering or Electrical Engineering Concurrent Degree majors only.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 5638 (3) Control Systems Laboratory**
Provides experience in control system design and analysis, using both real hardware and computer simulation. Covers the entire control system design cycle: modeling the system, synthesizing a controller, conducting simulations, analyzing the design to suggest modifications and improvements, and implementing the design for actual testing.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4638, MCEN 4638, and MCEN 5638
**Requisites:** Requires prerequisite course of ECEN/MCEN 4138/5138 (minimum grade D-). Restricted to graduate students only.

**ECEN 5645 (3) Introduction to Optical Electronics**
Introduces lasers, Gaussian optics, modulators, nonlinear optics, optical detectors, and other related devices.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Nanostructures and Devices

**ECEN 5652 (3) Detection and Extraction of Signals from Noise**
Introduces detection, estimation, and related algorithms. Topics in detection include simple/composite hypothesis testing, repeated observations and asymptotic performance and sequential detection. Topics in estimation include Bayesian estimation including minimum mean-square estimation and non-random parameter estimation. Topics in algorithms vary. Examples include algorithms for state estimation and smoothing in Hidden Gauss-Markov models and the expectation-maximization algorithm. Applications include communications, radar/sonar/geophysical signal processing, image analysis, authentication, etc.
**Requisites:** Restricted to Electrical/Computer Engineering, Computer Science, Applied Math or Physics graduate students only.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5672 (3) Digital Image Processing**
Course objective is to present the fundamental techniques available for image representation and compression (e.g., wavelets), filtering (e.g., Wiener and nonlinear filter), and segmentation (e.g., anisotropic diffusion).
**Requisites:** Requires prerequisite course ECEN 5632 (minimum grade C-).
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5673 (3) Distributed Systems**
Examines systems that span multiple autonomous computers. Topics include system structuring techniques, scalability, heterogeneity, fault tolerance, load sharing, distributed file and information systems, naming, directory services, resource discovery, resource and network management, security, privacy, ethics and social issues.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5673
**Recommended:** Prerequisite CSCI 5573 or a course in computer networks.
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 5678 (3) Control of Multi-agent Systems**
Covers basics of matrix theory and graph theory; distributed averaging and consensus methods on graphs; parallel computation of fixed points; basics of optimization; parallel and distributed optimization methods over graphs; convergence analysis. The techniques and methodologies presented in the course are introduced through application setups including Internet of Things, power and energy systems, sensor networks, transportation systems, and social networks. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites ECEN 5448 and courses in convex optimization.

**ECEN 5682 (3) Theory and Practice of Error Control Codes**
Introduces error control coding techniques for reliable transmission of digital data over noisy channels. Topics include algebraic characterizations of cyclic codes, convolutional codes, modern graph codes, decoding algorithms for block codes, Viterbi algorithm and iterative decoding on graphs. Applications include modern digital communication and storage systems including deep space communications, satellite broadcasting, cellular networks, and optical disk storage.
**Requisites:** Restricted to Electrical/Computer Engineering (EEEN) graduate students or Concurrent Degree students in Electrical Engineering (C-EEEN) or Electrical/Computer Engineering (C-ECENEEEN) or to Graduate Certificate Engineering (CRTGE) students.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5692 (3) Principles of Digital Communication**
Introduces fundamental principles of efficient and reliable transmission of information used in wired and wireless digital communication systems including cable modems, smart phones/tablets, cellular networks, local area (wi-fi) networks, and deep-space communications. Topics include bandwidth and power constraints, digital modulation methods, optimum transmitter and receiver design principles, error rate analysis, channel coding potential in wired/wireless media, trellis coded modulation, and equalization.
**Additional Information:** Departmental Category: Digital Signal Processing Communications

**ECEN 5696 (3) Fourier Optics**
Introduces a system level approach to the analysis and design of optical systems. Topics include holography, Fourier transform properties of lenses, two-dimensional convolution and correlation functions, spatial filtering and optical computing techniques. Also covers coherent and incoherent imaging techniques, tomography, and synthetic aperture imaging.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites ECEN 3300 and ECEN 3410.
**Additional Information:** Departmental Category: Optics

**ECEN 5712 (3) Machine Learning for Engineers**
Prepares students to apply/improve machine learning methods for engineering applications and to perform related research. Covers popular algorithms and theories for learning from data, e.g., supervised learning, unsupervised learning, online learning, neural networks, VC-dimension, PAC learning theory. Explores the connections with detection/estimation theory and information theory. The course project focuses on engineering applications related to students¿ majors.
**Recommended:** Prerequisites ECEN 5612, 5652 and 5622.

**ECEN 5713 (3) Advanced Embedded Software Development**
Building on fundamentals taught in ECEN 5813 PES, this course teaches more advanced programming principles for embedded systems that are implemented with the use of an embedded operating system. Topics include Linux kernel space and user programming, driver design, multi-threaded programming, and operating systems fundamentals, software design patterns, sound development methods and practices, and use of debugging and performance tools to create applications and enhance operating systems' services embedded system prototypes and products.
**Requisites:** Requires prerequisite course of ECEN 5813 (minimum grade D-).
**Recommended:** Prerequisites This course assumes students have direct coding and tool experience including C-programming Bare Metal Firmware Design, Compilation with GCC & Build Systems with GNU Make, Git, Linux command line operations, shell environment, compilation, Lab instruments, DVM, Logic Analyzer, Oscilloscope or demonstration of portable, maintainable, and testable software design.

**ECEN 5720 (1) Practical Printed Circuit Board Design Accelerator**
This course introduces students to the most important skills needed to convert a back-of-the-napkin circuit sketch into a working widget with first time success. Students will learn the seven steps in every board project: planning, selecting components, schematic entry, layout, assembly, bring up and debug, and documentation. This process will be exercised with a custom board design project. A commercial EDA tool widely used in the electronics industry will be used for the project. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4730 or ECEN 5730 ECEN 4720
**Recommended:** Prerequisites ECEN 2250 and ECEN 2260 and ECEN 2270.

**ECEN 5722 (3) Artificial Intelligence: Reasoning and Overview**
Presents tools for deterministic and probabilistic reasoning in artificial intelligence (AI) and engineering applications and explores the latest advances. Prepares students to further study and invent new AI technologies. Covers search algorithms, a unified graphical model for deterministic and probabilistic reasoning, reasoning with neural networks together with an overview of related areas of AI, such as reinforcement learning, deep learning, natural language processing, and ethics. The course project focuses on engineering applications chosen by students based on their own interests.
**Requisites:** Requires prerequisite course of ECEN 5612 Random Processes for Engineers.

**ECEN 5730 (3) Practical Printed Circuit Board Design and Manufacture**
This course prepares students with all skills needed to convert a back-of-the-napkin circuit sketch into a working widget with first time success. Students will master the seven steps in every board project: planning, selecting components, schematic entry, layout, assembly, bring up and debug, and documentation. This process will be exercised with three different board design projects with increasing challenge. A commercial EDA tool widely used in the electronics industry will be used for all projects. Previously offered as a special topics course. Degree credit not offered for this course and ECEN 4720 or ECEN 5720 or ECEN 3730.
**Recommended:** Prerequisites ECEN 2250 and ECEN 2260 and ECEN 2270.

**ECEN 5732 (3) Deep Learning and Its Connections to Information Theory**
Provides a hands-on introduction to deep learning using Python and explores related concepts in information theory to guide the design of neural networks. Covers the mechanism and various architectures of neural networks (convolutional, recurrent, Transformer, generative models, etc.), an introduction to related concepts in information theory (entropy, mutual information, divergence, channel capacity, data compression, rate-distortion theory, information bottleneck, Kolmogorov complexity, etc.) and information theory guided neural network design and optimization.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4732
**Requisites:** Prerequisite or corequisite: ECEN 5612 Random Processes for Engineers.
**Recommended:** Prerequisite ECEN 5622 (Information Theory and Coding), ECEN 5722 (Artificial Intelligence Foundations and Overview), and ECEN 5712 (Machine Learning for Engineers).

**ECEN 5737 (3) Adjustable-Speed AC Drives**
Presents unified treatment of complete electrical drive systems: mechanical load, electrical machine, power converter, and control equipment. Emphasizes induction, synchronous, and permanent-magnet drives. Uses simulation programs (e.g., SPICE, Finite Element/Difference Program) to simulate drive system components (e.g., gating, inverter, electric machine).
**Requisites:** Restricted to Electrical/Computer Engineering (EEEN) graduate students or Concurrent Degree students in Electrical Engineering (C-EEEN) or Electrical/Computer Engineering (C-ECENEEEN) or to Graduate Certificate Engineering (CRTGE) students.
**Recommended:** Prerequisite ECEN 3170.
**Additional Information:** Departmental Category: Power

**ECEN 5738 (3) Nonlinear Control Systems**
Nonlinear systems and control. Introduction to nonlinear phenomena: multiple equilibria, limit cycles, bifurcations, complex dynamical behavior. Planar dynamical systems, analysis using phase plane techniques. Input-output analysis and stability. Passivity. Lyapunov stability theory. Feedback linearization. Exploration of examples and applications. Formerly ECEN 7438.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5738 ASEN 6024
**Requisites:** Requires prerequisite course of ECEN 5448 (minimum grade C-). Restricted to graduate students only.
**Recommended:** Prerequisite knowledge in differential equations.
**Additional Information:** Departmental Category: Dynamical Systems and Control

**ECEN 5752 (3) Communication Laboratory**
Analysis and design of realistic communication signals in a modern digital signal processing environment. Covers both analog and digital communication signals with and without noise and distortion. Pulse amplitude modulation is used initially at baseband and then combined with amplitude and phase/frequency modulation to produce the kind of bandpass signals that are used in cell phones and wireless data networks.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4752
**Requisites:** Requires prerequisite course of ECEN 4242 (minimum grade C-). Restricted to College of Engineering majors only.

**ECEN 5753 (3) Computer Performance Modeling**
Presents a broad range of system modeling techniques, emphasizing applications to computer systems. Covers stochastic processes, queuing network models, stochastic Petri nets and simulation (including parallel processing techniques). Also requires second-semester calculus.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4753 and CSCI 4753 and CSCI 5753
**Additional Information:** Departmental Category: Computer and Digital Systems

**ECEN 5763 (3) Embedded Computer Vision**
Introduces students to machine vision and machine learning methods used in automation, autopilots and security and inspection systems. Embedded and automation topics include implementation of algorithms with FPGA or GP-GPU embedded real time co-processing for autopilots (intelligent transportation), general automation and security including methods for detection, classification, recognition of targets for inspection, surveillance, search and rescue, and machine vision navigation applications.
**Requisites:** Campus section restricted to graduate students in Academic sub-plans ESE or C-EEENP or C-ECENEEEP.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Embedded Systems Engineering

**ECEN 5773 (3) Developing the Industrial Internet of Things**
This course goes beyond consumer IoT hype to emphasize a much greater space for potential embedded system applications and growth: The Industrial Internet of Things (IIoT), also known as Industry 4.0. Cisco¿s CEO stated: ¿IoT overall is a $19 Trillion market. IIoT is a significant subset including digital oilfield, advanced manufacturing, power grid automation, and smart cities¿. The course examines emerging markets, technology trends, applications and skills required for exploring career opportunities in this space.
**Requisites:** Restricted to students with an Embedded Systems Engineering (ESE) subplan or Electrical Engr-Prof Degree (C-EEENP) or Elec Cmp Elec Eng-Prof Degree (C-ECENEEENP) only.
**Recommended:** Prerequisites ECEN 5613, ECEN 5823, ECEN 5053, and ECEN 5133.

**ECEN 5783 (3) Embedded Interface Design**
This course deeply explores interface design approaches and architectures for creating embedded system prototypes and products. For both machine and user interfaces, we will examine best practices for the interface design process, including considerations of characteristics of the information to be transferred between devices or between a device and a user. Projects leverage the now standard Raspberry Pi 3 single-board computer (SBC), providing a strong foundation for exploring many elements of interface design.
**Requisites:** Restricted to students with an Embedded Systems Engineering (ESE) subplan or Electrical Engr-Prof Degree (C-EEENP) or Elec Cmp Elec Eng-Prof Degree (C-ECENEEENP) only.
**Recommended:** Prerequisites knowledge of programming, particularly Python, ECEN 2120, ECEN 2350, ECEN 1030, ECEN 1310, CSCI 1300.

**ECEN 5793 (3) Secure Computer Architecture**
Explore cutting-edge secure architectures that look to protect the system from the hardware up. This course covers advanced topics in security with an emphasis on computer architecture on both the attack and defense sides. Discussion oriented classes will deepen understanding of weekly technical reading assignments, enhance the ability to analyze technical papers, and help carry out a semester long research project.
**Requisites:** Requires prerequisite or corequisite course of ECEN 5593 (minimum grade D-).

**ECEN 5797 (3) Introduction to Power Electronics**
An introduction to switched-mode converters. Includes steady-state converter modeling and analysis, switch realization, discontinuous conduction mode and transformer-isolated converters. Ac modeling of converters using averaged methods, small-signal transfer functions, feedback loop design and transformer design.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4797
**Requisites:** Restricted to Electrical/Computer Engineering (EEEN) graduate students or Concurrent Degree students in Electrical Engineering (C-EEEN) or Electrical/Computer Engineering (C-ECENEEEN) or to Graduate Certificate Engineering (CRTGE) students.
**Additional Information:** Departmental Category: Power

**ECEN 5803 (3) Mastering Embedded Systems Architecture**
Acquire an understanding of embedded systems architectures for the purpose of creating prototypes or products for a variety of applications. The salient issues in the decision making process will be examines, including trade-offs between hardware and software implementations, processor and operating system selection and IP creation or acquisition. Projects will involve the latest software development and tools and hardware platforms.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Embedded Systems Engineering

**ECEN 5807 (3) Modeling and Control of Power Electronic Systems**
Studies modeling and control topics in power electronics. Averaged switch modeling of converters, computer simulation, ac modeling of the discontinuous conduction mode, the current programmed mode, nulldouble injection techniques in linear circuits, input filter design, and low-harmonic rectifiers.
**Requisites:** Requires prerequisite course of ECEN 5797 (minimum grade C-).
**Additional Information:** Departmental Category: Power

**ECEN 5813 (3) Principles of Embedded Software**
Introduces principles around embedded software elements and software development needed for the Embedded Systems Engineering core curriculum. Student will write C program applications hat employ efficient, high performance and robust software design techniques. Topics include bare-metal firmware, c-programming optimization and introductions to underlying embedded architecture. Sound testing and debug practices will be instilled and utilized in several application projects.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Embedded Systems Engineering

**ECEN 5817 (3) Resonant and Soft-Switching Techniques in Power Electronics**
Covers resonant converters and inverters, and soft switching; sinusoidal approximations in analysis of series, parallel, LCC, and other resonant dc-dc and dc-ac converters; state-plane analysis of resonant circuits; switching transitions in hand-switched and soft-switched PWM converters; zero-voltage switching techniques, including resonant, quasi resonant, zero voltage transition, and auxiliary switch circuits.
**Requisites:** Requires prerequisite course of ECEN 5797 (minimum grade C-).
**Additional Information:** Departmental Category: Power

**ECEN 5823 (3) Internet of Things Embedded Firmware**
Acquire firmware development skills to meet low energy and internet connectivity demands of embedded systems. Event-driven firmware techniques will be explored through programming assignments, transitioning to programming an Internet of Things RF Network Protocol such as Bluetooth Low Energy or Thread. The coursework will align with the latest industry firmware and embedded wireless protocol trends.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Embedded Systems Engineering

**ECEN 5827 (3) Analog IC Design**
Covers the fundamentals of transistor-level analog integrated circuit design. Starting with motivations from application circuits, the course develops principles of dc biasing, device models, amplifier stages, frequency response analysis and feedback and compensation techniques for multi-stage operational amplifiers.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4827
**Requisites:** Restricted to Electrical/Computer Engineering (EEEN) graduate students or Concurrent Degree students in Electrical Engineering (C-EEEN) or Electrical/Computer Engineering (C-ECENEEEN) or to Graduate Certificate Engineering (CRTGE) students.
**Additional Information:** Departmental Category: Power

**ECEN 5828 (3) Hybrid Dynamical Systems: Theory and Applications**
Students will study the basic properties of differential and difference equations and inclusions including: existence of solutions, uniqueness, invariance principles; introduction to basic hybrid systems that combine continuous-time and discrete-time dynamics: automata, switched systems, etc.; Lyapunov theory for hybrid systems; and examples and applications in the areas of optimization, feedback control, machine learning, energy systems, social networks, multi-agent systems, and asynchronous systems. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.

**ECEN 5830 (3) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General

**ECEN 5833 (3) Low Power Embedded Design Techniques**
The course explores through weekly quizzes, assignments, and a course project, low energy hardware design concepts, selecting components to meet reliability goals, radio implementation, power supply design, product design, and system bring up. The programming of the microcontroller or SoC will most likely be ¿coding to the metal¿ to control individual microcontroller peripherals and utilizing them in the most energy efficient ways.
**Requisites:** Restricted to students with an Embedded Systems Engineering (ESE) subplan or Electrical Engr-Prof Degree (C-EEENP) or Elec Cmp Elec Eng-Prof Degree (C-ECENEEENP) only.
**Recommended:** Requisites Students should have knowledge of assembly and C programming, digital logic design, and embedded computer architecture, and have had at least one course in each of these subjects, such as ECEN 5813 or ECEN 5823, students should also have experience using a microcontroller Integrated Development Environment (IDE) and its associated tools including its debugger and register views.

**ECEN 5837 (3) Mixed-Signal IC Design Lab**
Software laboratory course extends the concepts developed in ECEN 5827 to full design and layout of mixed analog and digital custom integrated circuits. Assignments explore implementation of analog to digital and digital to analog converters, and final project developes a full custom IC for a target application.
**Requisites:** Requires prerequisite course of ECEN 5827 (minimum grade C-).
**Additional Information:** Departmental Category: Power

**ECEN 5840 (1-6) Independent Study**
Offers an opportunity for students to do independent, creative work at the master's level. Numbered ECEN 5840-5849. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: General

**ECEN 5853 (3) Embedding Sensors and Motors**
Introduces students to the design of sensors and motors, and methods that integrate them into embedded systems used in consumer and industrial products. Students will learn about sensor technologies and motors through lectures, recorded and online videos, online reading, and through laboratory experiments. Students will build systems that take sensor inputs, and sort, filter and evaluate the resulting data. They will also learn how to use sensor input to measure properties of motors.
**Requisites:** Restricted to students with an Embedded Systems Engineering (ESE) subplan or Electrical Engr-Prof Degree (C-EEENP) or Elec Cmp Elec Eng-Prof Degree (C-ECENEEENP) only.
**Recommended:** Prerequisites ECEN 1400, ECEN 2250, ECEN 2260 and ECEN 2440 or equivalent coursework.

**ECEN 5857 (3) Digital Control for Power Electronics**
Focuses on analysis, modeling and design of digitally controlled power converters. Covers the dynamical discrete-time analysis of power converters, digital compensator design and main nonlinear phenomena due to quantization effects. Addresses the basics of controller autotuning.
**Requisites:** Requires prerequisite course of ECEN 5797 (minimum grade C-).

**ECEN 5863 (3) Programmable Logic Embedded System Design**
Learn to design programmable systems on a chip for the purpose of creating prototypes or products for a variety of applications. Explore complexities, capabilities and trends of Field Programmable Gate Arrays (FPGA) and Complex Programmable Logic Devices (CPLD). Implement synchronization and timing closure in these devices. Projects will involve the latest software and FPGA development tools and hardware platforms.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Embedded Systems Engineering

**ECEN 5907 (3) Special Topics**
Special topics class.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**ECEN 5915 (3) Foundations of Quantum Engineering**
Introduces engineers to quantum theory. In this course you will learn how to describe many different physical systems (such as atoms, electrons, light, mechanical oscillators, and tops) mathematically. It also explores different notions of quantumness such as entanglement and non-contextuality. The foundations obtained in this course are important for further study of quantum hardware (sensors), communication, and computing.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3915

**ECEN 5925 (3) Foundations of Quantum Hardware**
Introduces students to the principles and operation of quantum hardware. In this course you will learn how to describe many different physical systems (trapped Ions, superconducting circuits, and optical systems) mathematically. This will allow you to model quantum sensors, communication systems and computing hardware.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4295

**ECEN 5930 (1-3) Industry Internship**
This class provides a structure for ECEE graduate students to receive academic credit for internships with industry partners that have an academic component to them suitable for graduate-level work. Participation in the program will consist of an internship agreement between a student and an industry partner who will employ the student in a role that supports the academic goals of the internship. Instructor participation will include facilitation of mid-term and final assessments of student performance as well as support for any academic-related issues that may arise during the internship period. May be taken during any term following initial enrollment and participation in ECEE graduate programs.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Grading Basis:** Letter Grade

**ECEN 5933 (3) Engineering Genetic Circuits**
Presents recent research into methods and software tools for the modeling, analysis, and design of genetic circuits that are enabling the new field of synthetic biology. Teaches both biological and engineering principles in order to enable collaborations between engineers and biologists working in the field of synthetic biology.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4933
**Recommended:** Prerequisite some familiarity with genetics, cell biology, molecular biology, or biochemistry or familiarity with engineering methods for modeling, analysis and design, but students are not expected to have knowledge in both.

**ECEN 6016 (1-3) Special Topics**
**Additional Information:** Departmental Category: Optics

**ECEN 6106 (3) Numerical Methods in Photonics**
Teaches students how to create and use their own computational techniques to explore optical physics, devices and systems. Learning is project-based, that is no traditional homework or exams are used. Instead, students write their own series of different numerical tools such as finite difference time domain and Fourier beam propagation. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ECEN 5696 Fourier Optics or equivalent and some familiarity with a numerical programming language such as Matlab is strongly recommended.

**ECEN 6139 (3) Logic Synthesis of VLSI Systems**
Studies synthesis and optimization of sequential circuits, including retiming transformations and don't care sequences. Gives attention to hardware description languages and their application to finite state systems. Also includes synthesis for testability and performance, algorithms for test generation, formal verification of sequential systems, and synthesis of asynchronous circuits.
**Recommended:** Prerequisites ECEN 5139 and CSCI 5454.
**Additional Information:** Departmental Category: VLSI CAD Methods

**ECEN 6144 (3) Electromagnetic Boundary Problems**
Provides mathematical and physical fundamentals necessary for the systematic analysis of electromagnetic fields problems. Covers basic properties of Maxwell's equations, potentials and jump conditions; scattering and diffraction by canonical structures; Green's functions, integral equations and approximate methods. Requires some maturity in electromagnetics.
**Requisites:** Requires prereq course of ECEN 5114 or 5134 (minimum grade C-). Restricted to graduate students in Electrical Engr (EEEN) or Electrical/Computer Engr (ECEN) or Electrical Engr Concurrent or Electrical/Computer Engr Concurrent Degree students only.
**Additional Information:** Departmental Category: Electromagnetics and Remote Sensing

**ECEN 6800 (3) Master of Engineering Report**
**Additional Information:** Departmental Category: General

**ECEN 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Additional Information:** Departmental Category: General

**ECEN 6950 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General

**ECEN 6960 (3) Master of Engineering Project**
**Additional Information:** Departmental Category: General

**ECEN 7840 (1-6) Independent Study**
Offers an opportunity for students to do independent, creative work at the doctoral level. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: General

**ECEN 7849 (1-6) Independent Study**
Offers an opportunity for students to do independent, creative work at the doctoral level. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: VLSI CAD Methods

**ECEN 8990 (1-10) Doctoral Dissertation**
**Repeatable:** Repeatable for up to 10.00 total credit hours.
**Additional Information:** Departmental Category: General

# Electrical & Computer Engineering Online (ECEA)

## Courses

The following courses are only available through CU Boulder on Coursera program offerings. Please refer to the Online Programs (p. 1895) section of the catalog for more information.

**ECEA 5000 (0.6) Special Topics**
Examines a special topic in Electrical, Computer, and Energy Engineering.
**Grading Basis:** Letter Grade

**ECEA 5001 (0.6) Special Topics**
Examines a special topic in Electrical, Computer, and Energy Engineering.
**Grading Basis:** Letter Grade

**ECEA 5002 (0.8) Special Topics**
Examines a special topic in Electrical, Computer, and Energy Engineering.
**Grading Basis:** Letter Grade

**ECEA 5003 (0.8) Special Topics**
Examines a special topic in Electrical, Computer, and Energy Engineering.
**Grading Basis:** Letter Grade

**ECEA 5004 (0.8) Special Topics**
Examines a special topic in Electrical, Computer, and Energy Engineering.
**Grading Basis:** Letter Grade

**ECEA 5005 (1) Special Topics**
Examines a special topic in Electrical, Computer, and Energy Engineering.
**Grading Basis:** Letter Grade

**ECEA 5006 (1) Special Topics**
Examines a special topic in Electrical, Computer and Energy Engineering.
**Grading Basis:** Letter Grade

**ECEA 5007 (1) Special Topics**
Examines a special topic in Electrical, Computer, and Energy Engineering.
**Grading Basis:** Letter Grade

**ECEA 5008 (1) Special Topics**
Examines a special topic in Electrical, Computer, and Energy Engineering.
**Grading Basis:** Letter Grade

**ECEA 5009 (1) Special Topics**
Examines a special topic in Electrical, Computer, and Energy Engineering.
**Grading Basis:** Letter Grade

**ECEA 5080 (0.8) Kalman Filter Boot Camp and State Estimation**
Introduces the Kalman filter as a method that can solve problems related to estimating the hidden internal state of a dynamic system. Develops the background theoretical topics in state-space models and stochastic systems. Presents the steps of the linear Kalman filter and shows how to implement these steps in Octave code and how to evaluate the filter¿s output.
**Grading Basis:** Letter Grade

**ECEA 5081 (0.8) Linear Kalman Filter Deep Dive and Target Tracking**
As a follow-on course to "Kalman Filter Boot Camp", this course derives the steps of the linear Kalman filter to give understanding regarding how to adjust the method to applications that violate the standard assumptions. Applies this understanding to enhancing the robustness of the filter and to extend to applications including prediction and smoothing. Shows how to implement a target-tracking application in Octave code using an interacting multiple-model Kalman filter.
**Grading Basis:** Letter Grade

**ECEA 5082 (0.8) Nonlinear Kalman Filters and Parameter Estimation**
As a follow-on course to "Linear Kalman Filter Deep Dive", this course derives the steps of the extended Kalman filter and the sigma-point Kalman filter for estimating the state of nonlinear dynamic systems. You will learn how to implement these filters in Octave code and compare their results. You will be introduced to adaptive methods to tune Kalman-filter noise-uncertainty covariances online. You will learn how to estimate the parameters of a state-space model using nonlinear Kalman filters.
**Grading Basis:** Letter Grade

**ECEA 5083 (0.8) Particle Filters and Navigation**
As the final course in the Applied Kalman Filtering specialization, you will learn how to develop the particle filter for solving strongly nonlinear state-estimation problems. You will learn about the Monte-Carlo integration and the importance density. You will see how to derive the sequential importance sampling method to estimate the posterior probability density function of a system¿s state. You will encounter the degeneracy problem for this method and learn how to solve it via resampling. You will learn how to implement a robust particle-filter in Octave code and will apply it to an indoor-navigation problem.
**Grading Basis:** Letter Grade

**ECEA 5200 (1) Digital Communications: I/Q Up/Down Conv & Wireless Channels**
Provides methods to convert baseband signals to RF/passband signals in order to be transmitted, and methods to convert passband signals to baseband signals for processing at the receiver. Shows how to model wireless channels.
**Grading Basis:** Letter Grade

**ECEA 5201 (1) Digital Communications: Modulation and Demodulation**
For transmitters, shows how to modulate discrete time signals to continuous time baseband signals without loss of generality and with minimum bandwidth. For receivers, shows how to demodulate continuous time signal to discrete time signal without loss of information.
**Grading Basis:** Letter Grade

**ECEA 5202 (1) Digital Communications: Detection, Intro Error Contr Coding**
Provides optimal detection methods and an introduction to Error Control Coding, such as convolutional codes, Turbo codes, and LDPC codes.
**Grading Basis:** Letter Grade

**ECEA 5300 (1) Programming Fundamentals for Embedded Software Development**
Learners will gain exposure to fundamental programming constructs using C within the context of embedded systems. This course aims to establish a solid understanding of crucial data types, data structures, and algorithms essential for embedded software development and testing. Learners will grasp the organization of ARM and microcontroller memory organization and its relationship with the structure of an executable file. Additionally, the curriculum will delve into the intricacies of converting C code into binary executable files, accompanied by an overview of tools for inspecting and analyzing these files.
**Grading Basis:** Letter Grade

**ECEA 5301 (1) Hands-on Embedded Software Development with Microcontrollers**
Learners will utilize a standard Integrated Development Environment (IDE) to program the ARM Cortex-M microcontroller using the C programming language. This course will cover the fundamentals of programming General Purpose Input/Output (GPIO) connections, emphasizing precise timing controlled by the timer module. Additionally, learners will be introduced to the primary programming paradigm for bare-metal programming, focusing on State Machines. Mastery of asynchronous programming techniques and understanding call flow with interrupts and their handling will be emphasized. Finally, learners will receive a high-level introduction to Assembly programming for the ARM Cortex-M processor.
**Grading Basis:** Letter Grade

**ECEA 5302 (1) Advanced Embedded Software Development with Microcontrollers**
This course explores communication protocols and analog signals essential for ARM Cortex-M microcontroller programming with C. It offers an overview of serial communication techniques and provides in-depth understanding of popular protocols like UART, I2C, and SPI for interfacing Embedded Systems. Additionally, the curriculum includes Analog-Digital conversion with application development utilizing Direct Memory Access (DMA). Learners will also be introduced to integer math (fixed point) methods for achieving execution efficiency in resource-limited microcontroller systems. Finally, the course will cover power management techniques tailored for embedded systems.
**Grading Basis:** Letter Grade

**ECEA 5305 (1) Linux System Programming and Introduction to Buildroot**
Provides an overview of System Programming for the Linux operating system, or software which is interfacing directly with the Linux Kernel and C library. The basic components of a Linux Embedded System, including kernel and root filesystem details are discussed. The Buildroot build system is introduced, which students use to build their own custom Embedded Linux system through programming assignments.
**Recommended:** Prerequisites Knowledge of C Programming and embedded computer architecture and working knowledge of Linux command line operations, shell programming, Git, and makefiles.
**Grading Basis:** Letter Grade

**ECEA 5306 (1) Linux Kernel Programming and Introduction to Yocto**
Provides an overview of Linux Kernel Programming. The basics of Linux Kernel development and device driver development are included. Building on content covered in the previous module, the Yocto Project is also introduced as a second Embedded Linux device build system. Students develop a custom character device driver and deploy on a Yocto or Buildroot based qemu emulated Embedded System.
**Recommended:** Prerequisites Knowledge of C Programming and embedded computer architecture and working knowledge of Linux command line operations, shell programming, Git, and makefiles.
**Grading Basis:** Letter Grade

**ECEA 5307 (1) Embedded System Topics and Project**
Building on concepts of previous courses in the series to implement a project based on a hardware platform which supports Embedded Linux, students pick a final project hardware platform and a final project topic. The project will use either Buildroot or Yocto to build a hardware image. Final project implementation will be organized in sprints based on Agile development methodology.
**Recommended:** Prerequisites Knowledge of C Programming and embedded computer architecture and working knowledge of Linux command line operations, shell programming, Git, and makefiles.
**Grading Basis:** Letter Grade

**ECEA 5315 (0.6) Real-Time Embedded Systems: Concepts and Practices**
Learn fundamentals concepts and practices for real-time embedded systems including hardware, firmware and software configurations, cyclic executive approach (small scale), RTOS (Real-Time Operating System), and real-time extensions to embedded operating systems (real-time Linux). The three approaches are compared and contrasted. Standard approaches for programming and integration of hardware, firmware, and software to provide real-time services (with deadline requirements) are covered.
**Grading Basis:** Letter Grade

**ECEA 5316 (0.8) Real-Time Embedded Systems: Theory and Analysis**
The Real-Time Embedded Systems Theory and Analysis course provides an in-depth and full mathematical derivation and review of models for scheduling policies and feasibility determination by hand and with rate monotonic tools along with comparison to actual performance for real-time scheduled threads running on a native Linux system.
**Grading Basis:** Letter Grade

**ECEA 5317 (0.8) Real-Time Embedded Systems: Mission-Critical, SW Application**
This course covers the difference between systems you can bet your life on (mission critical) and those which provide predictable response and quality of service (reliable).
**Grading Basis:** Letter Grade

**ECEA 5318 (0.8) Real-Time Embedded Systems: Project**
In the final course, we put it all together into a working real-time system and application with multiple services to synchronize with the real world via machine vision.
**Grading Basis:** Letter Grade

**ECEA 5330 (0.6) Computer Aided Verification: Foundations of CAV**
Foundations of Computer Aided Verification covers modeling finite-state systems for verification, writing properties as temporal logic formulae or automata, using model checkers to verify properties of a model, specifying fairness constraint to model environment and assumptions, and applying abstraction techniques to verification problems.
**Grading Basis:** Letter Grade

**ECEA 5331 (0.8) Computer Aided Verification: Decision Proc HW Model Checking**
Decision Procedures and Hardware Model Checking covers describing constraints in DIMACS and SMT-LIB2 format, applying satisfiability (SAT) solvers to sets of constraints, using Binary Decision Diagrams (BDDs) to manipulate Boolean functions, applying BDD-based approaches to the model checking of hardware models, and applying SAT-based approaches to the model checking of hardware models.
**Grading Basis:** Letter Grade

**ECEA 5332 (0.8) Computer Aided Verification: Software Verification**
Software Verification covers modeling systems with unbounded state space - unbounded data types and unbounded control (stack, concurrency), proving correctness of programs using Hoare Logic, proving termination of programs using ranking functions, using the Dafny program verifier, and using Abstract Interpretation as a technique for inferring invariants and using Apron library.
**Grading Basis:** Letter Grade

**ECEA 5333 (0.8) Computer Aided Verification: Cyberphysical Systems**
Verification of Cyberphysical Systems covers writing simulators from ordinary differential equations, implementing switching software-based control designs and writing closed-loop simulations, checking stability and safety arguments through Lyapunov and barrier functions, evaluating closed-loop control systems for stability, safety and other temporal requirements, and using verification tools such as Flow* and S-Taliro to check functional properties of closed-loop systems.
**Grading Basis:** Letter Grade

**ECEA 5340 (0.8) Embedding Sensors and Motors: Sensors, Sensor Circuit Design**
Sensors and Sensor Circuit Design covers temperature, flow and rotary sensors, and getting started with the Cypress PSOC development kit, including three hands-on lab experiments connecting different types of sensors to the development kit and record sensor data.
**Grading Basis:** Letter Grade

**ECEA 5341 (0.8) Embedding Sensors and Motors: Motors, Motor Control Circuits**
Motors and Motor Control Circuits covers motors and how to integrate them to analog and digital circuits, lab experiments measuring parameters of a DC motor, integrating the motor and a rotary sensor into the PSoC development kit.
**Grading Basis:** Letter Grade

**ECEA 5342 (0.8) Embedding Sensors and Motors: Pressure and Motion Sensors**
Pressure and Motion Sensors covers accelerometers and pressure sensors, and how to accommodate high-speed response of these sensors in a circuit. The course also covers range finders and how to use these sensors to detect proximate objects, as well as resistive and capacitive touch screens, and the associated applications for each of these technologies.
**Grading Basis:** Letter Grade

**ECEA 5343 (0.6) Embedding Sensors and Motors: Sensor Manufact, Process Ctrl**
Sensors and PID Control covers gyroscopes and how to optimize resolution of sensors using analog to digital converters, proportional-integral-derivative (PID) control, and how this method is used to create a closed loop sensor feedback system.
**Grading Basis:** Letter Grade

**ECEA 5346 (1) Embedded Interface Design: User Exp I/F Design for Emb Sys**
An introduction to usability and user experience (UX) design methods for embedded devices. UX methods are presented for user analysis, planning, research, design, and verification with discount and formal UX processes. Includes specifics on embedded interface components, human factors and cognitive psychology, applied UX tools for wireframes, sketches, testing, surveys. Includes practical design, programming exercises in Python, QT, Node.js, HTML.
**Grading Basis:** Letter Grade

**ECEA 5347 (1) Embedded Interface Design: Rapid Prototyping Emb I/F Designs**
Presents methods, practices for rapid prototyping embedded interfaces for devices, systems, people. Introduces applied lean, UX methods for design decisions in the prototype cycle. Specific focus on using cloud-based services to prototype key system elements. Examines best practices for device data, wearables, voice user interfaces, connected product designs. Includes practical IoT-style development with programming in Python, Node.js, Amazon Web Services.
**Grading Basis:** Letter Grade

**ECEA 5348 (1) Embedded Interface Design: M2M, IoT I/F Design & Protocols**
Study protocols and design practices for Machine to Machine (M2M) and Internet of Things (IoT) communications between embedded devices. Includes low-level, personal and local area network, IoT application, and low-power wide area network protocols. Also examines message queueing, API design, and cloud connectivity approaches. Programming exercises introduce Python, Node.js, and Amazon Web Services for learning interface and integration design methods.
**Grading Basis:** Letter Grade

**ECEA 5349 (1) Sensors for a Carbon Free World: Electric Vehicle Sensors**
¿Electric Vehicle Sensors¿ starts with a discussion on how electric vehicles work differently from gasoline or diesel fuel powered vehicles and the major types of electric vehicles. It then moves to the unique components of full electric and hybrid electric vehicles, and how in-vehicle and outside battery charging systems work. We reference all the sensors that are used for in-vehicle and outside unique components. Then we do a deep dive into how each of these sensors work.
**Grading Basis:** Letter Grade

**ECEA 5350 (1) Sensors for a Carbon Free World: Wind Turbine Sensors**
¿Wind Turbine Sensors¿ starts with a discussion on how wind turbines generate electricity for the grid. It then moves to the major components of a wind turbine and how the generator transfers power to the grid. We reference all the sensors that are used in wind turbines. Then we perform detailed calculations on power efficiency, kinetic energy, DC power generation, and DC to AC conversion. Last, we do a deep dive into how each sensor in a wind turbine works.
**Grading Basis:** Letter Grade

**ECEA 5351 (1) Sensors for a Carbon Free World: Solar Power Sensors**
¿Solar Power Sensors¿ starts with a discussion on the photovoltaic process for generating electricity for the grid. It then moves to the types of solar cells: monocrystalline vs. polycrystalline, thin film, perovskite. We the move to the major components of a solar cell, how electricity is transferred to the grid, and how solar power grids are constructed. We reference all the sensors that are used in solar cells. Then we perform detailed calculations on solar irradiance, shading and efficiency. Last, we do a deep dive into how each sensor in a solar cell works.
**Grading Basis:** Letter Grade

**ECEA 5360 (0.8) FPGA Design for Embedded Systems: Intro to FPGA Dsgn for ES**
The Intro to FPGA Design for Embedded Systems course covers entering and compiling FPGA designs using Quartus Prime, recalling a list of common PLD architectures and the applications for which they are best suited, along with complexities, capabilities and trends of Field Programmable Gate Arrays (FPGA) and Complex Programmable Logic Devices (CPLD).
**Grading Basis:** Letter Grade

**ECEA 5361 (0.8) FPGA Design for Embedded Systems: Hardwr Desc Lang FPGA Dsgn**
The Hardware Description Languages for FPGA Design course covers design of programmable logic circuits using both VHDL and Verilog hardware description languages, and recalling the steps in a standard FPGA Design flow.
**Grading Basis:** Letter Grade

**ECEA 5362 (0.8) FPGA Design for Embedded Systems: FPGA Softcore Proc, IP Acq**
The FPGA Softcore Processors and IP Acquisition course covers evaluating the tradeoff between implementing or acquiring Intellectual Property (IP) cores, understanding the process of creating softcore processors by study and implementation, and describing and demonstrating FPGA design verification techniques, including simulation of test benches using ModelSim.
**Grading Basis:** Letter Grade

**ECEA 5363 (0.6) FPGA Design for Embedded Systems: Building FPGA Projects**
Building FPGA Projects explores building a working FPGA embedded system by embedding a soft core processor in an Altera MAX10 FPGA, and using onboard analog IP to interface to real variables. This course also emphasizes understanding and practice of all aspects of FPGA development, including conception, design, implementation, and debugging.
**Grading Basis:** Letter Grade

**ECEA 5365 (1) Soft Processor Design for FPGAs: Expanded FPGA Training with NIOS II**
This course covers configuration of a NIOS II CPU project. Device selection is based on the DE10-Lite development board, used for simulation and verification of the initial basic design. A CPU will be implemented that transmits a test pattern to the VGA connector along with external I/O using the user switches to set the output pattern for display.
**Grading Basis:** Letter Grade

**ECEA 5366 (1) Soft Processor Design for FPGAs: Volatile Memory Interface**
This course covers requirements for interfacing with external memory and methods for verifying proper configuration, data access and timing. The DE10-Lite board¿s SDRAM will be used to demonstrate this process. A memory test project will be implemented to show the read and write cycles on the external memory are operating correctly.
**Grading Basis:** Letter Grade

**ECEA 5367 (1) Soft Processor Design for FPGAs: Video Processing in FPGA**
This course will cover key concepts related to video signals, including types of video input as well as the additional components of a video system used to capture data and structure it for display. Additionally, there will be a discussion of the bandwidth requirements in an embedded system for the proper capture and processing of signals.
**Grading Basis:** Letter Grade

**ECEA 5370 (1) Network Systems Foundation**
In this course, students will learn the most important principles in network systems. This will center on the layered design of networks, and cover the link layer (Ethernet), network layer (IP), transport layer (TCP, UDP), and application layer (HTTP, gRPC). With those as a foundation, student will learn about network security problems and how some current solutions work at different layers.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5063
**Grading Basis:** Letter Grade

**ECEA 5371 (1) Network Principles in Practice: Linux Networking**
In this course students will learn how networking is designed and used in the Linux operating system. This will be learned in the context of networking principles and the application to real modern uses ¿ building network operating systems (that power network appliances) and using Linux to support connectivity in modern containerized and virtualized applications (such as a Kubernetes network plugin).
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5073
**Grading Basis:** Letter Grade

**ECEA 5372 (1) Network Principles in Practice: Cloud Networking**
In this class, students will learn about the networking abstractions and services for building applications in the cloud, and the technology underlying cloud networking. Students will be able to architect complex applications in the cloud. In understanding how the cloud providers created their networks, students will be in a better position to troubleshoot applications and analyze different possible ways of architecting applications, and even help design the next generation of networking for cloud providers.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCA 5083
**Grading Basis:** Letter Grade

**ECEA 5375 (1) Microcontrollers: Basic Architecture and Design**
This course introduces students to the architecture and design of Microcontrollers (MCUs), which are small processors used in a myriad of products. The main MCU components of the processor, memory, I/O interfaces and their interconnections will be examined, with a focus on the processor. The process of optimizing performance, energy usage and cost will be explored in a project where students will begin the development of an MCU in a system context.
**Grading Basis:** Letter Grade

**ECEA 5376 (1) Microcontrollers: Memory and Peripheral Interface Design**
This course expands on MCU architecture and design, with detailed analysis of the memory and peripheral interface components and how they are selected and used in specific systems. Special emphasis will be placed on the power control system and the various techniques used to optimize power and energy in a system. Many memory and peripheral components will be added to the course project.
**Grading Basis:** Letter Grade

**ECEA 5377 (1) Microcontrollers: Intelligent DMA and AI at the Edge**
This course analyzes DMA in MCUs and its impact on power and energy. The basic concepts of Artificial Intelligence (AI) inference are presented, and the special challenges of AI implementations in small, low power systems (AI at the Edge) will be explored. Special emphasis will be on components which accelerate AI functions with minimal power. The course project will be expanded with DMA and AI functions.
**Grading Basis:** Letter Grade

**ECEA 5380 (1) Dsgn Domain-Specifc Arch Proc: Domain-Specific CPUs**
There is a growing need to develop heterogeneous processor solutions for embedded signal processing, speech recognition, language translation, image and vision recognition, and Artificial Intelligence. Using modern highly abstracted processor development tools, Domain Specific Processors can be developed using data driven techniques in 30 days. This course and its series of courses utilizes a RISC-V open architecture processor core
**Grading Basis:** Letter Grade

**ECEA 5381 (1) Dsgn Domain-Specifc Arch Proc: Domain-Specific CPU Optimizn**
Domain-Specific CPU Optimization enables the processor architect to break through challenges of Dannard¿s Scaling and Moore¿s Law by optimizing the processor resources for the specific domain. Utilizing a highly abstracted processor development tool chain, students will explore optimizing a 5-stage RISC-V processor core with the addition of multi-stage instructions, hardware loops, L0 caches, and other techniques
**Grading Basis:** Letter Grade

**ECEA 5382 (1) Dsgn Domain-Specifc Arch Proc: Validating Optimized CPUs**
To manage time and risk, the design flow must integrate a verification process for Domain-Specific Processors that have been optimized for embedded signal processing, speech recognition, language translation, image recognition, and Artificial Intelligence. Through the use of integrated verification tools which incorporate Universal Verification Methodology, UVM, the highly abstracted processor development strategy shortens development schedules and reduces risk.
**Grading Basis:** Letter Grade

**ECEA 5385 (1) Industrial IoT Markets and Security**
In Markets and Security, students will learn about markets (Transportation, Agriculture and more), platforms (IBM Watson Cloud services for example), software and services, networking basics, wireless communications protocols and a thorough introduction to computer security.
**Grading Basis:** Letter Grade

**ECEA 5386 (1) Developing Industrial IoT: Proj Planning, Machine Learning**
Products don't design and build themselves. In this course, students learn how to staff, plan and execute a project to build a product. We explore sensors, which produce tremendous volumes of data, and then storage devices and file systems for storing big data. Finally, we study machine learning and big data analytics.
**Grading Basis:** Letter Grade

**ECEA 5387 (1) Developing Industrial IoT: Modeling and Debugging Embed Sys**
In this course, to study hypothetical scenarios, students learn about Digital Twins, using SystemC to model physical systems highly instrumented with sensors and actuators. We also look deeper into the Automotive and Transportation market segment, studying technologies and opportunities in that market space. Students learn techniques for debugging deeply embedded systems, then we examine technical idea promotion within a company, and learning from failures.
**Grading Basis:** Letter Grade

**ECEA 5420 (1) Antennas: Antenna Alphabet**
The Antenna Alphabet course covers fundamental parameters needed to understand the antenna as a circuit and as a space device are discussed. The antenna¿s role in communication, radar, and radiometric systems is also covered. Maxwellian approach to the antenna analysis and some basic theorems conclude this course.
**Grading Basis:** Letter Grade

**ECEA 5421 (1) Antennas: Wire Antennas**
In the Wire Antennas course, Dipole, monopole, loop, Yagi-Uda and helical antennas as well as some derivatives thereof are discussed. Theory of operation, fundamental near- and far-field parameters, impedance matching techniques, and baluns are also considered.
**Grading Basis:** Letter Grade

**ECEA 5422 (1) Antennas: Microstrip, Spiral, Aperture Antennas, and Arrays**
In this course, microstrip patch, horn, reflector, and frequency independent antennas are discussed. Array theory and application to linear, planar and circular arrays are also covered. Computer aided design of several antennas and arrays are included as well.
**Grading Basis:** Letter Grade

**ECEA 5445 (1) Stochastic Env Signal Process: Model-Based Estimation**
This course covers data set organization and manipulation using vectors, matrices, and transforms. Also covered are developing parameter-based models and parameter identification methods for large environmental data sets. Applications and quantitative implementation of a variety of spectral estimation methods are emphasized, along with measurement noise, statistical and sampling error, and noise and error impact in instrument applications and calibration.
**Grading Basis:** Letter Grade

**ECEA 5446 (1) Stochastic Env Signal Process: Statisticl Estimation, Filter**
This course covers optimal linear and nonlinear estimation algorithms suitable for large and small environmental data sets and real-time data streams. Continuous and discrete time and space optimal filtering methods are explored, along with impact of error and data covariance models and matrices. Kalman filtering and Bayesian estimation methods and forecasting and prediction applications using environmental models are also covered.
**Grading Basis:** Letter Grade

**ECEA 5447 (1) Stochastic Env Signal Process: Statistical Detection, Apps**
The Statistical Detection and Advanced Applications course covers the use of signal entropy in estimation theory and applications, as well as developing estimation and detection algorithms using neural nets. Also covered are optimal signal detection algorithms based on a-priori data, the application of supervised and unsupervised learning methods in signal classification, and recognizing advanced applications of environmental signal processing algorithms.
**Grading Basis:** Letter Grade

**ECEA 5450 (1) The Science of Spectrum Access**
This course starts with a discussion on how spectrum systems access the spectrum through data up conversions into the radio frequency (RF) spectrum. The basics of RF engineering, cascading RF components, propagation, and spectrum management are covered to prepare the student how to predict RF link budgets. RF link budgets will give the students an understanding of how wireless signals are transmitted and received and access the precious resource - the electromagnetic spectrum.
**Grading Basis:** Letter Grade

**ECEA 5451 (1) Radio Frequency Engineering**
The second module is a survey of RF engineering, delving into the design of the spectrum dependent systems. Using the design considerations, this course will then apply the designs to their applications and cover the math needed to computer predicted signal powers and signal to noise ratio needed to close a wireless link.
**Grading Basis:** Letter Grade

**ECEA 5452 (1) Signals and Propagation**
This course adds the presence of noise and non-linearities to the link budget calculations. This course will cover the various channel impediments that affect an unguided media and how to help mitigate those impediments.
**Grading Basis:** Letter Grade

**ECEA 5453 (1) The Electromagnetic Spectrum**
This course provides an overview and background of spectrum system fundamentals, concepts and engineering intuition, to provide the foundational basis for professional growth in the spectrum industry. It introduces the electromagnetic (EM) spectrum with an emphasis on the Radio Frequency portion of the EM spectrum. Both active and passive utilization of the Electromagnetic Spectrum are emphasized. Spectrum regulatory agencies and international standards bodies are introduced. RF propagation, antennas, the concept of decibels, and system link budgets are introduced. The OSI and TCP/IP layered models are overviewed, along with an introduction to modern software defined radio architectures, to provide a foundational basis for advanced topics. This course is strongly recommended for all non-technical/non-engineering students to provide the foundational basis for advanced topics and as a comprehensive review including the current state-of-the-art for students with engineering backgrounds.
**Grading Basis:** Letter Grade

**ECEA 5454 (1) Signal Fundamentals**
This course provides an overview and background of spectrum system fundamentals, concepts and engineering intuition, to provide the foundational basis for professional growth in the spectrum industry. It introduces analog and digital signal fundamentals, covers signal representation in both the time and frequency domain, and the transmission properties of different frequencies. The concepts of signal power, noise, interference, receiver sensitivity and frequency filters are covered. Examples are provided using AM, FM, and GPS radio frequency broadcasts to provide intuition and understanding.
**Recommended:** Prerequisite Introduction to Spectrum I.
**Grading Basis:** Letter Grade

**ECEA 5455 (1) Economics, Management and Policy**
This course provides an overview and background of the fundamentals Spectrum Management and Policy and the fundamentals of Spectrum Economics, Markets and Services. This course provides an introductory overview of the key theories, problems and principles that shape current spectrum management law and policy. Students will engage in critical debate of research and regulatory decisions determining how spectrum is allocated to support current and future wireless applications. The course introduces market trends in spectrum wireless telecommunications and the importance of the sector supply and demand, consumer demand analysis and the theory on how consumers value telecom goods and services. The class covers these topics from an interdisciplinary perspective, emphasizing the complex intersection of technology, economics, business, and public policy to achieve efficient implementation of spectrum management principles within the dynamic radio frequency spectrum sector. Recommended prerequisite: Introduction to S
**Grading Basis:** Letter Grade

**ECEA 5456 (1) Radio Services and Broadcast Applications**
Radio Services and Broadcast Applications¿ builds upon ¿Spectrum Engineering Fundamentals¿ to demonstrate applications of spectrum engineering through a survey of the earliest systems accessing the radio spectrum. From the first radio messages across the Atlantic, to radio and TV broadcasts, and land mobile radio applications, the characteristics of broadcast communication and their effect on spectrum use will be covered.
**Grading Basis:** Letter Grade

**ECEA 5457 (1) Mobile Communication: Cellular and Wi-Fi**
Mobile Communication: Cellular and Wi-Fi¿ addresses most recent spectrum system developments. Cellular and Wi-Fi systems have become the prevalent consumer systems accessing the spectrum through a variety of frequencies, modulations, and licensing arrangements. This module starts by detailing cellular communication characteristics, such as power, frequency use, and its evolution to 5G. Next, the inherent characteristics of Wi-Fi communication and similar systems operated without the need for a license are contrasted.
**Grading Basis:** Letter Grade

**ECEA 5458 (1) Radio Determination and Space Applications**
As the final module in the ¿Advanced Spectrum Engineering¿ course, ¿Radio Determination and Space Applications¿ focuses on less noticed spectrum applications, crucial for the functioning of many modern systems. Beginning with radio determination, the differences between active and passive spectrum systems is highlighted. This is followed by the distinction of radio location and radio navigation services, describing applications such as radar, range measurements, GNSS systems, and microwave ovens. The module concludes by moving the distinction between passive and active systems to space, where satellite communication, telemetry, earth observation, meteorological, and radio astronomy services are detailed.
**Grading Basis:** Letter Grade

**ECEA 5459 (1) The Electromagnetic Spectrum**
This first modules serves as an introduction to the value of the electromagnetic spectrum. It begins with a technical tutorial on the physics of spectrum and then how spectrum is divided up into services per band. Concluding with a discussion on the three primary dimensions of spectrum sharing.
**Grading Basis:** Letter Grade

**ECEA 5460 (1) History of Spectrum Management**
This second module reviews the spectrum licensing methods that have been attempted over the years. Topics covered include the first regulatory bodies, the international spectrum concerns, and what issues arose across the various licensing methods.
**Grading Basis:** Letter Grade

**ECEA 5461 (1) Spectrum Sharing**
The final module covers the way spectrum licenses are distributed presently with predictions towards the future. Globally spectrum licenses are being distributed through spectrum auctions while more flexible sharing mechanisms are being investigated and deployed. This module covers advanced sharing techniques while considering the technical and regulatory impediments.
**Grading Basis:** Letter Grade

**ECEA 5462 (1) Consumer Demand and Valuation**
This course uses fundamental economic tools to understand management decisions about consumer demand in telecom markets. The course emphasizes costs, benefits and incentives in understanding consumer behavior and how this behavior affects firms and market performance. The course comprises four parts. Part I introduces supply and demand. Part II examines empirical methods for consumer demand analysis. Part III presents consumer choice theory and Part IV applies the theory to consumer demand for telecom goods and services.
**Grading Basis:** Letter Grade

**ECEA 5463 (1) Firm Supply and the Structure of the Market**
This course uses fundamental economic tools to understand management decisions about firm organization and telecom market structure. The course emphasizes costs, benefits and incentives in understanding the production technology of firms and how this technology affects market performance. The course comprises four parts. Part I introduces production functions. Part II examines the short- and long-run costs of production. Part III describes the organization of the firm and it¿s profit objective and Part IV examines the firm¿s profit objective in a competitive telecom market.
**Grading Basis:** Letter Grade

**ECEA 5464 (1) Optimal Pricing with Market Power**
This course uses fundamental economic tools to understand management decisions about telecom pricing. The course emphasizes costs, benefits and incentives in understanding firm pricing and how these decisons affect market performance. The course comprises four parts. Part I introduces principles of monopoly pricing. Parts I examines pricing with market power. Part III presents theories of oligopoly competition and Part IV examines the role of government when telcom markets fail.
**Grading Basis:** Letter Grade

**ECEA 5600 (1) Optical Engineering: First Order Optical System Design**
This course will introduce first order optical system design, including an introduction to using OpticStudio as a computational design tool.
**Grading Basis:** Letter Grade

**ECEA 5601 (1) Optical Engineering: Optical Efficiency and Resolution**
This course begins with Maxwell¿s equations and introduces the concept of finite sized optics into the design as well as introducing tools to design and analyze systems with many optical elements.
**Grading Basis:** Letter Grade

**ECEA 5602 (1) Optical Engineering: Design High-Performance Optical Systems**
Design low aberration instruments via identification of 3rd order aberrations, calculations of Seidel coefficients, choice of optical layout and numerical optimization. Select and incorporate light sources into designs and calculate radiometric efficiency. Design optical systems to manipulate Gaussian beams.
**Grading Basis:** Letter Grade

**ECEA 5603 (1) Capstone Design Project in Optical System Design**
Learners will design a zoom telephoto camera, including: Paraxial design of zoom and telephoto lens functions; Specification of the imaging chip and aperture stop. Calculation of resolution and radiometric efficiency; Design, analysis and optimization of multi-element lenses. Requires ability to run OpticStudio. Preparation of a report documenting the results.The report will be peer graded.
**Repeatable:** Repeatable for up to 2.00 total credit hours.

**ECEA 5605 (1.2) Active Optical Devices: LEDs and Semiconductor Lasers**
You will learn about semiconductor light emitting diodes (LEDs) and lasers, and the important rules for design. You will do several homework assignments to cement your understanding of the material, as well as answering short questions during the presentation segments. After this course, you will be able to analyze and design semiconductor LED and laser sources.
**Grading Basis:** Letter Grade

**ECEA 5606 (1.2) Active Optical Devices: Nanophotonics and Detectors**
Nanophotonics and Detectors covers the basics of nanophotonic light emitting devices and optical detectors, including metal semiconductor, metal semiconductor insulator, and pn junctions, photoconductors, avalanche photodiodes and photomultiplier tubes.
**Grading Basis:** Letter Grade

**ECEA 5607 (0.6) Active Optical Devices: Displays**
The Displays course will cover the basics of electronic display devices, including liquid crystals, electroluminescent, plasma, organic light emitting diodes, and electrowetting based displays.
**Grading Basis:** Letter Grade

**ECEA 5610 (1.4) Foundations of Quantum Mechanics**
Introduces essential concepts and tools of quantum mechanics to engineering graduate students who may not have undergraduate level quantum mechanics background. Topics to be discussed include the concepts of quantum states, operators and measurements, one-dimensional potential problems, time evolution of quantum systems and ensembles of identical particles.
**Recommended:** Knowledge of undergraduate-level differential equations and linear algebra.
**Grading Basis:** Letter Grade

**ECEA 5611 (0.8) Theory of Angular Momentum**
Introduces the quantum mechanical concept of angular momentum operator and its relationship with rotation operator. It then covers the properties of the angular momentum operators and their eigenvalues and eigenfunctions. Finally, it offers an in-depth discussion on the theory of angular momentum addition.
**Recommended:** Knowledge of undergraduate-level differential equations and linear algebra.
**Grading Basis:** Letter Grade

**ECEA 5612 (0.8) Approximation Methods**
Introduces commonly used approximation methods in quantum mechanics. They include time-independent perturbation theory, time-dependent perturbation theory, tight binding method, variational method and the use of finite basis set. In each case, a specific example is given to clearly show how the method works.
**Recommended:** Knowledge of undergraduate-level differential equations and linear algebra.
**Grading Basis:** Letter Grade

**ECEA 5615 (0.6) Fourier Optics: Fourier Transforms in 1D and 2D**
This course covers the integral definition of Fourier transform and its properties, equivalence of 1-D temporal and spatial Fourier transforms, and Fourier transform pairs as 1-D plots and 2-D images. Emphasis is placed on utilizing Fourier transform pairs and properties to construct complex Fourier transforms in both 1-D and 2-D, and generalizing the Fourier transform to 2-D images and fields.
**Grading Basis:** Letter Grade

**ECEA 5616 (0.8) Fourier Optics: Optical Wave Propagation and Imaging**
This course demonstrates constructing arbitrary solutions to Maxwell's Equation as a superposition of plane waves and wave propagate through space. Learners develop clear intuition for plane wave propagation and Gaussian beams, how to compare, contrast, and analyze coherent and incoherent imaging systems, how to formulate and visualize a wave theory of aberrations, and applying numerical techniques to optical beam propagation.
**Grading Basis:** Letter Grade

**ECEA 5617 (0.8) Fourier Optics: Numerical Techniques in Wave Optics**
Numerical Techniques in Wave Optics explores the algorithmic efficiency of the FFT, how the FFT simplifies the calculation of optical beam propagation, and aberrations as just polynomial deformations of wavefronts.
**Grading Basis:** Letter Grade

**ECEA 5618 (0.8) Fourier Optics: Holography, Optical Information Processing**
In Holography and Optical Information Processing, we study using optical correlations for pattern recognition, and show how to invent holographic systems to record and transform optical fields. We extend ideas of holography to computer generated and digital holography, and further generalize the Fourier approach to broadband femtosecond fields. Finally, we use Fourier decomposition to invent and evaluate novel optical systems.
**Grading Basis:** Letter Grade

**ECEA 5630 (1) Semiconductor Devices: Semiconductor Physics**
Semiconductor Physics introduces the basic concepts in quantum theory of solids and presents the theory describing the carrier behaviors in semiconductors.
**Grading Basis:** Letter Grade

**ECEA 5631 (1) Semiconductor Devices: Diode: pn junction and metal semiconductor contact**
Presents in-depth discussion on pn junction and metal-semiconductor contact including the equilibrium behavior, current and capacitance responses under bias, breakdown, non-rectifying behavior and surface effect.
**Grading Basis:** Letter Grade

**ECEA 5632 (1) Semiconductor Devices: Transistor: Field Effect Transistor and Bipolar Junction Transistor**
Presents in-depth discussion on metal-oxide-semiconductor field effect transistor (MOSFET) and bipolar junction transistor (BJT) including the equilibrium characteristics, modes of operation, switching and current amplifying behaviors.
**Grading Basis:** Letter Grade

**ECEA 5700 (0.8) Power Electronics: Introduction to Power Electronics**
Introduces the basic concepts of switched-mode converter circuits for controlling and converting electrical power with high efficiency. Principles of converter circuit analysis are introduced and developed for finding steady-state voltages, current, and efficiency of power converters. Assignments include a dc-dc converter simulation, inverting dc-dc converter analysis, and modeling of an electric vehicle system and a USB power regulator.
**Grading Basis:** Letter Grade

**ECEA 5701 (1) Power Electronics: Converter Circuits**
Introduces more advanced switched-mode converter concepts. Realization of power semiconductors in inverters or in converters having bidirectional power flow is explained. Power diodes, power MOSFETs, and IGBTs are explained, including their switching time origins. Equivalent circuit models are refined to include the effects of switching loss. Several well-known converter circuit topologies are explored, including those with transformer isolation.
**Grading Basis:** Letter Grade

**ECEA 5702 (1.2) Power Electronics: Converter Control**
This course teaches feedback system design to control a switching converter. Equivalent circuit models derived in previous courses are extended to model small-signal ac variations. These models are then solved for important converter transfer functions and regulator system. Finally, the feedback loop is modeled and designed to meet requirements such as output regulation, bandwidth and transient response, and disturbance rejection.
**Grading Basis:** Letter Grade

**ECEA 5703 (1) Power Electronics: Magnetics Design**
Covers magnetic component analysis and design, including inductors and transformers in power electronic converters. First introduced are inductor and transformer physical principles, including concepts of inductance, core material saturation, inductors airgap and energy storage, reluctance and magnetic circuit modeling, transformer-equivalent circuits, magnetizing and leakage inductance. Multi-winding transformer model details are covered, plus optimizing inductors in switched-mode power converters.
**Grading Basis:** Letter Grade

**ECEA 5705 (0.8) Modeling, Control of Power Elec: Avged-Sw Modeling and Sim**
Focuses on practical design-oriented modeling and control of pulse-width modulated switched-mode power converters using analytical and simulation tools in time and frequency domains. A design-oriented analysis technique, the Middlebrook's feedback theorem, is introduced and applied to analysis and design of voltage regulators and other feedback circuits. Furthermore, circuit averaging and averaged-switch modeling techniques are also covered in detail.
**Grading Basis:** Letter Grade

**ECEA 5706 (0.6) Modeling, Control of Power Elec: Tech Dsgn-Oriented Analysis**
Focuses on two techniques of design-oriented analysis, Middlebrook's extra-element theorem (EET), and n-extra-element theorem (NEET). It is shown how EET simplifies circuit analysis and design, provides insights into effects of circuit elements initially neglected, and to formulate design approaches. NEET allows designers to easily derive complex transfer functions in circuits such as converter filters and averaged circuit models.
**Grading Basis:** Letter Grade

**ECEA 5707 (0.6) Modeling, Control of Power Elec: Input Filter Design**
To meet electromagnetic interference (EMI) requirements and mitigate effects of switching noise, switching power converters often require input filters. Using extra-element theorem, it is shown how adding an input filter may compromise system stability, and impedance criteria are formulated to mitigate system stability issues. Input filter design techniques are developed for single-stage and multi-stage filters to meet several design criteria.
**Grading Basis:** Letter Grade

**ECEA 5708 (1.2) Modeling, Control of Power Elec: Current-mode Control**
Control loops around switch-mode power converters are often based on current-mode control techniques. This course is focuses on analysis, modeling and design of current programmed mode or peak current mode (PCM) control, as well as average current mode (ACM) control. Sampling effects and compensation ramp concepts are introduced. Averaged dynamic models and transfer functions of PCM-controlled converters are developed.
**Grading Basis:** Letter Grade

**ECEA 5709 (0.6) Modeling, Control of Power Elec: Mod/Ctrl 1-Phase Rect/Inv**
Covers pulse-width modulated (PWM) converters connected to the single-phase ac power grid. Harmonic standards and the need for power factor correction are discussed. Modeling and control techniques for PWM rectifiers include design of input current control and output voltage control. Modeling and control of single-phase inverters are introduced in the context of a solar photovoltaic power system.
**Grading Basis:** Letter Grade

**ECEA 5715 (1.2) Power Electronics Capstone Project**
A design project that applies the material of courses ECEA 5700, 5701, 5702, 5703, and 5705 to design and verify a bidirectional dc-dc converter and its controller, to interface a lithium-polymer battery to a USB-C device. Three milestones demonstrate: design and steady-state operation of converter power stage, averaged modeling and design of converter controller, and closed-loop transient response and regulation.
**Grading Basis:** Letter Grade

**ECEA 5716 (1) Open-Loop Photovoltaic Power Electronics Laboratory**
Design, construct, and demonstrate an open-loop PV power electronics system in which a dc-dc switching converter interfaces a PV panel to a deep-discharge 12 V battery. The project includes testing and modeling of the PV panel, design and testing of the dc-dc converter and its magnetics, and use of a modern microcontroller to drive the power MOSFET.
**Recommended:** Prerequisites ECEA 5700, ECEA 5701, and ECEA 5703.
**Grading Basis:** Letter Grade

**ECEA 5717 (1) Closed-Loop Photovoltaic Power Electronics Laboratory**
Develop a digital controller to regulate the output voltage of the dc-dc SEPIC constructed in ECEA 5716. Modeling and measurement of the small-signal control-to-output transfer function, damping of the SEPIC internal resonance as necessary, design and implementation of a digital compensator, and demonstration of closed-loop performance.
**Recommended:** Prerequisites ECEA 5702 and ECEA 5716.
**Grading Basis:** Letter Grade

**ECEA 5718 (1) Photovoltaic Power Electronics Battery Management Laboratory**
Complete the photovoltaic power system of ECEA 5716-5718. Implement maximum power point tracking, charge taper, and float modes via digital control and current sensing circuitry.
**Recommended:** Prerequisites ECEA 5716 and ECEA 5717.
**Grading Basis:** Letter Grade

**ECEA 5721 (0.6) Introduction to Power Switches**
Power Semiconductor devices that are commonly used in power electronic circuits. Starting with the circuit models of these devices, we will identify the requirements leading to low loss circuits and learn how these can be simulated and analyzed in basic switching circuits. Department Enforced Prerequisite: Undergraduate active circuit knowledge and first exposure to SPICE.
**Recommended:** Prerequisite ECEA 5797.
**Grading Basis:** Letter Grade

**ECEA 5722 (1.2) High-Voltage p-n and Schottky Diodes**
Introducing the semiconductor physics background needed to understand the operation of high voltage p-n and Schottky diodes, the analysis of the electrostatic behavior of the diode, the diode current, and the circuit model for the diode. The course also includes a discussion of super junctions and high voltage termination structures. Department Enforced prerequisites: Knowledge of undergraduate physics including Ohm¿s and Gauss¿s law.
**Recommended:** Prerequisites ECEA 5797 and ECEA 5721.
**Grading Basis:** Letter Grade

**ECEA 5723 (1.2) MOSFETs, IGBTs and more**
Introducing active switches, gated semiconductor devices that can open or close a circuit. Included are MOSFETs, BJTs, and IGBTs as well as emerging devices such as GaN HEMTs and latching devices such as thyristors and TRIACs. The course concludes with the analysis of power modules, and device comparisons through modeling and simulation.
**Recommended:** Prerequisites ECEA 5797, ECEA 5721 and ECEA 5722.
**Grading Basis:** Letter Grade

**ECEA 5724 (0.6) Power Device Fabrication**
Introducing the fabrication of power devices, starting with the IC fabrication of power devices from a wafer to a packaged device. Included is an analysis of the needed high voltage termination structures, the influence of packaging parasitics and the thermal management.
**Recommended:** Prerequisites ECEA 5797, ECEA 5722 and ECEA 5723.
**Grading Basis:** Letter Grade

**ECEA 5730 (0.8) Introduction to Battery-Management Systems**
Introduces the need for and functional requirements placed on battery-management systems (BMS) for high-capacity lithium-ion battery packs. Overviews BMS hardware requirements and previews BMS algorithm requirements. Gives tutorial introduction to battery terminology, basic principles of battery operation, battery manufacture, and battery failure modes.
**Grading Basis:** Letter Grade

**ECEA 5731 (0.8) Equivalent-Circuit Cell-Model Simulation**
Motivates the need for mathematical models of lithium-ion cell dynamics and derives a progression of equivalent-circuit cell models of increasing fidelity. Shows how to regress laboratory data collected from physical cells to determine parameter values. Extends the single-cell model to describe battery packs and to show how to co-simulate a simplified battery and battery load. Concludes with a capstone project.

**ECEA 5732 (1) Battery State-of-Charge (SOC) Estimation**
Introduces physical significance of battery-cell state-of-charge (SOC) and the need for high-fidelity SOC estimates in a BMS. Derives linear and nonlinear Kalman filters (including extended Kalman filter and sigma-point/unscented Kalman filter) and applies them to estimate the states corresponding to a cell model, including SOC. Shows how to generalize efficiently to battery-pack state estimation. Concludes with a capstone project.

**ECEA 5733 (0.8) Battery State-of-Health (SOH) Estimation**
Introduces the concept of battery-cell health and the physical mechanisms by which lithium-ion cell health degrades. Introduces simple methods to estimate cell health and their limitations. Derives a progression of total-least-squares methods for total-capacity estimation, resulting in optimal and near-optimal estimates. Also applies Kalman-filter theory for this same purpose. Concludes with a capstone project.

**ECEA 5734 (0.8) Battery-Pack Balancing and Power Estimation**
Illustrates the need for balancing individual cell states-of-charge in a battery pack and presents electronics topologies and algorithm-design choices for bringing a battery pack into balance. Extends simplified power-limits methods from ECEA 5730 to give better estimates under dynamic loads using comprehensive cell model. Posits future directions for BMS algorithm research and development. Concludes with a capstone project.

**ECEA 5740 (1) Analog IC Design: Op-amp Basics and Design of One-Stage Amp**
The Op-amp Basics and Design of One-Stage Amplifier course first covers imperfections of amplifier and reasons behind them, then introduces learners to the most fundamental analog circuit, a simple one-stage amplifier in transistor level design. Methods of circuit analysis and design used in this basic course will be the basis for many other more complex circuits in the series.
**Grading Basis:** Letter Grade

**ECEA 5741 (1) Analog IC Design: Two-Stage Amplifier Design**
Two-Stage Amplifier Design covers two-stage amplifier circuit design based on given low-frequency specifications. Learners will have opportunity to practice skills learned in the previous course on a more complex circuit.
**Grading Basis:** Letter Grade

**ECEA 5742 (1.2) Analog IC Design: Frequency Response, Feedback, Compensation**
In the Frequency Response, Feedback and Compensation course, learners will be provided technical skills around inspecting and analyzing the frequency responses of several CMOS amplifier circuits, then apply results in a feedback system and analyze its stability, and also apply compensation techniques for two-stage amplifier.
**Grading Basis:** Letter Grade

**ECEA 5800 (1) Control Systems Analysis: Modeling of Dynamic Systems**
Covers differential equation derivation to model systems, solving these equations through Laplace transforms to determine transfer functions for simple mechanical, electrical, and electromechanical systems. We will analyze 1st and 2nd-order system dynamic responses, and explore approximating higher-order systems with 1st to 3rd-order systems. Also covered, Bounded-Input Bounded-Output (BIBO) stability, plus designing and evaluating proportional, integral, and derivative controllers.
**Grading Basis:** Letter Grade

**ECEA 5801 (1) Feedback Control and Root Locus Design**
In this course, we will sketch root loci following basic root locus plotting rules, analyze common features in root locus plots, and extract the overall control gain at a desirable closed-loop pole location. We will use Bode plots to design controllers and determine system stability, and also design PD, Lead, PI, Lag, PID, and Lead-Lag compensators.
**Grading Basis:** Letter Grade

**ECEA 5802 (1) Frequency-Domain and State-Space Design**
In this course, we will cover state-space equations and their relationship to transfer function representations of systems. We will design a full-state feedback control law and introduce a reference input to the state feedback system. Finally, we will design an estimator for a system and explore the concept of duality and how estimator design is related to control-law design.
**Grading Basis:** Letter Grade

**ECEA 5838 (1) Nonlinear Dynamics**
This course introduces the mathematical tools for analyzing nonlinear differential equations, focusing on behaviors such as equilibria, periodic orbits, and chaos. Students will learn to perform phase plane analysis, assess the existence and uniqueness of solutions, and simulate nonlinear systems using numerical methods. Emphasis is placed on understanding two-dimensional system dynamics, providing a foundation for interpreting and predicting the behavior of nonlinear dynamical systems.
**Grading Basis:** Letter Grade

**ECEA 5839 (1) Nonlinear Stability**
This course introduces the fundamental concepts of stability in nonlinear systems, focusing on Lyapunov stability, Krasovskii-LaSalle principles, and passivity. Students will learn to analyze invariant set stability using Lyapunov methods, identify passive systems, and evaluate input-to-output stability. Topics include input-to-state stability and the small-gain theorem, with an emphasis on both theoretical frameworks and practical applications for nonlinear stability analysis.
**Grading Basis:** Letter Grade

**ECEA 5840 (1) Nonlinear Control**
This course builds on nonlinear stability concepts to explore the design of control strategies for nonlinear systems. Topics include linearization, feedback linearization, control Lyapunov functions, backstepping, and passivity-based control. Students will learn to identify suitable control approaches and design feedback controllers tailored to specific nonlinear systems. The course also introduces hierarchical control methods, providing a comprehensive foundation for advanced nonlinear control design.
**Grading Basis:** Letter Grade

**ECEA 5850 (0.8) Kalman-Filter Boot Camp and State-Estimation Application**
Introduces the Kalman filter as a method that can solve problems related to estimating the hidden internal state of a dynamic system. Develops the background theoretical topics in state-space models and stochastic systems. Presents the steps of the linear Kalman filter and shows how to implement these steps in Octave code and how to evaluate the filter¿s output.
**Grading Basis:** Letter Grade

**ECEA 5851 (0.8) Linear Kalman Filter Deep Dive and Target Tracking**
As a follow-on course to "Kalman Filter Boot Camp", this course derives the steps of the linear Kalman filter to give understanding regarding how to adjust the method to applications that violate the standard assumptions. Applies this understanding to enhancing the robustness of the filter and to extend to applications including prediction and smoothing. Shows how to implement a target-tracking application in Octave code using an interacting multiple-model Kalman filter.
**Grading Basis:** Letter Grade

**ECEA 5852 (0.8) Nonlinear Kalman Filters and Parameter Estimation**
As a follow-on course to "Linear Kalman Filter Deep Dive", this course derives the steps of the extended Kalman filter and the sigma-point Kalman filter for estimating the state of nonlinear dynamic systems. You will learn how to implement these filters in Octave code and compare their results. You will be introduced to adaptive methods to tune Kalman-filter noise-uncertainty covariances online. You will learn how to estimate the parameters of a state-space model using nonlinear Kalman filters.
**Grading Basis:** Letter Grade

**ECEA 5853 (0.8) Particle Filters and Navigation**
As the final course in the Applied Kalman Filtering specialization, you will learn how to develop the particle filter for solving strongly nonlinear state-estimation problems. You will learn about the Monte-Carlo integration and the importance density. You will see how to derive the sequential importance sampling method to estimate the posterior probability density function of a system¿s state. You will encounter the degeneracy problem for this method and learn how to solve it via resampling. You will learn how to implement a robust particle-filter in Octave code and will apply it to an indoor-navigation problem.
**Grading Basis:** Letter Grade

**ECEA 5900 (1) Introduction to Modeling for Formal Verification**
This course introduces the basic concepts of functional verification and model checking, highlighting their importance in modern system designs. It explains different modeling formalisms for representing the behavior of hardware and software, which are either suitable for automated analysis or can represent data-dependent controls that are common in computing system designs. Additionally, it describes system compositions with respect to different communication models
**Grading Basis:** Letter Grade

**ECEA 5901 (1) Temporal Logic Model Checking**
This course introduces two temporal logics, linear time logic (LTL) and computation tree logic (CTL) for formally specifying desired properties of computing systems. It then introduces graph-based algorithms to decide the truth of properties specified in these logics against transition system models of target systems under verification. To improve the scalability of model checking to handle large and complex verification problems, symbolic model checking methods for CTL properties will be covered. This involves formulation of CTL model checking problems as Boolean logic operations, and introduction of ordered binary decision diagrams (OBDDs) as a method to efficiently support these Boolean operations.
**Grading Basis:** Letter Grade

**ECEA 5902 (1) Model Checking with SAT and SMT**
This course introduces the fundamentals of model checking with a focus on SAT (Propositional Satisfiability) and SMT (Satisfiability Modulo Theories). You will learn key techniques for verifying systems, including conflict-driven clause learning (CDCL), proof methods, and theory-specific solvers. Topics cover translating Boolean circuits to CNF, bounded and unbounded model checking, and advanced techniques like interpolation. Ideal for those seeking to understand and apply model checking methods in practical scenarios.
**Grading Basis:** Letter Grade

**ECEA 5903 (1) Safety Verification Using Invariants**
This course introduces the fundamentals of invariant-based safety specifications and automated verification techniques. Students will learn, through representative examples, safety design requirement specification using invariants, and basic techniques to strengthen them to enable correctness proofs through induction. Students will also learn formal modeling and deductive verification techniques for reasoning about the correctness of concurrent system design. In addition, this course introduces the state-of-the-art safety invariant checking technique, namely, Incremental Construction of Inductive Clauses for Indubitable Correctness (IC3), also called Property Directed Reachability (PDR).
**Grading Basis:** Letter Grade

**ECEA 5910 (1) Stochastic Simulation**
This course covers methods to estimate quantitative properties of random processes using Markov Chain models. Both continuous-time and discrete-time models are examined. Special attention is given to ¿fast¿ simulation of rare events using importance sampling and related techniques. Advantages and hazards of importance sampling are investigated. Methods are applied to example problems in biochemical reaction networks.
**Grading Basis:** Letter Grade

**ECEA 5911 (1) Formal Verification of Probabilistic Systems**
This course introduces the fundamentals of formal modeling and verification of systems that exhibit probabilistic behavior. Probabilistic modeling formalisms include discrete-time Markov chain (DTMC), continuous-time Markov chain (CTMC), and Markov decision process (MDP). This course also introduces multiple probabilistic temporal logic formalisms for system-design requirement specification. Probabilistic verification focuses on probabilistic model checking techniques for transient and steady-state analysis of the stated probabilistic modeling formalisms. In addition, this course introduces the PRISM probabilistic modeling language and probabilistic model checking tools.
**Grading Basis:** Letter Grade

**ECEA 5912 (1) Formal Verification of Timed Systems**
Safety critical systems often include hard real-time constraints that must be met for proper operation. This course introduces methods to model the timing behavior of these systems and to specify properties that these systems are expected to satisfy. This course will then introduce methods to verify these timing properties are satisfied using a technique called timed system model checking. The core aspect of these methods that is unique from other model checking methods is the requirement to effectively and efficiently represent time. Therefore, this course will introduce symbolic methods that can be utilized during state reachability analysis. Next, this course will introduce an alternative model for representing timed systems called timed Petri nets. Finally, this course will conclude with advanced topics in timing verification that will highlight various improvements and optimizations that can improve the efficiency of timing verification.
**Grading Basis:** Letter Grade

**ECEA 5913 (1) Formal Verification of Hybrid Systems**
Safety critical systems often include both continuous and discrete (hybrid) dynamical behavior. This course introduces methods to model hybrid dynamical behavior inherent in these systems and to specify properties that these systems are expected to satisfy. This course will then introduce methods to verify these hybrid properties are satisfied using a technique called hybrid system model checking. The core aspect of these methods that is unique from other model checking methods is the requirement to effectively and efficiently represent continuous behavior. Therefore, this course will introduce symbolic methods that can be utilized during state reachability analysis. Next, this course will introduce an alternative model for representing hybrid systems called hybrid Petri nets. Finally, this course will conclude with advanced topics in hybrid system verification that will highlight various improvements and optimizations that can improve the efficiency of hybrid system verification.
**Grading Basis:** Letter Grade

**ECEA 5934 (1) Engineering Genetic Circuits: Design**
Gives an introduction to the biology and biochemistry necessary to understand genetic circuits. It starts by providing an engineering viewpoint on genetic circuit design and a review of cells and their structure. The second module introduces genetic parts and the importance of standards followed by a discussion of genetic devices used within circuit design. The last two modules cover experimental techniques and construction methods and principles applied during the design process.
**Grading Basis:** Letter Grade

**ECEA 5935 (1) Engineering Genetic Circuits: Modeling and Analysis**
Covers mathematical models and analysis methods used to describe genetic circuits in the field of synthetic biology. The first module introduces modeling methods and standards for modeling. The following three modules cover different methods for the simulation of models to predict a genetic circuit's behavior in silico. Methods covered include ordinary differential equation analysis and stochastic analysis. The course ends with an introduction to genetic circuit technology mapping, the process of assigning physical biological parts to implement the functional design specification.
**Grading Basis:** Letter Grade

**ECEA 5936 (1) Engineering Genetic Circuits: Abstraction Methods**
Given the substantial computational requirements for simulation of even modest size genetic circuits, model abstraction is essential. To reduce the cost of simulation, this course first describes methods to simplify the original reaction-based model by applying several reaction-based abstractions. Second, this course introduces state-based (logical) abstraction methods and analysis techniques that have commonly been applied to electronic circuits.
**Grading Basis:** Letter Grade

# Energy Engineering (ENEN)

## Courses

**ENEN 2820 (1-6) Special Topics**
Explores topics related to energy engineering. Content will vary by semester and instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENEN 4321 (3) Oil and Gas Processing**
Provides a foundation in the fundamentals of oil and gas processing, including discovery, extraction and refining. Due to the importance of oil and gas in the current energy infrastructure, this course provides a broad understanding of the industry to students interested in energy engineering.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**ENEN 4600 (3) Interdisciplinary Energy Engineering Projects**
Prepares students to analyze energy systems from technical, economic, and policy perspectives with project topics varying by semester. Provides historical and contemporary context of the energy landscape. Emphasizes application of engineering fundamentals for the design and evaluation of real world energy systems. Projects will be completed by working in interdisciplinary teams.
**Requisites:** Restricted to Energy Engineering Minor (ENMR-MIN) students with 87-180 credits (Seniors).

**ENEN 4840 (1-6) Special Topics**
Explores topics related to energy engineering. Content will vary by semester and instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENEN 5840 (1-6) Special Topics**
Explores topics related to energy engineering. Content will vary by semester and instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Engineering graduate students only.

# Engineering for Developing Communities (EDEN)

## Courses

**EDEN 4147 (3) A Systems Approach to Global Engineering**
Introduces engineering students to the global context in which engineers are asked to operate in the 21st century using system dynamics tools and other decision-making tools (network analysis, agent based modeling, etc.) necessary to analyze the uncertainty and complexity inherent in global projects.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4157, CVEN 5157 and EDEN 5147

**EDEN 5001 (1-3) Special Topics in Global Engineering**
At the graduate level, covers topics of interest in global engineering. Content varies by section and from semester to semester.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.

**EDEN 5147 (3) A Systems Approach to Global Engineering**
Introduces engineering students to the global context in which engineers are asked to operate in the 21st century using system dynamics tools and other decision-making tools (network analysis, agent based modeling, etc.) necessary to analyze the uncertainty and complexity inherent in global projects.
**Equivalent - Duplicate Degree Credit Not Granted:** EDEN 4147, CVEN 4157 and CVEN 5157

# Engineering Honors (EHON)

## Courses

**EHON 1151 (3) Critical Encounters**
Explores critical, literary and philosophical approaches to the following related problems: 1) how we organize knowledge and construct meaning, and 2) how we locate a sense of self as both individuals and members of various groups amidst the resources and demands of competing interpretations, traditions challenges and circumstances. Department restriction, honors standing or instructor consent required.
**Requisites:** Restricted to Engineering Honors Program (PEHN) students only.

**EHON 1500 (1) Honors Reading Group**
Faculty led reading seminars, focusing on specific test or texts chosen by the faculty. Special attention will be paid to group formation and the process of collaborative learning.
**Requisites:** Restricted to Engineering Honors Program (PEHN) students only.
**Additional Information:** Engineering Honors Course

**EHON 3843 (3) Special Topics**
Explores different important themes relative to the Engineering Honors Program. Check with department for specific semester topics.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Engineering Honors Program (PEHN) students only.
**Additional Information:** Engineering Honors Course

**EHON 4051 (1) Dimensions of Leadership**
Explores the many dimensions of leadership that exceed technical knowledge: the ethical, societal, cultural, interpersonal, and personal. Through seminars, workshops and exposure to leaders, students will reflect upon their engineering education in light of the multifaceted demands of effective leadership and their own personal career goals. Students will take an active role in shaping the course. Department restriction, honors standing or instructor consent required.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**EHON 4151 (3) Critical Encounters 2**
Fosters critical reflection on students¿ college experience and rigorous philosophical analysis of personal and professional goals after graduation. Critical Encounters 2 uses literature and philosophy to look both backwards and forwards at the following questions: Who am I and who do I want to be? How do I intentionally cultivate personal and professional values? How am I shaped by tradition and culture? How can I actively shape various cultures to which I belong?
**Requisites:** Requires prerequisite course of EHON 1151 (minimum grade D-). Restricted to Engineering Honors (PEHN) students only. Restricted to Seniors only.

# Engineering Leadership Program (ENLP)

## Courses

**ENLP 2000 (3) Leadership, Fame and Failure**
Examines the ambition, moral character, prudence and grit required for effective leadership. Common causes of leadership failure are also considered. A wide variety of ancient and modern leaders are studied in the disciplines of science and technology, politics, business and military affairs using primary source readings in history, philosophy and literature. Also explores whether leadership is a teachable art.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) College of Engineering majors only.

**ENLP 3000 (3) Intelligent Leadership**
Investigates what it means to be a "smart" leader. In small, discussion-based classes, explores science fiction texts and social science research that generate fundamental questions about the dimensions, manifestations and value of intelligence in contexts related to leadership. Students explore social science research about how course themes are reflected in present-day, "real-life" technologies, policies and cultural phenomena.
**Requisites:** Restricted to College of Engineering undergraduate students only.

**ENLP 3052 (2) Leadership Seminar 2: Leadership Experience**
Tackling a leadership experience of their own design, students undertake a key component of the Engineering Leadership Program experience and a requirement for the completion of the Engineering Leadership Certificate. Guides students through a process of planning, executing and evaluating their leadership experience and progress toward personalized leadership development goals. Coursework involves working with a mentor, collaborating with peers and conducting research. Formerly COEN 3052.
**Requisites:** Requires a prerequisite course of COEN 2050 (minimum grade D-). Restricted to Engineering Leadership Program (PENL) students only.

**ENLP 3060 (3) Our Sustainable Future CU-in-DC Seminar**
Taught in Washington, D.C., this seminar combines traditional classroom learning with diverse site visits with sustainability practitioners, analysts, regulators, and business and community leaders. Students will engage complex and interdependent problems of regional and global sustainability, they will critically explore what role business and science should have in creating environmental policies, and they will learn how stakeholders across the private, non-profit, and public sectors can work collaboratively to achieve a more socially-equitable and environmentally-sustainable world.
**Equivalent - Duplicate Degree Credit Not Granted:** CESR 3060
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Recommended:** preference will be given to Engineering and Business majors.

**ENLP 3100 (3-4) Complex Leadership Challenges**
Approaches leadership as a process of inquiry, empathy, and action, cultivating skills leaders need to understand, communicate about, and generate innovative approaches to complex issues. Each student conducts extensive, principled research about a complex social issue of their choice, investigating its multidimensionality by applying different analytic lenses. Instructor consent required for students not in Engineering Leadership. Formerly COEN 3050.
**Requisites:** Requires prerequisite course of ENLP 2000 or ENLP 3000 (minimum grade C).

**ENLP 3843 (3) Special Topics**
Explores different important themes in leadership; check with department for specific semester topics.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students in College of Engineering and Applied Science (ENGR) only.

**ENLP 4000 (3) The Empire of Modern Science**
Examines science and technology's rise to the status of political, cultural and economic leader of the modern world. Also considers the ambitions and limits of the modern scientific enterprise, and investigates whether scientists are adequately equipped to lead humanity's political, spiritual and evolutionary future. Readings are drawn from primary sources in history, economics politics, philosophy and literature. Recommended restriction: this course is recommended for Sophomores, Juniors, and Seniors.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Recommended:** Prerequisite ENLP 2000 or ENLP 3000.

# Engineering Management (EMEN)

## Courses

**EMEN 3100 (3) Introduction to Engineering Management**
Examines topics important to the management of engineering activities within organizations. Topics include the relationship of engineering to business and management disciplines, the functions of an engineering manager, principles and techniques for managing financial resource and business ownership. Explores best practices in global engineering management, process management, legal issues, ethics, organizational behavior and communications.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) College of Engineering students only.

**EMEN 4030 (3) Project Management Systems**
A practical approach is used to help students learn about project management to help develop the skills needed to be successful in this dynamic profession. This course is designed for students with various experience levels and provides lessons learned examples from real-world projects in different industries. The course covers project management in both theory and practice by introducing globally recognized processes, tools, techniques, and methods used to effectively manage projects through their life cycle.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4050 (3) Leadership and Professional Skills**
Accelerate your personal and professional growth with the essential skills required to become an effective leader/manager. Conduct personal development through exercises in communication and leadership effectiveness. Explore leadership styles, managing commitments, change management, negotiation, conflict resolution, organizational culture, emotional intelligence, team dynamics and business ethics.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4055 (3) Designing for Diversity, Equity and Inclusion in Engineering**
Students will focus on the historical narrative of institutions and structures that have shaped instances of inclusion and exclusion in engineering, how their own identity and background shape their thoughts and actions, how transformational leadership is enacted for diversity, equity, and inclusion (DEI), and how involving DEI in the strategic planning process of designing can create additional innovations and opportunities.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**EMEN 4100 (3) Engineering Economics**
Introduces engineering cost concepts, financial statements and the corporate economic environment. Includes concepts and methods of analysis of the time value of money, project cost estimation, cash flow analysis, replacement analysis, risk management and financial case statements.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4110 (3) Supply Chain Management**
Explores the key issues related to the design and management of supply chains. Covers the efficient integration of suppliers, production facilities, warehouses, and stores so that the right products in the right quantity reach customers at the right time. Focuses on the minimization of the total supply chair cost subject to service requirements imposed by a variety of industries.
**Equivalent - Duplicate Degree Credit Not Granted:** MGMT 4110
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4120 (3) Managing Business Processes**
Covers the concepts and tools to design and manage business processes. Emphasizes modeling an analysis, information technology support for process activities, and management of process flows. Graphical simulation software is used to create dynamic models of business processes and predict the effect of changes. Prepares students for a strong management or consulting career path in business processes.
**Equivalent - Duplicate Degree Credit Not Granted:** MGMT 4120 and MGMT 5120
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4200 (3) Engineering and Entrepreneurship for the Developing World**
Use your engineering and problem solving skills, combined with market/industry research, customer interviews, design for manufacturability, stakeholder management and financial modeling to promote entrepreneurship and sustainable change in the developing world. Explore alternative energy, medical devices, phones, internet, recycling, cook stoves, clean water, sanitation and infrastructure.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4400 (3) Quality Management**
Examine the concepts, tools, and techniques used in managing and measuring quality and productivity in business. Topics include foundational concepts of quality, customers, the workforce, and processes. Apply the tools and techniques associated with the quality sciences, including statistical methods, design quality, measurement, control, process improvement, six sigma. Discover the basics of performance excellence management, Baldrige Award criteria, strategic planning, leadership, and daily management. Specific examples, case studies from modern companies will be studied.
**Equivalent - Duplicate Degree Credit Not Granted:** MGMT 4400
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4405 (3) Systems Engineering**
Examines the disciplined process of designing a complex system to meet a specified customer need. We begin with identifying the needed capability through operational and functional analysis, then progress through defining requirements that articulate operational and environmental capabilities that address reliability, maintainability, and producibility considerations across the system lifecycle. The course also introduces technical management tasks to include risk management, technology readiness assessment, and program controls using real-world, current aerospace industry examples.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4800 (3) Entrepreneurship and Marketing**
Offers an in-depth exploration of entrepreneurship through the lens of "The Lean Startup" methodology. You'll gain a comprehensive understanding of key startup concepts like Minimum Viable Product (MVP), venture capital, and the dynamics of early-stage companies. The curriculum combines lectures, workshops, and hands-on projects to equip you with the critical thinking skills and practical experience needed to identify and seize business opportunities in the world. Guest speakers from leading companies will occasionally enrich the classroom, providing industry insights.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4820 (3) Entrepreneurial Product Development**
Organizations are increasingly looking for employees with training and experience in design thinking and innovation. This course will look at product development through a design thinking lens. In addition, this course will be teamwork-oriented, but you will also complete readings and independent activities that will support the group work and ensure your depth of knowledge.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4825 (3) New Venture Creation**
Relevant to students seeking to acquire an entrepreneurial toolkit of knowledge and skills for working in the startup world or launching a new venture. Covers the techniques for evaluating the probability of success for a new venture and develops a methodology for entrepreneurial thinking that provides benefits for big and small ventures. The final deliverable is a professional pitch to a group of seasoned investors and the submission of a complete business plan.
**Equivalent - Duplicate Degree Credit Not Granted:** ESBM 4830
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4830 (1-3) Special Topics**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**EMEN 4840 (1-3) Independent Study Project**
Available only through approval of Engineering Management Program. Subjects arranged to fit the needs of the particular student.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**EMEN 4850 (3) Entrepreneurial Leadership**
Investigate the importance of entrepreneurship, value creation, and the entrepreneurial leader's role in driving innovation and growth. Explore and discuss building a culture of practical, ethical, and empowered leaders, developing a shared purpose, understanding the meaning of values in an organizational setting, and identifying potential negative issues in different roles within an entrepreneurial team. Essential skills learned will facilitate the development of capabilities to adapt leadership approaches/practices in various business and organizational contexts.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**EMEN 4875 (3) Entrepreneurial Finance**
Teaches the importance of company formation, what metrics are important to investors, types of investments and their pros and cons, company valuation as well as when and how to fundraise.

**EMEN 5005 (3) Introduction to Applied Statistical Methods**
Covers statistical reasoning and analysis in support of business and engineering decision making. Topics include: engineering and applied research, descriptive and inferential statistics to include estimation and hypothesis testing using both traditional parametric as well as nonparametric procedures for research situations involving one or two groups of treatment conditions. The R statistical analysis and programming system is used.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5015 (3) Engineering Communication**
Enables students to communicate their thoughts and ideas in written and oral form in professional environments. Understand and demonstrate the ability to write a correctly-formed document. Develop active listening skills, particularly when providing and receiving feedback. Learn to orally communicate ideas by speaking clearly, persuasively, energetically, and with appropriate non-verbal elements. Present in various environments and to various audiences.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5020 (3) Finance for Engineering Managers**
This course empowers technical managers to make better financial management decisions about issues like capital budgeting, project selection, financial planning, and working capital management. The course also covers topics essential to engineering managers communicating outside of engineering, including interpreting financial statements, the time value of money, and determining financial metrics of NPV and IRR in project valuation. Special topics covered include triple bottom line accounting and sustainability reporting as part of corporate risk management initiatives.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.
**Recommended:** Prerequisites beginning algebra and familiarity working with Excel spreadsheets.

**EMEN 5030 (3) Fundamentals of Project Management**
Project managers work cross-functionally to plan, monitor, and manage projects to successful completion. This course provides an introduction to the project management discipline, including the processes, tools, and techniques used in the management and leadership of projects. Key topics covered include the role of the project manager; the project team; stakeholder communications and management; cost, schedule, and risk management; quality in projects; and the project lifecycle.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5032 (3) Advanced Project Management**
Advance and elevate your skills to lead technical teams in pursuit of challenging projects and programs. You will investigate real-world, judgment-intensive decision-making via case studies drawn from famous and infamous engineering projects across a range of industries. You will acquire knowledge and abilities to employ throughout your career as a technical leader. Sophisticated tools such as Monte Carlo Analysis are investigated and assessed for real-world utility.
**Requisites:** Requires prereq courses of EMEN 5030 or MBAX 6440 (all min grade B). Restricted to Coll of Engineering grad students, Grad Certificate Engineering (CRTGE), Engr EMEN BAM students students w/ subplans C-ASENEMEN, C-ECENEMEN, C-EEEN-EME or C-MCENEMEN.

**EMEN 5033 (3) Aerospace Program Management**
Focuses on how program/project management fundamentals are adapted and extended within the specific needs and frameworks of aerospace programs, which are typically complex, multi-year, and high-stakes, with stringent safety, performance, and reliability requirements. Students learn to balance sponsor/customer objectives with business goals across U.S. Government (DoD, NASA), commercial, and international contexts, emphasizing lifecycle management, best practices, and integration across program disciplines. Case studies develop practical skills for managing diverse aerospace programs.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.
**Recommended:** Prerequisite EMEN 5030 Fundamentals of Project Management.
**Grading Basis:** Letter Grade

**EMEN 5042 (3) Quality Management**
Focuses on the principles and practices of quality management in modern organizations. Students will develop an understanding of theories, methodologies, and tools used to achieve and maintain high levels of quality in products and services. Topics covered include Total Quality Management, Six Sigma, Lean Management, ISO 9001, and Continuous Improvement. Students will learn how to design and implement quality management systems, conduct process improvement initiatives, measure / analyze performance data, lead organizational change.
**Requisites:** Restricted to graduate students and Engineering Management BAM students only.

**EMEN 5050 (3) Leading Oneself**
The "Leading Oneself" course offers a comprehensive blueprint for professional's keen on honing their leadership capabilities, starting with the cornerstone of personal excellence. The curriculum delves into essential areas such as personal accountability, genuine leadership traits, individual brand development, enhanced self-awareness, fostering a growth mindset, mastering emotional intelligence, and achieving personal mastery. This content lays the foundation for all leadership to follow.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5052 (3) Leading Others**
Understand and apply leadership techniques that develop and sustain a high-powered technical organization. Specifically, students evaluate qualities associated with successful leaders, learn practical leadership skills such as defining roles and responsibilities, setting vision, coaching, and dealing with conflicts. The course then addresses team building, from hiring the right team members, to managing the team, and conducting effective team meetings.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5053 (3) Leading Technical Organizations**
Leadership of technical, complex organizations is challenged by the pace of technology development, innovation, hyper competition by new entrants and a workforce that demands to be engaged and recognized. Examining relevant technical organization leadership skills using the context of stakeholder value creation is the basis of this course. The class explores how leaders multiply their abilities by leading through others, develop an accountable team, build enduring relationships, exhibit leadership presence, and create executable strategies.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5054 (3) Neuroscience of Leadership**
Examines leadership techniques through the lens of social cognitive neuroscience and psychology. Utilizing the latest research, we develop a leadership practice based on neuroscience. Consideration for leading oneself, leading others and leading organizations is covered. Topics include neuroplasticity, psychological safety, resililence, mental toughness, primal power of storytelling, improv and creativity, as well as the subtle power of influence.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5055 (3) Leading for Diversity, Equity and Inclusion in Engineering**
This course focuses on the importance of embedding diversity equity inclusion (DEI) in engineering workplace environments. Students focus on the historical narrative of institutions and institutional structures that have shaped instances of inclusion and exclusion in engineering, how their own identity and background shape their thoughts and actions, and how transformational leadership is enacted for DEI in a challenging atmosphere.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5065 (3) Global Topics in Aerospace**
Examining current international space topics including civil, military, and commercial activities forms the basis for this course. The origins and evolution of space policy and laws, current organizational and governance structures, space economics, space sustainability, human exploration strategies, the future of space exploration, and recent developments in the commercial space sector will be analyzed. The course exposes students to the current context of the industry to prepare them for a career in the space economy.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5080 (3) Ethical Decision-Making in Engineering Management**
Learn how to recognize ethical issues and dilemmas affecting managers in the workplace. Understand various models and practices offering solutions to these issues and how to create a culture of ethics and integrity in supporting and/or building a profitable, healthy and responsible organization.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5090 (3) Marketing and Technology Ventures**
Why do great products often lose in tech markets? This course analyzes processes for developing the customer bases essential for commercial success. Student teams develop strategic launch programs for actual tech startups of their choosing. Students will analyze and discuss real-world case studies and alternative strategies. Structured towards professional applicability for engineers in large enterprises as well as startups.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5094 (3) Technology Entrepreneurship**
This course is designed for engineers, project managers, and technical leaders interested in learning how to leverage technology to solve problems and meet emerging market demands. Students learn how to apply a holistic approach that engages an entrepreneurial mindset with methods like entrepreneurial systems thinking and opportunity pattern recognition to identify and address target customer needs. The course empowers students with the knowledge, skills, and methods needed to create and launch a new technology company.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5215 (3) Applied Sustainability for Engineering Managers**
Provides students the tools to integrate sustainability into business. The course explores why social and environmental sustainability are important, and how successful companies are incorporating sustainability as a core strategy. It then addresses the engineer¿s role in developing sustainable products through principles of the circular economy and life cycle assessment. The course culminates with a discussion of triple bottom line accounting, and how companies use the sustainability report to demonstrate progress toward their sustainability goals.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students and Engineering Management BAM students only.

**EMEN 5220 (3) Product Design for the Circular Economy**
Product Design for the Circular Economy provides the tools and knowledge necessary to implement Circular Economy (CE) principles, including design frameworks defined by Design for ¿R¿, Cradle-to-Cradle, Biomimicry, ISO 14000 and several EU Directives. Products can be certified if they meet certain criteria, and the course covers the major certifications available today. Finally, the course shows how companies report their progress using methods prescribed by the Global Reporting Initiative (GRI).

**EMEN 5225 (3) Sustainable and Resilient Operations and Supply Chains**
Innovative organizations need leaders and managers who understand the complex nature of corporate social responsibility, sustainability, and resilience. In this course, students will learn strategies to become good corporate citizens while still creating value for stakeholders. Students will learn concepts and practices companies employ to manage business processes that meet business needs while reducing negative impacts on the pollution and waste. You will also learn to build a more sustainable and socially responsible supply chains.

**EMEN 5230 (3) Resilience Engineering and Leadership in Crisis**
This course examines the qualities, concepts, and methodologies of resilience leadership amid conditions of chaos, uncertainty, and catastrophic breakdowns of complex social, ecological, and technological systems. The curriculum draws on topics from resilience policy, resilience engineering, crisis leadership, contemporary literature, and current events. These components collectively build a comprehensive understanding of resilience as a dynamic blend of processes embedded within and across complex systems like critical infrastructure essential to public health, safety, security, and well-being.
**Requisites:** Restricted to graduate students and Engineering Management BAM students only.
**Grading Basis:** Letter Grade

**EMEN 5315 (3) Business Law for Engineering Managers**
Provides engineering students an introduction to important areas of business law likely to be encountered as technology and engineering managers. Topics include fundamental legal concepts, intellectual property and strategy, contracts, data privacy and product liability. The course uses experiential and practical approaches and exercises to enable the student to identify and address critical legal issues in real-world business contexts.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5400 (3) Technical Product Development**
Product Development introduces contemporary methods like design thinking and sustainability for the circular economy to identify and create products and services that address verified customer needs and problems. By focusing on solutions and benefits offered, the course takes a project-based approach from ideation, concept development, and prototyping to customer validation, pricing, and productization. Students learn how to present their product concepts to senior management or potential investors and showcase their prototypes in a tradeshow-like setting.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5405 (3) Fundamentals of Systems Engineering**
Examines the disciplined process of designing a complex system to meet a specified customer need. We begin with identifying the needed capability through operational and functional analysis, then progress through defining requirements that articulate operational and environmental capabilities that address reliability, maintainability, and producibility considerations across the system lifecycle. The course also introduces technical management tasks to include risk management, technology readiness assessment, and program controls using real-world, current aerospace industry examples.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5415 (3) Introduction to Requirements, Verification and Validation**
This course introduces the concepts of Requirements, Verification and Validation as applied during system development. Students completing this course will understand the terminology, usage, planning, organization roles, as well as how these methods are used during the system development lifecycle and how to determine what methods are appropriate for the type of project they may be working.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.
**Grading Basis:** Letter Grade

**EMEN 5500 (3) Lean and Agile Management**
Learn lean and agile concepts and tools to improve customer value, improve processes and reduce waste. Examine and apply lean and agile principles in diverse circumstances including hardware/software, product development/ongoing operations and manufacturing products/ providing services. Apply your learning to improving performance in current responsibilities, whether as an individual contributor or as a manager.
**Equivalent - Duplicate Degree Credit Not Granted:** OPIM 6080
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

**EMEN 5830 (3) Special Topics**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students and Engineering Management BAM students only.

**EMEN 5840 (1-3) Independent Study Project**
Available only through approval of graduate advisor. Subjects arranged to fit the needs of the particular student. Non-EMP students require instructor permission.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering graduate students, Graduate Certificate Engineering (CRTGE) students and Engineering Management BAM students.

# Engineering Management Online (EMEA)

## Courses

The following courses are only available through CU Boulder on Coursera program offerings. Please refer to the Online Programs (p. 1895) section of the catalog for more information.

**EMEA 5006 (1) Defining, Describing and Visualizing Data**
As leaders in your chosen field, you need to not only know how to ask the right questions but also answer them using data-based methods. Through this class, you'll be able to get to the bottom of what you really want to know, describe the associated data related to that question and visualize the information from that data to understand and explain the results.
**Grading Basis:** Letter Grade

**EMEA 5007 (1) Data Acquisition, Risk and Estimation**
Engineering and Business professionals often have access to many sources of data. The best way to ensure your data is both valid and reliable is to plan for it ahead of time. Through this class, you'll be able to plan for accurate and precise data generation, then use that data for the purpose of estimation and risk reduction related to capital investments.
**Grading Basis:** Letter Grade

**EMEA 5008 (1) Data Driven Decision Making**
Once we¿ve generated data, we need to answer the research question by performing an appropriate statistical analysis. Engineers and Business Professionals need to know which test or tests to use. Through this class, you'll be able to plan for accurate and precise data generation, then use that data for the purpose of estimation and risk reduction related to capital investments.
**Grading Basis:** Letter Grade

**EMEA 5016 (1) Communication as a Technical Leader**
A technical leader spends a majority of their day interacting with others. Indeed, studies repeatedly point to the impact communication skills have on the ability of managerial leaders to succeed or fail. Too often, individuals move into managerial leadership roles without an awareness of the need to improve in this area. This course focuses on interpersonal skills such as listening, counseling, non-verbals, mentoring, coaching, building trust, and providing feedback.
**Grading Basis:** Letter Grade

**EMEA 5017 (1) Technical Managerial Written Skills**
Writing effective documents to influence teams and decision-makers is one of the essential elements of successful management. Additionally, in all of its forms, writing remains one of the primary vehicles by which a leader exercises leadership. Just like the other forms of communication, it must be coherent, complete, make a clear argument, and include appropriate decorum. This course focuses on these attributes as applied in all forms of modern written communication.
**Grading Basis:** Letter Grade

**EMEA 5018 (1) Speaking to a Technical Group**
Great speakers focus on voice, nonverbals, eye contact, body language, and storytelling to captivate their audiences. Moreover, as a leader, it is possible to communicate in such a manner and in such a tone of voice so as to inspire in others nothing but an intense desire to excel, making this form, potentially, the most powerful leadership-communication skill of all. This course focuses on the fundamentals of excellent oral communication.
**Grading Basis:** Letter Grade

**EMEA 5021 (1) Product Cost and Investment Cash Flow Analysis**
This first course in the finance specialization discusses costs and business practices to establish the cost of a product. The concept of time value of money (TVM) is developed to determine the present and future values of a series of cash flows. TVM principles are then applied to personal finances and retirement planning. This is a practical course that uses spreadsheets extensively to better prepare students in engineering and science for a career in industry.
**Grading Basis:** Letter Grade

**EMEA 5022 (1) Project Valuation and the Capital Budgeting Process**
This second course in the finance specialization describes the economic viability of an engineering project through application of net present value, internal rate of return, and payback period analysis. The impacts of depreciation, taxes, inflation and foreign exchange are then addressed. The capital budgeting process is discussed, showing how companies make decisions to optimize their investment portfolio. Risk is mitigated through application of quantitative techniques such as scenario analysis, sensitivity analysis and real options analysis.
**Grading Basis:** Letter Grade

**EMEA 5023 (1) Financial Forecasting and Reporting**
This third and final course in the finance specialization discusses how public projects are evaluated using cost-benefit analysis. Students then learn how interest rates and prices for stocks and bonds are determined. Techniques are presented on how to create departmental budgets for engineering cost centers and pro forma statements for profit centers. Students then work with corporate financial statements to assess a company¿s financial health, including recent measures of environmental, social and corporate governance (ESG).
**Grading Basis:** Letter Grade

**EMEA 5031 (1) Project Management: Foundations and Initiation**
The goal of this introductory course in the project management specialization is to provide students the foundational knowledge of how engineering projects are managed and initiated. Engineering project managers are responsible for project scope, stakeholder management, effective communication, and team leadership. In this course you will develop introductory skills needed to manage traditional engineering projects, along with tools needed to engage stakeholders and build diverse teams.
**Grading Basis:** Letter Grade

**EMEA 5032 (1) Project Planning and Execution**
The goal of this second course in the project management specialization is to provide students with skills necessary to plan and execute traditional engineering projects. Project managers must plan and manage complex projects constrained by time and budget. As part of this course, you will determine project schedules, budgets, and risk assessments. At the end of this course, you will be able to identify and explain various quality tools and methods used in project management.
**Grading Basis:** Letter Grade

**EMEA 5033 (1) Agile Project Management**
The goal of this third course in the project management specialization examines the philosophy and process of managing projects using Agile project management. Students in this course will learn the Agile philosophy and process including the Scrum framework, sprints, and user stories. Upon completion of this course, you will be able to distinguish between traditional and agile project management methodologies and understand the benefits of delivering value early in an engineering project.
**Grading Basis:** Letter Grade

**EMEA 5034 (1) The Need for Systems Engineering**
Systems engineering is an interdisciplinary approach to designing, realizing, and managing complex systems. In this course, you will be introduced to principles of systems engineering and its importance to the development of complex systems. You will learn to identify and define systems, manage their complexity, and describe their life cycle. The course uses real-world engineering examples to address how the systems engineering approach can address challenges.
**Grading Basis:** Letter Grade

**EMEA 5035 (1) Applying Systems Engineering to the Design Process**
In this course, you will learn what a systems engineer does. Following the conceptual foundations from The Need for Systems Engineering, you will perform requirements analysis and functional analysis on engineering programs. You will learn how to perform a trade study using a methodical, quantitative approach that is universal in application. This course also covers preparing design reviews, focusing on coordinating the inputs of multiple engineering disciplines into a cohesive description of the design approach.
**Grading Basis:** Letter Grade

**EMEA 5036 (1) Systems Engineering and Program Management**
This course teaches the learner how to apply Systems Engineering to the overall management of a complex program. This includes tailoring the systems engineering process to the specific needs of a particular program. The risk management process is described, including how to identify risks and develop a mitigation strategy. The key management tools are described along with how the scope of a program is defined and managed according to the terms of the contract.
**Grading Basis:** Letter Grade

**EMEA 5051 (1) Leading Oneself with Self-Knowledge**
Before we can lead others well, we must first learn to lead ourselves well. Knowing thyself is the starting point on this journey. In this course, you will come to understand the importance of three forms of awareness, craft a personal identity, gain understanding of how you work best, learn to be strategic with your time and energy and manage cognitive biases and understand your worldview.
**Grading Basis:** Letter Grade

**EMEA 5052 (1) Leading Oneself with Purpose and Meaning**
Before we can lead others well, we must first learn to lead ourselves well. Knowing your why is an important part of this journey. In this course, you will identify your core purpose and recognize meaning in your life, explore the power of spirituality and embracing our mortality, create a lasting impact by serving a greater good, describe your character and practice personal excellence.
**Grading Basis:** Letter Grade

**EMEA 5053 (1) Leading Oneself with Personal Excellence**
Before we can lead others well, we must first learn to lead ourselves well. Knowing personal excellence is the culmination of this journey. In this course, you will describe how and why to set goals and create action plans, increase your focus and reduce distraction, harness motivation and flow state for performance, build self-efficacy and agency, and redefine your relationship with stress, anxiety, fear and adversity.
**Grading Basis:** Letter Grade

**EMEA 5054 (1) Leadership Style and Building a High-Performance Team**
Leadership of complex technical organizations is being challenged by the rapid pace of technology development, innovation and the new flexible workplace where employees working from anywhere demand to be engaged, motivated and recognized. This first course in the Leading Technical Organizations specialization explores leadership style, value creation, how a leader multiplies their abilities by building high performance teams, leading through others and that one's executive presence is essential to be a leader of leaders.
**Grading Basis:** Letter Grade

**EMEA 5055 (1) Accountability and Employee Engagement**
Being a successful leader in complex technical organization requires being ultimately accountable for your team¿s performance and meeting commitments to all your stakeholders. This second course in the Leading Technical Organizations specialization explores how organizational leaders use different decision-making processes for different situations and that they are ultimately accountable for all results. You¿ll also look into how a company¿s culture drives strategy, risk and meeting stakeholder commitments.
**Grading Basis:** Letter Grade

**EMEA 5056 (1) Value Creation and Building Enduring Relationships**
The most effective leaders in complex technical organizations are successful leading the performance of large-scale technical endeavors. These leaders have generally established a network of professional relationships, supporting them throughout their career. This third course in the Leading Technical Organizations specialization explores techniques for building enduring relationships that have a multiplicative impact on business success. The course provides insight into how authentic leadership yields employee engagement that is critical to strategizing, planning and performing large scale technical endeavors.
**Grading Basis:** Letter Grade

**EMEA 5057 (1) Your World and What Shapes It**
Advancing equity, diversity, and inclusion (DEI) requires a process of examination, self-reflection, and action. In this course, students will examine their identity and background and reflect on how it has shaped their thoughts, activities, and relationships with others. The student will also explore the historical narratives and power dynamics that have shaped their environment. Discussions surrounding course topics will be approached through a global lens.
**Grading Basis:** Letter Grade

**EMEA 5058 (1) Their World and How You Define It**
As future leaders in workplace DEI initiatives, it is essential to develop an awareness of the experiences faced by others and cultural empathy. In this course, students will listen to and reflect on the voices of women, black, LGBTQ+, and neurodiverse experiences. Through listening, students will learn to look inward and confront their own ignorance, biases, or stereotypes.
**Grading Basis:** Letter Grade

**EMEA 5059 (1) Our World and How to Accept It**
In this course, students will learn the history of DEI in the workplace and how DEI initiatives can be successfully implemented in a global environment. The course will provide students with a toolkit to make lasting changes for themselves and their interactions with others.
**Grading Basis:** Letter Grade

**EMEA 5061 (1) A Technical Leader's Qualities and Effectiveness**
This course describes the traits of Great Leaders who combine fierce resolve with personal humility. Indeed, they might be described more as ¿plow horses¿ as opposed to ¿show horses¿. They see themselves as servants to the team and to the organization. They ¿hold the line¿ when faced with tough decisions and ¿do what must be done¿ when the time comes. Their leadership is based on solid ethical principles and they act with quiet, calm determination.
**Grading Basis:** Letter Grade

**EMEA 5062 (1) Challenges of Leading Individuals in the Tech Industry**
Great Leaders lead by example. They protect their team members, empower them, and help them to improve and grow while the team members, in turn, help the organization improve and grow. Working together with the team, they envision what the organization could be and inspire others to help execute the strategy that will take them there. Many times, they see their team members as more of a family than simply as business acquaintances.
**Grading Basis:** Letter Grade

**EMEA 5063 (1) Challenges of Leading Technical Teams**
Great Leaders¿ ambition is for the organization and team first, and for themselves a distant second. They help develop and ¿spin-off¿ other great leaders and help set up their successors for success. They seek truth about their organization, seeing it from the outside-in as well as from the inside-out. Most importantly, they focus on establishing processes that allow the organization to operate smoothly and efficiently.
**Grading Basis:** Letter Grade

**EMEA 5064 (1) The Neuroscience of Personal Excellence**
This course examines leadership techniques through the lens of social cognitive neuroscience and psychology. Utilizing the latest research, we develop a leadership practice based on the foundation of neuroscience. Topics include neuroplasticity, regulating arousal, personal performance, flow state, decision-making and learning. This course focuses on personal excellence to lead oneself.
**Grading Basis:** Letter Grade

**EMEA 5065 (1) The Neuroscience of Leading High-Performance Teams**
This course examines leadership techniques through the lens of social cognitive neuroscience and psychology. Utilizing the latest research, we develop a leadership practice based on the foundation of neuroscience. Topics include motivation, storytelling, improv, collaboration, psychological safety, influence, and coaching. This course focuses on leading high-performance teams.
**Grading Basis:** Letter Grade

**EMEA 5066 (1) The Neuroscience of Leading Transformational Organizations**
This course examines leadership techniques through the lens of social cognitive neuroscience and psychology. Utilizing the latest research, we develop a leadership practice based on the foundation of neuroscience. Topics include innovation, creativity, facilitating change, gender and diversity, mental toughness, and explore the neuroscience of business. This course focuses on leading transformational organizations.
**Grading Basis:** Letter Grade

**EMEA 5081 (1) A Theoretical Origin of Ethics in Business and Tech Industry**
In the pursuit of a clear understanding of business ethics, one may begin by considering our evolved eusocial behavior. Is the source of morality fundamentally biological in nature? If so, does that help to provide us with an explanation for the unresolvable tension between selfishness and altruism? Indeed, may we use this theory to help, then, explain the human condition and the drivers of ethics in business and industry?
**Grading Basis:** Letter Grade

**EMEA 5082 (1) Avoiding Ethical Pitfalls in the Tech Industry**
Most executives who commit crimes make those decisions on the basis of intuition and gut feeling. The weaknesses associated with this type of decision-making are exacerbated by an environment where leaders are increasingly distanced from the consequences of their decisions and the individuals they impact. This course is a look at the ethical dark side of the modern business world.
**Grading Basis:** Letter Grade

**EMEA 5083 (1) Ethical Decision Making for Success in the Tech Industry**
Good ethics is absolutely essential to effective business practice. That is, how each employee works and the standards they uphold while working affects both personal and company reputations. Indirectly, they also affect politics, society at large, and even the national reputation. This course focuses on various techniques that help one avoid an incorrect ethical path in business and industry and, instead, make ethically correct decisions.
**Grading Basis:** Letter Grade

**EMEA 5091 (1) Getting Started with Technology Startups**
This course will introduce the contemporary practice of entrepreneurship for engineers. Students will identify their driving purpose for creating a new startup and explore the fundamental tools and practice of entrepreneurship. They will develop the knowledge and skills for thinking and acting like an entrepreneur and gain insight about how to recognize new opportunities. The tools, resources, and methods introduced can be used to generate new product and service ideas that address real customer needs.
**Grading Basis:** Letter Grade

**EMEA 5092 (1) Creating a Technology Startup Company**
This course will examine the core elements that make up the inner and outer workings of a startup company. Students will learn how to define, research, and segment markets and use that knowledge to develop viable business and revenue models. The models will be used to construct pro forma financial statements suitable for potential investors. Students will gain the knowledge and skills to build networks and teams and create a lean business plan of operations.
**Grading Basis:** Letter Grade

**EMEA 5093 (1) Forming, Funding, and Launching a Technology Startup Company**
This course explores the key steps and processes involved with forming, funding, and launching a startup company. Students will learn about funding options and how to interpret investor needs and requirements. They will gain the knowledge and skills needed for creating and presenting viable business plans to potential investors. Students will explore topics related to company formation, legal issues relevant to startups, and map the key steps to launching, growing, and exiting a startup company.
**Grading Basis:** Letter Grade

**EMEA 5094 (1) Market Research & Analysis for Tech Industries**
This first course of the Marketing Strategy for Engineers and Technologists specialization begins with customer behavior, both consumer and business-to-business. We learn to design and execute means of gathering information on markets and customers, market research. We then analyze that data using various tools and approaches. Throughout, our guiding scenario of a technology or engineering startup with a novel product or service is both exciting and a realistic representation of staff, financial and time resources.
**Grading Basis:** Letter Grade

**EMEA 5095 (1) Digital Media & Strategic Planning in Technology Markets**
This second course of the Marketing Strategy for Engineers and Technologists specialization develops strategic analysis and planning skills, applying the tools of industry to turn market research into actionable items. Next, we will investigate the most effective media channels available, focused on the more efficient and dynamic digital marketing channels. Throughout, our guiding scenario of a technology or engineering startup with a novel product or service is both exciting and a realistic representation of staff, financial and time resources.
**Grading Basis:** Letter Grade

**EMEA 5096 (1) Building and Pitching Marketing Campaigns in Tech Industries**
This third course of the Marketing Strategy for Engineers and Technologists specialization brings together all skills to build a marketing plan for a real-world startup company of our choosing. We develop and apply industry decision metrics and critical lenses while building a comprehensive plan, both written and a video pitch, addressing executive decision-makers. Now our guiding scenario of a technology startup with a novel product comes to fruition with a complete strategic program for a firm operating in a dynamic engineering industry.
**Grading Basis:** Letter Grade

**EMEA 5216 (1) Sustainability and the Circular Economy**
This first course in the Applied Sustainability specialization discusses the need to shift from today¿s linear economy to a circular one. The course begins with the sustainability imperative and introduces the Anthropocene. It then shifts to solutions, detailing the rapid transition to renewable energy, electric vehicles, and the design of more environmentally responsible buildings. The course closes with an overview of the circular economy, and how it is integrated into these solutions.
**Grading Basis:** Letter Grade

**EMEA 5217 (1) Applied Sustainability Engineering**
This second course in the Applied Sustainability specialization discusses the techniques used by engineers and scientists to develop and assess the environmental impact of products and processes. It discusses carbon and water footprints and how they are determined. Topics then address the different approaches to environmental analysis, including life cycle assessment, energy and material flow analysis, and eco-audits. The course concludes definitions of what constitutes circular product and packaging design.
**Grading Basis:** Letter Grade

**EMEA 5218 (1) Leading the Circular and Sustainable Business**
This final course in the Applied Sustainability specialization discusses the business case for circularity. Topics include design of production and operations and ensuring circularity throughout the supply chain. The course then examines the marketing of circular products and what distinguishes true marketing from greenwashing. Finance is impacted by circularity and is addressed through Triple Bottom Line accounting. Finally, the course concludes with how individuals can become agents of change in the organizations where they work.
**Grading Basis:** Letter Grade

**EMEA 5222 (1) Product Design for the Circular Economy**
This course illustrates the product design tools necessary to implement Circular Economy (CE) principles. The course begins with an overview of the Circular Economy and why it is necessary today. It then discusses the design strategies involving Design for the Environment, DfE, and Design for ¿R¿, where R refers to Reuse, Repair, Remanufacturing, and Recycling. The course ends highlighting ways designers can select the appropriate materials to achieve their circularity objectives and make eco-informed decisions.
**Grading Basis:** Letter Grade

**EMEA 5223 (1) Packaging Design for the Circular Economy**
The course begins with a discussion of the essential elements of packaging. It then overlays sustainability and sustainable development onto the fundamentals and explore new ways packaging can be done while still performing its function. The course then introduces packaging design, and what packaging engineers pay attention to. The course wraps up with a discussion of current packaging materials, and opportunities for new, more circular materials that are in development.
**Grading Basis:** Letter Grade

**EMEA 5224 (1) Circular Product Design Frameworks and Certifications**
This course provides the tools necessary to incorporate circular product design into the corporate product development process, using frameworks such as the Ellen MacArthur Foundation-IDEO Design Thinking Model, the CIRCit Circular Product Design and Development Model, and Biomimicry. The course also explores the new European Union Eco-Design for Sustainable Products Regulation (ESPR), and how that drives more circular product design. The course wraps-up with a detailed review of the Cradle-to-Cradle Product Certification Program.
**Grading Basis:** Letter Grade

**EMEA 5226 (1) Sustainable and Resilient Operations Management**
Operations management is the use of company resources to create value or meet a market need. Increasingly, customers are demanding more attention be paid to the environmental impacts of the goods and services they buy. In this course, students will learn concepts and practices companies employ to manage business processes that meet the needs of shareholders and employees while reducing negative impacts on the pollution and waste.
**Grading Basis:** Letter Grade

**EMEA 5227 (1) Developing and Managing Sustainable Supply Chains**
Customers are becoming more aware of the environmental and social impacts of where and how the products they purchase are produced and delivered. Many are demanding organizations act in environmentally responsible ways. In this course, you will learn to build a more sustainable and socially responsible supply chain while meeting business expectations.
**Grading Basis:** Letter Grade

**EMEA 5228 (1) Impacts of Sustainable Operations and Supply Chains**
Innovative organizations need leaders and managers who understand the complex nature of corporate social responsibility, sustainability, and resilience. In this course, students will learn strategies to become good corporate citizens while still creating value for stakeholders. You will learn methods to measure environmental and social impacts of sustainable operations and supply chains.
**Grading Basis:** Letter Grade

**EMEA 5231 (1) Resilience and Leadership: Concepts, Definitions, and Frameworks**
This course is part 1 of 3 that comprise the specialization `Resilience Engineering and Leadership in Crisis¿. The course introduces the common terms, definitions, and concepts that characterize resilient systems. Frameworks for resilience engineering and leadership in crisis are applied to complex systems and the built environment. Learners will explore a holistic approach to critical infrastructure resilience and apply a threat assessment protocol to a project scenario.
**Grading Basis:** Letter Grade

**EMEA 5232 (1) Resilience and Leadership: Tools, Methods, and Applications**
This course is Part 2 of 3 comprising the specialization `Resilience Engineering and Leadership in Crisis.¿ The course offers tools and methods for applying the concepts from Part 1 to various applications and disaster scenarios. Systems thinking, crisis management lifecycle, and organizational strategy are presented to help cultivate and strengthen crisis leadership and communication skills. Learners will assess the resilience of a complex system and create a crisis management plan.
**Grading Basis:** Letter Grade

**EMEA 5233 (1) Resilience and Leadership: Design, Development, and Integration**
This course is part 3 of 3 that comprise the specialization `Resilience Engineering and Leadership in Crisis¿. The course emphasizes the importance of practices like organizational learning and adaptive change management amid uncertainty. Resilience engineering principles and strategies are combined with critical leadership knowledge and skills essential to navigating unanticipated catastrophic disruptions. Learners will integrate selective assignments from Parts 1, 2, & 3 to construct a comprehensive resilience report of a complex project scenario.
**Grading Basis:** Letter Grade

**EMEA 5241 (1) The Circular Economy**
This course defines the Circular Economy and how it differs from the linear economy. It then highlights the need to move toward a Circular Economy, and how such a transition could take place. This also requires customers going from being ¿consumers¿ to ¿users¿, which impacts product design, and therefore challenges existing financial business models. The course concludes with several case studies highlighting companies successfully adopting Circular design practices.
**Grading Basis:** Letter Grade

**EMEA 5242 (1) Sustainable Marketing and Consumer Trends**
As businesses increasingly recognize the importance of Environmental, Social, and Governance (ESG) criteria in their operations, understanding how to integrate sustainability goals into marketing efforts becomes essential. In this course, you will learn tools and strategies for marketing products and services with a focus on sustainability. Emphasis will be placed on aligning organizational sustainability objectives with consumer preferences and market trends.
**Grading Basis:** Letter Grade

**EMEA 5243 (1) Leading the Way: Becoming a Sustainability Change Agent**
As sustainability becomes increasingly central to corporate strategy, managers must be adept at leading and managing sustainability initiatives. This course will explore the principles of corporate sustainability, change management strategies, and techniques for building networks and seizing opportunities in the rapidly evolving landscape of sustainable business. It is to equip future business leaders with the knowledge, skills, and mindset required to drive sustainable change within organizations.
**Grading Basis:** Letter Grade

**EMEA 5316 (1) Principles of Business Law for Technical Managers**
In this first course of the Business Law for Technical Managers specialization, students learn the legal principles most likely encountered as technical managers, beginning with the legal structures of business. The course then discusses contracts and agreements, typical of those made with suppliers, employees and other business stakeholders. We then explore employment law, critical when managing others. The course concludes with a discussion of data privacy, a rapidly evolving field in the digital world today.
**Grading Basis:** Letter Grade

**EMEA 5317 (1) Strategic Management of Intellectual Property**
This second course in the Business Law for Technical Managers specialization focuses on intellectual property (IP), first defining components of IP. trademarks, patents, and copyrights. We then consider trademarks as a company¿s brand, and explore types of patents and how to read and interpret them. Next the course examines copyrights, critical in protecting creative works such as software. The course concludes with an overview of the different strategies companies employ to manage their IP.
**Grading Basis:** Letter Grade

**EMEA 5318 (1) Practical Matters in Business Law**
In this third and final course of the Business Law for Technical Managers specialization, we cover legal issues likely to be encountered by a technical manager. We begin with product liability and the manger¿s responsibility to ensure product safety. We then cover business ethics and an area of increasing importance, environmental law. The course then outlines the litigation process from discovery to the trial, and concludes examining the legal matters associated with mergers and acquisitions.
**Grading Basis:** Letter Grade

**EMEA 5401 (1) Strategic Product Development**
This first course in the product development specialization discusses how companies create new products that customers want while achieving their financial objectives. We begin by defining the product strategies necessary to ensure a company¿s long-term growth. We then explore the different product development processes used by high-tech businesses today, such as Stage-Gate and Lean/Agile techniques. We conclude illustrating the tools to build the high-performance teams that take the development process from concept through product launch.
**Grading Basis:** Letter Grade

**EMEA 5402 (1) Managing the New Product Development Process**
This second course in the product development specialization goes into the product development process in detail. With the opportunity defined, we begin with ideation techniques such as Design Thinking to create new product concepts. We then define the tools to create product specifications that meet customer requirements, and then conceptualize different ways of meeting those requirements. With finally explore prototyping and the techniques used to down-select to a concept that is then carried through launch.
**Grading Basis:** Letter Grade

**EMEA 5403 (1) Product Innovation Management**
This third course in the product development specialization discusses a product¿s life cycle with the strategies to ensure long-term success. We begin with an overview of digital product development and how it differs from physical products. Students are then introduced to product roadmaps and forecasting techniques, and apply these in creating a compelling financial business case. We conclude with how sustainability impacts product development today and how to design innovative products for a circular economy.
**Grading Basis:** Letter Grade

**EMEA 5831 (1) Special Topics**
Examines a special topic in leadership and management.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

# Engineering, Ethics & Society (ENES)

## Courses

**ENES 1010 (3) Humanity in a Technological Age**
This seminar considers what it means to be human in an increasingly technological age. Designed for engineering students, it also looks at the role of technology designers and creators in shaping the human environment. Students focus on sharpening their written and oral communication skills through a series of iterative assignments and projects. Fulfills College of Engineering writing requirement for first-year students only.
**Requisites:** Restricted to students with 0-26 (Freshmen) College of Engineering majors only.

**ENES 1843 (3) Special Topics**
Explores different important themes in engineering, ethics, and society; check with the department for specific semester topics. Formerly HUEN 1843.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) College of Engineering majors only.

**ENES 1850 (3) Engineering in History: The Social Impact of Technology**
Investigates how technology and engineering have both shaped our modern world and been shaped by it. Inquiry-based projects examine the history of technology through historical sources and provide opportunities for critical reflection on how historical thinking can inform engineering practice. Alongside an overview of modern engineering and technology, we investigate questions such as whether new technologies made household labor easier in the 20th century and how the needs of end-users shaped the development of computing. Formerly HUEN 1850.
**Requisites:** Restricted to students with 0-56 (Freshmen or Sophomore) College of Engineering majors only.

**ENES 2010 (3) Tradition and Identity**
Explores the place and possibility of personal identity both within and against the influence of tradition, including family, culture, language, and social, political and economic institutions. Via literature and film, wrestles with the nature of freedom, self-determination, and belonging. Formerly HUEN 2010.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 2020 (3) The Meaning of Information Technology**
A survey of the mutual influence of technology, media, and society. Equips students with an understanding of technological transformations in interpersonal, organizational, and mass communication. Emphasis is on the technological, social and political changes that underlie the movement toward a digital society. As such, the class acts as a survey of various technologies and their relationship to socio-political issues. We not only address ¿how does it work¿ and ¿where does this come from¿ but ¿why is it here¿ and ¿how does it impact us as individuals and as a society¿.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 2100 (3) History of Science and Technology to Newton**
Spans invention and discovery from the Stone Age to the age of Newton, raising questions about culture, history, and personal expectation; studies Pyramids, odometers, cathedrals , Galileo, etc., on the way. Formerly HUEN 2100.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 2120 (3) History of Modern Science from Newton to Einstein**
Surveys the great discoveries and theoretical disputes from Newtonian celestial mechanics to the theory of relativity. Includes physics, astronomy, chemistry, geology, and biology; closely examines scientific method, evolution, light and quantum theory. Uses original sources by Newton, Faraday, Lavoisier, Darwin, etc., for immediate contact with the great minds in science. Formerly HUEN 2120.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 2130 (3) History of Modern Technology from 1750 to the Atomic Bomb**
Surveys the great innovations from the Steam Age to the Atomic Age: transportation, modern construction, communications, internal combustion, etc. Supplements textbook accounts with drawings, patents, and original selections by Edison, Carnegie, Tesla, Bell, etc. Studies the sociological impact of social change via contemporary sources in literature, philosophy, painting and film. Formerly HUEN 2130.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 2160 (3) Energy, Society, and the Climate Question**
Examines the social, political, and cultural dynamics of energy production and consumption with a focus on the ¿green¿ energy transition. Analyzes historic and contemporary efforts to address climate change in the US and around the globe and contextualizes technical and infrastructural developments; students collectively identify barriers and develop possible solutions.
**Equivalent - Duplicate Degree Credit Not Granted:** ENES 3160
**Requisites:** Restricted to students in College of Engineering and Applied Science (ENGR) only.

**ENES 2210 (3) Modern Science and Technological Society**
Explores challenges that engineering and science pose for society plus the ways that societies shape or impede science and engineering. Case studies range from contemporary issues (global warming, nuclear weapons, and genetic engineering) to classic cases (the execution of Socrates). Core texts in the Western Tradition supplement contemporary articles and films. Formerly HUEN 2210.
**Equivalent - Duplicate Degree Credit Not Granted:** ENES 3210
**Requisites:** Restricted to College of Engineering majors only.

**ENES 2346 (3) Women and Engineering**
Explores the role of women as shaping and shaped by engineering, from the past into the future. Texts from history, women¿s studies, philosophy, film, and literature shed light on how gender has contributed to the forging of our identities, both personal and professional. Engineering professors guest-lecture, sharing their life stories and their research.
**Equivalent - Duplicate Degree Credit Not Granted:** ENES 3346
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Grading Basis:** Letter Grade

**ENES 2360 (3) Gaining a Global State of Mind for Effective Engineering Practice**
Ranges across cultures and centuries to reveal many dimensions of globalization; shows how cultural awareness enhances effectiveness in the increasingly global profession of engineering. This highly interactive course uses history, philosophy, geography, religion, economics, the arts, etc., to illustrate the complexity of global engineering¿s cultural context. Concurrently, it encourages new insights into culture and identity, both at home and abroad. Formerly HUEN 2360.
**Equivalent - Duplicate Degree Credit Not Granted:** ENES 3360
**Recommended:** restricted to students in the College of Engineering and Applied Science.

**ENES 2840 (1-3) Lower Division: Independent Study**
Offers opportunity for lower-division Engineering students to do independent study work in humanities, appropriate to their academic level. Subject determined, with a Herbst instructor, to fit the needs of the student. Department and faculty consent required. Formerly HUEN 2840.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Grading Basis:** Letter Grade

**ENES 2843 (3) Special Topics**
Explores different important themes in engineering, ethics, and society; check with the department for specific semester topics. Formerly HUEN 2843.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 3100 (3) Ethical Awareness for Engineers**
This seminar introduces engineering students to a variety of essential texts and works drawn from literature, history, philosophy, and the arts. Through class discussions and a variety of writing assignments, students reflect on their personal values, goals, commitments, and responsibilities, and how these align with the ethical challenges of engineering. Fulfills the College of Engineering and Applied Science writing requirement.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**ENES 3160 (3) Energy, Society, and the Climate Question**
Examines the social, political, and cultural dynamics of energy production and consumption with a focus on the ¿green¿ energy transition. Analyzes historic and contemporary efforts to address climate change in the US and around the globe and contextualizes technical and infrastructural developments; students collectively identify barriers and develop possible solutions.
**Equivalent - Duplicate Degree Credit Not Granted:** ENES 2160
**Requisites:** Restricted to students in College of Engineering and Applied Science (ENGR) only.

**ENES 3210 (3) Modern Science and the Technological Society**
Explores challenges that engineering and science pose for society as well as the ways that societies shape or impede science and engineering. Case studies range from contemporary issues (global warming, nuclear weapons, and genetic engineering) to classic cases (the execution of Socrates). Core texts in the Western Tradition supplement contemporary articles and films.
**Equivalent - Duplicate Degree Credit Not Granted:** ENES 2210
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**ENES 3280 (3) Science and Religion**
Explores relationship between science and religion from multiple contrasting stances, including Western and non-Western culture; ancient and modern viewpoints; pro and counter Enlightenment arguments. The course uses history, philosophy, psychology, cognitive science, biology, poetry, theology, sociology, political theory, literature, film, and social media to show the pervasiveness and complexity of the relation between science and religion. The course also promotes sympathetic treatment of perspectives, cutting widely across the political, cultural, and belief spectrums. Previously offered as a special topics course.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Grading Basis:** Letter Grade

**ENES 3320 (3) Don Quixote's Spain**
Examines the first modern novel in the context of modern society¿s preoccupation with fake news and the difficulty of separating fictions from truth. As a global intensive, focuses on the origins of modern Spain, the rise of Madrid at its center, and the continuing presence of Don Quixote and Sancho Panza in the popular imagination. Interrogates the virtuality of our own perceptions and the role that imagination plays in our construction of self and other.
**Recommended:** Spanish language experience; fluency not required.

**ENES 3330 (3) Science Fiction and Philosophy**
Examines significant philosophical concepts through global science fiction novels, stories and films. Relates these concepts to the life, choices and professional career of the future engineer.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 3340 (3) Leonardo da Vinci's World**
Examines Leonardo da Vinci¿s notebooks, his art and his socio-historical context while interrogating his various engineering roles, his creativity, and his synthesis of science, technology, and art.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 3346 (3) Women and Engineering**
Explores the role of women as shaping and shaped by engineering, from the past into the future. Texts from history, women¿s studies, philosophy, film, and literature shed light on how gender has contributed to the forging of our identities, both personal and professional. Engineering professors guest-lecture, sharing their life stories and their research.
**Equivalent - Duplicate Degree Credit Not Granted:** ENES 2346
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Grading Basis:** Letter Grade

**ENES 3350 (3) Gods, Heroes and Engineers: The Western Quest for Excellence**
Investigates the intensely competitive quest of the ancient Greeks for excellence in everything from art and literature to science and war and also the odyssey of the mind generated by this quest, culminating in our modern world. Formerly HUEN 3350.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**ENES 3360 (3) Gaining a Global State of Mind for Effective Engineering Practice**
Ranges across cultures and centuries to reveal many dimensions of globalization; shows how cultural awareness enhances effectiveness in the increasingly global profession of engineering. This highly interactive course uses history, philosophy, geography, religion, economics, the arts, etc., to illustrate the complexity global engineering¿s cultural context. Concurrently, it encourages new insights into culture and identity, both at home and abroad. Formerly HUEN 3360.
**Equivalent - Duplicate Degree Credit Not Granted:** ENES 2360
**Requisites:** Restricted to students in College of Engineering and Applied Science (ENGR) only.

**ENES 3370 (3) Harry Potter and the Conflict of Being**
Addressing the idea of conflict from a wide variety of perspectives: personal identity, class, race, morality, education, age, ambition, leadership and friendship, this course will explore how these themes are worked out both within this extended coming of age narrative and against the classical background that J.K. Rowling so freely appropriates. Through a close reading of the texts, themselves, we will map out their philosophical/existential significance and how this is related to their popularity. Formerly offered as a special topics course.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 3430 (3) Ethics of Genetic Engineering: A Multidisciplinary Approach**
Investigates the metaphorical, ideological and scientific constructs that inform debates over the genetic modification of humans, animals and plants. Begins with a close reading of Shelley's Frankenstein, proceeds to a consideration of philosophical arguments for and against human modification and concludes with a consideration of the scientific and political contexts that inform the regulation of genetically modified foods. Formerly HUEN 3430.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 3450 (3) Narrative Medicine**
Explores the foundations of a narrative practice of medicine through rigorous engagement with various texts, guided writing, and class conversation. Medicine here is defined broadly as engagement with illness and healing, including the practices of doctors, nurses, social workers, researchers, and caregivers. Special attention is given to the role of artists and craftspeople and how such practices might be integrated with an increasingly specialized and technical medical system.
**Recommended:** Prerequisite a minimum of 30 credit hours.

**ENES 3543 (3) History of Western Medicine**
Introduces the intriguing and appalling history of western medicine, from prehistory to the present. Includes grave-robbers, leeches and the Black Death. This course links past to present, in discussion of evidence, innovation, ethics and standards of medical education and practice. Based on original sources, textbook accounts and modern scholarship, and featuring student presentations on the Disease of the Week. Formerly HUEN 3543.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.
**Grading Basis:** Letter Grade

**ENES 3700 (3) Culture Wars in Rome**
Investigates in Rome, Italy (during Maymester), the cultural contrasts among three different cities: ancient, pagan, aristocratic Rome; medieval, Christian, theocratic Rome; and modern, secular, democratic Rome. Draws on evidence from Roman literature, politics, art and architecture. Must have completed a minimum of 26 credit hours by start of course. Requires some preparatory work in Boulder. Formerly HUEN 3700.

**ENES 3720 (3) Voices of Vienna: Freud, Wittgenstien, Mozart**
Study and visit Vienna, a city famous for Mozart's music, Freud's psychology and Wittgenstein's philosophy. As the seat of the Habsburg Empire, Vienna was a rich cultural and political center; it was a crossroads for international trade and exciting new ideas. As the lively capital of present-day Austria, it remains in the forefront of social change. Formerly HUEN 3720.

**ENES 3750 (3) Xi'an, China: Self-Awareness and Images of the Other**
Explores Chinese culture abroad, focusing on ideas of self and other within special historical, social, political, and economical circumstances. Chinese and American concepts of self and society, and of individual, collective, and national identities will be analyzed. Held on the campus of Xi'an Jiaotong University, China. Formerly HUEN 3750.
**Recommended:** Prerequisite completion of lower-division Humanities course.
**Additional Information:** Departmental Category: Asia Content

**ENES 3840 (1-3) Independent Study**
Offers an opportunity for students to do independent work in the humanities. Subject arranged to fit the needs of the student. Department consent required. Formerly HUEN 3840.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) College of Engineering students only.

**ENES 3843 (3) Special Topics**
Explores different important themes in engineering, ethics, and society; check with department for specific semester topics. Formerly HUEN 3843.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering (ENGRU) undergraduates only.

**ENES 3844 (3) Special Topics Global Intensive**
Explores different important themes in the humanities and includes a Global component; check with department for specific semester topics.
**Equivalent - Duplicate Degree Credit Not Granted:** COEN 4000 or COEN 5000
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students in College of Engineering and Applied Science (ENGR) only.

**ENES 4800 (1) Leadership & Ethics in the Real World**
Formerly HUEN 4800.

**ENES 4830 (3) Special Topics**
Explores different important themes in engineering, ethics, and society; check with department for specific semester topics. Formerly HUEN 4830.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ENES 1010 or ENES 3100. Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

# English (ENGL)

## Courses

**ENGL 1001 (3) Writing, Reading, Culture**
This course provides training and practice in writing and critical thinking with a focus on literary and cultural studies. We will emphasize reading, the writing process, the fundamentals of composition, and the structure of arguments. There will be varied writing assignments with opportunities for revision.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Lower
MAPS Course: English

**ENGL 1110 (1) Grammar Bootcamp**
Students will learn the basics of English grammar by practicing sentence analysis. The class will reinforce the words associated with parts of speech and parts of the sentence, tense, mood, and modification. Students will learn to use sentence diagrams as an analytical tool. By the end of the class, successful students will be to able wield the vocabulary of English grammar to analyze and explain the composition of complex English sentences.

**ENGL 1120 (1) Editing Bootcamp**
Students will learn the basics of editing English. The class will reinforce the rules of punctuation. By the end of the class, successful students will be to edit a 750-word document with 95% accuracy.

**ENGL 1130 (1) Citation Bootcamp**
Students will learn the basics of MLA Citation. By the end of the class, successful students will be able to responsibly cite paraphrases, partial quotations, full quotations and block quotations with 95% accuracy.

**ENGL 1191 (3) Introduction to Creative Writing**
Introduces techniques of fiction and poetry. Student work is scrutinized by the instructor and may be discussed in a workshop atmosphere with other students. May not be taken concurrently with ENGL 2021 or ENGL 2051. May not be repeated.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1210 (3) The Novel**
The ¿novel¿ means ¿the new.¿ And the novel is a new literary genre in history, a fresh young upstart compared to poetry and drama. This course introduces students to the novel form: its definitions, evolutions, and possibilities. Novels may be drawn from a range of British, American, European, and global traditions to expose students to the endless potential of how novels imagine the world.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1220 (3) From Gothic to Horror**
Explores literature in the Gothic mode and aesthetic and critical theories related to modern "horror" genres or their precursors. Introduces literary-critical concepts (such as notions of abjection, repression and anxiety) that developed alongside this branch of literature. Students read canonical works in British and American traditions while reflecting on notions of popular or marginalized literature.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1230 (3) Environmental Literature**
This course explores the conjunctions of literature and environments: natural, built, and/or virtual. Students consider literary confrontations with issues such as ecological crises, climate change, human impact on the planet, technics and indigeneity, non-human animals and inhuman agencies, future natures, and environmental justice. Readings may include novels, non-fiction, short fiction, poems, graphic novels, and more.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1240 (3) Planetarity**
Focuses on post-WWII American writing and thought about the planet and humanity. We explore how postwar efforts to transform the terrestrial environmental and conquer outer space raise questions about humanity, technology, and nature. We also study how earth and space serve novelists, artists, and film-makers as environments to confront large-scale questions about culture, identity, and power.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 1240
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1250 (3) Introduction to World Literature by Women**
This course considers how literature represents gendered experiences across multiple countries and continents. Students will read fiction and poetry by women from South Asia, East Asia, Africa, Europe, and the Americas, that address questions of sexuality, marriage, and family, politics, labor, and justice at the intersections of gender, race, and nation.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 1250
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**ENGL 1270 (3) Introduction to American Literature by Women**
This course investigates how literature by women has shaped the United States over time, from Indigenous authors, to abolitionists, to suffragists, to feminists of various waves. With attention to intersections between class, race, and sexual orientation, students will consider what it has meant and still means to be a woman writer in the United States and will explore how women have engaged, subverted, and resisted ideas about gender.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 1270
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ENGL 1280 (3) Plague and Pandemic**
Explores how literature has depicted the experience of plague across different historical periods and geographical areas (for instance, the Black Death in medieval times, smallpox in colonial America, the 1918 Spanish influenza, the HIV epidemic). Investigates how pandemics raise philosophical questions about what constitutes human communities and borders between insiders and outsiders, health and illness, self and other.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1290 (3) Crime, Policing, Detection**
Explores stories about crime and policing, deviance and detection, law and order. Students will learn how genres such as detective or crime fiction or police procedurals narrate anxieties about race, class, gender, sexuality, and nationality. Analyzes how categories of innocence and guilt, justice and punishment, are imagined and portrayed in short stories, films, novels, and TV shows.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1310 (3) The Modern Fairy Tale**
This course will introduce you to a great variety of fairy tales, folk tales, parables and legends written and composed in English, translated from other languages, and criticism around the form. By the end of the semester, you will have tools to understand these types of stories in terms of both reading and writing. We will discuss terminology, themes, tradition and innovation, as well as the ways that fairytales live in the world now.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1320 (3) The Short Story**
Short stories offer writers the freedom to build new worlds, create new characters, try out new narrative voices and structures, and explore new ideas¿again and again. You will read a range of authors and genres as you consider this dynamic, powerful, and widely varied form.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1340 (3) Mysticism and the Jewish American Literary Tradition**
Explores the mystical tradition within Judaism from ancient times to the present. With roots in the Hebrew Bible, Jewish mysticism is one of the oldest forms of mysticism and has had an influence on some of the greatest philosophical traditions of western civilization.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 1234
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Ideals and Values

**ENGL 1420 (3) Poetry**
Introduces students to how to read a poem by examining the great variety of poems written and composed in English from the very beginning of the English language until recently.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1500 (3) Introduction to British Literature**
Introduces students to the British literary tradition through intensive study of centrally significant texts and genres.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1600 (3) Introduction to American Literature**
Introduces students to the American literary tradition through intensive study of centrally significant texts and genres.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1700 (3) Introduction to Shakespeare**
This course introduces several of William Shakespeare¿s plays, including comedies, tragedies, and histories. Students will become familiar with Shakespeare¿s dramatic language, often by reading aloud, acting short scenes, or offering creative responses. We will also explore how filmmakers have adapted Shakespeare¿s dramas for the screen. No previous experience with Shakespeare is expected: all students at CU are welcome!
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 3000
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 1800 (3) American Ethnic Literatures**
Students will learn how writings by African American, Native American and Indigenous, Chicana/o/x, Latina/o/x, Asian American, and/or Arab American authors are central to the US literary tradition. The class explores the significance of ethnic US literatures and cultures through short stories, novels, plays, films, and more.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ENGL 2006 (3) American Comics and Graphic Novels: An Ambivalent Art**
Immerse yourself in comics. Spanning all media platforms, comics are a global force in the twenty-first century culture. This course is an introduction to comics history and a headlong dive into comics today. It covers superheroes, movies, novels, as well as making comics. It proposes that comics help us understand ourselves in the world today. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 2006
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2016 (3) Children¿s Literature**
This course examines classics of children¿s literature. Students will read a wide range of genres written for children, from fantasy to adventure to fairy tales to realistic fiction. We will discuss how ideas about childhood change over time as well as how one of the most lucrative parts of the publishing industry wields a wide cultural influence.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2017 (3) World Literature**
Songs. Epics. Autobiographies. Novels. Tales. Plays. Films. These genres appear across cultures, languages, and historical periods. This course focuses on how genres work in a variety of cultures and time periods, reading work written in English and in translation. Students will gain a deep understanding of the possibilities of that genre as well as an introduction to the way that literature travels between cultures. Topics and focus will vary by instructor.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2021 (3) Introductory Poetry Workshop**
Introductory course in poetry writing.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of ENGL 1191 (minimum grade B).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2026 (3) Popular Culture, Critical Reading**
This course engages with forms of popular culture (for example, franchises, graphic novels, genre fiction, video games, trashy books) and considers how we can analyze these cultural forms critically. Students read a range of criticism written by amateurs, fans, journalists, social media, critics, and scholars, and will consider how the production of these cultural forms are shaped by different audiences.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2036 (3) Introduction to Media Studies in the Humanities**
Serves as an introduction to media studies specifically from a humanities perspective. Studies both histories and theories of media from the 20th and 21st centuries. Touches on methodologies for undertaking media studies (including distant ready and media archaeology). Objects of study may include such topics as film, radio, social media platforms and games, as well as digital art and literature.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 2036 and AHUM 2036
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2040 (3) Money Matters: Literature and Finance**
This course focuses on the interplay between literature, culture, and the world of money, trade, economics, and finance. Students may consider how literary, cultural, and visual artworks spread alongside trade routes; how writers and artists have depicted financial bubbles, boom and bust cycles, and economic crashes; and how culture is tied to capitalist systems that writers and artists have criticized and boosted. Students may visit Norlin¿s Special Collections and the CU Art Museum.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2046 (3) Future Histories of Technology**
This class explores both literature about future technologies and literary technologies that move across periods, regions, and disciplines. Our cultural and historical approach to future histories of technology will illuminate how race, gender and sexuality, class, and nationality structure seemingly neutral research and development, usage, and innovation. Ultimately, our goal is to see how we¿re not passive consumers but active participants in reimagining the present and future of technology.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 2046
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ENGL 2051 (3) Introductory Fiction Workshop**
Introductory course in fiction writing.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of ENGL 1191 (mimimum grade B).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2058 (3) Introduction to Modern and Contemporary Literature**
This course explores how literature, art, and culture in the 20th and 21st centuries responded to the social, political, and economic upheavals that have occurred since 1900. Students will read a selection of modern and contemporary writers from Anglo-American and/or global traditions to help us understand our present moment and to see what made us who we are.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2102 (3) Literary Analysis**
Students will build skills in careful, detailed reading and critical writing. Focusing on poetry, prose, and plays, the course cultivates an understanding of literary forms and genres and introduces techniques and vocabulary essential for the study of literature.
**Requisites:** Restricted to English (ENGL) majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2112 (3) Introduction to Literary Theory**
This course introduces students to a wide range of critical theories essential to the study of literature. Critical theories have broad applications because they provide ways to interpret all cultural products, including visual arts, music, and writing. We will investigate some of the major movements relevant to literary studies, which may include, for example, cultural studies, structuralism, feminisms, ecocriticism, critical race theories, postmodern theory, media theories, etc.
**Requisites:** Restricted to English (ENGL) majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2115 (3) American Frontiers**
This course explores the power of the frontier myth in US literature and culture. The material we cover may range from stories of the American West and American empire to frontiers like cyberspace or outer space (the final frontier). Texts may include short stories, novels, movies, photographs, and computer games.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2212 (3) Science Fiction**
This course examines science fiction novels, short stories, and movies, paying close attention to what they teach us about our world. How do these works speculate about the future and alternative realms, and how do they portray our hopes and fears for the promises and limits of technology? Science fiction thinks about ways in which bodies, individuals, and societies might be different, and imagines ways of being and living other than our present.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2226 (3) Literature and Psychology**
Explores imaginative representations of mental life and connections between literature and psychology. Topics may include: Allegory, psychomachy, and affective language; Psychoanalytic concepts in literary and cultural studies; Psychoanalytic criticism; Narcissism and selfhood; Dreams, fantasies and interpretation; Family and socialization; Grief and trauma. Students read literary and theoretical texts concerned with affect, cognition and depictions of mind.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2503 (3) Medieval and Renaissance**
Surveys groundbreaking literature from the medieval period to the late seventeenth century. Topics of discussion may include gender and embodiment, technologies of communication and discovery, and premodern notions of race or cultural identity. Students will be encouraged to read aloud, explore unfamiliar literary forms, and share their ideas and questions.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2504 (3) Enlightenment and Modernity**
Surveys key trends and works in literature after 1660, focusing on issues such as modernity; national or colonial identities; political, economic, social, technologic and scientific revolutions; and reading and media technologies. Students will be encouraged to read aloud, explore unfamiliar literary forms, and share their ideas and questions. Formerly ENGL 2512.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2655 (3) American Literature to the Civil War**
Students will explore chaos, possibilities, and violence in American literature as Indigenous lands transform into British colonies transform into a nation that expands across the continent, but nearly implodes in civil war. This class considers how authors struggling to define America used a rising print culture and evolving literary landscape to confront issues of nation, empire, race, gender, sexuality, religion, modernity, and industrialization.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2665 (3) American Literature from the Civil War**
This course surveys the vibrant, diverse, and complex traditions of US writing from the aftermath of the Civil War through the present. Students will explore a period of literary innovation while asking how the United States has transformed into the nation it is today. Topics of discussion may include race, capital, empire, media, and culture.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2666 (3) Monsters**
As Neil Gaiman says when paraphrasing GK Chesterton: ¿Fairy tales are more than true¿not because they tell us dragons exist, but because they tell us dragons can be beaten¿ [my emphasis]. In here we¿ll look with wonder at the monsters, but always with an eye to how we can survive our encounters with them, and how, by beating them, by resisting them, by insisting that there¿s another way than brute strength, we can leave the world a little better than it was.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2707 (3) Introduction to Queer Literature**
How is literature shaped by cultural understandings of queer and non-normative genders and sexualities? How does it, in turn, shape those understandings? This class explores how genders, sexualities, and writing intersect with issues of race, class, nation, ability, and empire. Readings may include novels, short stories, poetry, graphic novels, films, essays, blogs, and more.
**Equivalent - Duplicate Degree Credit Not Granted:** LGBT 2707
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ENGL 2717 (3) American Indian Literature**
Surveys historical and contemporary North American Native American literature. Examines the continuity and incorporation of traditional stories and values in Native Literature, including novels, short stories and poetry.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 2713
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 2737 (3) Introduction to African American Literature**
This course traces the roots of contemporary African American writings through the Harlem Renaissance to early Black poetry and slave narratives. Students will explore how African American authors have used genre, language, and publication to question intersections of race, gender, sexuality, class, nation, empire, colorism, and freedom in US and African American history.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 2732
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ENGL 2747 (3) Introduction to Chicana/o/x Literature**
This class explores the diverse and vibrant writings of Chicana/o/x authors from today back through a time when places like Colorado and California were part of Mexico. Readings consider how Chicana/o/x authors have used concepts such as Greater Mexico, Aztlán, la frontera, and Chicanidad to question intersections of language, race, class, gender, sexuality, indigeneity, nation, violence, and empire.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 2746
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ENGL 2767 (3) Race, Empire, and the Postcolonial**
When did the sun set on the British Empire? In the twentieth century, countries across Africa, Asia, and the Caribbean fought for their independence and built their own literary and cultural traditions while grappling with the legacies of empire. This course explores how authors from these new nation-states wrote about racial oppression; global economic inequalities; the promise of new national identities; the lingering effects of colonialism; and the use of English as a literary language.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 2761
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**ENGL 3000 (3) Shakespeare for Nonmajors**
Introduction to Shakespeare. Introduces students to 6-10 of Shakespeare's major plays. Comedies, histories, and tragedies will be studied. Some non-dramatic poetry may be included. Viewing of Shakespeare in performance is often required.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 1700
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only. English (ENGL) and Humanities (HUMN) majors are excluded from taking this class.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3005 (3) The Literature of New World Encounters**
This course explores how literary, cultural, and historical works stage intersections and encounters between European settlers and Indigenous peoples. Christopher Columbus¿s epochal journey brought the Old World (Asia, Africa, Europe) into contact with the New World (the Americas), setting in motion the diffusion of plants, animals, peoples, and pathogens. Students will think about the economic, cultural, historical, and biological consequences of the European invasion and settlement of the Americas.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**ENGL 3006 (3) Digital Editions & Web Publishing**
Introduces students to the theories and practices involved in making a scholarly edition. Students create their own digital editions and learn the requisite skills to publish scholarly research on the web.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3008 (3) The Novel After 1900**
This course explores developments in the novel after 1900. The twentieth and twenty-first centuries witness multiple experiments in the genre as the novel keeps being invented anew. Students will learn about a range of different novelistic styles and trends in the twentieth and twenty-first centuries, which may include: modernism, socialist realism, postmodernism, postcolonialism, proletariat writing, domestic and feminist fiction, queer fiction, autobiography, magical realism, encyclopedic novels, climate change fiction, middlebrow fiction, speculative fiction.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3016 (3) Writing in the Age of AI**
In this advanced-writing course, students will study the history of artificial intelligence (AI) technology and its current applications, develop hands-on skills for using AI text generators, and examine the ethical concerns and implications of AI technology. Students will learn how AI chatbots draw from vast amounts of data to generate responses to written prompts. They will explore different versions of AI language-generating tools and evaluate their strengths and weaknesses, and they will experiment with using AI at different stages of the writing process. They will practice formulating and revising prompts and verifying the authenticity of AI-produced responses and citations.
**Recommended:** Corequisite ENGL 1110, Grammar Bootcamp (1 credit) and recommended prerequisite of a lower-division writing course.
**Additional Information:** Arts Sci Gen Ed: Written Communication-Upper
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3020 (3) Climate Change Fiction**
This course explores climate change fiction. Popularly known as ¿CliFi,¿ such fiction attempts to represent the cascading impacts and disorienting realities of a planet reshaped by climate change. Rising sea levels, persistent droughts, viral pandemics, super-storms, failed states, collapsing ecosystems, extreme economic inequality, colossal geoengineering projects, reanimated extinct species, remade worlds: the fictions we read address all these aspects of climate change. We will also consider relevant non-fiction, poetry, graphic narratives, and non-literary media.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3021 (3) Intermediate Poetry Workshop**
Intermediate course in poetry writing.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of ENGL 2021 (minimum grade B). Restricted to Creative Writing minor students or students with a sub plan of Creative Writing.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Undergraduate Writing

**ENGL 3022 (3) Medical Humanities**
Explore concepts¿through multifaceted classic and contemporary literary works¿of culture, ethics, and interpretation within the medical field of today, with an eye to thinking critically about the health professions. In this challenging but rewarding course, students will focus on composition, critical thinking, information synthesis, and communication in a global context of conflicting values and assumptions; they will prepare themselves to address problems in healthcare through writing and critical reasoning.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3025 (3) America: Colony, Nation, World**
This course explores how literature creates, complicates, and nuances narratives of the United States from its early beginnings to the contemporary moment. The course may focus on a specific context (for example, the US and the Americas; regionalism; neoliberalism), period (for example, pre-Civil War, Reconstruction, post-1945), or genre (for example, travel narratives; political writing; legal cases).
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3026 (3) Syntax, Citation, Analysis: Writing About Literature**
Students hone their writing skills by closely analyzing the language in literary texts. The course will focus on the nuances of sentence structure and grammar, in order to help students become better writers and readers. Students will learn how to perform research in literary criticism and will write and revise a research paper, as well as a number of other short papers for different audiences. Students will learn and use citation methods within the discipline and will discuss the reasoning behind citational practice.
**Recommended:** Prerequisite completion of lower-division writing requirement.
**Additional Information:** Arts Sci Gen Ed: Written Communication-Upper

**ENGL 3031 (3) Studies in Creative Writing for Nonmajors**
How do stories work, and what's involved with writing them and then getting them out into the world? This course will, through lectures and recitation, work through the many techniques writers use to pull the reader ahead page by page¿dialogue, exposition, prose, structure, and the rest¿as well as the various mechanisms by which that writing can make its way out into the world.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**ENGL 3036 (3) Artist Books in Theory and Practice**
This course will introduce students to an exciting but neglected body of work: artist books. Beginning in the twentieth century, artist books joined the ranks of developed art forms, appearing in every major artistic movement. The first half of the course will introduce students to the wide diversity of styles and materials artist books employ. The second half will be a workshop, in which students will create their own unique books based on research projects.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 3036
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3041 (3) Studies in Fiction and Poetry**
Examines literary forms and themes with special emphasis on issues related to the craft of poetry and fiction. This course is taught in conjunction with visiting lectures by practicing writers. Does not count as Creative Writing workshop credit.
**Requisites:** Requires prerequisite course of ENGL 1191 (minimum grade B).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3046 (3) Literature and Architecture**
This course explores the role of storytelling in literature and architecture. It is part seminar and part studio/workshop. Stories invite readers to dwell in them. Buildings tell stories. Stories and buildings are hence sequential arts. Students study examples of narrative architecture from different periods and cultures and analyze literary and philosophical works that explore the connection between buildings and stories. Students also create literary adaptations of works of architecture and translate literary texts into three-dimensional structures.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 3046
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3051 (3) Intermediate Fiction Workshop**
Intermediate course in fiction writing.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course ENGL 2051 (minimum grade B). Restricted to Creative Writing minor students or students with a sub plan of Creative Writing.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3056 (3) Writing the Past**
In Writing the Past students will study and respond to innovative historical writing across genres and platforms including narrative histories, creative nonfiction, memoir, poetry, novels, graphic novels, and web-based historical projects. Students will respond in writing to an array of projects, generating short reading/viewing responses, and will produce a research project relevant to their own interests and in a genre/platform appropriate to their project. Final projects will be highly individualized.
**Requisites:** Requires prerequisite course of ARSC 1080 or ARSC 1150 or CLAS 1020 or ENGL 1001 or PHIL 1500 or WRTG 1100 or WRTG 1150 or WRTG 1250 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3060 (3) Modern and Contemporary Literature for Nonmajors**
Close study of significant 20th-century poetry, drama, and prose works. Readings range from 1920s to the present.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3068 (3) Modernisms and Modernity, 1900-1945**
What does it mean to be modern? This course explores the aesthetic and literary experiments that flourished in the early twentieth century, as authors confronted the experience of modernity¿urbanization, warfare, changing gender and sexual roles, revolutionary political ideologies, new media, anti-colonial struggles¿and sought to rethink the relationship of the present to the past. Students will learn what modernisms are and how writers transformed literary conventions to capture ways of being modern.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3078 (3) Contemporary Literature: 1945 to the Present**
This course explores contemporary literature written in English from 1945 to the twenty-first century. Students may read authors writing in British, American, or global Anglophone traditions, and will learn about the different historical trends that shaped experiments in literary and cultural production. We will consider how these texts engage with a range of issues contemporary to us, for instance, politics, racial and sexual identities, economics and globalization, families and intimacies.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3081 (3) Intermediate Nonfiction Workshop**
Discussion and practical criticism of student work and discussion of relevant works of literary nonfiction.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of ENGL 2021 or ENGL 2051 (minimum grade B).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3088 (3) Major Authors After 1900**
This course focuses on a single author writing in the twentieth or twenty-first centuries. We will study literary and historical influences and other contemporaneous writers as necessary for gaining a full understanding of an author¿s body of work. The author studied will vary each semester. Check department description for details.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3106 (3) Introduction to Literary Study with Data Science**
Introduces students to the use of data science methods in literary criticism. This course explores how computers and data science methods can provide insight into literature while also developing the necessary coding skills to perform such analysis. Students will learn both to perform and to think critically about computationally-based literary scholarship.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 3106
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3116 (3) Topics in Advanced Theory**
This course will focus on a specific topic in critical theory. The class is designed to give students a deeper understanding of a theoretical issue or problem. Topics will vary by semester. Check department description for details.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3164 (3) History and Literature of Georgian Britain**
The Georgian era (1714-1811) was a period of staggering political, social, economic, intellectual, and artistic transformations. This course studies how literary and artistic works have shaped and responded to the tumultuous history of the eighteenth century, a period both modern and strange. Students learn how writers embraced politeness and Enlightenment values while relying on crude satires to make sense of disease outbreaks, financial bubbles and crashes, changes to marriage, industrialization, slavery, and the French Revolution.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3204 (3) The Novel and its Origins**
Where do novels come from? What explains the emergence of this genre as a form invented alongside the rise of the middle classes, the spread of capitalism, the expansion of the reading public, the increasing visibility of women, and changes in print technology? What is the novel¿s relationship to other literary and cultural forms? Students will learn about the rise of the modern novel in the eighteenth century and its developments throughout the nineteenth century.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3217 (3) Topics in Gender and Sexuality**
This course will focus on a particular issue related to questions of gender, sexuality, identity and culture. Students will explore how literature represents and constructs ideas about gender identity and sexual orientation. Topics vary each semester. Check department description for details.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3227 (3) Sex in Shakespeare's Time**
It¿s easy to think about the 1500s and 1600s as a time of starched ruffs, strict morals, and silenced women. This class seeks to complicate this story by asking how Renaissance Englishmen and -women wrote about and imagined sex. Studying drama, poetry, recipes, letters, ballads, and more, we¿ll explore an erotic landscape full of surprises. How did women describe their desire for other women? Was heterosexual intercourse between consenting partners the norm? In what ways could writers express a desire for intimacy with the dead, or nature, or man-made objects? Could they experience asexuality? Did Renaissance authors recognize or celebrate trans identities? We¿ll pursue these questions and more, inviting each other to test out new ways of reading, writing, and sharing our ideas as a community.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**ENGL 3235 (3) American Novel**
This class explores how over two centuries of Americans have shaped the novel and how the novel has shaped America. What themes or crises define the ¿American novel¿? How do immigrant authors, writers of color, Indigenous novelists, and queer or working class authors unsettle the American stories we think we know? Together we¿ll ask how the transformation of America is made visible in the novel¿s shifting boundaries and forms.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3245 (3) American Poetry**
The poetry of America is as diverse as the peoples who inhabit it. This course offers a chance to spend time with some of the most exciting and challenging verse of the last few centuries, exploring poetic form as something continually remade and unmade. We¿ll read poetry written as protest and poetry as public memory, private poems and poems meant for singing, poetry from the margins and poetry that purports to speak for America itself.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3246 (3) Topics in Popular Culture**
Studies special topics in popular culture; specially designed for English majors. Topics vary each semester. May be repeated for a total of 6 credit hours for different topics.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3267 (3) Women Writers**
This course explores how women write about a range of issues, some explicitly gendered, such as desire, sexuality, marriage, and family, and others perhaps less so, such as politics, justice, race, and class. We¿ll consider how women think about their craft, how they approach questions of art and beauty, and whether we should consider writing by women a separate category. Students will examine a range of literature by women, aiming to be inclusive and intersectional.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3267
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3300 (3) Literary London**
Study the works of a major author, school or period of English literary history in London. Subject rotates each year, with possible topics ranging from medieval to contemporary literature. Course incorporates local sites, landmarks, museums, performances and scholars. Application through the Office of International Education required.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3306 (3) Global Comics**
Focuses on comics as a global narrative art defined by an ongoing process of formal and cultural hybridity. We begin by studying the intertwined history, distinct and shared formal characteristics, and respective cultural significance of the three ¿great traditions¿: American comics, Franco-Belgian bande dessinée, and Japanese manga. We then turn out attention to the study of the contemporary patterns of cross-pollination, dissemination, and globalization that characterize European, North and Latin American, Pan-Asian, and African comics.
**Recommended:** Prerequisite ENGL 2006 Comics and Graphic Novels: An Ambivalent Art.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3310 (3) The Bible as Literature**
No single book has been as influential to the English-speaking world as the Bible. We¿ll read the Hebrew Bible and the New Testament for stories, poetry, and wisdom traditions. We¿ll approach the Bible as literature by analyzing its plots, characters, and meanings. Students study its textual history, how there came to be a ¿Bible,¿ and the many writers, conflicts, and cultures from which it emerged. We¿ll consider the Bible¿s powerful influence on ethics and philosophy. Formerly ENGL 3312.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3310 and JWST 3310
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3347 (3) Asian American Literature**
Surveys the artistic practices and innovations of Asian American novelists, poets, and filmmakers. Through literary and cultural studies, history, and historiography, we will explore the ways that Asian Americans have worked within and against genres of sentimental fiction, realism, postmodernism, memoir, and the graphic novel. Our starting point is Lisa Lowe¿s assertion in Immigrant Acts that Asian American culture is: a site that shifts and marks alternatives to the national terrain by occupying other spaces, imagining different narratives and critical historiographies, and enacting practices that give rise to new forms of subjectivity and new ways of questioning the government of human life by the national state. Thus, we will approach Asian American literature itself as theory, historiography, and socio-historical practice as well as art.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ENGL 3377 (3) Literatures of Race, Multiculturalism, Ethnicity**
Race-related controversies are constantly in the news, and college is when many of us form opinions on these topics. Exploring the literatures of race, multiculturalism, and ethnicity alongside and beyond traditional classics can help us become more informed members of society. This course will help students understand how reading literary and cultural texts and media consumption can shape our assumptions of shared belonging or unbridgeable differences. Topics vary each semester. Check department description for details.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3523 (3) Renaissance Literature**
Study the vibrant English literature of the sixteenth and seventeenth centuries, including the new genres of the public stage play and the love sonnet. Together, we¿ll trace how English writers used poetry, prose, and drama to re-tell Classical stories of transgressive desire, confront religious and social change, and represent cultural negotiations with Islam and the Indigenous inhabitants of the Americas. Students will have the opportunity to explore four-hundred year old books in CU¿s Special Collections. Formerly ENGL 4523.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3544 (3) The Long Eighteenth Century**
This course studies the long eighteenth century (approximately 1660-1815), a time of global wars, political revolutions, scientific innovation, and commercial and colonial expansion. Satire ruled, the novel rose to prominence, women actors and writers took the stage, philosophers challenged authority, and enlightenment ideas took hold. Students will consider how new ideas about democracy, capitalism, industrialization, and what it meant to be human emerged. They may visit Norlin¿s Special Collections and the CU Art Museum.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3553 (3) Chaucer and the Invention of English Literature**
This course explores the literary experiments and innovations of Geoffrey Chaucer¿s writing and those of his contemporaries during the end of the fourteenth century, a period that saw enormous social changes. Students will reflect on what literature is and does, both in the past and in our own time.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3563 (3) Shakespeare in Dialogue**
Shakespeare has often seemed to stand apart. This course proposes instead that the full power of Shakespeare¿s drama and poetry emerges in dialogue. Students will read his plays alongside those of talented contemporaries; explore the dynamic social and political contexts of his writing; ask how Shakespeare¿s works can participate in modern conversations about race, sexuality, nation, and ability; or consider how ¿Shakespeare¿ is transformed by the bodies that perform, edit, or simply read his writing.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3564 (3) Romantic Literature and its Revolutions**
Filled with revolutions and reforms, the Romantic period (1770-1830) saw writing and thinking that shifted the world toward contemporary configurations we recognize. The American, Haitian and French Revolutions changed conceptions of liberty. Poetry and the novel transformed, and women writers gained critical attention. As plantations and factories expanded, writers considered the individual¿s place in society and the natural world, changing gender expectations, and what it meant to be complicit in networks that included human bondage.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3573 (3) Shakespeare in Performance**
Focuses on Shakespeare the dramatist through the study of the three Shakespeare plays produced in the summer by the Colorado Shakespeare Festival. In addition to exploring the text, the historical context and performance conventions c. 1600, students meet the CSF teams (professional directors, dramaturgs, designers and actors) of the three plays and the Producing Artistic Director of the CSF.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3583 (3) Milton¿s Worlds**
This course studies the writings of John Milton within his turbulent political and literary landscape. We will focus on Milton¿s epic, Paradise Lost, which tells a story of worlds created and squandered. We will also explore art and literature that talks back to Milton¿s vision of paradise and evil.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3593 (3) Major Authors in Literature Before 1660**
This course focuses on a single author from the medieval or early modern period. We will study literary and historical influences and other contemporaneous writers as necessary for gaining a full understanding of an author¿s body of work. The author studied will vary each semester. Check department description for details.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3604 (3) Victorian Literature**
This course studies how literature and culture represent the upheavals of the nineteenth century, including industrialization, the science of evolution, and the expansion of the British Empire. Realist, Gothic, and Sensation novels thrived during this period and people turned to poetry to mourn, to celebrate, to seduce, and to inspire. This literature helped to establish literary forms and social and political ideas that remain influential today.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3675 (3) Majors Authors in American Literature**
This course focuses on a single author in American Literature. We will study literary and historical influences and other contemporaneous writers as necessary for gaining a full understanding of an author¿s body of work. The author studied will vary each semester. Check department description for details.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3767 (3) Feminist Fictions**
Examines a series of literary texts to consider how writers across the world have used fiction to creatively stage and reimagine gender and sexuality. Attends to the formal and narrative techniques by which these texts call attention to the fictionality--and thereby the creative malleability--of gender itself. Some cinematic and performance texts will also be included.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3767
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Diversity-Global Perspective

**ENGL 3796 (3) Queer Theory**
Surveys theoretical, critical, and historical writings in the context of lesbian, bisexual, transgender and gay literature. Examines relationships among aesthetic, cultural and political agendas, and literary and visual texts of the 20th century.
**Equivalent - Duplicate Degree Credit Not Granted:** LGBT 3796
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3830 (3) Topics in Advanced Writing and Research**
This reading and writing-intensive course provides students with the resources necessary to conceive, propose, and execute their own research projects. This course will introduce students to a range of critical methods in the study of literature and culture, while offering a writing-intensive experience in a small seminar environment. Readings for the course may include novels, poems, films, or other media as well as relevant historical and critical commentary. The topic of the course will vary.
**Additional Information:** Arts Sci Gen Ed: Written Communication-Upper

**ENGL 3846 (3) Real Analysis: Proofs, Poems, Poetic-Mathematical Analogues**
Focuses on the discovery of analogues, of the visual and metaphorical machinery similarly at work in both mathematical and poetic thought found in proofs and poems. Emphasis will be on building up mathematical and poetic literacy. Cross-genre student discussion and writing will highlight the inner workings of Calculus and 20th-century poetic aesthetics.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3856 (3) Topics in Genre Studies**
Studies special topics in genre studies; specially designed for English majors. Topics vary each semester. May be repeated for a total of 6 credit hours for different topics.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 3930 (1-6) Internship**
Provides academically supervised opportunity for upper-division students to work in public or private organizations on projects related to students' career goals and to relate classroom theory to practice. Department enforced prerequisite: 3.0 GPA and faculty supervision.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: General Literature and Language

**ENGL 3940 (1-3) Service Learning Practicum**
Under faculty supervision, students participate in a service project in conjunction with an academic course.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: General Literature and Language

**ENGL 3950 (1-2) Career Exploration and Development**
Discover tools to facilitate the research and exploration of a wide variety of career opportunities. The class offers hands-on, practical job-search skills such as close reading job advertisements, creating polished resumes, and crafting persuasive cover letters. In addition, reflective activities encourage students to investigate their professional values, interests, strengths and skills. By the end of term, students will have a ready-to-use portfolio to begin the internship or job application process.

**ENGL 4003 (3) Old English 1: Introduction to Old English**
Introduces students to Old English, the ancient ancestor of Modern English (as Latin is the ancestor of Spanish and Italian, distinct from both). Course will focus on reading knowledge through grammar study and translation, and to a lesser extent on pronunciation. Provides basic parsing and translation skills and an introduction to the history, culture, and literature of early medieval Britain. Provides an introduction to grammar and to the history of the English language.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 5003
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4013 (3) Old English 2: Intermediate Old English**
Continues to develop skills in Old English reading and translation. Focuses on shorter canonical texts in verse and prose. Students will produce idiomatic translations for every class, write a midterm exam based on those translations, and write either a final exam or a final paper. Students will also memorize and present a short section of verse in the original language. Graduate students will read and present on secondary scholarship and produce original research.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 5013
**Requisites:** Requires prerequisite course of ENGL 4003 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4018 (3) Literature and Globalization**
This is a special topics course that studies how the rise of globalization, internationalism, and transnationalism has shaped literary and cultural works in the twentieth and twenty-first centuries. Topics vary each semester and may include, for instance, analyses of cross-cultural and economic exchanges, migrations and hybrid identities, the legacies of imperialism, or the globalization of English as a literary language. Check department description for details.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4021 (3) Advanced Poetry Workshop**
Advanced course in poetry writing.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course ENGL 3021 (minimum grade B). Restricted to Creative Writing minor students or students with a sub plan of Creative Writing.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4023 (3) Old English 3: Beowulf**
Continues to develop students' proficiency in Old English through the translation and literary study of the heroic poem _Beowulf_. Students will produce idiomatic translations for every class, write a midterm exam based on those translations, and write either a final exam or a final paper. Students will also memorize and present a short section of the poem. Graduate students will read and present on secondary scholarship and produce original research. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 5023
**Requisites:** Requires prerequisite courses of ENGL 4003 or ENGL 4013 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4026 (3) Special Topics in Genre, Media, and Advanced Writing**
Studies theoretical and historical approaches to genre, media, and writing at the advanced level.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4039 (3) Capstone in Literary Studies**
Topic varies by section, but all sections include small seminar discussions and focus on an individualized research project related to the topic. This course will draw on skills from previous courses in critical reading, thinking, and writing and will culminate in high-level discussions and in the final project.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of ENGL 2102 and ENGL 2112 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) English (ENGL) or Humnanities (HUMN) majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4048 (3) The Modernist Novel**
This course studies the experimental fiction that emerged during the modernist era from roughly 1880 to 1945. The fiction of this time sought to redefine its relationship to the realist novel of the nineteenth century; incorporated the innovations of new media, technologies, and popular forms (radio, film, advertising); responded to radical sociopolitical changes (wars, economic depression, sexual freedoms, extremist ideologies, racial and anticolonial struggles); and imagined the revolutionary possibilities of a new century. Formerly ENGL 4224.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4051 (3) Advanced Fiction Workshop**
Advanced course in fiction writing.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of ENGL 3051 (minimum grade B). Restricted to Creative Writing minor students or students with a sub plan of Creative Writing.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4061 (3) Undergraduate Publishing Workshop**
Students in this workshop will work together to read, rank and select a group of ten finalists from a pool of unsolicited manuscripts collected during an open call for submissions. The open call will be for "horror" novellas, but other genres may be considered in future years. After the judge has selected the contest winner, the class will work together to typeset the collection and to solicit a cover. At the conclusion of the course, the novella will be sent to the printer and will be published by Subito before the conclusion of the 25/26 academic year.
**Requisites:** Prerequisite courses of ENGL 3021 or ENGL 3051 (minimum grade of B).
**Recommended:** Prerequisite other 3000 or 4000 level literature courses.

**ENGL 4071 (3) Screenwriting Workshop**
Designed to give students practical criticism of their script writing and technical format requirements. Either stage plays or screenplays are studied, as announced.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 4071
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of ENGL 3021 or ENGL 3051 (minimum grade B). Restricted to Creative Writing minor students or students with a sub plan of Creative Writing.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4081 (3) Playwriting Workshop**
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of ENGL 3021 or ENGL 3051 (minimum grade B). Restricted to Creative Writing minor students or students with a sub plan of Creative Writing.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4098 (3) Special Topics in the Novel After 1900**
This is a special topics class where students will study particular historical trends, styles, or themes that shape the 20th- and/or the 21st-century novel. Topics will vary each semester. Check department description for details.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4106 (3) Literary Study with Data Science**
This course offers students an opportunity to explore how approaches to ¿big data¿ can be used to advance our understanding of literature. We will learn how to work with a range of intermediate-level computational techniques to generate insights about individual works of literature and about large collection of literary texts. This course will also examine some the methodological implications of enlisting computers in the analysis of literature.
**Recommended:** Prerequisite ENGL 3106.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4113 (3) Medieval Worlds**
This course introduces students to the time period when England and English emerged out of the intersections of Germanic (Viking and English), Celtic, French, and other influences, c. 500-1500 CE. The course offers a dialogue with texts and artifacts from this distant past to explore what is shared with and what distinguishes us from medieval people and their culture.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4116 (3) Advanced Topics in Media Studies**
This course explores specific topics in the history, theory, and practice of mediation. Past topics have included history of the book, theories of digital media, and the theory and practice of multimedia forms. Topics vary each semester. Check department description for details.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4206 (3) Writing for the Real World**
Trains students in advanced techniques of writing with a view toward ¿real world¿ application¿¿that is, usefulness after graduation. Emphasis on writing for a variety of audiences and techniques for achieving conciseness, clarity, expressiveness, logic, and appropriateness of diction and evidence. Readings include classic and contemporary writings about writing and exemplary professional essays from a variety of fields. Previously offered as a special topics course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Written Communication-Upper

**ENGL 4277 (3) Special Topics in Women Writers**
This course focuses on a special topic or issue in works written by women. Topics vary by semester, and may focus on a particular historical period or literary genre. Students may consider writing by women as itself a genre, asking what unites these works in terms of both subject and style. Check department description for details.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4277
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4287 (3) Special Topics in Queer Literature**
This course will focus on a special topic in queer literature and non-normative genders and sexualities. Students will consider how literature reflects and represents understandings of sexuality, gender, desire, and more; the course may engage a variety of genres. Topics vary by semester. Check department description for details.
**Equivalent - Duplicate Degree Credit Not Granted:** LGBT 4287 and WGST 4287
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4368 (3) Modern Drama**
This course surveys continental, British, and American playwrights, drama, and theatrical performance since the 1880s. Students will study significant theatrical movements like realism, absurdism, and postcolonialism. Whether questioning our ability to make sense of our world or arguing that we must change the world to liberate the excluded, plays speak to our moment, taking up everything from women¿s rights to queer identity to racial equality.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4468 (3) Modern Poetry**
This course studies the diverse themes and forms of poetry written across the 20th and 21st centuries. From structured forms to free verse, from songs to sonnets, from private lyrics to public commemorations, from the intimacy of feelings to political anthems, from grief to joy, modern poetry bears witness to how we felt and how the world transformed across the turmoil and turbulence of these centuries we call modern.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4513 (3) British Medieval Literature**
Intensive study of the major literary works of the Middle Ages in Britain.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4514 (3) Advanced Topics: The Long 18th Century**
Covers advanced topics in the Restoration and Eighteenth-century.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4524 (3) Advanced Topics: Romanticism**
Covers advanced topics in British Romanticism. Formerly ENGL 4574.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4624 (3) Topics in Transnational Literature 1660-1900**
This course explores a topic in British literature and culture in the period sometimes referred to as the ¿modernity¿ (1660-1900) that crosses the traditional divisions of nationality, history, and/or discipline. Topics vary by semester. Check department description for details.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4634 (3) Advanced Topics: The Victorians**
Covers advanced topics in Victorian literature. Formerly ENGL 4614.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4655 (3) Special Topics in American Literature to 1900**
This course will focus on a special topic in American literature prior to 1900: the class may cover anything in American literature from before Columbus arrived in the Americas through the excesses of the Gilded Age and the Spanish-American War. Topics vary by semester. Check department description for details.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4665 (3) Special Topics in American Literature after 1900**
This course will focus on a special topic in US literature after 1900: the class might study anything in US literature from the dawn of the twentieth century through our contemporary moment. Topics vary by semester. Check department description for details.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4677 (3) Jewish-American Literature**
This course explores a variety of Jewish-American literary works from the late-nineteenth century to the present, from Abraham Cahan to Philip Roth to Cynthia Ozick. We examine a number of issues, including what a Jewish-American writer is or is not, what role the immigrant experience plays in Jewish writing, how assimilation is represented, how this literature changes over time, what the significance is of gender roles, and how it draws from spiritual and mystical traditions. Formerly ENGL 3677.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4677
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ENGL 4693 (3) Advanced Topics in British Literature to 1660**
Explores a special topic in medieval or early modern literature. May be repeated for a total of 9 units for different topics.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENGL 4697 (3) Special Topics in Ethnic US Literatures**
This course will go in-depth into a special topic in ethnic US literatures through texts drawn from African American, Chicana/o/x, Latina/o/x, Native American and Indigenous, Asian American, and/or Arab American traditions. Topics vary by semester. Check department description for details.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4692
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ENGL 4717 (3) Native American and Indigenous Studies Capstone Seminar**
Engages a wide range of NAIS methodologies with a series of case studies. Focuses on print, visual, and digital texts encompassing wide swathe of Eurowestern disciplines, while seeking to recuperate and restore Indigenous epistemic practices within our scholarship. Refines students' skills in intellectual debate in the spirit of shared inquiry and challenges research and writing skills.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4717
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**ENGL 4820 (3) Honors Seminar**
Prepares prospective honors students to write honors theses. Focuses on sharpening the skills needed to write a successful thesis, including research techniques and the ability to evaluate and respond to secondary materials. Required for Honors in English Literature.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sciences Honors Course

**ENGL 4830 (3) Honors Thesis**
Students accepted to English Departmental Honors are enrolled in this course.
**Additional Information:** Arts Sciences Honors Course

**ENGL 4840 (1-3) Independent Study---Upper Division**
Creative writing.
**Repeatable:** Repeatable for up to 8.00 total credit hours.

**ENGL 4850 (1-3) Independent Study---Upper Division**
Literature/language.
**Repeatable:** Repeatable for up to 8.00 total credit hours.

**ENGL 5000 (3) Introduction to Applied Shakespeare**
Provides an introduction to the life, work and world of William Shakespeare to prepare students for the Applied Shakespeare Professional Masters Certificate two-week intensive. Students will gain a background in the social, cultural and political context of Renaissance theater, will be introduced to the conventions of Shakespearean drama and will explore key concerns impacting our understanding of Shakespeare's works. Department consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5003 (3) Old English 1: Introduction to Old English**
Introduces students to Old English, the ancient ancestor of Modern English (as Latin is the ancestor of Spanish and Italian, distinct from both). Course will focus on reading knowledge through grammar study and translation, and to a lesser extent on pronunciation. Provides basic parsing and translation skills and an introduction to the history, culture, and literature of early medieval Britain. Provides an introduction to grammar and to the history of the English language.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 4003

**ENGL 5013 (3) Old English 2: Intermediate Old English**
Continues to develop skills in Old English reading and translation. Focuses on shorter canonical texts in verse and prose. Students will produce idiomatic translations for every class, write a midterm exam based on those translations, and write either a final exam or a final paper. Students will also memorize and present a short section of verse in the original language. Graduate students will read and present on secondary scholarship and produce original research.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 4013

**ENGL 5019 (3) Survey of Contemporary Literary and Cultural Theory**
Introduces a variety of critical and theoretical practices informing contemporary literary and cultural studies.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5023 (3) Old English 3: Beowulf**
Continues to develop students' proficiency in Old English through the translation and literary study of the heroic poem _Beowulf_. Students will produce idiomatic translations for every class, write a midterm exam based on those translations, and write either a final exam or a final paper. Students will also memorize and present a short section of the poem. Graduate students will read and present on secondary scholarship and produce original research. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 4023

**ENGL 5029 (3) British Literature and Culture Before 1800**
Introduces graduate level study of medieval and/or early modern writing and/or the long eighteenth century. Topics will vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5059 (3) British Literature and Culture After 1800**
Introduces graduate level study of Romantic, Victorian, Modern, and/or Postmodern writing. Topics will vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5109 (3) Literature and Culture of the United States**
Introduces graduate level study of writing of early and/or nineteenth-century and/or twentieth-century American literature. Emphasizes a wide range of genres, forms, historical background, and secondary criticism. Topics will vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5139 (3) Global Literature and Culture**
Introduces graduate level study of recent writing in English from around the world. Emphasizes a wide range of genres, forms, new media, and secondary criticism. Cultivates research skills necessary for advanced graduate study. Topics will vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5169 (3) Multicultural/Postcolonial Studies**
Introduces graduate level study of ethnic American and/or postcolonial writing in English, including relevant theoretical discourse. Emphasizes a wide range of genres, forms, historical background, and secondary criticism. Cultivates research skills necessary for advanced graduate study. Topics will vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5199 (3) Studies in Special Topics**
Introduces graduate level study of writing of the United States from its inception to the present. Emphasizes a wide range of genres, forms, historical background, and secondary criticism. Topics will vary.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5229 (3) Poetry Workshop**
Designed to give students time and impetus to generate poetry and discussion of it in an atmosphere at once supportive and critically serious. Enrollment requires admission to the Creative Writing Graduate Program or the instructor's approval of an application manuscript.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to English Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5239 (3) Fiction Workshop**
Designed to give students time and impetus to generate fiction and discussion of it in an atmosphere at once supportive and critically serious. Enrollment requires admission to the Creative Writing Graduate Program or the instructor's approval of an application manuscript.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to English Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5259 (3) Nonfiction Workshop**
Designed to give students time and impetus to generate nonfiction and discussion of it in an atmosphere at once supportive and critically serious. Enrollment requires admission to the Creative Writing Graduate Program or the instructor's approval of an application manuscript.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5269 (3) Publishing Workshop**
Provides practical experience in the editorial, design, and business procedures of desktop publishing.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5279 (3) Studies in Poetry**
Addresses contemporary poetry, and/or literary works important for contemporary poetry.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5299 (3) Studies in Fiction**
Addresses contemporary fiction, and/or literary works important for contemporary fiction. May be repeated for up to 6 total credit hours.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5309 (3) Playwriting**
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5319 (3) Studies in Literary Movements**
Studies styles, trends, innovations and major writers in significant literary movements, particularly those after 1900, such as modernism and postmodernism.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5459 (3) Introduction to the Profession**
Introduces purposes, methods and techniques of professional scholarship in English. Provides an overview of the discipline, including traditional areas of research and recent developments. Teaches students how to use research, bibliographic, and reference tools to prepare papers for conferences and publication. Required of all MA students in English.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5529 (3) Studies in Special Topics 1**
Studies special topics that focus on a theme, genre, or theoretical issue not limited to a specific period or national tradition. Topics vary each semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5549 (3) Studies in Special Topics 2**
Studies special topics that focus on a theme, genre, or theoretical issue not limited to a specific period or national tradition. Topics vary each semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5559 (3) Studies in Special Topics 3**
Studies special topics that focus on a theme, genre, or theoretical issue not limited to a specific period or national tradition. Topics vary each semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 5849 (1-6) Independent Study (Graduate Level 1)**
Independent investigation of topics of specific interest to individual students. Students wishing to enroll in independent study must petition the Associate Chair for Graduate Studies prior to the beginning of the semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 6949 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 6959 (1-9) Master's Thesis**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 7019 (3) Advanced British Literature and Culture Before 1800**
Studies special topics in medieval and/or early modern writing and/or the long 18th century. Topics will vary.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 7059 (3) Advanced British Literature and Culture After 1800**
Studies special topics in Romantic and/or Victorian, and/or modern and/or postmodern writing. Topics will vary.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 7119 (3) Advanced Literature and Culture of the United States**
Studies special topics in writing of the United States.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 7149 (3) Advanced Global Literature and Culture**
Studies special topics in recent writing in English from around the world.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 7179 (3) Advanced Multicultural/Postcolonial Studies**
Studies special topics in ethnic American and/or postcolonial writing in English, including relevant theoretical discourses. Topics will vary.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 7489 (3) Advanced Special Topics**
Studies special topics in theory, culture, and literature of any period. Topics will vary.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to English (ENGL) and English Lit- Creative Writing (CRWR) graduate students only.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 7849 (1-3) Independent Study (Graduate Level 2)**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Courses

**ENGL 8999 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Courses

# English as a Second Language (ESLG) Courses

**ESLG 1130 (2) Pronunciation for International Graduate Students**
Designed for international graduate students who want to polish and refine their spoken English skills. The course emphasizes producing increasingly accurate English stress, rhythm and intonation, and vowels and consonants. Students participate in listening and speaking activities targeting specific pronunciation features, prepare recordings, and deliver short presentations related to their field. Students receive weekly individualized feedback.
**Requisites:** Restricted to International Graduate students.

**ESLG 1140 (2) Public Speaking for International Students**
Designed for international graduate students to improve oral communication skills for effective academic, professional, and social interactions. Specific attention is given to presenting, explaining and clarifying ideas, negotiating, interrupting, hedging, and responding to questions. Students deliver short formal presentations and impromptu speeches, and lead and participate in group discussions. Students improve active listening skills, non-verbal communication and English pronunciation.
**Requisites:** Restricted to International Graduate students.

**ESLG 1210 (2) Academic Writing for International Graduate Students**
Designed for international graduate students who would benefit from academic and professional writing instruction and practice. This course addresses development of paragraphs and full-length papers, reports and proposals. Focus areas include organization and style, grammar and vocabulary, and using source material effectively. Assignments are customized to students' disciplines with extensive instructor feedback to improve fluency, clarity, and accuracy in writing.
**Requisites:** Restricted to International Graduate students.

**ESLG 1222 (2) Advanced Written Composition for Foreign Students**
Continued practice in academic writing, including incorporating the ideas of others and citing sources appropriately. Extensive instructor feedback provided. Preparation, writing, and revising of a full-length academic term/research paper or work on chapters for a master's thesis or doctoral dissertation. Does not fulfill humanities or major requirements.
**Recommended:** Prerequisite ESLG 1210.

**ESLG 1410 (3) Integrated Academic English Skills for Undergraduate International Students**
Designed for international undergraduate students who want to improve oral and written English communication skills. Students build confidence and accuracy through interactive reading, writing, listening and speaking activities. Students gain insight on U.S. academic culture and conventions by giving short presentations, collaborating on team projects, and writing academic papers using source materials. Course also emphasizes organization, grammar, and vocabulary.
**Requisites:** Restricted to International Undergraduate students.

# Entrepreneurial and Small Business Management (ESBM)

## Courses

**ESBM 3100 (3) Innovation: From Creativity to Entrepreneurship**
Introduces non-business students to the multiple facets of entrepreneurship and the entrepreneurial process. Entrepreneurship is a process of fundamental transformation: from innovative idea to enterprise and from enterprise to valuethus, entrepreneurship is more than a business practice. Innovation is central to this process and students will be challenged to develop creative solutions to a problem or need. Degree credit not granted for Business majors.
**Requisites:** Restricted to non-Business majors with 60-180 units completed.

**ESBM 3700 (3) Entrepreneurial Environments**
Introduces entrepreneurship. Addresses opportunity recognition, target markets, industry analysis, business model identification, sources of funding, managing rapid growth and writing feasibility studies. Examines alternative forms of entrepreneurship such as franchising, corporate entrepreneurship, family business and social entrepreneurship.
**Requisites:** Requires prerequisite courses of BCOR 2001 or BCOR 2204 and BASE 2104 (all minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**ESBM 4570 (3) Entrepreneurial Finance**
Focuses on the financial concepts, issues, methods and industry practices relevant to entrepreneurial decision makers. Addresses a variety of topics including financial valuation, various sources of funds, structures and legal issues in arranging financing, the private and public venture capital markets, and preparation for, and execution of, an initial public securities offering. Provides an understanding of the segments of the capital markets specializing in start-ups and growth financing.
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**ESBM 4820 (3) Special Topics in Entrepreneurship**

**ESBM 4830 (3) New Venture Creation**
This course content is relevant to the student who wants the entrepreneurial toolkit, start a new venture, is interested in working in the startup world, would like to effectively evaluate the probability of success for a new venture and/or develop a methodology for entrepreneurial thinking that provides benefits for big and small ventures. The final deliverable is a professional pitch to a group of seasoned investors and the submission of a complete business plan.
**Equivalent - Duplicate Degree Credit Not Granted:** EMEN 4825
**Requisites:** Requires prerequisite course of ESBM 3700 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**ESBM 4900 (1-3) Projects in Entrepreneurial Companies**
Complete projects in preselected entrepreneurial companies. Department consent required.

# Environment and Sustainability (ENST)

## Courses

**ENST 4150 (3) Energy Policy Project**
Provides students with an opportunity to apply their knowledge of energy technologies, systems and policies to current issues. Specific topical coverage varies by semester. Examples include natural gas fracking, automotive fuel economy standards and natural gas exports. Students work in teams to research, prepare and present a detailed and specific energy project proposal. Intended for Renewable and Sustainable Energy Certificate students. Formerly RSEI 4150.
**Requisites:** Restricted to Renewable Sustainable Energy (RASE-CERU) students only.
**Recommended:** Prerequisites ENVS/PHYS 3070 and ENVS 3621.

**ENST 5100 (1) Renewable and Sustainable Energy Seminar**
Examines a wide range of energy issues in seminar format. Students attend energy-related seminars and critique/evaluate the presented material. Open to graduate students from all disciplines. Formerly RSEI 5100.

**ENST 5200 (3) Energy Topics Course**
Covers timely topics related to renewable and sustainable energy. Specific offerings vary by semester. Formerly RSEI 5200.

# Environmental Design (ENVD)

## Courses

**ENVD 1001 (1) ENVD First-Year Seminar**
Transitions first-year ENVD students into college through the process of discovering their path to educational success. Provides opportunities to facilitate learning through peer support groups and curricular integration with the ENVD core classes.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Social Factors

**ENVD 1002 (2) Technology 1: Applications for Environmental Design**
Introduces technological competencies to support studio work including design representation and presentation. Students develop fundamental competencies in sketching, graphic design, file management and 3D modeling. Course is part of a co-requisite sequence: ENVD 1002, Technology 1: Applications for Environmental Design is a 16-week class that is taught alongside the following two 8-week studios. ENVD 1010, Studio 1: Introduction to Environmental Products of Design, taken the first half of the semester, followed by ENVD 1020, Studio 1: Introduction to Architecture, taken in the second half of the semester.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and to IUT On Track students.
**Grading Basis:** Letter Grade

**ENVD 1004 (3) Introduction to Environmental Design**
Introduces methods, principles and philosophies that guide environmental design. Explores ways of thinking about, and accomplishing, the act of design. Students contemplate the processes and motivations behind design decisions including discussions of environmental sustainability and social responsibility.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: History and Theory

**ENVD 1010 (3) Studio 1: Introduction to Environmental Products of Design**
Introduces students to concepts and techniques related to the design of products at a human scale. In an immersive project-based studio environment students develop the foundation of design communication and thinking through a series of hands-on projects with physical outcomes. Course is part of a co-requisite sequence: ENVD 1010, Studio 1: Introduction to Environmental Products of Design is taken the first 7-weeks of the semester, followed by ENVD 1020, Studio 1: Introduction to Architecture, taken in the second 7-weeks of the semester, along with ENVD 1002, Technology 1: Applications for Environmental Design, a 14-week class that is taught alongside the two 7-week studios.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and to IUT On Track students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: History and Theory

**ENVD 1012 (2) Technology 2: Visual Communications**
Explores the basic visual communication skills necessary for environmental design through image manipulation, vector and raster graphics, and composite renderings. Students will explore concepts in visual hierarchy, composition, and color theory to inform graphics within each environmental design major. Course is part of a co-requisite sequence: ENVD 1012, Technology 2: Visual Communications is a 16-week class that is taught alongside the following two 8-week studios. ENVD 1030, Studio 1: Introduction to Landscape Architecture, taken the first half of the semester, followed by ENVD 1040, Studio 1: Introduction to Sustainable Planning and Urban Design, taken in the second half of the semester.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and to IUT On Track students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 1020 (3) Studio 1: Introduction to Architecture**
Introduces students to strategies and techniques of architectural design and communication in a hands-on studio environment. Students explore architectural form-making and design opportunities through an iterative design process culminating with a small-scale architectural project that responds to environmental, contextual and programmatic needs. Course is part of a co-requisite sequence: ENVD 1020, Studio 1: Introduction to Architecture, an 7-week class which is taken in the second half of the first semester. ENVD 1010, Studio 1: Introduction to Environmental Products of Design, taken during the first 7-weeks of the semester, and ENVD 1002, Technology 1: Applications for Environmental Design is a 14-week class that is taught alongside the two 7-week studios.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and to IUT On Track students.
**Grading Basis:** Letter Grade

**ENVD 1022 (2) Technology 3: Intermediate Applications for Environmental Design**
Explores more advanced competencies in graphic design, diagramming, 3D modeling, and digital fabrication.
**Requisites:** Requires prerequisite course of ENVD 1012 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 1024 (3) History of the Built Environment**
Fosters an appreciation for the designed environment by exploring historical contexts that have shaped our built environment. Students gain insight into how design themes have emerged in response to significant historical movements. Covering a diverse range of topics, this course examines everything from small objects to iconic buildings, significant landscapes, gardens, and urban spaces. Through this exploration, students develop an understanding of how the built environment influences and reflects societal values throughout history.
**Requisites:** Requires prerequisite course of ENVD 1004 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and to IUT On Track students.
**Grading Basis:** Letter Grade

**ENVD 1030 (3) Studio 1: Introduction to Landscape Architecture**
Exposes students to concepts and strategies inherent to the practice of landscape architecture. Students design for biodiversity, climate resilience and human and beyond human physical and mental health within an urban context. Course is part of a co-requisite sequence: ENVD 1030, Studio 1: Introduction to Landscape Architecture, taken the first 8-weeks of the semester, followed by ENVD 1040, Studio 1: Introduction to Sustainable Planning and Urban Design, taken in the second 8-weeks of the semester, along with ENVD 1012, Technology 2: Visual Communications, a 16-week class that is taught alongside the two 8-week studios.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and to IUT On Track students.
**Grading Basis:** Letter Grade

**ENVD 1040 (3) Studio 1: Introduction to Sustainable Planning and Urban Design**
Explores concepts and strategies related to urban planning and design. Students collaboratively develop a design solution to a small-scale problem within an urban fabric using basic skills of analysis and design iteration. Course is part of a co-requisite sequence: ENVD 1040, Studio 1: Introduction to Sustainable Planning and Urban Design, an 8-week class which is taken in the second half of the first semester. ENVD 1030, Studio 1: Introduction to Landscape Architecture, taken during the first 8-weeks of the semester, and ENVD 1012, Technology 2: Visual Communications, a 16-week class that is taught alongside the two 8-week studios.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and to IUT On Track students.
**Grading Basis:** Letter Grade

**ENVD 1110 (3) Studio 2: Fundamentals of Environmental Design 1**
Explores the core principles shared across environmental design disciplines, including Architecture, Landscape Architecture, Environmental Product Design, and Sustainable Planning and Urban Design. Through a multidisciplinary studio approach, students engage in spatial problem-solving, sustainable design strategies, peer-to-peer collaboration, and design thinking. Hands-on projects challenge students to apply foundational tools and methods to real-world challenges, considering social, environmental, and cultural impacts in both built and natural environments.¿Course is part of a co-requisite sequence: ENVD 1110, Studio 2: Fundamentals of Environmental Design 1, taken the first 7-weeks of the semester, followed by ENVD 1120, Studio 2: Fundamentals of Design 2, taken in the second 7-weeks of the semester, along with ENVD 1022, Technology 3: Intermediate Applications for Environmental Design, a 14-week class that is taught alongside the two 7-week studios.
**Requisites:** Requires prerequisite courses of ENVD 1040 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 1120 (3) Studio 2: Fundamentals of Design 2**
Explores the core principles shared across environmental design disciplines, including Architecture, Landscape Architecture, Environmental Product Design, and Sustainable Planning and Urban Design. Through a multidisciplinary studio approach, students engage in spatial problem-solving, sustainable design strategies, peer-to-peer collaboration, and design thinking. Hands-on projects challenge students to apply foundational tools and methods to real-world challenges, considering social, environmental, and cultural impacts in both built and natural environments. The course is part of a co-requisite sequence: ENVD 1120, Studio 2: Fundamentals of Design 2, a 7-week class which is taken in the second half of the first semester. ENVD 1110, Studio 2: Fundamentals of Environmental Design 1, taken during the first 7-weeks of the semester, and ENVD 1022, Technology 3: Intermediate Applications for Environmental Design, a 14-week class that is taught alongside the two 7-week studios.
**Requisites:** Requires prerequisite courses of ENVD 1040 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 1130 (3) Studio 2: Fundamentals of Design 3**
Explores the core principles shared across environmental design disciplines, including Architecture, Landscape Architecture, Environmental Product Design, and Sustainable Planning and Urban Design. Through a multidisciplinary studio approach, students engage in spatial problem-solving, sustainable design strategies, peer-to-peer collaboration, and design thinking. Hands-on projects challenge students to apply foundational tools and methods to real-world challenges, considering social, environmental, and cultural impacts in both built and natural environments.
**Requisites:** Requires prerequisite courses of ENVD 1040 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 1140 (3) Studio 2: Fundamentals of Environmental Design 4**
Explores the core principles shared across environmental design disciplines, including Architecture, Landscape Architecture, Environmental Product Design, and Sustainable Planning and Urban Design. Through a multidisciplinary studio approach, students engage in spatial problem-solving, sustainable design strategies, peer-to-peer collaboration, and design thinking. Hands-on projects challenge students to apply foundational tools and methods to real-world challenges, considering social, environmental, and cultural impacts in both built and natural environments.¿
**Requisites:** Requires prerequisite course of ENVD 1040 (all minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 1150 (3) First Year Writing for Environmental Design**
Introduces students to the fundamentals of effective academic and professional communication within Environmental Design. Students develop strong written and oral communication skills and build knowledge of research techniques. Classroom activities and discussions challenge students to become critical and flexible thinkers.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 1976 (1) Colloquium - Exploring Careers, Research and Practice**
Develops an understanding of the breath of environmental design careers, research and practice, through a series of faculty and professional lectures.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 2001 (3) Human Behavior and Design**
Examines reciprocal relationships between people and the built and natural environments and the ways that human well-being is impacted by the built environment. Traces major issues and approaches in design research to understand how people are influenced by the environment and how they can create healthy, just, and livable places.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and to IUT On Track students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Social Factors

**ENVD 2003 (3) Ecological Systems in Design**
Introduces the essential principles and concepts of ecology as they relate to the design and understanding of the built environment. Students explore interactions between people and nature, the design of resilient ecological systems and ways that the built world is influenced by its environment.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Physical Factors

**ENVD 2011 (1-6) Special Topics: Social Factors in Environmental Design for non-majors**
Addresses variable topics in the relationship of human experience and behavior to the built environment.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to non-Environmental Design majors with 0-56 credits (Freshmen or Sophomores).

**ENVD 2012 (1-6) Special Topics: Computer Methods and Graphic Applications for non-majors**
Addresses variable topics in design communications, animation and environmental simulation, and computational methods of technical evaluation and optimization.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to non-Environmental Design majors with 0-56 credits (Freshmen or Sophomores).

**ENVD 2013 (1-6) Special Topics: Physical Factors in Environmental Design for non-majors**
Addresses variable topics in appropriate technology, public policy and natural hazards, organization of the designing and building process, and physical elements of urban development.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to non-Environmental Design majors (not ARCH, EPOD, LAND, PLAN or open option ENVD)with 0-56 credits (Freshmen or Sophomores).

**ENVD 2014 (1-6) Special Topics: Theory, History and Historiography of Environmental Design for non-majors**
Addresses variable topics in theory and criticism, history and historiography of environmental design.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to non-Environmental Design majors with 0-56 credits (Freshmen or Sophomores).

**ENVD 2015 (1-6) Special Topics: Technology and Practice for non-majors**
Addresses variable topics in the new technologies and issues of professional practice in the environmental design professions.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to non-Environmental Design majors with 0-56 credits (Freshmen or Sophomores).

**ENVD 2101 (3) Context of Design: Planning and Implementation**
Explores the regulatory and procedural context in which design decisions are made and implemented. Includes an examination of finance, policy, and development procedures necessary in bringing conceptual designs to life.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 2352 (1-6) Special Topics: Beginning Digital Applications**
Foundation level computing skills for design analytics and representation.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 3002 (3) Revit I: Introduction to Building Information Modeling (BIM)**
Introduces students to BIM modeling through the Revit platform. Fundamental skills will be taught to help students understand technical and practical aspects of this software to support academic projects and gain early exposure to expectations in professional practice.
**Requisites:** Requires prerequisite course of ENVD 1022 (minimum grade C-) and 30+ credits. Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 3003 (3) Site Planning**
Introduces the site planning process including: site analysis and its relationship to building program and site concept, and preparation of site plans. Emphasis is placed on the planning of the physical site through a thorough understanding of process, land use, site constraints and synthesis of ecological, functional and aesthetic considerations in the site planning process.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite ENVD 2130.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Physical Factors

**ENVD 3009 (1-6) Special Topics in Environmental Design**
Seminar or design lab on special issues in environmental design, including study abroad. Variable topic class.
**Repeatable:** Repeatable for up to 21.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 3011 (1-6) Special Topics: Social Factors in Environmental Design for non-majors and ENVD students**
Addresses variable topics in the relationship of human experience and behavior to the built environment.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) are required to take class for grade.

**ENVD 3012 (1-6) Special Topics: Computer Methods and Graphic Applications for non-majors and ENVD students**
Addresses variable topics in design communications, animation and environmental simulation, and computational methods of technical evaluation and optimization.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of ENVD 3002 (minimum grade C-). Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) are required to take class for grade.

**ENVD 3014 (1-6) Special Topics: Theory, History and Historiography of ENVD for non-majors and ENVD students**
Addresses variable topics in theory and criticism, history and historiography of environmental design.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) are required to take class for grade.

**ENVD 3023 (1-6) Special Topics: Physical Factors in Environmental Design for non-majors and ENVD students**
Addresses variable topics in appropriate technology, public policy and natural hazards, organization of the designing and building process, and physical elements of urban development.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) are required to take class for grade.

**ENVD 3035 (1-6) Special Topics: Technology and Practice for non-majors and ENVD students**
Addresses variable topics in the new technologies and issues of professional practice in the environmental design professions.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) are required to take class for grade.

**ENVD 3052 (3) Digital Tools for LAND/PLAN**
Weave together digital tools used in the landscape architecture and sustainable planning professions. Emphasizing the exploration of design, 3D modeling, analysis, and how to use and present data. Tools covered include software for mapping, data analysis and 3D modeling.
**Requisites:** Requires prerequisite course of ENVD 1022 (minimum grade C-). Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD) and Environmental Planning Minor students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 3100 (6) ENVD Interdisciplinary Design Studio**
Explores a sequence of investigations that lead to the development of design concepts for critical evaluation and discussion. Students analyze intermediate to advanced design practices that are common to the disciplines of architecture, planning, urban design, landscape architecture, and product design through an interdisciplinary design project.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and Environmental Planning Minor students with 40+ credits and ENVD 2003 or ENVD 2001 prerequisites.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Studios

**ENVD 3102 (3) Revit II**
Provides students a learning and practice environment to deepen and expand their skills within the Revit software. The experiential nature of this software benefits from repetitive use and expansion of skills, which this course provides. More attention will be given to presentation techniques, family building and templates which support project advancement and production. This course may also integrate plug-ins and other software compatible within and alongside Revit.
**Requisites:** Requires prerequisite course of ENVD 3002 (minimum grade C-). Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 3150 (3) Professional Communication for Design Students**
Prepares students for the projects they will undertake as design professionals. Enriches students' awareness of writing as a life-long tool and communicates the importance of writing well, while emphasizing effective written and oral communication skills.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 3152 (3) ArcGIS: Geographic Information Systems (GIS)**
Focuses on construction and use of computer-based information systems to represent and manipulate geographic data. Emphasizes the recording, mapping, and transforming of data for analysis and use by environmental designers.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 3212 (3) Color Theory**
Develops visual awareness and technical knowledge while exploring the significance of color in the design world. Color plays a crucial psychological role, evoking emotions and influencing behavior, making it essential for designers to use color intentionally and thoughtfully. Through hands-on activities, we examine contemporary uses of color and patterns, learning how to achieve color harmony in design.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 3252 (3) RHINO: Intro to 3-D Modeling**
Teaches beginning to intermediate skills and design practices of 3D modeling using Rhino-Rhinoceros 3D software. Learn strategies around representing your design in 3D models and how to use these techniques.
**Requisites:** Requires prerequisite course of ENVD 1022 (minimum grade C-) and 30+ credits. Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 3314 (1-6) Special Topics: History of Design**
Provides a lecture exploring various topics of design history of the built environment. The focus of this course is directed to all majors.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) students with 27-180 credits (Sophomores, Juniors or Seniors).
**Grading Basis:** Letter Grade

**ENVD 3352 (1-6) Special Topics: Intermediate Digital Applications**
Intermediate level computing skills for design analytics and representation.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of ENVD 3252 or in progress. Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 3909 (1-6) Independent Study**
By special arrangement with instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 3919 (1-6) Teaching Assistant**
By special arrangement with instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Program in Environmental Design (ARPLU) students with 87 -180 credits (Seniors).
**Recommended:** Prerequisite three point zero GPA.
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 3929 (1) Peer Leadership and Mentorship and Transitioning Students**
Explores the student transition to university life and engage students in active leadership and mentoring capacity-building activities. Examines the role peers play in leading students through transitional development. Students will learn the theoretical basis for understanding student transition and develop their mentoring capacities as well as examine personal identity and values and its intersection with leadership and mentorship.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) students with 27-180 credits (Sophomores, Juniors or Seniors).
**Recommended:** 3.00 GPA.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 3939 (1-3) Exploratory Internship**
Offers professional experiences allowing students to discover a variety of design-related environments. In addition to the internship experience, students attend classroom sessions providing professional development exercises.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) students with 27-180 credits (Sophomores, Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 3972 (3) Advanced Writing in Environmental Design**
Prepares students for researching, planning, and writing a Senior Honors thesis and for professional life. Enriches students' awareness of writing as a life-long tool and communicates the importance of writing well. Emphasizes clear, persuasive, and effective written and oral communication skills. Projects explore the many ways in which writing is a powerful tool in the world of design.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) students with 57 credit hours and a cumulative GPA of 3.0 or higher.
**Grading Basis:** Letter Grade

**ENVD 4009 (1-6) Special Topics in Environmental Design**
Variable topic seminar or design lab on special issues in environmental design.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 4023 (3) Environmental Impact Assessment**
Provides a field-oriented seminar in current environmental impact controversies. Gives attention to history, theory, and application of impact analysis at state levels for designers, land-use planners, and others involved in resource decision making. By instructor consent, open to nonmajors on a space available basis.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Physical Factors

**ENVD 4052 (3) Portfolio Design: Graphic Communication for Designers**
Explores topics related to graphic design and visual communication aimed at constructing your professional identity. Topics include layout, composition, fonts, color theory, printing, publication and web-based presence. Comprehend the fundamentals of graphic design and their application in visual communication through the use of Adobe Creative Suite.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD), with 60+ credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 4055 (3) Professional Practice of Environmental Design**
Explores how projects are conceived, designed, documented, and built. Students will examine the complexities of the design and construction process, including industry standards, project delivery methods, and practice management. Emphasizing problem-solving and real-world applications, the course prepares students to navigate the challenges of translating ideas into built environments.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**ENVD 4100 (3-6) Advanced Design Lab 1**
Design lab exploring new and emerging themes in design.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Studios

**ENVD 4112 (3) Advanced Graphics for Designers**
Illustrates techniques of graphics communication and presentation for environmental design, including advanced illustration and color studies.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 4122 (3) Digital Photo for Designers**
Explores digital photographic workflow from capture to exhibition. Students gain the ability to document their projects and utilize photography as a means of creative expression. Topics include: using DSLRs, Adobe Lightroom, retouching with Adobe Photoshop, time-lapse photography, Adobe Premier, professional printing, landscape and architectural photography, sharing work through blogs and social media, and submitting work for publication and exhibition.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 4152 (3) Digital Design and Fabrication**
Teaches beginning to intermediate concepts, strategies, and techniques in digital design and fabrication. Students will use 3D modeling (Rhino) and parametric plugins (Grasshopper) to investigate new ways of making using 3D printing, CNC machining, laser cutting and other processes.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 4252 (3) Advanced Digital Design and Fabrication**
Teaches intermediate to advanced concepts, strategies, technologies and joinery around ways to make objects and systems using computer software, analytical software and machines such as 3d printers, laser cutters, CNC machines and robot arms, etc. Explores more personal driven object typologies around furniture, building skins and small structures/folies tailored around performance and optimizations around materiality, manufacturing tolerances, embodied energies and sustainability.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD) and Environmental Planning Minor students.
**Grading Basis:** Letter Grade

**ENVD 4311 (3) Housing Policies and Practices**
Provides students with a descriptive knowledge and analytical understanding of the use and development of residential settings in global and political economies of high-, low-, and middle-income countries.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Social Factors

**ENVD 4322 (1-6) Special Topics: Graphics**
Provides an advanced seminar on special issues in design communications.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 4352 (1-6) Special Topics: Computer Methods**
Topics include animation and environmental simulation, computational methods of technical evaluation and optimization, and computational mapping and analysis.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methods and Techniques

**ENVD 4361 (1-6) Special Topics: Social Factors in Design**
Addresses variable topics in the relationship of human experience and behavior to the built environment, e.g., social research methods in environmental design.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Social Factors

**ENVD 4363 (1-6) Special Topics: Physical Factors in Environmental Design**
Includes such topics as appropriate technology, public policy and natural hazards, organization of the designing and building process, and physical elements of urban development.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Physical Factors

**ENVD 4364 (1-6) Special Topics: History and Historiography of Environmental Design**
Provides an advanced seminar on history and historiography of environmental design, e.g., American dwellings.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: History and Theory

**ENVD 4365 (1-6) Special Topics: Technology and Practice**
Provides an advanced seminar on new technologies and issues of professional practice in the environmental design professions.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Technology and Practice

**ENVD 4420 (3) Senior Capstone Seminar**
Focuses on theoretical concerns and practical issues inherent in environmental design and planning. Views concerns and issues in terms of setting, processes, and planning and design outcomes. Provides a critical synthesis of the inherently interdisciplinary nature of planning and design education.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Studios

**ENVD 4764 (1-6) Special Topics: Theory and Criticism in Environmental Design**
Provides an advanced seminar on theory and criticism in environmental design.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: History and Theory

**ENVD 4909 (1-6) Independent Study**
By special arrangement with instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite Students should have a minimum three point zero GPA.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 4919 (1-6) Teaching Assistant**
By special arrangement with instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Prerequisite 3.00 GPA.
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 4929 (1-6) Research Assistant**
By special arrangement with instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Prerequisite Students should have a minimum three point zero GPA.
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 4939 (3) Professional Design Internship**
Students develop design and professional skills outside of the curriculum while working for an organization in the field of Environmental Design. Students also attend classroom sessions providing professional development exercises.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite Students should have a minimum three point zero GPA.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 4972 (1-3) Honors Research Methods and Thesis Preparation**
Prepares students for undertaking a research based honors thesis project in Environmental Design. Students engage with existing literature in the field to understand how research and design projects are conducted, and how their contribution fits within a long tradition of scholarship.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 4979 (1-3) Honors Thesis**
Working with an advisor, students prepare, complete, and defend a research-based honors thesis project, in an area of Environmental Design.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 5000 (6) Design Skills Studio**
This studio course is tailored for students from non-design backgrounds to develop foundational design skills essential for the interdisciplinary nature of environmental design. Basic graphic representation and design software that incorporates objects, buildings, landscapes, and urban scales.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) with 80 credits or more.
**Grading Basis:** Letter Grade

**ENVD 5001 (3) Critical Thinking and ENVD**
This course focuses on cultivating students' critical thinking skills by exploring theoretical frameworks and analyzing case studies pertinent to environmental design. Students engage with a variety of contemporary issues, such as climate change, sustainable development, environmental justice, and the impact of technological advancements on design practices. By critically analyzing real-world examples and theoretical perspectives, students gain a deeper understanding of the complexities and nuances involved in environmental design. The course aims to foster a thoughtful and reflective mindset, enabling students to approach design challenges with a well-rounded and informed perspective. By the end of the course, students will be equipped with the analytical tools and critical insights necessary to address contemporary environmental issues effectively.
**Requisites:** Requires prerequisite course of ENVD 5004 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) with 80 credits or more.
**Grading Basis:** Letter Grade

**ENVD 5002 (3) Design Research Methods**
This course equips students with the essential research methodologies crucial to environmental design, facilitating rigorous investigation and analysis within the field. Through an interdisciplinary approach, students delve into the foundational principles of environmental design writing and research across the main disciplines. The course surveys various research methods, including surveys, journalism, manifestos, scholarly essays, critical essays, and narratives, providing insight into effective methods of articulating architectural, urban, and environmental concepts.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) with 80 credits or more.
**Grading Basis:** Letter Grade

**ENVD 5004 (3) Environmental Design Theory and Practice**
This course delves into the theoretical underpinnings and practical implementations of environmental design, with a particular emphasis on sustainability and resilience principles. Students will acquire the foundational skills necessary to embark on a career as a designer, encompassing not only the creation of drawings and objects, but also the design of buildings, landscapes, and urban spaces. Furthermore, the course illuminates the intricate interplay between ecological and human-made systems that characterize our dynamic environment. Students will gain firsthand experience in drawing, measuring, and design processes, fundamental components of the profession.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) with 80 credits or more.
**Grading Basis:** Letter Grade

**ENVD 5005 (3) Sustainable Design Tech**
This seminar delves into the latest technologies and strategies in sustainable design, providing students with the essential knowledge to incorporate environmental considerations into their professional practice. The course covers a wide range of topics, including renewable energy systems, green building materials, water conservation techniques, and waste reduction methods. Students will explore innovative technologies such as smart building systems, sustainable urban planning tools, and circular economy practices. By the end of the course, students will be equipped to make informed decisions that enhance environmental sustainability, reduce ecological footprints, and contribute to the development of resilient, sustainable communities.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) with 80 credits or more.
**Grading Basis:** Letter Grade

**ENVD 5012 (3) Design Practice**
This course focuses on the practical application of environmental design through the perspective of a recognized practitioner. The course details the user, community engagement, and ethical considerations of environmental design projects. Students will focus on exploring how environmental design practices influence and shape the design process. Throughout the course, students will delve into advanced practical and managerial concepts, methodologies, and frameworks that underpin design practice, gaining a deep understanding of how theoretical insights can be applied to real-world environmental challenges.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) with 80 credits or more.
**Grading Basis:** Letter Grade

**ENVD 5014 (3) Theory in Action**
This elective course is led by one of the selected faculty members at ENVD and focuses on a unique case example of epistemological inquiry. Students will have the opportunity to explore the theoretical context of such inquiry and participate in the development of knowledge production based on the theoretical foundations of the scholar's inquiry. Throughout the course, students will delve into advanced theoretical concepts, methodologies, and frameworks that underpin the case study, gaining a deep understanding of how theoretical insights can be applied to real-world environmental challenges. The course aims to enhance students' critical thinking skills, intellectual curiosity, and ability to integrate diverse theoretical perspectives into their professional practice.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) with 80 credits or more.
**Grading Basis:** Letter Grade

**ENVD 5100 (6) Interdisciplinary Studio 1**
This course emphasize the intricate relationship between product design and architectural spaces. Through hands-on projects, students explore the intersection of these domains, integrating principles of environmental sustainability and innovative design practices. The course encourages students to consider user experience and form. Furthermore, the studio delves into the broader implications of design decisions on environmental sustainability, prompting students to create solutions that are not only innovative but also ecologically responsible. By the end of the course, students will have developed a comprehensive understanding of how to harmonize product design with architectural spaces, considering both user needs and sustainable design principles.
**Requisites:** Requires prerequisite course of ENVD 5000 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) with 80 credits or more.
**Recommended:** Prerequisites ARCH 3100, ENVD 3100, EPOD 3100, LAND 3100 or PLAN 3100 (minimum grade C-).
**Grading Basis:** Letter Grade

**ENVD 5200 (6) Interdisciplinary Studio 2**
Building upon the foundational principles explored in the first interdisciplinary studio, this course expands its focus to the design of landscapes and urban environments. Students engage in complex projects that address the multifaceted challenges of environmental sustainability, social equity, racial justice, gender considerations, and political dynamics. Through collaborative studio work, the course emphasizes holistic and inclusive design approaches that respond to the needs of diverse communities. Students will explore how to create resilient and equitable urban landscapes that promote social cohesion and environmental stewardship.
**Requisites:** Requires prerequisite course of ENVD 5100 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) with 80 credits or more.
**Grading Basis:** Letter Grade

**ENVD 5346 (1-6) Spec Topics: Environmental Design**
Graduate level topics vary from semester to semester.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) with 80 credits or more.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**ENVD 6100 (6) Practicum Self-guided Capstone**
In this culminating experience, students undertake a self-directed capstone project that integrates their knowledge, skills, and research interests, addressing real-world environmental design challenges. This course encourages students to apply theoretical concepts and practical skills acquired throughout their program to a comprehensive project of their own design. Students will engage in rigorous research, creative problem-solving, and innovative design thinking to develop solutions that respond to contemporary environmental issues. They will explore their unique interests within the field of environmental design, focusing on the intersectionality and interdisciplinarity of at least two disciplinary areas.
**Requisites:** Requires prerequisite course of ENVD 5200 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) with 80 credits or more.
**Grading Basis:** Letter Grade

**ENVD 7909 (1-6) Independent Study**
Independent course content for advanced students.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) with 80 credits or more.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

# Environmental Engineering (EVEN)

## Courses

**EVEN 1000 (1) Introduction to Environmental Engineering**
Introduces first-year students to the environmental engineering program from an academic and a career perspective. Covers air quality, applied ecology, chemical processing, energy, engineering for developing communities, environmental remediation, and water resources and treatment. Includes reading and writing on the history of environmental engineering, major environmental issues, and professional ethics.
**Requisites:** Restricted to students with 0-60 units completed. Restricted to Environmental Engineering (EVEN) and Open Option Engineering (XXEN) majors only.

**EVEN 1001 (3) Environmental Engineering 101: An Introduction to Pollution Science**
Surveys the science and engineering needed to understand the environmental and energy challenges which face urbanizing society: air and water pollution, climate change, and mining. Introduces how environmental engineers leverage basic science concepts to reduce pollution and optimize energy use. Analyzes how the mainstream media presents the environmental science of climate change and modern environmental disasters.

**EVEN 2840 (1-3) Independent Study: General Topics**
General topics relating to environmental engineering. One-on-one assistance with an instructor.

**EVEN 2909 (3) Introduction to Global Sustainability**
This course introduces engineering and non-engineering students to basic definitions and principles of sustainability (i.e., environment, economy, society) and the historical context regarding modern social and technical sustainability challenges as they pertain to population growth and climate change. The course places an emphasis on identifying the drivers, determinants and solutions favoring equitable access to water, sanitation, energy, food, transportation and shelter. Topics include technology development and validation, data collection and impact evaluation.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 2909
**Recommended:** for engineering students.

**EVEN 3012 (3) Thermodynamics for Environmental Science and Engineering**
Introduces students to fundamentals of thermodynamics. Includes focused coverage of the laws of thermodynamics, system energy balances, state properties (internal energy, enthalpy, entropy, etc.) and property estimation for ideal gases and steam. Additionally, this course will introduce the following concepts: thermodynamic cycles, chemical reaction thermodynamics, psychrometrics, process devices (pumps, heat exchangers, etc.) and reversibility.
**Requisites:** Requires prerequisite of PHYS 1110 and (APPM 1360 or MATH 2300) and (CHEN 1201 or CHEN 1211 or CHEM 1113) (all minimum grade C-).

**EVEN 3414 (3) Fundamentals of Environmental Engineering**
Emphasizes chemical, ecological and hydrological fundamentals and importance of mass and energy balances in solving environmental engineering problems related to water quality, water and wastewater treatment, air pollution, solid and hazardous waste management, sustainability and risk assessment.
**Requisites:** Requires prereq courses CHEN 1201 or CHEN 1211 or CHEM 1113 or MCEN 1024 and APPM 1360 or MATH 2300 (all min grade C-). Restricted to CVEN, AREN, EVEN, MCEN, CHEN, IDEN or AMEN majors only.

**EVEN 3550 (3) Sustainability Principles for Engineers**
An introduction to sustainability principles in the field of environmental engineering. Students will apply these principles to engineering problems in order to evaluate the environmental, economic and social implications of engineering and design decisions. Topics include definitions of sustainability, main engineering sustainability challenges (e.g., water, climate and materials), pollution generation and prevention and sustainability assessment tools.
**Requisites:** Requires a corequisite course of CVEN / EVEN 3414. Restricted to Environmental Engineering (EVEN) majors only.

**EVEN 3650 (3) Sustainable Energy Systems Analysis**
This course introduces students to the fundamentals of technology utilized in sustainable energy systems. Students will learn performance modeling, environmental life cycle assessment, and economic viability evaluation with a focus on the following: sensitivity analysis of cost-performance models, uncertainty and risk assessment, multi-criteria decision making and sustainability assessment. This course highlights the limits and obstacles facing the integration.
**Requisites:** Requires prerequisite courses of (MCEN 3012 or GEEN 3852 or AREN 2110 or EVEN 3012) AND PHYS 1120 AND (EVEN 3550 or MCEN 3032) (minimum grade D-).

**EVEN 3830 (1-3) Special Topics**
Study of technical topics within the field of environmental engineering. Subject matter to be selected from topics of current interest.
**Repeatable:** Repeatable for up to 9.00 total credit hours.

**EVEN 4100 (3) Environmental Sampling and Analysis**
Introduces students to techniques for characterization of surface water, subsurface water, soils and sediments, and air and planning of sampling and analysis efforts. Laboratories include stream sampling, drilling, monitoring well installation, water level, slug tests, air sampling.
**Requisites:** Requires prerequisite courses of CVEN 4404 and CVEN 4424 (all minimum grade C-). Restricted to Environmental Engineering (EVEN) majors only.

**EVEN 4131 (3) Air Pollution Control Engineering**
Introduces air quality regulations, meteorology and modeling. Examines methods for controlling major classes of air pollutants, including particulate matter and oxides of sulfur and nitrogen, as well as control technology for industrial sources and motor vehicles. Requires interdisciplinary design projects.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4131 and MCEN 5131 and EVEN 5131
**Requisites:** Requires prerequisite courses of (MCEN 3021 or CHEN 3200 or CVEN 3313) and (MCEN 3012 or GEEN 3852 or AREN 2110 or EVEN 3012) (all minimum grade C-). Restricted to Mechanical Engineering or Environmental Engineering majors with 57+ credits only.

**EVEN 4141 (3) Indoor Air Pollution**
Describes the impact of indoor air pollutants on human health, including an introduction to key pollutants and their sources. Students will estimate emission factors, calculate generation/ventilation rates, quantify the impact of deposition and chemical reactions and explore relevant control technology. Current issues will also be addressed, including climate change, green building design, economic concerns and relevance to the developing world.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4141, MCEN 5141, and EVEN 5141
**Requisites:** Requires prerequisite courses of (MCEN 3022 or CHEN 3210) (minimum grade C-). Restricted to Mechanical and Environmental Engineering majors with 57+ credits only.

**EVEN 4404 (3) Water Chemistry**
Introduces chemical fundamentals of inorganic aqueous compounds and contaminants in lecture and laboratory. Lecture topics include thermodynamics and kinetics of acids and base reactions, carbonate chemistry, air-water exchange, precipitation, dissolution, complexation, oxidation-reduction and sorption.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4404
**Requisites:** Requires prerequisite course of (CHEN 1203 or CHEN 1211 or CHEM 1133) and (CHEM 1221 or CHEM 1134) (all minimum grade C-). Requires corequisite course of CVEN 3414. Restricted to Civil (CVEN) or Environmental (EVEN) Engineering majors only.

**EVEN 4414 (1) Water Chemistry Laboratory**
Reinforces chemical fundamentals of inorganic aqueous compounds and contaminants from CVEN/EVEN 4404 in laboratory experiments and reports. Topics include acids and bases, carbonate chemistry (alkalinity) and other water chemistry characteristics (hardness, dissolved oxygen); precipitation, complexation and oxidation-reduction reactions; and laboratory techniques and reporting.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4414
**Requisites:** Requires prerequisite courses of CHEN 1201, CHEN 1203, CHEM 1221 or CHEN 1211 or CHEM 1113 and CHEM 1133 (all minimum grade C-). Requires corequisite course of CVEN 4404. Restricted to Civil (CVEN) or Environmental (EVEN) Engineering majors only.

**EVEN 4424 (3) Environmental Organic Chemistry**
Examines the fundamental physical and chemical transformations affecting the fate and transport of organic contaminants in natural and treated waters. Emphasizes quantitative approach to solubility, vapor pressure, air-water exchange, sorption, hydrolysis and redox reactions, and photodegradation.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4424
**Requisites:** Requires prereq course (CHEN 1211 or CHEN 1203 or CHEM 1133 or CHEM 2100) and EVEN 4404 (min grade C-).

**EVEN 4434 (4) Environmental Engineering Design**
Examines the design of facilities for the treatment of municipal water and wastewater, hazardous industrial waste, contaminated environmental sites and sustainable sanitation in developing countries. Economic, societal and site specific criteria impacting designs are emphasized.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4434
**Requisites:** Requires prerequisite course of CVEN 3414 and EVEN 4464 or CVEN 3424 (minimum grade C-).
**Grading Basis:** Letter Grade

**EVEN 4464 (3) Environmental Engineering Processes**
Develops and utilizes analytic solutions for environmental process models that can be used in a) reactor design for processes used in the treatment of water, wastewater and hazardous waste and b) process analysis of natural systems, such as streams and groundwater flow. Models facilitate the tracking of contaminants in engineered and natural systems.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5464 and CVEN 4464
**Requisites:** Requires prerequisite courses of (CVEN 3313 or CHEN 3200 or MCEN 3021 or AREN 2120) and CVEN 3414 (all minimum grade C-).

**EVEN 4484 (3) Integrative Environmental and Molecular Microbiology**
Surveys microbiology topics germane to modern civil and environmental engineering. Provides fundamentals needed to understand microbial processes and ecology in engineered and natural systems and reviews applications emphasizing the interface between molecular biology and classical civil engineering.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4484, CVEN 5484, and EVEN 5484
**Requisites:** Requires prerequisite courses of (CHEN 1211 or CHEN 1201 or CHEM 1113) and (CHEN 1221 or CHEM 1114) and (APPM 1350 or MATH 1300) (all minimum grade C-).

**EVEN 4494 (3) Contaminant Fate and Transport**
The course requires students to design and conduct experiments, analyze, interpret data, and write technical engineering reports. This lab-based course gives students an understanding of processes that govern the behavior of pollutants in the environment. The subject includes aspects of intermedia contaminant transport, surface and groundwater hydrology, air pollution modeling, degradation processes and remediation, human exposure pathways and risk analysis.
**Requisites:** Requires prerequisite courses of CVEN 4404 or EVEN 4404 (minimum grade D-). Requires corequisite courses of CVEN 4424 or EVEN 4424.
**Recommended:** Prerequisite or corequisite EVEN 4464 (Environmental Engineering Processes).

**EVEN 4544 (3) Solid Waste Management and Resource Recovery**
Covers the scope of the nonhazardous solid waste problem and regulations that drive its management; discussions of nonengineering factors that impact waste management and recycling; design of incinerators, composting facilities, and landfills used to treat and dispose of solid waste. Formerly EVEN 4444.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 5544 and CVEN 5544
**Requisites:** Requires prereq courses (CHEN 1201 or CHEN 1211 or CHEM 1113 or MCEN 1024) and (APPM 1350 or MATH 1300) (all min grade C-). Restricted to CVEN, AREN, EVEN, MCEN, CHEN, IDEN or AMEN majors only.
**Recommended:** Prerequisite CVEN 3414.

**EVEN 4830 (3) Special Topics**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.

**EVEN 4840 (1-3) Independent Study: General Topics**
General topics relating to environmental engineering. One-on-one assistance with an instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**EVEN 4959 (3) International Environmental Impact Assessment**
Provide elements needed to develop Environmental Impact Assessments (EIA) in countries around the world. Familiarizes students with terms and definitions used in environmental practice. Explains the application of methodologies/tools used globally in EIA studies, taking into consideration the cause-effect relationships between project activities and the environment. Overview of World Bank and regional evaluation criteria driven by local ecosystems, society, and regulations. Case studies focus on the application of tools/methodologies and criteria in various international scenarios.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 5959
**Requisites:** Requires prerequisite or corequisite course of EVEN 3414 (minimum grade C-).
**Recommended:** Prerequisite or corequisite EVEN 3550.

**EVEN 4969 (3) Water and Sanitation in Developing Countries**
Studies the design and fundamentals behind effective treatment processes and engineering solutions targeted for developing countries. Approaches to clean water and sanitation in lesser industrialized countries often demand alternative solutions to those developed for industrialized societies. Explores issues and solutions developed to tackle these problems.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4969
**Requisites:** Requires prerequisite course of CVEN 3414 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).

**EVEN 4980 (3) Senior Thesis 1**
Provides faculty-supervised independent research in environmental engineering for students planning to complete a senior thesis. To be taken prior to EVEN 4990, during the final year before graduation. Department consent required.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Environmental Engineering (EVEN) majors only.

**EVEN 4990 (3) Senior Thesis 2**
Continuation of EVEN 4980. Consists of final phase of faculty-supervised research, the preparation of a written thesis, and an oral defense of the research to
**Requisites:** Requires prerequisite course of EVEN 4980 (minimum grade C-).

**EVEN 5131 (3) Air Pollution Control Engineering**
Introduces air quality regulations, meteorology and modeling. Examines methods for controlling major classes of air pollutants, including particulate matter and oxides of sulfur and nitrogen, as well as control technology for industrial sources and motor vehicles. Requires interdisciplinary design projects.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5131 and MCEN 4131 and EVEN 4131
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering or Environmental Engineering undergraduate majors only.

**EVEN 5141 (3) Indoor Air Pollution**
Describes the impact of indoor air pollutants on human health, including an introduction to key pollutants and their sources. Students will estimate emission factors, calculate generation/ventilation rates, quantify the impact of deposition and chemical reactions and explore relevant control technology. Current issues will also be addressed, including climate change, green building design, economic concerns and relevance to the developing world.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5141, MCEN 4141, and EVEN 4141
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering or Environmental Engineering undergraduate majors only.

**EVEN 5444 (3) Analytical Methods, Experimental Design, and Applied Data Analysis**
Focuses on experimental design and applied statistical methods for data analysis in the environmental engineering field. Students learn how to design and interpret experiments considering multiple variables, avoid confounding effects, and identify interactions between variables. Statistical tools are applied to analytical methods to validate environmental analytical samples. Students learn how to decipher analytical methods to ensure that environmental samples are collected and analyzed following robust quality assurance/quality control procedures.
**Requisites:** Restricted to College of Engineering and Applied Science graduate students or BS/MS Concurrent Degree Students only.
**Recommended:** Prerequisite an undergraduate statistics course.
**Grading Basis:** Letter Grade

**EVEN 5484 (3) Integrative Environmental and Molecular Microbiology**
Surveys microbiology topics germane to modern civil and environmental engineering. Provides fundamentals needed to understand microbial processes and ecology in engineered and natural systems and reviews applications emphasizing the interface between molecular biology and classical civil engineering.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 4484, EVEN 4484, and CVEN 5484
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.

**EVEN 5514 (3) Bioremediation**
Advanced study on biological processes used to treat toxic organic and inorganic compounds contained in contaminated water, air, and soil; design and evaluation of in situ toxic compound biotransformation; fundaments of phytoremediation; critical reviews of current literature on bioremediation.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5514

**EVEN 5544 (3) Solid Waste Management and Resource Recovery**
Covers the scope of the nonhazardous solid waste problem and regulations that drive its management; discussions of nonengineering factors that impact waste management and recycling; design of incinerators, composting facilities, and landfills used to treat and dispose of solid waste.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 5544 and EVEN 4544
**Requisites:** Restricted to graduate students or students accepted in the AREN, CVEN or EVEN Bachelor Accelerated Masters (BAM) programs.
**Recommended:** Prerequisite CVEN 3414.

**EVEN 5584 (3) Sustainable Engineering Design**
Introduces students to sustainable design and quantitative sustainability assessment methods. Students will develop an understanding of quantitative sustainable design and how to navigate engineering decision-making. Students will learn tools for economic (life cycle costing, LCC) and environmental (life cycle assessment, LCA) sustainability assessments, and how to link these tools to engineering design decisions under uncertainty. Students will design engineered technologies individually and in teams, with special attention to energy and water technologies. Main course objectives are that students will have the ability to assess the relative sustainability of design alternatives using quantitative tools and to complete the detailed design of civil/environmental engineering infrastructure while navigating trade-offs across and within dimensions of sustainability.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**EVEN 5830 (1-4) Environmental Engineering Special Topic**
Supervised study of special topics of interest to students under instructor guidance.
**Repeatable:** Repeatable for up to 30.00 total credit hours. Allows multiple enrollment in term.

**EVEN 5959 (3) International Environmental Impact Assessment**
Provide elements needed to develop Environmental Impact Assessments (EIA) in countries around the world. Familiarizes students with terms and definitions used in environmental practice. Explains the application of methodologies/tools used globally in EIA studies, taking into consideration the cause-effect relationships between project activities and the environment. Overview of World Bank and regional evaluation criteria driven by local ecosystems, society, and regulations. Case studies focus on the application of tools/methodologies and criteria in various international scenarios.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 4959
**Requisites:** Requires prerequisite or corequisite course of EVEN 3414 (minimum grade C-). Restricted to graduate students or concurrent degree sub plans (C-AREN, C-CVEN, C-ARENCVEN, C-EVENCVEN or C-EVEN) only.
**Recommended:** Prerequisite or corequisite EVEN 3550.

**EVEN 5979 (1-3) Introduction to Humanitarian Aid**
Addresses the humanitarian-development nexus and gives an overview of the main ethical and professional principles, standards, and key stakeholders involved in humanitarian aid. Students will learn the historical and legal frameworks that shaped these principles, and examine their applicability to the challenges faced by humanitarian actors today. Increasing frequency, intensity, complexity, and length of emergency situations require new approaches and coordination among historically divided humanitarian and development actors.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) or graduate students only.
**Recommended:** Prerequisite CVEN 4839/5919 Global Development for Engineers.
**Grading Basis:** Letter Grade

**EVEN 5989 (1-3) Disaster Risk Reduction**
Explores disaster governance, the decentralization of disaster resources and responsibilities, and best practices and tools in preparedness and mitigation. Students will examine the intersection of development, climate change, and disasters, by studying the impact of crisis events on human, social, and political behavior, and associated responses from impacted populations. Students will learn how to use data, tools, and geospatial techniques (GIS) that can inform and enhance vulnerability assessments, mitigation planning, and response operations.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) or graduate students only.
**Recommended:** Prerequisite CVEN 4839/5919 Global Development for Engineers, or EVEN 5979, Introduction to Humanitarian Aid.
**Grading Basis:** Letter Grade

**EVEN 5999 (1-3) Refugees and Displacement**
Examines the processes and policies contributing to and driving refugee and migration flows, as well as response strategies. The focus will be on forced displacement, which currently impact the lives of almost 80 million people worldwide. This course covers solutions, particularly in the settlement context, for the appropriate provision of covered living space to adequately shelter displaced populations, while also promoting safer, healthier settlements that link emergency shelter and settlement assistance to longer-term recovery efforts. Previously offered as a special topics course.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) or graduate students only.
**Recommended:** Prerequisites CVEN 4839/5919, EVEN 5979 and EVEN 5989.
**Grading Basis:** Letter Grade

**EVEN 6504 (3) Advanced Physical-Chemical Processes for Water and Water Reuse Treatment**
Teaches the process fundamentals of (1) granular activated carbon adsorption (2) UV, ozone and advanced oxidation processes (3) membrane filtration and reverse osmosis treatment and (4) ion exchange. These processes, as applied to impaired water sources, including brackish/saline/saltwater and wastewater reuse, will address water quality parameters including pathogenic microorganism, background organic matter, specific organic contaminants, metals and salts.
**Requisites:** Requires prerequisite course of CVEN 5524 (minimum grade C-).
**Grading Basis:** Letter Grade

**EVEN 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.

**EVEN 6950 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**EVEN 6960 (1-3) Master's Report**
Offers report research under faculty supervision. Faculty advisor consent required.
**Repeatable:** Repeatable for up to 3.00 total credit hours.

**EVEN 8990 (1-10) Doctoral Dissertation**
**Repeatable:** Repeatable for up to 10.00 total credit hours.

# Environmental Product of Design (EPOD)

## Courses

**EPOD 2004 (3) History and Theory of Environmental Products of Design**
Explores the chronology of product design and how it has shaped our engagement with the everyday context. The course will explore impactful precedents and the design thoughts behind them. Surveys advances in production and material technologies that have propelled key product designs from regional exclusivity to global access. Investigate product design¿s influence on cultural adaptations. Class discussions will give space to think critically about product design intent and perceived successes.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite EPOD 2100.
**Grading Basis:** Letter Grade

**EPOD 2100 (6) Studio 1: Foundations of Environmental Products of Design**
Project-based studio in which students focus on the design of products at a human scale with an emphasis on visualization, both graphic and 3D modeling, digital fabrication file production, and translation to physical form to design and build solutions for real users.
**Requisites:** Requires prerequisite course of ENVD 1120 (minimum grade C-). Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite EPOD 2004.
**Grading Basis:** Letter Grade

**EPOD 3100 (6) Studio 2: Intermediate Environmental Products of Design**
Introduces students to emerging technologies and techniques in digital fabrication and design through a project-based studio environment. Students will be asked to develop design solutions that benefit humanity through material investigations, cradle-to-cradle methodology, and more advanced methods in design optimization.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite course of EPOD 2100 (minimum grade C-). Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite EPOD 3101.
**Grading Basis:** Letter Grade

**EPOD 3101 (3) Theory and Ethics in Design**
Engages with key theories and provocative ideas at the intersection of design, sustainability, and ethics. Students will explore contemporary challenges designers face, critically analyzing readings and discussions to develop their own principled foundations. The course emphasizes the ethical impact of design outcomes on society, the environment, and individuals. By the end, students will articulate personal values and ethical guidelines, gaining tools to address complex moral issues in their future design work.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite EPOD 3100.
**Grading Basis:** Letter Grade

**EPOD 3105 (3) Human Centered Design and Entrepreneurship Strategies**
Exposes students to innovation and entrepreneurial practices around the topic of Environmental Products of Design through human/user centered design strategies.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**EPOD 4100 (6) Studio 3: Capstone in Environmental Products of Design**
Draws on design research processes such as design thinking, human-centered design, and speculative/critical design to create a comprehensive proposal. In this capstone experience, students identify a specific need, opportunity, or problem and then develop a design solution that addresses the challenge. This proposal is brought to life through the creation of a full-scale physical prototype.
**Requisites:** Requires prerequisite courses of EPOD 3100 and 4115 (minimum grade C-). Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**EPOD 4115 (3) Materials and Manufacturing Processes in Product Design**
Explores the creation of products through an environmental lens as they relate to Material Science, Manufacturing Methods and Production Systems. Students have the opportunity to investigate innovative alternative materials and industry production approaches that improve upon pre-existing materials and paradigms; including sustainable materials, advanced production techniques at a variety of scales and a thorough understanding of the environmental cost incurred in the creation of products.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD) students with 30-180 credits.
**Grading Basis:** Letter Grade

# Environmental Studies (ENVS)

## Courses

**ENVS 1000 (4) Introduction to Environmental Studies**
This course provides students with an introduction to natural science topics and skill sets necessary to address multi-dimensional human-environment interactions. Students will survey biological and physical science aspects of environmental change, examining ecological, biological, chemical, and technological factors that influence the quality of life on Earth. The focus of the class is on developing a stronger science-based understanding of Earth¿s environmental systems and how they are altered by human activity. Required for ENVS majors.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 1001 (4) Introduction to Human Dimensions of Environmental Studies**
Examines the human dimensions of sustainability and environmental justice. Students examine a core set of human factors linked to the environment, including the production and use of knowledge, behavior, values, social movements, policy, market forces, and systems of power, exploitation, oppression, and inequality. Through hands-on activities, students learn how these factors impact and result from the human-environment interface. Students will build quantitative and writing skills to empirically study human dimensions of the environment.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 1150 (3) First-Year Writing in Energy, Environment and Sustainability**
Provides development of effective writing skills, knowledge and habits for success in the campus culture using topics related to the environmental sciences, energy, sustainability and academic/career interests. Focuses on the processes in rhetoric, emphasizing skills in creative, analytical and critical thinking, as well as research and presentation using digital and "old fashioned" methods and materials.
**Requisites:** Restricted to Environmental Studies (ENVS) students with 0-56 credits (Freshman or Sophomore) only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Lower

**ENVS 2000 (4) Applied Ecology for Environmental Studies**
Covers how ecological ideas and principles underlie both the problems and solutions of multiple environmental issues. Ecology of environmental concerns ranging from endangered species to global carbon cycling will be reviewed, including perspectives from physiological, behavioral, population, community and ecosystem ecology. Fulfills intermediate natural science requirement for Environmental Studies major.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 2040 and EBIO 2640
**Recommended:** Prerequisites ENVS 1000 and a course in introductory statistics and two courses in introductory biology or physical geography.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 2001 (3) Topical Seminar in Enivronmental Studies**
Serves as an introductory seminar to topics in environmental studies. Topics are diverse and include such areas as climate and conflict, food production, land use change, and other emerging areas in environmental studies.
**Grading Basis:** Letter Grade

**ENVS 2030 (3) Introduction to Human Dimensions of the Environment**
Reviews social science concepts and research important to the understanding of human interactions with the environment. Serves as an introduction to the study of demographic processes, human decision making, approaches to environmental governance, consumption patterns, among other foundational topics. Content will be grounded in contemporary case studies that will vary with instructor. Positions students to participate in interdisciplinary dialogue and practice related to solving environmental problems.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 2100 (2-4) Topics in Applied Environmental Studies**
Covers a variety of topics not currently offered in the curriculum: offered depending on instructor availability and student demand. Fulfills application requirement in Environmental Studies major.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite ENVS 1000.

**ENVS 2840 (1-6) Independent Study**
Students work with an approved faculty sponsor to explore a topic in greater depth and to pursue an interest that is not offered in the formal curriculum.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Recommended:** Prerequisite ENVS 1000.

**ENVS 3001 (3) Sustainable Solutions Consulting**
Introduces students to green design, industrial ecology, and life cycle analysis. Students use basic techniques of environmental auditing to analyze the CU Boulder campus. Fulfills application requirement for Environmental Studies major.
**Requisites:** Requires prerequisite course of ENVS 1000 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Environmental Studies (ENVS) majors only.
**Recommended:** Requisite any two-semester science sequence.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 3005 (3) Environmental Education: From Theory to Practice**
Learning to teach about the environment is an essential skill for helping to create a sustainable world. From urban school programs to nature centers, to fostering social justice and international collaboration - becoming an effective environmental educator can support many professional pursuits. It's fun too! This class will help you gain essential knowledge and skills for starting on this path.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3007 (3) Animal Ethics and Policy**
Explores the principles that underlie our treatment of and attitudes toward non-human animals. Analyzes how these principles impact environmental policy in the context of contemporary environmental issues and debates.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ENVS 3020 (3) Advanced Writing in Environmental Studies**
Offers training in critical thinking and analytical writing skills appropriate to upper-division classes. Writing assignments integrate the subject matter of different topical areas. Fulfills writing requirement for Environmental Studies major.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Environmental Studies (ENVS) majors only.
**Recommended:** Prerequisite ENVS 1000.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**ENVS 3022 (3) Climate Politics and Policy**
Engages students in exploring the realm of contemporary and historical climate policy at three major levels of government: international, national and local/regional. Through course lectures, discussions, readings and activities, students will become conversant with the actors, mechanisms and concerns involved in climate policy and politics and develop their own sense of how to judge the success of climate policies. Fulfills intermediate social science requirement in Environmental Studies Major.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 3022
**Recommended:** Prerequisite ENVS 1000 or GEOG 1972.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3030 (3) Topics in Environmental Social Sciences**
Covers a variety of topics that may include human ecology, environment and society, and quantitative environmental social science. Offered depending upon instructor availability and student demand. Fulfills intermediate social science requirement for Environmental Studies major. Not repeatable for credit.
**Recommended:** Prerequisite ENVS 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3031 (3) Environmental Psychology**
Examines how people interact with the environment by examining theories and methods from Environmental Psychology. How does nature impact human well-being? How do people make decisions that have environmental consequences? How can we promote behavior change to reduce environmental degradation? Fulfills intermediate social science requirement for ENVS major.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3032 (3) Environment, Media and Society**
Examines how mass media influence our society, specifically with regard to environmental issues and outcomes. Focuses on media influence over environmental politics and policy, environmental public opinion, popular culture, and environmental/scientific knowledge. Fulfills intermediate social science requirement for Environmental Studies major.
**Recommended:** Prerequisite ENVS 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3033 (3) Governing the Environment**
Examines how, when, and why human communities succeed in conserving environmental commons. Using a marine lens and taking a social-ecological systems approach, this course will provide foundations in environmental governance while examining case studies from local to global scale. Utilizes lecture, discussion, group work, literature, film, guest speakers, and class projects to study environmental problems and their solutions, including the student¿s personal role in governing natural resources. Fulfills intermediate social science requirement for ENVS major.
**Recommended:** Prerequisite ENVS 1000.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3034 (3) Foundations of Environmental Justice**
Explores qualitative social science, forms of environmental inequality, and the underpinnings of environmental justice and social change. Environmental justice is the right to a safe and healthy environment for everyone, regardless of race, class, gender, or other considerations. Students engage in in-depth case study analysis and develop a social science research proposal on an environmental justice topic of their choosing. Previously offered as a special topics course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3040 (4) Conservation Biology**
Applies principles of population ecology, population genetics, biogeography, animal behavior, and paleobiology to the maintenance of biodiversity and natural systems. The resulting theory is then applied to conservation policy and management techniques.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 3040
**Recommended:** Prerequisite EBIO 2040 or EBIO 2640.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 3064 (3) Environmental Political Theory**
Examines environmental discourses as conceptual means for theorizing environmental politics, and applies normative political theories to contemporary environmental policy issues. Considers the roles of political actors (individuals, groups, the state) in defining and addressing environmental problems on local, national, and global levels.
**Equivalent - Duplicate Degree Credit Not Granted:** PSCI 3064
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3070 (3) Energy and the Environment**
Examines contemporary issues in energy consumption and its environmental impact, including fossil fuel use and depletion; nuclear energy and waste disposal; solar, wind, hydroelectric, and other renewable sources; home heating; energy storage; fuel cells; and alternative transportation vehicles. Includes some basic physical concepts and principles that often constrain choices. No background in physics is required.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 3070
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 3100 (2-4) Topics in Applied Environmental Studies**
Covers a variety of topics not currently offered in the curriculum; offered depending upon instructor availability and student demand. Fulfills application requirement for Environmental Studies major.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Recommended:** Prerequisite ENVS 1000.

**ENVS 3103 (3) Applied Environmental Studies: Mining in Four Corners**
Explores mining related issues that have pronounced impact on the environment, economy and politics of the Four Corners region. Students apply their basic knowledge of environmental science, policy and values toward the understanding of and productive discourse about the conflicts and opportunities brought about by the mining industry in the Four Corners region. Course includes a seven day field trip, visiting mining and reclamation sites in New Mexico, Utah and Colorado. Fulfills application requirement for Environmental Studies majors.
**Recommended:** Prerequisite ENVS 1000 and one year natural science.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 3140 (3) Environmental Ethics**
Examines major traditions in moral philosophy to see what light they shed on value issues in environmental policy and the value presuppositions of the economic, ecological, and juridical approaches to the environment.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 3140
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**ENVS 3173 (3) Creative Climate Communication**
We generate multimodal compositions on the subject of climate change and engage with various dimensions of issues associated with sustainability. We work to deepen our understanding of how issues associated with climate change are or can be communicated, by analyzing previously created expressions from a variety of media (interactive theatre, film, fine art, television programming, blogs, performance art, for example) and then be creating our own work.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 3173 and THTR 4173
**Recommended:** Prerequisite ENVS 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3434 (3) Introduction to Applied Ecology**
Emphasizes the integration of physical, chemical and biological processes in controlling terrestrial and aquatic ecosystems. Ecosystem concepts are applied to current environmental and water quality problems. Includes field trips and a group project.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 3434
**Requisites:** Requires prereq courses of (CHEN 1201 or CHEN 1211 or CHEM 1113 or CHEM 1400 or MCEN 1024) and (CHEM 1114 or CHEM 1221) (all min grade C-).Restricted to students w/ 57-180 credits (Jr or Sr) Civil (CVEN), Environ (EVEN) or Arch Eng (AREN) or (IDEN) mjrs
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 3520 (3) Energy and Climate Change: An Interdisciplinary Approach**
Examines sources of energy and other resources in light of their availability, use, environmental impact, as well as their impact on policy, economics and values. As fossil fuels are the dominant energy source today, particular emphasis is placed on climate impacts and the carbon cycle. All material is assessed through the lenses of the physical sciences, policy, ethics and economics.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 3520
**Recommended:** Prerequisite a two-course sequence in any natural science.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 3525 (3) Intermediate Environmental Problem Analysis: Topical Cornerstones**
Engages students in in-depth study of a topic such as climate change, energy, natural resources or sustainability. Through lectures, discussions, readings and activities, students will become conversant with how science, policy and values are integrated in environmental problem solving, and develop their own sense of how to critically engage with proposed solutions. Fulfills cornerstone requirement for Environmental Studies Major.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisite ENVS 1000.

**ENVS 3555 (3) Sustainable Economies**
Applies a holistic and transdisciplinary approach to answering the following questions: (i) What might an environmentally sustainable economy look like? (ii) What social and political challenges might such an economy face? (iii) What institutions might support an environmentally and socially sustainable economy? The course draws on concepts from several branches of economics¿especially macroeconomics, ecological economics, and public finance¿as well as other related disciplines, including history, psychology, politics, and evolutionary biology.
**Recommended:** Prerequisites ECON 2010 or ECON 2020 or other introductory-level economics course.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3600 (3) Principles of Climate**
Describes the basic components of the climate system: the atmosphere, ocean, cryosphere and lithosphere. Investigates the basic physical processes that determine climate and link the components of the climate system. Covers the hydrological cycle and its role in climate, climate stability and global change.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 3601 and ATOC 3600
**Recommended:** Prerequisites one semester of calculus and ATOC 1060 or ATOC 3300 or GEOG 3301 or GEOG 1001.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 3621 (3) Energy Policy and Society**
Examines how society makes decisions about energy, and how these decisions affect the environment and the economy. Uses tools from policy analysis, economics, and other disciplines to build an in-depth understanding of energy's role in U.S. contemporary society. Fulfills Cornerstone requirement of ENVS majors.
**Recommended:** Prerequisites ENVS 1000 and ENVS 3070 or PHYS 3070.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 3640 (3) Data Analysis for Global Environmental Affairs**
Develops data analysis techniques for global environmental data including demographic, economic, agricultural, fisheries and energy sectors. Designed to support the development of basic and intermediate data analysis skills for students in the Global Environmental Affairs certificate program. Includes hands-on exploration of up-to-date global data sets from a variety of sources. Fulfills the application requirement for the ENVS major.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3640
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 3800 (3) The Art of Research: The Essential Elements of Research in Environmental Studies**
Introduces students to the practice of doing research in environmental studies. Examines how to define a research problem, select methods, design research, construct arguments and evaluate others' research. Aims to familiarize students with the process of doing research and enable them to proceed with confidence in pursuing their own research topics. Recommended for juniors planning to write ENVS honors theses. Fulfills capstone requirement in Environmental Studies major.
**Requisites:** Requires prerequisite course of ENVS 1000 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) majors only.
**Recommended:** Prerequisite ENVS 3020.

**ENVS 3930 (1-3) Internship**
Relates classroom theory to practice. Provides academically supervised opportunities for environmental studies majors to work in public and private organizations on projects related to students' career goals. Fulfills application requirement in Environmental Studies major.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite ENVS 1000.

**ENVS 4027 (3) Inequality, Democracy, and the Environment**
Focuses on the structural forces affecting environmental degradation and environmental behavior by examining the relationships between (a) inequality and democratic decision making and (b) undemocratic decision making; U.S. and corporate food and energy policy; and global environmental degradation. The course also focuses on the role that global inequality plays in fostering environmental degradation.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4027
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 4030 (3) Sociology of Climate Change**
Examines the human drivers and causes of climate change, the health and security risks it creates and the efforts of societies to mitigate and adapt to its effects.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4030
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ENVS 4050 (2-4) Field Methods in Ecosystem Science**
Studying the relationships among organisms, physical features, biogeochemistry and humans in ecological communities - this is ecosystem science. This course provides conceptual understanding and practical experience conducting research. Students will pose their own scientific questions, learn several field and lab methods, analyze data and design a project. Upon completion, they will have useful skills for internships, jobs and graduate school. Fulfills application requirement in ENVS major. Department enforced prerequisite: ENVS 1000 or two semesters of natural sciences; such as chemistry, geology or biology.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 4100 (3) Special Topics in Environmental Studies**
Various topics not normally covered in the curriculum: offered depending on student demand and specialties of faculty. Applied to specialization requirement for Environmental Studies major.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**ENVS 4135 (3) Dogs, Wolves, and Humans**
Humans have a closer and longer history with ancestral and domestic dogs than any other animal species. Ironically, the closest living relative of dogs (wolves) remain one of the world¿s most persecuted species ¿ an issue that rages today throughout the United States, including Colorado. This class centers on the biology of domestication, evolution of behavior, canid paleontology and genetics, wolf conservation, and the evolutionary, social, and cultural significance of wolves and dogs to humans. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 5135
**Recommended:** Prerequisite ANTH 2010 or EBIO 1030 or EBIO 1210 or EBIO 1220 or EBIO 2040 or ENVS 2000.

**ENVS 4155 (4) Ecosystem Ecology**
Integrates information from physics (energetics), chemistry (element properties) and biology (evolutionary traits, photosynthetic pathways) to understand the structure and functioning of ecosystems. Provides an analysis of biotic community responses and feedbacks to environmental change drivers. Strong focus on water, nutrient cycling and carbon dynamics of diverse terrestrial and aquatic landscapes.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4155, EBIO 5155 and ENVS 5155
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 4160 (3) Introduction to Biogeochemistry**
Covers fundamentals of biogeochemical cycling, emphasizing water, carbon and nutrient dynamics in terrestrial ecosystems; chemical interactions of atmosphere, biosphere, lithosphere and hydrosphere; natural and human-managed environments.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4160 and GEOL 4160
**Requisites:** Requires prerequisite courses of GEOL 3320 or EBIO 3270 and CHEM 1011 (all minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 4185 (3) Geomicrobiology**
Examines how microbial and chemical processes interact on the Earth¿s surface today and have shaped the planet throughout its history. Emphasis will be placed on how the life styles and chemical ingenuity of microorganisms drive key biogeochemical processes including weathering and transformations of carbon, oxygen, sulfur, iron and nitrogen. Towards this goal, major geologic and evolutionary events will be examined through the lens of microbial diversity, metabolic energetics, microbe-mineral interactions, and molecular biomarkers.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5185, GEOL 4185, and MCDB 4185
**Requisites:** Requires prerequisite courses of CHEM 1113 and CHEM 1114 or CHEM 1400 and CHEM 1401 (minimum grade C-).
**Recommended:** Prerequisites GEOL 1180 or MCDB 1150 or GEOL 3320 or EBIO 3400 or ENVS 4160 or EVEN 4484.
**Grading Basis:** Letter Grade

**ENVS 4201 (3) Biometeorology**
Learn about the interactions between atmospheric processes and living organisms (plants, animals, and humans) through a meteorology/ biology lens. Topics include carbon and water cycling through vegetation, the energy and water balances in the system, and human temperature regulation to better understand how organisms adapt to a changing environment using a practical, problem-solving approach.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4201
**Requisites:** Prereq GEOG 1001 any of: (APPM1340 and 1345) or APPM1350 or ECON1088 or ECON3818 or MATH1081 or MATH1300 or MATH1310 or MATH2510 or ANTH4000 or BCOR1020 or GEOG3023 or GEOL3023 or PSCI2075 or PSYC2111 or SOCY2061 or SOCY4061 or STAT4000 (min grade D-)
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 4340 (4) Conservation Biology and Practice in Brazil's Atlantic Forest**
Field Studies. Examines the application of conservation principles in the Atlantic Forest of Brazil, a 'biodiversity-in-crisis' setting. Explores successful conservation strategies integrated with efforts to alleviate socioeconomic issues. Three-week Maymester, Study Abroad Global Seminar.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 5340, EBIO 4340 and EBIO 5340
**Recommended:** Prerequisites EBIO 2040 or ENVS 2000 or 2000/higher-level course in ANTH, EBIO, ENVS, EVEN, GEOG, IAFS or other discipline related to ecology or sustainability.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 4795 (3) Field Methods in Zoology and Botany**
Class covers research and field methods for biological disciplines associated with natural history museums: vertebrates, invertebrates and plants. Emphasis is on field research techniques: observations, sampling, collection and preservation methods and comparisons among elevation zones. Includes 5 field labs, 2 weekend trips, 5 lab practica, experience with several taxonomic experts and individual research projects.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 4795 and MUSM 5795
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**ENVS 4800 (3) Capstone: Critical Thinking in Environmental Studies**
Examines a specific environmental topic in depth, synthesizing information from complex and controversial issues. Different course sections present different topics. Fulfills capstone requirement for Environmental Studies major.
**Requisites:** Restricted to Environmental Studies (ENVS) majors only.
**Recommended:** Prerequisites ENVS 1000 and ENVS 3020.

**ENVS 4840 (1-6) Independent Study**
Students work with an approved faculty sponsor to explore a topic in greater depth and to pursue an interest that is not offered in the formal curriculum.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Recommended:** Prerequisite ENVS 1000.

**ENVS 4850 (1-3) ENVS Honors Thesis Research**
To be taken in final academic year prior to graduation. Consists of honors research and thesis preparation under the guidance of a faculty mentor. Department enforced restriction: Requires a minimum 3.3 GPA and a declared ENVS major and approval by departmental honors committee. If a student wishes to use ENVS 4850 to complete the ENVS Capstone degree requirement, at least 3 credit hours of ENVS 4850 are required (by graduation).
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade

**ENVS 4950 (3) Seminar: ENVS Honors Thesis**
Offers an opportunity for students who are either in the process of writing an Honors thesis, or are in the early process of conducting Honors research, to receive guidance on the process of thesis writing, evaluation and presentation of research results, and defending a thesis. Thesis requirements and the role of the A&S Honors Council will be discussed. Also offers the opportunity to hear practice defense talks from the graduating Honors candidates. Department enforced prerequisite: Requires a minimum 3.3 GPA and a declared ENVS major and approval by departmental honors committee.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**ENVS 4990 (3) Senior Thesis**
Supervised writing project involving original research. Fulfills Capstone requirement in Environmental Studies major. Open only to Environmental Studies majors.
**Requisites:** Requires prerequisite course of ENVS 1000 (minimum grade D-). Restricted to students with 87-180 credits (Senior) Environmental Studies (ENVS) majors only.
**Recommended:** Prerequisite ENVS 3020 and ENVS students should have completed a cornerstone class (ENVS 3520, ENVS 3525, ENVS 3555, or ENVS 3621).

**ENVS 5000 (3) Policy, Science, and the Environment**
Introduction to methodologies of the policy sciences with emphasis on applications to environmental issues; role of science in decision making; professional roles and responsibilities as a policy analyst.
**Requisites:** Restricted to Environmental Studies (ENVS) graduate students only.

**ENVS 5003 (3) Conceptual Foundations of Environmental Studies**
Addresses basic theoretical questions underlying common methods employed by those conducting research in environmental science, values, and policy. The course provides a broad overview of the conceptual background relevant to work and research in environmental studies, with an emphasis on understanding many debates that have informed and challenged disciplinary research and, in so doing, shaped the interdisciplinary field of environmental studies.
**Requisites:** Restricted to Environmental Studies (ENVS) graduate students only.
**Grading Basis:** Letter Grade

**ENVS 5004 (3) Research Design in Environmental Studies**
Offers a conceptual understanding of the diverse methodological traditions used in empirical environmental research, when and why methods are deployed, and their relative strengths and weaknesses. Designed for students pursuing interdisciplinary environmental careers or those looking for a broad foundation prior to specializing. Emphasizes foundational research skills of developing a research question, scientific writing, interdisciplinary collaborations, and science communication. Formerly offered as a special topics course.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 5050 (3) Theories of the Policy Process**
Examines the public policy process, including the influences and actors that shape policy outcomes. Focuses on the major theories, frameworks, and models of policy change, along with emerging scholarship that challenges, refines, and advances the theory.
**Requisites:** Restricted to graduate students only.

**ENVS 5100 (1-3) Special Topics in Environmental Studies**
A variety of topics not currently offered in curriculum; offered depending on instructor availability and student demand.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**ENVS 5110 (1-3) Topics in Environmental Social Science and Humanities**
Covers various topics in the social sciences and humanities in environmental studies.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to Arts and Sciences, Journalism, Law or Business Graduate Students only.

**ENVS 5120 (1-3) Topics in Quantitative Methods**
Covers a wide range of quantitative methods used in policy research and their applications. Topics may include decision-making under uncertainty, fundamentals of microeconomics, mathematics of economic efficiency, cost-benefit analysis, system optimization, budgeting, fundamentals or probability, risk assessment, risk perception, risk communication, and decision analysis. Includes practical exercises, as well as readings and discussion, of various strengths and weaknesses of the different methods.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ENVS 5135 (3) Dogs, Wolves, and Humans**
Humans have a closer and longer history with ancestral and domestic dogs than any other animal species. Ironically, the closest living relative of dogs (wolves) remain one of the world¿s most persecuted species ¿ an issue that rages today throughout the United States, including Colorado. This class centers on the biology of domestication, evolution of behavior, canid paleontology and genetics, wolf conservation, and the evolutionary, social, and cultural significance of wolves and dogs to humans.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 4135
**Recommended:** Prerequisite ANTH 2010 or EBIO 1030 or EBIO 1210 or EBIO 1220 or EBIO 2040 or ENVS 2000.

**ENVS 5155 (4) Ecosystem Ecology**
Integrates information from physics (energetics), chemistry (element properties) and biology (evolutionary traits, photosynthetic pathways) to understand the structure and functioning of ecosystems. Provides an analysis of biotic community responses and feedbacks to environmental change drivers. Strong focus on water, nutrient cycling and carbon dynamics of diverse terrestrial and aquatic landscapes.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4155, EBIO 5155 and ENVS 4155
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 5240 (3) Environmental Philosophy**
A survey of the major philosophical issues in environmental studies, comprising key issues in environmental ethics, in environmental political philosophy and in the philosophy of biology and ecology.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5240
**Requisites:** Restricted to Environmental Studies (ENVS) graduate students only.

**ENVS 5340 (4) Conservation Biology and Practice in Brazil's Atlantic Forest**
Field Studies. Examines the application of conservation principles in the Atlantic Forest of Brazil, a 'biodiversity-in-crisis' setting. Explores successful conservation strategies integrated with efforts to alleviate socioeconomic issues. Three-week Maymester, Study Abroad Global Seminar.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 4340, EBIO 4340 and EBIO 5340
**Recommended:** Prerequisites EBIO 2040 or ENVS 2000 or 2000/higher-level course in ANTH, EBIO, ENVS, EVEN, GEOG, IAFS or other discipline related to ecology or sustainability.
**Grading Basis:** Letter Grade

**ENVS 5510 (1) Environmental Studies Colloquia Series**
All first year ENVS graduate students are required to attend the ENVS Colloquia Series. Speakers from around the world and within the department cover topics in all areas of Environmental Studies.
**Repeatable:** Repeatable for up to 2.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Environmental Studies (ENVS) graduate students only.
**Grading Basis:** Pass/Fail

**ENVS 5520 (1-3) Seminar in Environmental Studies**
Addresses current topics in Environmental Studies. Provides forum for students to critically evaluate the primary literature on a particular theme.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 5701 (3) Policy, Politics and Management: Foundations**
Examines concepts related to policy and regulatory processes, institutions and management of the environment and natural resources. Explores environmental laws at the international, national, state and local levels as well as how the processes and institutions at various levels of government help shape laws and their implementation. Focuses on policy tools including property rights, regulation, voluntary compliance and market-based mechanisms.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 5702 (3) Environmental Governance: Actors and Institutions**
Provides an examination of environmental governance issues across scales, from local to global. Focuses on foundational theory while critically examining empirical case studies of success and failure in managing common pool resources. Emphasizes understanding the role of diverse actors and institutions in driving environmental outcomes. Students will obtain practical tools and skills towards facilitating environmental sustainability of natural resources across scales.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 5740 (3) Context-Sensitive Research Methods**
Prepares students to conduct research on topics where data is not obvious or not easily available. Encompasses variations in context and setting as part of data observations. Methods include interviewing protocols, interpretive methods, cluster analyses, case study methodologies and textual analyses.
**Equivalent - Duplicate Degree Credit Not Granted:** PSCI 7116
**Requisites:** Restricted to graduate students only.

**ENVS 5750 (3) Climate Politics and Science-Policy**
Explores, understands and critically analyzes influences and trends in climate politics and science-policy. Course participants will gain an improved understanding of the myriad factors, pressures and processes that are involved in contemporary climate politics under-girding explicit policy proposals. Course participants will more capably identify consequential spaces of decision-making, recognize tractable places for change and fashion constructive strategies for their own research by way of best available evidence from work done in these areas. Overall, our attention to these course themes, concepts and case studies will help us to more capably understand, analyze and engage in the high-stakes 21st century arena of climate politics and science-policy. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVM 5750, GEOG 5750 and SOCY 5750
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 5760 (2) Inclusive Pedagogy**
Classroom instructors have a critical role in promoting student success through inclusive teaching approaches. This graduate seminar will prepare graduate students in key areas of inclusive teaching. Students will explore questions like: How can you foster a class climate that supports a sense of belonging for all students? How can clear and transparent learning outcomes promote student success for all students? How can course assignments and teaching strategies contribute to inclusive teaching? Students will also examine the literature on inclusive teaching and create a teaching statement that integrates aspects of inclusivity.
**Grading Basis:** Letter Grade

**ENVS 5810 (3) Water Resources and Environmental Sustainability**
Assesses impacts of climate variability and regional growth on western U.S. water resources, and examines successes and failures of different management strategies, as well as ways that science is used and misused in support of water management.
**Requisites:** Restricted to Arts and Sciences, Journalism, Law or Business Graduate Students only.

**ENVS 5820 (3) Energy Policy in the 21st Century**
Examines energy policy and the problem of sustainability through a variety of disciplinary and topical perspectives: historical, political, behavioral, techno-economic and legal. A critical approach is applied to arguments about energy policy processes, systems and desired outcomes, with special emphasis on the role of renewable and sustainable energy in the changing global system.
**Requisites:** Restricted to graduate students only.

**ENVS 5830 (3) Critical Issues in Climate and the Environment**
Discusses current issues such as ozone depletion, global warming and air quality for graduate students in nonscientific fields. Provides the scientific background necessary to understand, follow scientific developments and critically evaluate these issues.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 4800 and ATOC 5000

**ENVS 5840 (3) Global Biogeochemical Cycles**
Focuses on the cycling of elements at the global scale with a particular emphasis on human modification of biogeochemical cycles. Major biogeochemical cycles, their past dynamics, present changes and potential future scenarios will be addressed. Ecosystem to global-scale model of the earth system will be discussed, along with global-scale measurements of element fluxes from satellites, aircraft and measurement networks.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5305
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite general chemistry, some organic chemistry.

**ENVS 5909 (1-3) Independent Study**
Only 3 hours of independent study can be used towards degree requirements.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**ENVS 5930 (2) Internship**
Provides academically supervised opportunities for environmental studies majors to work in public and private organizations on projects related to the students' research and career goals, and to relate classroom theory to practice.

**ENVS 6007 (3) Foundations of Environmental Sociology**
Provides overview of environmental sociological theory and research including topics such as: public environmental perception, concern, and knowledge; environmentalism as a social movement; environmental justice; energy, technology, and risk; human dimensions of environmental change; and natural hazards and disasters.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 6007

**ENVS 6201 (3) Qualitative Research Methods for Environmental Studies**
Introduces students to research design, data collection and analysis methods. Exploration of the rationale underlying the use of various methods, the skills needed to employ qualitative method and the process of designing a research protocol will provide graduate students with a sound foundation to begin their own thesis research.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 6222 (2-3) Environmental Decision-Making**
Explores the foundational issues that underlie agency decision-making, including environmental ethics, cost-benefit analysis, risk assessment, constitutional law and administrative law. Compares and contrasts National Environmental Policy Act and the National Historic Preservation Act and the Endangered Species Act.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 7222
**Grading Basis:** Letter Grade

**ENVS 6301 (3) Environmental and Energy Economics**
Introduces non-economists to the study of energy markets, environmental externalities, economic regulation and public policy. This applied course uses examples from electricity generation, renewable energy, manufacturing, transportation and other energy intensive industries. A variety of policy instruments will be studies, including: technology standards, subsidies, environmental mandates, rate-based policies, emissions taxes and cap-and-trade systems.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 6302 (3) Sustainable Landscapes, Sustainable Livelihoods**
Examines rural transformation and the adoption of recreation economies in communities across the U.S. West in response to burgeoning recreation industry and interest in public lands. Students will evaluate different approaches for developing and managing recreation economies in small towns that consider diverse social, cultural, economic, and environmental constraints as well as opportunities in a time of rapid change. Project-based course. Students learn techniques to gather and synthesize data that support solution development.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVM 6302
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 6303 (3) Transportation and Sustainable Cities**
Examines the problem of organizing transportation systems from a variety of perspectives and explores how transportation decisions get made at a variety of scales, from local to national. Covers some of the dramatic changes coming from technological innovation in arenas like vehicle electrification, autonomous vehicles and the potential shift from individual vehicle ownership to shared mobility.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 6304 (3) Introduction to Food Systems Internationally**
Introduces students to contemporary food system challenges a the global scale, the course will first identify key historic and projected trends, to set the scene for the remainder of this specialization. Second it will draw on international case studies to explore some of the institutional, technological and market responses to food system challenges across the globe.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 6305 (3) Reducing the Environmental Impact of Food Systems: Evidence-Based Solutions**
Explores the evidence and ideas underlying some of the most important contemporary food system debates. We will ask: in enhancing the environmental sustainability of food systems, what do the data tell us about the roles that can be played by genetically engineered food, organic agriculture, local food systems, changes to animal agriculture, and reductions in food waste? Students will draw on peer-reviewed research to address the science, policy, and ethical dimensions of these topics.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVS 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.

**ENVS 6950 (1-6) Master's Thesis**

**ENVS 7118 (3) Foundations of Environmental Justice**
Examines environmental justice movements, policies, institutions, objectives, and scholarship. Identifies factors that contribute to environmental inequality, and efforts to reduce it. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** COMM 7118, GEOG 7118 and PSCI 7118
**Requisites:** Restricted to graduate students only.

**ENVS 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

# Ethnic Studies (ETHN)

## Courses

**ETHN 1022 (3) Introduction to Africana Studies**
Overview of Africana studies as a field of investigation, its origins and history.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 1023 (3) Introduction to Native American and Indigenous Studies**
Introduces critical terms, issues, and questions that inform the discipline of American Indian Studies. Examines "historical silences" and highlights how American Indian scholars, poets, and filmmakers use their work to address/redress historical subjects, and represent their Native communities.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: American Indian Studies

**ETHN 1025 (3) Introduction to Asian American Studies**
Examines the various factors that define minority groups and their positions in American society using Asian Americans as a case study. Emphasizes the perspectives and methodologies of the discipline of ethnic studies.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Asian American Studies

**ETHN 2001 (3) Foundations of Comparative Ethnic Studies: Race, Gender and Culture(s)**
Introduction to the study of race, ethnicity and gender in the United States. Overview of concepts, theories and analytic frames that shape the interdisciplinary field of Ethnic Studies. Focuses on historic, institutional, legal and cultural issues that impact African-Americans, Asian-Americans, Chicanas and Chicanos, European Americans, Native Americans and Indigenous peoples in the U.S.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 2004 (3) Themes in American Culture 1**
Enables students to explore various themes in pre-1865 American culture. Examines these themes, which vary each year, in their social context.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American Studies

**ETHN 2013 (3) Critical Issues in Native North America**
Explores a series of issues including regulations of population, land and resource holdings, water rights, education, religious freedom, military obligations, the sociopolitical role of men and women, self-governance, and legal standing as these pertain to American Indian life.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: American Indian Studies

**ETHN 2014 (3) Themes in American Culture 2**
Enables students to explore various themes in post-1865 American culture. Examines these themes, which vary each year, in their social context.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American Studies

**ETHN 2020 (3) Flourishing, Belonging, Liberation**
This course explores perspectives from the humanities (Indigenous, African-American, and Buddhist) and the sciences about what it means to flourish: an existence filled with wellness, purpose, connection, and justice. Human flourishing is considered in relation to theories of social and spiritual liberation given global legacies of colonialism, such as structural inequity and racialization. Students will engage in experiential learning where their bodies, minds, and communities are engaged as somatic laboratories and fields of exploration.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ETHN 2044 (3) Crime and Society**
Explores issues related to crime, the criminal justice system, and crime-related public policy. It addresses what we know about crime and how we know it, how our society responds to crime, how the institutions designed to address crime (police, courts, corrections) function, and diversity in experiences with the criminal justice system.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 2044
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 2053 (3) Introduction to BIPOC Horror**
Mainstream horror often centers on white fears and problematic representations of Black, Indigenous, and People of Color (BIPOC). This class will take a different approach by highlighting horror created by BIPOC in films, novels, and comics. Employing a critical Ethnic Studies lens, focusing on the intersections of race, class, gender, sexuality, and ability, we will interrogate the various and changing meanings of fear, fright, and despair and how they inform culture, identity, and community.
**Recommended:** Prerequisite ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ETHN 2203 (3) American Indians in Film**
Surveys representations of American Indians in American (especially Hollywood) film with an emphasis on "revisionist," or ¿breakthrough¿ films. It follows the creation of "the Hollywood Indian" from early literature to contemporary motion pictures. Films are analyzed within historical, social, and artistic contexts, and examined in terms of the impact their images have exerted upon American society at large, as well as Native communities. Near the end of the course we will look at what happens when Native Americans write, direct, and act in independent films or streaming television series.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 2203
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: American Indian Studies

**ETHN 2215 (3) The Japanese American Experience**
Surveys the Japanese American experience, emphasizing post-WWII developments. Gives attention to intragroup diversity having to do with generation, ethnicity, ecology, and gender.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Asian American Studies

**ETHN 2232 (3) Contemporary African American Social Movements**
Examines selected case studies of African American collective behavior in a historical context. Emphasizes an in-depth investigation of the continuing African American struggle for social/democratic rights.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Africana Studies

**ETHN 2242 (3) African American Social and Political Thought**
Introductory course designed to acquaint students with historical and contemporary thinking, writings, and speeches of African Americans.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Africana Studies

**ETHN 2304 (3-4) Introduction to Social Justice**
Provides undergraduate students with an understanding of how social systems, primarily the educational and health care systems, are key to understanding injustices and criminalization. Topics covered will include trauma and victimization, food and housing justice, educational justice, physical and mental health justice, mass incarceration, #BlackLivesMatter and restorative justice.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American Studies

**ETHN 2432 (3) African American History**
Surveys African American history. Studies, interprets and analyzes major problems, issues and trends affecting African Americans from about 1600 to the present.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 2437
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Africana Studies

**ETHN 2500 (3) Race, Ethnicity, and Language**
Explores the relationship between race, ethnicity, and language and how they are co-constructed. How do speakers of different racial and ethnic groups use language differently, and what are the social implications of these different language varieties? Discusses the implications of ethnolinguistic variation on racial stereotypes, education, and the law.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 2500
**Recommended:** Prerequisite LING 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**ETHN 2536 (3) Survey of Chicana/o History and Culture**
Through historical and social scientific studies, novels, autobiographies, testimonies, films, music, and art, this course will provide students a survey of Chicana/o history and culture. Historical overviews of Chicana/o peoples from Mesoamerica; the Spanish Conquest; the historical presence of Chicana/o peoples in the Southwest; the rise of the Chicana/o student and community movements; immigration issues; and the gender, sexuality, and criminalization issues.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Chicana/o Studies

**ETHN 2546 (3) Chicana and Chicano Fine Arts and Humanities**
Provides foundation for study of Chicano literature, music, the plastic arts, theatre and film. Also introduces aesthetic and critical concepts and their applications in Chicana and Chicano studies.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Chicana/o Studies

**ETHN 2703 (3) Native American and Indigenous Religious Traditions**
Studies the religious lifeways of diverse Indigenous peoples in North America. The course considers how these religious lifeways facilitate healing, movements of social protest, and efforts for self-determination in response to ongoing forms of colonialism. Students will critically explore the impact of colonial structures on Native American religious traditions, such as missionization, and evaluate the meaning of decolonization as both a pathway and goal supporting Native liberation.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 2700
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: American Indian Studies

**ETHN 2713 (3) American Indian Literature**
Surveys historical and contemporary North American Native American literature. Examines the continuity and incorporation of traditional stories and values in Native Literature, including novels, short stories and poetry.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 2717
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: American Indian Studies

**ETHN 2732 (3) Introduction to African American Literature**
This course traces the roots of contemporary African American writings through the Harlem Renaissance to early Black poetry and slave narratives. Students will explore how African American authors have used genre, language, and publication to question intersections of race, gender, sexuality, class, nation, empire, colorism, and freedom in US and African American history.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 2737
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Africana Studies

**ETHN 2746 (3) Introduction to Chicana/o/x Literature**
This class explores the diverse and vibrant writings of Chicana/o/x authors from today back through a time when places like Colorado and California were part of Mexico. Readings consider how Chicana/o/x authors have used concepts such as Greater Mexico, Aztlán, la frontera, and Chicanidad to question intersections of language, race, class, gender, sexuality, indigeneity, nation, violence, and empire.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 2747
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Chicana/o Studies

**ETHN 2761 (3) Race, Empire, and the Postcolonial**
When did the sun set on the British Empire? In the twentieth century, countries across Africa, Asia, and the Caribbean fought for their independence and built their own literary and cultural traditions while grappling with the legacies of empire. This course explores how authors from these new nation-states wrote about racial oppression; global economic inequalities; the promise of new national identities; the lingering effects of colonialism; and the use of English as a literary language.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 2767
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3015 (3) Asian Pacific American Communities**
Covers the concepts, methods, and theories commonly used in community research, as well as substantive information on selected Asian/Pacific American communities. Emphasizes the ethical/political dimensions of community studies.
**Recommended:** Prerequisite ETHN 1025 or ETHN 2001.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asian American Studies

**ETHN 3024 (3) Introduction to Critical Sports Studies**
Learn to think in an informed and critical way about sports in society. Examine the socio-cultural significance of sports as it relates to topics such as youth, social class, race/ethnicity, gender, identity, and intercollegiate athletics. Readings, class discussions, videos, and guest speakers will help expand our understanding of this important social phenomenon.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3026 (3) Women of Color: Chicanas in U.S. Society**
Critically explores the Chicana experience and identity. Examines issues arising from the intersection of class, race, and gender. Focuses on controversies surrounding culture and gender through an analysis of feminism and feminismo.
**Recommended:** Prerequisite ETHN 2001 or ETHN 2536.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Chicana/o Studies

**ETHN 3044 (3) Race, Class, Gender, and Crime**
Overview of race, class, gender and ethnicity issues in offending, victimization and processing by the justice system. Examines women and people of color employed in the justice system.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 3044 and WGST 3044
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3101 (3) Selected Topics in Ethnic Studies**
Intensive examination of a particular topic, theme, issue, or problem in ethnic studies as chosen by the instructor.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3102 (3) Selected Topics in African American Studies**
Intensive examination of a particular topic, theme, issue, or problem concerning the African American presence, as chosen by the instructor. Sample offerings could include African American Pop Culture, the Civil Rights Movement, or other African American issues.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite ETHN 1022 or ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 3103 (3) Selected Topics in American Indian Studies**
Examines a particular topic, theme, issue, or problem in American Indian Studies.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite ETHN 2001 or ETHN 2203.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American Indian Studies

**ETHN 3104 (3) Selected Topics in American Studies**
Critically examines American identity and experiences, past and present, focusing on ethnicity, gender, popular culture, and political culture.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American Studies

**ETHN 3105 (3) Selected Topics in Asian American Studies**
Intensive examination of a topic or issue affecting Asian Americans, such as the Japanese American internment during World War II, or Asian American social movements or community organizations.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite ETHN 1025 or ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asian American Studies

**ETHN 3106 (3-6) Selected Topics in Chicana and Chicano Studies**
Intensive examination of a particular topic, theme, issue, or problem in Chicana and Chicano studies as chosen by the instructor.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite ETHN 2001 or ETHN 2536.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Chicana/o Studies

**ETHN 3136 (3) Chicana Feminisms and Knowledges**
Provides insight into the present socioeconomic condition of Chicanas and the concept of feminismo through interdisciplinary study of history, sociology, literary images, and film portrayals.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3135
**Recommended:** Prerequisite ETHN 2001 or ETHN 2536.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Chicana/o Studies

**ETHN 3201 (3) Social Justice, Leadership and Community Engagement Internships**
Focuses on leadership theories and skills necessary for effectiveness in social justice settings. Students gain understanding of traditional and culturally diverse approaches to leadership and change. Community service required.
**Equivalent - Duplicate Degree Credit Not Granted:** INVS 3100
**Requisites:** Restricted to Ethnic Studies (ETHN) majors or minors or INVST Community Studies (IVT) subplan students only.
**Recommended:** Prerequisite ETHN 2001.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3212 (3) Introduction to Hip Hop Studies**
Examines critical questions posed by hip hop culture. Accentuated in this course are hip hop's contributions to the political-economic, philosophical, and sociological study of race, racism, sexism and sexuality. Examines the ways in which hip hop, as a new social phenomenon, cultural force and aesthetic form, have influenced contemporary American and global culture.
**Recommended:** Prerequisite ETHN 1022 or ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 3213 (3) American Indian Women**
Explores the experiences, perspectives, and status of American Indian women in historical and contemporary contexts. Examines representations of Indigenous women in mainstream culture. Emphasizes the agency of American Indian women-their persistence, creativity, and activism, especially in maintaining Indigenous traditions.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3210
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite ETHN 1023 or ETHN 2001 or WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: American Indian Studies

**ETHN 3252 (3) African American Urban History**
Fosters a better understanding and appreciation of the role African Americans have played in the evolution and shaping of urban America. Employs techniques of urban studies to more effectively assess the many dimensions, subtitles, and insensitivities of life in the city. S. and Afro-American history.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ETHN 1022 or ETHN 2001 and a working knowledge of U.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 3301 (3) Elements of Religion**
Explores universal components of religion, as inferred from religions of the world, ranging from smaller-scale oral to larger-scale literate traditions.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 3300
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3314 (3) Violence Against Women and Girls**
Focuses on aspects of the victimization of women and girls that are "Gendered" - namely, sexual abuse and intimate partner abuse. Also explores the importance of race, class, and sexuality in gendered violence.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 3314 and WGST 3314
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3403 (3) Indigenous Rights and Red Power Movement**
Deals with historical events involving conflicts between the U.S. government and American Indians. Examples include the role of the FBI in the Pine Ridge Sioux Reservation (1972-76) or the 1864 massacre of the Cheyenne and Arapaho Indians in Colorado territory. Additional courses may relate to tribal governments.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ETHN 1023 or ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American Indian Studies

**ETHN 3501 (3) Theory/Methods/Writing in Ethnic Studies**
Preparation for empirical inquiry in Ethnic Studies. Emphasizes philosophy of social science and cultural studies. Students engage rigorous, theoretical concepts to understand research methods. Prepares students for writing a lengthy, cogent research paper.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) Ethnic Studies (ETHN) majors only.
**Recommended:** Prerequisite ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3575 (3) Japanese American Internment: Critical Thinking in Sociocultural Diversity**
Offers a historical overview of the Japanese American experience in the United States. Introduces and explores fundamental issues inherent in the study of human beings from the perspective of cultural social difference.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ETHN 1025 or ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asian American Studies

**ETHN 3671 (3) People of Color and Social Movements**
People of color the world over are struggling for sovereignty, independence, civil and human rights, food security, decent wages and working conditions, healthy housing, and freedom from environmental racism and other forms of imperialism. Course analyzes and brings alive these struggles.
**Equivalent - Duplicate Degree Credit Not Granted:** INVS 3671
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3692 (3) African Am Music: Fr Spirituals and the Blues to Rap/Hip Hop Soul**
Offers an overview of the origins and evolution of African American music. Guides students through the musical history, as well as the social, political and cultural history, of the spirituals, blues, ragtime, jazz, gospel, freedom songs, rhythm and blues, rock and roll, soul, funk, disco, techno, house, rap and hip hop soul.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites ETHN 1022 and ETHN 2001 and ETHN 3212.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Africana Studies

**ETHN 3701 (3) Gender, Sport and Culture**
Critically examines the experiences of girls and women in American sport from a psycho-socio-cultural perspective with a particular emphasis on the constructs of gender, race, class and sexuality and how these constructs both independently and collectively mediate the female sport experience. Explores theories and interpretive frameworks from sport studies, feminist studies, race studies, psychology and cultural studies.
**Recommended:** Prerequisite ETHN 3024.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3702 (3) African American Sport Experience**
Provides a socio-cultural and historical overview of the contributions of African Americans (men and women) to sport in America. Focus is on the macro (patterns of behavior related to large-scale social structures and processes) and micro (behaviors we observe in society, often readily observable in the context of sport and exercise) level of sport analysis.
**Recommended:** Prerequisite ETHN 3024.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 3704 (3) Athlete as a National Symbol: Nationhood/Nationalism, Sport**
This is a global seminar that explores the nationalistic terrain of sport as a way to understand how athletes became a symbol of nationhood and how they are influenced by, and themselves influence, other aspects of society and culture. Using historical and contemporary examples, this course examines how race, gender, sexuality, economics and the media constructed the nationalistic world of sports today.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 3705 (3) Sport and Culture in Latin America and the Caribbean**
A critical examination of the changing relationship between sport and culture in Latin America and the Caribbean. Examines the historical evolution and current dynamics of Latin American sport and leisure from the post-colonial period through the 21st Century. A variety of sources examine specific examples from several cities, including Buenos Aires, Bogotá, Brasilia, Caracas, Havana, Santo Domingo, Mexico City, Lima, Rio de Janeiro, and São Paulo. Topics include colonialism, nationalism, transnationalism, consumer cultures, masculinity & femininity, and sports & leisure.
**Recommended:** Prerequisite ETHN 3024.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ETHN 3707 (3) Critical Study of Race and Ethnicity in Sports Films**
Examines how race/ethnicity, gender, identity, social class, and nationalism are represented in sport films. The films examined will follow historical social movements throughout the twentieth century, as well as socio-cultural topics today. Readings, class discussions, videos, and guest speakers will help expand our understanding of this important social phenomenon.
**Recommended:** Prerequisite ETHN 3024.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ETHN 3777 (3) Inside-Out: Prison and Social Justice**
Provides a unique experience for Inside (prisoner) and Outside (CU-B undergraduate) students to take a seminar course together in a prison. We address social justice through an ethnic studies, intersectional, and interdisciplinary lens, including social justice topics such as health, education, and work. Outside students must complete an application provided by the instructor and pass a criminal history check by the Colorado Department of Corrections to be enrolled and space is limited. Previously offered as a special topics course.
**Recommended:** Prerequisite ETHN 2001.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ETHN 3841 (1-6) Undergraduate Independent Study**
Consult the Department of Ethnic Studies for information. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite ETHN 2001.
**Additional Information:** Departmental Category: Crosscultural/Comparative Studies

**ETHN 4001 (3) Screening Race, Class & Gender in the U.S. and the Global Borderland**
Engaging with the ways in which racial, class, gender and sexual oppression intersect, this class examines several film productions by and about diasporic and subaltern subjects (especially children and women) in the U.S./Mexico borderlands, and the urban ethnic metropoles of the global borderlands.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4001 and ETHN 5001
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Crosscultural/Comparative Studies

**ETHN 4006 (3) Chicana/Chicano Native American Cultures of the U.S.**
Theoretically engaged seminar considers intersections of Chicana/o and Native American studies to shape our scholarly understanding of the U.S. and Mexico borderlands. Ethnographies, historical studies, novels, film, and music will be used to understand the processes of Spanish and Euro-American colonization, neocolonialism, identity formation, gender, syncretism, and mestizaje.
**Requisites:** Requires a prerequisite course of ETHN 2001 or ETHN 2536 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Chicana/o Studies

**ETHN 4009 (3) Chicana/os and Education**
Chicana/o and Mexican-origin communities make up the largest and oldest of U.S. Latinx peoples. In many urban school districts across the country they make up the majority of the school enrollment; yet they are grossly underrepresented in higher education. This course will examine the socio-historical, cultural, and political contexts that have shaped the educational experiences of Chicana/os in the U.S. including issues of race, language learning and identity formation as they intersect with nation building. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5009
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** this course is primarily designed for upper level (juniors and seniors) students but open to sophomores.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**ETHN 4084 (3) Punishment, Law and Society**
Places the current state of punishment in the U.S. in historical and cross national context. Examines key features of penal systems and key sociological theories about the relationship between punishment and society. Department enforced prerequisite: SOCY 1001 or SOCY 1004.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4084
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 4102 (3) Special Topics in Africana Studies**
Variable topic that allows intensive coverage of a subject, theme, or issue in African American studies.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5102
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of ETHN 1022 or ETHN 2001 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 4106 (3) Special Topics in Chicana and Chicano Studies**
Examines a particular topic, theme, issue or problem concerning Chicana and Chicano studies.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4106
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of ETHN 2001 or ETHN 2536 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Chicana/o Studies

**ETHN 4116 (3) Spoken Word Latinx Poetics and Poetry**
This is a writing intensive workshop in contemporary poetry writing and Chicana/o and Latina/o poetics-specifically, Nuyorican and Afro-Latino (the Nuyorican Poets Cafe). The purpose of the course is dual-fold: 1) students will be encouraged and empowered to express and develop their poetic voice; 2) students will be challenged to develop and refine their poetic craft. Examines primarily Chicana and Latino specific poetic expression that reflects the cultural mestizaje of Chicano/a and Latina/o peoples.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5116
**Requisites:** Requires a prerequisite course of ETHN 2001 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Requisite 6 credits in any ETHN class.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Chicana/o Studies

**ETHN 4213 (3) Indigenous Futurisms: Speculative Genres and Native Tomorrows**
Examines how Indigenous authors, artists and filmmakers have recently begun exploring the genres of Horror, Science Fiction and Fantasy. Considers this shift in light of past and present Native realities. Explores why this shift is happening now, how it helps communities and individuals make political statements, address/redress historical subjects and help to build better futures for us all.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: American Indian Studies

**ETHN 4232 (3) The Life and Thought of Martin Luther King Jr**
An intensive exploration and examination of the life and thought of the Rev. Dr. Martin Luther King Jr. Special emphasis on the stages of his life and their corresponding productions.
**Requisites:** Requires a prerequisite course of ETHN 1022 or ETHN 2001 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 4233 (3) Native American and Indigenous Environmental Issues**
Explores the unique knowledges, practices and perspectives of Native American and Indigenous peoples with regard to environmental issues, and how they both contrast with and complement dominant ways of knowing. Views central themes of Land, Plants, Animals, and Air/Water through political-ecological lenses. Critically assesses historical and contemporary Indigenous environmental matters in the contexts of colonial histories and tribal sovereignty.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5233
**Recommended:** Prerequisite ETHN 1023 or ETHN 2013.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American Indian Studies

**ETHN 4272 (3) W.E.B. Du Bois Seminar**
Analyzes the life and thought of W.E.B. Du Bois for its contributions to interdisciplinary and intersectional studies. Emphasis will be placed on the innovative interdisciplinary and intersectional nature of Du Bois's epistemology and research methodology, as well as his participation in radical political and social movements.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5272
**Requisites:** Requires a prerequisite course of ETHN 1022 or ETHN 2001 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Ethnic Studies (ETHN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 4306 (3) The Chicana and Chicano and U.S. Social Systems**
Gives special attention to ways U.S. institutions (i.e., legal, economic, educational, governmental and social agencies) affect Chicanas and Chicanos. Discusses internal colonialism, institutional racism, assimilation and acculturation, and identity.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5306
**Requisites:** Requires a prerequisite course of ETHN 2001 or ETHN 2536 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Chicana/o Studies

**ETHN 4353 (3) Indigenous Traditions and Law: A Global Perspective**
Explores intersections of indigenous religions and law through historical and contemporary case studies. American Indian and Hawaiian contexts will be featured, as well as the study of the United Nations Declaration on the Rights of Indigenous Peoples and its recent implementation in places as diverse as Bolivia, Norway and Nagaland. Theoretical issues in the academic study of religion and ethnic studies will be emphasized.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5353 and RLST 4353 and RLST 5353
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 4504 (3) Ethnic-American Autobiography**
Investigates the genre of autobiography in America from its inception to the present. American autobiography has been associated with the invention of national character and, thus, is a site of cultural contestation and identity formation. Its changing form crosses disciplinary lines and provides a site for discourses on ethnicity, class, gender, sexuality, age, family, religion and other American cultural conflicts.
**Requisites:** Requires a prerequisite course of ETHN 2001 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: American Studies

**ETHN 4552 (3) The Harlem Renaissance: Fr Black Wmn's Club Mvmnt to Hip Hop**
Offers an interdisciplinary and intersectional overview of the origins and evolution of the Harlem Renaissance. Explores classic texts, music and works of art emerging from the Harlem Renaissance and related events and movements of its epoch: the Black Women's Club Movement, New Negro Movement, Pan-African Movement, Lost Generation, Jazz Age, World War I and World War II.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 4552 and ETHN 5552
**Requisites:** Requires prerequisite course of ETHN 1022 or ETHN 2001 or ETHN 3212 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 4553 (3) Indigenous Representations in the United States**
Examines the relationship and negotiation of culture/status/place through representation(s) within and concerning Indigenous peoples/communities. Focuses on U.S. representational forms in popular experiences e.g., literature, film, media and the roots of those representations via legal and medical definitions. This investigation and analysis is supplemented with focus on gender as well as contextualization through global Indigenous portrayals.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5553
**Requisites:** Requires a prerequisite course of ETHN 2001 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite ETHN 1023.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American Indian Studies

**ETHN 4632 (3) Frantz Fanon Seminar**
Analyzes the life and thought of Frantz Fanon for its contributions to interdisciplinary and intersectional studies. Emphasis will be placed on the innovative interdisciplinary and intersectional nature of Fanon's psychology, sociology and philosophical anthropology, as well as his participation in African and Caribbean anti-colonial movements.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5632
**Requisites:** Requires a prerequisite course of ETHN 1022 or ETHN 2001 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Ethnic Studies (ETHN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 4672 (3) Seminar on the Civil Rights and Black Power Movements**
A review of the ideas, events, persons, organizations oriented to the quest for African American social justice in the decade of the sixties.
**Requisites:** Requires a prerequisite course of ETHN 1022 or ETHN 2001 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Africana Studies

**ETHN 4692 (3) Special Topics in Ethnic US Literatures**
This course will go in-depth into a special topic in ethnic US literatures through texts drawn from African American, Chicana/o/x, Latina/o/x, Native American and Indigenous, Asian American, and/or Arab American traditions. Topics vary by semester. Check department description for details.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 4697
**Requisites:** Requires a prerequisite course of ETHN 1022 or ETHN 2001 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Africana Studies

**ETHN 4714 (3) Sport for Social Justice**
Takes a look at the nuanced and controversial relationship between sport and peace. Although sport is heralded as a powerful tool for social good, drawing attention to causes such as conflict resolution, HIV prevention, environmental initiatives and improved international relationships, it also continues to reflect and reproduce social inequalities in ways commonly overlooked.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5714
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior).
**Recommended:** Prerequisite ETHN 3024.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 4717 (3) Native American and Indigenous Studies Capstone Seminar**
Engages a wide range of NAIS methodologies with a series of case studies. Focuses on print, visual, and digital texts encompassing wide swathe of Eurowestern disciplines, while seeking to recuperate and restore Indigenous epistemic practices within our scholarship. Refines students' skills in intellectual debate in the spirit of shared inquiry and challenges research and writing skills.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 4717
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Grading Basis:** Letter Grade

**ETHN 4841 (1-6) Independent Study**
Work with an approved faculty sponsor to explore a topic in greater depth. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisite ETHN 2001.
**Additional Information:** Departmental Category: Crosscultural/Comparative Studies

**ETHN 4951 (3) Senior/Graduate Seminar in Ethnic Studies**
Capstone experience in Ethnic Studies. Includes an independent research project and public presentation.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 5951
**Requisites:** Requires prerequisite courses of ETHN 2001 and ETHN 3501 (all minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Crosscultural/Comparative Studies

**ETHN 4961 (3) Honors Thesis 1**
Supervised original research project in the field of ethnic studies. The goal is to make substantial progress on a written honors thesis that will be orally defended and submitted to the Honors Program of the College of Arts and Sciences. Department enforced restriction: application and acceptance into the ETHN Honors Program.
**Requisites:** Requires a prerequisite course of ETHN 2001 (minimum grade D-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Ethnic Studies (ETHN) majors only.
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Crosscultural/Comparative Studies

**ETHN 4971 (3) Honors Thesis 2**
Supervised original research project in the field of ethnic studies. The goal is to complete progress on a written honors thesis that will be orally defended and submitted to the Honors Program of the College of Arts and Sciences. Department enforced prerequisite: application and acceptance into the ETHN Honors Program.
**Requisites:** Requires prerequisite courses of ETHN 2001 and ETHN 4961 (all minimum grade D-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Ethnic Studies (ETHN) majors only.
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Crosscultural/Comparative Studies

**ETHN 5001 (3) Screening Race, Class & Gender in the U.S. and the Global Borderland**
Engaging with the ways in which race, class, gender and sexual oppression intersect, this class examines several film productions by and about diasporic and subaltern subjects (especially children and women) in the U.S./Mexico borderlands, and the urban ethnic metropoles of the global borderlands.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4001 and CINE 4001
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Crosscultural/Comparative Studies

**ETHN 5009 (3) Chicana/os and Education**
Chicana/o and Mexican-origin communities make up the largest and oldest of U.S. Latinx peoples. In many urban school districts across the country they make up the majority of the school enrollment; yet they are grossly underrepresented in higher education. This course will examine the socio-historical, cultural, and political contexts that have shaped the educational experiences of Chicana/os in the U.S. including issues of race, language learning and identity formation as they intersect with nation building. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4009
**Requisites:** Restricted to graduate students only.

**ETHN 5102 (3) Special Topics in Africana Studies**
Variable topic that allows intensive coverage of a subject, theme, or issue in African American studies.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4102
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Africana Studies

**ETHN 5106 (3) Special Topics in Chicana and Chicano Studies**
Examines a particular topic, theme, issue or problem concerning Chicana and Chicano studies.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4106
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chicana/o Studies

**ETHN 5116 (3) Spoken Word Latinx Poetics and Poetry**
This is a writing intensive workshop in contemporary poetry writing and Chicana/o and Latina/o poetics-specifically, Nuyorican and Afro-Latino (the Nuyorican Poets Cafe). The purpose of the course is dual-fold: 1) students will be encouraged and empowered to express and develop their poetic voice; 2) students will be challenged to develop and refine their poetic craft. Examines primarily Chicana and Latino specific poetic expression that reflects the cultural mestizaje of Chicano/a and Latina/o peoples.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4116
**Recommended:** Requisite 6 credits in any ETHN class.
**Additional Information:** Departmental Category: Chicana/o Studies

**ETHN 5233 (3) Native American and Indigenous Environmental Issues**
Explores the unique knowledges, practices and perspectives of Native American and Indigenous peoples with regard to environmental issues, and how they both contrast with and complement dominant ways of knowing. Views central themes of Land, Plants, Animals, and Air/Water through political-ecological lenses. Critically assesses historical and contemporary Indigenous environmental matters in the contexts of colonial histories and tribal sovereignty.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4233
**Recommended:** Prerequisite ETHN 1023 or ETHN 2013.
**Additional Information:** Departmental Category: American Indian Studies

**ETHN 5272 (3) W.E.B. Du Bois Seminar**
Analyzes the life and thought of W.E.B. Du Bois for its contributions to interdisciplinary and intersectional studies. Emphasis will be placed on the innovative interdisciplinary and intersectional nature of Du Bois's epistemology and research methodology, as well as his participation in radical political and social movements.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4272
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Africana Studies

**ETHN 5306 (3) The Chicana and Chicano and U.S. Social Systems**
Gives special attention to ways U.S. institutions (i.e., legal, economic, educational, governmental and social agencies) affect Chicanas and Chicanos. Discusses internal colonialism, institutional racism, assimilation and acculturation, and identity.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4306
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Chicana/o Studies

**ETHN 5353 (3) Indigenous Traditions and Law: A Global Perspective**
Explores intersections of indigenous religions and law through historical and contemporary case studies. American Indian and Hawaiian contexts will be featured, as well as the study of the United Nations Declaration on the Rights of Indigenous Peoples and its recent implementation in places as diverse as Bolivia, Norway and Nagaland. Theoretical issues in the academic study of religion and ethnic studies will be emphasized.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4353 and RLST 4353 and RLST 5353
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 5552 (3) The Harlem Renaissance: Fr Black Wmn's Club Mvmnt to Hip Hop**
Offers an interdisciplinary and intersectional overview of the origins and evolution of the Harlem Renaissance. Explores classic texts, music and works of art emerging from the Harlem Renaissance and related events and movements of its epoch: the Black Women's Club Movement, New Negro Movement, Pan-African Movement, Lost Generation, Jazz Age, World War I and World War II.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4552 and HUMN 4552
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Africana Studies

**ETHN 5553 (3) Indigenous Representations in the United States**
Examines the relationship and negotiation of culture/status/place through representation(s) within and concerning Indigenous peoples/ communities. Focuses on U.S. representational forms in popular experiences e.g., literature, film, media and the roots of those representations via legal and medical definitions. This investigation and analysis is supplemented with focus on gender as well as contextualization through global Indigenous portrayals.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4553
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: American Indian Studies

**ETHN 5632 (3) Frantz Fanon Seminar**
Analyzes the life and thought of Frantz Fanon for its contributions to interdisciplinary and intersectional studies. Emphasis will be placed on the innovative interdisciplinary and intersectional nature of Fanon's psychology, sociology and philosophical anthropology, as well as his participation in African and Caribbean anti-colonial movements.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4632
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Africana Studies

**ETHN 5714 (3) Sport for Social Justice**
Takes a look at the nuanced and controversial relationship between sport and peace. Although sport is heralded as a powerful tool for social good, drawing attention to causes such as conflict resolution, HIV prevention, environmental initiatives and improved international relationships, it also continues to reflect and reproduce social inequalities in ways commonly overlooked.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4714
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 5951 (3) Senior/Graduate Seminar in Ethnic Studies**
Capstone experience in Ethnic Studies. Includes an independent research project and public presentation.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4951
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 6000 (3) Foundations of Critical Ethnic Studies**
Examines theories of race, ethnicity, gender, sexuality, colonialism and globalization, especially from the perspectives of communities most impacted by these categories and processes. This is the introductory course for graduate work in Critical Ethnic Studies.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 6001 (3) Research Methods in Critical Ethnic Studies**
Examines various humanistic and social science research methodologies and applies critical frameworks (including feminist, queer, Indigenous and decolonial theories) to research through an intersectional lens committed to analyzing race, class, gender and sexuality as interconnected, knowledge-producing systems of power. Examines how Ethnic Studies scholars can engage with social justice projects by producing knowledge in cutting edge ways.
**Requisites:** Requires prerequisite course of ETHN 6000 (minimum grade C). Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 6002 (1) Professionalization Seminar in Comparative Ethnic Studies**
Provides graduate students with professionalization skills, including how to prepare a national fellowship application, how to give a successful job talk, how to publish refereed journals and book volumes and how to approach the academic job market.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to Ethnic Studies (ETHN) graduate students only.
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 6011 (3) Race and Sexuality Studies**
Examines primary texts in queer studies and queer theory while challenging colonial heteronormative and homonormative studies that exclude queers of color and their life experiences. Readings include works by Gloria Anzaldua, Jose Munoz, Audre Lorde, David Eng, Judith Butler, Judith Halberstam, and Michel Foucault. Topics such as queer borderlands, citizenship, racialized and transgender identities will be interrogated.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 6014 (3) Gender, Race, Class, and Crime**
Examines crime and the criminal legal system practices through the lens of intersecting oppressions, particularly racism, sexism, heterosexism and classism.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 7014
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 6100 (3) Race and Citizenship in U.S. History and Culture**
Examines how the cultural and legal bounds of U.S. citizenship have been linked to race, gender, labor, class, and sexuality. Analyzes the experiences of racialized and gendered groups to explore the racial formations, exclusions and contradictions inherent with the institution of citizenship.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 6101 (1-6) Topics: Specialized Comparative Studies**
Focuses on a variety of advanced interdisciplinary studies. Themes include: Race and Sports, Critical Whiteness Studies, Race and Masculinity, Applied Community Engagement, Black Women in the Diaspora, US/Mexico Border Cultures, Criminalization and Latinas/os, Race, Violence and Film, and Cuba and Tourism.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Requisite ETHN coursework.
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 6103 (3) Indigenous Thought and Theory: Foundations in NAIS**
Introduces the theoretical landscapes of Native American and Indigenous Studies. Explores debates, methodologies and concerns that ground the field and provides critical engagement with Indigenous communities and knowledges. Teaches standards for evaluating scholarly sources based on criteria derived from the most outstanding recent scholarship in the field. Requires writing and thinking critically about issues of concern for global indigenous communities.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: American Indian Studies

**ETHN 6110 (3) Adv Tpcs: Chicana/o Studies: US/Mexico Borderlands**
Examines complex histories, cultural practices and liminal, 3rd spaces of the US and Mexico borderlands; racial and gender identities; community formations. Considers a range of autobiographic testimony narratives, films, social and legal studies, and theories of subjectivity that engage with the politics of representation vis a vis the criminalization of Chicana/o and ethnic youth, immigrants and those perceived to be immigrants.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 6110
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Chicana/o Studies

**ETHN 6301 (3) Decolonial/Postcolonial Theory**
Offers an overview of the origins and evolution of Decolonial/Postcolonial Theory. Critically compares and contrasts decolonial discourse with postcolonial theory. Exposes students to the ways in which decolonial and postcolonial theory conceptually interconnect via Cultural Studies, Critical Race Studies and Ethnic Studies-derived discourses such as racial colonialism, the critique of European imperialism, transnationalism feminism, Indigeneity/Indigenous Studies, Diaspora Studies and Subaltern Studies.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 6501 (3) Critical Race Theory: Soc Scnc Explrtn/Intrvntn into Crit Race St**
Offers an overview of the origins and evolution of Critical Race Theory (CRT). Critically compares and contrasts legal and extralegal social science approaches to CRT. Exposes students to the ways in which CRT and Critical Ethnic Studies conceptually interconnects via CRT-derived discourses such as Critical Race Feminism, Critical White Studies, TribalCrit, LatCrit, AsianCrit, DesiCriti, QueerCrit and Decolonial/ Postcolonial Critical Race Theory.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 6841 (1-6) Advanced Directed Readings in Ethnic Studies**
This is a graduate level directed readings course designed to expand student knowledge in a particular area of concentration with a broad interdisciplinary and comparative framework. These areas of concentration include work in Africana, American Indian, Asian American, Chicana and Chicano and Transnational/Hemispheric ethnic studies.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

**ETHN 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for a minimum of 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Additional Information:** Departmental Category: Crosscultural/ Comparative Studies

# Executive MBA (MBAE)

## Executive MBA (MBAE)

**MBAE 6001 (1.5) Ethics I**
Focuses upon individual leadership and personal ethics. Students will reflect on how personal values shape their approach to leadership and business decision-making. Students will develop individual decision-making frameworks for use in their careers as they earn increasing responsibility and decision-making authority. Topics covered will include values-driven leadership, stakeholder theory, normative ethics and moral psychology.
**Requisites:** Restricted to Executive MBA (EMBA) students.

**MBAE 6002 (1.5) Ethics II**
Focuses on the overlap between organizational leadership and business ethics. Students consider the interconnectedness of law, ethics, values, public policy, regulation, and organization leadership/culture, with opportunity to reflect on how organizational and societal values shape our organizational decision-making processes and actions. Topics covered will include Environmental, Social, Governance (ESG) issues, corporate governance, public policy (lobbying, collective action, regulation, etc.), and community relations/corporate social responsibility (CSR).
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6010 (1.5) The Economics of Pricing, Price Forecasting, and the Macroeconomy**
Examines Price Setting, Price Forecasting and Macroeconomics. Learn to identify consumer price-sensitivity, optimal pricing, and variability driven by consumer attributes. Predict direction of prices in competitive markets. Identify timeframe to profitably act upon this information and the impact of market structure and the level of slack in a market. Develop understanding of the economy as a system. Learn predictive tool for forecasting evolution of GDP, exchange rates, interest rates given policy changes or economic shocks.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6021 (1.5) Financial Accounting I**
This course introduces the basic concepts and practices of the financial reporting system used by companies to convey the results of their operations to stakeholders. Students will develop fluency in accounting terminology and better understand how the intersection of business activities and accounting principles affect corporate financial statements. By the end of the course, students will have the ability to read and interpret real-world financial statements.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6022 (1.5) Financial Accounting II**
This course builds on the foundations from Financial Accounting 1 to explore the complexity of accounting due to the discretion and judgment involved in choosing among alternative methods of accounting. Students will also explore how controls are utilized to mitigate potential risks from misstatements caused by errors, omissions, or fraud. By the end of the course, students will understand how management and accounting decisions affect financial reporting.
**Requisites:** Restricted to Executive MBA (EMBA) students.

**MBAE 6050 (3) Executive Level Strategy**
The fundamental question of strategy is how firms can attain and sustain competitive advantage. In this course, we will analyze in depth the sources of competitive success among firms and develop skills and knowledge necessary to be an effective strategy analyst. You will enhance your strategic thinking skills by learning the concepts and tools of strategic analysis and by applying them to actual competitive situations in case studies and team work.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6051 (3) Operations Management**
Addresses the interface between a firm¿s operations and its over-arching strategy, exploring the design and qualities of a reinforcing operating model, considerations in selecting performance measures, building organizational capabilities, and managing uncertainty. Develops an understanding of processes at the system level, generating insights into the factors that limit a system¿s productivity as well as the alignment of processes with the organization¿s goals/strategy.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6065 (3) Business Finance**
This class presents foundational concepts of corporate finance and investments; describes equity and debt markets; practices discounting cash flows; measures risks and returns using the capital asset pricing model (CAPM) and demonstrates the benefit of diversification. Explores how certain biases and behaviors of market participants may lead to inefficiencies in the market. Students gain understanding of modern financial institutions (e.g., venture capital) and modern financial instruments (e.g., ETFs) and their roles in the modern economy.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6081 (1.5) Data and Uncertainty**
Explores fundamental techniques for analyzing data found in the business environment, concentrating on practical, hands-on experience using and communicating your findings in a concise manner. Course focuses on inference and regression analysis. We will rely on software to calculate the numerical results, but the interpretation will come from you and your team or partners. These tools prepare you for your work specifically in economics, finance, and marketing, specifically, and in all business aspects, generally.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6091 (1.5) Strategic Marketing I**
Marketing is the critical business function of creating value for customers. In this course, you will apply foundational strategic frameworks to develop marketing strategies to achieve organization objectives. Through situation analyses and understanding of consumer behavior and consumer segmentation, organizations position brands to maximize return on marketing investments.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6092 (1.5) Strategic Marketing II**
In this course we will focus on designing, evaluating, and refining the value proposition (4 P¿s of product, price, place and promotion) for consumer segments. Our emphasis will include consumer and trade promotion tactics, digital marketing tools, distribution metrics, and pricing strategies to reach, persuade, and satisfy the organization¿s customers.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6100 (3) Entrepreneurship**
Examines initial decisions that set a foundation for growth, pros/cons of alternative growth strategies, organizational scaling tactics, and keys to realizing value. Focusing on ¿adolescent¿ firms ¿ which have moved beyond the start-up stage but have yet to evolve into mature businesses ¿ and internal ¿intrapreneurship¿ efforts of established firms, will explore key choices founders and managers face as they scale their businesses, growth-related stumbling blocks and alternative strategies that may be used to overcome these obstacles.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6205 (1.5) Risk Management**
Corporations face a multitude of risks beyond their control that nevertheless affect the bottom line. There are risks that are financial in nature, risks associated with operational decisions, and reputational risks. With the introduction of new technologies, companies also need strong cyber resilience to combat security risks. This course will provide a framework for identifying risks faced by organizations and developing risk mitigation plans to manage the uncertainty presented by external forces.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6211 (1.5) Applied Financial Management I**
This applied course provides the toolkit for decision-makers to answer the two fundamental questions in financial strategy: How should a project be financed?¿ How much funding is required?¿ The tools include financial statement forecasting, working capital management, optimal capital structure, and the determination of cash retention and payout ratios, among others. These topics are analyzed through case studies involving high-growth environments, share repurchase recapitalizations, financial distress, and intangible assets, among others.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6212 (1.5) Applied Financial Management II**
This applied course provides the toolkit for decision-makers to answer the most fundamental question in business: Is this a good project? The financial valuation techniques include discounted cash flow methods and relative valuations using peers¿ multiples.¿ These topics are analyzed through case studies involving initial public offerings, capital budgeting for large investment projects, mergers and acquisitions, and restructurings, among others.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6420 (3) Digital Strategy**
This course combines theories and frameworks with practical approaches to provide students with the skills required to help companies identify business opportunities, find appropriate information related technologies, and lead digital transformation efforts to success. Thus, it is not a technical course; rather, it addresses the question: why and how these new technologies should be leveraged to innovate, shape and support new as well existing business strategies in today¿s global competitive landscape.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6470 (3) Creating Value Through Innovation**
Innovation is a critical growth driver for many organizations. In this course, you will learn how to use innovations to generate value, both for your business and for the customers you serve. This ability to unlock growth and power through innovation will serve managers in all functional areas well, and it applies to all organizations ¿ from entrepreneurial ventures to large multinational corporations. Draws on both your creative capacity, and your logical and analytical skills.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6480 (1.5) M&A and Corporate Development**
Focuses on some of the key aspects of M&A deal-making and implementation; will adopt an integrative approach that emphasizes strategic management issues in corporate development. Through a combination of case studies and readings covering concepts and frameworks, course participants will be exposed to a range of M&A issues that can be grouped into four main pillars: 1) M&A within Corporate Strategy; 2) Advisory Inputs; 3) Corporate Development Tools; and 4) Deal Implementation.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6530 (1.5) Negotiations**
Negotiation is subtle skill. The goal of this course is to make you a better negotiator. Students will explore the major concepts and theories of the psychology of negotiation, and apply their knowledge of these topics through directed practice and case analysis. Successful students will be committed to actively participating in the simulations, and be willing learn from the feedback as well as the behavior of others in the course.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6560 (1.5) Executive Leadership**
The purpose of this course is to build MBA students¿ understanding of leadership theories, concepts, processes, and behavior while also helping students identify, develop, and build their own leadership capabilities. The class will enable students to prepare themselves to become leaders of organizations and to embark on paths of personal leadership development.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6565 (1.5) Inclusive Leadership**
Focuses on how to lead in an inclusive way. Ethical missteps can ruin companies and careers; learning inclusive leadership skills is an imperative to successful management. Leaders who understand the nature of unconscious bias and the meaning of inclusion are best able to lead today¿s diverse workforce. Examines what it means to lead in a more inclusive way by understanding what inclusion means and how to create it in teams and organizations.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6581 (1.5) Aligning People with Business Strategy I**
Focuses on providing a foundational understanding of key human capital management concepts allowing leaders to better appreciate the full potential of the function, set the right expectations, understand the inherent risks, and establish proper accountability. Explores how to align innovative human capital solutions with business strategy resulting in the long-term prosperity of organizations.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6582 (1.5) Aligning People with Business Strategy II**
Focuses on enhancing understanding of key human capital strategy concepts specifically applied to enhance organizational performance resulting in competitive differentiation.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

**MBAE 6806 (1.5) Global Business Experience**
This course provides an opportunity for students to apply the business knowledge learned throughout the Executive MBA program, culminating in an international trip to engage with experts in our host countries. Provides first-hand, on-the-spot experience of how business is conducted (e.g., strategy, finance, organization, culture, and management) in the host countries. The trip presents a unique opportunity for face-to-face contact and exchange of experience between executives from the U.S. and their counterparts in the destination countries.
**Requisites:** Restricted to Executive MBA (EMBA) students.
**Grading Basis:** Letter Grade

# Experience Design (TDXD)

## Courses

**TDXD 5005 (3) Design Theory**
Interrogates the principals, theories and philosophies that scaffold successful and innovative design with specific application to the design of immersive and interactive experiences and across a range of commercial, performative and cultural contexts. Activities will clarify how the philosophies of design support the core story-telling and interactive elements of experience designs.
**Requisites:** Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Design: Technique

**TDXD 5105 (3) Collaboratory in Experience Design 1**
Addresses philosophies of storytelling through experience and the general concepts and aesthetics of Experience Design. The first in a two-part series, this course lays foundational principles focusing on the components of a live experience and how space, narrative and interaction affect the design from early conceptualization through implementation.
**Requisites:** Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Design: Process

**TDXD 5500 (3) Experience Design Atelier 1: Design Evolution and Expression**
Introduces students to various techniques for graphically representing design ideas using drawing and illustration techniques in order to augment and deepen the diverse skill sets of students in the class. The first in three-part sequence on graphic representation and expressive practices, students will learn how to work out design ideas through sketching, drawing, creating storyboards and collages.
**Requisites:** Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Design: Technique

**TDXD 5700 (3) Experience Design Atelier 2: Introduction to Design Graphics**
Introduces students to advanced techniques for representing design ideas in graphic form including commonly used software applications (Sketchup, Vectorworks, AutoCAD), scale modeling, mechanical drawing and rendering. The second in a three-part class sequence on graphic representation and expressive practices, this atelier will offer a range of exercises tailored to the skill level of individual students.
**Requisites:** Requires a prerequisite course of TDXD 5500 (minimum grade B-). Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Design: Technique

**TDXD 5805 (3) Professional Portfolio 1**
Focuses on selecting, organizing and developing a plan for presenting material that will eventually culminate in the completion of a competitive professional portfolio, a vital tool for gaining employment in the Experience Design industry. The first of a two-part credited final project, students begin the process to prepare their professional portfolio under the guidance of faculty and industry professionals.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Dsgn: Documentation

**TDXD 6105 (3) Collaboratory in Experience Design 2**
Introduces students to professional models of working in the Experience Design industry. The second in a two-part class sequence, students work collaboratively on industry case studies focusing on entertainment, education and cultural destination genres with input from outside professionals in the field.
**Requisites:** Requires a prerequisite course of TDXD 5105 (minimum grade B-). Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Design: Process

**TDXD 6210 (3) Storytelling for XD**
Explores multi-modal, expressive strategies for experimental storytelling and investigates the diverse languages of live experience. Students complete projects using varying modes of conveyance including physical and spatial action, filmic approaches, digital media and alternative methods. Students will discuss current trends in expressive methods and the nature of story.
**Requisites:** Restricted to Experience Design (TDXD) MFA students only.

**TDXD 6500 (3) Experience Design Atelier 3: Packaging the Design Presentation**
Investigates strategies for visually communication and "selling" design ideas in a compelling and well composed visual/aural presentation. The third in a three-part sequence on graphic representation and expressive practices, this class culminates I a final, comprehensive design project portfolio that follows current professional standards.
**Requisites:** Requires a prerequisite course of TDXD 5700 (minimum grade B-). Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Design: Technique

**TDXD 6555 (3) Experience Design Technology**
Explores established and cutting-edge technologies employed in visual, auditory, and interactive elements of designed environments and experiences. Develops an understanding of the function of these areas, the ways in which they facilitate a complete experience and examines new directions of experimentation in these fields. Elicits research, analysis, and development of new concepts in response to current practices and design problems.
**Requisites:** Restricted to Experience Design (TDXD) MFA students only.

**TDXD 6805 (3) Professional Portfolio 2**
Through editing materials collected in TDXD 5805, students will complete adaptable versions (hard copy, digital, web-based and presentations) of their professional portfolios. In this second of a two-part credited project, a committee comprised of faculty and industry professionals guide the completion of XD portfolios.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires a prerequisite course of TDXD 5805 (minimum grade B-). Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Dsgn: Documentation

**TDXD 6849 (3-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**TDXD 6901 (3) XD Implementation and Engineering**
Explores the realities and challenges of implementing themed entertainment design. Within the framework of project based case studies and a real work project, this course analyzes aspects of construction management, client management and approvals, scheduling, budgeting, value engineering, architecture and design.
**Requisites:** Restricted to Experience Design (TDXD MFA) students only.

**TDXD 6910 (3-6) The Experience Design Center**
Offers Experience Design students an opportunity to engage in and complete projects posed by industry professionals or non-profit partners seeking assistance with experiential projects in a professional, practicing lab/studio setting. The XD Center, house in a campus "maker-space," accepts design challenges and assignments that provide a realistic field experience for students.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Experience Design (TDXD) MFA students only.

# Farrand Residential Academic Program (FARR)

## Courses

**FARR 1000 (1) Farrand Service-Learning Practicum: Special Topics**
Offers a varying service-learning practicum experience as corequisite to a service-learning lecture course.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**FARR 1003 (1) Banned Books and the First Amendment**
Focuses on a heated topic of discussion since the Constitution was drafted: the censorship of books. Looks at some classics in literature: Catcher in the Rye, The Color Purple and Huck Finn, and will explore the questions of why they were controversial and whether censorship of books is ever justified.

**FARR 1100 (1) Passport to LIterature in the Humanities**
Designed to build on Farrand's strength in the humanities, this course provides first-year students with the tools to think critically and independently and to engage in thoughtful discourse. It offers several short articles selected to provide a sense of community, and also one or two literary works chosen for more in-depth analysis and exploration.
**Grading Basis:** Letter Grade

**FARR 1562 (3) Gandhi's Satyagraha: Love in Action for Humans and Other Creatures**
Class texts and films explore social justice and structural violence in regard to humans, animals, and the environment in the light of a Gandhian approach to these issues. Outreach work in the community is included.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**FARR 2000 (3) Farrand Seminar in the Humanities and the Arts**
Studies an aspect of the theme of the Center for Humanities Seminar Program each year, and will be taught by faculty participants in the Center's fellowship program.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**FARR 2002 (3) Literature of Lifewriting**
Examines how diverse writers have created unique personal narratives that shape memory within historical and social contexts. Works will exemplify a wide range of literary structures, themes, and strategies that enhance an understanding of the genre and provide models for students' own life writing assignments.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**FARR 2510 (3) Exploring Good and Evil through Film**
Studies films that depict the best and worst sides of our nature and our capacities both good and evil. It considers how representations of zombies, aliens, cowboys, villains and bad girls reveal what society represses in order to believe in order and goodness. Investigates how the figure of the detective or the hero relies on the criminal or the villain to create his virtue, even as he tries to destroy evil. Topics addressed will be: forms of evil, monstrous women, cowboy heroes, detective evil.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**FARR 2660 (3) Ethics of Ambition**
Through selected readings in classical literature on ethics and through more contemporary readings and films, examines critical ethical issues relating to the competition of ambitions and the alternative styles of choosing between courses of action in adangerous world. Uses biographies of those whose lives illustrate both the complexities of the struggles and the profundity of possibilities. Considers the unconscious metaphors of national visions and ambitions, the competing ethics of ends and means, the conflicting ambitions in a pluralistic society, and the transcendent ambitions of visionaries.
**Equivalent - Duplicate Degree Credit Not Granted:** HONR 2250
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**FARR 2820 (3) Future of the Spaceship Earth**
Examines major ecological, political, economic, cultural, legal, and ethical issues that will shape the future. Students consider how their decisions influence the future, and reflect on fundamental values and ideals underlying the search for solutions to these complex problems.
**Equivalent - Duplicate Degree Credit Not Granted:** HONR 2820
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

# Farsi (FRSI)

## Courses

# Finance (FNCE)

## Courses

**FNCE 2000 (3) Introduction to Investing**
There¿s never been a better time to study the captivating world of finance. With this course, you'll unlock the secrets of finance and discover its extraordinary influence on our lives. Introduction to Investing is a comprehensive introduction, equipping you with the skills and knowledge to assess the financial health of companies, projects, and investments. By making astute financial judgments, you'll be well-prepared to enhance your career prospects and achieve your financial aspirations. Counts as a business elective for Business students.

**FNCE 2010 (3) Quantitative Methods for Finance**
Study of quantitative approaches to finance. Covers mathematical and statistical topics required for such analysis, including derivatives, optimization, integration, probability, inference, and regression. Students will become proficient in using the tools and applying them to various financial contexts using analytics Excel.
**Requisites:** Requires prerequisite or corequisite course of BCOR 2002 or BCOR 2203 and BCOR 2204 (minimum grade D-). Restricted to Business (BUSN) majors with 26-180 units completed.

**FNCE 2070 (3) Trading and Markets: An Introduction to Investing**
Provides an introduction to the world of investing, specifically focusing on trading and markets. Students will gain a solid understanding of how the stock market works, the principles of trading, and the various investment products and strategies available. The course begins by introducing students to the basics of the stock market, including the different types of securities, the roles of various market participants, and how the market functions as a whole. Counts as a business elective for Business students.

**FNCE 2280 (3) Investing in Sustainability**
This course will provide students with a core understanding of sustainable systems and the application of sustainability to businesses and investments. As part of the class, students will learn basic fundamentals of economic systems, business models, and investment principles both from a traditional and sustainability lens. With this primary comprehension of sustainable finance, students will gain valuable frameworks and insights that can be broadly applied towards the growing sustainability practices among a variety of industries. Counts as a business elective for Business students.

**FNCE 2820 (3) Introduction to Personal Financial Planning**
Introduces the concepts, tools, and applications of personal financial planning. Provides the students with tools and techniques for managing their personal finances. With these skills, students gain the ability to effectively deal with their ever-changing financial environment.
**Requisites:** Restricted to business majors with 26-150 credits.

**FNCE 2830 (3) Personal Investment Management**
This course examines concepts of personal investment management. Topics include the structure and regulations of securities markets, market participants and their roles, the characteristics, uses and taxation of investment vehicles, personal trading accounts, risk and return, time value of money, quantitative investment concepts, asset allocation and diversification, portfolio development and analysis, investment strategies, characteristics and valuation of fixed income and equities, alternative investments, and behavioral finance.
**Requisites:** Restricted to students with minimum 26 units completed. Leeds School of Business (BUSN) majors only.

**FNCE 3000 (3) Financial Modeling**
Prepares students for the use of Excel for financial analysis. There will be projects focused on investments, corporate finance, and real estate. The course will look to improve the Excel skills of the student by teaching and practicing useful shortcuts for working in Excel. As much as possible the course will teach the student to ¿ditch the mouse.¿ In addition, it prepares the students to take the two Microsoft Office Specialist Excel Exams, Associate and Expert.
**Requisites:** Requires prerequisite course of BCOR 2203 and BCOR 2204 (minimum grade D¿). Restricted to Business (BUSN) majors with 26¿180 units completed.

**FNCE 3005 (3) Programming for Finance**
Data science has now become a critical part of the finance and banking industries. This course is designed to equip finance students with the essential programming skills through a series of finance applications for data analysis in finance. The programming language of choice for the course is Python. Through a combination of theoretical programming concepts and hands-on programming exercises, students will develop a solid foundation of finance knowledge and build practically useful applications in the finance and banking industries.
**Requisites:** Requires prerequisite course of BCOR 2203 and BCOR 2204 (minimum grade D¿). Restricted to Business (BUSN) majors with 26¿180 units completed.

**FNCE 3010 (3) Corporate Finance**
Covers the theory and practices governing the management of capital in a business firm. Examines the determinants of capital requirements, methods of obtaining capital, problems of internal financial management, implications of risk, and methods of financial analysis and valuations.
**Requisites:** Requires a prerequisite or corequisite course of BASE 2104 (minimum grade D-). Restricted to Business majors with 36-180 units completed.

**FNCE 3030 (3) Investment and Portfolio Management**
Develops modern portfolio theory and applies it to pricing both individual assets and portfolios of assets. Topics include Markowitz portfolio selection model, capital asset pricing model, arbitrage pricing theory, bonds, portfolio performance measurement, and issues of market efficiency. Formerly FNCE 4030.
**Equivalent - Duplicate Degree Credit Not Granted:** FNCE 3035
**Requisites:** Requires a prerequisite course of FNCE 2010 and a prerequisite or corequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 36-180 units completed.

**FNCE 3035 (3) Investments - PFP Track**
Develops modern portfolio theory and applies it to pricing both individual assets and portfolios of assets. Topics include Markowitz portfolio selection model, capital asset pricing model,arbitrage pricing theory, bonds, portfolio performance measurement and issues of market efficiency. Additionally, course content has been customized to cover investment planning topics as required by the CFP Board of Standards and content tested on FINRA¿s Security Industry Essentials Exam, including capital markets, products and risks, trading and customer accounts, prohibited activities and the regulatory framework.
**Equivalent - Duplicate Degree Credit Not Granted:** FNCE 3030
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to students in the Personal Financial Planning (PFP) track with 52-180 units completed.

**FNCE 3040 (3) Retirement Planning**
Examines concepts related to retirement savings and income planning. Specific topics include retirement need, Social Security benefits, qualified employer plans, other tax-advantaged retirement plans, distribution options, taxation of benefits, plan selection and administration, eldercare, special needs planning, non-qualified retirement plans and employee benefits.
**Requisites:** Requires a prerequisite or corequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**FNCE 3060 (3) Estate Planning**
Basic estate planning principles and skills are presented that are necessary for the financial planner to successfully counsel clients and provide relevant advice as part of a comprehensive financial plan. Topics include wealth distribution strategies, transfer document, tax code, unified transfer tax system and the determination of an individual's estate tax liability.
**Requisites:** Requires a prerequisite or corequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**FNCE 3820 (3) Principles of Personal Financial Planning and Insurance**
You will examine general principles of personal financial planning, including the strategic financial planning process, personal financial statements, cash and debt management, financing strategies, education funding, and client communication and counseling. In the second part of the course, you will study risk management and insurance, including analysis of risk exposures and types of insurance, including health, disability, long-term care, annuities, life, and property & casualty.
**Requisites:** Requires prerequisite courses of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**FNCE 4000 (3) Financial Institutions Management**
Analyzes the structure, markets, and regulations of financial institutions. Studies problems and policies of internal management of funds, loan practices and procedures, investment behavior, deposit and capital adequacy, liquidity, and solvency.
**Requisites:** Requires a prerequisite course of FNCE 3010 and BASE 2104 (minimum grade D-). Restricted to Business majors with 52-180 units completed.

**FNCE 4040 (3) Derivative Securities**
Develops the modern theory of contingent claims in a mathematical framework oriented toward applications. Examines how to use derivatives for risk management and to tailor portfolio payoffs. Provides an in-depth analysis of the properties of options.
**Requisites:** Requires a prerequisite course of FNCE 3010 and BASE 2104 (minimum grade D-). Restricted to Business majors with 52-180 units completed.

**FNCE 4050 (3) Capital Investment Analysis**
Focuses on capital budgeting and investment issues. Emphasizes issues relating to cash flows, capital rationing, the investment versus financing decision, leasing, fluctuating rates of output, investment timing, capital budgeting under uncertainty and investment decisions with additional information.
**Requisites:** Requires prerequisites courses of FNCE 3010 and FNCE 3030 (all minimum grade D-). Restricted to Business majors with 52-180 units completed.

**FNCE 4060 (1-6) Special Topics in Finance**
Presents new subject matter in finance. The summer offering is the London Seminar in International Finance and Business. Department enforced prereq.: varies, see advising office.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires a prerequisite course of FNCE 3010 (minimum grade D-). Restricted to Business majors with 52-180 units completed.

**FNCE 4070 (3) Financial Markets and Institutions**
Examines the economics of financial markets and the management of financial institutions, both domestic and international. Topics include an overview of U.S. and international financial markets, pricing and risk factors, interest rates, markets for securities and financial services and markets for derivative financial instruments. For students planning to take FNCE 4000 and FNCE 4070, it is recommended that FNCE 4070 precede rather than follow FNCE 4000.

**FNCE 4080 (3) Blockchain and Cryptocurrencies - Speculation or Innovation?**
Recent years have been major ones for cryptocurrencies, but the typical investor¿s understanding of cryptocurrencies¿ distinctions is limited. In addition to blockchain and cryptocurrencies, this course introduces students to fundraising mechanisms like ICOs and NFTs, the stance of cryptocurrency regulators, and promising blockchain business applications. Given the growing salience and market capitalization of cryptocurrencies, better understanding these digital units of account and their underlying technology is an increasingly valuable skillset for many private sector roles.
**Requisites:** Requires prerequisite courses BASE 2104 and FNCE 3010 (all minimum grade D-). Restricted to Business majors with 52-180 units completed.

**FNCE 4340 (3) Security Analysis**
**Requisites:** Requires prerequisite courses of FNCE 3010 and FNCE 3030 (minimum grade D-). Restricted to Business majors with 52-180 units completed.

**FNCE 4820 (3) Topics in Finance**
Offered irregularly to provide opportunity for investigation into new frontiers in finance.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of FNCE 3010 and FNCE 3030, and APPM 2350 or MATH 2400, and MATH 2130 or 2135 or APPM 2360, and CSCI 1300 (minimum grade D-). Restricted to Business majors with 52-180 units completed.

**FNCE 4825 (3) Experimental Seminar**
Offered irregularly to provide opportunity for investigation of new frontiers in Finance.
**Requisites:** Requires prerequisite courses of FNCE 3010 and FNCE 3030 (minimum grade D-). Restricted to Business majors with 52-180 units completed.

**FNCE 4826 (3) Experimental Seminar: Corporate Governance**
What is the objective of corporate managers? Do they only think about their own benefit? Are they concerned about their shareholders? Are corporate managers concerned about their other stakeholders like employees, customers, and people that live in towns and cities they operate in? Corporate governance addresses the above questions. The objective of the course is to provide the student with a state-of-the-art understanding of corporate governance as it relates to: Corporate board structure, Executive and board compensation, Entrepreneurship and private equity, Corporate social responsibility.
**Requisites:** Requires prerequisite courses of FNCE 3010 and FNCE 3030 (minimum grade D-). Restricted to Business majors with 52-180 units completed.

**FNCE 4827 (3) Experimental Seminar: Topics in Derivatives**
This is a markets-oriented survey of derivatives usage. The two major markets covered are equities and commodities. In the equity markets the focus will be on the S&P 500 options market and the VIX. The commodity focus will be on the energy markets of crude oil, its refined products and natural gas. The course will end with a focus on risk management.
**Requisites:** Requires prerequisite course of FNCE 4040 (minimum grade D-). Restricted to BUSN majors and 52-180 credit hours.

**FNCE 4828 (3) Experimental Seminar: Social Institutions: Theory, History and Methods**
Introduces students to the cornerstone institutions of modern developed societies: (i) property rights; (ii) organizations, both public and private; (iii) monetary and financial systems; (iv) political systems; (v) legal systems; and (vi) the cultural underpinnings of economic development. By focusing on how societies agree upon rules to facilitate mutually beneficial outcomes, the course provides a deeper understanding of the economic and legal foundations of democratic market economies. Given this focus on the rules of the game, the course also serves as a great preparation to law school, as well as an introduction to the type of thinking needed to succeed therein.
**Requisites:** Requires prerequisite course of BCOR 1015 (minimum grade D-). Restricted to Business majors.

**FNCE 4830 (3) Seminar in Investment Banking**
Introduces the student to a career in investment banking and provides specific modeling skills necessary and important dring the first phase of such a career.
**Requisites:** Requires prerequisite courses of FNCE 3010 and FNCE 3030 (minimum grade D-). Restricted to Business majors with 52-180 units completed.

**FNCE 4831 (3) Seminar in Investment Management**
The purpose of this course is for students to understand the investment management profession. The course is designed to be a blend of theory and practice. Extends the basic principles of security analysis, asset pricing theory, portfolio construction, and portfolio performance evaluation. Students will apply these principles in determining, over the semester, how to manage the CU investment fund.
**Equivalent - Duplicate Degree Credit Not Granted:** MSBX 5225
**Requisites:** Requires prerequisite course of FNCE 3010, and prerequisite or corequisite of FNCE 3030 (minimum grade D-). Restricted to Business majors with 52-180 units completed.

**FNCE 4835 (3) Fixed Income Securities**
Provides a working knowledge of fixed income securities, primary and secondary fixed income and interest rate markets, bond credit analysis, credit default swaps and bond portfolio management strategies. The institutional details of government, corporate and municipal fixed income securities and markets will be covered. Also covered will be corporate credit analysis and credit default swaps and, finally, bond portfolio management strategies.
**Requisites:** Requires prerequisite courses of FNCE 3010 and FNCE 3030 (all minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**FNCE 4840 (3) Personal Financial Plan Development Capstone**
Reviews, integrates and applies personal financial planning concepts and skills. It builds on the previous PFP courses taken in the program. Students will prepare written financial plans based on comprehensive and integrative cases. The case method is a primary instructional tool. Individual and team written reports, as well as class presentations of cases, are required.
**Requisites:** Requires prerequisite courses of ACCT 3440 and FNCE 3820 and FNCE 3040; and FNCE 3030 or FNCE 2830 (all minimum grade D-). Restricted to Business (BUSN) majors with 102-180 units completed.

**FNCE 4850 (3) Business Senior Seminar in Finance**
Develops analytical and decision making skills necessary to address real-world business finance situations. Topics include financial analysis and forecasting, capital budgeting, valuation, capital structure policy, international finance, and financial ethics. Uses a combination of lecture and cases; team and individual work.
**Requisites:** Requires prerequisite courses of BASE 2104, FNCE 3010, FNCE 3030 and ACCT 3220 (all minimum grade D-). Restricted to senior Finance (FNCE) majors with 90 to 180 units completed.

**FNCE 4900 (1-6) Independent Study**
Intended only for exceptionally well qualified business seniors. Prior consent of dean and instructor under whose direction study is taken is required and departmental form.

**FNCE 6820 (1-3) Graduate Seminar**
Experimental seminar offered irregularly to provide opportunity for investigation of new frontiers in finance.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.

**FNCE 6900 (1-6) Independent Study**
Requires consent of instructor under whose direction study is taken. Departmental form required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**FNCE 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Repeatable:** Repeatable for up to 3.00 total credit hours.

**FNCE 6950 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**FNCE 7020 (3) Financial Economics and Research**
Studies both theoretical models at the intersection of information economics and finance, as well as natural language processing techniques, focused on financial and accounting documents.

**FNCE 7100 (3) Doctoral Seminar: Finance Theory**
Develops the foundations for the study of modern financial economics by analyzing individuals' consumption and portfolio decisions in the context of risk and then traces the implications to market valuation of traded securities. Topics include the meaning and measurement of risk, portfolio theory, the Capital Asset Pricing Model, and arbitrage pricing arguments like those employed in Modigliani and Miller's capital structure theory and the Black-Scholes option pricing model.
**Requisites:** Restricted to Business Administration (BUAD) graduate students only.

**FNCE 7200 (3) Doctoral Seminar: Empirical Research Methods in Finance**
Develops an understanding of current empirical methods used to examine research issues related to corporatefinance and the capital markets.

**FNCE 7330 (3) Doctoral Seminar: Empirical Asset Pricing**
Develops and examines theories and issues in corporate finance. Topics may include corporate control, capital structure, financial signaling, and payout policy.

**FNCE 7550 (3) Doctoral Seminar: Special Topics in Finance**
Closely examines areas of specific interest to academic research in finance. Subjects vary and may include game theory, stochastic processes in finance, continuous-time modeling, derivative security pricing, the microstructure of securities markets and financial institutions, innovation, and engineering.

**FNCE 7800 (3) Doctoral Pre-Seminar: Finance**
Provides finance doctoral students with an orientation to the finance field; introduces contemporary research perspectives and priorities. Students discuss papers that illustrate academic researchers' use of various disciplinary theoretical and empirical tools to address finance problems.

**FNCE 7830 (1) Doctoral Seminar: Dissertation Research**
Assists doctoral students in integrating courses and fields of study in order to apply their knowledge and skills to problems in finance. Gives special attention to development of thesis topics. Continuous enrollment required of all finance doctoral students while doing course work.

**FNCE 8820 (3) Dynamic Corporate**
Experimental seminar offered irregularly to provide opportunity for investigation of new frontiers in finance.

**FNCE 8900 (1-3) Independent Study**
Instructor consent required and departmental form required.
**Repeatable:** Repeatable for up to 3.00 total credit hours.

**FNCE 8990 (1-10) Doctoral Dissertation**

# First Year Exploration (FYXP)

## Courses

**FYXP 1000 (1) Academic Exploration & Critical Decision Making**
Students will work through the major exploration process in a guided and intentional way and be introduced to a variety of college success strategies as they evaluate their strengths, interests and goals, as well as understand the skills that will be necessary to succeed in an academic discipline. Throughout this course students will engage in questions of social justice, inclusivity, and the ability to impact the world as a result of their education.
**Requisites:** Restricted to Exploratory Studies (XXES or PXPL-COS) students only.

**FYXP 1100 (1) Academic Success Seminar**
The Academic Success Seminar is a one-credit course designed for first-year students in the Program in Exploratory Studies and is taught by staff in the University Exploration & Advising Center. Through participation in FYXP 1100, students will develop the skills they need to succeed in college. The class focuses on developing learning strategies, improving executive functioning (time management, organization, self-monitoring, etc.), and setting S.M.A.R.T. goals. Personal self-reflection is an important component of this course. Students will also identify their strengths and participate in collaborative peer-to-peer interactions.
**Requisites:** Restricted to Exploratory Studies (XXES or PXPL-COS) students only.

**FYXP 1500 (1) First Year Success Seminar**
Designed to assist first-year students with their successful transition to the University of Colorado Boulder. Students will learn about campus resources, goal setting, study skills, and academic exploration. Participation in class discussions, self reflection, and engagement in course assignments are essential in this course. This course will provide a supportive environment for new students to engage with peers, staff, and faculty to support the first eight weeks of the transition to college.
**Requisites:** Restricted to freshmen (0-26) Exploratory Studies (XXES) students only.

**FYXP 2200 (1) Design Thinking Seminar: Using Design Thinking to Create Your Brand and Share Your Story**
The Design Thinking Seminar introduces students to the principles of the design thinking framework and its application toward solution development and personal brand building. In this course students will participate in interactive and hands-on sessions to develop their own story, understand community needs, and create tangible solutions. Students will acquire a strong understanding of the design thinking framework, a deeper sense of their personal passions, and tools to craft their own path at CU and beyond. Department enforced prerequisite: Students must be enrolled in the Design Your Path Living Learning Community.

**FYXP 3000 (1) Transfer Success Seminar**
This success seminar course is designed to assist you, a first semester transfer student, with your transition to the University of Colorado Boulder. Through this course you will learn about various campus and academic resources applicable to an upper-division student; evaluate your skills, interests, strengths and education as they relate to overall career goals; and establish an encouraging transfer student community. Participation, group work, and class discussions are essential in this course.

# First Year Seminar (FYSM)

## Courses

**FYSM 1000 (3) First Year Seminar**
Provide first year students with an immersive experience in an interdisciplinary topic that addresses current issues including social, technical and global topics. Taught by faculty from across campus, the course provides students with an opportunity to interact in small classes, have project based learning experiences and gain valuable communication skills. Seminar style classes focused on discussion and projects.
**Requisites:** Restricted to freshmen (0-26) Exploratory Studies (XXES) students only.

**FYSM 1100 (3) First Year Interest Group Seminar**
Creates a First Year Interest Group by linking a small first-year seminar with an existing introductory course on a related topic. Each seminar section will be linked to a different course and students in that FYSM 1100 section must be registered for that course. There will be a different co-requisite course for each seminar section.
**Requisites:** Restricted to students with 0-26 credits (Freshmen) only.
**Grading Basis:** Letter Grade

**FYSM 1200 (3) First Year Seminar Global Experience**
Offers a first year seminar experience with an international education component. This course consists of a first year seminar taught during the semester, plus a mandatory 1-week trip abroad. Seminar topics and international destinations vary for different sections of this course and not all topics are offered every semester. Additional fees may be required for participation in ths course. Please consult the First Year Seminar Program and International Education for information on topics, destinations, requirements, schedules, fees and other details.
**Requisites:** Restricted to students with 0-26 credits (Freshmen) only.
**Grading Basis:** Letter Grade

**FYSM 2200 (1) Design Thinking Seminar: Using Design Thinking to Create Your Brand and Share Your Story**
The Design Thinking Seminar introduces students to the principles of the design thinking framework and its application toward solution development and personal brand building. In this course students will participate in interactive and hands-on sessions to develop their own story, understand community needs, and create tangible solutions. Students will acquire a strong understanding of the design thinking framework, a deeper sense of their personal passions, and tools to craft their own path at CU and beyond. Department enforced requisite: Students must be enrolled in the Design Your Path Living Learning Community.

# French (FREN)

## Courses

**FREN 1010 (5) Beginning French 1**
For students with no previous knowledge of French. Presents basic grammar and most commonly used French vocabulary. Introduces students to Francophone culture.
**Equivalent - Duplicate Degree Credit Not Granted:** FREN 1050
**Additional Information:** Departmental Category: French

**FREN 1020 (5) Beginning French 2**
Continuation of FREN 1010. Completes the presentation of most basic structures and French vocabulary.
**Equivalent - Duplicate Degree Credit Not Granted:** FREN 1050
**Requisites:** Requires a prerequisite course of FREN 1010 (minimum grade C-).
**Additional Information:** Departmental Category: French

**FREN 1050 (5) Beginning French Review**
Covers the material of FREN 1010 and 1020 in one accelerated semester. Intended for students who know some French (i.e., four to five semesters in high school) but do not have skills adequate for 2000-level courses. Instructors enforce prerequisites: 2 years of high school French.
**Equivalent - Duplicate Degree Credit Not Granted:** FREN 1010 or FREN 1020
**Additional Information:** Departmental Category: French

**FREN 1200 (3) Medieval Epic Through Game of Thrones**
Covers the most important works of medieval literature, in English translation. Among the texts studied are the Song of Roland, and Arthurian romances, including the stories of Lancelot and Guinevere. Offers a general introduction for nonmajors to medieval literature and society. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 1350 (3) Introduction to Social Change in the Arts**
This course serves as an introduction to the Certificate in Art and Social Change. It introduces students to theories, concepts, and ideas that shape artistic productions and activist conversations around social change in a variety of geo-cultural contexts. The course is divided into three main units: theater and performance, media, and visual arts. Through these different lenses, students will learn about artistic practices in the US and in regions where Italian and French are spoken (North Africa, Sub-Saharan Africa, Latin America, and the Mediterranean region). This course allows students to engage with some of the most urgent issues in our societies, as they relate to justice, equality, and diversity. Artists and activists play an increasingly important role in advancing justice and promoting social change at the local, national, and global levels. The interdisciplinary approach of this course enables students to examine the role of different forms of artistic productions as a catalyst for social change.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Arts Humanities

**FREN 1400 (3) Sexuality and Gender Wars in Italy and France**
Introduces students to key participants and arguments in the debate on the status of women in Italy and France during the period 1300 to 1700. Explores writings and art by women and men addressing topics such as gender roles, sexuality, sex work, marriage, and access to education. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 1400
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: French

**FREN 1500 (3) Literature and Politics in the Age of Enlightenment**
Introduces political dimensions of 18th century French literature. Surveys political and social preoccupations that manifest themselves across genres (novels, scientific treatises, dialogues, erotic literature, etc.). Examines contributions made by 18th century French writers to the sociological and political imagination of Western tradition. Taught in English.
**Additional Information:** Departmental Category: French

**FREN 1550 (3) The Power of Fairy Tales in Italy and France**
Examines French and Italian fairy tales written between 1550 and 1750 and analyzes their connections to each other and to contemporary fairy tales literature, film, and the arts.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 1550
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**FREN 1610 (3) How to Be French, 1: The Ancien Regime**
Explores medieval and early modern French culture in the widest sense, encompassing masterpieces of French literature, architecture, and visual art as a key to the habits, customs, and practices of everyday life. Major themes are "living and dying," "heroes, villains, and kings," "courtliness, civility, and the art of love," and "crafty little guys.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 1620 (3) How To Be French? 2: Modernity**
Introduces students to French culture in its widest sense and in particular to reflect on major social and cultural contradictions inherited from the French Revolution, which still define "Frenchness" today. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 1700 (3) Francophone Literature in Translation**
Studies the literary expression of French-speaking peoples of Africa, the Caribbean, and Canada. Gives special attention to oral tradition, identity, question, and cultural conflict. Taught in English.
**Additional Information:** Departmental Category: French

**FREN 1750 (3) French Colonialism: North Africa and the Middle East**
Offers a general introduction to French and Francophone literature and visual arts (painting, photography, film) from the nineteenth century to the present depicting cultures and societies of the Middle East and North Africa. In English with English translations of French texts.
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: French

**FREN 1800 (3) Contemporary French Literature in Translation**
Reviews the major philosophical, political, and aesthetic issues in the 20th century French novel and drama. Beginning with existentialist literature, discussion focuses subsequently on the Theatre of the Absurd, the new novel, World War II and the Holocaust, and recent women writers. Taught in English.
**Additional Information:** Departmental Category: French

**FREN 1850 (3) Introduction to French Society and Culture through Cinema**
Introduces students to French society and culture through French films that focus thematically on historical events and cultural aspects of French Society( e.g., war; gender; post-colonial legacy; the environment). Taught in English.
**Additional Information:** Departmental Category: French

**FREN 1880 (3) The Zombie in History and Popular Culture**
Discusses the emergence of the zombie figure in the Caribbean and its evolution from colonial Haiti to present-day popular culture having passed through Hollywood. Through movies and literary, historical, and scientific documents, students will study critically how this mass-media icon came to represent deep-rooted anxieties about the modern world.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 1880
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 1900 (3) Modern Paris in Literature, Photographs, Paintings and Movies**
Explores the evolution of modern Paris through the eyes of its artists and writers, Parisians and expatriates alike, from the French Revolution (1789) to the present. Studies historical and contemporary changes in architecture and urban planning as the city adapts to growing population, social challenges, and sustainability. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 1950 (3) French Feminisms**
Introduces students to the central problematics that have defined French feminist studies. This course focuses on the various literary and historical contexts in which core concepts such as female subjectivity and agency, feminist writing and political engagement have arisen and developed in Early Modern and Modern France by looking at multiple media (literary text, film, painting). Taught in English.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: French

**FREN 2110 (3) Second-Year French Grammar Review and Reading 1**
A film based curriculum will expand the knowledge of francophone culture and will continue the development of communication skills begun in the first year. This third semester course will review essential beginning grammar before introducing intermediate structures, vocabulary, and cultural/literary readings.
**Requisites:** Requires a prerequisite course of FREN 1020 or FREN 1050 (minimum grade C-).
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Foreign Language
Departmental Category: French

**FREN 2120 (3) Second-Year French Grammar Review and Reading 2**
Completes the film-based study of intermediate grammar begun in FREN 2110. Continued reading in French literature and culture, with considerable practice in writing and speaking French. Fulfills the Graduate School language requirement for the Ph.D.
**Requisites:** Requires a prerequisite course of FREN 2110 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 2500 (3) Conversation in French**
Puts into practice all that has been learned in the first four semesters of college French. Builds conversational skills and confidence through acquisition of new vocabulary and a review of grammar essential to discussing different aspects of French culture. All work is in French.
**Requisites:** Requires a prerequisite course of FREN 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 3010 (3) French Phonetics and Pronunciation**
Improves students' ability to pronounce French correctly. Coursework involves mastering and using the International Phonetic Alphabet, understanding the differences between pairs of sounds, and recognizing the relationship between spelling and pronunciation. Required of all FREN majors.
**Requisites:** Requires a prerequisite course of FREN 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 3020 (3) French Phonetics Through Musical Performance**
Advanced oral practice and interpretation of a French Musical. This course of applied and corrective phonetics concentrates on developing good pronunciation and fluency through song. The course culminates with a public presentation of the musical studied in class.
**Requisites:** Requires a prerequisite course of FREN 3010 (minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 3050 (3) French Composition**
French third-year level composition course. Students practice and write different forms of formal French writing. They also hone their grammar skills and analytical reading of short literature pieces. This course is required for all French majors.
**Requisites:** Requires a prerequisite course of FREN 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Upper
Departmental Category: French

**FREN 3100 (3) Introduction to Critical Reading and Writing in French Literature**
An exploration of important moments in French culture and history as represented in major works of fiction, poetry, and drama. Emphasis on refining critical thought through compositions and oral expression in French.
**Requisites:** Requires a prerequisite or corequisite course of FREN 3050 (minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 3110 (3) Main Currents of French Literature 1**
An exploration of principal themes and texts from Medieval times to the Revolution. Students will become familiar with key moments of intellectual and cultural history.
**Requisites:** Requires a prerequisite or corequisite course of FREN 3100 (minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 3120 (3) Main Currents of French Literature 2**
A survey of important texts and artistic movements from the nineteenth century to the present that inform the contemporary French and Francophone world. Students will become familiar with the intellectual history crucial to understanding the present moment.
**Requisites:** Requires a prerequisite or corequisite course of FREN 3100 (minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 3200 (3) Introduction to Literary Theory and Advanced Critical Analysis**
Introduces important aspects of both classical and modern literary theory as an aid to reading and understanding literary texts. Covers theoretical works by figures ranging from Plato and Aristotle to modern French critics such as Barthes, Foucault, and Derrida in conjunction with selected literary works. Offers students more sophisticated means of understanding issues like gender, ethnicity, the roles of both author and reader in constructing meaning, the nature and functions of signs, and the relationship between literature and the larger society. Conducted in English, though French majors are required to read the texts in the original language. Required for students taking honors in French or Italian.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 3300 (3) French Culture Through Fashion**
Studies fashion as a means of identity construction as well as a means of resistance in France from 1789 until present day. Through an analysis of clothing trends, students will study the cultural significance of certain fads in French history that allowed marginalized demographics to define and assert their individuality.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**FREN 3400 (3) Culture, Performance and Development in Dakar, Senegal**
Offers students an immersive experience in Dakar, Senegal, one of Africa's most historically rich and electrifying capitals. Introduces the history, culture and religious practices of a country at the crossroads of global notions of African, Francophone and Muslim identities. Includes a capstone public presentation in collaboration with a Senegalese activist theater company.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**FREN 3450 (3) Underground Paris**
This Global Seminar explores the literal and figurative spaces of the Parisian underground (catacombs, metro, forgotten histories and subcultures) while also visiting the more iconic sites of the City of Light (the Louvre, the Centre Pompidou, Montmartre and more). Through readings, films, excursions and immersive assignments, students will learn about less commonly acknowledged spaces, populations and cultural movements that nonetheless constitute the life and past of this highly romanticized destination. Taught in English.

**FREN 3500 (3) French Current Events: Conversation and Composition**
Establishes a solid foundation of contemporary French civic and cultural life through the study of film, journalism, and other current media. Focuses on presentations, debates, discussions, readings and written work. Taught in French.
**Requisites:** Requires prerequisite course of FREN 2120 (minimum grade C-) and corequisite course of (FREN 3010 or FREN 3020 or 3050).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 3600 (3) Business French 1**
Gives students the tools needed to function in a French-speaking work environment. A culminating project involves creating a business in a francophone country.
**Requisites:** Requires a prerequisite course of FREN 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 3700 (3) French-American Cultural Differences**
Students will identify and consider key differences between French and American cultural, political and civic values through the analysis of film, literature, journalism, and personal observations.
**Requisites:** Requires prerequisite or corequisite course of FREN 3050 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 3800 (3) France and the Muslim World**
Introduces students to the polemic colonial, social, and cultural interactions of France and Islam. Close attention will be paid to paradigms of identities of one of the major European nations and the Islamic world. Readings and discussion topics for this course cover the social, cultural, and literary depictions of Islamic and French interactions, negotiations, and contradictions. Taught in English. Cannot be used for French major or minor credit.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: French

**FREN 4030 (3) Advanced Oral Practice and Interpreting**
Concentrates on developing (or preserving) speaking fluency, correct pronunciation, and a good working vocabulary.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of FREN 3050 and FREN 3100 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4110 (3) French Special Topics**
Topics vary each semester. Consult the online Schedule Planner for specific topics. See also FREN 4120.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires a prerequisite course of FREN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4120 (3) French Special Topics**
Topics vary each semester. Consult the online Schedule Planner for specific topics. See also FREN 4110.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4170 (3) Francophone Literature**
Studies the literary expression of French-speaking peoples of Africa, the Caribbean, and French Canada. Gives special attention to oral tradition, identity question, and cultural conflict.
**Requisites:** Requires prerequisite course of FREN 3100 (minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4250 (3) Medieval and Renaissance Readings**
Explores the complex and evolving cultural and historical contexts of medieval and/or Renaissance French. Introduces the masterpieces of French medieval and Renaissance literature, such as the Chanson de Roland, Arthurian romances, and the work of Christine de Pizan. Course explores a variety of literary genres, while focusing on specific themes, such as representations of licit or illicit desire.
**Requisites:** Requires prerequisite courses of FREN 3050 and FREN 3100 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4300 (3) Theatre and Modernity in 17th Century France**
Readings of plays by Corneille, Moliere and Racine introduce students to theatre's role as a mirror of the multifarious tensions shaping modern Western experience. Taught in English with English translations.
**Requisites:** Requires prerequisite courses of FREN 3050 and FREN 3100 (all minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4330 (3) Moliere and 17th Century French Comedy**
Close readings of farces and comedies of Moliere in context with selected comedies by Corneille, Rotrou and Cyrano de Bergerac and selected satires by Boileau and La Fontaine. Themes include comedy as a form of social criticism and the sociocultural significance of such episodes of Moliere's career as the scandalous quarrels of L'ecole des Femmes and Tartuffe.
**Requisites:** Requires prerequisite courses of FREN 3050 and FREN 3100 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4350 (3) French Enlightenment**
Studies fiction, essays, theatre, and philosophical tales. Emphasizes the Enlightenment in France through the texts of its major representatives: Montesquieu, Voltaire, Marivaux, Diderot, and Rousseau.
**Requisites:** Requires a prerequisite course of FREN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4430 (3) Survey of 19th Century French Literature**
Examines fiction, poetry and theatre in 19th century France. Focuses on developing and changing literary styles and subject matter throughout the century in historical, philosophical and social context.
**Requisites:** Requires prerequisite course of FREN 3050 or FREN 3100 (minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4470 (3) 20th Century French Theatre and Poetry**
Close readings of plays from the turn of the century to the contemporary period introduce the principal themes and techniques of modernist and postmodernist French theatre. Students are encouraged to consider problems commonly evoked by these texts and to compare the positions that each text takes on such problems as the status and uses of language, the function and limits of the theatre and the dialectic of appearance and reality.
**Equivalent - Duplicate Degree Credit Not Granted:** FREN 5470
**Requisites:** Requires prerequisite courses of FREN 3050 and FREN 3100 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4480 (3) 20th Century French Novel**
Close readings of novels from the 1930s to the contemporary period introduce the principal themes and techniques of the modernist and postmodernist French novel. Students are encouraged to analyze a variety of questions commonly evoked in these texts, such as the problem of representation, the uses and abuses of writing, the relation of fiction and history and the status of the subject in the world.
**Requisites:** Requires prerequisite courses of FREN 3050 and FREN 3100 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4600 (3) Topics in French Film**
Covers various topics in the French and some other Francophone cinemas (Belgian, Swiss, Quebecois) from 1895 to the present. Focuses on periods, schools, themes, and directors from Melies to Duras, and the critical approaches by which they are studied. Varies from year to year.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of FREN 3050 and FREN 3100 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4700 (3) Encountering Animals: Contemporary Discourse and the Dialog of Species**
Explores the Western tradition of thinking about animals as well as recent challenges to our beliefs in human exceptionality and radical animal difference. Themes include the ¿animal machine,¿ nature-culture dualism, animal representations in today¿s culture, philosophy and science, interspecies relations, post-humanism. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 4700
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4750 (3) Methods of Teaching French and Professional Orientation**
Presents current methodology and techniques for teaching foreign language for proficiency. Areas of study include ACTFL guidelines, National Standards, assessment, classroom activities, curriculum, and syllabus design.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: French

**FREN 4800 (3) Postmodernist French Novel in Translation**
Focuses upon recent innovations in the French novel, and upon the postmodernist literary aesthetic. Students will examine a variety of avant-garde novels, and analyze the kinds of literary experimentation that those novels propose. They will be asked to consider a series of questions concerning the changing nature of literary representation and the status of the novel as a cultural form. Taught in English. Cannot be used for major or minor credit.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4840 (1-6) Independent Study: Language**
Upon consultation only and at the undergraduate level.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: French

**FREN 4860 (3) War, Trauma, and Memory: Amnesias, Revisions, and Representations of Traumatic History**
Investigates how extreme historical events (war, genocides, terror attacks) function as "trauma" and how these extreme events are dealt with by personal and collective memory in historical narratives, literary and cinematic fiction, and memorials. Amnesia and other types of historical negations or revisions will be analyzed, along with representations of trauma and the difficulties raised by this memorializing. Taught in English.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: French

**FREN 4960 (6) High School French Teaching**
Offered as part of the supervised student teaching in a secondary school required for state licensure to teach French. These hours do not count toward student hours in the major nor in the maximum departmental hours allowed.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Departmental Category: French

**FREN 4980 (3) French Senior Honors Thesis**
The senior honor thesis is a 40 to 45 page original research paper, written in French, and constitutes a requirement for graduating with departmental honors.
**Requisites:** Requires a prerequisite course of FREN 3200 (minimum grade D-).
**Additional Information:** Arts Sciences Honors Course
Departmental Category: French

**FREN 4990 (3) Senior Seminar**
Preparation of a 15-page research paper in French presented to two members of the department faculty and defended orally in class.
**Recommended:** Prerequisite at least one course numbered FREN 4100 or above and all third-year requirements and advisor consent.
**Additional Information:** Departmental Category: French

**FREN 5110 (3) French Special Topics**
Different topics are offered and, in a number of cases, cross-listed with other departments.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5120 (3) French Special Topics**
Different topics are offered and, in a number of cases, cross-listed with other departments.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5170 (3) Francophone African Literature**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5180 (3) Postcolonial Theory and the Francophone World**
Explores the major theories and reach of postcolonial thought throughout the Francophone world. Examines the theoretical interventions and contributions of the anti-colonial movement as well as current engagements with decolonial and performance theory. Provides students with a critical background to facilitate advanced graduate research in the humanities. Second part of a two-semester series of graduate seminars on critical theory offered by the Department of French and Italian. Formerly offered as a special topics course.
**Requisites:** Restricted to graduate students only.

**FREN 5250 (3) Medieval and Renaissance Readings**
Through close readings of masterpieces of French medieval and Renaissance literature in conjunction with contemporary criticism and theory, explores the contexts of medieval and Renaissance France. Readings in French. May be taught in English to accommodate students in other programs.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5310 (3) 17th Century French Tragedy and Poetry**
Close readings of tragedies by (among others) Corneille and Racine, placed in the context of baroque and neoclassical political and artistic culture as illustrated by philosophy, painting, and science. Drawing on recent criticism and theory, explores heroic drama's role as a symptom and agent of early modern French social and intellectual history. Readings in French, but may be taught in English.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5320 (3) 17th Century French Prose**
Close readings of major works by, e.g., Descartes, Pascal, La Fayette, La Rochefoucauld, and La Bruyere. Themes include 17th century theories of self, early modern epistemology, notions of honnetete and the critical analysis of human motives and behavior, the emerging novel, and the critique of heroic idealism and of the monarchic absolutism of the Sun King, Louis XIV. Readings in French, but may be taught in English.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5330 (3) Moliere and 17th Century French Comedy**
Close readings of the comedies in context with the works of, e.g., Corneille, Rotrou, Cyrano, Boileau, and La Fontaine. Themes include Moliere and the institution of literary authorship, comedy's role as social critique, the deconstruction of the early modern subject, and the cultural politics of the scandals surrounding L'ecole des femmes and Tartuffe. Readings in French, but may be taught in English.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5350 (3) French Enlightenment**
Focuses on the uses of literature to address the revolutionary philosophical, scientific, religious, and/or sociopolitical questions of the day. Explores Diderot and d'alembert's Encyclopedie, Voltaire and Diderot's philosophical tales and dialogues, Rousseau's Discours, and other writings. Discusses the development of specific literary forms to promote the ideas and goals of the philosophers to reach a changing and diverse readership and to fight censorship.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5360 (3) 18th Century French Literature**
Focuses on the study of a specific literary genre (e.g., theatre, the novel) or on the global production of a major author (e.g., Voltaire, Diderot, Rousseau). Discussion stresses both the uniqueness of the genre/writer and their significance as representatives of the century's changing society and culture.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5420 (3) 19th Century French Literature**
A survey of principal works and movements, intended as an introductory course.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5430 (3) Topics in 19th Century French Prose, Poetry, and Theatre**
Topics vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5440 (3) Literary Ludics**
Taught in French and English. Focuses on literary structures proposed by author to reader as games. Considers critical texts, both practical and theoretical, with a view toward defining the relation between criticism and its objects.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5445 (3) Literary Theory, Part I**
Covers Western literary theory from Plato to Latour as the first part of a two-semester literary theory course investigating the Western tradition from the Greeks on to post-colonial and empire studies. This initial course follows the history of criticism and its philosophical underpinning up to 20th century trends but does not cover cultural and post-colonial studies. Taught in English.
**Requisites:** Restricted to graduate students only.

**FREN 5450 (3) Proust and Modernity**
Introduces Proust's masterwork "In Search of Lost Time" in its English translation. The class offers an overview of the work's structure, themes and context. Particular attention is given to Proust's role as a major theoretician of modernity in philosophy, literature and visual arts. Formerly offered as a special topics course.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**FREN 5470 (3) 20th Century French Theatre and Poetry**
Close readings of plays from the turn of the century to the contemporary period introduce the principal themes and techniques of modernist and postmodernist French theatre. Students are encouraged to consider problems commonly evoked by these texts and to compare the positions that each text takes on such problems as the status and uses of language, the function and limits of the theatre and the dialectic of appearance and reality.
**Equivalent - Duplicate Degree Credit Not Granted:** FREN 4470
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 5770 (2-3) Methods of Teaching French as a Foreign Language**
Familiarizes students with current methodology and techniques in foreign language teaching.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 6840 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

**FREN 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**FREN 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: French

# General Engineering (GEEN)

## Courses

**GEEN 1010 (4) Engineering Explorations Through Physics**
Explore the world of engineering through understanding physics concepts, engaging in active learning assignments, and conducting hands-on labs and experiments. Students will analyze product designs and engineering decisions based on the physics surrounding the situation. Formerly COEN 1010.
**Requisites:** Restricted to College of Engineering majors with 75 or less cumulative hours.

**GEEN 1017 (3) Engineering Drawing**
Introduces CAD software; relevant concepts, including orthographic projection, sections, engineering drawing, geometric dimensioning and tolerancing; and rapid manufacturing methods. Final design project involves rapid prototyping. Not recommended for AREN majors.

**GEEN 1400 (3) Engineering Projects**
First-year students solve real-world engineering design problems in interdisciplinary teams. Design projects vary by section. Curriculum focuses on iterative design process, teamwork and team dynamics, supporting design with testing and analysis, and technical writing. Completed projects are exhibited at an end-of-semester design expo. Students responsible for contributing towards their design project budget (approximately $75).
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 2500, ASEN 1400, ASEN 1403 and ECEN 1400
**Requisites:** Restricted to College of Engineering majors with 75 or less cumulative hours or IUT On Track applicants only.

**GEEN 1830 (1-4) Special Topics in Engineering**
Explores topics of interest in engineering. Content varies by instructor and semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**GEEN 2010 (3) Engineering Tools and Analysis**
Taught by engineering faculty, this course utilizes active learning pedagogies to connect math content to engineering problems (across multiple disciplines) by using real engineering tools. Students are introduced to circuits, multimeters, oscilloscopes, sensors and more. They learn to program in MATLAB (no previous programming experience necessary). Students work collaboratively with other students to collect and analyze experimental data. There is one lecture, one mixed lecture/hands-on problem session, and one lab period each week.

**GEEN 2400 (3) Engineering Projects for the Community**
Design engineering products for local community clients, with emphasis on humanitarian engineering and integrated systems with electrical, mechanical, and software components. Students are challenged to take design projects to a higher level by requiring an additional iteration through design cycle and more engaged user-testing, in order to infuse student projects with robustness necessary for public-use products. Students responsible for contributing towards their design project budget, workshop, and expo costs (approximately $100). Cannot be taken concurrently with GEEN 3400.
**Requisites:** Restricted to students with 45-180 credits (Sophomores, Juniors or Seniors) or requires prerequisite course of GEEN 1400 or COEN 1400 or ASEN 1400 or ECEN 1400 (minimum grade C-). Must be College of Engineering majors or IUT On Track applicants only.

**GEEN 2830 (1-4) Special Topics**
Explores topics of interest in engineering. Content varies by instructor and semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours.

**GEEN 2851 (3) Statics for Engineers**
Examines vector treatment of force systems and their resultants; equilibrium of frames and machines, including internal forces and three-dimensional configurations; static friction; properties of surfaces, including first and second moments; hydrostatics; and minimum potential energy and stability.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 2121 and MCEN 2023
**Requisites:** Requires prerequisite course of PHYS 1110 and APPM 1360 or MATH 2300 (all minimum grade C-). Restricted to College of Engineering majors or IUT On Track applicants only.

**GEEN 3010 (3) Circuits for Engineers**
Examines basic concepts of electricity, digital systems, circuit analysis, and circuit design. Specific topics covered include analysis of electric circuits by use of Ohm's law, network reduction, node and loop analysis, Thevenin and Norton theorems, DC and AC signals, transient response of simple circuits, basic diode and transistor circuits, operational amplifiers, and microcontrollers. Students are challenged to integrate their knowledge in a final design project.
**Requisites:** Requires a prerequisite course of PHYS 1140 and a prerequisite or corequisite course of (APPM 2360 or MATH 2130 and MATH 3430) (all minimum grade C-). Restricted to College of Engineering undergraduate majors only.

**GEEN 3024 (3) Materials Science for Engineers**
Examines structure, properties, processing and uses of metallic, polymeric, ceramic and composite materials. Specific topics covered include perfect and imperfect solids, phase equilibria, transformation kinetics, mechanical and electrical behavior and failure modes. Approach incorporates both materials science and materials engineering applications. Formerly GEEN 2024.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 2024
**Requisites:** Requires a prerequisite course of PHYS 1110 (minimum grade C-). Restricted to College of Engineering students only.
**Grading Basis:** Letter Grade

**GEEN 3400 (3) Invention and Innovation**
Introduction to business development and product innovation with a hands-on approach. Students explore invention process, hone their engineering design skills, and explore initial stages of entrepreneurship (patenting, intellectual property, marketing research, and raising capital). Student teams design, create, and test a commercial product, and exhibit at an end-of-semester design expo. Students are responsible for contributing towards their design project budget, workshop, and expo costs (approximately $100). Cannot be taken concurrently with GEEN 2400.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Engineering students only.

**GEEN 3830 (1-4) Special Topics**
Explores topics of interest in engineering. Content varies by instructor and semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to College of Engineering undergraduate students only.

**GEEN 3852 (3) Thermodynamics for Engineers**
Explores fundamental concepts and basic theory, including first and second laws of thermodynamics, properties, states, thermodynamic functions and cycles. Links theory and application with labs and a design project involving a functioning thermodynamic process.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 3012 or AREN 2110
**Requisites:** Requires prerequisite course of PHYS 1110 (minimum grade C-). Restricted to College of Engineering majors only.

**GEEN 3853 (4) Data Analysis for Engineers**
Learn to design and execute experiments and analyze the results. Topics covered include measurement fundamentals, design of experiments, probability, descriptive statistics, linear regression, propagation of uncertainty, and hypothesis testing (t-tests and ANOVA).
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 3047
**Requisites:** Requires prereqs PHYS 1140 (APPM 1360 or MATH 2300) (ASEN 1320 or CHEN/ECEN 1310 or CSCI 1200 or 1300 or 1310 or 1320). Requires prereq or coreqs (ECEN/GEEN 3010 or MCEN 3017) (WRTG 3030 or 3035 or ENES 1010 or 3100 or ENLP 3100) (all min grade C-

**GEEN 4400 (3) Teaching Design**
Examines teaching engineering design to a variety of audiences including secondary schools, project teams, and other communities. Students examine the process of teaching hands-on design including scoping, stages of team evolution, and iteration. Students also explore different design methods, the development of engineering identity, and the interface between engineering and society. Students practice integrating design thinking into local schools and companies, develop ready-to-use tools and resources, and explore the design education literature.
**Requisites:** Requires prerequisite courses of GEEN 1400 and GEEN 2400 and prerequisite or corequisite course of GEEN 3400 (all minimum grade B).

**GEEN 4848 (1-3) Independent Study**
Subjects arranged in consultation with instructor and undergraduate advisor. Instructor and program consent required.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Integrated Design Engineering (IDEN-BSIDE) students with a minimum of 60 credit hours.
**Grading Basis:** Letter Grade

# Geography (GEOG)

## Courses

**GEOG 1001 (4) Our Changing Planet: Climate and Vegetation**
Understanding our fragile planet and the life it harbors requires understanding how the distribution of the sun's energy at the surface, the atmosphere and its circulation, and the distribution of ocean and lands shape patterns of temperature, precipitation and vegetation across the globe. Along with providing a foundation for understanding planet Earth, this course addresses the growing impacts of human systems on climate change and environmental quality.
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography
MAPS Course: Natural Science Lab or Lab/Lec
MAPS Course: Natural Science

**GEOG 1011 (4) Our Changing Planet: Landscapes and Water**
In many ways, the Earth is defined by its abundance of water and vigorous hydrologic cycle. This course introduces how floodplains and their associated river systems, river deltas, erosional features such as the Grand Canyon, depositional features such as Cape Cod and Long Island, as well as mountain and even desert landscapes reflect the great power of water in shaping our planet and impacting life on Earth.
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography
MAPS Course: Natural Science Lab or Lab/Lec
MAPS Course: Natural Science

**GEOG 1100 (3) Colorado Geographies: Environment, Society and Change in the Centennial State**
This course offers an introduction to the interdisciplinary field of geography through an exploration of Colorado. It covers Colorado¿s physical geography, including mountain orogeny, weather and climate, hydrology, and bioregions. It delves into the social forces that shape current realities in the state, exploring Indigenous geographies, political economy, urban development, and environmental justice. Students will deepen their knowledge of diverse people and environments in Colorado while gaining skills in map literacy and spatial visualization.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOG 1200 (3) Climate Change Geographies: Science, Impacts, and Action**
Climate change is one of the greatest challenges of our time, and this course introduces students to the fundamental concepts they need to understand the problems and contribute to solutions by integrating perspectives from physical, social, and spatial sciences. . Students will review the scientific evidence for climate change, its impacts on human and environmental systems, and approaches to climate solutions via technology, policy, and social movements.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOG 1962 (3) Geographies of Global Change**
Familiarizes students with a geographic understanding of conflicts around the globe and of economic, political and cultural globalization. Analyzes the relationship between global forces, regions and local interests in contemporary territorial and geopolitical tensions and conflicts, emphasizing issues such as nationalism, migration, labor and natural resources. Formerly GEOG 2002.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Asia Content
MAPS Course: Geography

**GEOG 1972 (3) Sustainable Futures, Environment and Society**
Deepen your understanding of key global environmental issues, such as climate change, biodiversity loss, pollution, overconsumption, and environmental health hazards. We will discuss topics including conservation, water use, ethics, and environmental justice, and think about the relationship between politics, economy, culture and nature with case studies from around the globe.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment-Society Geography
MAPS Course: Geography

**GEOG 1982 (3) Global Geographies: Societies, Places, Connections**
Introduces a comparative framework for recognizing and understanding the diversity of the world¿s societies and cultures. Units explore both local scale issues such as economic growth, inequality, political conflict, ethnic and racial dynamics, and climate change impacts, as well as broader scale trends associated with globalization, international development, migration, and the historical legacies of colonialism and imperialism.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content
MAPS Course: Geography

**GEOG 1992 (3) Human Geographies**
Examines social, political, economic, and cultural processes creating the geographical worlds in which we live, and how these spatial relationships shape our everyday lives. Studies urban growth, geopolitics, agricultural development and change, economic growth and decline, population dynamics, and migration exploring both how these processes work at global scale as well as shape geographies of particular places.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
MAPS Course: Geography

**GEOG 2001 (1-4) Topics in Physical Geography**
Examines various topics in physical geography that are not typically covered in the curriculum for lower division students; offered intermittently depending on student demand and availability of instructors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOG 2053 (3) Mapping Our World**
Maps, geospatial data and technology play an important role in our understanding of the world and our geospatial literacy. Learn about the evolution of maps, the map as an art form, the map as a form of communication, and the ways maps influence our view of the world. Engage in critical thinking about maps and spatial data, and their use in society. In hands-on exercises students learn how to critically read and evaluate maps for expanding their spatial awareness of the world around them.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Techniques (Skills)

**GEOG 2092 (3) Advanced Introduction to Human Geography**
Provides a rigorous introduction to key analytical concepts of human geography - place, space, scale, regions, nature, landscapes and territory - while giving an overview of topics addressed in subfields including economic geography, political geography, cultural geography and development geography. Specific topics may vary slightly from semester to semester but will likely include borders and migration, maps, tourism, climate change and the Anthropocene, geopolitical conflict, development, urbanization, nationalism, gender, race, inequality and identity.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
MAPS Course: Geography

**GEOG 2212 (3) Location, Location, Location: Introduction to Affordable Housing and Urban Development Geographies**
This course examines the geographies of housing affordability and urban development in the United States. Students will engage with course readings and assignments toward an understanding of spatial marginalization through housing exclusion. The contemporary affordable housing crisis will be discussed through the lens of politics, economic, and societal marginalization associated with race, gender, class, ability/disability, geographic location, and the ways in which places are shaped by housing policies at different scales.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 2271 (3) Introduction to the Arctic Environment**
Rising temperatures, shrinking sea ice and melting glaciers are only the most visible indications of a rapidly changing Arctic. This course addresses the climate of the Arctic and the changes being observed at a non-mathematical level. It is intended to provide students with a basic understanding of the Arctic physical and biological environment as well as the impacts of Arctic change on human and environmental systems.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 2321 (3) Geography of Skiing and Snowboarding**
Skiing and snowboarding (hereafter, skiing) are sports that lie at the convergence of diverse Earth science disciplines. Skiing is about the unique interaction between mountains, climate, the physics of glissading, technological innovation, and human expression. This course studies skiing through the lens of geographic inquiry, introducing students to the science of geography, by investigating the physical processes that govern mountain weather, snow properties, and the dynamics by which humans glissade over snow.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOG 2421 (3-4) Visualizing Climate Change and Extreme Weather Events**
Climate change is one of the most important and contentious issues impacting every aspect of our society. So what is climate change and who will it impact? This course will address the environmental and societal consequences and more. You will graph, map, and view satellite data to provide evidence of climate change around the world. In these efforts, you will be introduced to basic graphing, GIS, and remote sensing skills.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOG 2692 (3) Foundations in Public Health**
Get a comprehensive overview of public health as well as an in-depth introduction to specific public health-related topics. Beginning with a historical overview, students will explore major public health concepts such as the basic principles of epidemiology, the biomedical basis of disease, social and behavioral determinants of health, and systems thinking. Learn about the concepts of measuring and evaluating the health of populations, principles of communicable and non-communicable diseases, environmental and occupational health, the economics of health, and the role of public health workers in society.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 2692 and PBHL 2692
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 2852 (3) Contemporary Southeast Asia: Environmental Politics**
Examines globally pressing questions of environmental sustainability, regional inequality and development in the dynamic and heterogeneous landscapes of contemporary Southeast Asia. Focuses on interactions between histories of uneven development and contemporary debates over energy and infrastructure, food security, governance and access to land, forest and water-based resources.
**Equivalent - Duplicate Degree Credit Not Granted:** ASIA 2852
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment-Society Geography

**GEOG 3022 (3) Climate Politics and Policy**
Engages students in exploring the realm of contemporary and historical climate policy at three major levels of government: international, national and local/regional. Through course lectures, discussions, readings and activities, students will become conversant with the actors, mechanisms and concerns involved in climate policy and politics and develop their own sense of how to judge the success of climate policies. Fulfills intermediate social science requirement in Environmental Studies Major.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3022
**Recommended:** Prerequisite ENVS 1000 or GEOG 1972.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment-Society Geography

**GEOG 3023 (4) Statistics and Geographic Data**
Learn how to use computational and statistical tools to solve problems in the geographic domain and apply introductory statistical concepts to real world problems through lab exercises. Using spatial data you will be trained in powerful specialized descriptive and predictive analysis technique. You will explore how to manipulate and visualize data and make inference using state-of-the art statistics software, applied to various social and Earth Science problems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 3023
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Quantitative Reasoning Math
Departmental Category: Techniques (Skills)

**GEOG 3053 (4) Geographic Information Science: Mapping**
Introduction to Geographic Information Systems (GIS) and the fundamentals of cartographic design. Learn about the science and art of map design in a GIS environment! Students will learn how to build a spatial database, implement best practice for processing various types of environmental and social spatial data and apply basic visual analytics to understand spatial patterns.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Recommended:** Prerequisite basic familiarity with computers and an introductory course in statistics (may be taken concurrently).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Techniques (Skills)

**GEOG 3251 (3) Mountain Geosystems**
Surveys mountain environments and their human use with illustrations from temperate and tropical mountain areas.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Physical Geography

**GEOG 3301 (3) Analysis of Climate and Weather Observations**
Discusses instruments, techniques and statistical methods used in atmospheric observations. Covers issues of data accuracy and analysis of weather maps. Provides application to temperature and precipitation records, weather forecasting and climate change trends. Uses computers to access data sets and process data.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 3300
**Requisites:** Requires prerequisite courses of APPM 1340 and 1345 or APPM 1350 or ECON 1088 or MATH 1081 or MATH 1300 or MATH 1310 and ATOC 1050 and ATOC 1060 or GEOG 3601 or ATOC 3600 or ENVS 3600 or GEOG 1011 (all minimum grade D-).
**Recommended:** Prerequisites ATOC 1050 or ATOC 1060 or ATOC 3600 or GEOG 3601 or ENVS 3600 or GEOG 1001 and one semester calculus.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 3351 (3) Biogeography**
Surveys and analyzes plant and animal distributions on a world scale from ecological and historical perspectives. Emphasizes human impact on species.
**Requisites:** Requires prerequisite course of GEOG 1001 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 3402 (3) Natural Hazards**
Explores the impacts of extreme geophysical events on human society. Emphasizes adaptations to extreme events and ways of reducing vulnerability and damage.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment-Society Geography

**GEOG 3412 (3) Conservation Practice and Resource Management**
Studies policy and management of natural resources. Emphasizes practical approaches to the conservation and management of soil, land, water and air resources.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment-Society Geography

**GEOG 3422 (3) Political Ecology**
Political ecology is an influential approach to understanding society-environment relationships. Learn about issues including different philosophies of nature and wilderness, the politics of conservation, causes of environmental degradation, environmental conflict and indigenous ecological knowledge and understand their importance in our society.
**Recommended:** Prerequisite GEOG 1972.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment-Society Geography

**GEOG 3511 (4) The Water Cycle**
The pathway a raindrop or snowflake takes from the atmosphere to the stream determines water quality and quantity society relies on. This course examines the water cycle and its relationship with climate, vegetation, and soil. Learn how to work with quantitative analysis tools used by water managers during labs.
**Requisites:** Requires a prerequisite course of GEOG 1011 or GEOL 1010 or GEOL 1012 (minimum grade D-).
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 3601 (3) Principles of Climate**
Describes the basic components of the climate system: the atmosphere, ocean, cryosphere and lithosphere. Investigates the basic physical processes that determine climate and link the components of the climate system. Covers the hydrological cycle and its role in climate, climate stability and global change.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 3600 and ENVS 3600
**Requisites:** Restricted to Geography (GEOG) or Environmental Studies (ENVS) majors or Atmospheric Oceanic Sciences (ATOC) minors only.
**Recommended:** Prerequisites one semester of calculus and ATOC 1060 or ATOC 3300 or GEOG 3301 or GEOG 1001.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 3612 (3) Reimagining Cities: Spaces of Power, Privilege, and Possibility**
Curious about what shapes your lifestyle, health, job opportunities, and how long you¿ll live? Your zip code! This course introduces the dynamics of American cities by investigating our country¿s built, social, and natural urban environments through a critical and applied lens. With engaging class exercises and independent local field trips, you¿ll explore how urban (re)development is a contested, socially and spatially uneven process. As a group, we will unpack how structural axes of power and privilege literally shape cities and create highly unequal opportunities for health, wellbeing, and opportunity. By the end of the course, students will be able to critically analyze urban spaces and apply insights to fields like urban planning, public health, social justice, and environmental sustainability. Whether pursuing further academic research or engaging in community-based work, students will gain practical skills in spatial analysis, policy evaluation, and the design of more equitable urban spaces.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**GEOG 3622 (3) Cities of the Global South**
Examines the geographies, processes, structural forces and everyday forms of urban life that are at the core of rapid urban transformation in the global South. Through using interdisciplinary scholarship, empirical case studies and key theoretical work, the course covers themes such as migration and urbanization, informality and governance, infrastructures of everyday life and urban environmental politics.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3670

**GEOG 3662 (3) Economic Geography**
Presents theories of the spatial organization of economic production, consumption and exchange systems. Geographical dynamics of industrialization, urbanization and economic growth. Examination of property, labor and social conflict, with a focus on political economy.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 3672 (3) Who Runs the World? Sex, Power, and Gender in Geography**
This course will examine how gender and sexuality is constructed locally, nationally, and globally, drawing on conversations about feminist pasts, presents, and futures. We will focus on how gender intersects with race, class, sexuality, ability, religion, ethnicity, and geopolitical location to structure the lived experiences of women across the globe. We will apply critical geographic perspectives to gender inequality, exploring the overlaps and differences in women¿s and LGBTQ+ struggles as they are shaped by ongoing socio-cultural, political, and economic conditions globally.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3672
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092 or WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography

**GEOG 3682 (3) International Development: Economics, Power, and Place**
Learn about global economic and political inequalities through international development programs. Understand why some countries are in conditions of cyclical poverty while others experience massive economic growth and wealth. We will examine different approaches to economic development and critically consider existing and future planning.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography
Departmental Category: Asia Content

**GEOG 3692 (4) Introduction to Global Public Health**
Introduces global health by putting its contemporary definition, determinants, development and direction as a field into a broad global context. The course is divided into four core topics: 1) the burden and distribution of disease and mortality; 2) the determinants of global health disparities; 3) the development of global health policies; and 4) the outcomes of global health interventions. Required for the Public Health Certificate.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography

**GEOG 3742 (3) Place, Power, and Contemporary Culture**
Examines the relationship between places, power, and the dynamics of culture. Explores how the globalization of economics, politics, and culture shapes cultural change. Looks at how place-based cultural politics both assist and resist processes of globalization.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1982 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Human Geography

**GEOG 3782 (3) Environmentalism, Race, and Justice**
Examines spatial inequalities in environmental problems and their relationships to environmentalism and racism. Examines the implications for human health, well-being, and sense of place. Identifies factors that contribute to environmental inequalities, with particular attention to environmentalism and racism. Explores efforts to reduce environmental inequality, including by social movements, researchers, students, journalists, political leaders, and government agencies. Introduces students to research methods for documenting and analyzing environmental inequality. Focuses geographically on the United States. Formerly offered as a special topics course.
**Recommended:** Prerequisite GEOG 1972.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 3812 (3) Mexico, Central America, and the Caribbean**
Introduces the geography of Latin America, focusing on the lands and peoples of Mexico, Central America, and the Caribbean. Examines regional and national culture, history, environment, and population, as well as ongoing environmental and socioeconomic changes.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography

**GEOG 3822 (3) China¿s Diverse Geographies: Environment, Society, Politics**
Get to know one of the world¿s most diverse countries, its physical and historical geography, urbanization and regional development, agriculture, population, energy, and the environment. Learn more about China and how to situate its development in a broader Asian and global context.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography
Departmental Category: Asia Content

**GEOG 3832 (3) India and Its Neighbors: Societies, Economies, and Geopolitics**
Experience the diverse societies and cultures of India, Nepal, Afghanistan, Pakistan, Bangladesh, Sri Lanka, Bhutan, and the Maldives. Learn about the different belief systems, cultural practices, and environments in this region and how international relations and politics in this region influence global trade/economics, politics, conflict, and security.
**Recommended:** Prerequisites GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography
Departmental Category: Asia Content

**GEOG 3840 (1-6) Undergraduate Independent Study**
Provides an independent study opportunity, by special arrangement with faculty, for students presenting strong geography preparation. Instructor consent required.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Geography (GEOG) majors only.

**GEOG 3842 (3) Human Geography of Czechia: Political, Economic and Social Transitions**
Excursions in Prague will begin with an understanding of Czech history through various imprints on the landscape, such as city planning, design, architecture and culture. This will be followed by a discussion of Prague in the 20th century and the various political, economic and social transitions. These transitions will be explored through field based study in and outside of Prague.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 3862 (3) Global Africa: Environment, Development, and Culture**
What comes to mind when you think about Africa as a place and its connectedness to the rest of the world? Learn about the cultures, politics, economies, and ecologies of very specific places across the continent -- from urban Nigeria to rural villages in Tanzania. Understand historic and present day flows of people, wealth, ideas, and more, to and from Africa to the rest of the world, from the slave trade, colonialism and wildlife conservation, to food, music and sports.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography

**GEOG 3882 (3) Geography of the Former Soviet Union**
Examines the contemporary social, political, population, cultural, ethnic and resource geography of the former Soviet Union. Relations between Russia and neighboring countries are also considered. Historical and physical geography are introduced as background to understanding post-Soviet developments and challenges.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 3930 (3) Internship**
Provides an academically supervised opportunity for advanced geography or environmental studies majors to work in public and private organizations on projects related to the student's career goals and to relate classroom theory to practice. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Geography (GEOG) or Environmental Studies (ENVS) majors only.

**GEOG 4001 (1-4) Topics in Physical Geography**
Examines various topics in physical geography that are not typically covered in the curriculum. Offered intermittently depending on student demand and availability of instructors.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOG 4002 (1-4) Topics in Human and Environment/Society Geography**
Examines various topics in human and environment / society geography that are not typically covered in the curriculum. Offered intermittently depending on student demand and availability of instructors.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 4003 (1-4) Topics in Geographic Skills**
Examines various topics in geographical skills and techniques that are not typically covered in the curriculum. Offered intermittently depending on student demand and availability of instructors.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOG 4023 (4) Advanced Quantitative Methods for Spatial Data**
Reviews fundamental statistical and quantitative modeling techniques and introduces more advanced statistical techniques widely used in geography today. Emphasizes geographic examples and spatial problems teaching hands-on skills in statistical programming. Topics covered include generalized linear models, spatial autocorrelation, spatial regression methods, and working with complex datasets.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5023
**Requisites:** Requires prerequisite course of GEOG 3023 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Methods

**GEOG 4043 (4) Advanced Geovisualization and Web Mapping**
Advanced technical course in web-based cartography and geovisualization stressing the important role digital cartography plays in cyberspace and society. Focuses on principles of effective cartographic design in multimedia and hypertext environments. Labs are organized around hands-on active learning projects demonstrating skills in geovisualization and cartographic practice.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5043
**Requisites:** Requires prerequisite course of GEOG 3053 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Methods

**GEOG 4093 (4) Remote Sensing of the Environment**
Covers acquisition and interpretation of environmental data by remote sensing. Discusses theory and sensors as well as manual and computerized interpretation methods. Stresses infrared and microwave portions of the spectrum.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5093 and GEOL 4093 and GEOL 5093
**Requisites:** Requires prerequisite course of APPM 1340 1345 or APPM 1350 or ECON 1088 or 3818 or MATH 1081 or 1300 or 1310 or 2510 or ANTH 4000 or BCOR 1020 or GEOG 3023 or GEOL 3023 or PSCI 2075 or PSYC 2111 or SOCY 2061 or 4061 or STAT 4000 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Methods

**GEOG 4103 (4) Geographic Information Science: Spatial Analytics**
Explores advanced topics in geospatial databases, spatial analytics and geoprocessing in a Geographic Information System (GIS). Emphasizes how geographic concepts are linked to methodological frameworks for recording, transforming, storing/retrieving, analyzing, and processing geographic data as well as various forms of uncertainty. Exercises demonstrate the application of GIS-based methods to real world scenarios in interdisciplinary settings.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5103
**Requisites:** Requires prereq of (GEOG 3053 or GEOG 4603) and ANTH 4000 or APPM 4570 or BCOR 1020 or ECON 3818 or GEOG 3023 or GEOL 3023 or MATH 2510 or PSCI 2075 or PSYC 2111 or SOCY 2061 or SOCY 4061 (all min C-). Restrictd to students with 57-180 credits (Jun/Sr).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: GIScience

**GEOG 4173 (3) Research Seminar**
Examines the nature of research and develops pregraduate skills for geographic research, emphasizing problem definition, methods, sources, data interpretation, and writing. Recommended for students pursuing honors.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Geography (GEOG) or Environmental Studies (ENVS) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Methods

**GEOG 4201 (3) Biometeorology**
Learn about the interactions between atmospheric processes and living organisms (plants, animals, and humans) through a meteorology/ biology lens. Topics include carbon and water cycling through vegetation, the energy and water balances in the system, and human temperature regulation to better understand how organisms adapt to a changing environment using a practical, problem-solving approach.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 4201
**Requisites:** Prereq of GEOG 1001 any of (APPM 1340 1345) or APPM 1350 or ECON 1088 or 3818 or MATH 1081 or 1300 or 1310 or 2510 or ANTH 4000 or BCOR 1020 or GEOG 3023 or GEOL 3023 or PSCI 2075 or PSYC 2111 or SOCY 2061 or 4061 or STAT 4000 (min grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 4203 (4) Geographic Information Science: Spatial Modeling**
Focuses on the use and development of advanced models for human and environmental applications in a geospatial environment integrating raster and vector data models. Covers terrain and hydrologic modeling, geostatistical modeling, dasymetric modeling, as well as multi-criteria modeling. Group projects critically design, implement and test spatial models to develop independent skillsets in a chosen problem setting.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5203
**Requisites:** Requires prerequisite course of GEOG 4103 (minimum grade C-).
**Recommended:** Requisite working knowledge of GIS software.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: GIScience

**GEOG 4241 (4) Earth Surface Processes**
Earth¿s surface is constantly reshaped by water, ice, wind, and life. This class investigates the earth's landscapes and the processes that modify them, both gradually by slow weathering and erosion, and abruptly through the action of floods, landslides, and other geologic events. We cover surface processes in hillslope, glacial, riverine, desert, and coastal environments. Upon completion of the course, students will have mastered knowledge about diverse surface processes and landforms and applied core geomorphic principles to a variety of landscapes. Students will also learn that understanding surface processes is important for managing natural hazards (e.g., landslides and floods). This course will draw from many disciplines, including geology, geography, physics, chemistry, and biology. The laboratory portion of the course will include quantitative problem solving and field trips to collect and analyze geomorphic data.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4241
**Requisites:** Requires prerequisite courses of GEOG 1011 or GEOL 2001 and a calculus course (MATH 1300 or APPM 1350 or (APPM 1340 and APPM 1345)), all minimum grade C-.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 4251 (3-4) River Systems and Landforms**
Rivers integrate the landscape, carrying water, sediment, and organic matter. Rivers also shape the landscape, eroding and depositing material. This course covers the physical (geomorphic) processes in river systems and the landforms that they create. Topics covered include drainage basin processes, river hydraulics, sediment transport, channel forms and patterns, interactions between ecological and geomorphic processes in rivers, and river restoration and management. The course will combine lectures, discussions, in-class activities, and field trips.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5251
**Requisites:** Requires prerequisite courses of GEOG 1011 and GEOG 3511 (minimum grade D-).
**Recommended:** Prerequisite GEOG 3023.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 4261 (3) Glaciers and Permafrost**
Surveys the major terrestrial components of the cryosphere, including permafrost, glaciers and ice sheets. Emphasizes physical processes involving ice, including thermal behavior, ice deformation and mass balance, but also considers biogeochemical processes and landforms associated with ice. The climate context, including human interactions and recent climate history, will be considered. Taught in a combination lecture-seminar format.
**Requisites:** Requires prerequisite course of GEOG 1011 or GEOL 1010 (minimum grade D-).
**Recommended:** Prerequisite GEOG 4241.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 4271 (3) The Arctic Climate System**
Understanding the climate of the Arctic requires a synthetic, system oriented approach. The course focuses on the intimate linkages between the atmosphere, ocean and land that give the Arctic region its unique character, link the Arctic to the larger global climate system, and promote understanding the rapid changes occurring in the Arctic.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5271
**Requisites:** Requires prerequisite course of GEOG 1001 or ATOC 1050 or ATOC 1060 (minimum grade D-).
**Recommended:** Prerequisites GEOG 3511 or GEOG 3601 or ATOC 3600 or ENVS 3600 and statistics.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 4292 (3) Migration, Immigrant Adaptation, and Development**
Examines historical and current patterns of migration with an emphasis in international movement. Looks at leading migration theories related to both origin- and destination-based explanations while critically looking at the role of development as a potential cause and consequence of population movement. Finally, covers some aspects of immigrants' social and economic adaptation to their host society.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5292
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Human Geography

**GEOG 4303 (4) Geographic Information Science: Spatial Programming**
Focuses on the extension of geographic information systems (GIS) through programming as well as on the development of algorithms for spatial analysis and information extraction in vector and raster data using open source tools. Covers concepts, principles and techniques of programming and solving spatial problems in natural and social science settings. Group projects will foster skillsets in implementing solutions to complex spatial problems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5303
**Requisites:** Requires prerequisite course of GEOG 4103 (minimum grade C-).
**Recommended:** Prerequisite GEOG 4203.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: GIScience

**GEOG 4311 (3) Watershed Biogeochemistry**
Emphasizes terrestrial-aquatic linkages in headwater catchments, focusing on hydrologic pathways, isotopic and geochemical tracers, nutrient cycling, water quality, experimental manipulations, and modeling.
**Requisites:** Requires prerequisite courses of GEOG 1011 and GEOG 3511 (minimum grade D-).
**Recommended:** Requisite parametric statistics.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 4321 (3-4) Snow Hydrology**
Offers a multidisciplinary and quantitative analysis of physico-chemical processes that operate in seasonally snow-covered areas, from the micro- to global-scale: snow accumulation, metamorphism, ablation, chemical properties, biological aspects, electromagnetic properties, remote sensing, GIS and quantitative methods.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5321
**Requisites:** Requires prerequisite course of APPM 1340 1345 or APPM 1350 or ECON 1088 or 3818 or MATH 1081 or 1300 or 1310 or 2510 or ANTH 4000 or BCOR 1020 or GEOG 3023 or GEOL 3023 or PSCI 2075 or PSYC 2111 or SOCY 2061 or 4061 or STAT 4000 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 4331 (3-4) Mountain Climatology**
Surveys and analyzes climatic characteristics of mountain environments worldwide.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5331
**Requisites:** Requires prerequisite course of GEOG 1001 or ATOC 1050 or ATOC 1060 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 4371 (3) Forest Geography: Principles and Dynamics**
Surveys principles of forest geography and ecology. Includes both individual tree responses to environmental factors and species interactions within communities. Emphasizes forest dynamics and their relation to management problems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5371
**Requisites:** Requires prerequisite course of GEOG 1001 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 4401 (3) Soils Geography**
Discusses chemical and physical properties of soils, soil development, distributions and management relevant to understanding plant-soil relationships in natural and human-altered landscapes.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5401
**Requisites:** Requires prerequisite course of GEOG 1011 (minimum grade D-).
**Recommended:** Prerequisite inorganic chemistry.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Physical Geography

**GEOG 4403 (3) Geographic Information Science: Space Time Analytics**
Focuses on understanding processes (human, natural, social or physical) through data driven analysis of patterns in spatio-temporal data. Covers a wide range of topics relevant to space time data, including pattern analysis, modeling and visualization as well as time geography and various contemporary issues in space time analytics. Utilizes a hands-on, flipped classroom approach with in-class development of technical skills.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5403
**Requisites:** Requires a prerequisite course of GEOG 3023 or GEOG 4023 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: GIScience

**GEOG 4430 (3) Seminar: Conservation Trends**
Provides environmental studies or geography majors with an undergraduate format for interdisciplinary discussion and research into current and future directions of conservation.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment-Society Geography

**GEOG 4463 (3) Earth Analytics Data Science Bootcamp**
Learn key skills to automate data processing and visualization workflows that support both repeatable analysis and collaborative project approaches using scientific programming, version control and project management tools. Covers working with heterogeneous, large spatio-temporal data derived from space, airborne and ground based sensors and other sources. Gain applied experience through group projects that address real world problems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5463
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Methods

**GEOG 4501 (3) Water Issues in the American West**
Water scarcity is a perpetual issue facing communities in the western Unites States. This course critically evaluates water use, emphasizing problems associated with geographic maldistribution, appropriations, irrigation, industry, pollution and regional development. Interprets and analyzes hydroclimatic data, surface and groundwater.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5501
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment-Society Geography

**GEOG 4503 (3) Geographic Information Science: Project Management**
Managing a geospatial project encompasses problem identification, project design, analysis and supporting team dynamics. The class mixes lectures and class exercises with student-selected projects and works through all stages of a project from articulating an initial idea to project planning and scoping, building a work plan, timeline and budget, executing the work plan and evaluating a project's progress.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5503
**Requisites:** Requires prerequisite course of GEOG 3053 or GEOG 4103 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: GIScience

**GEOG 4542 (3) Public Health Capstone Research Methods: Environmental Interventions to the Mental Health Epidemic**
This course will introduce students to interdisciplinary research methods in public health, with a focus on environmental interventions to address mental health. Robust data shows that spending time in nature can positively impact mental health. This course will teach students about the many phases of the scientific research process through doing; students will work in small groups to do their own research project throughout the semester on a pre-picked topic that can change from year to year.
**Equivalent - Duplicate Degree Credit Not Granted:** PBHL 4542 and PSYC 4542
**Requisites:** Prerequisites: Restricted to Public Health majors or those pursuing the Public Health certificate. Also, must have taken one of the following: ANTH 4000, ECON 3818, GEOG 3023, IPHY 3280, MATH 2510, PSCI 2075, PSYC 2111, SOCY 2061, STAT 2600.
**Recommended:** Prerequisite Students who are interested in taking this course but do not meet these requirements must have instructor approval.

**GEOG 4563 (3) Earth Analytics**
Introduce students to major unanswered questions in Earth science and to the analytical tools, including data management, analysis and visualization, necessary to explore 'big data' from a suite of sensors. Aligns with Earth Lab, a new initiative of the University's Grand Challenge (http://www.colorado.edu/grandchallenges/) to use our expertise in space-based observation to address our world's most pressing problems. Comparable programming course work may be substituted for GEOG 4463 with instructor approval.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5563
**Requisites:** Requires prerequisite course of GEOG 4463 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Methods

**GEOG 4603 (3) GIS in the Social and Natural Sciences**
Introduces Geographic Information Systems and their underlying principles through interactive lectures and lab exercises. Students get basic skills for working in a GIS environment and learn how to handle and manage geospatial data, create maps and conduct geospatial analysis focusing on project tasks typically encountered in the social and natural sciences.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5603
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: GIScience

**GEOG 4622 (3) City Life**
Analyzes social, behavioral, political and demographic factors that influence development and maintenance of communities in contemporary urban environments, with primary emphasis on U.S. cities.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5622
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 4632 (3) Development Geography**
Provides an overview of development policy and practice, surveying foundational works in Development Studies as well as critical interventions. Required for Graduate Certificate in Development Studies.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5632
**Requisites:** Requires prerequisite course of GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 (minimum grade D-).
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography

**GEOG 4692 (3) Climate Change and Health**
Climate change is one of the great societal challenges of our times and it not only threatens the physical environment but also threatens human health. The course will explore the ways that climate change is affecting public health now and is projected to affect health in the future. We will also explore the public health implications, positive and negative, of efforts to respond to climate change through mitigation and adaptation. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5692

**GEOG 4712 (3) Political Geography**
Systematic study of relations between geography and politics, especially as background for better understanding of international affairs. Includes topics such as frontiers and boundaries, power analysis, geopolitics, international political economy, and strategic concepts.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5712
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092 or IAFS 1000 or PSCI 2012 or PSCI 2223.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography

**GEOG 4722 (3) Field Methods in Human Geography**
Examines research methods associated with field work in human geography. Prepares students for fieldwork by focusing on geographic and interdisciplinary field work techniques; interpretation of field data; discussion of the politics, ethics and gender, race, class and cross-cultural issues related to field work.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5722
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Methods

**GEOG 4732 (3) Population Geography**
Emphasizes spatial aspects of population characteristics including fertility, mortality, migration, distribution and composition. Includes both theoretical and empirical considerations, in addition to field work and computer simulations.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5732
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography

**GEOG 4742 (3) Topics in Environment and Society**
Studies peoples and their environments, including human modification of nature and cultural interpretation and construction of rural and urban landscapes.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or 1982 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment-Society Geography

**GEOG 4762 (3) Geographies of Political Islam**
Explores the postcolonial landscape of political Islam through the lens of political and cultural geography. Develops a critical anti-essentialist framework for understanding the political crisis of the Muslim world in relation to broader questions of empire, nationalism, democracy, revolution, security, terrorism, globalization and modernity. Focuses on the post-1979 period, several key Muslim nation-states (Saudi-Arabia, Egypt, Iran, Turkey, Pakistan) and movements (Taliban, ISIS).
**Recommended:** Prerequisite GEOG 1982 or GEOG 1992 or GEOG 2092 or GEOG 3742.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography

**GEOG 4772 (3) Food and Power**
Analyzes people's relationships with food through lenses of power, justice, and sustainability. Topics covered include the political economy of global food systems, agroecology, agricultural technologies, alternative food movements, migration and labor politics, and influence of gender, race, class, and culture on food consumption. Draws on case studies from across the United States and around the globe.
**Recommended:** Prerequisites GEOG 1972 or GEOG 1982 or GEOG 2092.

**GEOG 4812 (3) Political Ecology & Latin America**
Presents theoretical approaches to the links between environment and development in Latin America and focuses on analytical discussion of contemporary (and controversial) issues in sustainable development in Latin America. Examines social, ecological, economic, and political forces influencing the use of natural resources.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1982 or GEOG 1992 or GEOG 2092 or GEOG 3682 or GEOG 3422 or GEOG 3812 or ANTH 3110 or PSCI 3032.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment-Society Geography

**GEOG 4822 (3) Environment and Development in China**
Examines key environmental problems in relation to China's rapid modernization and development.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1982 or GEOG 1992 or GEOG 2092 or HIST 1618.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment-Society Geography
Departmental Category: Asia Content

**GEOG 4832 (3) Geography of Tibet**
Rigorously examines contemporary Tibetan society, culture and nature from a geographical perspective. Uses readings on contemporary Tibet as an entry point into scholarly research about nationalism, representation, diaspora, landscape and place, sustainable development, natural resource management, identity and environmentalism.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5832
**Recommended:** Prerequisite GEOG 3822 or other classes on China.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**GEOG 4842 (3) Global Frontiers in Southeast Asia**
Uses the theme of the global frontier to examine and compare three key moments in the modern history of Southeast Asia: the colonial encounter, the rise of the modern territorial state, and the age of contemporary globalization. Examines case studies from earlier eras to analyze emerging global frontiers at the junction of state territoriality and transnational economic expansion.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5842 and ASIA 4842
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**GEOG 4852 (3) Health and Medical Geography**
Examines geographical patterns of health and disease with an emphasis on global health issues. Focuses on three major approaches to medical geographic research: ecological approaches, which systematically analyze relationships between people and their environments; social approaches, including political economy and socio-behavioral approaches; and spatial approaches, which employ maps and spatial analysis to identify patterns of health and disease. Elective course for Public Health Certificate.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5852
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites GEOG 1001 or GEOG 1011 and GEOG 1962 or GEOG 1972 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography

**GEOG 4892 (3) Geography of Western Europe**
Provides a regional survey of cultural, political, economic, social, and physical geography of Western Europe, emphasizing the distinctive character and problems of each major area and the relationship of the region to the world.
**Recommended:** Prerequisite GEOG 1962 or GEOG 1972 or GEOG 1982 or GEOG 1992 or GEOG 2092.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Human Geography

**GEOG 4990 (3) Senior Thesis**
Offers thesis research under faculty supervision. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Geography (GEOG) majors only.

**GEOG 5003 (4) Elements of Geographic Information Systems**
Discusses incorporating GIS methods into graduate thesis or dissertation research. Reviews basic mapping concepts (scale and projections), acquiring different types of spatial data (raster and vector), building an error-free database, making simple queries, overlays, charts, and maps. Intended for students who want to learn GIS but lack background skills in computing or cartography.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite some experience with Mac or Windows.
**Additional Information:** Departmental Category: GIScience

**GEOG 5023 (4) Advanced Quantitative Methods for Spatial Data**
Reviews fundamental statistical and quantitative modeling techniques and introduces more advanced statistical techniques widely used in geography today. Emphasizes geographic examples and spatial problems teaching hands-on skills in statistical programming. Topics covered include generalized linear models, spatial autocorrelation, spatial regression methods, and working with complex datasets.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4023
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Methods

**GEOG 5043 (4) Advanced Geovisualization and Web Mapping**
Advanced technical course in web-based cartography and geovisualization stressing the important role digital cartography plays in cyberspace and society. Focuses on principles of effective cartographic design in multimedia and hypertext environments. Labs are organized around hands-on active learning projects demonstrating skills in geovisualization and cartographic practice.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4043
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Methods

**GEOG 5093 (4) Remote Sensing of the Environment**
Covers acquisition and interpretation of environmental data by remote sensing. Discusses theory and sensors as well as manual and computerized interpretation methods. Stresses infrared and microwave portions of the spectrum.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4093 and GEOL 4093 and GEOL 5093
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Methods

**GEOG 5100 (1-4) Special Topics: Geography**
Covers various topics outside of the normal curriculum; offered intermittently depending on student demand and availability of faculty.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**GEOG 5103 (4) Geographic Information Science: Spatial Analytics**
Explores advanced topics in geospatial databases, spatial analytics and geoprocessing in a Geographic Information System (GIS). Emphasizes how geographic concepts are linked to methodological frameworks for recording, transforming, storing/retrieving, analyzing, and processing geographic data as well as various forms of uncertainty. Exercises demonstrate the application of GIS-based methods to real world scenarios in interdisciplinary settings.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4103
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: GIScience

**GEOG 5113 (3) Seminar: Geographic Information Systems**
Focuses on the current research topics in geographical information systems and selected areas of application. Includes major journal articles related to each topic. Students complete and present a seminar paper.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite GEOG 4103 or GEOG 5103 or instructor consent required.
**Additional Information:** Departmental Category: GIScience

**GEOG 5152 (3) History and Theory of Geography**
History of ideas and institutions that have shaped contemporary geographic inquiry. Examines the evolving relations among human geography, physical geography, environment-society relations, and geographic information processing. Designed to situate graduate student research within major subfields and intellectual currents of geography.
**Requisites:** Restricted to Geography (GEOG) graduate students only.

**GEOG 5161 (3) Research Design in Geography**
The human section reads and discusses contemporary research philosophies and methodologies in human geography. Practices the development of research proposals and presentation of research ideas and results. The physical section reads and discusses contemporary research philosophies and methodologies in physical geography (climatology, geomorphology, biogeography, and soils geography). Practices the development of research proposals and presentation of research ideas.
**Requisites:** Restricted to Geography (GEOG) graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5203 (4) Geographic Information Science: Spatial Modeling**
Focuses on the use and development of advanced models for human and environmental applications in a geospatial environment integrating raster and vector data models. Covers terrain and hydrologic modeling, geostatistical modeling, dasymetric modeling, as well as multi-criteria modeling. Group projects critically design, implement and test spatial models to develop independent skillsets in a chosen problem setting.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4203
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite GEOG 4103 or GEOG 5103 or working knowledge of GIS software or instructor consent required.
**Additional Information:** Departmental Category: Methods

**GEOG 5211 (3) Seminar: Physical Climatology**
Involves a research seminar concerned with problems of mass and energy exchange in the Earth-atmosphere system. Selects topics from such areas as air quality, bioclimatology, hydrology, climate change, and the climates of urban, agricultural, and natural environments.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5221 (3) Synoptic and Dynamic Climatology**
Examines global climates from the standpoint of synoptic and dynamic climatology.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5241 (1-3) Topics in Physical Geography**
Presents recent research topics that vary from year to year. Consult the online Schedule Planner for specific topics.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5251 (3-4) River Systems and Landforms**
Rivers integrate the landscape, carrying water, sediment, and organic matter. Rivers also shape the landscape, eroding and depositing material. This course covers the physical (geomorphic) processes in river systems and the landforms that they create. Topics covered include drainage basin processes, river hydraulics, sediment transport, channel forms and patterns, interactions between ecological and geomorphic processes in rivers, and river restoration and management. The course will combine lectures, discussions, in-class activities, and field trips.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4251
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5271 (3) The Arctic Climate System**
Understanding the climate of the Arctic requires a synthetic, system oriented approach. The course focuses on the intimate linkages between the atmosphere, ocean and land that give the Arctic region its unique character, link the Arctic to the larger global climate system, and promote understanding the rapid changes occurring in the Arctic.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4271
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5292 (3) Migration, Immigrant Adaptation, and Development**
historical and current patterns of migration with an emphasis in international movement. Looks at leading migration theories related to both origin- and destination-based explanations while critically looking at the role of development as a potential cause and consequence of population movement. Finally, covers some aspects of immigrants' social and economic adaptation to their host society.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4292
**Requisites:** Restricted to graduate students only.

**GEOG 5303 (4) Geographic Information Science: Spatial Programming**
Focuses on the extension of geographic information systems (GIS) through programming as well as on the development of algorithms for spatial analysis and information extraction in vector and raster data using open source tools. Covers concepts, principles and techniques of programming and solving spatial problems in natural and social science settings. Group projects will foster skillsets in implementing solutions to complex spatial problems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4303
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite GEOG 4203/5203.
**Additional Information:** Departmental Category: GIScience

**GEOG 5321 (3-4) Snow Hydrology**
Offers a multidisciplinary and quantitative analysis of physico-chemical processes that operate in seasonally snow-covered areas, from the micro- to global-scale: snow accumulation, metamorphism, ablation, chemical properties, biological aspects, electromagnetic properties, remote sensing, GIS and quantitative methods.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4321
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5331 (3-4) Mountain Climatology**
Surveys and analyzes climatic characteristics of mountain environments worldwide.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4331
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5371 (3) Forest Geography: Principles and Dynamics**
Surveys principles of forest geography and ecology. Includes both individual tree responses to environmental factors and species interactions within communities. Emphasizes forest dynamics and their relation to management problems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4371
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5391 (3) Seminar: Biogeography**
Considers in detail current research themes in biogeography. Includes intensive reading of current research literature and preparation of research papers. Topics vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5401 (3) Soils Geography**
Discusses chemical and physical properties of soils, soil development, distributions and management relevant to understanding plant-soil relationships in natural and human-altered landscapes.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4401
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 5403 (3) Geographic Information Science: Space Time Analytics**
Focuses on understanding processes (human, natural, social or physical) through data driven analysis of patterns in spatio-temporal data. Covers a wide range of topics relevant to space time data, including pattern analysis, modeling and visualization as well as time geography and various contemporary issues in space time analytics. Utilizes a hands-on, flipped classroom approach with in-class development of technical skills.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4403
**Requisites:** Restricted to graduate students only.

**GEOG 5463 (3) Earth Analytics Data Science Bootcamp**
Learn key skills to automate data processing and visualization workflows that support both repeatable analysis and collaborative project approaches using scientific programming, version control and project management tools. Covers working with heterogeneous, large spatio-temporal data derived from space, airborne and ground based sensors and other sources. Gain applied experience through group projects that address real world problems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4463
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**GEOG 5501 (3) Water Issues in the American West**
Water scarcity is a perpetual issue facing communities in the western Unites States. This course critically evaluates water use, emphasizing problems associated with geographic maldistribution, appropriations, irrigation, industry, pollution and regional development. Interprets and analyzes hydroclimatic data, surface and groundwater.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4501
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Environment-Society Geography

**GEOG 5503 (3) Geographic Information Science: Project Management**
Managing a geospatial project encompasses problem identification, project design, analysis and supporting team dynamics. The class mixes lectures and class exercises with student-selected projects and works through all stages of a project from articulating an initial idea to project planning and scoping, building a work plan, timeline and budget, executing the work plan and evaluating a project's progress.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4503
**Requisites:** Requires prerequisite course of GEOG 5103 (minimum grade C-).

**GEOG 5563 (3) Earth Analytics**
Introduce students to major unanswered questions in Earth science and to the analytical tools, including data management, analysis and visualization, necessary to explore 'big data' from a suite of sensors. Aligns with Earth Lab, a new initiative of the University's Grand Challenge (http://www.colorado.edu/grandchallenges/) to use our expertise in space-based observation to address our world's most pressing problem. Comparable programming course work may be substituted for GEOG 5463 with instructor approval.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4563
**Requisites:** Requires prerequisite course of GEOG 5463 (min grade B-) Restricted to graduate students only.
**Grading Basis:** Letter Grade

**GEOG 5603 (3) GIS in the Social and Natural Sciences**
Introduces Geographic Information Systems and their underlying principles through interactive lectures and lab exercises. Students get basic skills for working in a GIS environment and learn how to handle and manage geospatial data, create maps and conduct geospatial analysis focusing on project tasks typically encountered in the social and natural sciences.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4603

**GEOG 5622 (3) City Life**
Analyzes social, behavioral, political and demographic factors that influence development and maintenance of communities in contemporary urban environments, with primary emphasis on U.S. cities.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4622
**Requisites:** Restricted to graduate students only.

**GEOG 5632 (3) Development Geography**
Provides an overview of development policy and practice, surveying foundational works in Development Studies as well as critical interventions. Required for Graduate Certificate in Development Studies.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4632
**Requisites:** Restricted to graduate students only.

**GEOG 5642 (3) Seminar: Urban Geography**
Surveys current research topics in urban geography. Emphasizes definition of possible student thesis topics.
**Requisites:** Restricted to graduate students only.

**GEOG 5652 (3) Introduction to Social Theory**
Surveys theoretical paradigms in the social sciences. Includes canonical works from the history of the social sciences as well as contemporary theorists. Appropriate for beginning to advanced graduate students doing qualitative research.
**Requisites:** Restricted to graduate students only.

**GEOG 5662 (3) Seminar: Topics in Economic Geography**
Covers selected topics emphasizing faculty specialties. Topics vary with instructor. Check with department for semester offerings.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**GEOG 5663 (1-3) Earth Analytics Applications**
Develop expertise in finding, organizing, managing and processing large, heterogeneous, spatio-temporal data to address a real-world problem. Students will work collaboratively on semi-guided science project. Students gain critical skills required to understand data structures, utilize APIs, extract insight from data and understand how uncertainty propagates. Culminates with a formal presentation of project results.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires prerequisite course of GEOG 5463 and GEOG 5563 (min grade B-) Restricted to graduate students only.
**Grading Basis:** Letter Grade

**GEOG 5692 (3) Climate Change and Health**
Climate change is one of the great societal challenges of our times and it not only threatens the physical environment but also threatens human health. The course will explore the ways that climate change is affecting public health now and is projected to affect health in the future. We will also explore the public health implications, positive and negative, of efforts to respond to climate change through mitigation and adaptation. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4692
**Requisites:** Restricted to graduate students only.

**GEOG 5712 (3) Political Geography**
Systematic study of relations between geography and politics, especially as background for better understanding of international affairs. Includes topics such as frontiers and boundaries, power analysis, geopolitics, international political economy, and strategic concepts.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4712
**Requisites:** Restricted to graduate students only.

**GEOG 5722 (3) Field Methods in Human Geography**
Examines research methods associated with field work in human geography. Prepares students for fieldwork by focusing on geographic and interdisciplinary field work techniques; interpretation of field data; discussion of the politics, ethics and gender, race, class and cross-cultural issues related to field work.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4722
**Requisites:** Restricted to graduate students only.

**GEOG 5732 (3) Population Geography**
Emphasizes spatial aspects of population characteristics including fertility, mortality, migration, distribution and composition. Includes both theoretical and empirical considerations, in addition to field work and computer simulations.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4732
**Requisites:** Restricted to graduate students only.

**GEOG 5750 (3) Climate Politics and Science-Policy**
Explores, understands and critically analyzes influences and trends in climate politics and science-policy. Course participants will gain an improved understanding of the myriad factors, pressures and processes that are involved in contemporary climate politics under-girding explicit policy proposals. Course participants will more capably identify consequential spaces of decision-making, recognize tractable places for change and fashion constructive strategies for their own research by way of best available evidence from work done in these areas. Overall, our attention to these course themes, concepts and case studies will help us to more capably understand, analyze and engage in the high-stakes 21st century arena of climate politics and science-policy. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVM 5750, ENVS 5750 and SOCY 5750
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**GEOG 5782 (3) Sustainable Development: Critique**
Investigates historical and contemporary theories and critiques of development and their implications for geographic theory and method. Focuses on the role of representation in evaluating case studies and examining the potential for a sustainable development.
**Requisites:** Restricted to graduate students only.

**GEOG 5832 (3) Geography of Tibet**
Rigorously examines contemporary Tibetan society, culture and nature from a geographical perspective. Uses readings on contemporary Tibet as an entry point into scholarly research about nationalism, representation, diaspora, landscape and place, sustainable development, natural resource management, identity and environmentalism.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4832
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Asia Content

**GEOG 5840 (1-3) Graduate Independent Study**
Offers independent research for master's students only. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**GEOG 5842 (3) Global Frontiers in Southeast Asia**
Uses the theme of the global frontier to examine and compare three key moments in the modern history of Southeast Asia: the colonial encounter, the rise of the modern territorial state, and the age of contemporary globalization. Examines case studies from earlier eras to analyze emerging global frontiers at the junction of state territoriality and transnational economic expansion.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4842 and ASIA 4842
**Requisites:** Restricted to graduate students only.

**GEOG 5852 (3) Health and Medical Geography**
Examines geographical patterns of health and disease with an emphasis on global health issues. Focuses on three major approaches to medical geographic research: ecological approaches, which systematically analyze relationships between people and their environments; social approaches, including political economy and socio-behavioral approaches; and spatial approaches, which employ maps and spatial analysis to identify patterns of health and disease. Elective course for Public Health Certificate.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4852
**Requisites:** Restricted to graduate students only.

**GEOG 5930 (3) Advanced Internship**
Provides an academically supervised opportunity for graduate-level geography majors to work in public and private organizations on advanced projects related to geographic theory and their career goals. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**GEOG 5961 (3) Theories of Climate and Climate Variability**
Critically reviews current theories of climatic variability based on analysis of the different physical processes affecting climate.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 6180 (1-3) Seminar: Geographic Problems**
Applies research methods to selected problems. Topics vary with instructor.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**GEOG 6211 (1-3) Readings in Climatology**
Discusses selected topics in current climatological literature. Specific themes vary.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Physical Geography

**GEOG 6402 (3) Seminar: Political Ecology**
Critically examines the politics of human-environment relationships across cultures and societies. Focuses on environmental degradation, change and management from the perspectives including political economy, cultural politics, STS and post structural theory.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**GEOG 6712 (3) Seminar: Political Geography**
Considers in detail history and methodology of the field, including an analysis of selected systematic topics such as frontiers and boundaries, international rivers, conflicting claims to territory, and electoral geography.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**GEOG 6732 (3) Formal Population Geography: Analysis and Forecasting**
In-depth introduction to formal demography. In addition to learning the basic demographic tools used nowadays in fertility, marriage, mortality, migration and forecasting/projections, it also looks at some potential links between formal and statistical demographic work that would enable the student to apply some of the methods learnt in an econometric or multivariate setting.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite GEOG 5023.

**GEOG 6742 (3) Seminar: Cultural Geography**
Explores various geographic topics emphasizing the concept of culture. Emergence of several points of view in the development of cultural geography.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**GEOG 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.

**GEOG 6950 (1-6) Master's Thesis**
Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**GEOG 7118 (3) Foundations of Environmental Justice**
Examines environmental justice movements, policies, institutions, objectives, and scholarship. Identifies factors that contribute to environmental inequality, and efforts to reduce it. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** COMM 7118, ENVS 7118 and PSCI 7118
**Requisites:** Restricted to graduate students only.

**GEOG 7840 (1-3) Graduate Independent Study**
Offers independent research for doctoral students only. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**GEOG 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section. Instructor consent required.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.

# Geological Sciences (GEOL)

## Courses

**GEOL 1010 (3) Exploring Earth**
Introductory geology for majors and non-majors. Studies Earth, its materials, its characteristics, its dynamic processes, and how it relates to people. Separate lab (GEOL 1030) is recommended. Degree credit not granted for both GEOL 1010 and GEOL 1012.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**GEOL 1012 (3) Exploring Earth for Scientists**
Studies Earth, its materials, its characteristics, its dynamic processes, and how it relates to people. This course is an introductory geology course suitable for geology and other STEM majors. Like GEOL 1010, but taught at a higher intellectual level with a greater amount of quantitative analysis. Separate lab (GEOL 1030) is recommended. Degree credit not granted for both GEOL 1010 and GEOL 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 1020 (3) Dodos, Dinos, and Deinococcus: The History of a Habitable Planet**
Examines how the solid, fluid, and living Earth interact, how changes in the oceans, atmosphere and life reflect that interaction over the immensity of geologic time, and how the rock record is analyzed to reconstruct the co-evolution of Earth and life.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**GEOL 1030 (1) Introduction to Geology Laboratory 1**
Features field trips to local points of geologic interest. Studies rocks and topographic and geologic maps. Meets the MAPS requirement for natural science lab, if taken with GEOL 1010 or GEOL 1012.
**Recommended:** Requisite Concurrent registration in any 1000-level geology course is beneficial but not required.
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science Lab or Lab/Lec

**GEOL 1040 (3) Geology of Colorado**
Reviews the geologic evolution and history of Colorado. It first develops the basic concepts needed to interpret the geology and then systematically shows how the state evolved through geologic time. Designed for those who enjoy understanding the beauty and splendor of the state.
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**GEOL 1060 (3) Global Change: An Earth Science Perspective**
Focuses on evidence for planetary warming, climate change, glacier and ice-sheet melting and sea level rise both now and in the recent past. Attempts to develop understanding of the interactions within the coupled Earth system that regulate such changes. Utilizes examples from the geological and instrumental records, and evaluates the global warming forecast.
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**GEOL 1150 (3) Water, Energy and Environment: An Introduction to Earth Resources**
Explores how geological processes and human populations together affect the quantitfy, quality and availability of Earth resources. Includes examination of the water cycle and how humans use and modify water; fossil-fuel and mineral resources, and renewable energy options. Sustainable versus non-sustainable use and population growth is considered.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**GEOL 1160 (3) Environmental Geoscience ¿ Where Science Meets Society**
This is an introductory-level course designed primarily for freshmen non-science majors. The course targets four main questions at the intersection of geoscience and society. (1) What is science and how is it useful to me? (2) How do Earth processes, particularly natural disasters, impact people? (3) How does the Earth, particularly its natural resources, allow people to live the way we do? (4) How do people impact the environment? The course is designed to not only support students in learning about how science and society intersect in the realm of environmental geoscience, it is also designed to support students¿ development of academic-success and career-ready skills including goal setting, time management, communication, collaboration and teamwork, and more.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 1170 (3) Our Deadly Planet**
This course investigates those events so dramatic and catastrophic that they have left evidence in the geologic record that suggest they significantly impacted life on the planet. These include. but are not limited to, violent volcanic eruptions, mega-earthquakes and associated tsunamis, landslides and sector collapse on volcanoes, megafloods, rapid climatic change, superstorms, and impacts from asteroids and comets. The intent is to use examples from recent events and processes to frame and interpret evidence for these types of events observed in the rock record.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**GEOL 1180 (3) Our Microbial Planet**
Examines how microorganisms shape the world around us, both throughout the Earth's history and today. Major topics include the origin and evolution of life, the interplay between microbes and the environment, roles of microbes in global change, and applications of microbiology in biotechnology and energy.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**GEOL 2001 (4) Planet Earth**
Explores the dynamics of planet Earth with particular emphasis on the factors that make the planet habitable. Includes examination of heat balance, hydrology, geomorphology, biogeochemistry and climate history through both lecture and lab-based activities. Required for the Geology major, introduces students to the major concepts in contemporary Earth system science.
**Requisites:** Requires prerequisite course of GEOL 1010 or GEOL 1012 or GEOL 1020 or GEOL 1040 or GEOL 1060 or GEOL 1150 or GEOL 1170 or GEOL 1180 or GEOL 2100 or ENVS 1000 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 2005 (4) Introduction to Earth Materials**
Provides introduction to the classification, composition and properties of the materials that compose the Earth, how these materials are studied, and how they are used to interpret Earth history and processes. Required for the Geology major.
**Requisites:** Requires prerequisite courses of (GEOL 1010 or GEOL 1012 or GEOL 1020 or GEOL 1040 or GEOL 1060 or GEOL 1150 or GEOL 1170 or GEOL 1180 or GEOL 2100) and CHEM 1113 and CHEM 1114 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 2040 (3) The Search for Life in the Universe**
Introduces the scientific basis for the possible existence of life elsewhere in the universe. Includes origin and evolution of life on Earth and the search for evidence of life in our solar system, including Mars and Jupiter's moon Europa. Discusses the conditions necessary for life and whether they might arise on planets around other stars.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 2040
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 2100 (3) Environmental Geology**
Introduces the influences of geologic processes on human lives and the changes human actions cause in geologic systems. Uses examples and case studies from Colorado and the West.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 2700 (2) Introduction to Field Geology**
Introduces basic field techniques necessary to collect geologic data and samples, and necessary to map geologic units.
**Requisites:** Requires prerequisite courses of GEOL 1030 and GEOL 2005 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3005 (3) Mesozoic Monsters ¿ Dinosaurs, Pterosaurs, and Sea Lizards**
Origin and evolution of the reptiles that lived during the Mesozoic Era, including dinosaurs, pterosaurs, mosasaurs, and plesiosaurs. Course will focus on evolution, paleobiology, paleoecology, and extinction of these extraordinary animals, and a history of their discoveries. The course also introduces students to the scientific method and how hypotheses in paleontology are formulated and tested.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3010 (3) Introduction to Mineralogy**
Covers origin, occurrence, identification, classification, and uses of minerals with emphasis on applications of mineralogy to economic geology and petrology. Two lectures and one lab per week.
**Requisites:** Requires prerequisite courses of CHEM 1113 and CHEM 1114 and GEOL 2005 and MATH 1300 or APPM 1350 (all minimum grade C-).
**Recommended:** Prerequisite GEOL 2005.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3020 (4) Petrology**
Studies field relations, petrography, petrology, chemistry, and origins of igneous and metamorphic rocks by means of lectures, reading, and lab and field experience. Labs include instruction in the fundamentals of optical petrography and the study of rocks in thin section.
**Requisites:** Requires prerequisite course of GEOL 2005 or GEOL 3010 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3023 (4) Statistics and Geographic Data**
Learn how to use computational and statistical tools to solve problems in the geographic domain and apply introductory statistical concepts to real world problems through lab exercises. Using spatial data you will be trained in powerful specialized descriptive and predictive analysis technique. You will explore how to manipulate and visualize data and make inference using state-of-the art statistics software, applied to various social and Earth Science problems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 3023
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Quantitative Reasoning Math

**GEOL 3030 (3) Introduction to Hydrogeology**
Introduces groundwater flow concepts, hydrologic cycle, physical and chemical properties, flow net, hydraulic potential, geologic controls on heterogeneity and anisotropy, aquifers and aquitards in a geologic system, saturated and unsaturated flow, flow to a well, pumping tests, and role of groundwater in geologic processes.
**Requisites:** Requires prerequisite courses of any 1000-level GEOL lecture course (GEOL 1010, 1012, 1020, 1040, 1060, 1150, 1170, or 1180), GEOL 2001, and (MATH 1300 or APPM 1350) (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3040 (3) Global Change: The Recent Geological Record**
Geological records in lakes, oceans, deserts, and around glaciers indicate the significant changes in the global systems that have taken place over the last few hundred or thousand years. Explores the timing and nature of these changes. Department enforced prerequisites: any two-course sequence of natural science core courses.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3050 (2) GIS for Geologists**
Provides an introduction to Geographic Information Systems (GIS) techniques focused on geological applications. Covers GIS analyzing, mapping and GPS use. Basic computer skills are a plus before entering the class.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3070 (3) Introduction to Oceanography**
Explores Earth's dynamic oceans. Discusses the disciplines of oceanography including marine geology, chemistry, biology and physical oceanography with emphasis on global change. Specific topics may include: tectonics, currents, biogeochemical cycles, ecology and global warming.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 3070
**Recommended:** Prerequisite any 1000-level ATOC or GEOL course or ATOC major.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3090 (3) Developing Scientific Writing Skills**
Focuses on the development of scientific writing skills. Enhances student ability to write professionally, revise text and review the work of others. Writing assignments integrate the subject matter of different topics in earth science. Department enforced prerequisites: a lower division writing course.
**Requisites:** Two of the following: GEOL 2001 or GEOL 2005 or GEOL 2700 or GEOL 3010 or GEOL 3030 or GEOL 3120 or GEOL 3320 or GEOL 3430 or GEOL 3820 (min grade C-).
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**GEOL 3120 (4) Structural Geology**
Introduces the basic principles and processes involved in deformation of natural rocks and minerals and the techniques used to analyze a variety of common geological structures (e.g., fractures, folds, fault zones).
**Requisites:** Requires prerequisite courses of GEOL 2001 and GEOL 2005 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3181 (4) Microbial Planet Laboratory**
Provides beginner friendly lab & research experience working on a microbiology project. The course teaches how to conduct original scientific research from hypothesis to experimentation, evaluation and reporting. Students study non-pathogenic microorganisms they isolate themselves from nature as part of the course. Hands-on topics covered in class include how to isolate & culture new microbes; how to observe, describe and classify them; and how to examine their metabolic capabilities such as the production of antibiotics.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 3181
**Requisites:** Requires prerequisite courses of CHEM 1113 and CHEM 1114 or CHEM 1400 and CHEM 1401 (all minimum grade C-).
**Recommended:** Prerequisite GEOL 1180 or MCDB 1150 or EBIO 1210.

**GEOL 3300 (3) Extraterrestrial Life**
Discusses the scientific basis for the possible existence of extraterrestrial life. Includes origin and evolution of life on Earth; the possibility of life elsewhere in the solar system, including Mars; and the possibility of life on planets around other stars. Department enforced prerequisite: one-year sequence in a natural science.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 3300
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3320 (3) Introduction to Geochemistry**
Students build upon principles introduced in general chemistry in order to predict and interpret chemical dynamics in Natural environmental systems. We explores the formation and chemical differentiation of the early Earth, how chemical weathering and mineral dissolution and precipitation modifies the Earth's surface, and how redox biogeochemistry shapes aquatic environments.
**Requisites:** Requires prerequisite courses of CHEM 1113, CHEM 1114, GEOL 2001, and (MATH 1300 or APPM 1350). All minimum grade C-.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3330 (3) Principles of Geophysics**
Provides an introduction to fundamental geophysics including seismology, geomagnetism, gravity, and electromagnetic methods with applications to plate tectonics and exploration of the subsurface.
**Requisites:** Requires prerequisite courses of MATH 1300 or APPM 1350 and PHYS 1110 or PHYS 1115 and GEOL 2001 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3410 (3) Paleobiology**
Surveys morphology, ecology and evolution of ancient animal and plant life and their interactions on Earth. Fossils used to solve geological and biological problems. Department enforced prerequisites: GEOL 1010 and GEOL 1020 or GEOL 2005 or EBIO 1030 and EBIO 1040 or EBIO 1210 and EBIO 1220 (all minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3430 (4) Sedimentology and Stratigraphy**
Introduces the study of sedimentary rocks emphasizing their origin, characteristics, and interpretation; and the principles and techniques for establishing the temporal order and spatial distribution of sedimentary layers.
**Requisites:** Requires prerequisite courses of GEOL 2001 and GEOL 2005 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3520 (3) Energy and Climate Change: An Interdisciplinary Approach**
Examines sources of energy and other resources in light of their availability, use, environmental impact, as well as their impact on policy, economics and values. As fossil fuels are the dominant energy source today, particular emphasis is placed on climate impacts and the carbon cycle. All material is assessed through the lenses of the physical sciences, policy, ethics and economics.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3520
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3540 (3) Introduction to Petroleum Geology**
Discusses the origin and distribution of conventional and unconventional petroleum resources, source rocks, types of traps and seals, reservoir rock properties, exploration methods (seismic data analysis and interpretation, formation evaluation, subsurface mapping), reservoir characterization and modeling, reserves calculations.
**Requisites:** Requires prerequisite courses of GEOL 2001 and GEOL 2005 (minimum grade C-).
**Recommended:** Corequisite GEOL 3430.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3600 (3) Introduction to Python Programming for Earth Scientists**
Introduces students to scientific computing and computer programming using the Python language. Emphasis is on scientific applications such as data input and analysis, plotting, and simulation. Examples are drawn from earth and environmental sciences. Course covers variables, operations, data types, conditionals, loops, data structures, array calculations, and libraries for data analysis and plotting. Coursework is primarily based on weekly programming assignments.
**Requisites:** Requires prerequisite course of GEOL 2001 (minimum grade C-).
**Recommended:** Prerequisite Introductory course in GEOL, ENVS, GEOG, ATOC, or EVEN.

**GEOL 3720 (3) Evolution of Life: The Geological Record**
Discusses the evolution of life on Earth, beginning with the earliest origins and surveying the major steps that led to the rise of higher plants and animals. Covers modern ideas on the causes of periodic mass extinctions in both the marine and terrestrial realms. Emphasizes geologic evidence for the pathways of evolution, using examples from the ordinary to the bizarre.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3820 (4) The Fluid Earth**
Examines the myriad forms of fluid behavior found on Earth, from the atmosphere to the inner core. Explores how basic principles of fluid physics may be used to understand a broad range of earth processes, including mantle convection, atmosphere and ocean dynamics, stream flow, lava spreading, and glacier motion, among others. Covers fundamental fluid concepts such as viscosity, pressure, convection, friction, and free-surface flow.
**Requisites:** Department enforced prerequisites: GEOL 2001 and (MATH 1300 or (APPM 1340 and APPM 1345) or APPM 1350) (all minimum grade of C-).
**Recommended:** Prerequisites Any 1000 level GEOL class and PHYS 1110.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 3910 (4) Earth and Planetary Inference**
Introduces modern ways to interpret earth science observations in the context of conceptual models. We will learn how earth and planetary scientists synthesize geological, geochemical, and geophysical measurements and theoretical knowledge to make new discoveries and predictions. The tools that will be introduced in the course range from order-of-magnitude estimation techniques to a gentle intro to inverse thinking.

**GEOL 3950 (3) Natural Catastrophes and Geologic Hazards**
Surveys historic and prehistoric natural disasters, their cause and potential for recurrence. Meteorite impact, earthquakes, volcanic eruptions, tsunamis, landslides, floods, magnetic reversals and major extinction events. Department enforced prerequisite: one year of science.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4001 (1) Geology Majors Research Seminar**
Reading and discussion seminar to enhance students¿ critical evaluation of research design, assumptions, and presentation of results in the geosciences. Readings will focus on the events involved in the geologic evolution of the American West and its timing. Papers read will employ a variety of geologic and geophysical techniques. Geared towards students completing independent research and interested in pursuing a research-focused career. Development of career/graduate school plan and application materials is covered.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Requires Prerequisites of GEOL 2005 or GEOL 2001 (all minimum grade C-). Restricted to Geology majors only.
**Recommended:** Prerequisite or corequisite GEOL 2700.

**GEOL 4021 (4) Petrology: Evolution of Crustal and Mantle Rocks**
Origin, physical, and chemical properties of igneous and metamorphic rocks. This course develops a thermodynamic framework for the interpretation of geologic processes from observed mineral assemblages and rock textures. Laboratory component emphasizes the study of rocks in thin section and hand samples to understand earth processes in the mantle and crust.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5021
**Requisites:** Requires prerequisite courses of CHEM 1113 and CHEM 1114 and GEOL 2005 and (MATH 1300 or APPM 1350) (all minimum grade C-).
**Recommended:** Prerequisites GEOL 2001 and 2700.
**Grading Basis:** Letter Grade

**GEOL 4060 (4) Oceanography**
Examines the ocean as a system influencing the Earth's surficial processes and climate. Composition and properties of seawater, ocean circulation, waves, tides, coastal-, shallow-, and deep-water processes, biogeochemical cycles, deep sea sediments. Laboratory emphasizes the use of oceanographic data. Department enforced prerequisite: one semester chemistry or physics or geology.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5060
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4070 (3) Paleoclimatology**
Covers the primary forcings and feedbacks that determine Earth's energy balance and the resultant climate system on decadal to millennial time scales. Covers ocean/atmosphere circulation, the role of ice sheets in the climate system, monsoons, Holocene climate change and 20th Century warming. Includes coverage of the proxies available to reconstruct climates of the past and the archives that contain these proxies. Department enforced prerequisite: environmental science or geology introduction sequence courses.
**Requisites:** Requires prerequisite course of GEOL 2001 (minimum grade C-).
**Recommended:** Prerequisite natural science majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4093 (4) Remote Sensing of the Environment**
Covers acquisition and interpretation of environmental data by remote sensing. Discusses theory and sensors as well as manual and computerized interpretation methods. Stresses infrared and microwave portions of the spectrum.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 5093 and GEOG 4093 and GEOL 5093
**Requisites:** Requires prerequisite course of APPM 1340 1345 or APPM 1350 or ECON 1088 or 3818 or MATH 1081 or 1300 or 1310 or 2510 or ANTH 4000 or BCOR 1020 or GEOG 3023 or GEOL 3023 or PSCI 2075 or PSYC 2111 or SOCY 2061 or 4061 or STAT 4000 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4120 (3) Advanced Structural Geology and Tectonics**
Provides valuable exposure to theory and applications related to deformation (rheology) of solid Earth materials as well as the structural and geophysical characteristics of the world's major orogenic belts. The processes that will be covered span a wide range of Earth's depths, from compaction in sedimentary rocks and flow of ice/salt near Earth's surface to cataclastic mechanisms in fault rocks to plastic flow of deep crust and mantle rock. The course will involve lectures, some in-class and take home problem sets, some local field exercises and field data analysis, classic and modern paper discussions, and a research term project (written and oral presentation).
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5120
**Requisites:** Requires prerequisite course of GEOL 3120 (minimum grade C-).
**Grading Basis:** Letter Grade

**GEOL 4150 (2) Planetary Field Geology**
Provides an overview of the geology, age and origins of the solid (rocky) planets, dwarf planets and moons of our solar system and the processes that form them from comparative studies from comparative geology. Includes modules on volcanism, rifting, aeolian processes, fluvial erosion, impacts, climate change and paleontology.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5150
**Requisites:** Requires prerequisite course of GEOL 2700 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4160 (3) Introduction to Biogeochemistry**
Covers fundamentals of biogeochemical cycling, emphasizing water, carbon and nutrient dynamics in terrestrial ecosystems; chemical interactions of atmosphere, biosphere, lithosphere and hydrosphere; natural and human-managed environments. Department enforced prerequisites: GEOL 3320 or EBIO 3270 and CHEM 1011.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4160 and ENVS 4160
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4185 (3) Geomicrobiology**
Examines how microbial and chemical processes interact on the Earth¿s surface today and have shaped the planet throughout its history. Emphasis will be placed on how the life styles and chemical ingenuity of microorganisms drive key biogeochemical processes including weathering and transformations of carbon, oxygen, sulfur, iron and nitrogen. Towards this goal, major geologic and evolutionary events will be examined through the lens of microbial diversity, metabolic energetics, microbe-mineral interactions, and molecular biomarkers.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5185, ENVS 4185, and MCDB 4185
**Requisites:** Requires prerequisite courses of CHEM 1113 and CHEM 1114 or CHEM 1400 and CHEM 1401 (minimum grade C-).
**Recommended:** Prerequisites GEOL 1180 or MCDB 1150 or GEOL 3320 or EBIO 3400 or ENVS 4160 or EVEN 4484.
**Grading Basis:** Letter Grade

**GEOL 4215 (2) Geochronology and Thermochronology**
Constraining the timing of events and rates of processes is fundamental to earth science research. The field of geochronology and thermochronology is rapidly evolving. Cutting-edge aspects of geochronologic methods and emerging techniques will be especially emphasized. Lectures will emphasize the principles and assumptions of each technique. Seminar discussions will focus on recent papers that demonstrate state-of-the-art applications to diverse problems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5215
**Requisites:** Requires prerequisite courses of GEOL 2001 and GEOL 2005 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4241 (4) Earth Surface Processes**
Earth¿s surface is constantly reshaped by water, ice, wind, and life. This class investigates the earth's landscapes and the processes that modify them, both gradually by slow weathering and erosion, and abruptly through the action of floods, landslides, and other geologic events. We cover surface processes in hillslope, glacial, riverine, desert, and coastal environments. Upon completion of the course, students will have mastered knowledge about diverse surface processes and landforms and applied core geomorphic principles to a variety of landscapes. Students will also learn that understanding surface processes is important for managing natural hazards (e.g., landslides and floods). This course will draw from many disciplines, including geology, geography, physics, chemistry, and biology. The laboratory portion of the course will include quantitative problem solving and field trips to collect and analyze geomorphic data.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4241
**Requisites:** Requires prerequisite courses of GEOG 1011 or GEOL 2001 and a calculus course (MATH 1300 or APPM 1350 or (APPM 1340 and APPM 1345)), all minimum grade C-.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4270 (3) Marine Chemistry and Geochemistry**
Examines the chemical, biological, geological and physical processes affecting (and affected by) the chemistry of the oceans. Topics include: chemical cycling in seawater; the marine carbon cycle and its long-term control on atmospheric CO2; the large-scale interdependence of nutrient distributions and biological productivity, chemical tracers of ocean circulation; the chemistry of marine sediments, including early diagenesis.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5270
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors). Requires prerequisite courses of CHEM 1113, CHEM 1114, CHEM 1133, CHEM 1134, and GEOL 2001 (minimum grade C-).
**Recommended:** Prerequisites introductory chemistry, introductory geology, introductory oceanography.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4330 (3) Cosmochemistry**
Investigates chemical and isotopic data to understand the composition of the solar system: emphasis on the physical conditions in various objects, time scales for change, chemical and nuclear processes leading to change, observational constraints, and various models that attempt to describe the chemical state and history of cosmological objects in general and the early solar system in particular.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5330 and ASTR 4330 and ASTR 5330
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors). Requires prerequisite courses of (CHEM 1113 or CHEM 1400 or CHEN 1211) and (PHYS 1110 or PHYS 1115); all minimum grade C-.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4341 (3) The Cryosphere: Earth's Icy Environments**
Serves as an advanced introductory course in to the cryosphere for science majors. The course covers the nature of ice and the icy component of the Earth System, and how changing ice affects society. The course will not cover sea ice. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5341
**Requisites:** Requires prerequisite course of GEOL 2001 or PHYS 1110 or PHYS 1115 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4380 (3) Fundamentals of Stable Isotope Geochemistry**
This course teaches students the fundamental principles of stable isotope fractionation during physical and biological processes, and the application of these behaviors to a wide range of important geologic questions. The course will use classic case studies from the geologic record to illustrate these principles.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5380
**Requisites:** Requires prerequisite courses of (MATH 1300 or APPM 1350) and CHEM 1113 (all minimum grade C-).

**GEOL 4474 (4) Vertebrate Paleontology**
Discusses the history and evolution of the vertebrates, including the phylogenetic relationships and evolutionary patterns of the major groups. Lab focuses on comparative vertebrate osteology and fossil representation of major groups. Department enforced prerequisites: GEOL 1020 and GEOL 3410 (or permission from the instructor).
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5474
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4611 (3) Organic Geochemistry**
Explores the ¿biomarker concept¿ as a tool to elucidate microbial, biogeochemical, and climatic processes in natural systems through three fundamental goals: a) characterization and classification of organic molecules in complex, natural mixtures; b) biosynthesis, transport, transformation, preservation and destruction of organic matter in nature; c) application of lipid biomarkers and their stable isotope composition to study biological, biogeochemical, and climatic processes in modern and ancient systems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5611
**Requisites:** Requires prerequisite courses of CHEM 1113, CHEM 1114, CHEM 1133, and GEOL 2001 (all minimum grade C-).
**Recommended:** Prerequisite GEOL 3320 or GEOL 4270.
**Grading Basis:** Letter Grade

**GEOL 4660 (3) Sedimentology and Geobiology of Carbonates**
Focuses on how carbonate sediments are formed, deposited, and lithified and what influences the preservation and alteration of textural and geochemical signals. We will cover facies identification, interpreting depositional environment, and carbonate geochemistry, with a particular emphasis on recent advances and unanswered questions at the intersection of carbonates and geobiology, including the role of microbial carbonate precipitation and/or dissolution in the formation and degradation of stromatolites, carbonate mud, ooids, etc.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5660
**Requisites:** Requires prerequisite course of GEOL 3430 (minimum grade C-).
**Recommended:** Prerequisites GEOL 3320, GEOL 4185.

**GEOL 4670 (3) Isotope Geology**
Introduces principles of stable and radiogenic isotope systematics in inorganic and organic geochemistry. Emphasizes application of isotope data to problems in igneous, metamorphic and sedimentary petrology, geobiochemistry, and petroleum genesis.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5670
**Requisites:** Requires prerequisite a course of MATH 1300 or APPM 1350 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4675 (3) Stable Isotopes in Paleoclimate and Paleoecology**
Explores the use of stable isotope geochemistry for research questions in paleoclimatology and paleoecology. Covers physical and biological drivers of isotopic fractionation, systematics and applications of light elements such as carbon, nitrogen, oxygen, hydrogen, sulfur and boron and some less traditional isotopic systems. Applications include marine and terrestrial paleoclimate proxies and some uses for ecology and paleoecology.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5675
**Requisites:** Requires prerequisite course of CHEM 1113 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4700 (1-4) Special Geological Topics**
Studies in selected geological subjects of special current interest (for undergraduates).
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4711 (2) Igneous and Metamorphic Field Geology**
Applies field techniques to interpretation of igneous and metamorphic rocks. Field exercises and lectures focus on collecting data required to map igneous and metamorphic rock units.
**Requisites:** Requires prerequisite courses of (GEOL 2001 or GEOL 2700) and GEOL 2005 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4712 (2) Structural Field Geology**
Explores methods of field study of structure of rocks, including observations, data collection and interpretation to understand geometry of deformation and causative processes and kinematics. Field projects are mapped using different scales, air photos, topographic maps and compass and tape.
**Requisites:** Requires prerequisite courses of GEOL 2700 and GEOL 3120 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4714 (2) Field Geophysics**
Applies geophysical field techniques and data interpretation to studying geological and engineering problems. Fieldwork includes seismic, gravity, magnetic, and electrical measurements.
**Requisites:** Requires prerequisite courses of GEOL 2001 or GEOL 2700 and GEOL 3330 and MATH 1300 and PHYS 1110 or PHYS 1115 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4715 (2) Field Techniques in Hydrogeology**
Introduces various field techniques and data analysis methods in hydrogeologic studies for students in geology, environmental studies, geography, and civil engineering. Exercises include mapping ground water levels, conducting slug and pumping tests, measuring stream flows, interpreting aquifer parameters from geophysical measurements, and using field data for water budget analysis.
**Requisites:** Requires prerequisite courses of GEOL 3030 and GEOL 2001 or GEOL 2700 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4716 (2) Environmental Field Geochemistry**
This is a critical thinking course that makes use of field and laboratory environments. Students learn methods and develop hands-on expertise needed to identify, characterize and interpret the reactions that govern the quality of water in natural systems, through activities in local watersheds.
**Requisites:** Requires prerequisite courses of (GEOL 2001 or GEOL 2700) and GEOL 3320 and (CHEM 1011 and CHEM 1031) or (CHEM 1113 and CHEM 1133). All minimum grade C-.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4717 (2) Field Seminar in Geology and Tectonics**
Studies geologic features in and around Colorado to gain an overview of the geologic and tectonic evolution of the western U.S.
**Requisites:** Requires perquisite courses of GEOL 2001 or GEOL 2700 and GEOL 3120 or GEOL 3320 or GEOL 3430 or GEOL 4241 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4719 (2) Field Analysis and Tectonics of Crystalline Rocks**
Introduces basic and advanced mapping tools and concepts for structural and tectonic analysis of solid-state and magmatic deformation, metamorphism, and fluid flow in igneous and metamorphic rocks. Includes some digital mapping concepts using smartpad and smartphone applications, and computer-based analysis of structure data. Includes multi-day mapping projects in the Front Range, and in western Colorado, southern Wyoming, or northern New Mexico. Also includes introductions to Precambrian tectonic history of western North America and mineral resources of Colorado.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5719
**Requisites:** Requires prerequisite courses of GEOL 2700 and GEOL 3120 (all minimum grade C-).
**Grading Basis:** Letter Grade

**GEOL 4721 (2) Field Methods in Active Tectonics**
Analysis of active geologic structures, including strike slip fault systems, secondary structures in stepovers and related eruptive centers. Includes the use of digital imagery, elevation models, offset geomorphic features and Quaternary deposits to determine local deformation rates and their relation to plate motions.
**Requisites:** Requires prerequisite courses of GEOL 2700 and GEOL 3120 (all minimum grade C-).
**Recommended:** Prerequisite GEOL 4712.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4723 (2) Field Studies in Sedimentology**
Provides students experience in observing and interpreting sedimentary rocks in the field. We will visit outcrops in CO and UT spanning a range of depositional environments, including eolian, lacustrine, fluvial, and marine. Developing observational and notetaking skills will be emphasized; students will be responsible for contributing to a group field guide based on their guided field observations at each site.
**Requisites:** Requires prerequisite courses of GEOL 2700 and GEOL 3430 (all minimum grade C-).

**GEOL 4725 (1-4) Field Based Special Topics in Geoscience**
Explores selected geological subjects of special interest in a field setting.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5725
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**GEOL 4747 (3) Unconventional Resources**
To introduce the concepts, principles, methods, and techniques of unconventional reservoirs. Unconventional reservoirs can be defined informally as those reservoirs that need artificial stimulation to produce. Accumulations in conventional traps are due to buoyancy. Seven common kinds of unconventional reservoirs: tight-gas sandstones, shale gas, shale oil, coal-bed methane, heavy-oil sands, oil shale, gas hydrates. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5747
**Requisites:** Requires prerequisite courses of GEOL 2001, GEOL 2005, GEOL 2700, and GEOL 3430 (all minimum grade C-).

**GEOL 4755 (2) Field Geobiology**
Provides students technical fieldwork skills in the interdisciplinary field of geobiology, spanning modern environments and to ancient environments in preserved in rock record, and spanning techniques from geochemistry, environmental microbiology, and sedimentology.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5755
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Requires prerequisite courses of GEOL 2700 and GEOL 3430 (all minimum grade C-).

**GEOL 4833 (3) Teaching and Learning Earth Systems**
Learn and develop pedagogically effective strategies for teaching and understanding Earth Science concepts. Particular emphasis is placed on understanding the importance of geoscience habits of mind (i.e. spatial/temporal reasoning, multiple working hypotheses, geographic context). Focuses upon inquiry and evaluation of evidence, the importance of background knowledge and misconceptions, and developing effective discourse within and outside the classroom.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 5833 and EDUC 4833 and GEOL 5833
**Requisites:** Requires prerequisite course of ATOC 1060 or ENVS 1000 or GEOL 1010 or GEOL 1020 or GEOL 1060 (minimum grade C-).
**Grading Basis:** Letter Grade

**GEOL 4840 (1-3) Independent Study in Geology**
Time and credit to be arranged. For advanced undergraduates who have high scholastic standing. Open only upon consultation with department advisor.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**GEOL 4841 (1-3) Independent Study-Economic Geology**
Time and credit to be arranged. For advanced undergraduates who have high scholastic standing. Open only upon consultation with department advisor. May be repeated for a total of 7 credit hours.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**GEOL 4842 (1-3) Independent Study-Petrology**
Time and credit to be arranged. For advanced undergraduates who have high scholastic standing. Open only upon consultation with department advisor. May be repeated for a total of 7 credit hours.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**GEOL 4843 (1-3) Independent Study-Sedimentology**
Time and credit to be arranged. For advanced undergraduates who have high scholastic standing. Open only upon consultation with department advisor. May be repeated for a total of 7 credit hours.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**GEOL 4844 (1-3) Independent Study-Structure/Tectonics**
Time and credit to be arranged. For advanced undergraduates who have high scholastic standing. Open only upon consultation with department advisor. May be repeated for a total of 7 credit hours.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**GEOL 4845 (1-3) Ind Stdy-Geochemistry**
Time and credit to be arranged. For advanced undergraduates who have high scholastic standing. Open only upon consultation with department advisor. May be repeated for a total of 7 credit hours.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**GEOL 4846 (1-3) Independent Study-Geophysics**
Time and credit to be arranged. For advanced undergraduates who have high scholastic standing. Open only upon consultation with department advisor. May be repeated for a total of 7 credit hours.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**GEOL 4847 (1-3) Independent Study-Hydrology**
Time and credit to be arranged. For advanced undergraduates who have high scholastic standing. Open only upon consultation with department advisor. May be repeated for a total of 7 credit hours.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**GEOL 4849 (1-3) Indepedent Study-Paleontology**
Time and credit to be arranged. For advanced undergraduates who have high scholastic standing. Open only upon consultation with department advisor. May be repeated for a total of 7 credit hours.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**GEOL 4851 (1-3) Independent Study in Geoscience Education**
**Repeatable:** Repeatable for up to 3.00 total credit hours.

**GEOL 4862 (1-4) Geology Independent Study**
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5862
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite students may not enroll in this course without completing the Independent Study Contract.

**GEOL 4990 (1-3) Honors Thesis**
Supervised project involving original research in any area of the geological sciences. The thesis is submitted to the Honors Program of the College of Arts and Sciences and is orally defended. Must be accepted by the departmental honors committee. Department enforced prerequisite: minimum cumulative GPA of 3.30.
**Additional Information:** Arts Sciences Honors Course

**GEOL 5001 (3) Physics and Chemistry of the Solid Earth**
Reviews the physical and chemical characteristics of the solid earth, from the core to the crust, and the processes that govern behavior through the earth. Lectures are supplemented with readings from the recent literature. Topics include convection, phase transitions, melt generation, forces of plate tectonics, origin of continents and lithosphere, continental tectonics, and earthquakes.
**Requisites:** Restricted to graduate students only.
**Recommended:** Requisite a course in basic chemistry and a course in physics.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5002 (3) Physics, Chemistry, and Biology of Sedimentary Systems**
Reading and discussion of current issues and themes in the stratigraphic sciences, including stratigraphic and facies analysis, spatial heterogeneity and self-organization, numerical modeling; origin, evolution, mass extinctions, and megatrajectories of life; and paleooceanographic and paleoclimatic signals in sedimentary rocks. Goal is to diversify students' understanding of the role of physics, chemistry, and biology in attacking research problems in sedimentary systems.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5003 (2) Graduate Writing Seminar**
Aims at improving graduate student writing, editing, and reviewing skills, while meeting student writing goals. Includes discussion of materials about effective writing, and peer-editing of text that students are producing for their graduate research endeavors.

**GEOL 5021 (4) Petrology: Evolution of Crustal and Mantle Rocks**
Origin, physical, and chemical properties of igneous and metamorphic rocks. This course develops a thermodynamic framework for the interpretation of geologic processes from observed mineral assemblages and rock textures. Laboratory component emphasizes the study of rocks in thin section and hand samples to understand earth processes in the mantle and crust.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4021
**Requisites:** Restricted to graduate students only.

**GEOL 5042 (3) Computational Tools in Geosciences**
Scientific research and teaching in geological sciences and related disciplines relies increasingly on computational tools. This class aims to introduce graduate students in the geological, geophysical and biogeochemical sciences to a wide range of commonly used concepts and open source data tools to empower them to find the right tool for their computational needs in research and teaching. Previously offered as a special topics course.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisite Prior experience with at least one programming language is recommended.

**GEOL 5060 (4) Oceanography**
Examines the ocean as a system influencing the Earth's surficial processes and climate. Composition and properties of seawater, ocean circulation, waves, tides, coastal-, shallow-, and deep-water processes, biogeochemical cycles, deep sea sediments. Laboratory emphasizes the use of oceanographic data.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4060
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5080 (1-3) Advanced Hydrogeology and Modeling Concepts**
Introduces advanced groundwater flow and modeling concepts, equations for steady state and transient flow, saturated and unsaturated flow, finite difference method, application of modeling in geologic processes, radial flow and aquifer parameters, infiltration and groundwater recharge, model calibration, verification and prediction. Department enforced prerequisite: MATH 2300 or Fortran.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5093 (4) Remote Sensing of the Environment**
Covers acquisition and interpretation of environmental data by remote sensing. Discusses theory and sensors as well as manual and computerized interpretation methods. Stresses infrared and microwave portions of the spectrum.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4093 and GEOG 4093 and GEOG 5093
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5101 (1) Introduction to Geological Sciences Faculty I**
Welcomes and introduces all new graduate students to the Department of Geological Sciences. Faculty discuss their research and their academic trajectories. The week¿s geology colloquium is discussed. Tutorials from staff introduce how the university works, what funding opportunities exist, and how and when to apply for such funding.
**Grading Basis:** Letter Grade

**GEOL 5102 (1) Introduction to Geological Sciences Faculty II**
Continues to introduce all new graduate students to the Department of Geological Sciences. Faculty discuss their research and their academic trajectories. The week¿s geology colloquium is discussed. In addition, students craft reports on their intended research.
**Grading Basis:** Letter Grade

**GEOL 5110 (3) Geomechanics**
Introduces fundamental physical processes important to the transport of heat and mass in the Earth and on Earth's surface. Provides practice with quantitative treatment of geological problems. Solutions for each problem are derived from first principles, including conservation and flux laws. Emphasizes heat conduction and viscous fluid flow. Department enforced prerequisite: restricted to graduate students only and a course in calculus.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5111 (3) Rheology: Fracture and Flow of Rocks**
Focuses on the elastic and plastic deformation of planetary materials (e.g. rocks and minerals, melts, tectonic plates, etc.). Topic include stress and strain, failure criterion, fracture propagation, creep (dislocation and diffusion), and deformation of multiphase materials. Prior coursework in basic chemistry, physics, mineralogy/petrology, and structure/geology is recommended.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**GEOL 5120 (3) Advanced Structural Geology and Tectonics**
Provides valuable exposure to theory and applications related to deformation (rheology) of solid Earth materials as well as the structural and geophysical characteristics of the world's major orogenic belts. The processes that will be covered span a wide range of Earth's depths, from compaction in sedimentary rocks and flow of ice/salt near Earth's surface to cataclastic mechanisms in fault rocks to plastic flow of deep crust and mantle rock. The course will involve lectures, some in-class and take home problem sets, some local field exercises and field data analysis, classic and modern paper discussions, and a research term project (written and oral presentation).
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4120
**Recommended:** Prerequisite GEOL 3120.
**Grading Basis:** Letter Grade

**GEOL 5123 (3) Teaching and Learning in Post-Secondary Science Education**
Introduces the science of learning and research-based instructional strategies. Open to students in any STEM discipline considering a career that involves college-level teaching. Students apply research on learning and teaching to the development of instructional materials for a target course they envision teaching at the college level in the future.
**Recommended:** Prerequisite at least one semester teaching/TAing undergraduate courses (waived with instructor approval).

**GEOL 5125 (3) Communicating Earth Science with the Public**
Introduces research on science communication and discusses examples drawn from geoscience. Students apply research on science communication to conceptualizing how to communicate about their specific geoscience research to the public in different contexts. Students should be familiar enough with their area of graduate research in geoscience to apply different models of science communication to it.
**Requisites:** Restricted to graduate students only.

**GEOL 5150 (2) Planetary Field Geology**
Provides an overview of the geology, age and origins of the solid (rocky) planets, dwarf planets and moons of our solar system and the processes that form them from comparative studies from comparative geology. Includes modules on volcanism, rifting, aeolian processes, fluvial erosion, impacts, climate change and paleontology.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4150
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5185 (3) Geomicrobiology**
Examines how microbial and chemical processes interact on the Earth¿s surface today and have shaped the planet throughout its history. Emphasis will be placed on how the life styles and chemical ingenuity of microorganisms drive key biogeochemical processes including weathering and transformations of carbon, oxygen, sulfur, iron and nitrogen. Towards this goal, major geologic and evolutionary events will be examined through the lens of microbial diversity, metabolic energetics, microbe-mineral interactions, and molecular biomarkers.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4185, ENVS 4185, and MCDB 4185
**Grading Basis:** Letter Grade

**GEOL 5215 (2) Geochronology and Thermochronology**
Constraining the timing of events and rates of processes is fundamental to earth science research. The field of geochronology and thermochronology is rapidly evolving. Cutting-edge aspects of geochronologic methods and emerging techniques will be especially emphasized. Lectures will emphasize the principles and assumptions of each technique. Seminar discussions will focus on recent papers that demonstrate state-of-the-art applications to diverse problems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4215
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5216 (1) Geochronology Reading and Discussion Seminar**
The goals of this reading and discussion seminar are to: 1) learn key aspects of a selected geochronology topic, 2) read, critically evaluate, and discuss peer-reviewed scientific papers that include geochronology data, methods, and interpretations, and 3) set up a framework and appropriate environment in which participants will discuss the ¿next steps¿ to address the big problems associated with each theme. This course will focus on a different geochronology theme each time that it is offered. A theme will be selected based on conversations among interested participants. At the beginning of the semester, weekly discussion topics and associated papers will be chosen to systematically work through concepts associated with that theme. Previously offered as a special topics course.
**Repeatable:** Repeatable for up to 5.00 total credit hours.

**GEOL 5253 (3) Stable Isotope Fractionation in Biogeochemical Processes**
Investigates the origins of stable isotope fractionation in geochemical systems with special emphasis on the role of biological catalysts as key drivers of isotopic effects during biogeochemical transformations. The class will cover a wide range of topics relevant to isotope fractionation including partition functions, diffusional, enzymatic and equilibrium isotope effects, open and closed system behavior, Rayleigh distillation, reservoir effects, enzymatic catalysis, physiological drivers and signal preservation.
**Recommended:** Prerequisites MATH 1300 or APPM 1350.

**GEOL 5270 (3) Marine Chemistry and Geochemistry**
Examines the chemical, biological, geological and physical processes affecting (and affected by) the chemistry of the oceans. Topics include: chemical separation in seawater; the marine carbon cycle and its long-term control on atmospheric CO2; the large-scale interdependence of nutrient distributions and biological productivity, chemical tracers of ocean circulation; the chemistry of marine sediments, including early diagenesis.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4270
**Recommended:** Prerequisites introductory chemistry, introductory geology, introductory oceanography.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5280 (3) Aqueous and Environmental Geochemistry**
Explores the fundamentals of low-temperature geochemistry to investigate element speciation and chemical behavior in waters, soils and sediments. Topics include water-rock interaction and weathering, mineral dissolution and precipitation reactions, aqueous complexation, mineral surface chemistry, kinetics, element cycles, and redox biogeochemistry. Includes exposure to spectroscopic tools, computer simulations and microbial geochemistry. Department enforced prerequisite: GEOL 3320 or 2 year of college chemistry.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5305 (3) Global Biogeochemical Cycles**
Focuses on the cycling of elements at the global scale with a particular emphasis on human modification of biogeochemical cycles. Major biogeochemical cycles, their past dynamics, present changes and potential future scenarios will be addressed. Ecosystem to global-scale model of the earth system will be discussed along with global scale measurements of element fluxes from satellites, aircraft and measurement networks. Department enforced prerequisite: restricted to graduate students only, general chemistry and some organic chemistry.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 5840
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5330 (3) Cosmochemistry**
Investigates chemical and isotopic data to understand the composition of the solar system: emphasis on the physical conditions in various objects, time scales for change, chemical and nuclear processes leading to change, observational constraints, and various models that attempt to describe the chemical state and history of cosmological objects in general and the early solar system in particular. Department enforced prerequisite: graduate standing in physical science and graduate chemistry or physics or math courses.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4330 and ASTR 4330 and ASTR 5330
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5341 (3) The Cryosphere: Earth's Icy Environments**
Serves as an advanced introductory course in to the cryosphere. The course covers the nature of ice and the icy component of the Earth System, and how changing ice affects society. The course will not cover sea ice. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4341
**Requisites:** Restricted to graduate students only.

**GEOL 5380 (3) Fundamentals of Stable Isotope Geochemistry**
This course teaches students the fundamental principles of stable isotope fractionation during physical and biological processes, and the application of these behaviors to a wide range of important geologic questions. The course will use classic case studies from the geologic record to illustrate these principles.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4380
**Requisites:** Restricted to graduate students only.

**GEOL 5420 (3) Quaternary Dating Methods**
Features in-depth survey of standard and experimental dating methods that provide absolute ages for events of the last two million years of Earth history. Includes theory and application of radiocarbon, uranium series, amino acid, thermo-luminescence, fission track, potassium/argon, hydration, light stable isotopes, and other radioactive techniques.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5430 (3) Paleoceanography and Paleoclimatology**
Examines scientific tools, data, and theories related to the dramatically varied past climate of the Earth. Focus will be on marine records of climate change and ocean circulation, but ice cores and other continental archives will also be discussed. Course covers the Cenozoic Era (66 Ma to present), but with particular emphasis on the Quaternary ice age cycles.
**Recommended:** Prerequisites Introductory geology and introductory oceanography or atmospheric science.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5432 (3) Active Tectonics**
Considers the physical processes that drive coseismic and interseismic strain in the upper crust on Earth. It is focused on recognition and interpretation of surface strain produced by active faulting, folding and flexure at a range of timescales. This includes defining how coseismic strain cycles act to build geologic structures while considering methods of analysis with rapidly emerging remotely sensed and geochronologic datasets to quantify strain rates for seismic hazard assessment. Previous coursework in structural geology, geomorphology and remote sensing is recommended.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade

**GEOL 5474 (4) Vertebrate Paleontology**
Discusses the history and evolution of the vertebrates, including the phylogenetic relationships and evolutionary patterns of the major groups. Lab focuses on comparative vertebrate osteology and fossil representation of major groups.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4474 and MUSM 5474
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5555 (3) Topics in Macroevolution**
Macroevolution extends beyond the limits of microevolution by including processes that encompass many species, in both recent and fossils organisms. Some of the topics include evolutionary novelty and innovation, developmental evolution, disparity and diversity dynamics, and extinction. We will survey case studies, methods, and the current literature.
**Repeatable:** Repeatable for up to 9.00 total credit hours.

**GEOL 5611 (3) Organic Geochemistry**
Explores the ¿biomarker concept¿ as a tool to elucidate microbial, biogeochemical, and climatic processes in natural systems through three fundamental goals: a) characterization and classification of organic molecules in complex, natural mixtures; b) biosynthesis, transport, transformation, preservation and destruction of organic matter in nature; c) application of lipid biomarkers and their stable isotope composition to study biological, biogeochemical, and climatic processes in modern and ancient systems.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4611
**Recommended:** Prerequisites CHEM 1113 or equivalent from undergraduate degree and GEOL 5270 or GEOL 5280 or GEOL 5305 or GEOL 5675.

**GEOL 5612 (3) Techniques in Organic Geochemistry**
Explores the techniques in analytical chemistry and organic geochemistry for the study of lipid biomarkers in the environment, which include the following topics: a) Extraction of environmental samples and separation of lipid classes; b) Analysis of apolar lipids using gas chromatography-mass spectrometry (GC-MS); c) Determine the stable isotope composition of lipids using GC-isotope ratio-MS (GC-IR-MS); d) Analysis of polar lipids using high performance liquid chromatography-MS (HPLC-MS). Requires previous coursework in general chemistry and Organic Geochemistry.
**Recommended:** Prerequisites Introductory or advanced courses in organic chemistry, biochemistry, biogeochemistry, geochemistry, geomicrobiology, paleoclimate, or geology.

**GEOL 5660 (3) Sedimentology & Geobiology of Carbonates**
Carbonate sedimentary rocks are a significant component of the geobiological rock record, capturing a history of organisms and the environments they inhabit. This course will focus on how carbonate sediments are formed, deposited, and lithified and what influences the preservation and alteration of textural and geochemical signals. We will cover facies identification, interpreting depositional environment, and carbonate geochemistry, with a particular emphasis on recent advances and unanswered questions at the intersection of carbonates and geobiology, including the role of microbial carbonate precipitation and/or dissolution in the formation and degradation of stromatolites, carbonate mud, ooids, etc.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4660
**Recommended:** Prerequisite prior coursework in Sedimentology.

**GEOL 5670 (3) Isotope Geology**
Introduces principles of stable and radiogenic isotope systematics in inorganic and organic geochemistry. Emphasizes application of isotope data to problems in igneous, metamorphic and sedimentary petrology, geobiochemistry, and petroleum genesis.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4670
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5675 (3) Stable Isotopes in Paleoclimate and Paleoecology**
Explores the use of stable isotope geochemistry for research questions in paleoclimatology and paleoecology. Covers physical and biological drivers of isotopic fractionation, systematics and applications of light elements such as carbon, nitrogen, oxygen, hydrogen, sulfur and boron and some less traditional isotopic systems. Applications include marine and terrestrial paleoclimate proxies and some uses for ecology and paleoecology.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4675
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5690 (3) Tectonic History of the Western United States**
Provides students with the practical tools needed to make tectonic interpretations through study of the geologic history of the western United States and the geodynamic models used in interpreting that history. Paleomagnetism, geobarametry, geothermometry, geodynamic modeling, and elements of structural geology and stratigraphy are topics considered in this class.
**Requisites:** Requires prerequisite courses of GEOL 3120 and PHYS 1110 (all minimum grade D-).
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5700 (1-4) Geological Topics Seminar**
Offers seminar studies in geological subjects of special current interest. Primarily for graduate students, as departmental staff and facilities permit.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5701 (2) Super-Problems in Quatrnary Climate**
Investigates major problems in the study and understanding of Quaternary climate variation, in seminar format. Each year one major topic will be addressed, such as: the physics and chemistry of the Ice Age ocean circulation; the theory and mechanics of glacial/interglacial atmospheric C02 change; the origins of the 20, 40, and 100 kyr orbital (Milankovitch) climate cycles.
**Recommended:** Prerequisites Introductory geology and climatology, oceanography, paleoclimatology, or paleoceanography.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5702 (1-3) Geomorphology Seminar**
Explores the dynamics and forms of the earth's surface through critical reading and discussion of both classical and modern literature.
**Repeatable:** Repeatable for up to 10.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5703 (1) Seminar in Tectonics**
Focuses on a wide variety of topics related to crust, mantle and whole earth tectonics. Published papers from recent peer-reviewed literature are read and discussed. The format and specific topics will vary each semester (e.g., a relatively focused theme or open format) and will in part be determined by the makeup of enrolled students. Department enforced prerequisite: restricted to graduate students only.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5704 (1) Carbonates Seminar**
Focuses broadly on the topic of carbonates, including sedimentology, geochemistry, and geobiology of carbonates. Each semester will have a distinct theme under these sub-topics. Students will be responsible for leading discussion on individual readings and will be able to provide input on both the theme and the individual reading selections. Upper-level GEOL majors can register with instructor approval.
**Repeatable:** Repeatable for up to 10.00 total credit hours.

**GEOL 5705 (1-3) Seminar in Paleoclimate**
Investigates major problems in the study and understanding of past climate variations as preserved in the geologic record. Course format is a seminar-style critical reading and discussion of journal articles in paleoclimatology and paleoceanography. Topical focus varies from year to year. Prior coursework in geology, climate science, and/or paleoclimate is recommended.
**Repeatable:** Repeatable for up to 9.00 total credit hours.

**GEOL 5711 (1-3) Igneous and Metamorphic Field Geology**
Applies field techniques to interpretation of igneous and metamorphic rocks. Field exercises and lectures focus on collecting data required to map igneous and metamorphic rock units. Department enforced prerequisites: restricted to graduate students only and GEOL 2001 or GEOL 2700 and GEOL 3020.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5712 (1-3) Structural Field Geology**
Methods of field study of structure of rocks, including observations, data collection and interpretation to understand geometry of deformation and causative processes and kinematics. Field projects are mapped using different scales, air photos, topographic maps and compass and tape. Department enforced prerequisites: GEOL 2001 or GEOL 2700 and GEOL 3020.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5714 (2) Field Geophysics**
Applies geophysical field techniques and data interpretation to studying geological and engineering problems. Fieldwork includes seismic, gravity, magnetic and electrical measurements. Department enforced prerequisite: restricted to graduate students only and GEOL 2001 or GEOL 2700 and MATH 1300 and PHYS 1110.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5715 (1-3) Field Techniques in Surficial Geology and Geohydrology**
Introduces various field techniques and data analysis methods in hydrogeologic studies for students in geology, environmental studies, geography and civil engineering. Exercises include mapping ground water levels, conducting slug and pumping tests, measuring steam flows, interpreting aquifer parameters from geophysical measurements and using field data for water budget analysis. Department prerequisite: GEOL 2001 or GEOL 2700.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5716 (1-3) Environmental Field Geochemistry**
Develops basic field skills in the most commonly performed tasks required for the environmental characterization of solid and aqueous wastes. Media of study include soils, stream sediments, surface waters, ground waters and atmospheric particulates. Department enforced prerequisites: GEOL 2001 or GEOL 2700 and CHEM 1011 and CHEM 1031 or CHEM 1113 or CHEM 1133 and GEOL 3320.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5717 (2) Field Seminar in Geology and Tectonics**
Studies geologic features in and around Colorado to gain an overview of the geologic and tectonic evolution of the western U.S. Department enforced prerequisites: restricted to graduate students only and GEOL 2001 or GEOL 2700 and at least one of the following: GEOL 3120 or GEOL 3320 or GEOL 3430.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5719 (2) Field Analysis and Tectonics of Crystalline Rocks**
Introduces basic and advanced mapping tools and concepts for structural and tectonic analysis of solid-state and magmatic deformation, metamorphism, and fluid flow in igneous and metamorphic rocks. Includes some digital mapping concepts using smartpad and smartphone applications, and computer-based analysis of structure data. Includes multi-day mapping projects in the Front Range, and in western Colorado, southern Wyoming, or northern New Mexico. Also includes introductions to Precambrian tectonic history of western North America and mineral resources of Colorado.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4719
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**GEOL 5721 (2) Classics and Frontiers in Hydrology**
The first part of this course studies classic papers in hydrology that include development of fundamental concepts and governing principles governing water flow in subsurface. It will also include benchmark papers that define critical advances in hydrology. The second part of this course focuses on latest research front that spans from theoretical and modeling studies to measuring and monitoring technologies.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**GEOL 5725 (1-4) Field Based Special Topics in Geoscience**
Explores selected geological subjects of special interest in a field setting.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4725
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5747 (3) Unconventional Resources**
To introduce the concepts, principles, methods, and techniques of unconventional reservoirs. Unconventional reservoirs can be defined informally as those reservoirs that need artificial stimulation to produce. Accumulations in conventional traps are due to buoyancy. Seven common kinds of unconventional reservoirs: tight-gas sandstones, shale gas, shale oil, coal-bed methane, heavy-oil sands, oil shale, gas hydrates. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4747

**GEOL 5755 (2) Field Geobiology**
Provides students technical fieldwork skills in the interdisciplinary field of geobiology, spanning modern environments and to ancient environments in preserved in rock record, and spanning techniques from geochemistry, environmental microbiology, and sedimentology. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4755
**Repeatable:** Repeatable for up to 8.00 total credit hours.

**GEOL 5775 (3) Introduction to Numerical Modeling in Geoscience**
Numerical models play an essential role across the geosciences, with applications that include hypothesis exploration, data interpretation, and prediction. This course provides a hands-on introduction to numerical modeling. Students learn scientific programming and modeling concepts by iterating through a series of model-development assignments in Python and Matlab. Applications span a range of topics in the geosciences, with emphasis on physical processes that involve mass, energy, and/or momentum transport.

**GEOL 5800 (3) Planetary Surfaces and Interiors**
Examines processes operating on the surfaces of solid planets and in their interiors. Emphasizes spacecraft observations, their interpretation, the relationship to similar processes on Earth, the relationship between planetary surfaces and interiors and the integrated geologic histories of the terrestrial planets and satellites.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 5800
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5820 (3) Origin and Evolution of Planetary Systems**
Considers the origin and evolution of planetary systems, including proto-planetary disks, condensation in the solar nebula, composition of meteorites, planetary accretion, comets, asteroids, planetary rings and extrasolar planets. Applies celestial mechanics to the dynamical evolution of solar system bodies.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 5820
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5830 (3) Topics in Planetary Science**
Examines current topics in planetary science, based on recent discoveries, spacecraft observations and other developments. Focuses on a specific topic each time the course is offered, such as Mars, Venus, Galilean satellites, exobiology, comets or extrasolar planets. Department enforced prerequisite: restricted to graduate students in the physical sciences.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5830 and ASTR 5830
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5833 (3) Teaching and Learning Earth Systems**
Learn and develop pedagogically effective strategies for teaching and understanding Earth Science concepts. Particular emphasis is placed on understanding the importance of geoscience habits of mind (i.e. spatial/temporal reasoning, multiple working hypotheses, geographic context). The course focuses upon inquiry and evaluation of evidence, the importance of background knowledge and misconceptions and developing effective discourse within and outside the classroom.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 4833 and GEOL 4833 and EDUC 5833
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**GEOL 5835 (1) Seminar in Planetary Science**
Studies current research on a topic in planetary science. Students and faculty give presentations. Subjects may vary each semester. Department enforced prerequisite: senior level undergraduate physics.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5835 and ASTR 5835
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5840 (1-3) Independent Study-Quaternary Geology**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5841 (1-3) Independent Study-Economic Geology**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5842 (1-3) Independent Study-Petrology**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5843 (1-3) Independent Study-Sedimentology**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5844 (1-3) Independent Study-Structure/Tectonics**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5845 (1-3) Independent Study-Geochemistry**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5846 (1-3) Independent Study-Geophysics**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5847 (1-3) Independent Study-Hydrology**
.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5849 (1-3) Independent Study-Paleontology**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5851 (1-3) Independent Study-Sediment Petrology**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5852 (1-3) Independent Study--GIS Applications in Quaternary Geosciences**
Leads students through quantitative spatial analysis of environmental and paleoclimatic problems. Each student will develop a project from start to finish, with emphasis on raster GIS for building large empirical databases that bear on process and variability.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 5862 (1-4) Geology Independent Study**
Students may not enroll in this course without completing the Independent Study Contract.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4862
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**GEOL 5910 (3) Geothermodynamics**
Provides a solid foundation in chemical thermodynamic concepts and calculations as applied to geochemistry and geobiology.

**GEOL 6050 (3) Space Instrumentation**
Provides an overview of the relevant space environment and process, the types of instruments flown on recent mission and the science background of the measurement principles.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 6050 and ASEN 6050
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6060 (4) Petroleum Geology of Turbidite Systems**
Covers the exploration and production aspects of petroleum submarine fans and turbidite systems.
**Requisites:** Requires prerequisite course of GEOL 6330 (minimum grade B).
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6310 (3) Sedimentary Petrology**
Covers interpretation of depositional and diagenetic history of sedimentary rocks as determined from thin-section studies. Department enforced prerequisites: GEOL 3010 and GEOL 3020 and GEOL 3430 or equivalents.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6330 (4) Applied Sequence Stratigraphy and Basin Analysis**
Develops skills in the stratigraphic interpretation of seismic reflection data, recognition of sequence stratigraphy in well logs and outcrop and their applications to basin analysis in petroleum exploration. Department enforced prerequisite: restricted to graduate students only and introductory undergraduate physics and sedimentology/stratigraphy.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6610 (3) Earth and Planetary Physics 1**
Examines mechanics of deformable materials, with applications to earthquake processes. Introduces seismic wave theory. Other topics include inversion of seismic data for the structure, composition and state of the interior of the Earth.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 6610 and PHYS 6610
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6620 (3) Earth and Planetary Physics 2**
Covers space and surface geodetic techniques as well as potential theory. Other topics are the definition and geophysical interpretation of the geoid and of surface gravity anomalies; isostasy; post-glacial rebound; and tides and the rotation of the Earth.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 6620 and PHYS 6620
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6630 (3) Earth and Planetary Physics 3**
Examines the solar system, emphasizing theories of its origin and meteorites. Highlights distribution of radioactive materials, age dating, heat flow through continents and the ocean floor, internal temperature distribution in the Earth, and mantle convection. Also covers the origin of the oceans and atmosphere.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 6630 and PHYS 6630
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6650 (1-3) Seminar in Geophysics**
Advanced seminar studies in geophysical subjects for graduate students.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 6650 and PHYS 6650
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6655 (3) InSAR Processing and Interpretation**
Understand the concepts and applications of interferometric synthetic aperture radar (InSAR) and differential InSAR, to include an introduction to physical geodesy and satellite techniques.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 6655
**Grading Basis:** Letter Grade

**GEOL 6670 (2) Geophysical Inverse Theory**
Principles of geophysical inverse theory as applied to problems in the Earth sciences, including topography, Earth structure and earthquake locations. Department enforced prerequisites: a course in calculus and a course in computer programming (any language).
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 6670
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6950 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 6960 (1-3) Plan II Master's Research**
The Plan II program requires at least 3 credit hours of GEOL 6960 (Plan II Master¿s Research) under the supervision of the advisory committee.
**Additional Information:** Departmental Category: Graduate Course

**GEOL 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Additional Information:** Departmental Category: Graduate Course

# German (GRMN)

## Courses

**GRMN 1010 (4) Beginning German 1**
Introduction to language and culture of the German-speaking world, with emphasis on the acquisition of basic communication skills in cultural context. For students with no previous training in German.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 1030
**Additional Information:** Departmental Category: German

**GRMN 1020 (4) Beginning German 2**
Continued development of German-language skills and cultural knowledge for effective communication. Emphasis on more complex language structures and sustained interactions. Department enforced prerequisite: GRMN 1010 (min grade of C-).
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 1030
**Additional Information:** Departmental Category: German

**GRMN 1030 (5) Intensive Beginning German**
Covers the same material as GRMN 1010 and GRMN 1020 in one course. Focuses on acquiring ability to understand and speak everyday German; on developing reading and writing skills; and on learning about the cultures of the German-speaking countries.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 1010 and GRMN 1020
**Additional Information:** Departmental Category: German

**GRMN 1500 (3) German for Reading Knowledge**
Designed especially for graduate students. Emphasizes analytical skills for acquiring reading proficiency in specialized and technical German in one's field of research. Recommended for pass/fail registration. Does not satisfy the arts and sciences foreign language requirement. Does not count towards the German major.
**Additional Information:** Departmental Category: German

**GRMN 1601 (3) Germany Today**
Introduces contemporary debates in Germany, Austria and Switzerland through analysis of contemporary cultural products such as film, literature, graphic novels, and other media/art. Examines refugee migration, far-right parties, social justice movements, responses to climate change. Taught in English.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 1602 (3) Metropolis and Modernity**
An interdisciplinary introduction to the modern industrial city in Europe and the USA, with particular attention to the representation of urbanism in the visual arts. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 1701 (3) Nature, Climate and Environment in German Culture**
Critically examines cultural products from German-speaking contexts that thematize climate and environment. Depictions of nature, climate and environment are examined in relationship to understandings of race, nation, sexuality, gender, labor, and rural versus urban spaces. Discussions span Romantic conceptions of nature and nation, to colonial resource extraction, to fascist understandings of home and nature, to contemporary political debates around contemporary Germany's environmental policies. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 1701
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 2010 (4) Intermediate German 1**
Development of skills for independent use of German. Discussions, writing and listening/viewing activities that address topics of the contemporary German-speaking world. Department enforced prerequisite: GRMN 1020 or 1030 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 2030
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: German

**GRMN 2020 (4) Intermediate German 2**
Development of communication skills and knowledge about recent social, cultural and political developments in German speaking countries through texts, media and film. Department enforced prerequisite: GRMN 2010 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 2030
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 2030 (5) Intensive Intermediate German**
Covers the same material as GRMN 2010 and GRMN 2020 in one semester. Offers review and continuation of basic skills begun in the first year: reading, writing, speaking and oral comprehensive. Department enforced prerequisite: GRMN 1020 or GRMN 1030 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 2010 and GRMN 2020
**Additional Information:** Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: German

**GRMN 2141 (3) Topics in Modern German Culture and Society**
Examines topics in modern German culture, including German literature, film, art, and politics. Topics vary each semester. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**GRMN 2301 (3) Inside Nazi Germany: Politics, Culture, and Everyday Life in the Third Reich**
Examines social culture and everyday life in Nazi Germany. Topics include the role of propaganda in the media and entertainment industries, anti-Semitism and suppression of ethnic, social and religious minorities, the role of education and youth organizations, as well as the role of women, the churches, and the effects of a controlled economy before and during World War II. Taught in English.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 2302 (3) Nazis on Screen: Hollywood, War, Propaganda**
Explores representations of Nazism in Hollywood films from the early 1940s until today. How does the film image of the Nazi change from World War II through the Cold War era and beyond? From Chaplin's "The Great Dictator" to "Star Wars" and Tarantino's "Inglorious Basterds," this course focuses on how representations of Nazism and fascism informed American self-conceptions and strengthened the belief and trust in democratic institutions. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 2302
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**GRMN 2402 (3) Sports and Athleticism in German and Global Culture**
Examines development of sports and athleticism from ancient Greek and Roman games and spectacles to the present day. Particular emphasis is given to the role of sports in courtly societies, to the emergence of popular sports in 19th century Germany and Europe, and to the globalization of sports in the 20th century. Topics include the history of Olympic Games, cultural differences as differences in sports (Football vs. soccer, baseball vs. cricket), as well as alternative and niche sports. Taught in English. Formerly offered as a special topics course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**GRMN 2501 (3) Miniatures of Modern Life: From Berlin to Vienna and Beyond**
Offers an introduction to German, Austrian, and Swiss short fiction in the 20th and 21st centuries. Students will explore issues associated with modern life, such as: alienation and anxiety; cultures of spectatorship; gender roles, sexuality, and social life; technology, industry, and capitalism. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 2502 (3) Representing the Holocaust**
Examines representations of the Holocaust in film, memoirs, poetry, novels, graphic novels, memorials. Considers questions such as: How to depict an event that resists representation? How does the memory of the Holocaust transform over generations? How do representations of the Holocaust inform our understanding of other experiences of racism and genocide? What ethical issues are at stake? Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 2502
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 2503 (3) Fairy Tales of Germany**
Explores the origins, cultural significance, stylistic and thematic features of the German fairy tale, with emphasis on the Brothers Grimm; on artistic fairy tales by Goethe, Tieck, Brentano, and others; and, on modern retellings in literature and popular culture. Taught in English.
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 2504 (3) Gothic, Horror, and Fantasy**
Introduces students to gothic, horror, and fantasy with a multimedia approach. Investigates links between scary, creepy, and fantastical representations and their social and historical contexts. Explores German and Austrian films, images, fiction and poetry from a range of periods. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**GRMN 2601 (3) Kafka and the Kafkaesque**
Exposes the students to a wide selection of Kafka's literary output and aims to define the meaning of the Kafkaesque by looking not only for traces of Kafka's influence in the verbal and visual arts, but also for traces left in Kafka's own work by his precursors in the literary tradition. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 2601
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3010 (3) Advanced German 1**
Focuses on cultural topics and reviews grammatical topics, expands vocabulary and provides practice in reading, writing, listening and conversation skills. Students have the option of taking the internationally recognized exam Goethe-Zertifikat B1 after GRMN 3010. Department enforced prerequisite: four semesters of college German or equivalent. Open to freshmen with instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 3020 (3) Advanced German 2**
Expands and refines skills acquired in GRMN 3010. Improves overall fluency and deepens cultural understanding of the German-speaking countries. Develops an advanced skill level in the areas of listening, speaking, reading and writing. Students have the option of taking the internationally recognized exam Goethe-Zertifikat B1 or B2 after GRMN 3020. Department enforced prereq., GRMN 3010 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 3030 (3) Business German**
Introduces students to key issues in German society, politics, culture, institutions, economy, business and professional life. Topics and assignments are geared towards practicing and expanding all language skills with an emphasis on Business German. Students will have the option of taking the internationally recognized exam Goethe-Zertifikat B1 or B2 after GRMN 3030. Department enforced prereq., GRMN 2020 (minimum grade C-). Taught in German.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 3050 (3) German for Science and Engineering**
Introduces students to German technical language needed to engage in professional communication in STEM. Students will explore language used in mathematics, science, engineering, and technology through authentic resources in form of scientific texts, manuals, and interviews. They will acquire and practice vocabulary and structures to 1) make connections with STEM disciplines, and 2) speak and write effectively in professional settings. Department enforced prerequisite: completion of GRMN2020 with min. grade C-. Taught in German.

**GRMN 3120 (3) German Literature from the Enlightenment to Expressionism**
Examines selected literary texts of various periods. Emphasizes longer texts and critical skills. Department enforced prereq., GRMN 2020 (minimum grade C-). Taught in German.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 3130 (3) Issues in German Philosophy and Literature**
Examines selected interdisciplinary texts from the German literary and philosophical tradition. Topics address issues central to philosophical inquiry, and may include knowledge and its limits, mind and body, determinism and free will, reason and religious belief, and ethical problems. Department enforced prereq., GRMN 2020 or 2030 (minimum grade C-). Taught in German.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 3140 (3) Current Issues in German Culture**
Examines issues depicted in contemporary German film, tv series, news media, social media, literature, and more. Topics may include youth culture, feelings of belonging, racisms, gender, sexuality, work and labor, and more. Department enforced prerequisite: GRMN 2020, 2030 or comparable fluency. Topics vary by semester. Taught in German.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 3141 (3) Topics in Modern German Culture and Society**
Examines topics in modern German culture, including German literature, film, art, and politics. Topics vary each semester. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**GRMN 3150 (3) Issues in German Politics, Literature and Media**
Examines literary, film, and theoretical texts in German about the relationship between media, film, literature and politics. Topics may include migration, right-populism, revolution, student movements, protest art. Topics vary by semester. Taught in German. Department enforced prereq., GRMN 2020, GRMN 2030, or comparable fluency. Taught in German.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 3301 (3) Modern Art and Design at the Bauhaus**
Introduces the art, architecture, and design of the Bauhaus, the most influential European art school in the twentieth century. Examines the Bauhaus as a utopian project to design a new modern lifestyle. The course explores the relation of the Bauhaus to its cultural, political, gendered, and economic contexts.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 3301

**GRMN 3401 (3) The German Experience in North America**
Discusses German immigration to North America, particularly the history, culture, and literature of German-speaking immigrants and refugees from the seventeenth to the twenty-first century. Investigates factors that shape human activity through migration and the diaspora experience of Germans to the United States and Canada. Taught in English. Formerly GRMN 2401.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3501 (3) The German-Jewish Experience: From the Enlightenment to the Present**
Provides insight into the German-Jewish identity through essays, autobiographies, fiction and journalism from the Enlightenment to the post-Holocaust period. Examines the religious and social conflicts that typify the history of Jewish existence in German-speaking lands during the modern epoch. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3501
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: German Courses Taught in English

**GRMN 3502 (3) The Creation of the Modern Individual in German Culture**
Features the writings of Germany's major literary figures from 1749 to 1832. Special attention is paid to the formation of literary periods, genres, aesthetic, and socio-historical developments contributing to the birth of modernism in German intellectual history and literature. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3503 (3) German Film Through World War II**
History and theory of Weimar and Nazi film with sociocultural emphasis. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 3503
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3504 (3) Topics in German Film**
Analyzes key issues in German culture as they are represented in film and other media, e.g., technology, architecture, women and the Holocaust. Taught in English.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3505 (3) The Enlightenment: Tolerance and Emancipation**
Examines Enlightenment notions of reason, humanity and social progress. Topics include 18th century views on government, science, education, religion, slavery and gender roles. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3505
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3506 (3) Tracing the Criminal: Crime in 19th C Society and Culture**
Examines cultural and literary representations of crime from the Enlightenment to the early 20th century and contextualizes them within the history of judicial and medical approaches to criminality. Focusing on representations of the criminal as an object of knowledge, this survey of intellectual history introduces students to critical approaches in the humanities and the study of social phenomena in their historical context. Taught in English.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3507 (3) Engineering and the Practice of Literature**
Examines the relation between the practices of engineering and the production of fictional worlds in words and images. Focusing on the history of engineering and of literature, the course interlaces these seemingly disparate practices by showing commonalities and shared solutions to common problems. Readings highlight stages in the development of engineering in parallel with literary works from the end of the eighteenth century to the present. May include analysis of media like film and television. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**GRMN 3508 (3) Masters of Suspicion: Marx, Nietzsche, Freud**
Explores some of the most significant writings by Karl Marx, Friedrich Nietzsche, and Sigmund Freud, three authors who have radically shaped much of modern thinking. Students will practice the analysis of challenging theoretical texts from the German intellectual tradition and develop a critical, theoretically informed vocabulary. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**GRMN 3513 (3) German Film and Society 1945-1989**
Introduces issues in German society through film during the Cold War. Focus on East and West Germany, though some other German language films may be included. Emphasis is on reading films in their social, historical and political contexts. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 3513
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3514 (3) German Film & Society After 1989**
Introduces post-1989 German culture through film. Emphasizes films in their socio-historical contexts and explores developments in German culture during and after the unification. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3520 (3) Open Topics in the Cultural Context**
Examines topics in the cultures of German-speaking central Europe. Contact the departmental office for specific course offerings. Department enforced prereq., GRMN 3020 (minimum grade C-)
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 3601 (3) German Women Writers**
Explores writing by German/Austrian women from 1945 to the present, with special attention to the representation of the Holocaust, the continuation of avant-garde traditions, innovations in literary form, and feminism. Visual arts, film, and feminist theory will also be considered in their relation to literature. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3601
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: German Courses Taught in English

**GRMN 3681 (3) Refugees in German Culture**
Introduces the diversity of refugee migration in German culture through artistic and cultural "texts," including those created by or in collaboration with refugees (film, comic journalism, literature, blogs, hashtag campaigns, music, etc). These texts are discussed in relationship to theories of racism, precarity, and biopolitics together and contextualized by work from other disciplines. This interdisciplinary course is methodologically informed by the theory and practice of cultural studies. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3681, JWST 3681 and AHUM 3681
**Recommended:** for students with sophomore standing or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**GRMN 3702 (3) Dada and Surrealist Literature**
Surveys the major theoretical concepts and literary genres of the Dada and Surrealist movements. Topics include Dada performance and cabaret, the manifesto, montage, the ready made, the Surrealist novel, colonialism and the avant-garde, and literary and philosophical precursors to the avant-garde. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3702
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3802 (3) Politics and Culture in Berlin 1900-1939**
Examines early 20th century German culture, with emphasis on the Weimar Republic (1918-1933) in light of contemporaneous political discussions. The course presents modern art and literature (Expressionism, Dada, Brecht's epic theater) and architecture and design (Bauhaus, Werkbund) as well as political movements of women, sexual minorities, and Berlin's Jewish communities. Taught in English. Offered through CU Study Abroad Program.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3802
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 3900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: German

**GRMN 3930 (1-6) Internship**
Provides an academically supervised opportunity for upper-division students to earn credit while working for public or private organizations. Students apply skills and knowledge earned in the major, and supplement their work experience through directed readings and assignments.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) German Studies (GRMN) majors only.
**Additional Information:** Departmental Category: German

**GRMN 4010 (3) Advanced German III**
Emphasizes idiomatically correct spoken and written German in a variety of genres and culturally relevant contexts. Includes a comprehensive grammar review and readings, discussions, and writing on topics related to current cultural, social, and political issues in the German-speaking countries. Students have the option of taking the internationally recognized exam Goethe-Zertifikat B2 or C1 after GRMN 4010. Department enforced prereq., GRMN 3020 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 4051 (3) Critical Theory of the Frankfurt School**
Serves as an introduction to the "Frankfurt School" and Critical Theory with particular emphasis upon rationality, social psychology, cultural criticism, and aesthetics. Through close readings of key texts by members of the school (Horkheimer, Benjamin, Adorno, Habermas) we will work toward a critical understanding of the analytical tools they developed and consider their validity. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 5051
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: German Courses Taught in English

**GRMN 4231 (3) The Invention of Sexuality**
Traces the development of various concepts of sexuality, from ideas inherited from antiquity to the modern invention of homosexuality by German and Austrian sexologists and psychoanalysts, up to and including contemporary queer critiques. Students will also gain an understanding of how cultural beliefs and biases about queer sexualities are rooted in both the history of science and changing/persisting gendered norms. Explores the intersecting philosophical, literary, and ideological underpinnings of process(es) of marginalization of both women and queer sexualit(ies). Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 5231
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: German Courses Taught in English

**GRMN 4251 (3) Marxism**
Examines the economic, political, and philosophical thought of Karl Marx, placing it in the context of his predecessors in the classical German tradition and his successors (and critics) in the twentieth century. Themes may include the development of historical materialism; Marx¿s analysis of estranged labor; the critique of utopian socialism; the categories of Marxist economic analysis; the relation between politics, philosophy, and economics; theories of labor, surplus value, and exploitation; and the fate of communism.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4250
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: German Courses Taught in English

**GRMN 4301 (3) Gender, Race and Immigration in Germany and Europe**
Introduces students to debates surrounding migration and race in contemporary Germany with comparisons to other European contexts. Emphasis on reading texts in context using tools of cultural studies, integrating analyses of gender, race, nation, and sexuality. Texts may include film, literature, television, social media, news media, political posters, etc. Topics include: race and racisms, Black and women of color feminisms, Roma feminisms, Muslim feminisms, notions of integration and citizenship, and more. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4301 and AHUM 4301 and GRMN 5301
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: German Courses Taught in English

**GRMN 4330 (3) The Age of Goethe**
German literature from 1770 to 1830. Close examination of representative texts from the periods of Sturm und Drang, classicism, and romanticism. Emphasizes philosophical and social background. Department enforced prereq., GRMN 3020 (minimum grade C-). Taught in German.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 4340 (3) Seminar in German Literature**
Intensive study of a particular literary period, author, or genre. Secondary sources are used. Course content differs each time. Department enforced prereq., GRMN 3020 (minimum grade C-). Taught in German.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 4450 (3) Methods of Teaching German**
Required of students who desire the recommendation of the department for secondary school teaching positions. For student teaching in German, see EDUC 4712 under the School of Education.
**Requisites:** Restricted to School of Education (EDUC) undergraduates only
**Additional Information:** Departmental Category: German

**GRMN 4460 (6) High School German Teaching**
Part of the supervised student teaching in a secondary school required for state certification to teach German.
**Requisites:** Restricted to School of Education (EDUC) undergraduates only
**Additional Information:** Departmental Category: German

**GRMN 4501 (3) Seminar: Literature in Cultural Context**
Provides a broader basis for the work of literature, viewing it from various cultural perspectives. Specific content of course is defined by the instructor. Taught in English.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 4502 (3) Nietzsche: Literature and Values**
Emphasis is placed on Nietzsche's major writings spanning the years 1872-1888, with particular attention to the critique of Western values. A systematic exploration of doctrines, concepts and ideas leading to the values of creativity. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 4502
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 4503 (3) Issues in German Thought**
Provides the opportunity to examine major issues in German philosophical, social, and religious thought from the end of German idealism to existentialism and critical theory. Emphasizes the relationship between ideas and social and political action. Taught in English.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 4504 (3) Goethe's Faust**
Systematic study of the Faust motif in Western literature, with major emphasis on Faust I and II by Goethe and Thomas Mann's Doctor Faustus. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 5504 and HUMN 4504
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German Courses Taught in English

**GRMN 4550 (3) Senior Seminar in German Studies**
This course provides students with a capstone experience through in-depth study of a topic in German Studies, and deepens students' engagement with theories and methodologies informing contemporary German Studies scholarship. Students work closely with faculty to develop a major final research paper or project. Topic varies by semester.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) German (GRMN) or School of Education (EDUC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: German

**GRMN 4900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: German

**GRMN 5010 (3) Theory and Practice of German Studies**
Provides a graduate-level introduction to German Studies, with emphasis on theoretical approaches and current trends in German Studies. Special attention will be given to developing the tools necessary for advanced criticism: close-reading skills, mastery of critical terminology, and training in a range of theoretical approaches. The main goals of this course are (1) to introduce students to critical approaches to literature/art/film and recent theoretical trends in German literary and cultural studies, (2) to give students the opportunity to deepen interpretive skills through close reading and discussion of representative texts, and (3) to encourage students to explore theoretical approaches to literary and cultural material.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5020 (3) Applied Linguistics and Foreign Language Teaching Methodology**
Required of all graduate teaching assistants, this course provides a knowledge of the aspects of German linguistics that are important for teaching German and a survey of foreign language teaching methods and second language acquisition research.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5030 (3) Foundations of Critical Theory**
An introductory study of nineteenth-century German philosophy (especially Kant, Hegel, and Marx). Required course for the graduate certificate in Critical Theory.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5051 (3) Critical Theory of the Frankfurt School**
Serves as an introduction to the "Frankfurt School" and Critical Theory with particular emphasis upon rationality, social psychology, cultural criticism, and aesthetics. Through close readings of key texts by members of the school (Horkheimer, Benjamin, Adorno, Habermas) we will work toward a critical understanding of the analytical tools they developed and consider their validity. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 4051
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Courses Taught in English
Departmental Category: German Graduate Courses

**GRMN 5210 (3) Seminar: The Age of Enlightenment**
Examines the influence of the emerging middle class on the transformation of aesthetic and societal values. Major works of theory, philosophy, literature, and criticism by Lessing, Herder, Kant, J. E. Schlegel, and others. Examines major literary and cultural influences from France and Great Britain.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5220 (3) Seminar: Topics in the Age of Goethe**
Examines various aspects of German-speaking society from the 1770s to 1830s. Topics may include Sturm und Drang as social commentary; romantic theory in the wake of the French Revolution; romantic nationalism; the Faust theme; Weimar as a cultural center; and others.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5231 (3) The Invention of Sexuality**
Traces the development of various concepts of sexuality, from ideas inherited from antiquity to the modern ¿invention¿ of ¿homosexuality¿ by German and Austrian sexologists and psychoanalysts, up to and including contemporary queer critiques. Students will also gain an understanding of how cultural beliefs and biases about queer sexualities are rooted in both the history of science and changing/persisting gendered norms. Explores the intersecting philosophical, literary, and ideological underpinnings of process(es) of marginalization of both women and queer sexualit(ies). Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 4231
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5301 (3) Gender, Race, and Immigration in Germany and Europe**
Introduces students to debates surrounding migration and race in contemporary Germany with comparisons to other European contexts. Emphasis on reading texts in context using tools of cultural studies, integrating analyses of gender, race, nation, and sexuality. Texts may include film, literature, television, social media, news media, political posters, etc. Topics include: race and racisms, Black and women of color feminisms, Roma feminisms, Muslim feminisms, notions of integration and citizenship, and more. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 4301 and WGST 4301
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5310 (3) Seminar: Topics in the 19th Century**
Examines the transformation of realism from Buechner to Gerhart Hauptmann. Topics may include literary responses to the Restoration; intellectuals and the Revolution of 1848; philosophy and literature; theatrical representations of woman, family, and gender; and others.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5320 (3) Seminar: The German Novel from 1901--1956**
Beginning with T. Mann's Buddenbrooks, charts the rise of the German novel in the early 20th century and examines such topics as Wilhelminian society; intellectuals and World War I; dehumanization and alienation; national socialism and literary exile; and others. Authors include T. Mann, H. Hesse, R. Rilke, F. Kafka, A. Seghers, and A. Zweig.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5330 (3) Seminar: German Intellectuals and Society Between the Wars**
Examines the period of social crisis and the intellectual responses to the collapse of the prewar order. Gives attention to the antidemocratic thought of Spengler, Juenger, Stefan George and his circle, to the emergence of existentialism with Scheler and Heidegger, and to the search for a new political humanism as evidenced by the work of Thomas Mann.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5410 (3) Seminar: Topics in Early 20th Century German Society**
Focuses on major issues, events, movements, and figures prior to World War II. Topics may include the ontology of lyric poetry; Berlin in the 1920s; exiles, their communities, and their writings; women writers from Andreas-Salome to Anna Seghers; topics in German film; and others.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5420 (3) Seminar: Topics in Contemporary German-speaking Societies**
Analyzes artistic and literary engagement with major discussions and debates in contemporary German-speaking societies. Course also provides an introduction to theoretical approaches relevant to the topic. See specific topic description for more details.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5504 (3) Goethe's Faust**
Systematic study of the Faust motif in Western literature, with major emphasis on Faust I and II by Goethe and Thomas Mann's Doctor Faustus. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 4504 and HUMN 4504
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5510 (3) Seminar: Open Topics in German Civilization**
Focuses on cultural issues that cross lines of literary periodization. Topics may include the theater as social criticism from Lessing to Handke; forms of German protest from Luther to Thomas Mann; nihilism from Bonaventura to Thomas Bernhard; topics in German film; and others.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5520 (3) Seminar: Current Issues in German Literature and Media**
Examines issues pervading contemporary German literature and media, such as concerns of youth, xenophobia, stereotyping as it affects women and men in their relations, work experience, feminism, problems connected with the reunification, and other issues.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 5900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 6900 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 7010 (1-3) Writing Colloquium**
Prepares students for the qualifying examination paper and dissertation, and equips students with the skills needed to transform seminar papers into publishable work. Includes sessions on dissertation writing, publishing journal articles, preparing a reading list, and conducting archival research. Required for students in the German Studies PhD program. Cannot be satisfied through transfer credit.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to German Studies PhD students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: German

**GRMN 7900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 7930 (1-6) Internship**
Provides an academically supervised opportunity for doctoral students to earn credit while working for public or private organizations. Students supplement their work experience through directed readings and assignments. Students interested in applying for an internship must complete the Arts & Sciences Internship Application at http://advising.colorado.edu/sites/default/files/Internshipcredit.pdf. 1-6 hours;
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to German Studies graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

**GRMN 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements of the degree. For detailed information regarding doctoral dissertation credit, refer to Graduate School rules.
**Repeatable:** Repeatable for up to 100.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: German Graduate Courses

# Germanic and Slavic Languages and Literatures (GSLL)

## Courses

**GSLL 2350 (3) Introduction to Jewish Culture**
Explores the development and expressions of Jewish cultures across the chronological and geographical map of the Jewish people, with an emphasis on the variety of Jewish ethnicities and their cultural productions, cultural syncretism, and changes, including such issues as sexuality and foodways. Sets the discussion in relevant contexts and looks at cultural representations that include literary, religious and visual texts.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 2350
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Germanic and Slavic Courses

**GSLL 2551 (3) Modern Jewish Literature**
Examines Jewish experience through the study of literary texts from around the world, mainly from the 20th and 21st centuries. Discusses issues pertaining to secularism and tradition; diasporas and homelands; modernity and questions of identity raised by the intellectual transitions brought about by political and social emancipation; sexualities; enormous changes wrought by population redistributions, world wars and rapid cultural transformations.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 2551
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Germanic and Slavic Courses

**GSLL 3401 (3) The Heart of Europe: Filmmakers and Writers in 20th Century Central Europe**
Surveys the major works of 20th century central and central east European film and literature. Examines cultural production in the non-imperial countries and non-national languages of the region including Yiddish, Belarusian, Czech, Hungarian, Polish and Romanian, among others. Traces the rise of nationalism over the course of the century from the age of empires through the "Cold War." Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3401
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Germanic and Slavic Courses

**GSLL 3600 (3) Contemporary Jewish Societies**
Uses transnational lens to explore contemporary debates about Jewish people, places and practices of identity and community; places that Jews have called 'home', and what has made, or continues to make those places 'Jewish'; issues of Jewish homelands and diasporars; gender, sexuality, food and the Jewish body; religious practices in contemporary contexts. Readings drawn primarily from contemporary journalism and scholarship.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3600 and IAFS 3600
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Germanic and Slavic Courses

**GSLL 5900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Germanic and Slavic Courses

# Global Studies Residential Academic Program (GSAP)

## Courses

**GSAP 1000 (3) World Politics and Society**
Explores the history leading up to-and away from-the attacks of 9/11 within an American framework. Topics to be covered include: America's relationship with key countries since 1945; the rise of Muslim extremism; modern terrorism and its meaning; the importance of oil; and the events of 9/11 and the Bush Administration's response to it, at home and abroad.
**Requisites:** Restricted to Global Studies Residential Academic Program (PGST) students only.

**GSAP 1500 (1) Community Engagement**
Facilitates community-level service and volunteer opportunities in the University, Boulder-Denver area, and Colorado communities for first-year students. Participants will learn how to conduct basic community research and will design their own volunteer, service, or internship plan in conjunction with the instructor and the class, targeting a university center, community nonprofit, local business, government agency, or international institution.

**GSAP 2010 (3) Introduction to National Security**
Introduces national and international security studies to students. The course examines the influence of history, domestic politics, and international events and actors on the development of security policy.
**Requisites:** Restricted to Global Studies Residential Academic Program (PGST) students only.

# Graduate School (GRAD)

## Courses

**GRAD 5000 (1) Responsible Conduct of Research**
Training in handling issues such as conflicts of interest, mentor/mentee relationships, peer review, research misconduct and authorship and publication. Reviewing policies regarding human and animal subjects, safe laboratory practices. Instruction on conducting quality research including collaborative research, the scientist as a responsible member of society, ethical issues, rigor and reproducibility which will include effective design, execution, analysis, interpretation and communication.

**GRAD 5100 (2) Graduate Training Course in Inclusive Excellence**
Prepares graduate students in key areas of inclusive excellence relevant to teaching, research and professional conduct. Builds skills necessary to thrive in a multicultural environment and diverse workforce and strengthen the culture of inclusivity and diversity within academic units and the university. Provides unique opportunities for graduate student interaction and learning across the physical sciences, social sciences and humanities.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

# Graduate Teacher Education (GRTE)

## Courses

**GRTE 5010 (0.5-5) Graduate Humanities for Teachers**
Addresses special topics in arts and humanities with an emphasis on building conceptual understanding of content and enhancing teacher's practice in teaching this content.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Teacher Education

**GRTE 5020 (0.5-5) Graduate Mathematics for Teachers**
Addresses special topics in mathematics with an emphasis on building conceptual understanding of content and enhancing teacher's practice in teaching this content.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Teacher Education

**GRTE 5030 (0.5-5) Graduate Natural Sciences for Teachers**
Addresses special topics in natural sciences with an emphasis on building conceptual understanding of content and enhancing teacher's practice in teaching this content.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Teacher Education

**GRTE 5040 (0.5-5) Graduate Social Sciences for Teachers**
Addresses special topics in social sciences with an emphasis on building conceptual understanding of content and enhancing teacher's practice in teaching this content.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Graduate Teacher Education

# Greek Language (GREK)

## Courses

**GREK 1013 (4) Beginning Classical Greek 1**
For students with no previous knowledge of Greek. Introduces basic grammar and vocabulary.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Greek

**GREK 1023 (4) Beginning Classical Greek 2**
Completes the presentation of grammar and introduces reading of literature.
**Recommended:** Prerequisite GREK 1013.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Greek

**GREK 3013 (1) Readings in the Greek New Testament and Septuagint**
Readings in ancient (koine) Greek from the New Testament and the Septuagint. Students aim to achieve fluency in reading and to enrich their knowledge of key terms and ideas borrowed from the Greek past in the early Christian tradition. Formerly CLAS 3013.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Recommended:** Prerequisites GREK 1013 and GREK 1023.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Greek

**GREK 3113 (3) Intermediate Classical Greek 1**
Reading of selected prose texts of authors in ancient Greek such as Plato, Xenophon, Lysias, and selections from the Greek New Testament. Incorporates review of grammar.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisites GREK 1013 and GREK 1023.
**Additional Information:** Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Greek

**GREK 3123 (3) Intermediate Classical Greek 2**
Reading of selections from Homer or a Greek tragedy in ancient Greek, with attention to literary form and context as well as advanced grammar and syntax.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisites GREK 1013 and GREK 1023 and GREK 3113.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Greek

**GREK 4013 (3) Topics in Greek Prose**
Author or topic in ancient Greek specified in the online Schedule Planner (e.g., Thucydides, Herodotus, Plato, Aristotle, Attic Orators).
**Equivalent - Duplicate Degree Credit Not Granted:** GREK 5013
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Greek

**GREK 4023 (3) Topics in Greek Poetry**
Author or topic in ancient Greek specified in the online Schedule Planner (e.g., Homer, Hesiod, lyric poetry, tragedy, comedy).
**Equivalent - Duplicate Degree Credit Not Granted:** GREK 5023
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Greek

**GREK 4093 (3) Survey of Greek Literature**
Greek literary history in ancient Greek from Homer to the Hellenistic age.
**Equivalent - Duplicate Degree Credit Not Granted:** GREK 5093
**Recommended:** Prerequisites GREK 3113 and GREK 3123.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Greek

**GREK 4843 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Greek

**GREK 5013 (3) Topics in Greek Prose**
Author or topic in ancient Greek specified in the online Schedule Planner (e.g., Thucydides, Herodotus, Plato, Aristotle, Attic Orators).
**Equivalent - Duplicate Degree Credit Not Granted:** GREK 4013
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Greek

**GREK 5023 (3) Topics in Greek Poetry**
Author or topic in ancient Greek specified in the online Schedule Planner (e.g., Homer, Hesiod, lyric poetry, tragedy, comedy).
**Equivalent - Duplicate Degree Credit Not Granted:** GREK 4023
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Greek

**GREK 5093 (3) Survey of Greek Literature**
Greek literary history in ancient Greek from Homer to the Hellenistic age.
**Equivalent - Duplicate Degree Credit Not Granted:** GREK 4093
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Greek

**GREK 6003 (3) Graduate Reading**
Author or topic specified in the online Schedule Planner.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Greek

**GREK 6843 (1-3) Graduate Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Greek

**GREK 7013 (3) Graduate Seminar in Greek Literature**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Greek

# Hebrew (HEBR)

## Courses

**HEBR 1010 (4) Beginning Modern Hebrew, First Semester**
First semester Hebrew is an introductory course designed for students with little or no prior knowledge of Hebrew. Begins with the Hebrew alphabet and develops rudimentary, conversational reading and writing skills. By the end of the semester students are expected to have attained basic understanding and expressive abilities in Hebrew.
**Equivalent - Duplicate Degree Credit Not Granted:** HEBR 1050
**Additional Information:** Departmental Category: Hebrew

**HEBR 1020 (4) Beginning Modern Hebrew, Second Semester**
Builds on skills introduced in HEBR 1010, focusing on speaking, comprehension, reading and writing. Students learn new verbal tenses and paradigms. Blends communicative method with formal grammatical instruction. By semester's end students will be able to speak, comprehend and write basic Hebrew. Department enforced prerequisite HEBR 1010 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** HEBR 1050
**Additional Information:** Departmental Category: Hebrew

**HEBR 1030 (3) Beginning Biblical Hebrew, First Semester**
Designed to enable students to read the Hebrew Bible in the original language. Focus is on the ability to read the various genres of the text, utilizing both the tools of modern language acquisition and the study of classical grammar methods.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Hebrew

**HEBR 1050 (6) Intensive Beginning Modern Hebrew**
Covers the same material as HEBR 1010 and 1020 combined in one course. Focuses on acquiring basic ability to understand and speak modern Hebrew. Develops basic reading and writing skills and provides exposure to the fundamentals of Israeli culture.
**Equivalent - Duplicate Degree Credit Not Granted:** HEBR 1010 or HEBR 1020
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Hebrew

**HEBR 2030 (3) Intermediate Biblical Hebrew, First Semester**
Builds on linguistic skills acquired in first year biblical Hebrew. Develops students' reading comprehension and language production with textual assignments and writing exercises. Advances the study of complex grammatical forms.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Hebrew

**HEBR 2040 (3) Intermediate Biblical Hebrew, Second Semester**
Develops and extends grammatical knowledge acquired in the first three semesters of biblical Hebrew. Reading of more comprehensive biblical texts which include readings from the Pentateuch, prophets and writings.
**Requisites:** Requires prerequisite course of HEBR 2030 or JWST 2030 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Hebrew

**HEBR 2110 (4) Intermediate Modern Hebrew, First Semester**
Third semester Hebrew builds on skills introduced in the first two semesters and focuses on speaking, comprehension, reading and writing. Students learn new verbal tenses and paradigms, modes of expression and syntactical forms. The course blends a communicative method with formal grammatical instruction. By the end of the semester students are expected to be able to converse in, comprehend, and produce written Hebrew at an intermediate level. Department enforced prerequisite: HEBR 1020 (minimum grade C-).
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Foreign Language
Departmental Category: Hebrew

**HEBR 2120 (4) Intermediate Modern Hebrew, Second Semester**
Focuses on texts, while still developing speaking, comprehension and writing skills. Students build on grammatical understanding while learning some of the more sophisticated verbal paradigms and nominal patterns. Blends a communicative method with some formal grammatical instruction. By the end of this semester students are expected to converse in, comprehend and produce written Hebrew at an intermediate level. Department enforced prerequisite: HEBR 2110 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hebrew

**HEBR 3010 (3) Third Year Modern Hebrew, First Semester**
Focuses on students' active Hebrew language skills acquired in the first four semesters of Hebrew at CU-Boulder in weekly conversation and composition sessions. Develops grammatical understanding with a further exploration of the root, verbal and noun systems. Students are introduced to texts in contemporary Hebrew fiction and poetry, as well as some biblical readings. Department enforced prerequisite: HEBR 2120 (minimum grade C-) or instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hebrew

**HEBR 3020 (3) Third Year Modern Hebrew, Second Semester**
Focuses on students' Hebrew language skills acquired in the first five semesters of Hebrew at CU-Boulder in weekly conversation and composition sessions. Develops grammatical understanding with a further exploration of the root, verbal and noun systems. Students are introduced to texts in contemporary Hebrew fiction and poetry, as well as some biblical readings, academic texts and Israeli newspapers. Department enforced prereq., HEBR 3010 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hebrew

**HEBR 3030 (3) Advanced Biblical Hebrew, Third Year, First Semester**
Develops students' understanding of the more complex linguistic challenges of Biblical Hebrew by reading both narrative and poetic biblical texts. We also revise in greater depth forms we have studied in the previous semesters and begin to look at the ways scholars have dealt with Hapax Legamona and other linguistic features that cannot be easily understood.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hebrew

**HEBR 3202 (3) Women, Gender & Sexuality in Jewish Texts & Traditions**
Reads some of the ways Jewish texts and traditions look at women, gender and sexuality from biblical times to the present. Starts with an analysis of the positioning of the body, matter and gender in creation stories, moves on to the gendered aspects of tales of rescue and sacrifice, biblical tales of sexual subversion and power, taboo-breaking and ethnos building, to rabbinic attitudes towards women, sexuality and gender and contemporary renderings and rereadings of the earlier texts and traditions. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3202 and RLST 3202 and WGST 3201
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Hebrew

**HEBR 3840 (3) Independent Study**
Department enforced prerequsites: HEBR 1010 and HEBR 1020 and HEBR 2110 and HEBR 2120 (all minimum grade C-).
**Additional Information:** Departmental Category: Hebrew

**HEBR 3850 (3) Independent Study**
Department enforced prerequsites: HEBR 1010 and HEBR 1020 and HEBR 2110 and HEBR 2120 and HEBR 3840 (all minimum grade C-).
**Additional Information:** Departmental Category: Hebrew

**HEBR 4101 (3) Topics in Hebrew Studies**
Explores topics in Hebrew and Jewish literature and cultures. These may include topics such as diasporic literatures, Jewish artists and thinkers, courses on specific authors, figures or communities. Topics change each semester. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4101
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hebrew

**HEBR 4203 (3) Israeli Literature: Exile, Nation, Home**
Examines the creation and development of Israeli literature from its pre-State beginnings to the present day, from the writings of immigrants for whom Hebrew was not their mother tongue to a literature written by native Hebrew speakers. Considers texts written by Israeli Jewish and Arab writers and explores how ideas of exile, nation, and home play into the Israeli experience.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4203
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisites ENGL 4677 or JWST 4677 or GRMN 2502 or JWST 2502 or JWST 2551 or WRTG 3020.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hebrew

**HEBR 4301 (3) Venice: The Cradle of European Jewish Culture**
Explores the development of European Jewish culture from the late Middle Ages to the present by focusing on Jewish life in the city of Venice, Italy. Emphasis is on the development of Venetian print culture and emergence of Italy as a center of Jewish publishing in both the religious and secular world. Examines a variety of cultural and historical material including early printings of the Talmud, the creation of Yiddish popular literature, Hebrew rabbinic literature, responses to political turmoil, and the aftermath of the Nazi genocide. Taught in English. Department enforced prerequisite: HEBR 2350 or JWST 2350 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4301
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hebrew

# Hindi/Urdu (HIND)

## Courses

**HIND 1010 (4) Beginning Hindi 1**
Provides a thorough introduction to the modern Hindi language, emphasizing speaking, listening, reading, and writing skills. This course is proficiency-based. Activities aim to place the student in the context of the native-speaking environment from the very beginning. Students will be provided with opportunities to participate in local South Asian cultural events.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi
Departmental Category: Asia Content

**HIND 1011 (3) Introduction to South Asian Civilizations**
Survey of traditional and modern world views and experiences of people on the Indian subcontinent through literature and film, beginning with the Ramayana and including medieval tales, modern novels, and feature films. Taught in English.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Hindi Courses in English
Departmental Category: Asia Content

**HIND 1020 (4) Beginning Hindi 2**
Continuation of HIND 1010. Provides a thorough introduction to the modern Hindi language, emphasizing speaking, listening, reading and writing skills. Proficiency-based course aims to place the student in the context of the native-speaking environment from the beginning of the course. Provides opportunities to participate in local South Asian cultural activities and events.
**Requisites:** Requires prerequisite course of HIND 1010 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi
Departmental Category: Asia Content

**HIND 2110 (4) Intermediate Hindi 1**
Emphasizes speaking, listening, reading and writing skills and culturally appropriate language use.
**Requisites:** Requires prerequisite course of HIND 1020 (minimum grade C).
**Additional Information:** Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Hindi
Departmental Category: Asia Content

**HIND 2120 (4) Intermediate Hindi 2**
Continuation of HIND 2110. Enhances students' speaking, listening, reading and writing skills and culturally appropriate language use.
**Requisites:** Requires prerequisite course of HIND 2110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi
Departmental Category: Asia Content

**HIND 3110 (4) Advanced Hindi 1**
Emphasizes speaking, listening and conversational fluency in Hindi, with a focus on cultural appropriate expression and practical knowledge.
**Requisites:** Requires prerequisite course of HIND 2120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi
Departmental Category: Asia Content

**HIND 3120 (4) Advanced Hindi 2**
Continuation of HIND 3110. Emphasizes reading, listening, and speaking fluency in Hindi/Urdu, with a focus on literary, cinematic and cultural themes in modern and contemporary Hindi/Urdu media and culture. Thematic focus of the course may change each semester. An effort will be made to encourage students to put their language skills into literary and cultural context.
**Requisites:** Requires prerequisite course of HIND 3110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi
Departmental Category: Asia Content

**HIND 3400 (3) Special Topics**
Topics in Hindi. No prerequisites.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi
Departmental Category: Asia Content

**HIND 3441 (3) Screening India: A History of Bollywood Cinema**
Provides a critical overview of one of the world's largest and most beloved film industries, the popular Hindi cinema produced in Bombay (Mumbai) and consumed around the world under the label "Bollywood". Focus on the post-Independence era to the present, with introduction to key films, directors, stars, genres, formal techniques, and themes, as well as critical analyses of these and other topics. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi Courses in English
Departmental Category: Asia Content

**HIND 3651 (3) Living Indian Epics: The Ramayana and the Mahabharata in the Modern Political Imagination**
Explores the Ramayana and Mahabharata, two fundamental mythological pillars of Indian society, through literature, comic books, film, television, and political rhetoric as a means of examining major issues of religion, gender, popular culture, and social politics in contemporary India. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi Courses in English
Departmental Category: Asia Content

**HIND 3661 (3) South Asian Diasporas: Imagining Home Abroad**
Examines fundamental questions of home, nation, identity, ethnicity, and foreignness in the context of the enormous South Asian diaspora. By means of literature, ethnography, and film, the various connotations of diaspora will be explored along with the cultural productions of members of the South Asian diaspora (both Indian and Pakistani). Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi Courses in English
Departmental Category: Asia Content

**HIND 3811 (3) The Power of the Word: Subversive and Censored 20th Century Indo-Pakistani Literature**
Provides an overview of a selection of writings by important 20th century Indo-Pakistani authors, which will permit students to get acquainted with Indian literature. Provides insight into the experience of social and political events in the 20th century and the reaction of the government to the critical analysis and portrayal of these events. Taught in English.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Hindi Courses in English
Departmental Category: Asia Content

**HIND 3831 (3) The Many Faces of Krishna in South Asia Literature and Culture**
Using both textual and visual sources, the multiple facets of Krishna in Indian religious experience will be explored through poetry and prose, painting and sculpture, music, dance, and drama. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi Courses in English
Departmental Category: Asia Content

**HIND 3851 (3) Devotional Literature in South Asia**
Focuses on the medieval and modern periods (1200-present), and the languages of North India and Pakistan (Hindi, Urdu, Panjabi). Students engage with English translations of works by Tulsidas, Surdas, Kabir, Mirabai, Nanak, Khusrau, Ghalib, Anis and Iqbal. Recurring themes include issues of authorship and interpretation; religious and aesthetic encounter; and the legacy of these traditions in modern South Asian society and literature. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hindi Courses in English
Departmental Category: Asia Content

**HIND 4900 (1-3) Independent Study**
Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Hindi

# History (HIST)

## Courses

**HIST 1011 (3) Greeks, Romans, Kings & Crusaders: European History to 1600**
Examines the history and formation of Europe from its roots in the ancient Near East to Greece to the creation of Medieval states and kingdoms. Topics may include the rise of Christianity, Barbarian migrations, religious persecution, the role of gender and minority status, the growth of trade and European encounters, the Black Death, the European Renaissance the Protestant Reformation.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Ancient and Medieval
MAPS Course: Social Science
MAPS Course: Social Sci World Context

**HIST 1012 (3) Empire, Revolution and Global War: European History Since 1600**
Examines the history of modern Europe from 1600. Topics may include religious conflict, absolutism, the Scientific Revolution, the global impact of European colonialism and imperialism, the Enlightenment, the French and Industrial Revolutions, and the emergence of romanticism, nationalism, liberalism, socialism and modernism. Concludes by analyzing World War I and II, communist and fascist totalitarianisms, decolonization and the Cold War. Formerly HIST 1020
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Modern
MAPS Course: Social Science
MAPS Course: Social Sci World Context

**HIST 1015 (3) American History to 1865**
Examines American history from pre-Columbian times to the Civil War, including ancient cultures, exploration, colonization, Native American responses, the rise of race slavery, the American Revolution, political developments, Anglo-American expansion, slave life and culture, the market revolution, industrialization, reform and disunion. Introduces students to history as a dynamic discipline that shapes our understanding of the past and present. S. history.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods
MAPS Course: Social Science
MAPS Course: Social Science US Context

**HIST 1018 (3) Introduction to Early Latin American History to 1810**
Introduces students to the history of what is now called Latin America from about 1450 to the wars of independence in the nineteenth century. Examines pertinent aspects of the societies and cultures of indigenous people, the history of European conquest, and the most salient features of the Spanish and Portuguese colonial empires in America.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions

**HIST 1025 (3) American History since 1865**
Explores political, social and cultural changes in American life since Reconstruction. Focuses on shifting social and political relations as the U.S. changed from a nation of farmers and small-town dwellers to an urban, industrial society; the changing meaning of American identity in a society divided by ethnicity, race and class; and the emergence of the U.S. as a world power.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods
MAPS Course: Social Science
MAPS Course: Social Science US Context

**HIST 1028 (3) Latin American History since Independence**
Introduces students to Latin America¿s rich and complex history from independence in the early 1800s to the present. Explores major events shaping the region, from anti-colonial rebellions to the Cold War, and from revolutions to ¿drug wars.¿ Addresses longer-term themes such as national and racial identities, Black and indigenous resistance, migration, and economic and cultural shifts. While centering Latin American perspectives, the class analyzes the role played by the United States in the region¿s affairs.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Specific Regions

**HIST 1051 (3) The World of the Ancient Greeks**
Surveys the emergence, major accomplishments, failures and decline of the world of the ancient Greeks, from Bronze Age civilizations of the Minoans and Mycenaeans through the Hellenistic Age (2000-30 B.C.)
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 1051
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Ancient and Medieval

**HIST 1061 (3) The Rise and Fall of Ancient Rome**
Surveys the rise of ancient Rome in the eighth century B.C. to its fall in the fifth century A.D. Emphasizes political institutions, foreign policy, leading personalities, and unique cultural accomplishments.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 1061
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Ancient and Medieval

**HIST 1113 (3) Introduction to British History to 1660**
Deals with Roman, medieval and early modern periods. Covers the demographic, economic, social patterns, political and religious developments, and cultural changes that contributed to the formation of the English nation.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 1123 (3) Introduction to British History Since 1660**
Deals with the period from the 17th century to the present. Political, economic, social and imperial developments that contributed to creation of the modern industrial and democratic state are the major issues covered.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 1218 (3) Introduction to Sub-Saharan African History to 1850**
Provides an introduction to African history, beginning with early man and ending in 1850. Moves rapidly through civilizations as different as Ancient Egypt, Mali, Oyo and the Cape Colony, touching on important developments and highlighting themes relevant to the history of Africa as a whole. Including migration, technology, environment, trade, gender, religion, slavery and more.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Specific Regions

**HIST 1228 (3) Introduction to Sub-Saharan African History Since 1850**
Introduces students to the history of Sub-Saharan Africa from 1850 to the present. Major topics of study included the trans-Atlantic slave trade, African state-building, European colonialism, African responses to colonialism and issues facing independent African nations, ranging from debt to HIV/AIDS.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Specific Regions

**HIST 1308 (3) Introduction to Middle Eastern History**
Interdisciplinary course that focuses on medieval and modern history of the Middle East (A.D. 600 to the present). Introduces the Islamic civilization of the Middle East and the historical evolution of the region from the traditional into the modern eras. Covers social patterns, economic life, and intellectual trends, as well as political development.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 1438 (3) Episodes in Korean History**
Examines the history of Korea from the archaeological period to the 21st century. Topics may include: the origin of the early states, Kory¿ dynasty and Mongol rule, Confucian influence on Chos¿n society, Japanese colonial rule, WWII and the ¿Comfort Women,¿ the Korean War and the division, North Korea, rapid industrialization in South Korea under dictatorships, the democratization movement, evolving roles for women, and Korea as an emerging multi-ethnic society.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 1518 (3) The History of India from Aryans to Maratha Warriors, 2500 BCE-1757 CE**
Beginning with the origin of Indian civilization amongst a people who called themselves Aryans, the course introduces students to major milestones in Indian history and culture: The Indus valley civilization (2500-1900 BCE), the Buddha (563-483 BCE), Alexander¿s invasion (326 BCE), the first Pan-Indian polity, the Mauryan Empire (321-185 BCE), the epic, Mahabharata, the Mughal empire (1526-1707), and finally the rise of Hindu nationalism under the Marathas (1650-1757).
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 1528 (3) Introduction to South Asian History since 1757**
Introduces the history of modern South Asia from 1757 to the present. Examines themes such as the nature of British colonial state formation in South Asia, social transformation under British rule, modes of anticolonial resistance movements, particularly Mahatma Gandhi's nonviolent civil disobedience movement, Muslim nationalism and the formation of Pakistan, and current political conflicts involving India, Pakistan and Afghanistan.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 1618 (3) Great Wall Exchange: China and the Nomadic Conquerors, 500 BC ¿ 1500 AD**
This course surveys the intertwined history of China and the Inner Asian nomads. Major themes include but are not limited to 1) the origins of Chinese and Inner Asian civilizations, 2) the Great Wall and nomadic conquests of China, 3) the Silk Road and trans-Eurasian trades, 4) Chinggis Khan and the Mongol empire, 5) Buddhism, Islam, and Confucianism, 6) the tribute system and Asia, and 7) China and the Indian Ocean.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 1623 (3) Introduction to Central and East European History since 1770**
Examines major themes and events in the history of East-Central Europe from the late 1700s to the present. Themes include the impacts of nationalism, fascism, liberal democracy and communism in shaping the history of the region. Topics include World War I, World War II and the Holocaust, the Cold War, the fall of Communism, the Ukrainian revolution and more.
**Equivalent - Duplicate Degree Credit Not Granted:** CEES 1623
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 1628 (3) Introduction to Chinese History since 1644**
Introduces students to modern Chinese history and culture, from the 17th century to the present. Considers the pertinent aspects of modern China, focusing on its social patterns, economic structure, intellectual trends and political developments.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 1708 (3) Japan from Clay Pots to Robots**
Surveys the history of Japan from earliest times through the 21st century. Topics may include: the origins of civilization in the Japanese archipelago, the development of religions such as Shinto and Buddhism, the writing of the world¿s first novel, the rise of the samurai, the persecution of Christians, empire-building in Asia, World War II, occupation by the United States and its allies, J-pop, and contemporary headline news.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 1800 (3) Introduction to Global History**
The first cornerstone course for history majors applies a broad perspective to the global past in order to illuminate how common historical patterns and processes, as well as unique elements, shaped the human experience. Using a thematic approach, all topical variations of this course highlight cross-cultural interactions among societies, and, when relevant, how historical processes that began centuries ago still impact the contemporary world. Topics will vary by section. Department enforced prerequisite: 3 hours of any history coursework.
**Requisites:** Restricted to students with 27-180 credits (Sophomore, Junior, or Senior) History (HIST) majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Methodological, Comparative, and Global
Departmental Category: Asia Content

**HIST 1818 (3) Jewish History to 1492**
Focus on Jewish history from the Biblical period to the Spanish Expulsion in 1492. Study the origins of a group of people who call themselves, and whom others call, Jews. Focus on place, movement, power/powerlessness, gender, and the question of how to define Jews over time and place. Introduces Jews as a group of people bound together by a particular set of laws; looks at their dispersion and diversity; explores Jews' interactions with surrounding cultures and societies; introduces the basic library of Jews; sees how Jews relate to political power.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 1818 and RLST 1818
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 1828 (3) Jewish History Since 1492**
Surveys the major historical developments encountered by Jewish communities beginning with the Spanish Expulsion in 1492 up until the present day. Studies the various ways in which Jews across the modern world engaged with the emerging notions of nationality, equality and citizenship, as well as with new ideologies such as liberalism, socialism, nationalism, imperialism and antisemitism.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 1828 and RLST 1828
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Specific Regions

**HIST 1830 (3) Global History of Holocaust and Genocide**
Examines the interplay of politics, culture, psychology and sociology to try to understand why the great philosopher Isaiah Berlin called the 20th century, "The most terrible century in Western history." Our focus will be on the Holocaust as the event that defined the concept of genocide, but we will locate this event that has come to define the 20th century within ideas such as racism, imperialism, violence, and most important, the dehumanization of individuals in the modern world.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 1830 and RLST 1830
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Methodological, Comparative, and Global

**HIST 2015 (3) US Revolutionary Origins**
Examines major themes in the development of colonial societies in North America from the 15th to the early 19th centuries. Explores intercultural relations, economic development, labor systems, religion and society, and family life. Specific course focus may vary.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods

**HIST 2100 (3) Revolution in History**
Examines the causes, character, and significance of political revolution in world history. Concentrating on one of the major revolutions of modern history, it examines why revolutions occur, who participates in revolution, and to what effect. Specific course focus varies.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Methodological, Comparative, and Global

**HIST 2110 (3) Topics in Early Modern History**
Between the Black Death (c. 1350) and the French Revolution (1789), Europeans experienced transformative changes¿print, science, industrialism, overseas empires, religious and civil wars, and political revolutions¿that altered their relationship with the rest of the world. Examines topics in early modern history (e.g., intellectual developments, religion, culture, social history, economic/political changes, and warfare) in a specific region or nation (i.e. Europe, Latin America, the Atlantic World, Spain, Russia, China, Japan, etc.). Topics vary.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Methodological, Comparative, and Global
Departmental Category: Asia Content

**HIST 2126 (3) Issues in Modern U.S. Politics and Foreign Relations**
Traces the historical development of modern U.S. politics and foreign relations. Analyzes subjects such as the Cold War, the Vietnam War, the War on Terror, and the relationship between foreign and domestic politics, and the developing meaning of political conservatism, liberalism, and radicalism in the U.S. Explains the impact of race, gender, class, and immigration. Topics vary in any given semester.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 2166 (3) The Vietnam Wars**
Traces the causes, course, and outcome of the wars in Vietnam from 1940 until 1975. Explains the successes of the revolutionaries and the failures of the French and Americans. Analyzes the development of Vietnamese nationalism, French colonialism, and U.S. intervention.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: United States: Topical Courses 1
Departmental Category: Asia Content

**HIST 2170 (3) History of Christianity 1: To the Reformation**
General introduction to the history of Christianity from its beginnings through the first period of the Protestant Reformation. Examines religious life and the church in relation to its social and cultural setting.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Methodological, Comparative, and Global

**HIST 2220 (3) History of War and Society**
Focuses on war and society in a variety of global contexts. Explores the character, origins, and social, political, and intellectual impacts of war in contexts ranging from several centuries of international conflict to the experience of individual nations in specific wars. Topic varies in any given semester; contact Department of History for details.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Methodological, Comparative, and Global
Departmental Category: Asia Content

**HIST 2316 (3) History of American Popular Culture**
Traces changes in American popular culture from the Revolution to the present. Focuses on the increasing levels of mediation represented by print, spectacular performance, radio, television, and recorded music. The study of popular culture offers clues to decipher shifting patterns of consumption, globalization, race, gender, politics, technology, and media.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4546
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 2326 (3) Issues in the History of U.S. Society and Culture**
Examines the origins, development, and impacts (social, political, cultural, economic, etc.) of significant issues and themes in the cultural,intellectual, and/or social history of the United States from independence to the present day. Explains the impact of race, gender, ethnicity, and class on these issues. Topics vary in any given semester.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 2437 (3) African American History**
Surveys African American history. Studies, interprets and analyzes major problems, issues and trends affecting African Americans from about 1600 to the present.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 2432
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: United States: Topical Courses 2

**HIST 2476 (3) United States Legal History**
Surveys U.S. legal history from the founding era to today. It covers legal ideas that shaped the drafting of the Constitution and examines the pressures that tested that founding document through the present. It addresses legal debates in contexts of territorial expansion, industrial development, financial crisis, shifting demographics, and both civil and world war. It considers how slavery, civil rights, race, regulation, economic expansion, privacy, and equality contributed to various understandings of citizenship.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 2500 (3) Fact and Fiction in History**
Examines history and historical sources through the alternating lenses of ¿fact¿ and ¿fiction¿ in order to think not only about what happened, but how we acquire information and knowledge, and how we use sources and evidence to construct our own understandings of the past and to write history. Considers how narratives found in novels, myths, movies, television, music, visual material, monuments, or public memories, represent the past and relate to historical accounts.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**HIST 2516 (3) America Through Baseball**
Baseball could not have existed without America. Explains how the game fit into the larger context of social, cultural, economic and political history from the 19th century to the present. Studies the events and people who made baseball the national pastime.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4556
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1
Departmental Category: Asia Content

**HIST 2566 (3) Made in America: Work and Workers in American History**
Puts the working lives of Americans, and the meaning of work in American life, in historical perspective. What "counts" as work and how has that changed over time? How do people's expectations of their working lives today compare to how people thought about work trajectories in the past? Whose work has been valued and whose has not? The course focuses mainly on the nineteenth and twentieth centuries while drawing parallels to the present.

**HIST 2616 (3) History of Gender in America**
Introduces the social and cultural construction of femininity and masculinity in America from 1500 to the present. Explores gender as a status acquired and performed through tasks, clothing, adornment and bodily movement. Examines gender ideals, expression and practices such as gender crossing, gender bending and gender plan.
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: United States: Topical Courses 1

**HIST 2629 (3) China in World History**
Examines the multiple connections between Chinese history and other parts of the world over the course of China's long history. Specific course focus may vary by instructor/term.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 2718 (3) History of Japan Through Cinema**
Japan¿s incredibly rich cinematic tradition, from early 20th-century dramatic masterpieces to 21st-century anime, reveals much about its culture and history. We will use Japanese films to study key issues in the history of Japan, roughly between the years 1500-2000, including the changing role of the samurai, women and the `floating world¿ of pleasure, modernization, the devastation of war, economic recovery, the downside of prosperity, and nostalgia for the past.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 2728 (3) Japan: From Samurai to Kamikaze**
Death-defying warriors prepared to cut their bellies and die over the slightest insult to their honor. Conscripted soldiers who charged uphill directly into the line of fire while shouting their loyalty to the emperor. Pilots who took off knowing they wouldn't return, blowing up military targets and themselves. This course peeks beneath stereotypes in the military history of Japan from the first evidence of armed conflict through World War II and beyond.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**HIST 2810 (3) Antisemitism: Histories, Concepts, Practices**
This class explores the main histories, concepts, and practices of antisemitism. It analyzes how and why they emerged and what accounts for their persistence. Why are Jews targeted? Is there a ¿new antisemitism¿¿ since the 1970s¿ that differs significantly from older manifestations? How is antisemitism related to anti-Zionism? What is its relationship with racism? And how have political, social, and religious groups and organizations responded to these threats and what challenges have they faced?
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 2810
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 2830 (3) Disease and Public Health in Global History**
Examines the global history of health and disease from the Paleolithic to the present. Themes and topics vary by semester but may include the co-evolution of humans, microbes, and vectors; food, famine, and nutrition; mental health; contagions such as plague, smallpox, cholera, yellow fever, influenza, HIV, and coronaviruses; cultural, social, medical, and institutional developments; gender, race, and sexuality; and connections between public health and environment, climate, water supply, colonization, globalization, imperialism, migration, and transportation.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 3012 (3) Seminar in Modern European History**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on modern European history, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Modern

**HIST 3018 (3) Seminar in Latin American History**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on Latin American history, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions

**HIST 3020 (3) Historical Thinking & Writing**
The second cornerstone course for history majors centers on the essential skills all historians use. Students will advance their reading, sourcing, and research techniques, hone critical, analytical, and synthetic skills, navigate scholarly discourse, and practice historical writing. As this simultaneously satisfies the College's upper-division writing requirement, all sections involve substantial, regular, and varied writing assignments as well as instruction in methods and the revision process. All topical variations of this course are limited to a maximum of 18 students in order to focus on supporting students as they learn to write - and think - like an historian. Topics will vary by section. Recommended for sophomores or juniors, HIST 3020 may be taken concurrently with, but not prior to, HIST 1800.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prereq courses of ARSC 1080 or 1150 or CLAS 1020 or ENGL 1001 or PHIL 1500 or WRTG 1100 or 1150 or 1250 and prereq/coreq of HIST 1800 or HIST 1830 (all min grade C-). Restrctd to students with 27-180 credits (Soph, Jr, or Sr) HIST majors only.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Upper
Departmental Category: Methodological, Comparative, and Global

**HIST 3109 (3) Seminar in Asian History**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on Asian history, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources. Previously offered as a special topics course.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 3110 (3) Honors Seminar**
Practical historiography for students who wish to write a senior honors thesis. Emphasizes choice of topic, critical methods, research, organization, argumentation, and writing.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 3.5 or higher.
**Additional Information:** Arts Sciences Honors Course
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Methodological, Comparative, and Global

**HIST 3112 (3) Seminar in Renaissance and Reformation**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on the history of the Renaissance and Reformation, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Modern

**HIST 3113 (3) Seminar in Medieval and Early Modern English History**
The third, and final, cornerstone course for history majors is a capstone seminar. Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous classes towards producing historical knowledge about a particular area of interest. This seminar focuses on medieval and early modern English history, and will include readings and discussions in a small seminar setting. These and other class activities and assignments will support the central goal: for each student to develop an individual research project on a topic of their own choosing in relation to medieval and early modern English history. Students will then write a substantial and original research paper based on primary sources. Completion of HIST 3020 is required for history majors to enroll in a senior seminar.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 3115 (3) Seminar in Early American History**
The third, and final, cornerstone course for history majors is a capstone seminar. Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous classes towards producing historical knowledge about a particular area of interest. This seminar focuses on early American history, and will include readings and discussions in a small seminar setting. These and other class activities and assignments will support the central goal: for each student to develop an individual research project on a topic of their own choosing in relation to early American history. Students will then write a substantial and original research paper based on primary sources. Completion of HIST 3020 is required for history majors to enroll in a senior seminar.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods

**HIST 3120 (3) Honors Thesis**
Intended for students writing an Honors Thesis in History. Department enforced prerequisite: HIST 3110 and instructor consent.
**Requisites:** Requires prerequisite course HIST 3110 (minimum grade C-).
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Methodological, Comparative, and Global

**HIST 3212 (3) Seminar in Early Modern Europe**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on early modern European history, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Modern

**HIST 3218 (3) Seminar in African History**
Deals with the history and anthropology of selected west African societies in the period before the imposition of European colonial rule.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions

**HIST 3328 (3) Seminar in Middle Eastern History**
Examines selected issues in modern Middle Eastern history. Check with the department concerning the specific subject of the seminar.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 3414 (3) Seminar in Modern European Thought and Culture**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on the history of modern European thought and culture, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Topical

**HIST 3415 (3) Seminar in Recent American History**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on recent American history, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods

**HIST 3416 (3) Seminar in American Society and Thought**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on the history of American society and thought, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 3417 (3) Seminar in African American History**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on African American history, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 2

**HIST 3628 (3) Seminar in Recent Chinese History**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on recent Chinese history, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 3713 (3) Seminar in Russian History**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on Russian history, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 3718 (3) Seminar in Japanese History**
Capstone seminars are designed for advanced history majors to pull together the skills they have honed in previous courses. This seminar focuses on Japanese history, and will include readings and discussions in a small seminar setting. In relation to the course topic, students will develop an individual research project and write a substantial and original paper based on primary sources.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 3800 (3) Seminar in Global History**
Organized around themes that change year to year, this seminar allows students to explore and research processes, phenomena, and events of global significance in historical context. Stress will be upon subjects that span multiple world areas. Possible topics include: the international arms trade; slavery; health and disease; youth culture; women's rights; genocide. See department for current theme.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course HIST 3020 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) History (HIST) majors (excludes minors).
**Recommended:** History GPA of 2.0 or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Methodological, Comparative, and Global

**HIST 3840 (1-3) Independent Study**
Course content determined by faculty and student
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

**HIST 3841 (1-3) Independent Study**
Course content determined by faculty and student
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Europe: Ancient and Medieval

**HIST 3842 (1-3) Independent Study**
Course content determined by faculty and student
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Europe: Modern

**HIST 3843 (1-3) Independent Study**
Course content determined by faculty and student
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Europe: Specific Countries

**HIST 3844 (1-3) Independent Study**
Course content determined by faculty and student
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Europe: Topical

**HIST 3845 (1-3) Independent Study**
Course content determined by faculty and student
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: United States: Chronological Periods

**HIST 3846 (1-3) Independent Study**
Course content determined by faculty and student
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 3847 (1-3) Independent Study**
Course content determined by faculty and student
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: United States: Topical Courses 2

**HIST 3848 (1-3) Independent Study**
Course content determined by faculty and student
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: World Areas: Specific Regions

**HIST 3849 (1-3) Independent Study**
Course content determined by faculty and student
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: World Areas: Comparable and General

**HIST 4018 (3) Aztecs, Incas, and the Spanish Conquest of the Americas**
Building upon contemporary texts and modern histories of both famous and ordinary people, this course examines the indigenous empires known as the Aztecs and the Incas. It also examines the encounter of Europeans and native people, following the history of exploration and conquest from the time of Columbus to about 1550. Equal consideration is given to the course's three components: Aztec, Inca and the Spanish conquest.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1018 or HIST 3020.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: World Areas: Specific Regions

**HIST 4020 (3) Topics in Comparative History**
Explores historical themes from a comparative perspective. Encourages students to think more analytically about historical change. Consult current online schedule for specific topics. Often team-taught by more than one faculty.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite two 4000-level History courses in differing content areas.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Methodological, Comparative, and Global

**HIST 4021 (3) Athens and Greek Democracy**
Studies Greek history from 800 B.C. (the rise of the city-state) to 323 B.C. (the death of Alexander the Great). Emphasizes the development of democracy in Athens. Readings are in the primary sources.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4021 and CLAS 5021
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Europe: Ancient and Medieval

**HIST 4031 (3) Alexander the Great and the Rise of Macedonia**
Covers Macedonia's rise to dominance in Greece under Philip II and the reign and conquests of Alexander the Great.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 5031 and CLAS 4031
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite CLAS 1051 or CLAS 1509 or CLAS 2039 or CLAS 4139 or CLAS 4149 or CLAS 2041 or CLAS 4021 or CLAS 4041 or HIST 1051 or GREK 3113.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Europe: Ancient and Medieval

**HIST 4041 (3) Classical Greek Political Thought**
Studies main representatives of political philosophy in antiquity (Plato, Aristotle, Cicero) and of the most important concepts and values of ancient political thought. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4041 and CLAS 5041 and PHIL 4210
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Europe: Ancient and Medieval

**HIST 4048 (3) Latin American Revolutions**
Examines the origins, development and continuing influence of 20th-Century Latin American revolutionary movements, with a focus on placing these struggles in comparative historical context. Explores various approaches to revolution and the general role of left political formations in Latin America. Specific focus can vary by semester with examples drawn from various Latin American countries, including Mexico, Guatemala, Cuba, Chile and Nicaragua.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5048
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1018 or HIST 1028 or HIST 3020.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: World Areas: Specific Regions

**HIST 4061 (3) Twilight of Antiquity**
Explores the reasons for the fall of the Roman Empire in the western Mediterranean and its survival in the east as Byzantium. Emphasizes Christianity; barbarians; social, economic and cultural differences; contemporary views of Rome; and modern scholarship. No Greek or Latin is required.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5061 and CLAS 4061 and CLAS 5061
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Europe: Ancient and Medieval

**HIST 4071 (3) Seminar in Ancient Social History**
Considers topics ranging from demography, disease, family structure, and the organization of daily life to ancient slavery, economics, and law. Focuses either on Persia, Greece, or Rome and includes a particular emphasis on the methodology required to reconstruct an ancient society, especially the interpretation of problematic literary and material evidence and the selective use of comparisons with better known societies. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4071 and CLAS 5071
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Ancient and Medieval

**HIST 4081 (3) The Roman Republic**
Studies the Roman Republic from its foundation in 753 B.C. to its conclusion with the career of Augustus. Emphasizes the development of Roman Republic government. Readings are in the primary sources. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4081 and CLAS 5081
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Ancient and Medieval

**HIST 4083 (3) Trials and Triumphs on the Emerald Isle: The Irish People and Their Histories, 1641-1998**
Covers the history of Ireland during modern times, beginning with the rebellion of 1641 and ending with the Good Friday Agreement in 1998. Students will learn about some of the most tumultuous, triumphant, and creative periods in Irish history, all the while considering the blending of cultures, ideas, and artistic accomplishments that created Modern Ireland.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1012 or HIST 1123.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4091 (3) The Roman Empire**
Studies Imperial Roman history beginning with the Roman Revolution and ending with examination of the passing of centralized political authority in the western Mediterranean. Emphasizes life, letters and personalities of the Empire.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4091 and CLAS 5091
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Ancient and Medieval

**HIST 4101 (3) Greek and Roman Slavery**
Surveys slavery in ancient Greece and Rome beginning with its growth, economics and political effects, moving to the life experiences of slaves, resistance and revolt, and finishing with the ideology of slavery. Focuses throughout on the challenge of understanding classical slavery on the basis of scattered and biased evidence and on the controversies that have surrounded this topic.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4101 and CLAS 5101
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**HIST 4103 (3) England from the Viking Age to the Tudors**
During the Middle Ages Germanic values of honor and retribution became deeply ingrained in the warrior culture of the English aristocracy. This course begins with an examination of the Scandinavian and Germanic roots of this warrior culture before exploring the residue of that culture in the centuries leading up to the Tudor period.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Recommended:** Prerequisite HIST 1011 or HIST 1113.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 4109 (3) World War II in Asia and the Pacific**
For Asia, World War II began with the Mukden Incident (1931), resulting in the Japanese domination of Manchuria and leading to a full-scale war between China and Japan in 1937. Only after the Japanese attacked the U.S. Pacific fleet at Pearl Harbor four years later did the United States enter the war. Discusses the various socioeconomic and political factors leading to the war in Asia, examines the nature of the conflict on the Asian mainland and in the Pacific, and assesses legacy of the war on all those involved.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 4116 (3) History of U.S. Foreign Relations, 1865-1940**
Traces the rise of the United States to world power. Explores the interactions of expansionist and isolationist impulses with politics, ideology, culture and economics, with a focus on the Spanish American War and the acquisition of empire, World War I and the coming of World War II.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5116
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 4117 (3) Colorado History**
Presents the story of the people, society, culture, and environment of Colorado from the earliest Native Americans, through the Spanish influx, the fur traders and mountain men, the gold rush, railroad builders, the cattlemen and farmers, the silver boom, the twentieth-century tourists, city-dwellers, workers and activists. Highlights the historical origins of twenty-first century institutions, problems, challenges, and opportunities.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1015 or HIST 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 2

**HIST 4118 (3) History of Mexico to 1821**
Studies Mexican history beginning with roots and evolution of pre-Columbian civilizations and concluding with the events of Mexican independence in 1821. Emphasizes society and culture of the Aztecs and Mayans, the Spanish conquest of Mexico, and the colonial regime of New Spain.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions

**HIST 4123 (3) Kings & Commoners in an Age of Crisis: English History 1327-1487**
England in the 14th and 15th centuries endured climate change, the Black Death, peasant revolts, foreign and civil war and the forcible removal of five kings; yet this period also saw renewed forms of religious devotion, famous military victories and the exaltation of kingship. Crucially, it also saw the growing importance of the common people in English politics and the notion that government should aspire to serve the common good of the whole realm.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011 or HIST 1113.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4125 (3) Early American History to 1763**
Explores the colonial era of American history from the pre-Columbian period to the end of the Seven Years' War. Topics include pre-contact Native societies, exploration, European settlement and Native American responses, labor system and the rise of slavery, imperial wars, and the developments in religion, society, politics and culture.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5125
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: United States: Chronological Periods

**HIST 4126 (3) History of U.S. Foreign Relations Since 1941**
Traces the development of the United States as a superpower. Details American power and diplomacy in World War II and the rise of the national security state in the Cold War. Explores the Korean, Vietnam and Persian Gulf Wars, and the era of modern-day globalization.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5126
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 4128 (3) The History of Modern Mexico Since 1821**
Centers on the Mexican search for political consolidation and stability through the 19th, 20th and 21st centuries. Focuses on the Mexican Revolution (1910-1940) and the post revolutionary rule of the Institutional Revolutionary Party. Examines the War on Drugs and the causes of Mexican migration to the United States.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5128
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1028 or HIST 3020.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions

**HIST 4129 (3) China, Japan, Thailand: Asia under Semicolonialism**
China, Japan, and Thailand were never formally colonized, but were nonetheless deeply impacted by imperialism. Beginning with the age of Euro-American empire-building in the nineteenth century, we trace the different ways in which China, Japan, and Siam/Thailand strategized to secure their status as independent, sovereign nations. We also investigate how these states interacted with and influenced each other, particularly during the early twentieth century when Japan itself became a colonial power in Asia.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**HIST 4131 (3) The Origins of Christianity**
Examines the history of Christianity from Jesus Christ to the eighth century, including the Roman Empire and the rise of the papacy. Topics include the religion¿s spread across Afro-Eurasia, the Latin West and Greek East, ¿micro-Christendoms,¿ monastic life, cults of relics, cities and frontiers, saints¿ lives, and Christianity's encounters with heresies, Greek philosophy, and the beliefs of Judaism and Islam.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011 or HIST 1061 or HIST 2170 or CLAS 1061.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Ancient and Medieval

**HIST 4133 (3) Tudor England, 1485-1603**
Includes topics such as the aftermath of the Wars of the Roses; Henry VIII's 'Great Matter' and his six wives; Reformation and Counter-Reformation; the courtships of Elizabeth I; how Elizabeth became the Virgin Queen; Mary Queen of Scots and the perils of a queen marrying badly; the Tudors and Ireland; English pirates of the Caribbean; the Gran Armada and war against Spain; and the conspiracy that marked the end of England's most famous royal dynasty.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011 or HIST 1113.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4143 (3) The Making of Great Britain: British History 1603-1714**
Covers the history of the British Isles from 1603 to 1714, the era of the English Civil War and the Glorious Revolution. Traces economic and social relationships, cultural change and religious and political conflict under the Stuart monarchs.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011 or HIST 1012 or HIST 1113 or HIST 1123.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4166 (3) The Vietnam War in US Politics and Culture**
Examines America's second-longest and most divisive war from the beginning of the U.S. involvement in the 1950s to the repercussions echoing into the 1980s. Considers the global context, motives, and evolution of U.S. involvement, support for and opposition to the war in the USA, the war's repercussions in international policy and US politics, and representations of the war in American popular culture.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1
Departmental Category: Asia Content

**HIST 4205 (3) The Colonial Wars and the Coming of American Independence, 1739-1776**
Investigates imperial warfare and its effects during the late colonial period, concentrating on the French and Indian War (1754-1763), the disruption of Anglo-American relations and the origins of the War of American Independence (1775-1783).
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5205
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods

**HIST 4212 (3) The Age of Religious Wars: Reformation Europe,1500-1648**
Traces the history of Europe from the end of the Hundred Years War through the Thirty Years War. During this period Europe experienced tremendous changes including emerging religious heresies, the advent of the Spanish Inquisition, violent civil wars, the witch craze, and the Thirty Years War, a precursor to the World Wars of the 20th century.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011 or HIST 1113.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Modern

**HIST 4215 (3) The Revolutionary War and the Making of the American Republic, 1775-1801**
Investigates the Revolutionary War and its impact on the creation of American political institutions, as well as its cultural, social and economic effects, from the Battles of Lexington and Concord through the inauguration of Thomas Jefferson.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5215
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods

**HIST 4217 (3) The American West in the 19th Century**
Explores cultural, social and political interaction in the American West during the 19th century. Themes include environmental change; conflict and syncretism across race, class, and gender lines; mythic images, and their relationship to the "Real" West.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1015 or HIST 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 2

**HIST 4218 (3) Lost Kingdoms & Caliphates: West Africa to 1900**
Investigates the formation and dissolution of West Africa's kingdoms, caliphates and stateless societies during the era of the trans-Atlantic and trans-Saharan slave trades. Through a survey of oral and written sources, this course examines West Africa's geopolitical transformation in warfare, jihad, trade and slavery, especially in relation to the African Diaspora to the Americas and Muslim world.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Specific Regions

**HIST 4222 (3) War and the European State, 1618-1793**
Studies the development of the European states in response to international power struggles in the 17th and 18th centuries (up to the French Revolution).
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5222
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Modern

**HIST 4223 (3) The French Revolution and Napoleon**
Traces the origins, course, and consequences of the most important modern revolution, the French Revolution of 1789. While seeking to explain how a liberal movement for progressive change soon degenerated into the factional bloodbath of the Terror, will also examine the revolution's global impact and how three decades or revolutionary warfare lead to the rise and fall of Napoleon Bonaparte.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5223
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4227 (3) The American West in the 20th Century**
Explores cultural, social, and political interaction in the American West during the 20th century. Themes include popular culture, state-federal relationships, environmental change, urbanization, immigration, and cultural formation.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 2

**HIST 4232 (3) From Revolt to Revolution: Europe in an Age of Global Enlightenment, 1648-1789**
Studies how colonial and imperial expansion transformed cultural, political, and socio-economic institutions in Europe from the end of the Thirty Years War through the outbreak of the French Revolution. Central themes include state centralization, popular resistance, bureaucratization, commercialization, and cultural developments such as scientific revolution and enlightenment.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Modern

**HIST 4235 (3) Jacksonian America**
Focuses on the social and cultural history of the Jacksonian Era. Issues include the transformation of the market economy, slavery, moral reform, Indian removal, changes in ideas about men's and women's natures and roles, western expansion, and political culture.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5235
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1015.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods

**HIST 4238 (3) History of Southern Africa**
Examines the history of southern Africa history from the earliest times to the present. Short background readings and lectures cover southern African's history and class discussions of novels are layered over these basics. Topics of study include Cecil Rhodes and the diamond/gold mines; Shaka and the Zulu "nation"; apartheid; Nelson Mandela and the antiapartheid movement; issues facing South Africa today.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisites HIST 1218 or 1228 or 3109 or 4258 or 4218 or ANTH 1150 or ANTH 3100 or ANTH 4630 or GEOG 3862 or PSCI 3082 or WGST 3712.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Specific Regions

**HIST 4258 (3) Africa under European Colonial Rule**
Looks at the British, French, Portuguese and German empires that undertook the "Scramble for Africa" in the late 19th century. Themes include slavery and the slave trade; colonization and "pacification"; African resistance to European rule; missionaries and converts; decolonization and anti-colonial uprisings; issues facing Africa today, including oil, war and the Rwandan genocide.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1218 or HIST 1228 or HIST 3020 or ANTH 1150 or ANTH 3100 or ANTH 4630 or GEOG 3862 or PSCI 3082.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Specific Regions

**HIST 4303 (3) Venice and Florence during the Renaissance**
Comparative urban study of Florence and Venice from 13th through 16th centuries. Principal subjects are the distinctive economies of the cities, political developments, Renaissance humanism, patronage of the arts, and foreign policy.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4303
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4304 (3) The Cosmos in Ancient Mediterranean Societies**
Through a chronological investigation of ideas about the cosmos in ancient Mediterranean societies, this course communicates how ancient and premodern people thought about, described, and made space part of their daily lives. It will expose students to primary sources such as hieroglyphs, paintings, poems, lyrics & maps. By doing so students will also develop knowledge about ancient societies. The course will include lectures, student skit presentations, learning cells & one class project.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisites HIST 1011 or CLAS 1051 or CLAS 1061.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 4313 (3) History of Modern Italy**
Examines the major historical, economic and social factors that have shaped the identity of modern Italy, from the enthusiasm of young patriots during Italy's unification in the 1860s to the discontent and domestic terrorism of the 1960s-1980s. Focuses on Mussolini, the Fascist movement and on World War II, as well as the changing role of women. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 4250
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4315 (3) Civil War and Reconstruction**
Describes the forces at work in the antebellum period that led to sectional warfare; social, economic, and political changes effected by the war; the American agony of reconstruction; and the long-range results of that difficult era.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1015.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods

**HIST 4320 (3) The History of the Mediterranean, 600 CE-1600 CE**
Familiarizes students with the Mediterranean ecumene covering concepts such as the Renaissance, the Crusades, traders and travelers, religions and cities. Explores both conflicts (military, confessional) and exchanges (commercial, artistic, scientific) thus helping students think cross culturally, comparatively and thematically. Emphasizes the Mediterranean contribution to historical developments of western Europe, the Middle East, and North Africa.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011 or HIST 1061 or HIST 1308 or HIST 4061 or HIST 4071 or HIST 4081 or HIST 4091 or HIST 4711.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Methodological, Comparative, and Global

**HIST 4323 (3) Mafia and Terrorism: Organized Violence in Italy**
Investigates the origins and development of the Sicilian Mafia and Political Terrorism in Italy. In the first part of the course, the context of Italian politics, economy and society in which the mafia was born and flourished in the 19th and 20th century will be explored. The ramification of the Mafia in the United States in the 20th c. will also be studied.
In the second part of the course, the political and social causes of Italian left and right wing Terrorism will be examined, starting from the Piazza Fontana slaughter (1969) until the murder of Professor Marco Biagi (2002). Particular attention will be devoted to the kidnapping and murder of Democratic Christian Party President Aldo Moro and to the Red Brigades terrorist movement. The role of women in both Mafia and Terrorism will be explored.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 4260
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 4326 (3) Epidemic Disease in US History**
Focuses on the impact of infectious epidemic disease on American history, from smallpox and cholera to influenza, AIDS and Ebola. Addresses early depopulation of the Americas; contagion and social upheaval; interpretations of pestilence; social construction of disease; urbanization; doctors and alternative practitioners; public health; prejudice and infection; the ethics of quarantine; public versus individual interests; and the paradox of prevention.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: United States: Topical Courses 1

**HIST 4328 (3) The Modern Middle East, 1600 to the Present**
Primarily from 1800 to the present. Attention divided equally between the region's political history and international relations and its patterns of economic, social and cultural modernization in the main countries.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5328
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1308.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4329 (3) Islam in the Modern World: Revivalism, Modernism, and Fundamentalism, 1800-2001**
Examines the more important movements of reform in Muslim world (including Africa, the Middle East and India) from the 18th century to the present, and their origins and intellectual import. Due to the trans-regional nature of this broad movement of reform, particular attention is paid to how these movements related to local political, economic and social contexts, and how they, in turn, moved across larger networks of oceanic commerce and trade. Concludes with extended case studies of Islamic reformism in modern Egypt and India, and their ultimate influence on the politics of contemporary Islamist movements, especially the intellectual position of Ussama B. Ladin.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1308.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 4336 (3) Nineteenth-Century American Thought and Culture**
Examines the emergence of intellectual traditions and cultural trends in their social and political contexts from the early republic to the beginning of the modern era. Addresses developing arguments about democracy, religion, transcendentalism, gender, race, union/disunion, the Darwinian revolution, utopia/dystopia realism and naturalism in literature and the arts.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 4338 (3) History of Modern Israel/Palestine**
How did we get to this point? What histories do we need to know to understand the situation of Israelis and Palestinians today? To answer these questions, this course traces the intertwined histories of Israel/Palestine, Israelis and Palestinians from the late Ottoman period to the present. Topics include: nationalism and colonialism, the development of Zionisms, Palestinian nationalism, the Jewish community (Yishuv) under British rule, the founding of the State of Israel, Arab-Israeli and Palestinian-Israeli relations, Israel's minorities, the role of religion in Israel today and changing relationships between the United States, Israel and Palestinians.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4338
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST/JWST 1818 or HIST/JWST 1828 or HIST 1308 or JWST 2350 or other course work in Middle Eastern or Jewish History.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4339 (3) Borderlands of the British Empire**
Examines the development of the borderlands of the British empire through imperial expansion, consolidation, and early decolonization. Focuses on the 19th and early 20th centuries. Topics include domination, resistance and negotiation in areas such as India, Afghanistan, the Palestine Mandate. Aims for students to acquire skills in comparative history and to develop a better understanding of the roots of contemporary conflicts.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5339
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1012 or HIST 1123 or HIST 1228 or HIST 1308 or HIST 1528.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 4343 (3) Medieval Spain: Tolerance, Conquest and Religion, 800-1600**
This course examines the culture and politics of the Iberian Peninsula focusing on the two themes of toleration and reconquest c.800-1600. We focus on how Spain¿s institutions and religious beliefs shaped European culture. We explore convivencia, the period of Muslim toleration that borrowed heavily from the medieval Mediterranean, when the interaction between Christians, Jews, and Muslims produced cultural vibrancy. We then analyze the Spanish monarchs¿ solidification of their nation through expulsions, persecution, and empire building. Formerly HIST 4064.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5343
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011 or HIST 1018.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Topical

**HIST 4348 (3) Topics in Jewish History**
Covers topics in Jewish history from biblical beginnings to present day. Topics vary each semester. Consult the online Schedule Planner for specific topics.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4348
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1818 or JWST 1818 or HIST 1828 or JWST 1828 or HIST 1308 or JWST 2350 or other course work in Middle Eastern or Jewish History.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions

**HIST 4349 (3) Decolonization of the British Empire**
Examines the end of the British Empire. Focuses on connections between imperial territories, such as networks of anticolonial activists and links between British decision makers. Students will acquire research skills and develop a better understanding of the roots of contemporary conflict. Prior coursework in British imperial history and excellent writing skills are required.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5349
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1123 or HIST 1228 or HIST 1308 or HIST 1528 or HIST 4053 or HIST 4238 or HIST 4258 or HIST 4328 or HIST 4329 or HIST 4338 or HIST 4339 or HIST 4538 or HIST 4548 or HIST 4558.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 4358 (3) Childhood in Modern Israel/Palestine**
Examines topics relating to History, Jewish Studies and Israel/Palestine studies. Analyzes the history of modern childhood in Israel and Palestine from the 19th century to the present. Themes include agency, work, life cycle and culpability. Topics range from collective parenting on Israeli Kibbutzim, growing up in Ottoman Palestine, to the legal status of stone-throwing Palestinian children. Sources include memoirs, literature, films, monographs and articles.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4358 and JWST 5358 and HIST 5358
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST/JWST 4338 History of Modern Israel/Palestine, this course would give students relevant background on the history of the region, but is not required.

**HIST 4359 (3) The Global History of Modern Arabia**
Examines the history, politics and society of the countries of the Arabian Peninsula (modern day Saudi Arabia, Oman, Yemen, Bahrain, Qatar and the UAE) in the period between 1800 and the present. The guiding assumption will be that the histories of Arabia cannot be studied in isolation from broader histories of capital formation, imperialism, religious reform, state formation and the discourses and practices which they informed. To that end, the focus will be on Arabia as part of the British, Ottoman and Omani Empires, a participant in Indian Ocean commerce, a source and destination for migrant scholars, students and laborers, the center of the petroleum economy and a domain of struggle for activists and intellectuals representing multiple political/ideological currents-not only Islamist, but also, liberal, socialist and communist.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Comparable and General

**HIST 4366 (3) Culture Wars: Modernism, Mass Culture, and the Modern U.S.**
Examines how U.S. public moralists, intellectuals, and artists from the end of the nineteenth century to World War II both celebrated and attacked the rise of two characteristic features of modernity: mass culture (amusement parks, popular music, radio, movies), and modernist literary and artistic expression. Addresses how Americans both constructed and violated the line between "popular" and "high" culture.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 4378 (3) Jews in and of the Middle East**
Examines the modern history and culture of Jewish communities under Islamic rule in the Middle East and North Africa; Jews' and Muslims' encounters with empire, westernization and nationalism; representations of Sephardi and Eastern Jews; Jewish-Muslim relations in Europe and the U.S.; and contact and conflict between Jews and Muslims in (and about) Israel/Palestine. Sources include memoirs, diaries, newspapers and films.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5378, JWST 5378, and JWST 4378
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4388 (3) History Today: Global Intensive in Israel/Palestine**
This global intensive analyzes history, memory and nationalism in one of the areas where the relationship between these three categories is the most fraught: Israel/Palestine. After learning the historical background to the Arab/Israeli and Palestinian conflict in Boulder, students will visit Israel and the West Bank/Occupied Territories/Judea and Samaria. Through this course, students will gain a nuanced, multi-sided perspective of Israel, Palestine and the uses of history and memory.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4388
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 4412 (3) Europe, 1890-1945**
Examines the origins, character and significance of the First and Second World Wars for the major nations of Europe during the first half of the 20th century.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Modern

**HIST 4416 (3) Environmental History of North America**
Examines how people of North America, from precolonial times to the present, interact with, altered, and thought about the natural world. Key themes include Native American land uses; colonization and ecological imperialism; environmental impacts of food and agriculture; industrialization, urbanization and pollution; energy transitions; cultures of environmental appreciation; the growth of the conservation and environmental movements.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 4423 (3) German History 1848-1989: Weimar Republic, Nazism, State Socialism**
Cultural, political and social history of Germany from the Revolutions of 1848 to the Fall of the Berlin Wall in 1989. Emphasizes German unification & Bismarck, the effects of World War I, Weimar politics, the rise of Nazism, World War II and the Holocaust, the post-war paths of West and East Germany, and reunification.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4425 (3) United States History, 1917-1945**
Examines U.S. history from World War I through World War II. Key themes include: warfare; the rise of the modern state; consumer culture; the shift from conservative politics to the New Deal liberalism; the women's movement; immigration restriction; segregation; the Great Migration, and civil rights; conflicts between secular modernism and religious fundamentalism; and new technologies such as the automobile.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods

**HIST 4426 (3) Animals in U.S. History**
This course explores interactions between people and other animals in the present day U.S. over the last six hundred years. Animals, as we will learn, have shaped American history in profound and surprising ways. Reading works and viewing films on wolves, horses, grizzly bears, dogs, elephants, pigs, humans, and other creatures, we will explore the historical origins and development of present-day human-animal relationships in the realms of economics, science, culture, ethics, and the law.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 4433 (3) Nazi Germany and the Holocaust**
Focuses on the political, social, and cultural origins of National Socialism, the nature of the Nazi regime, the origins and course of the Second World war, and the perpetration of the Holocaust.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4435 (3) From the Cold War to the Counterculture: U.S. History 1945-73**
Analyzes high politics, grassroots movements, and cultural change in the years of unprecedented economic prosperity and rapid change after WWII. Explores the foreign and domestic politics of the Cold War; labor unionism; the Vietnam War; the Civil Rights, antiwar, and women's rights movements; and technocultural changes like the rise of television and the growing dominance of the automobile.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods

**HIST 4437 (3) African American History, 1619--1865**
Explores the history of Africans in America from the first arrivals to emancipation, and their role in the social, cultural, economic, and political evolution of the United States.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1015.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 2

**HIST 4442 (3) Europe since 1945**
Explores Europe from the end of World War II through the present day. Topics include postwar reconstruction; the cold war; anticommunist opposition and new social movements; consumer culture and punk music; the fall of communism; the Yugoslav wars; European unity.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Modern

**HIST 4445 (3) United States History since 1973**
Traces political, diplomatic, economic, and social developments in the United States from 1973 to the present.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Chronological Periods

**HIST 4447 (3) African American History, 1865 - Present**
Explores the cultural, social and political history of African Americans after 1865. Focuses on African American social movements, the diversity of the African American communities, as well as a critical examination of the African Americans¿ relationship to the United States. Students in this course will study the advances made in the years following Emancipation as well as the continued challenges for Black freedom in the U.S.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**HIST 4448 (3) Wars of Liberation in Southeast Asia**
Uses the contemporary nations of Indonesia, Myanmar, and Singapore as case studies to examine the making and unmaking of European and Japanese colonialism in Southeast Asia in the years surrounding World War II. In what ways did diverse communities understand and narrate imperialism and independence? How can we understand wars of liberation as local, regional, and global experiences, with legacies for today?
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5448 and ASIA 4448
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Departmental Category: Asia Content

**HIST 4454 (3) Jewish Thought in Modern History**
Takes students on a journey from Medieval Spain to contemporary United States to explore how Jews, living in different societies, have attempted to reshape and interpret central Jewish values and beliefs in accordance with the prevailing ideas of their host societies. Focuses on the historical context of each Jewish society that produced the thinkers and ideas considered in this course.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4454
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Topical

**HIST 4511 (3) Europe in the Dark Ages (400-1000 A.D.)**
Examines the history of Europe from the fall of the Roman Empire to the turn of the first millennium. Treats social, political and religious transformations in the barbarian kingdoms, and considers the persistence of Roman institutions and culture and the impact of Christianity in northern Europe.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011 or HIST 2170.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Ancient and Medieval

**HIST 4521 (3) Europe in the High Middle Ages (1000-1400 A.D.)**
Examines the history of Europe from the emergence of feudal institutions to the rise of nation states, with specific attention to social, intellectual and religious change, the role of law and ritual, the crusades and European expansion, and urban growth and identity in the West.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011 or HIST 2170.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Ancient and Medieval

**HIST 4524 (3) Expulsions and Diasporas: The Jews of Spain and Portugal**
Considers the experience of Jews and converses during the Spanish Inquisition and the Iberian expulsions of the 1490s. Sephardic refugees faced social, economic, and political upheavals in the decades after their exile, leading to new communities in settings as diverse as North Africa, India, Turkey, the Caribbean, and the Americas. The study of texts and traditions from the Sephardic diaspora will explore themes including forced conversion, rabbinic authority, colonialism, and mercantile networks. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4524
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 4527 (3) Mexican-American History since 1848**
Examines Mexican-origins people in the United States from the 19th century through the present. Focuses on Mexican-American history as both an integral part of American history and as a unique subject of historical investigation. Using primary and secondary sources, students will examine how Mexicans and Mexican-Americans have negotiated, influenced, and responded to political, social, cultural, and economic circumstances in the U.S.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1015 or HIST 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: United States: Topical Courses 2

**HIST 4538 (3) History of Modern India**
Examines the history of India from the British conquest of India in the late 18th century to independence in 1947. Emphasizes the impact of British rule on the political, economic and social development of modern India.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5538
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of any history coursework.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4546 (3) Popular Culture in the Modern United States**
Traces the history of cultural expression in the United States since the late nineteenth century. From art, fiction, and music to the movies, amusement parks, shopping, and sports, popular culture offers clues to decipher shifting patterns of consumption, globalization, race, gender, politics, technology, and media. Includes instruction and practice interpreting cultural materials in historical context.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 2316
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 4548 (3) Women in Modern India**
Examines the history of women and gender in India from the late 18th century to the present. Explores topics such as the changing legal status of women in the colonial and postcolonial period, marriage, domesticity and patriarchy, and women's education and participation in anti-colonial and postcolonial politics, women, work and the environment, violence against women, and women and globalization.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5548
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1528.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4554 (3) Researching European Jewish Life**
This upper-level hybrid class is a research and learning initiative of CU Boulder¿s History Department with the Department of History, Philosophy, and Jewish Studies at the Open University of Israel and the Center for Research in Antisemitism at the Technical University of Berlin, Germany. It revolves around an in-person research seminar in Europe. Topics will vary, beginning with a focus on egodocuments in the study of twentieth-century German Jewish life.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4554 and HIST 5554
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) only. Restricted to students who have taken either HIST/JWST 1828, HIST/JWST/RLST 1830, HIST 4423, HIST 4433 or GRMN 2301 with a grade of C- or better; or with permission of instructor.

**HIST 4556 (3) The History of America through Baseball**
Baseball serves as a window to view the American experience. Covers U.S. history since 1830, addressing the major topics that reflect on American society, such as professionalization, labor management conflict, race, gender, culture, politics, economics and diplomacy.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 2516
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1015 or 1025.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 4558 (3) Buddha to Gandhi: A History of Indian Nonviolence**
Focuses on the intellectual history of nonviolence in India from the time of the Buddha to Mahatma Gandhi who led India to national independence from the British Empire in 1947. Pursues this history in light of the encounter between Indian and western cultural traditions in modern India.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4618 (3) From Genghis Khan to the Opium War: Early Modern China**
Examines political, social, and cultural history of China from the Song Dynasty (960-1279) to the opium War (1839-1842). Topics covered include the development of imperial political institution and gentry society, Conquest Dynasties, Neo-Confucianism, China's "medieval economic revolution", Chinese world order in East Asia, Qing multiethnic empire, Chinese overseas migration, and the coming of the West.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5618
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1618 or HIST 1628 or CHIN 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4619 (3) Women in East Asian History**
Considers major issues in the history of women in East Asia (China, Korea, Japan) in the 17th through 20th centuries. Focuses on gender roles in Asian family, state, and cultural systems. Topic varies in any given semester.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4619 and HIST 5619
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 4623 (3) History of Eastern Europe Since 1914**
Examines the struggle of nations of eastern Europe to assert their independence, from break-up of the imperial system at the end of World War I, through the Soviet bloc that emerged after World War II, to the establishment of democratic governments after the1989 revolutions.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4628 (3) Modern China: Collapse of Imperial Brilliance, 1644-1949**
Examines the brilliance of the Qing dynasty, its collapse in 1911, and the bloody and chaotic several decades that followed, up to the 1949 Communist Revolution. Focuses on such topics a Qing imperialism in Central Asia, global capitalism and Western imperialism in China, the opium trade, domestic violence, nationalism, concepts of modernity, competing revolutionary movements, and WW II in Asia.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5628
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4636 (3) Lesbian and Gay History: Culture, Politics, and Social Change in the United States**
Considers current theoretical approaches to the history of sexuality and traces the changing meaning of same-sex sexuality in the United States through investigation of lesbian/gay identity formation, community development, politics, and queer cultural resistance.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5636 and WGST 4636
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1015 or HIST 1025 or LGBT 2000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: United States: Topical Courses 1

**HIST 4638 (3) Contemporary China: Radicalism and Reform, 1949 to Present**
Examines the dramatic, often tragic, and globally transformative history of China under the Chinese Communist Party. Focuses on such topics as political, social, and cultural revolution, nationalism, Maoism, the Great Leap Forward, Red Guards and the Great Proletarian Cultural Revolution, the Deng Xiaoping era, relations with Taiwan, the 1989 Tiananmen Massacre, and China's rise as a world power.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5638
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4640 (3) Women, Gender and War**
Study of how women experience war, how the structure, practice and memory of war, and the rights and obligations of military service (masculinity and femininity) are structured by the gender system.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4640
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1015 or HIST 1012 or HIST 1025 or HIST 1123 or HIST 1628 or HIST 1708.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Methodological, Comparative, and Global

**HIST 4648 (3) Inventing Chinese Modernity, 1800 to Present**
Examines the long and painful transformation, during the modern period of native Chinese concepts about the meaning of life, the proper order of politics and society, the role of the individual, the nature and role of human emotions, the place of the gods, the definition of nation, the proper relations between the sexes, and China's place in the global order.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1618 or HIST 1628 or CHIN 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4653 (3) Ukraine: The History Behind the Headlines**
Explores major topics in the history of Ukraine, including the impact of Russian imperialism, Ukrainian nationalism, the legacy of Soviet rule, the Second World War, and Ukraine¿s struggle for sovereignty, with a particular emphasis on periods in Ukrainian history that remain relevant and debated today. Over the course of the semester, we will also discuss the question of historical and cultural memory, diving into questions about the uses (and abuses) of the past.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1012, HIST 2100, HIST 4723, or HIST 4733.

**HIST 4658 (3) Between Beijing and Baghdad: China and Islam**
Traces how "Muslims in China" transformed themselves into "Chinese Muslims" while at once accommodating and conflicting with Chinese states and people throughout history until the present time.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5658
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1618 or HIST 1628 or CHIN 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4688 (3) Window on Modern China**
Examines the relationship between China's recent history and its booming contemporary economy and society through on-location study in a Chinese city. The course makes use of a rich array of historical and other kinds of sites to teach students to think critically about themes and events that played a shaping role in the unfolding of modern Chinese history.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4710 (3) China and Russia, 1200-2000**
The course explores entangled history of China and Russia since the thirteenth century from comparative and transnational perspectives. Major topics covered in this class include but not limited to the rise and the evolution of autocratic rulership in both countries; their frontier interactions through Inner Asian border regions of Mongolia, Xinjiang and Manchuria; Russia and the communist revolution in China; political split between China and Soviet Union in 1960s and 1970s.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisites of HIST1618 and HIST1628.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 4711 (3) The Medieval Crusades: Holy War and Its History, 1095-1400**
Studies the innovation, impact and meaning of holy war and the expansion of Christendom during the High Middle Ages. Topics include the definition of crusade and crusaders, religious persecution and tolerance, the expansion of European modes of government, war memory, colonization and its aftermath, the meaning of the Holy Land and the home front.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011 or HIST 2170.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Ancient and Medieval

**HIST 4713 (3) History of Russia through the 17th Century**
Introduces the history and culture of Russia from the 9th to the 17th century. Emphasizes selected topics in social, economic, religious and cultural history, including the formation of the Russian state conversion to Orthodox Christianity, the Mongol invasion and the reign of Ivan the Terrible.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1011.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4723 (3) Imperial Russia**
Surveys major cultural, social, and economic changes from the reign of Peter the Great through World War I.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4726 (3) A Nation of Immigrants: Immigration in American History**
Examines the shifting kaleidoscope of immigration to the United Sates in the 19th and 20th centuries. Considers immigrant motives, cultures and experiences; changing cultural and political ideas about the value of immigration; the relationship of immigration and immigration policy to ideas about the American national project; the creation and consequences of immigration law.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: United States: Topical Courses 1

**HIST 4728 (3) Japan¿s Empire: Birth and Death**
Examines the origins of Japan¿s wartime military state in the age of the samurai and the subsequent dislocations of revolution, industrialization, Westernization, and nation-building. Topics may include: colonialism in Asia, evolving roles for women, the rise and fall of democracy, the origins of fascism, the home front, military atrocities, the atomic bombs, war memory, and the art and literature of the late nineteenth and early twentieth centuries.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5728
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4733 (3) The Russian Revolution and the Soviet Regime**
Covers in detail the significant social, economic and political events of Soviet Russia from the February Revolution of 1917 to the present.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4738 (3) Japan¿s Great Peace, 1590-1868**
When we think of early modern Japan we think of samurai: swords flashing, heads rolling. Such images circulate through popular culture via films, anime, and video games. But samurai were only one small part of a complex society, and early modern Japan was characterized by over 250 years of peace. This course spotlights factors that enabled Japan¿s ¿great peace¿: political stability, the growing economy, foreign relations, restructured gender and family roles, and popular culture.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4758 (3) Japan after World War II**
Explores political, economic, social, and cultural factors in postwar Japan. Although defeat in 1945 is often seen as a moment of breakage with the past, the outlines of Japan today emerged before and during World War II. This course traces the impact of occupation by the Allied powers, the development of a ¿special relationship¿ with the United States, high-speed economic growth, social change, globalization, war memory, and other themes in the late twentieth-century Japanese nation-state.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 4761 (3) Roman Law**
Studies the constitutional and legal history of ancient Rome; emphasizes basic legal concepts and comparisons with American law. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5761 and CLAS 4761 and CLAS 5761
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Ancient and Medieval

**HIST 4776 (3) History and Genealogy in American Society**
Introduces students to the uses and cultural importance of family history in American society and to the techniques of doing genealogy. It examines the subject of genealogy through its relationship to nostalgia, ethnicity, regionalism, slavery, race, sexuality, immigration, and national identity between the colonial period and the present. The course also requires students to engage in primary research on their own family or a family of their choosing.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**HIST 4800 (3) Special Topics in Global History**
Organized around themes that change yearly, this class allows students to study and research processes, phenomena, and events of global significance in historical context. Will stress historical subjects that span multiple geographic regions of the globe. Topics could include the global history of: the arms trade; slavery; health and disease; youth culture; women's rights; genocide, the environment, migration, economic trade, warfare exploration etc...
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Methodological, Comparative, and Global

**HIST 4803 (3) Special Topics in European History**
Covers specialized topics in European history, usually focusing on a specific country or theme. Formerly offered as a general special topics course.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisites HIST 1011 or HIST 1012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Europe: Specific Countries

**HIST 4806 (3) Special Topics in American History**
Focuses on special topics in U.S. history to provide a novel thematic, comparative, or methodological focus that cuts across usual geographical and temporal ranges within American history. Topics vary each semester. Students will engage in focused historical learning and research that spans across geographical and temporal ranges within American history. Topics may include: the History Animals in the American West, Slavery along the Atlantic Rim, Presidential Power in the Twentieth Century, the History of American Football, Immigration and Migration in the American Past, etc...
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 4808 (3) Special Topics in World Areas History**
Covers specialized topics in the history of World Areas outside of Europe and/or North America, usually focusing on one country or region.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: World Areas: Specific Regions

**HIST 4820 (3) Human Rights: Historical Perspectives**
Examines the history of modern ideas of human rights.Focuses on themes such as the universalism/cultural relativism debate, colonialism, nationalism, refugees and stateless peoples, the United Nations and humanitarianism, ethnic genocide in Rwanda, and human rights abuses by the Taliban regime in Afghanistan.
**Requisites:** Requires a prerequiste of 6 hours of credit in any History course. Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Methodological, Comparative, and Global Departmental Category: Asia Content

**HIST 4830 (3) Human Trafficking in Global Perspective**
Surveys the global history of slavery, serfdom, chattel slavery, debt bondage, pawnship, domestic servants, bonded labor, child soldiers, forced marriage, sex trafficking, abolitionism, and meanings associated with ¿freedom¿ from the ancient world to the modern day.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective Departmental Category: Asia Content

**HIST 4837 (3) Jews in the American West**
Explores the history of Jewish migration and settlement in the American West. Jewish pioneers in the nineteenth century included explorers, businessmen, and cowgirls that established small communities in territories that had not yet achieved statehood. As westward expansion progressed, Jews continued to find opportunity in the West, balancing assimilation with unique expressions of religious identity. The history of communal institutions including synagogues, hospitals and summer camps offers new perspectives on this underrepresented segment of American Jewry.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4837
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HIST 4930 (1-6) History Internship**
Matches selected students with supervised internships in professional archives research libraries, historical associations, and special projects. Interns apply their academic area specialty to their work in the field. Internships have a work and academic (reading and writing) component.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) History (HIST) majors and minors only.
**Recommended:** Prerequisite completion of lower-level history coursework (for example HIST 1015 or HIST 1025).
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

**HIST 5000 (3) Historical Methods: Introduction to the Professional Study of History**
Introduces purposes, materials, and techniques of historical scholarship. Theory, practice, and criticism.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

**HIST 5012 (3) Graduate Colloquium in European History**
Acquaints students with key works in the literature of European history, and addresses matters of method and interpretation. Department enforced requisite: admission to the graduate program in history.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Modern

**HIST 5061 (3) Twilight of Antiquity**
Explores the reasons for the fall of the Roman Empire in the western Mediterranean and its survival in the East as Byzantium. Emphasizes Christianity; barbarians; social, economic and cultural differences; contemporary views of Rome; and modern scholarship. No Greek or Latin is required.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4061 and CLAS 4061 and CLAS 5061
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Ancient and Medieval

**HIST 5106 (3) Graduate Colloquium in United States History**
Students gain an acquaintance with major works in the field and discuss current issues of interpretation and methodology.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 5116 (3) History of U.S. Foreign Relations, 1865-1940**
Traces the rise of the United States to world power. Explores the interactions of expansionist and isolationist impulses with politics, ideology, culture and economics, with a focus on the Spanish American War and the acquisition of empire, World War I and the coming of World War II. Instructor's permission required for non-history graduate students.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4116
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 5125 (3) Early American History to 1763**
Explores the colonial era of American history from the pre-Columbian period to the end of the Seven Years' War. Topics include pre-contact Native societies, exploration, European settlement and Native American responses, labor system and the rise of slavery, imperial wars, and the developments in religion, society, politics and culture.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4125
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Chronological Periods

**HIST 5126 (3) History of U.S. Foreign Relations Since 1941**
Traces the development of the United States as a superpower. Details American power and diplomacy in World War II and the rise of the national security state in the Cold War. Explores the Korean, Vietnam and Persian Gulf Wars, and the era of modern-day globalization.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4126
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 5128 (3) The History of Modern Mexico Since 1821**
Centers on the Mexican search for political consolidation and stability through the 19th, 20th and 21st centuries. Focuses on the Mexican Revolution (1910-1940) and the post revolutionary rule of the Institutional Revolutionary Party. Examines the War on Drugs and the causes of Mexican migration to the United States.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4128
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions

**HIST 5129 (3) Colloquium in Modern Asian History**
Introduces major topics and themes in Asian history. Analyzes readings relating to topics such as imperialism, cultural agency, gender, race, nationalism, decolonization, and revolution.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 5205 (3) The Colonial Wars and the Coming of American Independence, 1739-1776**
Investigates imperial warfare and its effects during the late colonial period, concentrating on the French and Indian War (1754-1763), the disruption of Anglo-American relations and the origins of the War of American Independence (1775-1783).
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4205
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Chronological Periods

**HIST 5215 (3) The Revolutionary War and the Making of the American Republic, 1775-1801**
Investigates the Revolutionary War and its impact on the creation of American political institutions, as well as its cultural, social and economic effects, from the Battles of Lexington and Concord through the inauguration of Thomas Jefferson.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4215
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Chronological Periods

**HIST 5222 (3) War and the European State, 1618-1793**
Studies the development of the European states in response to international power struggles in the 17th and 18th centuries (up to the French Revolution).
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4222
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Modern

**HIST 5223 (3) The French Revolution and Napoleon**
Traces the origins, course, and consequences of the most important modern revolution, the French Revolution of 1789. While seeking to explain how a liberal movement for progressive change soon degenerated into the factional bloodbath of the Terror, will also examine the revolution's global impact and how three decades or revolutionary warfare lead to the rise and fall of Napoleon Bonaparte.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4223
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Specific Countries

**HIST 5235 (3) Jacksonian America**
Focuses on the social and cultural history of the Jacksonian Era. Issues include the transformation of the market economy, slavery, moral reform, Indian removal, changes in ideas about men's and women's natures and roles, western expansion, and political culture.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4235
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Chronological Periods

**HIST 5303 (3) Venice and Florence during the Renaissance**
Comparative urban study of Florence and Venice from 13th through 16th centuries. Principal subjects are the distinctive economies of the cities, political developments, Renaissance humanism, patronage of the arts, and foreign policy.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4303
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Specific Countries

**HIST 5328 (3) The Modern Middle East, 1600 to the Present**
Primarily from 1800 to the present. Attention divided equally between the region's political history and international relations and its patterns of economic, social and cultural modernization in the main countries.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4328
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 5339 (3) Borderlands of the British Empire**
Examines the development of the borderlands of the British empire through imperial expansion, consolidation, and early decolonization. Focuses on the 19th and early 20th centuries. Topics include domination, resistance and negotiation in areas such as India, Afghanistan, the Palestine Mandate. Aims for students to acquire skills in comparative history and to develop a better understanding of the roots of contemporary conflicts.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4339
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 5343 (3) Spain and Portugal during the Golden Age**
Surveys the history of Spain and Portugal from the late medieval period through early modern period. Explores the thought, art, politics and socio-economic milieu of the Golden Age. Topics include attitudes toward minorities, the Inquisition, the Age of Exploration and the establishment of colonial empires in Asia and the Americas, court culture and architecture, religious conflicts and literary production. Formerly HIST 5064.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4343
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Topical

**HIST 5349 (3) Decolonization of the British Empire**
Examines the end of the British Empire. Focuses on connections between imperial territories, such as networks of anticolonial activists and links between British decision makers. Students will acquire research skills and develop a better understanding of the roots of contemporary conflict. Prior coursework in British imperial history and excellent writing skills are required.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4349
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Comparable and General

**HIST 5358 (3) Childhood in Modern Israel/Palestine**
Examines topics relating to History, Jewish Studies and Israel/Palestine studies. Analyzes the history of modern childhood in Israel and Palestine from the 19th century to the present. Themes include agency, work, life cycle and culpability. Topics range from collective parenting on Israeli Kibbutzim, growing up in Ottoman Palestine, to the legal status of stone-throwing Palestinian children. Sources include memoirs, literature, films, monographs and articles.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4358 and HIST 4358 and JWST 5358
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite HIST/JWST 4338 History of Modern Israel/Palestine, this course would give students relevant background on the history of the region, but is not required.

**HIST 5378 (3) Jews in and of the Middle East**
Examines the modern history and culture of Jewish communities in the Middle East and North Africa; Jews' and Muslims' encounters with empire, westernization and nationalism; representations of Sephardi and Eastern Jews; Jewish-Muslim relations in Europe and the U.S.; and contact and conflict between Jews and Muslims in (and about) Israel/Palestine. Sources include memoirs, newspapers and films.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4378, JWST 4378, and JWST 5378
**Requisites:** Restricted to graduate students only.

**HIST 5448 (3) Wars of Liberation in Southeast Asia**
Uses the contemporary nations of Indonesia, Myanmar, and Singapore as case studies to examine the making and unmaking of European and Japanese colonialism in Southeast Asia in the years surrounding World War II. In what ways did different communities understand and narrate imperialism and independence? How can we understand wars of liberation as local, regional, and global experiences, with legacies for today?
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4448 and ASIA 4448
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Asia Content

**HIST 5538 (3) History of Modern India**
Examines the history of India from the British conquest of India in the late 18th century to independence in 1947. Emphasizes the impact of British rule on the political, economic and social development of modern India.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4538
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite 6 hours of any history coursework.
**Additional Information:** Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 5548 (3) Women in Modern India**
Examines the history of women and gender in India from the late 18th century to the present. Explores topics such as the changing legal status of women in the colonial and postcolonial period, marriage, domesticity and patriarchy, and women's education and participation in anti-colonial and postcolonial politics, women, work and the environment, violence against women, and women and globalization.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4548
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 5554 (3) Researching European Jewish Life**
This upper-level hybrid class is a research and learning initiative of CU Boulder¿s History Department with the Department of History, Philosophy, and Jewish Studies at the Open University of Israel and the Center for Research in Antisemitism at the Technical University of Berlin, Germany. It revolves around an in-person research seminar in Europe. Topics will vary, beginning with a focus on egodocuments in the study of twentieth-century German Jewish life.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4554 and HIST 4554
**Requisites:** Restricted to graduate students only.

**HIST 5618 (3) From Genghis Khan to the Opium War: Early Modern China**
Examines political, social, and cultural history of China from the Song Dynasty (960-1279) to the opium War (1839-1842). Topics covered include the development of imperial political institution and gentry society, Conquest Dynasties, Neo-Confucianism, China's "medieval economic revolution", Chinese world order in East Asia, Qing multiethnic empire, Chinese overseas migration, and the coming of the West.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4618
**Requisites:** Restricted to graduate students only.

**HIST 5619 (3) Women in East Asian History**
Considers major issues in the history of women in East Asia (China, Korea, Japan) in the 17th through 20th centuries. Focuses on gender roles in Asian family, state, and cultural systems. Topic varies in any given semester.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4619 and WGST 4619
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 5628 (3) Modern China: Collapse of Imperial Brilliance, 1644-1949**
Examines the brilliance of the Qing dynasty, its collapse in 1911, and the bloody and chaotic several decades that followed, up to the 1949 Communist Revolution. Focuses on such topics a Qing imperialism in Central Asia, global capitalism and Western imperialism in China, the opium trade, domestic violence, nationalism, concepts of modernity, competing revolutionary movements, and WW II in Asia.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4628
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 5638 (3) Contemporary China: Radicalism and Reform, 1949 to Present**
Examines the dramatic, often tragic, and globally transformative history of China under the Chinese Communist Party. Focuses on such topics as political, social, and cultural revolution, nationalism, Maoism, the Great Leap Forward, Red Guards and the Great Proletarian Cultural Revolution, the Deng Xiaoping era, relations with Taiwan, the 1989 Tiananmen Massacre, and China's rise as a world power.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4638
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions

**HIST 5658 (3) Between Beijing and Baghdad: China and Islam**
Traces how "Muslims in China" transformed themselves into "Chinese Muslims" while at once accommodating and conflicting with Chinese states and people throughout history until the present time.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4658
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 5728 (3) Japan¿s Empire: Birth and Death**
Begins with early modern Japan, proceeds through the era of rapid modernization after the Meiji Restoration in the mid-19th century, and concludes with Japan's gradual descent into prolonged war, first with China and then in the Pacific.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4728
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 5738 (3) History of Early Modern Japan (1590-1868)**
Covers the history of early modern Japan (1590-1868). Explores the political, social, cultural and economic context of Japan's history from the era of Warring States through the rise and fall of the Tokugawa military government (Shogunate).
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4738
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 5761 (3) Roman Law**
Studies the constitutional and legal history of ancient Rome; emphasizes basic legal concepts and comparisons with American law. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4761 and CLAS 4761 and CLAS 5761
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Ancient and Medieval

**HIST 5840 (1-3) Independent Study**
Course content determined by consent of faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

**HIST 5841 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Ancient and Medieval

**HIST 5842 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Modern

**HIST 5843 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Specific Countries

**HIST 5844 (1-3) Independent Study-Europe/Topical**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Topical

**HIST 5845 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Chronological Periods

**HIST 5846 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 5847 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 2

**HIST 5848 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions

**HIST 5849 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Comparable and General

**HIST 6000 (3) Teaching History in the University**
Introduces graduate students to basic pedagogy with special attention to discipline-specific methods, practices, and challenges in teaching history at the college level. In touching upon and integrating the several stages of teaching in a graduate student¿s career and after, this course provides a solid foundation for students to continue their pedagogical development as their instructional experience and skills become more advanced.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**HIST 6012 (3) Readings in Modern European History**
Graduate Readings in Modern European History will explore a facet of Modern European History in depth. Topic will very by instructor.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to History (HIST) graduate students only.
**Additional Information:** Departmental Category: Europe: Modern

**HIST 6019 (3) Readings in World History**
Explores various topics and methods in history and historical writing concerning world areas (areas other than the U.S. and Europe). Geared toward graduate students in History, but students from other disciplines with graduate standing may enroll with instructor consent. Topic and content of course will vary depending on instructor.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 6020 (3) Modern Empires: Readings in Imperial History**
Introduces major topics and themes in imperial history. Reviews central theories of modern colonial empire, ranging from economic and political motivations for expansion, to the cultural and social impact of empire, to post-colonialism.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Methodological, Comparative, and Global
Departmental Category: Asia Content

**HIST 6028 (3) Readings in Modern Latin American History**
Examines major themes and topics in the social, political and economic history of Latin America. Possible topics include nationalism and state-building, neocolonialism, revolution and reaction, race, and gender.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite HIST 5128.
**Additional Information:** Departmental Category: World Areas: Specific Regions

**HIST 6109 (3) Readings in Asian History**
Explores a specific theme in Asian History in depth. Topic may vary each semester.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 6116 (3) Readings in American Diplomatic History**
**Requisites:** Restricted to graduate students only.
**Recommended:** Requisite undergraduate work in American history.
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 6123 (3) Readings in English History Since 1688**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Specific Countries

**HIST 6317 (3) Readings in the American West**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 2

**HIST 6326 (3) Readings in United States Intellectual History**
Examines the history of ideas and the social history of intellectuals in American society during the 19th and 20th centuries. Stresses social and political dimensions and the changing cultural and institutional contexts of intellectual discourse.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to History (HIST) graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 6410 (3) Readings in Environmental History**
Offers historical perspective on the complex and interdependent relationship between human social and cultural institutions and the natural world. Considers interdisciplinary methodologies incorporating history, biology, geography, law, and other disciplines. Formerly HIST 6417.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 6420 (3) Memory and History in Transnational Perspective**
Engages in debates about historical methods and how the past is represented. Central topics will include memory and the forces of nationalism and war; commemoration and monuments; the role of memory in the construction of race and ethnicity; personal past and cultural remembrance; and the relationships between academic, public, and popular histories.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

**HIST 6427 (3) Readings in African American History**
Introduces classic and recent scholarship, and critical issues in African American history, from slavery to the present.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 2

**HIST 6528 (3) Reading in South Asian History**
Introduces major topics and themes in South Asian history. Reviews central theories relating to topics such as religion, nationalism, law, gender, colonialism, and literature.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions
Departmental Category: Asia Content

**HIST 6540 (3) Readings in Cultural History and Theory**
Introduces standard works and recent developments in cultural history. Explores structuralism and post-structuralism, semiotics, social construction, relativism, hegemony, and the idea of postmodernity in the uses of culture as an historical category.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 6756 (3) Race and Nationalism**
Focuses on analytical, ideological, cultural, and political tensions between understandings of race and nationalism. Readings are interdisciplinary, but students identify and analyze tensions between race and nationalism at particular historical moments.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 6790 (3) Readings in Digital History**
Re-conceptualizes topics surrounding traditional theories, methods, and practices of writing history in the digital age. Topics revolve around collating big data, curating digital exhibits, copyright and image preparation for digital/print publications, website development/design, cartography, sustainability and preservation, among other themes. Lab work provides conceptual and technical recommendations required to conceive, launch, and preserve online digital history projects.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

**HIST 6800 (3) Readings in Global History**
Explores various topics, regions, and methods in history and historical writing by utilizing a global/thematic approach. Geared toward graduate students in History, but students from other disciplines with graduate standing may enroll with instructor consent. Topic and content of course will vary depending on instructor.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

**HIST 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

**HIST 6950 (1-6) Master's Thesis**
Registration intended for students working on a master's thesis.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

**HIST 7000 (3) Seminar in Historical Research and Writing**
Discusses methods of historical research, writing, and revision. Along with common reading discussion, students will produce a research paper based on original historical research. Fulfills research seminar (7000-level) requirements for students of all fields.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**HIST 7119 (3) Graduate Research Seminar in Asian History**
Prepares students for research in historical documents in Asian languages in order to write a substantial original research paper based on primary and secondary source materials.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Requisite background in Asian history.
**Additional Information:** Departmental Category: World Areas: Comparable and General
Departmental Category: Asia Content

**HIST 7252 (3) Seminar: Early Modern Europe, 16th to 18th Centuries**
Introduces graduate students to various research approaches and methods in early modern European historiography and requires them to produce a substantial and original research paper using both primary and secondary sources. Specific topics will vary.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Modern

**HIST 7257 (3) Seminar: History of the American Frontier**
**Requisites:** Restricted to History (HIST) graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 2

**HIST 7415 (3) Graduate Seminar in Modern United States History**
Introduces students to various research approaches and methods in modern U.S. historiography and requires them to produce a substantial and original research paper using both primary and secondary sources.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Chronological Periods

**HIST 7800 (3) Research Seminar in Global History**
Discusses various topics, themes and methods which inform the field of Global History. Readings and research papers will explore transnational and global historical interactions, including the exchange of ideas, peoples, commodities, and cultural practices. Geared toward graduate students in History, but students from other disciplines with graduate standing may enroll with instructor consent. Topic and content of course will vary depending on instructor.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to History (HIST) graduate students only.

**HIST 7840 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

**HIST 7841 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Ancient and Medieval

**HIST 7842 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Modern

**HIST 7843 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Specific Countries

**HIST 7844 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Europe: Topical

**HIST 7845 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Chronological Periods

**HIST 7846 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 1

**HIST 7847 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: United States: Topical Courses 2

**HIST 7848 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Specific Regions

**HIST 7849 (1-3) Independent Study**
Course content determined by faculty and student.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: World Areas: Comparable and General

**HIST 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Additional Information:** Departmental Category: Methodological, Comparative, and Global

# Honors (HONR)

## Courses

**HONR 1001 (1) Honors Coseminar**
Honors coseminars are designed to combine an honors seminar experience with the shared experience of an organized lecture course. Designed typically for 15 students, coseminars are taken for an additional 1 credit hour. Coseminars provide honors students with an opportunity to extend their common experience in the course lecture into an enriched interactive, critical thinking opportunity.
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Enrollment allowed for first-year AS students invited into the Honors Program for the current academic year (not including Honors RAP students) and continuing AS students with a minimum cumulative GPA of 3.300.
**Additional Information:** Arts Sciences Honors Course

**HONR 1125 (3) Heroines and Heroic Traditions**
Reevaluating global heroic traditions is critical to understanding power structures. In this course we will interrogate the concept of the monomyth and redefine what it means to be a hero/ine. The course will explore comparative mythology, folklore, literature, film and television in order to reinterpret and investigate heroic traditions in diverse communities.
**Equivalent - Duplicate Degree Credit Not Granted:** HONR 4025
**Requisites:** Enrollment allowed for first-year AS students invited into the Honors Program for the current academic year (not including Honors RAP students) and continuing AS students with a minimum cumulative GPA of 3.300.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sciences Honors Course
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**HONR 1810 (3) Honors Diversity Seminar**
Students will develop an appreciation for, and experience with, diverse perspectives. In particular this includes: racial/ethnic, gender, sexual orientation, and class perspectives, for constructing knowledge as they proceed through their undergraduate studies. Three themes provide the framework for the course: education for the next century, the 21st century citizen, and the modern individual in a diverse society. Topics explored include privilege, stigmatization, targeted and nontargeted grouping, and oppression. Engaging in independent research and experiential, empathetic experiences is required.
**Requisites:** Enrollment allowed for first-year AS students invited into the Honors Program for the current academic year (not including Honors RAP students) and continuing AS students with a minimum cumulative GPA of 3.300.
**Additional Information:** Arts Sciences Honors Course
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**HONR 2250 (3) Ethics of Ambition**
Through selected readings in classical literature on ethics and through more contemporary readings and films, examines critical ethical issues relating to the competition of ambitions and the alternative styles of choosing between courses of action in a dangerous world. Uses biographies of those whose lives illustrate both the complexities of the struggles and the profundity of possibilities. Considers the unconscious metaphors of national visions and ambitions, the competing ethics of ends and means, the conflicting ambitions in a pluralistic society, and the transcendent ambitions of visionaries.
**Equivalent - Duplicate Degree Credit Not Granted:** FARR 2660
**Requisites:** Enrollment allowed for first-year AS students invited into the Honors Program for the current academic year (not including Honors RAP students) and continuing AS students with a minimum cumulative GPA of 3.300.
**Additional Information:** Arts Sciences Honors Course
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**HONR 2251 (3) Introduction to the Bible**
Studies the major works, figures, and genres of the Bible and attempts to understand what they meant to their own time and why they became so important to Western civilization and contemporary America.
**Requisites:** Enrollment allowed for first-year AS students invited into the Honors Program for the current academic year (not including Honors RAP students) and continuing AS students with a minimum cumulative GPA of 3.300.
**Additional Information:** Arts Sciences Honors Course
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**HONR 2500 (3) Open Topics**
Variety of new courses at the 2000 level. See honors program announcements for specific contents.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Enrollment allowed for first-year AS students invited into the Honors Program for the current academic year (not including Honors RAP students) and continuing AS students with a minimum cumulative GPA of 3.300.
**Additional Information:** Arts Sciences Honors Course

**HONR 2820 (3) Future of the Spaceship Earth**
Examines major ecological, political, economic, cultural, legal, and ethical issues that will shape the future. Students consider how their decisions influence the future, and reflect on fundamental values and ideals underlying the search for solutions to these complex problems.
**Equivalent - Duplicate Degree Credit Not Granted:** FARR 2820
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**HONR 2860 (3) The Figure of Socrates**
Investigates why Socrates intrigued great writers like Aristophanes, Plato, Xenophon, and Aristotle and why, through his life and execution by the Athenian democracy, he still influences Western ethics, politics, and education and is central to cultural literacy.
**Additional Information:** Arts Sciences Honors Course
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HONR 3004 (3) Women in Education**
Honors women in education and their legacy. Introduces women educators, beginning in the late 19th century, whose significant theories of education and work in teaching have had an impact on all of our lives, in history and in society. Explores the educational theories and methods of several representative women educators and analyzes them through an investigation of their professional and personal lives.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3004
**Additional Information:** Arts Sciences Honors Course
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**HONR 3220 (3) Advanced Honors Writing Workshop**
Intensive practice of expository writing skills, particularly argumentation in longer forms. Course includes extensive practice in researching secondary sources, synthesizing large bodies of information, structuring cogent arguments for diverse sources, etc.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sciences Honors Course
Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**HONR 3270 (3) Journey Motif in Women's Literature**
Investigates literature thematically centered on forced migration, diaspora, and marginalized communities through novels, graphic novels, and short essays by women. Themes explored: feminism, identity, intersectionality, diaspora, issues of gender and borders, exile, ethnicity, and literary theory among others.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sciences Honors Course
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**HONR 3550 (1-6) Open Topics**
Investigates special topics in humanities, social sciences, and natural sciences. Topics vary from semester to semester and from course to course. See Honors program announcements for specific contents. Open to Honors-qualified students beyond the freshman year. May be repeated for up to six credit hours for different topics.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sciences Honors Course

**HONR 3810 (3) Privilege and Modern Social Construction**
Examines social constructions that lead to productive interactions between and among American social communities. Using case studies and humanistic accounts, students analyze the lived experiences of a unique group or successful citizens who routinely evidence productive practices of multicultural engagement. Through interactions with policy makers and community practitioners, students design and enact activities that allow them to reconstruct their personal patterns of privilege practices of their peer groups in various settings.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sciences Honors Course

**HONR 3900 (3) Honors Internship Course**
Engages students in hands-on work in the community imparting practical knowledge and real-world experience. The course is designed to help students combine professional experiences with an academic component that involves critical thinking and interdisciplinary approaches to problem-solving. Benefits of the course include acquiring professional skills and knowledge, building a network of connections, developing insights on possible career options, and applying classroom material to real-world experiences.
**Grading Basis:** Letter Grade

**HONR 4000 (3) Open Topics**
Variety of new courses at the 4000 level, see Honors Program announcements for specific contents.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sciences Honors Course

**HONR 4025 (3) Heroines and Heroic Tradition**
Given recent controversies about the roles of women in power, this course re-evaluates heroic traditions as the stories that ground our sense of public endeavor. What do we mean by heroic? What is a heroine? Are heroines different from heroes?
**Equivalent - Duplicate Degree Credit Not Granted:** HONR 1125
**Requisites:** Enrollment allowed for first-year AS students invited into the Honors Program for the current academic year (not including Honors RAP students) and continuing AS students with a minimum cumulative GPA of 3.300.
**Additional Information:** Arts Sciences Honors Course
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**HONR 4055 (3) Discourse Analysis and Cultural Criticism**
Discourse analysis critically investigates the founding assumptions by which systems of meaning operate. Its practice is aimed at a rigorous, systematic analysis of both specific cultural issues and the dynamics by which structures of meaning may be maintained or transformed.
**Requisites:** Requires a corequisite course of HONR 4056. Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sciences Honors Course

**HONR 4056 (1-3) Service Practicum: Discourse Analysis and Cultural Criticism**
Help communities in need, with credit hours varying according to time commitment. The practicum provides experiential and intellectual understanding of the discourses and dynamics that maintain major cultural hierarchies of values and of resource distribution.
**Requisites:** Requires a corequisite course of HONR 4055. Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sciences Honors Course

**HONR 4075 (3) Environmental Justice**
Examines the experiences of people who face disproportionate environmental harms related to historical marginalization correlating with race, class, and gender. Covers the history, principles, and contemporary state of the environmental justice movement in its opposition to environmental inequalities.
**Requisites:** Enrollment allowed for first-year AS students invited into the Honors Program for the current academic year (not including Honors RAP students) and continuing AS students with a minimum cumulative GPA of 3.300.
**Recommended:** Junior or Seniors with 57-180 credits completed.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**HONR 4490 (3) Capstone in Interdisciplinary Honors Studies**
Explores the value of interdisciplinarity for conceptualizing, investigating, and solving problems. Critical analysis of interdisciplinarity across different fields will hone creative thinking, research, writing, and communication skills. Students will create a research project that encompasses multiple disciplines, informed by an appreciation of diverse points of view. Students will also examine how an interdisciplinary perspective is vital to being an engaged citizen.
**Requisites:** Requires prerequisite course of HONR 1810 (minimum grade C-).

**HONR 4900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sciences Honors Course

**HONR 4959 (3-6) Honors Thesis**
Requires approval of Honors Program.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sciences Honors Course

# Humanities (HUMN)

## Courses

**HUMN 1001 (3) Forms of Narrative: An Introduction to Humanities**
Introduces students to forms of narrative from different historical, geographical, and cultural contexts in different media in order to explore how narrative, as cognitive tool and form of representation, functions as a means of understanding human experience. Students learn to analyze and interpret narratives and improve critical thinking, the practice of close reading, and written and verbal communication. Serves to introduce students to the types of questions and methods of interpretation encountered in Humanities.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 1002 (3) Visualizing Culture: An Introduction to Humanities**
How do we see, what do we consider worth looking at, how does this shape culture? What do visual media do to/for us and how do we endow them with meaning? This class probes such questions using a range of visual media including visual art, film, music videos, and social media. With the help of theoretical, scholarly, and popular sources, students analyze examples of visual culture and articulate their responses to the issues raised.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 1003 (3) Conflicts in History: Civilization and Culture: An Introduction to Humanities**
Introduces students to concepts of culture, history, and civilization as sites of conflict across different historical times and geographical locations. Course materials address political and artistic questions that intersect across different ages through their different histories and guiding concepts. Students will learn to read and understand critical, historical, political, and artistic works. Emphasis will be placed on developing critical thinking, close reading, and the ability to articulate and develop issues in writing and verbally.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 1004 (3) Sound and Meaning**
This course examines how music creates meaning. Topics include: How ancient and modern writers conceive of the effects of music on its listeners; how the meanings of canonic texts are transformed in contemporary digital culture; how musical works are established though music writing and sound recording; and how music is used to voice identity. Musical examples are drawn primarily from historical repertories of western art music with comparative perspectives from more recent popular and recorded music.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 1110 (3) Introduction to Humanities: Literature 1**
Introduces students to works from the major Western literary periods (Classical, Medieval, Renaissance, Baroque) from the 8th c. BC to the early 17th c. AD comparatively, i.e., outside their national literary boundaries. Theorizes interdisciplinary, genre studies, periodization, comparativism, thematology, hermeneutics, criticism, etc. May be taken separately from HUMN 1120.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 1120 (3) Introduction to Humanities: Literature 2**
Introduces students to works from the major Western literary periods (Baroque, Enlightenment, Romanticism, Realism, Modernism) from the 17th- through the 20th-centuries comparatively, i.e., outside their national literary boundaries. Theorizes interdisciplinarity, genre studies, periodization, comparativism, thematology, hermeneutics, criticism.May be taken separately from HUMN 1110.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 1210 (3) Introduction to Humanities: Art and Music 1**
Examines the major artistic and musical works in the Western tradition from ancient Greece through the 16th century in their larger historical, interdisciplinary, and theoretical ("aesthetic") contexts. May be taken separately from HUMN 1220.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 1220 (3) Introduction to Humanities: Art and Music 2**
Examines the major artistic and musical works in the Western tradition from the 17th century to 21st-century post-modernism in their larger historical, interdisciplinary, and theoretical ("aesthetic") contexts. May be taken separately from HUMN 1210.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 1400 (3) Mediterranean Foundations**
Examines the pre-Modern Mediterranean as the foundational zone of Western Humanism and culture, beginning with Classical Antiquity and through to the dawn of Modernity. Through history, art, literature and thought, it studies the region's role as the crucible of Helleno-Persian culture, Roman society, of Judaism, Christianity and Islam, the intersection of Europe, Africa and Asia in the development of Modernity.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 1701 (3) Nature, Climate and Environment in German Culture**
Critically examines cultural products from German-speaking contexts that thematize climate and environment. Depictions of nature, climate and environment are examined in relationship to understandings of race, nation, sexuality, gender, labor, and rural versus urban spaces. Discussions span Romantic conceptions of nature and nation, to colonial resource extraction, to fascist understandings of home and nature, to contemporary political debates around contemporary Germany's environmental policies. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 1701
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 2000 (3) Methods and Approaches to the Humanities**
Provides a transition from the introductory courses to the upper-division courses. Introduces the various technical methods and topics encountered in the department's comparative, interdisciplinary upper-division courses, including cultural studies, rhetoric, translation, hermeneutics, word/image studies.
**Requisites:** Restricted to HUMN majors and minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 2100 (3) Arts, Culture and Media**
Promotes a better understanding of fundamental aesthetic and cultural issues by exploring competing definitions of art and culture. Sharpens critical and analytical abilities by asking students to read and compare different theories about arts, culture, media, and identity, and then to apply and assess those theories in relation to a selection of visual and verbal texts from a range of cultural and linguistic traditions.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 2145 (3) African America in the Arts**
Introduces interrelationships in the arts of African Americans and the African American contribution to American culture as a whole.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Diversity-U.S. Perspective
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 2311 (3) Energy Cultures: Oil, Coal, and Atoms in Modern Literature and Film**
Explores the concept of energy and its influence in world culture from the 19th century to the present, paying particular attention to how writers and filmmakers from the United States, Russia, and elsewhere have responded to the accelerating production and consumption of fossil fuels and nuclear power. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 2311 and REES 2311
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 2601 (3) Kafka and the Kafkaesque**
Exposes the students to a wide selection of Kafka's literary output and aims to define the meaning of the Kafkaesque by looking not only for traces of Kafka's influence in the verbal and visual arts, but also for traces left in Kafka's own work by his precursors in the literary tradition.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 2601
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3092 (3) Studies in Humanities**
Students should check with the department for specific semester offerings.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3093 (3) Topics in Humanities**
Students should check with the department for specific semester offerings.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3104 (3) Film Criticism and Theory**
Surveys the range and function of film criticism, introduces major positions and concepts of film theory and focuses on students' abilities to write about film.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 3104
**Requisites:** Requires prerequisite course of FILM 1502 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3200 (3) Fictions of Illness: Modern Medicine and the Literary Imagination**
Examines the ways in which the rise of modern medicine fueled the literary imagination with a new focus, new patterns of perception and potent metaphors. Through a study of various works of fiction, critical theory and medical history, the course traces how medical discoveries and the increasing professionalization of medicine manifested itself in modern literature.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3210 (3) Narrative**
Explores the nature of narrative in literature, film, and the visual arts.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3211 (3) The Craft of Mystery**
Explores examples of and theories about the formation and growth of the genre of detective fiction, especially in the late 19th and early 20th centuries. Explores the social conditions of the times in which the texts were written and the possible resulting influences on style. Compares the texts and theories to examples from other genres and time periods.
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3212 (3) Shipwrecks, Mutinies, and Other Catastrophes at Sea**
Explores the theatrical analogy that frames our understanding of catastrophes at sea and their literary and visual representation, paying particular attention to issues of gender, race, and sexuality, which are intentionally banned from such representations, but turn out to be their secret focus.
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3240 (3) Tragedy**
Studies some of the great tragic works of art, music,and literature from the Greeks to the 20th century. Tragic theory is invoked as an aid to interpretation.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3280 (3) Social Justice and the Humanities**
Provides a historical foundation for the study of cultural and political movements that aim to remedy racial, gender, economic, and environmental inequalities in order to create more egalitarian societies. Examines depictions of struggles against inequality in the Spanish-speaking world, including slave revolts in nineteenth-century Cuba, anarchist revolutionary efforts during the Spanish Civil War in 1936-39, student protests in late 1960s Mexico, and the fight for environmental rights in contemporary Spain. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective

**HUMN 3290 (3) Foundations of Disability Studies**
Introduces students to the interdisciplinary field of disability studies by investigating key concepts in disability theory, disability history and culture, media representations of people with disabilities, and pertinent bioethical issues.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**HUMN 3310 (3) The Bible as Literature**
No single book has been as influential to the English-speaking world as the Bible. We¿ll read the Hebrew Bible and the New Testament for stories, poetry, and wisdom traditions. We¿ll approach the Bible as literature by analyzing its plots, characters, and meanings. Students study its textual history, how there came to be a ¿Bible,¿ and the many writers, conflicts, and cultures from which it emerged. We¿ll consider the Bible¿s powerful influence on ethics and philosophy. Formerly ENGL 3312.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 3310 and JWST 3310
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3321 (3) Political Thought in Ancient China**
Focuses on the political, religious, philosophical and literary aspects of ancient Chinese civilization (1500 B.C.-A.D. 200). Special attention is paid to foundational works that influenced later developments in Chinese culture. All readings are in English and taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** CHIN 3321
**Recommended:** Prerequisite CHIN 1012 or CHIN 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**HUMN 3341 (3) Literature and Popular Culture in Modern China**
Surveys 20th century Chinese literature and popular culture against the historical background of rebellion, revolution and reform. Emphasizes close and critical reading skills and an understanding of how aesthetic texts reflect and critically engage with historical and cultural experiences. Assignments include novels, essays, short stories, poems, plays, songs, films and scholarly articles. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** CHIN 3341
**Recommended:** Prerequisite CHIN 1012 or CHIN 1051.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**HUMN 3500 (3) Literatures of Consciousness**
Facilitates a complex and productive understanding of consciousness by analyzing and synthesizing interdisciplinary works (including literature, film and theoretical and scientific texts). This interdisciplinary approach enables students to think deeply about the following questions: what is consciousness? How do we think and perceive? What does it mean to be "neurotypical"? What does all of this have to do with who we are?
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3505 (3) The Enlightenment: Tolerance and Emancipation**
Examines Enlightenment notions of reason, humanity and social progress. Topics include 18th century views on government, science, education, religion, slavery and gender roles.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 3505
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3600 (3) Avatars: Studies in Contemporary Posthumanism**
Seeks to introduce students to the analysis of posthuman thought via the concept of the avatar within our digital cultures. Through an interdisciplinary approach to theory, art, and culture, students will become familiar with the discourse of both humanism and posthumanism as it relates to games, virtual spaces, and digital embodiments. Formerly offered as a special topics course.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3640 (3) Modernisms: Art and Theory from 1900 to 1960**
Offers an introduction to Modernism in various media, emphasizing in particular the historical development of the visual arts from German Expressionism and Cubism to Neo-Dada and Pop Art. Readings in literature will include Proust, Beckett, Blanchot and poets associated with various art movements. Theoretical readings range from Saussure and Freud to Adorno and Jameson. Recommend prerequisite: HUMN 2000.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3660 (3) The Postmodern**
Analyzes the cultural and critical practices as well as the thought that defines the postmodern period at the end of 20th century.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3666 (3) Critical Futures: Theorizing Climate Change**
This course takes an interdisciplinary approach to understanding environmental humanities and explores the insights that arts and humanities can provide in the face of climate change, environmental injustice, and our uncertain futures. By looking at diverse representations/theories about the Anthropocene, this course considers how we account for humans¿ relationship to nature and what the consequences of this are. It also discusses how art and fiction might harness individual and group will to sustain our world.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3702 (3) Dada and Surrealist Literature**
Surveys the major theoretical concepts and literary genres of the Dada and Surrealist movements. Topics include Dada performance and cabaret, the manifesto, montage, the ready made, the Surrealist novel, colonialism and the avant-garde, and literary and philosophical precursors to the avant-garde.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 3702
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3800 (3) Paris, Modernity, and the Avant-garde (1848-1914)**
Investigates the development of the concept of the 'avant-garde' in late-nineteenth and early twentieth-century Paris against a backdrop of political and social revolution. Analyzes the innovative nature of certain works of art, theater, photography, music and literature as well as the influence of the city. Probes and problematizes the concept of the artist as social outsider and cultural critic.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3801 (3) Muslims, Christians, Jews and the Mediterranean Origins of the West**
Provides a historical foundation for the study of western Modernity, including the Anglo-European and Islamic worlds. It focuses on the Mediterranean region in the long Middle Ages (650-1650), emphasizing the role of Christian, Muslim and Jewish peoples and cultures, in Europe, Africa and West Asia. The approach is interdisciplinary incorporating social, economic, cultural, literary and art history, combining lectures with discussions based around readings of contemporary documents and the analysis of contemporary artifacts.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 3801
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**HUMN 3802 (3) Politics and Culture in Berlin 1900-1939**
Examines early 20th century German culture, with emphasis on the Weimar Republic (1918-1933) in light of contemporaneous political discussions. The course presents modern art and literature (Expressionism, Dada, Brecht's epic theater) and architecture and design (Bauhaus, Werkbund) as well as political movements of women, sexual minorities, and Berlin's Jewish communities. Taught in English. Offered through CU Study Abroad Program.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 3802
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3811 (3) The World of the Shining Prince: The Tale of Genji and Heian Literature**
An exploration of the literary landscape of Classical Japan focusing on The Tale of Genji (early 11th century), a brilliantly provocative work of fiction sometimes called ¿the world¿s first novel.¿ Covers the extensive world drawn within Genji and provides context for understanding its origins and reception through readings of other important works of Heian-era (794-1185) literature. Taught in English; no prior knowledge of Japanese language, culture, or history is necessary or expected.
**Equivalent - Duplicate Degree Credit Not Granted:** JPNS 3811
**Recommended:** Prerequisite JPNS 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**HUMN 3841 (3) Transforming Worlds: Japanese Literature in Modernity**
Explores works of modern Japanese literature from the late 1800s to 1970s, placing novels, short stories, and poetry in their historical and cultural contexts. Topics covered include literary responses to Japan¿s modernisation and encounters with the West, the individual in society, mass culture and popular literature, the rise of fascism and colonialism, and visual media, including film. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** JPNS 3841
**Recommended:** Prerequisite JPNS 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**HUMN 3850 (3) The Mediterranean: Religion Before Modernity**
Offers an innovative approach to the multifaceted history of Christian-Muslim-Jewish interaction in the Mediterranean. It eschews established paradigms (e.g., Europe, Islamic world) that distort our understanding of these and pushes students to reconsider the accepted paradigms of Western history. Students will reappraise assumptions regarding the nature of ethnic, religious, national and cultural identity, and their role in human history.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 3850
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**HUMN 3860 (3) Politics and the Arts in the Information Age**
Examines the political aspects of the art and literature of the information age, with a focus on conceptual practices since 1965. The course investigates political theories of art along side sculpture, performance, installation, poetry, and graphic design.
**Recommended:** Requisite HUMN 2000 or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 3930 (1-6) Humanities Internship**
Students gain academic credit and professional experience working in fields such as museums, galleries, arts administration, publishing, nonprofits, and cultural organizations. They work 3-18 hours per week under the guidance of a professional supervisor and meet regularly with a faculty advisor, who oversees the academic requirements, including reading and writing assignments. An interview with the faculty advisor is required.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**HUMN 3935 (1-3) Humanities Internship: Literature and Social Violence**
See HUMN 4835.
**Requisites:** Requires enrollment in corequisite course of HUMN 4835.

**HUMN 4000 (3) The Question of Romanticism**
Interdisciplinary study of literature, art, and music from 1780 to 1830 in France, England, and Germany.
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4004 (3) Topics in Film Theory**
Provides topic-centered analyses of controversial areas in film theory. Students read extensive materials in the topic area, analyze and summarize arguments as presented in the literature, write "position" papers and make oral presentations in which they elaborate their own arguments about specific assigned topic, establishing critical dialogue with the primary materials.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4004 and ARTF 5004
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of CINE 3051 (minimum grade D-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Cinema Studies or Humanities (HUMN) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4006 (3) Introduction to Game Studies**
Seeks to introduce students to the analysis, history, cultural impact, and critique of games both digital and analogue - the largest and fastest growing Media throughout the world. Through an interdisciplinary approach to theory, art, and culture, students will become familiar with the discourse of contemporary game studies and its cultural manifestations. Formerly offered as a special topics course.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4010 (3) Hitchcock and Freud**
Applies Freudian psychoanalysis to the films of Alfred Hitchcock. Students will familiarize themselves with the Freudian methodology by reading a number of books and essays and then apply both Freud's general ideas as well as specific texts to particular aspects, both formal and contentual, of his films. Particular attention will be given to the important field of "feminism and psychoanalysis" as it relates to the study of the role of women in Hitchcock's films.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4011 (3) The Criminal-Hero**
Studies various theories of literary transgression by Aristotle, Nietzsche, Freud, Bataille and others to understand the many works, beginning with Genesis and the Iliad and including contemporary works such as Norman Mailer's The Executioners Song and the films of Herzog (Aguirre, Nosferatu) and Scorsese (Taxi Driver, Cape Fear) which feature this paradoxical figure.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4020 (3) Reading, Chance, and Guessing**
Considers the method of the humanities as opposed to those of the natural and social sciences, especially in view of their respective ability or claim to predict the future and to master chance.
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4030 (3) The Art of Travel**
Examines the art of travel: not where to go and what to do, but rather philosophical concepts about why people travel. Areas of discussion will include exploration, discovery, escape, pilgrimage, the grand tour, expatriotism, exile, nomadism, armchair travel, and the sense of home. Materials will include books by travel writers, novels, films, essays, short stories, art, music, and historical documents.
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4050 (3) Representations of People with Disabilities**
Examines the representation of people with disabilities in canonical and contemporary literature and drama, and introduces students to disability theory and the history of people with disabilities.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**HUMN 4060 (3) Modern Critical Theory**
Explores, through guided discussions, the concept of theory itself and how a theory is constructed. Emphasizes the close reading of theory in order to learn to analyze critically, considering theory as something to be thought about rather than simply applied.
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4070 (3) Making Meaning: Language, Myths, Dreams**
Introduces students to theories concerned with signification, communication, and meaning. The course will focus on the legacy of Ferdinand de Saussure¿s study of the sign and examine how Saussure¿s insights have been put to work in a variety of intellectual contexts from literary analysis to cultural anthropology, and psychoanalysis. Formerly offered as a special topics course.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**HUMN 4082 (3) 19th Century Art and Literature**
Interdisciplinary study of English fiction and poetry together with related movements in visual arts.
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4092 (3) Advanced Studies in the Humanities**
Students should check with the department for specific semester offerings.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4093 (3) Advanced Topics in the Humanities**
Students should check with the department for specific semester offerings.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4100 (3) Writing the World in Traditional China**
Examines the history and implications of the central role played by writing in pre-modern China, especially with regard to traditional constructions of the world, including relations with aesthetics, the non-human, and the spiritual. Key works of Chinese literature and thought from different periods are studied, with the aim of determining a particular type of Chinese humanism. All readings in English.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**HUMN 4110 (3) Greek and Roman Epic**
Students read in English translation the major epics of Greco-Roman antiquity such as the Iliad, Odyssey, Argonautica, Aeneid, and Metamorphoses. Topics discussed may include the nature of classical epic, its relation to the novel, and its legacy. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4110 and CLAS 5110
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4111 (3) Modern and Contemporary Culture**
Examines the legacy of the historical avant-garde (1910-1930) in postwar and contemporary culture: 1945 to the present. We will study the construction of a "neo-avant-garde" in diverse fields (art, film, philosophy) as well as the methodology of "social art history" which, like the artistic neo-avant-garde, critically analyzes the relation between aesthetic production and global capitalism.
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4120 (3) Greek and Roman Tragedy**
Intensive study of selected tragedies of Aeschylus, Sophocles, Euripides and Seneca in English translation. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4120 and CLAS 5120
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4130 (3) Greek and Roman Comedy**
Studies Aristophanes, Plautus, and Terence in English translation. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4130 and CLAS 5130
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4131 (3) The Greek and Roman Novel**
Studies a number of complete Greek and Roman novels from Classical Antiquity and their predecessors and contemporary neighbors in the genres of Greek prose fiction. Ancient texts in English translation.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4140 and CLAS 5140
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4135 (3) Art and Psychoanalysis**
Explores psychoanalytic theory as it relates to our understanding of literature, film and other arts. After becoming familiar with some essential Freudian notions (repression, narcissism, ego/libido, dreamwork, etc.), students apply these ideas to works by several artists (e.g., Flaubert, James, Kafka, Hoffmann and Hitchcock).
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4140 (3) What the Hell?: Dante¿s Divine Comedy and the Meaning of Life**
Focuses on close reading of Dante's poetry with emphasis on the intellectual, religious, political, and scientific background of the medieval world. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 4140 ITAL 4145 or ITAL 4147
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4150 (3) Boccaccio's Decameron: Tales of Sex and Death in the Middle Ages**
Studies Boccaccio's masterpiece, the Decameron, as emblematic of the post-Black Plague era in the late Middle Ages. Focuses on the art of storytelling through gendered perspectives to portray the complexity of the Middle Ages. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 4150
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**HUMN 4155 (3) Philosophy, Art, and the Sublime**
Explores philosophies of art, theories of the sublime, and the relation between art and morality through philosophy, literature, and the visual arts. Includes works by Plato, Longinus, Burke, Rousseau, Kant, Mary Shelley, Melville, Friedrich, Turner, and Pollock.
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4170 (3) Fiction and Reality: Literature, Science, and Culture**
Explores the significance of how one defines "fiction" and "reality". Begins by defining the core concepts and compares them with related terms. Lectures and discussions analyze the implications of these concepts from the perspective of a variety of disciplines and in the context of diverse issues in order to develop a critical awareness of them.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4502 (3) Nietzsche: Literature and Values**
Emphasis is placed on Nietzsche's major writings spanning the years 1872-1888, with particular attention to the critique of Western values. A systematic exploration of doctrines, concepts and ideas leading to the values of creativity.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 4502
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4504 (3) Goethe's Faust**
Systematic study of the Faust motif in Western literature, with major emphasis on Faust I and II by Goethe and Thomas Mann's Doctor Faustus.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 4504 and GRMN 5504
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4552 (3) The Harlem Renaissance: Fr Black Wmn's Club Mvmnt to Hip Hop**
Offers an interdisciplinary and intersectional overview of the origins and evolution of the Harlem Renaissance. Explores classic texts, music and works of art emerging from the Harlem Renaissance and related events and movements of its epoch: the Black Women's Club Movement, New Negro Movement, Pan-African Movement, Lost Generation, Jazz Age, World War I and World War II.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4552 and ETHN 5552
**Requisites:** Requires prerequisite course of ETHN 1022 or ETHN 2001 or ETHN 3212 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**HUMN 4555 (3) Interpreting Art**
Introduces various methods of interpretation (New Criticism; Reader Response; structuralism, post-structuralism, psychoanalysis, art history, etc.) with which to examine how one determines the meaning of the work of art. Methodologies are studied in close conjunction with particular poems, paintings, stories and films.
**Requisites:** Requires either prerequisite course of HUMN 2000 (minimum grade D-) or restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4650 (3) Religion, Power, Modernity**
Examines the representation of religion in relationship to the claims made by modern narratives of power in fables, literature, graphic novels, visual materials and critical writings.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4720 (3) Architecture and the Feminine: Women on Space and Creativity**
Examines women¿s depictions of space, confinement, and liberation in literature, art, and film. Women¿s artistic productions have sought to conceptualize, expose, and subvert the ways that gender and power relations are inscribed into the spaces they inhabit. Students will trace the history of these visions of spaces (physical, geographical, psychological, imagined) and explore their relationship to subjectivity, power, and creativity.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4730 (3) Italian Feminisms: Culture, Theory, and Narratives of Difference**
Studies Italian women writers, artists and filmmakers. Literary and visual texts are analyzed in dialogue with readings of leading Italian gender theorists. Italian history and culture is reread by following the development of a discourse about women. Taught in English; readings in Italian for Italian majors.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 4730
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**HUMN 4811 (3) 19th Century Russian Literature**
Surveys background of Russian literature from 1800 to 1900. Russian writers and literary problems in the 19th century emphasizing major authors: Pushkin, Lermontov, Gogol, Dostoevsky, Turgenev, Tolstoy, and Chekhov.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4821 (3) 20th-Century Russian Literature and Art**
Interdisciplinary course emphasizing the influence of literature and art in 20th century Russian literature. Follows the changing cultural landscape from the time when Russia was in the vanguard of modern European literature to the period of Stalinism. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4821 and REES 5821
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4835 (3) Literature and Social Violence**
Provides a theoretical understanding of heightened awareness arising from literary and sociological investigations of contemporary sources of social violence (gang culture, racism, domestic violence), combined with the concrete knowledge offered by an internship in a social service agency. Optional internship credit is available.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4840 (1-3) Independent Study**
May be repeated for a maximum of 6 total credit hours.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**HUMN 4845 (3) Reading Culture: The Meanings We Make**
Analyzes a range of literary and cultural texts through the lens of critical theory in order to come to more understanding of how we are making meaning, how those meanings make us and how we might use that awareness to open new fields of possibility, both in our readings of texts and in our reactions to cultural contexts and conventions.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**HUMN 4950 (1-6) Honors Thesis**
Supervised project on a topic of the student's own choosing. It should demonstrate ability in interdisciplinary (such as literature and art, art and music, film and literature, literature and theory), extensive research, critical thinking, and excellent writing skills. The thesis is submitted to the Honors Program of the College of Arts and Sciences and is orally defended.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Humanities (HUMN) majors only.

# Indonesian (INDO)

## Courses

**INDO 1110 (3) Beginning Indonesian 1- DILS**
Provide students with an integrated introductory Basic Indonesian Course using the Directed Independent Language Study (DILS) method. Classes will also employ "flipped" task-based learning approaches. Reading assignments will include reading, listening and grammar, which students will demonstrate during class sessions, in which they will offer reading summaries, answer questions and practice speaking. Grades will be based on mastery of the assignments and demonstrated proficiency of written and spoken Indonesian, through in-class performance and mid-term and final examinations.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**INDO 1120 (3) Beginning Indonesian 2 - DILS**
A continuation of Beginning Indonesian 1 (INDO 1110), this is an integrated course. Classes are offered in person or remotely using the Directed Independent Language Study method. Classes will employ "flipped" task-based learning approaches. Coursework includes reading, listening, grammar, answering questions, and speaking practice. Grades are based on demonstrated proficiency of written and spoken Indonesian through in-class performance and examinations.
**Requisites:** Requires prerequisite course of INDO 1110 (minimum grade C).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**INDO 2110 (3) Intermediate Indonesian 1- DILS**
Building on Beginning Indonesian, students are exposed to active communication in Bahasa Indonesia. Offered in person or remotely using the Directed Independent Language Study (DILS) method, employing "flipped" task-based learning approaches. Assignments develop the four language skills, with vocabulary, grammar and cultural instruction. Students demonstrate progress during class sessions through reading summaries, answering questions and practicing speaking. Grades are based on demonstrated proficiency of written and spoken Indonesian, through in-class performance and midterm and final examinations.
**Requisites:** Requires prerequisite course of INDO 1120 or 1020 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**INDO 2120 (3) Intermediate Indonesian 2- DILS**
Continuation of Intermediate Indonesian 1. In the second year, students will be exposed to more active communication The structure, vocabulary and language features and the four language skills are embedded within various topics. Throughout the semester, students will be exposed to Indonesian vocabulary, structure, and culture.
**Requisites:** Requires prerequisite course of INDO 2110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

# Information Management and Business Analytics (BAIM)

## Courses

**BAIM 2999SA (0.1-99) BAIM Lower Division**
**Repeatable:** Repeatable for up to 99.00 total credit hours. Allows multiple enrollment in term.

**BAIM 3100 (3) Data Visualization**
Data, no matter whether it is BIG or small, is not just for researchers or analysts any more. Everyone needs to be comfortable with it. One of the easiest ways to do that is thru data visualization. In this course, you will be introduced to basic data concepts, types, and uses. And you will learn to explore, summarize, and analyze the data using various data visualization techniques and best practices with Tableau Software.
**Requisites:** Restricted to students with 52-180 credits (Junior or Senior) Business (BUSN) majors only.

**BAIM 3205 (3) Business Data Management**
Emphasizes the fundamentals of modern database design in the context of large-scale applications. Covers analysis phase activities such as data modeling for requirements analysis. Covers the extended entity relationship model and the semantic data model in-depth. Covers design phase activities such as the normalization criteria of the relational model and transformation from conceptual to physical design. Introduces object oriented databases. Formerly MGMT 4205.
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**BAIM 3210 (3) Low Code for Citizen Developers**
This course prepares students for success in the nexus of business and technology convergence. We examine the strategic context and competitive factors that influence design thinking approaches to integrate and orchestrate Cloud Computing and Software as a Service (SaaS) platforms to achieve organizational goals. Through a series of agile ¿sprints¿, this course moves from theoretical to applied, enabling ¿citizen developers¿ to leverage leading low-code development and mobile messaging tools to build and extend business applications.
**Requisites:** Requires prerequisite course of BASE 2104 or BCOR 2500 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**BAIM 3220 (3) Introduction to Python Programming**
Python has emerged as the key programming language for data science and business analytics. Helps students understand the programming mindset though use of open source software and libraries and introduces students to object oriented programming. Formerly MGMT 3220.
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed

**BAIM 4065 (3) Leadership in a Digital Age**
In the digital age, leaders have to orchestrate radical redesign of everything from their internal processes to their business model on an ongoing basis. This requires leaders to adopt new approaches to leadership and new behaviors. This course provides students with the skills required in identifying business opportunities, finding appropriate information related technologies and leading innovation efforts to success. Formerly MGMT 4065.
**Requisites:** Requires prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 90-180 units completed.

**BAIM 4090 (3) IT and Business Strategy**
Although some companies are very successful in discovering and cultivating innovative technology-enabled business strategies, many fail in the process. Combines theories and frameworks with practical approaches to provide students with the skills required to help companies identify business opportunities, find appropriate information related technologies, and lead adoption efforts to success. Formerly MGMT 4090.
**Requisites:** Requires prerequisite courses of BCOR 2202 and BASE 2104 (all minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**BAIM 4120 (3) Business Analytics**
Teaches cutting-edge tools and approaches to the analysis of data, including "big data" for effective decision-making. The class creates data connoisseurs through hands-on exposure to exploratory and predictive analytics. Application areas covered include Web Marketing, the Internet of Things, Biometric Monitoring, as well as data integration and analysis for online marketing, human resources and operations. Formerly BAIM 3200.
**Equivalent - Duplicate Degree Credit Not Granted:** MGMT 3201 or MKTG 3201
**Requisites:** Requires prerequisite or corequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**BAIM 4200 (3) Advanced Business Analytics**
Students in this class will use the Python programming language to create, evaluate, and deploy advanced machine learning predictive models. They will be trained in using modern collaborative source-code versioning tools. Best-practice methods will be provided to develop and create machine learning models, enabling their coding processes and their output to be shared with other analysts and managers alike. Formerly MGMT 4500.
**Requisites:** Requires prerequisite course of BASE 2104; BAIM 3205 and 3220 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**BAIM 4220 (3) Enterprise Applications**
We grasp how to operate a contemporary business. Learn how firms committed to sustainability achieve top-line growth, increase business revenue, alter business operations, and unleash efficiency with automated business processes. Examine operational excellence inside Enterprise Resource Planning (ERP) utilizing proven industry-specific business processes (Lines of Business) and technologies such as AI, ML, and IoT to increase efficiency and decision-making. Customer relationships (CRM) and Human Capital (HCM) are input sources for ERP supplementing intelligent business decisions. Formerly BAIM 3230.
**Requisites:** Requires prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**BAIM 4230 (3) Customer Success with Salesforce CRM**
Customer Relationship Management (CRM) systems track an organization¿s interactions with all current and potential customers through a comprehensive lifecycle. As part of a digital execution strategy for insight-driven businesses, CRM enables customer-centricity and success across marketing, sales, operations, finance, and general management. Measurable outcomes include customer retention, satisfaction feedback, and recurring revenue growth, yielding long-term profitable relationships. This immersive course equips students in Cloud Computing, Software as a Service (SaaS), and leading CRM platform ecosystems. Formerly MGMT 4230.
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed

**BAIM 4240 (3) Agile Project Management**
Teaches students the processes involved in implementing enterprise and analytical systems into organizations. The class focuses on Agile product delivery with a focus on human centricity, continuous exploration, integration, deployment, and innovation. Students learn to develop user stories, acceptance criteria, value design, and Agile team structuring while delivering a project for an organization. Students are given a problem and then plan, execute and deliver a solution using the tools learned during the semester.
**Requisites:** Requires prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**BAIM 4250 (3) Information Security Management**
A broad introduction to the managerial issues of information security. Because security is multifaceted, the topics of the class range widely, including technical (e.g., cryptography), managerial (e.g., policy compliance), physical (e.g., door locks) and psychological (e.g., social engineering) issues. A key objective is to develop a security mindset, in which one learns to think like an attacker for ways to exploit a system. Formerly MGMT 4250.
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**BAIM 4900 (1-3) Independent Study**
Intended only for exceptionally well qualified business seniors. Departmental form required. Instructor consent required.
**Requisites:** Restricted to Business (BUSNU) majors only.

# Information Science (INFO)

## Courses

**INFO 1101 (3) Computation in Society**
Introduces students to modern information and communication technology, the basic principles of software and programming, the fundamental role of algorithms in modern society, computational reasoning, the major organizations in the information sector and fundamental interactions between humans and information technology. Appropriate for students with limited prior experience with computing. Fulfills the CMDI computing requirement.
**Grading Basis:** Letter Grade

**INFO 1111 (4) Introduction to Information Science: Understanding the World Through Data**
Provides a hands-on survey of key concepts and theories in Information Science, including the nature of information, everyday experience of data, technologies that generate data, and how data are conveyed and represented. Students will critically examine texts, systems, and interpretations of data from multidisciplinary perspectives. Through design explorations, activities, and group projects, students will develop facility representing and transforming information.
**Grading Basis:** Letter Grade

**INFO 1121 (4) Designing Interactions**
Provides an introduction to human-centered design and the universal requirements of interactions with data, information and technologies. Studio experiences challenge students to consider the impact that information and computing technology design choices have on a) enabling diverse audiences to access, manipulate and experience information, and b) how differences get encoded by data and technology, ultimately reflecting biases.
**Grading Basis:** Letter Grade

**INFO 1201 (4) Computational Reasoning**
Introduces principles of computational thinking through the manipulation, transformation, and creation of media artifacts, such as images, sounds, and web pages. Students will be exposed to a high-level overview of algorithms, functions, data structures, recursion, and object-oriented computer programming through a series of assignments that emphasize the use of computation as a means of creative expression.

**INFO 1301 (3) Statistics for Information Science**
Introduces concepts and techniques for characterizing and quantifying data. Students will learn to summarize, visualize, and interpret data with descriptive statistics and will learn the foundations of statistical inference and modeling. Topics include statistical distributions and the normal distribution, hypothesis testing and statistical significance, and linear regression.
**Grading Basis:** Letter Grade

**INFO 1701 (4) Programming for Information Science 1**
Introduces principles of programming for information and data science using the Python programming language. Students will learn to understand, modify and create Python programs and will learn about programmatic techniques for exploring, discovering, and communicating information contained within various data sources.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 1200 or CSCI 1200

**INFO 2001 (1) Information Science Portfolio and Professional Development**
Facilitates career development through the disciplined reflection about and presentation of one's work using a variety of modalities across a variety of media. Students will be introduced to individuals and organizations representing a diversity of career paths in information science.
**Requisites:** Restricted to Information Science (INFO) majors and minors.
**Grading Basis:** Letter Grade

**INFO 2131 (3) Information Ecosystems**
Introduces students to techniques for working with communities, organizations, and institutions in the transformative use of information. Develops students' ability to listen for (and mediate among) diverse, discordant voices and values. Employs qualitative research, design explorations, activities, and small group projects as students examine, navigate, and design for complex interactions across ecosystems.
**Grading Basis:** Letter Grade

**INFO 2201 (4) Programming for Information Science 2**
Surveys techniques for accessing, exploring, and analyzing real-world data in various formats. Students will acquire, process, and visualize this data in order to communicate their findings to a general audience. Requires demonstrated proficiency with introductory computer programming.
**Requisites:** Requires prerequisite course of INFO 1701 or CSCI 1300 or CSCI 1200 or LING 1200 or ATLS 1300 or APPM 1650 (minimum grade C-).

**INFO 2301 (3) Quantitative Reasoning for Information Science**
Introduces methods for quantifying and analyzing different types of data, covering foundational concepts in discrete mathematics, probability, and predictive modeling, along with complementary computational skills to apply these concepts to real problems. Covers counting and combinatorics, logic, set theory, introductory probability, common probability distributions, regression, and model validation. Requires demonstrated proficiency with introductory computer programming.
**Requisites:** Requires prerequisite course of INFO 1701 or CSCI 1200 or CSCI 1300 or LING 1200 or ATLS 1300 (all minimum grade C-).
**Grading Basis:** Letter Grade

**INFO 3101 (3) History of Computing and Information**
Focusing on two topics: the changing role of information in everyday life over time and the increasing role of information in disciplinary studies such as social science, engineering, computer science, mathematics, digital humanities. Examines information related academic disciplines, businesses, industries and technologies from multiple perspectives from the 17th century to the present.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 3101

**INFO 3401 (3) Information Exploration**
Teaches students how to use information to identify interesting real world problems and to generate insight. Students will learn to find, collect, assemble and organize data to inspire new questions, make predictions, generate deliverables, and work towards solutions. They will learn to appropriately apply different methods (including computational, statistical and qualitative) for exploratory data analysis in a variety of domains.
**Requisites:** Requires prerequisite course of INFO 2201 and any one of INFO 2301, GEOG 4023, PSCI 3075, PSYC 3111 or SOCY 3201 (all minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 3402 (3) Information Exposition**
Teaches students to communicate information to a wider audience and construct stories with data across a variety of domains. Students will learn to use data for rhetorical purposes, applying visual, statistical and interpretative methods. Students will learn to think critically about ethical and social implications of using data in expository media, including identification of bias.
**Requisites:** Requires prerequisite course of INFO 2201 and any one of INFO 2301, GEOG 4023, PSCI 3075, PSYC 3111 or SOCY 3201 (all minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).

**INFO 3501 (3) Open Collaboration**
Analyzes the mechanisms of peer production and crowdsourcing systems like Wikipedia and OpenStreetMap. Students will investigate how these crowdsourced platforms work socially and technically, develop skills using tools for their analysis and critically evaluate platform and community limitations.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5501
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 3502 (3) Online Communities**
Explores practical and theoretical topics in online communities through inquiry into one or more particular online communities. Student projects will explore online communities as social and technical systems, including their alignment with conceptualizations of community, expressed and apparent interests, nature of membership and participation, history, participants' motivations for involvement, and explicit, implicit, and infrastructural features that enable and constrain behaviors.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5502
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 3503 (3) Everyday Information Behavior**
Familiarizes students with practical and theoretical topics in the discipline of information behavior and its application to everyday events, activities and environments. Explores the information dimension of various everyday activities such as buying a car, playing a game or looking up health information online. Students learn to analyze the informational dimensions that occur in their everyday lives.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5503
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 3504 (3) Digital Identity**
Explores and analyzes identity in a digital era. Through applied research, students investigate both social and technical aspects of how identity is captured, represented and experienced through technology using theoretical, empirical and design-based inquiry. Methods and platforms studied vary by semester.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5504
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 3505 (3) Designing for Creative Learning**
Analyzes learning technologies, discusses learning theories and develops prototypes to investigate strategies for engaging people in creative and inclusive learning experiences. Students explore design, learning and technology by examining sociotechnical systems like construction kits, online communities and makerspaces with a critical lens on equity and inclusion. Studio format enables students to apply constructionist ideas into the design of technology-enabled environments.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5505
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 3506 (3) Online Fandom**
Explores and analyzes fan communities in a digital context. Through applied research, students will investigate online spaces devoted to participatory and remix culture, media fandom, and fan creation. This class will draw concepts and methods from fan studies, social computing, ethnography, data science, and sociology to drive project-based inquiry.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5506
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 3507 (3) Foundations and Futures in Digital Humanities**
Explore foundational methods and major movements in digital humanities. This course discusses the impact of digitization on humanist inquiry and introduces students to techniques for analyzing digital data across literature, history, and art. Emphasizes key methodologies, technical practices, and the creation of media artifacts. Familiarity with foundational programming concepts is recommended. Degree credit not granted for both this course and INFO 5507.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 3508 (3) Personal Information Management**
Explores and analyzes personal information management: the organization of our digital "stuff", including course assignments, internship documents, files shared with others via the cloud, social media posts, step counts captured by smartwatches, and location traces collected by phones. In this course, students will participate in a semester-long design research project exploring ways to re-imagine how technology handles our digital stuff.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 3509 (3) Personal Health Informatics**
Surveys the theoretical and practical foundations for the design of patient-centered health and wellness technologies. Students will conduct an in-depth exploration of the multidisciplinary research literature informing the design of these systems, participate in discussions about the practical information management and interaction design challenges that must be addressed in their implementation, and demonstrate their learning through a variety of research study- and system-design activities. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5509
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 3510 (3) Music as Information**
Music is universal throughout all of society. This class will utilize the Python programming language to explore information that is inherent in and generated by music. Topics will cover various types of information related to music itself as well as the production of music which may include topics such as consumer-related music data, music recommender systems, sonification, and brain-music interfaces.
**Requisites:** Requires prerequisite course of INFO 2201 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) only.

**INFO 3702 (3) Cognitive Science**
Introduces cognitive science, drawing from psychology, philosophy, artificial intelligence, neuroscience, and linguistics. Studies the linguistic relativity hypothesis, consciousness, categorization, linguistic rules, the mind-body problem, nature versus nurture, conceptual structure and metaphor, logic/problem solving and judgment. Emphasizes the nature, implications and limitations of the computational model of mind.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3702 and LING 3005 and PHIL 3310 and PSYC 3005 and SLHS 3003 and CSPB 3702
**Requisites:** Restricted to INFO majors with 57-180 credits.

**INFO 3901 (3) Digital Legacy Clinic**
Gain hands-on experience running CU¿s Digital Legacy Clinic, supporting end-of-life planning and digital affairs management. Students will learn to establish a startup, collaborate effectively, and solve common startup challenges. Through team-based work, students will gain practical skills in service design, collaboration, technical research, and client support.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with minimum of 90 credit hours taken (Seniors) and Information Science (INFO) majors.
**Grading Basis:** Letter Grade

**INFO 4001 (1) Information Science Portfolio and Professional Development**
Facilitates career development through the disciplined reflection about and presentation of one's work using a variety of modalities across a variety of media. Students will be introduced to individuals and organizations representing a diversity of career paths in information science.
**Requisites:** Requires prerequisite course of INFO 2001 (minimum grade C-). Restricted to Information Science (INFO) majors and minors.
**Grading Basis:** Letter Grade

**INFO 4601 (3) Information Ethics and Policy**
Explores ethical and legal complexities of information and communication technology. By combining real-world inquiry with creative speculation, students will probe everyday ethical dilemmas they face as digital consumers, creators and coders, as well as relevant policy. Explores themes such as privacy, intellectual property, social justice, free speech, artificial intelligence, social media and ethical lessons from science fiction.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5601
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 4602 (3) Information Visualization**
Explores the design, development and evaluation of information visualizations. Covers visual representations of data and provides hands-on experience with using and building exploratory tools and data narratives. Students create visualizations for a variety of domains and applications, working with stakeholders and their data. Covers interactive systems, user-centered and graphic design, perception, data storytelling and analysis, and insight generation. Programming knowledge is strongly encouraged.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5602
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 4603 (3) Survey Research Design**
Familiarizes students with practical and theoretical topics in using survey methods for conducting information science research. Through discussion and real world assignments, students will learn when and why to use surveys for collecting data; effective, efficient and ethical approaches to maximizing response; sampling issues; development of valid items and scales; and how to implement, analyze and report on survey data collection.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5603
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 4604 (3) Applied Machine Learning**
Introduces algorithms and tools for building intelligent computational systems. Methods will be surveyed for classification, regression and clustering in the context of applications such as document filtering and image recognition. Students will learn the theoretical underpinnings of common algorithms (drawing from mathematical disciplines including statistics and optimization) as well as the skills to apply machine learning in practice.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5604
**Requisites:** Requires prerequisite courses of INFO 2201 or INFO 2301 or CSCI 2270 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior).
**Grading Basis:** Letter Grade

**INFO 4605 (3) Ethnographic Research in Applied Settings**
Demonstrates the power of ethnography as an investigative approach that is useful in design, evaluation and question formation for information scientists across all workforce sectors. Teaches students how to be keen observers of the unusual as well as the everyday to reveal meaningful insights that elaborate information science projects.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5605
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 4606 (3) Critical Technical Practice**
Surveys design theory and methods that can be used to question relationships between technology, culture, and the environment. Students will discuss readings and synthesize those readings through design exercises. The course will equip students with resources for thinking more critically and creatively about design and possible future human-technology relationships.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5606, ATLS 4606, and ATLS 5606
**Grading Basis:** Letter Grade

**INFO 4607 (3) Software Engineering for Data-Centered Systems**
Explores design and engineering of systems for data storage and analysis. Introduces fundamental development concepts used in real-world data systems. By combining software engineering with knowledge from data science and human-centered computing, prepares students to develop systems, interpret and modify codebases, understand modern concepts for managing data at scale, and work in teams to create cutting-edge applications for consumer use.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5607
**Requisites:** Requires prerequisites of INFO 2201 or CSCI 2270 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior)
**Grading Basis:** Letter Grade

**INFO 4608 (3) Community-Based Design**
Surveys techniques in cooperative design with community members as collaborators rather than subjects. Students will explore approaches such as participatory design and co-design. Students will work in teams in partnership with community stakeholders to create tools, experiences, or systems that meet the needs of communities, contribute to social change, and/or lead to advancing academic knowledge.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5608
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 4609 (3) User-Centered Design**
Surveys the theoretical and practical foundations of human-computer interaction and user-centered design. Students learn theories of interaction (including cognitive, organizational, collaborative, and task-based approaches), user interface design techniques, design guidelines, and usability testing in the context of developing technology. Course content is explored through a variety of interfaces (desktop, mobile, touch, vision, audio, etc.) and contexts (personal, organizational, cross-cultural, etc.).
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5609
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 4611 (3) Ubiquitous Computing Experience Design**
Introduces the field of ubiquitous computing, including sensors, ambient displays, tangibles, mobility, location awareness and context awareness. These topics are explored from a user-centered design perspectives, focusing on how a situated models of computing affect requirements gathering, interaction design, prototyping and evaluation. Students gain mastery with contemporary "UbiComp" technologies and learn to incorporate them into a user-centered design process.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5611
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 4613 (3) Network Science**
Introduces theories and methods for analyzing relational data in social, information, and other complex networks. Students will understand the processes and theories explaining network structure and dynamics as well as develop skills analyzing and visualizing real-world network data. No math or statistics training required, but course will assume familiarity with Python.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5613
**Requisites:** Requires prerequisite course of INFO 3402 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 4614 (3) Information and Data Retrieval Systems**
Examines techniques for managing and accessing information and data of a variety of types for a range of applications. Students will study retrieval models for text and for structured and unstructured data, covering creation, management and querying techniques for each, and how to apply each model in data-intensive applications. Students will also consider ethical aspects of data management including data protection, data rights and user privacy.
**Requisites:** Requires prerequisite course of INFO 2201 (minimum grade C-).

**INFO 4615 (3) Fair Machine Learning**
Equips students with the foundational knowledge needed to understand fairness in machine learning from an interdisciplinary perspective and the essential skills necessary to address fairness challenges in practice. Provides an overview of core concepts concerning fair machine learning, from defining fairness to the measurement and mitigation of fairness-related harms. Proficiency in Python programming and prior coursework in machine learning required.
**Grading Basis:** Letter Grade

**INFO 4617 (3) Web Data Science**
The internet makes many kinds of information easy to access. The ability to retrieve, parse, and analyze this information is a valuable skill for data scientists. This course will provide an overview of computational tools and practices for transforming web documents and APIs into data for common research designs.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 4620 (3) Race and Technology**
This course is designed with the understanding that race and racial inequality have been central to how societies and societal systems of power have been shaped and reshaped over time. Students will critically examine how race is created by and through sociotechnical systems. Students will explore how the design, implementation, and use of digital platforms and their data continue to perpetuate and embody white, cisgender, heteronormative systems of power. This course will cover a wide range of foundational and emergent scholarship¿giving voice to Scholars of Color¿providing students with a foundation through which they can continue to critique and explore sociotechnical and other societal arrangements more broadly.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5620
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**INFO 4651 (3) Fundamental Concepts in Data Science**
This intensive course provides a general understanding of the mathematical concepts required for success in data science. This course will cover a wide range of mathematical tools in data science including an overview of calculus and linear algebra along with selected topics from numerical analysis. The course will also explore computational implementations of these ideas. This course provides a bridge for students without these advanced math concepts to learn to apply them within a data science career or within a graduate program in data science.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5651
**Requisites:** Requires prerequisite course of INFO 1301 or ANTH 4000 or GEOG 3023 or PSCI 2075 or PSYC 2111 or SOCY 2061 (minimum grade C-). Restricted to juniors and seniors.

**INFO 4652 (3) Statistical Programming in R**
This intensive course covers foundational data science tools and techniques in the R programming language, including acquiring, cleaning, exploring, and analyzing data, programming, and conducting reproducible research. The course will emphasize the use of data management best practices such as the tidyverse toolkit in R.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5652
**Requisites:** Requires prerequisite course of INFO 1301 or ANTH 4000 or GEOG 3023 or PSCI 2075 or PSYC 2111 or SOCY 2061 (minimum grade C-). Restricted to juniors and seniors.

**INFO 4700 (3) Senior Capstone**
Provides senior level INFO students an opportunity to demonstrate the culmination of their learning in the major by designing and implementing a significant information system or developing a research question, typically in response to a problem of personal interest related to or informed by their secondary area of specialization. Reinforces project planning, public presentation and ethic skills.
**Requisites:** Restricted to Information Science (INFO) majors only with a minimum of 90 hours.
**Grading Basis:** Letter Grade

**INFO 4747 (4) Defamiliarizing Data: The Ethnography and Design of Making Data Strange**
Introduces students to the design and use of data in an unfamiliar, international context. Develops students¿ ethnographic and design skills for defamiliarizing data¿seeing, characterizing, and designing for data in ways that render it as unfamiliar and strange in order to gain new perspectives and insights about those data and the contexts in which they are produced and consumed. This course includes international travel.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 5747

**INFO 4800 (1-3) Leadership Practicum in Information Science**
Equips students for taking on leadership roles in the interdisciplinary context of information science. Students will learn to facilitate learning among students with diverse backgrounds and expertise, developing communication and mentoring skills and gaining exposure to a variety of learner-centered design strategies and pedagogical approaches. Enrollment is by invitation and at the discretion of the instructor.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Information Science (INFO) majors only.
**Grading Basis:** Letter Grade

**INFO 4841 (1-6) Undergraduate Independent Study**
Involves in-depth independent research and/or project work completed under the direction of a faculty member that demonstrates learning at the upper-division level within the discipline. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Information Science (INFO) majors only.
**Grading Basis:** Letter Grade

**INFO 4871 (1-4) Special Topics**
Special topics.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**INFO 4900 (1-6) Research Experience in Information Science**
Provides research experience in information science. Students will contribute to the construction of new knowledge, helping to answer current research questions or to solve contemporary problems in the domain. Enrollment is by invitation and discretion of the advising faculty member.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Grading Basis:** Letter Grade

**INFO 4950 (1-6) Honors Thesis**
Involves the preparation and oral defense of an honors thesis, based on faculty-supervised original research, including final phases of the research project. Students receive guidance on research, the process of thesis writing, presentation of research results, and thesis defense. Thesis requirements and the role of the CMDI Honors Council will be discussed. Honors students share written, visual, and oral drafts for peer and faculty feedback and offer feedback to their peers.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 55-180 credits (Juniors or Seniors) and Information Science majors only.
**Grading Basis:** Letter Grade

**INFO 5301 (3) Computation for Research in Information Science**
Introduces principles of computational thinking through the manipulation, transformation and creation of data artifacts used in research. Students will be exposed to a high-level overview of algorithms, functions, data structures, recursion and object-oriented computer programming through a series of assignments that emphasize the use of computation as a means of scholarship.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5501 (3) Open Collaboration**
Analyzes the mechanisms of peer production and crowdsourcing systems like Wikipedia and OpenStreetMap. Students will investigate how these crowdsourced platforms work socially and technically, develop skills using tools for their analysis and critically evaluate platform and community limitations.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3501
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5502 (3) Online Communities**
Explores practical and theoretical topics in online communities through inquiry into one or more particular online communities. Student projects will explore online communities as social and technical systems, including their alignment with conceptualizations of community, expressed and apparent interests, nature of membership and participation, history, participants' motivations for involvement, and explicit, implicit, and infrastructural features that enable and constrain behaviors.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3502
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5503 (3) Everyday Information Behavior**
Familiarizes students with practical and theoretical topics in the discipline of information behavior and its application to everyday events, activities and environments. Explores the information dimension of various everyday activities such as buying a car, playing a game or looking up health information online. Students learn to analyze the informational dimensions that occur in their everyday lives.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3503
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5504 (3) Digital Identity**
Explores and analyzes identity in a digital era. Through applied research, students investigate both social and technical aspects of how identity is captured, represented and experienced through technology using theoretical, empirical and design-based inquiry. Methods and platforms studied vary by semester.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3504
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5505 (3) Designing for Creative Learning**
Analyzes learning technologies, discusses learning theories and develops prototypes to investigate strategies for engaging people in creative and inclusive learning experiences. Students explore design, learning and technology by examining sociotechnical systems like construction kits, online communities and makerspaces with a critical lens on equity and inclusion. Studio format enables students to apply constructionist ideas into the design of technology-enabled environments.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3505
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5506 (3) Online Fandom**
Explores and analyzes fan communities in a digital context. Through applied research, students will investigate online spaces devoted to participatory and remix culture, media fandom, and fan creation. This class will draw concepts and methods from fan studies, social computing, ethnography, data science, and sociology to drive project-based inquiry.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3506
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5507 (3) Data and the Humanities**
Introduces students to foundational computing and statistical concepts for analyzing humanities data. This course discusses the influence of digitization and data on humanist inquiry and exposes students to techniques for working with data in different areas of the humanities, including literature, history, and art. The course emphasizes technical practices involved in humanist data analysis. Comfort with programming is strongly encouraged.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3507
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5509 (3) Personal Health Informatics**
Surveys the theoretical and practical foundations for the design of patient-centered health and wellness technologies. Students will conduct an in-depth exploration of the multidisciplinary research literature informing the design of these systems, participate in discussions about the practical information management and interaction design challenges that must be addressed in their implementation, and demonstrate their learning through a variety of research study- and system-design activities. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3509
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5601 (3) Information Ethics and Policy**
Explores ethical and legal complexities of information and communication technology. By combining real-world inquiry with creative speculation, students will probe everyday ethical dilemmas they face as digital consumers, creators and coders, as well as relevant policy. Explores themes such as privacy, intellectual property, social justice, free speech, artificial intelligence, social media and ethical lessons from science fiction.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4601
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5602 (3) Information Visualization**
Explores the design, development and evaluation of information visualizations. Covers visual representations of data and provides hands-on experience with using and building exploratory tools and data narratives. Students create visualizations for a variety of domains and applications, working with stakeholders and their data. Covers interactive systems, user-centered and graphic design, perception, data storytelling and analysis, and insight generation. Programming knowledge is strongly encouraged.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4602
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5603 (3) Survey Research Design**
Familiarizes students with practical and theoretical topics in using survey methods for conducting information science research. Through discussion and real world assignments, students will learn when and why to use surveys for collecting data; effective, efficient and ethical approaches to maximizing response; sampling issues; development of valid items and scales; and how to implement, analyze and report on survey data collection.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4603
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5604 (3) Applied Machine Learning**
Introduces algorithms and tools for building intelligent computational systems. Methods will be surveyed for classification, regression and clustering in the context of applications such as document filtering and image recognition. Students will learn the theoretical underpinnings of common algorithms (drawing from mathematical disciplines including statistics and optimization) as well as the skills to apply machine learning in practice.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4604
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5605 (3) Ethnographic Research in Applied Settings**
Demonstrates the power of ethnography as an investigative approach that is useful in design, evaluation and question formation for information scientists across all workforce sectors. Teaches students how to be keen observers of the unusual as well as the everyday to reveal meaningful insights that elaborate information science projects.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4605
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5606 (3) Critical Technical Practice**
Surveys design theory and methods that can be used to question relationships between technology, culture, and the environment. Students will discuss readings and synthesize those readings through design exercises. The course will equip students with resources for thinking more critically and creatively about design and possible future human-technology relationships.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5606, ATLS 4606 and INFO 4606
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5607 (3) Software Engineering for Data-Centered Systems**
Explores design and engineering of systems for data storage and analysis. Introduces fundamental development concepts used in real-world data systems. By combining software engineering with knowledge from data science and human-centered computing, prepares students to develop systems, interpret and modify codebases, understand modern concepts for managing data at scale, and work in teams to create cutting-edge applications for consumer use.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4607
**Requisites:** Requires prerequisites of INFO 2201 or CSCI 2270 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior)
**Grading Basis:** Letter Grade

**INFO 5608 (3) Community-Based Design**
Surveys techniques in cooperative design with community members as collaborators rather than subjects. Students will explore approaches such as participatory design and co-design. Students will work in teams in partnership with community stakeholders to create tools, experiences, or systems that meet the needs of communities, contribute to social change, and/or lead to advancing academic knowledge.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4608
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5609 (3) User-Centered Design**
Surveys the theoretical and practical foundations of human-computer interaction and user-centered design. Students learn theories of interaction (including cognitive, organizational, collaborative, and task-based approaches), user interface design techniques, design guidelines, and usability testing in the context of developing technology. Course content is explored through a variety of interfaces (desktop, mobile, touch, vision, audio, etc.) and contexts (personal, organizational, cross-cultural, etc.).
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4609
**Requisites:** Restricted to graduate students only.

**INFO 5611 (3) Ubiquitous Computing Experience Design**
Introduces the field of ubiquitous computing, including sensors, ambient displays, tangibles, mobility, location awareness and context awareness. These topics are explored from a user-centered design perspectives, focusing on how a situated models of computing affect requirements gathering, interaction design, prototyping and evaluation. Students gain mastery with contemporary "UbiComp" technologies and learn to incorporate them into a user-centered design process.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4611
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5612 (3) Recommender Systems**
Explores the space of personalized information access applications known as recommender systems. This class will introduce students to a range of approaches for building recommender systems including collaborative, content-based, knowledge-based, and hybrid methods. Students will also explore a variety of applications for recommendation including consumer products, music, social media, and online advertising. The course will also examine controversies surrounding recommendation, including Pariser's "filter bubble", and questions of algorithmic bias. Proficiency in Python programming required.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5613 (3) Network Science**
Introduces theories and methods for analyzing relational data in social, information, and other complex networks. Students will understand the processes and theories explaining network structure and dynamics as well as develop skills analyzing and visualizing real-world network data. No math or statistics training required, but course will assume familiarity with Python.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4613
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 5620 (3) Race and Technology**
This course is designed with the understanding that race and racial inequality have been central to how societies and societal systems of power have been shaped and reshaped over time. Students will critically examine how race is created by and through sociotechnical systems. Students will explore how the design, implementation, and use of digital platforms and their data continue to perpetuate and embody white, cisgender, heteronormative systems of power. This course will cover a wide range of foundational and emergent scholarship¿giving voice to Scholars of Color¿providing students with a foundation through which they can continue to critique and explore sociotechnical and other societal arrangements more broadly.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4620
**Requisites:** Restricted to graduate students only.

**INFO 5651 (3) Fundamental Concepts in Data Science**
This intensive course provides a general understanding of the mathematical concepts required for success in data science. This course will cover a wide range of mathematical tools in data science including an overview of calculus and linear algebra along with selected topics from numerical analysis. The course will also explore computational implementations of these ideas. This course provides a bridge for students without these advanced math concepts to learn to apply them within a data science career or within a graduate program in data science.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4651

**INFO 5652 (3) Statistical Programming in R**
This intensive course covers foundational data science tools and techniques in the R programming language, including acquiring, cleaning, exploring, and analyzing data, programming, and conducting reproducible research. The course will emphasize the use of data management best practices such as the tidyverse toolkit in R.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4652

**INFO 5653 (3) Text Mining**
Introduces students to techniques for extracting information from text data, including text gathering and cleaning, and text processing methods, such as dimensionality reduction, normalization, and text visualization. It will introduce applications and methodologies of machine learning for text, such as sentiment analysis, association rule mining, and topic modeling.

**INFO 5747 (4) Defamiliarizing Data: The Ethnography and Design of Making Data Strange**
Introduces students to the design and use of data in an unfamiliar, international context. Develops students¿ ethnographic and design skills for defamiliarizing data¿seeing, characterizing, and designing for data in ways that render it as unfamiliar and strange in order to gain new perspectives and insights about those data and the contexts in which they are produced and consumed.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 4747

**INFO 5841 (1-3) Independent Study**
Independent Study
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**INFO 5871 (1-4) Special Topics**
Topics will vary by semester.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**INFO 5919 (3) HCC Survey and Synthesis: Foundations and Trajectories**
Examines the interdisciplinary field of human-centered computing through a comprehensive content and historical survey. Considers new trajectories of inquiry and how the field merges with others. Social computing, is emphasized as a central topic. Students across disciplines will find the course foundational for understanding human-centered technology matters, including computer scientists, information scientists, social scientists, and business and media arts students.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5919
**Requisites:** Restricted to graduate students only.

**INFO 5931 (1-3) Internship**
Internship
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**INFO 6101 (3) Theories and Concepts in Information Science**
Surveys foundational theories and concepts in information science. Students will learn to read and reflect critically about seminal texts, tracing their intellectual genealogies from a variety of originating disciplines to their appropriation by information science. Students will apply these theories to contemporary issues and problems.
**Requisites:** Restricted to PhD students only.
**Grading Basis:** Letter Grade

**INFO 6201 (3) Interdisciplinary Ways of Knowing**
Introduces principles of research design and surveys the breadth of research methods appropriated by the field of information science. Students will explore the diversity of epistemological orientations that make up the field, that influence the types of often mixed research methods applied and that shape the kinds of questions that are and are not explored.
**Requisites:** Restricted to PhD students only.
**Grading Basis:** Letter Grade

**INFO 6301 (3) Computation for Research in Information Science**
Examines the diversity of roles that computation can play in information science research, ranging from an overview of some data-driven practices to prototyping and infrastructure development to computation-as-research-support. Provides students with a level of computational literacy to engage with the multiplicity of roles that computation serves in the different kinds of research work that is happening across the domain, including exemplars of different kinds of technical contributions and approaches.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 6401 (3) Information and Ideas in Design Disciplines**
Introduces fundamental principles and practices from user-centered design disciplines and examines how those principles and practices intersect with contemporary issues in information science. Theory, research and exemplary practices from interaction, graphic, product, communication and experience design are introduced through readings, problems and case histories. Projects provide direct experience with common design tools and exposure to leading practitioners.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 6500 (1) Information Science Seminar**
Enculturates graduate students in the discipline of Information Science through weekly seminar series that hosts guest speakers, internal faculty and graduate speakers and other community building and professional development activities.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**INFO 6871 (3) Special Topics**
Topics will vary by semester.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**INFO 6940 (1-6) Supervised Master's Research Project**
Students enrolling in this course will conduct supervised research in Information Science under the supervision of one or more faculty advisors, to include preparation of academic literature reviews, laboratory or field experiments, surveys or interviews with technology stakeholders, interface or system design and development, system evaluation, or other examples of rigorous scholarship in the discipline of Information Science. Some research projects may be carried out in collaboration with other graduate students and faculty members. Although contribution to publishable scholarship (e.g., posters, demonstrations, conference papers, or journal articles) is one possible outcome of this educational experience, the student and his/her advisor(s) may agree to determine alternate mechanisms for assessing mastery of the academic research process, depending on the scope of work carried out as part of this experience, the publishability of the research, and the specific needs and career goals of the student.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**INFO 6950 (1-6) Master's Thesis**
Designing, researching and writing a master's thesis under the supervision of the student's advisors.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**INFO 7000 (3) Introduction to Doctoral Studies in Information Science**
Introduces students to practices associated with successful advancement in a doctoral program, rigorous scholarship in information science and more expert and early participation in their scholarly community of practice.
**Requisites:** Restricted to Information Science (INFO) Ph.D. graduate students only.
**Grading Basis:** Letter Grade

**INFO 7841 (1-3) Independent Study**
Independent Study
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to PhD students only.

**INFO 7871 (3) Special Topics**
Topics will vary by semester.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to PhD students only.

**INFO 8991 (1-10) Doctoral Dissertation**
**Repeatable:** Repeatable for up to 40.00 total credit hours.
**Requisites:** Restricted to PhD students only.

# Integrative Physiology (IPHY)

## Courses

**IPHY 1020 (1) Introduction to Integrative Physiology**
Introduces students to Integrative Physiology. Provides an overview of the major and how it differs from other biology programs; how to get involved in clubs, research, and/or internship opportunities; strategies for succeeding in IPHY courses; and career options. This is a first-year colloquium course specifically designed for freshman and other students exploring their educational and career opportunities.

**IPHY 1030 (1-2) Introduction to the Health Professions**
Introduces students to careers in healthcare. This exploratory course is designed to expose students to the wide spectrum of healthcare occupations available and the knowledge of basic requirements and personal attributes needed to enter such career fields. Students will discover potential careers that match their skills and interests. Other topics include locations and areas healthcare professionals practice, including the lesser-known areas, as well as cultural and economic factors impacting health equity and access. This course is designed for first-year and second-year students.

**IPHY 1040 (1) Medical Professional Speaker Series**
Fall semester only, meets one time per week. For students enrolled in Health Professions Residential Academic Program (HPRAP). Introduction to careers by working professionals from a variety of medical fields.
**Grading Basis:** Pass/Fail

**IPHY 1111 (2) Analysis of Human Movement with Smart-Phone Technology**
Learn how to measure and analyze human movement using a smart-phone application. After being provided with some background information on human physiology, students will learn how to acquire, process, and analyze signals detected by the app. Students will be required to participate in a group project that they present in poster format to their peers.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab

**IPHY 1131 (2) Using model organisms to study human disease: hands-on research**
Provides a hands-on laboratory research experience, including undertaking science scholarship, designing and performing experiments, and analysis of quantitative data. Students will also be exposed to basic concepts in genetics and molecular biology, as well as the rationale for current experimental approaches for understanding human disease.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 1181 (2) Biological Probiotic/Drug Discovery Through Hands-on Screens**
Provides introduction to research and laboratory experience. Students will work in teams to screen novel mycobacterial strains for use as probiotics or immunoregulatory/anti-inflammatory drugs using THP-1 cells, a human monocytic cell line. Topics covered include the hygiene or "Old Friends" hypothesis, the human microbiome, approaches to screening for new probiotics of therapeutics and statistical analysis of the data.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 1181
**Grading Basis:** Letter Grade

**IPHY 1211 (2)**
**Using Sensor Technology to Study the Effects of Light on Human Health**
Introduces you the basics of photobiology, measurement of light (including a discussion of humancentric vs. radiometric units for quantifying light exposure), and light effects on human physiology and longterm health. You will also be taught how to program light sensors, extract raw data, process, analyze and visualize it (incl. basic statistics in R).
**Grading Basis:** Letter Grade

**IPHY 1600 (3) Basic Human Anatomy and Physiology For Non-Majors**
Focuses on basic knowledge of human body structures and functions. Topics include an orientation to the human body, basic chemistry and cell structure, the integumentary, skeletal, muscular, nervous, endocrine, cardiovascular, lymphatic, immune, respiratory, digestive, urinary, and reproductive systems. Integrative Physiology (IPHY) majors should take IPHY 3410 and 3430 to fulfill the anatomy and physiology degree requirements.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 1950 (3) Introduction to Scientific Writing in Integrative Physiology**
Gives students practical tools that they will need as majors in Integrative Physiology or other sciences: skills in finding, reading, and using professional scientific publications; understanding of the formats required by various scientific documents; practice in writing about science for different purposes and audiences; and tools for analyzing and developing their own writing processes.
**Requisites:** Restricted to students with 0-86 credits (Freshmen, Sophomore or Juniors) only.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Lower
MAPS Course: English

**IPHY 2010 (1-3) Seminar in Integrative Physiology**
Introduces a small group of lower-division students to current research topics in integrative physiology. Emphasizes relevant applications to real-world situations.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 2030 (2) Preparing for a Career in the Health Professions**
This course is designed to help students learn the basic requirements and personal attributes needed to enter the healthcare professions, while building the primary elements of their application to health professional schools. Students will explore the ways in which they can gain shadowing, volunteering, and other clinical experiences that both fit their career path and reflect their personal goals and values. Students will also spend time working on one of the biggest components of their application - their personal statement. This course is specifically designed for sophomores, juniors, and seniors who are new to navigating admissions processes.
**Recommended:** Prerequisite IPHY 1030.

**IPHY 2400 (2) Introduction to Medical Terminology for Future Health Professionals**
Introduces medical terminology used within the health professions. Word roots, prefixes and suffixes used in medical records for major body systems will be examined and explained. The structure and functions of the major systems will be defined and described.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 2420 (3) Introduction to Nutrition**
Focuses on the basic anatomy, physiology, and chemistry of nutrition. Topics include weight management, the role of diet and lifestyle in disease prevention, specific nutrient deficiencies and toxicities, nutrition standards and guidelines, sports nutrition recommendations, agricultural practices, and food policy issues.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 3400
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 2692 (3) Foundations in Public Health**
Get a comprehensive overview of public health as well as an in-depth introduction to specific public health-related topics. Beginning with a historical overview, students will explore major public health concepts such as the basic principles of epidemiology, the biomedical basis of disease, social and behavioral determinants of health, and systems thinking. Learn about the concepts of measuring and evaluating the health of populations, principles of communicable and non-communicable diseases, environmental and occupational health, the economics of health, and the role of public health workers in society.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 2692 and PBHL 2692
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**IPHY 2910 (1-6) Practicum in Integrative Physiology**
Offers lower-division students practical experience in laboratory, clinical, or field settings with direct supervision. Students can earn 1 credit for every 45 hours of intern work.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.

**IPHY 3010 (1-2) Teaching in Integrative Physiology**
Provides an opportunity for students to assist in specific lecture, recitation, or laboratory sections under direct faculty supervision. Students can earn 1 credit for 30-49 hours of class contact time or 2 credits for 50+ hours.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite Students must have earned B- or higher in the course they are assisting.

**IPHY 3020 (1) Next Steps: Preparing for Life After Graduation**
Helps upper-division students prepare for what comes after graduation. Topics include exploring careers; how to write a resume or CV; interviewing tips; how to build your portfolio; asking for letters of recommendations. This course is specifically designed for juniors starting to prepare for the next stage post-graduation.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 3020 and MCDB 3020
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Pass/Fail

**IPHY 3280 (4) Intro to Data Science and Biostatistics**
Builds a foundation for modern data analysis and experimental design in the context of human physiology, health and disease. An intuitive understanding of probability, statistical methods, test outcomes and data relationships are emphasized over rigorous mathematical proofs. Foundational analytical skills using R and R Studio are developed using real and simulated data.
**Additional Information:** Arts Sci Gen Ed: Quantitative Reasoning Math

**IPHY 3410 (3) Human Anatomy**
Explores the cells, tissues, and organs that compose the different anatomical systems including integumentary, skeletal, muscular, digestive, respiratory, cardiovascular, lymphatic, nervous, urinary and reproductive. All registration restrictions will be strictly enforced by the department.
**Requisites:** Requires prerequisite 1-semester biology lecture of EBIO 1210 or MCDB 1150 or CHEN 2810 (minimum grade C-).
**Recommended:** Prerequisite EBIO 1220.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 3415 (2) Human Anatomy Laboratory**
Introduces structures of the human anatomical systems using human cadavers and animal tissue. This laboratory is meant to complement IPHY 3410. All registration restrictions will be strictly enforced by the department.
**Requisites:** Requires prerequisite or corequisite of IPHY 3410 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 3430 (4) Human Physiology**
Introduces the physiology of the endocrine, nervous, muscular, cardiovascular, respiratory, urinary, digestive, reproductive and immune systems. Each system will be integrated into the larger contexts of homeostasis and adaptation during pathology and challenges. Students must enroll in lecture and recitation sections. All registration restrictions will be strictly enforced by the department. Students can be co-enrolled in CHEM 1133/1134 or IPHY 3435.
**Requisites:** Requires prerequisite courses of IPHY 3410 and prerequisite or corequisite of CHEM 1133 and 1134 (all minimum grade C-).
**Recommended:** Prerequisite IPHY 3415.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 3435 (2) Physiology Lab**
Introduces laboratory experience in selected aspects of human physiology with a focus on applying the scientific method in experimentation. This laboratory is meant to complement IPHY 3430. Students should take IPHY 3435 or IPHY 3437 to fulfill degree requirements. All registration restrictions will be strictly enforced by the department.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 3437
**Requisites:** Requires prerequisite course of IPHY 3280 or EBIO 1010 or MATH 2510 or PSYC 2111 or SOCY 2061, and prerequisite or corequisite course of IPHY 3430 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 3437 (2) Virtual Human Physiology Laboratory**
Introduces online laboratory experiences for select aspects of human physiology using laboratory simulations. This online laboratory is meant to complement IPHY 3430. As an online course, this lab may not fulfill prerequisites for post-baccalaureate, graduate, or other allied health programs. Please consult with your Biology advisor before enrollment. Students should take IPHY 3435 or IPHY 3437 to fulfill degree requirements. All registration restrictions will be strictly enforced by the department.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 3435
**Requisites:** Prerequisite or corequisite of IPHY 3430 and prerequisite statistics course of IPHY 3280 or EBIO 1010 or MATH 2510 or PSYC 2111 or SOCY 2061 (all minimum grade C-). All registration restrictions will strictly enforced by the department.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 3440 (3) Clinical Nutrition**
Exploration of clinical nutrition concepts from a health care provider perspective. Examines how and why diseases develop and what nutritional therapy and intervention is appropriate for disease resolution. All registration restrictions will be strictly enforced by the department.
**Requisites:** Requires prerequisite of IPHY 2420 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Integrative Physiology (IPHY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 3490 (3) Introduction to Epidemiology**
Examines the history and uses of epidemiology, measures of disease frequency and occurrence, association and causality, analytic epidemiology, evidence-based screening and outbreak investigations.
**Recommended:** Prerequisite Statistics course (IPHY 3280 or EBIO 1010 or MATH 2510 or PSYC 2111 or SOCY 2061).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 3590 (3) Health and Function over the Adult Lifespan**
Examines topics in the field of biomedical aging in the context of public health including lifespan, changing demographics of aging, health span, genetics of aging; physiology of aging (changes in function with age; biological mechanisms of aging); clinical disorders of aging (aging and chronic diseases; clinical syndromes in geriatric medicine); lifestyle and pharmacological strategies for preserving health and function with aging.
**Requisites:** Requires prerequisite courses of Human Physiology (IPHY 3430) and a statistics course (IPHY 3280, EBIO 1010, MATH 2510, PSYC 2111, or SOCY 2061).

**IPHY 3700 (3) Scientific Writing in Integrative Physiology**
Takes a process-based approach to writing. Assignments and classroom experiences emphasize critical thinking, using scientific evidence and reasoning to construct original arguments, and applying conventions and problem-solving skills to craft successful documents.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Integrative Physiology (IPHY) or Neuroscience (NRSC) majors only.
**Recommended:** Prerequisite Statistics course (IPHY 3280 or EBIO 1010 or MATH 2510 or PSYC 2111 or SOCY 2061).
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**IPHY 4010 (1-3) Seminar in Integrative Physiology**
Introduces a small group of students to current research topics in integrative physiology, evaluation of current research and discussion of critical issues.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite Statistics course (IPHY 3280 or EBIO 1010 or MATH 2510 or PSYC 2111 or SOCY 2061).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4040 (3) History of Medicine**
Explores the history of western European medicine from the Middle Ages to the 19th century with a focus on the influence of social events and how these shaped the process and evolution of medicine. Projects explore topics of student interest that might include pharmacology, pathology, mental illness, optometry, dentistry, women in medicine, and the influence of war on medical practices. This is a three-week Education Abroad Global Seminar.
**Requisites:** Prerequisite IPHY 3410 (minimum grade C-)

**IPHY 4041 (3) Global Health and Disease**
This course will provide a comprehensive study of community health and common diseases with a specific geographical case study that will vary. Students will have the opportunity to learn about these topics through observations, discussions, visiting local clinics, and hospitals, and interaction with local communities. This is a three-week Education Abroad Global Seminar.
**Requisites:** Requires prerequisite course of IPHY 3410 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4060 (4) Cell Physiology**
Focuses on the molecular machines and cellular sub-compartments that allow cells to renew, replicate, and function in the context of multicellular organisms. Students in lecture section 010 must also enroll in a lab section. The online section of the course may not fulfill prerequisites for post-baccalaureate, graduate, or other allied health programs. Please consult with your Biology advisor before enrollment.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 5060
**Requisites:** Requires prerequisite course of IPHY 3430 and IPHY 3435 or IPHY 3437 (all minimum grade C-). Restricted to Integrative Physiology (IPHY) or Neuroscience (NRSC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4200 (3) Physiological Genetics and Genomics**
Covers fundamental concepts in molecular genetics/genomics with physiological applications. Topics include structure and function of nucleic acids, genome structure, genetic and genomic research tools, methods for identifying disease-causing mutations, regulation of gene expression, pharmacogenetics, gene therapy and ethical issues in modern genomics. First course of a 3-course series recommended for IBG students. Includes a recitation section.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 5200
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4300 (3) Pathophysiology of Disease**
Uses case studies to explore various disease states of the organ systems within the body and the underlying mechanisms that contribute to the manifestations of these diseases. Additionally, students will examine the importance of epidemiology in the understanding of disease as well as discuss infectious disease, and the role of genetics in congenital defects and cancer. All registration restrictions will be strictly enforced by the department.
**Requisites:** Prerequisite of IPHY 3410 and IPHY 3430 (minimum grade C-).
**Grading Basis:** Letter Grade

**IPHY 4420 (3) Nutrition and Human Performance**
Examines nutrient use during exercise and the nutrient needs of athletes and active individuals, including strategies to improve physical performance and recovery through dietary manipulations and dietary supplements. All registration restrictions will be strictly enforced by the department.
**Requisites:** Prerequisite of IPHY 2420 (minimum grade C-). Restricted to Integrative Physiology (IPHY) majors only.

**IPHY 4440 (4) Endocrinology**
Introduces mammalian endocrine system. Provides a thorough analysis of chemical communication by hormones and related bioregulators with emphasis on the major endocrine systems such as the thyroid, gonad, pituitary and the brain. All registration restrictions will be strictly enforced by the department.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 5440
**Requisites:** Requires prerequisite courses of IPHY 3430 and IPHY 3435 or IPHY 3437 (minimum grade C-). Restricted to Integrative Physiology (IPHY) or Neuroscience (NRSC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4470 (3) Biology of Human Reproduction**
Anatomy and physiology of human reproduction, including gender determination, embryology, puberty, menstrual cycle, pregnancy, lactation, menopause, sexual behavior, sexual abnormalities and contraception. Open to all majors.
**Requisites:** Prerequisite of general biology (lecture + lab).
**Recommended:** Prerequisite IPHY 3430 and IPHY 4440.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4480 (3) Comparative Reproduction**
Focuses on comparative anatomy and physiology of reproductive system and the evolution of reproductive behavior in vertebrates and invertebrates. Topics include courtship, mating, fertilization, estrous and menstrual cycles and environmental control of seasonal reproduction.
**Requisites:** Prerequisite of general biology (lecture + lab).
**Recommended:** Prerequisite IPHY 3430.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4490 (3) Case Studies in Public Health**
Explores case studies in public health in how they have influenced our approach to disease outbreaks and disease resolution. Examines famous case studies in infectious disease, zoonoses and non-infectious diseases, including environmental and occupational exposure to see how they have changed our understanding of disease and responses by health and medical personnel. Examines special populations within public health, as well as discuss modern public health challenges.
**Requisites:** Prerequisite of IPHY 3490 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4540 (5) Biomechanics**
Applies the principles of physics and physiology to analyze the movement of humans and other animals. Assesses the mechanical properties of muscles, tendons, ligaments and bones. Quantitatively analyzes forces, torque, mechanical energy, power impulses and momentum associated with human movement. Students enroll in a lab, and the enrolled lab will have a designated recitation and lecture attached. All registration restrictions will be strictly enforced by the department.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 5540
**Requisites:** Requires prerequisite courses of IPHY 3430 and physics (PHYS 1110 or PHYS 2010) (all minimum grade C-). Restricted to Integrative Physiology (IPHY), Neuroscience (NRSC), or College of Engineering majors only.
**Recommended:** Prerequisites IPHY 3415 and calculus (MATH 1300 or MATH 1310 or APPM 1350) and statistics (IPHY 3280 or EBIO 1010 or MATH 2510 or PSYC 2111 or SOCY 2061).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4580 (3) Sleep Physiology**
Describes the physiology, neurobiology, and functions of sleep and circadian rhythms; explains the impact of sleep and circadian rhythms, as well as sleep and circadian disruptions and disorders on immune, endocrine, thermoregulatory, cardiovascular, respiratory, and neural systems; examines changes in sleep and circadian rhythms across the life span. The integrative nature of sleep and circadian rhythms in normal physiological and cognitive functions and their importance in health and disease processes will be emphasized. All registration restrictions will be strictly enforced by the department.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 5580
**Requisites:** Requires prerequisite course of IPHY 3430 (minimum grade C-). Restricted to Integrative Physiology (IPHY) or Neuroscience (NRSC) majors only.
**Recommended:** Prerequisites Statistics course (IPHY 3280 or EBIO 1010 or MATH 2510 or PSYC 2111 or SOCY 2061).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4600 (3) Immunology**
Studies the immune system, a multi-cellular system that functions to protect us from disease. Introduces concepts associated with the development and function of individual cells of the immune system (T-cells, B-cells, neutrophils, dendritic cells, macrophages), as well as their integrative roles in physiology and host defense. This course requires a conceptual understanding of the material and emphasizes problem-solving skills through case studies. All registration restrictions will be strictly enforced by the department.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 5600
**Requisites:** Requires prerequisite course of IPHY 3430 (minimum grade C-). Restricted to Integrative Physiology (IPHY) or Neuroscience (NRSC) majors only.
**Recommended:** Prerequisite or corequisite IPHY 4060.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4650 (5) Exercise Physiology**
Examines physiological and biochemical adjustments that occur in the body with acute and chronic exercise. Topics center on physiological mechanisms pertaining to metabolic, cardiovascular, and hormonal alterations, the role of exercise in health and disease, soreness and fatigue, immune function, as well as exercise during varied environmental conditions. All registration restrictions will be strictly enforced by the department.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 5650
**Requisites:** Requires prerequisite course of IPHY 3430 and IPHY 3435 or IPHY 3437 (all minimum grade C-). Restricted to Integrative Physiology (IPHY) or Neuroscience (NRSC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4720 (4) Neurophysiology**
Explores the function of the nervous system, including how the properties of neurons influence nervous system activity, how the nervous system controls the activity of muscles and how the sensory effects of muscle activity influence the function of the nervous system. All registration restrictions will be strictly enforced by the department.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 5720
**Requisites:** Requires prerequisite courses of IPHY 3430 and IPHY 3435 or IPHY 3437 (all minimum grade C-). Restricted to Integrative Physiology (IPHY) or Neuroscience (NRSC) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IPHY 4780 (3) Sleep, Circadian Rhythms, and Health**
Examines the history of the fields of sleep and circadian rhythms; lifespan development of sleep and rhythms; observational, physiological, and clinical measures of sleep; screening for sleep and circadian disorders; associations between poor sleep and circadian misalignment and health; and evidenced-based sleep and circadian interventions/preventions in healthy and clinical samples. Dept. enforced requisite: one year of biology (lecture and lab).
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 5780

**IPHY 4800 (3) Molecular Evolution: How Natural Selection has Shaped the Molecules of Life**
This course explores how Darwin¿s idea has shaped the structures of DNA, RNA and proteins across the long history of life on earth. Natural selection driving the evolution these macromolecules and subsequent developmental pathways will be fully appreciated as the process that ultimately produced the amazing variety of species on this planet. Looking ahead, our recent efforts to harness the power of evolution in the test tube to develop new therapies will be covered.
**Requisites:** Requires prerequisite courses of MCDB 3135 and MCDB 3145 (minimum grade C-).

**IPHY 4850 (1) Honors Thesis Seminar**
The course is specifically designed for students who are enrolled in the IPHY Honors program and have a faculty mentor. The course follows a workshop-based approach and aims to guide students through the various stages of writing and defending a thesis. It also provides an opportunity to share and receive feedback on works in progress. Throughout the course, students will have the chance to explore the scientific writing format, improve their writing process, and effectively communicate about science. Additionally, student will have the opportunity to practice a thesis defense talk.
**Recommended:** Prerequisite IPHY 3700; and IPHY 4870 (taken concurrently).

**IPHY 4860 (1-8) Independent Study: Undergraduate**
An opportunity for upper-division students to earn academic credit for working under the individual direction of a faculty member. Consult with faculty mentor and undergraduate coordinator for approval. Department enforced prerequisites: Cumulative GPA of 2.0 and completion of at least one upper-division IPHY course. Students can earn 1 credit for every 25 hours worked.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**IPHY 4870 (1-6) Honors Thesis**
An opportunity for students enrolled in the IPHY Honors program to earn academic credit for working on their thesis. Students can earn 1 credit for every 25 hours worked.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisites IPHY 3700; and IPHY 4850 (taken concurrently).
**Additional Information:** Arts Sciences Honors Course

**IPHY 4880 (3) Advanced Data Analysis in Biomedical Research**
Provides advanced training on statistics and scientific reasoning in laboratory and clinical research. Conceptual foundations of classical and modern statistical techniques is reviewed. Multiple class projects consist of written reports on statistical analysis of data representative of the student's field of interest. The use of statistical packages, primarily R, is required.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 5880
**Requisites:** Prerequisite: Statistics course (IPHY 3280 or EB10 1010 or MATH 2510 or PSYC 2111 or SOCY 2061 (minimum grade C).
**Grading Basis:** Letter Grade

**IPHY 4900 (1-6) Public Health Practicum**
Offers practical experience in Public Health with direct supervision.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4900 and MCDB 4900
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**IPHY 4930 (1-6) Internship**
Offers upper-division students practical experience in laboratory, clinical, and field settings with direct supervision Students can earn 1 credit for every 45 hours of intern work. Consult with departmental internship coordinator for approval. Department enforced prerequisite: Cumulative GPA of 2.0 and completion of two upper-division IPHY courses.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**IPHY 4940 (1-6) Application for Clinical Internship**
Provides upper-division students an opportunity for internship experience in a clinic and hospital setting with an established Affiliation Agreement with CU Boulder. Students can earn 1 credit for every 45 hours of intern work. Consult with departmental internship coordinator for approval. Department enforced prerequisite: Cumulative GPA of 2.0 and completion of two upper-division courses.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**IPHY 4950 (1-6) Global Study Abroad Internship**
Provides an opportunity for students to combine international experiential learning and academic theory as a means to gain professional experience and to develop a new perspective on a career field. Contact the Study Abroad office (abroad@colorado.edu) for information on available opportunities and to find out how to enroll in this course.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**IPHY 5060 (4) Cell Physiology**
Focuses on the molecular machines and cellular sub-compartments that allow cells to renew, replicate, and function in the context of multicellular organisms. Students must enroll in lecture and recitation sections.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4060
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 5100 (2) Colloquium in Integrative Physiology**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 5200 (3) Physiological Genetics and Genomics**
Covers fundamental concepts in molecular genetics/genomics with physiological applications. Topics include structure and function of nucleic acids, genome structure, genetic and genomic research tools, methods for identifying disease-causing mutations, regulation of gene expression, pharmacogenetics, gene therapy and ethical issues in modern genomics. First course of a 3-course series recommended for IBG students. Includes a recitation section.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4200 and PSYC 5200
**Requisites:** Restricted to Integrative Physiology (IPHY or C-IPHY) or Psychology (PSYC) graduate students only.

**IPHY 5300 (3) Statistical Genetics for Complex Traits**
Focuses on the methods of mapping complex disease genes in both population and family-based samples. Topics include both linkage and association analyses of qualitative and quantitative phenotypes.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 5440 (4) Endocrinology**
Introduces mammalian endocrine system. Provides a thorough analysis of chemical communication by hormones and related bioregulators with emphasis on the major endocrine systems such as the thyroid, gonad, pituitary and the brain. Department enforced prerequisites: one year of general biology (lecture + lab) and one year of general chemistry (lecture + lab).
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4440
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 5540 (5) Biomechanics**
Applies the principles of physics and physiology to analyze the movement of humans and other animals. Assesses the mechanical properties of muscles, tendons, ligaments and bones. Quantitatively analyzes forces, torque, mechanical energy, power impulses and momentum associated with human movement.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4540
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.
**Recommended:** Prerequisite one semester of physiology and one semester of general physics (lecture + lab).

**IPHY 5580 (3) Sleep Physiology**
Describes the physiology, neurobiology, physiology and functions neurobiology of sleep and circadian rhythms; explains the impact of sleep, sleep deprivation, and circadian rhythms, as well as sleep and circadian disruptions and disorders on immune, endocrine, thermoregulatory, cardiovascular, respiratory, and and neural systems; systems, as well as examines changes in sleep and circadian rhythms across the the life span. The integrative nature of sleep and circadian rhythms in normal physiological and cognitive functions and their importance in health and disease processes will be emphasized. Department enforced prerequisite: statistics equivalent.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4580
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 5600 (3) Immunology**
Studies the immune system, a multi-cellular system that functions to protect us from disease. Introduces concepts associated with the development and function of individual cells of the immune system (T-cells, B-cells, neutrophils, dendritic cells, macrophages), as well as their integrative roles in physiology and host defense.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4600
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.
**Recommended:** Prerequisites one year of general biology (lecture + lab) and one year of general chemistry (lecture + lab); IPHY 3470.

**IPHY 5650 (5) Exercise Physiology**
Examines physiological and biochemical adjustments that occur in the body with acute and chronic exercise. Topics center on physiological mechanisms pertaining to metabolic, cardiovascular, and hormonal alterations, the role of exercise in health and disease, soreness and fatigue, immune function, as well as exercise during varied environmental conditions.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4650
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.
**Recommended:** Prerequisite one semester of physiology and one semester of physiology lab.

**IPHY 5720 (4) Neurophysiology**
Explores the function of the nervous system, including how the properties of neurons influence nervous system activity, how the nervous system controls the activity of muscles and how the sensory effects of muscle activity influence the function of the nervous system. Department enforced prerequisites: one year of general biology (lecture + lab) and one year of general chemistry (lecture + lab), IPHY 2800 (or equivalent); IPHY 3410.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4720
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.
**Grading Basis:** Letter Grade

**IPHY 5740 (3) Theory of Motor Skill Learning**
Offers a critical analysis of motor learning theories, including Adam's closed loop theory, Schmidt's schema theory and the influence of contextual interference on learning and performance. Also covers feedback and practice organization. Projects and presentations required.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4740
**Requisites:** Restricted to Integrative Physiology (IPHY or C-IPHY) or Psychology (PSYC) graduate students only.

**IPHY 5780 (3) Sleep, Circadian Rhythms, and Health**
Examines the history of the fields of sleep and circadian rhythms; lifespan development of sleep and rhythms; observational, physiological, and clinical measures of sleep; screening for sleep and circadian disorders; associations between poor sleep and circadian misalignment and health; and evidenced-based sleep and circadian interventions/preventions in healthy and clinical samples. Dept. enforced requisite: one year of biology (lecture and lab); statistics course.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4780

**IPHY 5800 (4) Advanced Statistics and Research Methods in Integrative Physiology**
Introduces advanced statistical techniques important for analyzing data rising in biomedical research, including physiology. StatistIcal reasoning will be emphasized through problem solving and applications using statistical software packages.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.
**Recommended:** Prerequisite IPHY 2800.

**IPHY 5840 (1-6) Graduate Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 5880 (3) Advanced Data Analysis in Biomedical Research**
Provides advanced training on statistics and scientific reasoning in laboratory and clinical research. Conceptual foundations of classical and modern statistical techniques is reviewed. Multiple class projects consist of written reports on statistical analysis of data representative of the student's field of interest. The use of statistical packages, primarily R, is required.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4880
**Requisites:** Requires prerequisite course of IPHY 5800 (minimum grade B).
**Grading Basis:** Letter Grade

**IPHY 5900 (3) Data Literacy in Biomedical Research**
Provides a platform to develop a deeper understanding of quantitative biomedical research, current trends, challenges, and limitations. The course complements graduate statistical training by introducing topics relevant to open science and data literacy, including reproducibility, data privacy challenges, and the importance of good data management. Challenges in advanced statistical data evaluation and analysis in biomedical research settings will be discussed.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.
**Recommended:** Prerequisite IPHY 5800.
**Grading Basis:** Letter Grade

**IPHY 6010 (1-3) Seminar**
Presents special topics in integrative physiology.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 6660 (3) Locomotion Energetics and Biomechanics**
Critiques and discusses both classic and cutting edge scientific research in the area of terrestrial locomotion.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.
**Recommended:** Prerequisites IPHY 4540 and IPHY 4650.

**IPHY 6680 (3) Matlab for Physiological and Biomechanical Research**
Introduces Matlab programming skills needed to write and modify programs for data acquisition and analysis, statistics, plotting, and simulation.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 6830 (3) Professional Skills for the Research Scientist**
Discusses grant and manuscript writing, scientific presentations, peer-review, setting up/directing a research laboratory, research ethics, mentoring and other professional skills.
**Requisites:** Restricted to Intergrative Physiology (IPHY) doctoral students only.

**IPHY 6840 (1-3) Research Project**
Involves a scholarly investigation of a selected topic using literature and/or experimental techniques. Advisor required.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 6950 (1-6) Master's Thesis**
Must have 4 credit hours and may be repeated up to 6 total credits.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Integrative Physiology (IPHY) or Integrative Physiology Concurrent Degree (C-IPHY) graduate students only.

**IPHY 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Requisites:** Restricted to Intergrative Physiology (IPHY) doctoral students only.

# Intermedia Art, Writing and Performance (IAWP)

## Courses

**IAWP 6000 (3) Introduction to Practice-Based Research**
Introduces students to practice-based research methods in intermedia art, writing and performance.
**Requisites:** Restricted to College of Media, Design, and Information (CMDI) graduate students only.

**IAWP 6100 (3) Theory and Practice of Doing**
Introduces students to the theory of doing and making. Guiding questions include: what does it mean to place "doing" at the center of one's research agenda? What does it mean to do hands-on work in an art/design studio, a digital humanities lab, a media lab, a media archaeology lab, a makerspace or a hackerspace?
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 6100
**Grading Basis:** Letter Grade

**IAWP 6200 (3) Intermedia Collaboratory**
Collaborative studio course in which students focus on emerging practices in intermediate art, writing and performance while collaboratively building art, writing and/or performance projects that are presented to the community as public events and programs including exhibitions, publications and performances.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to College of Media, Design, and Information (CMDI) graduate students only.

**IAWP 6700 (3) Special Topics**
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Media, Design, and Information (CMDI) graduate students only.

**IAWP 6800 (3) Intermedia Seminar**
Focuses on intermedia arts, writing and performance as they relate to digital media, communication and information.
**Requisites:** Restricted to College of Media, Design, and Information (CMDI) graduate students only.
**Grading Basis:** Letter Grade

**IAWP 6871 (3) Special Topics**
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**IAWP 7841 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**IAWP 7871 (3) Special Topics**
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**IAWP 8991 (1-10) Doctoral Dissertation**
**Repeatable:** Repeatable for up to 40.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

# International Affairs (IAFS)

## Courses

**IAFS 1000 (4) Global Issues and International Affairs**
Introduces the student to the international affairs program. The course examines political and economic development in several countries in many different world regions. Examines historical trends and development as well as current political and economic issues.
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**IAFS 3000 (3) Special Topics in International Affairs**
Junior or senior level umbrella seminar spanning a variety of topics relevant to the study of international affairs. Subjects addressed under this heading vary according to student interest and faculty availability.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Political Science (PSCI) majors or International Affairs (IAFS) majors or minors with 57-180 credits (Junior or Senior) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**IAFS 3010 (3) Islam, Geopolitics and Society: Gender, Identity and Place**
Examines Islam, geopolitics and society in various locations throughout the globe, such as Afghanistan, Egypt, France, Germany, India, Indonesia, Iran, Iraq, Ireland, Israel/Palestine, Morocco, Pakistan, Saudi Arabia, Turkey, Yemen, the UK and the US. Addresses issues of gender, identity and place to illustrate the complexity and diversity of social experiences within the milieu of Islam and geopolitics.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**IAFS 3500 (3) French Connections: Contemporary France and America in Historical Context**
Faculty-led Global Seminar, based in Bordeaux, France provides an opportunity to compare French history and contemporary culture, economy, and culture to that of the United States. Lectures in Boulder and Bordeaux are supplemented by interactions with officials, scholars, business leaders, interest groups, and organizations in France. Offered through Study Abroad.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4190
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**IAFS 3520 (6) Global Seminar: Justice, Human Rights and Democracy in Israel**
Explore the challenges and complexities of justice, democracy and human rights in Israel and the West Bank through field trips, course work and service learning projects with Jerusalem based non-profit organizations. Acquire new knowledge and lived experience on critical issues facing Israelis and Palestinians with the wider scope of Middle East politics.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4302
**Recommended:** Prerequisites ANTH 4050 or JWST 4050 and IAFS 3600 or JWST 3600.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**IAFS 3530 (3) Global Seminar: Jews and Muslims - The Multiethnic History of Istanbul**
Spend two weeks in Istanbul and examine Jewish-Muslim relations in a place that was for 500 years the crossroads of civilization. The only Muslim city in the 21st century with a large, thriving Jewish community, Istanbul models how people from different social classes, ethnicities and religious backgrounds can coexist.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3530 and RLST 3530
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**IAFS 3540 (3) Migration, Human Rights, and Conflict in the Mediterranean**
Faculty-led Global Seminar, based in Malta, provides the opportunity to study social, political, and economic issues surrounding international migration, Focuses on causes and consequences of recent migration flows from nations in the Middle East and Sub-Saharan Africa to European nations located in the Eastern Mediterranean. Students will interact with representatives of state governments, NGOs, and activist groups, and learn about the rich culture and history of Malta as a pivotal state promoting international diplomacy and regional security.
**Equivalent - Duplicate Degree Credit Not Granted:** PACS 3540
**Requisites:** Requires prerequisite course of PACS 2500 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective

**IAFS 3600 (3) Contemporary Jewish Societies**
Uses transnational lens to explore contemporary debates about Jewish people, places and practices of identity and community; places that Jews have called 'home', and what has made, or continues to make those places 'Jewish'; issues of Jewish homelands and diasporars; gender, sexuality, food and the Jewish body; religious practices in contemporary contexts. Readings drawn primarily from contemporary journalism and scholarship.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3600 and GSLL 3600
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**IAFS 3610 (3) Topics in International Affairs and Jewish Studies**
Explores topics in international affairs as it relates to Jewish culture and society. Subjects addressed under this heading vary according to student interest and faculty availability.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3610
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**IAFS 3621 (3) Rogues to Revolutionaries: Russian Rebels, Past and Present**
Explores the tradition of dissent and opposition in Russian culture, from the medieval period to present, approaching forms of rebellion (religious, political, social, aesthetic) in historical context. This survey in intellectual history will trace this phenomenon across historical documents, literary texts, film, and the fine and performing arts, pairing these primary materials with readings in Russian history. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4481 and RUSS 5481
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**IAFS 3622 (3) Understanding Ukraine: Culture, Diversity, Conflict**
Introduces students to Ukraine¿s cultural diversity and orients them in the history of the country at the heart of contemporary world politics. This course will provide students with a necessary historical frame for understanding current and war-time cultural debates about Ukraine¿s contested heritage and future. Taught in English. Degree credit not granted for REES 4871 and REES 5871.

**IAFS 3630 (3) Radical Nationalism in Contemporary Northern Europe**
Examines the current rise of National Socialists, white supremacists, ethnic separatists, anti-Islam activists and social and cultural ultraconservatives in northern Europe. Treats extremist nationalism as a social, cultural, aesthetic, intellectual and political movement. Consults scholarship from sociology, criminology and political science, as well as music, literature, art and film.
**Equivalent - Duplicate Degree Credit Not Granted:** SCAN 3301
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences

**IAFS 3631 (3) Arctic Society and Culture**
Investigates representations of the Arctic in literature, art, cinema, media and scientific, and geographical writing over the past century and a half, spanning material from North America, Britain, continental Europe and the Nordic region. Interpretive approaches include ecocriticism; post-colonialism; literary studies; indigenous studies; visual, film and media theory; Cold War studies.
**Equivalent - Duplicate Degree Credit Not Granted:** SCAN 3631
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**IAFS 3632 (3) Scandinavia and the European Union**
Examining the role that the EU plays in the Nordic region, this course is an introduction to the complex relationship between the Nordic nation states and the European project. We explore how the EU is perceived in the Nordic countries and investigate why the Nordic region is reluctant in its relation to the European Union.
**Equivalent - Duplicate Degree Credit Not Granted:** SCAN 3632

**IAFS 3640 (3) Data Analysis for Global Environmental Affairs**
Develops data analysis techniques for global environmental data including demographic, economic, agricultural, fisheries and energy sectors. Designed to support the development of basic and intermediate data analysis skills for students in the Global Environmental Affairs certificate program. Includes hands-on exploration of up-to-date global data sets from a variety of sources. Fulfills the application requirement for the ENVS major.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3640
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**IAFS 3650 (3) History of Arab-Israeli Conflict**
Explores the origins and development of the Arab-Israeli conflict. Traces Arab-Jewish/Israeli relations from the 19th century through the Palestine Mandate, the evolution of Arab and Jewish nationalism and the creation of Israel to the present day.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3650
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) International Affairs (IAFS) majors only.
**Recommended:** Prerequisite HIST 1308 or HIST 1828 or JWST 1828.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**IAFS 3670 (3) Cities of the Global South**
Examines the geographies, processes, structural forces and everyday forms of urban life that are at the core of rapid urban transformation in the global South. Through using interdisciplinary scholarship, empirical case studies and key theoretical work, the course covers themes such as migration and urbanization, informality and governance, infrastructures of everyday life and urban environmental politics.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 3622

**IAFS 3681 (3) Refugees in German Culture**
Introduces the diversity of refugee migration in German culture through artistic and cultural "texts," including those created by or in collaboration with refugees (film, comic journalism, literature, blogs, hashtag campaigns, music, etc). These texts are discussed in relationship to theories of racism, precarity, and biopolitics together and contextualized by work from other disciplines. This interdisciplinary course is methodologically informed by the theory and practice of cultural studies. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 3681, JWST 3681 and AHUM 3681
**Recommended:** for students with sophomore standing or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**IAFS 3850 (3) International Conflict Resolution and Peacebuilding**
Provides an introduction to the interdisciplinary field of international conflict resolution and peacebuilding. Provides tools for analyzing and intervening in contemporary manifestations of violent social conflict. Argues for an approach to international affairs rooted in more nuanced understandings of the nature of violent conflict and its dynamics. Bases the quest to build sustainable peace not on military supremacy or coercive diplomacy, but rather the ability of states and peoples to work collaboratively to develop mutually beneficial solutions aimed at the satisfaction of basic needs, collective security, political representation, and respect for human dignity. Explores how international conflicts are mitigated, contained, and resolved through processes such as DDR (disarmament, demobilization, and reintegration), citizen diplomacy, and reconciliation.
**Equivalent - Duplicate Degree Credit Not Granted:** PACS 3850
**Recommended:** Prerequisite PACS 2500.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective

**IAFS 4500 (3) The Post-Cold War World**
Capstone course for international affairs majors. Examines the ways in which the end of the Cold War, the collapse of failed states, and the rise of global terrorism changed the world. Studies how peoples, governments and nongovernmental organizations face new social, political, economic and security challenges in an era of globalization. Includes discussion, oral reports, critical book reviews, and research papers.
**Requisites:** Restricted to students with 87-180 credits (Senior) International Affairs (IAFS) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**IAFS 4800 (3) Honors Seminar in International Affairs**
Directed research course tailored to the particular research interests of the students enrolled. Devoted to research methodology and the development of students' research. Department enforced prerequisite: overall 3.30 GPA and IAFS 3.40 GPA.
**Additional Information:** Arts Sciences Honors Course

**IAFS 4810 (3) Honors in International Affairs**
Continuation of IAFS 4800. Students complete original research begun in the fall and write, defend their honors thesis and meet regularly with the instructor.
**Requisites:** Requires prerequisite course of IAFS 4800 (minimum grade C-).
**Additional Information:** Arts Sciences Honors Course

**IAFS 4900 (1-6) Independent Study in International Affairs**
Provides an opportunity to earn academic credit for learning outside the formal class structure. Students interested in doing in-depth research propose a research project to a faculty sponsor and then work closely with that person to produce a piece of original research. Department enforced prerequisite: restricted to students with 57-180 credits (Juniors or Seniors), GPA of 3.00 or better, grade of C or better in all lower-division courses, and at least 6 upper-division courses.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**IAFS 4930 (3-6) Internship in International Affairs**
Working individually under the guidance of a public or private organization, students are assigned to projects selected for their academic suitability. Written assignments occur throughout the semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) International Affairs (IAFS) majors only.

# International Business (INBU)

## Courses

**INBU 3101 (3) Operations Management Global Seminar**
Examines concepts, tools and techniques used in the management of operations. Focuses on how firms add value and compete with high quality products and efficient services. Emphasizes the use of models for designing and improving operations to deliver product and services. Based on an experiential learning approach that balances lecture with business visits to an international location. Credit can be granted for this course and MGMT 3100, but only one will count towards the major.
**Requisites:** Requires a prerequisite course of BCOR 1025 (minimum grade D-). Restricted to Business majors only.
**Grading Basis:** Letter Grade

**INBU 3300 (3) International Business and Management**
This survey course takes a broad and comprehensive perspective on managing and operating in a rapidly growing global economy. Explores regional and national approaches to international management, including trade practices, country penetration strategies, international finance and accounting, marketing across cultures, global service and manufacturing operations, cultural and legal differences, ethical and sustainability issues and global competitive strategy.
**Equivalent - Duplicate Degree Credit Not Granted:** INBU 3500
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) or International Affairs (IAFS) majors with 52-180 units completed.
**Additional Information:** Departmental Category: Asia Content

**INBU 3301 (3) Doing Business in China**
This survey course examines how to conduct international business in China. Explores all the major functional areas of international business as they apply to U.S. companies in China: marketing, human resources, operations, finance, accounting, government relations, cultural and legal differences, ethical and sustainability issues, and global competitive strategy. Open to non-business students.
**Requisites:** Restricted to students with 52-180 units completed.
**Additional Information:** Departmental Category: Asia Content

**INBU 3333 (3) Leading and Managing Across Cultures in Northern Europe**
Explains the "whats" and the "whys" of cultural differences in international management as it covers leadership, motivation, communication, planning, decision making process, change, structure, organizational culture, strategy, negotiation, team work and international assignments in a multicultural environment and in a multidisciplinary context from the perspective of practicing managers. Students will meet with international business professionals from European companies.
**Equivalent - Duplicate Degree Credit Not Granted:** BUSM 3006
**Requisites:** Restricted to students with 52-180 units completed.

**INBU 3450 (3) International Business and Marketing**
Describes the economic, geographic, political and social forces that have shaped and continue to define global markets. Examines topics critical to success in international markets, including assessment of a firm's international capabilities, techniques for gauging the potential of international markets, international segmentation approaches and alternative arrangements for entering foreign markets. Compares and contrasts product, price, distribution, logistics, promotion and research decisions made in global versus domestic markets. Introduces students to financial arrangements characteristic of international marketing, including exchange rates and controls, balance-of-payment principles, import licensing agreements and tariffs.
**Equivalent - Duplicate Degree Credit Not Granted:** INBU 5100
**Requisites:** Requires prerequisite class of BCOR 2001 or BCOR 2201 (minimum grade D-). Restricted to Business (BUSN), Advertising (ADVT) or International Affairs (IAFS) majors with 52-180 units completed.

**INBU 3500 (3) Global Intensive: International Strategy and Entrepreneurship**
International Business Strategy and Entrepreneurship takes a broad perspective on operating in a rapidly growing and interconnected global economy. It is designed to help managers analyze and synthesize various environmental contexts to create appropriate international business strategies to compete and succeed in a dynamic and globally-connected world. In addition to in-class work, this course provides a 10-day in-country immersion experience in one of the largest and most innovative economies in the world¿Japan.
**Equivalent - Duplicate Degree Credit Not Granted:** INBU 3300
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**INBU 4151 (3) International Operations in Hong Kong**
Compares systems of production/operations management in the United States with those in Asia. Contrasts various regional and national approaches to business, quality management, labor practices, management styles, international competitiveness, productivity, distribution systems, trade practices, and strategies for penetrating foreign markets. Examines different sociocultural environments, government-business relationships, banking industries, operations strategies, and the potential for transferring industrial management practices and techniques between countries.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Asia Content

**INBU 4200 (3) International Financial Management**
Examines the financial policies and problems associated with firms doing business internationally. Topics include the foreign exchange environment, country risk, managing foreign exchange exposure, international working capital management, international capital budgeting, and international financial markets.
**Requisites:** Requires prerequisite or corequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.
**Additional Information:** Departmental Category: Asia Content

**INBU 4825 (1-6) Experimental Seminar**
Offered irregularly to provide opportunity for investigation of new frontiers in International Business Entrepreneurship.
**Requisites:** Restricted to students with 57-86 credits (Junior).

**INBU 4900 (1-12) Independent Study**
Department instructor required. Departmental form required.

**INBU 4910 (3-6) Global Internship**
Business programs must balance theory and practice in order to produce graduates who are not only proficient in the language of business, but also have hands-on experience in their areas of emphasis. Internships are an effective way of acquiring the practical experience that business graduates need. A global internship consists of a practical international experience that includes an academic component.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Business (BUSNU) majors only.
**Grading Basis:** Letter Grade

**INBU 4925 (6) Entrepreneurship and Empowerment in South Africa**
The EESA program is broken into two main elements. The first element consists of workshop sessions that address various aspects of an entrepreneurial venture and the consulting experience. The second element involves the actual field experience in the form of consulting interventions. Students will consult with two entrepreneurs, evaluate their venture and implement tangible deliverables that make the biggest impact.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**INBU 5100 (3) International Business and Marketing**
Describes the economic, geographic, political and social forces that have shaped and continue to define global markets. Examines topics critical to success in international markets, including assessment of a firm's international capabilities, techniques for gauging the potential of international markets, international segmentation approaches and alternative arrangements for entering foreign markets. Compares and contrasts product, price, distribution, logistics, promotion and research decisions made in global versus domestic markets. Introduces students to financial arrangements characteristic of international marketing, including exchange rates and controls, balance-of-payment principles, import licensing agreements and tariffs.
**Equivalent - Duplicate Degree Credit Not Granted:** INBU 3450
**Additional Information:** Departmental Category: Asia Content

# INVST Community Studies (INVS)

## Courses

**INVS 1000 (4) Responding to Social and Environmental Problems Through Service Learning**
By integrating theory with required community service, students explore how problems are shaped by cultural values and how alternative value paradigms affect the definition of problems in areas such as education and the environment. Students examine different approaches to solving problems and begin to envision new possibilities.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Invst Community Studies

**INVS 1513 (3) Civic Engagement: Using the Electoral Process as a Tool for Social Change**
Designed to educate and inspire civic engagement primarily in the area of electoral politics. Examines various explanations of why people participate in the electoral process and whom they choose to support. Develops the practical skills necessary to participate successfully in the electoral arena. Through a service component, the course provides experience working on a campaign and mobilizing others to participate in the electoral process.
**Additional Information:** Departmental Category: Invst Community Studies

**INVS 2005 (2) Puksta Scholars Practicum**
Integrates critical reflection and community-based experiences for undergraduates in the Puksta Scholars Program. This two-semester course will focus on the development of knowledge, attitudes and skills to productively engage the public realm. Examines topics includes ethical leadership, frameworks for social action, project design and participatory action research.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**INVS 2919 (3) Renewing Democracy in Communities and Schools**
Examines concepts of activism, citizenship, democracy, power, and diversity through classroom discussions and participation in a local K-12 school's Public Achievement project. Through community-based partnerships, students will develop leadership skills; dialogue with diverse groups of people; identify multiple perspectives around controversial issues; and learn to use research and writing to articulate public problems and advocate for their solutions.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 2919
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Invst Community Studies

**INVS 2989 (3) Dialogue Across Difference**
Provides practical facilitation training that equips students to be change makers in any setting. Students examine models of dialogic communication and theories of intergroup relations to understand how dialogue can build deeper understanding of self/others, reinvigorate democratic values and foster a more just society. Through hands-on experience participating in, observing, and leading dialogue, students learn to facilitate dialogue among their peers.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**INVS 3000 (3-4) Innovative Approaches to Contemporary Issues through Service Learning**
Explores creative approaches for solving complex social and environmental issues, with a focus on peace and population. Students analyze the root causes of issues in theoretical and historical contexts, and develop their understanding of effective and innovative approaches to change. This course has a requirement of community service.
**Recommended:** Requisite upper-division status.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Invst Community Studies

**INVS 3041 (3) Self and Consciousness**
Explores human development from a psychosocial perspective, focusing on the interplay between psychological patterns and social forms. Issues such as self-image and social consciousness are studied within the larger context of individual and collective forces leading to transformation.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 3041
**Requisites:** Requires prerequisite courses of SOCY 1001 and SOCY 3001 or SOCY 3011 (all minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Invst Community Studies

**INVS 3100 (3) Social Justice, Leadership and Community Engagement Internships**
Focuses on leadership theories and skills necessary for effectiveness in social justice settings. Students gain understanding of traditional and culturally diverse approaches to leadership and change. Community service required.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 3201
**Recommended:** Prerequisite ETHN 2001.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Departmental Category: Invst Community Studies

**INVS 3301 (3) Climate Justice Summer**
The Climate Justice Summer for 1st-year students in The INVST Program focuses on community organizing, antiracism, climate change, environmental sustainability, activism, energy, power, equity & social justice.

**INVS 3302 (3) Facilitating Peaceful Community Change**
Students gain knowledge and skills that enable them to become effective agents of community change. Focuses on understanding the processes of community building with a multicultural emphasis. Students are encouraged to apply their own life experiences and to examine themselves as potential change agents.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3302
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Invst Community Studies

**INVS 3402 (3) Implementing Social and Environmental Change**
Examines grassroots innovation as a means for creating comprehensive, solution-based strategies to address social and environmental problems. Students develop an understanding of the root causes of problems, identify how changes are initiated at the grassroots level, and learn the theory and practice of effective and responsible change efforts.
**Additional Information:** Departmental Category: Invst Community Studies

**INVS 3671 (3) People of Color and Social Movements**
People of color the world over are struggling for sovereignty, independence, civil and human rights, food security, decent wages and working conditions, healthy housing, and freedom from environmental racism and other forms of imperialism. Course analyzes and brings alive these struggles.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 3671

**INVS 3931 (3) The Community Leadership Internship, Part 1**
Develops students' competencies as community leaders working for a just and sustainable world. Under the supervision of an instructor and a community supervisor, students learn organizational leadership skills by serving as volunteer staff members at community-based organizations. Required requisite, admission into INVST CLP.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Invst Community Studies

**INVS 3932 (3) Community Leadership Internship, Part 2**
Develops students' competencies as community leaders working for a just and sustainable world. Under the supervision of an instructor and a community supervisor, students learn organizational leadership skills by serving as volunteer staff members at community-based organizations. Required requisite, membership in INVST CLP.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of INVS 3931 (minimum grade D-).
**Additional Information:** Departmental Category: Invst Community Studies

**INVS 4302 (3) Critical Thinking in Development**
Exposes students to current issues in the political economy of development. Subjects range from globalization, democratization and economic development. Specifically explores the international and domestic determinants of economic development with special reference to currency markets, foreign direct investment, trade, and democratization.
**Equivalent - Duplicate Degree Credit Not Granted:** PSCI 4732
**Requisites:** Requires prerequisite courses of PSCI 2012 or IAFS 1000 and ECON 2010 and 2020 (all minimum grade D-).
**Recommended:** Prerequisite one upper-division PSCI course.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Departmental Category: Invst Community Studies

**INVS 4402 (3) Nonviolent Social Movements**
Explores theories of democracy and development in relation to movements for nonviolent social change. Focuses on means and ends, spirituality, leadership, decision-making, civil society, cooperative economics, ecology and decentralized powers.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Sociology (SOCY) or Political Science (PSCI) majors only.
**Additional Information:** Departmental Category: Invst Community Studies

**INVS 4919 (1-2) Teaching Social Justice for Public Achievement**
Participate as teaching assistants for the practicum course INVS 2919. Focusing on the issues of democratic education, diversity, social justice and social change, students learn how to foster undergraduates' skills as experiential educators.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of INVS 2919 (minimum grade B).

**INVS 4931 (1-6) Community Leadership in Action, Part 1**
Develops students' expertise as community leaders. Under the supervision of an instructor and a community advisor, students design a community-based project.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of INVS 3931 and INVS 3932 (all minimum grade D-).
**Recommended:** Prerequisite admission to INVST CLP.
**Additional Information:** Departmental Category: Invst Community Studies

**INVS 4932 (1-6) Community Leadership in Action, Part 2**
Develops students' expertise as community leaders working for a just and sustainable world. Under the supervision of an instructor and a community advisor, students learn organizational and leadership skills by designing, implementing and evaluating a community-based project. First-hand experience provides students with a deepened understanding of the complex issues facing humanity, and competence with solution-based strategies.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of INVS 4931 (minimum grade D-).
**Additional Information:** Departmental Category: Invst Community Studies

**INVS 4999 (1-4) Teaching Social Justice**
Students participate in a service-learning practicum under the supervision of a Community Studies instructor. They explore teaching strategies for implementing concrete educational goals. Focusing on the issues of social justice and social change, they learn how to encourage higher levels of creativity and analysis among students.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Invst Community Studies

# Italian (ITAL)

## Courses

**ITAL 1010 (4) Beginning Italian 1**
The four skills of listening, speaking, reading, and writing are developed progressively. Grammatical concepts are explained and practiced through dialogues, written exercises, and conversations. The cultural focus is on the personal world and life of students.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 1050
**Additional Information:** Departmental Category: Italian

**ITAL 1020 (4) Beginning Italian 2**
Continuation of ITAL 1010, with more difficult grammatical concepts explored. The cultural focus shifts to social and civic areas.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 1050
**Requisites:** Requires a prerequisite course of ITAL 1010 (minimum grade C-).
**Additional Information:** Departmental Category: Italian

**ITAL 1050 (4) Fast-Track Italian**
Two semesters of beginning Italian in one, for students who have studied other languages or have had previous exposure to Italian.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 1010 or ITAL 1020
**Additional Information:** Departmental Category: Italian

**ITAL 1300 (3) La Dolce Vita: How to Live a Good Life, Italian Style**
Introduces students to a critical appraisal of the Humanities in their world. Because the Humanities were rediscovered in the late Middle Ages in Italy, the course explores the Humanities from an Italian-centered perspective, though it broadens the scope of its analysis to make this perspective relevant for students who come from a variety of cultures and backgrounds.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 1350 (3) Introduction to Social Change in the Arts**
This course serves as an introduction to the Certificate in Art and Social Change. It introduces students to theories, concepts, and ideas that shape artistic productions and activist conversations around social change in a variety of geo-cultural contexts. The course is divided into three main units: theater and performance, media, and visual arts. Through these different lenses, students will learn about artistic practices in the US and in regions where Italian and French are spoken (North Africa, Sub-Saharan Africa, Latin America, and the Mediterranean region). This course allows students to engage with some of the most urgent issues in our societies, as they relate to justice, equality, and diversity. Artists and activists play an increasingly important role in advancing justice and promoting social change at the local, national, and global levels. The interdisciplinary approach of this course enables students to examine the role of different forms of artistic productions as a catalyst for social change.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Arts Humanities

**ITAL 1400 (3) Sexuality and Gender Wars in Italy and France**
Introduces students to key participants and arguments in the debate on the status of women in Italy and France during the period 1300 to 1700. Explores writings and art by women and men addressing topics such as gender roles, sexuality, sex work, marriage, and access to education. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** FREN 1400
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Italian

**ITAL 1500 (3) That's Amore: Introduction to Italian Culture**
Introduces students to representations of Italian society that have persisted through the ages. The course readings allow students to better understand how certain stereotypes about Italian society (e.g., Latin lover, Mafia) were born and persist in the present. Taught in English.
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 1550 (3) The Power of Fairy Tales in Italy and France**
Examines French and Italian fairy tales written between 1550 and 1750 and analyzes their connections to each other and to contemporary fairy tales literature, film, and the arts.
**Equivalent - Duplicate Degree Credit Not Granted:** FREN 1550
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ITAL 1600 (3) Strategies of Fear: Introduction to Italian Fantastic Literature**
Traces the development of the fantastic theme in Italian Literature from its origins (late nineteenth century) to contemporary times. Analyzes the modes of reception and appropriation of non-Italian gothic and fantastic narrative traditions through which Italian writers have subverted the national literary model proposed by realist narrative. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 2110 (4) Intermediate Italian Reading, Grammar, and Composition 1**
Enhances the skills learned in the first-year course and develops greater fluency in understanding and speaking Italian while exploring complex grammatical functions. More emphasis is placed on reading and writing through the use of activities featuring daily life themes that present a realistic portrait of contemporary Italy. Taught in Italian.
**Requisites:** Requires a prerequisite course of ITAL 1020 or ITAL 1050 (minimum grade C-).
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Italian

**ITAL 2120 (4) Intermediate Italian Reading, Grammar, and Composition 2**
Continuation of ITAL 2110. Increases students' reflection on more advanced grammatical concepts. Students read about social problems, culture, and some Italian literature as they acquire considerable practice in writing and speaking Italian. Fulfills the Graduate School language requirement for the Ph.D.
**Requisites:** Requires a prerequisite course of ITAL 2110 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 2130 (3) Readings in Italian: Sustainability**
This intermediate Italian course is designed specifically to improve a student's ability to understand and analyze out loud a variety of texts on the topic of sustainability in Italian. At the end of the course students will have improved their communicative abilities by discussing general sustainability issues with a particular focus on Italian culture. Taught in Italian.
**Requisites:** Requires a prerequisite or corequisite course of ITAL 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 2271 (3) Space, Invention, and Wonder in Fairy Tales, Literature and Film**
Explores the themes of space, invention, technology and wonder in fairy tales from Italian, Russian, French, German, and Spanish traditions in order to compare their transformation in different national and historical settings. Students analyze the intersection of fairy tales and science in literature and film. Counts for the Space Minor. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ITAL 3015 (3) Advanced Composition 1**
Teaches students to write in Italian in a variety of genres, focusing on the creative aspects of writing. Exercises and themes are drawn primarily from current events and culture (i.e., blogging, journaling, essays and films), but also allows students to develop their critical skills in other areas.
**Requisites:** Requires a prerequisite course of ITAL 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 3025 (3) Advanced Composition 2: Introduction to Literary Writing**
Introduces students to complex forms of writing within Italian studies. Focuses on the analysis of literary genres (e.g., autobiography, essays, short stories) through a step-by-step process that allows students to craft advanced arguments in Italian. Studies will read Italian literary texts and write and revise in workshop format (e.g., peer review, collaborative assignments).
**Requisites:** Requires a prerequisite course of ITAL 3015 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Upper
Departmental Category: Italian

**ITAL 3030 (3) Italian Conversation Through Art History**
Improves vocabulary and fluency in spoken Italian, and competence and confidence in correct and more sophisticated written Italian through the study of the history of Italian art. Exercises and themes focus on Italian Classical, Medieval, Renaissance, and Modern Art.
**Requisites:** Requires a prerequisite course of ITAL 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 3040 (3) Italian Conversation Through Cinema**
Taught in Italian, the course covers various topics of Italian Cinema from WWII to the present. Focus is on periods, genres, themes, and auteur/directors. Emphasis on review of language structures previously learned and acquisition of new vocabulary to enable students to discuss different aspects of Italian culture, in Italian.
**Requisites:** Requires a prerequisite course of ITAL 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 3140 (3) Main Current of Italian Culture and Literature 3**
Uses literary masterpieces as a springboard to explore the literature, visual arts, film, theater, and music produced in Italy from 1900 to today in its cultural and historical context. Emphasizes interpretation and critical analysis of major cultural figures, artistic forms, and ideas of the period. Taught in Italian.
**Requisites:** Requires prerequisite course of ITAL 2130 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 3150 (3) Main Current of Italian Culture and Literature 2**
Uses literary masterpieces as springboard to explore the literature, visual arts, film, theater, and music produced in Italy from 1800 to 1900 in its cultural and historical context. Emphasizes interpretation and critical analysis of major cultural figures, artistic forms, and ideas of the period. Taught in Italian..
**Requisites:** Requires prerequisite course of ITAL 2130 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 3160 (3) Main Currents of Italian Culture and Literature 1**
Uses literary masterpieces as springboard to explore the literature, visual arts, film, theater, and music produced in Italy from 1200 to 1800 in its cultural and historical context. Emphasizes interpretation and critical analysis of major cultural figures, artistic forms, and ideas of the period. Includes hands-on work with texts and arts from the period. Taught in Italian.
**Requisites:** Requires prerequisite course of ITAL 2130 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4010 (3) Problems in Translation, Advanced Grammar, and Stylistics 1**
Emphasizes practice in translating varying types of prose from Italian into English and English into Italian.
**Requisites:** Requires a prerequisite course of ITAL 2130 or ITAL 3015 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4030 (3) Contemporary Italian Culture, Politics, and the Media**
Serves as an introduction to the study of the effect that politics and the media have in shaping Italian culture. Makes use of the World Wide Web for instruction. Taught in Italian. Familiarity with Internet helpful.
**Requisites:** Requires a prerequisite course of ITAL 2130 or ITAL 3015 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4040 (3) Business Italian Style**
Provides an introduction to the Italian way of conducting business, with a close view on the company and its world through learning marketing and producing a real company project for the market. Analyzes topics of international marketing and trade using Italian and American economics websites. Focuses on building cross-cultural bridges between the U.S. and Italy to have smoother business relationships and enable students to participate more easily in joint international working teams.
**Requisites:** Requires a prerequisite course of ITAL 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4140 (3) What the Hell?: Dante¿s Divine Comedy and the Meaning of Life**
Focuses on close reading of Dante's poetry with emphasis on the intellectual, religious, political, and scientific background of the medieval world. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 4140 ITAL 4145 or ITAL 4147
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4145 (3) The Age of Dante in Italian**
Focuses on close readings of Dante's poetry with emphasis on the intellectual, religious, political, and scientific background of the medieval world. Taught in Italian.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 4140 or ITAL 4147 or HUMN 4140
**Requisites:** Requires prerequisite course of ITAL 2130 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4147 (3) Visualizing Dante's Inferno: A Global Seminar in Florence Italy**
Focuses on close reading of Dante's Inferno. Examines the specific sites and art in Florence and nearby cities that Dante references in the Inferno, as well as visual representations of Hell created both before and after Dante's poem. Taught in English. Offered through the CU Study Abroad Program.
**Equivalent - Duplicate Degree Credit Not Granted:** ITAL 4140 or ITAL 4145 or HUMN 4140
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4150 (3) Boccaccio's Decameron: Tales of Sex and Death in the Middle Ages**
Studies Boccaccio's masterpiece, the Decameron, as emblematic of the post-Black Plague era in the late Middle Ages. Focuses on the art of storytelling through gendered perspectives to portray the complexity of the Middle Ages. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 4150
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Italian

**ITAL 4160 (3-5) Italian Literature Special Topics**
Topics vary each semester. Consult the online Schedule Planner for specific topics.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4170 (3) Italian Literature Special Topics**
Topics vary each semester. Consult the online Schedule Planner for specific topics.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4200 (3) Topics in Italian Culture and Civilization from the Origins through the Renaissance**
Taught in English. Topics vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4250 (3) History of Modern Italy**
Examines the major historical, economic and social factors that have shaped the identity of modern Italy, from the enthusiasm of young patriots during Italy's unification in the 1860s to the discontent and domestic terrorism of the 1960s-1980s. Focuses on Mussolini, the Fascist movement and on World War II, as well as the changing role of women. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4313
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4260 (3) Mafia and Terrorism: Organized Violence in Italy**
Investigates the origins and development of the Sicilian Mafia and Political Terrorism in Italy. In the first part of the course, the context of Italian politics, economy and society in which the mafia was born and flourished in the 19th and 20th century will be explored. The ramification of the Mafia in the United States in the 20th c. will also be studied.
In the second part of the course, the political and social causes of Italian left and right wing Terrorism will be examined, starting from the Piazza Fontana slaughter (1969) until the murder of Professor Marco Biagi (2002). Particular attention will be devoted to the kidnapping and murder of Democratic Christian Party President Aldo Moro and to the Red Brigades terrorist movement. The role of women in both Mafia and Terrorism will be explored.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4323
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**ITAL 4280 (3) Topics in Italian Cinema**
Examines different aspects of Italian cinema from the origins of neorealism to the present. May focus on a particular director, the culture of a specific period, or certain themes (e.g., the representation of women, the relationship between cinema and literature, or socio-aesthetic movements like Futurism or Fascism). Taught in English.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4290 (3) Italian Culture Through Cinema**
Examines the representations of Italian culture through its cinema. Focusing especially on post-World War II cinema, examines how Italian filmmakers have portrayed Italian history and specific aspects of its culture (i.e., Fascism, post-war reconstruction, the Mafia, patriarchy) in the past 50 years. Taught in English.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4300 (3) Multiculturalism in Italy**
Focuses on multiculturalism and difference in contemporary Italian society. Readings assigned explore the experience and co-existence of ethnic and religious minorities in Italy. Students will study how specific minorities live in a major Western-European country and will investigate the connotations that the concept of 'multiculturalism' takes in the Italian context.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Italian

**ITAL 4350 (3) From Wops to Dons to Movers and Shakers: The Italian-American Experience**
Exposes students to the history of Italian immigration to the United States. By studying how Italians and Americans negotiated different ideas concerning identity, traditions and community, it helps students understand how Italians transformed themselves from a despised and marginalized minority into active participants in the success of the United States in the 20th and 21st centuries. Taught in English.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4500 (4) Italian Theatre**
Using theatre as a medium, this course helps students attain a higher level of proficiency in spoken and written Italian. Study of Italian theatre is integrated with acting activities and pronunciation exercises. Culminates in the production of a play. Performance is in Italian and the students participate in the writing of the script. Taught in Italian.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Requires a prerequisite course of ITAL 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4600 (3) Once Upon a Time in Italy**
Examines the evolution of the Italian fairy tale from the 1500s to the 2000s in literature, theater, and film. Considers the tales and their authors in their social-historical context.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Italian

**ITAL 4730 (3) Italian Feminisms: Culture, Theory, and Narratives of Difference**
Studies Italian women writers, artists and filmmakers. Literary and visual texts are analyzed in dialogue with readings of leading Italian gender theorists. Italian history and culture is reread by following the development of a discourse about women. Taught in English; readings in Italian for Italian majors.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 4730
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Italian

**ITAL 4840 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Italian

**ITAL 4930 (1-3) Languages Internship for Professions**
Offers opportunities to use Italian skills in service to various sectors of the community, including private industry, government, and education.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires a prerequisite course of ITAL 2120 (minimum grade C-).
**Additional Information:** Departmental Category: Italian

**ITAL 4980 (3) Italian Senior Honors Thesis**
The senior honors thesis is a 40 to 45 page original research paper, written in Italian, and constitutes a requirement for graduating with departmental honors.
**Requisites:** Requires a prerequisite course of ITAL 3015 (minimum grade C-).
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Italian

**ITAL 4990 (3) Senior Seminar**
Preparation of a 15-page research paper in Italian presented to two members of the faculty and defended orally in class.
**Requisites:** Requires a prerequisite course of ITAL 3015 (minimum grade C-).
**Additional Information:** Departmental Category: Italian

# Japanese (JPNS)

## Courses

**JPNS 1010 (5) Beginning Japanese 1**
Provides a thorough introduction to modern Japanese, emphasizing speaking, listening, reading, and writing in a cultural context.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 1012 (4) Introduction to Japanese Civilization**
An interdisciplinary introduction to the cultural history of peoples of the Japanese archipelago from prehistory to the present through the exploration of literature, material life, art forms, politics, religious practices, and intellectual currents. Taught in English; no prior knowledge of Japanese language, culture, or history is necessary or expected.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 1020 (5) Beginning Japanese 2**
Continuation of JPNS 1010.
**Requisites:** Requires prerequisite course of JPNS 1010 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 1051 (3) Portals to Japanese Literature**
Surveys Japanese thought and culture through careful reading and discussion of selected significant works of Japanese literature in translation. Texts may include works of poetry, fiction, drama, diaries, and essays, from ancient times to the present. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 2110 (5) Intermediate Japanese 1**
Continued study of oral and written modern Japanese in a cultural context.
**Requisites:** Requires prerequisite course of JPNS 1020 (minimum grade C).
**Additional Information:** Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 2120 (5) Intermediate Japanese 2**
Continuation of JPNS 2110.
**Requisites:** Requires prerequisite course of JPNS 2110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 2441 (3) Japanese Culture through Film and Anime**
Examines 20th century Japanese culture through cinematic and animated films. Studies films by Ozu, Kurosawa, Mizoguchi, and contemporary animators Tezuka, Miyazaki, and Kon Satoshi. Considers cultural issues raised in film and anime in light of modern Japanese history and literature. Requires no knowledge of Japanese. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 2811 (3) Heroes and the Supernatural: Word and Image in Old Japan**
Examines the fusion of literary and visual arts in twelfth- to nineteenth-century Japan, focusing on illustrated handscrolls and narrative paintings. Students will explore tales of monsters, samurai, fantastic journeys to other worlds, anthropomorphic animals, and the eighteenth- and nineteenth-century precursors of contemporary Japanese comics. This course seeks to analyze visual-literary texts in their historical contexts as both literature and art. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 3110 (5) Advanced Japanese 1**
Enhances student competence and performance in Japanese language in a holistic and integrative manner.
**Requisites:** Requires prerequisite course of JPNS 2120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 3120 (5) Advanced Japanese 2**
Continuation of JPNS 3110. Enhances student competence and performance in Japanese language in a holistic and integrative manner.
**Requisites:** Requires prerequisite course of JPNS 3110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 3200 (3) Adv Wrtg Topics on Chinese & Japanese Literature and Civilization**
Provides an introduction to the academic study of Chinese and Japanese literature and culture with a focus on writing skills in English through a survey of standard academic writing conventions. Review and assessment of selected textual materials, class presentation, critique, and revision. Recommended for majors. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** CHIN 3200
**Requisites:** Restricted to students with a minimum of 45 credits completed.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Upper
Departmental Category: Chinese Courses in English
Departmental Category: Asia Content

**JPNS 3311 (3) Japanese Minority and Transnational Literature**
Explores the diversity and complexity of literature produced in the 20th and 21st century by Japanese racial, ethnic, and other minorities. We will examine works by Chinese, Korean, Ainu, Okinawan and Taiwanese writers, as well as writers from the Japanese diaspora in North and South America. Topics include empire, migration, colonialism, race, and indigenous identity. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English

**JPNS 3321 (3) Japanese Sci-Fi and Speculative Fiction**
Examines the genres of fantasy and sci-fi across Japanese media, including literature, film, anime, and manga. We will consider what the Japanese speculative imagination about different worlds can teach us, and consider subgenres of cyberpunk, space opera, mythological fantasy, cli-fi, and feminist speculation. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English

**JPNS 3331 (3) Business Japanese**
Designed to teach Japanese with emphasis on using Japanese for professional purposes. The course aims to foster the skills and the knowledge of effective cross-cultural and interpersonal communication in Japanese and to develop intercultural competence in business contexts.
**Requisites:** Requires prerequisite course of JPNS 2120 (minimum grade C).
**Recommended:** Prerequisite JPNS 3110.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 3511 (3) Paper Worlds, Screen Worlds: Contemporary Japanese Literature**
Explores Japanese literature from the 1980s to the present day, also drawing on film, manga, and visual media. Topics covered include the rise of electronic media, video games, responses to disasters, social deviance, sexualities and bodies, and imaginations of the future. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English

**JPNS 3611 (3) Speaking the Truth: Women's Counter-narratives of Korea and Japan**
Explores the rich history of women¿s writing in premodern Japan and Korea, focusing on works produced by and for women in vernacular scripts (kana and han'g¿l) during the Heian (794-1185), Kamakura (1185-1333), and Chos¿n (1392-1910) periods. Topics covered include the textual construction and subversion of idealized femininity, the representation of women's real lived experiences, and the subjective nature of historical truth.
**Equivalent - Duplicate Degree Credit Not Granted:** KREN 3611
**Recommended:** Prerequisite JPNS 1012, JPNS 1051 or KREN 1011.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**JPNS 3811 (3) The World of the Shining Prince: The Tale of Genji and Heian Literature**
An exploration of the literary landscape of Classical Japan focusing on The Tale of Genji (early 11th century), a brilliantly provocative work of fiction sometimes called ¿the world¿s first novel.¿ Covers the extensive world drawn within Genji and provides context for understanding its origins and reception through readings of other important works of Heian-era (794-1185) literature. Taught in English; no prior knowledge of Japanese language, culture, or history is necessary or expected.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3811
**Recommended:** Prerequisite JPNS 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 3821 (3) Monsters, Monks, and Mayhem: Medieval Japanese Literature in Translation**
Surveys the major works and authors of medieval Japanese (poetry, prose, and drama) from the Kamakura and Muromachi periods (1185-1600). Taught in English.
**Recommended:** Prerequisite JPNS 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 3831 (3) The Floating World in the Literature of Early Modern Japan**
Explores the seventeenth- and eighteenth-century concept of the ¿floating world¿ of fleeting urban pleasures in the fiction, drama, and ukiyo-e art of Tokugawa-period Japan, focusing on the great city centers of Edo and Osaka and their celebrity courtesans, kabuki actors, and samurai devotees. Taught in English; no prior knowledge of Japanese language, culture, or history is necessary or expected.
**Recommended:** Prerequisite JPNS 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 3841 (3) Transforming Worlds: Japanese Literature in Modernity**
Explores works of modern Japanese literature from the late 1800s to 1970s, placing novels, short stories, and poetry in their historical and cultural contexts. Topics covered include literary responses to Japan¿s modernisation and encounters with the West, the individual in society, mass culture and popular literature, the rise of fascism and colonialism, and visual media, including film. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3841
**Recommended:** Prerequisite JPNS 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 3851 (3) Japanese Popular Culture**
Introduces aspects of Japanese popular culture from the early 1990s economic collapse until the present through a variety of artistic mediums including manga, anime, literature, live-action cinema, video gaming, music, and the visual arts. Taught in English.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 3861 (3) Imagining the Samurai in Japanese Literature and Culture**
Explores the rich history of samurai in the Japanese popular imagination, from fiction and drama to cinema and the visual arts. Encompasses both fantastical and realistic representations of warrior culture from the twelfth through twentieth centuries. Taught in English; no prior knowledge of Japanese language, culture, or history is necessary or expected.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 3871 (3) Horror and the Macabre in Japanese Literature, Film, Culture**
Explores Japanese horror texts from both the pre-modern and modern eras in a variety of genres, including the monogatari, kaidan, kabuki, contemporary horror fiction, film and anime. Texts will be considered in historical and cultural context with attention being given to interactions with and within popular culture. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 3881 (3) Environment, Nature and Disaster in Japanese Literature and Culture**
Explores the significance of the environment, nature and disaster in Japanese literature and culture through readings in a variety of genres, including fiction, essay, poetry, sci-fi, film and anime. Attention will also be given to environmental/ecological issues, such as conservation, pollution, biodiversity and industrial development. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 3891 (3) Travel/Travel Writing in Japanese Literature and Culture**
Explores selected Japanese literary and cultural texts that treat travel and travel writing, including short and long fiction, poetry, memoir, nonfiction, biography and travel commentary. Taught in English.
**Recommended:** Prerequisite JPNS 1051.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Japanese Courses in English
Departmental Category: Asia Content

**JPNS 4030 (3) Japanese Syntax**
Deals with syntactic phenomena from five areas of Japanese grammar that cause the most difficulty for learners. Their characteristics are explored in forms and discoursal functions that go beyond the explanations in basic, prescriptive grammars of Japanese.
**Requisites:** Requires prerequisite course of JPNS 3120 or JPNS 4120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 4050 (3) Japanese Sociolinguistics**
Explores issues related to contemporary Japanese language and society, such as language and identity, language and ideology, and language variation and change in Japan. More specifically, we will reconsider topics such as diversity in gender language, honorifics, dialects, and use of English in Japanese society that have been unidirectionally taught in Japanese language classrooms. The course aims to provide students opportunities to incorporate critical perspectives of sociolinguistics into analyses of Japanese literature and Japanese language education.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4050
**Requisites:** Requires prerequisite course of JPNS 3110 (minimum grade C).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 4080 (3) Kanji in Japanese Orthography**
Covers the issues in kanji research from historical, sociolinguistic, linguistic, cognitive perspective and vocabulary acquisition theories in the context of teaching and learning the Japanese language.
**Equivalent - Duplicate Degree Credit Not Granted:** JPNS 5080
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 4110 (3) Advanced Readings in Modern Japanese 1**
Surveys a variety of material written in modern Japanese, including texts from literature, the social sciences, religion, and cultural history. Emphasizes content and style. Texts and selections vary from year to year.
**Requisites:** Requires prerequisite course of JPNS 3120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 4120 (3) Advanced Readings in Modern Japanese 2**
Continuation of JPNS 4110. Texts and selections vary from year to year.
**Requisites:** Requires prerequisite course of JPNS 4110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 4300 (3) Open Topics: Readings in Japanese**
Examines selected texts on a particular topic taught by regular or visiting faculty. Topics change each term.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 4310 (3) Classical Japanese 1**
Introduces reference tools for reading classical Japanese, and grammar, vocabulary, and use of scripts in premodern Japanese, focusing on the 10th century Taketori Monogatari and the 13th century Hojoki.
**Requisites:** Requires prerequisite course of JPNS 3110 (minimum grade C).
**Recommended:** Prerequisites JPNS 3120 and JPNS 3811 and JPNS 3821.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 4320 (3) Classical Japanese 2**
Continuation of JPNS 4310. Surveys changes in Japanese literary language from the Nara (eighth century) to Meiji (late 19th century) periods. Attention given to changes in grammar, vocabulary, and use of scripts in premodern Japanese. Introduces representative works of classical Japanese literature of all periods.
**Requisites:** Requires prerequisite course of JPNS 4310 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 4900 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 4950 (3) Honors Thesis**
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 5010 (3) Bibliography and Research Methods**
Introduces research materials on Japan in Japanese and Western languages, including bibliographic tools, style sheets, and library resources. Overview of secondary sources and publication outlets/methods of disseminating research.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 5080 (3) Kanji in Japanese Orthography**
Covers the issues in kanji research from historical, sociolinguistic, linguistic, cognitive perspective and vocabulary acquisition theories in the context of teaching and learning the Japanese language.
**Equivalent - Duplicate Degree Credit Not Granted:** JPNS 4080
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 5150 (3) Japanese Literary Translation**
Explores theories and practice of translation of literary texts as applied to Japanese-English translation; strategies for handling a variety of texts; and professional standards and ethics.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 5210 (3) Classical Prose Literature**
Examines selected prose works and authors from the Classical, or Heian, period (784-1185). Texts may include selections from diaries, tale literature, and zuihitsu such as Izumi Shikibu Nikki, Genji Monogatari, and Makura no Soshi. Texts and selections vary from year to year. Knowledge of Classical Japanese at the level of JPNS 4320 is required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 5220 (3) Waka, Renga, and Haiku**
Studies the three most important poetic forms in Japanese literary history. Emphasizes the reading and analysis of selected texts and authors that best represent these genres. Readings include selections from the first eight imperial poetry anthologies (hachidaishu), famous renga sequences (Minase Sangin Hyakuin, for example), and the haiku of Basho. Texts and selections vary from year to year. Knowledge of Classical Japanese at the level of JPNS 4320 is required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 5270 (3) Readings in Sino-Japanese Texts**
Provides a foundation in glossing (kundoku), interpreting, and translating of Sino-Japanese (kanbun) texts. Cultivates a general understanding of practices surrounding the reading and writing of kanbun in various periods and examines unique elements of kanbun texts as produced within Japan.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite JPNS 5310 or equivalent.

**JPNS 5280 (3) Topics in Classical Japanese Literature**
Studies a specific problem or issue in classical (eighth through twelfth century) Japanese literature, e.g., the development of specifically Japanese theories of literature or the concept of genre in the Japanese tradition. Topics vary from year to year.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 5310 (3) Advanced Classical Japanese 1**
Focuses on stylistic, grammatical, and orthographic variations in texts of the classical, medieval, and early modern eras. Knowledge of Classical Japanese at the level of JPNS 4310 is required.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 5320 (3) Advanced Classical Japanese 2**
Advanced analysis of stylistic, grammatical, and orthographic variations in texts of the classical, medieval, and early modern eras, including kanbun and hentaigana; translation and explication of texts.
**Requisites:** Requires prerequisite course of JPNS 5310 (minimum grade C). Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 5410 (3) Medieval Prose Literature**
Focuses on selected prose works and authors from the medieval, or Kamakura and Muromachi periods (1185-1600). Texts may include selections from a variety of war tales, histories, courtly fiction, diaries, memoirs, short prose narratives (otogi-zoshi), Noh plays, and Buddhist literature such as Heike Monogatari, Towazugatari, Izayoi Nikki, Tsurezuregusa, and Shasekishu. Texts and selections vary from year to year. Knowledge of Classical Japanese at the level of JPNS 4320 is required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5420 (3) Japanese Buddhism and Literature**
Studies selected works from the Japanese literary tradition in which Buddhism plays a significant thematic role. Focuses on texts such as the Nihon Ryoiki, Buddhist poetry (Shakkyo-Ka) from the imperial poetry anthologies, Heike Monogatari, Hojoki, the poetry of Saigyo and Basho, and selected Noh plays. Texts and selections vary from year to year. Knowledge of Classical Japanese at the level of JPNS 4320 is required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5480 (3) Topics in Medieval Literature**
Focuses on a specific problem or issue in medieval literature, e.g., the spread of literary composition beyond the court. Topics vary from year to year.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5620 (3) Early Modern Japanese Literature and Culture**
Examines the literature, arts, drama and culture of Japan's early modern period in the original language, as well as secondary scholarship and methodologies for pursuing work on early modern materials. Genres covered include kana-zoshi, uklyo-zoshi, dangibon, yomihon, sharebon, kibyoshi, ninjobon, kokkelbon, gokan, halkai, senryo, kyoka, joruri, kabuki, and literary thought.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5810 (3) Modern Japanese Literature**
Studies selected texts in Japanese literature from the Meiji Restoration (1868) to the end of the Pacific War. Surveys various literary genres, emphasizing the development of the modern novel as an aspect of Japan's response to Western cultural forms. The unique cultural politics of each of the periods (Meiji,Taisho, and Showa) are illuminated through the filter of both canonical and more marginalized texts. Specific selections vary from year to year.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5820 (3) Contemporary Japanese Literature**
Covers developments in Japanese prose fiction and/or other literary genres from the end of the Pacific War in 1945 to the present.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5830 (3) Readings in Modern and Contemporary Japanese Thought and Culture**
Examines central issues in Japanese culture and society since the Meiji Restoration (1868) through selected readings of the works of major writers in the fields of literature, anthropology, feminism, political science, and religion, among others. Provides a broad context for cultural studies in modern and contemporary Japan by positioning the most important commentators within their historical and social situations.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5920 (3) Topics in Modern Literature and Culture**
Close study of a specific problem or issue in modern or contemporary literature or culture: e.g., transwar literary nationalism.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 5980 (1) Practical Issues in Japanese Language Pedagogy**
Focuses on practical issues in Japanese language pedagogy for students who will serve as teaching assistants in Japanese language class. Examines the connection between theory and practice as well as practical methods for teaching Japanese. Discusses how to teach Japanese as a second language in a communicative approach and how to assess student language learning. Knowledge of Modern Japanese at the level of JPNS 4120 is required.
**Equivalent - Duplicate Degree Credit Not Granted:** JPNS 4980
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 6900 (1-6) Japanese Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese Departmental Category: Asia Content

**JPNS 6950 (1-6) Master's Thesis**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese
Departmental Category: Asia Content

**JPNS 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Japanese
Departmental Category: Asia Content

# Jewish Studies (JWST)

## Courses

**JWST 1234 (3) Mysticism and the Jewish American Literary Tradition**
Explores the mystical tradition within Judaism from ancient times to the present. With roots in the Hebrew Bible, Jewish mysticism is one of the oldest forms of mysticism and has had an influence on some of the greatest philosophical traditions of western civilization.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 1340
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 1818 (3) Jewish History to 1492**
Focus on Jewish history from the Biblical period to the Spanish Expulsion in 1492. Study the origins of a group of people who call themselves, and whom others call, Jews. Focus on place, movement, power/powerlessness, gender, and the question of how to define Jews over time and place. Introduces Jews as a group of people bound together by a particular set of laws; looks at their dispersion and diversity; explores Jews' interactions with surrounding cultures and societies; introduces the basic library of Jews; sees how Jews relate to political power.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 1818 and RLST 1818
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Asia Content

**JWST 1828 (3) Jewish History Since 1492**
Surveys the major historical developments encountered by Jewish communities beginning with the Spanish Expulsion in 1492 up until the present day. Studies the various ways in which Jews across the modern world engaged with the emerging notions of nationality, equality and citizenship, as well as with new ideologies such as liberalism, socialism, nationalism, imperialism and antisemitism.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 1828 and RLST 1828
**Additional Information:** GT Pathways: GT-HI1 - History
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**JWST 1830 (3) Global History of Holocaust and Genocide**
Examines the interplay of politics, culture, psychology and sociology to try to understand why the great philosopher Isaiah Berlin called the 20th century, "The most terrible century in Western history." Our focus will be on the Holocaust as the event that defined the concept of genocide, but we will locate this event that has come to define the 20th century within ideas such as racism, imperialism, violence, and most important, the dehumanization of individuals in the modern world.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 1830 and RLST 1830
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**JWST 1900 (3) Introduction to the Hebrew Bible/Old Testament**
Examine the content of the Hebrew Bible and critical theories regarding its development. Explore the development of these texts, as well as their foundational role for rabbinic literature and the New Testament. Assess the enduring influence of the Hebrew Bible/Old Testament in world literature and culture (such as in art and music).
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 1900
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**JWST 1910 (3) Introduction to the New Testament**
Examine the background, content and influence of the New Testament books. Studies the diverse perspectives contained in the various books, as well as the process of canonization. Assess the influence of the New Testament on the development of Christianity as well as world (eastern and western) culture.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 1910
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 2350 (3) Introduction to Jewish Culture**
Explores the development and expressions of Jewish cultures across the chronological and geographical map of the Jewish people, with an emphasis on the variety of Jewish ethnicities and their cultural productions, cultural syncretism, and changes, including such issues as sexuality and foodways. Sets the discussion in relevant contexts and looks at cultural representations that include literary, religious and visual texts.
**Equivalent - Duplicate Degree Credit Not Granted:** GSLL 2350
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Diversity-U.S. Perspective

**JWST 2502 (3) Representing the Holocaust**
Examines representations of the Holocaust in film, memoirs, poetry, novels, graphic novels, memorials. Considers questions such as: How to depict an event that resists representation? How does the memory of the Holocaust transform over generations? How do representations of the Holocaust inform our understanding of other experiences of racism and genocide? What ethical issues are at stake?
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 2502
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 2551 (3) Modern Jewish Literature**
Examines Jewish experience through the study of literary texts from around the world, mainly from the 20th and 21st centuries. Discusses issues pertaining to secularism and tradition; diasporas and homelands; modernity and questions of identity raised by the intellectual transitions brought about by political and social emancipation; sexualities; enormous changes wrought by population redistributions, world wars and rapid cultural transformations.
**Equivalent - Duplicate Degree Credit Not Granted:** GSLL 2551
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Hebrew

**JWST 2600 (3) Judaism, Christianity, and Islam: Abrahamic Religions**
In Judaism, Christianity, and Islam, Abraham is described as a founding figure. In recent times, the label ¿Abrahamic Religions¿ has become increasingly important both as a way to describe the origins and beliefs of Judaism, Christianity, and Islam and as a means for finding common ground in political and religious discourse. Yet in each religion Abraham is also used in strikingly different ways and for distinct purposes. In this course, we will look at these three religious traditions and how each one imagines Abraham. In particular, the focus will be on how each religion uses Abraham to construct foundational stories of a special relationship to God, stories that ultimately serve to promote religious identity over time.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 2600
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**JWST 2810 (3) Antisemitism: Histories, Concepts, Practices**
This class explores the main histories, concepts, and practices of antisemitism. It analyzes how and why they emerged and what accounts for their persistence. Why are Jews targeted? Is there a ¿new antisemitism¿¿ since the 1970s¿ that differs significantly from older manifestations? How is antisemitism related to anti-Zionism? What is its relationship with racism? And how have political, social, and religious groups and organizations responded to these threats and what challenges have they faced?
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 2810
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 2850 (3) Sex, Religion, and Politics in US Healthcare**
Examines the roles of religion, gender, and sexuality in the politics of healthcare in the United States. Topics may include sexual health and education; debates over health and sexuality during the HIV/AIDS crisis; the expansion and contraction of access to birth control; public debates over abortion; debates over religion, politics, and healthcare for transgender people; and histories of religion, health, and race.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 2850
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 3100 (3) Judaism**
Explores Jewish religious experience and its expression in thought, ritual, ethics, and social institutions.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 3100
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**JWST 3110 (3) Of Jewish Legends, Folktales and the Supernatural**
Explores Jewish traditional legends, folktales and stories of the supernatural. Starts with Aggadic Talmud tales and Midrashic texts and focuses on later rabbinic and mystical texts and folktales ca 500-1900 C.E. from around the Jewish world with subjects ranging from didactic narratives extolling the virtues of the simple pure soul, to the horrors of a blood sucking vampiric outside world.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 3110
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 3120 (3) Radical Jews**
Explores major Jewish figures, and their cultural productions, who were radical in the challenges they posed and transformative in the effects they had on society. The figures we examine range from the Rabbis of the Talmud who revolutionized a sacrificial cult religion, to Western secularist Baruch Spinoza and American icons such as Allen Ginsberg, Gloria Steinem and Bob Dylan.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 3120
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 3150 (3) Jerusalem: The Holy City in History, Legend, and Religious Thought**
The history of Jerusalem and the stories that have given it prominence in the religious imagination continue to shape much of the world in which we live. In this class, we will survey approximately three millennia of the history of the city. We will ask methodological question, such as: What does it mean for a place to be conceived of as holy? How does this perceived holiness come about? What happens when holy places are destroyed and rebuilt? We will examine the biblical stories about Jerusalem not only as important sources themselves, but also for how they shape later religious traditions, specifically Judaism, Christianity, and Islam. As such, we will address what it means for the same place to be perceived as ¿holy¿ by differing, and often competing, groups. These contestations regarding Jerusalem will, then, allow us to engage issues of religious diversity and conflict both historically and in the present.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 3150
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 3200 (3) Religion and Feminist Thought**
Examines the origin of patriarchal culture in the theology and practices of Judaism and Christianity. Explores attitudes and beliefs concerning women as Judeo-Christian culture impacts gender roles and gender stratification through reading and discussion. Women's religious experience is studied from the perspective of feminist interpretations of religiosity.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3200
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 3202 (3) Women, Gender & Sexuality in Jewish Texts & Traditions**
Reads some of the ways Jewish texts and traditions look at women, gender and sexuality from biblical times to the present. Starts with an analysis of the positioning of the body, matter and gender in creation stories, moves on to the gendered aspects of tales of rescue and sacrifice, biblical tales of sexual subversion and power, taboo-breaking and ethnos building, to rabbinic attitudes towards women, sexuality and gender and contemporary renderings and rereadings of the earlier texts and traditions.
**Equivalent - Duplicate Degree Credit Not Granted:** HEBR 3202 and RLST 3202 and WGST 3201
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**JWST 3310 (3) The Bible as Literature**
No single book has been as influential to the English-speaking world as the Bible. We¿ll read the Hebrew Bible and the New Testament for stories, poetry, and wisdom traditions. We¿ll approach the Bible as literature by analyzing its plots, characters, and meanings. Students study its textual history, how there came to be a ¿Bible,¿ and the many writers, conflicts, and cultures from which it emerged. We¿ll consider the Bible¿s powerful influence on ethics and philosophy. Formerly ENGL 3312.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3310 and ENGL 3310
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 3401 (3) The Heart of Europe: Filmmakers and Writers in 20th Century Central Europe**
Surveys the major works of 20th century central and central east European film and literature. Examines cultural production in the non-imperial countries and non-national languages of the region including Yiddish, Belarusian, Czech, Hungarian, Polish and Romanian, among others. Traces the rise of nationalism over the course of the century from the age of empires through the Cold War.
**Equivalent - Duplicate Degree Credit Not Granted:** GSLL 3401
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 3501 (3) The German-Jewish Experience: From the Enlightenment to the Present**
Provides insight into the German-Jewish identity through essays, autobiographies, fiction and journalism from the Enlightenment to the post-Holocaust period. Examines the religious and social conflicts that typify the history of Jewish existence in German-speaking lands during the modern epoch.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 3501
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**JWST 3530 (3) Global Seminar: Jews and Muslims - The Multiethnic History of Istanbul**
Spend two weeks in Istanbul and examine Jewish-Muslim relations in a place that was for 500 years the crossroads of civilization. The only Muslim city in the 21st century with a large, thriving Jewish community, Istanbul models how people from different social classes, ethnicities and religious backgrounds can coexist.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3530 and RLST 3530
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**JWST 3600 (3) Contemporary Jewish Societies**
Uses transnational lens to explore contemporary debates about Jewish people, places and practices of identity and community; places that Jews have called 'home', and what has made, or continues to make those places 'Jewish'; issues of Jewish homelands and diasporars; gender, sexuality, food and the Jewish body; religious practices in contemporary contexts. Readings drawn primarily from contemporary journalism and scholarship.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3600 and GSLL 3600
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**JWST 3610 (3) Topics in International Affairs and Jewish Studies**
Explores topics in international affairs as it relates to Jewish culture and society. Subjects addressed under this heading vary according to student interest and faculty availability.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3610
**Repeatable:** Repeatable for up to 9.00 total credit hours.

**JWST 3650 (3) History of Arab-Israeli Conflict**
Explores the origins and development of the Arab-Israeli conflict. Traces Arab-Jewish/Israeli relations from the 19tj century through the Palestine Mandate, the evolution of Arab and Jewish nationalism and the creation of Israel to the present day.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3650
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**JWST 3681 (3) Refugees in German Culture**
Introduces the diversity of refugee migration in German culture through artistic and cultural "texts," including those created by or in collaboration with refugees (film, comic journalism, literature, blogs, hashtag campaigns, music, etc). These texts are discussed in relationship to theories of racism, precarity, and biopolitics together and contextualized by work from other disciplines. This interdisciplinary course is methodologically informed by the theory and practice of cultural studies. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3681, GRMN 3681 and AHUM 3681
**Recommended:** for students with sophomore standing or higher.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 3820 (3) Topics in Jewish Studies**
Intensive study of a selected area or problem in Jewish Studies.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 3930 (3) Internship in Jewish Studies**
Learn beyond the classroom by interning in a local non-profit organization that connects with the Program in Jewish Studies through its mission and/or program. Interns will attend class to learn about work place ethics, professional development and leadership skills through a Jewish Studies lens. Interns will be supervised by the faculty member of record as well as the employer housing the intern.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisites HEBR 2350 or JWST 2350 or HIST 1818 or JWST 1818 or HIST 1828 or JWST 1828.

**JWST 4000 (1-3) Capstone in Jewish Studies**
Serves as the final product for students completing the major in Jewish Studies. Students will design a project under the supervision of a mentor that serves as the summation of their past work in Jewish Studies. Capstone projects can take the form of a thesis, film or another media. Instructor consent required for JWST minors.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Jewish Studies (JWST) BA majors only. Excludes JWST minors.

**JWST 4050 (3) Anthropology of Jews and Judaism**
Explores topics in Jewish anthropology. Uses the lens of anthropological inquiry to explore, discover and analyze different concepts within Jewish culture. Topics explored will include customs, religious practices, languages, ethnic and regional subdivisions, occupations, social composition, and folklore. Explores fundamental questions about the definition of Jewish identity, practices and communities.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4050
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4101 (3) Topics in Hebrew Studies**
Explores topics in Hebrew and Jewish literature and cultures. These may include topics such as diasporic literatures, Jewish artists and thinkers, courses on specific authors, figures or communities. Topics change each semester. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HEBR 4101
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4122 (3) Music in Jewish Culture**
Introduces students to a wide range of musical styles, traditions, genres, performers, composers, events and works that are part of Jewish culture, focusing on the twentieth and twenty-first centuries. Provides tools for understanding music on its own and in connection with issues of identity, diaspora, memory and liturgy. Includes opportunities for creative and critical engagement with Jewish music.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4122
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4170 (3) God and Politics**
Explores the relationship between religion and politics. Examining traditions such as Judaism and Christianity, this course considers diverse ways in which ancient, medieval and modern sources have imagined the role of religion in civic life. Some topics include the status of religious minorities, the nature of religious freedom and contemporary debates surrounding issues such as torture, sexuality and climate change.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4170 and RLST 5170
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4180 (3) Is God Dead?**
Explores debates about the following questions: does it make sense to believe in God? Should believing or not believing in God make a difference for how individuals behave? Examining ancient and modern views on the existence and nature of a higher power, this course considers topics including evil and suffering, religion and science and religion's role in politics.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4180 and RLST 5180
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4190 (3) Love and Desire**
Explores debates about the following questions: what and whom should humans and gods love, and what role should passions play in religion? Examining traditions such as Judaism and Christianity, this course considers diverse views on topics including religion and sexuality, the promise and perils of loving gods and humans, and the relationship between love, politics, and violence.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4190 and RLST 5190
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4200 (3) Religion and Reproductive Politics in the United States**
Focuses primarily on how Protestant, Catholic, and Jewish conversations about sexuality and reproduction have shaped access and attitudes towards reproductive health in the US over the course of the twentieth and twenty-first centuries.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4200, WGST 5200 and JWST 5200
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Diversity-U.S. Perspective

**JWST 4203 (3) Israeli Literature: Exile, Nation, Home**
Examines the creation and development of Israeli literature from its pre-State beginnings to the present day, from the writings of immigrants for whom Hebrew was not their mother tongue to a literature written by native Hebrew speakers. Considers texts written by Israeli Jewish and Arab writers and explores how ideas of exile, nation, and home play into the Israeli experience.
**Equivalent - Duplicate Degree Credit Not Granted:** HEBR 4203
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisites ENGL 4677 or JWST 4677 or GRMN 2502 or JWST 2502 or JWST 2551 or WRTG 3020.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4260 (3) Topics in Judaism**
Examines in depth central themes, schools of thought, and movements in Judaism, along with other traditions, across a range of historical periods.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4260 and RLST 5260
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4301 (3) Venice: The Cradle of European Jewish Culture**
Explores the development of European Jewish culture from the late Middle Ages to the present by focusing on Jewish life in the city of Venice, Italy. Emphasis is on the development of Venetian print culture and emergence of Italy as a center of Jewish publishing in both the religious and secular world. Examines a variety of cultural and historical material including early printings of the Talmud, the creation of Yiddish popular literature, Hebrew rabbinic literature, responses to political turmoil, and the aftermath of the Nazi genocide. Taught in English. Department enforced prerequisite: HEBR 2350 or JWST 2350 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** HEBR 4301
**Additional Information:** Arts Sci Core Curr: Literature and the Arts Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4302 (6) Global Seminar: Justice, Human Rights and Democracy in Israel**
Explore the challenges and complexities of justice, democracy and human rights in Israel and the West Bank through field trips, course work and service learning projects with Jerusalem based non-profit organizations. Acquire new knowledge and lived experience on critical issues facing Israelis and Palestinians with the wider scope of Middle East politics.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3520
**Recommended:** Prerequisites ANTH 4050 or JWST 4050 and IAFS 3600 or JWST 3600.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**JWST 4338 (3) History of Modern Israel/Palestine**
How did we get to this point? What histories do we need to know to understand the situation of Israelis and Palestinians today? To answer these questions, this course traces the intertwined histories of Israel/Palestine, Israelis and Palestinians from the late Ottoman period to the present. Topics include: nationalism and colonialism, the development of Zionisms, Palestinian nationalism, the Jewish community (Yishuv) under British rule, the founding of the State of Israel, Arab-Israeli and Palestinian-Israeli relations, Israel's minorities, the role of religion in Israel today and changing relationships between the United States, Israel and Palestinians.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4338
**Recommended:** Prerequisite HIST 1818 or JWST 1818 or HIST 1828 or JWST 1828 or HIST 1308 or JWST 2350 or other course work in Middle Eastern or Jewish History.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4348 (3) Topics in Jewish History**
Covers topics in Jewish history from biblical beginnings to present day. Topics vary each semester. Consult the online Schedule Planner for specific topics.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4348
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4358 (3) Childhood in Modern Israel/Palestine**
Examines topics relating to History, Jewish Studies and Israel/Palestine studies. Analyzes the history of modern childhood in Israel and Palestine from the 19th century to the present. Themes include agency, work, life cycle and culpability. Topics range from collective parenting on Israeli Kibbutzim, growing up in Ottoman Palestine, to the legal status of stone-throwing Palestinian children. Sources include memoirs, literature, films, monographs and articles.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4358 and JWST 5358 and HIST 5358
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite HIST/JWST 4338 History of Modern Israel/Palestine, this course would give students relevant background on the history of the region, but is not required.

**JWST 4378 (3) Jews in and of the Middle East**
Examines the modern history and culture of Jewish communities under Islamic rule in the Middle East and North Africa; Jews' and Muslims' encounters with empire, westernization and nationalism; representations of Sephardi and Eastern Jews; Jewish-Muslim relations in Europe and the U.S.; and contact and conflict between Jews and Muslims in (and about) Israel/Palestine. Sources include memoirs, diaries, newspapers and films.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 5378, JWST 5378, and HIST 4378
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**JWST 4388 (3) History Today: Global Intensive in Israel/Palestine**
This global intensive analyzes history, memory and nationalism in one of the areas where the relationship between these three categories is the most fraught: Israel/Palestine. After learning the historical background to the Arab/Israeli and Palestinian conflict in Boulder, students will visit Israel and the West Bank/Occupied Territories/Judea and Samaria. Through this course, students will gain a nuanced, multi-sided perspective of Israel, Palestine and the uses of history and memory.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4388
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4454 (3) Jewish Thought in Modern History**
Takes students on a journey from Medieval Spain to contemporary United States to explore how Jews, living in different societies, have attempted to reshape and interpret central Jewish values and beliefs in accordance with the prevailing ideas of their host societies. Focuses on the historical context of each Jewish society that produced the thinkers and ideas considered in this course.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4454
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4524 (3) Expulsions and Diasporas: The Jews of Spain and Portugal**
Considers the experience of Jews and converses during the Spanish Inquisition and the Iberian expulsions of the 1490s. Sephardic refugees faced social, economic, and political upheavals in the decades after their exile, leading to new communities in settings as diverse as North Africa, India, Turkey, the Caribbean, and the Americas. The study of texts and traditions from the Sephardic diaspora will explore themes including forced conversion, rabbinic authority, colonialism, and mercantile networks. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4524
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4554 (3) Researching European Jewish Life**
This upper-level hybrid class is a research and learning initiative of CU Boulder¿s History Department with the Department of History, Philosophy, and Jewish Studies at the Open University of Israel and the Center for Research in Antisemitism at the Technical University of Berlin, Germany. It revolves around an in-person research seminar in Europe. Topics will vary, beginning with a focus on egodocuments in the study of twentieth-century German Jewish life.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4554 and HIST 5554
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only. Restricted to students who have taken either HIST/JWST 1828, HIST/JWST/RLST 1830, HIST 4423, HIST 4433 or GRMN 2301; or by permission of instructor.

**JWST 4580 (3) The Holocaust: An Anthropological Perspective**
Focuses on the Holocaust during the Third Reich, which involved the murder of millions of people, including six million Jews. Reviews the Holocaust's history, dynamics and consequences as well as other genocides of the 20th century, using an anthropological approach.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4580
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4677 (3) Jewish-American Literature**
This course explores a variety of Jewish-American literary works from the late-nineteenth century to the present, from Abraham Cahan to Philip Roth to Cynthia Ozick. We examine a number of issues, including what a Jewish-American writer is or is not, what role the immigrant experience plays in Jewish writing, how assimilation is represented, how this literature changes over time, what the significance is of gender roles, and how it draws from spiritual and mystical traditions. Formerly ENGL 3677.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 4677
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**JWST 4800 (3) Ethics, Medicine and the Holocaust: Legacies in Health and Society**
Engages the disturbing fact that German health care professionals actively participated in the architecture and machinery of the Third Reich; explores the implications of these facts for contemporary health care ethics; expands beyond the Holocaust to consider the ramifications for our understanding of the problem of evil in general.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 5800
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4837 (3) Jews in the American West**
Explores the history of Jewish migration and settlement in the American West. Jewish pioneers in the nineteenth century included explorers, businessmen, and cowgirls that established small communities in territories that had not yet achieved statehood. As westward expansion progressed, Jews continued to find opportunity in the West, balancing assimilation with unique expressions of religious identity. The history of communal institutions including synagogues, hospitals and summer camps offers new perspectives on this underrepresented segment of American Jewry.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4837
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**JWST 4900 (1-6) Independent Study in Jewish Studies**
Working with a faculty member in Jewish Studies on an independent study research project provides students with an opportunity to learn outside the formal classroom structure, with individual direction from Jewish Studies faculty on a topic of mutual interest not offered in regularly scheduled classes. (Independent study may not be used to substitute for a regular course not being offered in a given term.)
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**JWST 5200 (3) Religion and Reproductive Politics in the United States**
Focuses primarily on how Protestant, Catholic, and Jewish conversations about sexuality and reproduction have shaped access and attitudes towards reproductive health in the US over the course of the twentieth and twenty-first centuries.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4200, JWST 4200, WGST 5200

**JWST 5348 (3) Graduate Topics in Jewish History**
Covers topics in Jewish history from biblical beginnings to present day. Topics vary each semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**JWST 5358 (3) Childhood in Modern Israel/Palestine**
Examines topics relating to History, Jewish Studies and Israel/Palestine studies. Analyzes the history of modern childhood in Israel and Palestine from the 19th century to the present. Themes include agency, work, life cycle and culpability. Topics range from collective parenting on Israeli Kibbutzim, growing up in Ottoman Palestine, to the legal status of stone-throwing Palestinian children. Sources include memoirs, literature, films, monographs and articles.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4358 and HIST 4358 and HIST 5358
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite HIST/JWST 4338 History of Modern Israel/Palestine, this course would give students relevant background on the history of the region, but is not required.

**JWST 5378 (3) Jews in and of the Middle East**
Examines the modern history and culture of Jewish communities in the Middle East and North Africa; Jews' and Muslims' encounters with empire, westernization and nationalism; representations of Sephardi and Eastern Jews; Jewish-Muslim relations in Europe and the U.S.; and contact and conflict between Jews and Muslims in (and about) Israel/Palestine. Sources include memoirs, newspapers and films.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4378, JWST 4378, and HIST 5378
**Requisites:** Restricted to graduate students only.

**JWST 5800 (3) Ethics, Medicine and the Holocaust: Legacies in Health and Society**
Engages the disturbing fact that German health care professionals actively participated in the architecture and machinery of the Third Reich; explores the implications of these facts for contemporary health care ethics; expands beyond the Holocaust to consider the ramifications for our understanding of the problem of evil in general.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4800
**Grading Basis:** Letter Grade

**JWST 5900 (1-6) Graduate Independent Study in Jewish Studies**
Working with a faculty member in Jewish Studies on an independent study research project provides graduate students with an opportunity to learn outside the formal classroom structure with individual direction from Jewish Studies faculty on a topic of mutual interest not offered in regularly scheduled classes. (Independent study may not be used to substitute for a regular course not being offered in a given term).
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

# Journalism (JRNL)

## Courses

**JRNL 1000 (3) Principles of Journalism and Networked Communication**
Surveys the history, practices and responsibilities of journalism in a democracy. Examines ethics, best practices in institutional and network settings, reporting and writing, international news systems, personal branding, and strategies for creating and distributing content across media platforms. Promotes the highest professional values and encourages students to be leaders who recognize the possibilities of journalism in a democratic society.

**JRNL 1871 (1-3) Special Topics for First-Year Students**
Special studies in media that are specific for first-year students. May be repeated for a maximum of three credit hours.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**JRNL 2000 (3) Writing for the Media**
Introduces students to writing news for a range of news media platforms, including print / online, broadcast, social media and more, and teaches them how to use the appropriate grammar and style conventions for those media types. Also introduces students to various types of stories, from breaking news to features to profiles, and to basic reporting skills. Students encouraged to take concurrently with JRNL 2001.
**Requisites:** Requires prerequisite of JRNL 1000 (minimum grade C-). Restricted to students with JRNL plan (Major or Minor) or who are on-track admitted to JRNL.

**JRNL 2001 (3) Fundamentals of Reporting Technologies**
Develops news-gathering skills for work in news enterprises. Students learn skills for working with technologies used in news reporting and in storytelling for various media formats. Students are introduced to a range of technologies for recording, editing and producing. Students encouraged to take concurrently with JRNL 2000.
**Requisites:** Requires prerequisite of JRNL 1000 (minimum grade C-). Restricted to students with JRNL plan (Major or Minor) or who are on-track admitted to JRNL.

**JRNL 2003 (3) Data Journalism**
Instructs students in data-driven reporting, from practice to ethical considerations. The class includes hands-on, in-depth instruction in gathering data, processing, presenting, and writing about data as a critical tool in journalistic storytelling. Students learn to read, interpret and critique data analysis for journalistic purposes.

**JRNL 2014 (3) Race and Sports Journalism**
Examines the intersection of sports journalism and race. It investigates the subject from two distinct but related perspectives. First, the class looks historically at how race has been covered in both journalism generally and sports journalism more specifically. Then it seeks to understand the effects of said coverage.

**JRNL 2301 (3) Journalism Ethics and History in Film**
Examines how the depiction of journalists evolves over time through watching classic films. Also, the course studies how journalists depicted in film enact (or do not enact) ethical norms of the profession. Through the reading of cinema as text, and in conjunction with written texts, the class will discuss how these depictions in popular culture have, over time, impacted the way American society views the media.

**JRNL 2401 (3) Media Coverage of Diverse Populations**
Explores the ways in which issues of gender, gender expression, sexual orientation, race, ethnicity and religion play out in news coverage and how news organizations approach coverage of marginalized groups in society.

**JRNL 3000 (3) Intermediate Reporting**
Builds on basic reporting, writing, and multimedia skills to produce text-story-centered packages on a variety of topics. Students develop beat reporting and enterprise skills, developing sources and progressive stories over the course of a semester.
**Requisites:** Requires prerequisite courses of JRNL 2000 and JRNL 2001 (all minimum grade C-). Restricted to JRNL majors and minors.

**JRNL 3102 (3) Photojournalism I**
Introduces the basic elements of visual communication. Covers the use of camera systems, digital imaging techniques and other aspects of photojournalism including law, ethics, history and critical decision-making.
**Requisites:** Requires a prerequisite course of JRNL 2001 (min grade C-). Restricted to Journalism (JRNL) majors or minors with a minimum of 57 credits only.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 3112 (3) Concepts in Visual Culture**
Studies the principles, theories and language of visual communication, emphasizing the evaluation and use of images in mass media. Designed to help students build theories and practices learned in previous classes and perfect their skills integrating words and pictures in communication to gain a greater appreciation of the visual world.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 3201 (3) Critical Perspectives on Journalism**
Introduces students to the critical perspectives most often employed in qualitative analysis of journalistic texts and practice: Marxism, psychoanalytical criticism, semiology, sociological criticism, structuralism, etc. Emphasis is upon texts from contemporary print and broadcast media, although students may also explore documentary film and literary journalism.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 3202 (3) Covering Political Campaigns**
Provides a blend of theoretical understanding and on the ground experience for students interested in learning about the forces that shape election coverage and the practicalities of reporting on the local and national races for public office.
**Requisites:** Requires prerequisite course of JRNL 2000 (minimum grade C-).

**JRNL 3211 (3) History of Broadcasting**
Offers a broad overview of significant broadcast programs, the institutions and sociocultural and economic influences that have steered the course of radio, television and electronic media history in the United States.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 3221 (3) History of Digital Journalism**
Explores the history, economics and traditions of digital technologies. Addresses the interaction between digital technologies, culture and economy with particular emphasis on the effects on digital journalism. Concludes with a focus on how these concepts are embraced by new journalism market models.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 3231 (3) History of Documentary Film**
Explores the evolution of the documentary, both in feature films and on television, to understand how the genre offers both historical context and an understanding of the world in which we live.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 3241 (3) History of Journalism**
Explores the foundations of journalism practice in a historical context. Students study the evolution of the news industry and analyze examples of contemporary broadcasting, photography, online and print media in light of the past.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 3251 (3) History of Sports Journalism**
Explores the foundations of sports journalism practice in a historical context. The class provides an overview of sports journalism, reporting, and media from early documentation and myths surrounding competition in ancient civilizations through the exponential growth of the craft throughout the 20th century, to the current state of sports journalism across numerous traditional and digital platforms as a part of a multi-billion dollar sports media industry.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 3301 (1) Camera Workshop for Video**
Develop competent skills using camcorders to get the most compelling visuals and professional audio. Learn time-saving strategies to shoot footage for unplanned news events, scripted shows, and documentaries. Explore types of shots, the axis, camera movement, and ways to shoot for the edit with sequences and in-camera transitions. Students will be introduced to basic camcorder functions, rule of thirds, depth of field, exposure settings, white balance, and focus techniques. Students will also learn how to obtain the best audio for interviews and natural sound, and how to light interview shots.
**Recommended:** Prerequisite JRNL 2001.

**JRNL 3302 (1) Video Editing Skills**
Explore time-saving editing workflows using shortcut editing techniques to create compelling and dynamic content. Understand file management, saving and importing media properly. Recognize and interpret film language and the grammar of editing, such as cross-cutting, montage, screen direction, cutting on the action, match action, and even ways to manipulate time. Students will also learn how to create graphics, perform colour correcting, and do basic animation.
**Recommended:** Prerequisite JRNL 2001.

**JRNL 3303 (1) Motion Graphics**
Explore how to enhance visuals and produce animated graphics using Adobe After Effects. Learn ways to work within virtual 3D environments to create production elements that include titles, lower thirds, bumps, and full-screen graphic presentations. Develop skills with using masks, virtual cameras, parallax in photos, tracking motion, and rotoscoping.
**Recommended:** Prerequisite JRNL 2001.

**JRNL 3304 (1) Contemporary News and Ethics Intensive**
This course uses cases coming from the contemporary media world to explore issues that include conflicts of interest, privacy, bias in media coverage, incorporating diverse voices, social responsibility, and source relationships through the lens of various theories and frameworks for ethical decision-making.

**JRNL 3305 (1) Writing Fundamentals**
An intensive refresher or introduction to the basics of writing for journalism majors and journalism and sport media minors. This short course is offered to students who need additional writing coaching and practice, or to those who seek intensive writing instruction and practice prior to or in addition to JRNL 2000.

**JRNL 3306 (1) Writing for the Ear**
Offers an intensive refresher or introduction to the basics of journalistic writing for audio and video. Students develop an understanding of how writing for the ear differs from writing for the eye, and practice how to effectively integrate video and audio into multimedia writing.

**JRNL 3307 (1) Copyright and Fair Use for Content Creators**
The explosion of web-based content and Creative Commons licenses make understanding copyright and fair use a thorny and confusing area. This course, designed for content creators both inside and outside of journalism, will enable students to better understand when they can use content created by others, and when that content is off limits.

**JRNL 3344 (3) Short Form Documentary**
Teaches students how to raise the production value of their work based on standards used by professionals. Students learn theory of various short forms in video; how to implement tools such as lenses, lights, and other video gear to enhance the cinematic quality of their video; how to edit their video clips with professional pacing and rhythm; how to apply color grading techniques for a cinematic look; and how to create motion graphics to illustrate data, create titles and lower thirds.
**Requisites:** Requires a prerequisite course of JRNL 2000 and JRNL 2001 (minimum grade C-). Restricted to JRNL majors or minors only.
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 3401 (3) Sociology of News**
Provides students with an introduction to the factors that shape news reporting and production, including gatekeeping, intermedia agenda setting, pack journalism, beat structures, news values and issues unique to the various platforms on which news is delivered.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 3402 (3) Social Media Storytelling**
Investigates the theory, ethics and best practices in storytelling across a variety of social media platforms including, but not limited to, Facebook, Twitter, Instagram, Snapchat, Medium and YouTube. Examines best practices for social media engagement. Students develop a story for multiple platforms and analyze the story performance in the sites and make recommendations for best practices.
**Requisites:** Requires prerequisite courses of JRNL 2000 and JRNL 2001 (all minimum grade C-). Restricted to JRNL majors and minors with 57-180 credits (Juniors or Seniors).

**JRNL 3552 (3) Online Production and Editing**
Explores the best practices for newsroom web production and copyediting, working with web-based stories and online audience engagement. Students develop story packages for online audiences, learn to work with content management systems (CMS), build webpages using industry leading platform, and learn the fundamentals of search engine optimization (SEO). Students also develop visual multimedia skills that enhance their visual communication skills.
**Requisites:** Requires prerequisite courses of JRNL 2000 and JRNL 2001 (all minimum grade C-). Restricted to JRNL majors and minors.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 3614 (3) Audio Storytelling and Podcasting**
Introduces audio production techniques using digital technologies. Students learn to apply fundamental principles to create professional radio and online programs and podcasts.
**Requisites:** Restricted to College of Communication, Media, Design and Information (CMDI) or Journalism (JRNL) majors and minors with a minimum of 45 hours taken.
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 3644 (3) Video News Production and Reporting**
This course teaches essential video production skills in both field and studio operation, camera and editing work, lighting, and multi-camera studio directing. Students will learn how to develop visual narratives, shoot quality footage for the story, and apply best journalistic practices to positively impact society on multiple media platforms.
**Requisites:** Requires prerequisite courses of JRNL 2000 and JRNL 2001 (minimum grade C-). Restricted to JRNL majors or minors with a minimum of 45 completed hours.
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 3651 (3) Media Law and Ethics**
Studies state and federal laws and court decisions that affect the media in order to develop knowledge of media rights and responsibilities and an understanding of the legal system. Provides students with an overview of the theories, ethics, codes, and analytical models that are used in journalism, and introduces students to a variety of ethical issues that can arise in journalism.
**Requisites:** Restricted to College of Communication, Media, Design and Information (CMDI) or Journalism (JRNL) majors and minors with a minimum of 45 hours taken.

**JRNL 3704 (3) Sports Reporting I**
Prepares students for the world of sport journalism. Combines the skills of a hard news reporter, the perspective of an entertainment reporter and the persuasive abilities of an editorial writer.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 3804 (3) Sports, Media and Society**
Examines how sports, culture and especially the media, with a specific focus on journalism, all come together to influence society. Explores how sports communication affects, and is affected by, the issues and tension that touch society at large, such as law and politics, race, gender, sexuality and disability.
**Requisites:** Restricted to CMDI students with a minimum of 45 credits completed or non-CMDI students who have completed CMDI 2001 (minimum grade D-).

**JRNL 3904 (3) Sports Journalism and Gender**
Analyzes the role gender has played in providing opportunities for women to compete in athletics and journalistic coverage of those athletes and the sporting events in which they participate. It will also examine how gender has influenced opportunities for sports journalists in the past and in the contemporary sports media industry.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 4004 (3) The Sports Media Industry**
Examines the business practices and frameworks of the sports that journalists cover. Topics include market-driven journalism, the growth of sports coverage throughout in the 20th century, the technologies impacting sports business today, and the way money impacts coverage. Finally, the class explores the unique issues and challenges posed by the different financial structures of amateur and professional sports and how they influence sports coverage and reporting.
**Requisites:** Restricted to CMDI students with a minimum of 45 credits completed or non-CMDI students who have completed CMDI 2001 (minimum grade D-).

**JRNL 4011 (3) Principles of Media Relations**
Provides students with information about the ethics, history and practice of media relations (community affairs, community relations, customer relations, government relations, industry relations, internal communications, public relations, press agentry, public affairs, publicity, etc.). Introduces students from multiple academic disciplines to the genres of writing required for a media relations career.
**Requisites:** Restricted to students with a minimum of 45 credits completed.

**JRNL 4102 (3) Photojournalism II**
Advanced course intended to give students a forum in which technical skills will be brought to professional standards. Build a polished portfolio of work to present to editors and buyers.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5102
**Requisites:** Requires a prerequisite course of JRNL 3102 (minimum grade C-).
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 4311 (3) Literary Journalism**
Explores the telling of nonfiction stories through the techniques of fiction, through study of American literary journalists, from the New Journalism of the 1960s through current longform narrative multimedia. Students will read and analyze narrative nonfiction from several periods of American history in order to expand their own storytelling repertoire. The class will emphasize in-depth reporting for narrative, character and scene development, narrative arc and structure and the use of dialogue. They will also explore the particular ethical dilemmas faced by writers of creative nonfiction.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5311
**Requisites:** Requires prerequisite course of JRNL 2000 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 4344 (3) Video Documentary Production**
Designed to give students the experience of researching, writing, shooting and editing their own documentaries.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5344
**Requisites:** Requires a prerequisite course of JRNL 3644 (minimum grade C-). Restricted to Journalism (JRNL) majors or minors.
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 4351 (3) Reporting Wars, Conflict and Peace**
Explores how journalists report international breaking news with a focus on war, disaster and peace and how these news events affect peoples' lives, governmental decisions and news media operations.

**JRNL 4354 (3) Video News Reporting**
Focuses on writing and reporting compelling visual stories using mobile devices and video cameras. Students also learn storytelling techniques of backpack video journalism and reporting for broadcast television and online news.
**Requisites:** Requires a prerequisite course of JRNL 3644 (minimum grade C-). Restricted to Journalism (JRNL) majors or minors.
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 4401 (3) News and Public Perception**
Considers the impact that news and journalistic practice have on the public through processes like agenda setting and second-level agenda setting, as well as issues such as news avoidance, the spiral of silence and political cynicism.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 4402 (3) Journalism and Social Identity**
Provides a discussion-based inquiry into the role of journalism and journalists in the representation of intersectional identities, focusing on race, gender, sexual expression and socioeconomic class in the United States. The study and practice of journalism in this course will address issues of trust, power, privilege and ethics inherent in reporting across difference.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5402
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite JRNL 2401.

**JRNL 4411 (3) International Media and Global Crises**
Investigates how media organizations, audiences and other international organizations function during various global crises, such as national disasters, climate change and health epidemics, due to imbalanced distribution of wealth and resources, ethnic tensions and diplomatic failures.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 4562 (3) Digital Journalism**
Builds upon digital production skills through the creation of multimedia project. Applies media theory to evaluate digital media content and explore how digital forms influence the news industry, politics, culture and society.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5562
**Requisites:** Requires prerequisite courses of JRNL 2000 and JRNL 2001 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 4572 (3) News Corps**
CU News Corps provides students the opportunity to immerse themselves in a single project and then produce an in-depth text based or multimedia explanatory/investigative story for publication in professional media. Students spend several weeks studying the subject in question before reporting and producing their stories.
**Requisites:** Requires prerequisite course of JRNL 3674 or JRNL 4002 or JRNL 4354 or JRNL 3402 or JRNL 3552 or JRNL 4344 or JRNL 4602 or JRNL 4614 or JRNL 4702 or JRNL 4802 or JRNL 4822 (min grade C-).
**Grading Basis:** Letter Grade

**JRNL 4573 (3) CU News Corps Investigative Reporting & Leadership**
Take lessons learned from the CU News Corps capstone to the next level with this course designed to give elite students the opportunity to broaden and deepen their investigative reporting by either expanding on their capstone project's subject matter, or beat, or by taking a deep dive into a different field of research. Further develop brainstorming and editing skills.
**Requisites:** Requires prerequisite course of JRNL 4572 (minimum grade B).

**JRNL 4602 (3) Opinion Writing**
Concentrates on several of the subjective areas of journalism. Emphasizes editorial and column writing, editorial pages and blogging.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5602
**Requisites:** Requires a prerequisite course of JRNL 2000 (minimum grade C-). Restricted to Journalism (JRNL) majors or minors with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 4614 (3) Narrative Audio Storytelling and Podcasting**
Develops audio storytelling techniques using digital technologies and expands on podcasting skills. Students expand their abilities to create professional radio and online stories, podcasts and programs.
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 4624 (4) NewsTeam**
Students participate in Newsteam Boulder, a program broadcast live over the Boulder cable television system.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5624
**Requisites:** Requires prerequisite course of JRNL 4354 (minimum grade C-).
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 4634 (1-3) Broadcast Projects**
Covers interpretation, preparation, and/or reporting in programs for broadcast media. Students produce radio or television documentaries and informational/entertainment programs.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5634
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires a prerequisite course of JRNL 3644 (minimum grade C-). Restricted to JRNL majors or minors.
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 4651 (3) Advanced Media Ethics**
Examines the responsibilities, the power and the problems of news media through the lens of ethical inquiry. Applies the philosophical an other perspectives from humanities and social sciences to consider ethical frameworks for guiding journalism in an era of technological disruption. Examines issues including privacy, conflicts of interest, undercover reporting, use of graphic images, interviewing trauma victims and other concerns in journalism through the lens of moral philosophy, best practices and codes of ethics.
**Requisites:** Requires prerequisite course of JRNL 3651 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 4674 (3) Live Streaming and Studio Producing**
Students develop, plan, and produce visual stories and live streaming productions both in the field and in studio. Additionally, students learn how to conduct live reporting, sharpen their visual storytelling, camera, and digital editing skills, and apply professional workflows and standards to their work.
**Requisites:** Requires a prerequisite course of JRNL 3344 or JRNL 3644 (minimum grade C-).
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 4702 (3) Arts/Cultural Reporting and Criticism**
Emphasizes composition of criticism for the performing arts and other areas of entertainment.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5702
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 4704 (3) Athletic Media Relations**
Offers the opportunity to both observe and experience what is required to work in the world of intercollegiate athletic media relations and professional sports public relations. Covers how to write and how to budget the vital components of publications, media bias and crisis management.

**JRNL 4710 (3) Sports Reporting II**
Prepares students for the world of sport journalism. Combines the skills of a hard news reporter, the perspective of an entertainment reporter and the persuasive abilities of an editorial writer. The class focuses on how to cover sports from all angles.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5710
**Requisites:** Requires prerequisite course of JRNL 3704 (minimum grade C-).
**Recommended:** Prerequisite restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 4714 (3) Sports Broadcasting**
Teaches students how to do live sports television production. Students will learn the sports TV business from the ground up, and be responsible for participating in the broadcasting of three to four live sporting events.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 4724 (3) Sports Announcing**
Teaches students about sports talk and sports announcing, how to interview sports celebrities and the legal considerations and ethics of the business. Students will be doing play-by-play and color of live sporting events. Department consent required.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**JRNL 4802 (3) Feature Writing**
Provides practice in writing freelance articles. Considers types, sources, methods, titles, illustrations, and freelance markets. Students submit work for publication.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 5802
**Requisites:** Requires prerequisite courses of JRNL 2000 and JRNL 2001 (minimum grade C-). Restricted to JRNL majors or minors with 57-180 credits (Juniors or Seniors).

**JRNL 4822 (3) Environmental Journalism**
Explores environmental topics including climate change, energy, water, biodiversity, and food. To enrich their skills and approaches, students produce stories on a range of environmental topics and examine media coverage of the environment, discussing the complex issues involved in reporting these stories, and exploring the ways that environmental crises intersect with other stories in the news.
**Requisites:** Requires prerequisite courses of JRNL 2000 and JRNL 2001 (minimum grade C-). Restricted to JRNL majors or minors with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 4841 (1-6) Undergraduate Independent Study**
Involves in-depth independent research and/or project work completed under the direction of a faculty member that demonstrates learning at the upper-division level within the discipline. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**JRNL 4874 (1-3) Special Topics**
Special Topics
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to JRNL majors or minors with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 4920 (3) Seminar in Honors Writing & Research**
This course supports seniors accepted into departmental Honors Programs in developing the research foundation for their projects, whether they are scholarly, creative, or hybrid. Course topics include topic development, primary and secondary source research, and the writing of a scholarly literature review. Project and time management, planning for creative and scholarly field research, and peer support and editing are also emphasized. Formerly offered as a special topics course.
**Grading Basis:** Letter Grade

**JRNL 4931 (1-6) Internship**
Internship
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of JRNL 3674 or JRNL 4002 or JRNL 4354 or JRNL 3402 or JRNL 3552 or JRNL 4344 or JRNL 4602 or JRNL 4614 or JRNL 4702 or JRNL 4802 or JRNL 4822 (min grade C-).

**JRNL 5001 (3) Media Technology Boot Camp**
Offers a foundation in the technologies of journalistic storytelling across a variety of established and emerging media platforms, such as print, television, radio, online publications, blogs, social media and emerging forms of communication. Students will emerge from the course with basic competence in the technical tools they will need as journalists.
**Requisites:** Restricted to graduate students only.

**JRNL 5011 (3) Newsgathering and Multimedia Storytelling**
Develops skills in research and reporting on public issues and news events, and in the construction of narrative in the journalistic and documentary traditions, using a variety of media platforms.
**Requisites:** Restricted to graduate students only.

**JRNL 5102 (3) Photojournalism Portfolio**
Advanced course intended to give students a forum in which technical skills will be brought to professional standards. Build a polished portfolio of work to present to editors and buyers.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4102
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 5311 (3) Literary Journalism**
Studies the contributions of American literary journalists from Sara Davidson, Joan Didion, Normal Mailer, Hunter S. Thompson and Tom Wolfe; to established writers of nonfiction, including Annie Dillard, Jon Krakauer, Jane Kramer, Adrian Nichole LeBlanc and Terry Tempest Williams; to the newest wave of long-form journalists. Explores the boundaries between fiction and nonfiction and the literary techniques that distinguish creative nonfiction and literary journalism from other reportorial and storytelling forms. Formerly JRNL 6321.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4311
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**JRNL 5344 (3) Video Documentary Production**
Designed to give students the experience of researching, writing, shooting and editing their own documentaries.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4344
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 5402 (3) Journalism and Social Identity**
Provides a discussion-based inquiry into the role of journalism and journalists in the representation of intersectional identities, focusing on race, gender, sexual expression and socioeconomic class in the United States. The study and practice of journalism in this course will address issues of trust, power, privilege and ethics inherent in reporting across difference.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4402
**Requisites:** Restricted to graduate students only.

**JRNL 5411 (3) Global Journalism and International News**
This graduate course provides students with an overview of the field of international and global journalism with particular foci on comparative media research and international affairs reporting. The course seeks to expose students to theoretical foundations and key concepts in the news media systems and journalistic practices around the world. It also addresses the political, social, and economic consequences of global journalism and the challenges related to it.

**JRNL 5502 (3) Newsgathering 2**
Involves writing news and features about actual events for publication under deadline pressure.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 5521 (3) Data Journalism**
Instructs students in data-driven investigative reporting. Includes hands-on, in-depth instruction in gathering data from census reports, commercial databases, information networks, and other sources, and utilizing statistical analysis software and spreadsheets to analyze the information in ways that can help deepen and strengthen journalistic stories on a wide variety of subjects.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**JRNL 5552 (3) Multimedia Editing**
Discusses principles and practice in copy editing and writing headlines for local and wire stories. Practice in page makeup, picture editing, and electronic editing.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 5562 (3) Digital Journalism**
Builds upon digital production skills through the creation of multimedia project. Applies media theory to evaluate digital media content and explore how digital forms influence the news industry, politics, culture and society.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4562
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 5572 (3) News Corps**
Provides students the opportunity to immerse themselves in an explanatory/investigative news project that gives students a chance to use in-depth research to produce content for Colorado news outlets and practice the skills they've learned in previous reporting classes. Students spend several weeks studying the subject in question before reporting and producing their stories.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 5573 (3) News Corps Investigative Reporting and Leadership**
Take lessons learned from the CU News Corps capstone to the next level with this course designed to give elite students the opportunity to broaden and deepen their investigative reporting by either expanding on their capstone project's subject matter, or beat, or by taking a deep dive into a different field of research. Further develop brainstorming and editing skills.
**Requisites:** Requires prerequisite course of JRNL 4572 (minimum grade B).

**JRNL 5602 (3) Opinion Writing**
Concentrates on several of the subjective areas of journalism. Emphasizes editorial and column writing, editorial pages and blogging.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4602
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 5624 (4) NewsTeam**
Students participate in Newsteam Boulder a program broadcast live over the Boulder cable television system.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4624
**Requisites:** Requires prerequisite courses of JRNL 5001 and JRNL 5011 (all minimum grade C-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 5634 (1-3) Broadcast Projects**
Covers interpretation, preparation, and/or reporting in programs for broadcast media. Prepares radio or television documentaries and informational/entertainment programs. Instructor consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4634
**Requisites:** Requires prerequisite courses of JRNL 5001 and JRNL 5011 and JRNL 5514 (all minimum grade C-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Broadcast Journalism

**JRNL 5651 (3) Journalism Law & Ethics**
Explores the legal and ethical frameworks of journalistic practice and media production. Covers historical as well as current frameworks used in examining the legal and ethical issues that arise in newsgathering and publication. Examines the relationships between ethics and the law in various media context.
**Requisites:** Restricted to graduate students only.

**JRNL 5684 (3) The Art of Visual Storytelling**
Teaches students how to raise the production value of their work based on standards used by professionals. Students learn how lenses, lights and contrast can affect an image; how to assemble their shots with pacing and rhythm; how to apply color grading techniques to give video a cinematic look; and how to create motion graphics for titles and lower thirds.
**Requisites:** Requires prerequisite courses of JRNL 5001 and JRNL 5011 (all minimum grade C-). Restricted to graduate students only.

**JRNL 5702 (3) Arts/Cultural Reporting and Criticism**
Emphasizes composition of criticism for the performing arts and other areas of entertainment.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4702
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 5710 (3) Sports Reporting II**
Prepares students for the world of sport journalism. Combines the skills of a hard news reporter, the perspective of an entertainment reporter and the persuasive abilities of an editorial writer. The class focuses on how to cover sports from all angles.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4710

**JRNL 5802 (3) Feature Writing**
Provides practice in writing freelance articles. Considers types, sources, methods, titles, illustrations, and freelance markets. Students submit work for publication.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4802
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 5810 (3) Community-Based Storytelling**
Offers students the opportunity to produce a story or series for publication in local media. A collaboration between the newsroom and the Center for Environmental Journalism, the course operates as a pop-up newsroom where students collaborate on a single project, working together to dive deeply into an underreported topic of importance to the community. Formerly offered as a special topics course.
**Requisites:** Requires prerequisite course of JRNL 5011 (minimum grade D-).

**JRNL 5812 (3) Science Writing**
Helps students acquire the basic skills and knowledge required of science journalists. Also examines issues of scientific importance such as climate change, the nature of scientific knowledge, and how science is covered in various media.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 5822 (3) Reporting on the Environment**
This class examines media coverage of environmental topics, and explores the ways that environmental crises intersect with other stories in the news. Students read contemporary environmental journalism, discuss the complex issues involved in reporting on the environment, and produce their own stories on topics including climate change, energy, water, biodiversity, and food.
**Equivalent - Duplicate Degree Credit Not Granted:** JRNL 4822
**Requisites:** Requires prerequisite courses of JRNL 5001 and JRNL 5011 (all minimum grade C-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Print Online Journalism

**JRNL 5841 (1-3) Graduate Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**JRNL 5851 (1-6) Graduate Professional Project**
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**JRNL 5871 (1-3) Special Topics**
Special Topics
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**JRNL 5931 (1-3) Internship**
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires pre-requisite of JRNL 5001 and JRNL 5011 and JRNL 5521 (all minimum grade of C-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**JRNL 6551 (3) News Media Representation and Identity**
Examines the role of race, gender, immigration status, religion, and other identities in journalistic representations. Students will apply the work of journalism scholars to historic and current case studies in print, broadcast, and online media. They will apply quantitative and qualitative research methods to more deeply investigate the role of journalism in constructing social identity. Formerly JRNL 5551.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 6651 (3) Media Law**
Graduate seminar in communications law. Studies changing law and applied legal research techniques.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**JRNL 6862 (3) Visual Communication and Mass Media**
Visual communication involves understanding both perception of messages and construction of them. Students analyze their visual thinking abilities and develop habits of visual analysis and criticism, as well as visual communication skills.
**Requisites:** Restricted to graduate students only.

**JRNL 7001 (3) ProSeminar in Mass Communication Theory 1**
Discusses prominent theoretical and methodological points of view in journalism studies and strategic communication that range from social science to critical studies to the humanities. The premise is that methods are driven by research questions, so there is no best way to conduct research. You should leave this course with an understanding of how to address various mass communication phenomena.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7001
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7002 (3) Research Design**
Adopts a holistic and creative approach to bridging theory with method for the purpose of research design. Students learn how to bridge theory and method, exploring research designs that effectively address research questions and hypotheses through elaboration of theoretical and operational linkages.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7002
**Requisites:** Requires prerequisite course of JRNL 7003 or APRD 7003 (minimum grade C-). Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7003 (3) ProSeminar in Mass Communication Theory II**
Continues introducing and discussing theoretical and methodological points of view in areas of communication, journalism and persuasion. Discusses the most important qualitative and quantitative methodological points of view, and from theoretical viewpoints that range from social science to critical studies. The idea is to develop an appreciation for theories and methodologies that can be employed depending upon the research question.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7003
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7004 (1) Doctoral Professionalization Seminar**
Introduces you to the university and gives you a chance to think out loud about what your academic future might look like. The course is designed to be responsive to your needs regarding your career, getting a job, getting tenure and teaching. In short, the course prepares you for a career in academia.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7004
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7010 (3) Qualitative Interviewing as a Research Method**
Develops the necessary skills to conceptualize, plan, and execute interview-based research projects. Covers topics such as brainstorming and implementing a research idea, formulating research questions, designing a thorough research plan, navigating the IRB, recruiting participants, creating the interview guide, conducting interviews, and analyzing and writing up data. Course also examines reflexivity and ethical issues that are inherent in interview studies, especially ones involving certain populations.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7010
**Requisites:** Restricted to graduate students only.

**JRNL 7011 (3) Seminar in Strategic Public Relations**
Analyzes the various dimensions of public relations based on scholarship. The seminar seeks to expose students to key public relations specialties such as issues management, risk and crisis communication, corporate social responsibility, communication campaigns, public diplomacy. It also aims to train students to recognize public relations as a strategic practice that can contribute significantly to organizational effectiveness and social good.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7011
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7012 (3) Ethnography and Media**
Provides a ¿how to¿ concerning the intersection of ethnography and the media. During which, the course examines the epistemology of fieldwork. We will critically examine aspects and approaches to doing and writing ethnography, including with and without social science theory. We will discuss the challenges of entering, being in, and leaving the field. And we will explore data collection techniques.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7012
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7013 (3) Mixed Research Methods**
Examines the practice of mixed-methods research in the social sciences with an emphasis on the pragmatic considerations necessary for such projects. The class will discuss the development and execution, the analyses of data obtained, and the practical tools required for such studies. Throughout the course, students will examine and discuss specific applications of mixed methods research.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7013
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7014 (3) Experimental Design**
Introduces all facets of experimental design for studies of forms of communication. This course study experiments, both for your own research and to help you evaluate the work of others, and provide an overview of research in the field and the various ways in which media can be utilized in experimental research. This is a hands-on, nuts-and-bolts methods course. You will not only learn about the various theories and methodologies, but also implement your own.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7014
**Requisites:** Requires prerequisite course of JRNL 7061 or APRD 7061 (minimum grade D-). Restricted to graduate students only.

**JRNL 7020 (3) The Public Sphere**
Investigates the role media play in the public sphere and democratic practices. Does media facilitate support or opposition to political and economic policies and cultural frames that become part of publics? Which institutions best inform publics and why? This course traces the development of U.S. and selected international media institutions. We analyze and debate the relationship of differing media content to political power, freedom of critical inquiry, and the facilitation or inhibition of democratic practices.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7020
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7021 (3) Science Communication**
Focuses on mass communication of issues related to science and follows two lines of inquiry. The seminar takes a cultural perspective, and explores the concept of scientific uncertainty in media. It will use these as a springboard for examining how we use media to conceptualize science, environment, health, etc., and how that impacts the way we live on this planet.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7021
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7030 (3) Media Sociology**
Examines a range of theories for how media messages and media institutions turn out the way they do. `Media sociology¿ refers to theorizing about the media as the `dependent variable;¿ even though many of the `independent variables¿ explored are not narrowly sociological. It connects media actors, organizations, and institutions to sociological concepts such as socialization, interaction, roles, and structures.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7030
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7031 (3) Media Ethics**
Explores the psychological structures and processes that come into play as individuals interpret moral problems, and formulate, select and execute a moral action in response. The seminar will explore the work of Jean Piaget, Lawrence Kohlberg, and James Rest, among others, and apply moral psychology theories and methods to contemporary issues and cases in media professions.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7031
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7034 (3) Health Communication**
Advanced seminar that examines and critiques the literature on health communication in two specific areas: news about health and its impact on individuals, and health promotion campaigns.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7034

**JRNL 7051 (3) Qualitative Research Methods**
Provides a survey of various qualitative modes of inquiry, attending to the philosophical, conceptual, and practical foundations of qualitative research in media, communication, and information. The course is designed to support students in developing a critical understanding of the different considerations in and stages of qualitative research, including the development of research questions, theoretical and conceptual frameworks, methodological approaches, data collection, data analysis, and assessment of reliability and validity of qualitative data. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7051
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**JRNL 7061 (3) Quantitative Research Methods**
Introduces graduate students to concepts and applications in quantitative research methods. The course prepares students fordissertation writing through hands-on experience in developing research designs and conducting independent quantitative research.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7061
**Grading Basis:** Letter Grade

**JRNL 7062 (3) Advanced Statistical Analysis for Mass Communication**
Provides instruction on the following topics: ordinary least squares regression, statistical mediation and moderation, path analysis, count and categorical data modeling, and factor analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7062
**Grading Basis:** Letter Grade

**JRNL 7063 (3) Text Analytics for Computational Mass Communication Research**
This course tackles advanced advertising and marketing analytics through three advanced methods aimed at solving these problems: text classification, text topic modeling, and semantic network analysis. Each key area will involve a deep dive into the leading computer science methods aimed at solving these methods using Python. Students will walkthrough conceptual overviews of the methods, and dive into real-world datasets through instructor-led tutorials. Students will also conduct a major project for each of the 3 key methods.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7063
**Grading Basis:** Letter Grade

**JRNL 7841 (1-3) Independent Study**
Provides opportunities for independent study at PhD level. Students work on research or reading in a subject area guided by faculty.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**JRNL 7871 (3) Special Topics**
Special Topics
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**JRNL 7880 (3) Persuasion Theory**
This seminar acts as an overview of psychological knowledge as it pertains to capturing consumer insight, and includes a consideration of how the brain works, what factors influence consumer choice, and a critical evaluation of psychological assessment tools.
**Equivalent - Duplicate Degree Credit Not Granted:** APRD 7880

**JRNL 8991 (1-10) Doctoral Dissertation**
Working on dissertation.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.

# Korean (KREN)

## Courses

**KREN 1010 (5) Beginning Korean 1**
This course is designed to develop students' basic communication skills in various everyday topics through an integrated practice of listening, speaking, reading, writing, and presentation. Additionally, students will engage in free unlimited 1:1 conversation practice online with AI Korean speakers as their language partners to enhance their pronunciation and conversation skills through real-time interaction.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Korean
Departmental Category: Asia Content

**KREN 1011 (3) Introduction to Korean Civilization**
Introduces the history of Korean culture within the context of political, social, and economic history. Covers the old Choson dynasty to present day Korea. Taught in English.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Korean Courses in English
Departmental Category: Asia Content

**KREN 1020 (5) Beginning Korean 2**
Continuation of KREN 1010. This course is designed to develop students' basic communication skills in various everyday topics through an integrated practice of listening, speaking, reading, writing, and presentation. Additionally, students will engage in free unlimited 1:1 conversation practice online with AI Korean speakers as their language partners to enhance their pronunciation and conversation skills through real-time interaction.
**Requisites:** Requires prerequisite course of KREN 1010 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Korean
Departmental Category: Asia Content

**KREN 2110 (5) Intermediate Korean 1**
Extends the conversational and written skills acquired at the elementary level. Although emphasis remains on spoken Korean, readings are increased, elementary writing skills are introduced gradually, and some Sino Korean characters are taught.
**Requisites:** Requires prerequisite course of KREN 1020 (minimum grade C).
**Additional Information:** Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Korean
Departmental Category: Asia Content

**KREN 2120 (5) Intermediate Korean 2**
Continuation of KREN 2110.
**Requisites:** Requires prerequisite course of KREN 2110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Korean
Departmental Category: Asia Content

**KREN 2441 (3) Film and Korean Culture**
Introduces students to major works, genres, and trends of Korean cinema from the colonial period to the present. We will explore how cinema registers Korea's experience with modernity, colonialism, national division, the Cold War, and globalization, paying particular attention to class, gender, nation, race and migration. Taught in English. No prior knowledge of Korea or film art is required.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Korean Courses in English
Departmental Category: Asia Content

**KREN 3110 (5) Advanced Korean 1**
Promotes an advanced level of speaking, reading, and writing. Focuses on contemporary business Korean language as reflected in various Korean media such as newspapers, magazines, and television. The goal is to acquire Korean language skills at a level that allows students to conduct business activities.
**Requisites:** Requires prerequisite course of KREN 2120 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Korean
Departmental Category: Asia Content

**KREN 3120 (5) Advanced Korean 2**
This second semester of Korean offers advanced level speaking and writing. Focuses on understanding contemporary Korean languages as reflected in various communication media, such as print, TV, and films to help students understand Korean in a variety of contexts.
**Requisites:** Requires prerequisite course of KREN 3110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Korean
Departmental Category: Asia Content

**KREN 3611 (3) Speaking the Truth: Women's Counter-narratives of Korea and Japan**
Explores the rich history of women¿s writing in premodern Japan and Korea, focusing on works produced by and for women in vernacular scripts (kana and han'g¿l) during the Heian (794-1185), Kamakura (1185-1333), and Chos¿n (1392-1910) periods. Topics covered include the textual construction and subversion of idealized femininity, the representation of women's real lived experiences, and the subjective nature of historical truth.
**Equivalent - Duplicate Degree Credit Not Granted:** JPNS 3611
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**KREN 3841 (3) Modern Korean Literature in English Translation**
Surveys masterpieces of modern Korean literature written by significant Korean/Korean American authors in English. Provides various literary and theoretical frameworks to understand Korean literature within the context of Asian global culture. Covers from colonial period to the present. Taught in English. No prior knowledge of Korea or Korean literature is required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Korean Courses in English
Departmental Category: Asia Content

**KREN 3851 (3) Studies in Korean Popular Culture**
Introduces Korean popular culture, considering its ideological, economic, and socio-political function, its reception and use, and medium-specific textual operations of individual works, drawing from music, cinema, dance, music videos, literature, comics, and other forms of texts and events. The course moves from the Japanese colonial period to the contemporary moment, providing coverage of North and South Korea. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Korean Courses in English

**KREN 4110 (3) Advanced Reading Through Pre-Modern Korean History**
In this advanced-level Korean course, students will explore pre-modern Korean history through the lens of culture and society. The primary course materials consist of written Korean texts from the main textbook, supplemented by various resources such as news articles, movies, literature, songs, photographs, and television/radio content. Students will analyze these texts thematically and write concise paragraphs based on their readings, covering pre-modern history from the Three Kingdoms period to the Joseon Dynasty.
**Requisites:** Requires prerequisite course of KREN 3110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**KREN 4900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Korean
Departmental Category: Asia Content

# Landscape Architecture (LAND)

Courses

**LAND 2004 (3) History of Landscape Architecture**
Through an examination of distinct historical periods, this course explores the human narrative of reshaping nature through the practice of what is now Landscape Architecture. This course introduces major histories, theories, and sites guiding Landscape Architecture while questioning the Eurocentric perspective that has framed history¿s curation. Students will survey humanity¿s redesign of natural surroundings such as fields, groves, avenues, gardens, terraces, coastal restorations, riparian ecological systems, national parks, and urban greenways.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD), and Environmental Planning Minor students only.
**Recommended:** Corequisite LAND 2100.
**Grading Basis:** Letter Grade

**LAND 2100 (6) Studio 1: Foundations of Landscape Architecture**
Introduces essential landscape architecture skills through a project-based studio. Building on design literacy, students incorporate varied ecological processes, explore landscape as a medium for connecting the natural and cultural, develop analog and digital communication tools and focus on the importance of place-making.
**Requisites:** Requires prerequisite course of ENVD 1120 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD), students with 40+ credits.
**Recommended:** Corequisite LAND 2004.
**Grading Basis:** Letter Grade

**LAND 3003 (3) Site Planning, Materials, and Technologies**
Presents the fundamental skills in site planning and decision-making. Students will perform analysis, concept generation, and programming through biophysical and socio-economic parameters, while reflecting on the subjective experiences, and historical, cultural, and infrastructural factors influencing design. Additional emphasis on the practice of site grading, surveying methods and infrastructure detailing in the context of watersheds and landscape restoration. Students will gain insights into materiality and design technologies.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite LAND 3100.
**Grading Basis:** Letter Grade

**LAND 3100 (6) Studio 2: Intermediate Landscape Architecture**
Advances the understanding of the practice of landscape architecture. Focusing on concepts such as community engagement and client-based projects and covering topics such as health-focused spaces, ecological adaptability, green equity and gentrification. This studio builds on digital technologies, drawing, and graphic communication skills.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite course of LAND 2100 (minimum grade C-). Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**LAND 3103 (3) Ecological Planting Design**
Introduces species identification, planting design concepts, and design tools and methods. By framing the course in local ecological systems, the course eclipses the mere fundamentals of planting design resulting in students building a robust plant palette applicable to Colorado and the American West and the knowledge needed to deploy an ecologically responsive design intervention. Students are exposed to planting design methods of placemaking, embracing senescence, planting habitats, and designing for changing climates.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Recommended:** Corequisite LAND 3100.
**Grading Basis:** Letter Grade

**LAND 4100 (6) Capstone in Landscape Architecture**
Emphasizes individual project development and well-defined design concepts. Capstone experience introduces critical strategies, advanced design techniques, and representation skills to address pressing issues in landscape architecture.
**Requisites:** Requires prerequisite course of LAND 3100 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**LAND 4114 (3) Landscape Architecture Theory**
Students research and interrogate the boundaries of landscape architecture theory and practice. Analyzing the values and concepts that have shaped landscape architecture throughout its history into the present. The course further focuses on connecting central theories to lived experiences, studio practices and contemporary design that exemplifies these theoretical approaches.
**Requisites:** Requires prerequisite course of LAND 2004 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and Environmental Planning Minor students.
**Grading Basis:** Letter Grade

# Language Technology (LGTC)

## Courses

**LGTC 5010 (2) Second Language Acquisition and Language Education**
Introduces students to major theoretical approaches to Second Language Acquisition and explores their educational potential through scholarly readings and practical implementation and assessment of their usefulness in the foreign language classroom. This course is offered online summer semesters (D Term) through the School of Continuing Education.
**Grading Basis:** Letter Grade

**LGTC 5020 (3) Educational Technology Foundation**
Introduces the field of language technology from its origin to today; the latest theories and practices in technology integration; key journals, trends, issues and researchers in the field. This course is offered online summer semesters (D Term) through the School of Continuing Education.
**Grading Basis:** Letter Grade

**LGTC 5030 (2) Language Technology Tools in Practice**
Introduces students to major technical tools, explores their educational potential through scholarly readings and practical implementation and assessment of their usefulness in the classroom.
**Grading Basis:** Letter Grade

**LGTC 5031 (2) Emerging Technology for Language Learning**
Introduces students to new and emerging technology and practices, explores their educational potential through scholarly readings and practical implementation and assessment of their usefulness in the classroom.
**Grading Basis:** Letter Grade

**LGTC 5032 (2) Digital Games and Language Learning**
Understand the fundamental aspects of games and gamification. Be able to distinguish between gaming and gamification in a classroom context. Explain and apply how games can support instruction. Identify various game tools and resources for classroom use and explain how these tools and resources support learning. Use appropriate professional language to discuss game mechanics in a learning context. Apply ACTFL standards for teaching and learning to gameful learning contexts.
**Grading Basis:** Letter Grade

**LGTC 5035 (2) Online and Blended Language Instruction**
Explores the topic of teaching and learning languages online and in a blended format with an emphasis on employing best practices, course design, assessment and the use of synchronous and asynchronous tools to plan, deliver, teach and assess language through learning management systems and various Web 2.0 tools, culminating in the creation of a sample course plan and sample module for a prospective online or blended language course.
**Grading Basis:** Letter Grade

**LGTC 5040 (2) Telecollaboration for Language Learning Foundations**
Trains foreign language faculty and instructors in dual immersion language learning via telecollaboration. This course is offered online summer semesters (B Term) through the School of Continuing Education.
**Grading Basis:** Letter Grade

**LGTC 5045 (1) Language Teacher Proficiency Through Telecollaboration**
Requires that students conduct a total of 10, 30-minute long virtual immersions (through a video conferencing tool) with a language partner. Students will receive assistance to find a partner. Can be repeated for a total of 2 credit hours for certificate students.
**Repeatable:** Repeatable for up to 2.00 total credit hours.

**LGTC 5050 (3) Language Technology Practicum**
Select, design, implement and assess a capstone instructional technology project of significance. Students will work closely with their advisor at each stage of the project and develop an online multimedia portfolio. This course is offered online spring semesters through the School of Continuing Education.
**Grading Basis:** Letter Grade

**LGTC 5060 (3) Global Voices, Telecollaboration, and Language Learning**
Telecollaboration refers to the practice of pairing students or groups of students to native speakers of the target language through video conferencing tools for the specific purpose of increasing their oral and cultural proficiency. In this course, you will learn about the many approaches to telecollaboration, including using social media, one-on-one, and class-to-class exchanges, and virtual guest speakers. You will learn to design pedagogical tasks that ensure that these activities have a measurable impact on students' global awareness, linguistic proficiency, and intercultural competence.
**Grading Basis:** Letter Grade

# Latin American Studies (LAMS)

## Courses

**LAMS 1000 (3) Introduction to Latin American and Latinx Studies**
Focuses on the main topics of Latin American and Latinx Studies, exploring them through interdisciplinary approaches. Core course of the Latin American and Latinx Studies Certificate.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective Arts Sci Gen Ed: Distribution-Social Sciences

**LAMS 3100 (3) Travel, Science and Adventure**
Focuses on the expeditions of the most important scientific travelers in Ecuador during the 18th and 19th centuries: French mathematician Charles-Marie La Condamine, German naturalist Alexander von Humboldt and English naturalist Charles Darwin. In Ecuador, La Condamine proved the shape of the Earth, Humboldt designed the theory of ecosystems and their interconnections, and Darwin found evidence of evolution in the Galapagos. These travelers made important observations about Ecuador¿s nature, society, and history.
**Grading Basis:** Letter Grade

**LAMS 3930 (3) Internship in Latin American and Latinx Studies**
Provides an academically supervised opportunity for student to work in public and private organizations on projects related to Latin American and Latinx Studies. Students must relate their academic experience to their field work experience though a portfolio and a final paper. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** it is recommended for students to be enrolled in LALSC certificate, but it is not a requirement.

**LAMS 4854 (1-3) Independent Study**
Work with an approved faculty sponsor to explore a topic in greater depth. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisite LAMS 1000 (minimum grade D-).

# Latin Language (LATN)

## Courses

**LATN 1014 (4) Beginning Latin 1**
Introduces basic grammar and vocabulary. For students with no previous knowledge of Latin.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Latin

**LATN 1024 (4) Beginning Latin 2**
Continues the presentation of grammar, incorporates review of fundamentals, and introduces the reading of literature. For students with previous experience of Latin.
**Recommended:** Prerequisite LATN 1014 or equivalent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Latin

**LATN 2004 (3) Accelerated Latin 1**
Intensive introductory course in Latin including a survey of grammar and practice reading and writing. No previous knowledge of Latin is required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Latin

**LATN 2044 (3) Accelerated Latin 2**
Continuation of LATN 2004. Reading of advanced texts: Caesar, Cicero, Ovid and others.
**Recommended:** Prerequisite LATN 2004.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 2114 (4) Intermediate Latin 1**
Completes the presentation of grammar and continues the reading of literature, from a variety of authors of poetry and prose.
**Recommended:** Prerequisite LATN 1024 or equivalent.
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Latin

**LATN 2124 (4) Intermediate Latin 2**
Selections from Virgil's Aeneid with attention to literary form and context as well as advanced grammar and syntax.
**Recommended:** Prerequisite LATN 2114.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 3014 (3) Introduction to Latin Prose**
Author or topic in Latin specified in the online Schedule Planner (e.g., Cicero, Livy, Pliny). Formerly CLAS 3014.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 3024 (3) Introduction to Latin Poetry**
Author or topic in Latin specified in the online Schedule Planner (e.g., Virgil, Ovid, Catullus, Horace).
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 4014 (3) Topics in Latin Prose**
Author or topic in Latin specified in the online Schedule Planner (e.g., Roman historians, Roman epistolography, Cicero, Roman novel).
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 5014
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Recommended:** Prerequisites LATN 3014 and LATN 3024.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 4024 (3) Latin Prose Composition**
Reviews grammar and syntax. Introduces Latin prose style and composition.
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 5024
**Recommended:** Prerequisites LATN 3014 and LATN 3024.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 4044 (3) Topics in Latin Poetry**
Author or topic specified in Latin specified in the online Schedule Planner (e.g., Roman elegy, Neronian poetry, Lucretius, Roman satire).
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 5044
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisites LATN 3014 and LATN 3024.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 4084 (3) Survey of Roman Literature Part 2: Imperial**
Covers Imperial Roman literary history from the mid-late Augustan Period to the start of Late Antiquity. Students read principal surviving works of Imperial Roman poetry and prose in the original Latin.
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 5084
**Recommended:** Prerequisites LATN 3014 and LATN 3024.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 4094 (3) Survey of Roman Literature Part 1: Republican to Augustan**
Introduces Roman literary history from its origins to the 30s BCE. Students read principal surviving works of the Roman Republican poetry and prose in the original Latin.
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 5094
**Recommended:** Prerequisites LATN 3014 and LATN 3024.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Latin

**LATN 4824 (3) Latin Teaching Methods: Open Topics**
Covers specialized topics in Latin pedagogy specified in the online Schedule Planner.
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 5824
**Additional Information:** Departmental Category: Latin

**LATN 4844 (1-3) Independent Study**
Formerly CLAS 4844.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: Latin

**LATN 5014 (3) Topics in Latin Prose**
Author or topic in Latin specified in the online Schedule Planner (e.g., Roman historians, Roman epistolography, Cicero, Roman novel).
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 4014
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Latin

**LATN 5024 (3) Latin Prose Composition**
Reviews grammar and syntax. Introduces Latin prose style and composition. Formerly CLAS 5024.
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 4024
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Latin

**LATN 5044 (3) Topics in Latin Poetry**
Author or topic specified in Latin specified in the online Schedule Planner (e.g., Roman elegy, Neronian poetry, Lucretius, Roman satire).
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 4044
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Latin

**LATN 5084 (3) Survey of Roman Literature Part 2: Imperial**
Covers Imperial Roman literary history from the mid-late Augustan Period to the start of Late Antiquity. Students read principal surviving works of Imperial Roman poetry and prose in the original Latin.
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 4084
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Latin

**LATN 5094 (3) Survey of Roman Literature Part 1: Republican to Augustan**
Introduces Roman literary history from its origins to the 30s BCE. Students read principal surviving works of the Roman Republican poetry and prose in the original Latin.
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 4094
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Latin

**LATN 5404 (3) Special Project: Teaching**
Trains students to prepare classroom-ready materials, which are then tested in the students' own classroom. Required of master's candidates (teaching of Latin option). Formerly CLAS 5404.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Latin

**LATN 5824 (3) Latin Teaching Methods: Open Topics**
Covers specialized topics in Latin pedagogy specified in the online Schedule Planner.
**Equivalent - Duplicate Degree Credit Not Granted:** LATN 4824
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Latin

**LATN 6004 (3) Graduate Reading**
Author or topic specified in the online Schedule Planner. Formerly CLAS 6004.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Latin

**LATN 6844 (1-3) Graduate Independent Study**
Formerly CLAS 6844.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Latin

**LATN 7014 (3) Graduate Seminar in Latin Literature**
Formerly CLAS 7014.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Latin

# Law School (LAWS)

## Courses

**LAWS 4001 (1-3) Special Topics In Law**
Special topics in the study of law. Topics will be determined by the instructor.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**LAWS 4005 (3) Constitutional Law: Founding Principles and Current Debates**
Explores the principles underlying the United States Constitution and offers an introduction to the powers of the three branches of the federal government and the interrelationship of state and national governments. Includes an introduction to the individual rights protected by the Bill of Rights and the operation of the Fourteenth Amendment's due process and equal protection clauses.
**Requisites:** Restricted to undergraduate students only and not law students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 4007 (3) Federal Income Taxation of Individuals**
Provides an introduction to federal income taxation of individuals.
**Requisites:** Restricted to undergraduate students only and not law students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Taxation

**LAWS 4017 (3) Introduction to Business Taxation**
Provides a comprehensive introduction to the taxation of business activity and entities, including: 1) overview of principles of income taxation; 2) choice of entity; 3) formation, operation and dissolution of entities; 4) taxable and tax-deferred acquisitions; and 5) overview of international taxation. There are no course prerequisites.
**Requisites:** Restricted to undergraduate students only and not law students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Taxation

**LAWS 4075 (3) Introduction to U.S. Law for Undergraduate Students**
Introduces undergraduate students to the American legal system and to legal reasoning and argumentation via case studies of prominent litigation. Students will learn basic conceptual building blocks of American law, basic lawyering skills and an understanding of how the American legal system structures and resolves complex disputes.
**Requisites:** Restricted to undergraduate degree and non-degree students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Electives

**LAWS 4201 (1) Philosophy of Entrepreneurship**
Explores how entrepreneurship principles apply in a variety of life's contexts, ranging from startup companies to legal practice to developing one's own professional brand. Participants consider whether adoption of entrepreneurial principles - viz., a philosophy of entrepreneurship - is a useful way to approach problem solving, management issues, career strategies and other life challenges.
**Requisites:** Restricted to undergraduate students only and not law students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Electives

**LAWS 4211 (3) Corporate Law**
Covering foundations legal issues in corporate law. Topics may include the nature and purpose of the corporate form, the relationship between shareholders and management, the fiduciary duties of directors, securities regulation and mergers and acquisitions.
**Requisites:** Restricted to undergraduate students only and not law students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 4226 (3) Professional Communication in Business**
Aims to teach students the rhetorical principles and writing practices necessary for producing effective business letters, memos, e-mails, reports and collaborative projects in professional contexts. The curriculum is informed by current research in rhetoric and professional writing and is guided by the needs and practices of business, industry and the professions.
**Requisites:** Restricted to undergraduate students only and not law students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Electives

**LAWS 4458 (2-3) Introduction to Law and Literature**
Explores the intersection between law and literature and will provide an opportunity to think about the law by reading engaging works of fiction and non-fiction, viewing important films and examining the law from a humanistic and philosophical perspective.
**Requisites:** Restricted to undergraduate students only and not law students.
**Grading Basis:** Letter Grade

**LAWS 4521 (2-3) The Law At Work**
Designed to explore the basic legal requirements and limitations that govern the employer-employee relationship and inform human resource practices and policies. After completing this course students will have a(n): Clear understanding of the main features of current employment law; Ability to apply legal standards/reasoning to human resource problems; Knowledge necessary to develop effective and legal human resource policies; Awareness of the fluid nature of employment law.
**Requisites:** Restricted to undergraduate students only and not law students.
**Grading Basis:** Letter Grade

**LAWS 4618 (2) Marijuana Law in Colorado**
Explores the aspects of marijuana's history, pharmacology, potential harms and medical uses needed for intelligent study of governing law. Discusses the Federal statutory law classifying marijuana as a Schedule 1 forbidden drug and Colorado's medical and recreational laws permitting marijuana use on specific conditions and the conflicts between the two.
**Requisites:** Restricted to undergraduate students only and not law students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Electives

**LAWS 4700 (3) Native American and Indigenous Peoples Law**
Examine international law in the context of the adoption of the United Nations Declaration on the Rights of Indigenous Peoples, which represents a global consensus on adopting a human rights based approach to Indigenous Peoples. Explores how the domestic and international regimes intersect and are developing, as well as implications for future work and we will also look to the development of laws by Native American and indigenous peoples themselves.
**Requisites:** Restricted to undergraduate students only and not law students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 4801 (2-3) Technology, Law and Society**
Provides a comprehensive and rigorous overview of contemporary challenges and opportunities introduced by evolving technology. From the Internet to drones, robotics to smartphones, and machine learning to video games, recent advances in technology put pressure on venerable societal institutions. This class focuses on the technology and the institutions, giving a deeper understanding of how each evolve and react to changes.
**Requisites:** Restricted to undergraduate students only and not law students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 4808 (2-3) Argument and Persuasion in American Law**
Explore the role of lawyers and their craft¿the art of persuasion¿in winning cases, shaping legislation, and influencing public policy and the development of social issues. Students will learn how lawyers and other legal actors use the techniques of persuasion to achieve desired results in courts, legislatures, and American society more generally. The course will study the rhetorical and narrative theories and techniques employed by lawyers, and will consider both historical and contemporary examples of great legal advocates at work in a variety of contexts. In the end, students will have a deeper understanding of the art of advocacy, and will be able to practice that art to advantage.
**Grading Basis:** Letter Grade

**LAWS 5064 (1-2) Legal Analysis**
Designed to help students develop the analytical skills necessary for success in law school and on the bar exam. Students will strengthen their core analytical skills, written communication skills, and ability to retain information. The ability to engage legal questions at the highest level is a skill that can be practiced and improved.
**Requisites:** Restricted to Professional Year 1 Law students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Research and Writing

**LAWS 5103 (1) Legal Ethics & Professionalism: What Kind of Lawyer Do You Want to Be?**
Explores both the kind of law students might decide to practice and the ethical, personal and professional commitments central to the practice of law.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 5121 (4) Contracts**
Covers basic principles of contract liability, offer, acceptance and consideration, statute of frauds, contract remedies, the parole evidence rule, performance of contracts, conditions, effect of changed circumstances, third-party beneficiaries, assignment and specific performance.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 5201 (1) Entrepreneurship, Innovation and Public Policy**
Explores cutting edge questions around entrepreneurship, including being an entrepreneur, leadership and what makes a great founding team, building and scaling a business, entrepreneurial communities, financing entrepreneurial companies, leadership in government, entrepreneurship and innovation policy.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Business

**LAWS 5203 (1) Legal Ethics, Professionalism and Creative Problem Solving**
Developing reflective, creative problem solving and ethical legal professionals by touching a core set of issues facing lawyers, including the duty of confidentiality to clients and the hazard of conflicts of interest, providing students with an opportunity to confront these challenges in an interactive and engaged environment.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Electives

**LAWS 5205 (3) Legislation and Regulation**
Introduces lawmaking in the modern administrative state. Examines the way Congress and administrative agencies adopt binding rules of law (statutes and regulations, respectively) and the way that implementing institutions, courts and administrative agencies, interpret and apply these laws. Considers the structure of the modern administrative state, the incentives that influence the behavior of the various actors, and the legal rules that help to structure the relationships among Congress, the agencies and the courts.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 5211 (1) Framing and Legal Narrative**
Thinking through the fundamental concepts that inform and animate different areas of law.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail

**LAWS 5223 (2) Legal Writing II**
Students prepare appellate briefs and related documents and deliver oral arguments before a three-judge court composed of faculty, upper-division students, and practicing attorneys. Practice arguments are videotaped and critiqued.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 5226 (2) Legal Writing I**
Provides an intensive introduction to the resources available for legal research. Students also prepare written material of various kinds designed to develop research skills, legal writing style, and analysis of legal problems.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 5303 (4) Civil Procedure**
Studies modern practice in civil suits, including rules governing pleading, joinder of parties, discovery, jurisdiction of courts over the subject matter and parties, right to jury trial, appeals, and res judicata and collateral estoppel, with emphasis on the Federal Rules of Civil Procedure and their Colorado counterpart.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 5323 (1) Courtroom Observation Civil**
An elective that requires 15 hours observing actual civil proceedings in a courtroom, attending a two-hour class meeting every other week, preparing and submitting a journal of recorded observations. Figuring out how to gain access to appropriate proceedings is part of the student's work, although the professor is available for advice and guidance.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 5425 (3) Torts**
Studies nonconsensual allocation of losses for civil wrongs, focusing primarily on concepts of negligence and strict liability.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 5503 (4) Criminal Law**
Studies statutory and common law of crimes and defenses, the procedures by which the law makes judgments as to criminality of conduct, the purposes of criminal law, and the constitutional limits upon it.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 5513 (1) Courtroom Observation Criminal**
An elective that requires 15 hours observing actual criminal proceedings in a courtroom, attending a two-hour class meeting every other week, preparing and submitting a journal of recorded observations. Figuring out how to gain access to appropriate proceedings is part of the student's work, although the professor is available for advice and guidance.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 5624 (4) Property**
Topics include personal property, estates and interests in land, landlord-tenant, basic land conveyancing, and private land use controls.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Property

**LAWS 5646 (1) Foundations of Legal Research**
Designed to move students from the brief introduction to legal research offered in the first-year legal writing classes to the problem-centered research students will perform starting in the summer after their first year. Provides students with a conceptual understanding of the organization and connectivity of legal authority and with instruction in research methodology at both the project and resource levels.
**Requisites:** Restricted to Professional Year 1, 2, or 3 Law students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Research and Writing

**LAWS 5803 (1) Courtroom Observation International**
An elective that requires fifteen hours observing proceedings before an international tribunal(s), attending a two-hour class meeting every other week, preparing and submitting a journal of recorded observations. The proceedings observed will be available streaming online and the professor will provide information about how to gain access to them.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 6002 (3) Public Land Law**
Deals with the legal status and management of resources on federal lands, including national forests, parks and BLM lands. Explores federal law, policy, and agency practice affecting the use of mineral, timber, range, water, wildlife and wilderness resources on public lands.
**Requisites:** Requires prerequisite course of LAWS 6112 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 6004 (3) Real Estate Transactions**
Focuses on legal issues that arise in all phases of real estate transactions, with an emphasis on the role of the lawyer in the business of real estate as well as on the regulation of real estate markets.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Property

**LAWS 6005 (4) Constitutional Law**
Studies constitutional structure: judicial review, federalism, separation of powers; and constitutional rights of due process and equal protection.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 6007 (4) Income Taxation**
Emphasizes the fundamentals of the federal income tax system and examines its impact on the individual.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 6700
**Requisites:** Restricted to Professional Year 1, 2, or 3 Law students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Taxation

**LAWS 6008 (3) Foundations of International Legal Thought**
Provides students with a broad historical and philosophical introduction to international law. Addresses changing conceptions of sovereignty between 1492 and World War II, I the contexts of the Spanish conquest of the Americas, the international legality of the slave trade, relations between the Ottoman Empire and the "Great Powers", the Chinese opium wars and the rise of modern international institutions.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 6009 (4) Legal Aid Civil Practice 1**
Emphasizes procedural and practical remedies and defenses available in civil litigation. Assigns civil cases related to the course material. Develops working knowledge of courtroom skills.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 6019 (4) Civil Practice Clinic 2**
Emphasizes procedural and practical remedies and defenses available in civil litigation. Assigns civil cases related to the course material. Develops working knowledge of courtroom skills.
**Requisites:** Requires prerequisite or corequisite course of LAWS 6353 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 6021 (3) Secured Transactions**
Explores the methodology and policies of Article 9 of the Uniform Commercial Code, dealing with financing transactions in personal property.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 6029 (4) Criminal and Immigration Defense Clinic**
Provides thorough grounding in problems of criminal defense. Students defend indigent misdemeanants in Boulder courts. Develops working knowledge of courtroom skills.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 6031 (2) Consumer Protection Laws and Policies**
Focuses on deceptive trade practices and consumer rights. Reviews the law of deception/misrepresentation at common law, and federal and state laws regarding unfair acts and practices. Covers credit practices, environmental and health claims, and telecommunications and privacy. Discusses remedies, including governmental enforcement actions, and individual and class actions.
**Grading Basis:** Letter Grade

**LAWS 6035 (3) White Collar Crime**
Examines distinctions between white collar crime and other types of criminal activity and the needs for and arguments against white collar laws and law enforcement. Studies securities fraud, mail and wire fraud, insider trading, money laundering, false statements, conspiracy and criminal forfeiture statutes. Includes use of the grand jury, privileges applicable in the corporate setting, immunity, discovery and the impact of parallel civil proceedings. Examines effect of government policy on corporations and their counsel, pre-trial and trial strategy, jury selection and victim notification and restitution options.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 6039 (4) Criminal Defense Clinic 2**
Provides thorough grounding in problems of criminal defense. Students defend indigent misdemeanants in Boulder courts. Develops working knowledge of courtroom skills.
**Requisites:** Requires prerequisite or corequisite course of LAWS 6353 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 6045 (3) Criminal Procedure**
Focuses primarily on the constitutional limitations applicable to such police investigative techniques as arrest, search, seizure, electronic surveillance, interrogation and lineup identification.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 6055 (3) Post-Conviction Criminal Procedure**
Addresses sentencing process and schemes, direct appeals, probation modification and revocation, parole revocation, pardon and commutation processes, post-conviction litigation and appeal in both state and federal court, federal review of state convictions through habeas and/or the AEDPA, and ethical issues that arise in post-conviction proceedings.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 6059 (2-3) Legal Aid and Defender**
**Grading Basis:** Letter Grade

**LAWS 6060 (3) White Collar Crime Practicum**
Addresses the non-trial portion of white collar criminal law. Drawing examples and problems from wire fraud, securities fraud, health care, and computer fraud contexts, explores a white collars case's major investigative and charging phases, corporate and organizational issues, as well as pleas and punishment.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 6069 (4) Immigration Clinic**
Emphasizes practice skills in immigration cases. Includes litigation before Federal Immigration judges, Board of Immigration Appeals, and Federal Circuit Court of Appeals.
**Requisites:** Requires prerequisite or corequisite course of LAWS 6353 (minimum grade D-).
**Grading Basis:** Pass/Fail

**LAWS 6079 (4) Criminal Defense Clinic**
Provides thorough grounding in problems of criminal defense. Students defend indigent misdemeanants. Develops working knowledge of courtroom skills, advocacy and evidence presentation. Concludes with full mock trial.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 6099 (4) Family Law Clinic**
Represents low-income clients in family law cases in local state district court. Students will gain court-based experience in dissolution's and allocations of parental responsibilities. Seminar component includes instruction on substantive family law, related ethical issues, and theoretical backgrounds of poverty lawyering.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation, Negotiation Alt Dispute Resolution

**LAWS 6103 (2-3) Legal Ethics Professionalism**
Examines the legal profession as an institution, its history and traditions and the ethics of the bar with particular emphasis on the professional responsibilities of the lawyer. Discusses the Model Rules of Professional Conduct.
**Requisites:** Restricted to Professional Year 1, 2, or 3 Law students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 6104 (3) Wills and Trusts**
Covers intestate succession; family protection; execution of wills; revocation and revival; will contracts and will substitutes; creation of trusts;modification and termination; charitable trusts; fiduciary administration, including probate and contest of wills; construction problems in estate distribution.
**Requisites:** Restricted to Professional Year 1, 2, or 3 Law students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Property

**LAWS 6108 (3) Conflict of Laws**
Addresses the conflicts that arise when the significant facts of a case are connected with more than one jurisdiction, whether that jurisdiction belongs to a state, the federal government, or a foreign government. The subject is studied in its theoretical and historical context, with special emphasis on the international aspects of extraterritorial jurisdiction.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 6109 (2) Trial Advocacy**
Focuses on voir dire, opening statement, direct examination of witnesses and cross examination.
**Requisites:** Restricted to Professional Year 1, 2, or 3 Law students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 6112 (3) Foundations of American Natural Resources Law**
Introduces students to the law of natural resources. Examines the legal, historical, political, and intellectual influences that shape resources development and conservation.
**Requisites:** Restricted to Professional Year 1, 2, or 3 Law students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 6113 (2) Legal Ethics and Professionalism: Ethics and the Law of Lawyering**
Continuation of LAWS 5103. Focuses on the Model Rules of Professional Conduct. Provides the nuts and bolts of the ethical rules needed to begin to explore externships, clinics, pro bono projects and other practice experiences during law school.
**Requisites:** Requires prerequisite course of LAWS 5103 (mimimum grade D-). Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 6114 (2) Construction Law**
Focuses on the basic principles and practices of construction law. Provides an overview of construction industry participants and players (engineers, contractors, insurers) and discusses and analyzes the various obligations and liabilities of these parties. Covers construction and design contracting, construction claims, professional negligence, construction insurance and suretyship and ADR in construction. Provides transactional-practice oriented exercises.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Property

**LAWS 6115 (2-3) Representing the Spanish-Speaking Client**
This course is a survey of the substantive law of matters likely to be encountered by attorneys representing Spanish-speaking clients in Colorado. Topics may include, among others, family law, criminal law, employment law, wage theft, and consumer rights. The course will not only introduce legal Spanish vocabulary, but more importantly, it will teach students how to communicate legal concepts so as to be understood by the clients.
**Grading Basis:** Letter Grade

**LAWS 6119 (1) Deposition Skills**
Provides valuable skills to assume active roles in the deposition process. Explores why and when to take depositions; drafting and objecting to deposition notices for individual deponents, non-party witnesses and corporate designees; drafting successful outlines, proper questions and objections; using exhibits; furthering case theory, making and using stipulations; using depositions in pretrial motions and at trial.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 6122 (2) International Natural Resources Law and Policy**
Examines the suite of policy issues and legal ramifications associated with sustainable natural resource development. Examines most recent research on the "resource curse" theory. Examines recent policy developments and discussions that have occurred among industry, NGOs, multilateral development agencies and governments. Examines issues related to bribery and corruption in developing country environments and dispute resolution mechanisms at national and local levels.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment Natural Resources
Departmental Category: International Comparative Law

**LAWS 6123 (2) Legislative and Policy Drafting**
Exposes students to the process of drafting and amending enacted legal texts such as statutes, regulations, and polities of both governmental and non-governmental entities. Students will critically examine lawyers' roles as counselors, advocates and experts in different legislative and policy-drafting contexts.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 6128 (1-3) Statutory Interpretation**
Examines theories of legislation and the relation between legislatures and courts, emphasizing problems of statutory interpretation and other issues in the judicial use or misuse of statutes.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 6157 (3) Corporate Taxation**
Examines the federal income taxation of ¿subchapter C¿ corporations and their shareholders. Topics may include choice of entity, operations, distributions, redemptions, formations, liquidations, taxable asset and stock acquisitions, and tax-free reorganizations (that is, mergers and acquisitions).
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 6450
**Requisites:** Requires prerequisite course of LAWS 6007 (minimum grade D-). Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Taxation

**LAWS 6167 (3) Partnership Taxation**
Examines the federal income taxation of partnerships and other pass-through entities, which represent most small businesses in the United States. Topics may include the allocation of operating income and deductions among owners, contributions and distributions of property, and acquisitions and dispositions of partnership interests by partners.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 6430
**Requisites:** Requires a prerequisite course of LAWS 6007 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Taxation

**LAWS 6170 (1-2) E-Discovery**
Exposes students to the legal and practical challenges presented by E-discovery and how electronically stored information shapes litigation and the pretrial process. Students gain an understanding of how electronically stored information can impact an overall discovery strategy and how this complicates a lawyer's ethical and professional obligations.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 6201 (3-4) Agency, Partnership, and the LLC**
Surveys agency law whose principles are important in many other areas of law. Studies the legal organizations commonly used by small businesses: partnerships and limited liability companies (LLCs).
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 7621 and LAWS 6211
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 6207 (2) Writing in the Regulatory State**
Provides an umbrella for several advanced business law sections, each providing an intensive intellectual experience for law students by requiring them to connect deep concepts and knowledge from basic business courses to complex transactional environments. Students are required to solve client problems and negotiate transactions in the face of intricate and conflicting legal regimes that sprawl across doctrinal fields.
**Grading Basis:** Letter Grade

**LAWS 6209 (4) Community Collaboration Law Lab**
Provide legal and policy advice, guidance and representation related to sustainable development with a focus on fostering social enterprise, healthy communities and poverty reduction.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Grading Basis:** Letter Grade

**LAWS 6211 (3-4) Corporations**
Covers formation of corporations and their management; relations among shareholders, officers and directors; the impact of federal legislation on directors' duties; the special problems of closed corporations.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 7621 and LAWS 6201
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 6213 (2) Advanced Appellate Advocacy**
Advanced study and practice of written and oral appellate advocacy. Builds on the first-year advocacy course, but provides more advanced techniques for brief writing, and preparing for and conducting oral argument. Students are required to write an appellate brief and participate in several oral arguments, and receive detailed, one-on-one critiques of work product.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 6217 (3) Estate and Gift Tax Planning**
Explores structural and planning aspects of the current federal wealth transfer tax system, including the federal tax code provisions governing estate and gift taxation.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 7217 or ACCT 6720
**Requisites:** Requires prerequisite course of LAWS 6104.
**Recommended:** Prerequisite LAWS 6007.
**Grading Basis:** Letter Grade

**LAWS 6221 (3) Compliance**
Covers requirements for corporate compliance programs and key components of them, including the role of audit committee, internal audit and ethics and compliance. Looks closely at different compliance regimes, including Sarbanes Oxley, the privacy and security components of the Health Insurance Portability and Accountability Act of 1996 (HIPAA), the evolution of other data privacy standards and the anti-corruption standards of the Foreign Corrupt Practices Act and the UK Bribery Act.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 6223 (3) Research and Writing in the Regulatory State**
Focus on developing in students the research, writing and analytical skills necessary to operate within any highly regulated field. Students will work broadly on research and writing skills required in a regulatory practice and narrowly on how that applies to particular areas of expertise, to gain an understanding of a particular area of the law.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 6226 (1-3) Advanced Legal Writing**
Builds on skills learned in the first-year legal writing course to improve written legal analysis. Students will complete multiple written assignments and will receive individual feedback on their work. Sections vary significantly depending on the professor; please check the Legal Writing page of the Colorado Law website to read each professor's course description.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 6228 (1) Writing in Context**
Provides the opportunity to improve legal writing and analytical skills in a particular field of law. This course will be offered in conjunction with a doctrinal course, and the writing assignments will be based on the law taught in the doctrinal course. Students enrolled in this course will need to be concurrently enrolled in the doctrinal course.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to 2L or 3L students only.
**Grading Basis:** Letter Grade

**LAWS 6236 (2) Judicial Opinion Writing**
Considers the contemporary American judicial opinion in historical and comparative context. Examines institutional constraints and emerging challenges to judicial decision-making. Analyzes individual opinion authors¿ writing styles. Builds upon the first-year legal-writing curriculum. Challenges students to develop a personal style and approach to writing and editing opinions.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 6246 (2) Introduction to United States Legal System/Legal Reasoning, Research and Writing**
Introduces students without a law degree to the basic structure and content of the United States legal system, examining how the three branches of government at the state and federal levels make law and policy in the United States. The course will provide a basic introductory overview of the following: the various sources of law, including an understanding of how statutes are enacted by legislative institutions; the role of the United States court system in interpreting laws; application of judicial precedent in common-law systems; trial and appellate court procedures; and judicial review standards. The course will also introduce students to the methodology of American law, including legal reasoning, research, and writing, through a variety of in-class and outside research and writing assignments.
**Grading Basis:** Letter Grade

**LAWS 6270 (1-2) Law and Mathematics**
Covers basic mathematical concepts frequently encountered in the practice of law. Examines the relationships between evidence, calculation, and truth. Intended especially for students who lack confidence in their math skills and/or have not previously studied statistics, but all are welcome.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Electives

**LAWS 6271 (1-2) Special Topics: Deals Lab**
Provides an umbrella for several advanced business law sections, each providing an intensive intellectual experience for law students by requiring them to connect deep concepts and knowledge from basic business courses to complex transactional environments. Students are required to solve client problems and negotiate transactions in the face of intricate and conflicting legal regimes that sprawl across doctrinal fields.
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite LAWS 6211.
**Grading Basis:** Letter Grade

**LAWS 6280 (1) Intensive Intro to Financial Info, Accounting and the Law: Accounting Boot Camp**
Exposes students to the basics of financial accounting and when and how lawyers encounter accounting problems. Students will leave the course with an understanding of the basic framework of accounting, including the double-entry method, balance sheets, income statements, and statements of cash flows; time value of money; discount rates; basic methods of business valuation; and risk and diversification concepts.
**Grading Basis:** Letter Grade

**LAWS 6281 (3) Accounting Issues for Lawyers**
Studies accounting and auditing problems in the form they are placed before the lawyer, including a succinct study of basic bookkeeping, in-depth legal analysis of the major current problems of financial accounting, and consideration of the conduct of the financial affairs of business.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 6301 (3) Introduction to Intellectual Property Law**
Provides an overview of our nation's intellectual property laws, including patents, copyrights, trademarks and trade secrets. Discusses other matters related to intellectual property, including licensing, competition policy issues and remedies.
**Equivalent - Duplicate Degree Credit Not Granted:** TLEN 5245
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 6302 (3) Water Resources**
Analyzes regional and national water problems, including the legal methods by which surface and ground water supplies are allocated, managed and protected.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 6315 (2) The Prosecutor's Role in the Criminal Justice System**
Designed to familiarize students with the professional and ethical duties of the prosecutor in the criminal justice system, with the goal of encouraging students to think about the role that prosecutors play. While the focus of the materials and presentations will center on the Colorado criminal Justice system, the concepts and principles addressed translate to all state systems and the federal system. National trends and legislative policy decisions related to criminal law, and their potential impact on public safety and prosecution efforts will also be discussed.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Criminal

**LAWS 6318 (3) Economic Analysis of Law**
Introduces the basic elements of economic theory and emphasizes demand and utility, cost and optimality.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 6321 (2-3) Computer Crime**
Explores legal issues that judges, legislators, prosecutors, and defense attorneys confront as they respond to recent explosions in computer-related crime. Includes the Fourth Amendment in cyberspace, the law of electronic surveillance, computer hacking and other computer crimes, encryption, online economic espionage, cyberterrorism, First Amendment in cyberspace, federal/state relations in enforcement of computer crime laws, and civil liberties online.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 6331 (1) The Technology of Privacy**
Explores the escalating debates by policymakers, scholars, advocates and industry representatives about the growing spread of tracking and surveillance in society. Debates are being spurred by the pace of changes to technology and particularly of changes to Internet and mobile technology. Practitioners in information privacy law or technology policy must understand the past, present, and likely future, of the technology of privacy.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 6353 (3) Evidence**
Studies the methods and forms of proof in litigation, including detailed consideration of hearsay, impeachment of witnesses, relevancy and certain restrictions on authentication and best evidence doctrines, and privileges.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 6361 (2-3) Information Privacy and Cybersecurity**
Explores the laws that regulate the basic technologies of the internet and the management of information in the digital age. It examines the most significant statutes, regulations and common law practices that comprise this emerging legal framework.
**Grading Basis:** Letter Grade

**LAWS 6363 (5) Evidence and Trial Practice**
Studies methods and forms of proof in litigation, including detailed consideration of hearsay, impeachment of witnesses, relevancy and certain restrictions on authentication and best evidence doctrines, and privileges. Applies rules and doctrine of evidence in simulated trial settings. Combined Evidence and Trial Practice course. Satisfies the trial practice requirement and counts two hours toward the 14 credit hour maximum in clinical hours.
**Grading Basis:** Letter Grade

**LAWS 6373 (3) Federal Litigation: Everything but the Trial**
Litigates through all pretrial phases as plaintiff's counsel, a mock federal case: an employee's challenge to compensation and termination, with possible claims including breach of contract, breach of the implied covenant of good faith and fair dealing, violation of wage payment statutory and regulatory requirements, and fraudulent inducement to contract.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 6383 (1) Applied Evidence**
Provides the opportunity to improve the legal writing and analytical skills by practicing written analysis based on the law of Evidence. Professors Griffin and Bloom designed materials specifically for this course, which is designed to be taken concurrently with Professor Bloom's Evidence class. Student receive individual feedback on every exercise and assignment.
**Requisites:** Requires corequisite course of LAWS 6353.
**Grading Basis:** Letter Grade

**LAWS 6400 (3) International Law**
Examines the nature, structure and sources of international law, the relationship between international law and domestic U.S. law, the role of international organizations such as the United Nations, the methods of resolving international disputes, the bases of international jurisdiction, and select substantive areas of international law that may change from semester to semester.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 6401 (1) Investigating Allegations of Bribery, Human Trafficking, and Related Misconduct**
We, as consumers, expect that the products we purchase will not be tainted by bribery, corruption, or any form of forced labor (including trafficked and child labor). This interactive class examines private practitioners' role in the fight, including their role as lawyers investigating allegations of misconduct, interacting with US and foreign authorities, conducting due diligence, and ensuring compliance. The legal market recognizes the need for lawyers who understand these rapidly developing areas of law. This class is designed to give students that competitive advantage.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade

**LAWS 6410 (3) International Trade Law**
Examines the law of the World Trade Organization and the General Agreement on Tariffs and Trade. Examines rules restraining national restrictions on trade that addresses tariff and non-tariff barriers, discrimination, regionalism, anti-dumping, countervailing duties and safeguards. Considers the relationship between trade and other regulatory areas or social values, such as environmental protection, health and safety standards, human rights, intellectual property protection.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 6420 (1) Law and the Holocaust**
Explores comparative law, jurisprudence, conflicts of laws and international law. Examines the Nazi philosophy of law emanating from its egregious racial ideology, and how it was used to pervert Germany's legal system to discriminate against, ostracize, dehumanize and eliminate certain classes of people. Studies the role of international law in rectifying the damage by bringing perpetrators to justice and constructing a legal system designed to prevent a repetition.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 6501 (2-3) The Practice of Labor and Employment Law**
Focuses on aspects of the practice of employment law, rather than the examination of legal doctrines. Discusses typical issues presented in advising and litigating on behalf of employers and employees. Topics include special attention to ethical issues.
**Grading Basis:** Letter Grade

**LAWS 6502 (2) Wildlife and the Law**
Examines the law that protects wildlife, its habitat and biodiversity. Explores human-caused threats including habitat destruction, illegal trade and climate change. Focuses on statutes, case law, environmental ethics, and current controversies to highlight legal, scientific and political strategies for protecting biodiversity. Particular emphasis is placed on the U.S. Endangered Species Act.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 6508 (1) The Philosophy of Law**
Questions the nature of law, characteristics and considerations of a legal system, rights and from where they come; thinking like a lawyer, basic techniques of legal reasoning, difference between doctrinal and normative legal analysis. Explores law's frontier and what distinguishes law from morality or politics. Focuses on influential texts from the end of WWII to the end of the Cold War.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 6510 (2-3) International Environmental Law**
Examines international environmental law, including transboundary impacts and global issues. Addresses such issues as intergenerational equities, principles of compensation, and if international environmental norms should receive special environmental norm consideration. A course in public international law is not a prerequisite, but students who have not taken such a course will probably find it useful to do some additional background reading. Offered in alternate years.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 6511 (3) Labor Law**
Relates to labor unions and other collective aspects of employment, including the right of workers to form and join unions, to provoke collective bargaining and to strike and engage other forms of protest. Focuses on domestic law at the federal level and with a particular statute, the National Labor Relations Act, and the workings of particular agency, the National Labor Relations Board. Engages other sources of law, including constitutional law, as well as judicial decisions and other statues.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 6518 (2-3) Introduction to Islamic Law & Jurisprudence**
Develops student understanding of the internal working of Islamic law at its theoretical roots. Analyzes the various methodologies that are represented in Islamic legal literature, heling to enable the students to identify modern manifestations of these methodologies in contemporary Muslim discourses. Contextualizes the subject of Islamic law within various governmental and constitutional structures, beginning with the classical period, continuing through colonialism and reaching into the present day.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 6521 (3) Employment Law**
Entails a survey of employment-at-will, workplace safety, workplace torts; ERISA and retirement, workers' compensation; controls on hours and wages; health insurance; disability and unemployment compensation.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 6525 (2-3) Elder Law**
The counseling and legal representation of older persons and their representatives. Topics may include: legal aspects of health and long-term care planning, public benefits, surrogate decision making, legal capacity, the conservation, disposition, and administration of older persons' estates, the implementation of their decisions concerning such matters, and the broad ethical issues of representing clients in this field of practice.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 6528 (3) Capital Punishment in America**
Surveys the history and current status of capital punishment in the United States, with a critical examination of arguments both for and against the death penalty.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 6540 (3) Global Law & Global Governance**
Addresses contemporary theories of globalization. We will explore questions such as: What is globalization, and in particular, what is the globalization of law? What is the extent of legal globalization, and how can we know? Are global law and global governance good things? How are these categories any different from what has traditionally been called "international law"? Our search for answers will be guided by a selection of recent books from theorists of globalization and global governance, such as David Held, Immanuel Wallerstein, and David Kennedy.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 6541 (2) Colorado Worker's Compensation Theory and Practice**
Introduces the legal theories that underlie the no-fault compensation system, its historical evolution, policy conundrums and ethical quandaries. Teaches the application of the procedural rules most frequently utilized in administrative setting. Studies the Workers' Compensation Act, the Workers' Compensation Rules of Procedure and the Office of Administrative Courts Rules of Procedure.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 6551 (3) Employee Benefits and Compensation Law**
Examines past and present employee benefits and compensation practices among private and public employers. Covers ERISA and defined benefit, defined contribution, and welfare benefit plans; equity awards granted by corporations; equity awards granted by LLCs and partnerships; nonqualified deferred compensation and Section 409A of the Internal Revenue Code; golden parachutes and Sections 280G and 4999 of the Internal Revenue Code.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 6555 (2-3) Disability Rights**
Explores the theories of disability, including whether disability is the product of society/social construction or medicine. The course will then explore some of the major federal protections for disability, including the Americans with Disabilities Act, which prohibits discrimination in employment and public accommodations, and the Individuals with Disabilities in Education Act.
**Grading Basis:** Letter Grade

**LAWS 6602 (3) Cultural Property Law**
Concerns domestic and International regulation of property that expresses group identity and experience. Organized around traditional categories of property (real, personal and intellectual), covers historic preservation, archeological resources, art and museum law, with attention to indigenous people's advocacy on burial sites, traditional lands, ceremonies, music, symbols, ethnobotany, genetic information and language. May satisfy upper-level writing requirement.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 6631 (3) Artificial Intelligence and the Law**
This course will investigate emerging legal frameworks being created to address the uses of Machine Learning (ML) and Artificial Intelligence (AI) across society, by private parties and public actors alike. Students will survey laws from the United States, as well as other countries. They will discuss how AI is shaping the practice of law itself. The course draws a thread through many practice areas to ask: what are the consistent challenges of regulating AI systems?
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade

**LAWS 6702 (1) Climate Justice**
Introduces the field of climate justice and seeks to identify legal and policy tools for advancing fair outcomes in climate change decision making. Climate justice is concerned with the intersection of race and/or indignity, poverty, and climate change.
**Grading Basis:** Letter Grade

**LAWS 6708 (1-3) LAWS:**
Explores special topics in law.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 6712 (3) Climate Change Law and Policy**
Examines the science of climate change and the broader role of science in public policymaking. Reviews the changing legal landscape to abate greenhouse gas emissions and key issues in policy design. Reviews the Supreme Court's April 2, 2007, decision in Massachusetts v. EPA, overturning EPA's refusal to regulate greenhouse gas pollution from motor vehicle tailpipes and the aftermath in the courts, Executive Branch and Congress.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 6722 (3) Energy Law and Regulation**
Provides an introduction to energy law and regulation in the United States. Covers basic principles of rate regulation and public utilities, the division of jurisdiction between federal and state governments and the key federal statutes and regulatory regimes governing natural gas, electricity and nuclear power. Focuses on the basic federal frameworks for natural gas and electricity regulation, with an emphasis on understanding the messy and uneven transition to wholesale competition in these sectors and, in the electricity context, the experience with state restructuring and retail competition.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 6732 (3) Renewable Energy Project Finance and Development**
Examines renewable energy and how legal topics impact financing projects. Reviews structure, regulation, and functioning of electric energy industry and laws applicable to development, ownership and operation of renewable energy projects across technologies. Addresses legal policy, economic and financing issues associated with expansion and improvement of the transmission grid to support renewable energy development.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 6801 (1) Anti-money Laundering Law**
Explores domestic and foreign laws against money laundering, including know your customer and bank secrecy rules.
**Grading Basis:** Letter Grade

**LAWS 6808 (1) LILAC Symposium Course: Leadership in Law and Community**
Addresses issues in law, community, and leadership, explored through multiple pedagogies in teaching and learning, in a symposium-style setting. After introductory classes on the theme of leadership in law and community, and related topics of professional responsibility and personal identity, social change, creative lawyering, the course will turn to spring service projects in law and community.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Grading Basis:** Pass/Fail

**LAWS 6813 (2) Problem-Solving, Professional Judgment, and Decision Making**
Drawing from materials in psychology, behavioral economics, and mathematics, the course studies a range of patterns, fallibilities, and best practices concerning the complex problems commonly encountered by attorneys. Topics include general problem-solving strategies, techniques for operating in environments of uncertainty and complexity, empirically supported cognitive biases and errors, and strategies for recognizing and overcoming those errors.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 6816 (1-2) Problem-Solving and Writing**
Enhances students' ability to solve problems and writing concise coherent memos to clients or other legal documents outlining their legal analysis and strategic thinking. Uses diagnostic exams in which students are given multiple documents for fact patterns to begin their analysis.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 6823 (1-2) Legal Reasoning**
This course of seven 100-minute classes aims to present legal reasoning skills crucial to the crafting and criticism of legal arguments. The classes will cover seven topics: rules and standards, the art of the legal distinction, dealing with legal contradictions, facts and framing, level of abstraction, baselines, and legal interpretation.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 6826 (2-3) Interactive Programming for Lawyers**
Teaches students how to develop simple computer applications that would help in the practice of law and the delivery of legal services, using a drag-n-drop application development platform. Students will learn programming logic and principles of user-centric design. No programming experience is required. Includes substantial legal research and analysis.
**Grading Basis:** Pass/Fail

**LAWS 6836 (1) Special Topics in Legal Research**
Builds upon first-year legal research problem solving skills by exposing students to the nuances of research topics in a specialized topic and tracking related doctrinal classes, e.g., environmental and natural resources law.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 6856 (2-3) Advanced Legal Research**
Offers an in-depth look at research resources and methods. Includes sources from the judicial, legislative, and executive branches of federal and state government; research in topical areas such as environmental law, taxation, and international law; and extensive coverage of secondary and nonlaw resources. Covers both print and electronic sources. Students will have several assignments and a final project.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 6866 (1) Colorado Legal Research**
Surveys resources and methods to effectively research Colorado law. Covers primary and secondary resources including Colorado statutes, cases and digests, regulations, and constitution and practice materials. Covers how to research Colorado municipal law and other Colorado topics.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 6876 (2) Legal Research Skills for Practice**
Focuses on preparing students to research in a transactional law legal practice. Students will learn how to research in transactional law subject areas using practitioner-focused research platforms, including Westlaw Practical Law, Lexis Practice Advisor, and Bloomberg Law. Students will also learn how to research corporate and industry data, property records and dockets as well as acquire other competencies and skills helpful for researching in a transactional law practice.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 6886 (3) Advanced Legal Research and Analysis**
Develops students' ability to think critically about and solve current legal problems. Evaluates the benefits and detriments of both print and on-line legal resources, and how to create an efficient research plan. Formulates and applies research strategies to real-world legal problems, and uses legal analysis to refine and improve research results. Note: students who have taken LAWS 6856 may not enroll in this course.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 6896 (3) Advanced Legal Research and Writing for Practice**
Advances and improves legal research and writing skills learned in first year. Proposes variety of assignment types across substantive and procedural areas to prepare for experiences as summer associates or new attorneys.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 7003 (3) Federal Courts**
Looks at structure and jurisdiction of the federal courts, emphasizing problems of federalism and separation of powers and their relationship to resolution of substantive disputes.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 7004 (3) Advanced Deals Lab: Real Estate Transactions**
Using documents from actual real estate transactions, this course will focus on the drafting and negotiation skills required for the successful practice of real estate transaction law. Students will negotiate and draft actual real estate transactional documents.
**Requisites:** Requires prerequisite course of LAWS 6004 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 7005 (3) Internet and Media Law**
Provides a survey of common, statutory, and regulatory law as applied to the media, including the internet. Topics include: the law as it affects the gathering of news; publisher liability online and offline; First Amendment issues; and related regulation of the internet and computer technologies.
**Grading Basis:** Letter Grade

**LAWS 7011 (3) Creditors' Remedies and Debtors' Protections**
Examines typical state rights and procedures for the enforcement of claims and federal and state law limitations providing protection to debtors in the process. Includes prejudgment remedies, statutory and equitable remedies, fraudulent conveyance principles and exemptions and other judicial protections afforded debtors.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7013 (2) Supreme Court Decision Making**
Students deliberate over several important cases as "Justices" of the Supreme Court. Class is divided into three "Courts" with the first hour spent in deliberation and the second hour in discussion of the deliberative process as well as the substantive issues.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 7015 (3) First Amendment**
Examines speech and religion clauses of the First Amendment. Includes the philosophical foundation of free expression, analytical problems in First Amendment jurisprudence and the relationships between free exercise of religion and the separation of church and state.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 7019 (1-3) Advanced Clinical Practicum**
Enables a clinical student an optional 1-3 credits to complete advanced legal work in the Clinical Education Program. Course must follow enrollment in an existing clinical offering already successfully completed. Permission of the appropriate clinical faculty member required. For each credit taken, a clinical student must complete a minimum of 50 hours of legal work, all of which shall be graded pass/graded. A clinical student may complete 1-3 credits of work over the course of no more than two semesters. A clinical student may earn no more than 3 credits total over the student¿s law school career.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7021 (3-4) Bankruptcy**
Bankruptcy is the field of law that governs economic failure, and oftentimes, economic revival. The course includes both consumer and corporate bankruptcy, and for each of these areas, we will learn liquidation, and reorganization. Students will gain a strong understanding of Chapters 7, 11 and 13 of the Bankruptcy Code.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7023 (2) Jury Selection and History**
Studies the history of the jury from ancient times through the implications of Apprendi, the grand jury from the time of Henry II through modern federal practice, and current jury selection procedures, both federal and Colorado, both civil and criminal. Experienced trial attorneys will work with students to demonstrate jury selection.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 7024 (2-3) Real Estate Planning**
Considers various contemporary legal problems involved in the ownership, use, development, and operation of real estate, with particular emphasis on the federal income tax aspects of these issues. Topics may include sales, leases, and loans; choice of entity; leveraged partnerships; tax credit financing, foreign and tax-exempt investors; and real estate investment trusts.
**Requisites:** Requires prerequisite or corequisite course of LAWS 6007 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Property

**LAWS 7025 (3) Civil Rights**
Presents a comprehensive study of federal civil rights statutes briefly reviewed in other courses (e.g., Constitutional Law or Federal Courts). Studies federal civil rights statutes, their judicial application,and their interrelationships as a discretely significant body of law of increasing theoretical interest and practical importance.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 7029 (3) Appellate Advocacy Practicum**
Offers the opportunity to represent parties in federal and state civil appeals. Students draft opening briefs in the fall semester, and draft reply briefs and appear fororal argument in the spring. Prior appellate advocacy experience will be helpful. Enrollment is limited to six students.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7031 (3) Regulation of Financial Institutions**
Focuses on the core banking law and works outward to cover a broader spectrum of bank-like financial institutions. Covers bank licensing, restrictions on bank business, regulating safety and soundness of banks, consumer protection of depositors and other bank customers and regulatory examination and enforcement.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7045 (3) Criminal Procedure: Adjudicative Process**
Focuses primarily on criminal procedure at and after trial. Looks at bail, prosecutorial discretion, discovery, plea bargaining, speedy trial, jury trial, the right to counsel at trial, double jeopardy, appeal and federal habeas corpus.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 7051 (1-3) Transactional Drafting**
Focuses on principles of contemporary transactional drafting. Skills gained will be applicable to transactional practice and will also be useful to litigators. Students will learn to translate, draft and review contracts, as well as how to add value to deals.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade

**LAWS 7055 (3) Education Law**
Considers issues raised by the interaction of law and education. Issues may include the legitimacy of compulsory schooling, alternatives to public schools, socialization and discipline in the schools and questions of equal educational opportunities.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 7065 (3-4) Immigration and Citizenship Law**
Covers legal issues pertaining to noncitizens of the United States, especially their right to enter and remain as immigrants and nonimmigrants. Topics include admission and exclusion, deportation, and refugees and political asylum. Approaches topics from various perspectives, including constitutional law, statutory interpretation, planning, ethics, history and policy.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 7071 (2-3) Advanced Transactional Drafting**
Provides students with the opportunity to further develop skills gained in LAWS 7051 and put them to use in simulations and business contexts across various areas of practice. Students will be asked to draft industry specific contract provisions, revise existing contracts, counsel and negotiate on behalf of clients and work through ethical dilemmas encountered by transactional attorneys.
**Requisites:** Requires a prerequisite course of LAWS 7051 (minimum grade D-).
**Grading Basis:** Letter Grade

**LAWS 7079 (2-3) Wrongful Convictions**
Focuses on the issues and remedies in cases of people who have been convicted, whose traditional appellate remedies have been exhausted, and who continue to claim actual innocence. Preference given to those who have taken or are taking more criminal procedure courses.
**Grading Basis:** Letter Grade

**LAWS 7085 (2) Law and Religion**
Uses judicial decisions as well as historical and theoretical materials to explore significant aspects of the relationship between law and religion. The religion clauses of the First Amendment are a central but not exclusive subject of study. Offered in alternate years.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 7101 (4) Deals: Engineering Financial Transactions**
Explores the business lawyer's role in creating valueby helping clients identify, assess and manage business risks through efficient contract design while achieving the optimal legal, tax or regulatory treatment for the deal. Includes case studies of actual transactions.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7102 (2-3) Oil and Gas**
Deals with the legal problems associated with private arrangements for the ownership and development of oil and gas: deeds and leases to oil and gas rights, trespass, adverse possession, implied covenants in leases, conveyances of fractional interests, and the interaction of private rights and conservation regulation.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7103 (2-3) Ethics and Compliance Capstone**
Integrates skills and knowledge from the introductory compliance course and other courses in law school compliance curriculum as students develop a compliance program for an institution.
**Requisites:** Requires prerequisite course of LAWS 6221 (minimum grade D).
**Grading Basis:** Letter Grade

**LAWS 7105 (3) Family Law**
Focuses on nature of marriage, actions for annulment and divorce, problems of alimony and property division, separation agreements, and custody of children. Also considers illegitimacy, abortion, contraception, the status of married women in common law and under modern statutes and relations of parent and child.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7106 (1-2) Moot Court Competition**
Offers an intensive involvement in legal research, appellate brief writing and oral arguments in a competitive context. Student finalists may continue involvement in regional and national competitions.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7115 (3) Juvenile Justice**
Covers how the judicial system deals with minors accused of crimes, and the collateral consequences for youth in the educational and child welfare systems.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7116 (1) Barristers Council**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Pass/Fail

**LAWS 7122 (2-3) Mining and Mineral Development Law**
Addresses major issues affecting the development of mineral resources in the western United States. Includes the regulation of the impacts of hardrock and coal mining and oil and gas development on the environment under federal and state laws. Covers the Mining Law of 1872, the Mineral Leasing Act, 'split estates,' and state regulation of mineral development.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7126 (1-2) Transactional Competition**
Covers a broad array of topics, including, but far from limited to, contract negotiation, health law, mergers and acquisitions, and client counseling. A valuable opportunity for students to gain experience outside the classroom and develop tactics for interacting with clients, negotiation, techniques, and transactional drafting skills. Provides great opportunities for networking. A division of Barristers' Council.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7128 (2-4) Jurisprudence**
Addresses a number of fundamental questions, such as: What is law? What should it be? How is it created? Our readings consist of cutting-edge articles from leading modernist/postmodernist schools of thought including legal formalism, legal realism, interpretive theory, law and economics, feminist jurisprudence, critical legal studies and law and literature.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 8128
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 7135 (3) Parent, Child, and State**
Examines the legal rights of parents and children in a constitutional framework, as well as the state's authority to define and regulate the parent-child relationship. Addresses rights of parents and children to freedom of expression and religious exercise, termination of parental rights and adoption, paternity orientation and culture in defining the family.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7145 (3) Comparative Family Law**
Examines and critiques law, legal institutions and traditions of the country of focus and the US as they affect children, families, and work. Enhances research and writing skills, including field and international research. Contributes to host country through scholarship and service. Increases cultural competence through active engagement with peers and with social justice issues in another country. Includes required field study component and service learning project over spring break.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7154 (3) Land Use Planning**
Explores mechanisms for public control of private land uses, such as planning, zonin, and regulation of land development; including consideration of federal and state constitutional and statutory limitations on local governments. Offered in alternate years.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Property

**LAWS 7155 (3) American Legal History**
Explores the history of American law from the Constitution to the twenty-first century Global War on Terror. It covers topics including the law of slavery and freedom, the development of civil rights law, business regulation and deregulation, the origins of the administrative state, and the rise of the conservative legal movement. Throughout, the course emphasizes the ways that political and economic change shapes the law and the practical effect law has on social movements.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade

**LAWS 7159 (2) Advanced Trial Advocacy**
Offers an advanced course covering trial practice elements. Open only to students who have taken LAWS 6109.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7169 (2) Motions Advocacy**
Provides practical training in preparing and arguing pretrial, post-trial and chambers motions to an experienced federal judge based on materials from actual case files. Assigns some research papers. Limited to students with interest in trial advocacy and willingness to participate in confrontational exercises.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7201 (3) Antitrust**
Studies American competition policy: collaborations among competitors, including agreements on price and boycotts, definition of agreement, monopolization, vertical restraints such as resale price maintenance and territorial confinement of dealers.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7202 (3) Environmental Law**
Examines and analyzes federal, state, and tribal regulation of clean air and water, hazardous wastes, toxic substances, and contaminated properties. Considers related environmental justice theory, economic, ethics and policy issues.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7205 (3) Administrative Law**
Covers practices and procedures of administrative agencies and limitations thereon, including the Federal Administrative Procedure Act, and the relationship between courts and agencies.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 7207 (3) Federal Estate and Gift Tax**
Analyzes the federal estate and gift taxation of inter vivos and testamentary transfers, introduces the federal income taxation of estates and trusts, and explores elementary estate planning. Prior or simultaneous enrollments in Income Taxation (LAWS 6007) and Wills and Trusts (LAWS 6104) are helpful, but not required. Students may receive credit for this course and either Estate Planning (LAWS 7217) or Estate and Gift Tax Planning (LAWS 6217).
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Taxation

**LAWS 7209 (4) Natural Resources and Environmental Law Clinic**
Offers hands-on experience in the practice of natural resources law in the Rocky Mountain region to a select number of clinic students. The clinic's docket of active cases focuses on public land law and the environmental statutes protecting those lands and their resources. Students participate in projects that test the full range of lawyering skills, including traditional litigation, administrative advocacy, legislative drafting, and the conduct of complex negotiations and settlements.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7211 (3) Business Planning**
Focuses on the development and use of concepts derived from a number of legal areas in the context of business planning and counseling. Topics such as formation of business entities, sale of a business, recapitalization, division, reorganization and dissolution are considered.
**Requisites:** Requires prerequisite course of LAWS 6007 (minimum grade D-).
**Recommended:** Prerequisite or corequisite LAWS 6201 or LAWS 6211.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7217 (2) Estate Planning**
Deals with the practical application of estate planning principles to various client situations, including certain federal wealth transfer taxation issues. Students may not receive credit for both Estate Planning (LAWS 7217) and Estate and Gift Tax Planning (LAWS 6217).
**Requisites:** Requires prerequisite course of LAWS 7207 (minimum grade D-).
**Recommended:** Prerequisites LAWS 6007 and LAWS 6104.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Taxation

**LAWS 7222 (2-3) Environmental Decision-Making**
Explores the foundational issues that underlie agency decision-making, including environmental ethics, cost-benefit analysis, risk assessment, constitutional law and administrative law. Compares and contrasts National Environmental Policy Act and the National Historic Preservation Act and the Endangered Species Act.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 6222
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7232 (3) Global Energy Justice**
Establishes why nearly a third of the world populated by the energy oppressed poor, presents a major national and international "legislative" or socio political problem calling for answers from governments and civil societies in the developed and developing world. Explains and elucidates the concept of energy justice, its jurisprudential heritage and its meaning and relevance in contemporary society. Case studies present problem solving frameworks spanning the political, social, behavioral, engineering, natural sciences and law.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7241 (3) Telecommunications and Internet Law and Policy**
Examines laws governing telecommunications industries, including federal and state regulation and international aspects. Includes telephone, cable, satellite, cellular and other wireless systems and the Internet.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5410
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/Technology/Telecommunication

**LAWS 7242 (3) Environmental Justice and Law**
Examines issues of unequal environmental protection across various contexts, including air and water pollution, siting of toxic and hazardous waste, noxious land uses, and access to environmental goods such as public lands. The course will explore the role that U.S. law has played in constructing the unequal distribution of environmental harms and benefits. It will then examine efforts within the U.S. to use law and other tactics to redress environmental injustice.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade

**LAWS 7251 (3) Non-Profit Law**
Examines the legal and policy issues raised by non-profits. Topics may include the formation of a non-profit, qualification for federal tax exemption, the rise and role of private foundations, fiduciary duty issues, restrictions on political activity and private benefit, and the unrelated business income tax. Also focuses on broader social questions raised by giving, charities, and philanthropy.
**Grading Basis:** Letter Grade

**LAWS 7255 (3) Local Government**
Studies state legislative and judicial control of the activities, powers and duties of local governmental units, including home-rule cities and counties, and some problems of federal, state, and local constitutional and statutory limitations on governmental powers when exercised by local governmental units (e.g., the powers to regulate private activities, tax, spend, borrow money and condemn private property for public uses).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 7271 (3) Venture Capital and Private Equity**
Provides overview of the legal and financial principles to represent privately held companies, their founders and managers and their investors. Emphasizes transaction structuring rather than judicial opinions. Includes the organization and financing of start-ups, structuring buyout transactions, exit strategies, legal organization of investment funds and other financial intermediaries. Discusses the relevant regulatory landscape, including securities law, bankruptcy, ERISA and tax law.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7285 (2-3) Marshall-Brennan Constitutional Literacy Project**
Teaches students how to educate high school students in the local Denver Metro area high schools about the constitution, public speaking, and logical reasoning. Interested students must apply and requires a commitment teaching once per week in a local high school. Encourages individual development as teachers, writers, and critical thinkers and provides an opportunity to grow as colleagues and teammates.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Government and Public

**LAWS 7301 (2-3) Copyright**
Examines state and federal laws relating to the protection of works of authorship ranging from traditional works to computer programs. Studies the1976 Copyright Act as well as relevant earlier acts. Gives attention to state laws, such as interference with contractual relations, the right of publicity, moral right, protection of ideas and misappropriation of trade values, that supplement federal copyright.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 7302 (2) Advanced Oil and Gas**
Covers the history of oil and gas conservation and its regulation, proration and allowable regulation, compulsory pooling and unitization, permitting and environment regulation, and the interplay between federal, state and local regulation.
**Requisites:** Requires prerequisite course of LAWS 7102 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7303 (3) Complex Civil Litigation**
Covers civil procedure in modern complex multiparty suits, including class actions in such settings as employment discrimination and mass torts, and problems in discovery, joinder, res judicata, collateral estoppel and judicial management in such suits.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 7309 (2-4) American Indian Law Clinic**
Offers a clinical education course involving participation in the representation and advocacy of Indian causes -- land or water claims, Indian religious freedom, job or other discrimination based on race and issues implicating tribal sovereignty.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7310 (1-3) International Dispute Settlement**
Examines various mechanisms for the settlement of international disputes. Includes negotiation, inquiry, mediation, conciliation, arbitration, and adjudication. Focuses on intergovernmental dispute resolution.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 7311 (2-3) Patent Law**
Covers selected topics, such as patentable subject matter, patentability and utilization of patent rights through licensing and infringement litigation. Covers practice and procedure of the patent and trademark office.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 7312 (2) Advanced Water Law**
Builds on the study of basic water law principles for those interested in practicing in this field. Explores in more detail the highly developed legal and administrative system of water law in Colorado and other states, including the use of special courts to adjudicate the existence of water rights and approve changes of use.
**Requisites:** Requires prerequisite course of LAWS 6302 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7315 (3) Criminal Justice Policy and Practice**
Focuses on policy and practice issues rather than case law. Examines how American criminal justice is (and has been) dispensed in the vast majority of cases that never reach trial. Devotes attention to systemic issues rather than case-specific problems. Studies policy behavior, prosecutorial charging and bargaining discretion, the provision of defense services, bail and preventive detention, plea negotiation, and sentencing---aspects of the criminal process that affect huge volumes of cases and require thought in global terms.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Criminal

**LAWS 7318 (3) Economics of the American Legal System**
Explores the economics of the American legal system. Topics include the cost of producing lawyers, the market for legal services, the practical challenges of running small and large law firms and the government's role in making legal services available.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7321 (1-2) Patent Drafting and Prosecution**
Covers transactions, and often high-tech deals involving intellectual property rights. Studies IP ownership; assignment or rights; commercialization transactions (licensing, distribution, strategic); antitrust; emerging issues. Gives students essential tools to draft and analyze technology contracts.
**Requisites:** Requires prerequisite course of LAWS 6301 or 7301 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 7323 (2-3) Patent Litigation**
Focuses on unique aspects of patent litigation: substantive patent law, civil procedure, federal jurisdiction and litigation strategy; includes claim construction, infringement, anticipation and obviousness defenses, unenforceability challenges, declaratory judgments, injunctions, damages, settlements, licenses and trial strategy. Of interest and useful to those interested in intellectual properly generally, not just patents or in litigation.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 7325 (3) Election Law**
Examines the rapidly evolving field of election law: the right to vote, voting procedures, redistricting, candidate selection, campaign finance laws and direct democracy. Emphasizes federal law, including applicable constitutional jurisprudence.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 7331 (2-3) Sports Law**
Covers the application of rules from agency, antitrust, contracts, constitutional law (including sex discrimination), labor law, property, torts, unincorporated associations and other subjects to those persons involved in the production and delivery of athletic competition to consumers. Explores the development of the application of these rules to a sports setting and related economic issues.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7333 (2) Advanced Evidence: Forensic Science and the Criminal Courts**
Explores the admissibility of forensic science opinion and expert testimony, its use as evidence at a trial, and the challenges that such evidence may pose for the courts and the entire criminal justice system in the future.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 7341 (3) Trademark and Unfair Competition Law**
Examines trademark protection, the interaction of trademark and unfair competition law with other intellectual property doctrines, the requirements for acquiring and retaining federal trademark rights, false advertising and other misrepresentations, the right of publicity and related claims, remedies for infringement, and international aspects of trademark protection.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 7343 (2) Technical & Engineering Knowledge in Litigation**
Teaches law students and engineering students to work with each other in varied legal disputes implicating technical matters (acccidents, trade secrets, pollution, etc.), covering expert witness law and practice, use of empirical methods in litigation, and more broadly the roles of lawyers and of engineers in such disputes. Experiential learning-based assignments may include initial investigations, witness testimony, and legal writings that include engineers¿ expert witness reports and lawyers¿ complaints and motions.
**Grading Basis:** Letter Grade

**LAWS 7350 (2-3) Analytical Strategies**
Develops analytical, writing and problem-solving skills necessary to pass the bar exam and succeed in practice. Designed for third-year law students in their final semester. Students will improve their techniques for analyzing, organizing and writing responses to essay and performance test questions through frequent written exercises and individual feedback on those exercises.
**Grading Basis:** Letter Grade

**LAWS 7361 (2) Cybersecurity**
Introduces students to the laws that regulate the basic technologies of the Internet and the management of information in the digital age. It examines the most significant statutes, regulations, and common law principles that comprise this emerging legal framework, including the Federal Wiretap Act, the HIPAA Privacy Rule, and the Digital Millennium Copyright Act.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 7365 (2) Comp Constitutional Law**
**Grading Basis:** Letter Grade

**LAWS 7381 (3) Intellectual Property Counseling and Licensing**
Introduces strategic development and procurement of IP, including patents, trademarks, copyrights, and trade secrets. Evaluates the latest cases and legal trends from a practical and strategic perspective. Focuses on widely accepted best practices and critical thinking in these areas.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property, Technolgy Telecomm

**LAWS 7401 (3) Securities Regulation**
Stresses statutory interpretation of the various federal statutes regulating the issue of corporate securities and the cases and regulations that have arisen out of those statutes.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7402 (2) The Law of Toxic and Hazardous Wastes**
Examines the EPA's federal hazardous waste statutes, including the Resource Conservation and Recovery Act of 1976 (RCRA), and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). Analyzes the RCRA "Cradle-to-grave" hazardous waste program and addresses the evolving CERCLA liability scheme and cleanup process.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7405 (2-3) Health Law 2: Medical Malpractice and Quality Regulation**
Explores (1) the law controlling ethical issues that arise during the delivery of medical care, (2) the substantive law of medical malpractice and tort reform aimed at reducing the frequency and severity of medical malpractice verdicts, and (3) the practical aspects of litigating a medical malpractice case. Cross-listed at the Health Sciences Center; will include field trips there.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7406 (1) International Moot Court Competition**
Open only to students who actively participate in the seminar preparing for the competition, in the preparation of memorials for the competition, and in the practice of oral arguments or regional oral arguments.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7407 (1-3) Tax Policy**
Explores current issues in tax policy. Topics may include the tax legislative process, consumption taxes, taxes and distributive justice, the tax exemption for nonprofits, carbon taxes, corporate taxes and integration, and taxes and entrepreneurship. There are no required prerequisites, but Federal Income Tax will be helpful.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Taxation

**LAWS 7409 (3) Legal Negotiation**
Explores the fundamentals of effective negotiation techniques and policies for lawyers. Students engage in mock negotiations of several legal disputes.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7411 (2-3) Mergers, Acquisitions and Reorganizations**
Studies the planning of corporate mergers, acquisitions and reorganizations, examining the application and integration of state corporate law, federal securities law, accounting principles, tax law, labor law, products liability law, environmental law, ERISA and antitrust law.
**Equivalent - Duplicate Degree Credit Not Granted:** BADM 6900
**Requisites:** Requires prerequisite LAWS 6211 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7415 (2) Bioethics and Law**
**Grading Basis:** Letter Grade

**LAWS 7418 (2) Legal Imagination**
Advanced course in reading and writing for law students. Varied literary and other works are read. May be of interest to the student interested in the question: Does my choice to become a lawyer mean the sacrifice of my ambitions to be a serious writer (or person)?
**Grading Basis:** Letter Grade

**LAWS 7421 (2-3) Business and Human Rights**
Examine the role of international human rights law in regulating or influencing businesses enterprises, along with relevant policy considerations.
**Grading Basis:** Letter Grade

**LAWS 7425 (2-3) Health Law and Policy**
Acquaints students with the issues arising at the interface between law and medicine through analysis of cases and other materials. Critically analyzes methods used by courts and legislatures to address medical/legal problems in an effort to determine whether the legal resolution was reasonable and appropriate in light of medical, social and political considerations. Offered in alternate years.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7426 (2) Health Care Compliance**
Introduces students to a number of primary laws and regulations that give rise to the vast majority of serious fraud and abuse cases. The primary statues and regulations implementing them will then be viewed from the context of common problems in the health care industry such as: up-coding, unbundling, worthless services/quality of care, medically unnecessary care, over-utilization, joint ventures with referral physicians, off-label marketing.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7433 (3) Remedies**
Examines the types of relief available to vindicate various rights. Covers damages, specific performance, injunctions, and restitution. Emphasizes the planning aspect of enforcement, in view of the limitations and problems of proof associated with specific remedies.
**Grading Basis:** Letter Grade

**LAWS 7439 (2-3) Mediation**
Explores mediation, one of the more important methods of alternative dispute resolution and the legal issues that may arise related to mediation. Considers what kinds of persons and disputes are most appropriate for mediation. Includes role playing.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7440 (3) International Human Rights and Humanitarian Law**
Surveys international human rights both in law and in philosophy, both current and historical.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 7445 (2) Insurance Law**
**Grading Basis:** Letter Grade

**LAWS 7449 (2-4) Juvenile and Family Law Clinic**
Examines the world of child welfare from the view of the child client, by representing their best interests in abuse and neglect cases. As Guardians ad litem, students will represent children in abuse and neglect cases from the beginning, at the temporary shelter hearing, through the conclusion of the case at a permanency orders hearing.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7450 (2) Regional Human Rights Protection for JD Students**
Examines how human rights law and policy is created, interpreted and enforced within regional systems. Explores the main sources of human rights law including treaties, international customary law, constitutional law, municipal law, comparative law and principles; the jurisprudence of regional courts and tribunals, the institutions that support human rights advocacy and the cultural perspectives of affected communities and peoples.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**LAWS 7451 (3) Law and Finance for Entrepreneurs**
Studies unique legal problems faced by entrepreneurs, including formation issues (choice of entity, rights of the founders, initial investors), operation issues (governance, key employees, intellectual property, financing), IPOs and buy-outs.
**Equivalent - Duplicate Degree Credit Not Granted:** BADM 6910
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7461 (1) Dispute Resolution in the Digital Age**
Explores the need for expanded and equalized access to remedies in consumer cases, and how the internet opens doors to online dispute resolution ("ODR") systems that utilize cost-effective negotiation, mediation, and arbitration processes for resolving complaints. This course will look at the various systems currently used by major companies, as well as the rules and treaty developments in global markets.
**Grading Basis:** Letter Grade

**LAWS 7465 (2) Public Health Law and Ethics**
Explores the legal and ethical dimension of public health. Focuses on topics that generate legal and ethical controversies, including governmental duties to protect citizens, nature and the extent of the government's ability to regulate conduct and responses to epidemics.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7471 (3) Securities Litigation and Enforcement**
Covers the provisions of the Securities Exchange Act of 1934 and related federal statutes, concentrating on the arbitration of private securities claims; SEC enforcement actions; international securities regulation; securities manipulation and fraud; self-regulatory organizations; and regulation of attorneys and accountants practicing before the SEC.
**Grading Basis:** Letter Grade

**LAWS 7475 (2) Advanced Torts**
Studies selected tort actions and theories. Topics covered may include "Dignitary torts" (e.g., defamation, privacy, etc.), business torts, and product liability. Offered in alternate years.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 7505 (2) Sexuality and the Law**
Examines the regulation of sexuality in local, state,and federal law, with particular emphasis on sexual orientation. Explores how sexuality shapes, and is shaped by, an array of laws and policies, which may include family law, military regulations, tax law, employment law, trusts and estates, obscenity law, and criminal law.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7507 (2-3) State and Local Taxation**
Examines the operation of the income, property and sales tax used to finance our state and local governments. Includes requirements of equal protection and due process. Covers jurisdiction to tax allocation of the tax base among different state and local governments.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 6760
**Grading Basis:** Letter Grade

**LAWS 7509 (1) Mock Trial Competition**
Student teams further develop trial and advocacy skills in a competitive mock-trial format involving two or more rounds of trials. Requires preparation of trial briefs and drafting other court pleadings and documents. Credit is limited to the top two teams (six students). Student finalists may continue involvement in regional and national competitions.
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7512 (2) Advanced Environmental Law: Air Pollution**
Provides an examination of efforts to regulate air pollution in the United States under the Clean Air Act. Covers key provisions, basic approach of cooperative federalism, role of science and risk assessment establishing health-based standards, implications of instrument choice and regulatory design on innovation and economic growth, development of 'first generation' climate policies, and new approaches to compliance and enforcement.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7513 (3) Domestic Violence**
Explores the law, policy, history and theory of domestic violence. Examines the limits of legal methods and remedies for holding batterers accountable and keeping victims safe; the dynamics of abusive relationships; the history of the criminal justice system's response to domestic violence; the defenses available to battered persons who kill their abusers; the legal paradigm of the sympathetic victim; psychological and feminist theories about abusive relationships; civil rights and tort liability for batterers and third parties; and the intersection of domestic violence with international human rights.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7515 (3) Poverty Law**
Explores the legal and policy responses to poverty in the United States and addresses how the law shapes the lives of poor people and communities. Examines the extent of poverty in the United States, the root causes and the historical development of social welfare policy. Focuses on the rights-based aspect of poverty law and various policies that attempt to ameliorate poverty.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 7520 (3) Food Law and Practice**
Surveys the basic regulatory landscape of food law with insight into critical legal issues facing industry and consumers. Covers federal, state and municipal regulation, litigation, government incentives, international standards and soft-law. Combines doctrinal approaches with simulation and problem solving to introduce systems-level thinking. No prerequisites or prior knowledge if required, though interest in food law and corporate law are helpful.
**Grading Basis:** Letter Grade

**LAWS 7529 (1) Appellate Advocacy Competition**
Gives students the opportunity to participate in an intermural appellate advocacy competition, in which a brief must be filed and reviewed, critiqued, and deemed credit-worthy by a member of the faculty. (Law School Rule 3-2-9 (b) should be consulted prior to enrollment.)
**Grading Basis:** Pass/Fail

**LAWS 7531 (3) Wage Law and Litigation**
Teaches federal and state wage statutes, common-law claims for unpaid wages (e.g., fraud, contract/quasi-contract, etc.), and complex statutes outside employment law (racketeering, antitrust, etc.) that creative wage litigators sometimes use. Coverage of the limits of wage law scope may include non-employee contractors (both traditional and gig economy workers), undocumented workers, students, volunteers, and/or prisoners. Teaches litigation practice and strategy, including class/collective action practice, plus experiential learning assignments that may include deposition-taking/client-interviewing, claim-strategizing, damages-calculating, and/or motion-writing.
**Grading Basis:** Letter Grade

**LAWS 7535 (2) Poverty, Health and Law 1**
Introduces students to the substantive areas of health and poverty law. Topics include health disparities and the role of law, cultural competence, standards of care for vulnerable populations, relationships between income, employment, housing, education, health, violence, and immigrants. Students will also help with intake of clinic patients and support client representation by the attorney of record.
**Grading Basis:** Letter Grade

**LAWS 7541 (2-3) Employment Discrimination**
Examines statutory and constitutional prohibitions ofdiscrimination in employment on the basis of race, gender, age, religion, national origin and disability.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7545 (2) Poverty, Health and Law Practicum**
A service learning course in which students draw from the substantive materials studied in LAWS 7535 to develop competency in case planning, problem solving, cooperative decision making, and client counseling. Students will staff cases under the supervision of a CO Legal Services (CLS) staff attorney or a pro bono attorney working on behalf of CLS.
**Requisites:** Requires prerequisite course of LAWS 7535 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7551 (2) Trade Secrets**
Examines law of trade secrets and how companies and entrepreneurs use this field to protect intellectual property in conjunction with other forms of legal protection (e.g., patent, copyright and trademark).
**Grading Basis:** Letter Grade

**LAWS 7555 (4) Poverty, Health, and Law Practicum**
Introduces students to the substantive areas of health and poverty law. Topics include health disparities and the role of law, cultural competence, standards of care for vulnerable populations, relationships between income, employment, housing, education, and health. Students will also staff cases under the supervision of a Colorado Legal Services (CLS) staff attorney or a pro bono attorney working on behalf of CLS, and will develop competency in case planning, problem solving, cooperative decision making, and client counseling.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7565 (3) Corporate Transactions in Health Law**
Introduces key corporate and regulatory issues impacting the delivery of health care. Focus will be transactional, with students gaining an understanding of basic corporate law and regulatory principles, and then learning to integrate core federal and state laws into choice and use of corporate structures and operational strategies.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 7601 (2-3) Business Transactions**
Provides a practical understanding of how to apply the law in both transactional and litigation settings. Gives an interdisciplinary look at how various areas of the law are brought together in common factual settings. Teaches students to negotiate, document and close the acquisition of a business covering the areas of practice of corporate, contracts, real property, secured transactions and bankruptcy law. Tests, in a litigation setting, the decisions made during the acquisition stage.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 7605 (2-3) Refugee and Asylum Law**
Focuses on protections offered under international and domestic law for persons who are threatened by persecution or other adverse conditions in their country of origin. Covers who is a refugee and the protections they have or do not have under United States and international law.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 7609 (1-2) Law Practice Management**
Studies the establishment of a solo or small-firm legal practice. Topics include the business structure (PC, LLC, etc.), office systems, marketing and development, staffing, liability insurance, managing time, technology and billing. (This practice course counts toward the 14 credit hour maximum of practice hours.) Course supported by the Section of Law Practice Management of the ABA in memory of Harold A. Feder, CU Law '59.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7611 (2-3) International Business Transactions**
Examines the sources of international business law, the relationship between such law and the U.S. legal system, the choice of law in international business disputes, the special issues that arise when doing business with foreign governments, the law governing international sales and the shipment of goods and international intellectual property protection. Offered in alternate years.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 7615 (4) Immigration Law and Immigrants' Rights**
Addresses four broad questions: Who is a citizen of the United States? Who else can come to this country? When and why can noncitizens be forced to leave? Who has the authority to answer these questions? These questions prompt us to examine the history of U.S. immigration, the constitutional-statutory-regulatory framework that governs immigration and citizenship law and the federal agencies that administer it. Also addresses contemporary challenges to, and assertions of, immigrants' rights.
**Equivalent - Duplicate Degree Credit Not Granted:** PSCI 7181
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 7617 (3) International Taxation**
Explores the United States income taxation of international activities, principally U.S. persons doing business abroad and foreign persons doing business in the United States. This course focuses on the Internal Revenue Code as well as tax treaties.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 6780
**Requisites:** Requires prerequisite course of LAWS 6007 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Taxation

**LAWS 7618 (1) Marijuana Law and Policy**
Covers three distinct but interwoven topics: substantive law governing marijuana; policy rationales behind and outcomes produced by different approaches to regulating the drug; and the legal authority to regulate the drug. The objective is to prepare to handle legal issues that arise in practice but also to provide informed counsel on proposed an future reforms to the law.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Electives

**LAWS 7619 (3-4) Entrepreneurial Law Clinic**
Provides law students with practical experience in transactional law while offering valuable legal services without charge to local startup businesses lacking access to legal resources. Enrollment priority is given to third year law students. The ELC professor may set forth additional requirements to ensure that students are qualified to provide services to ELC clients.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7621 (4) Business Associations**
Covers the law of agency, partnerships, limited liability companies and corporations. It includes principles of agency, formation and operation of business entities, fiduciary duties of the actors in business entities, and the relevant federal and state laws related to those entities.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 6201 and LAWS 6211
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade

**LAWS 7629 (1) Introduction to the In-House Practice of Law**
Explores cutting edge questions around the practice of law as an employee of a business. Demonstrates how the combination of law and business can be valuable to businesses and also innovative, challenging and rewarding to legal professionals. Legal services to corporate America is changing dramatically with more entities relying on in-house counsel, compared to private practitioners, to obtain legal advice and counsel.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7640 (2-3) Comparative Law On Indigenous Peoples**
This course examines and compares the treatment of Indigenous peoples by the legal systems of a sampling of countries in the Western Hemisphere and elsewhere. The course will also compare the foreign legal regimes examined to relevant United States law and to international standards, with the aim of critically assessing the comparative adequacy of U.S. law in this context and exploring potential reforms in U.S. law that might be informed by legal developments in other countries. Students will gain knowledge of the similarities and differences in the foundational characteristics of diverse legal systems and of their histories and political contexts.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade

**LAWS 7709 (3) Advanced Legal Negotiation**
Deepens students' understanding of the economic, psychological, cultural, and critical literatures related to legal negotiation and bargaining, provides students an advanced set of negotiations, experiences and simulations that introduce new dynamics and problems not dealt wit in the core course, and deepens students' self-understanding and ability to learn from experience.
**Requisites:** Requires prerequisite course of LAWS 7409 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7710 (2-3) Space Law and Policy**
Examines the role of international law in the regulation of outer space activities. Topics include current and potential future uses of outer space, law-making process related to space activities, legal regime of outer space and celestial bodies, legal status of spacecraft, liability for damage caused by space activities, settlement of space-related disputes.
**Grading Basis:** Letter Grade

**LAWS 7715 (3) Indigenous Peoples in International Law**
Studies developments in the substance and procedure of international human rights law pertaining to indigenous peoples, examining these developments through varying perspectives, doctrinal and political, pragmatic and critical. Students will become familiar with indigenous peoples' involvement in the human rights movement both before and after WWII, and corresponding developments in the United Nations, Organization of American States, and other institutions.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 7718 (2) The Regulation of Marijuana**
Covers three distinct but interwoven topics: substantive law governing marijuana, policy rationales behind and outcomes produced by different approaches to regulating the drug and the legal authority to regulate the drug. Prepares one to handle legal issues that arise in practice, but also to provide informed counsel on proposed and future reforms to law.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 7725 (3) American Indian Law I**
Investigates the federal statutory, decisional and constitutional law that bears upon American Indians, tribal governments and Indian reservation transactions.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7735 (3) American Indian Law II**
Investigates the legal history and current legal status of Alaska Natives and Native Hawaiians. Addresses other current topics such as tribal water rights, tribal fishing and hunting rights, tribal justice systems, religious freedom, and tribal natural resource and environmental management.
**Requisites:** Requires prerequisite course of LAWS 7725 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7745 (2-3) Tribal Law**
Tribes are sovereign nations with inherent powers of self-government, including the right to ¿make their own laws and be ruled by them. ¿¿Williams v. Lee, 358 U.S. 217, 220 (1959). This course provides a historical and contemporary overview of the internal laws of Tribal nations. It serves as a general introduction to the diverse types of laws by which Tribal nations govern themselves, with attention paid to topics such as oral tradition, Tribal governments, membership, Tribal constitutions, criminal and civil jurisdiction, and Tribal court jurisprudence. This course is intended to not only familiarize students with traditional and continuously developing aspects of Tribal law, but also to examine external impacts and limitations on the internal law of Tribal nations.¿Although this course primarily considers the laws of Tribes located in the United States, we may also from¿time¿to time explore the¿laws of indigenous peoples in other¿parts of the world.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 7751 (3) Arbitration**
Discusses the nature of arbitration, enforcement of arbitration agreements and awards, complexities of multi-party arbitrations, fairness and efficiency of the arbitral process and other issues related to arbitration's prevalence in contexts ranging from corporate to consumer and employment disputes.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7801 (1) Tech Policy Advocacy**
Provides an intensive, one-week look at the substance, strategy, tactics, and import of technology policy advocacy. Each year, we will study one particular theme or conflict and examine it in-depth. The point of studying one particular episode is to learn lessons about the practice of technology policy advocacy that apply beyond this one historical moment. This class is meant to combine traditional doctrinal approaches with an experiential focus.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 7809 (2-4) Technology Law and Policy Clinic**
Features technology law advocacy before administrative, legislative and judicial bodies in the public interest.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5250
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7846 (1-3) Independent Legal Research**
Involves independent study and preparation of a research paper under faculty supervision. Students produce a research paper equivalent to a seminar research paper. a draft is submitted, subjected to critique by the faculty member, and redrafted. Available during or after the fifth semester of law school. Instructor consent required.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 7896 (1) Journal: University of Colorado Law Review**
Gives students the opportunity to participate in the research, writing and editing activities involved in publishing the University of Colorado Law Review.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Research and Writing

**LAWS 7906 (1-4) Journal: University of Colorado Law Review**
Gives students the opportunity to participate in the research, writing, and editing activities involved in publishing the University of Colorado Law Review.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Research and Writing

**LAWS 7916 (1) Colorado Environmental Law Journal**
Gives students the opportunity to participate in the research, writing and editing activities involved in publishing the Colorado Environmental Law Journal.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Research and Writing

**LAWS 7926 (1-4) Colorado Environmental Law Journal**
Gives students the opportunity to participate in the research, writing and editing activities involved in publishing the Colorado Environmental Law Journal.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Research and Writing

**LAWS 7936 (1) Journal: Colorado Technology Law Journal**
Gives students the opportunity to participate in the research, writing and editing activities involved in publishing the Journal of Telecommunications and High Technology Law.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Research and Writing

**LAWS 7939 (1-10) Extern Program**
Extern credit may be earned for uncompensated work for a sponsor, which may be any lawyer, judge, or organization that employs lawyers or judges and is approved by the Academic and Student Affairs Committee. Work is done under the direction of a field instructor (a lawyer or judge as the sponsor) and a member of the law faculty. Requires a substantial writing component and 50 hours of working time per credit hour.
**Repeatable:** Repeatable for up to 10.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 7946 (1-4) Journal: Colorado Technology Law Journal**
Gives students the opportunity to participate in the research, writing, and editing activities involved in publishing the Colorado Technology Law Journal.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Research and Writing

**LAWS 7949 (2) Remote Externship Course Component**
Accompanies remote externship placements and provides and opportunity for structured and interactive reflection on the educational experience afforded by the externship placement.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practice: Clinical and Simulation

**LAWS 8002 (1-3) Sem: Special Topics in Law**
Explores special topics in law. Students will be given the opportunity for in-depth discussion and study on law-related topics. Law topics will vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**LAWS 8003 (2) Seminar: Lawyers and Leadership**
Analyzes challenges and responsibilities of serving in leadership roles, with particular emphasis on utilizing law as a vehicle to change organizations and societies. Topics include characteristics, models, styles, and theories of leadership, charisma, civil and human rights, conflict management, decision-making, diversity, ethical responsibilities, forms of influence and persuasion, innovation, mindfulness, organizational dynamics, positive organizational scholarship, and scandal. Materials will include cutting-edge research, case histories, exercises, problems, simulations, and video clips from popular culture and media.
**Grading Basis:** Letter Grade

**LAWS 8015 (1-3) Seminar: Constitutional Theory**
Aims at thinking broadly about the challenges, and problems of constitutionalism in the U.S. What are the fundamental tensions that attend the constitutional enterprise¿internally, externally? What relations does the Constitution have to democracy and liberalism? Readings will be taken from legal theory, social theory, philosophy and occasionally judicial opinions. Emphases will differ slightly each year as announced.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 8021 (2-3) Seminar: Consumers and the Law**
Expands understanding and analysis of contracts beyond the basic concepts learned in the first-year contracts course. Explores norms, goals and functions of consumer law and also observes the law "in action" through a class blog and outreach with the Boulder County Department of Housing and Human Services ("BCDHHS"), who assists people throughout Boulder County with an array of financial, housing and other consumer issues.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 8035 (2) Seminar Speech, Religion, and Equality: Constitutional Values in Tension**
Addresses past and continuing debates involving potential tensions between antidiscrimination principles and free speech, free exercise and establishment clause values. Examines constitutional protections under the First Amendment and the equal protection clause, together with an array of existing and proposed federal and state antidiscrimination laws regulating employment,housing, and public accommodations, among other areas.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 8036 (2-3) Seminar: Special Topics in Intellectual Property**
Applies copyright doctrine to the digital music contexts. Topics may include but are not limited to radio, compulsory licensing, performance rights, sampling, user generated content, term extension, termination rights, "open-access" and the public domain, emerging technologies and infringement, social implications of copyright legislation, digital fair use and the first sale doctrine and moral rights for users and artists.
**Requisites:** Require a prerequisite course of LAWS 6301 or LAWS 7301 (minimum grade D-).
**Grading Basis:** Letter Grade

**LAWS 8060 (3) Seminar: Poverty and Inequality in Comparative Perspective**
Investigates the nature, causes, consequences and major responses to persistent poverty and inequality in the United States and several other countries. Students are expected to write short response papers for each assignment as well as a substantial research paper on a topic selected in discussion with the instructor.
**Grading Basis:** Letter Grade

**LAWS 8075 (2) Seminar: Race, Racism, and American Law**
Focuses on issues of race reform law, in particular the group of issues dealing with Black Americans. (Students of all hues and persuasions are welcome.)Offers an interpretive or critical dimension, rather than a litigation-oriented one. Helps students understand how race reform law works and how attitudes and historical forces have shaped that body of law.
**Grading Basis:** Letter Grade

**LAWS 8085 (2-3) Sem: Critical Race Theory**
Studies Critical Race Theory, a radical left movement of legal scholars who have focused a critical eye on race and racism. Traces the intellectual history of the movement through key writings that have formed the center of CRT. May cover subjects like intersectionality, racial capitalism and interest convergence, as well as more specific topics like police brutality, affirmative action, and immigration.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade

**LAWS 8095 (2) Seminar: Problems in Constitutional Law**
Explores, in depth, various topics in U.S. constitutional law. Examines history, societal impacts, and challenges raised by those topics. The coverage of the seminar varies from year to year, depending on the instructor¿s interests and expertise.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 8101 (3) Seminar: Business Law Colloquium**
Business law scholars from CU and around the country present research papers at this weekly colloquium. Topics may include contracts, corporate law, securities regulation, tax, intellectual property, venture capital and private equity and the legal profession. No prior knowledge of law and economics is expected, although some knowledge of business organizations will be useful.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 8105 (3) Seminar: Comparative Family Law**
Examines and critiques law, legal institutions and traditions of the country of focus and the U.S. as they affect children, families and work. Enhances research and writing skills, including field and international research. Contributes to the host country through scholarship and service. Increases cultural competence through active engagement with peers and with social justice issues in another country. Includes required field study component and service learning project over spring break.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 8110 (2) Seminar: Fascism and the Liberal State**
Explores fascist legal theory and its critiques of the liberal democratic state. Readings of major conservative, liberal, fascist, Nazi and Marxist theorists including Marx, Gentile, Fuller, Neumann, Schmitt, Agamben, Hayek and Mill. Understand from a variety of perspectives, the structure and character of the liberal democratic state, its strengths and weaknesses as well as it susceptibility of fascism.
**Grading Basis:** Letter Grade

**LAWS 8111 (3) Sem: National Security Law and US Foreign Policy**
Explores the legal frameworks influencing the development of national security policy and U.S. foreign policy. Students will be introduced to applicable U.S. Foreign Relations Law, U.S. National Security Law and International Law before considering how such apply and interact in response to current threats to national security.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 8112 (2-3) Seminar: Advanced Natural Resources Law**
Provides in-depth study and analysis of current problems in natural resources law, using historical, literary, and scientific materials. Includes field-trip, and requires additional field trip expenses. Department enforced prerequisites or corequisites: any two of the following: LAWS 6002 or LAWS 6112 or LAWS 6302 or LAWS 7725.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite LAWS 6112.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 8120 (2-3) Special Topics in Constitutional Law**
Offers students the opportunity for in-depth discussion and study on an important topic of constitutional law. Topics may vary from year to year.
**Grading Basis:** Letter Grade

**LAWS 8128 (2-3) Seminar: Jurisprudence**
Addresses a number of fundamental questions, such as: What is law? What should it be? How is it created? Our readings consist of cutting-edge articles from leading modernist/postmodernist schools of thought including legal formalism, legal realism, interpretive theory, law and economics, feminist jurisprudence, critical legal studies and law and literature.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 7128
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Legal Theroy, Jurisprudence Social Policy

**LAWS 8145 (2) Seminar: History and Law of American Policing**
Explores the development of policing in the United States since the nineteenth century. We will examine a number of related topics including professionalization, strikebreaking, order maintenance policing, racial profiling, police brutality, federal law enforcement, militarization, and sheriffs. We will also discuss the process of suing police under § 1983, including barriers such as qualified immunity.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade

**LAWS 8210 (2) Seminar: Comparative Law**
Develops student understanding of the internal working of Islamic law at its theoretical roots. Analyzes the various methodologies that are represented in Islamic legal literature, helping to enable the students to identify modern manifestations of these methodologies in contemporary Muslim discourses. Contextualizes the subject of Islamic law within various governmental and constitutional structures, beginning with the classical period, continuing through colonialism and reaching into the present day.
**Grading Basis:** Letter Grade

**LAWS 8211 (2) Sem: Comp Constitutional Law: US, UK and Australia**
Takes a comparative law approach to the constitutional law of the United States, the United Kingdom, and Australia. The seminar's intellectual purpose is to understand all three nations more deeply (especially our own) by seeing what they do similarly, what they do differently, what the advantages and disadvantages of each nation's approach appear to be, and whether any lessons learned in one place could profitably be transferred to another.
**Grading Basis:** Letter Grade

**LAWS 8235 (2) Seminar: Advanced Topics In Family Law**
Explores a variety of current issues related to family law: topics will change to reflect emerging issues and will draw from legal and social science scholarship as well as relevant statues and cases. Possible topics include reproductive technology, children's rights, the role of religion in family law, and political theories of the family.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 8242 (2) Seminar: Funding Climate Action**
Explores the menu of legal and policy options that can be used to fund climate change mitigation, as well as adaptation to climate risks already underway. Robust climate action will require investment on an enormous scale and an increasingly tight timeline. How to fund these investments is one of the central questions of climate policy today.
**Grading Basis:** Letter Grade

**LAWS 8251 (2) Seminar: Advanced Corporate Law**
Explores current issues in corporate and securities law, including developments in fiduciary duties of officers and directors, corporate governance, executive compensation, revisions to the model business corporation act, and state and federal litigation reform.
**Grading Basis:** Letter Grade

**LAWS 8252 (2-3) Seminar: Policy and Climate Change In The Mont Blanc Region**
Explore the Mont Blanc region including the history and culture, along with the political and economic forces that have shaped it. Attention to the environmental and land use issues and climate change impact. Consideration of the opportunities and obstacles for regional political leaders in adapting to changes in the regional climate. Review techniques to monitor and understand baseline conditions and how climate change may be impacting those conditions. Field work on site required.
**Grading Basis:** Letter Grade

**LAWS 8285 (2-3) Seminar: Education and the Constitution**
Teaches the substantive constitutional law governing public education. Students will teach constitutional materials to high school students in the local Denver Metro area high schools. Interested students must apply and requires a commitment to a full-year curriculum. Encourages individual development as teachers, writers, and critical thinkers, and provides an opportunity to grow as colleagues and teammates. Requires exatra time outside of class.
**Requisites:** Restricted to Law (LAWS) students only.
**Recommended:** Prerequisite LAWS 7055.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 8300 (3) Seminar: International Adjudication**
Focuses on writing briefs and memoranda of law suitable for practice before tribunals such as the International Courts of Justice. Emphasis will be on students writing, legal analysis, and presentationof oral arguments. Instruction identifies how to research and analyze international materials, such as treaties, covenants, and international customary law.
**Grading Basis:** Letter Grade

**LAWS 8303 (2) Seminar: Advanced Oil and Gas**
Covers the history of oil and gas conservation and its regulation, proration and allowable regulation, compulsory pooling and unitization, permitting and environmental regulation, and the interplay between federal, state and local regulation.
**Requisites:** Requires prerequisite course of LAWS 7102 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 8312 (3) Seminar: The Law of the Colorado River**
Addresses the many areas of law and policy that affect management of the Colorado River and the communities that depend on it. The seminar will also include material and presentations from experts in other disciplines, including conservation biology, climate science, anthropology, geology, and hydrology. The centerpiece of the class will be a two-week raft trip through the Grand Canyon.
**Grading Basis:** Letter Grade

**LAWS 8315 (2) Seminar: Advanced Criminal Justice**
Studies policy and practice issues rather than case law. Focuses primarily on how American criminal justice is dispensed in cases that do not reach trial, including police behavior, prosecutorial discretion, defense services, bail, plea bargaining, and sentencing.
**Grading Basis:** Letter Grade

**LAWS 8318 (2) Seminar: Law and Economics**
Introduces the uses and limitations of microeconomic theory for understanding and resolving legal problems. Emphasizes concepts prominent in the law and economics literature such as cost, transaction costs, utility, and rational self interest.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 8320 (2-3) Seminar: Oil and International Relations**
Addresses the extent to which the international community of nations is oil dependent. Assesses the impact and the geopolitical dangers to international relations arising from the expanding demand for scarce oil from developing, as well as developed, economies.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 8321 (2) Seminar: Computers and Law**
Explores a range of topics surrounding the juxtaposition of computers and law. Most are aware of the impact that law has on computers through the myriad of regulations that govern computers and related technologies. Less well known is the impact that computer technology is having on governance and on the practice of law. Explores both sides of this dynamic interplay between law impacting computing, and computing impacting law.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 8322 (3) Seminar: Environmental Decision Making**
Explores the foundational issues that underlie agency decision making, including environmental ethics, cost benefit analysis, risk assessment, constitutional law and administrative law. Compares and contrasts National Environmental Policy Act and the National Historic Preservation Act and the Endangered Species Act.
**Grading Basis:** Letter Grade

**LAWS 8341 (3) Seminar: Law and Economics of the Information Age**
Examines basic regulatory and legal challenges of our information economy and digital age. Emphasizes the "networked" information industries, the proper role of "unbundling" policies to advance competition and how intellectual property and antitrust rules should be developed.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5260
**Requisites:** Requires prerequisite course of LAWS 7201 or LAWS 7241 or LAWS 7301 (minimum grade D-).
**Grading Basis:** Letter Grade

**LAWS 8351 (2) Seminar: Law and Economics of Utility Regulation**
Discusses economics of regulation and matters ranging from neoclassical economic analysis to public choice theory to new institutional economics. Discusses several regulatory domains, including antitrust law, telecommunications regulation and energy regulation. Highlights both economic and non-economic goals,including universal service, sustainability (e.g., renewable energy) and architecture (e.g., free speech concerns with regard to telecommunications networks).
**Requisites:** Requires prerequisite course of LAWS 6301 or 7201 or 7241 (mimimum grade D-). Restricted to Law (LAWS) or Telecommunications (TELE) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 8355 (2) Seminar: Sentencing Law and Policy**
Studies sentencing law against the backdrop of criminal justice policy and concerns of public policy. Covers theories of punishment, the merits of indeterminate sentencing, sentencing guidelines, and nonincarcerative sanctions. Confronts problems of race, class, and other disparities in criminal sentencing.
**Grading Basis:** Letter Grade

**LAWS 8361 (2) Seminar: Advanced Information Privacy**
Explores current issues in information privacy law and cybersecurity law at depth. Topics will change to reflect subjects that emerge each time that the seminar is offered. Some examples include: federal consumer protection law, federal sectoral privacy statutes, state privacy laws, cybersecurity regulation, and European and comparative data privacy law.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Intellectual Property/ Technology/Telecommunication

**LAWS 8385 (2) Sem Law & Religion**
**Grading Basis:** Letter Grade

**LAWS 8400 (2) Seminar: Special Topics in International Law**
Provides in-depth coverage of particular issues in international law and exposes students to intellectual concepts in the field. Students write seminar length papers and develop critical thinking through writing and research.
**Grading Basis:** Letter Grade

**LAWS 8401 (2) Seminar: Securities Litigation and Enforcement**
Designed for students interested in studying topics related to securities litigation. Covers civil liability under the Securities Act of 1933, proxy fraud, class actions (with special emphasis on the Private Securities Litigation Reform Act and the Securities Litigation Uniform Standards Act), market manipulation, SEC enforcement actions, enforcement issues involving attorneys and accountants, criminal enforcement, international securities fraud and securities arbitration.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 8407 (2) Seminar: Tax Law, Economics and Policy**
Explores current issues in tax policy. Topics may include equity, efficiency, and distributive justice;¿the role of tax law in furthering structural inequalities and racism;¿choice of tax base, including consumption taxes; social policy in the Internal Revenue Code; corporate taxation and tax incidence;¿current issues in international taxation;¿and¿the intersection of tax law and technological innovation.¿
**Requisites:** Requires prerequisite or corequisite course of LAWS 6007 (minimum grade D-). Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Taxation

**LAWS 8412 (2) Seminar: Critical Law and Economics**
Explores some of the more successful and enduring critiques of Chicago Law and Economics. Starts with an introduction to economic analysis, including basic analytic tools like rational actor theory, supply and demand, efficiency notions, and cost concepts. Later classes will explore more advanced works in the area.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 8425 (2) Seminar: Advanced Torts**
Explores how dignitary interests have influenced the development of and have been incorporated into law, using the common law of torts and the constitutional rights of life and liberty as a general (but not exclusive) focal point of discussion.
**Grading Basis:** Letter Grade

**LAWS 8426 (2) Seminar: The Law of Pandemics**
Develops student understanding of the numerous ways in which the law must reckon with, regulate, and regulate around, pandemics. Shows how, while public health law primarily engages with pandemic to stop its spread, secondary legal regimes must also take pandemics into account in order to ensure the operation of law. This includes the laws of contract, tort, property, finance, welfare, and the like. Situates reading and format within ongoing pandemics to the degree appropriate.
**Grading Basis:** Letter Grade

**LAWS 8440 (1-3) Seminar: International Human Rights**
Exposes students to a variety of human rights issues and the responses by international institutions. In the fall, the seminar will meet for several sessions in a colloquium format, featuring guest speakers from around the world. In the spring semester, students will complete a paper that satisfies the law school's seminar writing requirement.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Grading Basis:** Letter Grade

**LAWS 8446 (2) Seminar: Pharmaceutical Regulation**
This course will explore how overlapping regulations affect how pharmaceutical companies innovate and how patients access medicine. It will cover FDA, patent, and Medicare regulations that govern how the government approves drugs and pays for them, as well as the role of antitrust law. Throughout the course, we will discuss political debates around prescription drug prices and seek to understand: why are drug prices so high? No prerequisites required.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade

**LAWS 8455 (2) Seminar: Gender and Criminal Justice**
Explores the intersection of gender and criminal justice in such areas as police and prosecutorial discretion, the investigation and prevention of crimes, the definition of offenses and defenses, factors contributing to criminality, criminal sentencing and the experience of punishment, and the societal ramifications of incarcerating children's caregivers.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 8458 (2) Seminar: Law and Literature**
Focuses on the question of what literature can teach lawyers through a variety of literary works and films. Covers traditional works by Shakespeare, Tolstoy, Camus, Kafka and Melville, as well as more contemporary works by Toni Morrison and Norman Mailer. Several short reflection papers, a journal and a final paper will be required.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 8533 (2) Seminar: Criminal Law in Context: Legal and Social Images of Victims and Perpetrators**
Contextualizes criminal law by engaging in an in depth study of the legal and social characterizations of victims and perpetrators in U.S. law, politics and popular culture.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 8535 (2) Seminar: Class and Law**
Explores issues relating social class to such areas as labor relations, law enforcement, controls on radical movements and the distribution of wealth and power. Considers problems defining social class.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 8545 (2-3) Seminar: Food Law and Policy**
Introduces students to the laws and regulations that govern our food supply. The focus is federal law provided by the U.S. Food and Drug Administration, with additional readings, videos and speakers. Topics to be covered include legal definitions for food, rules on food labeling, standards for food safety, biotechnology, international trade, organic and environmental regulation, hunger, farmer's markets and obesity.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 8548 (1-2) Seminar: Theory of Punishment**
Explores the various justifications that philosophers have developed to explain why we have the right to punish. Examines the historical evolution of our punishment system and focuses on the death penalty as a critical contemporary issue in the debate about the proper role of punishment in our society.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 8565 (1-3) Seminar: Citizenship and Equality**
The concept of citizenship connects immigration with studies of race, international human rights, gender, criminality and many others. It has been receiving growing attention in many scholarly disciplines. Examines the notion of citizenship in recent scholarship spanning law, political science, sociology and history.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 8605 (3) Seminar: Regulation and Innovation**
Explores two related questions: first, what role does regulation play in encouraging (or inhibiting) innovation? Second, what kinds of innovation approaches to regulation itself are being employed or might be employed and how might these strategies improve the environment for private innovation?
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Electives

**LAWS 8608 (2) Seminar: Power, Ethics, and Professionalism**
Examines critically the possibility and character of ethical reasoning within the legal profession in light of its institutional structures. Explores descriptive/normative accounts of the profession's structure, "Professionalism," and individual conscience. Put simply, the seminar explores whether it is possible to be a good lawyer and ethical person.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 8611 (2) Seminar: US National Security and Foreign Relations in a Time of Change**
Explores the legal frameworks influencing the development of national security policy and US foreign policy. Students will be introduced to aplicable US Foreign Relations Law, US National Security Law and International Law and will engage in analysis about current policy approaches to emergy national security threats.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International

**LAWS 8613 (2) Seminar: Civil Liberties Litigation**
Studies issues unique to the prosecution and defense of civil liberties lawsuits. Discusses litigation strategies with reference to lawsuits currently pending in the federal courts.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public Law

**LAWS 8645 (3) Seminar: Law and Politics Colloquium: Race in America**
A co-taught colloquium that exposes students to highly prominent scholars conducting research on current topics at the intersection of race, social science and the law, including racial profiling, hate crime and affirmative action. Students will complete a final paper satisfying the CU Law seminar requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** PSCI 7191
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Government and Public

**LAWS 8650 (3) Seminar: Conflict of Laws**
This seminar addresses the conflicts that arise when the significant facts of a case are connected with more than one jurisdiction, whether that jurisdiction belongs to a state, the federal government, or a foreign government. The subject is studied in its theoretical and historical context, with special emphasis on the international aspects of extraterritorial jurisdiction.
**Grading Basis:** Letter Grade

**LAWS 8665 (2) Seminar: Sexuality, Gender Identity, and Law**
Examines the regulation of sexuality and gender identity in local, state, and federal law. Explores how sexuality and gender identity shape, and are shaped by, an array of laws and policies, which may include family law, military regulations, tax law, employment law, trusts and estates, obscenity law, and criminal law.
**Grading Basis:** Letter Grade

**LAWS 8701 (2) Seminar: Counseling Families in Business**
Explores the legal aspects of owning, managing and participating in a successful family business system, including corporate structure, legal issues, succession planning and estate management, internal capital markets in private enterprise, ownership issues in private businesses, how lawyers can assist with family governance, planning for and managing family philanthropy, gender issues in family business and conflict resolution.
**Recommended:** Prerequisites LAWS 6104 and LAWS 6157 and LAWS 6211 and/or LAWS 7409.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Business

**LAWS 8722 (2-3) Seminar: Advanced Energy Law**
Provides an opportunity for students to further develop their knowledge of the field and to engage in a substantial writing project. Examples of possible topics include hydraulic fracturing, regulation of air emissions from power plants, the smart grid, transmission siting and development, the ratemaking process, design and regulation of electricity markets, energy finance or comparative study of energy regulation.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 8725 (2) Seminar: Advanced Topics in American Indian Law**
Examines a variety of current issues related to American Indian Law. Topics will change to reflect the subjects that emerge at each time that the seminar is offered. Some examples of topics considered include legal protections for American Indian religion and culture, cultural property, Tribal law, gaming law, and Native American natural and cultural resources law. Department enforced corequisite: LAWS 7725.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Environment, Natural Resources and American Indian

**LAWS 8728 (2) Seminar: Critical Theory Colloquium**
Surveys critical legal theory; introduces the discipline of analytical engagement with law review literature; feminist legal theory, and critical race theory. Offers a deeper understanding of the purposes behind legal reforms, the interaction between law on the books and law in action, how different groups experience the law in different ways and difficult yet rewarding nature of working through seemingly intractable and emotionally charged race, sex and class issues.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Jurisprudence and Perspective

**LAWS 8765 (2) Seminar: Gender, Law, and Public Policy**
Introduces students to various schools of feminist theory and examines the relationship between feminist theories and concrete problems in such areas as constitutional law, education law, employment discrimination, family law and criminal law.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Family, Gender, and Health

**LAWS 8785 (2-3) Seminar: Access to Justice**
Explores the scholarship that has developed around the provision of legal services - or the lack of legal services - for those who cannot afford market prices for attorneys. The seminar will also examine recent efforts to provide empirical support for the range of political claims that are made about access to the legal system.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Electives

**LAWS 8795 (2) Seminar: Topics in Law and Feminism**
Explores a variety of current issues related to feminism and the law: topics will change to reflect emerging issues and will draw from legal and social science scholarship as well as relevant statues and cases. Possible topics include reproductive justice, sex discrimination in education and employment, gender and human rights, international and comparative feminism, legal regulation of sex, and feminist legal theory.
**Grading Basis:** Letter Grade

**LAWS 8808 (2) Seminar: Rhetoric and the Art of Persuasion**
Explores recent work in rhetoric to identify the principles and techniques of effective persuasion in law. Examines the ways in which cognition, language, imagery, metaphor, narrative, and scene setting shape the ways in which lawyers and judges strive to persuade each other.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Litigation and Procedure

**LAWS 9003 (3) Ethical Organizations and Professionals**
Provides students, particularly those in the Master of Studies in Law (MSL) in Ethics and Compliance program, the opportunity to examine what drives ethical behavior within organizations and the role that ethics and compliance professionals play in promoting ethical behavior. Investigates ethical challenges and decision making, methods to assess ethical organizational culture and qualities of ethical leadership.
**Grading Basis:** Letter Grade

**LAWS 9005 (3) Introduction to U.S. Law for MSL Students**
Provides an overview of the US legal system and will help MSL students begin to 'think like lawyers'. Students will be provided with the necessary vocabulary and skills to use legal resources and legal reasoning in academic and professional environments, including reading and analyzing cases, statues and regulations, doing legal research, and applying existing law to the issue at hand to predict answers to legal questions.
**Requisites:** Restricted to Master of Studies in Law (LAWS-MSL) students only.
**Grading Basis:** Pass/Fail
**Additional Information:** Departmental Category: Electives

**LAWS 9025 (2-3) Introduction to U.S. Law For LLM Students**
Reviews the fundamentals of the U.S. legal system, including an overview of the U.S. Constitution, federalism, the structure and function of courts, sources of legal authority, and common-law methodology.
**Requisites:** Restricted to students in the LLM program.
**Grading Basis:** Letter Grade

**LAWS 9221 (2) Advanced Applied Compliance**
Enables students to discover what is takes to transform a company's compliance program beyond a "paper program." The class will explore the elements of a strong, effective and mature Compliance program. Taught by an experienced compliance professional with the support of several expert guests, the class will investigate how the best Compliance programs augment compliance policies with processes, controls and continuous monitoring.
**Grading Basis:** Letter Grade

**LAWS 9222 (1-2) Topics in Compliance**
Learn how to assess allegations of wrongdoing and recognize situations in which internal investigations are appropriate. Students will lean how to develop an investigation plan and will be introduced to the primary steps in an investigation including the following: initiating an investigation, locating and gathering evidence, conducting interviews, analyzing evidence, articulating conclusions and drafting investigative reports.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Studies in Law (MSL) or Law-JD students only.
**Grading Basis:** Letter Grade

**LAWS 9223 (1-2) Investigations**
Learn how to assess allegations of employee wrongdoing and recognize situations in which internal investigations are appropriate. They will learn how to develop an investigation plan and will be introduced to the primary steps in an investigation including the following: initiating an investigation, locating and gathering evidence, conducting interviews, analyzing evidence, articulating conclusions and drafting investigative reports.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade

**LAWS 9226 (1-3) Communications for Compliance Professionals**
Develops the tools students will need to thrive in the law school's MSL program. Deepens students' understanding of the United States legal system and develops their ability to communicate effectively and appropriately in writing and orally to their intended audience, and research, organize and explain their ideas clearly, using appropriate writing conventions.
**Requisites:** Restricted to Master of Studies in Law (LAWS-MSL) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 9246 (2-3) Intro to U.S. Legal Practice: Legal Writing, Research and Analysis**
Assist LL.M. students develop their legal writing skills as well as teach practical skills needed in the U.S. legal environment including locating cases, statutes and other legal source materials, citing legal authority correctly, and checking the validity of case citations.
**Requisites:** Restricted to students in the LLM program.
**Grading Basis:** Letter Grade

**LAWS 9846 (1-2) LLM Seminar**
LLM students study academic legal writing in this 1-credit per semester yearlong course. Topics covered will include: the purpose of academic legal writing; how academic legal writing differs from other forms of legal writing; topic selection; legal research (methods and ethics); first drafts; editing; academic workshops; and publishing. In addition, guest speakers will talk to LLM students about career planning and job seeking. International LLM students will learn about the American legal system.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

**LAWS 9856 (1-4) LL.M Thesis**
Provides eligible LL.M students the option to enroll in this two-credit LLM Thesis course. The course requires a significant work of original research on a topic chosen in consultation with a faculty supervisor and other law school faculty with set assignments for topic selection, drafts, and a workshop. In exceptional circumstances and only after pre-approval, an LLM student may enroll for a third or fourth credit.
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Law (LAWS) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Research and Writing

# Leadership (LEAD)

## Courses

**LEAD 1000 (3) Becoming a Leader**
The foundation course will prepare students to exercise leadership in business, government and community organizations. Introduces leadership skills useful in a variety of settings including community and civic activities. Helps students to improve self awareness, understand multiple theories, recognize moral courage, build analytic and critical thinking skills and adapt leadership practices to different people and contexts.
**Additional Information:** Departmental Category: CU Engage

**LEAD 1001 (3) Becoming a Leader: Multicultural Leadership Scholars**
Introduces students to the theories and practices of historical and contemporary leadership studies. Students will also examine both the moral and ethical dimensions of leadership and how cultural diversity, inclusivity and social justice apply to culturally competent leadership in the 21st century.
**Equivalent - Duplicate Degree Credit Not Granted:** LEAD 1000
**Requisites:** Requires corequisite course of EDUC 2910.
**Recommended:** restricted to students admitted into the Multicultural Leadership Scholars Program.

**LEAD 1002 (3) Becoming a Leader: Leadership & Community Engagement**
Introduces students to the theories and practices of historical and contemporary leadership studies. Serves as the foundation course for the Leadership and Community Engagement Major. Students examine the relationships between leadership and social identities, ethics, democratic engagement, diversity and inclusion, and social practices.
**Equivalent - Duplicate Degree Credit Not Granted:** LEAD 1000
**Requisites:** Restricted to Leadership/CommunityEngagement (LDCE) majors only.

**LEAD 1571 (2) Topics in Leadership: Introduction to Research Methods**
Participants will establish their understanding of research through critical exploration of research language, ethics, and approaches. The course introduces the language of research, ethical principles and challenges, and the elements of the research process within quantitative, qualitative, and mixed methods approaches. Participants will use these theoretical underpinnings to begin to critically review literature relevant to their field or interests and determine how research findings are useful in forming their understanding of their work, social, local and global environment. Their work will culminate in a research project proposal submitted to CU's Undergraduate Research Opportunity Program.
**Requisites:** Requires prerequisite courses of LEAD 1001, LEAD 2410 and INVS 3100 (all minimum grade C-).
**Recommended:** Students in the Multicultural Leadership Scholars program.
**Grading Basis:** Letter Grade

**LEAD 2410 (3) Dynamics of Power, Privilege, Oppression and Empowerment in Leadership**
Examines the theoretical frameworks of social identity and power dynamic development (individual, group, institutional, cultural) and the resulting inequalities formed by systems of privilege and oppression - and their intersections - are manifested in society and how leadership is used to continue these systems or lead to empowerment and liberation.
**Requisites:** Requires prerequisite course of LEAD 1000 (minimum grade C).
**Additional Information:** Departmental Category: CU Engage

**LEAD 4000 (4) Leadership in Context and Emerging Challenges: A Capstone**
Integrates leadership topics and experiences students pursued through the Leadership Studies Minor. Using advanced critical thinking skills, the seminar requires students to evidence their knowledge, competencies and skills related to leadership theory and practice through examining contemporary leadership challenges. Further, the seminar directs students to justify decision-making processes, demonstrating their ability to synthesize prior knowledge to effect desirable, ethical outcomes.
**Requisites:** Requires a prerequisite course of LEAD 1000 or LDSP 1000 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: CU Engage

**LEAD 4501 (3) Leadership Capstone 1**
Apply skills and knowledge developed throughout the Leadership and Community Engagement Major to design and implement public action project. Critically examine local context, including organizations, agencies, firms, and movements. Identify partners and develop relationships based on reciprocity and mutually. Develop theory of change for project and design evaluation tools to measure impact.
**Requisites:** Requires corerequisite course of EDUC 4500. Restricted to Leadership and Community Engagement (LDCE) majors only.
**Recommended:** Prerequisite EDUC 4150.
**Grading Basis:** Letter Grade

**LEAD 4502 (3) Leadership Capstone 2**
Apply skills and knowledge developed throughout the Leadership and Community Engagement Major to design and implement public action project. Manage complex project with team of students and multiple community partners. Evaluate public impact of project with partners.
**Requisites:** Requires prerequisite courses of LEAD 4501 and EDUC 4500 (all minimum grade C-). Restricted to Leadership and Community Engagement (LDCE-BA) majors only.

# Lesbian, Gay and Bisexual Studies (LGBT)

## Courses

**LGBT 2000 (3) Introduction to Lesbian, Gay, Bisexual, and Transgender Studies**
Investigates the social and historical meanings of racial, gender, and sexual identities and their relationship to contemporary lesbian, bisexual, gay, and transgender communities.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 2030
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**LGBT 2707 (3) Introduction to Queer Literature**
How is literature shaped by cultural understandings of queer and non-normative genders and sexualities? How does it, in turn, shape those understandings? This class explores how genders, sexualities, and writing intersect with issues of race, class, nation, ability, and empire. Readings may include novels, short stories, poetry, graphic novels, films, essays, blogs, and more.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 2707
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**LGBT 3710 (3) Topics in LGBT Studies**
Content varies by semester and reflects contemporary issues in the field of LGBT Studies.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**LGBT 3796 (3) Queer Theory**
Surveys theoretical, critical, and historical writings in the context of lesbian, bisexual, transgender and gay literature. Examines relationships among aesthetic, cultural and political agendas, and literary and visual texts of the 20th century.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 3796
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**LGBT 3930 (1-6) Lesbian, Gay, Bisexual, Transgender, and Queer Studies Internship**
Matches selected students with supervised internships in university programs and advocacy groups, local businesses, human service or government agencies. Internships will focus on lesbian, gay, bisexual, transgender or queer issues, such as anti-violence programs, educational outreach, and civil rights initiatives.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisite LGBT 2000.

**LGBT 4287 (3) Special Topics in Queer Literature**
This course will focus on a special topic in queer literature and non-normative genders and sexualities. Students will consider how literature reflects and represents understandings of sexuality, gender, desire, and more; the course may engage a variety of genres. Topics vary by semester. Check department description for details.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 4287 and WGST 4287
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**LGBT 4400 (3) Critical Inquiries in Transgender Studies**
Examines theories, methods and debates in the emerging field of transgender studies. Drawing on interdisciplinary perspectives, this course examines transgender identities, communities and political movements in different historical and cultural contexts. Focuses on crosscutting issues that shape transgender subjectivities, with special attention given to how transgender movements negotiate race, class, sexuality, labor, culture and nation.
**Equivalent - Duplicate Degree Credit Not Granted:** LGBT 5400 and WGST 4400 and WGST 5400
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**LGBT 4840 (1-6) Independent Study in LGBTQ Studies**
Self-directed research project in LGBTQ studies supervised by a faculty member and approved by one of the Co-Directors of the LGBT Studies Certificate Program.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**LGBT 5400 (3) Critical Inquiries in Transgender Studies**
Examines theories, methods and debates in the emerging field of transgender studies. Drawing on interdisciplinary perspectives, examines transgender identities, communities and political movements in different historical and cultural contexts. Focuses on crosscutting issues that shape transgender subjectivities, with special attention given to how transgender movements negotiate race, class, sexuality, labor, culture and nation.
**Equivalent - Duplicate Degree Credit Not Granted:** LGBT 4400 and WGST 4400 and WGST 5400
**Grading Basis:** Letter Grade

# Libby Residential Academic Program (LIBB)

## Courses

**LIBB 1133 (3) Exploring Art, Culture and Visual Literacy through Drawing**
Teaches basic drawing skills, mechanics of two dimensional space and deconstructs the kinds of artistic images students commonly encounter in social media, street art, graffiti, advertising, comics and tattoos as a basis for understanding how complex visual language communicates profound meaning. Experiential learning activities introduce the practices of design thinking, idea production, the creative process and critical thinking.
**Requisites:** Restricted to Libby Residential Academic Program (LIBY) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**LIBB 1233 (3) First Person Voices: Identity and Image**
Increases awareness about diverse identities and marginalization. Reveals how keen observation techniques expand cognitive skills. Students become visually and culturally literate deconstructing images about race, gender, sexuality, and class in order to separate facts from opinions, and recognize pertinent and useful information. Experiential learning activities employ the practices of idea development, the creative process, and critical thinking.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**LIBB 1500 (3) The Dialogue of Art and Religion**
Focuses on interdisciplinary study of visual art from the three Abrahamic monotheistic traditions. Addresses aesthetic issues related to the object; the relationship between belief systems and form; and the context of the work, especially religious and social history. Objects and structures studied include Russian Orthodox icons, Celtic and Qu'ranic manuscripts and Christian churches.
**Requisites:** Restricted to Libby Residential Academic Program (LIBY) students only.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**LIBB 1600 (3) Gender and Film**
Explores a wide variety of cinematic forms and styles and discusses the treatment of femininity, masculinity, sexuality, and how gender is represented as an artifact of mass culture. Although the course title privileges issues of gender, the course also includes the study of issues of race and ethnicity in film and the inherent connections between the cinematic representations of race and gender.
**Requisites:** Restricted to Libby Residential Academic Program (LIBY) students only.
**Additional Information:** GT Pathways: GT-AH1 - Arts Hum: Arts Expression
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**LIBB 1700 (3) The History of Communication from Caves to Cyberspace**
Surveys the history, evolution, and nature of communication and communication technologies. Students learn about the ongoing media revolution and its broader context, considering the interdependence of communication, culture, and society. They critically examine utopian, deterministic, and pessimistic arguments about the influence of new technologies and arts. Course combines lecture, discussion, and group work in a seminar format.
**Requisites:** Restricted to Libby Residential Academic Program (LIBY) students only.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**LIBB 2001 (3) Pop Culture Heroes**
Examines ideals and values related to heroic archetypes as reflected in and circulated by American popular culture. Focuses on the ideology that drives notions of the heroic in pop culture figures such as celebrities and athletes, and in film, TV, comics, street art and slam/performance poetry/
**Requisites:** Restricted to Libby Residential Academic Program (LIBY) students only.

**LIBB 2013 (3) Film and the Quest for Truth**
Concerns the subjectivity and relativity of truth. Focuses on how and why we pursue (or fail to pursue) the truths about ourselves and about the people and events around us, and how and why such truths are often elusive, fragmentary, and impermanent.
**Requisites:** Restricted to Libby Residential Academic Program (LIBY) students only.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**LIBB 2100 (3) Russian Revolutions: Social and Artistic**
Examines revolution as seen not only in light of political and economic effects but through the lens of its major cultural concomitant: revolution in the arts. Material is drawn from 20th century Russian social and artistic revolutions which, due in part to new post-Soviet research, provide some of the most striking examples of art and revolutionary social practices.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 2221
**Requisites:** Restricted to Libby Residential Academic Program (LIBY) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities

**LIBB 2500 (1-3) Special Topics in Libby Residential Academic Program**
Introduces timely studio subjects in the visual and performing arts that cannot be offered on a regular basis. Information concerning the studio topics offered in any given semester is available prior to registration from the Libby RAP.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to Libby Residential Academic Program (LIBY) students only.

**LIBB 2510 (1-3) Special Topics in Libby Residential Academic Program**
Introduces timely subjects in the visual and performing arts that cannot be offered on a regular basis. Information concerning the seminar topics offered in any given semester is available prior to registration from the Libby RAP.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to Libby Residential Academic Program (LIBY) students only.

**LIBB 2800 (3) Horror Films and American Culture**
Examines American horror films in an historical context through which students learn to recognize how horror films represent our culture's "collective fears" and provides an analysis of the horror film genre. Considers the cultural contexts in which horror films are made through study of the creation and reception of these films during specific times in American history.
**Requisites:** Restricted to Libby Residential Academic Program (LIBY) students only.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities

# Libraries (LIBR)

## Courses

**LIBR 2000 (3) Introduction to Information Literacy**
This course will introduce information practices and the integrated literacies for discovering information, exploring how information is produced, and for participating in collaborative creation of new knowledge. Topics include an introduction to the research process, information ethics, and critical analysis of sources. The course will prepare students for both university level research and information practices after graduation.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.

**LIBR 3010 (3) Information Landscapes and Literacies**
Through sustained inquiry into information literacy topics, students will examine the ways that our critical understanding of the world are shaped by information. Students will explore information practices and cultivate the capacity to draw meaning from and to contribute to information landscapes. Emphasizes information literacy, critical thinking, and research.

**LIBR 3030 (1) Civic Engagement in a Changing Information Landscape**
With a 24 hour news cycle, political use of social media, and the growth of disinformation, being an informed citizen has become increasingly more important and difficult. With a practical approach on participation in government, students will research and discuss the United States political system, examine the current political climate, what it means to be a good digital citizen, and engage in opposing views.
**Grading Basis:** Letter Grade

**LIBR 3900 (1-3) Independent Library Research**
In-depth library research project for upper-division students. Instructor consent required.

**LIBR 4029 (1) Art History Research Methods**
In this class we will investigate how art scholarship is formed and organized; learn to expertly navigate the vast array of art research resources; and explore advanced techniques for searching both online and offline sources of art information. We will work to develop a critical understanding of our own research processes and reflect on the tools and techniques that lead to both expert research and successful participation in art discourse.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTH 4029 and ARTH 5029
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**LIBR 4900 (1-3) Independent Library Research**
In-depth library research project for upper-division students. Instructor consent required.

# Linguistics (LING)

## Courses

**LING 1000 (3) Language in U.S. Society**
Nontechnical exploration of the ways that language is used in America. Emphasizes language as a social institution and how values and goals of both public institutions and private groups shape and are shaped by language and its use.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
MAPS Course: Social Science

**LING 1010 (3) The Study of Words**
Study of English words of Latin and Greek origin, focusing on etymological meaning by analysis of component parts (prefixes, bases, suffixes) and on the ways in which words have changed and developed semantically.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 1010
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**LING 1020 (3) Languages of the World**
Explores the issue of human diversity by examining how languages vary around the world. Outlines historical, geographic, and typological classifications of languages across human societies, and the criteria used by linguists for grouping them into language families. Theorizes the relationship between linguistic and cognitive diversity, and considers the impact of language death on humanity. No formal training in linguistics is required.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**LING 1200 (3) Introduction to Python Programming**
Presents techniques for computer programming in high level programming languages such as Python to address a range of problems with a specific focus on language processing and linguistics. The class is suitable for students with little to no prior experience in computing or programming.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 1200 or INFO 1701
**Recommended:** Prerequisite LING 2000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 1500 (3) Understanding Grammar**
Presents fundamentals of grammar in the Western tradition. Emphasizes making concepts and uses of grammar (as exemplified in English and closely related foreign languages) understandable to the nonspecialist.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 1900 (1) Community-Based Learning Practicum: Literacy and Language Learning**
Student volunteers act as mentors to literacy and language learners in the Boulder community for 1-2 hours per week. Specific meeting times will be arranged at the beginning of the semester.
**Repeatable:** Repeatable for up to 3.00 total credit hours.

**LING 2000 (3) Introduction to Linguistics**
Introduces the study of languages as structural systems. Describes principles of sound patterns, word formation, meaning, and sentence structure. Gives attention to language acquisition, psycholinguistics, language families, dialects, historical change in languages, and different language types.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
MAPS Course: Social Science

**LING 2030 (3) The Ancient Roots of Modern Medicine**
Students learn the meaning and use of the Greek and Latin roots in modern medical terminology; they gain an appreciation of ancient Roman and Greek medicine history and culture in their relation to the modern practice of Western medicine and the sciences; they become familiar with common ancient bioethical principles that govern the ancient practice of medicine and the sciences and learn to appreciate how these principles inform and influence modern medicine and the sciences.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 2030 and CLAS 2030
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**LING 2400 (3) Language, Gender and Sexuality**
Familiarizes students with the effects of gender and sexuality on language use; discusses popular beliefs and scholarly theories about language and communication. Provides students with tools for exploring the role of language and gender.
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**LING 2500 (3) Race, Ethnicity, and Language**
Explores the relationship between race, ethnicity, and language and how they are co-constructed. How do speakers of different racial and ethnic groups use language differently, and what are the social implications of these different language varieties? Discusses the implications of ethnolinguistic variation on racial stereotypes, education, and the law.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 2500
**Recommended:** Prerequisite LING 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**LING 3005 (3) Cognitive Science**
Introduces cognitive science, drawing from psychology, philosophy, artificial intelligence, neuroscience, and linguistics. Studies the linguistic relativity hypothesis, consciousness, categorization, linguistic rules, the mind-body problem, nature versus nurture, conceptual structure and metaphor, logic/problem solving and judgment. Emphasizes the nature, implications and limitations of the computational model of mind.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3702 and CSCI 3702 and PHIL 3310 and PSYC 3005 and SLHS 3003 and CSPB 3702
**Recommended:** Prerequisites two of the following CSCI 1300 or LING 2000 or PHIL 2440 or PSYC 2145.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Distribution-Social Sciences

**LING 3100 (3) Language Sound Structures**
Introduces the sounds of languages and their organization into phonological structures.
**Requisites:** Requires prerequisite of LING 2000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 3185 (3) Figurative Language**
Introduces a framework for analyzing the metaphorical systems used to reason about abstract phenomena like emotion, conflict, purpose, relationships, power, causation, time, life and ideation. Explores how new word meanings develop and how meaning is grounded in embodied experience. Investigates how metaphor is distinguished from other common types of figurative language, including irony.
**Requisites:** Requires prerequisite of LING 2000 (minimum grade C-).
**Recommended:** Prerequisite or corequisite LING 3430 and junior or senior class standing.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 3200 (3) Academic Oral Communication in English**
Designed for undergraduate students who speak English as an additional language, this course improves students' oral communication skills for effective academic interactions in the classroom and within their academic discipline. Specific attention is given to presentation skills; developing, explaining and clarifying ideas; and discussion skills such as interrupting, hedging, and responding to questions. Students deliver formal presentations and impromptu speeches, and lead and participate in group discussions. Students improve active listening skills, non-verbal communication and English pronunciation. This course does not count toward the Linguistics major or minor.
**Recommended:** this course is restricted to course is restricted to speakers of English as an additional language.
**Grading Basis:** Letter Grade

**LING 3210 (3) English for Academic Purposes**
Designed for undergraduate students for whom English is an additional language, this course develops academic English skills for university-level work. Students sharpen English accuracy through academic reading, writing, speaking, and listening practice. They learn to express ideas more clearly, both orally and in writing, while engaging critically in class discussions, and giving presentations, including on a researched topic related to their major. Students improve grammatical accuracy, develop academic vocabulary, and expand critical thinking skills and metacognitive strategies. This course does not count toward the Linguistics major or minor.
**Recommended:** this course is restricted to students who use English as their additional language.
**Grading Basis:** Letter Grade

**LING 3220 (3) American Indigenous Languages in their Social and Cultural Context**
A sampling of the many indigenous languages and cultures found in America. Emphasizes the United States, but also gives attention to the languages of Canada and Latin America.
**Recommended:** students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**LING 3251 (3) Language in Arab Society**
This course introduces the multilingual situation of Arab societies and presents fundamental concepts in sociolinguistics. Students study the major theories and frameworks of language variation and change and the influence of variables such as gender, social class, religion, and colonization on language choice. Students will understand the relationship between language, identity and ideology revealing power dynamics in Arab communities. The course is taught in English and no prior knowledge of Arabic language is required.
**Equivalent - Duplicate Degree Credit Not Granted:** ARAB 3251
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**LING 3430 (3) Semantics**
Theoretical and practical study of meaning in natural language. Considers both semantic theories and semantic phenomena from diverse languages.
**Requisites:** Requires prerequisite LING 2000 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Linguistic major or minors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 3545 (3) World Language Policies**
Examines the economic and sociopolitical impact of choosing English vs. other languages in the U.S. Introduces the study of language policies, rights, and planning in other countries, including the worldwide use of English in social, business, and legal contexts.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-Global Perspective

**LING 3550 (3) Talk at Work: Language Use in Institutional Contexts**
Provides an overview of language use in various workplace settings, with an emphasis on hands-on data analysis. Possible contexts include 911 emergency calls, doctor-patient consultations, news interviews, customer-service encounters, classroom discourse, and courtroom interaction. The course also discusses language-based inequalities in such contexts, as well as some of the laws and policies that govern language in the workplace.
**Recommended:** Prerequisite LING 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 3800 (3) Special Topics in Linguistics**
Intensive study of a selected area or problem in linguistics.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite of LING 2000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 3832 (3) Computational Linguistics**
Surveys the fundamental problems, models, and algorithms found and used in the processing of natural language. Computational linguistics is a large field and we will only be able to cover a selection of the vast range of methods employed to solve tasks involving natural language. However, arguably there exists a "core vocabulary" of techniques shared by most practitioners and researchers in the field, which we will focus on.
**Requisites:** Requires Prerequisite of LING 1200 or CSCI 1200 or CSCI 1300 or INFO 2201 (all minimum grade C-).
**Recommended:** Prerequisite or corequisite LING 2000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4050 (3) Japanese Sociolinguistics**
Explores issues related to contemporary Japanese language and society, such as language and identity, language and ideology, and language variation and change in Japan. More specifically, we will reconsider topics such as diversity in gender language, honorifics, dialects, and use of English in Japanese society that have been unidirectionally taught in Japanese language classrooms. The course aims to provide students opportunities to incorporate critical perspectives of sociolinguistics into analyses of Japanese literature and Japanese language education.
**Equivalent - Duplicate Degree Credit Not Granted:** JPNS 4050
**Requisites:** Requires prerequisite course of JPNS 3110 (minimum grade C).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Diversity-Global Perspective

**LING 4100 (3) Perspectives on Language**
Provides extended critical examination of a few selected issues, chosen each term for their general interest and relevance, e.g., the relation between language and thought, or human language vs. animal languages, and computer languages.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite LING 2000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4200 (3) Introduction to Computational Corpus Linguistics**
This course is an Includes extensive introduction (with lab) to the use of Python programming language, UNIX corpus tools, concordance programs, syntactic treebanks, propbanks, and corpora for linguistic analysis and natural language processing. discourse and phonology research. A major focus is the development of computational skills, preparing the student for CSCI 5832 (Natural Language Processing). Previous completion of LING 1200 or CSCI 1300 highly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5200
**Recommended:** Prerequisite LING 1200.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4220 (3) Language and Mind**
Studies topics such a speech perception, word recognition, sentence comprehension, language acquisition, bilingualism, reading and writing. Examines the role of language as a product and producer of the mind, studying interactions between language and cognition from an interdisciplinary perspective. Students will become familiar with the methods of psycholinguistics and design and conduct a psycholinguistic experiment on their own.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 4220
**Recommended:** Prerequisites PSYC 1001 and LING 2000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4225 (4) Interdisciplinary Research Methods in Child Language Acquisition**
Explores fundamental issues in language acquisition cross-culturally, combining methods from Linguistics, Anthropology, Psychology and Computer Science. Students will explore theoretical issue using a hands-on approach that involves acquiring skills such as designing and conducting experiments, investigating corpus data, and computational modeling.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 4225
**Recommended:** Prerequisites PSYC 1001 and LING 2000.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4420 (3) Morphology and Syntax**
Introduces principles of word formation and sentence structure. Covers major morphological and syntactic structures found in the world's languages, and methods for describing grammatical structures, and includes practice in analyzing data from a variety of languages.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5420
**Requisites:** Requires prerequisite course of LING 2000 (minimum grade C-). Restricted to Linguistic (LING) majors or minors with 57-180 credits (Junior or Senior) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4450 (3) Introduction to Formal Syntax**
Introduces formal generative grammar, including determining constituent structure, drawing trees, writing rules, understanding the properties of the lexicon and their interaction with syntax, X-bar theory and its modifications and movement analysis. Recommend pre-req: LING 4420
**Requisites:** Requires prerequisite of LING 2000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4560 (3) Language Development**
Covers the development of language in childhood and into adult life, emphasizing the role of environment and biological endowment in learning to communicate with words, sentences, and narratives.
**Equivalent - Duplicate Degree Credit Not Granted:** SLHS 4560 and PSYC 4560
**Requisites:** Restricted to Linguistics (LING) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4610 (3) Pedagogical Grammar for Teachers of English to Speakers of Other Languages**
Provides an introduction to the study of English grammar from the perspective of the nonnative learner and user of English. The focus is on understanding the form, meaning, and use of grammatical constructions and on how to teach these constructions in an ESL/EFL context.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5610
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4620 (3) Teaching Second Language (L2) Oral Skills and Communication**
This course explores pedagogical approaches for developing nonnative speakers' oral English proficiency and communication skills. We explore the practical and theoretical aspects of teaching the macroskills - listening and speaking - as well as related microskills, including pronunciation, fluency, vocabulary, and comprehension. Pedagogical concepts are considered through the lens of various teaching contexts for learners of all ages and backgrounds. Praxis occurs through lesson development and analysis and interactions with language learners in the community. Recommended prerequisite: LING 3100.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5620
**Recommended:** Prerequisite or corequisite LING 4630.

**LING 4622 (3) Statistical Analysis for Linguistics**
Aims to acquaint students with the fundamentals of quantitative analysis in linguistics and provide a practical introduction to the R statistical computing environment. Topics that will be covered include examining and manipulating data, tests for independence, regression modeling, mixed models, measures of association, and data visualization. It is suitable for students with no prior experience with statistics or statistical software packages.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5622
**Requisites:** Requires prerequisite of LING 2000 (minimum grade C-).
**Recommended:** recommended to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Quantitative Reasoning Math Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4630 (3) TESOL and Second Language Acquisition: Principles and Practices**
Provides an overview of methods and materials for teaching English as an additional language, along with opportunities for students to observe, discuss and analyze these in relation to language teaching principles, second language acquisition, linguistic considerations, and global and local contexts. Aimed primarily at the teaching of English to non-native speaking adults, the course also addresses second and foreign language teaching.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4632 (3) Machine Learning and Linguistics**
Is an introduction to machine learning, with a focus on linguistic applications. It is oriented toward students who want to understand the basics of machine learning and apply well-known techniques to address problems related to language and linguistics. The main goal is to achieve a practical grasp of the fundamental and most successful concepts in machine learning and to be equipped with techniques to apply this knowledge in linguistic domains. The course is also intended to provide a perspective on natural language acquisition and learning, namely, insight into what types of language acquisition problems are truly difficult, and what types of learning problems can be solved by fairly straightforward pattern recognition techniques. Formerly offered as a special topics course.
**Requisites:** Requires prerequisite course of LING 1200 (minimum grade C-) or CSCI 1200 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4640 (3) Teaching Language Skills: Focus on Social Justice**
Introduces the underlying theories and classroom practices for teaching second language reading, writing, listening and speaking. The course highlights the nature of literacy and oral language development, beginning language skills (phonemic awareness, phonics, pronunciation), and meaning-focused language instruction. This unique iteration of the course, designed for CU Boulder¿s Global Seminar program takes a theme-based and project-based approach, contextualizing the study of language teaching around an exploration of social justice issues that are pressing both in Armenia and globally.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5640
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4650 (3) Language Teaching Materials Design**
This course introduces the role of English as an international language and its impact on languages, cultures, and communities around the world. Students evaluate approaches to teaching English against the backdrop of sociopolitical and historical factors. This course utilizes a project-based approach to study language teaching in a Zapotec speech community. The project involves co-creating language teaching materials for use by Zapotec speakers in efforts to maintain and revitalize the Zapotec language among young learners.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5650

**LING 4700 (3) Conversation Analysis and Interactional Linguistics**
Provides an introduction to the theories and methods of Conversation Analysis (CA) and Interactional Linguistics (IL), which aim to uncover the procedural infrastructure of language use in social interaction. The course emphasizes hands-on experience in analyzing naturally-occurring interactional data. Topics may include: turn-taking, sequence and preference organization, repair, reference, epistemics, and identity.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5700
**Requisites:** Requires prerequisite of LING 2000 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4800 (3) Language and Culture**
Principles of language structure and how language and culture interrelate, how language and language use are affected by culture and how culture may be affected by use of, or contact with, particular languages.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4800
**Recommended:** Prerequisite LING 1000 or LING 2400 or ANTH 2100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4830 (1-3) Honors Thesis**
Required for students who elect departmental honors. Students write an honors thesis based on independent research under the direction of a faculty member.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sciences Honors Course

**LING 4900 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.

**LING 4910 (3) TESOL Practicum**
Provides the field-based component and practical experience in English language teaching for the TESOL Certificate. Work on site includes class observations and supervised teaching in community-based programs/ ESL providers. Weekly meetings provide opportunities to debrief/discuss teaching practice and connect theory, methods and practice. Supports professional development, completion of a teaching resume and portfolio and the job search process.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5910
**Requisites:** Requires prerequisite course of LING 3630 or LING 4630 (minimum grade C).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**LING 4920 (3) Speakers and the Structure of their Languages**
This is a summer intensive course that introduces various areas of Linguistics (specifically phonology, morphology, and syntax) at the same time that highlights the importance of language documentation, description and revitalization. The target language for Summer 2024 is Zapotec. 50% of this course is designed so that students can get a basic knowledge of this language as a second language and be able to interact with the community of speakers.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 5920
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**LING 5030 (3) Linguistic Phonetics**
Introduces practical and theoretical aspects of phonetics. Provides training in recognition and production of speech sounds, and instruction on fundamentals of articulatory, acoustic, and auditory phonetics.
**Requisites:** Restricted to graduate students only.

**LING 5140 (2) CLASIC Capstone**
In this capstone to the Computational Linguistics, Analytics, Search and Informatics (CLASIC) professional master¿s program, we will review each student¿s internship project and prepare presentations and technical reports based on those internships. Students will present their work on the annual Industry Day or at an Advisory Board meeting to industry representatives. They will also submit a paper to a relevant conference or workshop. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5140
**Requisites:** Restricted to students in the Computational Linguistics, Analytics, Search and Informatics (CLSI) program only.
**Recommended:** It is recommended that this course be taken after the CLASIC internship has been completed.

**LING 5200 (3) Introduction to Computational Corpus Linguistics**
This course is an introduction to the use of corpora for linguistic analysis and natural language processing. A major focus is the development of computational skills, preparing the student for CSCI 5832 (Natural Language Processing). Previous completion of LING 1200 or CSCI 1300 highly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4200
**Requisites:** Restricted to graduate students only.

**LING 5300 (3) Research in Psycholinguistics**
Explores research topics and methods in psycholinguistics selected from areas such as language production and comprehension, language and cognition, and language acquisition.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite at least one graduate-level course in LING, PSYC or CSCI.

**LING 5410 (3) Phonology**
Studies sound systems of language. Introduces both principles of organization of sound systems and major kinds of phonological structures found worldwide. Provides extensive practice in applying phonological principles to data analysis.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 5030.

**LING 5420 (3) Morphology and Syntax**
Introduces principles of word formation and sentence structure. Covers major morphological and syntactic structures found in the world's languages, and methods for describing grammatical structures, and includes practice in analyzing data from a variety of languages.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4420
**Requisites:** Restricted to graduate students only.

**LING 5430 (3) Semantics and Pragmatics**
Explores fundamental concepts of semantics and pragmatics, including theories of communication and meaning, representation, conversational implications, speech acts, and discourse structure.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 5420.

**LING 5570 (3) Introduction to Diachronic Linguistics**
Familiarizes students with terminology, methods, and theories dealing with phenomena of language change through time.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 5410.

**LING 5610 (3) Pedagogical Grammar for Teachers of English to Speakers of Other Languages**
Provides an introduction to the study of English grammar from the perspective of the nonnative learner and user of English. The focus is on understanding the form, meaning, and use of grammatical constructions and on how to teach these constructions in an ESL/EFL context.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4610
**Requisites:** Restricted to graduate students only.

**LING 5620 (3) Teaching Second Language (L2) Oral Skills and Communication**
Provides teaching and learning principles and practices for developing nonnative speakers' oral English proficiency and intercultural communication skills. Examines the sound system of American English (including prosody), listening and pronunciation, lexical considerations, and discourse functions and grammar, and how these contribute to speaking fluency, accuracy and communicative effectiveness. Focuses on teaching applications and includes one-on-one sessions with English learners.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4620
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 3100 or LING 5030 and LING 5410.
**Grading Basis:** Letter Grade

**LING 5622 (3) Statistical Analysis for Linguistics**
Aims to acquaint students with the fundamentals of quantitative analysis in linguistics and provide a practical introduction to the R statistical computing environment. Topics that will be covered include examining and manipulating data, tests for independence, regression modeling, mixed models, measures of association, and data visualization. It is suitable for students with no prior experience with statistics or statistical software packages.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4622

**LING 5630 (3) TESOL and Second Language Acquisition: Principles and Practices**
Provides an overview of methods and materials for teaching English as an additional language, along with opportunities for students to observe, discuss and analyze these in relation to language teaching principles, linguistic considerations, and global and local contexts. Aimed primarily at the teaching of English to nonnative speaking adults, the course also addresses second and foreign language teaching generally.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4630
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 5610 or LING 5620.
**Grading Basis:** Letter Grade

**LING 5640 (3) Teaching Language Skills: Focus on Social Justice**
Introduces the underlying theories and classroom practices for teaching second language reading, writing, listening and speaking. The course highlights the nature of literacy and oral language development, beginning language skills (phonemic awareness, phonics, pronunciation), and meaning-focused language instruction. This unique iteration of the course, designed for CU Boulder¿s Global Seminar program takes a theme-based and project-based approach, contextualizing the study of language teaching around an exploration of social justice issues that are pressing both in Armenia and globally.
**Equivalent - Duplicate Degree Credit Not Granted:** 4640
**Grading Basis:** Letter Grade

**LING 5650 (3) Language Teaching Materials Design**
This course introduces the role of English as an international language and its impact on languages, cultures, and communities around the world. Students evaluate approaches to teaching English against the backdrop of sociopolitical and historical factors. This course utilizes a project-based approach to study language teaching in a Zapotec speech community. The project involves co-creating language teaching materials for use by Zapotec speakers in efforts to maintain and revitalize the Zapotec language among young learners.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4650
**Requisites:** Restricted to graduate students only.

**LING 5700 (3) Conversation Analysis and Interactional Linguistics**
Provides an introduction to the theories and methods of Conversation Analysis (CA) and Interactional Linguistics (IL), which aim to uncover the procedural infrastructure of language use in social interaction. The course emphasizes hands-on experience in analyzing naturally-occurring interactional data. Topics may include: turn-taking, sequence and preference organization, repair, reference, epistemics, and identity.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4700
**Grading Basis:** Letter Grade

**LING 5800 (3) Open Topics in Linguistics**
Various topics not normally covered in the curriculum. Offered intermittently depending on student demand and availability of instructors. Contact the department office for information.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**LING 5832 (3) Natural Language Processing**
Explores the field of natural language processing as it is concerned with the theoretical and practical issues that arise in getting computers to perform useful and interesting tasks with natural language. Covers the problems of understanding complex language phenomena and building practical programs.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5832
**Requisites:** Restricted to graduate students only.

**LING 5900 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**LING 5910 (3) TESOL Practicum**
Provides observation and supervised teaching experiences in classroom and other contexts involving the teaching of English to speakers of other languages, especially adults and young adult learners in settings outside K-12. Meetings provide opportunities to debrief and to consult on teaching practice; help students connect theory, methods and practice; and support a professional teaching portfolio process.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4910
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of LING 4630 or LING 5630 (minimum grade C). Restricted to graduate students only.
**Recommended:** Prerequisite LING 4610 or LING 5610.

**LING 5920 (3) Speakers and the Structure of their Languages**
This is a summer intensive course that introduces various areas of Linguistics (specifically phonology, morphology, and syntax) at the same time that highlights the importance of language documentation, description and revitalization. The target language for Summer 2024 is Zapotec. 50% of this course is designed so that students can get a basic knowledge of an indigenous language as a second language and be able to interact with the community of speakers.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4920

**LING 6200 (3) Issues and Methods in Cognitive Science**
Interdisciplinary introduction to cognitive science, examining ideas from cognitive psychology, philosophy, education, and linguistics via computational modeling and psychological experimentation. Includes philosophy of mind; learning; categorization; vision and mental imagery; consciousness; problem solving; decision making, and game-theory; language processing; connectionism. No background in computer science will be presumed.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 6402 and EDUC 6504 and PHIL 6310 and PSYC 6200 and SLHS 6402
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite at least one course at the 3000-level or higher in CSCI, LING, PHIL, or PSYC.

**LING 6300 (3) Topics in Language Use**
Discusses current issues and research in a selected area related to language use and function. Sample topics include conversational interaction, language policy, language content, and sociolinguistic variation.
**Requisites:** Restricted to graduate students only.

**LING 6310 (3) Sociolinguistic Analysis**
Serves as an advanced introduction to the empirical and theoretical foundations of contemporary sociolinguistic analysis, with special emphasis on linguistic variation, diversity and change.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**LING 6320 (3) Linguistic Anthropology**
Serves as an advanced introduction to the empirical and theoretical foundations of contemporary linguistic anthropology, with special emphasis on the ways in which culture and society emerge semiotically through language and discourse.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 6320
**Requisites:** Restricted to graduate students only.

**LING 6450 (3) Syntactic Analysis**
Introduces the major constructs used by formal theories of syntax to capture the relationship between meaning and syntactic form and uses data from diverse languages to explore the universality of these constructs.
**Requisites:** Restricted to graduate students only.

**LING 6500 (3) Issues in Indigenous Languages**
Addresses socio-cultural issues concerning indigenous languages, including human rights, intellectual property, language endangerment and maintenance, identity, linguistic relativity, sense of place.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 6500
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**LING 6510 (3) Language Structures**
Surveys the structure of one or more languages, emphasizing understanding how parts of the language interact. Designed to supplement courses in which parts of languages are used to illustrate theoretical claims.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites LING 5410 and LING 5420.

**LING 6520 (3) Topics in Comparative Linguistics**
Students compare and contrast selected structures of languages treated from a typological, genetic, or a real perspective. No special prior knowledge of the subject language is required.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites LING 5410 and LING 5420 and LING 5570.

**LING 6560 (3) Language Acquisition**
Theories and research methods in first-language acquisition of phonology, morphology, syntax, semantics, and pragmatics.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites LING 5410 and LING 5420 and LING 5430.

**LING 6632 (3) Machine Learning and Linguistics**
Is an introduction to machine learning, with a focus on linguistic applications. It is oriented toward students who want to understand the basics of machine learning and apply well-known techniques to address problems related to language and linguistics. The main goal is to achieve a practical grasp of the fundamental and most successful concepts in machine learning and to be equipped with techniques to apply this knowledge in linguistic domains. The course is also intended to provide a perspective on natural language acquisition and learning¿namely, insight into what types of language acquisition problems are truly difficult, and what types of learning problems can be solved by fairly straightforward pattern recognition techniques.

**LING 6861 (1-2) Interdisciplinary Training in the Social Sciences Methods Course**
This is a new course number for a series of interdisciplinary graduate methods seminars created as part of the new Interdisciplinary Training in the Social Sciences program, which is co-funded by the Graduate School and the College of Arts and Sciences. These courses, which have rotating topics, train graduate students in qualitative and quantitative methods. CARTSS/IBS will arrange three one-credit advanced methods mini-courses each Spring semester. The mini-courses will be taught weekly (two hours per week) for five weeks. The courses will change each spring; topics include a wide variety of advanced statistical analysis methods, machine learning for social sciences, text analysis, experimental techniques, network analysis, survey design, interview protocols, etc. Open to all interested graduate students, with programming provided jointly by the Institute of Behavioral Science (IBS) and the Center to Advance Research and Teaching in the Social Sciences (CARTSS).
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 6861
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**LING 6930 (1) Professional Internship**
Provides a structure for CLASIC graduate students to receive academic credit for internships with industry partners that have an academic component to them suitable for graduate-level work. Participation in the program will consist of an internship agreement between a student and an industry partner who will employ the student in a role that supports the academic goals of the internship. Instructor participation will include facilitation of final assessments of student performance as well as support for any academic-related issues that may arise during the internship period. May be taken during any term following initial enrollment and participation in CLASIC graduate program courses.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**LING 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.

**LING 6950 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**LING 7030 (3) Phonetic Theory and Analysis**
Provides students with the practical skills and the conceptual framework to do independent research in phonetics (or in other areas relying on phonetic data). Introduces current and traditional issues in phonetic research (both experimental and theoretical) and gives training in analytical methods.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites LING 5030 and LING 5410.

**LING 7100 (3) Field Methods 1**
Introduces the process of discovering structure of a language from data obtained directly from its speakers. Emphasizes effectiveness in the field context, rapid recognition of structural features,and preliminary formulation using computational tools.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites LING 5410 and LING 5420.

**LING 7310 (3) Social Semiotic Theory**
Introduces students to semiotics, the study of the use and interpretation of signs. Engages with key topics and concepts in the study of semiotic theory¿e.g., indexicality, iconicity, enregisterment, embodiment, agency¿ and how these topics bear on research in sociolinguistics and linguistic anthropology.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 6310 or LING 6320.

**LING 7350 (3) Language and Gender in Cultural Perspective**
Examines organizations of language and gender in a variety of societies and cultures from the perspectives of sociolinguistics, linguistic anthropology, and socially-oriented discourse analysis.
**Requisites:** Restricted to graduate students only.

**LING 7410 (3) Phonological Theory**
Provides an introduction to phonetic and morphophonological representations, with a focus on distinctive features; segments; prosodic structures; morphological structures; phonological processes and their interaction; naturalness conditions.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 5410.

**LING 7415 (2) Cognitive Science Research Applications Seminar 1**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7412 and EDUC 6506 and PSYC 7415 and PHIL 7415 and SLHS 7418
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite EDUC 6505.

**LING 7420 (3) Syntactic Theory**
Covers various topics in syntactic theory.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 5420.

**LING 7425 (2) Cognitive Science Research Applications Seminar 2**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7422 and EDUC 6516 and PSYC 7425 and PHIL 7425 and SLHS 7428
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 7415 or PSYC 7415 or CSCI 7412 or EDUC 6506.

**LING 7430 (3) Semantic Theory**
Explores current developments in the theory of linguistic semantics. Potential topics include truth-conditional and set-theoretic theories of meaning; cognitive semantics; semantic typology; social semiotics; the syntax-semantics interface; and the interaction between meaning conventions and conventions of usage.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 5430.

**LING 7565 (3) Computational Phonology and Morphology**
Surveys of the main approaches and central questions related to computational modeling and learning of morphology and phonology. We consider questions related to learnability of phonology/morphology, machine learning implementations, and linguist-driven grammar modeling.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7565
**Recommended:** Prerequisites LING 5410 and LING 5420.

**LING 7570 (3) Advanced Diachronic Linguistics**
Presents theories of language change. Discusses mechanisms of language change, its trajectories over linguistic categories and items and its relation to theories of grammar and of language variation.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites LING 5410 and LING 5420 and LING 5570.

**LING 7575 (3) Computational Lexical Semantics**
Computational semantics has recently been upended by the advent of language models trained on vast amounts of text. These have proven to be very effective as a starting point for building robust downstream applications, although their ability to appropriately take context and world knowledge into account is still open to question. At the same time, rich representational schemes such as Abstract Meaning Representation (AMR) have been improving performance on numerous semantic tasks, including information extraction, question-answering, co-reference, and entailment. This class will explore the theory and practice behind these two advances, examine their respective strengths and weaknesses, and brainstorm about ways of combining them.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7575
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite LING 5430 Semantics and Pragmatics, LING 5832 Natural Language Processing (cross-listed as CSCI 5832) are recommended.
**Grading Basis:** Letter Grade

**LING 7585 (3) Computational Models of Discourse and Dialogue**
This course is an introduction to computational models, corpora, and processing methods for discourse and dialogue. The course will introduce students to the foundational concepts and approaches, building a base from which students can go on to do research in these areas.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7585
**Recommended:** Prerequisite LING 5832 Natural Language Processing.
**Grading Basis:** Letter Grade

**LING 7775 (1) Topics in Cognitive Science**
Reading of interdisciplinary innovative theories and methodologies of cognitive science. Students participate in the ICS Distinguished Speakers series that hosts internationally recognized cognitive scientists who share and discuss their current research. Session discussions include analysis of leading edge and controversial new approaches in cognitive science.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7772 and EDUC 7775 and PHIL 7810 and PSYC 7775 and SLHS 7775
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**LING 7800 (3) Open Topics in Linguistics**
Various topics not normally covered in the curriculum; offered intermittently depending on student demand and availability of instructors. Contact the department office for information.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**LING 7900 (1-5) Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**LING 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.

# Management (MGMT)

## Courses

**MGMT 3100 (3) Operations Management**
Examines concepts, tools and techniques used in the management of service operations. Focuses on how firms add value and compete with high quality and efficient services. Emphasizes the use of models for designing new products services and improving the effectiveness of service processes. Studies the application of technology in the context of productivity, growth and the globalization of manufacturing and services.
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**MGMT 3201 (3) Business Analytics**
Teaches cutting-edge tools and approaches to the analysis of data, including "big data" for effective decision-making. Creates data connoisseurs through hands-on exposure to exploratory and predictive analytics. Application areas covered include Web Marketing, the Internet of Things, Biometric Monitoring, as well as data integration and analysis for online marketing, human resources and operations.
**Equivalent - Duplicate Degree Credit Not Granted:** MKTG 3201 BAIM 4120
**Requisites:** Requires prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**MGMT 3800 (3) Consulting Skills**
Provides students with skills to understand, diagnose and solve problems that businesses face. Strong focus on action learning, so emphasizes case analyses, project based learning and exposure to models used in the consulting world. Features interactions with consultants from some of the top firms in the world, such as McKinsey.
**Requisites:** Restricted to Business (BUSN) and Engineering (ENGR) students with 26-180 units completed.

**MGMT 4110 (3) Supply Chain Management**
Explores the key issues related to the design and management of supply chains. Covers the efficient integration of suppliers, production facilities, warehouses, and stores so that the right products in the right quantity reach customers at the right time. Focuses on the minimization of the total supply chair cost subject to service requirements imposed by a variety of industries.
**Equivalent - Duplicate Degree Credit Not Granted:** EMEN 4110
**Requisites:** Requires prerequisite course of BASE 2104 or BCOR 2500 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**MGMT 4120 (3) Managing Business Processes**
Covers the concepts and tools to design and manage business processes. Emphasizes modeling an analysis, information technology support for process activities, and management of process flows. Graphical simulation software is used to create dynamic models of business processes and predict the effect of changes. Prepares students for a strong management or consulting career path in business processes.
**Equivalent - Duplicate Degree Credit Not Granted:** EMEN 4120 and MGMT 5120
**Requisites:** Requires prerequisite course of BASE 2104 or BCOR 2500 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**MGMT 4130 (3) Sustainable Operations**
In the last 20 years or so, there has been a revolution in the way that people think about the planet and the roles that business, industry, and individuals have in maintaining it. Sometimes it¿s called sustainability, sometimes the triple-bottom-line ¿ but whatever the terminology, the realities of expanding economies, a growing population, and global warming are prying open our minds and forcing/enabling us to work in a way that is anything but business-as-usual. The challenges are numerous, complex, and daunting. But in the final analysis, business is such a powerful engine that, when fueled by the strategies of sustainability, it presents us with a realistic and hopeful path forward. This course, 4130, Sustainable Operations, will explore the new and rapidly evolving field of sustainability within the context of business operations in sectors like energy, transportation, food, sports and fashion, and will equip students with real-world examples, tools, and new ways to think about work.
**Equivalent - Duplicate Degree Credit Not Granted:** CESR 4130
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**MGMT 4140 (3) Project Management**
Introduces multidisciplinary project management concepts, skills, and tools, including the relationship between project definition, organization, planning, scheduling, resource and risk management, control, costing and performance. Presents both qualitative and quantitative tools for better project management.
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**MGMT 4150 (3) International Operations Management**
Compares systems of production/operations management in the United States with those in Japan, Europe and Asia. Contrasts various regional and national approaches to business, quality management, labor practices, management styles, international competitiveness, productivity, distribution systems, trade practices and strategies for penetrating foreign markets. Examines different sociocultural environments, government-business relationships, banking industries, operations strategies and the potential for transferring industrial management practices and techniques between countries.
**Requisites:** Requires prerequisite course of BASE 2104 or BCOR 2500 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**MGMT 4160 (3) Managing Growth: Entrepreneurship and High Growth Ventures**
This is a course about how to grow a business beyond the start-up stage. The course will focus on businesses that are not small by design, but on those businesses that with hard work and good luck can be expected to develop into complex enterprises. We will discuss the initial decisions that set a foundation for growth, the pros and cons of alternative growth strategies, organizational scaling tactics, and the keys to realizing value.
**Requisites:** Requires prerequisite course of BASE 2104 or BCOR 2500 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**MGMT 4200 (3) Competitive Strategy**
Provides students with the foundational skills related to competitive strategy. Tools and techniques associated with this course will enable students to understand the fundamentals of why one firm out performs another through understanding the fundamentals of superior performance at the business unit level. Examples of specific learning objectives: develop an understanding of fundaments of what is strategy, foundations of competitive advantage.
**Requisites:** Requires prerequisite course of BASE 2104 or BCOR 2500 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**MGMT 4400 (3) Quality Management**
Examine the concepts, tools, and techniques used in managing and measuring quality and productivity in business. Topics include foundational concepts of quality, customers, the workforce, and processes. Apply the tools and techniques associated with the quality sciences, including statistical methods, design quality, measurement, control, process improvement, six sigma. Discover the basics of performance excellence management, Baldrige Award criteria, strategic planning, leadership, and daily management. Specific examples, case studies from modern companies will be studied.
**Equivalent - Duplicate Degree Credit Not Granted:** EMEN 4400
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**MGMT 4440 (3) Privacy in Big Data Analytics**
Privacy = the new currency. In a time where technology allows unprecedented aggregation of personal information use of "private" information is moving faster than social norms and laws can follow. We will dissect the technologies and social trends related primarily to privacy and use of information about individuals to reap profits. A good complement to business intelligence and analytics classes.
**Equivalent - Duplicate Degree Credit Not Granted:** CESR 4440
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**MGMT 4820 (3) Decision Analytics**
This course prepares students to thrive in analytics-driven organizations. Students will explore the capabilities and challenges of data-driven business decision making. The course will introduce a set of common analytics tools. Students will have opportunities to apply the analytics tools to business problems based on practical data sets from various companies. Excel spreadsheet and several other software packages will be used extensively in the course. The class will be conducted with a combination of lectures, case discussions, lab sessions, and student presentations. Grading will be based on several problem sets, exams, case reports, and a final project.
**Equivalent - Duplicate Degree Credit Not Granted:** MGMT 5820
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**MGMT 4825 (3) Experimental Seminar**
Offered irregularly to provide opportunity for investigation of new frontiers in Management.
**Requisites:** Restricted to Business (BUSN) majors with 52-180 units completed.

**MGMT 4850 (3) Senior Seminar in Management**
Covers the issues and challenges of running a firm in a competitive environment. It integrates and builds upon coursework in other functional areas. Discusses principles, frameworks, and techniques that helps understand how to analyze the competitive environment; firm sources of competitive advantage; competitive dynamics; and, specific types of strategies to promote firm performance. Focuses on specific company examples. Formerly MGMT 4000.
**Requisites:** Requires prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 90-180 units completed.

**MGMT 4900 (1-3) Independent Study**
Intended only for exceptionally well qualified business seniors. Departmental form required. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**MGMT 4910 (3) OPIM Academic Internship**
Internship component of the OPIM certificate. Offers students the opportunity to gain professional work experience in a management position while still in school. Provides academically relevant work experience that complements students' studies and enhances their career potential. Students must have completed one OPIM course prior to enrolling in the course. An Internship the semester of the course is required.
**Requisites:** Requires prerequisite courses of BASE 2104 and one of the following: BAIM 3200, 3210, 3220, 4065, 4090, 4205, 4220, 4230, 4250, MGMT 3100, 4110, 4120, 4130, 4140, 4500, or MKTG 3700 (all min grade D-). Restricted to students with 52-180 units completed.

**MGMT 5820 (3) Decision Analytics**
This course prepares students to thrive in analytics-driven organizations. Students will explore the capabilities and challenges of data-driven business decision making. The course will introduce a set of common analytics tools. Students will have opportunities to apply the analytics tools to business problems based on practical data sets from various companies. Excel spreadsheet and several other software packages will be used extensively in the course. The class will be conducted with a combination of lectures, case discussions, lab sessions, and student presentations. Grading will be based on several problem sets, exams, case reports, and a final project.
**Equivalent - Duplicate Degree Credit Not Granted:** MGMT 4820
**Requisites:** Requires a prerequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**MGMT 8900 (1-3) Independent Study**
Requires consent of instructor under whose direction study is taken. Departmental form required.

**MGMT 8990 (1-10) Doctoral Dissertation**
Work with a faculty advisor on a doctoral thesis. Student should have passed comprehensive exam before registering for doctoral thesis hours.
**Requisites:** Restricted to graduate students only.

# Marketing (MKTG)

## Courses

**MKTG 2250 (3) Understanding Buyer Behavior in a Global Marketplace**
Why do we buy some brands while turning away from others? Why do some advertisements catch our attention while others are ignored? How do others influence us to buy? This course is designed to give nonbusiness majors an understanding of the psychological, sociological, and economic influences on buyer behavior in the marketplace. With an understanding of these influences, marketers can better design product, pricing, distribution, and promotional strategies that best fulfill consumer needs.
**Equivalent - Duplicate Degree Credit Not Granted:** MKTG 3250

**MKTG 2400 (3) Principles of Marketing for Communications**
At its most fundamental level, marketing encompasses activities designed to facilitate exchange. These activities are often described with the "4Ps": product, place, price and promotion. Through these 4Ps, marketers create benefits that provide values to consumers. This course will address how marketers make decisions about the 4Ps to provide value to consumers and motivate consumers to engage in exchange transactions.
**Requisites:** Requires a prerequisite course of APRD 1002 (minimum grade D-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors), Strategic Communication (STCM) majors only.

**MKTG 2700 (3) Digital Marketing Tools**
Digital marketing is an exciting area of marketing practice. Designed to give the knowledge, skills and experiences for digital marketing. Topics covered include search engine optimization, social media data analysis, search ads, the advertising technology business landscape and email marketing. An important course theme is that digital efforts should be designed with performance measurement in mind.
**Equivalent - Duplicate Degree Credit Not Granted:** MKTG 3700

**MKTG 3050 (3) Customer Analytics**
Students develop a deep understanding of customer centricity and its implications for the firm, learn about state-of-the-art methods for calculating customer lifetime value and customer equity and develop the analytical and empirical skills that are needed to judge the appropriateness, performance and value of different statistical techniques that can be used to address issues around customer acquisition, development and retention.
**Requisites:** Requires prerequisite or corequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.
**Additional Information:** Business Honors Course

**MKTG 3100 (3) Fundamentals of Professional Selling**
Explores the principles and methods of professional salesmanship with a focus on sales processes, best practices and frameworks used to organize sales efforts. Structured to include involvement from working sales professionals. Topics covered include: the role and value of professional selling in the marketing mix, ethical sales practices, sales quotas and compensation, effective sales communication, prospecting and funnel management, overcoming objections, professional sales closure and negotiation techniques.
**Requisites:** Requires prerequisite or corequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**MKTG 3150 (3) Sales Management, Leadership and Organization Development**
Explores factors that determine size, shape and strategies of high performing sales organizations in the context of an overall go-to-market strategy. Structure includes involvement from professional sales executives. Includes overview of fundaments of professional selling, designing sales organization, sales objectives and metrics, sales analytics, sales force recruitment and selection, sales force training and education, sales force motivation and compensation.
**Requisites:** Requires prerequisite course of MKTG 3100 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**MKTG 3201 (3) Business Analytics**
Teaches cutting-edge tools and approaches to the analysis of data, including "big data" for effective decision-making. Creates data connoisseurs through hands-on exposure to exploratory and predictive analytics. Application areas covered include Web Marketing, the Internet of Things, Biometric Monitoring, as well as data integration and analysis for online marketing, human resources and operations.
**Equivalent - Duplicate Degree Credit Not Granted:** MGMT 3201
BAIM 4120
**Requisites:** Requires prerequisite or corequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**MKTG 3250 (3) Buyer Behavior**
Covers both consumer buying behavior and organizational buying behavior. Consumer behavior topics include needs and motives, personality, perception, learning, attitudes, cultural influence, and contributions of behavioral sciences that lead to understanding consumer decision making and behavior. Explores differences between business and consumer markets, business buying motives, the organizational buying center and roles, and the organizational buying process. Required for marketing majors.
**Equivalent - Duplicate Degree Credit Not Granted:** MKTG 2250
**Requisites:** Requires prerequisite or corequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors and 52-180 hours completed.

**MKTG 3350 (3) Marketing Research and Analytics**
Explores fundamental techniques of data collection and analysis used to solve marketing problems. Specific topics include problem definition, planning an investigation, developing questionnaires, sampling, tabulation, interpreting results, and preparing and presenting a final report. Required for marketing majors. .
**Requisites:** Requires prerequisite or corequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**MKTG 3700 (3) Digital Marketing**
Covers the what, why and how of major digital marketing approaches, including online listening and monitoring, search engine optimization, search ads, email marketing, and social media. Designed to launch students as digital marketing professionals and to provide experience with industry-relevant hands-on assignments and exercises.
**Equivalent - Duplicate Degree Credit Not Granted:** MKTG 2700
**Requisites:** Requires prerequisite or corequisite course of BASE 2104 (minimum grade D-). Restricted to Business (BUSN) majors.

**MKTG 3800 (1) Sales and Marketing Technologies**
Are you curious about new technologies and how they are used in business? Sales and Marketing functions have changed dramatically in the last few decades due to the emergence of the Information Technology ¿Cloud¿ and the capabilities it enables. This course is for students to learn about sales and marketing in a B2B (business-to-business) environment and will feature technology tools in the areas of Inbound Marketing, Customer Relationship Management, Social Selling, Video Content, Business Communications, Data Analytics, and Artificial Intelligence.
**Requisites:** Requires prerequisite or co-requisite course of BASE 2104 (minimum grade D-). Restricted to business (BUSN) majors with 52-180 hours completed.

**MKTG 3825 (3) Experimental Seminar**
Offered irregularly. Provides opportunity for investigation into new frontiers in marketing.
**Requisites:** Requires prerequisite course of BCOR 2201 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**MKTG 4250 (3) Product Strategy**
Covers major topics in managing long-term customer relationships that derive from products. Focuses on concepts, analyses, and strategies for existing and new products. Topics include concept development and testing, conjoint analysis, product positioning, brand image measurements and brand management, and product issues in public policy and ethics. Methods of instruction include lectures, case discussions, student group papers and projects, and examinations. Required for marketing majors.
**Requisites:** Requires prerequisite courses of MKTG 3250 and MKTG 3350 (all minimum grade D-). Restricted to Business (BUSN) majors with minimum 52 units completed.

**MKTG 4300 (3) Pricing and Channels of Distribution**
Offered regularly to examine pricing and channel management, the two key components of companys' marketing strategies. Help students to understand the common types of pricing and channel strategies, the rationales behind these strategies. Train students to think analytically in order to apply these strategies. Required for marketing majors.
**Requisites:** Requires prerequisite courses of MKTG 3250 and MKTG 3350 (all minimum grade D-). Restricted to Business (BUSN) majors with minimum 52 units completed.

**MKTG 4350 (3) Services Marketing Strategy**
Designed for those students interested in working in the service industries. Addresses the distinct needs and problems of service organizations in the area of marketing and service quality. Service organizations (i.e., banks, transportation companies, hotels, hospitals, educational institutions, professional services, etc.) require a distinctive approach to marketing strategy—both in its development and execution. Builds and expands on marketing ideas and how to make them work in service settings.
**Requisites:** Requires prerequisite courses of MKTG 3250 and MKTG 3350 (all minimum grade D-).

**MKTG 4500 (3) Advertising Management**
**Requisites:** Requires prerequisite courses of MKTG 3250 and MKTG 3350 (all minimum grade D-). Restricted to students with 52-180 units completed.

**MKTG 4550 (3) Advertising and Promotion Management**
Analyzes advertising and promotion principles and practices from the marketing manager's point of view. Considers the decision to advertise, market analysis as a planning phase of the advertising program, media selection, public relations, sales promotion, promotion budgets, campaigns, evaluation of results, and agency relations. Required for marketing majors.
**Requisites:** Requires prerequisite courses of MKTG 3250 and MKTG 3350 (all minimum grade D-). Restricted to Business (BUSN) majors with minimum 52 units completed.

**MKTG 4650 (3) Institutional Relationships and Strategy**
Focuses on the management of a firm's relationships with other businesses. Addresses business-to-business marketing strategies, relationships with channel members, and strategic alliances/ partnerships. Topics include relationship structures, power, conflict, negotiation, industry analysis, selection of business partners, and managing for long-term stability.
**Requisites:** Requires prerequisite courses of MKTG 3250 and MKTG 3350 (all minimum grade D-).

**MKTG 4810 (3) Honors Seminar**
Social responsibilities of the business executive, business ethics, business-government relations, and business in literature. Department enforced prerequisites: open to seniors who have completed at least 30 semester hours of business courses with not less than a 3.30 GPA and have instructor consent. .
**Requisites:** Requires prerequisite course of BCOR 2400 (minimum grade D-).
**Additional Information:** Arts Sciences Honors Course

**MKTG 4820 (3) Special Topics in Marketing**
Offered irregularly. Provides opportunity for investigation into new frontiers in marketing.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Marketing (MKTG) majors and 57 units completed.
**Grading Basis:** Letter Grade

**MKTG 4825 (1-3) Pricing and Channels of Distribution**
Offered irregularly to provide opportunity for investigation of new frontiers in Marketing.
**Requisites:** Requires prerequisite courses of MKTG 3250 and MKTG 3350 (all minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior).

**MKTG 4850 (3) Senior Seminar in Marketing**
Capstone marketing course that integrates and further develops what students have learned in other courses. Provides students with the insight and skills necessary to formulate and implement sound socially responsible marketing strategies, product line management strategies, promotional and product/service communication strategies, pricing, and distribution strategies. Required for marketing majors.
**Requisites:** Requires prerequisite courses of MKTG 4250 and MKTG 4300; or MKTG 4250 and MKTG 4550; or MKTG 4300 and MKTG 4550 (all minimum grade D-). Restricted to senior Marketing (MKTG) majors with 90 to 180 units completed.

**MKTG 4900 (1-6) Independent Study**
Intended only for exceptionally well qualified business seniors. Instructor and division chair consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**MKTG 6900 (1-3) Independent Study**
Requires consent of instructor under whose direction study is taken. Departmental form required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**MKTG 6940 (1-6) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree. Departmental form required.

**MKTG 6950 (1-6) Master's Thesis**

**MKTG 7300 (3) Multivariable Methods in Marketing Research**
Includes Manova designs, causal models, cluster analysis, discriminant function analysis, factor analysis, and latent structure analysis. Emphasizes computer applications. Department enforced prerequisites: graduate courses in regression and Manova.

**MKTG 7310 (3) Design and Analysis of Experiments in Business**
Detailed exposure to experimental research methods for business applications. Emphasizes the choice of design options, data collection methods, statistical analysis, and substantive interpretation of experimental results.

**MKTG 7810 (3) Doctoral Seminar: Psychological Approaches to Research in Marketing**
Examines the basic psychological processes that underlie common marketing phenomena. Topics include memory and judgment, persuasion, attitude-behavior consistency, information processing, automatic and controlled processes, learning, motivation and cognition, social judgment, and the role of affect and mood on judgment. Discusses topics in consumer behavior and marketing management contexts, in conjunction with related methodological issues.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**MKTG 7815 (3) Doctoral Seminar: Consumer and Managerial Decision Making in Marketing**
Examines judgment and decision making research pertinent to understanding how consumers and marketing managers make decisions. Uses economic models as a normative backdrop for examining research on decision heuristics, judgment and choice anomalies, and contingent decision behavior. Examines processes of causal judgment and inference and the influenceof a variety of contextual factors (including time) on judgment and decision.

**MKTG 7835 (3) Marketing Strategy**
Examine theories of marketing strategy emanating from economics, sociology, psychology, strategy and organizational sciences, as well as marketing. Levels of analysis for studying marketing strategy research will include the individual, dyadic, group, firm, interorganizational and industry levels. Examines methods for doing marketing strategy research, including experiments, quasi-experiments, surveys, qualitative data and secondary data.
**Requisites:** Restricted to PhD students only.

**MKTG 7840 (3) Quantitative Marketing Seminar 1**
Provides a foundation for quantitative analysis in marketing. The empirical component covers fundamental empirical modeling techniques (e.g., field experiments, diffusion models, categorical data models, consumer heterogeneity). The theoretical components illustrates how utility maximizing consumers learn about consumption environment and respond to firms' marketing decisions and examines firms' competitive strategy and marketing mix decisions and relevant organizational and sociological factors.

**MKTG 8900 (1-3) Independent Study**
Requires consent of instructor under whose direction study is taken. Departmental form required.

**MKTG 8990 (1-10) Doctoral Dissertation**

# Master of the Environment (ENVM)

## Courses

**ENVM 5001 (3) Foundations of Environmental Leadership**
Engages and exposes students to diverse leadership models and styles and emphasizes concepts and skills necessary for effective environmental leadership. Students will explore and critically analyze approaches and tools for effective collaboration, creative communication with diverse stakeholders, facilitation of events and processes, negotiation, fiscal management, strategic planning, practicing design thinking, developing organizational structures and leading social change.
**Grading Basis:** Letter Grade

**ENVM 5002 (3) Environmental and Social Systems: Understanding, Mapping, and Stewardship**
Environmental and Social Systems: understanding, mapping, and stewardship. In this course you will learn about complex social and environmental systems, methods for how to map and understand them, and theories for how they change along with examples of global systems change contributions. This course will help you apply tools in systems-understanding to address and steward problematic systemic structures, and the underlying mental models that drive them, to contribute to positive change.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5003 (3) Ethics and Values in Environmental Leadership**
Prepares students to be effective leaders within their organizations by introducing them to a wide range of value systems and examining links between these and effective leadership. Students will learn tools and approaches for effective analysis and presentation of value-based appeals and will learn through practical scenarios to identify and assess value-based analyses used by others.
**Grading Basis:** Letter Grade

**ENVM 5004 (3) Public Finance and the Environment**
Explores the impact of a variety of factors that may result in market failures, including public goods, externalities, information asymmetries and uncertainty, with a special focus on the environment and natural resources. Government polices as a mitigating policy tool for market failures impacting the environment are assessed
**Grading Basis:** Letter Grade

**ENVM 5005 (3) The Business of Renewable and Sustainable Energy**
Addresses the business of renewable energy, including opportunities and challenges with renewable electricity, renewable transportation fuels and energy efficiency. Topics include energy markets, opportunity identification, life cycle analysis, economic analysis, policy impacts and project financing of sustainable renewable energy business models. Formerly ENST 5002.
**Equivalent - Duplicate Degree Credit Not Granted:** MBAX 6930
**Requisites:** Restricted to Graduate (GRAD) and Non-Degree Graduate (NDGR) students.
**Grading Basis:** Letter Grade

**ENVM 5006 (3) Sustainable Energy Policy**
The global energy system is at the early stages of a remarkable transformation: from one largely dependent on fossil fuels (coal, oil, and natural gas) to one based on renewable and sustainable energy sources. Energy policy - actions taken by public entities to influence energy - have and will play an essential role in this ongoing transformation. This course takes a critical and pragmatic look at energy policy: what policies are available, how do we evaluate them, who are the stakeholders in the energy policy process, and how do policies drive energy technology adoption.
**Requisites:** Restricted to Graduate (GRAD) and Non-Degree Graduate (NDGR) students.
**Grading Basis:** Letter Grade

**ENVM 5007 (3) Energy Systems and Technologies**
Examines the basics of energy technologies and energy delivery systems. Covers both conventional energy sources (oil and gas, coal, nuclear and hydroelectric) and renewable/sustainable energy technologies (wind, solar, biomass, geothermal and end-use efficiency). Investigates individual technologies as well as integration of multiple technologies on energy systems such as the electricity grid and liquid and gas fuels infrastructures.
**Requisites:** Restricted to (GRAD) graduate students and (NDGR) non-degree graduate students
**Grading Basis:** Letter Grade

**ENVM 5008 (3) Legislative Analysis, Writing, and Advocacy**
This course will provide students with the skills and knowledge necessary to operate within the legal and policy framework of the United States. Students will learn how to locate and interpret federal and state statutes, municipal and county codes, agency policy documents, and judicial decisions at all levels. With this foundational knowledge established, the course then focuses on practical legislative drafting exercises, wherein students create clear and concise frameworks for the government and private parties to act while avoiding potential pitfalls in judicial interpretation. Formerly offered as a special topics course.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5009 (3) Business Fundamentals for Environmental Professionals**
Introduces MENV students to multiple facets of business including the entrepreneurial process/mindset and common business structures and processes, and sustainability. Consulting projects are used as proxies for working within a business involving key activities including project proposal, problem definition, solution development and presenting deliverables. Critical thinking is central to this process and teams will develop creative solutions to a business problem.
**Requisites:** Restricted to Master of the Environment (MENV) graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5010 (3) Water2050 Resilience and Sustainability**
Using the Colorado River as a frame, this course dives deep into the role of water in our modern economy and communities. The past, present, and future of water in the West (and the world) is covered in detail, with field trips and engagement with working professionals core learning tools. Formerly offered as a special topics course.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5011 (3) Collaborative Innovation and Social Change**
Enhancing practical abilities to work for social change. We (1) learn about innovators who effectively leverage change, (2) engage in hands-on, highly interactive approaches to empathize, problem-solve and co-create, and (3) turn our ideas into real-world, prototype designs. Class is varied and interactive, relying on a mixture of videos, case readings, interactive activities and discussion.
**Requisites:** Restricted to Master of the Environment (MENV) graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5012 (3) Water, Climate, and Sustainable Cities**
Provides students with the knowledge to characterize, analyze, assess and plan, urban systems, primarily those of water and landscape. Students will understand the nature of built systems in the urban environment, with particular focus on the urban water cycle and green infrastructure.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5013 (3) Environmental Governance: Actors and Institutions**
This course will incorporate a theoretical understanding of how policies are made, what decisions are enacted, and which actors seek to influence policy outcomes. Students in this class will assess frameworks for understanding policy formation and decision-making, and apply this understanding to cases of environmental and natural resource policy. This course will provide a baseline understanding of concepts including: Common Pool Resource Management, Social Ecological Systems, Local and Traditional Ecological Knowledge, Treaties, Compacts, Storymaps, Public Engagement, and Media Engagement.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5014 (3) Foundations of Environmental Policy and Management**
Examines concepts related to policy and regulatory processes, institutions, and management of the environment and natural resources. Surveys environmental issues and laws at the international, national, state and local levels. Focuses on policy tools including property rights, regulation, voluntary compliance, and market-based mechanisms. Students analyze a contemporary environmental or natural resources issue and prepare policy advocacy documents and presentations.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5015 (3) Water Energy Nexus**
Examines the physical, biological, social, behavioral, economic, and engineering basis of the water energy space that, in practice, includes domestic water use, reuse, recycling, water use in thermal generation, water use in oil and gas operations, water use in industry, water use for renewable energy, the transportation of water, water supplies, desalination, food, agriculture, geopolitics, and security. Recommended for Juniors, Seniors, and Graduate Students interested in energy or water related issues. Technical background is valuable but not required. Formerly offered as a special topics course.
**Grading Basis:** Letter Grade

**ENVM 5016 (3) Science, Politics, and Policy**
Examines the intersection of science with politics and policy, with an emphasis on how scientific information can be used to influence and support reasoned decision-making at all levels of government. The course will present the material through currently relevant and evolving topics such as climate change, species conservation and management, drought and other extreme climatic events, and topical issues as they arise during the course.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5017 (3) Collaborative Skills + Practices for Sustainable Solutions**
Achieving sustainable and resilient solutions requires leaders to reach across political, ideological and organizational boundaries, develop common knowledge, and engage people who represent components of complex systems. Collaboration is a core competency in sustainability and resilience planning and plays an increasingly important role in environmental policy. This course develops the skills and practices for effective collaboration.
**Requisites:** Restricted to Master of the Environment (MENV) graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5018 (3) The Scientific Basis of Environmental Change**
Provides an overview of the science that underlies some of the most complicated global environmental challenges we face today. These include topics such as climate change, air quality, land management, agriculture, biodiversity loss and conservation, as well as the underlying biogeochemical, hydrologic, and ecological processes that are critical for understanding the changing environment. Previously offered as a special topics course.
**Requisites:** Restricted to Master of the Environment (MENV) graduate students only.
**Recommended:** Prerequisite of department consent for Professional Master's in Global Engineering and Hazard Resilience (PMP) students.
**Grading Basis:** Letter Grade

**ENVM 5019 (3) Advanced Environmental and Natural Resources Policy Field Seminar**
Provides students with the opportunity to examine and research all environmental and natural resources policy issues within a geographic area. These areas can include the Colorado Plateau, the Greater Yellowstone Ecosystem, the San Luis Valley, the Puget Sound, or others. Emphasis will be placed on contextualizing contemporary natural resources issues within the greater political, policy, and human history of the examined area. Students will analyze these issues through the lenses of environmental justice, politics, and economics. Each student will choose a principal topic to deepen their knowledge in through research, teaching co-facilitation during the seminar, and writing a publication-quality policy paper. Course time will be spent on-location in the chosen geographic area to meet with policy makers, tribal leaders and members, business representatives, and other subject matter experts to deepen students¿ understanding of the issues.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5020 (3) Environmental Decision-making**
Examines the laws and policies controlling governmental decisions affecting the environment and how individuals, companies, and organizations can influence those decisions. Particular attention is paid to the National Environmental Policy Act and those laws commonly implicated such as the Endangered Species Act, National Forest Management Act, and the Federal Land Policy Management Act. Students prepare and submit a substantial public comment on a pending agency action.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5021 (1) Writing Skills for Environmental Professionals**
Writing for different audiences and purposes ¿ from emailing colleagues to writing grant applications, policy reports, internal memos, and more ¿ is a critical professional skill. Students will: (1) Develop skills in rhetorical analysis; (2) Practice information literacy; (3) Synthesize information; (4) Improve clarity, concision, and organization; and (5) Understand language conventions.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5022 (3) Communicating for Sustainability and Impact**
Sustainability professionals interface with a broad range of audiences, making effective communication challenging. Good communication considers the needs, interests, and a priori knowledge of the audience. It weaves science and technical details into the art of storytelling. In this course, students will practice and improve their written, visual, and oral communication using audience analysis, storytelling, active listening, and other essential tools. By the end, each student will showcase their communication skills in a personal portfolio.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5023 (3) GIS for Sustainability Professionals**
Geographic Information Systems (GIS) are increasingly important for tackling environmental change and sustainability challenges. This introductory course in GIS will provide a broad foundation of spatial thinking and geo-technologies. We will consider spatial data, learn about real-world applications of GIS within the field of sustainability, and work through hands-on exercises in ArcGIS Online and QGIS to build confidence utilizing such software in your future careers. A personal laptop is required; prior GIS experience is not. Formerly offered as a special topics course.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5024 (3) Stakeholder Engagement: Processes, Practices, Politics**
This course is organized around stakeholder engagement issues that are important to understand within, and across, the MENV's five areas of specialization. This course examines stakeholder processes, practices and politics and apply these to various cases, issues, challenges and opportunities.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5026 (3) Sustainable Land Use and Development: Principles and Practices**
Survey of fundamentals of land use planning, growth management and urban/ community development systems, covering a range of cultural, legal and ecological issues. By way of case studies and best practices, focus on new, ¿sustainable¿ approaches at the intersection of real estate development, land use and urban planning, economic/community development and environmental policy.
**Grading Basis:** Letter Grade

**ENVM 5027 (3) Microgrids and Distributed Energy Resources**
Covers technical, regulatory, and economic issues associated with distributed energy resources and microgrids. Microgrids are used to provide energy access in developing countries where there are still close to a billion people without access, on tens of thousands of islands and other remote areas where they have to rely on diesel gensets and everywhere that require a higher level of reliability and resilience than can be provided by a centralized grid. It will also cover technologies such as passive solar construction, heat pumps, induction stoves, pressure cookers, and electric vehicles that are critical to decarbonization of the energy sector.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5028 (3) Supply Chain Management for Food and Fiber**
Provides students with an overview and in-depth, engaged analysis of food and fiber specific supply chain management. Using a mix of lecture, group projects, guest lectures students will learn supply chain fundamentals, the challenges facing supply chain managers and develop solutions.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ENVM 5038-Nourishing Humanity within Planetary Boundaries: Introduction to Food Systems.
**Grading Basis:** Letter Grade

**ENVM 5029 (3) Food & Agriculture Policy in the United States**
Examines agricultural and food law and policy in the United States with a focus on enhancing sustainability and equity while ensuring a sufficient food supply. Surveys the history, overlapping mandates, authority, philosophies, and rules of the USDA, FDA, and EPA. Investigates policies pertaining to production, environmental impacts, food constituents, labeling, safety, manufacturing, marketing, retail, nutrition guidance and assistance programs. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites Introduction to Sustainable Food Systems: Nourishing Humanity within Planetary Boundaries.
**Grading Basis:** Letter Grade

**ENVM 5030 (3) Planning for Resilient Futures**
Planning for Community Resilience and Climate Action examines the relationships and connectivity between the natural environment, human society and the social ecological systems relevant to community resilience. The increasing demands of a globalizing economy, aging critical infrastructure, changing demographics, and the impacts of climate change increase concerns about the resilience of multiple scales of governance and the importance of social vulnerabilities.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5031 (3) Contemporary Issues in U.S. Public Lands Policy and Management**
Examines critical and emerging issues on public lands across the U.S. today. Following an overview of the structure of public lands management, including federal land management designations and agencies and major laws and policies relevant to public lands management, we will transition into issue-based discussions of challenges facing public lands management. Previously offered as a special topics course.
**Recommended:** Requisite ENVS 5701.
**Grading Basis:** Letter Grade

**ENVM 5032 (3) Corporate Sustainable Reporting and Strategy**
Explores frameworks and standards used to measure sustainability across different industry sectors and provides an investors perspective regarding which companies merit investment based on their sustainability performance. It will include a review of ISSB, GRI, CDP, SASB and TCFD, the process of conducting Materiality Assessments, the global regulatory landscape, and the role of ESG raters and rankers. It will explore how companies across the sustainability spectrum are developing enterprise-wide strategies and communicating their efforts.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5033 (3) Policy and Climate Change in the Mont Blanc Region**
Introduces students to the Mont Blanc region. Course begins with an assessment of the region's history, culture, economy and politics. Environmental and land use issues, along with climate change, will then be studied. Students will then review techniques and methods to assess climate impacts on the landscape. Previously offered as a special topics course.
**Recommended:** Graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5034 (3) Leading Socio-Environmental Change**
Build essential skills to be a purpose-driven and ethical leader. Students will explore their values, deepen their self-awareness, and practice giving voice to their values in situations where their values clash with other expectations in the workplace. We approach leadership as a practice by exploring the interpersonal dynamics and psychology of high performing diverse teams as the foundation of work. Previously offered as a special topics course.
**Requisites:** Restricted to Master of the Environment (MENV) graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5035 (1) Introduction to Environmental Thought & Influencers**
Grounds students in the influential writers ¿ both known and less known ¿ that have shaped the environmental movement in the United States over the past century. From classics environmental works to contemporary contributions, this course will provide students an opportunity to read and discuss major themes in environmental thought and commentary, and ensure that they are well-versed with the authors that students of the environment may be expected to know in their professional careers.
**Grading Basis:** Letter Grade

**ENVM 5038 (3) Nourishing Humanity within Planetary Boundaries - Intro to Food Systems**
Take a holistic approach to exploring environmental, economic, social, and cultural dimensions of agri-food sustainability. Conceptualize food systems and their dynamics, recognize their achievements, come to terms with their role in environmental and social ills, and explore a range of promising alternative practices for rebalancing and building resilience in food systems. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.
**Recommended:** Corequisite ENVS 6305.
**Grading Basis:** Letter Grade

**ENVM 5039 (1) Front Range Food System Field Lab**
Venture into the food system of the Front Range to consider a range of strategies and career paths for rebalancing and building resilience in food systems. This field lab complements the material studied in ENVM 5038 - Nourishing Humanity within Planetary Boundaries: Intro to Food Systems. Formerly offered as a special topics course.
**Requisites:** Requires corequisite course of ENVM 5038. Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5040 (3) MENV Clinic**
Seeks to bring the ideas and resources of supervised MENV students to bear on real-world, real-time resilience and sustainability challenges facing Colorado communities and organizations, with an emphasis on supporting under-served and at-risk populations and places. Through research, written reports, stakeholder interviews and other methods, MENV students gain critical skills and knowledge while providing valuable professional services.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to Master of the Environment (MENV) graduate students only.
**Recommended:** Prerequisite Second year MENV graduate students.
**Grading Basis:** Letter Grade

**ENVM 5041 (3) Sustainability & Resilience in Practice**
Explore sustainability strategies at the community scale and the drivers of decision making and investment in sustainability action. We will explore various approaches to sustainability with the goal of answering the question, ¿How do sustainability leaders engage with diverse stakeholders and decision makers to implement effective, equitable solutions to environmental problems?¿ We will select topics and case studies within Colorado that represent different kinds of challenges for sustainability planning and programs and evaluate solutions for each.
**Requisites:** Restricted to Master of the Environment (MENV) graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5042 (3) Renewable Energy Development & Project Finance**
Renewable Energy Development & Project Finance will present students with a sampling of the day-to-day work of clean energy industry professionals. The course will focus on the business of decarbonizing the energy sector and deploying clean and efficient energy technologies from several distinct perspectives, including (1) renewable energy project development; (2) corporate renewable energy procurement; and (3) energy solutions for the built environment.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite The course will assume that students have some understanding of the energy space, therefore a background in energy topics including graduate-level work in energy policy, finance, law, business, or engineering is recommended.
**Grading Basis:** Letter Grade

**ENVM 5043 (1) Benefit Cost Analysis**
Analyze the environmental, economic, and international dimensions of a range of food production systems. Focuses on the economic benefit-cost analyses (BCA) that inform decision-making in food systems. BCA is a widely used economic valuation tool that involves estimating all benefits and costs in monetary terms and then adding and comparing those values and can help communicate the economic benefit of a proposed intervention. Formerly offered as a special topics course.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites ENVM 5038 and ENVM 5039.
**Grading Basis:** Letter Grade

**ENVM 5044 (1) Life Cycle Assessment - Bringing Objectivity into Subjective Conversations**
Use the food system landscape to provide an introduction to life cycle thinking, including a survey of industry standards, approaches and tools useful in better understanding and making decisions around sustainability. Formerly offered as a special topics course.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites ENVM 5038 and ENVM 5039.
**Grading Basis:** Letter Grade

**ENVM 5045 (1) Introduction to Monitoring & Evaluation**
Gain an understanding of traditional and new approaches to monitoring and evaluation (M&E) in the context of food and water, sanitation and hygiene (WASH) systems in the developing world. Covers rigorous impact evaluation designs and when to use each.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites Intro to Food Systems (ENVM 5038) & Front Range Food Systems Field Lab (ENVM 5039).
**Grading Basis:** Letter Grade

**ENVM 5046 (3) International Energy and Sustainability**
This course is intended to explore the way in which different countries and cities around the world are approaching their transition to a sustainable and carbon free economy, highlighting the technologies, policies, economics, that underlie each country and city¿ approach. The classroom portion of the course will take place throughout the spring semester, meeting weekly for 1 hr. It will set the stage for the travel portion of the trip to a selected location, with the intent of witnessing some of the key urban sustainability and zero carbon technology and infrastructure solutions. The international component of the trip is anticipated to take place over a 10-12 day period (including travel).
**Recommended:** Prerequisite background in energy and or sustainability and application is required.
**Grading Basis:** Letter Grade

**ENVM 5047 (3) Collaborative Skills for Sustainable Solutions**
Collaborating is a core competency of sustainability. Meaningful collaboration is a combination of processes that provide a framework for decision-making and skills that are used within that framework. The course will approach collaborative skills from a practitioner¿s perspective and will draw from theory and practice as well as role play exercises related to the sustainable use of natural resources. Students will develop skills that make collaboration effective along with their application in the environmental, energy, and sustainability sectors.
**Requisites:** Restricted to Master of the Environment (MENV) graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5048 (3) Marketing Sustainability and CSR**
This course is designed to help students understand the power of marketing and branding within a context of Sustainability and Social Justice.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite some reading and critical reflection about business and the role of business in society.
**Grading Basis:** Letter Grade

**ENVM 5049 (3) Foundations of Environmental and Natural Resource Economics**
Introduces economic models, methods, and tools to analyze environmental and natural resource systems, their uses and issues, and policy solutions. Applies economic approaches to topics such as pollution, climate change, household waste and recycling, agriculture and food security, toxic substances and environmental justice, energy, forestry, fisheries, land, and water.
**Requisites:** Restricted to Graduate (GRAD) and Non-Degree Graduate (NDGR) students.
**Grading Basis:** Letter Grade

**ENVM 5050 (3) Social Innovation and Sustainable Cities**
Explore the emerging field of social innovation in the context of sustainable urban development; examine the core concepts, case studies and best practices that define it in areas such as carbon-neutral cities, impact investing/finance, modular housing, renewable energy, sustainable food production and urban mobility and develop our own social innovation ideas and models. Previously offered as special topics course.
**Requisites:** Restricted to Master of the Environment (MENV) graduate students only.
**Recommended:** Prerequisite ENVM 5026.
**Grading Basis:** Letter Grade

**ENVM 5051 (3) Humans, Environment, and Justice**
This course will examine the justice implications of the relationship between humans and the natural environment and in particular land use. We will take as a premise that all people have the right to access clean water, air and soil and to be free of contamination and hazardous pollution. We will look at current struggles and debates around topics of environmental quality and the processes that deny people access to basic resources.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5052 (3) Transportation, Mobility & Sustainable Cities**
The transportation sector is undergoing a revolution, with the sharing economy, new mobility options and technology advances changing not just how we travel but changing the makeup of cities themselves. This course will prepare students to be knowledgeable and effective practitioners in this revolution. Current transportation topics and policy debates will range from how we design our streets, to managing congestion, and how we price and pay for it all.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5053 (3) Climate Change: What Communities and Businesses Need to Know**
Course will cover fundamentals of climate change and review the scientific consensus on the causes of climate change and its associated impacts. Students will examine impacts of climate change on public and private sector, and potential responses, as well as an overview of federal and state policy responses. They will examine the challenges and opportunities that face public and private sector decision-makers every day as they work to reduce carbon pollution and prepare for future climate impacts. Previously offered as special topics course.
**Recommended:** MENV graduate students.
**Grading Basis:** Letter Grade

**ENVM 5054 (3) Stakeholder Engagement: Processes, Practices, Politics**
This course is organized around stakeholder engagement issues that are important to understand both within and across the MENV¿s 5 areas of specialization (environment and natural resources policy, renewable and sustainable energy, urban resilience and sustainability, sustainable food systems, and sustainability in the outdoor industry). Throughout the course, we examine stakeholder processes, practices, and politics and apply these to a variety of cases, issues, challenges, and opportunities. The course is divided into three units designed to educate students holistically on stakeholder engagement. Unit One begins with ¿the big picture¿ of stakeholder engagement, examining how it is done in different contexts and cases. Unit Two focuses on techniques for and processes of engagement so that you will have a variety of ¿tools in your toolbox¿ to use as needed in different situations. Unit Three focuses on the perspectives of different communities that employ stakeholder engagement and also, in cases, serve as
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5055 (3) Data Science and Visualization**
Explores ways of searching for and collecting relevant data and presents ways of cleaning, understanding, analyzing, and presenting such data. This class will require a basic understanding of mathematical concepts, statistics, and computer programming with a focus on the ability to use the R statistical programming language.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5057 (3) Introduction to Resilience Management**
In the era of COVID-19 and Climate Change, building resilience in our communities, economies and natural environments is a fundamental element of reframing and executing functional governance, green economies, policies and programs. The course is gaged to give students a firm understanding of resilience thinking and how to apply resilience tools across sectors of society.
**Grading Basis:** Letter Grade

**ENVM 5059 (3) Global Consulting for Environmental Professionals**
Experience the professional rigors of consulting while learning how to navigate the global economy, international business cultures, economic conditions, and differences in business between the US and other countries. You will be part of a team of 3-5 students that will deliver a strategic solution to a real-world company working to solve a global social, sustainability and/or environmental problem.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5060 (3) Governing for Sustainable Communities**
To make a sustainable environment, we need to have legal and governmental structures and rules that foment -- and do not stymie -- sustainable practices. This course explores how we govern for sustainable outcomes at all levels of governance, with a focus on the local. We will also examine the role that courts play in determining the lawfulness of such governance. Students will have an opportunity to role-play as lawmakers.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5061 (3) B Impact Clinic**
Evaluate sustainability and social impact performance for client companies using B Lab¿s B Impact Assessment (BIA). The BIA, a prerequisite for B Corp Certification, is used by over 100,000 businesses worldwide. Weekly workshops train students on the BIA, Certified B Corporations, and client engagement skills. Students offer consulting throughout the semester, culminating with the delivery of impact improvement recommendations.
**Recommended:** Prerequisite it is strongly recommended that students either have completed at least one graduate-level MENV or MBA course on business fundamentals, business operations, sustainable business, or equivalent; or have a minimum of 2 years full time professional experience in a for-profit business.
**Grading Basis:** Letter Grade

**ENVM 5062 (3) Zero Carbon Buildings**
Review of the current standards for Net Zero Energy and Carbon (NZE and NZC). Understanding building efficiency metrics and methods, onsite renewable energy considerations, building electrification, embodied carbon transportation impacts, and offsite renewable energy options. Integration of electric vehicle loads and conducting load shaping to minimize carbon impact on a time of use basis. City and utility policies and programs.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5063 (3) Agroecology**
Integrating a scientific framework, and ecological concepts with a concern social justice and cultural regeneration, this class introduces students to Agro-ecology as a discipline and a set of practices highlighting the multi-functionality of agricultural systems. We will also explore Agro-ecology as a social movement that aims to leverage traditional ecological knowledge to decolonize the multiple ecologies from seed to gut.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite ENVM 5308.
**Grading Basis:** Letter Grade

**ENVM 5064 (3) Introduction to Sustainability in the Outdoor Industry**
Providing an introduction to public lands and natural resources policy, challenges and opportunities for community economic development, and the outdoor recreation industry. Outdoor recreation economy definitions, theories and frameworks are discussed and critically examined. Key stakeholders are identified, along with current and future trends, opportunities, and challenges. The need for sustainable practices and cross-cultural understanding and communication within the outdoor recreation economy is also emphasized. Finally, we will explore the diverse career opportunities that exist within the outdoor recreation industry.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5065 (3) Community Economic Development and the ORE**
Introduces community economic development theories, frameworks, and processes, as relevant to the ORE. Best practices for building the ORE within all types of communities are discussed, highlighting the importance of equitable, community-focused, integrated, and sustainable destination development practices. Tying this all together is the importance of community economic development in building community capacity for the future.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5066 (3) Environmental Stewardship: Practice and Law**
Addresses the context in which environmental laws have been created, as well as the customs and laws related to resilience, sustainability, stewardship, and honorable practice. It will concentrate on law as a means of market regulation, cultural expression, health, equity, and justice. Water and land law, property rights, wildlife and public land management, and other topics of historical and ongoing relevance will be discussed.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5067 (3) Building Community Capacity**
Assist partner communities who are looking to build community capacity through outdoor recreation. Students learn and apply best practices related to building community capital and trust, assessing community strengths, providing strategic planning and guidance, engaging diverse community stakeholders, developing successful partnerships and identifying relevant programs, partners and funding sources to assist with community economic development.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5068 (3) Qualitative Methods for Sustainability**
Qualitative Research Methods is oriented to students who are likely to engage in research of any kind, formal or informal, that is concerned with people and the environment. It will cover the methods, employed in social sciences, that help us understand people's perceptions, beliefs, motivations, and actions around environmental issues.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5070 (3) Consulting in Practice: Introduction to Individual and Group Consulting**
Learn the basics of consulting in this class. Great consultants are strategists and problem solvers. They know how to sort through complexity and uncertainty to assess the core issue that a client needs to address. In this class students will learn 101 skills such as: project definition, scoping, proposal writing, project management of deliverables, contracts, and relationship management.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5071 (3) Facilitation for Change**
Learn how to guide groups toward agreement while increasing productivity and connection. Facilitation is the process of guiding a conversation with intention and skill toward the desired outcome. It is used for projects ranging from small-scale, brief gatherings to multi-year projects involving hundreds of people. In this class, we will learn the main types of facilitation and how they can be used effectively in varied professional and community settings. This class is open to anyone with an interest in facilitation regardless of current skill.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5072 (3) Energy Markets, Transactions and Policy**
Review the various regulatory structures and markets that exist (including the various ISOs and RTOs), the overarching federal policy structure and entities that govern them, and the opportunities for utilities, renewable energy developers, and end-users to engage with those markets and work within and navigate the completed energy landscape.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites ENVM 5006 and 5007.
**Grading Basis:** Letter Grade

**ENVM 5074 (3) Conservation Management: Policies, Leadership and Best Practices**
Introduces students to complex conservation issues and examine how governments, tribes and organizations have, and continue to nurture and conserve healthy land and waterscapes, while balancing a variety of human impacts and uses. Students will examine how conservation policymaking occurs and the importance of governance, more broadly, in conserving our natural resources. Indigenous and traditional knowledge surrounding land and water use and management internationally are examined including the integration of said knowledge in the management of public lands. Relevant tools and methods that are used are examined alongside best management practices at a local, regional and international level. These include the importance of engaging and collaborating with diverse stakeholder groups and recognizing the multiple disciplines, lived experiences and perspectives that all contribute to conservation management.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5075 (3) Equity in the Outdoors**
DEI is an ongoing learning process and requires commitment, personal leadership, and accountability. Building a community, work environment, and society that is diverse, inclusive, equitable, and just requires a foundation from which to develop. This course offers students insight into the importance of diversity, equity and inclusion as it relates to the outdoor industry and the importance of removing barriers to access for people from all backgrounds and lived experience to not only the outdoors, but the outdoor industry. Key challenges and opportunities surrounding DEI within the ORE will be examined, alongside some tools and strategies that students can use to help lead the transition to a more equitable outdoor industry. This course will enable students to be a part of developing an inclusive foundation for their respective organizations and communities with knowledge, tools, and best practices from global leaders within the outdoor recreation economy and beyond.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5076 (3) Entrepreneurship and Applied Project Management**
This course is an applied project-based course where students will partner with a business, non-profit organization or community to address an identified problem or opportunity related to the outdoor industry. Over the course of the semester, students will be introduced to business fundamentals, project management, and other relevant skills and knowledge to help them with their projects and to better understand and manage the entrepreneurial landscape. Whether students are interested in working for a start-up, small-medium sized enterprise, non-profit or government agencies, the need for entrepreneurial thinking and skills are essential and can be applied across all sectors. Real-world project experience will be gained through participating in the Wright Collegiate Challenge ¿ a friendly competition supported by the Colorado Outdoor Recreation Industry Office where students work in small teams to help a business, organization or community address an identified problem or opportunity related to the outdoor in
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5077 (3) Circular Economy and Sustainability**
Fundamentals of a circular economy, the business value in a circular economy, how business models are presently shifting, and why businesses should become part of this transformational shift. This course will also cover knowledge and skills needed to critique and improve sustainability outcomes for businesses and their stakeholders.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5078 (3) Sustainable Business Practice**
Provide students with the knowledge and tools to drive environmental and social responsibility in the business sector. Focus will be creating the case for a new business model by looking at market failures, the environmental crisis, and the critical role businesses play in being a force for good and exploring the practical tools required to implement sustainable solutions.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5079 (3) The Science and Practice of Sustainable Agriculture**
Explore the underlying biology and ecology of crop and animal agricultural production systems. The goal of this class is to equip students with a base understanding of the ecology of agricultural systems, gain applicable vocabulary and concepts related to agriculture and an understanding of the challenges and opportunities farmers face when seeking sustainable solutions.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5080 (3) Low-Carbon Energy Technologies of the Future**
Transitioning to a zero-carbon future will require major and fundamental changes in energy systems. Numerous advanced energy-related technologies and concepts are being explored - but which ones will succeed? This course takes a closer look at green hydrogen, advanced nuclear, carbon capture and storage (CCS), enhanced geothermal, and others; to better understand their potentials, limitations, and likely future impacts.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites of ENVM 5007, ENVM 5042, and ENVM 5072.
**Grading Basis:** Letter Grade

**ENVM 5081 (3) Climate and Energy Justice**
This course explores the roots of environmental injustice and evaluates solutions through a socio-ecological framework. Students apply strategies and tools to identify injustice in underserved communities.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites ENVM 5018 The Scientific Basis of Environmental Change.
**Grading Basis:** Letter Grade

**ENVM 5082 (3) Conservation and Sustainable Development in Brazil's Tropical Forests**
Brazil¿s tropical forests sequester and store carbon, harbor biodiversity, and support the livelihoods of millions of forest-dependent people. This Global Intensive Education Abroad class takes 12 MENV students to Brazil for two weeks, with one week in each of the Amazon and Atlantic Forest biomes. We work closely with Brazilian graduate students and professors to visit communities and talk with stakeholders about their efforts to promote conservation and sustainable development in Brazil¿s forests.
**Requisites:** Restricted to graduate students only.
**Recommended:** by application only.
**Grading Basis:** Letter Grade

**ENVM 5083 (3) GHG Accounting and Management**
Introduces students to the fundamentals of greenhouse gas accounting and management, including market trends, GHG inventory development, data analysis, strategic planning, and carbon markets. A particular focus will be paid to practical knowledge, with students developing and analyzing a detailed, Excel-based inventory model.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite Students are strongly encouraged to have at least an intermediary working knowledge of Excel prior to beginning this course, including familiarity with formulas and functions such as Sum, Index Match, X Lookup, If Statements, Pivot Tables and charts.
**Grading Basis:** Letter Grade

**ENVM 5084 (3) The Water-Energy-Food Nexus**
This course examines the concept, principles, and application of the Water-Energy-Food Nexus and their implications for sustainable development. The course explores contemporary and historical issues related to each of the water, energy, and food sectors, their interconnections, and opportunities for positively reinforcing policy decisions based on a nexus approach. Students will learn how the nexus concept developed in conjunction with ideas around international development; explore emerging technological solutions to nexus issues; and analyze specific problems and case studies of the nexus drawn from local, national, and international levels.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5085 (3) Product Life Cycle Assessment (LCA)**
How can we objectively determine which products are more sustainable? How are product carbon footprints done? How can business decisions and marketing claims on such topics be made with confidence? LCA provides the basis for answering these questions, but it has limitations of its own that need be understood as well. Students will learn the theoretical underpinnings of LCA as well as their practical application through conducting an LCA of their own on a product of their choosing. At the end of the course students should be able to successfully complete the required exam for the ACLCA professional LCACP certification.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 5750 (3) Climate Politics and Science-Policy**
Explores, understands and critically analyzes influences and trends in climate politics and science-policy. Course participants will gain an improved understanding of the myriad factors, pressures and processes that are involved in contemporary climate politics under-girding explicit policy proposals. Course participants will more capably identify consequential spaces of decision-making, recognize tractable places for change and fashion constructive strategies for their own research by way of best available evidence from work done in these areas. Overall, our attention to these course themes, concepts and case studies will help us to more capably understand, analyze and engage in the high-stakes 21st century arena of climate politics and science-policy. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 5750, GEOG 5750 and SOCY 5750
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**ENVM 6001 (1) Capstone Innovation Lab 1**
Providing hands-on, learning-by-doing experiences, while also providing client organizations with solutions to complex problems and useful products. Projects can take place in-residence with a client, when appropriate. Project ideas will be codeveloped by students and industry, government, or non-profit partners and will be guided and evaluated by a committee of ENVS faculty. Required for all MENV students.
**Requisites:** Restricted to Master of the Environment (MENV) graduate students only.
**Grading Basis:** Letter Grade

**ENVM 6002 (2) Capstone Innovation Lab 2**
Providing hands-on, learning-by-doing experiences, while also providing client organizations with solutions to complex problems and useful products. Projects can take place in-residence with a client, when appropriate. Project ideas will be codeveloped by students and industry, government, or non-profit partners and will be guided and evaluated by a committee of ENVS faculty. Required for all MENV students.
**Requisites:** Requires a prerequisite course of ENVM 6001 (minimum grade C). Restricted to Master of the Environment (MENV) graduate students only.
**Grading Basis:** Letter Grade

**ENVM 6003 (5-6) Capstone Project**
Providing hands-on, learning-by-doing experiences, while also providing client organizations with solutions to complex problems and useful products. Projects can take place in-residence with a client, when appropriate. Project ideas will be codeveloped by students and industry, government, or non-profit partners and will be guided and evaluated by a committee of ENVS faculty. Required for all MENV students.
**Requisites:** Requires a prerequisite course of ENVM 6002 (minimum grade C). Restricted to Master of the Environment (MENV) graduate students only.

**ENVM 6004 (1) Capstone Leadership Lab**
Providing hands-on, learning-by-doing experiences, while also providing client organizations with solutions to complex problems and useful products. Projects can take place in-residence with a client, when appropriate. Project ideas will be codeveloped by students and industry, government, or non-profit partners and will be guided and evaluated by a committee of ENVS faculty. Required for all MENV students.
**Requisites:** Requires a prerequisite course of ENVM 6003 (minimum grade C). Restricted to Master of the Environment (MENV) graduate students only.
**Grading Basis:** Letter Grade

**ENVM 6005 (3) Capstone Innovation Lab (CIL)**
Develops professional practice via the process of selecting, scoping, and launching a MENV Capstone Project.
**Requisites:** Restricted to Master of the Environment (MENV) graduate students only.
**Grading Basis:** Letter Grade

**ENVM 6100 (3) Special Topics for Master of the Environment Program**
A variety of topics not currently offered in curriculum; offered depending on instructor availability and student demand.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**ENVM 6101 (1-3) Special Topics for Master of the Environment Program**
A variety of topics not currently offered in curriculum; offered depending on instructor availability and student demand.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**ENVM 6302 (3) Sustainable Landscapes, Sustainable Livelihoods**
Examines rural transformation and the adoption of recreation economies in communities across the U.S. West in response to burgeoning recreation industry and interest in public lands. Students will evaluate different approaches for developing and managing recreation economies in small towns that consider diverse social, cultural, economic, and environmental constraints as well as opportunities in a time of rapid change. Project-based course. Students learn techniques to gather and synthesize data that support solution development.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 6302
**Recommended:** Prerequisite one year of MENV, ENVS, MBA or relevant graduate work.
**Grading Basis:** Letter Grade

**ENVM 6840 (1-4) Masters of the Environment Independent Study**
An independent study is a collaboration between a student and a faculty member on a special project that provides the student with a learning experience. An independent study may also fill an academic need of importance to the student that cannot be filled by regular course offerings. Independent studies are opportunities for students to earn credit for learning outside the normal lecture and seminar class structure. All independent study requests must be considered and approved by MENV program administration for approval.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Grading Basis:** Letter Grade

# Materials Science and Engineering (MSEN)

## Courses

**MSEN 2000 (3) Materials in Technology**
Introduces the basic principles of materials science including material properties and function with a focus on the role of materials in technology. Explores the current research and industrial applications of materials in biotechnology, medicine, energy, sustainability, computing, and construction.
**Requisites:** Requires prerequisite or corequisite courses of CHEN 1201, CHEM 1113, CHEM 1400, ASEN 1022, or MCEN 1024 (minimum grade D-).

**MSEN 5000 (1-3) Fundamentals of Materials Science and Engineering**
Discusses fundamental topics in materials science and engineering.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**MSEN 5064 (3) Soft Machines**
Introduces soft machines as a new paradigm of engineering that starts to impact healthcare, consumer electronics, renewable energy and collaborative robotics. Prepares students to participate in research on soft machines by starting with fundamentals of soft materials and by covering soft robotics, stretchable electronics, energy harvesting and functional polymers. Includes guest lectures, a literature review and a hands-on lab project.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4046 and MCEN 5046
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechancial (MCEN) majors or College of Engineering graduate students only.
**Grading Basis:** Letter Grade

**MSEN 5270 (3) Materials Characterization for Engineering**
Rigorous materials characterization is at the heart of understanding property-structure-processing relationships of materials, including soft matter. The goal of the course is to prepare graduate students to understand the basic principles behind material characterization tools and techniques. This class will offer students (1) an introduction to the principles and practice of diffraction, (2) introductory exposure to common characterization methods for the determination of structure, composition, and defects in inorganic and organic solids.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**MSEN 5370 (3) Materials Thermodynamics and Kinetics**
Reviews fundamentals of thermodynamics and kinetics and applies them to understand the chemical, thermal, and mechanical behavior of materials. Examines equations of state, solution theory, equilibrium diagrams, and phase changes. Examines kinetics of phase transformations including theories of diffusion, nucleation and growth, and solidification.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**MSEN 5430 (3) Transmission Electron Microscopy in Materials Science & Engineering**
This course provides a comprehensive introduction to transmission electron microscopy (TEM) as a powerful characterization tool in materials science. It is aimed at beginners and intermediate users of TEM and covers both the theoretical and practical aspects of advanced electron microscopy techniques. By taking this course, students will be able to interpret and analyze TEM data and understand electron microscopy publications. Students will learn the necessary theoretical basis for taking practical training on modern aberration-corrected TEMs. Previously offered as a special topics course.
**Requisites:** Restricted to students with 87-180 credits (Senior, 5th Yr Senior) or graduate students only.
**Recommended:** Prerequisite Experience on electron microscopy is recommended but not necessary.
**Grading Basis:** Letter Grade

**MSEN 5470 (3) Materials Composition and Structure**
The synthesis, organization, and processing of materials can enable functional performance. Curriculum will overview the synthesis and design of functional organic and inorganic materials. A particular emphasis will be placed on structure-performance correlations between chemistry and materials organization. Topical foci will include polymers, biomaterials, and materials for energy.

**MSEN 5840 (1-6) Independent Study**
Offers an opportunity for students to do independent work. Subject arranged to fit the needs of the student.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to MS and PhD students in the Materials Science and Engineering program (MTEN) only.

**MSEN 5919 (1-5) Special Topics in MSE: Mass Transport**
Mass Transport Phenomena for Materials & Membranes: Fundamentals of mass transport with particular attention to design problems associated with materials science (reactive 3d printing), electrochemistry and energy systems (fuel cells & batteries), environmental concerns ($CO_2$ capture), and general separations (water desalination). The principles of transport phenomena in material systems, involving multiple components, phases, chemical reaction, and simultaneous momentum, heat and mass transport will be discussed
**Repeatable:** Repeatable for up to 10.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**MSEN 6101 (1) Seminar in Materials Science and Engineering**
Required of all materials science and engineering PhD students. Student, faculty, and guest presentations and discussions of current research in materials science and engineering.
**Recommended:** first- and second-year materials science and engineering PhD MSE students.
**Grading Basis:** Letter Grade

**MSEN 6930 (3) Materials Science and Engineering Professional Internship**
This class provides a mechanism for MSE graduate students to receive academic credit for internships with industry partners that include an academic component suitable for graduate-level work. Participation in the course will consist of an internship agreement between the student and an industry partner who will employ the student in a role that supports the academic goals of the MSE program and the internship. Instructor participation will include facilitation of the mid-term and final assessments of student performance as well as support for any academic-related issues that may arise during the internship period. May be taken during any term after one semester of coursework in MSE graduate program.
**Grading Basis:** Letter Grade

**MSEN 6950 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to MS students in the Materials Science and Engineering program (MTEN) only.

**MSEN 8990 (1-10) Doctoral Dissertation**
Doctoral Dissertation hours
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to PhD students in the Materials Science and Engineering program (MTEN) only.

# Mathematics (MATH)

## Courses

**MATH 1005 (3) Introduction to College Mathematics**
Introductory level mathematics course which presents a college level introduction to algebraic functions and their applications. Only offered through the Student Academic Service Center.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 1011
**Additional Information:** MAPS Course: Mathematics

**MATH 1011 (3) College Algebra**
Covers simplifying algebraic expressions, factoring, linear and quadratic equations, inequalities, exponentials, logarithms, functions, graphs and systems of equations. Department enforced prerequisite: one year high school algebra.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 1005
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
MAPS Course: Mathematics

**MATH 1012 (3) Quantitative Reasoning and Mathematical Skills**
Promotes mathematical literacy among liberal arts students. Teaches basic mathematics, logic, and problem-solving skills in the context of higher level mathematics, science, technology, and/or society. This is not a traditional math class, but is designed to stimulate interest in and appreciation of mathematics and quantitative reasoning as valuable tools for comprehending the world in which we live.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 1112
**Additional Information:** GT Pathways: GT-MA1 - Mathematics
Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
MAPS Course: Mathematics

**MATH 1021 (3) College Trigonometry**
Covers trigonometric functions, identities, solutions of triangles, addition and multiple angle formulas, inverse and trigonometric functions and laws of sines and cosines. Department enforced prerequisite: MATH 1011 (minimum grade C-) or 1 1/2 years of high school algebra and 1 year of high school geometry.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1235 or MATH 1150

**MATH 1071 (3) Finite Mathematics for Social Science and Business**
Discusses systems of linear equations and introduces matrices, linear programming, and probability.
**Requisites:** Requires prerequisite course of MATH 1011 (minimum grade C-) or a score of 46% or greater on an ALEKS math exam taken in 2016 or earlier.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**MATH 1081 (3) Calculus for Social Science and Business**
Covers differential and integral calculus of algebraic, logarithmic and exponential functions. For more information about the math placement referred to in the "Enrollment Requirements", contact your academic advisor.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1345 or APPM 1350 or ECON 1088 or MATH 1300 or MATH 1310 or MATH 1330
**Requisites:** Requires prerequisite course of ECON 1078 or MATH 1011 or MATH 1071 or MATH 1150 or MATH 1160 (minimum grade C-) or an ALEKS math exam taken in 2016 or earlier, or placement into pre-calculus based on your admission data and/or CU Boulder coursework.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**MATH 1110 (3) Mathematics for Elementary Educators 1**
Includes a study of problem solving techniques in mathematics and the structure of number systems. Department enforced prereq., one year of high school algebra and one year of geometry. Department enforced restriction: restricted to prospective elementary teachers.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**MATH 1112 (4) Mathematical Analysis in Business**
Gives students experience with mathematical problem solving in real business contexts. Students will work with data and spreadsheets to build and analyze mathematical models. Themes of the course include applying logical operators to model business rules, interpreting data and using tables and graphs, finding break-even and optimal points, and addressing uncertainty and forecasting
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 1012
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
MAPS Course: Mathematics

**MATH 1120 (3) Mathematics for Elementary Educators 2**
Topics include geometry, measurement, probability, and statistics. Department enforced restriction: restricted to prospective elementary teachers.
**Requisites:** Requires prerequisite course of MATH 1110 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**MATH 1130 (3) Mathematics from the Visual Arts**
Introduces mathematical concepts through the study of visual arts.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**MATH 1150 (4) Precalculus Mathematics**
Develops techniques and concepts prerequisite to calculus through the study of trigonometric, exponential, logarithmic, polynomial and other functions. For more information about the math placement referred to in the "Enrollment Requirements", please contact your academic advisor.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1235 or MATH 1021
**Requisites:** Requires prerequisite course of MATH 1011 (minimum grade C-) or an ALEKS math exam taken in 2016 or earlier, or placement into pre-calculus based on your admissions data and/or CU Boulder coursework. Requires enrollment in corequisite course MATH 1151.
**Additional Information:** GT Pathways: GT-MA1 - Mathematics
Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
MAPS Course: Mathematics

**MATH 1151 (1) Precalculus Supplemental Lab**
Provides students concurrently enrolled in MATH 1150 with supplemental instruction.
**Requisites:** Requires enrollment in corequisite course of MATH 1150.
**Grading Basis:** Letter Grade

**MATH 1160 (3) Transition to Calculus (IBL): The Theory, Applications and Analysis of Functions**
Examines the functions of calculus and how they can be used to model concrete problems and/or change. This is an intensive study of these functions through Inquiry-Based Learning. Each class will be designed so students will be actively engaged in learning the material in small groups. For more information about the math placement referred to in the "Enrollment Requirements", please contact your academic advisor.
**Requisites:** Requires an ALEKS math exam taken in 2016 or earlier, or placement into pre-calculus based on your admissions data and/or CU Boulder coursework.

**MATH 1212 (3) Data and Models**
Engages students in statistical and algebraic problem solving through modeling data and real world questions taken from the social and life sciences. The course will emphasize these skills and the mathematical background needed for a university level statistics course.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 1011
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
MAPS Course: Mathematics

**MATH 1300 (5) Calculus 1**
Topics include limits, derivatives of algebraic and transcendental functions, applications of the derivative, integration and applications of the definite integral. Students who have already earned college credit for calculus 1 are eligible to enroll in this course if they want to solidify their knowledge base in calculus 1. For more information about the math placement referred to in the "Enrollment Requirements", contact your academic advisor.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1345 or APPM 1350 or ECON 1088 MATH 1081 or MATH 1310 or MATH 1330
**Requisites:** Requires prerequisite course of MATH 1011 and MATH 1021 or MATH 1150 or MATH 1160 or APPM 1235 (minimum grade C-) or an ALEKS math exam taken in 2016 or earlier, or placement into calculus based on your admissions data and/or CU Boulder coursework.
**Additional Information:** GT Pathways: GT-MA1 - Mathematics
Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**MATH 1301 (1) Calculus 1 Supplemental Lab**
Provides students concurrently enrolled in MATH 1300 with supplemental instruction.
**Requisites:** Requires corequisite course of MATH 1300.
**Grading Basis:** Letter Grade

**MATH 1310 (5) Calculus for Life Sciences**
Calculus concepts are developed through the analysis and modeling of complex systems, ranging from gene networks and cells to populations and ecosystems. Fundamental concepts of probability and statistics are also developed through the lens of calculus. MATH 1300 is similar, but a greater emphasis is placed on relevance and applications in biology and other life sciences. Students who have already earned college credit for calculus 1 are eligible to enroll in this course if they want to solidify their knowledge base in calculus 1. For more information about the math placement referred to in the "Enrollment Requirements", contact your academic advisor.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1345 or APPM 1350 or ECON 1088 or MATH 1081 or MATH 1300 or MATH 1330
**Requisites:** Requires prerequisite course of APPM 1235 or MATH 1021 or MATH 1150 or MATH 1160 or MATH 1300 (minimum grade C-) or an ALEKS math exam taken in 2016 or earlier, or placement into calculus based on your admissions data and/r CU Boulder coursework.
**Additional Information:** GT Pathways: GT-MA1 - Mathematics
Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**MATH 1330 (4) Calculus for Economics and the Social Sciences**
A calculus course intended to meet the needs of social science and economics majors, including applications. Covers differential and integral calculus of algebraic, logarithmic and exponential functions and modeling. For more information about the math placement referred to in the "Enrollment Requirements", contact your academic advisor.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1345 or APPM 1350 or ECON 1088 or MATH 1081 or MATH 1300 or MATH 1310
**Requisites:** Requires a prerequisite course of ECON 1078 or MATH 1011 or MATH 1071 or MATH 1150 or MATH 1160 (minimum grade C-) or an ALEKS math exam taken in 2016 or earlier, or placement into calculus based on your admissions data and/r CU Boulder coursework.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**MATH 2001 (3) Introduction to Discrete Mathematics**
Introduces the ideas of rigor and proof through an examination of basic set theory, existential and universal quantifiers, elementary counting, discrete probability, and additional topics.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 2002
**Requisites:** Requires prerequisite course of MATH 1300 or MATH 1310 or APPM 1345 or APPM 1350 (all minimum grade C-).

**MATH 2002 (3) Number Systems: An Introduction to Higher Mathematics**
Introduces the concepts of mathematical proofs using the construction of the real numbers from set theory. Topics include basic logic and set theory, equivalence relations and functions, Peano's axioms, construction of the integers, the rational numbers and axiomatic treatment of the real numbers.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 2001
**Requisites:** Requires prerequisite of MATH 1300 or MATH 1310 or APPM 1345 or APPM 1350 (all minimum grade C-).

**MATH 2130 (3) Introduction to Linear Algebra for Non-Mathematics Majors**
Examines basic properties of systems of linear equations, vector spaces, inner products, linear independence, dimension, linear transformations, matrices, determinants, eigenvalues, eigenvectors and diagonalization. Intended for students who do not plan to major in Mathematics. Formerly MATH 3130.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 2135 or APPM 3310
**Requisites:** Requires prerequisite course of MATH 2300 or APPM 1360 (minimum grade C-).

**MATH 2135 (3) Introduction to Linear Algebra for Mathematics Majors**
Examines basic properties of systems of linear equations, vector spaces, inner products, linear independence, dimension, linear transformations, matrices, determinants, eigenvalues, eigenvectors and diagonalization. Intended for students who plan to major in Mathematics. Formerly MATH 3135.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 2130 or APPM 3310
**Requisites:** Requires a prerequisite course of (MATH 2300 or APPM 1360) and (MATH 2001 or MATH 2002) (all minimum grade C-).

**MATH 2300 (5) Calculus 2**
Continuation of MATH 1300. Topics include transcendental functions, methods of integration, polar coordinates, differential equations, improper integrals, infinite sequences and series, Taylor polynomials and Taylor series. Department enforced prerequisite: MATH 1300 or MATH 1310 or APPM 1345 or APPM 1350 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 1360
**Requisites:** Requires prerequisite course of MATH 1300 or MATH 1310 or APPM 1345 or APPM 1350 (minimum grade C-).

**MATH 2380 (3) Mathematics for the Environment**
An interdisciplinary course where environmental issues, such as climate change, global epidemics, pollution, population models and kinship relations of Australian Aborigines are studied with elementary mathematics (such as fuzzy logic). Similar techniques are applied to analyze other current events, such as surveillance, economic meltdowns, identity theft and media literacy. Department enforced prerequisite: proficiency in high school mathematics.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math

**MATH 2400 (5) Calculus 3**
Continuation of MATH 2300. Topics include vectors, three-dimensional analytic geometry, partial differentiation and multiple integrals, and vector analysis. Department enforced prerequisite: MATH 2300 or APPM 1360 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 2350
**Requisites:** Requires prerequisite course of MATH 2300 or APPM 1360 (minimum grade C-).

**MATH 2510 (3) Introduction to Statistics**
Elementary statistical measures. Introduces statistical distributions, statistical inference, hypothesis testing and linear regression. Department enforced prerequisite: two years of high school algebra.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
MAPS Course: Mathematics

**MATH 3001 (3) Analysis 1**
Provides a rigorous treatment of the basic results from elementary Calculus. Topics include the topology of the real line, sequences of numbers, continuous functions, differentiable functions and the Riemann integral.
**Requisites:** Requires prerequisite courses of (MATH 2001 or MATH 2002) and (MATH 2130 or MATH 3130 or MATH 2135 or MATH 3135) (all minimum grade C-).

**MATH 3110 (3) Introduction to Theory of Numbers**
Studies the set of integers, focusing on divisibility, congruences, arithmetic functions, sums of squares, quadratic residues and reciprocity, and elementary results on distributions of primes.
**Requisites:** Requires prerequisite of MATH 2001 or MATH 2002 (both minimum grade C-).

**MATH 3120 (3) Functions and Modeling**
Engages the students in daily projects and occasional in-class labs designed to strengthen and expand knowledge of the topics in secondary mathematics, focusing especially on topics from algebra, precalculus and calculus. Projects and labs involve the use of multiple representations, transformations, data analysis techniques and interconnections among ideas from geometry, algebra, probability and calculus.
**Requisites:** Requires prerequisite of MATH 2001 or MATH 2002 (both minimum grade C-).

**MATH 3130 (3) Introduction to Linear Algebra**
Examines basic properties of systems of linear equations, vector spaces, inner products, linear independence, dimension, linear transformations, matrices, determinants, eigenvalues, eigenvectors and diagonalization.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 3135 or APPM 3310
**Requisites:** Requires prerequisite course of MATH 2300 or APPM 1360 (minimum grade C-).

**MATH 3135 (3) Honors Introduction to Linear Algebra**
Examines basic properties of systems of linear equations, vector spaces, inner products, linear independence, dimension, linear transformations, matrices, determinants, eigenvalues, eigenvectors and diagonalization.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 3130 or APPM 3310
**Requisites:** Requires a prerequisite course of MATH 2300 or APPM 1360 and MATH 2001 (all minimum grade C-).

**MATH 3140 (3) Abstract Algebra 1**
Studies basic properties of algebraic structures with a heavy emphasis on groups. Other topics, time permitting, may include rings and fields.
**Requisites:** Requires prerequisite courses of (MATH 2001 or MATH 2002) and (MATH 2130 or MATH 3130 or MATH 2135 or MATH 3135) (all minimum grade C-).

**MATH 3170 (3) Combinatorics 1**
Covers basic methods and results in combinatorial theory. Includes enumeration methods, elementary properties of functions and relations, and graph theory. Emphasizes applications.
**Requisites:** Requires prerequisite of MATH 2001 or MATH 2002 (both minimum grade C-).

**MATH 3210 (3) Euclidean and Non-Euclidean Geometry**
Axiomatic systems; Euclid's presentation of the elements of geometry; Hilbert's axioms; neutral, Euclidean and non-Euclidean geometries and their models.
**Requisites:** Requires prerequisite courses of (MATH 2001 or MATH 2002) and (MATH 2130 or MATH 3130 or MATH 2135 or MATH 3135) (all minimum grade C-).

**MATH 3430 (3) Ordinary Differential Equations**
Involves an elementary systematic introduction to first-order scalar differential equations, nth order linear differential equations, and n-dimensional linear systems of first-order differential equations. Additional topics are chosen from equations with regular singular points, Laplace transforms, phase plane techniques, basic existence and uniqueness and numerical solutions. Formerly MATH 4430.
**Requisites:** Requires prerequisite courses of (MATH 2400 or APPM 2350) and (MATH 2130 or 3130 or MATH 2135 or 3135 or APPM 3310) (all minimum grade C-).

**MATH 3450 (3) Introduction to Complex Variables**
Theory of functions of one complex variable, including integrals, power series, residues, conformal mapping, and special functions. Formerly MATH 4450.
**Requisites:** Requires prerequisite courses of MATH 2400 or APPM 2350 (minimum grade C-).

**MATH 3510 (3) Introduction to Probability and Statistics**
Introduces the basic notions of Probability: random variables, expectation, conditioning, and the standard distributions (Binomial, Poisson, Exponential, Normal). This course also covers the Law of Large Numbers and Central Limit Theorem as they apply to statistical questions: sampling from a random distribution, estimation, and hypothesis testing.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 2510 or MATH 4510
**Requisites:** Requires a prerequisite course of (MATH 2300 or APPM 1360) and (MATH 2001 or MATH 2002) (all minimum grade C-).

**MATH 3850 (1) Seminar in Guided Mathematics Instruction**
Provides learning assistants with an opportunity to analyze assessment data for formative purposes and develop instructional plans as a result of these analyses. These formative assessment analyses will build on the literature in the learning sciences. Students gain direct experiences interacting with the tools of the trade, especially with actual assessment data and models of instruction. Restricted to learning assistants in Math.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires a corequisite course of EDUC 4610.

**MATH 4000 (3) Foundations of Mathematics**
Focuses on a complete deductive framework for mathematics and applies it to various areas. Presents Goedel's famous incompleteness theorem about the inherent limitations of mathematical systems. Uses idealized computers to investigate the capabilities and limitations of human and machine computation.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5000
**Requisites:** Requires prerequisite courses of MATH 3001 or MATH 3140 or MATH 4730 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**MATH 4001 (3) Analysis 2**
Provides a rigorous treatment of infinite series, sequences of functions and an additional topic chosen by the instructor (for example, multivariable analysis, the Lebesgue integral or Fourier analysis).
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5001
**Requisites:** Requires prerequisite course of MATH 3001 (minimum grade C-).

**MATH 4120 (3) Introduction to Operations Research**
Studies linear and nonlinear programming, the simplex method, duality, sensitivity, transportation and network flow problems, some constrained and unconstrained optimization theory, and the Kuhn-Tucker conditions, as time permits.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5120 and APPM 4120 and MATH 5120
**Requisites:** Requires prerequisite course of MATH 2130 or 3130 or MATH 2135 or 3135 or APPM 3310 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MATH 4140 (3) Abstract Algebra 2**
Explores some topic that builds on material in MATH 3140. Possible topics include (but are not limited to) Galois theory, representation theory, advanced linear algebra or commutative algebra.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5140
**Requisites:** Requires prerequisite course of MATH 3140 (minimum grade C-).

**MATH 4200 (3) Introduction to Topology**
Introduces the basic concepts of point set topology. Includes topological spaces, metric spaces, homeomorphisms, connectedness and compactness.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5200
**Requisites:** Requires prerequisite course of MATH 3001 (minimum grade C-).

**MATH 4230 (3) Differential Geometry of Curves and Surfaces**
Introduces the modern differential geometry of plane curves, space curves, and surfaces in 3-dimensional space. Topics include the Frenet frame, curvature and torsion for space curves; Gauss and mean curvature for surfaces; Gauss and Codazzi equations, and the Gauss-Bonnet theorem.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5230
**Requisites:** Requires prerequisite courses of (MATH 2400 or APPM 2350) and (MATH 2001 or 2002) and (MATH 2130 or MATH 3130 or MATH 2135 or MATH 3135) (all minimum grade C-).

**MATH 4240 (3) Hilbert Spaces and the Mathematics of Quantum Mechanics**
Provides an introduction to Hilbert spaces and their application in quantum mechanics. The primary goal is to prove and understand the so-called spectral theorem, which is crucial for the formulation of quantum mechanics. In addition, some examples from physics will be discussed, such as the quantum harmonic oscillator and the spectrum of the hydrogen atom.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5240
**Requisites:** Requires prerequisite course of MATH 3001 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MATH 4330 (3) Fourier Analysis**
The notion of Fourier analysis, via series and integrals, of periodic and nonperiodic phenomena is central to many areas of mathematics. Develops the Fourier theory in depth and considers such special topics and applications as wavelets, Fast Fourier Transforms, seismology, digital signal processing, differential equations, and Fourier optics.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5330
**Requisites:** Requires prerequisite course of MATH 3001 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MATH 4440 (3) Mathematics of Coding and Cryptography**
Gives an introduction, with proofs, to the algebra and number theory used in coding and cryptography. Basic problems of coding and cryptography are discussed.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5440
**Requisites:** Requires prerequisite course of MATH 2130 or 3130 or MATH 2135 or 3135 (minimum grade C-).

**MATH 4470 (3) Partial Differential Equations**
Studies initial, boundary, and eigenvalue problems for the wave, heat, and potential equations. Solution by separation of variables, Green's function, and variational methods.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5470
**Requisites:** Requires prerequisite courses of MATH 3430 (minimum grade C-).

**MATH 4510 (3) Introduction to Probability Theory**
Studies axioms, combinatorial analysis, independence and conditional probability, discrete and absolutely continuous distributions, expectation and distribution of functions of random variables, laws of large numbers, central limit theorems, and simple Markov chains if time permits.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 3570 or ECEN 3810 or MATH 3510 MATH 5510
**Requisites:** Requires prerequisite courses of (MATH 2400 or APPM 2350) and (MATH 2130 or 3130 or MATH 2135 or 3135) (all minimum grade C-).

**MATH 4520 (3) Introduction to Mathematical Statistics**
Examines point and confidence interval estimation. Principles of maximum likelihood, sufficiency, and completeness: tests of simple and composite hypotheses, linear models, and multiple regression analysis if time permits. Analyzes various distribution-free methods.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5520 and STAT 4520 and STAT 5520
**Requisites:** Requires prerequisite course of MATH 4510 or APPM 3570 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MATH 4530 (3) Theoretical Foundations of Data Science**
Introduces theoretical concepts from mathematics, statistics, and computer science required to understand and analyze data. Topics include randomized algorithms, machine learning, streaming, sketching, clustering, random matrices and graphs, graphical models and compressed sensing.
**Requisites:** Requires prerequisite courses of (MATH 2130 or MATH 2135) and MATH 4510 (minimum grade C-).

**MATH 4540 (3) Introduction to Time Series**
Studies basic properties, trend-based models, seasonal models, modeling and forecasting with ARIMA models, spectral analysis and frequency filtration.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5540 and STAT 4540 and STAT 5540
**Requisites:** Requires prerequisite course of MATH 4520 or APPM 4520 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MATH 4650 (3) Intermediate Numerical Analysis 1**
Focuses on numerical solution of nonlinear equations, interpolation, methods in numerical integration, numerical solution of linear systems, and matrix eigenvalue problems. Stresses significant computer applications and software. Department enforced prerequisite: knowledge of a programming language.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4650
**Requisites:** Requires a prerequisite course of MATH 3430 or APPM 2360 and APPM 3310 (minimum grade C-).

**MATH 4730 (3) Set Theory**
Studies in detail the theory of cardinal and ordinal numbers, definition by recursion, the statement of the continuum hypothesis, simple cardinal arithmetic and other topics chosen by the instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5730
**Requisites:** Requires prerequisite courses of MATH 3001 or MATH 3110 or MATH 3140 or MATH 3170 or MATH 3210 or MATH 3510 or MATH 4230 (all minimum grade C-).

**MATH 4805 (1) Mathematical Teacher Training: Inclusive Pedagogy**
Designed to train students to teach mathematics in an inclusive, multicultural environment. Students teach a math course within the McNeill Academic Program (Student Academic Services Center) meeting weekly with faculty and colleagues to learn to re-design curriculum, fine-tune pedagogical practices, create assessments, mentor undergraduate instructor assistants and create an inclusive classroom environment. Department enforced restriction: experience with college-level instruction.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to students with 87-180 credits (Seniors) or graduate students only.

**MATH 4810 (1-3) Special Topics in Mathematics**
Covers various topics not normally covered in the curriculum. Offered intermittently depending on student demand and availability of instructors.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5810
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**MATH 4820 (3) History of Mathematical Ideas**
Examines the evolution of a few mathematical concepts (e.g., number, geometric continuum, or proof), with an emphasis on the controversies surrounding these concepts. Begins with Ancient Greek mathematics and traces the development of mathematical concepts through the middle ages into the present.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5820
**Requisites:** Prerequisite courses of MATH 2001 or MATH 2002 and one of the following: MATH 3001, 3110, 3120, 3140, 3170, 3210, 3430, 3450, 3510, 3850, 4000, 4001, 4120, 4140, 4200, 4230, 4330, 4440, 4510, 4520, 4540, 4650, or 4660 (all min grade C-).
**Recommended:** completion of upper division Written Communication requirement.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**MATH 4890 (1-3) Honors Independent Study**
Offered for students doing a thesis for departmental honors.
**Additional Information:** Arts Sciences Honors Course

**MATH 4900 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**MATH 5000 (3) Foundations of Mathematics**
Focuses on a complete deductive framework for mathematics and applies it to various areas. Presents Goedel's famous incompleteness theorem about the inherent limitations of mathematical systems. Uses idealized computers to investigate the capabilities and limitations of human and machine computation. Department enforced prerequisites: MATH 2130 and MATH 3140.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4000
**Requisites:** Restricted to graduate students only.

**MATH 5001 (3) Analysis 2**
Provides a rigorous treatment of infinite series, sequences of functions and an additional topic chosen by the instructor (for example, multivariable analysis, the Lebesgue integral or Fourier analysis).
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4001
**Requisites:** Restricted to graduate students only.

**MATH 5030 (3) Intermediate Mathematical Physics 1**
Surveys classical mathematical physics, starting with complex variable theory and finite dimensional vector spaces. Discusses topics in ordinary and partial differential equations, the special functions, boundary value problems, potential theory, and Fourier analysis. Department enforced prerequisite: MATH 4001. Instructor consent required for undergraduates.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5030
**Requisites:** Restricted to graduate students only.

**MATH 5040 (3) Intermediate Mathematical Physics 2**
Surveys classical mathematical physics, starting with complex variable theory and finite dimensional vector spaces. Discusses topics in ordinary and partial differential equations, the special functions, boundary value problems, potential theory and Fourier analysis. Department enforced prerequisite: MATH 5030.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5040
**Requisites:** Restricted to graduate students only.

**MATH 5120 (3) Introduction to Operations Research**
Studies linear and nonlinear programming, the simplex method, duality, sensitivity, transportation and network flow problems, some constrained and unconstrained optimization theory, and the Kuhn-Tucker conditions, as time permits.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4120 and MATH 4120 and APPM 5120
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites APPM 3310 OR MATH 2130 OR MATH 2135 or equivalent.

**MATH 5140 (3) Abstract Algebra 2**
Explores some topic that builds on material in MATH 3140. Possible topics include (but are not limited to) Galois theory, representation theory, advanced linear algebra or commutative algebra. Department enforced prerequisite: MATH 3140.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4140
**Requisites:** Restricted to graduate students only.

**MATH 5150 (3) Linear Algebra**
Highlights vector spaces, linear transformations, eigenvalues and eigenvectors, and canonical forms. Department enforced prerequisite: MATH 2130 or MATH 2135. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 5200 (3) Introduction to Topology**
Introduces the basic concepts of point set topology. Includes topological spaces, metric spaces, homeomorphisms, connectedness and compactness.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4200

**MATH 5230 (3) Differential Geometry of Curves and Surfaces**
Introduces the modern differential geometry of plane curves, space curves, and surfaces in 3-dimensional space. Topics include the Frenet frame, curvature and torsion for space curves; Gauss and mean curvature for surfaces; Gauss and Codazzi equations, and the Gauss-Bonnet theorem.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4230
**Requisites:** Restricted to graduate students only.

**MATH 5240 (3) Hilbert Spaces and the Mathematics of Quantum Mechanics**
Provides an introduction to Hilbert spaces and their application in quantum mechanics. The primary goal is to prove and understand the so-called spectral theorem, which is crucial for the formulation of quantum mechanics. In addition, some examples from physics will be discussed, such as the quantum harmonic oscillator and the spectrum of the hydrogen atom.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4240
**Requisites:** Restricted to graduate students only.

**MATH 5330 (3) Fourier Analysis**
The notion of Fourier analysis, via series and integrals, of periodic and nonperiodic phenomena is central to many areas of mathematics. Develops the Fourier theory in depth and considers such special topics and applications as wavelets, Fast Fourier Transforms, seismology, digital signal processing, differential equations, and Fourier optics. Department enforced prerequisite: MATH 4001.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4330
**Requisites:** Restricted to graduate students only.

**MATH 5430 (3) Ordinary Differential Equations**
Introduces theory and applications of ordinary differential equations, including existence and uniqueness theorems, qualitative behavior, series solutions, and numerical methods, for scalar equations and systems. Department enforced prerequisites: MATH 2130 and MATH 3001. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 5440 (3) Mathematics of Coding and Cryptography**
Gives an introduction, with proofs, to the algebra and number theory used in coding and cryptography. Basic problems of coding and cryptography are discussed; prepares students for the more advanced ECEN 5682.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4440
**Requisites:** Restricted to graduate students only.

**MATH 5470 (3) Partial Differential Equations**
Studies initial boundary and eigenvalue problems for the wave, heat and potential equations. Solution by separation of variables, Green's function, and variational methods. Department enforced prerequisite: MATH 3430 or MATH 5430. Instructor consent required for undergraduates.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4470
**Requisites:** Restricted to graduate students only.

**MATH 5510 (3) Introduction to Probability Theory**
Studies axioms, combinatorial analysis, independence and conditional probability, discrete and absolutely continuous distributions, expectation and distribution of functions of random variables, laws of large numbers, central limit theorems, and simple Markov chains if time permits.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4510
**Requisites:** Restricted to graduate students only.

**MATH 5520 (3) Introduction to Mathematical Statistics**
Examines point and confidence interval estimation. Principles of maximum likelihood, sufficiency, and completeness: tests of simple and composite hypotheses, linear models, and multiple regression analysis if time permits. Analyzes various distribution-free methods. Department enforced prerequisite: one semester calculus-based probability course, such as MATH 4510 or APPM 3570.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4520 and MATH 4520 and STAT 5520
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to APPM 3570 or STAT 3100 or MATH 4510; minimum grade of C- for all.

**MATH 5540 (3) Introduction to Time Series**
Studies basic properties, trend-based models, seasonal models modeling and forecasting with ARIMA models, spectral analysis and frequency filtration. Department enforced prerequisite: APPM 5520 or MATH 5520.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4540 and MATH 4540 and STAT 5540
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to STAT 4520 or MATH 4520 or STAT 5520 or MATH 5520; minimum grade of C- for all.

**MATH 5600 (3) Numerical Analysis 1**
Solution of nonlinear algebraic equations, interpolation, approximation theory and numerical integration. Department enforced prerequisites: MATH 2130 or MATH 2135 or APPM 3310 and experience with a scientific programming language. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 5610 (3) Numerical Analysis 2**
Solution of linear systems, eigenvalue problems, optimization problems, and ordinary and partial differential equations. Department enforced prerequisite: MATH 5600 or APPM 5600. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 5730 (3) Set Theory**
Studies in detail the theory of cardinal and ordinal numbers, definition by recursion, the statement of the continuum hypothesis, simple cardinal arithmetic and other topics chosen by the instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4730

**MATH 5810 (1-3) Special Topics in Mathematics**
Covers various topics not normally covered in the curriculum. Offered intermittently depending on student demand and availability of instructors.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4810
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**MATH 5820 (3) History of Mathematical Ideas**
Examines the evolution of a few mathematical concepts (e.g., number, geometric continuum, or proof), with an emphasis on the controversies surrounding these concepts. Begins with Ancient Greek mathematics and traces the development of mathematical concepts through the middle ages into the present.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 4820
**Requisites:** Restricted to graduate students only.
**Recommended:** Requisite completion of upper division Written Communication requirement.

**MATH 5905 (1) Mathematics Teacher Training**
Designed to train students to become effective teachers. Students teach a mathematics course, meeting weekly with faculty to discuss problems particular to the teaching of mathematics. Department enforced prerequisite: current employment as a teaching assistant.
**Requisites:** Restricted to graduate students only.

**MATH 6000 (3) Model Theory**
Proves the compactness theorem, showing the essential finiteness of logical implication. Proves many basic properties of theories, showing how the syntactic form of statements influences their behavior w.r.t., different models. Finally, studies properties of elements that cannot be stated by a single formula (the type of the element) and shows it can be used to characterize certain models.
**Requisites:** Restricted to graduate students only.

**MATH 6010 (3) Computability Theory**
Studies the computable and uncomputable. Shows that there are undecidable problems and from there builds up the theory of sets of natural numbers under Turing reducibility. Studies Turing reducibility, the arithmetical hierarchy, oracle constructions and end with the finite injury priority method. Department enforced prerequisite: MATH 6000.
**Requisites:** Restricted to graduate students only.

**MATH 6020 (3) Category Theory**
Studies categories, functors, natural transformations, adjoints, and universal constructions. Special topics may include monads and their algebras, abelian categories, Kan extensions, or sheaves in geometry and logic. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6110 (3) Introduction to Number Theory**
Examines divisibility properties of integers, congruences, diophantine equations, arithmetic functions, quadratic residues, distribution of primes and algebraic number fields. Department enforced prerequisite: MATH 3140. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6130 (3) Algebra 1**
Studies group theory and ring theory. Department enforced prerequisite: MATH 3140. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6140 (3) Algebra 2**
Studies modules, fields and Galois theory. Department enforced prerequisite: MATH 6130. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6150 (3) Commutative Algebra**
Introduces topics used in number theory and algebraic geometry, including radicals of ideals, exact sequences of modules, tensor products, Ext, Tor, localization, primary decomposition of ideals and Noetherian rings. Department enforced prerequisite: MATH 6140. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6170 (3) Algebraic Geometry**
Introduces algebraic geometry, including affine and projective varieties, rational maps and morphisms and differentials and divisors. Additional topics might include Bezout's Theorem, the Riemann-Roch Theorem, elliptic curves, and sheaves and schemes. Department enforced prerequisite: MATH 6140. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6175 (3) Algebraic Geometry 2**
Continuation of MATH 6170. Develops algebraic geometry using schemes. Topics include coherent and quasicoherent sheaves, sheaf cohomology, Serre duality, lifting criteria, smoothness, base change theorems, algebraic curves and surfaces, and additional topics at the discretion of the instructor. Instructor consent required for undergraduates. Department enforced prerequisite: MATH 6170.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites MATH 6150 or MATH 6290.

**MATH 6180 (3) Algebraic Number Theory**
Introduces number fields and completions, norms, discriminants and differents, finiteness of the ideal class group, Dirichlet's unit theorem, decomposition of prime ideals in extension fields, decomposition and ramification groups. Department enforced prerequisites: MATH 6110 and MATH 6140. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6190 (3) Analytic Number Theory**
Acquaints students with the Riemann Zeta-function and its meromorphic continuation, characters and Dirichlet series, Dirichlet's theorem on primes in arithmetic progressions, zero-free regions of the zeta function and the prime number theorem. Department enforced prerequisites: MATH 6110 and MATH 6350. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6210 (3) Introduction to Topology 1**
Introduces elements of point-set topology and algebraic topology, including the fundamental group and elements of homology. Department enforced prerequisites: MATH 2130 and MATH 3140 and MATH 4001. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6220 (3) Introduction to Topology 2**
Continuation of MATH 6210. Department enforced prerequisite: MATH 6210. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6230 (3) Introduction to Differential Geometry 1**
Introduces topological and differential manifolds, vector bundles, differential forms, de Rham cohomology, integration, Riemannian metrics, connections and curvature. Department enforced prerequisites: MATH 2130 and MATH 4001. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6240 (3) Introduction to Differential Geometry 2**
Continuation of MATH 6230. Department enforced prerequisite: MATH 6230. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6250 (3) Theory of Rings**
Studies semi-simple Artinian rings, the Jacobson radical, group rings, representations of finite groups, central simple algebras, division rings and the Brauer group. Department enforced prerequisites: MATH 6130 and MATH 6140. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6260 (3) Geometry of Quantum Fields and Strings**
Focuses on differential geometric techniques in quantum field and string theories. Topics include: spinors, Dirac operators, index theorem, anomalies, geometry of superspace, supersymmetric quantum mechanics and field theory and nonperturbative aspects in field and string theories. Department enforced prerequisites: MATH 6230 and MATH 6240 and PHYS 5250 and PHYS 7280. Instructor consent required for undergraduates.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 6260
**Requisites:** Restricted to graduate students only.

**MATH 6270 (3) Theory of Groups**
Studies nilpotent and solvable groups, simple linear groups, multiply transitive groups, extensions and cohomology, representations and character theory, and the transfer and its applications. Department enforced prerequisites: MATH 6130 and MATH 6140. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6280 (3) Advanced Algebraic Topology**
Covers homotopy theory, spectral sequences, vector bundles, characteristic classes, K-theory and applications to geometry and physics. Department enforced prerequisite: MATH 6220. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6290 (3) Homological Algebra**
Studies categories and functors, abelian categories, chain complexes, derived functors, Tor and Ext, homological dimension, group homology and cohomology. If time permits, the instructor may choose to cover additional topics such as spectral sequences or Lie algebra homology and cohomology. Department enforced prerequisites: MATH 6130 and MATH 6140.
**Requisites:** Restricted to graduate students only.

**MATH 6310 (3) Introduction to Real Analysis 1**
Develops the theory of Lebesgue measure and the Lebesgue integral on the line, emphasizing the various notions of convergence and the standard convergence theorems. Applications are made to the classical L^p spaces. Department enforced prerequisite: MATH 4001. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6320 (3) Introduction to Real Analysis 2**
Covers general metric spaces, the Baire Category Theorem, and general measure theory, including the Radon-Nikodym and Fubini theorems. Presents the general theory of differentiation on the real line and the Fundamental Theorem of Lebesgue Calculus. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite MATH 6310.

**MATH 6350 (3) Functions of a Complex Variable 1**
Focuses on complex numbers and the complex plane. Includes Cauchy-Riemann equations, complex integration, Cauchy integral theory, infinite series and products, and residue theory. Department enforced prerequisite: MATH 4001. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6360 (3) Functions of a Complex Variable 2**
Focuses on conformal mapping, analytic continuation, singularities and elementary special functions. Department enforced prerequisite: MATH 6350. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6534 (3) Topics in Mathematical Probability**
Offers selected topics in probability such as sums of independent random variables, notions of convergence, characteristic functions, Central Limit Theorem, random walk, conditioning and martingales, Markov chains and Brownian motion. Department enforced prerequisite: MATH 6310. Instructor consent required for undergraduates
**Requisites:** Restricted to graduate students only.

**MATH 6550 (3) Introduction to Stochastic Processes**
Systematic study of Markov chains and some of the simpler Markov processes, including renewal theory, limit theorems for Markov chains, branching processes, queuing theory, birth and death processes, and Brownian motion. Applications to physical and biological sciences. Department enforced prerequisite: MATH 4001 or MATH 4510 or APPM 3570 or APPM 4560. Instructor consent required for undergraduates.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 6550
**Requisites:** Restricted to graduate students only.

**MATH 6730 (3) Set Theory**
Presents cardinal and ordinal arithmetic, and basic combinatorial concepts, including stationary sets, generalization of Ramsey's theorem, and ultrafilters, consisting of the axiom of choice and the generalized continuum hypothesis. Department enforced prerequisites: MATH 4000 or MATH 5000 and MATH 4730 or MATH 5730. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6740 (3) Forcing**
Presents independence of the axiom of choice and the continuum hypothesis, Souslin's hypothesis and other applications of the method of forcing. Introduces the theory of large cardinals. Department enforced prerequisite: MATH 6730. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 6900 (1-3) Independent Study**
Instructor consent required for undergraduates.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**MATH 6940 (1) Master's Candidate for Degree**
This course is for students preparing for the no-thesis option for a master's degree. The content is set by the students' advisors.
**Requisites:** Restricted to graduate students only.

**MATH 6950 (1-6) Master's Thesis**

**MATH 8114 (3) Topics in Number Theory**
May include the theory of automorphic forms, elliptic curves, or any of a variety of advanced topics in analytic and algebraic number theory. Department enforced prerequisite: MATH 6110. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 8174 (3) Topics in Algebra I**
Department enforced prerequisites: MATH 6130 and MATH 6140. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 8210 (3) Topics in Topology**
Presents specialized topics in topology such as stable homotopy theory, derived algebraic geometry, Weil cohomology theories, cobordism and topological field theories, theory of stratified spaces, index theory, mixed Hodge modules, topological data analysis. Department enforced prerequisite: MATH 6210 or MATH 5200. Instructor consent required for undergraduates.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**MATH 8234 (3) Topics in Differential Geometry**
Presents advanced topics in Differential Geometry, such as index theory, partial differential equations on manifolds, exterior differential systems, and Cartan's methods.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of MATH 6230 and MATH 6310 (minimum grade D-). Restricted to graduate students only. Instructor consent required for undergraduates.

**MATH 8250 (3) Mathematical Theory of Relativity 1**
Focuses on Maxwell equations, Lorentz force, Minkowski space-time, Lorentz, Poincare, and conformal groups,metric manifolds, covariant differentiation, Einstein space-time, cosmologies, and unified field theories. Instructor consent required.
**Requisites:** Restricted to graduate students only.

**MATH 8304 (3) Topics in Analysis 1**
Presents advanced topics in analysis including Lie groups, Banach algebras, operator theory, ergodic theory, representation theory, etc. Department enforced prerequisites: MATH 8330 and MATH 8340. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 8330 (3) Functional Analysis 1**
Introduces such topics as Banach spaces (Hahn-Banach theorem, open mapping theorem, etc.), operator theory (compact operators and integral equations and spectral theorem for bounded self-adjoint operators) and Banach algebras (the Gelfand theory). Department enforced prerequisites: MATH 6310 and MATH 6320. Instructor consent required for undergraduates. See also MATH 8340.
**Requisites:** Restricted to graduate students only.

**MATH 8340 (3) Functional Analysis 2**
Introduces such topics as Banach spaces (Hahn-Banach theorem, open mapping theorem, etc.), operator theory (compact operators and integral equations and spectral theorem for bounded self-adjoint operators) and Banach algebras (the Gelfand theory). Department enforced prerequisite: MATH 8330. Instructor consent required for undergraduates. See also MATH 8330.
**Requisites:** Restricted to graduate students only.

**MATH 8370 (3) Harmonic Analysis 1**
Examines trigonometric series, periodic functions, diophantine approximation and Fourier series. Also covers Bohr and Stepanoff almost periodic functions, positive definite functions and the L^1 and L^2 theory of the Fourier integral. Applications to group theory and differential equations. Department enforced prerequisites: MATH 5150 and MATH 6320. Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.

**MATH 8714 (3) Topics in Logic 1 and 2**
**Requisites:** Restricted to graduate students only.

**MATH 8815 (1-3) Ulam Seminar**
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**MATH 8900 (1-3) Independent Study**
Instructor consent required for undergraduates.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**MATH 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School portion of the catalog.
**Requisites:** Restricted to graduate students only.

# MBA Advanced Electives (MBAX)

## Courses

**MBAX 6000 (3) Socially Responsible Enterprise**
Prepares future managers for confronting the truly difficult situations that arise when deploying economic resources, altering the physical environment, and making decisions that affect the lives of investors, employees, community members and other stakeholders. Case-based challenges will be examined in a broad range of contexts, and essential ethical concepts will be explored by drawing on theories from ethics, sociology, economics, political science and philosophy.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6097 (1-1.5) Professional Development Internship**
Experiential compliment to MBAC 6098 to focus on Professional Presentation, Network Development, and/or Executive Exposure.
**Repeatable:** Repeatable for up to 3.50 total credit hours.
**Requisites:** Restricted to Master of Business Admin (MBAD) or MBA with Dual Degree programs. Minimum of 27 credit hours required.
**Recommended:** Prerequisite MBAC 6098.
**Grading Basis:** Letter Grade

**MBAX 6100 (1.5) Entrepreneurship**
Examines the environments of entrepreneurial firms from start-up to development of ventures. Allows students to assess their fit with entrepreneurial firms. Key element is learning the process of determining the difference between ideas and commercializable opportunities through feasibility analysis and plans.
**Requisites:** Requires prerequisite course of MBAC 6020 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6101 (1.5) Entrepreneurship**
Examines the environments of entrepreneurial firms from start-up to development of ventures; allows students to assess their "fit" with entrepreneurial firms. A key element is learning the process of determining the difference between ideas and commercializable opportunities through feasibility analysis and plans.
**Requisites:** Requires prerequisite courses of MBAC 6010, MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6110 (3) Entrepreneurial Finance**
Addresses a variety of topics including financial valuation, various sources of funds, structures and legal issues in arranging financing, the private and public venture capital markets, and preparation for, and execution of, an initial public securities offering.
**Requisites:** Requires prerequisite course of MBAC 6020 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6111 (3) Entrepreneurial Finance**
Addresses a variety of topics including financial valuation, various sources of funds, structures and legal issues in arranging financing, the private and public venture capital markets, and preparation for, and execution of, an initial public securities offering.
**Requisites:** Requires prerequisite courses MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to MBA (MBAD) and Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6130 (3) Sustainable Venturing**
Focuses on environmentally sustainable business ventures as well as issues associated with starting and operating a business that solves natural environmental challenges while achieving profitability. Includes a number of case studies, topical discussions, talks by environmental entrepreneurs, and an applied or library research project.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6140 (3) Social Entrepreneurship in the US and Global Economies**
Social entrepreneurs adopt business approaches to solving global, social and environmental problems that have not been effectively addressed by government, business or traditional nonprofits. The course provides a framework for student teams to assist social entrepreneurs in developing countries, helping them achieve their social mission while operating sustainably and with measurable impact.
**Requisites:** Requires prerequisite courses of MBAC 6060 and 6090 (all minimum grade C). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Recommended:** Prerequisite MBAX 6170.
**Additional Information:** Departmental Category: MBA: Social Responsibility

**MBAX 6155 (1.5) Entrepreneurship Through Acquisition**
Explores entrepreneurship through acquisition (ETA) of a company, rather than starting one from scratch. Readings and class discussions will include how to purchase a business, finance an acquisition, and operate and grow a business. Also, sourcing and identifying acquisition opportunities, strategic, operational, legal, and financial due diligence, valuation, tax considerations, raising capital, structuring and closing transactions, post-closing integration, managing and exiting the acquisition, and prototypes for pursuing including search fund and fundless deal sponsor models.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6160 (1.5-3) Entrepreneurship: High Growth Companies**
Explores the initial decisions that set a foundation for business growth, the pros and cons of alternative growth strategies, organizational scaling tactics, and the keys to realizing value. Studying ¿adolescent¿ firms that are past the initial start-up stage but haven't evolved into mature businesses, we will focus on key choices founders face in scaling their businesses, investigating growth-related stumbling blocks and discussing alternative strategies that may be used to overcome these obstacles.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.

**MBAX 6170 (1.5) New Venture Creation**
This course content is relevant to the student who wants the entrepreneurial toolkit, start a new venture, is interested in working in the startup world, would like to effectively evaluate the probability of success for a new venture and/or develop a methodology for entrepreneurial thinking that provides benefits for big and small ventures. The final deliverable is a professional pitch to a group of seasoned investors and the submission of a complete business plan.
**Requisites:** Requires prerequisite course of MBAC 6020 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6171 (1.5) New Venture Creation**
This course content is relevant to the student who wants the entrepreneurial toolkit, start a new venture, is interested in working in the startup world, would like to effectively evaluate the probability of success for a new venture and/or develop a methodology for entrepreneurial thinking that provides benefits for big and small ventures. The final deliverable is a professional pitch to a group of seasoned investors and the submission of a complete business plan.
**Requisites:** Requires prerequisite courses of MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6180 (3) New Venture Launch**
Translate an existing product, service, or opportunity into a real, functioning venture. Each venture will undertake typical business functions (legal, raising money, web presence, selling, innovation, marketing, managing cash, and managing operations) with minimal resources. The course will rely heavily on outside experts and speakers who have personal experience being or working directly with entrepreneurs and/or investors. The course is a natural capstone to other courses in the entrepreneurship curriculum.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Recommended:** Prerequisite completion of MBAX 6170 is strongly recommended prior to enrolling in MBAX 6180.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6190 (3) Projects in Entrepreneurial Companies**
Limited to 12 students per section, each student is matched with an entrepreneurial company to complete a project that is key to company strategy. Students experience total company environment from the top management level through attending management meetings and interacting with cross-functional managers and employees. E-mail and face-to-face meetings result in discussing opportunities and issues resulting from experiences in companies.
**Requisites:** Requires prerequsite course of MBAX 6100 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Recommended:** Prerequisite completion of MBAX 6110 or 6111 is strongly recommended prior to enrolling in MBAX 6190.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Entrepreneurship

**MBAX 6195 (1-3) Special Topics in Entrepreneurship**
Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the standard MBA curriculum.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.

**MBAX 6210 (3) Applied Financial Management**
Analyzes the financial condition, planning, and control of current assets, current liabilities, and long-term financial arrangements. Topics include financial planning, managing working capital, short- and long-term financing, capital budgeting, valuation, and capital structure policies. Case studies are emphasized.
**Requisites:** Requires prereqs MBAC 6060, MSBC 5060, or MSBC 5610 (min grade D-).Restricted to Master of Business Admin (MBAD), MBA w Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Profl MBA Program (PMBA), MS Finance (FNCE-MS) MS Real Estate (REAL-MS) mjrs onl
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6211 (3) Applied Financial Management**
Focuses on how to apply key concepts in finance to real-world situations. Topics include valuation, capital structure, highly leveraged transactions, and financial distress and bankruptcy. Heavy emphasis on how to perform various kinds of valuations. Mixture of lectures and case discussions.
**Requisites:** Requires prerequsite course of MBAC 6060 (minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6215 (3) Principles of Wealth Management**
In-depth exploration of wealth management concepts, strategies and practices. Students gain understanding of how to effectively manage and grow wealth for individuals and families, considering various financial instruments, risk factors and ethical considerations. Topics include behavioral finance, portfolio creation, performance and risk measures, risk fac-tors, the use of traditional and alternative asset classes; use of financial products and alternative investments including cash, equities, fixed income, mutual funds, ETFs, VC funds, etc. Will discuss tax planning.
**Requisites:** Requires prerequisite course of MBAC 6060 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6220 (3) Investment Management and Analysis**
Covers managing investment portfolios, blending economic theory and evidence with practitioner experience. Topics include understanding risk and return relationships, diversification, portfolio management, various asset classes, popular valuation models (capital asset, arbitrage pricing, and option pricing), aspects of fixed income and performance assessment.
**Requisites:** Requires prerequisite course of MBAC 6060 or MSBC 5060 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6221 (1.5-3) Investment Management & Analysis**
Covers managing investment portfolios by blending academic theories and evidence with practitioner experience. Topics include risk and return relationships, securities, value theory (capital asset, arbitrage, and option pricing), portfolios, and performance evaluations.
**Requisites:** Requires prerequisite courses of MBAC 6010, MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6230 (3) International Financial Management**
Examines the financial procedures, policies, and risks faced by firms conducting business internationally. Topics include examining the international finance environment, managing foreign exchange risk exposure, managing international working capital, conducting analysis, and developing an understanding of international financial markets.
**Requisites:** Requires prerequisite course of MBAC 6060 or MSBC 5060 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6250 (3) Derivative Securities**
Derivatives, like options, futures, forwards, and swaps, encompass all aspects of finance. Topics cover the characteristics, valuation, and trading strategies associated with derivatives as well as their use in risk management.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Recommended:** Prerequisite for MBAD students, prerequisite course of MBAC 6060; for FNCE-MS majors, prerequisite MSBC 5060 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6260 (3) Fixed Income Investing**
Fixed income securities are those that nominally promise a fixed stream of payments. They include government and corporate long and short term debt issues that far exceed the amount of corporate stock issues, as well as long term personal debt (i.e.,home mortgages). Develops practical analytical tools for describing risk and return in fixed income securities, the markets where they are traded, and their purchase and management by financial intermediaries. This course will utilize the Bloomberg Lab to provide students with real world fixed income security analysis.
**Requisites:** Requires prerequisite course of MBAC 6060 or MSBC 5060 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6270 (3) Applied Derivatives**
Covers applications of financial derivatives and a range of topics, from market risk management to liquidity and counter party risk management in contemporary finance. Specifically, the course examines the pricing and use of financial derivatives, including options, forwards, futures, swaps and credit derivatives in risk management.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade

**MBAX 6280 (1.5) Entrepreneurship Valuation and Investment Seminar**
First section in series of three: Provides a premier experiential learning experience in early stage investing. Students will develop an understanding of the mechanics of early stage investing, will learn how to evaluate, select and recommend investments and manage the portfolio, put in practice managerial skills, negotiation, financial analysis, presentation skills, mastering/negotiating legal terms, and to incorporate uncertainty into projecting cash flows.
**Requisites:** Requires prerequisite courses of MBAC 6060 and 6090 (minimum grade C). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6281 (1.5) Entrepreneurship Valuation and Investment Seminar2**
Second section in series of three: Provides a premier experiential learning experience in early stage investing. Students will develop an understanding of the mechanics of early stage investing, will learn how to evaluate, select and recommend investments and manage the portfolio, put in practice managerial skills, negotiation, financial analysis, presentation skills, mastering/negotiating legal terms, and to incorporate uncertainty into projecting cash flows.
**Requisites:** Requires prerequisite courses of MBAC 6060 and 6090 (minimum grade C). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Recommended:** Prerequisite MBAX 6280.

**MBAX 6295 (1.5-3) Topics in Finance**
Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the standard MBA curriculum.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade

**MBAX 6310 (3) Marketing Strategy**
Marketing strategy has developed into an increasingly critical managerial activity as businesses recognizethe importance of creating customer value and being customer oriented. Discusses key elements of successful marketing strategy including market/customer analysis and competitor analysis, and identifies strategic approaches managers may adopt to succeed in today's highly competitive and rapidly changing business environment.
**Requisites:** Requires prereq course of MBAC 6090 (min grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Prog (PMBA) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6311 (3) Marketing Strategy**
Marketing strategy is a critical managerial activity that recognizes the importance of a strong market focus and the delivery of superior customer value as bases for long term financial success. This course examines key elements of successful marketing strategy including optimal market definition, strong segmentation and positioning approaches, high levels of customer satisfaction, and effective management of critical exchange relationships.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Marketing

**MBAX 6330 (3) Market Intelligence**
Market Intelligence is a decision-oriented course geared toward gathering, analyzing, and interpreting data about markets and customers. Students learn how to: define the marketing problem and determine what information is needed to make the decision; acquire trustworthy and relevant data and judge its quality; analyze the data and acquire the necessary knowledge to make certain classic types of marketing decisions.
**Requisites:** Restricted to MA of BusinAdmin (MBAD), MBA w/ Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Prof MBA (PMBA), MS Supply Chain Manag (SCMN-MS) or MS Busin Analytics (BUAN-MS) or Mktg Analytics cert (MKAG). Prereq MBAC 6090 or MSBX 5410, min grade D-.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6331 (3) Market Intelligence**
Market Intelligence is a marketing decision-oriented course geared toward gathering, analyzing, and interpreting data about markets and customers for both products and services. It is for managers as users of market information across marketing management, consulting, general management, and entrepreneurship to address problems of market selection, segmentation, positioning, new products, customer value and retention, pricing, communication, channel, etc.
**Requisites:** Requires prerequisite courses of MBAC 6010, MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Marketing

**MBAX 6350 (3) Digital Marketing**
Covers a variety of ways an organization uses online presence to support its goals. The main approaches covered are search engine optimization (SEO); online advertising, especially search ads (also called search engine marketing, SEM); and social media. SEO is setting up your website so that the right people can find you. Emphasis placed on selecting keywords and tracking responses to changes to a website. SEM refers to paid ("sponsored") ads on search engines. We will focus on AdWords.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Real Estate (REAL-MS), MS Supply Chain Management (SCMN-MS) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6351 (3) Digital Marketing**
Covers a variety of ways an organization uses online presence to support its goals. The main approaches covered are search engine optimization (SEO); online advertising, especially search ads (also called search engine marketing, SEM); and social media. SEO is setting up your website so that the right people can find you. Emphasis placed on selecting keywords and tracking responses to changes to a website. SEM refers to paid ("sponsored") ads on search engines. We will focus on AdWords.
**Requisites:** Requires prerequisite course of MBAC 6090 (minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Marketing

**MBAX 6360 (3) New Product Development**
Provides a better understanding of the new-product development process, highlighting the inherent risks and strategies for overcoming them. Using a combination of lectures, cases, and a project, this course examines the process of designing, testing, and launching new products. Emphasizes the interplay between creativity and analytical marketing research throughout the development process. Also covers branding issues, such as brand extensions and their impact on brand equity.
**Requisites:** Requires prereq course of MBAC 6090 (min grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Prog (PMBA) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Finance

**MBAX 6361 (1.5) New Product Development**
Provides students with a better understanding of the new-product development process, highlighting the inherent risks and different strategies for overcoming them. Using a combination of lectures, cases, and a project, this course will examine the process of designing, testing and launching new products.
**Requisites:** Requires prerequisite courses of MBAC 6010, MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Marketing

**MBAX 6365 (3) Practical Product Management**
This course will give students practical experience and tools required to successfully manage a product or product line for an established company or a new business. This course will cover the role of the Product Manager, explore market research to understand unsolved market needs, and teach students how to convert market needs to specifications, develop product business cases and establish funding priorities, culminating in the completion of a full product strategy and plan.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6368 (1.5) Consumer Packaged Goods Marketing Applied to the Natural & Organic Industry**
Explores the world of consumer packaged goods (CPG) and brand management skills needed to successfully launch and manage products in a retail environment, applied to the natural and organic product industry. The course will be split into three parts: 1) CPG and Brand Management principles and techniques, 2) shopper insights to manage CPG products at retail, 3) brand and retail management principles applied to the Natural & Organic industry.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6370 (2-3) Customer Analytics**
Provides a deep understanding of customer centricity and its implications for the firm; state-of-the art methods for calculating customer lifetime value and customer equity; analytical and empirical skills that are needed to judge the appropriateness, performance, and value of different statistical techniques that can be used to address a issue around customer acquisition, development, and retention. Students will be introduced to R programming in this course.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6380 (3) Consumer Decision-Making: Behavioral Economics, Psychology, and Experimental Design**
Consumer behavior often defies economic rationality. Behavioral economics attempts to integrate the quirks of human psychology into economic models; judgment and decision-making investigates how people solve economic problems. This course will introduce major theories, findings and ideas from these disciplines, and foundational concepts of experiment design that provide insight into consumer decision-making, with the goal of preparing future managers, analysts, consultants, and advisors to incorporate such insights into marketing and business strategies.
**Requisites:** Requires prerequisite course of MBAC 6090 (min grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6381 (3) Consumer Decision-Making: Behavioral Economics, Psychology, and Experimental Design**
Consumer behavior often defies economic rationality. Behavioral economics attempts to integrate the quirks of human psychology into economic models; judgment and decision-making investigates how people solve economic problems. This course will introduce major theories, findings and ideas from these disciplines, and foundational concepts of experiment design that provide insight into consumer decision-making, with the goal of preparing future managers, analysts, consultants, and advisors to incorporate such insights into marketing and business strategies.
**Requisites:** Requires prerequisite course of MBAC 6090 (minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6395 (1-3) Special Topics in Marketing**
Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the standard MBA curriculum.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6410 (3) Process Analytics**
Covers the concepts and tools to design and manage business processes. Emphasizes modeling and analysis, information technology support for process activities, and management of process flows. Graphical simulation software is used to create dynamic models of business processes and predict the effect of changes. Prepares students for a strong management or consulting career path in business processes.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) or Business Analytics (BUAN) majors or SCAG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Systems

**MBAX 6420 (3) IT and Business Strategy**
Although some companies are very successful in discovering and cultivating innovative technology-enabled business strategies, many fail in the process. Combines theories and frameworks with practical approaches to provide students with the skills required to help companies identify business opportunities, find appropriate information related technologies, and lead adoptions efforts to success.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Systems

**MBAX 6421 (3) IT & Business Strategy**
Although some companies are very successful in discovering and cultivating innovative technology-enabled business strategies, many fail in the process. This course combines theories and frameworks with practical approaches to provide students with the skills required to help companies identify business opportunities, find appropriate information related technologies, and lead adoption efforts to success.
**Requisites:** Requires prerequisite courses MBAC 6020, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6440 (3) Project Management**
Acquaints students with multidisciplinary aspects of project management, including the relationship between schedule, cost and performance. The course uses a hands-on project where the student interacts with a real customer, providing an opportunity to utilize the qualitative and quantitative tools taught in the classroom. At the conclusion of the course, the student may be eligible to apply for a project management certification from Project Management Institute based on previous work experience.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Real Estate (REAL-MS), MS Supply Chain Management (SCMN-MS) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6441 (3) Project Management**
Acquaints the student with multidisciplinary aspects of project management, including the relationship between scope, schedule, cost and performance. Uses a hands-on project from your own company, providing an opportunity to utilize the qualitative and quantitative tools taught in the classroom. During the course students will earn hours toward project management certification from the Project Management Institute.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors with 12 credit hours completed.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6450 (3) International Operations Management**
Takes a broad comprehensive perspective on managing and operating in a rapidly growing global economy. Explores regional and national approaches to international operations including trade practices; penetration strategies; financial, marketing, services, and manufacturing operations; ethical and sustainability issues; and global competitive strategy. Compares global business practices in Asia, South America, Europe, and Africa.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) majors or SCFG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6451 (3) International Business and Strategy**
Takes a broad comprehensive perspective on managing and operating in a rapidly growing global economy. Explores regional and national approaches to international operations including global trade practices; legal and political issues; US trade laws; finance and accounting risks; global supply chain management, cultural challenges; global marketing, and global strategies. Upon completing of the course, you will have a broad foundational understanding of important contemporary issues and challenges of international business.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6460 (3) Supply Chain Management**
Explores the key issues related to the design and management of supply chains. Covers the efficient integration of suppliers, production facilities, warehouses and stores so that the right products in the right quantity reach customers at the right time. Focuses on the minimization of the total supply chain cost subject to service requirements imposed by a variety of industries.
**Equivalent - Duplicate Degree Credit Not Granted:** MSBC 5460
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Recommended:** Prerequisite MBAC 6080.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Systems

**MBAX 6500 (3) Management of Organizational Change**
Explores ways to improve organizations to meet demands of changing environments. Emphasizes theoretical framework and models of organization change, barriers to implementing change and ways to overcome them, and the roles of the change agent and/or consultant.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6530 (1.5) Negotiating and Conflict Management**
Explores and builds skills for conflict management and negotiation problems faced by managers (e.g., dealing with subordinates, peers, superiors, or clients). Content is relevant to all MBA students, especially those interested in management, accounting, entrepreneurship, finance, and marketing.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6531 (1.5) Negotiating and Conflict Management**
Practice the art and science of successful negotiations. Provides students high interaction with businesses and entrepreneurs.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6540 (3) Consulting Skills**
Provides an integrative, hands-on exercise in managing change. Develops skills in contracting, collecting, and analyzing data, developing action plans, and preparing reports. Teams practice these skills by conducting an organizational diagnosis, consulting project within an organization.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6550 (3) Management of Technology and Innovation**
Examines a variety of issues common to management of technology, such as technology strategies, methods of technology transfer, selecting technology standards, managing the research and development process, and encouraging and rewarding innovation.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6560 (1.5) Executive Leadership**
Examines organizational leadership from the executive perspective, including private and public sector firms, and non-profits. Studies how executives lead change and innovation, interact with the top management team, and deal with the board of directors Topics include governance of the firm, strategies for enhancing executive influence, assessing and understanding diverse leadership styles, and the ethics and responsibilities of an executive. Formerly MBAX 6890.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6561 (1.5) Executive Leadership**
Provides an opportunity to examine leadership from the executive perspective in organizations including private and public sector firms and non-profits. Topics covered include how executives lead change and innovation in organizations, interact with the top management team, deal with the board of directors, leadership issues involved with governance of the firm and strategies for enhancing executive influence.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6565 (1.5) Inclusive Leadership**
This course focuses on how to lead to increase inclusion and maximize the benefits that diversity can bring. Women and minorities comprise only 25% and 27% of executives, respectively. Only 5% of CEOs are women. Thirteen percent of the population ¿ but fewer than 1% of Fortune 500 CEOs ¿ are Black. The data show irrefutable evidence that diversity increases innovation, market share, return on assets, and stock prices.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6570 (3) Topics in Sustainable Business**
Provides a comprehensive overview of the core concepts, strategies and practices of sustainable business, emphasizing innovative business practices and entrepreneurial opportunities created by the sustainability "movement". The topic of sustainability will be approached from the unique perspectives of seven core disciplines of business administration: economics, strategy, ethics, organizational behavior, operations, finance and accounting, and marketing.
**Requisites:** Requires prerequisite courses of MBAC 6011, MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to MBAD, DMBA, JMBA, PMBA, SCMN or BUAN majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Social Responsibility

**MBAX 6595 (1-3) Special Topics in Organizational Behavior**
Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the standard MBA curriculum.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6600 (3) Real Estate Principles**
The course covers a broad range of real estate principles including legal concepts, regulation and land use, valuation, financing methods and sources, and investment analysis. It provides a foundation for all other real estate courses in the MBA program.
**Requisites:** Restricted to Master of Business Admin (MBAD) students who have completed fewer than 24 credits; or MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Real Estate

**MBAX 6610 (3) Real Estate Finance and Investment Analysis**
Objectives of the course are to 1) conduct income property investment analysis; 2) to develop the technical competence necessary to structure real estate transactions; and 3) to understand the financial assets securitized by real estate. Students will analyze income properties using Excel and ARGUS-DCR. Techniques for structuring real estate transactions examined in this course include lender participations, sale-leasebacks, joint ventures, and real estate syndications.
**Requisites:** Requires prerequisite course of MBAX 6600 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Real Estate

**MBAX 6620 (3) Real Estate Project Competition**
Examines real estate market behavior beginning with an overview of residential and commercial property markets. Examines various theories of land price determination and uses these models to understand how the private market allocates land to competing residential, office, retail, industrial/warehouse, hotel and other end users. Examines how factors influencing the demand for real estate interact with the factors influencing the supply of real estate to determine market rents and how the flow of future expected income is capitalized to yield the market price of property. The course will also examine the roles that local, state and federal governments have in real estate market outcomes.
**Requisites:** Restricted to MS Real Estate majors (REAL-MS) or restricted to Master of Bus Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Profl MBA Prog (PMBA) with prerequisite courses MBAX 6600, 6610 and 6640 (all min grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Real Estate

**MBAX 6630 (3) Real Estate Economics**
Examines real estate market operations and discusses alternative methodologies for estimating real estate values. Examines various theories of land price determination and uses these models to understand how the private market allocates land to competing residential, office, retail, industrial/warehouse, hotel, and other end users. Examines how factors influencing the demand for real estate interact with the supply of real estate to determine market rents and how the flow of future expected income is capitalized to yield the market price of the asset.
**Requisites:** Restricted to MS Real Estate majors (REAL-MS) or restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Real Estate

**MBAX 6640 (3) Real Estate Law and Practice**
Examines the legal issues associated with developing, acquiring, transferring, and leasing real property. Topics include real estate contracts, land use and development agreements, vehicles for owning real estate, real estate covenants, conditions and restrictions, loan transactions, negotiating real estate contracts, commercial leases and real estate taxation. Material for this course will consist of assigned articles and real estate cases. Formerly MBAX 6855.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), or MS Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Real Estate

**MBAX 6650 (3) Real Estate Case Studies**
Requires students to analyze numerous real estate investment opportunities utilizing case study methodology. Cases will include analyses of various end uses (e.g. apartments, condominiums, office, retail, mixed use, industrial, and hotel) from both the purchaser and seller perspective. The cases include situations such as investing in existing properties, whether to make substantial rehabilitations, and how to put together a new development. Cases are primarily based in Colorado, although some are in other areas of US and international. Class discussion is designed to mimic a company¿s investment committee and requires students to both present and defend their positions.
**Requisites:** Requires prerequisite of MBAX 6630 or 6640 and MBAC 6610 or MSBC 5610 (all minimum grade D-). Restricted to MBA (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA (PMBA) or MS Real Estate (REAL-MS) students only.
**Grading Basis:** Letter Grade

**MBAX 6695 (1-3) Special Topics in Real Estate**
Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the standard MBA curriculum.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to MBA (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA (PMBA) or MS Real Estate (REAL-MS) students only.
**Grading Basis:** Letter Grade

**MBAX 6710 (3) Financial Statement Analysis**
Focuses on the use of accounting information by decision makers external to the firm. Considers judgments made by security analysts, bank lending officers and auditors. Emphasizes impact of changes to financial statement elements, profitability analysis and equity valuation.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 6250
**Requisites:** Requires prerequisite course of MBAC 6020 or MSBC 5020 (minimum grade D-). Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS majors only.
**Additional Information:** Departmental Category: MBA: Accounting

**MBAX 6720 (3) ESG Reporting and Analysis**
This course introduces students to the current state of corporate sustainability reporting through the lens of accounting and reporting concepts. The course has three basic elements. We will cover (1) data and measurement issues associated with corporate sustainability reporting, largely at the conceptual level, (2) current disclosure frameworks and the evolving regulatory landscape, and (3) other topics including ESG assurance, ESG ratings and the role of ESG information in sustainable investing.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Recommended:** Prerequisite MBAC 6020 Financial Accounting (MBA) or MSBC 5020 Financial Accounting (MS).
**Grading Basis:** Letter Grade

**MBAX 6761 (2) Managerial Accounting, Planning and Control**
Introduces managerial accounting, which includes the concepts, models, and systems that provide this information and control. The course will familiarize participants with the terminology and basic concepts of managerial accounting, touching on topics ranging from development and use of cost information for decision-making to management control systems.
**Requisites:** Requires prerequsite course of MBAC 6020 (minimum grade D-). Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Accounting

**MBAX 6801 (1.5-3) Global Perspectives Seminar**
Provides students with an in-depth perspective about a specific country or region outside the United States. The course can focus on a different region or country each time it is offered. If demand for this type of experience is strong, multiple sections of the course could be offered in a given semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6802 (3) Pricing Strategy and Tactics**
Pricing provides the means to capture value. The course covers theories, analytical tools and conceptual frameworks needed for devising price strategy as part of the value proposition for products and services. It draws upon principles from economics, marketing and psychology. Primary and secondary data based analysis is used to understand price response and competitive pricing. Substantive topics include customized pricing, price negotiations, bidding and auctions, price discounting, trade promotion, bundling, behavioral pricing, among others.
**Requisites:** Requires prerequisite courses of MBAC 6011, MBAC 6020, MBAC 6031, MBAC 6060 and MBAC 6090 (all minimum grade D-). Restricted to MBAD, DMBA, JMBA, PMBA, SCMN or BUAN majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Management

**MBAX 6806 (1.5-3) Global Perspectives**
Contrasting operations in US and a country or region outside the United States, students will study what changes US companies have made to successfully operate in foreign markets and how US companies have influenced foreign business operations. Reviews the history and present state of the inter-dependency between the domestic and international business environments. Culminates in a week-long trip to the country/region of study. Provides students with an in-depth perspective about a specific country or region outside the United States. The course can focus on a different region or country each time it is offered.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) majors only.
**Grading Basis:** Letter Grade

**MBAX 6815 (3) Sustainable Real Estate**
Explores techniques, processes, tools, and capabilities required to manage growth and land use change in the light of shifts beginning to transform the way we approach land use and real estate development.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Finance (FNCE-MS), or MS Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Real Estate

**MBAX 6827 (3) Integrated Reporting for Socially Responsible Strategies**
Explores the growing global trend of companies to measure, disclose and report for socially responsible initiatives. Integrated reporting combines financial, environmental, social and governance information into a single report. Current practices in sustainability and integrated reporting in the US and across the world will be examined through case studies, guest speakers, current literature and projects.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 5827
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAX 6843 (3) Supply Chain and Operations Analytics**
Analyzes key issues related to the design and management of operations and supply chains using quantitative tools such as linear, integer, and non-linear programming, regression, and statistical analysis. Covers important topics such as forecasting, aggregate planning, inventory theory, transportation, risk pooling, production control and scheduling, and facilities location, among others. Uses mathematical modeling, spreadsheet analysis, case studies, and pedagogical simulations to deliver material.
**Requisites:** Restricted to Master of Busn Admin (MBAD), MBA w Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) Profl MBA Prog (PMBA), Business Analytics (BUAN-MS) or Supply Chain Mgmt (SCMN-MS) majors or SCAG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Operations and Production Management

**MBAX 6930 (3) Commercializing Sustainable Energy Technologies**
Addresses the opportunities and problems of commercializing new renewable energy technologies. Focuses on energy markets, opportunity identification, life cycle analysis, policy economics, project financing and economic analysis as they relate to bringing renewable energy technologies to market.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVM 5005
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), or MS Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade

**MBAX 6966 (1-3) Independent Study-Real Estate**
Independent study in the field of real estate.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Additional Information:** Departmental Category: MBA: Real Estate

# MBA Core (MBAC)

## Courses

**MBAC 6001 (1.5) Foundations of Teamwork**
Focuses on teamwork effectiveness and collaboration. Students will understand what affects team outcomes, how to maximize a team¿s effectiveness and how to create a company environment that fosters collaboration and teamwork as they develop their own teamwork skills while learning to develop the skills of their employees' and colleagues'.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6002 (3) Social, Moral and Economic Foundations for Business**
Examines historical context for the rise of modern business institutions and market economies, and interrelationships in various business objectives. Connects how different economic approaches address the allocation of existing and future scarce resources, and how individual economic freedom relates to various societal objectives. Explores concepts of core business relevance including intellectual property, the role of ethics in the production of commercial information, and the value of diverse information sets in decision-making.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6003 (1.5) Foundations of Leadership**
Focuses on leadership theories and concepts, including individual and organizational elements in different leadership situations. Explores leadership principles, values, and ethical boundaries, why leaders lose their way and how to avoid derailment. Engages students in developing a leadership brand.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6004 (1.5) Social, Moral and Economic Foundations for Business**
Examines historical context for the rise of modern business institutions and market economies, and interrelationships in various business objectives. Connects how different economic approaches address the allocation of existing and future scarce resources, and how individual economic freedom relates to various societal objectives. Explores concepts of core business relevance including intellectual property, the role of ethics in the production of commercial information, and the value of diverse information sets in decision-making.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6010 (3) Managerial Economics**
Studies the elements of the business firm's fundamental problem---how to maximize profits. Develops for each element managerial theory based upon introductory and intermediate-level microeconomics. Analyzes various applications and misapplications of relevant concept, primarily through case studies. Differential calculus and statistics are used throughout the course. Students can take MBAC 6010 or take MBAC 6011 plus MBAC 6012. Credit can not be given for all.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6011 (1.5) Managerial Economics 1**
Studies the elements of the business firm's fundamental problem---how to maximize profits. Develops for each element managerial theory based upon introductory and intermediate-level microeconomics. Analyzes various applications and misapplications of the relevant concept, primarily through case studies. Differential calculus and statistics are used throughout the course. Students can take MBAC 6010 or take MBAC 6011 plus MBAC 6012. Credit can not be given for all.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6012 (1.5) Managerial Economics 2**
Develops a basic understanding of the macro economy and its relationship to an individual business or industry. This objective will be accomplished by understanding macroeconomic concepts and data sources, developing a basic model, understanding relevant policy instruments and integrating this information into the world economy. Students can take MBAC 6010 or take MBAC 6011 plus MBAC 6012. Credit can not be given for all.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6020 (3) Financial Accounting**
Introduces the financial reporting system used by business organizations to convey information about their economic affairs. Develops an understanding of financial reports and what they tell about a business enterprise. Focuses on how alternative accounting measurement rules represent different economic events in financial reports.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6031 (1.5) Quantitative Methods 1**
Covers foundations for statistical reasoning and statistical applications in business. Topics include data collection, descriptive stats and data visualization, probability, discrete probability distributions, continuous probability distributions, sampling distributions and estimation.
**Requisites:** Restricted to MBA (MBAD) and Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6032 (1.5) Quantitative Methods 2**
Second in a series of two courses covering foundations for statistical reasoning and statistical applications in business. Topics include hypothesis testing, one and two sample hypothesis tests, single regression analysis, multiple regression analysis.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6050 (3) Strategy**
Analyzes how firms can attain and sustain competitive advantage in today's competitive environment. Focuses on industry dynamics, competitive positioning, firm capabilities, and corporate innovation. Introduces a set of tools for assisting managers in solving complex, real-world business problems in strategy development. Integrates MBA learning in functional areas, and emphasizes the fit between competitive analysis and the role of management and organization.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6051 (3) Operations Management**
Develops an understanding of processes and the alignment of a process with the organization¿s operating priorities. Examines how interconnected processes relate to managing supply and demand and stakeholder incentives. Explores services, highlighting the differences and similarities between product and service businesses and considers ¿c-suite¿-level challenges such as managing firm growth, alignment of the operating system with strategic priorities, and mitigating uncertainty through optionality.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6052 (3) Capstone Projects**
Provides students with an opportunity to focus on a specific project which would have a positive strategic impact on the company for which they work. For those who have entrepreneurial aspirations, this project could result in a business plan for a new venture. Final deliverable should address marketing, financial, operational, and management implications and strategic impact.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6060 (3) Corporate Finance**
Analyzes the implications of modern finance theory for the major decisions faced by corporate financial managers. Develops the basic skills necessary to apply financial concepts to the various problems faced by a firm. Includes capital budgeting, capital structure, long term financing, short term financial management, and financial planning topics.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6081 (3) Data and Decisions**
Employers need managers who can integrate business knowledge and insight with the vast amount of data available using modern analytical tools. Students will access data from multiple sources, manipulate the data so it is ready for analysis, perform multiple regression analyses, validate the models they develop, and use the results to inform decisions. Goes beyond Excel spreadsheets to expose students to tools such as R and Tableau.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6090 (3) Marketing Management**
Provides a solid foundation of marketing knowledge by focusing on principles of marketing. Introduces the role that marketing cases play in advancing understanding and skill development in the field of marketing. Case discussions illustrate concepts discussed, and case studies are used to introduce the marketing decision making process. Emphasizes the international nature of marketing, as well as the importance of analysis and the understanding of the economic, demographic, political-legal-regulatory, sociocultural, technological, and natural environments.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Additional Information:** Departmental Category: MBA: Core Courses

**MBAC 6096 (1.5) Managerial Communications**
Tailored instruction, grounded in communication and business theory, that leads to improved business writing, public speaking, team presentations, team dynamics, interpersonal communication, and emotional intelligence with a focus on persuasion, audience analysis, and risk management.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MBAC 6098 (1) Professional Development I**
Professional Development I and II will introduce students to a range of skills to help them be successful in the professional work environment, including presentation development, constructive feedback loops, and personal presentation in team-based sessions. It will also offer a survey of the career management process and provide students with the tools and life-long skills to execute a strategic career management plan.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), Supply Chain Management (SCMN) or Business Analytics (BUAN) majors only.
**Additional Information:** Departmental Category: MBA: Core Courses

# Mechanical Engineering (MCEN)

## Courses

**MCEN 1024 (3) Chemistry for Energy and Materials Science**
Covers the basic physical and chemical fundamentals underlying the disciplines of energy and materials, with a focus on topics relevant to your mechanical engineering education. These fundamentals include atomic structure, stoichiometry, the periodic table, chemical bonding, states of matter, thermochemistry and chemical reactions.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEM 1113, CHEM 1400, CHEN 1201, and CHEN 1211
**Requisites:** Restricted to Mechanical Engineering (MCEN), Aerospace (ASEN), or Integrated Design Engineering (IDEN-BSIDE) students with a sub-plan of Mechanical (MEC) or Aerospace (AER).
**Recommended:** Prerequisite one year of high school chemistry.
**Additional Information:** Departmental Category: Materials

**MCEN 1025 (4) Computer-Aided Design and Fabrication**
Introduces CAD software and relevant concepts, including orthographic projection, sections, engineering drawing, geometric dimensioning and tolerancing, and an introduction to manufacturing methods. Lab work includes an introduction to fabrication techniques. Final design project involves reverse engineering of a physical product.
**Requisites:** Restricted to Mechanical Engineering (MCEN) or Engineering Physics (EPEN) majors only.
**Additional Information:** Departmental Category: Design

**MCEN 1030 (4) Introduction to Engineering Computing**
Introduces concepts and methods of computer programming with emphasis on applications to mechanical engineering. Includes vector/array manipulation, for/if/else/while loops, function definition, problem solving with programming. Covers MATLAB/Python with no previous experience expected.
**Requisites:** Requires a prerequisite or corequisite course of APPM 1235 or APPM 1340 or APPM 1345 or APPM 1350 or MATH 1150 or MATH 1300 or MATH 1310 (all minimum grade C-). Restricted to MCEN majors.

**MCEN 1208 (1-4) Special Topics in Mechanical Engineering**
Subject matter to be selected from topics of current interest. Credit to be arranged.
**Requisites:** Restricted to students with 0-26 units (Freshmen) Mechanical Engineering (MCEN) majors only.
**Additional Information:** Departmental Category: Special Topics

**MCEN 2000 (1) Mechanical Engineering as a Profession**
Provides an introduction to the profession of mechanical engineering. Specific topics addressed include career fields and roles relevant to mechanical engineering, internship search skills, professional communication, workplace culture, and current events/ethics topics relevant to the field. Course format may include additional evening/weekend activities.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) Mechanical Engineering (MCEN) majors, and IUT On Track applicants only.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 2023 (3) Statics and Structures**
Covers statics of particles, equivalent force systems, rigid bodies, equilibrium of rigid bodies in two and three dimensions, analysis of truss and frame structures, uniaxially-loaded members, distributed force systems and friction.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 2121 or GEEN 2851
**Requisites:** Requires prereq courses of (APPM 1360 or MATH 2300) PHYS 1110 (all min grade C-).Restricted to Mech (MCEN) or Enviro (EVEN) or Biomedical (BMEN) or Integrated Design Eng (IDEN-BSIDE) students w a sub-plan of Mechanical (MEC) or IUT On Track applicants
**Additional Information:** Departmental Category: Solids

**MCEN 2024 (3) Materials Science**
Provides an overview of the structure, properties and processing of metallic, polymeric and ceramic materials. Specific topics include perfect and imperfect solids, phase equilibria, transformation kinetics, mechanical behavior and material degradation. Approach incorporates both materials science and materials engineering components.
**Equivalent - Duplicate Degree Credit Not Granted:** GEEN 3024
**Requisites:** Requires prereqs (MCEN 1024 or CHEN 1211 or CHEM 1113 or CHEN 1201) PHYS 1110 (min grade C-). Restricted to Mechanical (MCEN) or Integrated Design (IDEN-BSIDE) students w/ sub-plan of MEC or Materials Sci minors (MTEN-MIN) or IUT On Track applicants.
**Additional Information:** Departmental Category: Materials

**MCEN 2043 (3) Dynamics**
Covers dynamic behavior of particle systems and rigid bodies. Topics include 2-D and 3-D kinematics and kinetics, impulse, momentum, potential and kinetic energy, and work and collision.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 3111
**Requisites:** Requires prerequisite courses of (MCEN 2023 or CVEN 2121 or GEEN 2851or ASEN 2701) and (APPM 1360 or MATH 2300) (all minimum grade C-). Restricted to MCEN or Integrated Design Engineering (IDEN-BSIDE) students with a sub-plan of Mechanical (MEC).
**Additional Information:** Departmental Category: Solids

**MCEN 2063 (3) Mechanics of Solids**
Covers axial forces, transverse forces, bending moments and torque on beams, shafts, columns and tensile members. Calculations of stresses from each of these loads, stresses in pressure vessels, stress concentrations. Stress transformation, principal stresses and maximum shear stress using Mohr¿s circle, combined load, failure criteria. Hooke¿s law, deflection and statically indeterminate structures, thermoelasticity.
**Equivalent - Duplicate Degree Credit Not Granted:** CVEN 3161
**Requisites:** Requires prereq of (MCEN 2023 or CVEN 2121 or GEEN 2851 or ASEN 2001 or ASEN 2701) and (APPM 1360 or MATH 2300) (all minimum grade C-). Restricted to Mechanical (MCEN) or Biomed (BMEN) or Integrated Design Engr (IDEN-BSIDE) students w/ sub-plan of MEC.
**Additional Information:** Departmental Category: Solids

**MCEN 3012 (3) Thermodynamics**
Explores fundamental concepts and basic theory, including first and second laws of thermodynamics, properties, states, thermodynamic functions and cycles.
**Equivalent - Duplicate Degree Credit Not Granted:** GEEN 3852 or AREN 2110
**Requisites:** Requires prereq course of APPM 1360 or MATH 2300 (min grade C-). Restricted to Mechanical (MCEN) or Environmental (EVEN) or Integrated Design (IDEN-BSID) students w/ sub-plan Mechanical (MEC) or Civil (CVEN) students w/ sub-plan of CMU partnership `1MSC
**Additional Information:** Departmental Category: Thermal

**MCEN 3017 (3) Circuits and Electronics for Mechanical Engineers**
Covers analysis of electrical circuits by use of Ohm's law, network reduction, node and loop analysis, Thevenin's and Norton's theorems, DC and AC signals, transient response of simple circuits, transfer functions, basic diode and transistor circuits, and operational amplifiers. Includes introductory digital electronics and microprocessors/microcontrollers.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3010
**Requisites:** Requires prereq course of PHYS 1120 and a prereq or coreq course of APPM 2360 or APPM 3310 or MATH 3430 (all min grade C-). Restricted to MCEN or EVEN or Integrated Design Engr (IDEN-BSIDE) students.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 3021 (3) Fluid Mechanics**
Examines fundamentals of fluid flow with application to engineering problems. Topics covered include fluid statics and kinematics, Bernoulli equations, laminar and turbulent viscous boundary layers, laminar and turbulent pipe flow, and conservation equations for mass, momentum and energy.
**Equivalent - Duplicate Degree Credit Not Granted:** CHEN 3200 and CVEN 3313
**Requisites:** Requires prereqs (MCEN 2023 or CVEN 2121 or GEEN 2851 or ASEN 2001 or ASEN 2701 or CHEN 2120) (APPM 2350 or MATH 2400) (all min grade C-). Restricted to MCEN, EVEN, and IDEN-BSIDE students w/ sub-plan of MEC.
**Additional Information:** Departmental Category: Fluids

**MCEN 3022 (3) Heat Transfer**
Studies fundamentals of heat transfer by conduction, convection, and radiation. Emphasizes problem formulation and selection of appropriate solution techniques. Provides applications to modern engineering systems, which may include energy, biological, environmental, and materials engineering problems.
**Requisites:** Requires prereq (MCEN 3021 or CVEN 3313), (MCEN 3012 or AREN 2110 or GEEN 3852 or EVEN 3012), (APPM 2360 or APPM 3310 or MATH 3430) (min grade C-). Restricted to Mech Engineering or Enviro Engineering or Integrated Design Engr w/sub-plan of MEC
**Additional Information:** Departmental Category: Thermal

**MCEN 3025 (3) Component Design**
Application of mechanics and materials science to the detailed design of various machine elements including shafts, bearings, gears, brakes, springs, and fasteners. Emphasizes application and open-ended design problems.
**Requisites:** Requires prerequisite courses of MCEN 1025 and (MCEN 2024 or GEEN 3024 or ASEN 1022), and (MCEN 2063 or CVEN 3161) (all minimum grade C-). Restricted to Mechanical (MCEN) or Integrated Design Eng (IDEN-BSIDE) students with a sub-plan of Mechanical (MEC)
**Additional Information:** Departmental Category: Design

**MCEN 3030 (3) Computational Methods**
Studies fundamental numerical techniques for the solution of commonly encountered engineering problems. Includes methods for linear and nonlinear algebraic equations, data analysis, numerical differentiation and integration, ordinary and partial differential equations.
**Requisites:** Requires prerequisite courses of (APPM 2360 or MATH 3430 or APPM 3310) and (MCEN 1030 or CSCI 1300 or CSCI 1310 or CSCI 1320 or ECEN 1310 or ASEN 1320) (all min grade C-). Restricted to Mechanical Engineering (MCEN) majors only.
**Additional Information:** Departmental Category: Math

**MCEN 3032 (3) Thermodynamics 2**
Offers advanced topics and applications for thermal system design and analysis. Topics include thermodynamics of state, entropy, thermodynamic cycles and reacting and nonreacting mixtures. Provides application to power generation, refrigeration and HVAC with conventional and advanced technologies. Most assignments are design oriented.
**Requisites:** Requires prereq of (MCEN 3021 or CHEN 3200 or CVEN 3313) (MCEN 3012 or GEEN 3852 or AREN 2110 or EVEN 3012 or CHEN 2120) (APPM 2360 or MATH 3430 or APPM 3310) (all min grade C-). Restricted to Mech Engineering or Enviro Engineering majors.
**Additional Information:** Departmental Category: Thermal

**MCEN 3047 (4) Data Analysis and Experimental Methods**
Learn to plan and carry out experiments and analyze the results. Topics covered include measurement fundamentals, design of experiments, elementary statistics and uncertainty analysis. Topics in statistics include probability, error propagation, confidence intervals, hypothesis testing, linear regression, one- and two-factor ANOVA and time series analysis. Formerly MCEN 3037.
**Equivalent - Duplicate Degree Credit Not Granted:** GEEN 3853
**Requisites:** Prereq PHYS 1140 (min grade C-). Coreqs 1 of:(WRTG 3030,3035,ENES 1010,3100,PHYS 3050,COEN 3050,ENLP 3100), 1 of:(ECEN 3010,2270,GEEN 3010,MCEN 3017), 1of:(MCEN 3030,APPM 4650,APPM 4600,CSCI 3656).Restricted to MCEN or IDEN w/MEC, 57+ credits only
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 3208 (1-4) Special Topics in Mechanical Engineering**
Subject matter to be selected from topics of current interest.
**Repeatable:** Repeatable for up to 15.00 total credit hours.
**Requisites:** Requires prereq courses of APPM 2360 PHYS 1140 and prereq or coreq courses of ECEN 3010 and WRTG 3030 or WRTG 3035 or HUEN 1010 or 3100 (all min grade C). Restricted to students with 57-180 credits (Jrs/Srs) Mechanical Engineering (MCEN) majors only.
**Additional Information:** Departmental Category: Special Topics

**MCEN 3930 (6) Mechanical Engineering Cooperative Education**
Students enrolled in this course participate in a previously arranged, department-sponsored education program with a university, government agency, or industry. This course is offered only through Continuing Education.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** At least a 2.75 cumulative GPA is required. Restricted to Mechanical Engineering or students with a plan of Mechanical Engineering Concurrent Degree or Integrated Design Engineering students with a MCEN subplan.
**Recommended:** Prerequisite 3.00 GPA or higher.
**Additional Information:** Departmental Category: Math

**MCEN 4010 (3) Microsystems Integration**
A microsystem consists of microelectronic, optoelectronic, microwave, microelectromechanical and energy components interconnected. Thermal, electrical, fabrication and assembly issues for microsystems represented by iPhone series will be studied. The packaging and interconnection technologies used to establish the design and manufacturing infrastructure of microsystems will be reviewed. Other optoelectronic, MEMS and batter components for microsystems will also be studied.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5010
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechanical Engineering (MCEN) majors only.

**MCEN 4012 (3) Renewable Fuels, Fuel Cells and Internal Combustion Engines**
With the accelerated availability of carbon-free and renewable fuels, we will explore high-efficiency, low-emissions fuel cell and internal combustion engine energy conversion technologies, preparing students to enter the rapidly changing fields of power and propulsion on the path to net-zero greenhouse gas emissions. Through thermodynamic modeling, systems engineering, and requirements flow-down, students will apply the fundamentals of thermodynamics, fluids and heat transfer, combustion and electrochemistry for fuel cells and IC engines.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5012
**Requisites:** Requires corequisite course of MCEN 3032. Restricted to College of Engineering and Applied Sciences students.
**Recommended:** Prerequisites MCEN 4152/5152 or MCEN 4194/5194.

**MCEN 4026 (3) Manufacturing Processes and Systems**
Examines manufacturing processes for metals and polymers, as well as manufacturing systems that integrate these processes. Lecture topics include shape forming, machining, joining, assembling, casting, process integration, statistical process control, total quality management, geometric dimensioning and tolerancing, and electronic packaging. Examines real-world manufacturing operations and applications through guest speakers and examples.
**Requisites:** Requires prerequisite course of MCEN 2024 or GEEN 3024 or ASEN 1022 (minimum grade C-). Restricted to Mechanical Engineering (MCEN) majors only.
**Additional Information:** Departmental Category: Manufacturing and Systems

**MCEN 4032 (3) Sustainable Energy**
Examines sustainability of our current energy systems, including transportation, using environmental and economic indicators. Uses systems analysis that addresses energy supply and demand. Explores the science and technology as well as environmental and economic feasibility of efficiency measures and renewable energy technologies. Additional emphasis is given to the global nature of the challenges and the potential for locally optimal solutions.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5032
**Requisites:** Requires prerequisite or corequisite course of (MCEN 3022 or CHEN 3210 or AREN 2120 or ASEN 3402 or MCEN 3032) (minimum grade C-).
**Additional Information:** Departmental Category: Thermal

**MCEN 4036 (3) Lean Six-Sigma in Manufacturing**
Focuses on Lean Principles and Six-Sigma methodologies for defining, measuring, analyzing, improving, and controlling (DMAIC) manufacturing processes to establish more efficient processes. Incorporates statistical process control methodologies. Teaches students to streamline industry and manufacturing processes and use data to make better informed decisions. Includes lectures, in-class activities, Minitab workshops, industry focused projects, and three exams based on the DMAIC process along with three projects focused on industry tours.
**Requisites:** Restricted to students with 57-180 credits (Jrs/Srs) Mechanical Engineering (MCEN) majors only.

**MCEN 4043 (3) System Dynamics**
Covers linear dynamic systems and mathematical tools for understanding them. Topics include Laplace transform, multi-domain system modeling, input-output relationships, time-domain response, Fourier series, frequency-domain response, and introduction to feedback control.
**Requisites:** Requires prereqs (MCEN 2043 or CVEN 3111), (ECEN 3010 or 2270 or GEEN 3010 or MCEN 3017), coreq (MCEN 3030 or APPM 4650 or APPM 4600 or CSCI 3656) all min grade C-. Restricted to MCEN or IDEN-BSIDE students w/ sub-plan of MEC.
**Additional Information:** Departmental Category: Solids

**MCEN 4045 (3) Mechanical Engineering Design Project 1**
First part of a two-course capstone design experience in mechanical engineering. Covers problem definition, determining design requirements, alternative design concepts, engineering analysis, proof-of-concept prototype and CAD drawings. Students make several oral design reviews, a final design presentation, and prepare a written report. IDEN-BSIDE students are not required to complete MCEN 2000, MCEN 3022, MCEN 3030 or MCEN 4026 but have additional prerequisites of GEEN 1400, 2400 and 3400.
**Requisites:** Restricted to MCEN or IDEN mjrs w/ prereqs (GEEN 1400, 2400, OR 3400) and MCEN 2000, 3012, 3021, 3025, 3030, AND (3022 or 4043 or 3047). Coreqs MCEN 4026, 3022, 4043, 3047, AND (WRTG 3030 or 3035 or ENES 1010 or 3100) (all min grade C-).
**Additional Information:** Departmental Category: Design

**MCEN 4057 (3) Environmental Modeling**
Enables students to develop and evaluate pollutant transport, fate, exposure, and risk models for air, water, and multi-media systems, with a special emphasis on air. Emphasizes the fundamental physics and chemistry that govern contaminant fate and transport and the basic mathematical equations and numerical approaches for describing these processes.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5057
**Requisites:** Requires prerequisite courses of CHEN 1211 or CHEM 1113 or MCEN 1024 and CSCI 1300 or CSCI 1320 (all minimum grade C).
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 4064 (3) Soft Machines**
Introduces soft machines as a new paradigm of engineering that starts to impact healthcare, consumer electronics, renewable energy and collaborative robotics. Prepares students to participate in research on soft machines by starting with fundamentals of soft materials and by covering soft robotics, stretchable electronics, energy harvesting and functional polymers. Includes guest lectures, a literature review and a hands-on lab project.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5046 and MSEN 5046
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechanical Engineering (MCEN) majors only.

**MCEN 4085 (3) Mechanical Engineering Senior Design Project 2**
Second part of a two-course capstone design experience in mechanical engineering. Includes refinement of prototype, design optimization, fabrication, testing, and evaluation. Students orally present the final design and prepare a written report and operation manual for the product. GEEN-BS and GEEN-BSEPL students are not required to complete MCEN 4026.
**Requisites:** Requires prerequisite course of MCEN 4045 (minimum grade C-).
**Additional Information:** Departmental Category: Design

**MCEN 4086 (1) Writing for Design Projects**
Communicate professionally in writing to the technical and nontechnical audience. Develop skills to analyze rhetorical situations and compose documents, such as reports, technical manuals and user guides, that achieve a specific purpose and meet the needs of a particular audience. Writing with clarity, conciseness and correctness will be emphasized.
**Requisites:** Requires prerequisite or corequisite course of MCEN 4045 (minimum grade C-).
**Additional Information:** Departmental Category: Manufacturing and Systems

**MCEN 4110 (3) Regenerative Biology and Tissue Repair**
Presents the regenerative biology behind tissue systems, along with the regenerative medicine of that tissue with an emphasis on engineering principles, using the assigned reading as a guideline. Follows lectures with class discussions of current papers on the regenerative biology of the same tissue system. In the final 1 ¿ 2 classes assigned to this topic, individual graduate students give 20 min presentations on a relevant regenerative medicine/engineering-focused paper.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 4110, BMEN 5110, and MCEN 5110
**Requisites:** Restricted to Mechanical Engineering (MCEN), Biomedical Engineering (BMEN), and Chemical Engineering (CHEN or BIEN) majors with 57+ credits only.

**MCEN 4111 (3) Introduction to Microfluidics**
Microfluidics deals with the behavior of fluids in small scale. It is a highly multidisciplinary field at the intersection of engineering, physics, chemistry, biology, medicine, nanotechnology, and biotechnology. This course covers the fundamentals and fabrication of microfluidic devices and their applications, particularly in lab-on-a-chip. Includes lectures, literature discussion, team presentations, and possibly one lab on microfluidic devices. Enhances your understanding of microfluidic technologies and their broad applications.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5111 and BMEN 4111 and BMEN 5111
**Requisites:** Requires prerequisite course of MCEN 3021 or CHEN 3200 or CVEN 3313 (all minimum grade C-). Restricted to Mechanical Engineering majors only.

**MCEN 4112 (3) Introduction to Nanoscale Transport**
Introduces the basic concepts, theoretical methods, and experimental techniques related to nanoscience and nanoengineering that are ubiquitous in microelectronics, renewable energy technology, heat transfer, nano-optics, MEMS/NEMS, and emerging quantum technologies. Discusses microscopic pictures and theories of various energy transport and conversion phenomena and real-world examples and demonstrations.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5112
**Requisites:** Requires prerequisite courses of PHYS 1110 and (APPM 2360 or MATH 3430) (all minimum C-). Restricted to Mechanical Engineering (MCEN) majors with 57+ credits only.

**MCEN 4113 (3) Mechanics of Cancer**
Cancer is considered to be an organ or an ecosystem, in which a critical component of the tumor microenvironment is mechanical forces. This course will cover the role of mechanics in cancer and cancer-related processes, with a focus on solid mechanics and fluid mechanics. In this course, you will apply engineering principles to come away with an appreciation of how mechanics influence cancer and its etiology as well as the development of future treatments.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 4113 and MCEN 5113 and BMEN 5113
**Requisites:** Requires prerequisite course of MCEN 3021 or CHEN 3200 or CVEN 3313 or MCEN 2063 or CVEN 3161 (all minimum grade C-). Restricted to Mechanical and Biomedical Engineering majors with 57+ credits only.

**MCEN 4114 (3) Automation of Industrial Processes**
Introduces students to Programmable Logic Controller (PLC) architecture, ladder logic programming, and programming Human Machine Interfaces (HMI). Students learn how to automate manufacturing processes and applications of PID control.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4114
**Requisites:** Prerequisite MCEN 3017 Circuits and Electronics for Mechanical Engineers.

**MCEN 4115 (3-4) Mechatronics and Robotics I**
Focuses on design and construction of microprocessor-controlled electro-mechanical systems. Lectures review critical circuit topics, introduce microprocessor architecture and programming, discuss sensor and actuator component selection, robotic systems and design strategies for complex, multi-system devices. Lab work reinforces lectures and allows hands-on experience with robotic design. Students must design and build an autonomous robotic device. Project expenses may be incurred ($50 maximum).
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5115
**Requisites:** Requires prerequisite courses of (MCEN 3017 or ECEN 3010 or 2250 or GEEN 3010) and (MCEN 1030 or ECEN 1310 or CSCI 1300 or CSCI 1320 or ASEN 1320) (all min grade C-). Restricted to Mechanical Engineering majors only.
**Additional Information:** Departmental Category: Design

**MCEN 4116 (3) Heating, Ventilation, and Air Conditioning Design**
Analysis and design of buildings and their systems to satisfy the requirements for a comfortable and healthy indoor environment. Covers psychometrics, thermal comfort, building heating and cooling loads, fluid flow basics, and HVAC components and systems.
**Requisites:** Prerequisite: MCEN 3012 Thermodynamics.

**MCEN 4117 (3) Anatomy and Physiology for Engineers**
Explores human physiological function from an engineering, specifically mechanical engineering, viewpoint. Provides an introduction to human anatomy and physiology with a focus on learning fundamental concepts and applying engineering (mass transfer, fluid dynamics, mechanics, modeling) analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 4117 and BMEN 5117 MCEN 5117
**Requisites:** Restricted to Mechanical or Biomedical Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 4118 (3) Mechanics of Snow**
This course covers the composition, structure and mechanics of ice and snow, from plasticity of ice at the atomic scale, to snowflakes and snow metamorphism, to fracture mechanics and avalanches in large snow slabs. Experiments and models (micromechanics, fracture mechanics) applied to ice and snow are reviewed. Fundamental knowledge is applied to predicting the mechanical strength and reliability of different types of snow. Assessment is largely based on in-class activities, and on a final project.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5118
**Requisites:** Requires prerequisite course of MCEN 2063 Mechanics of Solids, minimum grad C-. Restricted to Mechanical Engineering majors with 57+ credits only.

**MCEN 4123 (3) Vibration Analysis**
Highlights free and forced vibration of discrete and continuous systems. Examines Lagrange's equation, Fourier series, Laplace transforms, and matrix and computational methods. Applies knowledge to practical engineering problems.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 4123
**Requisites:** Requires prerequisite course of (MCEN 3030 or APPM 4650 or APPM 4600 or CSCI 3656 or ASEN 3112) (minimum grade C). Restricted to Mechanical Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Solids

**MCEN 4124 (3) Mechanical Behavior of Materials**
Addresses the relationship between material structure and the fundamental processes of deformation, yield, and fracture. Examines elements of elasticity theory, introduction to plasticity, and formulation of failure criteria. Studies basic deformation processes in terms of dislocation mechanics and macroscopic mechanical behavior. Takes into consideration the influence of compositional and processing strengthening mechanisms on mechanical properties.
**Requisites:** Requires prerequisite courses of (MCEN 2024 or GEEN 3024 or ASEN 1022) and (MCEN 2063 or CVEN 3161) (all minimum grade C). Restricted to Mechanical Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Materials

**MCEN 4125 (3) Optimal Design**
Focuses on linear optimization and will introduce non-linear optimization. Formulating Engineering applications as optimization problems that can be solved using industry known solvers will be learned. Some of these applications will include minimum cost mechanical design, wind farm power maximization, minimum energy control, production control, and more. Previous programming experience required.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5125
**Requisites:** Requires prerequisite course of (MCEN 3030 or APPM 4650 or APPM 4600 or CSCI 3656) (minimum grade C-). Restricted to Mechanical Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Design

**MCEN 4127 (3) Biomedical Ultrasound**
Covers the design of ultrasound systems for medical imaging and therapy, including the physics of wave propagation, transducers, pulse-echo imaging, flow, tissue characterization, and microbubble contrast, with an emphasis on current topics in biomedical ultrasound. Includes lectures on theory, practice and special topics; a laboratory on wave propagation; oral presentations on current literature; signal processing exercises; and a team project. Some experience with MATLAB is strongly encouraged for exercises throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 4127 and BMEN 5127 and MCEN 5127
**Requisites:** Requires prerequisite course of ECEN 3300 or ECEN 3301 or MCEN 4043. Restricted to Mechanical Engineering (MCEN), Biomedical Engineering (BMEN), and Environmental Engineering (ECEN) majors with 57+ credits only.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 4131 (3) Air Pollution Control Engineering**
Introduces air quality regulations, meteorology and modeling. Examines methods for controlling major classes of air pollutants, including particulate matter and oxides of sulfur and nitrogen, as well as control technology for industrial sources and motor vehicles. Requires interdisciplinary design projects.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 4131 and MCEN 5131 and EVEN 5131
**Requisites:** Requires prerequisite courses of (MCEN 3021 or CHEN 3200 or CVEN 3313) and (MCEN 3012 or GEEN 3852 or AREN 2110 or EVEN 3012) (all minimum grade C-). Restricted to Mechanical Engineering or Environmental Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Fluids

**MCEN 4133 (3) Intro to Tissue Biomechanics**
Focuses on developing an understanding of the fundamental mechanical principles that govern the response of hard and soft biological tissue to mechanical loading. Specifically, covers mechanical behavior of biological materials/tissues, classical biomechanics problems in various tissues, the relationship between molecular, cellular and physiological processes and tissue biomechanics and critical analysis of related journal articles.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5133 and BMEN 5133
**Requisites:** Requires prerequisite courses of (MCEN 2024 or GEEN 3024 or ASEN 1022 or BMEN 2010) and MCEN 2063 (both minimum grade C-). Restricted to MCEN and BMEN majors with 57+ credits.
**Additional Information:** Departmental Category: Materials

**MCEN 4135 (3) Wind Energy and Wind Turbine Design**
Focuses on understanding and applying principles related to current wind energy technologies. Students will apply technical coursework from throughout the engineering curriculum (environmental, fluids, statics, dynamics, power, economics, etc.) to the process of designing wind turbines and wind farms. Practical, real world examples will be integrated into the lessons and problems.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5135
**Requisites:** Requires prerequisite courses of (MCEN 3021 or CHEN 3200 or CVEN 3313 or AREN 2120) and (MCEN 3017 or ECEN 3010 or GEEN 3010 or ECEN 2270 or AREN 3040) (all minimum grade C-). Restricted to Mech or Environmental Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Design

**MCEN 4137 (3) Anatomy and Physiology 2**
Provides in-depth understandings of anatomy and physiology as well as introductions to transport phenomena, flow mechanics and solid mechanics in several organ systems: the cardiovascular, pulmonary, kidney, endocrine and digestive systems. Introduces artificial physiological systems to replace or assist physiological functions and introduce the concepts of physiological barriers that prevent diagnosis or effective therapeutics.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5137
**Requisites:** Requires prerequisite course of MCEN 4117 (minimum grade C). Restricted to students with 57-180 credits (juniors/seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 4138 (3) Control Systems Analysis**
Analysis and design of continuous time control systems using classical and state space methods. Laplace transforms, transfer functions and block diagrams. Stability, dynamic response, and steady-state analysis. Analysis and design of control systems using root locus and frequency response methods. Computer aided design and analysis. Department enforced prerequisite: background in Laplace transforms, linear algebra,and ordinary differential equations.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 4114 and ASEN 5114 ECEN 5138 and ECEN 4138 and MCEN 5138
**Requisites:** Requires prerequisite of MCEN 4043 or ECEN 3300 (minimum grade C-). Restricted to students with 57+ credits (Senior, Fifth Year Senior) Mechanical Engineering majors only.

**MCEN 4141 (3) Indoor Air Pollution**
Describes the impact of indoor air pollutants on human health, including an introduction to key pollutants and their sources. Students will estimate emission factors, calculate generation/ventilation rates, quantify the impact of deposition and chemical reactions and explore relevant control technology. Current issues will also be addressed, including climate change, green building design, economic concerns and relevance to the developing world.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 4141, MCEN 5141, and EVEN 5141
**Requisites:** Requires prerequisite courses of (MCEN 3022 or CHEN 3210) (minimum grade C-). Restricted to Mechanical and Environmental Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Fluids

**MCEN 4151 (3) Flow Visualization**
Explores techniques for the visualization of the physics of fluid flows including seeding with dyes, particles and bubbles, and shadowgraphy and schlieren. Reviews optics and fluid physics, especially atmospheric clouds. Assignments are student-driven, to individuals and mixed teams of graduates, undergraduates, engineering majors and photography/video majors.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5200, MCEN 5151, ATLS 4151 and ATLS 5151
**Requisites:** Restricted to College of Engineering and Applied Science students with 57+ credits only.
**Recommended:** Prerequisite MCEN 3021.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Fluids

**MCEN 4152 (3) Introduction to Combustion**
Focuses on the mechanisms by which fuel and oxidizers are converted into combustion products. Application to practical combustion devices such as Otto, Diesel, gas turbine and power plant combustion systems. Consideration of combustion-generated air pollution, fire safety and combustion efficiency.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5152
**Requisites:** Requires prerequisite course of MCEN 3012 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechanical Engineering majors only.
**Recommended:** Prerequisites MCEN 3021 and MCEN 3022.
**Additional Information:** Departmental Category: Thermal

**MCEN 4154 (3) Biocolloids and Biomembranes**
Covers the thermodynamics and mechanics of biological membranes and biomedical colloids. Considers intermolecular and surface forces, self-assembly and colloidal stability. Addresses structure-property relationships and design principles for biomedical applications. Focuses on monolayers, bilayers, micelles, filomicelles, liposomes, polymersomes, emulsions, microbubbles, polyplexes and polyelectrolyte multilayer capsules.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5154
**Requisites:** Requires prerequisite courses of (APPM 2360 or MATH 3130 or MATH 3135 or APPM 3310) and (PHYS 1120 or PHYS 1125) (all minimum grade C). Restricted to Mechanical Engineering students with 57+ credits only
**Additional Information:** Departmental Category: Materials

**MCEN 4155 (3) Automated Mechanical Design Synthesis**
Introduces computational approaches to automatically generate complex multimaterial mechanical designs that satisfy predefined high-level specifications, discusses algorithms to solve design as a constrained non-convex multi-objective optimization problem. Topics: expert-driven design process; computational analysis tools based on mechanical simulation (finite element methods, mesh-free methods); topological optimization; compositional design; multi-objective optimization; evolutionary design; design for manufacturing with additives (FDM, SLA, Inkjet). Students design a part to specifications, fabricate using advanced (3D printing, laser cutting, CNC, etc) tools.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5155
**Requisites:** Requires prerequisite course of MCEN 3030 or APPM 4650 or APPM 4600 or CSCI 3656 (all minimum grade C-). Restricted to Mechanical Engineering majors with 87+ credits only.
**Recommended:** Prerequisite students should be comfortable with MATLAB, PDEs, linear algebra, free body diagrams, mechanical modeling/design; exposure to finite-element modeling and state-space representations.

**MCEN 4157 (3) Modeling of Human Movement**
Human movement analysis is used in physical rehabilitation, sport training, human-robot interaction, animation, and more. Course provides a systematic overview of human movement on multiple levels of analysis, with an emphasis on the phenomenology amenable to computational modeling. Covers muscle physiology, movement-related brain areas, musculoskeletal mechanics, forward and inverse dynamics, optimal control and Bayesian inference, learning and adaptation. Inspires students to see and appreciate the complexities of movement control in all aspects of daily life.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 4157 and MCEN 5157 and BMEN 5157
**Requisites:** Requires prerequisite of (MCEN2043 or GEEN 3024 or ASEN 1022) and (APPM2360 or MATH2130 or MATH3130) all minimum grade C-. Restricted to students with 57-180 credits (Jrs/Srs) Mechanical Engineering (MCEN) and Biomedical Engineering (BMEN) majors only.

**MCEN 4162 (3) Energy Conversion**
Examines common energy-conversion methods and devices. Topics include power-cycle thermodynamics, turbocompressor and expander processes, combustion systems, and applications and limitations of direct energy-conversion systems.
**Requisites:** Requires prerequisite course of (MCEN 3012 or GEEN 3852 or AREN 2110 or EVEN 3012 or CHEN 3320) (minimum grade C). Restricted to Mechanical Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Thermal

**MCEN 4171 (3) Biofluids on the Micro Scale**
Introduces fundamental physical concepts and basic mechanisms of biological fluids in microscale. Elaborates on the application of fluid mechanics principles to major biological systems, including human organ systems and animal locomotion in microscale. Covers physiologically relevant fluid flow phenomena on the cellular level and the underlying physical mechanisms from an engineering perspective. Related state-of-art technologies such as organ-on-a-chip and micro/nano fabrication will be emphasized. Will enhance your understanding of organ-on-a-chip technologies and their broad applications.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 4171 and MCEN 5171 and BMEN 5171
**Requisites:** Restricted to Mechanical Engineering and Biomedical Engineering majors with 57+ credits.
**Recommended:** Prerequisites MCEN 3021 or CHEN 3200 or CVEN 3313 or BMEN 3010.

**MCEN 4173 (3) Finite Element Analysis**
Introduces the theory behind and applications of the finite element method as a general and powerful tool to model a variety of phenomena in mechanical engineering. Applications include structural mechanics, mechanics of elastic continua and heat conduction.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5173
**Requisites:** Requires prerequisite course of (MCEN 2063 or CVEN 3161) (minimum grade C-). Restricted to Mechanical Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Solids

**MCEN 4174 (3) Failure of Engineering Materials**
Examines the fundamental concepts regarding the failure of engineering materials. Case studies are used to integrate a basic understanding of material failure mechanisms with analysis techniques and tools. Topics include the elastic properties (isotropic and anisotropic materials) and the origin of elastic behavior, viscoelasticity, plasticity (dislocation mechanisms, yielding criteria, strengthening mechanisms), creep, fracture and fatigue.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5174
**Requisites:** Requires prerequisite courses of (MCEN 2024 or GEEN 3024 or ASEN 1022) and (MCEN 2063 or CVEN 3161) (all minimum grade C-). Restricted to Mechanical Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Materials

**MCEN 4183 (3) Mechanics of Composite Materials**
Introduces various kinds of composite materials, composite fabrication techniques, the physical and mechanical behavior of composites, and analytical and experimental methodologies.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5183
**Requisites:** Requires prerequisite courses of (MCEN 2024 or GEEN 3024 or ASEN 1022) and (MCEN 2063 or CVEN 3161) (all minimum grade C-). Restricted to Mechanical Engineering majors with 57+ credits only.
**Additional Information:** Departmental Category: Solids

**MCEN 4193 (3) Design of Coffee**
Serves as an introduction to how engineers use their disciplinary training to approach and solve problems outside of the traditional confines of their discipline, as illustrated by the roasting and brewing of coffee. In addition to focusing on the science, engineering and craftsmanship of making a cup of coffee from bean to cup, we will also study the global sourcing and sustainability aspects of coffee.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5193
**Requisites:** Requires prerequisite course of MCEN 3022 and (MCEN 3021 or CHEN 3200 or CVEN 3313) (minimum grade C-). Restricted to Mechanical Engineering majors with 57+ credits only.
**Recommended:** Prerequisite MCEN 3047.

**MCEN 4194 (3) Electrochemical Energy Conversion and Storage**
Presents the fundamentals, principles and experimental techniques of electrochemistry, the background of ionic or electronic conduction of metal, semiconductor, inorganic and polymer materials and applications in the areas of batteries, fuel cells, electrochemical double layer capacitors, electrochemical photonics, sensors and semiconductor electrochemistry.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5194
**Requisites:** Requires prereq course of (MCEN 2024 or GEEN 3024 or ASEN 1022) and coreq course of MCEN 3032 (all min grade C-). Restricted to Mechanical Engineering majors only.
**Additional Information:** Departmental Category: Materials

**MCEN 4195 (3) Bioinspired Robotics**
Bioinspired design views the process of how we learn from nature as an innovation strategy translating principles of function, performance, and aesthetics, from biology to human technology. The creative design process is driven by interdisciplinary exchange among engineering, biology, medicine, art, architecture and business. Diverse teams of students will collaborate on, create, and present original bioinspired design projects in the ITLL.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5195, BMEN 5195 and BMEN 4195
**Requisites:** Requires prerequisite courses of MCEN 3017 and MCEN 3025 (minimum grade C-). Restricted to students with 57+ credits (Jrs/Srs) Mechanical Engineering (MCEN) majors only.

**MCEN 4215 (3) Design for Inclusion**
Examines the ways technologies like apps, products, public infrastructures and educational systems have excluded the needs of certain user groups while optimizing for others. Explores design approaches including universal design, humanitarian engineering, and culturally responsive design through multiple hands-on projects with the goal of equipping all to become more capable designers for inclusion rather than exclusion.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5215
**Requisites:** Restricted to Mechanical Engineering majors with 87+ credits only.

**MCEN 4225 (3) Product Development and Definition**
Student teams work with project clients to provide a thorough solution to an overarching problem the client or market wants answered. Development focuses on advancing product development through an iterative prototyping and testing cycle. Includes design and development of rigorous product tests to collect critical data on performance criteria. Definition focuses on advancing CAD skills along with print production and definition using advanced GD&T. Skills are applied to the students¿ designed product and testing experiments.
**Requisites:** Corequisite of MCEN 3025.
**Recommended:** Prerequisites ENGR 161 and 162.

**MCEN 4228 (1-4) Special Topics in Mechanical Engineering**
Subject matter to be selected from topics of current interest.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5228
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57+ credits (Jrs/Srs) Mechanical Engineering (MCEN) majors only.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 4231 (3) Computational Fluid Dynamics**
This course is an in-depth introduction to the basic principles and applications of computational fluid dynamics (CFD). Students learn about fundamental CFD concepts such as discretization, meshing, error and accuracy; and focus on computational solutions of flow and transport problems using the finite element method. Students conduct multiple hands-on simulation-based activities and exercises on canonical and realistic engineering flow/transport problems. Final project for the course culminates in a mini-conference/symposium where students present their work.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 4231 and MCEN 5231 and BMEN 5231
**Requisites:** Requires prerequisite courses of MCEN 3021 or CHEN 3200 or CVEN 3313 and MCEN 3030 or APPM 4650 or CSCI 3656 (all minimum grade C-). Restricted to Mechanical Engineering majors only.

**MCEN 4238 (3) Design for Community**
Design for Community (D4C) will provide engineering students with practical experience in consulting while offering valuable engineering services to University and industry clients. Focuses on preparing students for the practice of engineering by acting as a consultancy for clients' engineering-related design and fabrication needs. Students may be expected to work in teams or individually under the supervision of project directors, depending on project scope. Each student or team will assist several clients during the semester. The D4C will pursue the following goals for its students: provide a practical just-in-time learning experience for students interested in engineering consulting; prepare students for the practice of engineering design with underspecified real-world problem sets; prepare students for the professionalism needed to interact with clients; provide outreach that connects communities outside the Department of Mechanical Engineering and serves clients that would not have access to engineering
**Requisites:** Restricted to students with 57-180 credits (Jrs/Srs) Mechanical Engineering (MCEN) majors only.

**MCEN 4279 (3) Aesthetics in Design**
Focuses on aesthetic aspects of design via hands-on design-build experiences. Students individually create dynamic artifacts of their own choice with the assistance of teammates. Content includes major design movements since 1900, constructive critique practice, hand sketching techniques and other selected industrial design topics. Students publish their design work on an archival public blog which provides a professional portfolio element.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 4279 and MCEN 5279 and ATLS 5279
**Requisites:** Restricted to students with 57-180 credits (Jrs/Srs) Mechanical Engineering (MCEN) majors only.

**MCEN 4291 (1-2) Project Based Learning in Rural Schools**
Focuses on the use of low cost air quality monitoring tools, dubbed Pods, to implement PBL curriculum in high school environmental science classes in rural communities in Colorado. Each student will be paired with a high school class and will serve as curriculum and technology advisors as well as science experts. During the fall semester, students will be trained to effectively work in those roles and will also travel to their schools to be introduced. During the spring semester, students will support high school teachers in implementing an existing PBL air quality curriculum with the Pods. This will include monthly visits to schools in the spring and reporting back to the class. Enrollment during Fall is required for enrollment during Spring. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5291
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57+ credits (juniors and above) only.

**MCEN 4292 (3) Materials and Devices in Medicine**
The main objective of this multidisciplinary course is to provide students with a broad survey of biomaterials and their use in medical devices for restoring or replacing the functions of injured, diseased, or aged human tissues and organs. The topics to be covered include: evolution in the medical device industry, a broad introduction to the materials used in medicine and their chemical, physical, and biological properties, discovery of medical problems, potential impacts of treatment innovations, existing devices and design considerations for several major physiological systems (cardiovascular, neuromuscular, skeletal, pulmonary, renal, dermal), materials interaction with the human body, basic mechanisms of wound healing, biocompatibility issues, testing methods and techniques in accordance with standards and relevant regulations, biofunctionalities required for specific applications, as well as state-of-the-art approaches for the development of new regenerative materials targeting cellular mechanisms. Sam
**Requisites:** Requires prerequisite courses of MCEN 2024 and MCEN 4117 or MCEN 5117 (all minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechanical Engineering majors only.

**MCEN 4293 (3) Mechanics of Soft Matter**
Provides a general overview of fundamental concepts behind the mechanical behavior of soft matter. The term soft matter (which includes polymers, colloids, liquid crystals and surfactants, to name a few) is typically used to describe classes of materials whose structural unit is much larger than atoms, making their response more complex and often richer that of traditional solids. The objective of this class is to understand how chemical and mechanical forces between these small units yield macroscopic behaviors that one can observe in everyday life. Key engineering applications will also be discussed.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5293
**Requisites:** Requires prerequisite course of MCEN 2063 or CVEN 3161 (minimum grade C). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechanical Engineering majors only.

**MCEN 4298 (3) Introduction to Polymers**
Polymers represent a major class of engineering materials that are used by mechanical engineers. In this class, we will discuss the most fundamental concepts regarding polymeric materials. Topics include synthesis/manufacturing and chemical properties of polymers, statistical properties of polymer chains, multiphase polymers including polymer solutions and polymer blends, crystallization and glass transition of polymers, and viscoelastic properties of polymers.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5298
**Requisites:** Requires prerequisite course of MCEN 2024 (minimum grade C). Restricted to students with 57+ credits (Junior, Senior) Mechanical Engineering majors only.

**MCEN 4299 (3) Household Energy Systems**
Cooking, heating and lighting in the developing world often involves inefficient and incomplete combustion of solid or liquid fuels. The Global Burden of Disease Study in 2010, ranked this combustion as the 4th largest risk factor, causing 4 million premature deaths per year. There is a strong societal need to tackle this problem. Students leaving this course will be able to meet this need as they will have the skills to assess existing and new technology used in the developing world for cooking, heating and lighting. The course will cover (1) food conversion chemistry with the focus on increasing useable calories, (2) combustion and heat transfer as related to cooking, heating and lighting, and (3) combustion emissions and stove use assessment. There will be case studies interlaced throughout the content and the bulk of the workload will be homeworks and projects.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 5299
**Requisites:** Requires prerequisite or corequisite course of MCEN 3022 (minimum grade C). Restricted to students with 57+ credits (Junior, Senior) Mechanical Engineering or Environmental Engineering majors only.

**MCEN 4638 (3) Control Systems Laboratory**
Provides experience in control system design and analysis, using both real hardware and computer simulation. Covers the entire control system design cycle: modeling the system, synthesizing a controller, conducting simulations, analyzing the design to suggest modifications and improvements, and implementing the design for actual testing.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5638, ECEN 4638, and MCEN 5638
**Requisites:** Requires prerequisite course of MCEN 4138 (minimum grade C-). Restricted to College of Engineering majors only.

**MCEN 4700 (3) Quantum Forge I**
Provides junior- and senior-level engineering and physical science students an opportunity to gain professional and technical quantum science skills and experience through participation in real-world projects in collaboration with industry leaders and academic investigators. Alongside project activity, students will engage in skill- and concept-focused modules to ensure proficiency in the skills necessary to participate in the quantum workforce. This capstone experience is intended for students who do not intend to continue on to graduate study in physics or engineering, but rather to enter the workforce directly.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 4700
**Requisites:** Requires prerequisite course of PHYS 3330 (minimum grade C-).
**Recommended:** Prerequisite or corequisite PHYS 4410.

**MCEN 4710 (3) Quantum Forge II**
Continuation of PHYS 4700, Quantum Forge I. The Quantum Forge provides junior- and senior-level engineering and physical science students an opportunity to gain professional and technical quantum science skills and experience through participation in real-world projects in collaboration with industry leaders and academic investigators. In the second semester, students will expand upon the knowledge and skills gained through the first-semester to bring projects to a point of completion and readiness for deployment in the industry context. As with Quantum Forge I, this capstone experience is intended for students who do not intend to continue on to graduate study in physics or engineering, but rather to enter the workforce directly.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 4710
**Requisites:** Requires prerequisite course of PHYS 4700 or MCEN 4700 (minimum grade C-).

**MCEN 4848 (1-6) Independent Study**
Subjects arranged in consultation with instructor and undergraduate advisor. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechanical Engineering majors only.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5000 (3) Sociotechnical Industry Skills**
Provides an introduction to sociotechnical skills as they relate to the practice of engineering. Themes include career exploration, communication, ethics, leadership, and teamwork. Students conduct several self-assessments to build awareness of their working styles and strengths. Students work on teams to be more effective as leaders and working on teams. Alumni and industry professionals regularly participate in the course to provide expertise and networking opportunities.
**Requisites:** Restricted to graduate students in the College of Engineering and Applied Science or undergraduate Mechanical Engineering (MCEN) majors with 57+ credits (Junior or Senior).

**MCEN 5010 (3) Microsystems Integration**
A microsystem consists of microelectronic, optoelectronic, microwave, microelectromechanical and energy components interconnected. Thermal, electrical, fabrication and assembly issues for microsystems represented by iPhone series will be studied. The packaging and interconnection technologies used to establish the design and manufacturing infrastructure of microsystems will be reviewed. Other optoelectronic, MEMS and batter components for microsystems will also be studied.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4010
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechancial (MCEN) majors or College of Engineering graduate students only.
**Grading Basis:** Letter Grade

**MCEN 5012 (3) Renewable Fuels, Fuel Cells and Internal Combustion Engines**
With the accelerated availability of carbon-free and renewable fuels, we will explore high-efficiency, low-emissions fuel cell and internal combustion engine energy conversion technologies, preparing students to enter the rapidly changing fields of power and propulsion on the path to net-zero greenhouse gas emissions. Through thermodynamic modeling, systems engineering, and requirements flow-down, students will apply the fundamentals of thermodynamics, fluids and heat transfer, combustion and electrochemistry for fuel cells and IC Engines.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4012
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.

**MCEN 5014 (3) Energy Materials Characterization**
Introduces theoretical framework for characterization techniques including X-ray diffraction, X-ray photoelectron spectroscopy and imaging methods used in the structural and morphological characterization of energy materials. Helps students determine characterization techniques suitable for their study and understand their data. Uses energy storage case studies to provide the methodologies for determining the nature and composition of materials. Helps students learn new characterization techniques from the literature and seek the characterization resources from DOE funded user facilities.
**Requisites:** Restricted to graduate students in the College of Engineering and Applied Science or undergraduate Mechanical Engineering (MCEN) majors with 57+ credits (Junior or Senior).
**Recommended:** Prerequisite MCEN 1024 Chemistry or equivalent, and MCEN 2024 Materials Science or equivalent.

**MCEN 5020 (3) Methods of Engineering Analysis 1**
Studies selected topics from linear algebra, multi-variable calculus, differential equations, and Fourier series. Assigns computer exercises. Correlates with analysis topics in other mechanical engineering graduate courses, and emphasizes applications. Prior courses in Calculus I, II, II, differential equations, and linear algebra strongly recommend.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Math

**MCEN 5021 (3) Introduction to Fluid Dynamics**
Focuses on physical properties of gases and liquids, and kinematics of flow fields. Analyzes stress; viscous, heat-conducting Newtonian fluids; and capillary effects and surface-tension-driven flow. Other topics include vorticity and circulation, ideal fluid flow theory in two and three dimensions, Schwartz-Christoffel transformations, free streamline theory, and internal and free-surface waves.
**Requisites:** Requires corequisite course of MCEN 5020. Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Fluids

**MCEN 5022 (3) Classical Thermodynamics**
First and second laws of thermodynamics. Entropy and availability. Cycle analysis. Thermodynamic properties of pure substances and mixtures. Property relations. Chemical reactions and chemical availability. Energy systems analysis.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Thermal

**MCEN 5023 (3) Solid Mechanics 1**
Introduces stress, strain and motion of a continuous system. Discusses material derivative; fundamental laws of mass, momentum, energy and entropy; constitutive equations and applications to elasticand plastic materials.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 5012
**Requisites:** Requires coreq course of MCEN 5020. Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering (MCEN) majors only.
**Additional Information:** Departmental Category: Solids

**MCEN 5024 (3) Materials Chemistry and Structures**
Provides graduate level students with a comprehensive overview of the chemistry and structure of material systems, with a focus on chemical bonding., the resulting material structures and their properties. This course is intended to become one of the four core courses offered in the new Materials Science curriculum. Course topics include: bonding in solids, crystalline and amorphous states, basic group theory, diffraction, metals and alloys, ceramics, and an intro to mat. characterization.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Materials

**MCEN 5027 (1) Graduate Seminar**
Offers weekly presentations by visiting speakers, faculty, and students.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5030 (3) Introduction to Research**
Provides students with fundamental skills important for success in research. Covers approaches to generating project and program ideas, securing funding, performing a literature search to understand the state of a field, communicating results through presentations and papers, understanding scientific ethics, developing a network of trusted peers, establishing and negotiating collaborations, fostering diversity, ensuring equity and inclusivity, and establishing a professional profile and becoming a leader in your field.
**Requisites:** Restricted to undergraduate or graduate Mechanical Engineering students only.

**MCEN 5032 (3) Sustainable Energy**
Examines sustainability of our current energy systems, including transportation, using environmental and economic indicators. Uses systems analysis that addresses energy supply and demand. Explores the science and technology as well as environmental and economic feasibility of efficiency measures and renewable energy technologies. Additional emphasis is given to the global nature of the challenges and the potential for locally optimal solutions.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4032
**Requisites:** Restricted to graduate students in the College of Engineering and Applied Science or undergraduate Mechanical Engineering (MCEN) majors with 57+ credits (Junior or Senior).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Thermal

**MCEN 5034 (3) Thermodynamics of Materials**
Provides a unified presentation of fundamental concepts applicable to the thermodynamics of engineering materials. Develops quantitative tools for understanding the physical principles that govern phase equilibrium and transformation. Generates binary and ternary phase diagrams and determine the resulting materials structures and corresponding physical and mechanical properties.
**Recommended:** Prerequisites MCEN 2024 and MCEN 3012.
**Additional Information:** Departmental Category: Materials

**MCEN 5040 (3) Methods of Engineering Analysis 2**
Studies selected topics from the theory of complex variables, integral transform methods, partial differential equations, and variational methods. Assigns computer exercises. Correlates with analysis topics in other mechanical engineering graduate courses, and emphasizes applications.
**Requisites:** Requires prerequisite course of MCEN 5020 (minimum grade D-). Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Math

**MCEN 5041 (3) Advanced Fluid Mechanics 1**
Highlights exact solution of Navier-Stokes equations and fundamentals of rotating fluids. Considers Low Reynolds number flow; similarity solutions; viscous boundary layers, jets, and wakes; and unsteady viscous flow.
**Requisites:** Requires corequisite course of MCEN 5020. Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Fluids

**MCEN 5042 (3) Heat Transfer**
Studies development of equations governing transport of heat by conduction, convection, and radiation, and their solution. Includes analytical and numerical solution of initial and boundary value problems representative of heat conduction in solids. Describes heat transfer in free and forced convection, including laminar and turbulent flow. Also involves radiation properties of solids, liquids, and gases and transport of heat by radiation.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Thermal

**MCEN 5044 (3) Mechanical Behavior of Materials**
This introductory-level graduate course incorporates relevant aspects of materials science, solid mechanics, thermodynamics and mathematics, and applies them to achieve a fundamental understanding of the mechanical behavior of crystalline and non-crystalline engineering materials.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering (MCEN) majors only.
**Additional Information:** Departmental Category: Materials

**MCEN 5045 (3) Design for Manufacturability**
Topics include general design guidelines for manufacturability; aspects of manufacturing processes that affect design decisions; design rules to maximize manufacturability; economic considerations; value engineering and design for assembly. Presents case studies of successful products exhibiting DFMA principles. Prerequisite of MCEN 4026 required for undergraduate students.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering (MCEN) majors only.
**Additional Information:** Departmental Category: Materials

**MCEN 5055 (3) Advanced Product Design**
Introduces engineering design and development of consumer products. Includes learning sketching, brainstorming, idea generation, design thinking, user-centered design, product requirements and specifications, product constraints, human factors, aesthetics, industrial design, intellectual property, concept prototyping, idea selection, tolerancing, cost estimating, design for assembly, and materials selection. Entails a semester-long team re-design of a consumer product.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Design

**MCEN 5057 (3) Environmental Modeling**
Enables students to develop and evaluate pollutant transport, fate, exposure, and risk models for air, water, and multi-media systems, with a special emphasis on air. Emphasizes the fundamental physics and chemistry that govern contaminant fate and transport and the basic mathematical equations and numerical approaches for describing these processes.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4057
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5064 (3) Soft Machines**
Introduces soft machines as a new paradigm of engineering that starts to impact healthcare, consumer electronics, renewable energy and collaborative robotics. Prepares students to participate in research on soft machines by starting with fundamentals of soft materials and by covering soft robotics, stretchable electronics, energy harvesting and functional polymers. Includes guest lectures, a literature review and a hands-on lab project.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4046 and MSEN 5046
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechancial (MCEN) majors or College of Engineering graduate students only.
**Grading Basis:** Letter Grade

**MCEN 5065 (3) Graduate Design I**
First part of a two-course graduate product design experience in mechanical engineering. Covers problem definition and specifications, determining design requirements, user feedback, alternative design concepts, engineering analysis, concept prototypes and CAD drawings. Students make several oral design reviews, a final design presentation and prepare a written report. Entails a team product design, fabrication and testing cycle of sponsored project. Students who complete this course are encouraged to take MCEN 5075 Graduate Design II.
**Requisites:** Requires prerequisite course of MCEN 5055 (minimum grade C).
**Additional Information:** Departmental Category: Design

**MCEN 5075 (3) Graduate Design II**
Second part of two-course graduate product design experience in mechanical engineering. Includes refinement of prototype, design optimization, fabrication, testing, and evaluation. Students orally present the final design and prepare a written report and operation manual for the product. Entails a team product design, fabrication, and testing cycle of a sponsored project, leading to a fully-functional product.
**Requisites:** Requires prerequisite course of MCEN 5065 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Design

**MCEN 5110 (3) Regenerative Biology and Tissue Repair**
Presents the regenerative biology behind tissue systems, along with the regenerative medicine of that tissue with an emphasis on engineering principles, using the assigned reading as a guideline. Follows lectures with class discussions of current papers on the regenerative biology of the same tissue system. In the final 1 ¿ 2 classes assigned to this topic, individual graduate students give 20 min presentations on a relevant regenerative medicine/engineering-focused paper.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 5110, BMEN 4110, and MCEN 4110
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.

**MCEN 5111 (3) Introduction to Microfluidics**
Microfluidics deals with the behavior of fluids in small scale. It is a highly multidisciplinary field at the intersection of engineering, physics, chemistry, biology, medicine, nanotechnology, and biotechnology. This course covers the fundamentals and fabrication of microfluidic devices and their applications, particularly in lab-on-a-chip. Includes lectures, literature discussion, team presentations, and possibly one lab on microfluidic devices. Enhances your understanding of microfluidic technologies and their broad applications.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 5111 and MCEN 4111 and BMEN 4111
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Recommended:** Prerequisite MCEN 3021 or CHEN 3200 or CVEN 3313.

**MCEN 5112 (3) Introduction to Nanoscale Transport**
Introduces the basic concepts, theoretical methods, and experimental techniques related to nanoscience and nanoengineering that are ubiquitous in microelectronics, renewable energy technology, heat transfer, nano-optics, MEMS/NEMS, and emerging quantum technologies. Discusses microscopic pictures and theories of various energy transport and conversion phenomena and real-world examples and demonstrations.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4112
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors with 57+ credits only.

**MCEN 5113 (3) Mechanics of Cancer**
Cancer is considered to be an organ or an ecosystem, in which a critical component of the tumor microenvironment is mechanical forces. This course will cover the role of mechanics in cancer and cancer-related processes, with a focus on solid mechanics and fluid mechanics. In this course, you will apply engineering principles to come away with an appreciation of how mechanics influences cancer and its etiology as well as the development of future treatments.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 5113 and BMEN 4113 and MCEN 4113
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical and Biomedical Engineering undergraduate majors only.

**MCEN 5115 (3) Mechatronics and Robotics I**
Focuses on design and construction of microprocessor-controlled electro-mechanical systems. Lectures review critical circuit topics, introduce microprocessor architecture and programming, discuss sensor and actuator component selection, robotic systems and design strategies for complex, multi-system devices. Lab work reinforces lectures and allows hands-on experience with robotic design. Students must design and build an autonomous robotic device. Project expenses may be incurred ($50 maximum).
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4115
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Design

**MCEN 5117 (3) Anatomy and Physiology for Engineers**
Explores human physiological function from an engineering, specifically mechanical engineering, viewpoint. Provides an introduction to human anatomy and physiology with a focus on learning fundamental concepts and applying engineering (mass transfer, fluid dynamics, mechanics, modeling) analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 4117 and BMEN 5117 MCEN 4117
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5118 (3) Mechanics of Snow**
This course covers the composition, structure and mechanics of ice and snow, from plasticity of ice at the atomic scale, to snowflakes and snow metamorphism, to fracture mechanics and avalanches in large snow slabs. Experiments and models (micromechanics, fracture mechanics) applied to ice and snow are reviewed. Fundamental knowledge is applied to predicting the mechanical strength and reliability of different types of snow. Assessment is largely based on in-class activities, and on a final project.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4118
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors with 57+ credits only.
**Recommended:** Prerequisite 2063 Mechanics of Solids or equivalent.

**MCEN 5121 (3) Compressible Flow**
Applies energy, continuity, and momentum principles to compressible flow. Topics include normal and oblique shocks; Prandtl-Meyer expansion; methods of characteristics; and one-, two-, and three-dimensional subsonic, supersonic, and hypersonic flows.
**Requisites:** Requires prerequisite course of MCEN 5021 (minimum grade D-). Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Fluids

**MCEN 5122 (3) Statistical Thermodynamics**
Axiomatic formulation of macroscopic thermodynamics. Quantum mechanical description of atomic and molecular structure. Statistical mechanics description of thermodynamic properties of gases, liquids and solids. Elementary kinetic theory of gases and evaluation of transport properties. Department enforced requisite: undergraduate thermodynamics.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Thermal

**MCEN 5125 (3) Optimal Design**
Focuses on linear optimization and will introduce non-linear optimization. Formulating engineering applications as optimization problems that can be solved using industry known solvers will be learned. Some of these applications will include minimum cost mechanical design, wind farm power maximization, minimum energy control, production control, and more. Previous programming experience required.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4125
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Design

**MCEN 5127 (3) Biomedical Ultrasound**
Covers the design of ultrasound systems for medical imaging and therapy, including the physics of wave propagation, transducers, pulse-echo imaging, flow, tissue characterization, and microbubble contrast, with an emphasis on current topics in biomedical ultrasound. Includes lectures on theory, practice and special topics; a laboratory on wave propagation; oral presentations on current literature; signal processing exercises; and a team project. Some experience with MATLAB is strongly encouraged for exercises throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 5127 and MCEN 4127 and BMEN 4127
**Requisites:** Restricted to graduate students in the College of Engineering and Applied Science or undergraduate Mechanical Engineering (MCEN), Biomedical Engineering (BMEN), and Environmental Engineering (ECEN) majors with 57+ credits (Junior or Senior).
**Recommended:** Prerequisite MCEN 4043 System Dynamics or equivalent.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5131 (3) Air Pollution Control Engineering**
Introduces air quality regulations, meteorology and modeling. Examines methods for controlling major classes of air pollutants, including particulate matter and oxides of sulfur and nitrogen, as well as control technology for industrial sources and motor vehicles. Requires interdisciplinary design projects.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 5131 and MCEN 4131 and EVEN 4131
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering or Environmental Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Fluids

**MCEN 5133 (3) Intro to Tissue Biomechanics**
Focuses on developing an understanding of the fundamental mechanical principles that govern the response of hard and soft biological tissue to mechanical loading. Specifically, covers mechanical behavior of biological materials/tissues, classical biomechanics problems in various tissues, the relationship between molecular, cellular and physiological processes and tissue biomechanics and critical analysis of related journal articles.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4133 and BMEN 5133
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical and Biomedical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Materials

**MCEN 5135 (3) Wind Energy and Wind Turbine Design**
Focuses on understanding and applying principles related to current wind energy technologies. Students will apply technical coursework from throughout the engineering curriculum (environmental, fluids, statics, dynamics, power, economics, etc.) to the process of designing wind turbines and wind farms. Practical, real world examples will be integrated into the lessons and problems.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4135
**Requisites:** Restricted to Mechanical (MCEN), Civil (CVEN) or Aerospace (ASEN) Engineering graduate students only or Mechanical (MCEN) undergraduates with 57+ credits (juniors and seniors).
**Additional Information:** Departmental Category: Design

**MCEN 5137 (3) Anatomy and Physiology 2**
Provides in-depth understandings of anatomy and physiology as well as introductions to transport phenomena, flow mechanics and solid mechanics in several organ systems: the cardiovascular, pulmonary, kidney, endocrine and digestive systems. Introduces artificial physiological systems to replace or assist physiological functions and introduce the concepts of physiological barriers that prevent diagnosis or effective therapeutics.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4137
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5138 (3) Control Systems Analysis**
Introduction to fundamental principles and techniques for analysis and synthesis of feedback control systems in the time and frequency domains. Laplace transforms, transfer functions and block diagrams. Stability, dynamic response, and steady-state analysis. Analysis and design of control systems using root locus and frequency response methods. Computer aided design and analysis. Introduction to state space representations and state feedback control.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 4114 and ASEN 5114 MCEN 4138 and ECEN 4138 and ECEN 5138
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Recommended:** Prerequisite MCEN 4043 or comparable knowledge gained through outside coursework.

**MCEN 5141 (3) Indoor Air Pollution**
Describes the impact of indoor air pollutants on human health, including an introduction to key pollutants and their sources. Students will estimate emission factors, calculate generation/ventilation rates, quantify the impact of deposition and chemical reactions and explore relevant control technology. Current issues will also be addressed, including climate change, green building design, economic concerns and relevance to the developing world.
**Equivalent - Duplicate Degree Credit Not Granted:** EVEN 5141, MCEN 4141, and EVEN 4141
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering or Environmental Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Fluids

**MCEN 5147 (3) Mechanobiology**
Studies how mechanical forces modulate the morphological and structural fitness of biological tissues. Current molecular mechanisms by which cells convert mechanical stimulus into chemical activity and the literature supporting them will be discussed. Students will acquire an understanding and expertise from the analysis of primary literature and completion of a synthesis project.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Mechancial (MCEN) majors or College of Engineering graduate students only.
**Grading Basis:** Letter Grade

**MCEN 5151 (3) Flow Visualization**
Explores techniques for the visualization of the physics of fluid flows including seeding with dyes, particles and bubbles, and shadowgraphy and schlieren. Reviews optics and fluid physics, especially atmospheric clouds. Assignments are student-driven, to individuals and mixed teams of graduates, undergraduates, engineering majors and photography/video majors.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4200 MCEN 4151, ARTF 5200, ATLS 4151 and ATLS 5151
**Additional Information:** Departmental Category: Fluids

**MCEN 5152 (3) Introduction to Combustion**
Focuses on the mechanisms by which fuel and oxidizers are converted into combustion products. Application to practical combustion devices such as Otto, Diesel, gas turbine and power plant combustion systems. Consideration of combustion-generated air pollution, fire safety and combustion efficiency.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4152
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Thermal

**MCEN 5153 (3) Introduction to Fracture Mechanics**
This course will introduce fundamental concepts, analytical approaches, and experimental methods to characterize the fracture of solid materials. Topics to be discussed include: linear elastic analysis of 2D cracks, energy flows and criteria for elastic fracture, experimental methods for elastic fracture, application of fracture mechanics in adhesion, introduction to elastic plastic fracture, and nonlinear fracture mechanics of soft materials.
**Requisites:** Requires prerequisite course of MCEN 2063 or CVEN 3161 or MCEN 5023 or ASEN 5012 (all minimum grade C).

**MCEN 5154 (3) Biocolloids and Biomembranes**
Covers the thermodynamics and mechanics of biological membranes and biomedical colloids. Considers intermolecular and surface forces, self-assembly and colloidal stability. Addresses structure-property relationships and design principles for biomedical applications. Focuses on monolayers, bilayers, micelles, filomicelles, liposomes, polymersomes, emulsions, microbubbles, polyplexes and polyelectrolyte multilayer capsules.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4154
**Recommended:** Prerequisites APPM 2360 and PHYS 1120.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Materials

**MCEN 5155 (3) Automated Mechanical Design Synthesis**
Introduces computational approaches to automatically generate complex multimaterial mechanical designs that satisfy predefined high-level specifications, discusses algorithms to solve design as a constrained non-convex multi-objective optimization problem. Topics: expert-driven design process; computational analysis tools based on mechanical simulation (finite element methods, mesh-free methods); topological optimization; compositional design; multi-objective optimization; evolutionary design; design for manufacturing with additives (FDM, SLA, Inkjet). Students design a part to specifications, fabricate using advanced (3D printing, laser cutting, CNC, etc) tools.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4155
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Recommended:** Prerequisite students should be comfortable with MATLAB, PDEs, linear algebra, free body diagrams, mechanical modeling/design; exposure to finite-element modeling and state-space representations.

**MCEN 5157 (3) Modeling of Human Movement**
Human movement analysis is used in physical rehabilitation, sport training, human-robot interaction, animation, and more. Course provides a systematic overview of human movement on multiple levels of analysis, with an emphasis on the phenomenology amenable to computational modeling. Covers muscle physiology, movement-related brain areas, musculoskeletal mechanics, forward and inverse dynamics, optimal control and Bayesian inference, learning and adaptation. Inspires students to see and appreciate the complexities of movement control in all aspects of daily life.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 5157 and MCEN 4157 and BMEN 4157
**Requisites:** Restricted to graduate students in the College of Engineering and Applied Science or undergraduate Mechanical Engineering (MCEN) and Biomedical Engineering (BMEN) majors with 57+ credits (Junior or Senior).

**MCEN 5161 (3) Aerosols**
Introduces atmospheric aerosols and properties of their distributions, followed by fundamental descriptions of single particle dynamics, thermodynamics, nucleation, coagulation, mass transfer and populations dynamics. During the second half of the course, the focus will shift to sources and sinks of atmospheric aerosols, their impacts on atmospheric chemistry and radiation, and the impacts of these processes on air quality and climate.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Fluids

**MCEN 5171 (3) Biofluids on the Micro Scale**
Introduces fundamental physical concepts and basic mechanisms of biological fluids in microscale. Elaborates on the application of fluid mechanics principles to major biological systems, including human organ systems and animal locomotion in microscale. Covers physiologically relevant fluid flow phenomena on the cellular level and the underlying physical mechanisms from an engineering perspective. Related state-of-art technologies such as organ-on-a-chip and micro/nano fabrication will be emphasized. Will enhance your understanding of organ-on-a-chip technologies and their broad applications.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 5171 and MCEN 4171 and BMEN 4171
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering or Biomedical Engineering undergraduate majors with 57+ credits.

**MCEN 5173 (3) Finite Element Analysis**
Introduces the theory behind and applications of the finite element method as a general and powerful tool to model a variety of phenomena in mechanical engineering. Applications include structural mechanics, mechanics of elastic continua and heat conduction.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4173
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Solids

**MCEN 5174 (3) Failure of Engineering Materials**
Examines the fundamental concepts regarding the failure of engineering materials. Case studies are used to integrate a basic understanding of material failure mechanisms with analysis techniques and tools. Topics include the elastic properties (isotropic and anisotropic materials) and the origin of elastic behavior, viscoelasticity, plasticity (dislocation mechanisms, yielding criteria, strengthening mechanisms), creep, fracture and fatigue.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4174
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Materials

**MCEN 5183 (3) Mechanics of Composite Materials**
Introduces various kinds of composite materials, composite fabrication techniques, the physical and mechanical behavior of composites, and analytical and experimental methodologies.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4183
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Solids

**MCEN 5193 (3) Design of Coffee**
Serves as an introduction to how engineers use their disciplinary training to approach and solve problems outside of the traditional confines of their discipline, as illustrated by the roasting and brewing of coffee. In addition to focusing on the science, engineering and craftsmanship of making a cup of coffee from bean to cup, we will also study the global sourcing and sustainability aspects of coffee.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4193
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.

**MCEN 5194 (3) Electrochemical Energy Conversion and Storage**
Presents the fundamentals, principles and experimental techniques of electrochemistry, the background of ionic or electronic conduction of metal, semiconductor, inorganic and polymer materials and applications in the areas of batteries, fuel cells, electrochemical double layer capacitors, electrochemical photonics, sensors and semiconductor electrochemistry.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4194
**Recommended:** Prerequisites MCEN 2024 and MCEN 3032.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Materials

**MCEN 5195 (3) Bioinspired Robotics**
Bioinspired design views the process of how we learn from nature as an innovation strategy translating principles of function, performance, and aesthetics, from biology to human technology. The creative design process is driven by interdisciplinary exchange among engineering, biology, medicine, art, architecture and business. Diverse teams of students will collaborate on, create, and present original bioinspired design projects in the ITLL.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4195, BMEN 4195, and BMEN 5195
**Requisites:** Restricted to graduate students in the College of Engineering and Applied Science or undergraduate Mechanical Engineering (MCEN) majors with 57+ credits (Junior or Senior).
**Recommended:** Prerequisite MCEN 3017 and MCEN 3025 or comparable electronics and design knowledge.

**MCEN 5208 (1-4) Special Topics**
Credit hours and subject matter to be arranged.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to undergraduate or graduate Mechanical Engineering students only.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5215 (3) Design for Inclusion**
Examines the ways technologies like apps, products, public infrastructures and educational systems have excluded the needs of certain user groups while optimizing for others. Explores design approaches including universal design, humanitarian engineering, and culturally responsive design through multiple hands-on projects with the goal of equipping all to become more capable designers for inclusion rather than exclusion.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4215
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors with 87+ credits only.

**MCEN 5228 (1-4) Special Topics in Mechanical Engineering**
Subject matter to be selected from topics of current interest.
**Repeatable:** Repeatable for up to 30.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students in the College of Engineering and Applied Science or undergraduate Mechanical Engineering (MCEN) majors with 57+ credits (Junior or Senior).
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5231 (3) Computational Fluid Dynamics**
This course is an in-depth introduction to the basic principles and applications of computational fluid dynamics (CFD). Students learn about fundamental CFD concepts such as discretization, meshing, error and accuracy; and focus on computational solutions of flow and transport problems using the finite element method. Students conduct multiple hands-on simulation-based activities and exercises on canonical and realistic engineering flow/transport problems. Final project for the course culminates in a mini-conference/symposium where students present their work.
**Equivalent - Duplicate Degree Credit Not Granted:** BMEN 5231 and MCEN 4231 and BMEN 4231
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.

**MCEN 5255 (3) Design for Mfg**
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Design

**MCEN 5258 (1-3) Sp Tpcs-Combustion Seminar**
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Special Topics

**MCEN 5279 (3) Aesthetics in Design**
Focuses on aesthetic aspects of design via hands-on design-build experiences. Students individually create dynamic artifacts of their own choice with the assistance of teammates. Content includes major design movements since 1900, constructive critique practice, hand sketching techniques and other selected industrial design topics. Students publish their design work on an archival public blog which provides a professional portfolio element.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5279 and MCEN 4279 and ATLS 4279
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.

**MCEN 5291 (1-2) Project Based Learning in Rural Schools**
Focuses on the use of low cost air quality monitoring tools, dubbed Pods, to implement PBL curriculum in high school environmental science classes in rural communities in Colorado. Each student will be paired with a high school class and will serve as curriculum and technology advisors as well as science experts. During the fall semester, students will be trained to effectively work in those roles and will also travel to their schools to be introduced. During the spring semester, students will support high school teachers in implementing an existing PBL air quality curriculum with the Pods. This will include monthly visits to schools in the spring and reporting back to the class. Enrollment during Fall is required for enrollment during Spring. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4291
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students and undergraduates with 57+ credits (juniors and seniors).

**MCEN 5292 (3) Materials and Devices in Medicine**
The main objective of this multidisciplinary course is to provide students with a broad survey of biomaterials and their use in medical devices for restoring or replacing the functions of injured, diseased, or aged human tissues and organs. The topics to be covered include: evolution in the medical device industry, a broad introduction to the materials used in medicine and their chemical, physical, and biological properties, discovery of medical problems, potential impacts of treatment innovations, existing devices and design considerations for several major physiological systems (cardiovascular, neuromuscular, skeletal, pulmonary, renal, dermal), materials interaction with the human body, basic mechanisms of wound healing, biocompatibility issues, testing methods and techniques in accordance with standards and relevant regulations, biofunctionalities required for specific applications, as well as state-of-the-art approaches for the development of new regenerative materials targeting cellular mechanisms. Rec
**Requisites:** Requires prerequisite course of MCEN 4117 or MCEN 5117 (minimum grade C). Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.

**MCEN 5293 (3) Mechanics of Soft Matter**
Provides a general overview of fundamental concepts behind the mechanical behavior of soft matter. The term soft matter (which includes polymers, colloids, liquid crystals and surfactants, to name a few) is typically used to describe classes of materials whose structural unit is much larger than atoms, making their response more complex and often richer that of traditional solids. The objective of this class is to understand how chemical and mechanical forces between these small units yield macroscopic behaviors that one can observe in everyday life. Key engineering applications will also be discussed.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4293
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Recommended:** Prerequisite knowledge comparable to that gained through MCEN 2063.

**MCEN 5298 (3) Introduction to Polymers**
Polymers represent a major class of engineering materials that are used by mechanical engineers. In this class, we will discuss the most fundamental concepts regarding polymeric materials. Topics include synthesis/manufacturing and chemical properties of polymers, statistical properties of polymer chains, multiphase polymers including polymer solutions and polymer blends, crystallization and glass transition of polymers, and viscoelastic properties of polymers.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4298
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Recommended:** Prerequisite knowledge comparable to that gained through MCEN 2024.

**MCEN 5299 (3) Household Energy Systems**
Cooking, heating and lighting in the developing world often involves inefficient and incomplete combustion of solid or liquid fuels. The Global Burden of Disease Study in 2010, ranked this combustion as the 4th largest risk factor, causing 4 million premature deaths per year. There is a strong societal need to tackle this problem. Students leaving this course will be able to meet this need as they will have the skills to assess existing and new technology used in the developing world for cooking, heating and lighting. The course will cover (1) food conversion chemistry with the focus on increasing useable calories, (2) combustion and heat transfer as related to cooking, heating and lighting, and (3) combustion emissions and stove use assessment. There will be case studies interlaced throughout the content and the bulk of the workload will be homeworks and projects. Recommended prerequisite: knowledge comparable to that gained through MCEN 3022 or concurrent enrollment in MC
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering or Environmental Engineering undergraduate majors only.

**MCEN 5448 (3) Linear Control Systems**
Introduces the theory of linear systems, including state space descriptions of dynamic systems, linear spaces, linear mappings, structure of linear operators, stability, controllability, observability, state variable estimation and feedback control methods.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5448 and ASEN 5014
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Recommended:** Prerequisite MCEN 4138 or MCEN 5138 and strong foundational knowledge of linear algebra and differential equations.

**MCEN 5488 (3) Geometric Control Theory**
Introduce geometric approaches to study dynamical control systems over manifolds. Cover fundamental control-theoretical results, such as controllability, observability, feedback stabilizability, symmetries and group actions, that are beyond linear control systems. Establish connections between control theory and mathematics, especially topology, differential geometry, Lie groups and Lie algebras. Final project focuses on engineering applications related to students¿ own research interests.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5488

**MCEN 5498 (3) Stochastic Control Theory**
Introduce a toolbox for dealing with stochastic control systems. Cover topics such as stochastic calculus, linear and nonlinear filtering, and dynamic programming. Discuss system theoretic issues and derive optimal control laws for a variety of stochastic control problems, including, e.g., the separation principle for Linear-quadratic-Gaussian problems. Final project focuses on engineering applications related to students¿ own research interests.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5498

**MCEN 5636 (3) Micro-Electro-Mechanical Systems 1**
Addresses issues of micro-electro-mechanical systems (MEMS) modeling, design, and fabrication. Emphasizes the design and fabrication of sensors and actuators due to significance of these devices in optics, medical instruments, navigation components, communications, and robotics. Department consent required.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Manufacturing and Systems

**MCEN 5638 (3) Control Systems Laboratory**
Provides experience in control system design and analysis, using both real hardware and computer simulation. Covers the entire control system design cycle: modeling the system, synthesizing a controller, conducting simulations, analyzing the design to suggest modifications and improvements, and implementing the design for actual testing.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 4638, MCEN 4638, and ECEN 5638
**Requisites:** Requires prerequisite course of ECEN/MCEN 4138/5138 (minimum grade D-). Restricted to graduate students only.

**MCEN 5738 (3) Nonlinear Control Systems**
Nonlinear systems and control. Introduction to nonlinear phenomena: multiple equilibria, limit cycles, bifurcations, complex dynamical behavior. Planar dynamical systems, analysis using phase plane techniques. Input-output analysis and stability. Passivity. Lyapunov stability theory. Feedback linearization. Exploration of examples and applications. Formerly ECEN 7438.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5738 ASEN 6024
**Requisites:** Requires prerequisite course of ECEN 5448 (minimum grade C-). Restricted to graduate students only.
**Recommended:** Prerequisite knowledge in differential equations.

**MCEN 5832 (3) Special Topics**
**Additional Information:** Departmental Category: Special Topics

**MCEN 5848 (1-6) Independent Study**
Available only through approval of graduate advisor. Subjects arranged to fit the needs of the particular student. May be repeated for up to 6 total credits.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering graduate students only.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5858 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5868 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5878 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5888 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 5930 (1-3) Professional Internship**
This class provides a structure for Mechanical Engineering graduate students to receive academic credit for internships with industry partners that have an academic component to them suitable for graduate-level work. Participation in the program will consist of an internship agreement between a student and an industry partner who will employ the student in a role that supports the academic goals of the internship. Instructor participation will include facilitation of mid-term and final assessments of student performance as well as support for any academic-related issues that may arise during the internship period. May be taken during any term following initial enrollment and participation in ME graduate programs. Department permission required to enroll.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Mechanical Engineering graduate students only.

**MCEN 6001 (3) Reacting Flows**
Provides an introduction to reacting flows and combustion. Covers chemical kinetics, including global and detailed mechanisms and the variable density flow equations are derived. Relevant non-dimensional parameters and limiting behaviors are discussed. The Rankine-Hugoniot relations are presented and various aspects of diffusion, kinetically dominated and balanced combustion are outlined. Flame structures are discussed, including laminar and turbulent flames, and the Burke-Schumann solution is outlined. The turbulent forms of the motion equations are derived, and the reactive scalar transport equation and mixture fraction variable are presented. The flamelet progress variable approach is outlined, including a comparison of steady and unsteady flamelet models. Specific topics in spray combustion, triple flames, solid-gas reactors and detonations are discussed.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 6001
**Requisites:** Requires prerequisite course of MCEN 5021 (minimum grade C-). Restricted to College of Engineering and Applied Science graduate students or BS/MS Concurrent Degree Students only.
**Additional Information:** Departmental Category: Fluids

**MCEN 6184 (3) Structure and Properties of Polymers**
Emphasizes the relationships between molecular structures and macroscopic properties of polymers. Structural aspects include chain conformation, configuration, and the crystalline and amorphous states. Discusses physical, mechanical and dynamic properties with a focus on solution and phase behavior, transitions of bulk polymers, and rubber and viscoelastic behavior.
**Requisites:** Restricted to College of Engineering graduate students only.
**Recommended:** Prerequisite an intro-level polymer course.
**Additional Information:** Departmental Category: Materials

**MCEN 6228 (1-4) Special Topics in Mechanical Engineering**
Subject matter to be selected from topics of current interest.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Engineering graduate students only.
**Additional Information:** Departmental Category: Special Topics

**MCEN 6848 (1-6) Independent Study**
Available only through approval of graduate advisor. Subjects arranged to fit the needs of the particular student.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 6858 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 6868 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 6878 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 6888 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Miscellaneous

**MCEN 6949 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Additional Information:** Departmental Category: Thesis

**MCEN 6959 (1-6) Master's Thesis**
**Additional Information:** Departmental Category: Thesis

**MCEN 7221 (3) Turbulence**
Hydrodynamic stability theory, equations for turbulent flows, free shear flows and boundary layers, homogeneous and isotropic turbulence, overview of turbulent combustion, reaction kinetics, energy equation, Favre averaging, Pdfs, premixed and nonpremixed flame modeling, and recent developments.
**Requisites:** Restricted to any College of Engineering and Applied Science graduate students or to Mechanical Engineering undergraduate majors only.
**Additional Information:** Departmental Category: Fluids

**MCEN 7228 (3) Special Topics**
**Additional Information:** Departmental Category: Special Topics

**MCEN 8999 (1-10) Doctoral Dissertation**
**Additional Information:** Departmental Category: Thesis

# Media Research and Practice (MDRP)

## Courses

**MDRP 7871 (3) Special Topics**
Special topics.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

# Media Studies (MDST)

## Courses

**MDST 1001 (3) Foundations of Media Studies**
Introduces students to key issues and debates and contemporary applications of critical media studies focusing on economic, social, political and cultural implications. Provides an understanding of the relationship between theory and practice and equips students with the tools to critically analyze various forms of textual transmission.
**Grading Basis:** Letter Grade

**MDST 1002 (3) Introduction to Social Media**
Introduces students to network structures and principles, the technology and infrastructures that allow them to flourish, and the cultures that grow up through and around them. Explores how social media enables community, how it assembles and empowers agents of change and how design informs individual and group behavior.
**Grading Basis:** Letter Grade

**MDST 1003 (3) Critical Media Literacies**
Learn to strategically access, analyze, evaluate, and produce communication in a variety of forms. This course explores the expanding nature of literacy in a digital world. Students will use applied research practices and communication tools to expand their existing media literacy skills and to design innovative presentations and projects that take advantage of new media. Meets Practice Course Requirement.
**Grading Basis:** Letter Grade

**MDST 1009 (3) Truth, Beauty, and Conspiracy**
With conspiracy at the forefront of social and political discourse, this course illuminates these problems of knowledge and representation by approaching conspiracy culture from the perspective of media theory. Explores conspiracy theories as narratives, analyzing their specific narrative features and the ways that different media platforms represent conspiracy. Students also consider how conspiracy narratives complicate the relationship between knowledge and aesthetic form. Offered in Fall or Spring.

**MDST 2001 (3) Introduction to Global Media**
Explores a world in which new media have enabled humans to be joined in a global system of socio-cultural and economic relations. Underscores the political dimensions of global media, the convergence of global culture, and the ways in which values are produced. Prepares students to become critical of media practices and empowered as active civic participants.

**MDST 2002 (3) Media and Communication History**
Examines the historical development of communication forms, tools, technologies and institutions (orality, writing, printing, photography, film, radio, television, computers, internet); their influence on culture (forms of expression and social relationships); and their impact on social and individual experience. Applies knowledge of communication history to contemporary social issues and problems in media and society, domestically and internationally.

**MDST 2010 (3) Media and Social Movements**
Surveys the history and contemporary efforts of social activists to bring about democratic media reform and examines how media are used as tools for connecting and advancing social movements. Emphasis is given to media activism and social movements in the United States, as well as to similar and related transnational activism and movements. Meets Practice Course Requirement.
**Requisites:** Requires a prerequisite course of MDST 1001 (minimum grade C-).
**Grading Basis:** Letter Grade

**MDST 2011 (3) Disruptive Entrepreneurship in the Internet's New Economies**
Grapples with the disruptive business models that drive the online economy: both the dominant ones and the alternatives vying to transform it. In addition to the Silicon Valley model, this course explores lesser known internet economies around the world and proposals for a more equitable online future. Meets Practice Course Requirement.
**Grading Basis:** Letter Grade

**MDST 2012 (3) Hacker Culture**
Chronicles the evolution of hacker culture from its origins as a geeky subculture to a criminal underground to its adaptation by CEOs. Considers how hacker formations sometimes represent a new kind of politics, sometimes a rejection of politics. Explores the contested figure of the hacker in the past, present and science-fiction of the internet. Meets Practice Course Requirement.
**Grading Basis:** Letter Grade

**MDST 2031 (3) Documentary and Social Change**
Explores how local, national and international filmmakers use documentaries to provide cultural observation, education, entertainment and memories to making sense of and transform the realities of contemporary societies. Emphasizes contemporary issues and practices in the production of documentaries, including the participatory means such as the crowdsourcing of documentary footage and the use of newer, non-theatrical means of distribution. Meets Practice Course Requirement.
**Grading Basis:** Letter Grade

**MDST 2032 (3) Visual Literacies & Design**
Examines cultural visual experiences from critical perspectives and social effects. The course acquaints students with visual design in ways that include image-making as a cognitive and perceptual practice, the production of visual significance and meaning, and the role of technology in creating and understanding mediated images. Students will use a variety of means to produce visual narratives. Meets Practice Course Requirement.
**Grading Basis:** Letter Grade

**MDST 2046 (3) Future Histories of Technology**
This class explores both literature about future technologies and literary technologies that move across periods, regions, and disciplines. Our cultural and historical approach to future histories of technology will illuminate how race, gender and sexuality, class, and nationality structure seemingly neutral research and development, usage, and innovation. Ultimately, our goal is to see how we¿re not passive consumers but active participants in reimagining the present and future of technology.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 2046

**MDST 3001 (3) Media Research**
Introduces theoretical approaches and practices used to analyze the content, structure, influence and contexts of media. Explores factors shaping media, including: politics, economics, technology, cultural traditions. Studies concepts, theoretical approaches and research methods of media criticism, and adopts and adapts these frameworks in analyses of mediated communication.

**MDST 3002 (3) Digital Culture and Politics**
Examines issues at the intersection of digital media, culture and politics, such as regulation and network architecture, piracy and hacking, and grassroots activism. Engage with a range of theories about cultural politics, democracy, liberalism and neo-liberalism in relation to digital information and communication technologies.

**MDST 3021 (3) Comic Books: Culture and Industry**
Explores practices of comic culture across a broad range of graphic stories. Using culture studies approaches to industry analysis and fan community discourses, students examine culture created through and around graphic texts, particularly representations of race, gender, sexuality, institutions and ideology. Considers the political economy of the comic industry, the struggles of independent producers and active fan practices.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**MDST 3022 (3) Social Media Cultures**
Expands students' understanding of network cultures, including how social media tools influence conversation strategies, how interfaces interact with perceived communication values, and how network boundaries reinforce distinct cultural identities. Students engage in projects to measure network behavior, create strategic messages to achieve communication and information goals, and to engage in social listening.
**Requisites:** Restricted to students with 55 or more hours.
**Grading Basis:** Letter Grade

**MDST 3101 (3) History of Computing and Information**
Focusing on two topics: the changing role of information in everyday life over time and the increasing role of information in disciplinary studies such as social science, engineering, computer science, mathematics, digital humanities. Examines information related academic disciplines, businesses, industries and technologies from multiple perspectives from the 17th century to the present.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3101

**MDST 3201 (3) Media, Culture and Globalization**
Surveys the political and economic structures of media system in developed and developing countries and discusses the impact of privatization, ownership consolidation, and globalization on the flow of information across national borders. Also looks at how global media flows and counter-flows affect conceptions of nationhood and cultural identity.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Communication, Media, Design and Information (CMDI) or International Affairs (IAFS) majors only.

**MDST 3321 (3) Media Industries and Economics**
Focuses on the institutions and practices of the media industries. Surveys the histories, structures, and activities of these organizations and the contemporary issues surrounding them.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) in College of Communication, Media, Design and Information (CMCIU).
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 3331 (3) Sports-Media Complex**
Explores the rich connections between the sports industry, spectating, the media complex and social life. Using theories of cultural studies and drawing on specific examples from the sports world, students focus on how sport shapes and reinforces understandings of gender, race, class and sexuality. Addresses major questions about the political economy, commodification, mediation and reception of the spectacle of the sports complex, as well as politics and cultural consequences of its transnational reach.
**Requisites:** Restricted to College of Communication, Media, Design and Information (CMDI) students with a minimum of 45 credit hours completed, or non-CMDI students who have completed CMDI 2001 (minimum grade D-).
**Grading Basis:** Letter Grade

**MDST 3341 (3) Designing Alternative Media Platforms**
Explores alternative forms of media to exhibit student research and build connections with community leaders. Surveys alternative exhibition traditions such as Social Practice, Relational Aesthetics and Craftvism to expand the impact of student work, culminating in the design of a unique cultural event focusing on each individual's research. Software/digital presentation skills. Meets Practice Course Requirement.

**MDST 3401 (3) Media, Food and Culture**
Explores the topic of food as a subject of popular culture: essential to life and the enter of local, national and transnational conflict and social movements. Students will examine media representations of food, what our food choices say about us and what the mediated politics of food mean for our collective future.
**Requisites:** Requires a prerequisite course of MDST 2002 (minimum grade C-).
**Grading Basis:** Letter Grade

**MDST 3711 (3) Media and Popular Culture**
Examines culture in the form of discourse, symbols, and texts transmitted through the media. Explores the relationship between such mediated culture and social myth and ideology.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 3791 (3) Media and the Public**
Provides an overview of how publishing in print and electronic forms has been tied closely to democratic ideals for centuries. Explores how the idea of the public is central to the theory and practice of media politics, and how the contested concepts of "the public sphere" and "public opinion" have long been linked to debates about the proper relationship between media and democratic citizenship.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) in College of Communication, Media, Design and Information (CMCIU), and MDST minors.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 4000 (3) Media Genre Studies**
Introduces students to the critical study of genres in media cultures. Genre exists as a form of organizing and packaging mediated content, but also as formulaic patterns for analysis that work for and against audience expectations to produce culture. Topics will vary by genre, medium, and transmedia strategies.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 5000
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**MDST 4003 (3) Digital Media Production and Design**
Introduces techniques, technologies of online development and online media presentation. Contextualizes the technical and social implications of the Internet through historical and critical perspectives. Students engage in online media projects designed to emphasize the affordances, conventions and usability considerations of effective online communication. Meets Practice Course Requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 5003
**Requisites:** Restricted to students with 55 or more hours.
**Grading Basis:** Letter Grade

**MDST 4071 (3) Screenwriting**
Students will be taught the fundamentals of screenwriting, but will also learn from peers. Students will workshop scenes, share, and discuss. Students will work scenes through description, dialogue, and action, combine those scenes into sequences, and those sequences into scripts. Students will learn how to create dramatic tension, how to write compelling dialogue, how to deal with character development.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 5071
**Requisites:** Requires prerequisite course of MDST 2002 or MDST 3021 (minimum grade B).

**MDST 4111 (3) Crime, Media and Contemporary Culture**
Addressed in the course are a range of issues from within a variety of literatures that consider the ways in which the media cover crime. Those literatures are particularly drawn from sociology and the emergent, and increasingly dominant, field of cultural criminology. The focus of the class is to get students to think of "crime" as a constructed and mediated concept and set of narratives that often create problematic public "understandings".
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**MDST 4121 (3) Deconstructing Disney: Mediated American Mythology**
Explores various Disney cultural products ¿ some with which students will be very familiar, some students may have never seen ¿ in order to discuss the cultural messaging The Walt Disney Company has presented over its long and illustrious history. Students will conduct analysis research in popular culture studies.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**MDST 4211 (3) Asian Media and Culture**
Offers an understanding of the various people, cultures and nations of East Asia through their media systems. Provides a critical overview of the historical, cultural, social, political and economic dimensions of East Asian communication systems in today's digitally connected/ disconnected world.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 5211
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Asia Content

**MDST 4220 (3) Viral Video & Media**
Students will examine how viral videos are produced and shared on social media platforms by developing an understanding of the components that make a viral video as well as by engaging in a critical analysis of those viral videos. Students will engage in critical analysis, consider strategies for virality, and learn about production and publishing. Students will analyze their own and their peers¿ work in terms of genre, convention, format, structure, and audience.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 5220
**Requisites:** Requires prerequisite course of MDST 2002 OR MDST 3021 (minimum grade B).

**MDST 4221 (3) Media Technology and Cultural Change**
Explores how media technologies affect social orders and shape cultural practices across the globe. Compares and critically evaluates different theories of technology, emphasizes the social construction of technology, asks how media technologies inform conceptions of social reality and individual identity and considers how media technologies can be understood across a range of academic disciplines.
**Requisites:** Requires prerequisite courses of MDST 2002 and MDST 3001 and MDST 3002 (minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior).
**Grading Basis:** Letter Grade

**MDST 4231 (3) Youth Media: Culture and Politics**
Emphasizes the sociological understandings of youth cultures, identities and practices in relation to media and politics. Topics include the influences of consumer branding, participatory culture, youth media production and representation, use of social media, mobile phones, gaming, and other digital media, and integrating them around themes of youth styles, gender, ethic, political identities, consumer culture, social behavior and other trends.
**Requisites:** Requires prerequisite course of MDST 3711 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**MDST 4241 (3) Visual Culture and Human Rights**
Provides the critical tools needed to understand images and their impact on the recognition and restitution of human rights claims. The course examines both visual practices (e.g. documentation, archiving, witnessing, advocacy and surveillance) and visual media (e.g. photography, film, video, drone and satellite images), unpacking the growing entanglement between visual culture and human rights.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**MDST 4311 (3) Mass Communication Criticism**
Introduces the critical perspectives most often employed in qualitative media analysis: semiology, structuralism, Marxism, psychoanalytical criticism, sociological criticism. Texts from contemporary print and broadcast media. Meets Practice Course Requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 5311

**MDST 4331 (3) Gender, Race, Class, and Sexuality in Popular Culture**
Studies the construction, interconnections, and replications of gender, race, class, and sexuality in popular culture and how these constructs become cultural norms and mores. Uses critical methods with a focus on producing responsible viewers and readers.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**MDST 4341 (3) International Media and Global Crises**
Examines strengths and limits on media¿s role in globalized crises (e.g. financial, climate change, health) in light of changing distribution of global power. Introduction to current crises; context-analytical approach to media technologies, financing and uses; application to national cases.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Media Studies (MDST) majors and minors, Journalism (JRNL) majors or International Affairs (IAFS) majors only.
**Additional Information:** Departmental Category: Asia Content

**MDST 4361 (3) TV and the Family in American Culture and Society**
Examines the history and character of two central institutions in American society--the family and television--to gain deeper understanding of their formative and enduring roles. Topics include: intersecting histories of the family and television; economic logic of the TV industry and programming; representations of the family in television programming; how families use and interact with television.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**MDST 4371 (3) Media and Religion**
Examines the way religion uses media as a social and political force. Introduces the major themes and trends in the mediation of religion and the religious inflection of the media in professional, popular, and emerging media contexts.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**MDST 4372 (3) Islam, Pop Culture and Media**
Explores the shifting boundaries of cultural and religious Muslim identities through media representation and production in Muslim-majority countries and in the West. Using popular culture as a complex site of struggle, this course examines how Muslims address questions of gender, ethnicity, class, democracy, sexuality, religion, and modernity in a variety of media forms and practices.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**MDST 4401 (3) Fan and Audience Studies**
Considers how audiences and fans are conceptualized, how they are constructed by media enterprises and how they operate within their cultural ecosystems. While media shape the sociocultural, political and economic dimensions of the social world, fan studies suggest a more active set of practices form sites of resistance and enable a greater degree of influence over cultural production.
**Requisites:** Requires prerequisite courses of MDST 2002 and MDST 3001 and MDST 3002 (all minimum grade C-).
**Grading Basis:** Letter Grade

**MDST 4402 (3) Transmedia Worldbuilding**
Guides students to develop entertainment concepts for transmedia delivery. Students will develop concepts and characters built around storytelling themes capable of producing serial and multimedia storylines. This course considers essential elements of storytelling; how to design and actively participate across media platforms; essential elements of meta-narratives; and how to create an immersive and interactive experience for audiences.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**MDST 4405 (3) Queer and Trans Identities in Popular Culture**
Gives students the theory, media history, and cultural frameworks to advocate for better queer & trans presentation in popular media. Uses queer studies, critical theory, media surveys, and trans theory as a tool for discussing and addressing gaps in media representation. Explores the emergence, codification, and rejection of queer and trans identities to deconstruct the documentaries, televisions shows, advertisements, print media, music, and digital media that contributed to the formation of these identities.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 5405
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**MDST 4601 (3) Media Law, Policy and Ethics**
Explores ethical and legal complexities of information and communication technology. Combines real-world inquiry with creative speculation to probe everyday ethical dilemmas faced by digital consumers, creators and coders, as well as policy-makers. Explore themes such as privacy, intellectual property, social justice, free speech, artificial intelligence, social media and ethical lessons from science fiction.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**MDST 4841 (1-6) Undergraduate Independent Study**
Involves in-depth independent research and/or project work completed under the direction of a faculty member that demonstrates learning at the upper-division level within the discipline. Department consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 4871 (1-3) Special Topics**
Special Topics.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with a minimum of 27 hours taken.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 4931 (1-6) Internship**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Prerequisite of MDST 2002 and MDST 3001 and MDST 3002. (All require minimum grade of C-). Restricted to MDST majors
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 5000 (3) Media Genre Studies**
Introduces students to the critical study of genres in media cultures. Genre exists as a form of organizing and packaging mediated content, but also as formulaic patterns for analysis that work for and against audience expectations to produce culture. Topics will vary by genre, medium, and transmedia strategies.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 4000
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**MDST 5001 (3) Connected Media Practices**
Provides a crucial frame through which students understand the evolution of film, television and gaming in the digital era. Explores an impending revolution in how screen media are created, circulated and consumed. Relates to a larger trend across the media industries to integrate digital technology and socially networked communication with traditional screen media practices.
**Requisites:** Restricted to graduate students only.

**MDST 5002 (3) Media Activism and Public Engagement**
Explores politics of media activism. Relies on survey of existing theory and scholarship on media activism and close analyses of activist practices within both old and new media and on local, national and global scale. Special attention paid to questions of relativity and efficacy and value of media activism as both aesthetic and political activity.
**Requisites:** Requires a prerequisite course of MDST 5001 (minimum grade C-). Restricted to graduate students only.

**MDST 5003 (3) Digital Media Production and Design**
Introduces techniques, technologies of online development and online media presentation. Contextualizes the technical and social implications of the Internet through historical and critical perspectives. Students engage in online media projects designed to emphasize the affordances, conventions and usability considerations of effective online communication.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 4003
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**MDST 5005 (1) MAPE Workshop**
Connects classroom work to community practice. Students will discuss applied projects and collaborate on public initiatives.
**Repeatable:** Repeatable for up to 4.00 total credit hours.

**MDST 5071 (3) Screenwriting**
Students will learn the fundamentals of screenwriting, but will also learn from peers. Students will workshop scenes, share, and discuss. Students will work scenes through description, dialogue, and action, combine those scenes into sequences, and those sequences into scripts. Students will learn how to create dramatic tension, how to write compelling dialogue, how to deal with character development.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 4071
**Recommended:** restricted to graduate students only.

**MDST 5121 (3) Deconstructing Disney: Mediated American Mythology**
Explores various Disney cultural products ¿ some with which students will be very familiar, some students may have never seen ¿ in order to discuss the cultural messaging The Walt Disney Company has presented over its long and illustrious history. Students will conduct analysis research in popular culture studies.
**Requisites:** Restricted to graduate students only.

**MDST 5211 (3) Asian Media and Culture**
Offers an understanding of the various people, cultures and nations of East Asia through their media systems. Provides a critical overview of the historical, cultural, social, political and economic dimensions of East Asian communication systems in today's digitally connected/disconnected world.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 4211
**Requisites:** Restricted to graduate students only.

**MDST 5220 (3) Viral Video & Media**
Students will examine how viral videos are produced and shared on social media platforms by developing an understanding of the components that make a viral video as well as by engaging in a critical analysis of those viral videos. Students will engage in critical analysis, consider strategies for virality, and learn about production and publishing. Students will analyze their own and their peers¿ work in terms of genre, convention, format, structure, and audience.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 4220
**Recommended:** graduate students only.

**MDST 5311 (3) Mass Communication Criticism**
Introduces the critical perspectives most often employed in qualitative media analysis: semiology, structuralism, Marxism, psychoanalytical criticism, sociological criticism. Texts from contemporary print and broadcast media.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 4311

**MDST 5331 (3) Gender, Race, Class, and Sexuality in Popular Culture**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 5341 (3) Designing Alternative Media Platforms**
This course helps students construct alternative form of media to exhibit their research and build connections with relevant community leaders. Through the practice and examination alternative exhibition traditions of such as Social Practice and Relational Aesthetics students connect with community members to design alternative platforms for media projects that respond to the needs of external communities.
**Requisites:** Restricted to graduate students only.

**MDST 5401 (3) Fan and Audience Studies**
Drawing upon a variety of theoretical perspectives and tools of measurement, students will explore the structures, forces and environments that produce culture. Students will also interpret popular culture as a site of cultural meaning, and to understand the historical approaches scholars have used to analyze meaning in media messages, fan practices, and institutional responses.
**Requisites:** Restricted to graduate students only.

**MDST 5402 (3) Transmedia Worldbuilding**
Guides students to develop entertainment concepts for transmedia delivery. Students will develop concepts and characters built around storytelling themes capable of producing serial and multimedia storylines. This course considers essential elements of storytelling; how to design and actively participate across media platforms; essential elements of meta-narratives; and how to create an immersive and interactive experience for audiences using digital communication tools.
**Requisites:** Restricted to graduate students only.

**MDST 5405 (3) Queer and Trans Identities in Popular Culture**
Give students the theory, media history, and cultural frameworks to advocate for better queer & trans presentation in popular media. Uses queer studies, critical theory, media surveys, and trans theory as a tool for discussing and addressing gaps in media representation. Explores the emergence, codification, and rejection of queer and trans identities and deconstructs the popular media that contributed to the formation of these identities.
**Equivalent - Duplicate Degree Credit Not Granted:** MDST 4405
**Requisites:** Restricted to graduate students only.

**MDST 5841 (1-3) Graduate Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**MDST 5851 (1-6) Graduate Professional Project**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**MDST 5871 (1-3) Special Topics**
Special topics in Media Studies.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**MDST 5931 (1-3) Internship**
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**MDST 6031 (3) Documentary and Social Change**
Explores how local, national and international filmmakers use documentaries to provide cultural observation, education, entertainment and memories with the hope of making sense of, and transforming, the realities of contemporary societies. The course emphasizes contemporary issues and practices in the production of documentaries, including the participatory means such as the crowd-sourcing of documentary footage, and the use of newer, non-theatrical means of distribution, including YouTube, Vimeo and other digital outlets.
**Requisites:** Restricted to graduate students only.

**MDST 6051 (3) Media Theories**
Studies theories and perspectives of mass and networked communication and explores the role of media in society.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6061 (3) Media Research**
Introduces concepts, theoretical approaches and research methods of media research. Students apply these frameworks in research on mediated communication. Covers qualitative and quantitative methods of gathering and analyzing data.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6071 (3) Critical Theories of Media and Culture**
Introduces students to critical theories and analysis of media and popular culture. Examines major theoretical traditions and/or theorists that significantly inform media studies (e.g., culturalism, structuralism, Marxism, critical theory, feminism, psychoanalysis, post-structuralism) and applies these to media analysis and criticism.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6100 (3) Theory and Practice of Doing: From the Sciences to the Arts and Humanities**
Introduces students to the theory of doing and making. Guiding questions include: what does it mean to place "doing" at the center of one's research agenda? What does it mean to do hands-on work in an art/design studio, a digital humanities lab, a media lab, a media archaeology lab, a makerspace or a hackerspace?
**Equivalent - Duplicate Degree Credit Not Granted:** IAWP 6100

**MDST 6201 (3) Global Media and Culture**
Explores the historical, cultural, social, political and economic dimensions of media systems in various parts of the world and their relationship with technological and cultural processes. Aims to provide a critical overview of the profound changes in media and culture in today's digitally connected/disconnected world. Formerly MDST 6201.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6211 (3) Communication and International Development**
Studies and analyzes communications technologies and techniques used in addressing social problems in developing countries.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6241 (3) Visual Epistemologies: Theory and Practice**
Examines visuals as a form of knowledge on its own terms with an emphasis on both theory and practice. It first considers how social, cultural and cognitive mechanisms shape visual ways of knowing, and it discusses methodological approaches for working with and in images. Then it traces the complicated status of visual knowledge over time and across institutional contexts¿religion, art, science, the law, journalism and politics.

**MDST 6250 (3) Algorithms, Culture, and Power**
Explores how automated computational processes (algorithms) affect the production, distribution, exchange, and consumption of media and other cultural goods. Also examines the history and politics of algorithms with respect to their growing prevalence in daily life. Foregrounds themes of power, identity, bias, aesthetics, infrastructure, epistemology, and political economy. Employs theories and methods from media studies, science and technology studies, digital humanities, and/or cultural studies.
**Requisites:** Restricted to graduate students only.

**MDST 6301 (3) Communication, Media, and Concepts of the Public**
Introduces students to historical and contemporary uses of fundamental concepts in research and theory about media institutions, particularly public, community, mass, publicity, public space, public opinion, public interest, and the public sphere.
**Equivalent - Duplicate Degree Credit Not Granted:** CMDI 6301
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6311 (3) Power, Politics and Mediated Culture**
Examines various literatures that consider the role of power in shaping social orders and the social beings that constitute that order and the place of media in both processes.
**Requisites:** Restricted to graduate students only.

**MDST 6341 (3) Children, Youth and the Media**
Examines the concepts of children and childhood from the historical, social, cultural, economic and political perspectives, this course explores the interaction between mass media and the socialization and cultivation process of children and youth. Multiple theoretical traditions are used as a framework to study a variety of issues related to children and the media.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6350 (3) Media & Cultural Policy**
Survey the research literature and practical significance of cultural policy as it relates to culture as a basis of social definition, inclusion, exclusion and conflict. The study of cultural policy does not focus exclusively on the role of government, but rather on a broader range of institutions that play central roles in governing contemporary culture, including museums, libraries, and media industries.
**Requisites:** Restricted to graduate students only.

**MDST 6351 (3) Media, Culture & Food Politics**
Stresses intersections among media industries, food industries, and politics, with an emphasis on how public knowledge and activism about food relate to questions of a sustainable environment, human health and safety, and social justice for food producers and consumers. Examines a wide range of political discourses about food, the politics of food labeling, the globalization and hybridization of food, public policies governing food, food activism, the biopolitics of food, and food-related manifestations of cultural capital. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.

**MDST 6551 (3) Media and Communication Policy**
Surveys historical and contemporary developments in media and communications policy, emphasizing social and cultural dimensions.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6552 (3) Media and Public Scholarship**
Historicizes the role of the public intellectual through readings and discussions of biographies of selected scholars and accounts of historical changes in the habitats ¿ the spaces of politics ¿ in which particular types of public engagement by intellectuals occurred in the past. The course will include a ¿media practicum¿ to enable students to understand what it means to become a scholar who has a public voice through direct and indirect engagement in a media-saturated age. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.

**MDST 6671 (3) Media, Myth, and Ritual**
Explores cultural practices of media audiences. Addresses theoretical and methodological implications of studying audiences from a culturalist perspective, with particular focus on media audience practices. Students engage in field research projects related to course content. Formerly MDST 6671.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6711 (3) Media and Popular Culture**
Introduces fundamental methods for understanding the construction of meaning in film, television, popular music and advertising. Traces the study of popular culture through film theory, mass media analysis and cultural studies. Surveys various strands of research that seek to understand popular culture and its effects.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6721 (3) Feminist Media Studies**
Explores the complex relation between feminism and global media consumption and production. Students will be introduced to key theoretical approaches to engage critically with film, print and broadcast media, digital media, and art. Students will engage with themes that frame feminist media studies today: intersectionality, gaze, (in)visibility, consumerism, resistance, bodies, representational narratives, queer identities, decolonial feminism as a theoretical tool of relationality, and explorations of decolonizing feminist practices originating in the global South.
**Requisites:** Restricted to graduate students only.

**MDST 6771 (3) History of Media and Communication: Selected Topics**
Examines history of communication, including the means (technologies) of communication, social practices (institutional, collective, individual) that intersect with the study of communication and media, and cultural forms (texts, products). Situates the study of media, technology, and culture within historical contexts, comparative historical research, media archaeology, genealogy and media history.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6781 (3) Political Economy of Media**
Examines economic problems and political issues relevant to media institutions and industries.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6871 (1-3) Special Topics**
Special topics. May be repeated up to 15 total credit hours hours
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.

**MDST 6951 (1-6) Master's Thesis**
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 7001 (1) PhD Colloquium Series**
Introduce the new doctoral students to the Media Research and Practice program and its faculty members and their research. The colloquium series will also include workshops on program planning, publishing, attending conferences, writing a dissertation, preparing and presenting a job talk, etc.
**Repeatable:** Repeatable for up to 2.00 total credit hours. Allows multiple enrollment in term.

**MDST 7011 (3) Proseminar in Media Communication Theory 1**
Introduces the principal concepts, literature, and theoretical and paradigmatic perspectives of media studies and mass communication and their ties and contributions to parallel domains in the social sciences and humanities. Formerly MDST 7011.
**Requisites:** Restricted to doctoral students in Media Studies (MDST), Journalism (JRNL) or Advertising, PR and Media Design (APRD) only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 7021 (3) Proseminar in Media and Communication Theory 2**
Continues the introduction of principle concepts, literature, and theoretical and paradigmatic perspectives of media studies and mass communication and their ties and contributions to parallel domains in the social sciences and humanities. Formerly MDST 7021.
**Requisites:** Requires prerequisite course of MDRP 7011 (minimum grade C-). Restricted to doctoral students in Media Studies (MDST), Journalism (JRNL) or Advertising, PR and Media Design (APRD).
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 7051 (3) Qualitative Research Methods in Media**
Provides a survey of various qualitative modes of inquiry, attending to the philosophical, conceptual, and practical foundations of qualitative research in media, communication, and information. The course is designed to support students in developing a critical understanding of the different considerations in and stages of qualitative research, including the development of research questions, theoretical and conceptual frameworks, methodological approaches, data collection, data analysis, and assessment of reliability and validity of qualitative data.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 7061 (3) Quantitative Research Methods in Media**
Examines various methods of quantitative data gathering methods and analysis in mass media and social media contexts.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 7841 (1-6) Independent Study**
Independent study.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 7871 (3) Special Topics**
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

**MDST 8991 (1-10) Doctoral Dissertation**
**Repeatable:** Repeatable for up to 40.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Core Curriculum and General Electives

# Medieval and Early Modern Studies (MEMS)

## Courses

**MEMS 2020 (3) Introduction to Medieval and Renaissance Studies**
Introduces students to the literature, history, culture and art of Europe and the Mediterranean basin from late antiquity through the renaissance. The course is interdisciplinary and focuces on topics which reveal the dynamism and diversity of pre-modern culture.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**MEMS 4020 (3) Medieval and Early Modern Studies: Texts and Contexts**
Focuses on communities in the Mediterranean basin and Europe (i.e., cloister, court and city), discussing major literary texts and visual monuments associated with them and their historical context. Emphasizes tensions between tradition and innovation, Latin and vernacular, East and West, Christian and non-Christian (Jewish and Islam), sacred and secular, authority and freedom and male and female.
**Equivalent - Duplicate Degree Credit Not Granted:** MEMS 5020
**Requisites:** Requires a prerequisite course of CLAS 1110 and CLAS 1120 and ENGL 2503 or HIST 1011 and HIST 1012 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**MEMS 4030 (3) Medieval and Early Modern Studies: Special Topics**
Different topics offered by the faculty of the Medieval and Early Modern Studies Program in alternate semesters. Topics may include the literature of pilgrimage and travel, women and minorities, theatre, music, epic, medieval and early modern views of the classics, the Bible, and medieval and early modern theories of education.
**Equivalent - Duplicate Degree Credit Not Granted:** MEMS 5030
**Requisites:** Requires a prerequisite course of CLAS 1110 and CLAS 1120 and ENGL 2503 or HIST 1011 and HIST 1012 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**MEMS 5020 (3) Medieval and Early Modern Studies: Texts and Contexts**
Focuses on communities in the Mediterranean basin and Europe (i.e., cloister, court and city), discussing major literary texts and visual monuments associated with them and their historical context. Emphasizes tensions between tradition and innovation, Latin and vernacular, East and West, Christian and non-Christian (Jewish and Islam), sacred and secular, authority and freedom and male and female.
**Equivalent - Duplicate Degree Credit Not Granted:** MEMS 4020
**Requisites:** Restricted to Comparative Literature (CMLT) or Theatre (THTR) or Classics (CLAS) majors only.
**Recommended:** Prerequisite ability to use literary texts in their original language.

**MEMS 5030 (3) Medieval and Early Modern Studies: Special Topics**
Different topics offered by the faculty of the Medieval and Early Modern Studies Program in alternate semesters. Topics may include the literature of pilgrimage and travel, women and minorities, theatre, music, epic, medieval and early modern views of the classics, the Bible, and medieval and early modern theories of education.
**Equivalent - Duplicate Degree Credit Not Granted:** MEMS 4030
**Requisites:** Restricted to Comparative Literature (CMLT) or Theatre (THTR) or Classics (CLAS) majors only.
**Recommended:** Prerequisite ability to use literary texts in their original language.

# Military Science - Army ROTC (MILR)

## Courses

**MILR 1011 (2) Adventures in Leadership 1**
Introduces fundamentals of leadership and the United States Army. Examines its organization, customs, and history as well as its current relevance and purpose. Students also investigate basic leadership and management skills necessary to be successful in both military and civilian settings. Includes fundamentals of Army leadership doctrine, team-building concepts, time and stress management, an introduction to cartography and land navigation, marksmanship, briefing techniques, and some basic military tactics.
**Additional Information:** Departmental Category: Military Science (U.S. Army)

**MILR 1021 (2) Adventures in Leadership 2**
Continues the investigation of leadership in small organizations. Covers selected topics such as basic troop leading procedures, military first aid and casualty evacuation concepts, creating ethical work climates, an introduction to Army organizations and installations, and a further examination of basic military tactics. Introduces students to effective military writing styles.
**Additional Information:** Departmental Category: Military Science (U.S. Army)

**MILR 2031 (3) Methods of Leadership and Management 1**
Comprehensively reviews advanced leadership and management concepts including motivation, attitudes, communication skills, problem solving, human needs and behavior, and leadership self development. Students continue to refine effective written and oral communications skills and to explore topics such as the basic branches of the Army, and officer and NCO duties. Students conduct classroom and practical exercises in small unit light infantry tactics and are prepared to perform as midlevel leaders in the cadet organization.
**Additional Information:** Departmental Category: Military Science (U.S. Army)

**MILR 2041 (3) Methods of Leadership and Management 2**
Focuses on leadership and management functions in military and corporate environments. Studies various components of Army leadership doctrine to include the four elements of leadership, leadership principles, risk management and planning theory, the be-know-do framework, and the Army leadership evaluation program. Continue to refine communication skills.
**Additional Information:** Departmental Category: Military Science (U.S. Army)

**MILR 3052 (3) Military Operations and Training 1**
Further explores the theory of managing and leading small military units with an emphasis on practical applications at the squad and platoon levels. Students examine various leadership styles and techniques as they relate to advanced small unit tactics. Familiarizes students with a variety of topics such as cartography, land navigation, field craft and weapons systems. Involves multiple, evaluated leadership opportunities in field settings and hands-on experience with actual military equipment. Students are given maximum leadership opportunities in weekly labs.
**Recommended:** Prerequisite instructor consent.
**Additional Information:** Departmental Category: Military Science (U.S. Army)

**MILR 3062 (3) Military Operations and Training 2**
Studies theoretical and practical applications of small unit leadership principles. Focuses on managing personnel and resources, the military decision making process, the operations order and oral communications. Exposes the student to tactical unit leadership in a variety of environments with a focus on preparation for the summer advance camp experience.
**Recommended:** Prerequisite instructor consent.
**Additional Information:** Departmental Category: Military Science (U.S. Army)

**MILR 3090 (1) Military Theory and Tactical Leadership**
Application of military domain knowledge, small until leadership skills and education on various subjects germane to military operations. Examination of military tactics, techniques and procedures to better understand how to successfully accomplish multiple military requirements. Instructor consent required. MSV students do not need to be enrolled in a MILR corequisite.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a corequisite course of MILR 1011 or 1021 or 2031 or 2041 or 3052 or 3062 or 4072 or 4082.
**Additional Information:** Departmental Category: Military Science (U.S. Army)

**MILR 4072 (3) Leadership 1: Adaptive Leadership**
Develops leaders of character that will excel in a complex, ambiguous and dynamic future operating environment: discusses personal growth, effective communication, critical thinking, problem solving and ethical leadership.
**Recommended:** Prerequisite instructor consent.
**Additional Information:** Departmental Category: Military Science (U.S. Army)

**MILR 4082 (3) Leadership 2: Leadership in a Complex World**
Develops leaders of character that will excel in a complex, ambiguous and dynamic future operating environment: develops universal leadership attributes such as critical thinking and problem solving, understanding the contemporary operating environment and improved inter-personal dynamics/team building skills.
**Recommended:** Prerequisite instructor consent.
**Additional Information:** Departmental Category: Military Science (U.S. Army)

**MILR 4840 (1-3) Independent Study**
**Additional Information:** Departmental Category: Military Science (U.S. Army)

# Molecular, Cellular and Developmental Biology (MCDB)

## Courses

**MCDB 1020 (1) Introduction to Molecular, Cellular and Developmental Biology Major**
Introduces students to the Molecular and Cellular Biology major. Provides an overview of the major and how it differs from other CU biology programs; how to get involved in clubs, research, and/or internship opportunities; strategies for succeeding in MCDB courses; and career options. This is a first-year colloquium course specifically designed for freshman and other students exploring their educational and career opportunities in our department.
**Recommended:** New MCDB majors.

**MCDB 1043 (1) Exploring Genetics Laboratory**
Provides hands-on experience with fundamental genetic principles. Topics include scientific method, experimental design, mitosis, meiosis, classical genetics, molecular genetics, mutagenesis, DNA analysis, and transgenic organisms. Wherever possible, the focus of the lab will be on integrating science process skills with human-relevant experiments to encourage students to learn and apply science skills while seeing the application to humans.
**Requisites:** Restricted to Biological Sciences (MCDB) non-majors only.
**Recommended:** Corequisite MCDB 1041.
**Additional Information:** Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science Lab or Lab/Lec

**MCDB 1150 (3) Introduction to Cellular and Molecular Biology**
Covers biologically important macromolecules and biological processes, together with an introduction to cell structure, function, and physiology. Provides the foundation for advanced MCDB courses to majors, and a rigorous overview of modern biology to non-majors.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 1111
**Recommended:** Prerequisite high school chemistry and algebra, and recommended corequisite of MCDB 1152.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science Lab or Lab/Lec

**MCDB 1152 (1) Problem Solving Co-Seminar for Introduction to Molecular and Cellular Biology**
Uses problem solving and other interactive group work to aid student learning in a corequisite course, MCDB 1150. Students will work in small groups on learning and practicing how to solve difficult conceptual problems, as well as using hands-on activities and concept mapping to help learn content.
**Recommended:** Corequisite MCDB 1150.

**MCDB 1161 (2) From Dirt to DNA: Phage Genomics Laboratory I**
Provides laboratory experience working on a bacteriophage genomics research project. Students will study novel bacteriophage they isolate from the environment. Topics covered include phage biology, bacteria and phage culturing and amplification, DNA isolation, restriction digest analysis, agarose gel electrophoresis, and electron microscopy.
**Recommended:** Prerequisites or corequisites: MCDB 1150 or EBIO 1210.
**Additional Information:** Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science Lab or Lab/Lec

**MCDB 1171 (2) Antibiotics Discovery Through Hands-on Screens I**
Provides introductory research and laboratory experience. Students will work in teams to screen small molecule libraries for novel antibiotics using the bacterium Salmonella as a model system. Topics covered include the basic biology of the model system, genetics, approaches to screening for new therapeutics, statistical analysis of the data, compound verification and lead compound development.
**Recommended:** Prerequisite or corequisite MCBD 1150 or EBIO 1210.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science Lab or Lab/Lec

**MCDB 1181 (2) Biological Probiotic/Drug Discovery Through Hands-on Screens**
Provides introduction to research and laboratory experience. Students will work in teams to screen novel mycobacterial strains for use as probiotics or immunoregulatory/anti-inflammatory drugs using THP-1 cells, a human monocytic cell line. Topics covered include the hygiene or "Old Friends" hypothesis, the human microbiome, approaches to screening for new probiotics of therapeutics and statistical analysis of the data.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 1181
**Grading Basis:** Letter Grade

**MCDB 1234 (1-9) Skills Center: Modular Laboratory of Modern Molecular Biology Skills**
Dedicated to teaching students fundamental laboratory skills in modern molecular biology. The skills are updated on a rolling basis in consultation with MCDB faculty and local Pharma/Biotech companies in an effort to provide students with real world skills that can help them transition from a traditional lab course environment to a more independent research environment. Students can mix and match various skills to receive one or more university credit hours and students who successfully complete a module are given a certificate recognizing their competency. Available skills modules and in more course information can be found at https://skillscenter.colorado.edu/
**Repeatable:** Repeatable for up to 15.00 total credit hours.
**Grading Basis:** Letter Grade

**MCDB 2150 (3) Principles of Genetics**
Introduces the behavior of genes and chromosomes in eukaryotic and prokaryotic organisms. Covers three areas: transmission genetics, molecular genetics, and population genetics. Attention is given to genetic mapping, recombinant DNA procedures, and gene expression.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 2222
**Recommended:** Prerequisite MCDB 1150 or EBIO 1210 or CHEN 2810 (minimum grade C-) and recommended corequisite of MCDB 2152.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 2152 (1) Problem Solving Co-Seminars for Genetics**
Uses problem solving and other interactive group work to aid student learning in MCDB 2150. Students will work in small groups on learning and practicing how to solve difficult conceptual problems, as well as using hands-on activities and concept mapping to help learn content.
**Recommended:** Corequisite MCDB 2150.

**MCDB 2161 (2) From DNA to Genes, Phage Genomics Laboratory II**
Provides laboratory experience working on a bacteriophage isolated during the previous semester. Topics include bioinformatics, genome annotation, open reading frame and RNA identification, BLAST analysis, phylogenetics and submission to a genomic database.
**Requisites:** Requires prerequisite course of MCDB 1161 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 2171 (2) Chemotherapeutic Discovery Through Hands-On Screens 2**
Provides introductory research and laboratory experience. Students will work in teams to screen molecule libraries using fruit flies as a model system. Topics covered include the basic biology of the model system, genetics, approaches to screening for new therapeutics, statistical analysis of the data, compound verification and lead compound development.
**Recommended:** Prerequisite or corequisite MCBD 1150 or EBIO 1210.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 2350 (3) Understanding Cancer: Introduction to the disease¿s biology, medicine, and societal implications**
A course for students who want to learn about cancer but have little or no background in biology. It is based on a text that presents relevant science and medicine in a readable and comprehensible way. Classes will be discussion of material from the text with weekly quizzes for feedback. The ethics and economics of cancer treatments will be discussed, along with ways to minimize one¿s own cancer risk and live with cancer if necessary.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 2840 (1-3) Lower-Division Independent Study**
Students with adequate prerequisites should take MCDB 4840.
**Repeatable:** Repeatable for up to 8.00 total credit hours.

**MCDB 3000 (3) Synthetic Biology: Engineering Biomolecular Systems in the Laboratory**
Hands-on research experience in engineering biological systems. Students will design biological systems to address relevant medical and environmental problems facing our society. They will learn how to build their molecular designs in the lab using current synthetic biology techniques. Students will also learn how to critically evaluate current research in the field and effectively communicate their own research. Formerly offered as a special topics course. Students can take MCDB 3001 as a continuing course for advanced research.
**Requisites:** Requires prerequisite courses of (MCDB 1150 and MCDB 2150) or CHEN 2810 (all minimum grade C).
**Recommended:** BCHM, ENGR and BCHM majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab

**MCDB 3001 (3) Advanced Synthetic Biology: Engineering Biomolecular Systems in the Laboratory**
This course in engineering biological systems is an extension of the hands-on research experience gained from MCDB 3000 and meant to take following completion of MCDB 3000. Students designed biological systems to address relevant medical and environmental problems facing our society in MCDB 3000. Engineering biological system in the lab often takes longer than one semester. MCDB 3001 teaches students new laboratory techniques that will allow them to take more involved projects to the next step and gain more confidence in the laboratory.
**Requisites:** Requires prerequisite course of MCDB 3000 (minimum grade C-).
**Recommended:** BCHM, ENGR and BCHM majors only.

**MCDB 3010 (2) Undergraduate Teaching in Course-Based Undergraduate Research Experiences**
To address the need for more advanced and continued participation in course-based research, MCDB 3010 is designed to train students who have taken MCDB 1171 or MCDB 2171 or MCDB 4202 as teaching assistants. The aim is to enhance the students' experience and responsibilities in course-based research and to prepare them for research and mentorship in a departmental or graduate laboratory.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Requires prerequisite course of MCDB 1171 or MCDB 2171 or MCDB 1161 or MCDB 4202 (minimum grade B).
**Grading Basis:** Letter Grade

**MCDB 3020 (1) Next Steps: Preparing for Life After Graduation**
Helps upper-division students prepare for what comes after graduation. Topics include exploring careers; how to write a resume or CV; interviewing tips; how to build your portfolio; asking for letters of recommendations. This course is specifically designed for juniors starting to prepare for the next stage post-graduation.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 3020 and IPHY 3020
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Pass/Fail

**MCDB 3030 (3) Artificial Intelligence in Biology**
Delves into the intersection of Artificial Intelligence and Biology by exploring the rich history of human and machine intelligence. We will uncover the significant implications of advances in AI within the biological sciences, including brain-machine interfaces, molecular structure predictions, biomedical diagnostics, drug discovery, and therapeutics. This course is designed to equip you with a comprehensive understanding of AI's role in advancing biological research and applications, preparing you for the rapidly evolving career opportunities in the field. Enhanced by guest lectures, this course offers both theoretical knowledge and a real-world perspective. Join us to navigate and contribute to the ethical and innovative applications of AI in biology, shaping the future of healthcare and environmental solutions.
**Requisites:** Prerequisites of MCDB 2150 or EBIO 2070 with a minimum of a C- or instructor consent.
**Grading Basis:** Letter Grade

**MCDB 3105 (3) Antibiotics: Functions and Failures**
Learn about treatments for infectious diseases, how the first antibiotics were discovered, where they come from, how and why they work, and how resistance develops. Understand how antibiotics make modern medicine possible. Explore ways clinicians minimize the spread of resistance to antibiotics. Examine how new antibiotics and other approaches to treating infection are being developed.
**Requisites:** Requires prerequisite course of MCDB 2150 (minimum grade C).
**Grading Basis:** Letter Grade

**MCDB 3135 (3) Molecular Biology**
Examines the central dogma of biology by discussing the most important molecules in cells (DNA, RNA and protein) and how their synthesis (DNA replication, transcription, RNA processing and translation) is regulated. Incorporated into the discussion is how recombinant DNA techniques are used to discover and dissect cellular processes, how to design and interpret experiments, and understanding the limits of experiments to draw conclusions.
**Requisites:** Requires prerequisite courses of MCDB 2150 or EBIO 2070 and CHEM 1113 or CHEM 1400 or CHEN 1201 or CHEN 1211 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3140 (2) Cell Biology Laboratory**
Provides laboratory experience using microscopy, bioinformatics, DNA isolation, PCR and gel electrophoresis to study cell biology and gene expression in a model organism. Students will learn research skills such as interpreting data and planning experiments.
**Recommended:** Corequisite MCDB 3135 or MCDB 3145.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3145 (3) Cell Biology**
Examines intracellular mechanisms, including transport of ions and small molecules across membranes; protein targeting to organelles; membrane trafficking between organelles; signal transduction; the cytoskeleton; and the cell cycle.
**Requisites:** Requires prerequisite courses of (MCDB 2150 or EBIO 2070) and (CHEM 1113 or CHEM 1400 or CHEN 1211) (all minimum grade C-).
**Recommended:** Prerequisite or corequisite MCDB 3140 concurrent with either this class or MCDB 3135.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3150 (3) Biology of the Cancer Cell**
Highlights dimensions of the cancer problem; cancer as a genetic/cellular disease; chemicals, viruses, and radiation as causes of cancer; cancer and diet; cancer epidemiology; cancer risk factors; proto-oncogenes, oncogenes, and cancer suppressor genes; and prevention of cancer.
**Recommended:** Prerequisite MCDB 2150 or EBIO 2070 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3160 (3) Infectious Disease**
Illustrate how cutting edge tools in genomics can be used to study, monitor and cure disease caused by new and re-emerging human pathogens such as SARS/MERS, Ebola virus, Neisseria meningitides, influenza virus and malaria parasites. Technologies covered will include genome sequencing, annotation, transcriptomics, phylogenetics and genotyping of microbial populations. An integrated approach to this topic will be presented, with these concepts threaded throughout: natural history and evolution of pathogens, molecular biology, immunology, epidemiology, public health and clinical diagnosis. There may be some overlap with material covered in MCDB 1030 and MCDB 4750.
**Requisites:** Requires prerequisite course of MCDB 2150 or EBIO 2070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3161 (2) From DNA to Genes, Phage Genomics Laboratory II**
Provides in-silico laboratory experience annotating bacteriophage genomes from bacteriophages that were isolated in MCDB 1161. Topics include genome annotation, predicting gene functions using BLAST and HHPred, independent research, scientific writing, and preparation of an annotation file that will be submitted to a public genome database.
**Requisites:** Requires prerequisite course of MCDB 1161 (minimum grade C-).

**MCDB 3171 (2) Advanced Discovery Based Lab - Antibiotics**
Provides students an opportunity to expand upon the research they performed in the introductory level course, Drug Discovery Through Hands on Screens I (MCDB 1171). Students will work in teams to validate potential antibiotics against human pathogens. Topics include hit validation, dose response, mechanism of action, applied statistical analysis, and an introduction to the primary literature.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Requires prerequisite course of MCDB 1171 (minimum grade C-).
**Grading Basis:** Letter Grade

**MCDB 3181 (4) Microbial Planet Laboratory**
Provides beginner friendly lab & research experience working on a microbiology project. The course teaches how to conduct original scientific research from hypothesis to experimentation, evaluation and reporting. Students study non-pathogenic microorganisms they isolate themselves from nature as part of the course. Hands-on topics covered in class include how to isolate & culture new microbes; how to observe, describe and classify them; and how to examine their metabolic capabilities such as the production of antibiotics.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 3181
**Requisites:** Requires prerequisite courses of CHEM 1113 and CHEM 1114 or CHEM 1400 and CHEM 1401 (all minimum grade C-).
**Recommended:** Prerequisite GEOL 1180 or MCDB 1150 or EBIO 1210.

**MCDB 3300 (3) Personalized Medicine - Recent Advances in Diagnostics and Therapeutics**
Time for personalized medicine is now. Attempts to learn from and put the patient/person back into the equation because personalized medicine, at its worst, does nothing personal at all. Discusses historical perspective, recent advances in molecular biology and medicine (including OMICS) in regards to diagnostics and therapeutics for selected human diseases, and what the future holds for personalized medicine. Guest lectures (medical experts, patients, family members) will further enrich the course.
**Recommended:** Prerequisites MCDB 2150 or EBIO 2070.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3330 (3) Evolution and Creationism**
Intensive lecture/discussion course on the interrelationships among science, religion, and social policy. Includes historical and scientific development of evolution theory, social Darwinism/sociobiology, and the public perception of science.
**Recommended:** Prerequisite MCDB 1150 or EBIO 1210 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3333 (3) Biomedical Innovations and Discoveries**
Discusses how biological inventions and discoveries fuel biomedical innovations, how important techniques in molecular biology have advanced our understanding of cellular processes and contributed to biotechnology revolution and biomedical sciences to benefit our society. Guest lectures from experts in industry and site visits will enhance the course by providing a non-academic perspective, networking opportunities, and unexpected avenues for career paths for our graduates. Department enforced prerequisite: MCDB 2150 or EBIO 2070 or instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3350 (3) Fertility, Sterility, and Early Mammalian Development**
Describes the production of germ cells, ovulation, fertilization, reproductive cycles, controls of reproduction, early development of the embryo, methods of contraception, and causes and treatments of sterility. Recommended for students planning careers in the health sciences.
**Recommended:** Prerequisite MCDB 1150 or EBIO 1210 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3450 (3) Biological Data Science**
The central function of data science is to extract information from complex datasets. Biology is an increasingly large-data endeavor with health care records, genomics datasets, and extensive imaging. This course will develop core data science skills, including statistical analysis, visualization, data management, machine learning, and modeling.
**Recommended:** Prerequisite MCDB 2150 or EBIO 2070 (minimum grade C-), or exposure to probability theory.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3456 (1-9) Skills Center: Modular Laboratory of Advanced Modern Molecular Biology Skills**
Dedicated to teaching students fundamental laboratory skills in modern molecular biology. The skills are updated on a rolling basis in consultation with MCDB faculty and local Pharma/Biotech companies in an effort to provide students with real world skills that can help them transition from a traditional lab course environment to a more independent research environment. Students can mix and match various skills to receive one or more university credit hours and students who successfully complete a module are given a certificate recognizing their competency. Available skills modules can be viewed at https://skillscenter.colorado.edu/
**Repeatable:** Repeatable for up to 15.00 total credit hours.
**Recommended:** Prerequisite MCDB 1234, MCDB 1150, MCDB 1111 or EBIO 1220.
**Grading Basis:** Letter Grade

**MCDB 3501 (3) Structural Methods for Biological Macromolecules**
Newest developments in cryo-electron microscopy opened new avenues to study cellular and molecular processes with high structural detail. The class will explore the most recent strategies in Structural Biology to study protein structure and function with a special focus on viral host-pathogen interactions and cell infection and its implications to cell function and architecture. The class will be composed of lectures, scientific paper discussions and hands-on problem solving and demonstrations on microscopes and software.
**Recommended:** Prerequisite MCDB 2150 or EBIO 2070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3650 (3) The Brain - From Molecules to Behavior**
Examines the molecular basis of the brain's role in thought, action, and consciousness by exploring issues such as relationship of cognition and localized brain function, sensory systems and their role in cognition, learning and memory, and behavioral neurochemistry.
**Recommended:** Prerequisite MCDB 2150 or EBIO 2070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3651 (3) The Brain: Dysfunction to Disease**
Misregulation of synaptic function results in abnormal brain function and behavior that is manifested in numerous neurological and psychiatric diseases. Explores the molecular mechanisms responsible for altered synaptic plasticity in neurological diseases such as frontotemporal dementia (FTD), Parkinson's disease, Huntington's disease, Creutzfeldt-Jakob disease, Down syndrome, epilepsy, autism, and Alzheimer's disease.
**Recommended:** Prerequisites MCDB 3650 or NRSC 2100 (minimum grade C-) or instructor consent required.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3700 (3) Poisons in Cell Biology and Society**
Investigate the inner workings of our cells by studying how poisons disrupt these processes. We will learn how selected poisons affect critical processes inside the cell to cause death or destruction. The scientific aspects of the poison will be discussed in the context of its historical significance or impact on society and popular culture.
**Requisites:** Requires prerequisite course of MCDB 2150 or EBIO 2070 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 3990 (3) Introduction to Systems Biololgy for Biologists**
Introduces majors with relatively little mathematical experience to the major concepts in systems biology, in the context of key processes (cell growth, division, adaptation, development, and disease). Designed to help students master the necessary mathematical tools involved.
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 and MATH 1310 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4001 (3) The What, The Why, and The How of Neural Tube Defects**
Neural tube defects (NTDs) involve incomplete neural tube closure in embryos, resulting in embryonic death or lifelong health complications. Students will select a gene from a list of candidate human NTD genes and investigate whether its loss leads to an NTD in chick embryos. This course will train students in CRISPR, cloning, embryology, and "softer" research skills such as publication formatting, with the ultimate goal of supporting students' development as researchers.
**Requisites:** Requires prerequisite course of MCDB 3140 (minimum grade C-).
**Recommended:** Junior or Senior standing.

**MCDB 4100 (1-6) Special Topics**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4105 (3) Function of Cellular and Nuclear, Assemblies, and Machines**
Maintaining cellular functions requires a coordinated interaction of all kinds of organelles, assemblies and machines. This course will explore the structure, function, regulation and interactions of cellular organelles, supramolecular assemblies, and molecular machines (motors, ribosomes, polymerases, channels, etc.). Students will be exposed to a set of lectures and prepare specific papers that will be discussed in the group.
**Grading Basis:** Letter Grade

**MCDB 4150 (3) Biology of Aging and Longevity**
Through lectures and reading assignments, this capstone course will introduce fascinating cellular and molecular mechanisms underlying aging and longevity based on historical and recent research achievements. We will discuss major aging theories and multiple cellular regulatory systems that prominently affect lifespan. The course will integrate basic concepts from multiple other courses by addressing specific physiological problems in the aging field and present students with the opportunity to learn the reasoning process in cutting-edge biomedical research.
**Requisites:** Requires prerequisite courses of (MCDB 1150 or EBIO 1210) AND (MCDB 2150 or EBIO 2070) (minimum grade of C-).
**Recommended:** Prerequisite MCDB 3135 or MCDB 3145 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4185 (3) Geomicrobiology**
Examines how microbial and chemical processes interact on the Earth¿s surface today and have shaped the planet throughout its history. Emphasis will be placed on how the life styles and chemical ingenuity of microorganisms drive key biogeochemical processes including weathering and transformations of carbon, oxygen, sulfur, iron and nitrogen. Towards this goal, major geologic and evolutionary events will be examined through the lens of microbial diversity, metabolic energetics, microbe-mineral interactions, and molecular biomarkers.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 5185, ENVS 4185, and GEOL 4185
**Requisites:** Requires prerequisite courses of CHEM 1113 and CHEM 1114 or CHEM 1400 and CHEM 1401 (minimum grade C-).
**Recommended:** Prerequisites GEOL 1180 or MCDB 1150 or GEOL 3320 or EBIO 3400 or ENVS 4160 or EVEN 4484.
**Grading Basis:** Letter Grade

**MCDB 4201 (3) From Bench to Bedside: The Role of Science in Medicine**
Demonstrates the breadth of research in the life sciences and how such research (not just in medical schools) can lead to medical applications. Lecturers from life sciences, the medical school and biotechnology, discuss drug development and the transfer of research into the clinical arena. Students also prepare a paper and presentation on the development of a commercial drug.
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4202 (3) The Python Project**
Studies how python hearts grow after they consume a meal. Understanding the molecular processes of growth and regression in the python heart could lead to development of therapeutics for heart disease. Students work in groups in the laboratory and generate novel data by using modern molecular biology and bioinformatic techniques to clone and sequence candidate molecules of the python genome. May be repeated once.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4234 (3) Research Methods**
Presents a rigorous and pedagogically coherent introduction into the experimental process used to collect data, formulate hypotheses, and answer scientific questions in general, and biological questions in particular. Includes a detailed consideration of the elements of experimental design, data collection and analysis, and the interpretation of results in the context of effective science teaching. Part of the CU Teach course sequence for teacher certification in science and mathematics.
**Requisites:** Restricted to Biological Sciences (MCDB) majors or School of Education (EDUC) undergraduate students only.
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4300 (3-4) Immunology**
Emphasizes cellular and molecular mechanisms by which organisms protect themselves from pathogens and the experimental basis for our understanding of these processes. Discusses development, function, and misfunction of t-cells, b-cells and other components of the immune system, focusing on the human immune system.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5301
**Requisites:** Requires prerequisite courses of MCDB 3135 and MCDB 3145 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4310 (3) Microbial Genetics and Physiology**
Examines the physiology and genetics of bacteria, Archaea and viruses. Particular emphasis will be on metabolism, regulation of gene expression and protein function, mechanisms of interactions with and manipulation of the environment, and evolution in response to environmental pressures.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5310
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 (minimum grade C-) and recommended corequisite of CHEM 4611.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4312 (3) Quantitative Optical Imaging**
Explores the fundamentals of optical imaging in biology, especially molecular and cellular biology. Covered topics include an introduction to optics and microscopes, fluorescence microscopy and image analysis, and biological applications. MATLAB will be taught at the beginning of the course and used throughout for image processing. Prior experience with MATLAB (or Python) is highly recommended but not required.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 4312, MCDB 5312 and BCHM 5312
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4350 (3) Microbial Diversity and the Biosphere**
Provides a molecular phylogeny-based perspective on microbial diversity and the interactions between organisms that result in the biosphere. Provides overview of recent methods and findings in microbial ecology, as well as computer-based workshop in molecular phylogeny. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5350
**Recommended:** Prerequisites MCDB 1150 or EBIO 1210 and CHEM 1133 and EBIO 3400 and/or CHEM 3311 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4410 (3) Human Molecular Genetics**
Studies the human organism as a genetic system, including effect of mutation on protein structure and function, biochemical basis of human genetic disease, polymorphic gene loci, gene mapping and identification, gene cloning and characterization, and impact of human genetics on medicine and society. Fulfills MCDB scientific reasoning requirement.
**Recommended:** Prerequisite MCDB 3135 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4420 (3) Genetics of Brain and Behavior**
Examines the genetic underpinnings of animal behavior, including an examination of behavioral evolution and the use of genes as tools to examine neural architecture. We will cover topics including foraging, social behavior, personality, parental care and fear. We will explore these behaviors at multiple levels, including genomics, population genetics, molecular genetics, epigenetics, endocrinology and neurobiology. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 4420
**Requisites:** Requires NRSC 2100 or (NRSC 2125 and NRSC 2150) and (EBIO 2070 or MCDB 2150). All minimum grade C-.
**Grading Basis:** Letter Grade

**MCDB 4422 (3) Molecular Biology of Free Radicals: Role(s) in Oxidative Stress, Signaling, Disease, Aging**
Examines how free radicals are formed in biological systems and their roles in oxidative stress, cell signalling, aging, and disease. Emphasis will be placed on the recent literature. Fulfills MCDB scientific reasoning requirement.
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 and CHEM 3311 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4425 (3) Topics in Membrane Biology: Cell Biology, Physiology and Disease**
Students will apply their knowledge of basic biology to exploring several of the most exciting topics in biomedicine including protein folding and stress responses, nutrient sensing and balance and signal transduction across membranes. Emphasis will be placed upon human physiology and associated human diseases including Alzheimer's disease, diabetes and cardiovascular disease. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5425
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 or instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4426 (3) Cell Signaling and Developmental Regulation**
Introduces several cell signaling processes and their biological functions. Students read and analyze original research articles to learn the thinking processes of scientific research. Writing assignments and oral presentations are required. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5426
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 and CHEM 4700 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4428 (3) Regulation of Lifespan**
Lectures and literature reading/discussion will introduce students to historical, fascinating and cutting-edge research achievements, as well as the basic genetic/biochemical approaches, towards understanding cellular signaling systems and mechanisms that regulate the aging process and lifespan of animals and humans. Through the combination of presentation, discussion, homework and two exams, students will learn the reasoning process of scientific research in the aging field, become familiar with typical experimental approaches and improve their communication ability.
**Requisites:** Requires prerequisite course of MCDB 3135 (minimum grade C-).
**Grading Basis:** Letter Grade

**MCDB 4441 (4) Animal Developmental Diversity**
Surveys development in a range of vertebrate and invertebrate systems to reconstruct the common bilatorian ancestor, and elucidate the developmental genetic changes underlying animal diversification. Lab focuses on vertebrate embryos and explores key methods in evolutionary developmental biology including in situ hybridization, embryo microinjection, and transgenesis.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5441 and EBIO 4440 and EBIO 5440
**Recommended:** Prerequisites MCDB 1150 or EBIO 1210 and MCDB 2150 or EBIO 2070 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4444 (3) Cellular Basis of Disease**
Explores the cellular basis of disease. Discusses diseases arising from defects in intracellular targeting, cytoskeletal function, intracellular signaling, genomic instability, gene regulation, cell proliferation, and cell death. Involves student-organized presentations and classroom discussion. Fulfills MCDB scientific reasoning requirement.
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4471 (3) Mechanisms of Gene Regulation in Eukaryotes**
Focuses on manifestations of regulated gene expression. Studies gene regulation at multiple steps, including transcription, RNA processing and translation. Is based on critical analysis of primary research papers. Written assignments and oral presentations are required. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5471
**Recommended:** Prerequisite MCDB 3135 (minimum grade C-) or instructor consent required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4520 (3) Bioinformatics and Genomics**
Computational and experimental methods in bioinformatics and genomics, and how these methods provide insights into protein structure and function, molecular evolution, biological diversity, cell biology and human disease. Topics include database searching, multiple sequence alignment, molecular phylogeny, microarrays, proteomics and pharmacogenomics.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5520
**Recommended:** Prerequisites MCDB 3135 or CHEM 4700 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4521 (1) Bioinformatics and Genomics Laboratory**
Provides experience with, and exposure to, computational and experimental methods in bioinformatics and genomics. Meets once a week. Students are expected to read original research papers, discuss findings, plan and execute data analysis in selected areas.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5521
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4550 (3) Cells, Molecules and Tissues: A Biophysical Approach**
Focuses on the biophysics governing the structure/function of enzymes, cells, extracellular matrix and tissue. Synthesizes ideas from molecular biology, physics, and biochemistry, emphasizing how low Reynolds number physics, not Newtonian physics, is relevant to life inside a cell. Fulfills MCDB scientific reasoning requirement. Recommended restrictions: Cannot be repeated if taken as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5550 and PHYS 4550 and PHYS 5550
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 and PHYS 2010 and PHYS 2020 and CHEM 1133 and MATH 1300 and/or CHEM 3311 (minimum grade C-) or instructor consent required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4560 (3) Introduction to Biophysics**
Covers an introduction to the physics of living systems. Focuses on how living systems are able to generate order, with both physical principles and biological examples. Covers the development of quantitative models for biological systems, including estimates. Taught from a physics perspective, with biology background introduced as needed.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5560 and PHYS 4560 and PHYS 5560
**Requisites:** Requires a prerequisites course of PHYS 2210 (minimum grade C-).
**Recommended:** Prerequisite PHYS 4230.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4567 (3) Skills Center Linked Lab Research Project**
This course is a Skills Center Linked Lab independent project. Students who have sucessfully completed linked lab ( https://skillscenter.colorado.edu/labs.html) skills through MCDB 1234/3456 are eligible to take MCDB 4567. Student work with a linked lab advisor and the Skills Center proctors to develop a research project and the student completes the project in the Skills Center or in the Linked Lab and learn research skills such as interpreting data and planning and executing experiments, data interpretation, statistical analysis and presentation.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of MCDB 3456 (minimum grade C-).
**Grading Basis:** Letter Grade

**MCDB 4615 (3) Biology of Stem Cells**
Stem cells have received considerable notice in both the scientific and social arena. Examines the stem cell concept by a critical examination of the primary scientific literature. Topics will include pluripotency and plasticity, environment, technology, self-renewal, transdifferentiation, molecular signature, epigenetic programming and stem cell versus cancer cell. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5615
**Recommended:** Prerequisite MCDB 3135 or MCDB 3145 or instructor consent required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4650 (3) Developmental Biology**
Explores the development of invertebrate and vertebrate organisms, emphasizing cellular, molecular and genetic mechanisms. Focuses on conceptual understanding and experimental approaches to topics such as embryology, developmental control of gene expression in eukaryotic cells, mechanisms of differentiation and morphogenesis and developmental genetics.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5651
**Requisites:** Requires prerequisite courses of MCDB 3135 and MCDB 3145 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4680 (3) Mechanisms of Aging**
Studies aging as a developmental process emphasizing genetic, cellular and molecular mechanisms. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5680
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4750 (3) Animal Virology**
Encompasses the structure and replication of both lytic and transforming animal viruses. Emphasizes diversity of naturally occurring genomic structures and the resulting strategies of infection as well as the impact of viral epidemics on society. Includes critical analysis of primary research papers. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5750
**Recommended:** Prerequisite MCDB 3135 (minimum grade C-) or instructor consent required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4777 (3) Molecular Neurobiology**
Introduces the functional anatomy of the nervous system and explores current knowledge regarding the molecular and genetic basis of the development and function of the nervous system. Studies recent insights into the molecular basis of neurodegenerative diseases, in the last portion of the course.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5777
**Requisites:** Requires prerequisite courses of MCDB 3135 and MCDB 3145 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4790 (3) Oocytes, Stem Cells, Organisms: Experiments to Discoveries**
Develop critical thinking, scientific reasoning and communication skills by reading and presenting primary research articles and Nobel Prize winning research on patterning, stem cells, cell death, genetic and epigenetic mechanisms that regulate embryonic development. Learn about experimental approaches from a historical and present view, while discussing their ethical implications.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4800 (3) Molecular Evolution: How Natural Selection has Shaped the Molecules of Life**
This course explores how Darwin¿s idea has shaped the structures of DNA, RNA and proteins across the long history of life on earth. Natural selection driving the evolution these macromolecules and subsequent developmental pathways will be fully appreciated as the process that ultimately produced the amazing variety of species on this planet. Looking ahead, our recent efforts to harness the power of evolution in the test tube to develop new therapies will be covered.
**Requisites:** Requires prerequisite courses of MCDB 3135 and MCDB 3145 (minimum grade C-).

**MCDB 4810 (3) Insane in the Membrane: The Biology and Biophysics of the Membrane**
Studies the biology and physics of the biomembrane. Topics include structure and mechanism of membrane proteins; membrane biogenesis; membrane protein folding and stability; membrane homeostasis; mechanisms of membrane fusion and fission; lipid trafficking. Fulfills MCDB scientific reasoning requirement.
**Recommended:** Prerequisite CHEM 4700 (minimum grade C-) or instructor consent required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4811 (3) Teaching and Learning Biology**
Provides an introduction to recent research into student learning on the conceptual foundations of modern biology, together with pedagogical methods associated with effective instruction and its evaluation. Students will be involved in active research into conceptual and practical issues involved in biology education, methods to discover student preconceptions, and the design, testing and evaluation of various instructional interventions.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 6811 and EDUC 4811 and MCDB 5811 and EBIO 4811
**Recommended:** Prerequisites MCDB 1150 or EBIO 1210 and MCDB 2150 and MCDB 3145.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**MCDB 4840 (1-6) Upper-Division Independent Study**
An independent study contract is required.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Recommended:** Prerequisite MCDB 2150.

**MCDB 4900 (1-6) Public Health Practicum**
Offers practical experience in Public Health with direct supervision.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4900 and IPHY 4900
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**MCDB 4960 (1) Research Communication: Analyzing Data and Effectively Communicating Science for Honors Students**
This course is intended for MCDB honors students and to be taken the same semester as their undergraduate thesis defense. The course will teach honors students how to analyze their research data with proper statistics and effectively write their undergraduate honors thesis. Students will also gain experience in presenting their research to an audience with constructive feedback given.
**Requisites:** Requires prerequisite courses of MCDB 3135 and MCDB 3145 (minimum grade C-).

**MCDB 4980 (3) Honors Research**
Provides faculty-supervised research for students who have been approved by the departmental honors committee. Normally taken during the semester before completion of the honors thesis.
**Recommended:** Prerequisite MCDB 4840 or comparable research experience, and minimum GPA of 3.20.
**Additional Information:** Arts Sciences Honors Course

**MCDB 4990 (3) Honors Thesis**
Involves the preparation and defense of an honors thesis, based on faculty-supervised original research, including final phases of the research project.
**Recommended:** Prerequisites MCDB 4840 or MCDB 4980 or comparable research experience, and minimum GPA of 3.3 and approval by the MCDB Honors Committee.
**Additional Information:** Arts Sciences Honors Course

**MCDB 5201 (1) Graduate Lab in Molecular Evolution**
Ever wonder what functional clues might reside in the DNA sequence of your favorite gene? In this course, graduate students will learn the fundamentals of phylogenetics with an emphasis on evolutionary models that infer selective pressures in protein-coding DNA sequences (genes). During the course, students will be working on their favorite gene and using it as a case study for applying all of the concepts that we will cover. By the end of the course they will have generated a publication-quality summary figure, along with appropriate supplemental figures, of the selective pressures shaping their favorite gene. Additionally, they will learn how to design and execute an experimental approach based off of findings from the evolutionary analysis.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**MCDB 5210 (3) Cell Structure and Function (Lecture and Discussion)**

**MCDB 5220 (3) Graduate Core 2**
**Requisites:** Restricted to graduate students only.

**MCDB 5230 (3) Graduate Core 1**
**Requisites:** Restricted to graduate students only.

**MCDB 5250 (3) Topics in Developmental Genetics (Methods and Logic)**
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**MCDB 5301 (3) Immunology**
Emphasizes cellular and molecular mechanisms by which organisms protect themselves from pathogens and the experimental basis for our understanding of these processes. Discusses development, function, and misfunction of t-cells, b-cells and other components of the immune system, focusing on the human immune system.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4300
**Requisites:** Restricted to Biological Sciences (MCDB) graduate students only.

**MCDB 5310 (3) Microbial Genetics and Physiology**
Examines the physiology and genetics of bacteria, Archaea and viruses. Particular emphasis will be on metabolism, regulation of gene expression and protein function, mechanisms of interactions with and manipulation of the environment, and evolution in response to environmental pressures.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4310

**MCDB 5312 (3) Quantitative Optical Imaging**
Explores the fundamentals of optical imaging in biology, especially molecular and cellular biology. Covered topics include an introduction to optics and microscopes, fluorescence microscopy and image analysis, and biological applications. MATLAB will be taught at the beginning of the course and used throughout for image processing. Prior experience with MATLAB (or Python) is highly recommended but not required.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 5312, MCDB 4312 and BCHM 4312
**Grading Basis:** Letter Grade

**MCDB 5350 (3) Microbial Diversity and the Biosphere**
Provides a molecular phylogeny-based perspective on microbial diversity and the interactions between organisms that result in the biosphere. Provides overview of recent methods and findings in microbial ecology, as well as computer-based workshop in molecular phylogeny.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4350
**Requisites:** Restricted to graduate students only.

**MCDB 5361 (3) Evolution and Development**
Relates how recent discoveries in the molecular mechanisms of development are shaping our understanding of animal evolution. Reviews basic principles of molecular developmental biology and applies these concepts to critically discuss current research in the field of Evo-Devo (evolution and development).
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4361

**MCDB 5425 (3) Topics in Membrane Biology: Cell Biology, Physiology and Disease**
Students will apply their knowledge of basic biology to exploring several of the most exciting topics in biomedicine including protein folding and stress responses, nutrient sensing and balance and signal transduction across membranes. Emphasis will be placed upon human physiology and associated human diseases including Alzheimer's disease, diabetes and cardiovascular disease.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4425
**Requisites:** Restricted to graduate students only.

**MCDB 5426 (3) Cell Signaling and Developmental Regulation**
Introduces several cell signaling processes and their biological functions. Students read and analyze original research articles to learn the thinking processes of scientific research. Writing assignments and oral presentations are required.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4426

**MCDB 5441 (4) Animal Developmental Diversity**
Surveys development in a range of vertebrate and invertebrate systems to reconstruct the common bilatorian ancestor, and elucidate the developmental genetic changes underlying animal diversification. Lab focuses on vertebrate embryos and explores key methods in evolutionary developmental biology including in situ hybridization, embryo microinjection, and transgenesis.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4441 and EBIO 4440 and EBIO 5440
**Requisites:** Restricted to graduate students only.

**MCDB 5471 (3) Mechanisms of Gene Regulation in Eukaryotes**
Focuses on manifestations of regulated gene expression. Studies gene regulation at multiple steps, including transcription, RNA processing and translation. Is based on critical analysis of primary research papers. Written assignments and oral presentations are required.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4471

**MCDB 5520 (3) Bioinformatics and Genomics**
Computational and experimental methods in bioinformatics and genomics, and how these methods provide insights into protein structure and function, molecular evolution, biological diversity, cell biology and human disease. Topics include database searching, multiple sequence alignment, molecular phylogeny, microarrays, proteomics and pharmacogenomics.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4520
**Requisites:** Restricted to graduate students only.

**MCDB 5521 (1) Bioinformatics and Genomics Laboratory**
Provides experience with, and exposure to, computational and experimental methods in bioinformatics and genomics. Meets once a week. Students are expected to read original research papers, discuss findings, plan and execute data analysis in selected areas.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4521
**Grading Basis:** Letter Grade

**MCDB 5550 (3) Cells, Molecules and Tissues: A Biophysical Approach**
Focuses on the biophysics governing the structure/function of enzymes, cells, extracellular matrix and tissue. Synthesizes ideas from molecular biology, physics, and biochemistry, emphasizing how low Reynolds number physics, not Newtonian physics, is relevant to life inside a cell.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4550 and PHYS 4550 and PHYS 5550

**MCDB 5560 (3) Introduction to Biophysics**
Covers an introduction to the physics of living systems. Focuses on how living systems are able to generate order, with both physical principles and biological examples. Covers the development of quantitative models for biological systems, including estimates. Taught from a physics perspective, with biology background introduced as needed.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4560 and PHYS 4560 and PHYS 5560
**Grading Basis:** Letter Grade

**MCDB 5615 (3) Biology of Stem Cells**
Stem cells have received considerable notice in both the scientific and social arena. Examines the stem cell concept by a critical examination of the primary scientific literature. Topics will include pluripotency and plasticity, environment, technology, self-renewal, transdifferentiation, molecular signature, epigenetic programming and stem cell versus cancer cell. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4615
**Requisites:** Restricted to graduate students only.

**MCDB 5650 (2) Teaching and Learning in Undergraduate Science Courses**
Discusses recent research on how students learn and applications to the teaching of undergraduate science courses. Conducted as an interactive workshop, in which active-engagement in learning approaches are modeled and experienced by participants. Open to undergraduate and graduate students. May be used to fulfill the pedagogical training requirement for undergraduate Learning Assistants in upper division science courses. Post-doctoral and faculty auditors are welcome to participate as regular auditors.

**MCDB 5651 (3) Developmental Biology**
Explores the development of invertebrate and vertebrate organisms, emphasizing cellular, molecular and genetic mechanisms. Focuses on conceptual understanding and experimental approaches to topics such as embryology, developmental control of gene expression in eukaryotic cells, mechanisms of differentiation and morphogenesis and developmental genetics.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4650
**Requisites:** Restricted to graduate students only.

**MCDB 5680 (3) Mechanisms of Aging**
Studies aging as a developmental process emphasizing genetic, cellular and molecular mechanisms.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4680
**Requisites:** Restricted to graduate students only.

**MCDB 5750 (3) Animal Virology**
Encompasses the structure and replication of both lytic and transforming animal viruses. Emphasizes diversity of naturally occurring genomic structures and the resulting strategies of infection as well as the impact of viral epidemics on society. Includes critical analysis of primary research papers. Fulfills MCDB scientific reasoning requirement. Course has additional graduate student level requirements.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4750
**Requisites:** Restricted to graduate students only.

**MCDB 5776 (1) Scientific Ethics and Responsible Conduct in Research**
Lect. Advanced discussion of topics in scientific ethics, including requirements for responsible conduct of research, case histories of fraud, research misconduct, ethical misconduct and development of professional values and ethical standards.
**Equivalent - Duplicate Degree Credit Not Granted:** BCHM 5776
**Requisites:** Requires a corequisite course of MCDB 5230 or BCHM 5771.

**MCDB 5777 (3) Molecular Neurobiology**
Introduces the functional anatomy of the nervous system and explores current knowledge regarding the molecular and genetic basis of the development and function of the nervous system. Studies recent insights into the molecular basis of neurodegenerative diseases, in the last portion of the course.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4777

**MCDB 5811 (3) Teaching and Learning Biology**
Provides an introduction to recent research into student learning on the conceptual foundations of modern biology, together with pedagogical methods associated with effective instruction and its valuation. Students will be involved in active research into conceptual and practical issues involved in biology education, methods to discover student preconceptions, and the design, testing and evaluation of various instructional interventions.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4811 and EDUC 4811 and EDUC 6811
**Requisites:** Restricted to graduate students only.

**MCDB 6000 (3) Introduction to Laboratory Methods**
Introduces methodology and techniques used in biological research. Designed as a tutorial between a few students and one faculty member. Students are expected to read original research papers, discuss findings, and to plan and execute experiments in selected areas.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Biological Sciences (MCDB) graduate students only.

**MCDB 6440 (1-3) Special Topics in MCD Biology**
Acquaints students with various topics not normally covered in the curriculum. Offered intermittently or upon student demand, and often presented by visiting professors.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**MCDB 6441 (1) Faculty Res Seminar**
Acquaints students with various topics not normally covered in the curriculum. Offered intermittently or upon student demand, and often presented by visiting professors.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**MCDB 6442 (2) Scientific Communication**
Acquaints students with various topics not normally covered in the curriculum. Offered intermittently or upon student demand, and often presented by visiting professors.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**MCDB 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.

**MCDB 6950 (1-6) Master's Thesis**
Students seeking a master's degree should consult a departmental advisor. Plan I or Plan II is offered.

**MCDB 7840 (1-6) Graduate Independent Study**
An independent study contract is required.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**MCDB 7910 (2) Seminar Practicum**
Designed for graduate students to give oral presentations on their thesis research, field questions, respond to critiques, and present background information. Students attend weekly seminar speaker presentations to gain knowledge on specialized research.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**MCDB 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to graduate students only.

# MS Business Core (MSBC)

## Courses

**MSBC 5015 (1.5) Managerial Economics**
Studies the elements of the business firm's fundamental problem: how to maximize profits. Develops for each element managerial theory based upon introductory and intermediate level microeconomics. Analyzes various applications and misapplications of relevant concept, primarily through case studies. Differential calculus and statistics are used throughout the course.
**Requisites:** Restricted to Finance (FNCE-MS) or Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5020 (1.5) Financial Accounting**
Introduces the financial reporting system used by business organizations to convey information about their economic affairs. Develops an understanding of financial reports and what they tell about a business enterprise. Focuses on how alternative accounting measurement rules represent different economic events in financial reports.
**Requisites:** Restricted to Finance (FNCE-MS) or Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5031 (3) Quantitative Methods in Finance**
Covers foundations for statistical reasoning and statistical applications in business. Topics include graduate level treatment of descriptive statistics, probability, probability distributions, sampling theory and sampling distributions and statistical inference (estimation and hypothesis testing) applied to the field of finance. Provides an introduction to topics such as regression analysis, analysis of variance, time series forecasting, decision analysis, index numbers, and nonparametric methods.
**Grading Basis:** Letter Grade

**MSBC 5032 (3) Real Estate Data Analysis**
Covers foundations for statistical reasoning and statistical applications in business. Topics include graduate level treatment of descriptive statistics, probability, probability distributions, sampling theory and sampling distributions and statistical inference (estimation and hypothesis testing) applied to real estate. Provides an introduction to topics such as regression analysis, analysis of variance, time series forecasting, decision analysis, index numbers, and nonparametric methods.
**Requisites:** Restricted to REAL-MS students only.
**Grading Basis:** Letter Grade

**MSBC 5060 (3) Corporate Finance**
Analyzes the implications of modern finance theory for the major decisions faced by corporate financial managers. Develops the basic skills necessary to apply financial concepts to the various problems faced by a firm. Includes capital budgeting, capital structure, long term financing, short term financial management and financial planning topics.
**Requisites:** Restricted to Finance (FNCE-MS) or Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5070 (3) Survey of Business Analytics**
Designed as an introduction to Business Analytics, which considers the extensive use of data, methods and fact-based management to support and improve decision making. Business intelligence focuses on data handling, queries and reports to generate information associated with products, services and customers, business analytics uses data and models to explain business performance and how it can be improved. The class will be built on heavy hands-on coding; it will introduce and subsequently involve extensive use of Python.
**Requisites:** Restricted to MS Business Analytics (BUAN-MS) majors or MKAG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5180 (3) Machine Learning in Python**
This course exposes the students to commonly used platforms for statistical and predictive analytics. The class will go into depth of analytics using Python. Students will learn to analyze large datasets, including textual analytics such as twitter-stream analysis. The class will focus on predictive analytics.
**Requisites:** Restricted to Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade

**MSBC 5220 (3) Investment Management & Analysis**
Covers managing investment portfolios by blending academic theories and evidence with practitioner experience. Topics include risk and return relationships, securities, value theory (capital asset, arbitrage, and option pricing), portfolios, and performance evaluations.
**Requisites:** Restricted to Finance (FNCE-MS) or Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade

**MSBC 5235 (1.5) Finance Industry Academy**
This course provides finance industry perspectives, professional development, and information about finance industry careers for students in the MS finance program. The course complements the foundational material found in the rest of the MS finance curriculum with perspectives on how the MS finance skillset translates into varied careers in the finance industry. The course will draw heavily upon the finance industry perspective, the Burridge Center for Finance, and career resources at the Leeds school.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade

**MSBC 5460 (3) Supply Chain Strategy**
Introduces students to the fundamental principles underlying supply chains, and focuses on the integration with both operations and logistics.
**Equivalent - Duplicate Degree Credit Not Granted:** MBAX 6460
**Requisites:** Restricted to Supply Chain Management (SCMN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5480 (3) SCMN Experiential Projects**
Provides an opportunity to execute a project for a company, integrating course work knowledge in an applied capstone experience. Allows first hand exposure to the business analytics as both an observer and creator of the business analytics process. Students work closely with an area client company to solve an important business analytics problem under the close supervision of the instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Supply Chain Management (SCMN) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5490 (3) BUAN Experiential Projects**
Provides an opportunity to execute a project for a company, integrating course work knowledge in an applied capstone experience. Allows first hand exposure to the business analytics as both an observer and creator of the business analytics process. Students work closely with an area client company to solve an important business analytics problem under the close supervision of the instructor.
**Requisites:** Restricted to Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Core

**MSBC 5600 (1.5) Real Estate Principles**
The course provides students with an introduction to the foundational terms, concepts, principles, and formulas fundamental to the business of real estate. It establishes the foundation for other real estate courses. Course content includes legal concepts including property rights and title, mortgage loan types, calculations and decisions, an introduction to time value of money and income capitalization, and real estate investment valuation and decision making utilizing the most common income valuation methods. Instruction and course format are traditional lecture and conversational.
**Requisites:** Restricted to REAL-MS students only.
**Grading Basis:** Letter Grade

**MSBC 5610 (3) Real Estate Finance and Investment**
The primary objectives of this course are to: (1) describe, analyze, and compare the features of residential mortgage loans, commercial mortgage loans, and commercial leases; (2) conduct income property investment analyses and develop the technical competence necessary to structure basic real estate transactions; (3) understand the operations and valuations of private equity funds and real estate investment trusts (REITs), and how real estate is securitized and sold to everyday investors.
**Requisites:** Restricted to REAL-MS students only.
**Grading Basis:** Letter Grade

**MSBC 5635 (1.5) Real Estate Industry Academy**
Provides real estate industry perspectives about substantive topics and current events and trends, professional skills development, information and advice regarding real estate industry jobs and careers. By equipping students with the skills, knowledge, and networks necessary to pursue a career in real estate, the course complements the foundational material found in the rest of the MSRE curriculum. The course will draw heavily upon the expertise of our industry partners, CUREC, and career resources at Leeds.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to REAL-MS students only.
**Grading Basis:** Letter Grade

**MSBC 5680 (3) Optimization Modeling**
Focuses on formulating decision problems as mathematical models and employing computational tools to solve them. Microsoft Excel is used as the main modeling platform but the course will also cover advanced tools, such as modeling languages. Optimization modeling will be illustrated in problems associated with operations, marketing, management, and finance. Integrates topics from decision analysis and operations management as they relate to modeling management decisions.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Supply Chain Management (SCMN-MS) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade

# MS Business Electives (MSBX)

## Courses

**MSBX 5080 (3) Decision Modeling and Applications**
Integrates topics from decision analysis and operations management as they relate to modeling management decisions. Field projects involve the university, local companies, and/or government agencies.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Supply Chain Management (SCMN-MS) or MS Business Analytics (BUAN-MS) majors only.

**MSBX 5205 (3) Financial Strategy and Decision Modeling**
Develops functional frameworks for analyzing and assessing uncertainty in real and financial assets and evaluating financial decisions under diverse scenarios. This course covers various methods of mapping uncertainty including binomial decision tree models, linear programming models and Monte-Carlo simulations. Further topics include tax consequences of these decisions.
**Requisites:** Restricted to Masters of Finance (FNCE-MS) and Masters of Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5225 (3) Advanced Portfolio Management**
Covers the management and construction of investment portfolios. Topics include performance and risk measures, identification of risk factors and the use of traditional and alternative assets classes including real estate, mutual funds, ETFs, venture capital funds, private equity funds and hedge funds. Additional topics include tax consequences of investment decisions and cash management.
**Equivalent - Duplicate Degree Credit Not Granted:** FNCE 4831
**Requisites:** Restricted to Master of Finance (FNCE-MS), Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5260 (3) Fixed Income Investing**
Fixed income securities are those that nominally promise a fixed stream of payments. They include government and corporate long and short term debt issues that far exceed the amount of corporate stock issues, as well as long term personal debt (i.e.,home mortgages). Develops practical analytical tools for describing risk and return in fixed income securities, the markets where they are traded, and their purchase and management by financial intermediaries. This course will utilize the Bloomberg Lab to provide students with real world fixed income security analysis.
**Requisites:** Requires prereqs MBAC 6060, MSBC 5060, or MSBC 5610 (min grade D-).Restricted to Master of Business Admin (MBAD), MBA w Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Profl MBA Program (PMBA), MS Finance (FNCE-MS) MS Real Estate (REAL-MS) mjrs onl
**Grading Basis:** Letter Grade

**MSBX 5270 (3) Applied Derivatives**
Covers applications of financial derivatives and a range of topics, from market risk management to liquidity and counter party risk management in contemporary finance. Specifically, the course examines the pricing and use of financial derivatives, including options, forwards, futures, swaps and credit derivatives in risk management.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade

**MSBX 5280 (3) Sustainable Finance**
Course materials draw from finance, economics, and law studies that analyze the theoretical and actual impact of ESG forces on firm outcomes. The course will be divided into two primary topics, namely (1) sustainable capital allocation (i.e. how firms manage their capital budgeting choices given ESG goals & the influence/role of activist investors in those decisions); (2) sustainable financing (i.e., how firms raise capital given ESG goals & the influence/role of passive socially responsible investing).
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade

**MSBX 5310 (3) Customer Analytics**
Provides a deep understanding of how to use data on customer behavior and preferences to inform managerial decision making. Introduces methods for causal inference, modeling consumer demand, and modeling firm decisions. Applications include long-run customer management decisions (customer acquisition and retention) and short-run marketing mix (product, price, promotion and distribution) decisions. The R programming language is used for course examples and assignments. Students are assumed to have a working knowledge of R and linear regression techniques.
**Requisites:** Restricted to Supply Chain Management (SCMN-MS) or Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5311 (2) Customer Analytics**
Provides a deep understanding of customer centricity and its implications for the firm; state-of-the art methods for calculating customer lifetime value and customer equity; analytical and empirical skills that are needed to judge the appropriateness, performance, and value of different statistical techniques that can be used to address a issue around customer acquisition, development, and retention. Students will use their knowledge of R programming in this course.
**Requisites:** Restricted to Professional MBA Program (PMBA) majors only.
**Grading Basis:** Letter Grade

**MSBX 5320 (3) Digital Advertising**
Covers both traditional and emerging digital advertising methods, the popular platforms used to execute ads, and the leading analytic tools that can be used to assess advertising performance. Core advertising platforms covered include search, display, social media, native advertising, sponsored content and mobile. This class focuses on best practices and Key Performance Indicators that go with each advertising platform. Department consent required.
**Requisites:** Restricted to MS Business Analytics (BUAN-MS) majors or MKAG-CERG students only.
**Grading Basis:** Letter Grade

**MSBX 5405 (3) Structured Data Modeling and Analysis**
Explores both the functional and technical environment for the creation, storage and use of the most prevalent source and type of data for business analysis, ERP and related structured data. Students will learn how to access and leverage information via SQL for analysis, aggregation to visualization, create dashboards, and be source for business intelligence.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA w/ Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Supply Chain Management (SCMN-MS) or MS Business Analytics (BUAN-MS) majors BAMG-CERG, SCAG-CERG students only
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5410 (3) Fundamentals of Data Analytics**
Exposes the students to commonly used platforms for statistical and predictive analytics. The class will go into depth of analytics using R before demonstrating the same concepts using SPSS and SAS. Students will learn to analyze large datasets, including textual analytics such as twitter-stream analysis using R.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA (PMBA), MS Supply Chain Management (SCMN-MS), MS Business Analytics (BUAN-MS) or (SCAG-CERG) or (BAMG-CERG) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5415 (3) Advanced Data Analytics**
Explores the capabilities and challenges of data-driven business decision making and prepares students to lead in analytics-driven organizations. Introduces a set of common predictive and prescriptive analytics tools. Students apply the analytics tools to important decisions based on practical data sets from various companies. Analytics software packages are used extensively in the course.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA (PMBA), MS Supply Chain Management (SCMN-MS), MS Business Analytics (BUAN-MS) or (SCAG-CERG) or (BAMG-CERG) students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5420 (3) Unstructured and Distributed Data Modeling and Analysis**
Moves the student beyond structured data and sources into business scenarios where data is semi-structured to unstructured such as those from social and web applications. Specific topics include introduction to SQL-on-Hadoop, NoSQL and related distributed processing technologies. Students will learn practical application and mechanisms for getting this sort of data ready for analytics.
**Requisites:** Requires prereq course MSBX 5405 (min grade D-). Restricted to Master of Business Admn (MBAD), MBA w/ Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Profl MBA Program (PMBA) Supply Chain Mgmnt (SCMN) or Business Analytcs (BUAN) or BAMG-CERG mjrs onl
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5425 (3) Natural Language Processing for Healthcare Analytics**
Practitioners of natural language processing (NLP) use methods from math, science, engineering and linguistics to teach computers to understand human language. Because much biomedical information is stored as text, there are many possible applications of NLP in health sciences. This course offers an introduction to NLP for the health sciences. Students will gain a conceptual and hands-on introduction to fundamental tools, concepts and problems from NLP by exploring applications in healthcare, population health and biomedicine.
**Requisites:** Requires prerequisite courses of MSBC 5070 and MSBC 5180 (minimum grade D-).
**Recommended:** Prerequisite Python 3.
**Grading Basis:** Letter Grade

**MSBX 5430 (3) Advanced Statistical Analysis**
Introduces advanced multivariate regression analysis and residual diagnostics, logistic regression, analysis of variance (ANOVA and MANOVA), time series models, and analysis of categorical variables. R, an open source programming language for statistical computing and graphics, will be used. It is assumed students have mastery of introductory statistics topics including descriptive tools, inference, and ordinary least squares regression.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5435 (1.5-3) Planning and Production**
At the core of GDP and productivity is the science of planning new products of services in design, bringing them to market then producing and replicating it in reliable, dependable, scalable fashion. The course takes an in-depth look at the mechanisms for supporting new product/process design in a scaled, often world-wide supply chain. (MRP, Six Sigma, Modeling Software, Heuristic Model use).
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) majors or SCFG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5440 (3) Decision Analysis**
Covers both behavioral/psychological aspects and analytical approaches to making decisions with multiple objectives. The focus for the course is learning to frame decisions that involve multiple stakeholders with multiple objectives and then learning the various techniques used to evaluate the choices. Influence diagrams, decision heuristics using spreadsheets, and decision trees will all be explored with user-friendly decision tree software.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), MS Supply Chain Management (SCMN-MS) or MS Business Analytics (BUAN-MS) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5450 (3) Transportation and Logistics**
Examines critical elements of distribution and logistics management, including physical distribution, supply chain echelon planning, warehouse (transportation note) selection and location, material handling, inventory quantity and location and other topics.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) majors or SCFG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5470 (1.5-3) Procurement and Contracting**
Examines principles and concepts of the acquisition process from commercial and governmental perspectives, focusing on the procurement process, including planning, source selection, solicitation writing, negotiations and oral discussions, contract preparation and administration.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Supply Chain Management (SCMN-MS) majors or SCFG-CERG students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5605 (3) Real Estate Investment and Risk Management**
This course empowers students with the knowledge and tools needed to understand, evaluate, and manage real estate investment risk and to recognize and capitalize upon potential real estate investment opportunities. We begin by exploring the types of risk investors face in residential real estate, mortgages, and investment properties and how to quantify those risks. With that foundation, we then delve into the history of such risks (e.g., the Great Depression, Great Recession, etc.) and regulations intended to address them. Finally, we explore current topics which are increasingly important in real estate (e.g., climate change, technology, ¿) including the risks and/or opportunities these challenges may present.
**Requisites:** Requires prerequisite course MBAX 6610 or MSBC 5610 (min grade D-). Restricted to Master's students in Real Estate (REAL), Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA) or Profl MBA Program (PMBA) majors onl
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: MS: Business Electives

**MSBX 5615 (1.5-3) Real Estate Modeling**
Real Estate Modeling and Analysis is a graduate level course which will teach students skills necessary to model Real Estate proformas to aid in valuation of acquisition and development of commercial real estate assets. The course will engage three software programs: Excel, Argus [¿Commercial Real Estate Software¿] and CoStar [¿largest commercial real estate information and analytics provider¿].
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA), or MS Real Estate (REAL-MS) majors only.
**Grading Basis:** Letter Grade

**MSBX 5680 (3) Real Estate Technology**
Course objectives are: (1) to understand economic forces that bridge technology, entrepreneurship and real estate; (2) to investigate short-, medium-, and lung-run effects of technology on residential and commercial real estate; (3) to communicate this information to Leeds School of Business students; and (4) to give current students the technology skills necessary to immediately add value for their potential employers.
**Requisites:** Restricted to Master's students in Real Estate (REAL), Master of Business Admin (MBAD), MBA with DUAL Degree (DMA), Joint Juris Doctor/MBA (JMBA) or Professional MBA Program (PMBA) majors only, or business majors with 80 completed units.

**MSBX 5820 (1-3) Special Topics in Accounting**
Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the standard graduate business curriculum.
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 5820
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Grading Basis:** Letter Grade

**MSBX 6290 (3) Textual Analysis in Business**
This course will discuss basic ideas around natural language processing (NLP) in research in different "dismal science" disciplines, from Economics to Psychology and Political Science, with a bent/focus on financial markets and accounting statements. The course is meant for graduate students as an introductory course on textual analysis, with an emphasis on methods and applications in Finance and Accounting. The language of choice for the course will be R. The course will be multilingual in that both the faculty and students can use other languages than R (python/perl/C).
**Equivalent - Duplicate Degree Credit Not Granted:** ACCT 6290
**Requisites:** Restricted to Master of Business Admin (MBAD), MBA with Dual Degree (DMBA), Joint Juris Doctor/MBA (JMBA), Professional MBA Program (PMBA) or MS Finance (FNCE-MS) majors only.
**Recommended:** Prerequisite MBAC 6060 or MSBC 5060 (minimum grade D-).
**Grading Basis:** Letter Grade

# Museum (MUSM)

## Courses

**MUSM 4010 (3) Museums and Society**
Investigates the museum as an institution in society; history of museums and changing roles and methods in society; administrative structure; museum profession; methodology of museum collections, exhibitions, and education. Designed for students interested in museums or museum careers.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 4021 (2-4) Selected Museum Topics**
Provides framework for student projects on varied museum topics (e.g., ethics of collecting, data management, the museum's role in the community). Student projects include case study analysis, interviewing, and original presentations. Topics vary each semester. Prereq., instructor consent.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.

**MUSM 4473 (3) Museum Field Methods in Botany**
Emphasizes field techniques for observation, analysis, and identification of vascular plants, collection, preservation, and date recording for museum specimens.
**Additional Information:** Departmental Category: Botany

**MUSM 4484 (3) Museum Field Methods in Geology**
Paleontological and paleoecological field techniques including collecting; recording of geographic, stratigraphic and quarry information; preservation; interpretation, including applicable readings. Designed for individuals who have some background in geology but little or no prior field experience. Offered summer only.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 5484
**Additional Information:** Departmental Category: Geology

**MUSM 4795 (3) Field Methods in Zoology and Botany**
Class covers research and field methods for biological disciplines associated with natural history museums: vertebrates, invertebrates and plants. Emphasis is on field research techniques: observations, sampling, collection and preservation methods and comparisons among elevation zones. Includes 5 field labs, 2 weekend trips, 5 lab practica, experience with several taxonomic experts and individual research projects.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 5795 and ENVS 4795
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Zoology

**MUSM 4900 (1-6) Independent Study**
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 5900
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Independent Study

**MUSM 4912 (3) Collections Research Practicum in Cultural Anthropology**
Designed as a practicum, introduces students to research and practice in museum anthropology, utilizing the extensive anthropology collections at CU-Boulder Museum. Students will gain skills in primary and secondary research, collections and object research and narrative story development for the exhibition of anthropological material culture.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 5912 and ANTH 4470 and ANTH 5470
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Anthropology

**MUSM 4913 (3) Museum Practicum in Botany**
Students take part in curatorial procedures of the botany section of the museum: specimen preparation, labeling, identification, cataloguing, conservation and collection management. Enrollment is limited therefore students should make arrangements during the previous semester.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 5913
**Recommended:** Prerequisite MUSM 5011.
**Additional Information:** Departmental Category: Botany

**MUSM 4914 (3) Museum Practicum in Geology**
Students take part in curatorial procedures of the geology section of the museum: field collection, specimen preparation, cataloguing, collection management and a survey of current laws as they apply to specimens. Enrollment is limited therefore students should make arrangements during the previous semester.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 5914
**Recommended:** Prerequisite MUSM 5011.
**Additional Information:** Departmental Category: Geology

**MUSM 4915 (1-3) Museum Practicum in Zoology**
Students take part in basic curatorial procedures of the zoology section of the museum: relaxing, fixing, positioning, preserving, cataloguing, storing and shipping. Also introduces students to the animal kingdom.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 5915
**Additional Information:** Departmental Category: Zoology

**MUSM 4916 (1-3) Museum Practicum in Entomology**
Students take part in curatorial procedures of the entomology section of the museum: field collection, specimen preparation, labeling, identification, rearing techniques and exhibit preparation. Department recommended prerequisite: MUSM 5011. Enrollment is limited, students should make arrangements during previous semester.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 5916
**Additional Information:** Departmental Category: Entomology

**MUSM 4917 (1-3) Museum Practicum in Techniques**
Students participate in museum public education functions that may include researching, planning, developing, and producing exhibits, traveling trunks, booklets, and other materials. May involve writing labels, molding and casting, conservation, and restoration.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 5917
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Museology

**MUSM 5011 (4) Introduction to Museum Studies**
Provides background in history and literature of museums, their objectives and methods, laboratory exercises in curatorship, exhibition theory, and administration.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 5021 (2-4) Selected Museum Topics**
Provides framework for student projects on varied museum topics (e.g., ethics of collecting, data management, the museum's role in the community). Student projects include case study analysis, interviewing, and original presentations. Topics vary each semester. Department consent required.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 5030 (3) Museum Education**
Survey of the theory and practice of education in museums and informal learning centers. Topics include current trends in the field, learning theories, teaching methodologies, program development, museum/school relationships, the role of education in exhibit development, and being a critically reflective practitioner.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 5031 (3) Museums and the Public: Exhibit Development**
Covers elements of exhibition development and design, up to production and evaluation of exhibit prototypes. The team approach is emphasized. Department enforced prerequisite: restricted to graduate students.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 5041 (3) Museum Administration**
Covers theory of organizations and how it applies to museums. Application of small business management and nonprofit organizations. Review museum organizational charts and staffing. Evolution of marketing and development in a museum context are reviewed. Budget process and annual financial reporting are discussed, and there is an emphasis on evaluating financial statements. Department enforced prerequisite: restricted to graduate students.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 5045 (3) Introduction to Museum Anthropology**
Traces the development of Anthropology and museums in America from late 19th century to present day. Students are encouraged to: explore museum theory and practice; think critically about the history of relations among Native Americans, Anthropology, and museums; consider the legacy of collecting and challenges of representing others; and, examine the interplay of Anthropology, material culture, and colonialism.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4045 and ANTH 5045
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Anthropology

**MUSM 5051 (3) Museum Collections Management**
Deals specifically with curation and data management. Topics include acquisition practices and problems; organization, management, use and preventive conservation of collections; computer data management of collections.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 5061 (3) Introduction to Scientific Illustration**
Intended for students with little to no art background. Focus is on the accurate rendering of scientific subjects for publication and for public display. Course begins with basic drawing skills and sharpening of visual perception. Students progress to be able to produce realistic renderings of subjects. Students are exposed to a variety of black and white and color techniques and the standards for presenting illustrations for a variety of audiences. Course concludes with computer illustration tools and techniques.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 5474 (4) Vertebrate Paleontology**
Discusses the history and evolution of the vertebrates, including the phylogenetic relationships and evolutionary patterns of the major groups. Lab focuses on comparative vertebrate osteology and fossil representation of major groups.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 4474 and GEOL 5474
**Additional Information:** Departmental Category: Geology

**MUSM 5484 (3) Museum Field Methods in Geology**
Paleontological and paleoecological field techniques including collecting; recording of geographic, stratigraphic and quarry information; preservation; interpretation, including applicable readings. Designed for individuals who have some background in geology but little or no prior field experience. Offered summer only.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 4484
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Geology

**MUSM 5520 (4) Flowering Plant Diversity**
Emphasizes the morphology, evolution, classification, phylogeny, natural history, identification, and economic importance of plants, with a focus on flowering plants (angiosperms). Because flowering plants are dominant and keystone features of both our natural and developed world, capacity to understand them from an evolutionary and ecological perspective is an important skill for anyone interested in field biology, ecology, evolution, environmental resource management, or simply in being a good steward to the land and to your society.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4520 and EBIO 5520
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**MUSM 5760 (4) Mammalogy**
Lect., lab, and field studies. Discusses origin, evolution and adaptation, geographic distribution, ecology and taxonomy of mammals; field and laboratory study of Coloradan species. Uses animals and/or animal tissues.
**Equivalent - Duplicate Degree Credit Not Granted:** EBIO 4760 and EBIO 5760
**Additional Information:** Departmental Category: Zoology

**MUSM 5795 (3) Field Methods in Zoology and Botany**
Class covers research and field methods for biological disciplines associated with natural history museums: vertebrates, invertebrates and plants. Emphasis is on field research techniques: observations, sampling, collection and preservation methods and comparisons among elevation zones. Includes 5 field labs, 2 weekend trips, 5 lab practica, experience with several taxonomic experts and individual research projects.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 4795 and ENVS 4795
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Zoology

**MUSM 5900 (1-6) Independent Study**
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 4900
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Independent Study

**MUSM 5912 (3) Collections Research Practicum in Cultural Anthropology**
Designed as a practicum, introduces students to research and practice in museum anthropology, utilizing the extensive anthropology collections at CU-Boulder Museum. Students will gain skills in primary and secondary research, collections and object research and narrative story development for the exhibition of anthropological material culture.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 4912 and ANTH 4470 and ANTH 5470
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Anthropology

**MUSM 5913 (3) Museum Practicum in Botany**
Students take part in curatorial procedures of the botany section of the museum: specimen preparation, labeling, identification, cataloguing, conservation and collection management. Enrollment is limited therefore students should make arrangements during the previous semester.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 4913
**Recommended:** Prerequisite MUSM 5011.
**Additional Information:** Departmental Category: Botany

**MUSM 5914 (3) Museum Practicum in Geology**
Students take part in curatorial procedures of the geology section of the museum: field collection, specimen preparation, cataloguing, collection management and a survey of current laws as they apply to specimens. Enrollment is limited therefore students should make arrangements during the previous semester.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 4914
**Recommended:** Prerequisite MUSM 5011.
**Additional Information:** Departmental Category: Geology

**MUSM 5915 (1-3) Museum Practicum in Zoology**
Students take part in basic curatorial procedures of the zoology section of the museum: relaxing, fixing, positioning, preserving, cataloguing, storing and shipping. Also introduces students to the animal kingdom.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 4915
**Additional Information:** Departmental Category: Zoology

**MUSM 5916 (1-3) Museum Practicum in Entomology**
Students take part in curatorial procedures of the entomology section of the museum: field collection, specimen preparation, labeling, identification, rearing techniques and exhibit preparation. Enrollment is limited, students should make arrangements during previous semester.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 4916
**Recommended:** Prerequisite MUSM 5011.
**Additional Information:** Departmental Category: Entomology

**MUSM 5917 (1-3) Museum Practicum in Techniques**
Students participate in museum public education functions that may include researching, planning, developing, and producing exhibits, traveling trunks, booklets, and other materials. May involve writing labels, molding and casting, conservation, and restoration.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSM 4917
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Museology

**MUSM 5918 (3) Museum Practicum in Advanced Collections Management**
Provides a hands-on environment for exploring issues in museum collections management. Through lecture, resource procurement, in-class activities and out-of-class projects, students will gain practical and professional experience in areas of policy, procedure, best practices, museum storage planning and legal issues.
**Recommended:** Prerequisite MUSM 5051.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 5919 (3) Collections Research Practicum: Archaeology**
Focuses on Museum collections management from archaeological sites mainly in the American Southwest and Mongolia. The course involves readings, discussion, and collections analysis and archival documentation. Extra time outside of class is required for the practicum aspect of this course. Each student will need to schedule with the professor an additional 3 hours each week when they will focus on an aspect of their project, to be discussed below under grading criteria. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ANTH 4919 and ANTH 5919
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.

**MUSM 6110 (1-3) Advanced Seminar in Museum Issues**
Offers a weekly seminar for museum and field study students that addresses one new topic each semester relevant to museum operations such as archival administration, museums, multiculturalism, repatriation and others. Department enforced prerequisite: MUSM 5011.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 6930 (2-4) Museum Internship**
Provides experience in museums of different sizes, audiences, and subjects, including history, natural history, art, and children's museums. Each student is supervised individually by a faculty member as well as the appropriate person in the cooperating museum.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 6940 (1-4) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 6950 (1-6) Master's Thesis**
A thesis, which may be of a research, expository, critical or creative type, is required of every master's degree candidate under the thesis option. Department enforced prerequisites: MUSM 5011 and MUSM 5051 and one of the following: MUSM 5030 or MUSM 5031 or MUSM 5041.
**Additional Information:** Departmental Category: Museum Studies

**MUSM 6960 (1-4) Master's Project or Paper**
A project or paper in the student's discipline and related to some aspect of museum studies is required of every master's degree candidate under the non-thesis-option plan. Department enforced prerequisites: MUSM 5011 and MUSM 5051. Students in collections/field track also need MUSM 5030 or MUSM 5031 or MUSM 5041.
**Additional Information:** Departmental Category: Museum Studies

# Music (MUSC)

## Courses

**MUSC 1051 (2) Basics of Songwriting**
Introduces students to the art and craft of songwriting. Activities center on creative self-expression through song, developing the fundamental tools and components of songwriting, both conventional and unconventional song forms, developing a personal musical style, developing critical listening/writing/thinking skills, performance, and the study of songs past and present. Examination of melody, harmony, rhythm, lyric writing, style and ensemble presentation.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**MUSC 1081 (3) Intensive Music Theory**
Introduces diatonic harmony and voice leading with intensive work on fundamentals (keys, intervals, triads, seventh chords and four-voice writing). The study of theoretical concepts is closely coordinated with aural skills. Feeds into the intensive section of MUSC 1111. Offered fall only.
**Requisites:** Requires corequisite course of MUSC 1121. Restricted to College of Music (MUSCU) majors or graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 1101 (2) Semester 1 Theory**
Introduces the fundamentals of diatonic harmony and voice leading, focusing on model composition (including one-, two- and four-voice writing) and analysis of excerpts from music literature. Offered fall only.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 1103 (1) Becoming a Music Teacher**
Provides an introduction to basic principles and practices of the music education profession. Explores contexts and methods of public school music teaching through class discussions, practice teaching and directed observations. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 1111 (2) Semester 2 Theory**
Continuation of MUSC 1101. Explores principles of harmony, voice leading and form. Continues emphasis on both model composition and analysis. Introduces chromatic elements (such as applied dominants and modulation), harmonic syntax and structural analysis of excerpts from music literature. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 1101 or MUSC 1081 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 1121 (1) Aural Skills Lab, Semester 1**
Focuses on sight singing, rhythm and dictation of diatonic melodies in major and minor keys (treble, alto and bass clefs). Covers identification of scale types, intervals, triads and dominant seventh chords. Includes individual and group improvisation. Offered fall only.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 1131 (1) Aural Skills Lab, Semester 2**
Continuation of MUSC 1121. Focuses on sight singing, rhythm and dictation of diatonic melodies; adds chromatic elements, more complex rhythms and two-part dictation. Includes harmonic dictation using vocabulary from MUSC 1111. Includes individual and group improvisation within harmonic contexts. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 1121 (minimum grade D-). Restricted to College of Music undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 1325 (1) Piano Sight Reading**
Studies techniques for improving sight-reading skills at the keyboard, with practical work in solo, ensemble and choral literature. Also covers score reading and transposition. Restricted to piano majors or instructor consent required. Offered fall only.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 1326 (2) Guitar Musicianship and Accompanying**
Survey of accompanying repertoire for guitar with solo instruments (flute, violin, voice, etc.), including introductory work in basso continuo. Activities in sight-reading, fretboard harmony and comprehension of harmony and texture. Some work will be tied to the repertoire being studied in studio lessons. Open only to guitar performance majors.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 1544 (1) Italian Diction**
Designed for the understanding of lyric Italian diction, the international phonetic alphabet, and its application to classical singing. Required for freshmen BM voice majors. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 1554 (1) English Diction**
Designed for the understanding of lyric English diction, the international phonetic alphabet, and its application to classical singing as well as various musical styles of English classical voice literature. Required for Freshmen BM voice majors.
**Requisites:** Requires prerequisite course of MUSC 1544 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 1802 (3) Introduction to Musical Styles and Ideas**
Introduces the study of musical traditions of the world; equips students with requisite skills for understanding and analyzing music as an art in historical and cultural contexts using an integrative approach that includes selected styles and genres, critical reading and writing skills and mastery of conceptual issues related to the discipline of music. Satisfies the World Music requirement for undergraduate students in the College of Music.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Musicology

**MUSC 2041 (1) Applications of Music Technology (5-week segment)**
Explores the use of technology, software, applications, and tools in a variety of creative, performance, pedagogical, and entrepreneurial contexts. Addresses the opportunities and challenges posed by evolving technologies. Emphasizes project-oriented learning.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 2061 (3) Introduction to Music Technology**
Surveys the various tools and techniques in the field of music technology. Topics include an introduction to basic synthesis, digital signal processing, MIDI and audio sequencing, music notation and a historical perspective on electronic music.
**Equivalent - Duplicate Degree Credit Not Granted:** MUEL 2061
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2081 (2) Prepared for the Soundcheck**
Provides an overview of the recording process from the performer's perspective from soundcheck through final mastering. Uses recorded material from in-class sessions. Examines differing approaches to recording as well as current technologies.
**Equivalent - Duplicate Degree Credit Not Granted:** CMDP 2860
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2091 (2) Recording Techniques**
Provides hands-on training in various audio recording techniques, acoustics and sound reinforcement, studio maintenance and troubleshooting. Real-world experience is gained through individual recording projects and College of Music events.
**Requisites:** Requires prerequisite course of MUSC 2081 or MUEL 2071 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2101 (2) Semester 3 Theory**
Continuation of MUSC 1111. Reviews harmonic and formal concepts from MUSC 1111. Introduces advanced chromatic concepts such as modal mixture, seventh chords with added dissonance, Neapolitan sixth chord and augmented-sixth chords. Explores in-depth structural analysis of musical works. Offered fall only.
**Requisites:** Requires prerequisite course of MUSC 1111 (minimum grade D-). Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2103 (2) Introduction to Music Education**
Introduces students to the broad range of skills and responsibilities inherent to the music education profession. Explores current topics in public school music teaching while developing teaching skills through supervised field experience. Offered fall only.
**Requisites:** Requires a prerequisite course of MUSC 1103 (minimum grade C-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 2111 (2) Semester 4 Theory**
Continuation of MUSC 2101. Builds on and synthesizes harmonic, melodic and formal concepts from semesters 1-3. Includes writing about musical structure and analyzing relationships of musical structure to extramusical elements (such as text, performance technique, dance, staging, etc.). Introduces 20th century compositional techniques. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 2101 (minimum grade D-). Restricted to College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2121 (1) Aural Skills Lab, Semester 3**
Continuation of MUSC 1131. Applies concepts from MUSC 2101 in performance (prepared, from sight and improvised) and analytical listening (transcription, diction and aural analysis). Offered fall only.
**Requisites:** Requires prerequisite course of MUSC 1131 (minimum grade D-). Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2131 (1) Aural Skills Lab, Semester 4**
Continuation of MUSC 2121. Applies concepts from MUSC 2111 in performance (prepared, from sight and improvised) and analytical listening (transcription, dictation and aural analysis. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 2121 (minimum grade D-). Restricted to College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 2325 (2) Applied Harmony for the Keyboard**
Provides an intensive study and application of the harmonic structure of music in a variety of keyboard skills: figured bass realization, chord progressions, harmonization, improvisation, transposition, on-sight harmonic analysis and playing by ear. Offered spring only.
**Requisites:** Requires prerequisite courses of MUSC 1111 and MUSC 1131 and MUSC 1325 (all minimum grade D-). Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 2365 (2) Introduction to Accompanying**
An overall study in the art of working with instrumentalists and singers including repertoire and orchestral reductions. Requires performance with a student instrumentalist or singer to be critiqued and coached by class and instructor. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 1325 (minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 2608 (1) Wellness for Musicians 1**
Explores strategies that help musicians maintain health while achieving peak performance. Investigate and employ powerful somatic methodologies including Alexander Technique and Body Mapping that improve physical functioning and prevent injury. Incorporates a variety of wellness aspects such as performance psychology, mental health, effective exercise, nutrition, breathing, hearing and vocal health.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 2772 (3) World Musics: Asia and Oceania**
Highlights music in Asia and Oceania using current ethnomusicological materials.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Musicology

**MUSC 2782 (3) World Musics: Africa, Europe, and the Americas**
Use current ethnomusicological materials and methods in the study of music outside the Western art tradition. Usually taught in the spring, focuses on music cultures of Africa, Europe and the Americas.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Musicology

**MUSC 2918 (2) Building Your Music Career**
Develop a broad range of tools needed for a professional career in music. Topics include networking, development and use of promotional materials, funding, social media and the internet and financial management, among others - all taught through an entrepreneurial lens. A range of career opportunities is explored, using the entrepreneurial process to assess and explore a variety of paths and opportunities.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 2988 (1) Introduction to Music Research**
Introduces music research tools and basic writing skills to provide information fluency and skills necessary for successful composition of formal music research papers. Applies curricular goals to specific topics of students' choice.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 2997 (1) Sophomore Proficiency**
To be completed by the second semester of the sophomore year.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theses and Recitals

**MUSC 3013 (1) String Class**
For music education majors with choral/general emphasis. Develops basic performance skills on two or more string instruments. Addresses teaching strategies and other specialized topics related to string instruction. Offered fall only.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3023 (1) Woodwind Class**
For music education majors with choral or choral/general emphasis. Develops basic performance skills on two or more woodwind instruments. Addresses teaching strategies and other specialized topics related to beginning and intermediate woodwind instruction. Offered spring only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3033 (1) Brass Class**
For music education majors with choral or choral/general emphasis. Develops basic performance skills on two or more brass instruments. Addresses teaching strategies and other specialized topics related to beginning and intermediate brass instruction. Offered spring only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3041 (2) Instrumentation and Arranging**
Learn to create professional arrangements for a diverse combination of instruments and/or voices. The course will work through instrumentation, score and part preparation, and issues of orchestration to prepare music student to create successful arrangements for a wide range of concert music settings. Final arranging projects will be geared towards individual interests.
**Requisites:** Requires prerequisite course of MUSC 2101 and MUSC 2121 (all minimum grade C). Restricted to College of Music (MUSC) students only.

**MUSC 3043 (1) Percussion Class**
Provides an introduction to playing techniques and pedagogical principles necessary for music educators to teach young students, including general understanding of the techniques used in playing and teaching percussion instruments in the school music program. Required of all string, voice, choral and instrumental general track music education students. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 3051 (2) Beginning Composition**
Covers issues relating to the craft of musical composition with analysis and writing in various styles. This introductory course is designed for music majors who are not composition majors. Some of the assignments will be read in class. Offered spring term of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 3061 (2) Jazz Improvisation I**
Develops skills in jazz improvisation through practical application of harmonic concepts, melodic construction, rhythmic awareness, transcription, repertoire and analysis. Open to all instruments. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Recommended:** Prerequisite for non-jazz majors MUSC 2111.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 3071 (2) Jazz Improvisation II**
Continues and expands upon the material presented in MUSC 3061. Reinforcement of ability to create an improvised melody in a range of harmonic contexts including blues, bebop, modal jazz, free jazz, and other styles. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 3061 (minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 3081 (3) Jazz Theory and Aural Foundations 1**
Presents the grammar and syntax of jazz. Helps to gain a greater understanding of the inner workings and application of chord progressions as they relate to the jazz idiom including major key harmony, secondary dominants, modal interchange and modulation. Students will demonstrate their understanding of these components through written assignments, singing, aural recognition, transcription and keyboard demonstration.
**Requisites:** Requires prerequisite courses of MUSC 1111 and MUSC 1131 and MUSC 3071 (all minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 3091 (3) Jazz Theory and Aural Foundations 2**
Presents the grammar and syntax of jazz and is the second course of the sequence. Units of study include elements of form, harmonic substitution, reharmonization, non-standard forms and harmonic progressions. Post-tonal concepts as they relate to jazz are introduced as well as foundational studies in jazz rhythm. Aural studies of all theoretical material is integrated throughout the semester.
**Requisites:** Requires prerequisite course of MUSC 3081 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.

**MUSC 3133 (2) Teaching General Music I**
Provides an overview of general music teaching with emphasis on developmentally appropriate strategies and materials. Required for all music education majors as partial fulfillment of course work leading to K-12 music licensure. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 2103 (minimum grade C-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3153 (2) Teaching Woodwind Instruments**
For music education majors with instrumental or instrumental/general emphasis. Develops basic performance skills on three or more woodwind instruments. Addresses teaching strategies and other specialized topics related to beginning and intermediate woodwind instruction. Offered spring only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3163 (2) Teaching String Instruments**
For music education majors with instrumental or instrumental/general emphasis. Develops basic performance skills on three or more string instruments. Addresses teaching strategies and other specialized topics related to beginning and intermediate string instruction. Offered fall only.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3176 (2) Conducting 1**
Introduces conducting and rehearsal techniques. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 3186 (2) Conducting II**
Introduces conducting and rehearsal techniques. Offered spring only.
**Requisites:** Requires prerequisite course of MUSC 3176 (minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 3191 (2) Studio Recording Techniques**
Introduces various aspects of studio recording techniques and explores the technical side of audio recording in the studio setting. Expands upon knowledge and skills learned in Recording Techniques (MUSC 2091).
**Requisites:** Prerequisite of Recording Techniques MUSC 2091. Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 3193 (2) Vocal Pedagogy and Literature for Young Voices**
Provides an overview of vocal anatomy/function, care of the voice, vocal repertoire, teaching strategies,and other specialized topics related to singing instruction in both private studio and public school choral settings. Fall section for instrumentalists; spring section for vocalists.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3223 (2) Teaching Brass Instruments**
For music education majors with instrumental or instrumental/general emphasis. Develops basic performance skills on three or more brass instruments. Addresses teaching strategies and other specialized topics related to beginning and intermediate brass instruction. Offered spring only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3226 (1) Percussion Literature and Pedagogy for Undergraduate Percussion Majors**
Explores, examines and analyzes percussion music, performance techniques and how to teach them through readings, discussion, analysis, extensive listening, and score study. The course is designed to meet the specific needs and requirements of the individual student.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 2997 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 3243 (2) Teaching Percussion Instruments**
Provides an introduction to playing techniques and pedagogical principles necessary for music educators to teach young students, including general understanding of the techniques used in playing and teaching percussion instruments in the school music program. Required of all instrumental band and instrumental band-jazz track music education students. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 3253 (2) Jazz Techniques for the Music Educator**
Prepares the music educator for successful experiences teaching jazz at the secondary level. Students gain insights into performance and rehearsal techniques for the instrumental jazz ensemble. Explores approaches for teaching jazz theory, improvisation, and selecting literature for young students. Own instrument required for certain classes. Offered spring only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Recommended:** Prerequisites MUSC 1111 and MUSC 2103.
**Additional Information:** Departmental Category: Music Education

**MUSC 3256 (2) Guitar Pedagogy**
Survey and develop appropriate teaching materials and techniques; learn how to identify and address the most common technical problems experienced by guitar students; create strategies for how to avoid the development of problems in guitar beginners.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 3273 (2) String Pedagogy and Literature**
Examines instructional methods/materials and pedagogical approaches appropriate for beginning to advanced string students in private studio, small ensemble, or large ensemble contexts. Topics may include group teaching strategies, as well as contemporary approaches including Rolland and Suzuki. Offered spring only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Recommended:** Prerequisites MUSC 2103 and MUSC 3163.
**Additional Information:** Departmental Category: Music Education

**MUSC 3345 (2) Piano Pedagogy 1**
Discusses teaching philosophies, objectives, and procedures. Examines and evaluates methods and materials. Studies practical aspects with which the private teacher is concerned. Offered fall of even-numbered years.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 3355 (2) Piano Pedagogy 2**
Materials and techniques for teaching piano with a focus on the intermediate level student. Offered only in spring of odd-numbered years.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 3363 (2) Marching Band Techniques**
Helps develop the skills needed to administer and teach all aspects of a contemporary high school marching band. Includes drill conception and design, instruction, organization, and administration. Offered fall only.
**Requisites:** Requires prerequisite course of MUSC 2103 and EMUS 1287 or EMUS 3287 (all minimum grade D-). Restricted to College of Music (MUSCU) majors or graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 3444 (1) French Diction**
Designed for the understanding of lyric French diction, the international phonetic alphabet, and its application to classical singing, as well as various musical styles of French classical vocal literature. Required of Junior BM voice majors.
**Requisites:** Requires prerequisite course of MUSC 1554 (minimum grade D-). Restricted to College of Music (MUSCU) majors or graduate students only.
**Recommended:** Prerequisite MUSC 3464.
**Additional Information:** Departmental Category: Voice

**MUSC 3464 (1) German Diction**
Designed for the understanding of lyric German diction, the international phonetic alphabet, and its application to classical singing, as well as various musical styles of German classical vocal literature. Required of sophomore BM voice majors.
**Requisites:** Requires prerequisite course of MUSC 1554 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 3642 (3) History of Jazz 1**
Utilizing musical examples and analysis, this course studies the distinctly American art form of jazz music from its origins up to the 1950's, including the various traditions, practices, historical events and people most important to its evolution. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Musicology

**MUSC 3652 (3) History of Jazz 2**
Utilizing musical examples and analysis, this course studies the distinctly American art form of jazz music from the 1950's to the present, including the various traditions, practices, historical events and people most important to its evolution. Offered spring only.
**Requisites:** Requires a prerequisite course of MUSC 3642 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 3772 (3) West African Music and Culture in Ghana**
Provides hands-on and experiential enrichment for students to interact at several levels with a local community in Ghana. Classroom lectures will be combined with direct participation in drumming and dancing, field trips to participate in festivals and court ceremonies, field trips to kente weaving village, adinkra cloth making, wood carving villages, and museums.
**Equivalent - Duplicate Degree Credit Not Granted:** MUEL 3772
**Requisites:** Requires prerequisite courses of MUSC 2782 and MUEL 2772 (all minimum grade D-). Restricted to students with 27-56 credits (Sophomore) non-College of Music majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 3802 (3) History of Western Music 1**
Surveys Western art music with stylistic analysis of representative works from all major periods through the Baroque. See also MUSC 3812.
**Requisites:** Requires prerequisite course of MUSC 1111 or MUSC 3091 (minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Musicology

**MUSC 3812 (3) History of Western Music 2**
Surveys Western art music with stylistic analysis of representative works from all major periods after the Baroque. See also MUSC 3802.
**Requisites:** Requires prerequisite course of MUSC 1111 (minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Musicology

**MUSC 3997 (1) Junior Recital**
To be completed by the second semester of the junior year.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 2997. Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Theses and Recitals

**MUSC 4001 (2) New Musical Styles and Practices**
Explores a variety of music from the 20th and 21st centuries beginning with Stravinsky and moving through current trends. Involves a mix an analysis/exploration of this music with short composition assignments imitating the different styles. Offered spring of odd-numbered years.
**Requisites:** Requires prerequisite courses of MUSC 2111 and MUSC 2131 (all minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4011 (2) 16th Century Counterpoint**
Provides a stylistic study of the main contrapuntal genres of the period including free, two- and three-part imitative counterpoint in the style of Palestrina. Provides a foundation in species counterpoint, working towards free counterpoint; stresses composing in 16th century styles. Offered fall of even-numbered years.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5011
**Requisites:** Requires prerequisite courses of MUSC 2111 and MUSC 2131 (all minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4012 (3) African Music**
Studies music cultures of Africa and the Black Diaspora, including folk and art music traditions, religious and popular music genres. Specific course topics could cover any or all of these styles, including exploring interconnections of musical stylistics of Africa and the Black Diaspora.
**Equivalent - Duplicate Degree Credit Not Granted:** MUEL 4012 and MUSC 5012
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4021 (2) 18th Century Counterpoint**
Provides a stylistic study of main contrapuntal genres of the period including inventions, suite movements and fugues. Provides a foundation in species counterpoint; stresses analysis and composing in the style. Offered fall only.
**Requisites:** Requires prerequisite courses of MUSC 2111 and MUSC 2131 (all minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4031 (2) Jazz Arranging 1**
Study of notation, score layout, transpositions, basic harmonic and melodic analysis, basic chord voicings, and composition for a small and large jazz ensemble. Use of notation software such as Finale or Sibelius. Offered fall semester only.
**Requisites:** Requires prerequisite course of MUSC 3091 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4034 (3) Musical Theatre History 1 - Antecedents through Musical Comedy**
Introduces musical theatre using historical and cultural contexts. Topics cover the social and historical elements inherent in the development of the Broadway Musical Theatre. Students will evaluate and compare a variety of musicals and their antecedents from the 19th Century to the era of Musical Comedy, including minstrel shows, vaudeville, operetta, burlesque, variety shows and musical revues.
**Requisites:** Restricted to BFA Musical Theatre and BM Musical Theatre students only.
**Grading Basis:** Letter Grade

**MUSC 4041 (2) Orchestration**
Studies advanced orchestration techniques through score analysis and student projects. Offered fall of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4044 (3) American Musical Theatre History 2 - Golden Age to Contemporary**
Continues to investigate Musical Theatre within its historical and cultural contexts, analyzing the cultural influence it has had on society. Students will evaluate and compare musicals from the start of the Golden Age to the modern era including Rock, Popsical, Jukebox, and Contemporary styles. This course is a continuation of Musical Theatre History 1.
**Requisites:** Restricted to Musical Theatre (MMTH-BMUS) students only.
**Grading Basis:** Letter Grade

**MUSC 4061 (2) Tonal Analysis**
Surveys tonal analytical techniques and forms of tonal music, including binary forms, ternary forms, rondo (and others) through study of selected works. Offered spring only.
**Requisites:** Requires prerequisite courses of MUSC 2111 and MUSC 2131 (all minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4071 (2) Post-Tonal Theory and Analysis**
Focuses on theory and analysis of post-tonal literature pre-1945. Offered fall of odd-numbered years.
**Requisites:** Requires prerequisite courses of MUSC 2111 and MUSC 2131 (all minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4078 (1) Piano Technician for Pianists**
Familiarizes pianists with the development of the modern grand piano, its construction and the proper terminology of parts and specifications. Trains pianists in minor repairs and adjustments of the grand piano action and in minor tuning tasks.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5078
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Recommended:** Prerequisite piano majors.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 4091 (2) Jazz Arranging 2**
Continuation and expansion of studies in MUSC 4031. Survey and analysis of major composers and arrangers of the idiom. Course focuses on creating several arranging projects for a jazz ensembles. Offered spring of odd-numbered years.
**Requisites:** Requires prerequisite course of MUSC 4031 (minimum grade D-). Restricted to College of Music undergraduate students only.
**Recommended:** Prerequisite MUSC 3081.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4101 (1-3) Theory and Aural Skills Review**
Reviews tonal harmony, voice leading, and essential aural skills. Prepares graduate students for more advanced work in music theory. Students may register for aural skills only (1 credit), theory only (2 credits) or both theory and aural skills (3 credits). May not be taken pass/fail. Aural skills section offered fall and spring. Theory section offered spring.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4103 (1) Introduction to Student Teaching**
Represents the first half of the professional internship year. Familiarizes students with the schools and music programs in which they plan to student teach. Music placements may consist of elementary and high school, elementary and middle school, or middle school and high school.
**Requisites:** Requires a prerequisite course of MUSC 4113 or MUSC 4313 or MUSC 4443 (minimum grade C-). Restricted to College of Music undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4106 (2) Guitar Literature**
An analytical and historical survey of the repertory of the guitar and its antecedents from the renaissance to the present day.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5106
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 4111 (2) Composing at the Computer**
Discover strategies and techniques for generating and manipulating sound at the computer. Student projects will include compositions, soundscapes, ambient environments and soundtracks for multimedia. Available to students without prior experience with computer music or composition. Offered fall of odd-numbered years.
**Requisites:** Requires prerequisite course of MUSC 2061 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4112 (3) Ethnomusicology**
Examines the definition, scope, and methods of ethnomusicology, the discipline that focuses on approaches to the study of music theory, history, and performance practices of world cultures.
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4113 (3) Teaching General Music 2**
Provides an in-depth examination of teaching and learning processes in the elementary general music classroom, based on the integration of child development and musical development theories with content and delivery skills appropriate for K-5 general music classrooms. Students implement and evaluate music instruction, design curricular projects, and build a repertoire of vocal, instrumental and speech-based arrangements. Offered fall of odd-numbered years.
**Requisites:** Requires prerequisite course of MUSC 2103 (minimum grade C-). Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4121 (3) Topics in Music Technology**
Exploration of issues, techniques, and tools of music technology. Topics vary from term to term and may include: interactive systems for performance; teaching and learning; computer music instrument design; digital synthesis and signal processing; music in intermedia, sound design and analysis. Lectures on work sessions will support student projects.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 2061 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4122 (3) Music in Jewish Culture**
Introduces students to a wide range of musical styles, traditions, genres, performers, composers, events and works that are part of Jewish culture, focusing on the twentieth and twenty-first centuries. Provides tools for understanding music on its own and in connection with issues of identity, diaspora, memory and liturgy. Includes opportunities for creative and critical engagement with Jewish music.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4122
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Musicology

**MUSC 4133 (3) Student Teaching Practicum**
Offers practice teaching under the guidance of a master music teacher.
**Requisites:** Requires prerequisite course of MUSC 4103 (minimum grade C-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4141 (2) Instrument Design Lab: Sound, Perception & Creativity**
Explores fundamental physical concepts of sound and music in a hands-on laboratory environment. Surveys a number of topics such as tuning, temperament, harmony and timbre through the construction of PVC overtone flutes, an investigation in the timbral intention of Dolly Parton's vocal technique, physical modeling through the testing of 3D-printed vowel flutes, the construction of a "Long String Instrument," and more. The course culminates in each student inventing, designing, and demonstrating their own new instrument.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5141
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Grading Basis:** Letter Grade

**MUSC 4142 (3) American Indian Music**
Examines Native North American musical cultures, emphasizing music as an integral part of religious expression and community life.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5142
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4143 (2) Topics in Choral Music Education**
Prepares students to teach, conduct and facilitate music making in various choral ensembles. Examines skills, teaching techniques and administrative procedures necessary for developing and maintaining various choirs at the elementary through high school levels. Includes discussion of current topics in choral music education and community choral field experiences. Offered fall terms, every two years.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5143
**Requisites:** Requires prerequisite course of MUSC 2103 (minimum grade C-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4151 (2) Topics in Music Analysis**
Examines critically a specific topic or repertory, such as Song Analysis or Music of Brahms. Uses readings and analyses, with grades to be determined from reading responses, analytical assignments and writing. Offered fall of even-numbered years.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of MUSC 2111 and MUSC 2131
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4152 (3) East Asian Music**
Surveys the development of music in Japan, China and Korea through the in-depth study of particular styles of traditional music. The course emphasizes the study of music and culture, particularly music's relationship to religion, politics, language, literature, dance and theatre.
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology
Departmental Category: Asia Content

**MUSC 4153 (1) Percussion Class and Pedagogy**
Required of all music education majors. Presents knowledge and skills necessary for music educators to teach young students, including a general understanding of the techniques used in playing and teaching percussion instruments in the school music program. Offered fall only.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4161 (2) Advanced Jazz Composition and Analysis**
Provides in depth listening, score study, and analysis, exploring major composers in jazz and their innovations in composition. "Foundational" topics concerning melody, form, and orchestration are studied to provide a framework for further analysis. Influences of western art music, American folk and popular music considered. Final projects to be performed and recorded by a CU jazz ensemble.
**Requisites:** Requires prerequisite of MUSC 3091 and MUSC 3081 (all minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 4163 (2) Choral Literature for School Ensembles**
Examination of literature, materials, and methods appropriate for teaching choral music in secondary schools. Offered fall of odd-numbered years.
**Requisites:** Requires prerequisite course of MUSC 2103 (minimum grade C-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4168 (3) World Music Theories**
Examines music rules, concepts or music theories and sociocultural elements that musicians use in creating musical sound, with emphasis on music practices from a variety of world traditions; observing shared and diverging principles, making cross-cultural comparisons and developing a new pedagogy that supports the substantive study of global musics.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5168
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Recommended:** Prerequisite MUSC 1802 or MUSC 2772 or MUSC 2782 or MUSC 4112.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4171 (2) Advanced Jazz Improvisation and Analysis**
Surveys important jazz improvisers and their historical context. Students engage in multiple methods of transcription and analysis. Listening plays a central role throughout the course and class discussions will foster the ability to engage in critical analysis of performances. The final project is an in-depth transcription of analysis of an improvisation.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite of MUSC 3081 and MUSC 3091 (all minimum grade D-). Restricted to College of Music (MUSC) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 4176 (2) Conducting 3**
This is a study in advanced conducting techniques. Demonstration of advanced score study techniques as well as the application to gesture and rehearsal techniques linked with conducting will be explored. Participation fully in discussion readings and contribute to the learning of all is expected.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5176
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of MUSC 3186 (minimum grade B-). Restricted to College of Music undergraduates majoring in Music Education (MUSE) only.
**Grading Basis:** Letter Grade

**MUSC 4191 (2) Advanced Recording**
Study of advanced recording techniques and concepts beyond those covered in MUSC 2091 involving multiplemicrophones for ensemble concerts and recording sessions within and outside of the College of Music. Offered spring of even-numbered years.
**Requisites:** Requires prerequisite course of MUSC 2091 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 4193 (1) Student Teaching Seminar**
Required for all music student teachers. Addresses topics of concern to beginning teachers including classroom management, interpersonal skills, legal issues, job search strategies and capstone project development.
**Requisites:** Requires prerequisite course of MUSC 4103 (minimum grade C-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4202 (3) Special Topic in Musicology: Current and Critical Issues**
Examination of a specific topic of current or critical interest within areas of music history, ethnomusicology, critical theoryand practice across the spectrum of Western, Popular and World Music traditions. Designed as a capstone course for music majors who have completed a full complement of musicology courses. Topics vary from term to term. Instructor consent is required for non-music majors.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Musicology

**MUSC 4203 (1) Music Methods Practicum**
Provides students with opportunities to observe and practice the use of various teaching techniques and relate them to concepts presented in the methods course. Students consult with the instructor to determine appropriate placements in schools.
**Requisites:** Requires prerequisite course of MUSC 2103 (minimum grade C-). Requires corequisite course of MUSC 4313 or MUSC 4443. Restricted to College of Music (MUSC) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4223 (2) Secondary Music Teaching Approaches**
Prepares students to teach and facilitate musical learning in non-performance secondary music classes. Includes units on music technology, music theory, music appreciation and class guitar. Connects experiential components to strategies for teaching and project design for middle and high school classrooms. Offered fall only.
**Requisites:** Requires a prerequisite course of MUSC 2103 (minimum grade D-).
**Grading Basis:** Letter Grade

**MUSC 4313 (3) Teaching Choral Music**
Examines choral music curricula, instructional materials and teaching techniques appropriate for secondary choral settings. Also addresses administrative strategies for choral music programs. Offered spring only.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5313
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Recommended:** Prerequisite MUSC 2103.
**Additional Information:** Departmental Category: Music Education

**MUSC 4323 (3) Differentiating Instruction in K-8 Music Classrooms**
Designed to focus on differentiating and individualizing instruction for K-8 music students representing diverse cultural, linguistic, and ability backgrounds. Includes developmental and practical orientations to pedagogical issues including planning, instruction and assessment. Emphasizes evidence-based teaching practices and programmatic interventions that support student learning and engagement in music instruction.
**Requisites:** Requires a prerequisite course of MUSC 2103 (minimum grade D-). Restricted to College of Music (MUSC) majors or graduate students only.
**Grading Basis:** Letter Grade

**MUSC 4325 (2) Keyboard Literature 1**
Surveys keyboard music from 1600 to 1830. Offered fall semester of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 4335 (2) Keyboard Literature 2**
Surveys keyboard music from 1830 to the present. Offered spring semester of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 4336 (2) Brass Pedagogy**
Analyzes pedagogical techniques and philosophies of teaching brass instruments, and examines materials. Offered every other spring terms.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5336
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 4346 (2) Woodwind Pedagogy**
Analyzes pedagogical techniques and philosophies of teaching wind instruments, and examines materials. Offered every other spring term.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5346
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 4405 (2) Basso-Continuo Accompaniment**
Studies the history, theory and practice of Basso-continuo accompaniment. Provides practical instruction in realizing harmony from a given bass line (figured or unfigured), projecting affect and creating dynamics at the harpsichord. Emphasizes individual cognition and creativity.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5405
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 4415 (2) Advanced Basso Continuo**
Explores advanced basso continuo, serving as more in depth study for those who have completed or tested out of Basso-Continuo Accompaniment (MUSC 4405).
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5415
**Requisites:** Prerequisite of MUSC 4405. Restricted to College of Music (MUSCU) undergraduate students.

**MUSC 4443 (3) Teaching Instrumental Music**
Examines instrumental music curricula, instructional materials and teaching techniques appropriate for rehearsal, class, and lesson settings. Also addresses administration strategies for instrumental music programs. Offered spring only.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5443
**Requisites:** Requires prerequisite course of MUSC 2103 (minimum grade C-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 4608 (1) Wellness for Musicians 2**
Develops and further integrates material covered in Wellness for Musicians 1. Deeper exploration of somatic and wide-ranging wellness strategies, including FM Alexander¿s conception of Inhibition and other approaches for proactive self-care and improvement. Consideration of how to integrate methodologies in teaching, pedagogy, and practice. Students will complete several projects related to their specific musical pursuits and interests.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5808
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 2608 (minimum grade C-). Restricted to College of Music undergraduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 4666 (3) Chamber Music Lit WW/Prc**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 4712 (3) Renaissance Music**
Provides a repertory and analysis of polyphonic music, 1400-1600.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5712
**Requisites:** Requires prerequisite courses of MUSC 1802 and MUSC 3802 (all minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4752 (3) Women in Music**
Examines the role of women as creators and performers of Western Music. Explores related issues in musicology, including canon formation, reception history and feminist aesthetics.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5752
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4772 (3) History of Opera**
Examines representative operas from the 17th through the 21st centuries. Emphasizes both cultural and analytical aspects and surveys related musicological literature.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5772
**Requisites:** Requires prerequisite courses of MUSC 1802 and MUSC 3802 or MUSC 3812 (all minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4802 (3) Studies in 20th Century Music**
Offers intensified work in history of music in the 20th century. Topics vary from year to year.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5802
**Requisites:** Requires prerequisite courses of MUSC 1802 and MUSC 3812 (all minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4808 (1-3) Internship in Music Industry**
Provides an opportunity for music majors to gain real world experience in a professional music organization outside of the CU Boulder academic environment and to engage with music industry organizations in the community (for profit or non-profit) while pursuing specific tasks or projects relevant to the student's career goals.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**MUSC 4852 (3) 17th and Early 18th Century Music**
Examines music and writings about music from the Baroque era. Emphasizes cultural and musical analysis and surveys current musicological literature.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5852
**Requisites:** Requires prerequisite courses of MUSC 1802 and MUSC 3802 (all minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4862 (3) African American Music**
Examines the sacred and secular genres of Black American music from folk spirituals to contemporary gospel and hip-hop in their cultural and historical contexts. Examines individual composers and performers in specific historical contexts in order to understand the meanings behind certain Black musical stylistics, sound ideals and aesthetic preferences. Formerly MUSC 2802.
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4872 (3) Late 18th and 19th Century Music**
Studies European and American music from the last developments of the styles through romanticism and its later 19th century reverberations.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5872
**Requisites:** Requires prerequisite courses of MUSC 1802 and MUSC 3812 (all minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4892 (3) Latin American Music**
Explores music of cultures of the Americas south of the United States and in the diaspora, emphasizing the relationships of music and culture in folk, popular and arts styles.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5892
**Requisites:** Requires prerequisite course of MUSC 1802 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.
**Additional Information:** Departmental Category: Musicology

**MUSC 4908 (1-3) Arts Administration Internship**
Engage with music/music business organizations in the community (for profit or non-profit) to pursue specific tasks or projects relevant to the student's career goals. A minimum of 48 hours is required per semester for one credit.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5908
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 4957 (1-4) Senior Thesis**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Theses and Recitals

**MUSC 4958 (2) Community Performances**
Explore the real-world issues of planning and presenting concerts. Learn to program music for all types of audiences, gain confidence speaking about your music and handle the logistics of concert production. Discuss the role of concerts in the 21st century and examine new styles of presentation, audience engagement and outreach. Course culminates in a concert presented in a local venue.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5958
**Requisites:** Requires prerequisite course of MUSC 2918 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 4968 (3) Management and Leadership in the Arts**
Focus on management, leadership, and communication strategies and their application to arts organizations. Concepts and approaches for leaders of small, medium, and large arts organizations in both the for-profit and nonprofit sectors, including human resource management, problem solving, and effective communication will be examined. Students will practice and refine their written communication skills by writing clearly and concisely throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5938
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**MUSC 4978 (3) Introduction to Arts Administration**
Introduce students to current trends in arts administration, explore the fundamentals of managing arts organizations and develop concrete tools for managing boards, volunteers and staff, effective fund raising, strategic planning and program development. Current issues, the role of the arts and arts advocacy will be discussed.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5978
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 4988 (3) The Entrepreneurial Artist**
Learn the core principles of entrepreneurship, such as idea formation, venture models, opportunity assessment, market analysis and strategies for launching a venture and apply them to entrepreneurial ideas. Lectures, projects, entrepreneur interviews and case studies will culminate in a feasibility study for an original entrepreneurial concept.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 5988
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Recommended:** Prerequisite MUSC 2918.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 4997 (1) Senior Recital**
To be completed by the second semester of the senior year.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite class of MUSC 3997 (minimum grade D-). Restricted to College of Music undergraduate students only.
**Additional Information:** Departmental Category: Theses and Recitals

**MUSC 4998 (1) Music Entrepreneurship Certificate Capstone**
Completes the Certificate in Music Entrepreneurship. Students will develop an art-based entrepreneurial concept, engage in customer discovery, refine their business model, create a marketing plan, research relevant intellectual property issues, and complete a business model canvas for their venture.
**Requisites:** Requires prerequisite courses of MUSC 2918, 4988, BUSM 2001 and BUSM 4001 (min. grade D-). Restricted to senior (90-180 credits) College of Music (MUSCU) majors.
**Grading Basis:** Letter Grade

**MUSC 5002 (3) Proseminar in Historical Musicology**
Prepares students to pursue independent research in the history of music. Meeting as a seminar, the course focuses on the nature of evidence, methods and tools of research, and theoretical or historiographic issues.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5011 (2) 16th Century Counterpoint**
Provides a stylistic study of the main contrapuntal genres of the period including free, two- and three-part imitative counterpoint in the style of Palestrina. Provides a foundation in species counterpoint, working towards free counterpoint; stresses composing in 16th century styles. Offered fall of even-numbered years.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4011
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5012 (3) African Music**
Studies music cultures of Africa and the Black Diaspora, including folk and art music traditions, religious and popular music genres. Specific course topics could cover any or all of these styles, including exploring interconnections of musical stylistics of Africa and the Black Diaspora.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4012 and MUEL 4012
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5021 (2) 18th Century Counterpoint**
Provides a stylistic study of main contrapuntal genres of the period including inventions, suite movements and fugues. Provides a foundation in species counterpoint; stresses analysis and composing in the styles. Offered fall terms only.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5026 (2) Percussion Literature**
In-depth investigation of major original solo works for percussion, significant ensemble literature including chamber and large ensembles, and selected transcriptions. Offered fall semester of even numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5036 (2) Brass Literature**
Investigates major original solo works for trumpet, horn, trombone, euphonium, and tuba, and ensemble literature including chamber and large settings. Offered every other spring term.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5041 (3) Advanced Orchestration**
Provides an advanced study of orchestration techniques through score analysis and student projects. Offered spring of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5061 (3) Advanced Tonal Analysis**
Surveys tonal repertory and analytical techniques. Student must have passed general written theory and aural skills preliminary exam or completed remediation before enrolling in course.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5071 (3) Post-tonal Theory and Analysis I**
Focuses on theory and analysis of post-tonal literature pre-1945. Student must have passed general written theory and aural skills preliminary exam or completed remediation before enrolling in course.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5078 (1) Piano Technician for Pianists**
Familiarizes pianists with the development of the modern grand piano, its construction and the proper terminology of parts and specifications. Trains pianists in minor repairs and adjustments of the grand piano action and in minor tuning tasks.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4078
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prerequisite piano majors.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 5081 (3) Applications in Music Technology**
Presents advanced strategies for applying computer technology in music creation. Synthesis, DSP, MIDI and audio sequencing, as well as advanced music engraving, will be explored through the use of various software platforms including Logic, Reason, MAX and Finale. Offered fall term only.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5091 (3) Contemporary Theory - Jazz and Modal Music**
Studies the composition and improvisation of Herbie Hancock, Wayne Shorter, Chick Corea and their contemporaries. Broadly examines modality in jazz and its similarities to music of Ravel and Debussy, as well as systems of organization in Messiaen and others. Strategies for analysis and integration of the material into a personal vocabulary as a composer and improviser are explored. Offered spring of even-numbered years.
**Requisites:** Requires prerequisite course of MUSC 3081 (minimum grade D-). Restricted to College of Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5103 (3) Teaching General Music**
Provides an in-depth examination of teaching and learning processes in the elementary general music classroom, based on the integration of child development and musical development theories with content and delivery skills appropriate for K-5 general music classrooms. Students implement and evaluate music instruction, design curricular projects, and build a repertoire of vocal, instrumental, and speech-based arrangements. Offered fall of odd-numbered years.
**Requisites:** Restricted to Music (MUSD) or Music Education (MMED or MUED) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5112 (3) Proseminar in Ethnomusicology**
Examines the definition, scope, and methods of ethnomusicology, the discipline that focuses on approaches to the study of music theory, history, and performance practices of world cultures.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5121 (3) Advanced Topics in Music Technology**
Conducts advanced research in techniques and tools of music technology. Topics vary from term to term and may include: user interfaces for computer music; advanced sound design; digital modeling of acoustic sounds; computer-aided analysis of sound; modeling music intelligence in real time. Lectures and work sessions will support student projects.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 5081 (minimum grade D-). Restricted to College of Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5136 (2) Advanced Conducting**
Offers advanced work in conducting.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5141 (2) Instrument Design Lab: Sound, Perception & Creativity**
Explore fundamental physical concepts of sound and music in a hands-on laboratory environment. Survey a number of topics through the construction of PVC overtone flutes, an investigation in the timbral intention of Dolly Parton's vocal technique, physical modeling through the testing of 3D-printed vowel flutes, the construction of a "Long String Instrument," and more. Specific topics include: tuning and temperament, harmony and timbre, and preparing the piano (digital and analog).
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4141
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 5142 (3) American Indian Music**
Examines Native North American musical cultures, emphasizing music as an integral part of religious expression and community life.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4142
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5143 (2) Topics in Choral Music Education**
Prepares students to teach, conduct and facilitate music making in various choral ensembles. Examines skills, teaching techniques and administrative procedures necessary for developing and maintaining various choirs at the elementary through high school levels. Includes discussion of current topics in choral music education and community choral field experiences. Offered fall terms, every two years.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4143
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5151 (3) Topics in Music Analysis**
Analytical study of a specific topic to be determined by the instructor (e.g., German Lieder, Bartok quartets, tonal rhythm, Schenker, etc). Study published analyses representing a variety of methodologies and produce original analyses. Student must have passed graduate preliminary exams or completed remediation before enrolling in this course.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prerequisite MUSC 5061 or MUSC 5071 as appropriate to the topic, or instructor consent required.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5153 (1) Advanced Topics in K-12 Music Pedagogy**
Examines the literature, skills, and pedagogical applications of selected topics applicable to all K-12 Music Educators such as curriculum, music listening, and composition.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Music Education (MMED-MMUE) students only.
**Grading Basis:** Letter Grade

**MUSC 5156 (2) Symposium in Choral Music**
Provides an advanced study of choral repertoire by style period. Required of all choral graduate students for a minimum of two semesters.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5163 (1) Advanced Topics in Secondary Choral Music Education Pedagogy**
Examines the literature, skills, and pedagogical applications of selected topics in choral music classrooms, such as adolescent vocal development, vocal jazz ensemble directing, and development of piano skills.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 5168 (3) World Music Theories**
Examines music rules, concepts or music theories and sociocultural elements that musicians use in creating musical sound, with emphasis on music practices from a variety of world traditions; observing shared and diverging principles, making cross-cultural comparisons and developing a new pedagogy that supports the substantive study of global musics.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4168
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 5173 (1) Advanced Instrumental Techniques and Pedagogy**
Reviews and expands knowledge of brass, woodwind, percussion, or string instrumental techniques and pedagogical tools, extending upon skills gained in a typical introductory class teachers complete prior to licensure. Students complete a project based on synthesizing new pedagogical resources and materials. Intended for music educators who teach in K-12 school settings.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Music Education (MMED-MMUE) students only.
**Grading Basis:** Letter Grade

**MUSC 5176 (2) Conducting 3**
This is a study in advanced conducting techniques. Demonstration of advanced score study techniques as well as the application to gesture and rehearsal techniques linked with conducting will be explored. Participation fully in discussion readings and contribute to the learning of all is expected.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4176
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Music Education (MMED) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 5183 (2) Research in Music Teaching**
Introduces basic descriptive, experimental, and qualitative research methods, including sampling, design, data collection, and analysis. Students review published music research and conduct one original research study. Offered fall of odd-numbered years.
**Requisites:** Restricted to Music (MUSD) or Music Education (MMED or MUED) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5203 (2) Topics in Music Education**
Provides an in-depth examination of contemporary topics in music education. Students implement and design relevant projects.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5215 (1-2) Studies in Piano Teaching**
Studies the practical aspects and techniques for teaching piano at the intermediate and advanced levels in pre-college and college settings, as well as teaching group piano at the college level.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prereqsuisites: MUSC 5305 and MUSC 5315.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5246 (3) Jazz Improvisation and Analysis**
Application of performance skills for the advanced improviser through specific harmonic, melodic and rhythmic techniques. Also includes analysis of transcriptions and varied harmonic contexts as well as a focus on the development of repertoire. Offered fall semester of odd-numbered years. Requires prerequisite course or instructor consent.
**Requisites:** Requires prerequisite course of MUSC 3071 (minimum grade D-). Restricted to Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5256 (3) Jazz Studies Administration and Pedagogy**
Surveys approaches, techniques, philosophies and materials available for teaching jazz at both pre-college and collegiate level. Subject areas covered include improvisation, composition and arranging, studio teaching and directing ensembles. Studies the organization and administration of collegiate jazz programs. Topic include curriculum, program philosophy, teaching techniques, funding, teacher training and evaluation. Offered fall terms of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prerequisite MUSC 3253.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5273 (2) Comprehensive String Pedagogy**
Comparative study and application of the principles of string teaching. In-depth analysis of individual instrument pedagogy and application to advanced studio and class teaching. Historical survey of major violin, viola, cello, and double bass pedagogues. Includes apprenticeship teaching. Offered fall of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5285 (3) Organ Survey**
Survey of organ repertoire and the history of organ building from the 16th century to the present.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4285
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5305 (2) Piano Pedagogy Group Techniques**
Discusses materials and techniques for teaching beginning piano students of various ages in studio and class settings. Special attention given to adult classes. Includes an introduction to educational technology used in group instruction. Offered fall of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5313 (3) Teaching Choral Music**
Examines choral music curricula, instructional materials and teaching techniques appropriate for secondary choral settings. Also addresses administrative strategies for choral music programs. Offered spring only.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4313
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5315 (2) Piano Pedagogy: Intermediate Literature**
Surveys repertoire at the intermediate level and discusses teaching techniques. Explores issues related to intermediate and advanced piano performance, such as performance anxiety, physical and psychological well-being of the performer, and the development of technique. Introduces educational technology relevant to intermediate teaching. Offered spring of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5325 (2) Keyboard Literature 1**
Examines areas of style, genre, and performance practice in selected keyboard music from 1600 to 1830. Emphasizes student presentation of specific topic areas. Offered fall terms of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5335 (2) Keyboard Literature 2**
Examines areas of style, genre, and performance practice in selected areas of keyboard music from 1830 to the present. Emphasizes student presentation of specific topic areas. Offered spring terms of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5336 (2) Brass Pedagogy**
Analyzes pedagogical techniques and philosophies of teaching brass instruments, and examines materials. Offered every other spring terms.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4336
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5345 (2) Research: Piano Literature and Pedagogy**
Looks at individual or group research related to piano pedagogy or literature for piano.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5346 (2) Woodwind Pedagogy**
Provides the knowledge and skills to teach woodwind instruments in both individual studio and collegiate class settings. Considers pedagogical techniques for all levels of instruction. Offered fall terms of odd-numbered years.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4346
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5356 (2) Jazz Studies Practicum**
Implements independent, project-based studies for further developing knowledge and experience in jazz pedagogy, performance and composition. Student is assessed and guided by faculty to develop specific skills needed toward becoming a more effective jazz educator. Offered spring of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prerequisite MUSC 5256.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5365 (2) Advanced Accompanying**
An in-depth study of collaborative repertoire in individually assigned projects, coached by collaborative piano faculty and others.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5375 (2) Opera Coaching for Pianists**
Teaches skills for opera coaches and rehearsal pianists.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5405 (2) Basso-Continuo Accompaniment**
Studies the history, theory and practice of Basso-continuo accompaniment. Provides practical instruction in realizing harmony from a given bass line (figured or unfigured), projecting affect and creating dynamics at the harpsichord. Emphasizes individual cognition and creativity.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4405
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5415 (2) Advanced Basso Continuo**
Explores advanced basso continuo, serving as more in depth study for those who have completed or tested out of Basso-Continuo Accompaniment (MUSC 5405).
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4415
**Requisites:** Prerequisite: MUSC 5405 - Basso-Continuo Accompaniment and restricted to graduate students only.

**MUSC 5425 (2) Collaborative Literature for Piano with Winds, Brass, and Percussion**
Study of all forms of wind, brass and percussion repertoire involving collaboration with piano including sonatas, duos, short pieces and concerti. Collaborative piano major or instructor consent required. Offered fall terms of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5435 (2) Collaborative Literature for Piano with Strings**
Study of all forms string repertoire involving collaboration with piano including sonatas, duos, short pieces and concerti. Collaborative piano major or instructor consent required. Offered spring terms of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 5443 (3) Teaching Instrumental Music**
Examines instrumental music curricula, instructional materials and teaching techniques appropriate for rehearsal, class, and lesson settings. Also addresses administration strategies for instrumental music programs. Offered spring only.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4443
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5444 (2) Vocal Pedagogy**
In depth study of the physiology, acoustics, and health aspects of the singing voice. Recommended for all graduate students in voice.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 5446 (1) Supervised Teaching Practicum**
Designed to provide supervised teaching experience that includes feedback on weekly teaching; weekly and longer-term planning; and reflection on the impact of teacher characteristics and actions on student development.
**Repeatable:** Repeatable for up to 5.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 5273 (minimum grade D-). Restricted to College of Music (MUSC) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 5454 (2) Repertory for Young Voices**
Survey of the solo repertoire for young voices, the physiological aspects of mutational voices, techniques of vocalizing young voices, and class voice procedure.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 5464 (2) Voice Literature I: French Song Literature and Oratorio/ Concert Solo Literature**
Explores the vocal literature of French Art Song and Oratorio/Concert Solo Literature in a graduate-level survey course taught in two modules.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Voice

**MUSC 5484 (2) Graduate Seminar in Vocal Pedagogy**
A thorough investigation of the challenges of studio voice pedagogy, including corrective techniques, psychological philosophies, and video analysis of student teaching. Examination and evaluation of comparative methodologies of vocal technique.
**Requisites:** Requires prerequisite course of MUSC 5444 (minimum grade D-). Restricted to College of Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 5564 (2) Voice Literature II: German, British & American Song Literature**
Explores the rich variety of German, British and American Song Literature from the late Middle Ages to the present in a graduate-level survey course taught in two modules.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Voice

**MUSC 5583 (2) Inclusive Music Classroom**
Surveys strategies necessary for teaching music to all students, including those with special needs. Offered fall of even-numbered years.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4583
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 5608 (1) Wellness for Musicians 1**
Explores strategies that help musicians maintain health while achieving peak performance. Investigate and employ powerful somatic methodologies including Alexander Technique and Body Mapping that improve physical functioning and prevent injury. Incorporates a variety of wellness aspects such as performance psychology, mental health, effective exercise, nutrition, breathing, hearing and vocal health.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 5642 (3) Jazz History and Literature**
Studies musical trends and cultural forces influencing jazz, with analysis of improvisational styles, melodic and motivic variations, transcriptions and orchestrations from significant periods in its history. Offered spring terms only.
**Requisites:** Requires prerequisite course of MUSC 3642 (minimum grade D-). Restricted to College of Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5666 (2) Chamber Music Literature: Woodwinds**
Provides a stylistic-historical survey in various genres from Baroque era to present. Offered fall terms of even numbered years.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 5708 (2) Introduction to Music Bibliography and Research**
Explores basic informational sources about music and musicians; a study of citation formats, research methodologies and writing techniques employed in music research papers, theses and dissertations. Intended to increase students' information fluency. Required in all master's degree programs.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 5712 (3) Renaissance Music**
Provides a repertory and analysis of polyphonic music, 1400-1600.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4712
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5742 (3) Performance Practice of Early Music**
Examines instrumental and vocal performance practices through the 18th century. Topics may vary from year to year.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5752 (3) Women in Music**
Examines the role of women as creators and performers of Western Music. Explores related issues in musicology, including canon formation, reception history and feminist aesthetics.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4752
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5762 (3-4) History of Choral Literature**
Provides a seminar in analysis of musical style and history of choral repertory . Those wishing review of literature and repertory may enroll for 4 credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5772 (3) History of Opera**
Examines representative operas from the 17th through the 21st centuries. Emphasizes both cultural and analytical aspects and surveys related musicological literature.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4772
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5802 (3) Studies in 20th Century Music**
Offers intensified work in history of music in the 20th century. Topics vary from year to year.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4802
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5808 (1) Wellness for Musicians 2**
Develops and further integrates material covered in Wellness for Musicians 1. Deeper exploration of somatic and wide-ranging wellness strategies, including FM Alexander¿s conception of Inhibition and other approaches for proactive self-care and improvement. Consideration of how to integrate methodologies in teaching, pedagogy, and practice. Students will complete several projects related to their specific musical pursuits and interests.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4608
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Requires prerequisite course of MUSC 5608 (minimum grade C-). Restricted to College of Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 5822 (3) Ancient and Medieval Music**
Surveys sources from the ancient Greeks to the early Christian era and music from the 8th to the 14th century.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5832 (3) Studies in American Music**
Offers intensified work in folk, popular, and art music of the United States.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5842 (3) Aesthetics of Music**
Surveys various philosophies of music in writings of philosophers, psychologists, sociologists, composers, critics and historians.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5852 (3) 17th and Early 18th Century Music**
Examines music and writings about music from the Baroque era. Emphasizes cultural and musical analysis and surveys current musicological literature.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4852
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5872 (3) Late 18th and 19th Century Music**
Studies European and American music from the last developments of the styles through romanticism and its later 19th century reverberations.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4872
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Recommended:** Prerequisite or corequisite MUSC 3812.
**Additional Information:** Departmental Category: Musicology

**MUSC 5882 (3) Studies in 18th and 19th Century Music**
Meets as a seminar and examines selected topics in Classic and Romantic music, 1750-1900. Topics vary from year to year.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5892 (3) Latin American Music**
Explores music of cultures of the Americas south of the United States and in the diaspora, emphasizing the relationships of music and culture in folk, popular and arts styles.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4892
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 5908 (1-3) Arts Administration Internship**
Engage with music/music business organizations in the community (for profit or non-profit) to pursue specific tasks or projects relevant to the student's career goals. A minimum of 48 hours is required per semester for one credit.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4908
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 5918 (2) Graduate Career Seminar**
Equips graduate music students with the tools and skills required to pursue a professional career in music. Topics include (but are not limited to) professional materials (resumes, CVs, websites), networking/social media, grant writing/fundraising, exploring career options, and copyrights/other legal issues.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 5938 (3) Management and Leadership in the Arts**
Focus on management, leadership, and communication strategies and their application to arts organizations. Concepts and approaches for leaders of small, medium, and large arts organizations in both the for-profit and nonprofit sectors, including human resource management, problem solving, and effective communication will be examined. Students will practice and refine their written communication skills by writing clearly and concisely throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4968
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 5948 (3) Sustainable Arts Organizations: Forecasting and Fundraising**
Equips students to create comprehensive fundraising plans rooted in strategic business planning for arts organizations, which depend on contributed income for sustainability. Students will learn the basics of planning, budgeting and forecasting, along with proven, effective fundraising strategies and techniques. Includes cased studies and guest speakers with extensive professional expertise in the field.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 5958 (2) Community Performances**
Explore the real-world issues of planning and presenting concerts. Learn to program music for all types of audiences, gain confidence speaking about your music and handle the logistics of concert production. Discuss the role of concerts in the 21st century and examine new styles of presentation, audience engagement and outreach. Course culminates in a concert presented in a local venue.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4958
**Requisites:** Requires prerequisite course of MUSC 5918 (minimum grade D-). Restricted to College of Music (MUSC) graduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 5978 (3) Introduction to Arts Administration**
Introduce students to current trends in arts administration, explore the fundamentals of managing arts organizations and develop concrete tools for managing boards, volunteers and staff, effective fund raising, strategic planning and program development. Current issues, the role of the arts and arts advocacy will be discussed.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4978
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 5988 (3) The Entrepreneurial Artist**
Learn the core principles of entrepreneurship, such as idea formation, venture models, opportunity assessment, market analysis and strategies for launching a venture and apply them to entrepreneurial ideas. Lectures, projects, entrepreneur interviews and case studies will culminate in a feasibility study for an original entrepreneurial concept.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4988
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prerequisite MUSC 5918.
**Additional Information:** Departmental Category: Music Entrepreneurship

**MUSC 6041 (3) Advanced Orchestration**
Provides an advanced study of orchestration techniques through score analysis and student projects. Offered spring of even-numbered years.
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 6051 (3) Pedagogy of Music Theory**
Explores methods, materials, practical techniques for teaching undergraduate music theory, aural skills and analysis. Student must have passed general written theory and aural skills preliminary exam or completed remediation before enrolling in course. Offered spring of odd-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 6113 (2) Foundations of Music Education**
Surveys historical and philosophical bases of contemporary music education. Offered fall of even-numbered years.
**Requisites:** Restricted to Music (MUSD) or Music Education (MMED or MUED) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 6133 (2) Comprehensive Musicianship through Performance**
Explores curricular models for music education. Emphasizes comprehensive musicianship and standards-based frameworks for curriculum and development. Offered spring terms of even-numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 6193 (1-3) Selected Studies in Music Education**
Instructor consent required.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to Music (MUSD) or Music Education (MMED-MMUE) students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 6203 (2) Psychology of Music Learning**
Provides an overview of psychological concepts relevant to music teaching and learning. Topics include learning theories, selected individual difference variables (motivation, anxiety, creativity, and personality), physiological structures related to hearing, psychoacoustics, and approaches to examining musical ability (e.g. brain research, music aptitude, and skill acquisition). Offered spring terms only.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 6213 (2) Assessment of Music Learning**
Provides an overview of traditional and contemporary approaches to music assessment. Topics include psychometrics, standardized tests, test construction, grade reports, and student portfolios. Offered on a rotating basis during summer session.
**Requisites:** Restricted to Music Education (MMED-MMUE) graduate students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 6223 (2) Sociology of Music Education**
Studies sociological perspectives related to music education. Topics include functions and uses of music; teacher and student role/identity development; social aspects of music performance, and cultural perspectives on music learning. Offered fall of even-numbered years.
**Requisites:** Restricted to Music (MUSD) or Music Education (MMED or MUED) graduate students only.
**Recommended:** Prerequisite MUSC 6113.
**Additional Information:** Departmental Category: Music Education

**MUSC 6233 (2) Pedagogy of Music Teaching and Learning**
Explores four topics (reflective/critical thinking, teacher effectiveness, cultural/program contexts, teachers' lives/career development) relevant to long-term teacher development. Includes individualized feedback on teaching. Open to graduate students in music education and performance-pedagogy. Offered spring terms of odd numbered years.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prerequisite MUSC 6113 and/or significant teaching experience.
**Additional Information:** Departmental Category: Music Education

**MUSC 6243 (1) Applications of Music Pedagogy**
Provides a structured, collaborative environment for graduate students with K-12 teaching duties to apply the content from music education courses to their current pedagogical environments. Students will apply inquiry strategies as they design and implement an applied project that synthesizes specific theoretical or conceptual areas. Offered fall term only.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to Music Education (MMED-MMUE) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Music Education

**MUSC 6325 (2) Seminar in Piano Literature**
Provides an intensive study of a selected area of repertoire or history. Offered fall terms only.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Keyboard

**MUSC 6343 (1) Capstone Portfolio Project**
Designed as the capstone course for students enrolled in the Summer MME degree program. Students are guided in their composition of three summative essays involving reflection on connections between two or more courses, comparisons between their entrance essays and current thinking, and identification of pedagogical impacts on their K-12 teaching.
**Requisites:** Restricted to Music Education (MMED-MMUE) graduate students only.
**Grading Basis:** Letter Grade

**MUSC 6801 (3) Advanced Topics in Music Theory**
Intensive study of a specialized topics in theory and analysis through critical reading and analysis, class presentations and independent research. Student must have passed graduate preliminary exams and completed 6 credits hours of graduate-level theory before enrolling in course. Instructor determined prerequisite will be enforced as appropriate to the topic.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of MUSC 5708 (minimum grade D-). Restricted to Music (MUAD, MUED or MUSD) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 6822 (3) Advanced Studies in Musicology**
Intensive study of a specialized topic in musicology. Students will be guided in critical reading, historical or ethnographic issues, analysis, oral presentations, and independent research.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of MUSC 5708 (minimum grade D-). Restricted to Music (MUAD, MUED or MUSD) graduate students only.
**Additional Information:** Departmental Category: Musicology

**MUSC 7046 (3) Seminar in Jazz Literature**
Provides advanced study in jazz literature and styles. Students present results of research on individually chosen topics or aspects of a topic central to the class. Requires class presentations and a major paper or project. Offered spring semester only.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.
**Recommended:** Prerequisites MUSC 5091 and MUSC 5642.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**MUSC 7103 (3) Historical Research in Music Education**
Topics include oral history, archival collections, data verification, and critiquing/publishing research. Students conduct one original research study. Offered spring of even-numbered years.
**Requisites:** Restricted to Music Education (MMED-MMUE) doctoral students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 7113 (3) Quantitative Research in Music Education**
Topics include sampling, questionnaire development, research design, intermediate and advanced statistics, presenting/publishing research, and research ethics. Students conduct an original research study. Offered fall of even-numbered years.
**Requisites:** Restricted to Music Education (MMED-MMUE) students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 7138 (3) Contemporary Issues in College Teaching**
Examines music teaching within colleges and universities, including the evolution of university music programs, undergraduate and graduate music curricula, music professors and their work, and sociopolitical issues. Offered spring of odd-numbered terms.
**Requisites:** Restricted to College of Music (MUED or MUSD) graduate students only.
**Additional Information:** Departmental Category: Interdepartmental Courses

**MUSC 7143 (3) Qualitative Research in Music Education**
Topics include qualitative research traditions, site and participant selection, data collection and analysis methods, quality standards, and research ethics. Students conduct an original research study. Offered fall of odd-numbered years.
**Requisites:** Restricted to MUED students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 7203 (3) Doctoral Seminar in Music Education**
Provides an advanced study of topics central to the music education profession. Requires class presentations and a major paper or project. Offered fall of even-numbered years.
**Requisites:** Restricted to MUED students only.
**Additional Information:** Departmental Category: Music Education

**MUSC 7801 (3) Doctoral Seminar in Music Theory**
Provides advanced study in theory. Students present results of research on individually chosen topics or aspects of a topic central to the class. Requires a major paper or project. Student must have passed graduate preliminary exams and completed 6 credits hours of graduate-level theory before enrolling in course. Instructor determined prerequisite will be enforced as appropriate to the topic.
**Requisites:** Requires a prerequisite course of MUSC 5708 (minimum grade D-). Restricted to College of Music (MUED or MUSD) graduate students only.
**Additional Information:** Departmental Category: Theory and Composition

**MUSC 7822 (3) Seminar in Musicology**
Required of all musicology majors before completion of comprehensive examinations. A different research area is designated each semester. Offered fall only.
**Repeatable:** Repeatable for up to 30.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Music (MUAD or MUSD) graduate students only.
**Additional Information:** Departmental Category: Musicology

# Music Electives (MUEL)

## Courses

**MUEL 1081 (3) Basic Music Theory**
Introduction to music notation, meter and rhythm, scales, intervals, triads, seventh chords, fundamentals of harmonic progression, voice leading, aural skills and composition. For nonmusic majors who have little or no previous background in the subject.
**Requisites:** College of Music (MUSC) majors are excluded from this course.

**MUEL 1115 (1) Piano Class 1**
Introduces the keyboard and music reading for nonmusic majors with no prior keyboard experience. Studies very easy classical and pop repertoire. No prior keyboard experience or instructor consent required.
**Requisites:** College of Music (MUSC) majors are excluded from this course.

**MUEL 1125 (1) Piano Class II**
Continuation of MUEL 1115. Focuses on development of music reading. Studies technical patterns, easy classical and pop repertoire, and improvisation.
**Requisites:** Requires prerequisite course of MUEL 1115 (minimum grade D-). College of Music (MUSCU) majors are excluded from this course.

**MUEL 1145 (2) Guitar Class**
A systematic study of the beginning literature and technique of the classical guitar with an emphasis on reading music. Designed for nonmusic majors with no prior musical experience.
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** College of Music (MUSC) majors are excluded from this course.

**MUEL 1155 (2) Intermediate Guitar**
Studies the intermediate literature and technique of the classical and popular guitar. Emphasis on reading standard notation and chord charts. Designed for non- music majors.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of MUEL 1145 (minimum grade D-). College of Music (MUSCU) majors are excluded from this course.

**MUEL 1184 (1) Voice Class**
Involves basic vocal technique and easy solo repertoire taught through a group medium, for beginner and intermediate level students. May be repeated upto 6 total credit hours.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** College of Music (MUSC) majors are excluded from this course.
**Recommended:** Requisite ability to read music.

**MUEL 1416 (2) Introduction to Hand Percussion**
Studies the literature and technique of hand percussion. Emphasizes African and Latin percussion techniques. Designed for non-music majors.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** College of Music (MUSC) majors are excluded from this course.

**MUEL 1832 (3) Appreciation of Music**
Introduces music, including the fundamental elements of music, the history of the Western tradition and its composers, the development of American popular music and aspects of World Music.
**Requisites:** College of Music (MUSC) majors are excluded from this course.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**MUEL 2031 (3) Making Electronic Music**
Explores the history, scope, and creation of electronic music. Combining scholarly and creative assignments, students will analyze art and popular electronic music genres as well as compose their own works. In the process, they will gain an analytical vocabulary, knowledge of key historical figures, competency with production techniques and tools, and experience thinking and writing critically about music more generally. No previous music experience is assumed or required.
**Requisites:** College of Music (MUSC) majors are excluded from this course.
**Grading Basis:** Letter Grade

**MUEL 2051 (3) Introduction to Songwriting Techniques**
Introduce students to the art and craft of songwriting through (1) the analysis of great songs past and present (2) creative work (3) experimentation (4) collaboration (5) performance and possibly recording. We will examine form, melody, harmony, rhythm, lyric writing (i.e. points of view, logic, use of literary device, etc.), solo and collaborative ensemble performance, style and poise.
**Requisites:** College of Music (MUSC) majors are excluded from this course.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**MUEL 2061 (3) Introduction to Music Technology**
Surveys the various tools and techniques in the field of music technology. Topics include an introduction to basic synthesis, digital signal processing, MIDI and audio sequencing, music notation and a historical perspective on electronic music.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 2061
**Requisites:** College of Music (MUSC) majors are excluded from this course.

**MUEL 2071 (2) Intro to Audio Recording**
Introduces and explores basic concepts in audio recording from microphones to digital audio workstations. Also focuses on development of critical listening skills.
**Requisites:** College of Music (MUSC) majors are excluded from taking this course.

**MUEL 2081 (2) Prepared for the Soundcheck**
Provides an overview of the recording process from the performer's perspective from soundcheck through final mastering. Uses recorded material from in-class sessions. Examines differing approaches to recording as well as current technologies. Specifically designed for non-music majors.
**Requisites:** College of Music (MUSC) majors are excluded from taking this course.

**MUEL 2091 (2) Intro to Audio Recording**
Introduces and explores basic concepts in audio recording from microphones to digital audio workstations. Also focuses on development of critical listening skills.
**Requisites:** College of Music (MUSC) majors are excluded from this course.

**MUEL 2184 (1) Voice Class**
Continuation of MUEL 1184, with more advanced repertoire and vocal techniques.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of MUEL 1184 (minimum grade D-). College of Music (MUSCU) majors are excluded from this course.

**MUEL 2742 (3) Wild West Soundscapes**
Explores major historical theories of the American West in relationship to music from 1800 to the present. The musical traditions of marginalized groups are used as a variegated lens to explore Western U.S. history. The class may explore a wide range of musical genres and styles from chant to hymns to folk to rock to opera to the Hollywood soundtrack.
**Requisites:** College of Music (MUSC) majors are excluded from taking this course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**MUEL 2752 (3) Music in American Culture**
Explores the role of music as a powerful cultural agent from the Colonial Period to the present. Focuses on influences from normative and marginalized musicians throughout American history. A wide range of musical styles and genres are studied to demonstrate themes of appropriation, appreciation, and syncretism. Teaches students to think critically about the relationships between culture, power, and identity.
**Requisites:** College of Music (MUSC) majors are excluded from this course.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**MUEL 2762 (3) Topics in Music and Drama**
Explores techniques used in combining music and dramatic arts, exploring a range of examples from musical and dramatic literature of the West or other world regions from circa 1000 to present. Specific course topics could cover any or all of these styles. Offered spring only.
**Requisites:** College of Music (MUSC) majors are excluded from this course.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts

**MUEL 2772 (3) World Musics: Asia and Oceania**
Highlight music in Asia and Oceania using current ethnomusicological materials.
**Requisites:** College of Music (MUSC) majors are excluded from this course.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**MUEL 2782 (3) World Music: Africa, Europe, and the Americas**
Highlights music in Africa, Europe and the Americas using current ethnomusicological materials.
**Requisites:** College of Music (MUSC) majors are excluded from this course.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**MUEL 2832 (3) Musical Mavericks: Misfits and Geniuses**
Discover a range of avant-garde composers from the 20th and 21st centuries that challenged the essence of how music is made, the way music is heard, and the way art defines our current culture. Investigate a great body of music that pushes boundaries, redefines genres, and pioneers new directions in music. Explore ten composers who changed the musical landscape.
**Requisites:** College of Music (MUSC) majors are excluded from this course.
**Grading Basis:** Letter Grade

**MUEL 2842 (3) American Musical Theatre**
Provides an overview of the role of musical theatre in U.S. culture, emphasizing the 20th century Broadway musical.
**Requisites:** College of Music (MUSC) majors are excluded from this course.

**MUEL 2852 (3) Music in the Rock Era**
Examines Rock music and its subgenres, primarily as a fusion of African-American and European-American musical styles. Considers precursors to Rock style (e.g. Blues, Folk) and their contributions. Traces the development of Rock as an art form as well as its cultural significance and saturation from the 1960s to the end of the 20th century. Offered fall and spring semesters.
**Requisites:** College of Music (MUSC) majors are excluded from this course.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**MUEL 2862 (3) American Film Musical**
Examines the development of filmed musicals from the beginning of sound movies through the Golden Age of Musicals. Emphasizes analysis and relationships of characters, songs, and incidental music.
**Requisites:** College of Music (MUSC) majors are excluded from this course.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**MUEL 2872 (3) Heavy Metal**
Explores, discuss, debate and develop deeper understanding of Heavy Metal. Included are study of musical style characteristics and lyrical content, innovative performers, unifying elements of Heavy Metal culture and the diversity within it, and its role in the larger Rock and societal contexts. Issues of gender, religion, and sexuality in the Heavy Metal construct are also discussed.
**Requisites:** College of Music (MUSC) majors are excluded from this course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**MUEL 3051 (2) Basic Composition**
Introduces the processes, materials, and forms of composition through the writing and performance of short musical works. Open to any student who already has rudimentary musical knowledge.
**Requisites:** College of Music (MUSC) majors are excluded from this course.

**MUEL 3642 (3) History of Jazz**
Surveys the distinctly American art form of jazz music from its origins to the present, including the various traditions, practices, historical events and people most important to its evolution. Offered fall and spring.
**Requisites:** College of Music (MUSC) majors are excluded from this course.

**MUEL 3772 (3) West African Music and Culture in Ghana**
Provides hands-on and experiential enrichment for students to interact at several levels with a local community in Ghana. Classroom lectures will be combined with direct participation in drumming and dancing, field trips to participate in festivals and court ceremonies, field trips to kente weaving village, adinkra cloth making, wood carving villages, and museums.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 3772
**Requisites:** Requires prerequisite courses of MUSC 2782 and MUEL 2772 (all minimum grade D-). Restricted to students with 27-56 credits (Sophomore) non-College of Music majors only.

**MUEL 3822 (3) Words and Music**
Explores the interaction between words and music in song. Students will consider how such features as rhyme, rhythm, tone, and the connotations of particular words contribute to meaning in poetry; how rhythm, tempo, dynamics, mood, and instrumentation contribute to meaning in music; and how words and music coalesce in song to make a new meaning.
**Requisites:** College of Music (MUSC) majors are excluded from this course.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**MUEL 3832 (3) Music in Literature**
Addresses literature that seeks either to explore the meaning of music or to make music out of words. Students will consider how musical concepts and techniques can be incorporated into poetry and prose, and will analyze the roles that writers have attributed to music in society, politics, and the life of the individual.
**Requisites:** College of Music (MUSC) majors are excluded from this course.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities

**MUEL 3862 (3) Music and Global Health**
Explores the ways in which music relates to health in different cultures including: Western art and popular music; ritual healings in Africa, Asia and Native and South America peoples; in relation to contemporary global health challenges.
**Requisites:** College of Music (MUSC) majors are excluded from this course.

**MUEL 3872 (3) Music in the Rock Era: Special Topics in Heavy Metal**
Explore, discuss, debate and develop deeper understanding of Heavy metal. Included are study of musical style characteristics and lyrical content, innovative performers, unifying elements of Heavy Metal culture and the diversity within it, and its role in the larger Rock and societal contexts. Issues of gender, religion, and sexuality in the Heavy Metal construct area also discussed.
**Requisites:** College of Music (MUSC) majors are excluded from this course.

**MUEL 3882 (3) Music and Violence**
Explores the role of music in generating, sustaining and contesting acts of violence. Focuses on conflicts occurring throughout the globe during the late 20th and early 21st centuries, with case studies that treat terrorism, warfare, revolution, street violence, domestic abuse, reconciliation and peace. Helps students to build an understanding of music's motivational powers and the nature of violence, as well as the role of expressive culture in mediating social conflict more generally.
**Requisites:** College of Music (MUSC) majors are excluded from this course.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences

**MUEL 3892 (3) Music and Space**
Explores the ways that outer space inspires and is portrayed in musical sound. Introduces literature and media from historical musicology, ethnomusicology, music theory, anthropology, physics, geography and planetary science, with case studies ranging from Ancient Greece, to classic and modern Western art music, to contemporary popular music.
**Requisites:** College of Music (MUSC) majors are excluded from this course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**MUEL 4012 (3) African Music**
Studies music cultures of Africa and the Black Diaspora, including folk and art music traditions, religious and popular music genres. Specific course topics could cover any or all of these styles, including exploring interconnections of musical stylistics of Africa and the Black Diaspora.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 4012 and MUSC 5012
**Requisites:** College of Music (MUSC) majors are excluded from this course.

**MUEL 4111 (2) Composing at the Computer**
Discover strategies and techniques for generating and manipulating sound at the computer. Student projects will include compositions, soundscapes, ambient environments and soundtracks for multimedia. Available to students without prior experience with computer music or composition.
**Requisites:** Requires prerequisite course of MUEL 2061 (minimum grade D-). College of Music (MUSC) majors are excluded from taking this course.
**Grading Basis:** Letter Grade

**MUEL 4121 (3) Topics in Music Technology**
Exploration of issues, techniques and tools of music technology. Topics vary from term to term and may include: interactive system for performance, teaching and learning; computer music instrument design; digital synthesis and signal processing; music in intermedia; sound design and analysis. Lectures and work sessions will support student projects.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of MUEL 2061 (minimum grade D-). College of Music (MUSC) majors are excluded from this course.

# Music Ensemble (EMUS)

## Courses

**EMUS 1017 (1) Campus Band**
Provides high-level performance opportunities to CU students (both music majors and non-majors) through the study of quality band repertoire while improving large ensemble and individual musical skills. The art of music-making requires continuous critical analysis of one¿s sound and how that sound is interacting with the whole of the ensemble. The study of historical and cultural context will be provided resulting in a vivid re-creation of each piece positively affecting an audience.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Grading Basis:** Letter Grade

**EMUS 1207 (1) Festival Chorus**
Prepares a roughly 100-member, auditioned mixed voice choir of music majors, non-majors, and community members to perform choral repertory of the highest standards in public settings. Designed to perform with the CU Symphony Orchestra, CU Wind Symphony, Boulder Philharmonic, and CU Holiday Festival. Music is selected from all historical style periods with the focus on choral masterworks with instrumental forces.
**Equivalent - Duplicate Degree Credit Not Granted:** MUSC 3207
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomores).
**Grading Basis:** Letter Grade

**EMUS 1217 (1) Chamber Singers**
CU's premiere choral ensemble, The CU Chamber Singers, is comprised of auditioned graduate and undergraduate singers. Chamber Singers has been cited with critical acclaim for its performances and sings classically based literature from all cultures and style periods. Members are selected by audition at the beginning of each academic year.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 3127 or 5217
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.

**EMUS 1227 (1) University Choir**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.

**EMUS 1237 (1) Treble Chorus**
This collaborative ensemble is devoted to the study and performance of wide-ranging voice-specific repertoire. This choir performs on campus and in the Boulder-area two to four times per semester. Audition required.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.

**EMUS 1247 (1) Men's Chorus**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.

**EMUS 1257 (1) Collegiate Chorale**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.

**EMUS 1277 (1) Court Players**
**Repeatable:** Repeatable for up to 12.00 total credit hours.

**EMUS 1287 (1) Marching Band**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.

**EMUS 1297 (1) Wind Symphony**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.

**EMUS 1307 (1) Symphonic Band**
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 3307
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**EMUS 1317 (1) Concert Band**
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 3317
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**EMUS 1327 (1) Symphony Orchestra**
2.0 hours offered CE Aspen Music School only.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.

**EMUS 1337 (1) Chamber Orchestra**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.

**EMUS 1347 (1) Bell Ensemble**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.

**EMUS 1367 (1) Early Music Ensemble**
CU¿S Early Music Ensemble is comprised of auditioned graduate and undergraduate instrumentalists and singers interested in exploring Baroque repertoire with an emphasis on historically informed performance practice. Repertoire ranges from small groups (duos and trios) to larger scale orchestral and vocal works, as well as concertos. Members are selected during two audition cycles: one at the beginning of the Fall semester, and the other mid-way through the Fall semester for the Spring semester. Auditions will also be held mid-way through the Spring semester for returning students. Using a Baroque bow or available Baroque instrument is possible by permission.  Contact the instructor early if you are interested in borrowing one of these items.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) College of Music (MUSC) majors only.

**EMUS 1377 (1) Chamber Music-Brass**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) College of Music (MUSC) majors only.

**EMUS 1387 (1) Chamber Music-Strings**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) College of Music (MUSC) majors only.

**EMUS 1397 (1) Chamber Music Piano Duo**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) College of Music (MUSC) majors only.

**EMUS 1407 (1) Chamber Music-Woodwinds**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) College of Music (MUSC) majors only.

**EMUS 1417 (1) Percussion Ensemble**
Percussion Ensemble is devoted to the study and performance of wide-ranging percussion-specific repertoire. Audition required.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) College of Music (MUSC) majors only.

**EMUS 1427 (1) Jazz Ensemble**
Students perform in a principal format for jazz expression. The large ensemble setting affords the opportunity to expand knowledge of jazz styles and repertoire as well as refine reading skills and improve spontaneous interaction with other musicians. Placed through auditions held at the beginning of search semester.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 3427 and EMUS 5427
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.

**EMUS 1437 (1) Jazz Combo**
Allows students the opportunity to perform in the principal format for jazz expression. The small group setting affords performers the opportunity to refine improvisation skills, improve spontaneous interaction with musicians and expand knowledge of jazz styles and repertoire. Placed through auditions held at the beginning of each semester.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 3427 and EMUS 5437
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.

**EMUS 1447 (1) Guitar Ensemble**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) College of Music (MUSC) majors only.

**EMUS 1457 (1) Electronic Music Ensemble**
Explores performance, composition and the history of electronic music, including 20th century art music on through to electronic music in contemporary popular culture.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 3457 and EMUS 5457
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) College of Music (MUSC) majors only.

**EMUS 1467 (1) World Music Ensemble**
Study and performance of musics of diverse cultures in the United States, including Native American, Latin American, African American and Asian American, as well as music from the mother cultures of these groups.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 3467 and EMUS 5467
**Repeatable:** Repeatable for up to 99.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.

**EMUS 1477 (1) Chamber Choir**
Study and performance of various vocal styles, including madrigals and vocal jazz, investigation of the challenges of music making in a small group choral setting.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 3477 and EMUS 5477
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Grading Basis:** Letter Grade

**EMUS 1507 (1) Chamber Music**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) College of Music (MUSC) majors only.

**EMUS 1517 (1) Campus Orchestra**
Offers University string, wind and percussion performers not majoring in music an opportunity to play in a conducted orchestra. Rehearsals are one night per week and has limited performance demands. Auditions are not required for strings. Instruments are available if needed.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 3517
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.

**EMUS 3017 (1) Campus Band**
Provides high-level performance opportunities to CU students (both music majors and non-majors) through the study of quality band repertoire while improving large ensemble and individual musical skills. The art of music-making requires continuous critical analysis of one¿s sound and how that sound is interacting with the whole of the ensemble. The study of historical and cultural context will be provided resulting in a vivid re-creation of each piece positively affecting an audience.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**EMUS 3207 (1) Festival Chorus**
Prepares a roughly 100-member, auditioned mixed voice choir of music majors, non-majors, and community members to perform choral repertory of the highest standards in public settings. Designed to perform with the CU Symphony Orchestra, CU Wind Symphony, Boulder Philharmonic, and CU Holiday Festival. Music is selected from all historical style periods with the focus on choral masterworks with instrumental forces.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 1207
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**EMUS 3217 (1) Chamber Singers**
CU's premiere choral ensemble, The CU Chamber Singers, is comprised of auditioned graduate and undergraduate singers. Chamber Singers has been cited with critical acclaim for its performances and sings classically based literature from all cultures and style periods. Members are selected by audition at the beginning of each academic year.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 1217 or 5217
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**EMUS 3227 (1) University Choir**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**EMUS 3237 (1) Treble Chorus**
This collaborative ensemble is devoted to the study and performance of wide-ranging voice-specific repertoire. This choir performs on campus and in the Boulder-area two to four times per semester. Audition required.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**EMUS 3247 (1) Men's Chorus**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**EMUS 3257 (1) Collegiate Chorale**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**EMUS 3287 (1) Marching Band**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**EMUS 3297 (1) Wind Symphony**
2.0 credit hours offered CE Aspen Music School only.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**EMUS 3307 (1) Symphonic Band**
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 1307
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**EMUS 3317 (1) Concert Band**
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 1317
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**EMUS 3327 (1) Symphony Orchestra**
2.0 hours offered CE Aspen Music School only.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**EMUS 3337 (1) Chamber Orchestra**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**EMUS 3347 (1) Bell Ensemble**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**EMUS 3357 (1) Harp Ensemble**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**EMUS 3367 (1) Early Music Ensemble**
CU¿S Early Music Ensemble is comprised of auditioned graduate and undergraduate instrumentalists and singers interested in exploring Baroque repertoire with an emphasis on historically informed performance practice. Repertoire ranges from small groups (duos and trios) to larger scale orchestral and vocal works, as well as concertos. Members are selected during two audition cycles: one at the beginning of the Fall semester, and the other mid-way through the Fall semester for the Spring semester. Auditions will also be held mid-way through the Spring semester for returning students. Using a Baroque bow or available Baroque instrument is possible by permission. Contact the instructor early if you are interested in borrowing one of these items.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.

**EMUS 3377 (1) Chamber Music-Brass**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.

**EMUS 3387 (1) Chamber Music-Strings**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.

**EMUS 3397 (1) Chamber Music Piano Duo**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.

**EMUS 3407 (1) Chamber Music-Woodwinds**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.

**EMUS 3417 (1) Percussion Ensemble**
Percussion Ensemble is devoted to the study and performance of wide-ranging percussion-specific repertoire. Audition required.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.

**EMUS 3427 (1) Jazz Ensemble**
Students perform in a principal format for jazz expression. The large ensemble setting affords the opportunity to expand knowledge of jazz styles and repertoire as well as refine reading skills and improve spontaneous interaction with other musicians. Placed through auditions held at the beginning of each semester.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 1427 and EMUS 5427
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite EMUS 1427 or previous experience in large jazz ensembles.

**EMUS 3437 (1) Jazz Combo**
Allows students the opportunity to perform in the principal format for jazz expression. The small group setting affords performers the opportunity to refine improvisation skills, improve spontaneous interaction with musicians and expand knowledge of jazz styles and repertoire. Placed through auditions held at the beginning of each semester.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 1437 and EMUS 5437
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite EMUS 1437 or previous performance experience in small jazz combos.

**EMUS 3447 (1) Guitar Ensemble**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.

**EMUS 3457 (1) Electronic Music Ensemble**
Explores performance, composition and the history of electronic music, including 20th century art music on through to electronic music in contemporary popular culture.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 1457 and EMUS 5457
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.

**EMUS 3467 (1) World Music Ensemble**
Study and performance of musics of diverse cultures in the United States, including Native American, Latin American, African American and Asian American, as well as music from the mother cultures of these groups.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 1467 and EMUS 5467
**Repeatable:** Repeatable for up to 99.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**EMUS 3477 (1) Chamber Choir**
Study and performance of various vocal styles, including madrigals and vocal jazz, investigation of the challenges of music making in a small group choral setting.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 1477 and EMUS 5477
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade

**EMUS 3507 (1) Chamber Music**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) College of Music (MUSC) majors only.

**EMUS 3517 (1) Campus Orchestra**
Offers University string, wind and percussion performers not majoring in music an opportunity to play in a conducted orchestra. Rehearsals are one night per week and has limited performance demands. Auditions are not required for strings. Instruments are available if needed.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 1517
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**EMUS 5217 (1) Chamber Singers**
CU's premiere choral ensemble, The CU Chamber Singers, is comprised of auditioned graduate and undergraduate singers. Chamber Singers has been cited with critical acclaim for its performances and sings classically based literature from all cultures and style periods. Members are selected by audition at the beginning of each academic year.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 1217 or 3217
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**EMUS 5227 (1) University Choir**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**EMUS 5297 (1) Wind Symphony**
2.0 credit hours offered CE Aspen Music School only.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**EMUS 5307 (1) Symphonic Band**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**EMUS 5327 (1) Symphony Orchestra**
2.0 hours offered CE Aspen Music School only.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**EMUS 5337 (1) Chamber Orchestra**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**EMUS 5367 (1) Early Music Ensemble**
CU¿S Early Music Ensemble is comprised of auditioned graduate and undergraduate instrumentalists and singers interested in exploring Baroque repertoire with an emphasis on historically informed performance practice. Repertoire ranges from small groups (duos and trios) to larger scale orchestral and vocal works, as well as concertos. Members are selected during two audition cycles: one at the beginning of the Fall semester, and the other mid-way through the Fall semester for the Spring semester. Auditions will also be held mid-way through the Spring semester for returning students. Using a Baroque bow or available Baroque instrument is possible by permission. Contact the instructor early if you are interested in borrowing one of these items.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.

**EMUS 5377 (1) Chamber Music-Brass**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.

**EMUS 5387 (1) Chamber Music-Strings**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.

**EMUS 5407 (1) Chamber Music-Woodwinds**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.

**EMUS 5417 (1) Percussion Ensemble**
Percussion Ensemble is devoted to the study and performance of wide-ranging percussion-specific repertoire. Audition required.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.

**EMUS 5427 (1) Jazz Ensemble**
Students perform in a principal format for jazz expression. The large ensemble setting affords the opportunity to expand knowledge of jazz styles and repertoire as well as refine reading skills and improve spontaneous interaction with other musicians. Placed through auditions held at the beginning of each semester.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 1427 and EMUS 3427
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite EMUS 3427 or previous experience in large jazz ensembles.

**EMUS 5437 (1) Jazz Combo**
Allows students the opportunity to perform in the principal format for jazz expression. The small group setting affords performers the opportunity to refine improvisation skills, improve spontaneous interaction with musicians and expand knowledge of jazz styles and repertoire. Placed through auditions held at the beginning of each semester.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 1437 and EMUS 3437
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite EMUS 3437 or previous performance experience in small jazz combos.

**EMUS 5447 (1) Guitar Ensemble**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.

**EMUS 5457 (1) Electronic Music Ensemble**
Explores performance, composition and the history of electronic music, including 20th century art music on through to electronic music in contemporary popular culture.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 1457 and EMUS 3457
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.

**EMUS 5467 (1) World Music Ensemble**
Study and performance of musics of diverse cultures in the United States, including Native American, Latin American, African American and Asian American, as well as music from the mother cultures of these groups.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 1467 and EMUS 3467
**Repeatable:** Repeatable for up to 99.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**EMUS 5477 (1) Chamber Choir**
Study and performance of various vocal styles, including madrigals and vocal jazz, investigation of the challenges of music making in a small group choral setting.
**Equivalent - Duplicate Degree Credit Not Granted:** EMUS 1477 and EMUS 3477
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**EMUS 5507 (1) Chamber Music**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.

# Natural Sciences (NASC)

## Courses

## Naval Science - ROTC (NAVR)

## Courses

**NAVR 1010 (2) Introduction to Naval Science**
Introduction to the naval profession. Instruction emphasizes the mission, organization and warfare components of the Navy and Marine Corps. Included is an overview of officer and enlisted ranks and rates, training, education, Naval customs and courtesies, military justice, leadership and nomenclature. Exposes the student to the professional competencies required to become a Naval/Marine Corps officer.
**Additional Information:** Departmental Category: Naval Science

**NAVR 1020 (3) Naval Ship Systems**
Naval Ship Systems
**Requisites:** Requires prerequisite course of NAVR 1010 (minimum grade D-).

**NAVR 2020 (3) Seapower and Maritime Affairs**
Surveys international maritime history and provides a review of American maritime history and policy. Examines American naval involvement in regional and global conflicts, evolution in technology and management, the role of the navies in foreign policy, and the influence of seapower on history.
**Requisites:** Requires prerequisite course of NAVR 1010 (minimum grade D-).
**Additional Information:** Departmental Category: Naval Science

**NAVR 3020 (3) Naval Operations and Seamanship**
Examines the Inland and International Rules of the Nautical Road, including court interpretations, principles of relative motion and vector analysis with the maneuvering board, ship handling procedures, weather, communications, tactical operations, and maritime law.
**Requisites:** Requires prerequisite course of NAVR 1010 (minimum grade D-).
**Additional Information:** Departmental Category: Naval Science

**NAVR 3030 (3) Naval Engineering Systems**
Studies in detail ship propulsion and related auxiliary systems. Emphasizes fossil fuel and nuclear steam and gas turbine systems. Stresses design constraints imposed by unique marine environment.
**Requisites:** Requires prerequisite course of NAVR 1010 (minimum grade D-).
**Additional Information:** Departmental Category: Naval Science

**NAVR 3040 (3) Weapons and Systems Analysis**
Introduces theoretical concepts upon which modern naval weapons systems are designed and constructed. Specific areas of study include physics of underwater sound propagation, pulse radar theory, automatic tracking principles, and fundamentals of missile guidance.
**Requisites:** Requires prerequisite course of NAVR 1010 (minimum grade D-).
**Additional Information:** Departmental Category: Naval Science

**NAVR 3101 (3) Evolution of Warfare**
Traces the development of warfare, focusing on the impact of military theorists and technical developments. Assists students to acquire a sense of strategy, develop an understanding of military alternatives, and see the impact of historical precedent on military actions.
**Requisites:** Requires prerequisite course of NAVR 1010 (minimum grade D-).
**Additional Information:** Departmental Category: Naval Science

**NAVR 3201 (3) Fundamentals of Maneuver Warfare**
Prepares future military officers and other leaders for service by studying modern tactical principles, current military developments and other aspects of warfare and their interactions with and influences on maneuver warfare doctrine.
**Requisites:** Requires prerequisite course of NAVR 1010 (minimum grade D-).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Naval Science

**NAVR 4010 (3) Leadership and Management**
Comprehensively studies organizational leadership. Emphasizes motivation, communication, empowerment, and needs of subordinates. Studies the role of professional and personal ethics in organizational leadership.
**Additional Information:** Departmental Category: Naval Science

**NAVR 4020 (3) Leadership and Ethics**
Studies the ethics and laws of armed conflict analyzing the leadership responsibilities of officers both in peace and in war. The curriculum focuses first on various moral, ethical and leadership philosophies followed by extensive use of case studies to reinforce the use of ethical decision-making tools. Defines the responsibilities of junior officers within the context of ethical leadership and decision making.
**Additional Information:** Departmental Category: Naval Science

**NAVR 4021 (3) Leadership and Ethics Online**
Studies the ethics and laws of armed conflict analyzing the leadership responsibilities of officers both in peace and in war. The curriculum focuses first on various moral, ethical and leadership philosophies followed by extensive use of case studies to reinforce the use of ethical decision-making tools. Defines the responsibilities of junior officers within the context of ethical leadership and decision making.

**NAVR 4030 (3) Navigation**
Offers theory and practical application in the art of navigation: charts, publications, piloting, dead reckoning, navigation aids and instruments, time, electronic fixing, global positioning system, and voyage planning.
**Requisites:** Requires prerequisite course of NAVR 1010 (minimum grade D-).
**Additional Information:** Departmental Category: Naval Science

# Neuroscience (NRSC)

## Courses

**NRSC 1020 (1) Exploring the Neuroscience Major**
This course familiarizes students to the neuroscience major at CU Boulder, and helps students develop key skills needed for academic success. Students will learn about department and campus resources, and how to get involved in the wider neuroscience community, including clubs and research. An overview of select neuroscience-related topics, and possible career paths, helps students determine goodness of fit. This elective course is designed for first-year and other students exploring educational and career opportunities in this exciting field.

**NRSC 2100 (4) Introduction to Neuroscience**
Provides an introduction to fundamental concepts in neuroscience. The goal of this first course is to provide a strong foundation in neurobiology-cell biology, physiology of the neuronal membrane, interneuronal communication, neurotransmission, gross anatomy, and how the brain develops. Students will also learn principles of sensory systems functions. Recitation will reinforce lecture concepts through discussion of current research.
**Requisites:** Requires prerequisite courses of MCDB 1111 or MCDB 1150 or EBIO 1210 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 2101 (1-4) Topics in Neuroscience**
Provides students with the opportunity to focus on a specific area of Neuroscience in depth.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 2125 (4) Introduction to Neuroscience I: Foundations**
Provides an introduction to fundamental knowledge and principles in neuroscience. The goal of this first semester of an Introduction to Neuroscience two semester sequence is to provide a strong foundation in neurobiology-cell biology, physiology of the neuronal membrane, synaptic neurotransmission, neurochemistry, gross anatomy and introduction to sensory perception. Recitation will reinforce lecture concepts.
**Requisites:** Requires prerequisite course of MCDB 1150 or EBIO 1210 (minimum grade C-).

**NRSC 2150 (4) Introduction to Neuroscience II: Systems**
Extends understanding of fundamental knowledge in neuroscience with a focus on systems function. The goal of this second semester of an Introduction to Neuroscience two semester sequence is to develop deeper understanding of neurobiological systems function. Featured is the neurophysiology, neuroanatomy and function of human sensory systems, motor systems, sensorimotor integration and higher level neurosystem function.
**Requisites:** Requires prerequisite course of NRSC 2100 or NRSC 2125 (minimum grade C-).

**NRSC 2200 (2) Laboratory Techniques in Neuroscience**
Introduces students to many basic and essential laboratory skills in neuroscience research. Students will learn experimental methods and perform experiments depicting principles in neurophysiology, neuroanatomy, neurochemistry, and the fundamentals of neuroimaging techniques.
**Requisites:** Requires a prerequisite course of NRSC 2100 or NRSC 2125 (minimum grade C-). Restricted to Neuroscience (NRSC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4011 (1-3) Senior Thesis**
Senior Thesis credits are available for students during the semester that they write and defend a departmental Honors Thesis. A neuroscience honors thesis must be based on an empirical research project that the student directs/participates in under guidance from a faculty member. Contact the neuroscience director for further information.

**NRSC 4015 (3) Affective Neuroscience**
Experiencing and learning from affect--emotional value--is a fundamental part of the human experience. When people started thinking of brains as computers, research on emotion fell by the wayside. Recently however, this has changed, and there is an explosion of work on the brain mechanisms of affective value. Covers recent advances in understanding the emotional brain.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 5015
**Requisites:** Requires a prerequisite course of PSYC 2012 or (NRSC 2100 or (NRSC 2125 and NRSC 2150)) (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4032 (3) Neurobiology of Learning and Memory**
Provides a comprehensive treatment of how the brain acquires, stores, and retrieves memories. To do this we will consider (a) the methods used to address these issues, (b) what we know about how brain systems are organized to support memories of different types,and (c) the synaptic mechanisms that are involved.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 5032
**Requisites:** Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4042 (3) Systems Neuroscience**
Explores the neurophysiology, neuroanatomy and function of human sensory systems, motor systems, sensorimotor integration and higher level neurosystem function.
**Requisites:** Requires prerequisite of (PSYC 2012 or NRSC 2100 or (NRSC 2125 and 2150)) and one of the following (EBIO 1210 or MCDB 1111 or MCDB 1150) all require minimum grade of C-.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4062 (3) The Neurobiology of Stress**
Provides an introduction to the concept of stress and the physiological systems involved. Factors modulating stress vulnerability versus resilience, and stress interactions with other systems with health relevance will be explored. Emphasis will be placed on current research on brain mechanisms. Formerly PSYC 4062.
**Requisites:** Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4072 (3) Clinical Neuroscience: A Clinical and Pathological Perspective**
Provides a review of the anatomy and physiology of the nervous system and then explores how alterations in these systems can result in neurologic or psychiatric disorders. Emphasizes pathological neuroanatomy, neurophysiology and neuropharmacology, which is essential for understanding problems related to health and disease.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 5072
**Requisites:** Requires a prerequisite course of (NRSC 2100 or (NRSC 2125 and NRSC 2150)) and (EBIO 2070 or MCDB 2150), (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4082 (3) Neural Circuits of Learning and Decision Making**
Provides an in-depth survey of the neural mechanisms of learning, motivated behavior and decision making. Analysis will focus on the interaction of neural circuits underlying these processes with particular attention to the cellular, molecular and information-processing aspects of identified pathways and considered into the context learning-based and neuroeconomic models of choice.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 5082
**Requisites:** Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4092 (3) Behavioral Neuroendocrinology**
Provides an introduction to neuroendocrinology with a focus on the interaction between hormones on brain development and behaviorally relevant brain function, including reproductive behaviors, stress, biological rhythms and mood.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 5092
**Requisites:** Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4132 (3) Neuropharmacology**
Study of drug action within the central nervous system. This course is designed to provide a fundamental understanding of the neurobiological and neurochemical mechanisms of drug action. Topics covered include the following: 1) principles of pharmacology; 2) brain neurotransmitter systems; 3) biochemical basis of psychiatric disorders and their pharmacological treatment.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 5132
**Requisites:** Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4155 (4) Cognitive Neuroscience/Neuropsychology**
Introduction to cognitive neuroscience and neuropsychology. Provides a survey of the neuropsychological underpinnings for a wide range of cognitive functions: vision, object recognition, attention, language, memory and executive function. One lab per week.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 4155
**Requisites:** Requires a prerequisite course of PSYC 2111 and PSYC 3111 and (PSYC 2012 or NRSC 2100 or (NRSC 2125 and NRSC 2150)) (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4420 (3) Genetics of Brain and Behavior**
Examines the genetic underpinnings of animal behavior, including an examination of behavioral evolution and the use of genes as tools to examine neural architecture. We will cover topics including foraging, social behavior, personality, parental care and fear. We will explore these behaviors at multiple levels, including genomics, population genetics, molecular genetics, epigenetics, endocrinology and neurobiology. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 4420
**Requisites:** Requires NRSC 2100 or (NRSC 2125 and NRSC 2150) and (EBIO 2070 or MCDB 2150). All minimum grade C-.
**Grading Basis:** Letter Grade

**NRSC 4542 (3) The Neurobiology of Mental Illness**
Provides in depth study of what is known concerning the neurobiology of mental illnesses, with a focus on depression and anxiety. Consideration will be given to both animal models and human work, with neurochemical, circuitry level, and neuroinflammatory processes to be highlighted. There will be discussion of the intricacies of determining the effectiveness of pharmacological treatments, and what the implications of such treatments might be.
**Requisites:** Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4545 (3) Neurobiology of Addiction**
Covers an intensive survey and synthesis of recent findings contributing to our understanding of the neurobiological basis of addiction. Analysis of both drug and behavioral addictions will be made at the molecular, cellular and neurocircuitry levels and synthesized into models utilizing common themes between various addictions and contributing pathologies.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 5545
**Requisites:** Requires prerequisite courses of (NRSC 2100 or (NRSC 2125 and NRSC 2150)) and NRSC 4132 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4561 (1-3) Special Topics in Neuroscience**
Presents and analyzes special interest topics from the broad and interdisciplinary field of neuroscience. The instructor determines the content of a particular section. Repeatable for up to 6 total credit hours.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**NRSC 4572 (3) Developmental Neurobiology**
Examines the molecular and cellular processes that generate a functional nervous system. Topics covered include cell fate determination, neurogenesis and gliogenesis, cell migration, axon pathfinding, synapse formation and synapse refinement. Also explores how alterations in development can result in neurologic or psychiatric disorders. Formerly offered as a special topics course.
**Requisites:** Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
**Recommended:** Prerequisite or corequisite MCDB 3135.

**NRSC 4841 (1-3) Independent Study in Neuroscience**
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Neuroscience (NRSC) majors only.

**NRSC 5015 (3) Affective Neuroscience**
Experiencing and learning from affect--emotional value--is a fundamental part of the human experience. When people started thinking of brains as computers, research on emotion fell by the wayside. Recently however, this has changed, and there is an explosion of work on the brain mechanisms of affective value. Covers recent advances in understanding the emotional brain.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 4015
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.

**NRSC 5032 (3) Neurobiology of Learning and Memory**
Provides a comprehensive treatment of how the brain acquires, stores, and retrieves memories. To do this we will consider (a) the methods used to address these issues, (b) what we know about how brain systems are organized to support memories of different types,and (c) the synaptic mechanisms that are involved.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 4032
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Biological

**NRSC 5072 (3) Clinical Neuroscience: A Clinical and Pathological Perspective**
Provides a review of the anatomy and physiology of the nervous system and then explores how alterations in these systems can result in neurologic or psychiatric disorders. Emphasizes pathological neuroanatomy, neurophysiology and neuropharmacology, which is essential for understanding problems related to health and disease.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 4072
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Biological

**NRSC 5082 (3) Neural Circuits of Learning and Decision Making**
Provides an in-depth survey of the neural mechanisms of learning, motivated behavior and decision making. Analysis will focus on the interaction of neural circuits underlying these processes with particular attention to the cellular, molecular and information-processing aspects of identified pathways and considered into the context learning-based and neuroeconomic models of choice.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 4082
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Grading Basis:** Letter Grade

**NRSC 5092 (3-4) Behavioral Neuroendocrinology**
Provides an introduction to neuroendocrinology with a focus on the interaction between hormones and brain function. In addition to attending and meeting all the requirements for the lecture portion of the course, graduate students meet for an additional hour each week to discuss in depth behavioral neuroendocrinology relevant research articles.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 4092
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Biological

**NRSC 5100 (3-4) Introduction to Neuroscience I**
This first course in the year-long sequence of introduction to neuroscience provides an intensive introduction to the principles of neuroscience, covering detailed neuroanatomy, physiology, neurophysiology, neurochemical and developmental characteristics of the central nervous system. Structure-function relationships in sensory and motor systems are then explored with neuroanatomical and electrophysiological perspectives. Students enrolled in the Behavioral Neuroscience Program should enroll in this course for 4 credits. All other students should enroll in this course for 3 credits.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students and students in the interdepartmental neuroscience program.

**NRSC 5110 (3-4) Introduction to Neuroscience II**
Provides an intensive interdisciplinary introduction to the principles of neuroscience. It is a sequel to NRSC 5100. Provides a detailed overview of neurochemistry, neurodevelopment, neuromotor control, neurogenetics, and cognitive neuroscience. Open to undergraduates with instructor permission. Students enrolled in the Behavioral Neuroscience Program should enroll in this course for 4 credits. All other students should enroll in this course for 3 credits.
**Requisites:** Requires a prerequisite course of NRSC 5100 or NRSC 4052 or PSYC 4052 (minimum grade C-). Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students and students in the interdepartmental neuroscience program.

**NRSC 5132 (3) Neuropharmacology**
Study of drug action within the central nervous system. This course is designed to provide a fundamental understanding of the neurobiological and neurochemical mechanisms of drug action. Topics covered include the following: 1) principles of pharmacology; 2) brain neurotransmitter systems; 3) biochemical basis of psychiatric disorders and their pharmacological treatment.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 4132
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Biological

**NRSC 5262 (3) Mammalian Neuroanatomy**
Provides a detailed overview of peripheral and central nervous system connectional neuroanatomy targeted at delineating functional sensory, motor and motivational systems and the control of behavior and cognition. Emphasizes histological, anatomical and functional techniques employed in investigations of the nervous system. Formerly PSYC 5262.
**Requisites:** Requires a prerequisite course of NRSC 2100 or NRSC 5100 or NRSC 4052 or PSYC 4052 (minimum grade C-). Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Biological

**NRSC 5545 (3) Neurobiology of Addiction**
Covers an intensive survey and synthesis of recent findings contributing to our understanding of the neurobiological basis of addiction. Analysis of both drug and behavioral addictions will be made at the molecular, cellular and neurocircuitry levels and synthesized into models utilizing common themes between various addictions and contributing pathologies.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 4545
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.

**NRSC 5911 (3) Teaching of Neuroscience**
Offers a rich experience for students to develop and organize curriculum to complement the Neuroscience core courses. Offers a valuable teaching experience utilizing computational modeling to simulate experimental results. Any Neuroscience curriculum course, such as Intro to Neuroscience I or II, Neuropharmacology, Neurobiology of Learning and Memory or Behavioral Neuroscience may be appropriate.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.

**NRSC 6000 (1-3) Introduction to Laboratory Methods**
Introduces methodology and techniques used in biological research. Designed as a tutorial between a few students and one faculty member. Students are expected to read original research papers, discuss findings, and to gain training in techniques necessary to plan and execute experiments in selected areas. These include but are not limited to, for example, surgical approaches, behavioral techniques, molecular biology approaches, and imaging.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Behavioral Neuroscience program graduate students.
**Grading Basis:** Letter Grade

**NRSC 6100 (2) Advances in Neuroscience Seminar**
Designed for beginning graduate students interested in neuroscience. Students read, discuss, and evaluate the primary literature on a number of current topics in neuroscience as well as attend the seminar program in neuroscience.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.

**NRSC 6602 (1-3) Behavioral Neuroscience Professional Skills Development**
Enrolled graduate students in the behavioral neuroscience program will be asked to prepare, present and receive feedback on scientific presentations of their own research or from review of a current research project.
**Repeatable:** Repeatable for up to 14.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Grading Basis:** Letter Grade

**NRSC 7102 (1-3) Topics in Neuroscience**
Advanced seminar dealing with different specialized topics in neuroscience. Instructor consent required for students outside of the department.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of NRSC 5110 (minimum grade D-). Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.

**NRSC 7152 (3) Special Topics in Neuroscience V**
Advanced seminar dealing with several different specialized topics in Neuroscience.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.

# Norlin Scholars (NRLN)

## Courses

**NRLN 2000 (3) Ways of Knowing: Constructions of Knowledge in the Academy and Beyond**
This course asks students to interrogate natural learning tendencies, how they know what they know, and how to cultivate other ways of knowing beyond intellectual. They analyze how knowledge is created, discovered, and interpreted. They¿ll explore what faculties are involved in learning, seeing, understanding and knowing; how revolutions in knowledge arise; the relationship between knowledge and power; and what wisdom is. Students draw on different ways of expressing knowledge, including the intellect, intuition, and more. Department consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** ARSC 2000
**Requisites:** Restricted to Norlin Scholars students only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**NRLN 3500 (3) Constructions of Knowledge in the Fields**
This course invites students to investigate how their fields construct knowledge and are constructed. Its interdisciplinarity encourages them to think critically about all dimensions of the field, from its ancient history to breaking news, its working theories to working conditions, its major controversies to the politics and passions that fuel them. Through theory, case study, film, and more, students come to see their fields as ways of knowing, living, working, and engaging in the world. Department consent required.
**Requisites:** Restricted to Norlin Scholars students only.
**Grading Basis:** Letter Grade

# Operations and Information Management (OPIM)

## Courses

**OPIM 6080 (3) Operations Management**
Covers demand forecasting, capacity management, scheduling, inventory planning and management, production planning and control, materials requirements planning, just-in-time production systems, product design and process selection, elements of statistical process control, service operations and quantitative techniques for operations decision making.
**Equivalent - Duplicate Degree Credit Not Granted:** EMEN 5500

**OPIM 6820 (3) Special Topics in Systems**
Offered irregularly to provide opportunity for investigation into new frontiers in systems.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**OPIM 6900 (1-3) Independent Study**
Requires prior consent of dean and instructor under whose direction study is taken. Intended only for exceptionally well-qualified business seniors who desire to study an advanced topic. Departmental form required.

**OPIM 6950 (1-6) Master's Thesis**

**OPIM 7110 (3) Simulation Modeling and Analysis**
Introduces the concepts of simulation modeling. Provides practical experience with real examples using popular commercial simulation packages such as Arena or Extend. Emphasizes discrete event simulation, but also covers topics in Monte Carlo simulation and system dynamics. Practical examples from operations management, manufacturing and services are used to give students an appreciation for the wide scope of application and the robust nature of simulation modeling in the context of decision making.

**OPIM 7120 (3) Discrete Optimization**
Covers the modeling and solution of discrete problems that arise in business and engineering. Classical techniques such as cutting planes and branch and bound are covered. Emphasizes the application of metaheuristic procedures, such as tabu search and evolutionary approaches, to the solution of practical combinatorial optimization problems.

**OPIM 7210 (1-3) Doctoral Seminar: Special Topics in Operations Research**
Introduces the fundamental tools and techniques in the field of operations research. Practical examples from operations management, manufacturing, and services are used to give students an appreciation for the wide scope of applications.

**OPIM 7220 (1-3) Doctoral Seminar: Special Topics in Optimization**
Covers the modeling and solution of discrete problems that arise in business and engineering. Classical techniques such as cutting planes and branch and bound are covered. Emphasizes the application of metaheuristic procedures, such as tabu search and evolutionary approaches, to the solution of practical combinatorial optimization problems.

**OPIM 7230 (1-3) Doctoral Seminar: Special Topics in Operations Management**
Covers concepts, models, and solution techniques relevant to the management of the processes required to provide goods or services to consumers. Emphasizes supply chain systems topics such as production, inventory, distribution, and scheduling. Management science and operations research methodology is also applied to problems such as facility capacity planning, facility design, and location analysis.

**OPIM 7240 (1-3) Doctoral Seminar: Special Topics in Stochastic Optimization**
Covers the basic models and solution techniques for stochastic dynamic programs with a finite or infinite number of stages. Application domains include, among others, revenue management and pricing, manufacturing, supply chains, service systems, and economics. Approximate solution techniques for problems involving large state/decision spaces and/or complex dynamics over time will also be discussed.

**OPIM 7250 (1-3) Doctoral Seminar: Special Topics in Empirical Methods**
Covers empirical research methods for operations management. Topics include statistical and econometric analysis with a wide range of applications, including sustainable operations, supply chain management, and revenue management and pricing.

**OPIM 7330 (3) Advanced Operations Management Modeling**
Covers concepts, models and solution techniques relevant to the management of the processes required to provide goods or services to consumers. Emphasizes supply chain systems topics such as production, inventory, distribution and scheduling. Management science and operations research methodology is also applied to problems such as facility capacity planning, facility design and location analysis.

**OPIM 7400 (3) Stochastic Dynamic Programming with Applications**
Covers the basic models and solution techniques for stochastic dynamic programs with finite or infinite number of stages. Application domains include, among other, revenue management and pricing, manufacturing, supply chains, service systems, and economics. Approximate solution techniques for problems involving large state/decision spaces and/or complex dynamics over time will also be discussed.
**Requisites:** Restricted to graduate students only.
**Recommended:** Requisite an introductory course in optimization and probability.

**OPIM 7800 (3) Doctoral Proseminar in Systems**
Provides systems doctoral students with an orientation to current research and the academic discipline in operations and information systems. Familiarizes students with key schools of thought in the field, provides background on reference disciplines, examines significant research streams and helps students begin developing their own area of interest.

**OPIM 7805 (3) Foundations of Research in Information Systems**
Examines foundations of information systems research, including classic readings in information systems and its reference disciplines, different research approaches, processes of research, and classic and contemporary readings in major topics in information systems.
**Requisites:** Restricted to graduate students only.

**OPIM 7810 (3) Technical Topics in Information Systems Research**
Examines in depth a selection of topics in technical areas of information systems. Includes theoretical perspectives for technical topics, critical perspectives on past and current research, appropriate methods for examining technical topics, and development of students' ability to identify and develop research topics in technical areas.
**Requisites:** Restricted to graduate students only.

**OPIM 7815 (3) Behavioral Topics in Information Systems Research**
Covers both basic and advanced topics. Develops skill in designing, evaluating, and understanding both quantitative and qualitative research methods. Includes the development of research proposals, making and justifying methodological choices, writing research reports, and understanding how to publish in information systems.
**Requisites:** Restricted to graduate students only.

**OPIM 7820 (3) Advanced Research in Information Systems**
Examines advanced topics in information systems research, focusing on the electronic era and ebusiness. Examines foundations of ebusiness, including basic technical, organizational, and behavioral foundations. Covers leading edge research from both topical and methodological perspectives. Focuses on methods appropriate for studying ebusiness and examines future research directions.
**Requisites:** Restricted to graduate students only.

**OPIM 8820 (3) Large-Scale Optimization**
Covers computational techniques for solving optimization problems with a large number of variables and/or constraints. The techniques will have many business and engineering applications. With the emphasis on integer programming, we will study Branch-and-Cut, Lagrangian relaxation, column generation and Bender's decomposition, from both a theoretical and practical perspective. Students will learn to formulate and solve large-scale problems and learn how to apply these techniques for their research.

**OPIM 8900 (1-3) Independent Study**

**OPIM 8990 (1-10) Doctoral Dissertation**

# Operations Management (OPMG)

## Courses

**OPMG 6900 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Additional Information:** Departmental Category: MBA: Operations and Production Management

**OPMG 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Additional Information:** Departmental Category: MBA: Operations and Production Management

**OPMG 6950 (1-6) Master's Thesis**
**Additional Information:** Departmental Category: MBA: Operations and Production Management

**OPMG 8990 (1-10) Doctoral Dissertation**
**Repeatable:** Repeatable for up to 10.00 total credit hours.
**Additional Information:** Departmental Category: MBA: Operations and Production Management

# Organization Management (ORMG)

## Courses

**ORMG 7310 (3) Seminar on Organizational Behavior**
Doctoral level seminar covering such issues as leadership, job attitudes, motivation, absenteeism, turnover, goal setting, and group dynamics. Instructor consent required.
**Requisites:** Restricted to graduate students only.

**ORMG 7320 (3) Doctoral Seminar: Organization Theory**
Critically investigates major issues in organization theory and provides students with experience in comprehensively surveying literature in subject areas such as organization design, power, culture, innovation, technology, environment, size, and strategy. Instructor consent required.
**Requisites:** Restricted to Business Administration (BUAD) graduate students only.

**ORMG 7330 (3) Seminar and Practicum in Organization Development**
Provides a doctoral level seminar emphasizing intervention theory and method in effectuating organizational change in a client system. Deals with group development, educational processes, conflict resolution, organizational interventions, change strategies, and ethical and skill requirements of the consultative role.

**ORMG 7800 (3) Doctoral Proseminar: Management**
Provides an orientation to doctoral level study for all students in management. Through critical analysis of articles and student and faculty presentations, students learn about reading and writing research articles and gain an overview of the management discipline.
**Requisites:** Restricted to graduate students only.

**ORMG 7830 (3) Research Design and Methods in Management**
Introduction to research design and commonly used methods in management and organizational research. Covers the fundamental building blocks of research, provides the basics of a number of analytical techniques, and presents considerations important in analyzing multivariate data in organizational research.
**Requisites:** Restricted to Business (BUSN) graduate students only.

**ORMG 8900 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**ORMG 8990 (1-10) Doctoral Dissertation**

# Organizational Leadership (ORGL)

## Courses

**ORGL 5005 (3) Leadership and Organizations**
Focuses on leadership theory and practice in contemporary organizations, discussing, comparing and contrasting theories of leadership, as well as factors that impact leadership in an organization. Students assess their own leadership style in the context of existing leadership models and potential organizational settings. Current topics and case studies in leadership are also discussed.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5010 (3) Leading Change and Innovation**
Addresses theories, methods and challenges associated with organizational change. The course exposes students to forces that drive organizations to change, why organizations change or fail to change, impediments and barriers associated with change and how change helps organizations become more competitive and profitable. The course also examines a variety of approaches, tools and techniques for effective personal and organizational change.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5015 (3) Analytics and Data-Driven Decision Making**
Focuses on analyzing data for making high quality predictions and decisions. The course covers use of statistical packages to make sense of large sets of data and turn them into actionable information for various audiences. The problems faced by decision makers in today's competitive business environment are often extremely complex and can be addressed by numerous possible courses of action. Evaluating these alternatives and choosing the best course of action represents the essence of this course.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5020 (3) Strategic Communication**
Communicating competently in the workplace requires the ability to express thoughts and ideas across all domains and barriers of an organization. From one-on-one interactions, conflict management situations, and large scale presentations, Strategic Communication is the backbone of a successful business model and it represents one of the most important foundations of career success.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5025 (3) Performance Management**
Focuses on organizational performance management systems and individual performance appraisals, explored in relationship to other human resource activities and processes designed to achieve organizational success. The course builds requisite management and leadership competencies of assessing performance, providing feedback, coaching, motivating, engaging, and increasing employees' achievement. Course utilizes lecture, readings, discussion, case studies, role plays, research, and/or personal peer feedback.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5105 (3) Negotiation and Conflict Resolution**
Introduces students to theory and research behind negotiation and conflict resolution as they relate to professional experiences in the workplace. Students will learn necessary information for understanding how negotiation can be used to resolve conflict. Students will also apply knowledge about negotiation and conflict resolution through addressing negotiation problems that are commonly faced by managers and professionals.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5110 (3) Human Resources Law**
Provides an overview of employment and labor law, regulations and emerging issues. Topics covered include: proper classification of workers and pay under the Fair Labor Standards Act; civil rights (race, color, gender, religious, disability, age and national origin discrimination); family and medical leave; workplace torts and contracts; privacy rights; OSHA; workers' compensation; and the National Labor Relations Act.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5115 (3) Total Rewards Strategies**
Studies the total rewards provided to employees in return for their contributions to an organization. The principles of modern compensation and benefits are considered from legal, practical and theoretical perspectives. Students will examine how compensation and benefits can add strategic value by aligning total compensation with organizational goals.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5120 (3) Training and Development**
Provides an understanding of the knowledge and skills required to assess employee training needs, design and administer employee training and development programs and evaluate both the efficiency and effectiveness of such programs. Training and development is based on the premise that people are the most valuable asset of an organization. Department consent required.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5205 (3) Strategic Planning in Organizations**
Addresses theories, techniques and challenges associated with strategic planning. This course exposes students to the processes and tools that drive organizations to create a framework for developing, adapting and aligning organizational vision, mission, values and goals to achieve and sustain a strategic advantage. Students will gain the knowledge needed to facilitate, formulate, execute and monitor strategic planning for any organization.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5210 (3) Competitive Analysis and Positioning**
Discusses how to perform a formal competitive analysis to understand better a company¿s brand, the brand's position in the marketplace, and the role the brand¿s competitors play in shaping the marketplace. The course addresses product positioning, Integrated Marketing Communications, markets (realized and potential), and company/brand strengths and weaknesses and how those may become threats. Students learn how to create Buyer Personas, conduct SWOT analyses, and establish Communication Objectives.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5215 (3) Organizations and the Law**
Provides an overview on business law and the legal environment. Examines contracts, torts, sales, employment law, property, forms of business organization and government regulation, and how they impact managerial decision making.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5220 (3) Operations and Designs of Organizations**
Addresses theories, techniques and challenges associated with effective designs of organizations. Students learn to use processes and tools that contribute to the competitiveness and survival of an organization, develop an understanding of how organizations affect and are affected by their environments and learn principles of organizational operations and design that can be used to improve the match between an organization and its environment.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5305 (3) Leadership and Intrapreneurship**
Intrapreneurship involves the practice of behaving entrepreneurially within a large organization. This course teaches students how to employ concepts from organizational behavior, strategic management, leadership, and entrepreneurship to develop and lead an intrapreneurial organization. Specifically, the course addresses topics such as how to develop highly-functioning teams; effect organizational change; create a learning organization that values innovation, idea generation, and mobilization; and align the organization with its external environment to create a sustained competitive advantage.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5310 (3) Design Thinking**
Explores the process of 'design thinking,' a systematic methodology that enables companies to identify a business model that truly addresses customer needs while providing greater returns for the company. The course looks at several real-world examples from different organizations that used design thinking to uncover compelling solutions. Topics addressed include customer journey mapping, value chain analysis, and ideation.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5315 (3) Strategy and Innovation**
Addresses the issues and challenges of running a firm in a competitive environment. It is an integrative course emphasizing a total organizational perspective as opposed to a functional viewpoint (accounting, finance, marketing, information technology, etc.). The emphasis is on the use innovation as an integral part of business strategy. Furthermore, it gets deeper in studying sustaining innovation enhancements for traditional business models, as well as disruptive innovations for radical new technological models.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5320 (3) Building and Leading Innovative Work Teams**
Learn how to build innovative work teams, with a special focus on promoting cohesion among groups that are inclusive and diverse. Students will learn how to diagnosis low-performing groups before they reach the point of failure. The course will also address the use of ¿tight-loose¿ leadership, which controls the process while giving free rein to diverse thinking. Special attention is paid to specific managerial tools, such as brainstorming, the nominal groups technique, devil¿s advocacy, and dialectical inquiry.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5405 (3) Diversity and Organizational Communication**
This course examines how we construct our social identities through everyday communication and how these identities intersect in complex ways to shape and influence organizational life. In other words, this course reframes social identities like gender, race, sexuality, and so forth as something that we do through ongoing communication at work, rather than as something we are or have and merely bring to work. Importantly, this shift in perspective underscores how systems of inclusion and exclusion that seem to be ¿just the way things are¿ are actually made by us as we all participate in seemingly mundane, everyday dynamics of identity and power. In shifting attention from people to everyday practice ¿ it points toward innovative ways we can intervene in the current state of affairs and cultivate organizations that better understand and value difference and diversity. Accordingly, students will learn to reflect on their own contributions to routine practices of identity and power and will learn to expand thei
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5410 (3) Dynamics of Group Communication**
Focuses on aspects of group communication leaders need for success in a variety of organizational contexts. Topics include decision making, creativity and innovation, conflict management, technology and virtual environments, difference and diversity, systems and institutions, group development and socialization, negotiation, identity, and interaction design. Organizational work often occurs in groups, and communication is essential to effective group work. Therefore, organizational leaders need to understand the dynamics of group communication and improve their group communication skills.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5415 (3) Organizational Culture**
Focuses on theory and practice associated with the successful development of organizational culture. Topics covered include symbolic artifacts, beliefs, and assumptions that distinguish organizational, corporate, and occupational/professional identities. Related coverage of the communication practices (e.g., performance, ritual, etc.) through which the cultural elements of organizing are created, maintained and transformed. Special emphasis placed on issues of cultural leadership, cultural control, and cultural change in the contexts of contemporary globalization and technological innovation.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5420 (3) Knowledge Management**
Knowledge Management (KM) initiatives typically define knowledge as a commodity that is easily stored and transferred; explores how technological advancements and claims to knowledge ownership constitute management in KM. The course then presents alternative models of knowledge and management in which knowledge is understood as a component of communicative action, and management is portrayed as the construction of communities of practice that share responsibility for innovation.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5505 (3) Sports and Coaching Leadership**
Provides an understanding of the unique dynamics and structure of leadership in sports teams and organizations, as well as within the sports industry as a whole. It delves into the types of ethics-based leadership that create success in community, collegiate, professional, and Olympic teams and organizations. Topics include: coaching and player development, media relations, marketing, winning negotiations, sports and contract law, and venue management. Students will have the opportunity to view theory in practice at various sporting events, venues, and organizations, including the University of Colorado sports programs.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Recommended:** Prerequisite completion of MSOL core courses.
**Grading Basis:** Letter Grade

**ORGL 5506 (3) Leading Diversity, Equity, and Inclusion in Organizations**
This course critically interrogates leadership theory and practice to identify the most promising approaches to advancing diversity, equity, and inclusion within contemporary organizations. The course offers an increased understanding of organizations as social systems and how they function as powerful tools for either social stativity or transformation. Explore topics such as critical consciousness, systems thinking, intersectionality, racial capitalism, and social dominance. Students will be challenged to identify, analyze, and navigate socio-political structures in order to build an organizational culture that centers effectiveness, belonging, anti-racism, and social responsibility.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Recommended:** Prerequisite completion of MSOL core courses.
**Grading Basis:** Letter Grade

**ORGL 5605 (3) Leading Diversity, Equity, and Inclusion in Organizations**
This course critically interrogates leadership theory and practice to identify the most promising approaches to advancing diversity, equity, and inclusion within contemporary organizations. The course offers an increased understanding of organizations as social systems and how they function as powerful tools for either social stativity or transformation. Explore topics such as critical consciousness, systems thinking, intersectionality, racial capitalism, and social dominance. Students will be challenged to identify, analyze, and navigate socio-political structures in order to build an organizational culture that centers effectiveness, belonging, anti-racism, and social responsibility.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Recommended:** Prerequisite completion of MSOL core courses.
**Grading Basis:** Letter Grade

**ORGL 5900 (3) Special Topics in Organizational Leadership**
Variable topics of current interest in Organizational Leadership.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 5905 (3) Independent Study**
Independent study in the field of Organizational Leadership.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

**ORGL 6830 (3) Master's Capstone (MSOL)**
Taken at/near the end of the MSOL program, this course allows students to synthesize the theoretical knowledge acquired during the program to complete a basic business research project involving actual data in a realistic setting. Students will recognize/identify a problem; form a methodology for possible solution of an hypothesis; gather data; verify/test the hypothesis; and form implementable recommendations. Department consent required.
**Requisites:** Restricted to Organizational Leadership (ORGL-MS) students only.
**Grading Basis:** Letter Grade

# Outdoor Recreation (OREC)

## Courses

**OREC 5000 (2) Introduction to the Outdoor Recreation Economy**
In this course, the outdoor recreation economy is viewed holistically. Content in this course provides an introduction to public lands and natural resources policy, challenges and opportunities for community economic development, and the outdoor recreation industry. Discuss and critically examine Outdoor Recreation Economy definitions, theories, and frameworks and explore the diverse career opportunities that exist within the outdoor recreation industry. Key stakeholders are identified, along with current and future trends, opportunities, and challenges. The need for sustainable practices and cross-cultural understanding and communication within the outdoor recreation economy is also emphasized. Finally, we will explore the diverse career opportunities that exist within the outdoor recreation industry.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5001 (2) Sustainability Practices within the Outdoor Recreation Economy**
Explore sustainability practices that create a diverse, resilient, equitable, and just outdoor recreation industry. Focus on sustainability practices for outdoor products and businesses, tourism and guiding services, as well as communities and destinations. Various certi¿cation programs and processes for outdoor brands, companies and destinations that are relevant to the Outdoor Recreation Economy are examined, alongside broader social, environmental, and economic movements and factors in¿uencing the future trajectory of the Outdoor Recreation Economy. Examine best practices surrounding the implementation and communication of sustainability efforts.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5002 (2) Leading Sustainable Change in the Outdoor Recreation Economy**
Explore the relationship between self-awareness, personal purpose, and leadership. Focus on the building blocks of collaborative leadership and organizational ethics. Examine different philosophies of leadership and explore how to engage with diverse constituencies. Learn how to participate in ethical decision-making. Compare training, tools, and techniques to promote and endorse ethical professional behavior within organizations.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5003 (2) Outdoor Recreation Project Tools and Skills**
Project management skills are critical for anyone wanting to lead sustainable change. In this course, students will learn to assume responsibility for ensuring overall success of a project given an array of challenges with a focus on projects related to the outdoor industry. They will learn to apply their skill and knowledge, both of project management best practices as well as of team leadership, to ensure the successful progression and completion of the undertaking at hand. This remote, synchronous course will integrate project management concepts, knowledge, and skills to provide the foundational knowledge and a working understanding of project management processes, systems, tools, and leadership.
**Requisites:** Restricted to graduate students only.
**Recommended:** restricted to Outdoor Recreation Economy students.
**Grading Basis:** Letter Grade

**OREC 5004 (2) Environmental Justice and Stewardship**
Explore an interdisciplinary approach to environmental justice and stewardship. Learn how law, policy, and outdoor recreation practices are connected to class, gender, racial, and religious disparities. Learn how law and outdoor recreation practices can contribute to both environmental integrity and social equity. Issues of water justice, public lands, sacred sites, biodiversity, wildlife management, public health, and access to nature through broader outdoor recreation are also addressed.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5005 (2) Issues in Public Lands**
Explore the historical legacy, present controversies, and the projected future of public lands. Review the role that federal, tribal, state, and local governments play in the management of public lands and develop an understanding of the statutes governing public lands management and agency actions. Apply analytical lenses to understanding the drivers of conflict over public lands management using examples of place-based case studies, such as Bears Ears National Monument and the roadless rule in the Tongass National Forest. Learn from guest lectures with practitioners on current issues in public lands management, including the balance between outdoor recreation and conservation, inclusive access for all, and tribal consultation.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5006 (2) Issues in Natural Resources Management**
Address the challenge of managing natural resources within the increasingly complex context of climate change and development, while balancing diverse and competing values. Explore case studies across topics and geographies and apply theoretical and practical policy tools to address problems of natural resource policy and management for just and durable outcomes.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5007 (2) Public Lands and Natural Resources Policy Project**
The project course represents a culmination of the certificate where students apply the skills and knowledge gained from certificate subject courses to address current policy, business, or community development challenges in the outdoor recreation economy. Students have the opportunity to analyze, research, develop, and implement innovative strategies, processes and solutions on an experiential project related to public lands and natural resources policy in the outdoor recreation economy. Students work collaboratively with colleagues and may engage stakeholders.
**Requisites:** Requires prerequisite courses of OREC 5004, 5005, 5006 and 5017 (all minimum grade C). Restricted to graduate students only.
**Recommended:** restricted to Outdoor Recreation Economy students.

**OREC 5008 (2) Strategies for Resilient Outdoor Recreation Economy Communities**
Focuses on the various strategies that can be adopted to develop and grow a resilient outdoor recreation economy within a given place. Through critically examining these strategies and how they have been applied, the many and different ways in which the ORE can contribute to community economic development and building resilient communities is analyzed.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5009 (2) Resilient Communities and Business Development**
Communities and businesses are often on the front lines when it comes to climate change impacts and natural disasters. Resilient systems can enhance communities and ultimately lower costs for businesses. This course addresses public and private sector actions that can be taken to enhance resiliency for communities and businesses.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5010 (2) Tools for Resilient Outdoor Recreation Economy Communities**
Focuses on the practical community economic development tools that support the outdoor recreation economy and help build resilient communities. By studying these tools and how they¿re commonly used, their importance to a community¿s outdoor recreation economy and its resiliency will be more readily understood and appreciated.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5011 (2) Outdoor Recreation Economy Community Economic Development Project**
The project course represents a culmination of the certificate where students apply the skills and knowledge gained from certificate subject courses to address current policy, business, or community development challenges in the outdoor recreation economy. Students have the opportunity to analyze, research, develop, and implement innovative strategies, processes and solutions on an experiential project that addresses current community economic development challenges and/or opportunities resulting from the outdoor recreation economy. Students work collaboratively with colleagues and may engage stakeholders.
**Requisites:** Requires prerequisite courses of OREC 5018, 5008, 5010, and 5019 (all minimum grade C). Restricted to graduate students only.
**Recommended:** restricted to Outdoor Recreation Economy students.

**OREC 5012 (2) Strategic Leadership in the Outdoor Recreation Economy**
Develop the skills and tools to confront the unique opportunities and complex situations Outdoor Recreation Economy leaders inevitably face when making decisions that can affect the lives of investors, employees, community members, and other stakeholders. Analyze business decisions in a broad range of contexts utilizing considerations of ¿nancial performance, personal values, and the values of key stakeholders to develop individual decision-making frameworks for use in your career as you earn increasing levels of responsibility and decision-making authority. This course aims to help develop purpose-driven leaders who go out into the world and build lives and organizations that do both well and good.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5013 (2) Circular Economy and Integration of Sustainable Business Practices**
Explore the fundamentals of a circular economy, the business value in a circular economy, how business models are presently shifting, and most importantly, why businesses should become part of this transformational shift. Examine the tools and practices needed to set, implement, track, and communicate progress towards sustainability goals. Develop an understanding of sustainability measurement and the skills needed to critique and improve sustainability outcomes for businesses and their stakeholders. Knowledge and skills from this course can be used to build sustainability strategies with clear and measurable outcomes, and to develop actionable sustainability plans.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5014 (2) Outdoor Recreation Business Project**
The project course represents a culmination of the certificate where students apply the skills and knowledge gained from certificate subject courses to address current policy, business, or community development challenges in the outdoor recreation economy. Students have the opportunity to analyze, research, develop, and implement innovative strategies, processes and solutions on an experiential project related to current leadership and/or sustainability challenges resulting from the outdoor recreation economy within specific businesses. Students work collaboratively with colleagues and may engage stakeholders.
**Requisites:** Requires prerequisites courses of OREC 5012, 5013, 5015 and 5020 (all minimum grade C). Restricted to graduate students only.
**Recommended:** restricted to Outdoor Recreation Economy students.

**OREC 5015 (2) Building an Outdoor Recreation Enterprise**
Explore entrepreneurial skills and learn how to successfully build an outdoor recreation enterprise. Students examine the fundamentals of how to develop outdoor recreation business concepts in order to turn them into a successful enterprise.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5016 (2) Foundations of Environmental Law and Culture**
Explores the historical framework of environmental law and policy as it relates to federal, state, and tribal governments. Examine how cultural ideologies shape environmental law and how environmental law shapes cultural ideologies. Learn how environmental decision-making through law and policy is connected both directly and indirectly to outdoor recreation.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5017 (2) Environmental Movements, Alliances, and Legal Change**
Examine the nuances of past and ongoing environmental movements and trends with a focus on public land management, outdoor recreation, water allocation, tribal self-determination, access to nature, and environmental justice. Study how law and policies have changed over the years and explore legal strategies to ensure a more sustainable, inclusive, and principled relationship with nature and fellow citizens. Learn to anticipate where environmental disputes are likely to arise in relation to outdoor recreation, and explore potential opportunities for collaboration and resolution.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5018 (2) Community and Place Matters**
Explore the towns and communities that nurture and develop outdoor recreation businesses and amenities. Compare how communities provide a place for people to live, as well as the necessary infrastructure, resources and supporting facilities and services that make communities great places to live, work, visit and recreate. Examine the structure and organization of communities and the role of government and governance. Learn how the engagement and participation of community members in decision-making through democratic processes can influence the development of the outdoor recreation economy and community economic development outcomes.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5019 (2) Building Community Capacity and Readiness for the Outdoor Recreation Economy**
How can communities ensure that development is not something that just happens to them, but rather is something that is instigated from within? How can communities ensure that development builds upon community strengths and assets and re¿ects the needs and wants of its members? What skills, knowledge, and tools do communities need to have at their disposal in order to inspire action and take charge of their future and become more livable, resilient and sustainable? This course seeks to answer these questions by examining how communities can build their capacity for change through the outdoor recreation economy and take proactive steps to improve their economic prospects and quality of life. Focus on how to build community capacity and readiness for the successful development of the Outdoor Recreation Economy. Emphasis is given to the different methods of building community capacity to ensure communities are in the best position to address challenges. Although every community is unique and the process of comm
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5020 (2) The Business of Outdoor Recreation**
Examine the outdoor recreation industry and the operational life-cycle of outdoor recreation businesses. Focus on identifying and understanding industry-critical functions and interdependencies such as manufacturing, product development, branding, selling and distributing outdoor recreation products, and current and future trends.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5021 (2) Foundations of Inclusivity in the Outdoor Recreation Economy**
We start by creating a safe space for deep learning, honest exploration, and open dialogue. This course will expand your knowledge and understanding of Diversity, Equity, and Inclusion (DEI). Everyone has the right to be treated fairly with dignity and respect. These are our human rights. Building a community, work environment, and society that is diverse, inclusive, equitable, and just requires a foundation from which to develop. DEI is an ongoing learning process and requires commitment, personal leadership, and accountability. This course will enable students to be a part of developing an inclusive foundation for their respective organizations and communities with knowledge, tools, and best practices from global leaders within the outdoor recreation economy and beyond. The course sets the intention to be a stepping stone to help break down the barriers to entry and participation while creating a more inclusive natural environment where all people can not only feel welcome but encouraged to become active p
**Requisites:** Restricted to graduate students only.

**OREC 5022 (2) Cultivating Belonging and Accountability in the Outdoor Recreation Economy**
Research shows that promoting diversity alone does not ensure a culture of inclusion and belonging. In this course, we work to create a secure and supportive environment for deep learning, honest exploration, and open dialogue. Belonging is a fundamental aspect of human existence and plays a crucial role in creating inclusive environments. This course aims to enhance your understanding and knowledge of how to center belonging as a part of Diversity, Equity, and Inclusion efforts in organizations (the workplace), communities, and within. Finally, this course explores the importance of accountability by focusing on 3 of the 5 success factors for DEIB (Diversity, Equity, Inclusion, and Belonging) integrated work: Having a meaningful definition of success, accountable and invested business leaders, and rigorous tracking and course correction.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5023 (2) Inclusive Leadership and Conscious Change in the Outdoor Recreation Economy**
Through the practice of inclusive and conscious leadership, we shift our focus from "I" to "We," igniting interconnectedness across all aspects of life and work. The journey begins with the self-awareness to drive meaningful change. This course provides a framework for transitioning from inclusive leadership to intentional and transformative change within organizations, communities, and personal growth journeys. It examines how leadership contributes to the five fundamental success factors of DEIB integration.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5024 (2) Social Justice and Equity in the Outdoor Recreation Economy**
Designed to provide students with a comprehensive understanding of the multifaceted forces that have shaped diverse communities, both historically and in the contemporary context. By the end of this course, students will possess the knowledge and analytical skills necessary to contribute meaningfully to discussions and actions aimed at advancing social justice and equity in the ORE and beyond.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5025 (2) Inclusivity and Belonging in the Outdoor Recreation Economy Project Course**
In this course, students apply the concepts, knowledge, and skills gained in the other courses within this certificate to complete a real-world project. Students analyze, research, develop and implement innovative strategies, processes and designs, and solutions as relevant to the outdoor recreation economy. This course has an experiential foundation and requires collaboration with colleagues, stakeholders, and partner organizations.
**Requisites:** Requires prerequisite courses of OREC 5021, 5022, 5023 and 5024 (all minimum grade C). Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 5030 (4) Concepts and Practice in the Outdoor Recreation Economy: Project Course**
In this course, which is experiential and workshop-driven, students will apply the concepts, knowledge, and skills gained in the other courses through their degree to complete an applied project with an external project partner. Students will analyze, research, develop, and implement innovative strategies, processes, and/or solutions to a defined problem related to the Outdoor Recreation Economy. This course will require collaboration with an external organization, a teammate(s), and ORE instructors.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**OREC 6100 (1-4) Special Topics for Outdoor Recreation Economy**
A variety of topics not currently offered in curriculum; offered depending on instructor availability and student demand.
**Repeatable:** Repeatable for up to 18.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

# Peace and Conflict Studies (PACS)

## Courses

**PACS 2500 (3) Introduction to Peace, Conflict and Security Studies**
Introduces the related fields of peace, conflict and security studies. Examines causes and dynamics of conflict and violence (interpersonal to global). Examines theory and research concerning peace movements, conflict resolution and security institutions. Explores career options in related fields.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective Arts Sci Gen Ed: Distribution-Social Sciences

**PACS 3540 (3) Migration, Human Rights, and Conflict in the Mediterranean**
Faculty-led Global Seminar, based in Malta, provides the opportunity to study social, political, and economic issues surrounding international migration, Focuses on causes and consequences of recent migration flows from nations in the Middle East and Sub-Saharan Africa to European nations located in the Eastern Mediterranean. Students will interact with representatives of state governments, NGOs, and activist groups, and learn about the rich culture and history of Malta as a pivotal state promoting international diplomacy and regional security.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3540
**Requisites:** Requires prerequisite course of PACS 2500 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective

**PACS 3700 (3) Communication and Conflict Management**
Examines interdisciplinary concepts and theories enabling students to better understand different types of conflict, sources of conflict, and communication patterns that serve to create, maintain and transform conflict. Teaches practical skills in conflict management areas such as bargaining, facilitation, mediation and negotiation.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite PACS 2500.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PACS 3800 (3) Security Studies**
Provides an introduction to the academic field of "Security Studies". Focuses on motives, institutions and processes associated with societal defense against threats posed to cherished possessions and the pursuit of stable, autonomous and prosperous existence. Reviews related theoretical traditions associated with militarism, war and conflict. Covers key concerns of (in-)security in post 9/11 global society, including surveillance, terrorism, genocide and insurgency.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PACS 3850 (3) International Conflict Resolution and Peacebuilding**
Provides an introduction to the interdisciplinary field of international conflict resolution and peacebuilding. Provides tools for analyzing and intervening in contemporary manifestations of violent social conflict. Argues for an approach to international affairs rooted in more nuanced understandings of the nature of violent conflict and its dynamics. Bases the quest to build sustainable peace not on military supremacy or coercive diplomacy, but rather the ability of states and peoples to work collaboratively to develop mutually beneficial solutions aimed at the satisfaction of basic needs, collective security, political representation, and respect for human dignity. Explores how international conflicts are mitigated, contained, and resolved through processes such as DDR (disarmament, demobilization, and reintegration), citizen diplomacy, and reconciliation.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3850
**Recommended:** Prerequisite PACS 2500.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective

**PACS 3860 (3) Environmental Conflict and Conflict Resolution**
This course focuses on the environment as a source of conflict in international and intranational contexts. Considers natural resource scarcity and extraction as causes of conflict and violence, the growing phenomenon of climate-change-induced migration, as well as the effects of war on the environment. Prospects for conflict intervention involving multiparty stakeholders, international cooperation, and environmentally sustainable development practices are explored as methods for resolving these situations.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PACS 3870 (3) Nonviolent Civil Resistance: Movements and Strategies**
Explores the development of nonviolent practices for creating social change. Examines cases from around the globe, both historical and contemporary, to understand the reasons actors form social movements, as well choices in tactics and strategies associated with nonviolent civil resistance to achieve their aims. Special attention is paid to the relationship between community organizing, social movement activism, and nonviolent revolution.
**Recommended:** Prerequisite PACS 2500.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PACS 4000 (3) Special Topics in Peace, Conflict and Security Studies**
Upper division umbrella seminar spanning a variety of topics relevant to the study of peace, conflict and security related issues. Subjects addressed under this heading vary according to student interest and faculty availability.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Recommended:** Prerequisite PACS 2500, PACS 3700 or PACS 3850.
**Grading Basis:** Letter Grade

**PACS 4100 (3) Managing Organizational Conflict**
This course introduces students to organizational conflict from a leadership perspective, the facilitative role leaders play in conflict intervention, and how leadership styles can affect organizational dynamics. Engaging with conflict productively requires leaders to recognize relational and structural factors that generate conflict. Leaders must guide difficult conversations and manage a range of situations. This includes challenges such as working in teams, remote/hybrid formats, cultural dimensions, and those related to gender discrimination and racial harassment.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite PACS 3700 or PACS 3860.
**Grading Basis:** Letter Grade

**PACS 4150 (3) Mediation Skills**
This 3-credit seminar trains students in facilitative mediation. The essential skills learned in this course are for anyone interested in helping people navigate, manage, and resolve conflicts in personal and professional settings. Students will engage in hands-on, experiential learning, participating in role plays and other exercises designed to teach them the basics of mediation as well as how to strengthen their communication and listening skills while working with those experiencing conflict. Formerly offered as a special topics course.
**Recommended:** Prerequisite PACS 3700.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PACS 4500 (3) Senior Seminar: Research in Conflict Contexts**
Course prepares students interested in working in the field of peace, conflict, and security studies with necessary research skills to navigate conflict contexts and collaborate with conflict-affected populations. Students conduct in-depth research projects, and develop data collection and analysis skills, specifically focusing on interviews, surveys, and secondary sources. Emphasizes use of critical thinking skills in writing, presentations, and class discussion, as well as explores ethical considerations faced in conflict zones.
**Recommended:** Prerequisite course of PACS 2500, PACS 3700, PACS 3850, or PACS 3860 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PACS 4900 (3) Undergraduate Independent Study**
Provides opportunities for independent study at the upper-division undergraduate level. Students work on research or a creative project guided by PACS faculty. May only be taken once for 3 credit hours. Department consent required prior to registration.
**Requisites:** Requires prerequisite courses of PACS 2500 and PACS 3700 or PACS 3850 (minimum grade C). Restricted to students with 57-180 credits (Junior or Seniors).
**Recommended:** Prerequisite C average or higher in all PACS coursework and enrollment in the PACS Certificate Program.
**Grading Basis:** Letter Grade

# Performance Music (PMUS)

## Courses

**PMUS 1105 (1) Keyboard Musicianship 1**
Introduces the keyboard, music reading in the treble and bass clefs, basic theory and keyboard harmony, technical patterns, and improvisation. Studies easy classical and pop repertoire.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard Musicianship

**PMUS 1117 (2) Musical Theatre Studio I**
Explores creativity, collaboration, and communication in the craft of acting both in musical theatre and stage acting, specifically directed to the Musical Theatre degree student. Focuses on terms and concepts of psychological realism fundamental to the actors' process through solo work and ensemble exercises. Emphasis on developing a character through analysis and scene study. Various acting modalities will be introduced.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 1117
**Requisites:** Restricted to BFA Musical Theatre and BM Musical Theatre students only.
**Grading Basis:** Letter Grade

**PMUS 1184 (1) Voice Class**
Involves basic vocal technique and easy solo repertoire taught through a group medium, for beginner and intermediate level students.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Voice

**PMUS 1205 (1) Keyboard-Musicianship 2**
Continuation of PMUS 1105.
**Requisites:** Requires prerequisite course of PMUS 1105 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard Musicianship

**PMUS 1217 (2) Musical Theatre Studio II**
Explores creativity, collaboration, and communication in the craft of acting both in musical theatre specifically directed to the Musical Theatre degree student. Focuses on terms and concepts of psychological realism fundamental to the actors' process through solo work and ensemble exercises. Emphasis on developing a character through analysis and scene study. This course is a continuation of PMUS 1117.
**Requisites:** Requires prerequisite course of PMUS 1117 (minimum grade D-). Restricted to College of Music BM/MT majors and BFA Musical Theatre (TBFA-BFA) students only.
**Grading Basis:** Letter Grade

**PMUS 1305 (3) International Chamber Music Seminar**
Study, learn, and perform works of chamber music literature particularly from the U.S. and the destination country, and be immersed in the culture of that country.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Recommended:** admission by audition.

**PMUS 1406 (2) Applied Songwriting**
Fosters the songwriting student's creative work and develops the individual artistic voice/vision through one-on-one interaction. Assesses the songwriting student's progress and prepares the songwriting student for recording and/or performance of his/her music.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Prerequisite of Basics of Songwriting MUSC 1051. Restricted to College of Music (MUSCU) undergraduate students only.

**PMUS 1515 (2) Jazz Piano Class**
Offers small group instruction in the concepts and skills required to learn jazz piano. Students not only learn basic techniques required to play jazz but also become familiar with the theory, grammar, and lexicon of the jazz language. Offered fall only.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Requires prerequisite course of PMUS 1205 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard Musicianship

**PMUS 1726 (2-4) Voice**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.

**PMUS 1886 (2-4) Jazz Voice**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**PMUS 2044 (3) Foundational Musical Theatre Styles**
Investigates foundational styles and performative and physical tags. Students will identify and perform a variety of Musical Theatre repertoire, including European Operetta, Gilbert and Sullivan, Musical Comedy, Rock, Popsical, and Contemporary styles. Focuses on the connection between voice, breath and body and its importance to these styles.
**Requisites:** Restricted to BFA Musical Theatre and BM Musical Theatre students only.
**Grading Basis:** Letter Grade

**PMUS 2105 (1) Keyboard-Musicianship 3**
Continuation of PMUS 1205.
**Requisites:** Requires prerequisite course of PMUS 1205 (minimum grade D-). Restricted to College of Music (MUSCU) majors only.
**Additional Information:** Departmental Category: Keyboard Musicianship

**PMUS 2117 (2) Musical Theatre Studio Class III**
Explores the creation of extended musical theatre performance using acting, movement and vocal techniques, with an emphasis on the ensemble. Topics: finding the arc of a role, staging techniques for small and large ensembles, rehearsal and performance skills for a range of contexts from summer stock to Broadway.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 2117
**Requisites:** Requires prerequisite course of PMUS 1217 (minimum grade D-). Restricted to College of Music Undergraduates (MUSCU) and BFA Musical Theatre (TBFA-BFA) students only.
**Grading Basis:** Letter Grade

**PMUS 2184 (1) Voice Class**
Continuation of PMUS 1184, with more advanced repertoire and vocal techniques.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of PMUS 1184 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Voice

**PMUS 2205 (1) Keyboard-Musicianship 4**
Continuation of PMUS 2105.
**Requisites:** Requires prerequisite course of PMUS 2105 (minimum grade D-). Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Keyboard Musicianship

**PMUS 2406 (2) Applied Songwriting**
Fosters the songwriting student's creative work and develops the individual artistic voice/vision through one-on-one interaction. Assesses the songwriting student's progress and prepares the songwriting student for recording and/or performance of his/her music.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Prerequisite of Basics of Songwriting MUSC 1051. Restricted to College of Music (MUSCU) undergraduate students only.

**PMUS 2726 (2-4) Voice**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**PMUS 2886 (2-4) Jazz Voice**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**PMUS 3117 (2) Musical Theatre Studio Class IV**
Explores the development of solo performance sets of songs in cabaret and small theatre venues incorporating a range of musical styles. Topics include: How to create an audition video, Commercial auditions, Conceive, construct and perform a cabaret and/or small theatrical event, and how to collaborate with a musical production team.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 3117
**Requisites:** Requires prerequisite course of PMUS 2117 (minimum grade D-). Restricted to College of Music Undergraduates (MUSCU) and BFA Musical Theatre (TBFA-BFA) students.
**Grading Basis:** Letter Grade

**PMUS 3167 (3) Opera Theatre Stagecraft**
Introduction to the processes, materials, and equipment used in theatrical production. Lecture and lab requirements. Lab experiences include introductory work in the opera scenery, property, costume, and electrical shops.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Voice

**PMUS 3305 (3) International Chamber Music Seminar**
Study, learn, and perform works of chamber music literature particularly from the U.S. and the destination country, and be immersed in the culture of that country.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Recommended:** Admission by audition.

**PMUS 3406 (2) Applied Songwriting**
Fosters the songwriting student's creative work and develops the individual artistic voice/vision through one-on-one interaction. Assesses the songwriting student's progress and prepares the songwriting student for recording and/or performance of his/her music.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Prerequisite of Basics of Songwriting MUSC 1051. Restricted to College of Music (MUSCU) undergraduate students only.

**PMUS 3886 (2-4) Jazz Voice**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**PMUS 4105 (1) Supervised Accompanying**
Assigned projects, both vocal and instrumental, are coached by collaborative piano faculty and others. May involve recital, jury, or master class performances.
**Repeatable:** Repeatable for up to 10.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of MUSC 1325 and MUSC 2365 (all minimum grade D-). Restricted to College of Music students only.
**Additional Information:** Departmental Category: Keyboard Musicianship

**PMUS 4117 (2) Musical Theatre Studio V**
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4193
**Requisites:** Restricted to College of Music undergraduates (MUSCU) and BFA Musical Theatre (TBFA-BFA) students only.
**Grading Basis:** Letter Grade

**PMUS 4137 (1) Opera Theatre 1**
Addresses issues related to young artist development. Areas of concentration include (but are not limited to) acting technique, resume preparation, audition technique, scene analysis, and role preparation. The acting technique is addressed in this course through textbook reading and exercise.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Voice

**PMUS 4147 (1) Opera Theatre 2**
Continuation of PMUS 4137. Further scene analysis andmovement exercises are addressed in this class.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Voice

**PMUS 4157 (1-3) Opera Practicum**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Voice

**PMUS 4167 (1-3) Opera Theatre Lab**
Advanced work in the scenery, property, costume, and electrical shops in opera performance. Additional experiences may include positions with opera run crews, the box office, or other supporting areas.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Voice

**PMUS 4257 (1) Musical Theatre Performance/Ensemble Practicum**
Enables students to perform in musical theatre productions produced by the BM/MT degree program in varied roles. Students will perform in a variety of musical styles ranging from Operetta to Broadway musicals. They will work with a broad range of theatre professionals each semester and learn multiple stage techniques. A 'working theatre ensemble' model will be emphasized throughout the course.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Grading Basis:** Letter Grade

**PMUS 4271 (2) Improvisation Basics**
Designed to introduce students to the basics of improvisation through 4 different modules of study: Jazz, Classical/Baroque, Free Improv and The Americas. Students will gain experience and confidence in areas of improvisation through study, listening and performance of the 4 areas of improvisation covered in the course.
**Equivalent - Duplicate Degree Credit Not Granted:** PMUS 5271
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**PMUS 4406 (2) Applied Songwriting**
Fosters the songwriting student's creative work and develops the individual artistic voice/vision through one-on-one interaction. Assesses the songwriting student's progress and prepares the songwriting student for recording and/or performance of his/her music.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Prerequisite of Basics of Songwriting MUSC 1051. Restricted to College of Music (MUSCU) undergraduate students only.

**PMUS 4425 (1) Tuning and Temperaments**
Teaches harpsichordists how to tune by ear (unisons and octaves), how to select historical temperaments, and how to create an appropriate tuning for selected repertoire.
**Equivalent - Duplicate Degree Credit Not Granted:** PMUS 5425
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**PMUS 4497 (1-2) Vocal Repertoire Coaching**
Group coaching class to prepare for voice recitals as well as to learn vocal repertoire including historical background, composers, styles, and poetic interpretation.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Voice

**PMUS 4517 (2) Orchestral Repertoire**
Prepares students for pre-professional and professional auditions commonly encountered after completing undergraduate studies in music. Through score study, listening sessions, individual string group coaching, and mock auditions, students will gain familiarity with standard orchestral repertoire, strokes, styles, and performance practices. Emphasis will be placed on ensemble playing, section responsibilities, audition preparation techniques, and general orchestral citizenship concepts.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSC) majors or graduate students only.
**Additional Information:** Departmental Category: Choral and Instrumental Music

**PMUS 4886 (2-4) Jazz Voice**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**PMUS 5137 (2) Opera Theatre 1**
Addresses issues related to young artist development at the graduate level. Areas of concentration will include (but are not limited to) acting technique for singers, resume preparation and scene and character analysis. Students will participate in acting and improvisation exercises. Substantial classical voice study is required.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Prerequisite Voice Majors only.
**Additional Information:** Departmental Category: Voice

**PMUS 5147 (2) Opera Theatre 2**
Continuation of PMUS 5137.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Voice

**PMUS 5184 (1) Graduate Voice Class**
Teaches solo and choral singing and vocal modeling. Designed for choral and music education graduate students. Instructor consent required.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Voice

**PMUS 5271 (2) Improvisation Basics**
Designed to introduce students to the basics of improvisation through 4 different modules of study: Jazz, Classical/Baroque, Free Improv and The Americas. Students will gain experience and confidence in areas of improvisation through study, listening and performance of the 4 areas of improvisation covered in the course.
**Equivalent - Duplicate Degree Credit Not Granted:** PMUS 4271
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PMUS 5305 (3) International Chamber Music Seminar**
Study, learn, and perform works of chamber music literature particularly from the U.S. and the destination country, and be immersed in the culture of that country.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Admission by audition.

**PMUS 5425 (1) Tuning and Temperaments**
Teaches harpsichordists how to tune by ear (unisons and octaves), how to select historical temperaments, and how to create an appropriate tuning for selected repertoire.
**Equivalent - Duplicate Degree Credit Not Granted:** PMUS 4425
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PMUS 5497 (1-2) Vocal Repertoire Coaching**
Group coaching class to prepare for voice recitals as well as to learn vocal repertoire including historical background, composers, styles, and poetic interpretation. Class may fulfill voice literature requirements when appropriate classes are not offered. Also available: weekly individual coaching to prepare for voice recitals and other projects. Diction, musical styles, and interpretation (music and text) are the main focus of this course. For graduate voice students and collaborative pianists.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Additional Information:** Departmental Category: Voice

**PMUS 5526 (2-3) Composition**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PMUS 5536 (2-4) Intermed Conducting**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PMUS 5566 (2-3) Guitar**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PMUS 5576 (2-3) Harp**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PMUS 5586 (2-3) Harpsichord**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PMUS 5626 (2-3) Percussion**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PMUS 5726 (2-3) Voice**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PMUS 5886 (1-3) Jazz Voice**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.

**PMUS 6305 (3) International Chamber Music Seminar**
Study, learn, and perform works of chamber music literature particularly from the U.S. and the destination country, and be immersed in the culture of that country.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.
**Recommended:** Admission by audition.

**PMUS 6506 (2-3) Bassoon**
**Repeatable:** Repeatable for up to 12.00 total credit hours.

**PMUS 6516 (2-3) Clarinet**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PMUS 6556 (2-3) Flute**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PMUS 6596 (2-3) Horn**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PMUS 6606 (2-3) Oboe**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PMUS 6696 (2-3) Viola**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PMUS 6706 (2-3) Violin**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PMUS 6716 (2-3) Violoncello**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PMUS 6726 (1-3) Voice**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PMUS 6886 (1-3) Jazz Voice**
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.

# Philosophy (PHIL)

## Courses

**PHIL 1000 (3) Introduction to Philosophy**
Discusses fundamental questions concerning human existence and the nature of reality. Questions may include: Does God exist? Am I the same person I was when I was born? Will I survive the death of my body? Do I have free will? How do I know whether the world around me really exists? What is knowledge? What is truth? What is morality, and how do I know what¿s right to do?
**Additional Information:** GT Pathways: GT-AH3 - Arts Hum: Ways of Thinking
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1010 (3) Introduction to Western Philosophy: Ancient**
Introduces major philosophical ideas originating in ancient Greece, including the concepts of eudaimonia (happiness), sophia (knowledge), philosophia, psychê (soul), aretê (virtue), erôs (love), and democracy, placing these in historical context and relating them to subsequent philosophical developments. Topics may include the nature of happiness; why philosophy and democracy flourished in ancient Greece; the ancient Greek origins of science; whether being a virtuous person makes you happier; and ancient Greek thinking about life, love, and death.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 1030
**Additional Information:** GT Pathways: GT-AH3 - Arts Hum: Ways of Thinking
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1020 (3) Introduction to Western Philosophy: Modern**
Introduces philosophy through core ideas of the seventeenth and eighteenth centuries, examining Enlightenment-era controversies such as: What are the foundations of scientific thinking? How does sense perception contribute to knowledge? How do we explain the movement of bodies in the natural world? What, if anything, is God¿s role in nature? How do societies form, and how should they be governed? Are human beings free? If so, how is human freedom compatible with political authority?
**Additional Information:** GT Pathways: GT-AH3 - Arts Hum: Ways of Thinking
Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1030 (3) Introduction to Global Philosophy**
Examines and compares different approaches to philosophy from across the globe, including Indian, Chinese, African, Islamic, Judaic, and European traditions. Topics may include: the nature of the self and reality, the foundations and limits of human knowledge, the role of the individual in the political community, the basic principles of ethics, and the meaning of life as a whole.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1040 (3) Introduction to African Philosophy**
Introduces the philosophical ideas of several African ethnic groups and contemporary African philosophers, also exploring cross-cultural comparisons between African philosophy and the Western tradition, with special attention to historical context and the post-colonial condition. Topics may include both methodological differences between African and Western philosophy and fundamental philosophical questions concerning human existence, such as the nature and value of persons, knowledge, custom and morality, human rights, and meaning.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1100 (3) Ethics**
Introduces students to moral philosophy by having them study and evaluate prominent moral theories and their application to a selection of real-world moral problems. Theories studied may include utilitarianism, rights theory, virtue ethics, social contract theory, divine command theory, cultural relativism, and natural law theory. Social problems covered may include abortion, world poverty, animal rights, reparations for slavery, gun rights, or similar such controversies.
**Additional Information:** GT Pathways: GT-AH3 - Arts Hum: Ways of Thinking
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1160 (3) Introduction to Medical Ethics**
Introduces students to moral dilemmas in medical practice, biomedical research, and health policy, placing them in the context of comprehensive ethical theories and core principles of bioethics. Topics may include: euthanasia; abortion; organ procurement; moral status; research on nonhuman animals; navigating cultural differences between patients and health professionals; and the fair distribution of healthcare resources; as well as the bioethical issues arising from technological advances in medicine, including genetic engineering, cloning, and assistive reproductive technologies.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1200 (3) Contemporary Social Problems**
Examines competing positions in debates over a wide variety of controversial moral, social and political issues. Topics may include: abortion, world poverty, animal rights, immigration, physician-assisted suicide, freedom of religion, hate speech, cloning, income inequality, pornography, gun rights, racial profiling, capital punishment, overpopulation, prostitution, drug legalization, torture. Formerly titled 'Philosophy and Society.'
**Additional Information:** GT Pathways: GT-AH3 - Arts Hum: Ways of Thinking
Arts Sci Core Curr: Ideals and Values
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
MAPS Course: Social Science

**PHIL 1250 (3) Poverty, Power, and Patriotism: Issues of Global Justice**
Explores justice (and injustice) in global and local contexts, introducing students to major traditions in political philosophy and core concepts like equality, liberty, reciprocity, and distributive justice. Specific topics may include: racism; sexism; reparations; colonialism; famine; immigration; patriotism; exploitation; labor justice; climate change; terrorism; and war. Relates political topics in U.S. society to their global context, challenging students to consider marginalization along axes of race, gender, and class across cultural boundaries.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**PHIL 1350 (3) Knowledge, Mind, and Reality**
Introduces philosophy by exploring fundamental questions concerning the nature of reality and our knowledge. Possible questions include: Does God exist? Are you the same person you were when you were born? Does the past exist? Are we free to choose our actions? Is the mind something distinct from the body? Can a computer think? How can we know anything at all?
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1400 (3) Philosophy and the Sciences**
Considers philosophical topics and concepts related to the natural sciences, such as the following: science and pseudo-science; scientific method; the nature of explanation, theory, confirmation, and falsification; the effect of science on basic concepts like mind, freedom, time, and causality; ethics of experimentation; and the relation of science to society.
**Additional Information:** GT Pathways: GT-AH3 - Arts Hum: Ways of Thinking
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHIL 1440 (3) Critical Thinking**
Develops students' skills in evaluating arguments and other aspects of critical thinking, focusing on the ways people reason and attempt to justify their beliefs. Activities may include modeling arguments, detecting common fallacies, examining the use (and misuse) of scientific evidence, and learning the basics of symbolic logic. Formerly titled "Introductory Logic.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1500 (3) Reading, Writing and Reasoning**
Teaches students how to write argumentative papers. Each seminar will focus narrowly on some controversial topic. For example, one seminar might focus on the existence of God, whereas another might question whether we have free will. In all cases, a significant portion of the course will be devoted to learning how to write cogent argumentative papers about controversial topics.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Lower

**PHIL 1600 (3) Philosophy and Religion**
Philosophical introduction to some of the central concepts and beliefs of religious traditions, focusing particularly on the question of the existence of God and on the relation between religious beliefs and moral beliefs.
**Additional Information:** GT Pathways: GT-AH3 - Arts Hum: Ways of Thinking
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**PHIL 1700 (3) Philosophy and the Arts**
Explores controversial questions in aesthetics (philosophy of art), such as: What counts as art? What makes art, music, or even the natural world beautiful? What¿s the proper way to appreciate beauty? Do some people have better taste in music or art than others? If so, what does ¿good taste¿ mean? Is pop music bad? What about cultural appropriation? Is it wrong when, e.g., white people perform music traditionally associated with black culture?
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1750 (3) Philosophy through Literature**
Introduces philosophy through literature. Selected novels, plays, and short stories that exemplify traditional problems in philosophy are read and discussed.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 1800 (3) Open Topics/Philosophy**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2140 (3) Environmental Justice**
Studies the intersection of environmental health and social justice, examining how political and economic institutions affect our planet and considering environmental problems in light of social problems that produce them. Topics may include sustainable development, climate justice, responsibility to future generations, global poverty, environmental racism, and the relation between economic systems (e.g., capitalism) and environmental concerns. Part philosophy, part policy, this class weaves together moral and factual issues, addressing fairness, rights, equality, and responsibility.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2150 (3) Ethics and Sex**
Explores a variety of moral questions relating to sex and procreation. Topics may include arguments for and against the wrongness of masturbation, incest, pedophilia, bestiality, necrophilia, voyeurism, pornography, sadomasochism, prostitution, abortion, commercial surrogacy and cloning, as well as arguments addressing such additional subjects as what constitutes rape and whether procreation is morally obligatory, optional, or forbidden.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2160 (3) Ethics and Information Technology**
Examines contemporary ethical issues concerning the use, misuse, and development of information technologies, with particular focus on the consequences such changes may have on the lives of individuals and on the shape of societies. Topics may include hacking and cyber crime; artificial intelligence; robotics and automation technologies, such as drones and self-driving cars; mass surveillance; use of personal information by corporate, law enforcement, and media interests; as well as gaming and virtual reality.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**PHIL 2170 (3) Ethics and Economics**
Examines a variety of perspectives on problems at the intersection of ethics and economics, using both empirical data and moral reasoning to evaluate arguments concerning topics such as: government regulation of private industry, protectionist economic policies, fair work compensation, retirement benefits, and access to health care.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2200 (3) Major Social and Political Theories**
Explores fundamental questions concerning the nature and legitimacy of major social and political institutions. Topics may include the nature of freedom; the meaning and value of democracy; competing conceptions of justice; the basis of political authority; civil disobedience; human dignity and individual rights; social conflict, tyranny, and war; just and unjust distributions of wealth; the relation between ethics and politics; the nature of political belief; and arguments for and against socialism, communism, libertarianism, and anarchism.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2220 (3) Philosophy and Law**
Considers controversies about the law in general and the U.S. system in particular. Questions may include: What is law? What should the law prohibit (e.g., abortion, drug use, prostitution, cloning)? Is there a moral obligation to obey the law? Can civil disobedience be justified? How do we justify punishing those who break the law? Is capital punishment morally justifiable?
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2240 (3) Philosophy and Sports**
Introduces students to philosophical issues surrounding sport. Topics may include: paying college athletes, sex testing in sports, the use of performance enhancing drugs, sports and gambling, the nature and value of sports and sportsmanship, gender equity and sports, the ethics of strategic fouling, sports fandom, the coach-athlete relationship, athletes as role models, and the risk of extreme bodily harm.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences

**PHIL 2250 (3) Philosophy and Video Games**
Introduces philosophical issues raised in and by video games. Students will discuss ethical, aesthetic, and/or metaphysical questions such as: Is it okay to engage in otherwise immoral behavior (like violence or murder) in video games? What do in-game choices say about you? What is the relationship between you and your avatar? Is gaming culture misogynistic? Are video games art? Is virtual reality ¿real¿? Is social media a kind of video game?
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2260 (3) Philosophy and Food**
Introduces students to topics and issues connected to the nature of food. Helps students investigate questions about our food choices, production and distribution, as well as connection food bears to culture and identity. No previous experience in philosophy required or presupposed.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2270 (3) Philosophy and Race**
Explores the historical relationship between western philosophy and race and investigates the ways in which philosophy can be used to address contemporary racial issues.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Diversity-U.S. Perspective

**PHIL 2290 (3) Philosophy and Gender**
Analyzes critically the concepts of sex, gender, and their intersection with other aspects of identity, exploring how these impact the extent to which people face injustice because of their gender.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 2290
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Diversity-U.S. Perspective

**PHIL 2380 (3) Philosophy and Psychiatry**
Introduces problems at the intersection of psychiatry and philosophy, combining philosophy¿s critical thinking tools with psychiatry¿s empirical grounding. Considers theoretical problems (What is mental disorder? Is there a boundary between normality and psychopathology at all? Is autism, e.g., a disorder?), as well as ethical problems (Is it permissible to administer psychiatric treatment against a patient¿s will? Is it permissible to amputate the limb of a patient with Body Integrity Dysphoria who strongly desires the amputation?).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2390 (3) Philosophy and Psychology**
Interdisciplinary course on issues where philosophy and psychology meet. For example, topics such as selfhood, motivation, psychotherapy, freedom, and human behavior are examined. Selected readings in philosophy and psychology are required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2440 (3) Symbolic Logic**
Introduces students to sentential logic, the logic of quantification and some of the basic concepts and results of metalogic (interpretations, validity and soundness).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2490 (3) The Power of Words**
Discusses philosophical problems about language and how our using it shapes the world. Topics may include: what language is, what we can do with words, how social norms affect meaning and communication, the relationship of language to features of the social world like race, gender, and ideology, the nature of speech acts, hate speech, propaganda, pejoratives, slurs, freedom of speech, humor, deception, translation, how language conveys thoughts, and how language shapes thought.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2710 (3) Philosophy and Film**
Introduces students to issues in philosophy through film, including consideration of film itself as an artistic medium. Students will watch films and wrestle with the philosophical problems they present. Topics will vary according to film selection and may include: the distinction (if any) between high and low art; aspects of film production that support or create aesthetic value; and how (if at all) film can and should be used to foment socio-political change.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2750 (3) Philosophy and Science Fiction**
Explores philosophical issues in science fiction literature and film. Topics may include time travel, artificial intelligence, free will, personal identity, and how scientific advances will change human life and society. Students may read science fiction stories and philosophical articles, and watch several movies.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2800 (3) Open Topics/Philosophy**
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 2840 (1-3) Independent Study**
Department-enforced prerequisite: 6 hours of philosophy course work (minimum grade D-).
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Philosophy (PHIL) majors or minors with 27-180 credits (Sophomores, Juniors, Seniors) only.

**PHIL 3000 (3) History of Ancient Philosophy**
Surveys developments in metaphysics, ethics, logic, and philosophy of mind from the Pre-Socratics through Hellenistic philosophy, focusing primarily on the arguments of the philosophers. Topics may include: Zeno¿s paradoxes of time and motion; Democritean atomism; Plato on knowledge, reality, ethics, and politics; Aristotle on logic and natural philosophy; Epicurus on pleasure and friendship; Epicurean atomism; the Stoics on materialism, determinism, and vagueness; and the coherence and practicality of global skepticism.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of philosophy coursework.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3010 (3) History of Modern Philosophy**
Introduces modern philosophy, focusing on the period from Descartes through Kant. In addition to careful analysis of philosophical arguments, attention is paid to the ways in which philosophers responded to and participated in major developments in the 17th and 18th century, such as the scientific revolution.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of philosophy coursework.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3030 (3) Asian Philosophies**
Explores various topics in Asian philosophy. Students will be exposed to and critically engage with a range of ethical, metaphysical, epistemological, and other philosophical issues in Chinese, Indian, and other Asian traditions, including discussion of how major Asian traditions relate to other approaches to philosophy. Specific topics and themes vary from term to term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3040 (3) African Philosophy: Personhood and Morality**
Examines conceptions of personhood, humanity, and morality among several African ethnic groups (including the Akan and Nso), employing a comparative approach that challenges traditional Western philosophical presuppositions and builds sensitivity to unfamiliar conceptions of morality and politics. Gives special attention to the effects of history, geography, and the environment on different societies¿ ways of conceptualizing ethical questions. Topics include human rights; free will and responsibility; custom and morality; and methodological questions concerning cross-cultural comparisons.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of Philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**PHIL 3050 (3) Continental Philosophy**
Considers texts, figures, and/or movements in Continental philosophy from the nineteenth century onwards. While diverse, Continental thought tends to involve radical reflection on the methodology of philosophy, challenging traditional conceptions of subjectivity and objectivity while contextualizing knowledge and rationality within the structures of human existence, history, and culture. Topics may be drawn from German idealism, phenomenology, psychoanalysis, existentialism, hermeneutics, poststructuralism, postmodernism, critical theory, Continental feminism, gender theory, queer theory, new materialism, and contemporary Marxist thought.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of philosophy coursework.

**PHIL 3100 (3) Ethical Theory**
Examines important doctrines and arguments in various areas of theoretical ethics, such as the normative ethics of behavior, axiology, virtue theory, and metaethics.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 6 hours of philosophy course work.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3110 (3) Feminist Practical Ethics**
Examines issues of public policy and personal ethics in light of the feminist commitment to gender justice. Readings for the course will present competing feminist points of view on topics such as: the environment, sex trafficking, immigration, abortion rights, the fashion and beauty industries, cosmetic surgery, food, and militarism. Contributes to an understanding of gender diversity from a U.S. perspective, fostering further insight into social, political, economic, and cross-cultural relations in America.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3110
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite PHIL 2290 or WGST 2000 or WGST 2290.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**PHIL 3120 (3) Applied Ethics**
Examines arguments about controversial social issues drawn from various areas of applied ethics including biomedical ethics, AI ethics, sexual ethics, criminal justice ethics, and environmental ethics. Multiple topics will be covered and may include abortion, physician-assisted suicide, obligations to the global poor, cloning, genetic engineering, algorithmic fairness, deepfake pornography, prostitution, animal rights, climate change, obligations to future generations, affirmative action, slave reparations, mass public surveillance, predictive policing, and criminal punishment.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of philosophy coursework.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3140 (3) Environmental Ethics**
Examines major traditions in moral philosophy to see what light they shed on value issues in environmental policy and the value presuppositions of the economic, ecological, and juridical approaches to the environment.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3140
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PHIL 1100 or PHIL 1200 or PHIL 2200 or PHIL 3100 or PHIL 3200.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3160 (3) Bioethics**
Analysis of ethical problems involved in such issues as abortion, euthanasia, organ transplants, eugenics, treatment of the patient as a person and the institutional nature of the health care delivery system.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of philosophy coursework.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3170 (3) Philosophy and Ethics of Artificial Intelligence**
Examines the philosophy and ethics of artificial intelligence (AI), exploring existing machine learning algorithms, autonomous AI systems of the near future (e.g., self-driving cars, autonomous weapons), and advanced AI of the distant future (e.g., superintelligence, robot rights), with applications to medicine, criminal justice, social media, and warfare. Questions may include: Are machine learning systems biased? Who deserves blame when autonomous systems make mistakes? Will AI systems ever be conscious or deserve rights?
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3190 (3) War and Morality**
Focuses on moral issues raised by war. When, if ever, can war be morally justified? Are rules of war globally applicable, or are they affected by local religious and cultural frameworks? Are colonized nations bound by the same rules of war as their colonizer states? Are states ever obligated to intervene to stop massacres or genocides in other states?
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of PHIL coursework.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3200 (3) Social and Political Philosophy**
Introduces students to an in-depth examination and analysis of central operational ideas in social and political philosophy, such as power, freedom, equality, democracy, justice, rights, community, individuality, civil disobedience, and law. A thorough treatment of any of these ideas may call for some cross-cultural and/or comparative political and social analysis.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of philosophy course work.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3260 (3) Philosophy and the International Order**
Considers philosophical topics concerning the international economic, political and legal systems. Topics that may be considered include the nature of international law, war and peace, humanitarian intervention, international justice, world hunger and human rights.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of philosophy coursework.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**PHIL 3290 (3) War and Morality and the Enduring Struggle for Freedom**
Explores normative theories of just war, political obligation, and collective self-determination, and select empirical studies of the causes and effects of violent revolutions. Designed primarily for PHIL, PSCI, IAFS, and PACS students, this interdisciplinary course involves an intensive two-week abroad study in Budapest, Hungary, where students will visit diverse historical sites that bear out normative and empirical lessons learned in the classroom about collective armed conflict and the enduring struggle for freedom.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite Three hours of PHIL coursework.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3310 (3) Cognitive Science**
Introduces cognitive science, drawing from psychology, philosophy, artificial intelligence, neuroscience, and linguistics. Studies the linguistic relativity hypothesis, consciousness, categorization, linguistic rules, the mind-body problem, nature versus nurture, conceptual structure and metaphor, logic/problem solving and judgment. Emphasizes the nature, implications and limitations of the computational model of mind.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3702 and LING 3005 and CSCI 3702 and PSYC 3005 and SLHS 3003 and CSPB 3702
**Recommended:** Prerequisites two of the following CSCI 1300 or LING 2000 or PHIL 2440 or PSYC 2145.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Distribution-Social Sciences

**PHIL 3410 (3) History of Science: Ancients to Newton**
Surveys the history of science up to Newton, tracing the emergence of scientific thinking from religious and philosophical roots in the Near East and Greece to its development in the Middle Ages and Renaissance, culminating with Newton and the seventeenth-century Scientific Revolution. Additional topics may include early discoveries concerning mathematics; technological advancement and its relation to the evolution of scientific theory; and cross-cultural comparisons of scientific and technological traditions (e.g., Chinese traditions).
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of philosophy coursework.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHIL 3430 (3) History of Science: Newton to Einstein**
Surveys the development of modern scientific thought, with an emphasis on the natural sciences, beginning with Newton and ending with the radical and controversial implications of relativity theory and quantum mechanics. Topics may include the rise of modern chemistry, Darwin¿s earth-shattering achievements in biology, the beginnings of the social sciences (and their relationship with the natural sciences), the rise of ecology and holistic science, and the philosophical interpretation of scientific method and explanation.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of philosophy coursework.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHIL 3480 (3) Critical Thinking/Writing in Philosophy**
Focuses upon the fundamental skills, methods, concepts and distinctions that are essential for the study of philosophy. Basic skills covered include the writing of philosophy papers, the reading of articles and the extraction and evaluation of arguments.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) Philosophy (PHIL) majors only (excluding minors).
**Recommended:** Prerequisites 6 hours of philosophy course work.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Upper

**PHIL 3600 (3) Philosophy of Religion**
Explores fundamental questions concerning major world religions, especially the Abrahamic religions. Possible topics include: the divine attributes (Is perfect goodness compatible with the existence of hell? Can God be truly omnipotent?), the problem of evil, divine hiddenness and evidence of the existence of God, religious experience, the legitimacy of faith, the dilemma of freedom and divine foreknowledge, God and morality, tensions between religion and science, conceptions of the self in Abrahamic religions and in Buddhism.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 6 hours of philosophy coursework.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3700 (3) Aesthetic Theory**
Introduces major theories of aesthetics and contemporary discussions of problems, such as the nature of art and the problem of evaluations in art.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of philosophy coursework.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3800 (3) Open Topics in Philosophy**
See current departmental announcements for specific content.
Department enforced prerequisite: 6 hours of philosophy course work.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 3840 (1-3) Independent Study**
Department enforced prerequisite: Minimum of 6 completed hours of philosophy course work (minimum grade D-).
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Philosophy (PHIL) majors only.

**PHIL 3930 (1-6) Internship in Applied Philosophy**
Provides an academically supervised opportunity for junior and senior Philosophy students to work in public or private organizations to gain practical knowledge and experience, allowing students to apply philosophical theory to real-world problems while enriching their understanding of philosophy itself through its application. Requires the student to pursue an academic research project and compose an original research paper. Department consent required, as well as a minimum 3.0 cumulative GPA.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 9 hours philosophy course work.

**PHIL 4010 (3) Single Philosopher**
Discusses the work of a single historical figure in philosophy with the aim of reaching a broad and deep understanding of the philosopher's thought.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5010
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4020 (3) Topics in the History of Philosophy**
Examines a specific philosophical problem over an extended historical period.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5020
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites 12 hours of philosophy course work including PHIL 3000 and PHIL 3010.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4030 (3) Medieval Philosophy**
Introduces philosophy from the late Roman era to the 14th century. Philosophers studied may include Augustine, Boethius, Aquinas, and Ockham. Topics range over religion, ethics, mind, and metaphysics.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4040 (3) Studies in 20th Century Philosophy**
Studies two or three major philosophies prominent during the last century.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4070 (3) Existentialist Philosophy**
Examines central figures and texts in the existential tradition, from Kierkegaard and Nietzsche to Heidegger and Sartre.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4110 (3) Contemporary Moral Theory**
Provides an in-depth look at some recent work in moral theory, usually organized around a single topic. Topics vary from year to year. Previous topics include: consequentialism and its critics, virtue theory, deontological ethics, moral psychology, well-being, and metaethics.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5110
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite or corequisite of PHIL 3100 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors). Restricted to PHIL majors or PHIL minors.
**Recommended:** Prerequisite 12 hours of PHIL coursework (all minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4120 (3) Philosophy and Animals**
Examines the moral status of nonhuman animals, and its implications for the common use of animals as food and experimental subjects for humans.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5120
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites PHIL 1100 or PHIL 1200 or PHIL 3100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4150 (3) Topics in Applied Ethics**
Discusses advanced work in applied normative philosophy. Topics vary from semester to semester and may focus on one or two specific areas (e.g., race, procreative ethics, military ethics, sports ethics) or take a broader approach that includes issues from across a wider range of subjects.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5150
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours of PHIL coursework.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4200 (3) Contemporary Political Philosophy**
Provides a survey of recent approaches to political philosophy: liberalism (Rawls, Dworkin); libertarianism (Nozick); communitarianism (Sandel, Macintyre); feminism (Jaggar). Topics and readings vary with the instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5200
**Requisites:** Requires prerequisite courses of PHIL 2200 or PHIL 3200 (all minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours of philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4210 (3) Classical Greek Political Thought**
Studies main representatives of political philosophy in antiquity (Plato, Aristotle, Cicero) and of the most important concepts and values of ancient political thought. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 4041 and CLAS 5041 and HIST 4041
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4250 (3) Marxism**
Examines the economic, political, and philosophical thought of Karl Marx, placing it in the context of his predecessors in the classical German tradition and his successors (and critics) in the twentieth century. Themes may include the development of historical materialism; Marx¿s analysis of estranged labor; the critique of utopian socialism; the categories of Marxist economic analysis; the relation between politics, philosophy, and economics; theories of labor, surplus value, and exploitation; and the fate of communism.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 4251
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours of GRMN or PHIL course work or instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Distribution-Social Sciences

**PHIL 4260 (3) Philosophy of Law**
Considers philosophical topics concerning law and the U.S. legal system. Topics that may be considered include the nature of law, relations between law and morality, justifications of punishment, the moral duty to obey the law, and law and liberty.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5260
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4300 (3) Philosophy of Mind**
Discusses topics in the philosophy of mind, including the mind-body problem, consciousness, intentionality, rationality, mental causation and the nature of mental states.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5300
**Requisites:** Requires prerequisite courses PHIL 2440 and PHIL 3010 and PHIL 3480 and PHIL 4340 (all minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4340 (3) Epistemology**
Studies some of the main topics of theory of knowledge, such as evidence, justification, prediction, explanation, skepticism, and concept acquisition.
**Equivalent - Duplicate Degree Credit Not Granted:** 5340
**Repeatable:** Repeatable for up to 15.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Philosophy (PHIL) majors only.
**Recommended:** Prerequisites PHIL 3480 and 12 credit hours of philosophy including PHIL 2440 and PHIL 3010.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4360 (3) Metaphysics**
Examines philosophical questions and debates about the general nature of reality. Specific topics may include: existence; identity; change; particulars and universals; parts and wholes; space and time; possibility and necessity; freedom and determinism; laws of nature; causation; and the posits of mathematical and physical theories.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5360
**Requisites:** Requires prerequisite courses PHIL 2440 and PHIL 3010 and PHIL 3480 (all minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4370 (3) Free Will and Determinism**
Explores the full range of questions relating to the problem of free will and determinism. Topics may include; the scientific evidence for determinism, hard versus soft determinism, arguments for and against the compatibility of free will and determinism, moral responsibility and the principle of alternate possibilities, hierarchical motivation, the deep self, reactive attitudes, the intelligibility question for libertarianism, divine foreknowledge.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5370
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4400 (3) Philosophy of Science**
Advances students' knowledge of topics in philosophy of science and develops students' ability to think and write clearly about science. Topics may include scientific methodology; distinguishing science from pseudoscience; characterizing experimental and historical sciences; interpretations of special and general relativity; interpretations of quantum mechanics; the nature of biological species; approaches to defining life; criteria for identifying alien life; artificial intelligence; neuroscience and consciousness; fundamental physical properties and laws of nature; chance and probability; and causation.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5400
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours philosophy course work including PHIL 2440.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4440 (3) Topics in Logic**
Provides for offering courses in a variety of topics in logic, including, but not limited to, mathematical logic, philosophical issues in logic, probability theory, decision theory, and inductive logic.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5440
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours PHIL coursework, including PHIL 2440.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4450 (3) History and Philosophy of Physics**
Discusses the epistemic question of what characterizes good physics research as well as the metaphysical question of what our best physics research tells us about the world. Topics may include case studies of physics experiments, theory choice, and scientific methodology in physics, as well as foundational metaphysical questions in statistical mechanics, quantum mechanics, special and general relativity, chance and probability, and the laws of nature.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5450 and PHYS 4450 and PHYS 5450
**Requisites:** Requires prerequisite course PHYS 1020 or PHYS 1120 or PHYS 2020 or PHIL 1400 or PHIL 2440 or PHIL 3410 or PHIL 3430 or PHIL 4400 (all minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Arts Sci Gen Ed: Distribution-Natural Sciences

**PHIL 4460 (3) Modal Logic**
Introduces the most philosophically relevant kind of logic that builds on PHIL 2440. Modal logic is the logic of the concepts of necessity, possibility and contingency. A variety of systems of sentential modal logic will be covered, along with the standard system of first-order modal logic.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5460
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite PHIL 2440.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4470 (3) Probability and Rational Choice**
Examines issues in four related areas: probability theory (e.g. the interpretation of probability, the raven paradox, and the principle of indifference), decision theory (e.g., the Newcomb problem, the toxin puzzle, and Pascal's wager), game theory (e.g., Prisoner's dilemma, tragedy of the commons, and Schelling points), and social choice theory (e.g., Arrow's theorem). Familiarity with symbolic logic is strongly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5470
**Recommended:** Prerequisite PHIL 2440 and 12 hours philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4480 (3) Formal Methods in Philosophy**
Introduces formal methods used in contemporary philosophy beyond classical first-order logic. Specific topics may vary. Examples: extensions of and alternatives to first-order logic (including propositional and quantified modal logic and higher-order and plural logic), alternatives to classical logic (including many-valued and intuitionistic systems), generalized and substitutional quantifiers, the lambda calculus, indicative and subjunctive conditionals, probability theory, inductive logic, and decision theory.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5480
**Requisites:** Requires prerequisite course of PHIL 2440 (minimum grade B). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4490 (3) Philosophy of Language**
Examines the nature of language through topics such as truth, reference, meaning, and use, as well as the general relationships between language and action, cognition, logic, and reality.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5490
**Requisites:** Requires prerequisite course PHIL 2440 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4800 (3) Open Topics in Philosophy**
See current departmental announcements for specific content.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4830 (3) Senior Seminar in Philosophy**
Critical in-depth examination of a selected philosophical topic.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Philosophy (PHIL) majors only.
**Recommended:** Prerequisite 15 hours philosophy course work.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PHIL 4840 (1-3) Independent Study**
Department enforced prerequisite: Minimum of 6 completed hours of philosophy course work (minimum grade D-).
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Philosophy (PHIL) majors or minors with 87-180 credits (Seniors, Fifth Year Senior) only.

**PHIL 4950 (3) Honors Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite 12 hours philosophy course work.
**Additional Information:** Arts Sciences Honors Course

**PHIL 5010 (3) Single Philosopher**
Discusses the work of a single historical figure in philosophy with the aim of reaching a broad and deep understanding of the philosopher's thought.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4010
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 5020 (3) Topics in the History of Philosophy**
Examines a specific philosophical problem over an extended historical period.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 5030 (1) Greek Philosophical Texts**
Selected readings in classical philosophy, in the original language, with a focus on achieving fluency in reading philosophical Greek.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite of GREK 1013 and GREK 1023 or the equivalent.

**PHIL 5040 (1) Latin Philosophical Texts**
Selected readings in classical and medieval philosophy, in the original language, with a focus on achieving fluency in reading philosophical Latin.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.

**PHIL 5100 (3) Values Proseminar**
Covers seminal classic texts and/or fundamental topics in analytic ethics and social/political philosophy, including its history.
**Requisites:** Restricted to Philosophy graduate students only.

**PHIL 5110 (3) Contemporary Moral Theory**
Provides an in-depth look at some recent work in moral theory, usually organized around a single topic. Topics vary from year to year. Previous topics include: consequentialism and its critics, virtue theory, deontological ethics, moral psychology, well-being, and metaethics.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4110
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 5120 (3) Philosophy and Animals**
Examines the moral status of nonhuman animals, and its implications for the common use of animals as food and experimental subjects for humans.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5120
**Requisites:** Restricted to graduate students only.

**PHIL 5150 (3) Topics in Applied Ethics**
Discusses advanced work in applied normative philosophy. Topics vary from semester to semester and may focus on one or two specific areas (e.g., race, procreative ethics, military ethics, sports ethics) or take a broader approach that includes issues from across a wider range of subjects.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4150
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 5200 (3) Contemporary Political Philosophy**
Provides a survey of recent approaches to political philosophy: liberalism (Rawls, Dworkin); libertarianism (Nozick); communitarianism (Sandel, Macintyre); feminism (Jaggar). Topics and readings vary with the instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4200
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 5230 (3) Bioethics and Public Policy**
Examines public policy implications of contemporary biological, genetic, biomedical, and behavioral science in light of ethics and human values. Considers theoretical and practical grounds for moral assessment of scientific research and possible applications of technology.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 5240 (3) Seminar in Environmental Philosophy**
Philosophical examination of several different approaches to environmental problems: economic, juridical, political and ecological. Discusses specific environmental problems, focusing on their moral dimensions, e.g., wilderness preservation, animal rights and land use and urban planning.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 5240
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 5260 (3) Philosophy of Law**
Considers philosophical topics concerning law and the U.S. legal system. Topics that may be considered include the nature of law, relations between law and morality, justifications of punishment, the moral duty to obey the law, and law and liberty.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4260
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 5290 (1-3) Topics in Values and Social Policy**
Deals with topics in the area of philosophy and public policy and is often interdisciplinary in focus. Topics vary from one semester to another.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 5300 (3) Philosophy of Mind**
Discusses topics in the philosophy of mind, including the mind-body problem, consciousness, intentionality, rationality, mental causation, and the nature of mental states.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4300
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 5340 (3) Epistemology**
Studies some of the main topics of theory of knowledge, such as evidence, justification, prediction, explanation, skepticism, and concept acquisition.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4340

**PHIL 5360 (3) Metaphysics**
Traditional and contemporary theories of the basic categories of reality and the human relationship to it, including universals, substance, identity, change, mind and body, free will, and modality.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4360
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 5370 (3) Free Will and Determinism**
Explores the full range of questions relating to the problem of free will and determinism. Topics may include; the scientific evidence for determinism, hard versus soft determinism, arguments for and against the compatibility of free will and determinism, moral responsibility and the principle of alternate possibilities, hierarchical motivation, the deep self, reactive attitudes, the intelligibility question for libertarianism, divine foreknowledge.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4370

**PHIL 5400 (3) Philosophy of Science**
Advances students' knowledge of topics in philosophy of science and develops students' ability to think and write clearly about science. Topics may include scientific methodology; distinguishing science from pseudoscience; characterizing experimental and historical sciences; interpretations of special and general relativity; interpretations of quantum mechanics; the nature of biological species; approaches to defining life; criteria for identifying alien life; artificial intelligence; neuroscience and consciousness; fundamental physical properties and laws of nature; chance and probability; and causation.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4400
**Requisites:** Restricted to graduate students only.

**PHIL 5440 (3) Topics in Logic**
Provides for offering courses in a variety of topics in logic, including, but not limited to, mathematical logic, philosophical issues in logic, probability theory, decision theory, and inductive logic.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4440
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 5450 (3) History and Philosophy of Physics**
Discusses the epistemic question of what characterizes good physics research as well as the metaphysical question of what our best physics research tells us about the world. Topics may include case studies of physics experiments, theory choice, and scientific methodology in physics, as well as foundational metaphysical questions in statistical mechanics, quantum mechanics, special and general relativity, chance and probability, and the laws of nature.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4450 and PHYS 5450 and PHYS 5450
**Requisites:** Restricted to graduate students only.

**PHIL 5460 (3) Modal Logic**
Introduces the most philosophically relevant kind of logic that builds on PHIL 2440. Modal logic is the logic of the concepts of necessity, possibility and contingency. A variety of systems of sentential modal logic will be covered, along with the standard system of first-order modal logic.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4460
**Requisites:** Restricted to graduate students only.

**PHIL 5470 (3) Probability and Rational Choice**
Examines issues in four related areas: probability theory (e.g. the interpretation of probability, the raven paradox and the principle of indifference), decision theory (e.g., the Newcomb problem, the toxin puzzle and Pascal's wager), game theory (e.g., Prisoner's dilemma, tragedy of the commons and Schelling points) and social choice theory (e.g., Arrow's theorem). Familiarity with symbolic logic is strongly recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4470
**Requisites:** Restricted to graduate students only.

**PHIL 5480 (3) Formal Methods in Philosophy**
Introduces formal methods used in contemporary philosophy beyond classical first-order logic. Specific topics may vary. Examples: extensions of and alternatives to first-order logic (including propositional and quantified modal logic and higher-order and plural logic), alternatives to classical logic (including many-valued and intuitionistic systems), generalized and substitutional quantifiers, the lambda calculus, indicative and subjunctive conditionals, probability theory, inductive logic, and decision theory.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4480
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 5490 (3) Philosophy of Language**
Examines theories and problems regarding the nature of language and its relation to reality. Concepts discussed include sense, reference, conventions, intentions, and their relation to science and social life. Relevant literature includes readings in Frege, Russell, Quine, Putnam, Kripke, and Chomsky.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4490
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 5550 (3) Metaphysics and Epistemology Proseminar**
Covers seminal classic texts and/or fundamental topics in analytic metaphysics and epistemology.
**Requisites:** Restricted to Philosophy graduate students only.

**PHIL 5600 (3) Philosophy of Religion**
Studies topics falling under philosophy of religion, such as proofs for God's existence, religious language, mysticism, psychology of religion, modern theological movements, miracles, and study of individual theologians.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 5700 (3) Aesthetics**
Analyzes the principal topics of aesthetics, including such issues as formal structure of aesthetics, the nature of critical judgments, and the status of the work of art.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 5800 (3) Open Topics in Philosophy**
Variety of new courses at the 5000 level. See current departmental announcements for specific content.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 5810 (1-3) Special Topics in Philosophy**
Instructor meets regularly with three or more students to discuss special topics in philosophy.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 5840 (1-3) Graduate Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 6000 (3-4) Seminar in the History of Philosophy**
Studies advanced topics in the history of philosophy. Content varies by semester, but may extend to any period in the history of philosophy, from the Presocratics into the modern era.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 6100 (3) Seminar in Ethics**
Intensive study of selected topics in ethical theory.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 6200 (3) Seminar in Social and Political Philosophy**
Provides an in-depth look at some particular topic in social and political philosophy, such as rights, political freedom, political obligation, or democracy.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 6300 (3) Seminar in Philosophy of Mind**
Intensive study of selected topics in philosophy of mind.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 6310 (3) Issues and Methods in Cognitive Science**
Interdisciplinary introduction to cognitive science, examining ideas from cognitive psychology, philosophy, education, and linguistics via computational modeling and psychological experimentation. Includes philosophy of mind; learning; categorization; vision and mental imagery; consciousness; problem solving; decision making, and game-theory; language processing; connectionism. No background in computer science will be presumed.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 6402 and EDUC 6504 and LING 6200 and PSYC 6200 and SLHS 6402
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite at least one course at the 3000-level or higher in CSCI, LING, PHIL, or PSYC.

**PHIL 6340 (3) Seminar in Epistemology**
Intensive study of selected topics in epistemology.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 6380 (3) Seminar in Metaphysics**
Intensive study of selected topics in metaphysics.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 6400 (3) Seminar in Philosophy of Science**
Topics connected with development of nature of science: the structure of scientific theories, the testing of hypotheses, the theory of decisions in science and the basic conceptions and models of abstraction in the history of science.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHIL 6490 (3) Seminar in Philosophy of Language**
Studies some of the main topics in the philosophy of language, such as meaning and theories of meaning, translation, speech acts, rules of language, reference, relevance of psycholinguistics, language and thought, and language and ontology.
**Repeatable:** Repeatable for up to 15.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to Philosophy graduate students only.

**PHIL 6950 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Requisites:** Restricted to Philosophy graduate students only.

**PHIL 7415 (2) Cognitive Science Research Applications Seminar 1**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7412 and EDUC 6506 and LING 7415 and PSYC 7415 and SLHS 7418
**Requisites:** Requires prerequisite course CSCI 6402 or EDUC 6504 or LING 6200 or PHIL 6310 or PSYC 6200 (minimum grade D-).

**PHIL 7425 (2) Cognitive Science Research Applications Seminar 2**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7422 and EDUC 6516 and LING 7425 and PSYC 7425 and SLHS 7428
**Requisites:** Requires prerequisite course CSCI 6402 or EDUC 6504 or LING 6200 or PHIL 6310 or PSYC 6200 (minimum grade D-).
**Recommended:** Prerequisite EDUC 6505 or PHIL 6310.

**PHIL 7810 (1) Topics in Cognitive Science**
Reading of interdisciplinary innovative theories and methodologies of cognitive science. Students participate in the ICS Distinguished Speakers series that hosts internationally recognized cognitive scientists who share and discuss their current research. Session discussions include analysis of leading edge and controversial new approaches in cognitive science.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7772 and EDUC 7775 and LING 7775 and PSYC 7775 and SLHS 7775
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHIL 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to Philosophy graduate students only.

# Physics (PHYS)

## Courses

**PHYS 1000 (3) Preparatory Physics**
Introduces basic physics, emphasizing an analytical approach to prepare for PHYS 1110 and PHYS 1120, the engineering majors sequence. Does not satisfy any MAPS deficiency in either the sciences or math. Department enforced prerequisite: 1 year high school algebra.
**Additional Information:** Arts Sci Core Curr: MAPS Course

**PHYS 1010 (3) Physics of Everyday Life 1**
Intended primarily for nonscientists, this course covers physics encountered in everyday life. Topics include balls, scales, balloons, stoves, insulation, light bulbs, clocks, nuclear weapons, basics of flashlights, and microwave ovens. Department enforced prereq., high school algebra or equivalent. This course should not be taken if the student has a MAPS deficiency in math.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Quantitative Reasoning Math
MAPS Course: Chemistry
MAPS Course: Physics

**PHYS 1110 (4) General Physics 1**
First semester of three-semester sequence for science and engineering students. Covers kinematics, dynamics, momentum of particles and rigid bodies, work and energy, gravitation, and simple harmonic motion.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 1115
**Requisites:** Requires prerequisite course of GEEN 3830 (minimum grade C-) or prerequisite or corequisite course of APPM 1345 or APPM 1350 or MATH 1300 or MATH 1310 (minimum grade C-).
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 1115 (4) General Physics 1 for Majors**
First semester of three semester sequence for physics, engineering physics and astronomy majors. Covers kinematics, dynamics momentum of particles and rigid bodies, work and energy, gravitation, and simple harmonic motion.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 1110
**Requisites:** Requires prerequisite course of GEEN 3830 or prerequisite or corequisite course of APPM 1345 or APPM 1350 or MATH 1300 or MATH 1310 (minimum grade C-). Restricted to Physics (PHYS-BA) or Engineering Physics (EPEN-BS) or Astronomy (ASTR-BA) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 1120 (4) General Physics 2**
Three lect., one rec. per week, plus three evening exams in the fall and spring semesters. Second semester of three-semester introductory sequence for science and engineering students. Covers electricity and magnetism, wave motion and optics. Normally is taken concurrently with PHYS 1140.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 1125
**Requisites:** Requires prerequsite courses of PHYS 1110 or PHYS 1115 and a prerequisite or corequisite course of APPM 1360 or MATH 2300 (all minimum grade of C-).
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 1125 (4) General Physics 2 for Majors**
Three lect., one rec per week, plus three evening exams in the fall and spring semesters. Second semester of three semester introductory sequence for physics, engineering and astronomy majors. Covers electricity and magnetism, wave motion and optics. Normally is taken concurrently with PHYS 1140.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 1120
**Requisites:** Requires a prerequisite course of PHYS 1110 or PHYS 1115. Requires a prerequisite or corequisite course of APPM 1360 or MATH 2300 (all minimum grade C-). Restricted to Physics (BA), Engineering Physics (BS) and Astronomy (BA) students only.
**Additional Information:** Arts Sci Core Curr: Natural Science Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 1140 (1) Experimental Physics 1**
Introduces experimental physics through laboratory observation of a wide range of phenomena. Covers experiments on physical measurements, including mechanics, electricity & magnetism, and optics, with the mathematical analysis of physical errors associated with the experimental process.
**Requisites:** Requires a prerequisite or corequisite course of PHYS 1120 or PHYS 1125 (minimum grade C-).
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 1230 (3) Light and Color for Nonscientists**
Discusses light, color, vision, and perception. Covers reflection, refraction, lenses, and applications to photography and other methods of light sensing. Other topics include lasers and holography. Course is geared toward nonscience majors. Department enforced prereq., high school algebra or equivalent. Should not be taken by students with a math MAPS deficiency.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Chemistry
MAPS Course: Natural Science
MAPS Course: Physics

**PHYS 1240 (3) Sound and Music**
Explores the physical processes that underlie the diversity of sound and musical phenomena. Topics covered include the physical nature of sound, the perception of sound, the perception of pitch and harmony, musical instruments, synthesizers and samplers, and room acoustics. Geared toward nonscience majors. Department enforced prereq., high school algebra or equivalent. Should not be taken by students with a math MAPS deficiency.
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Chemistry
MAPS Course: Natural Science
MAPS Course: Physics

**PHYS 1400 (1) Fundamentals of Scientific Inquiry**
Engages students in discussions and experimentation to uncover the aspects of physics that won't be found in a textbook, centered around how to do scientific research and be a part of the greater scientific community. Topics include model-building, metacognition, failure in science, and presentation skills. Students will have the opportunity to interact with real scientists through panels, lab tours, and direct mentorship as they engage in a hands-on group research project culminating in a poster presentation session. Geared toward first-year and transfer physics and engineering physics students. Does not count toward the PHYS-BA major requirements. For more information, please visit: http://www.cuprime.org/class.

**PHYS 1580 (3) Energy and Interactions**
Engages non-physics majors in hands-on, minds-on activities and labs to investigate the physical world, the nature of science, and how science knowledge is constructed. This introductory course is especially relevant for future elementary and middle school teachers although it will meet the needs of most non-physics and non-science majors. Physical content focuses on interactions and energy.
**Equivalent - Duplicate Degree Credit Not Granted:** EDUC 1580
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Chemistry
MAPS Course: Natural Science
MAPS Course: Physics

**PHYS 2010 (5) General Physics 1**
Includes three lectures, one two-hour laboratory/recitation per week, plus three evening exams in the fall and spring semesters. Covers mechanics, heat and sound. Thorough presentation of fundamental facts and principles of physics using algebra and trigonometry. Designed for life science majors, including premed students. Natural science majors with a knowledge of calculus and others taking calculus are urged to take the calculus-based courses PHYS 1110, PHYS 1120, PHYS 1140 and PHYS 2130, rather than PHYS 2010 and PHYS 2020. Department enforced prerequisites: ability to use high school algebra and trigonometry.
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Natural Science

**PHYS 2020 (5) General Physics 2**
Includes three lectures, one two-hour laboratory/recitation per week, plus three evening exams in the fall and spring semesters. Covers electricity and magnetism, light and modern physics. Designed for life science majors, including premed students. Natural science majors with a knowledge of calculus and others taking calculus are urged to take the calculus-based courses PHYS 1110, PHYS 1120, PHYS 1140 and PHYS 2130, rather than PHYS 2010 and PHYS 2020.
**Requisites:** Requires a prerequisite course of PHYS 1110 or PHYS 2010 (minimum grade C-).
**Additional Information:** GT Pathways: GT-SC1 - Natural Physcal Sci:Lec Crse w/ Req Lab
Arts Sci Core Curr: Natural Science Sequence
Arts Sci Core Curr: Natural Science Lab
Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 2130 (3) Introduction to Quantum Mechanics and Its Applications**
Learn about a leading edge of physics and engineering along with its applications to much of modern technology. Topics include quantum theory, atomic physics, solid state and nuclear physics. Applications discussed may include special relatively, lasers, diodes/transistors, nuclear energy, quantum computing and encryption. Third semester of introductory sequence for science and engineering students. Physics majors should take PHYS 2170 instead of this course. May be taken concurrently with PHYS 2150.
**Requisites:** Requires a prerequisite course of PHYS 1120 or PHYS 1125, and a prerequisite or corequisite course of MATH 2400 or APPM 2350 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 2150 (1) Experimental Physics 2**
One lect., one 2-hour lab per week. Includes many experiments of modern physics, including atomic physics, solid state physics, electron diffraction, radioactivity and quantum effects. Normally taken concurrently with PHYS 2130 or PHYS 2170, this course may be taken after PHYS 2130 or PHYS 2170.
**Requisites:** Requires a prerequisite course of PHYS 1140 and a prerequisite or corequisite course of PHYS 2130 or PHYS 2170 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 2170 (3) Foundations of Modern Physics**
Covers special relativity, quantum mechanics and atomic structure. Completes the three-semester sequence of general physics for physics and engineering physics majors. Normally taken with the laboratory PHYS 2150.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 2130
**Requisites:** Requires a prerequisite course of PHYS 1120 or PHYS 1125, and a prerequisite or corequisite course of MATH 2400 or APPM 2350 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 2210 (3) Classical Mechanics and Mathematical Methods 1**
Theoretical Newtonian mechanics, including position and velocity dependent forces, oscillation, stability, non-inertial frames and gravitation from extended bodies. Ordinary differential equations, vector algebra, curvilinear coordinates, complex numbers, and Fourier series will be introduced in the context of the mechanics.
**Requisites:** Requires a prerequisite course of PHYS 2130 or PHYS 2170 and a prerequisite or corequisite course of APPM 2350 or MATH 2400 and a prerequisite or corequisite course of APPM 2360 or MATH 3430 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 2600 (3) Introduction to Programming and Scientific Computing**
Covers basic concepts in programming and scientific computing, including numerical integration and simulation of physical systems. Students will learn the programming language Python and associated graphics libraries. Programming examples will be drawn from classical physical systems that can only be solved numerically, such as projectile motion with drag and N-body problems.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 2600
**Requisites:** Requires prerequisite course of PHYS 1120 (minimum grade C-). Requires prerequisite or corequisite course of PHYS 2170 or PHYS 2130 (minimum grade C-).

**PHYS 2840 (1-3) Independent Study**
Selected topics for undergraduate independent study. Subject matter to be arranged.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**PHYS 3000 (3) Science and Public Policy**
For nonscience majors. Reading, discussions, debates and lectures are used to study how science affects society economically, intellectually, and in terms of health and national security. Another focus is how government fosters and funds scientific activities. Department enforced prerequisite: completion of core science requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** ARSC 3200

**PHYS 3050 (3) Writing in Physics: Problem-Solving and Rhetoric**
Teaches strategies used in scientific writing with an emphasis on argument, reviews and reinforces essential writing skills, provides experience in writing both academic and professional communications in a style appropriate to the literature of physics. Department enforced prerequisite: lower-division core writing requirement. Does not count toward the PHYS-BA major requirements or major GPA.
**Requisites:** Requires a prerequisite course of PHYS 2130 or PHYS 2170 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**PHYS 3070 (3) Energy and the Environment**
Contemporary issues in energy consumption and its environmental impact, including fossil fuel use and depletion; nuclear energy and waste disposal; solar, wind, hydroelectric, and other renewable sources; home heating; energy storage; fuel cells; and alternative transportation vehicles. Included are some basic physical concepts and principles that often constrain choices. No background in physics is required.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3070
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 3090 (3) Introduction to Quantum Computing**
Covers the basics of quantum computation, including the basics of quantum information; axioms of quantum mechanics; quantum circuits and universality; the relationship between quantum and classical complexity classes; simple quantum algorithms such as the quantum Fourier transform; Shor factoring algorithm; Grover search algorithm; physical implementation of quantum computation; error correction and fault tolerance.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 3090 and ECEN 3090
**Requisites:** Requires prerequisite course of APPM 2360 or APPM 3310 or CSCI 2820 or MATH 2130 or MATH 2135 (minimum grade C-).

**PHYS 3210 (3) Classical Mechanics and Mathematical Methods 2**
Lagrangian and Hamiltonian treatment of theoretical mechanics, including coupled oscillations, waves in continuous media, central force motion, rigid body motion and fluid dynamics. The calculus of variations, linear algebra, tensor algebra, vector calculus, and partial differential equations will be introduced in the context of the mechanics.
**Requisites:** Requires a prerequisite course of PHYS 2210 and a prerequisite course of APPM 2350 or MATH 2400 and a prerequisite course of MATH 3430 or APPM 2360 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 3220 (3) Quantum Mechanics 1**
Introduces quantum mechanics with wave, operator and matrix computational techniques. Investigates solutions for harmonic oscillator, potential well and systems with angular momentum. Develops a quantitative description of one-electron atoms in lowest order.
**Requisites:** Requires a prerequisite course of PHYS 3210 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 3221 (1) Tutorial Practicum for Quantum Mechanics 1**
Uses interactive group work to aid student learning in corequisite course PHYS 3220. In this tutorial, students will work in small groups to practice how to solve challenging problems and their underlying conceptual basis, as well as using hands-on activities, demonstrations, and other techniques to help learn content.
**Requisites:** Requires a corequisite course of PHYS 3220.

**PHYS 3310 (3) Principles of Electricity and Magnetism 1**
Covers mathematical theory of electricity and magnetism, including electrostatics, magnetostatics, and polarized media, and provides an introduction to electromagnetic fields, waves, and special relativity.
**Requisites:** Requires a prerequisite course of PHYS 2210 and a prerequisite course of APPM 2350 or MATH 2400 and a prerequisite course of MATH 3430 or APPM 2360 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 3311 (1) Tutorial Practicum for Electricity & Magnetism 1**
Uses interactive group work to aid student learning in corequisite course PHYS 3310. In this tutorial, students will work in small groups to practice how to solve challenging problems and their underlying conceptual basis, as well as using hands-on activities, demonstrations, and other techniques to help learn content.
**Requisites:** Requires a corequisite course of PHYS 3310.

**PHYS 3320 (3) Principles of Electricity and Magnetism 2**
Continuation of PHYS 3310. Electromagnetic induction; magnetic energy; microscopic theory of magnetic properties; Ac circuits; Maxwell's Equations; planewaves; waveguides and transmission lines; radiation from electric and magnetic dipoles and from an accelerated charge.
**Requisites:** Requires a prerequisite course of PHYS 3310 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 3330 (2) Electronics for the Physical Sciences**
Introduces laboratory electronics for physical science students. Includes basic electronic instruments, dc bridge circuits, operational amplifiers, bipolar transistors, field-effect transistors, photodiodes, noise in electronic circuits, digital logic and microcontrollers. Students gain hands-on experience in designing, building and debugging circuits. Two lectures and one three hour laboratory per week. Concludes with a three-week project in which students design and build an experiment of their choice and present a seminar on the results.
**Requisites:** Requires prerequisite courses of PHYS 2150 and PHYS 2130 or PHYS 2170 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4130 (3) Biological Electron Microscopy: Principles and Recent Advances**
Covers basic mechanisms for imaging and recent advances used in current biological research, elements of electron optics, image optimization, resolution, radiation damage, various imaging modes (TEM, HVEM, Sem, Stem, Stm), specimen quantitation and reconstruction (stereo and 3-D), microanalysis and electron diffraction. Specimen preparation treated only incidentally.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5130
**Requisites:** Requires a prerequisite course of EBIO 1220 or MCDB 1150 or MCDB 4550 or MCDB 5550 or PHYS 1120 or PHYS 2020 (minimum grade D-).

**PHYS 4150 (3) Plasma Physics**
Discusses the fundamentals of plasma physics, including particle motion in electromagnetic fields, wave propagation, collisions, diffusion, and resistivity. Presents examples from space plasmas, astrophysical plasmas, laboratory fusion plasmas, and plasmas in accelerators.
**Requisites:** Requires a prerequsite course of PHYS 3310 and a prerequisite or corequisite course of PHYS 3320 (all minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4230 (3) Thermodynamics and Statistical Mechanics**
Statistical mechanics applied to macroscopic physical systems; statistical thermodynamics, classical thermodynamics systems; applications to simple systems. Examines relationship of statistical to thermodynamic points of view.
**Requisites:** Requires a prerequisite course of PHYS 2210 and a prerequisite or corequisite course of PHYS 3220 (all minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4340 (3) Introduction to Solid State Physics**
Discusses crystal structure, lattice dynamics, band theory, semiconductors and ferromagnetism.
**Requisites:** Requires a prerequsite course of PHYS 3220 (minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4410 (3) Quantum Mechanics 2**
Extends quantum mechanics to include perturbation theory and its applications to atomic fine structure, multi-particle systems, interactions with external forces, the periodic table and dynamical processes including electromagnetic transition rates.
**Requisites:** Requires prerequisite courses of PHYS 3220 and PHYS 3310 (all minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4420 (3) Nuclear and Particle Physics**
Introduces structure of the atomic nucleus, spectroscopy of subnuclear particles, scattering, reactions, radioactive decay, fundamental interactions of quarks and leptons.
**Requisites:** Requires prerequsite courses of PHYS 3320 and PHYS 4410 (all minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4430 (3) Advanced Laboratory**
Two lectures, one lab per week. Experiments introduce students to realities of the experimental physics so they gain a better understanding of theory and an appreciation of the vast amount of experimental work done in the physical sciences today.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5430
**Requisites:** Requires a prerequsite course of PHYS 3330 (minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4450 (3) History and Philosophy of Physics**
Discusses the epistemic question of what characterizes good physics research as well as the metaphysical question of what our best physics research tells us about the world. Topics may include case studies of physics experiments, theory choice, and scientific methodology in physics, as well as foundational metaphysical questions in statistical mechanics, quantum mechanics, special and general relativity, chance and probability, and the laws of nature.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 5450 and PHIL 4450 and PHYS 5450
**Requisites:** Requires a prerequisite course of PHYS 1020 or PHYS 1120 or PHYS 1125 or PHYS 2020 (minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4460 (3) Teaching and Learning Physics**
Learn how people understand key concepts in physics. Through examination of physics content, pedagogy and problems, through teaching, and through research in physics education, students will explore the meaning and means of teaching physics. Students will gain a deeper understanding of how education research is done and how people learn. Useful for all students, especially for those in interested in physics, teaching and education research.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5460 and EDUC 4460 and EDUC 5460
**Requisites:** Requires prerequisite courses of PHYS 3210 and PHYS 3310 (all minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4510 (3) Optics**
Basic electromagnetic theory of light, using Maxwell's equations. Examples in geometrical optics; extensive applications in physical optics including diffraction and polarization. Spectra, including Zeeman effect and fluorescence. Recent advances in experimental techniques: microwaves, lasers, image converters.
**Requisites:** Requires a prerequisite course of PHYS 3320 (minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4550 (3) Cells, Molecules and Tissues: A Biophysical Approach**
Focuses on the biophysics governing the structure/function of enzymes, cells, extracellular matrix and tissue. Synthesizes ideas from molecular biology, physics, and biochemistry, emphasizing how low Reynolds number physics, not Newtonian physics, is relevant to life inside a cell. Fulfills MCDB scientific reasoning requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** MCDB 5550 and MCDB 4550 and PHYS 5550
**Recommended:** Prerequisites MCDB 3135 and MCDB 3145 and PHYS 2010 and PHYS 2020 and CHEM 1133 or MATH 1300 and/or CHEM 3311 (minimum grade C-) or instructor consent required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4560 (3) Introduction to Biophysics**
Covers an introduction to the physics of living systems. Focuses on how living systems are able to generate order, with both physical principles and biological examples. Covers the development of quantitative models for biological systems, including estimates. Taught from a physics perspective, with biology background introduced as needed.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5560 and MCDB 4560 and MCDB 5560
**Requisites:** Requires a prerequisites course of PHYS 2210 (minimum grade C-).
**Recommended:** Prerequisite PHYS 4230.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4610 (2) Physics Honors**
Students are matched with a faculty member and work independently on a research topic. Typically, the honors program lasts three semesters. A senior thesis and an oral presentation of the work are required. See also PHYS 4620 and PHYS 4630. Department enforced prerequisite: mininimum 3.00 GPA. Registration by special arrangement with the Department of Physics.
**Additional Information:** Arts Sciences Honors Course

**PHYS 4620 (2) Physics Honors**
Students are matched with a faculty member and work independently on a research topic. Typically, the honors program lasts three semesters. A senior thesis and an oral presentation of the work are required. See also PHYS 4610 and PHYS 4630. Department enforced prerequisite: mininimum 3.00 GPA. Registration by special arrangement with the Department of Physics.
**Additional Information:** Arts Sciences Honors Course

**PHYS 4630 (2) Physics Honors**
Students are matched with a faculty member and work independently on a research topic. Typically, the honors program lasts three semesters. A senior thesis and an oral presentation of the work are required. See also PHYS 4610 and PHYS 4620. Department enforced prerequisite: mininimum 3.00 GPA. Registration by special arrangement with the Department of Physics.
**Additional Information:** Arts Sciences Honors Course

**PHYS 4700 (3) Quantum Forge I**
Provides junior- and senior-level engineering and physical science students an opportunity to gain professional and technical quantum science skills and experience through participation in real-world projects in collaboration with industry leaders and academic investigators. Alongside project activity, students will engage in skill- and concept-focused modules to ensure proficiency in the skills necessary to participate in the quantum workforce. This capstone experience is intended for students who do not intend to continue on to graduate study in physics or engineering, but rather to enter the workforce directly.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4700
**Requisites:** Requires prerequisite course of PHYS 3330 (minimum grade C-).
**Recommended:** Prerequisite or corequisite PHYS 4410.

**PHYS 4710 (3) Quantum Forge II**
Continuation of PHYS 4700, Quantum Forge I. The Quantum Forge provides junior- and senior-level engineering and physical science students an opportunity to gain professional and technical quantum science skills and experience through participation in real-world projects in collaboration with industry leaders and academic investigators. In the second semester, students will expand upon the knowledge and skills gained through the first-semester to bring projects to a point of completion and readiness for deployment in the industry context. As with Quantum Forge I, this capstone experience is intended for students who do not intend to continue on to graduate study in physics or engineering, but rather to enter the workforce directly.
**Equivalent - Duplicate Degree Credit Not Granted:** MCEN 4710
**Requisites:** Requires prerequisite course of PHYS 4700 or MCEN 4700 (minimum grade C-).

**PHYS 4810 (1-3) Special Topics in Physics**
Various topics not normally covered in the curriculum. Offered intermittently depending on student demand and availability of instructors.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PHYS 4840 (1-3) Independent Study**
Selected topics for undergraduate independent study. Subject matter to be arranged. See also PHYS 4850.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**PHYS 4850 (1-3) Independent Study**
Selected topics for undergraduate independent study. Subject matter to be arranged. See also PHYS 4840.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**PHYS 4970 (3) Seminar on Physical Methods in Biology**
Covers basic mechanisms and applications of physical methods used in current biological research, microprobe analysis, Eels, elementary electron and x-ray crystallography, biomedical imaging (NMR, MRI, Pet, Cat), Fourier analysis, synchrotron radiation, Exafs, neutron scattering and novel ultramicroscopy techniques. Includes lectures, student presentations, occasional demonstrations. Emphasis depends on student interest.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 5970
**Requisites:** Requires a prerequisite course of PHYS 1120 or PHYS 2020 and MCDB 1150 or EBIO 1220 (all minimum grade D-).

**PHYS 5030 (3) Intermediate Mathematical Physics 1**
This course and its continuation, PHYS 5040, form a survey of classical mathematical physics. Studies complex variable theory and finite vector spaces, and includes topics in ordinary and partial differential equations, boundary value problems, potential theory, and Fourier analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5030
**Requisites:** Restricted to graduate students only.

**PHYS 5040 (3) Intermediate Mathematical Physics 2**
Continuation of PHYS 5030. Includes group theory, special functions, integral transforms, integral equations and calculus of variations.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 5040
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite PHYS 5030.

**PHYS 5070 (3) Introduction to Computational Physics**
Surveys methods and practices in programming and scientific computing for the study of physics, using the Python programming language. Core material will include data analysis and visualization, numerical solution of differential equations, working with large-scale remote computers, and general software skills such as debugging, version control, and collaborative tools. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.

**PHYS 5130 (3) Biological Electron Microscopy: Principles and Recent Advances**
Covers basic mechanisms for imaging and recent advances used in current biological research, elements of electron optics, image optimization, resolution, radiation damage, various imaging modes (TEM, HVEM, Sem, Stem, Stm), specimen quantitation and reconstruction (stereo and 3-D), microanalysis and electron diffraction. Specimen preparation treated only incidentally.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 4130

**PHYS 5141 (3) Astrophysical and Space Plasmas**
Covers magnetohydrodynamics and a few related areas of plasma physics applied to space and astrophysical systems, including planetary magnetospheres and ionospheres, stars, and interstellar gas in galaxies.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 5140
**Requisites:** Restricted to Physics (PHYS) or Astronomy (ASTR) graduate students only.

**PHYS 5150 (3) Introductory Plasma Physics**
Includes basic phenomena of ionized gases, static and dynamic shielding, linear waves, instabilities, particles in fields, collisional phenomena, fluid equations, collisionless Boltzman equations, Landau damping, scattering and absorption of radiation in plasmas, elementary nonlinear processes, WKB wave theory, controlled thermonuclear fusion concepts, astrophysical applications and experimental plasma physics (laboratory). Department enforced prerequisite: PHYS 3310. Instructor consent required for undergraduates.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 5150
**Requisites:** Restricted to graduate students only.

**PHYS 5160 (3) Fundamentals of Optics and Lasers**
Covers the basic physic of lasers. Topics include basics of optical resonators and gaussian beam propagation, stimulated emission, laser threshold conditions, laser linewidth, q-switching and mode locking of lasers, tuning of Cw lasers, and specifics of various common lasers.
**Requisites:** Restricted to graduate students only.

**PHYS 5210 (3) Theoretical Mechanics**
Variational principles, Lagrange's equations, Hamilton's equations, motion of rigid body, relativistic mechanics, transformation theory, continuum mechanics, small oscillations, Hamilton-Jacobi theory.
**Requisites:** Restricted to graduate students only.

**PHYS 5250 (3) Introduction to Quantum Mechanics 1**
Quantum phenomena, Ehrenfest theorem and relation to classical physics, applications to one-dimensional problems, operator techniques, angular momentum and its representations, bound states and hydrogen atom, and Stern-Gerlack experiment and spin and spinor wave function. Department enforced prerequisite: advanced undergraduate quantum mechanics course.
**Requisites:** Restricted to graduate students only.

**PHYS 5260 (3) Introduction to Quantum Mechanics 2**
Symmetries and conservation laws, identical particle systems, approximation techniques (including time-dependent and time-independent perturbation theories and variational techniques) and their applications, scattering theory, radiative transitions, and helium atom.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite PHYS 5250.

**PHYS 5400 (3) Introduction to Fluid Dynamics**
Covers equations of fluid motion relevant to planetary atmospheres and oceans and stellar atmospheres; effects of rotation and viscosity; and vorticity dynamics, boundary layers and wave motions. Introduces instability theory, nonlinear equilibration and computational methods in fluid dynamics. Department enforced prerequisite: partial differential equations or equivalent.
**Equivalent - Duplicate Degree Credit Not Granted:** ATOC 5400 and ASTR 5400
**Requisites:** Restricted to graduate students only.

**PHYS 5430 (3) Advanced Laboratory**
Two lectures, one lab per week. Experiments introduce students to realities of the experimental physics so they gain a better understanding of theory and an appreciation of the vast amount of experimental work done in the physical sciences today. Department enforced prerequisites: PHYS 3330 and PHYS 3220 and PHYS 3320. Department enforced corequisites: PHYS 4410.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 4430
**Requisites:** Restricted to graduate students only.

**PHYS 5450 (3) History and Philosophy of Physics**
Discusses the epistemic question of what characterizes good physics research as well as the metaphysical question of what our best physics research tells us about the world. Topics may include case studies of physics experiments, theory choice, and scientific methodology in physics, as well as foundational metaphysical questions in statistical mechanics, quantum mechanics, special and general relativity, chance and probability, and the laws of nature.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 4450 and PHIL 5450 and PHIL 5450
**Requisites:** Restricted to graduate students only.

**PHYS 5460 (3) Teaching and Learning Physics**
Learn how people understand key concepts in physics. Through examination of physics content, pedagogy and problems, through teaching, and through research in physics education, students will explore the meaning and means of teaching physics. Students will gain a deeper understanding of how education research is done and how people learn. Useful for all students, especially for those interested in physics, teaching, and education research.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 4460 and EDUC 4460 and EDUC 5460
**Requisites:** Restricted to graduate students only.

**PHYS 5550 (3) Cells, Molecules and Tissues: A Biophysical Approach**
Focuses on the biophysics governing the structure/function of enzymes, cells, extracellular matrix and tissue. Synthesizes ideas from molecular biology, physics, and biochemistry, emphasizing how low Reynolds number physics, not Newtonian physics, is relevant to life inside a cell.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 4550 and MCDB 4550 and MCDB 5500

**PHYS 5560 (3) Introduction to Biophysics**
Covers an introduction to the physics of living systems. Focuses on how living systems are able to generate order, with both physical principles and biological examples. Covers the development of quantitative models for biological systems, including estimates. Taught from a physics perspective, with biology background introduced as needed.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 4560 and MCDB 4560 and MCDB 5560
**Grading Basis:** Letter Grade

**PHYS 5606 (3) Optics Laboratory**
Consists of 13 optics experiments that introduce the techniques and devices essential to modern optics, including characterization of sources, photodetectors, modulators, use of interferometers, spectrometers and holograms, and experimentation of fiber optics and Fourier optics.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 5606
**Recommended:** Prerequisite undergraduate optics course such as PHYS 4510.

**PHYS 5730 (3) Particle Physics**
Introduces the properties of elementary particles, phenomenology of particle interactions, particle detector, particle accelerators, scattering cross sections, decay rates, electron-positron annihilation, lepton scattering and hadron structure, quantum chromodynamics, electroweak interactions, symmetries and symmetry breaking.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites undergraduate courses in quantum mechanics and electricity and magnetism.

**PHYS 5770 (3) Gravitational Theory (Theory of General Relativity)**
Presents Einstein's relativistic theory of gravitation from geometric viewpoint; gives applications to astrophysical problems (gravitational waves, stellar collapse, etc.). Instructor consent required for undergraduates.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites PHYS 3220 and PHYS 3320.

**PHYS 5840 (1-3) Selected Topics for Graduate Independent Study**
Subject matter to be arranged.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**PHYS 5970 (3) Seminar on Physical Methods in Biology**
Covers basic mechanisms and applications of physical methods used in current biological research, microprobe analysis, Eels, elementary electron and x-ray crystallography, biomedical imaging (NMR, MRI, Pet, Cat), Fourier analysis, synchrotron radiation, Exafs, neutron scattering and novel ultramicroscopy techniques. Includes lectures, student presentations, occasional demonstrations. Emphasis depends on student interest.
**Equivalent - Duplicate Degree Credit Not Granted:** PHYS 4970
**Requisites:** Restricted to graduate students only.

**PHYS 6260 (3) Geometry of Quantum Fields and Strings**
Focuses on differential geometric techniques in quantum field and string theories. Topics include: spinors, Dirac operators, index theorem, anomalies, geometry of superspace, supersymmetric quantum mechanics and field theory and nonperturbative aspects in field and string theories.
**Equivalent - Duplicate Degree Credit Not Granted:** MATH 6260
**Recommended:** Prerequisites MATH 6230 and PHYS 5250 and MATH 6240 and PHYS 7280.

**PHYS 6610 (3) Earth and Planetary Physics 1**
Examines mechanics of deformable materials, with applications to earthquake processes. Introduces seismic wave theory. Other topics include inversion of seismic data for the structure, composition and state of the interior of the Earth.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 6610 and ASTR 6610
**Requisites:** Restricted to graduate students only.

**PHYS 6620 (3) Earth and Planetary Physics 2**
Covers space and surface geodetic techniques as well as potential theory. Other topics are the definition and geophysical interpretation of the geoid and of surface gravity anomalies; isostasy; post-glacial rebound; and tides and the rotation of the Earth.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 6620 and ASTR 6620
**Requisites:** Restricted to graduate students only.

**PHYS 6630 (3) Earth and Planetary Physics 3**
Examines the solar system, emphasizing theories of its origin and meteorites. Highlights distribution of radioactive materials, age dating, heat flow through continents and the ocean floor, internal temperature distribution in the Earth, and mantle convection. Also covers the origin of the oceans and atmosphere.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 6630 and ASTR 6630
**Requisites:** Restricted to graduate students only.

**PHYS 6650 (1-3) Seminar in Geophysics**
Advanced seminar studies in geophysical subjects for graduate students.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 6650 and GEOL 6650
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHYS 6655 (3) InSAR Processing and Interpretation**
Understand the concepts and applications of interferometric synthetic aperture radar (InSAR) and differential InSAR, to include an introduction to physical geodesy and satellite techniques.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 6655
**Grading Basis:** Letter Grade

**PHYS 6670 (2) Geophysical Inverse Theory**
Principles of geophysical inverse theory as applied to problems in the Earth sciences, including topography, Earth structure and earthquake locations.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOL 6670
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites a course in calculus and a course in computer programming (any language).

**PHYS 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.

**PHYS 6950 (1-6) Master's Thesis**
Approved problem in theoretical or experimental physics under the direction of staff members. Intended to introduce the student to procedures in research and development work. Work of an original nature expected.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PHYS 7160 (3) Intermediate Plasma Physics**
Continuation of PHYS 5150. Topics vary yearly but include nonlinear effects such as wave coupling, quasilinear relaxation, particle trapping, nonlinear Landau damping, collisionless shocks, solutions; nonneutral plasmas; kinetic theory of waves in a magnetized plasma; anisotropy; inhomogeneity; radiation- ponderomotive force, parametric instabilities, stimulated scattering; plasma optics; kinetic theory and fluctuation phenomena.
**Equivalent - Duplicate Degree Credit Not Granted:** ASTR 7160
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite PHYS 5150.

**PHYS 7230 (3) Statistical Mechanics**
Classical and quantum statistical theory, including study of both equilibrium and nonequilibrium systems. Topics covered include kinetic theory, degenerate gases, macrocanonical and grand canonical ensembles, and irreversible processes. Department enforced prerequisite: advanced undergraduate quantum mechanics course.
**Requisites:** Restricted to graduate students only.

**PHYS 7240 (3) Advanced Statistical Mechanics**
Introduces current research topics in statistical mechanics. Topics vary from year to year and may include phase transitions, critical phenomena, nonequilibrium phenomena, dense fluids, dynamical systems, plasma physics, or quantum statistical mechanics.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite PHYS 7230.

**PHYS 7250 (3) Quantum Many Body Theory**
Theory of quantum many body systems, including methods based on Green's functions, Feynman diagrams, and coherent state path integral with applications to interacting quantum gases, superconductivity and superfluidity, quantum phase transitions, quantum magnetism, quantum motion in the presence of disorder, and topological states of matter.
**Requisites:** Restricted to graduate students only.

**PHYS 7270 (3) Introduction to Quantum Mechanics 3**
Radiation theory; relativistic wave equations with simple applications; introduction to field theory and second quantization.
**Requisites:** Restricted to graduate students only.

**PHYS 7280 (3) Advanced Quantum Theory**
Quantum theory of fields, elementary particles, symmetry laws, and topics of special interest.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite PHYS 7270 or instructor consent required.

**PHYS 7310 (3) Electromagnetic Theory 1**
Sophisticated approach to electrostatics, boundary value problems, magnetostatics, applications of Maxwell's equations to electromagnetic wave propagation, wave guides, and resonant cavities and magnetohydrodynamics.
**Requisites:** Restricted to graduate students only.

**PHYS 7320 (3) Electromagnetic Theory 2**
Continuation of PHYS 7310. Topics include relativistic particle dynamics; radiation by moving charges; multiple fields; radiation damping and self-fields of a particle; collisions between charged particles and energy loss; radiative processes; and classical field theory.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite PHYS 7310.

**PHYS 7430 (3) Soften Condensed Matter Physics**
Introduces the science of liquid crystals, polymers, biological membranes, biopolymers, block copolymers, molecular monolayers, colloids, nanoparicle suspensions, emulsions, foals, gels, elastomers and other soft materials. Topics vary from semester to semester and is geared toward graduate students with diverse preparation backgrounds, including students from the Department of Physics, as well as other science and engineering departments.
**Requisites:** Restricted to graduate students only.

**PHYS 7440 (3) Theory of the Solid State**
Stresses application to the solid state of physical concepts basic to much of modern physics, single-particle approximation, and the energy-band description of electron states in solids, pseudopotential theory applied to ordered and disordered systems, dynamical behavior of electrons in solids, lattice dynamics, Hartree-Fock and random-phase approximation in solids, many-body aspects of magnetism, and superconductivity.
**Requisites:** Restricted to graduate students only.

**PHYS 7450 (3) Theory of Solid State 2**
Second semester of condensed matter physics, covers topics in soft condensed matter physics, liquid crystals, semiconductors, Quantum Hall effect, Fractional Quantum Hall effect, superconductivity and other topics at the discretion of the instructor.
**Requisites:** Restricted to graduate students only.

**PHYS 7550 (3) Atomic and Molecular Spectra**
Covers theory of atomic structure and spectra, including coupling of angular momenta, tensor operators, energy levels, fine and hyperfine structure, transition probabilities, Zeeman and Stark effects. Molecular spectra: electronic, vibrational, and rotational states. Rotation matrices, symmetric top.
**Requisites:** Restricted to graduate students only.

**PHYS 7560 (3) Quantum Optics**
Covers quantum optical and atomic systems including topics such as: coherent and squeezed states, theory of optical coherence, atom-radiation interaction, optical Bloch equations, open quantum systems, dynamics on the Bloch sphere, resonance fluorescence, beam-splitters and interferometry, entanglement and quantum information.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites PHYS 3220 and PHYS 4410.

**PHYS 7570 (3) Quantum Information and Computing**
Covers the foundations of quantum information and computing. Includes bits and qubits, entanglement, quantum algorithms, and quantum error correction. More advanced topics selected from: Quantum Shannon theory, quantum communication and networks, quantum-enhanced measurements, and quantum simulation. Department enforced prerequisite: PHYS 5250.
**Requisites:** Restricted to graduate students only.

**PHYS 7650 (3) Nonlinear and Nano-Optics**
Covers the field of ultrafast optics including both experimental and theoretical aspects. Topics include: description of ultrashort optical pulses, propagation of pulses including dispersion and nonlinearity, their integration, measurement and manipulation and their use in applications including spectroscopy.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites PHYS 4510 or PHYS 5160.

**PHYS 7660 (3) Ultrafast Optics**
Covers the field of ultrafast optics including both experimental and theoretical aspects. Topics include description of ultrashort optical pulses, propagation of pulses including dispersion and nonlinearity, their generation, measurement and manipulation and their use in applications including spectroscopy. Department enforced prerequisite: PHYS 5160, or PHYS 4510, or ECEN 5645.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**PHYS 7730 (3) Theory of Elementary Particles**
Systematics of elementary particles, leptons, quarks,gauge bosons, symmetries and symmetry breaking, scattering cross sections, decay rates, electron-positron annihilation, lepton scattering and hadron structure, quantum chromodynamics, electroweak interactions, gauge theories.
**Requisites:** Restricted to graduate students only.

**PHYS 7810 (1-3) Special Topics in Physics**
Various topics not normally covered in the curriculum; offered intermittently depending on student demand and availability of instructors.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**PHYS 7820 (3) Topics in Scientific Writing**
Teaches strategies used in scientific writing with emphasis on problem statement, audience analysis and principles of sound argument; reviews and reinforces essential writing skills, stressing the need for careful and strategic revision; provides experience in writing academic and professional communications; presentation skills and proposal writing. Most appropriate for students beginning to write journal articles, Comps II paper, or dissertation chapter.
**Requisites:** Restricted to graduate students only.

**PHYS 7830 (1) Plasma Seminar**
One credit 'journal club' style course covering current and significant historical advances in plasma physics research. Each week the class is assigned a journal article to read in advance of the meeting and one student is selected (on a rotating basis) to present a synopsis and lead a round-table discussion. Cannot be used for minimum credit hour requirements of graduate program. See also PHYS 7810 and PHYS 7820. May be repeated for a total of 7 credit hours.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**PHYS 7840 (1-3) Selected Topics for Graduate Independent Study**
Subject matter to be arranged.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**PHYS 7850 (1-3) Selected Topics for Graduate Independent Study**
Subject matter to be arranged. May be repeated for a total of 7 credit hours.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.

**PHYS 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.

# Planning and Urban Design (PLAN)

## Courses

**PLAN 2004 (3) History and Theory of Sustainable Planning and Urban Design**
Surveys the key urban theories that shape sustainable planning and urban design. Covers the evolution of city form, policy approaches, history of planning, and evolution of sustainability and its approaches globally.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD), and Environmental Planning Minor students only.
**Recommended:** Corequisite PLAN 2100.
**Grading Basis:** Letter Grade

**PLAN 2100 (6) Studio 1: Foundations of Sustainable Planning and Urban Design**
Expands on introductory sustainable planning and urban design concepts and methods to address social and ecological challenges in communities. Exploration skills include spatial analysis, basic community engagement techniques, legal and regulatory framework, and policy alternatives. The resultant project addresses challenges at the intersection of social and environmental systems.
**Requisites:** Requires prerequisite course of ENVD 1120 (minimum grade C-). Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD), students with 40+ credits.
**Recommended:** Corequisite PLAN 2004.
**Grading Basis:** Letter Grade

**PLAN 3005 (3) Process and Practice**
Introduces the regulatory and legal structures surrounding sustainable planning, design, and development. Covers issues of environmental policy, property rights, zoning, and building codes and laws. Includes work on professional development in the field of planning and design.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**PLAN 3100 (6) Studio 2: Intermediate Sustainable Planning and Urban Design**
Utilizes intermediate-level planning concepts and practices to create solutions to specific challenges in a collaborative process. Through a sequence of planning, policy, and design investigations students explore issues such as equity, housing, transportation, community engagement and land use.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Requires prerequisite course of PLAN 2100 (minimum grade C-). Restricted to all majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**PLAN 3102 (3) Strategies and Techniques for Sustainable Planning and Urban Design**
Explores analytical strategies and techniques in applied research and professional skills needed in sustainable planning and design. Includes quantitative and qualitative methods used by planners and designers to make informed decisions.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

**PLAN 4100 (6) Capstone in Sustainable Planning and Urban Design**
Applies advanced concepts in comprehensive planning, plan-making, and plan implementation for communities. Capstone experience provides an opportunity for students to engage with real-world challenges, working closely with communities to address complex issues. The project integrates both qualitative and quantitative skills, focusing on solving social, environmental, and ecological problems while emphasizing sustainable, impactful planning solutions for community development and resilience.
**Requisites:** Requires prerequisite course of PLAN 3100 (minimum grade C-). Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN), open option (ENVD), and Environmental Planning Minor students.
**Grading Basis:** Letter Grade

**PLAN 4101 (3) Sustainable Futures Planning**
Surveys innovative ways that planners and designers are addressing the great social and ecological challenges of the present and future. Includes issues such as population growth and climate change.
**Requisites:** Restricted to majors in Environmental Design (ARCH, EPOD, LAND, PLAN) and open option (ENVD).
**Grading Basis:** Letter Grade

# Political Science (PSCI)

## Courses

**PSCI 1101 (3) Introduction to American Politics**
Emphasizes interrelations among levels and branches of government, formal and informal institutions, processes, and behavior.
**Additional Information:** GT Pathways: GT-SS1 - Soc Behav Sci: Econ or Pol Systems
Arts Sci Core Curr: Contemporary Societies
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American
MAPS Course: Social Science
MAPS Course: Social Science US Context

**PSCI 2004 (3) Survey of Western Political Thought**
Studies main political philosophies and political issues of Western culture, from antiquity to 20th century.
**Additional Information:** GT Pathways: GT-SS1 - Soc Behav Sci: Econ or Pol Systems
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Theory

**PSCI 2012 (3) Introduction to Comparative Politics**
Most countries confront a variety of common political problems, including how to gain popular support, what kinds of political institutions are most appropriate, and how to distribute burdens and benefits to different segments of the population. Concentrates on learning how to compare different political systems and provides illustrative examples from several countries in both the industrialized and nonindustrialized world.
**Additional Information:** GT Pathways: GT-SS1 - Soc Behav Sci: Econ or Pol Systems
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 2028 (3) Special Topics**
Offers subjects not covered by existing courses. Offered when department approves a special topic.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General

**PSCI 2075 (3) Quantitative Research Methods**
Introduces quantitative research methods used in political science. Focuses on basic tools of analysis: data collection, processing, and evaluation, with special attention to survey techniques. Includes elite and case study analysis; aggregate, cluster, and content analysis; and the use of computers in political research.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Empirical Theory and Research Methdology
MAPS Course: Mathematics

**PSCI 2106 (3) Introduction to Public Policy Analysis**
Studies policymaking processes in American government, factors shaping public decision, and issues and questions relevant to political inquiry.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Public Policy

**PSCI 2116 (3) Introduction to Environmental Policy and Policy Analysis**
Teaches a systematic general framework for the analysis of environmental policy issues. Analyzes the interaction of environmental sciences, ethics, and policy across a range of environmental policy problems. Stresses critical thinking and practical applications.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Public Policy

**PSCI 2223 (3) Introduction to International Relations**
Introduces the field of international relations, with general survey of the theories, histories, and problems of historical and contemporary relations among state and nonstate actors.
**Additional Information:** GT Pathways: GT-SS1 - Soc Behav Sci: Econ or Pol Systems
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 2481 (3) Introduction to the Legal Process**
Covers basic legal concepts and processes emphasizing the American system. Gives special attention to political functions of law. Recommended as preparation for PSCI 4241.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3011 (3) The American Presidency and the Executive Branch**
Examines the constitutional, institutional and historical development of the presidency and the federal bureaucracy. Explores the changing role of the executive branch in the U.S. political system over time and competing views of executive power.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3021 (3) U.S. Campaigns and Elections**
Introduces students to the subjects, techniques, and findings of Political Science research on campaigns and elections. Particular emphasis is placed on the study of voting, campaign effects, partisan coalitions, electoral rules, campaign finance, and the policy impact of elections.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3022 (3) Russian Politics**
Covers the important and pressing issues in modern Russia politics since 1990. How and why did Communism end? How did Putin come to power, what are his goals, and how long will he stay in power? What is going on with the Russian-Ukrainian conflict? Does the Russian government interfere in the politics of other countries? Come learn about the politics of this major world power.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 3031 (3) Political Parties and Interest Groups**
Highlights the practice of party politics in the United States, including the nature, structure, organization, and functions of political parties and interest groups. Analyzes interest group politics and political behavior.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3032 (3) Democracy, Inequality and Violence in Latin America**
Stresses different perspectives on Latin American politics and understanding key political actors and processes. Country focus varies.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 3035 (3) Introduction to Qualitative Research Methods**
Enables students to create and critique qualitative research designs including comparative case studies, process tracing, interviews, archival research, and mixed methods. Includes lectures and in- or out-of-class exercises in which students use ideas discussed in the course to develop their own applied knowledge of these methods. Previously offered as a special topics course.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSCI 3041 (3) The American Congress**
Provides intensive examination of the role of Congress in American government, including congressional elections, representation, the organization of Congress, and congressional policy making. Examines larger context of congressional politics, including political parties, the president, and interest groups.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3051 (3) Public Opinion and Political Behavior**
Examines measurement of public opinion and evaluation of its impact on governmental policy formation, including survey research techniques.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3052 (3) Gender and Politics in Latin America**
Examines Latin American politics with particular focus on women's participation in social movements, war, revolution, and elections. Compares women's and men's politics and activism and examines changing gender and sexuality policies, gender relations, and the differential impact of political, economic, and social changes on men and women.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3650
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2600 or PSCI 3032.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 3054 (3) American Political Thought**
Highlights the development of American political theories and ideas from colonial period to present. Can also be taken for American field credit.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2004.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Theory

**PSCI 3061 (3) State Government and Politics**
Examines politics in the American states from a comparative and historical perspective. Considers major political actors---interest groups, citizens (direct democracy), and political parties, as well as central institutions, in the state political arena. Also focuses on major state public policy concerns.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3062 (3) Revolution and Political Violence**
Studies and evaluates alternative theoretical frameworks for the analysis of revolution and political violence. Theoretical material is firmly couched in case situations, such as ethnic, class, colonial, urban, racial, and religious conflicts.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101 or PSCI 2012 or IAFS 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 3064 (3) Environmental Political Theory**
Examines environmental discourses as conceptual means for theorizing environmental politics, and applies normative political theories to contemporary environmental policy issues. Considers the roles of political actors (individuals, groups, the state) in defining and addressing environmental problems on local, national, and global levels.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3064
**Recommended:** Prerequisite PSCI 2004.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Theory

**PSCI 3071 (3) Urban Politics**
Examines the structure of political, social, and economic influence in urban areas. Focuses on the relationship of the political system to governmental, social, and economic institutions and the contemporary policy processes in American cities.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3072 (3) Government and Politics in Southeast Asia**
Surveys historical and contemporary forces shaping politics in Southeast Asia. Gives special attention to comparative political economy, including development strategies and transitions to democracy.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2012 or IAFS 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative
Departmental Category: Asia Content

**PSCI 3075 (3) Applied Political Science Research**
Introduces the types of research design and quantitative methodology used in applied political science research. Directly builds on the data analysis performed in Quantitative Research Methods (PSCI 2075).
**Requisites:** Requires prerequisite course of PSCI 2075 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Empirical Theory and Research Methdology

**PSCI 3082 (3) Political Systems of Sub-Saharan Africa**
Analyzes post-independence and post-Cold War change in sub-Saharan Africa and provides intensive case studies of selected countries exemplifying each type with South Africa seen as a special case.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2012 or IAFS 1000.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 3084 (3) Diversity, Disagreement, and Democracy: an Introduction to the Theory and Practice of Democracy**
Examines the justification and limits for moral, political and religious pluralism. Students will be trained in the practice of dialogue and research the historical context of a subject that would be appropriate for a dialogue, and then interview members of the community who have different perspectives on the subject.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Theory

**PSCI 3091 (3) Politics of Social Movements**
Examines theoretical and empirical research on social movements from a U.S. perspective. Considers why social movements arise, who participates in them, the tactics they employ, obstacles they face, and their political impact.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3092 (3) Comparative Political Economy**
Presents theories on the interaction between policies and economics, economic models of politics, and familiarizes students with an approach that will prove useful in understanding current developments in both economics and politics. Explores relationships between financial markets, currency regimes and politics with some special consideration of the behavioral foundations of political and economic developments. Recommeded prerequisite: PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 3101 (3) Black Politics**
Examines structure of political, social, and economic influence in urban areas. Focuses on the relationship of political processes to governmental, social, and economic institutions and contemporary policy processes in American cities.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: American

**PSCI 3102 (3) South Asian Politics**
Examine the diverse political trajectories of four South Asian countries: India, Pakistan, Nepal, and Sri Lanka. Using a comparative lens, we will take into account historical, cultural, and economic, in addition to political, factors in deciphering this diversity of political paths.
**Recommended:** Prerequisite PSCI 2012 or IAFS 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative
Departmental Category: Asia Content

**PSCI 3105 (3) Designing Social Inquiry: An Introduction to Analyzing Political Phenomena**
Tackles conceptualization and measurement with a focus on reliability and validity of measures at the individual level. Explores how improper measurement and conceptualization can affect our inferences. Investigates how to use the tools of causal logic with statistical tools to differentiate linear, spurious, intervening and conditional relationships with a particular focus on what it means to "control for other factors".
**Requisites:** Requires prerequisite course of PSCI 2075 (minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Empirical Theory and Research Methdology

**PSCI 3122 (3) Authoritarianism in the Digital Age**
Introduces students to cutting edge research on how changes in information communication technologies (ICTs) have shaped politics in authoritarian regimes. Drawing on longstanding theories in the comparative politics literature, students will learn how governments, citizens, and non state actors use digital technologies to achieve their goals.
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSCI 3123 (3) War, Peace, and Strategic Defense**
Analyzes employment, or the threat of employing force, in securing American interests in the post-Cold War world. Gives special attention to utilities claimed for nuclear weapons, and alternatively, to weapons control and disarmament.
**Equivalent - Duplicate Degree Credit Not Granted:** PACS 3800
**Recommended:** Prerequisite PSCI 2223.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 3142 (3) Politics, History and Society of Cuba**
Provide students with general knowledge about Cuba, its history, government, and economy, with a particular emphasis on the Cuban Revolution and more current events such as changes to travel restrictions and US policy toward Cuba under Obama, Trump and Biden. As a global intensive, it also involves a 10-day travel/educational program in Cuba that will occur after the semester.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSCI 3143 (3) Current Affairs in International Relations**
Analyzes the various theoretical and policy challenges facing the post-Cold War world, with an emphasis on examining alternative conceptions of and approaches to such challenges.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2223.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 3155 (3) Survey Design and Analysis**
Provides the unique experience of involvement in ongoing survey research. Designed for students from different disciplines who will learn about what makes a good versus bad survey, how to write effective questions and how to put survey questions together into a cohesive questionnaire. Gain insight into the pitfalls of survey research and how to overcome them. Provides hands-on, real world experience on the design, implementation and analysis of the annual Colorado Political Climate survey.
**Requisites:** Requires prerequisite course ANTH 4000 or APPM 4570 or BCOR 1020 or ECON 3818 or GEOG 3023 or GEOL 3023 or MATH 2510 or PSCI 2075 or PSYC 2111 or SOCY 2061(minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Empirical Theory and Research Methdology

**PSCI 3163 (3) American Foreign Policy**
Examines foundations, assumptions, objectives, dynamics, and methods of U.S. foreign policy since WWII. Gives special attention to domestic and external problems of adapting U.S. policy to the changing world environment.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2223.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 3172 (3) Democracy and Its Citizens in the US and EU**
Explores the political institutions of the US and the EU and asks questions pertaining to the very citizenship experience in these two places; including policy, rights and liberties, quality of life, national identity, and immigration.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 3174 (3) Sex, Power, and Politics: U.S. Perspectives**
Explores how norms of sex, gender, race and sexuality find expression in institutions and policies in ways that legitimize only certain individuals as political actors, certain identities as politically relevant, and certain relationships as important. Critically examines how norms may be exposed, resisted, and changed by studying the politics of the women's, gay liberation, and men's movements in the U.S.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3174
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2004 or WGST 2000 or LGBT 2000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Theory

**PSCI 3183 (3) International Law**
Investigates the legal principles and landmark judicial cases that govern relations between countries and other international actors. Explores the development and effectiveness of law on issues such as human rights, war crimes, and the use of military force.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2223.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 3184 (3) Race, Power, and Politics**
Examines the fraught relationship between democracy and racial inequality in the US expressed in the founding contradiction between the Declaration of Independence and the recognition of slavery in the US Constitution. Explores these issues through study of the abolition movement, the Jim Crow era, Civil Rights and Black Power movements, immigrant activism, the American Indian movement, and Black Lives Matter.
**Recommended:** Prerequisite PSCI 2004.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**PSCI 3191 (3) National Security Organization and Policy Making**
Analyzes how the American governmental and political system is structured to define, select, and implement national security policies. Examines roles of the president, Congress, bureaucracy, interest groups,and other actors.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3193 (3) International Behavior**
Presents alternate theoretical frameworks for the explanation of international processes. Applies theories of conflict behavior and social organization to problems of war and peace.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2223.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 3205 (3) Undergraduate Research Experience**
Broadens and strengthens social science methodological skills and training by providing research collaboration between undergraduates and advanced graduate students and faculty. Promotes hands-on learning, immersion in the research process, and professional relationships. Students will collectively design and execute an original research project on a topic chosen with guidance by the instructor.
**Requisites:** Requires prerequisite course of PSCI 2075 (minimum grade C-). Restricted to students with 27-180 credits (Sophomore, Junior or Senior) Political Science (PSCI) majors or minors only. Restricted to students with a cumulative GPA of 3.0 or higher.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 3206 (3) The Environment and Public Policy**
Considers constitutional, political, and geographic factors in development of public policy affecting the use of natural resources and management of the environment; organization, procedures, and programs for use of natural resources; and administration of environmental policies.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101 or PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Public Policy

**PSCI 3211 (3) The Politics of Economic Inequality in the United States**
Explores empirical and normative origins and current state of economic inequality in the United States from a political science perspective. Evaluates how ideas about democracy and public policy address economic inequality, including the roles of gender, race and class in inequality. Examines the relationship between economic inequality and political inequality in both political behavior and political institutions.
**Requisites:** Requires a prerequisite course of PSCI 1101 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: American

**PSCI 3213 (3) International Political Economy**
Analyzes issues at the intersection of international politics and international economics. Utilizes theories and concepts from both economics and political science to understand issues in trade, finance, development and migration. Formerly PSCI 4193.
**Recommended:** Prerequisite PSCI 2223.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 3216 (3) Politics of Social Policy**
Examines theoretical assumptions, political processes, program content, and analytical methods used in development of US social policy. Current social policy issues are put in historic context and include assessment of social, economic, and political influences on policy choices and outcomes. Students have opportunity to compare policy approaches and gain practice in evaluating the politics and content of public policy alternatives.
**Recommended:** Prerequisite PSCI 1101, PSCI 2106 or PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSCI 3223 (3) International Human Rights**
Introduces the basic concepts behind international human rights. We define human rights and learn how human rights norms have developed. We explore why countries regularly violate the human rights of their own citizens. We learn how politics complicates the interactions between countries and other actors to protect human rights. Finally, we analyze the promise and limits of international cooperation and law in promoting human rights.
**Recommended:** Prerequisite PSCI 2223.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSCI 3225 (3) Strategy and Politics**
Focuses on the rational choice approach to understanding political decision making. Introduces students to the tools and methods of game-theoretic reasoning, and examines the strategic logic of many forms of political decision-making, including voting, lawmaking, and international conflict.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101 or PSCI 2012 or PSCI 2223.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Empirical Theory and Research Methdology

**PSCI 3271 (3) Law and Society: Legal Institutions and Human Behavior**
Examines relationship between human behavior and legal system, looking closely at the voluntary relationship between the citizen and the state, the use of law to balance economic liberty and equality, support for civil liberties, and procedural, distributive, and retributive justice.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3274 (3) Capitalism and its Critics**
Examines competing theoretical approaches to questions related to origins, development, and purposes of modern government in the United States; particular attention paid to impact of transformations in the underlying structure of the capitalist economy. Formerly PSCI 3171.
**Recommended:** Prerequisite PSCI 1101 or PSCI 2004.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Theory

**PSCI 3281 (3) Development of American Political Institutions**
Learn about the evolution of major American political institutions including the presidency, Congress, the judiciary, the party system and the right to vote.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3294 (3) Theories of Identity**
What is identity? How does it shape politics, and vice-versa? What are identity politics, and how do they shape the current political landscape? This course uses political theory, law, and case studies to give a three-part introduction to related core concepts: modern and contemporary theories of identity; the legal construction of identity in the United States; and the relationship between identity, policy, and activism in U.S. history and contemporary politics.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**PSCI 3301 (3) Gender, Sexuality and U.S. Law**
Contemporary and historic overview of U.S. courts' treatment of sex and gender. Using the case method, examines policy issues including, but not limited to: same sex marriage and civil unions; privacy; affirmative action; abortion; reproductive technologies; and discrimination based on sex and sexual orientation in education and in the workplace.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3300
**Recommended:** Prerequisite PSCI 1101 or WGST 2000.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: American

**PSCI 3311 (3) Gender and U.S. Politics: Protest, Polls and Policy**
Provides an overview and critical examination of women as political actors within the United States. Students will examine the gendered components of citizenship, election, political office and public policy. Furthermore, students will explore the ways in which gender intersects with class, race, ethnicity, sexual orientation and other identities in U.S. politics.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3311
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 3774 (3) Free Speech and Dangerous Ideas**
Examines in depth various philosophical and legal justifications of First Amendment rights of speech, press, association and religion. Assesses these justifications in relation to broader normative theories of liberal democracy. Can also be taken for American field credit. Formerly PSCI 4774.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisites PSCI 2004 and PSCI 2481.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Theory

**PSCI 4002 (3) Western European Politics**
Comparatively analyzes development of the political systems and processes of European democracies. Emphasizes contemporary institutions, decision making patterns, and policy issues. Special attention to challenges of welfare systems.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 4012 (3) Global Development**
Analyzes development theory, case studies in development strategies, and the problems and promises of development: specifically issues of gender, environment, labor, corruption and poverty. The primary focus is on explanations for variation in level of development over time and across countries.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 4015 (3) Social Media & Politics Research Methods**
Introduces students to state-of-the-art methods for using data from Twitter, Facebook, Instagram, Youtube, and TikTok in quantitative political science research. In this hands-on course, students will conduct original research projects using social media data, while learning text analysis and machine learning techniques that can be applied to diverse types of data.
**Requisites:** Requires prerequisite course of PSCI 2075 (minimum grade B).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSCI 4016 (3) Inequality and Public Policy in the U.S. and Europe**
Provides an in-depth understanding of factors that change the level of inequality in the U.S. and in Europe and its economic, political, and social consequences across these states over time.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101 or PSCI 2012 or PSCI 2106.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Public Policy

**PSCI 4022 (3) Chinese Foreign Policy**
History of China's external relations and theories of foreign policy decision making. Explores two vital bilateral relations (Sino-U.S. and Sino-Japanese) and several key issues (like Taiwan) in China's 21st century foreign policy.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative
Departmental Category: Asia Content

**PSCI 4024 (3) Senior Seminar in Political Theory**
Intensively analyzes and discusses major theories and issues of both contemporary political thought and the history of political philosophy. The topic is announced by the instructor, but might include analysis of concepts (justice, human rights, democracy, etc.) or major theories. Emphasizes advanced discussion plus individual research.
**Recommended:** Prerequisite PSCI 2004.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Theory

**PSCI 4028 (3) Special Topics**
Offers subjects not covered by existing courses. Offered when the department approves a special topic.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General

**PSCI 4052 (3) Chinese Politics**
Explores the politics of 20th century China to speculate on China's future in the 21st century. Begins with an extensive look at the political history of the People's Republic, before turning to social, cultural, economic, and political issues today. Concludes with an examination of Chinese foreign policy, with a focus on Sino-American relations.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative
Departmental Category: Asia Content

**PSCI 4062 (3) East European Politics**
Studies developments in the former Soviet satellites and Yugoslavia, their governmental organizations, and their relation to the former Soviet Union and the West.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 4106 (3) Issues and Challenges in American Green Energy Policy**
Explores growth of contemporary American green energy industry. Explores different types of green energy policies and how government institutions and regularly arrangements affect the development of green energy policy.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Public Policy

**PSCI 4131 (3) Latinos and the U.S. Political System**
Examines the political status and activities of Mexican Americans and other Latino groups (Cuban Americans and Puerto Ricans) in the U.S. Also covers Latino political attitudes and behaviors; Latino efforts to influence the major national, state, and local institutions of the American government; and public policy concerns of Latinos.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: American

**PSCI 4173 (3) International Organizations**
Explores if and how countries cooperate under anarchy. Investigates cooperation over a number of international issues, including peace and security, trade and development, human rights, and justice for victims of war crimes. Gives special attention to organizations including the United Nations, European Union, International Monetary Fund, and World Trade Organization.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 4213 (3) Europe and the International System**
Covers the past, present and future of Europe's global role.
**Recommended:** Prerequisite PSCI 2223.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 4221 (3) Political Psychology**
Examines the psychological foundations of political decision-making among citizens and elites. Considers the role of political psychology in explaining political behavior and outcomes at the individual and collective level.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 4241 (3) Constitutional Law**
Focuses on the nature and scope of American constitutional principles as developed by the U.S. Supreme Court, including federalism, separation of powers, commerce, due process and equal protection.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 4242 (3) Middle Eastern Politics**
Explores the domestic politics of various Middle Eastern countries as well as the development and globalization of the region. Includes topics such as the ongoing prevalence of dictatorships, political Islamism, oil politics, economic growth and stagnation, and relations with the U.S.
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative
Departmental Category: Asia Content

**PSCI 4243 (3) Modern Warfare: Terrorism, Ideology, Identity**
Explores the evolution of warfare and origins of terrorism. Ideological and identity differences have come to the forefront of violent political conflicts while the emerging doctrine of warfare has placed civilians in the middle of modern conflicts. Tracks potential changes in the means of and reasons for fighting, roles of civilians and media, and rules of war.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisites PSCI 2223 and PSCI 3193.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 4252 (3) Politics of Ethnicity and Nationalism**
Analyzes ethnic identity as a factor in contemporary politics. Deals extensively with the role of ethnic groups in political mobilization, the development of national collective consciousness, nation building, and international relations. Explores the influence of religion, language, history, culture and class on ethnic group formation and behavior.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 4253 (3) Politics of Identity and Inter-Ethnic Violence**
Discusses politics of identity and why identity is such a potent source of violence. Is inter-ethnic conflict an end in itself, or are ethnic groups trying to achieve other goals through violence? What can be done to prevent or ameliorate inter-ethnic strife? Examines theoretical aspects of identity, inter-ethnic conflict, as well as specific examples of ethnic crises.
**Recommended:** Prerequisite PSCI 2223 or PSCI 2012.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 4283 (3) International Migration and Policy**
Explores the politics of international migration, including public attitudes toward immigration, special interests politics of immigration policy making and the dynamics between political institutions and international migrations. Students will learn about the politics of international migration across different receiving and sending states over the past two centuries with an emphasis on the current debates over immigration in the U.S. and Western Europe.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 4302 (3) European Union Politics**
Explores the development, functioning, focus and future of the European Union. Examines history, institutions, policies and politics as well as governance theories that have been developed to explain origins and evolution of the EU.
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 4322 (3) Indigenous People's Politics**
Explore critical concepts, conversations, and issues surrounding Indigenous peoples' politics and politics around the globe. Analyze the ways in which Indigenous peoples have been impacted by colonization and look at how Indigenous peoples continue to respond to forces such as colonialism and capitalism in different geographical regions with a focus on the Americas. We will also draw on the experiences of indigenous peoples in Australia and New Zealand.
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSCI 4341 (3) Media and Politics**
Examines aspects of political communication as it applies to citizens, political decision makers, and specific public policies.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 4374 (3) Global Seminar: Revolutions in Paris**
Study the French Revolution (1789-1799) and the Paris Commune (1871) through immersive role-playing games, while learning about the ideas, history, and impact of these events through visits to important sites in and around the city of Paris. Learn about conservatism, republicanism, proto-socialism, slavery abolition, and anti-colonialism in the French Revolution; and socialism, Marxism, anarchism, and feminism in the Paris Commune.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSCI 4391 (3) Gender Politics and Global Activism**
Addresses the problems and challenges women face around the world and the ways in which women have mobilized to address them. Explores political activism at the local, national, regional and global levels. Focuses on different forms of activism, including strategies aimed at working with and within governmental institutions, as well as outside and against them.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4500
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 4701 (3) Symbolic Politics**
Introduces uses and abuses of symbols as instruments and indicators of political change.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 4703 (3) Technology, Society and the Future**
Explores some of the remarkable technological advances made in recent years such as Artificial Intelligence, Robotics, Social Media, "Big Data," Internet-Interconnectivity, etc. in order to better understand how they are reshaping the world around us. Looks at the implications of these technological advances for a variety of social and political issues including education, communication, medicine, international development, international relations, work, social life, politics, elections and democracy. Recommended Prerequistes: PSCI 2012 and/or IAFS 1000.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 4714 (3) Liberalism and Its Critics**
Examines contemporary arguments for and against liberalism. Focuses on the analysis, evaluation, and understanding of the philosophical contributions to this debate. Gives special attention to the concepts of justice, freedom, equality, and individualism.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2004.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Theory

**PSCI 4715 (3) Honors Political Science Seminar**
Involves writing and discussion of selected topics in political science. Critically reviews the major methodological and conceptual features of the discipline. Students begin their honors papers in the seminar. Department enforced prerequisite: minimum 3.3 GPA. Generally offered in fall term only.
**Additional Information:** Arts Sciences Honors Course
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Empirical Theory and Research Methdology

**PSCI 4716 (3) Selected Policy Problems**
Integrates general principles of policy inquiry with documents and other literature on specific problems in public policy, in order to evaluate courses of action.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Public Policy

**PSCI 4725 (3) Political Science Honors Thesis**
Involves writing an honors thesis. Formerly PSCI 4008.
**Requisites:** Requires prerequisite course of PSCI 4715 (minimum grade B-).
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Empirical Theory and Research Methdology

**PSCI 4731 (3) Civic Engagement in America**
Closely examines the various understandings of democracy, the arguments for and against democracy, and the progress of and prospects for democratic politics in the United States. Particular attention is paid to economic, social, and political developments in the United States that affect popular sovereignty, political equality, and liberty.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 4732 (3) Critical Thinking in Development**
Exposes students to current issues in the political economy of development. Subjects range from globalization, democratization and economic development. Specifically explores the international and domestic determinants of economic development with special reference to currency markets, foreign direct investment, trade and democratization.
**Equivalent - Duplicate Degree Credit Not Granted:** INVS 4302
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 4734 (3) Politics and Literature**
Broadly examines political topics as they are presented in important literary works and analyzes the possibilities involved in using the literary mode to present political teachings.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2004.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Theory

**PSCI 4751 (3) The Politics of Ideas**
Examines theoretical arguments and case studies of interactions of ideas, interests, and institutions in policymaking. Analyzes processes through which ideas come to the public agenda, how institutional settings shape those ideas, and why some ideas and interests are more successful.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 4771 (3) Civil Rights and Liberties in America**
Implementation of rights and liberties in America. Examines fundamental issues of free speech, press, association, and religion along with rights to due process and equal protection under the law.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: American

**PSCI 4783 (3) Global Issues**
Studies the principal issues confronting humanity that affect stability and survivability and their economic, social, and political implications.
**Requisites:** Restricted to Political Science (PSCI), International Affairs (IAFS) or Environmental Studies (ENVS) majors only.
**Recommended:** Prerequisite PSCI 2012 or PSCI 2223.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: International Relations

**PSCI 4792 (3) Issues in Latin American Politics**
Studies several Latin American countries in some depth including history and contemporary politics. Teaches students to listen to and evaluate different sides of political controversies, and critically evaluate arguments.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite PSCI 2012.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Comparative

**PSCI 4841 (1-3) Independent Study in American Politics**
Subjects are chosen and arrangements are made to suit the needs of each student. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall GPA of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. A special independent study approval agreement form must be obtained from the department.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Departmental Category: American

**PSCI 4842 (1-3) Independent Study in Comparative Politics**
Subjects chosen and arrangements made to suit needs of each student. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall GPA of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. Special independent study approval agreement form must be obtained from the department.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite PSCI 2012 or IAFS 1000.
**Additional Information:** Departmental Category: Comparative

**PSCI 4843 (1-3) Independent Study in International Relations**
Subjects chosen and arrangements made to suit needs of each student. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall average of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. Special independent study approval agreement form must be obtained from the department.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite PSCI 2223.
**Additional Information:** Departmental Category: International Relations

**PSCI 4844 (1-3) Independent Study in Political Theory**
Subjects and arrangements suit individual student needs. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall GPA of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. Special independent study approval agreement form must be obtained from the department.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite PSCI 2004.
**Additional Information:** Departmental Category: Political Theory

**PSCI 4846 (1-3) Independent Study in Public Policy**
Subjects chosen and arrangements made to suit needs of each student. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall average GPA of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. Special independent study approval agreement form must be obtained from the department.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Public Policy

**PSCI 4848 (1-3) Independent Study**
Subjects chosen and arrangements made to suit needs of each student. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall average of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. Special independent study approval agreement form must be obtained from the department.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General

**PSCI 4938 (3-6) Internship in Government**
With instructor's assistance, students secure an internship with a political or governmental organization. In addition to the internship, the class consists of regular seminars, course readings and assignments, and individual conferences with the instructor. Student pursues an academic research project and writes an original research paper. Instructor approval required in semester preceding internship. Contact instructor prior to early registration.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite PSCI 1101.
**Additional Information:** Departmental Category: General

**PSCI 6851 (2) Interdisciplinary Social Science Professional Socialization**
Trains graduate students and provides professional socialization in interdisciplinary social science research. Open to all interested students, with programming provided by the Institute of Behavioral Science. Sessions include IBS-housed colloquia and workshops in professional socialization, technological tools, interdisciplinary research, ethics, grant writing, etc. Students workshop and submit a research paper.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 6831 and SOCY 6851
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PSCI 6948 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General

**PSCI 7002 (3) Seminar in West European Politics**
Examines West European politics in terms of general theories of comparative politics, including institutional, behavioral and political economy approaches.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Comparative

**PSCI 7004 (3) Seminar: Political Theory**
Allows for intensive research in and presentation of selected topics. Introduces students to the broad context within which political ideas arise. Deals with classical and modern thought.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Political Theory

**PSCI 7008 (1) Teaching Political Science**
Designed to prepare graduate student teachers in the essentials of political science teaching and provide a background in theories of political science teaching and practical skills development in discipline-specific education.
**Requisites:** Restricted to Political Science (PSCI) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General

**PSCI 7011 (3) Seminar: American Politics**
Core field seminar for students of American politics. Course work emphasizes the diversity of contemporary research on American political history, political institutions, and political behavior.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7012 (3) Seminar: Comparative Political Systems**
Discusses current literature on comparative politics including theoretical and methodological issues.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Comparative

**PSCI 7013 (3) Seminar: International Relations**
Reviews salient literature on international relations, and subsequent presentation and critical discussion of analytical studies. Allows students wide latitude in substantive and methodological approaches. Emphasizes changing trends and efforts to understand the bases for cooperation and conflict.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International Relations

**PSCI 7021 (3) Latinos and U.S. Politics**
Examines in depth the theoretical and empirical literature assessing the political situation and activities of Latinos (Mexican Americans, Puerto Ricans, Cuban Americans, and others) in the U.S. Stresses original research.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7022 (3) Seminar in Political and Economic Development**
Covers domestic political and economic development in Latin America, Africa, and Asia, as well as interactions with the global economy. Includes defining, explaining, and prescribing policies for successful development, and comparing the experiences of developing and industrialized countries.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Comparative

**PSCI 7024 (3) Seminar: Selected Political Theories**
Familiarizes students with selected political philosophies or theories in classical or modern political thought.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Political Theory

**PSCI 7028 (1) Teaching Political Science 2**
Second course designed to train graduate teachers in the essentials of political science teaching and provide a background in theories of political science teaching and practical skills development in discipline specific education.
**Requisites:** Requires prerequisite course of PSCI 7008 (minimum grade D-). Restricted to Political Science (PSCI) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General

**PSCI 7031 (3) Seminar: Political Attitudes and Behavior**
Provides an intensive examination of topics in political attitudes and behavior such as political participation, ideology, voting, and elite behavior. Reviews methodology of behavioral research and introduces ICPSR data archive and computer-based research.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7032 (3) Seminar: Latin American Politics**
Stresses intensive study of the political process in Latin America with special emphasis on democratization.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Comparative

**PSCI 7043 (3) Seminar: Problems of International Institutions**
Investigates the choices that political actors make in forming international institutions, the power of institutions, the limits of institutional power, and the dysfunction of institutions. Explores the challenges that institutions face in addressing global problems such as human rights and international violence. Also analyzes the methods used to understand the influence of institutions.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International Relations

**PSCI 7046 (3) Seminar: Urban Public Policy**
Focuses on formulation, revision, and outcomes of public policy in American urban communities. Also uses some comparative Canadian and European literature.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Public Policy

**PSCI 7051 (3) Seminar: The United States Congress**
Comprehensively examines literature and selected research topics concerning the United States Congress.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7052 (3) Democracy & Authoritarianism**
Examine differences between democracies and authoritarian regimes; the choices and the consequences of democratic institutions in authoritarian regimes; and the causes of authoritarian survival and demise and the subsequent political choice.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite PSCI 7012.
**Additional Information:** Departmental Category: Comparative

**PSCI 7053 (3) War and Peace**
Explores the conditions that promote conflict between countries, focusing on broad and systemic explanations of war and peace. Investigates classical as well as current behavioral approaches to understanding why countries fight.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International Relations

**PSCI 7055 (3) Introductory Game Theory**
Develops competence in engaging formal theories of politics and in constructing and solving basic game-theoretic models of political behavior.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7056 (3) Readings in Public Policy**
Explores diverse approaches to policy choice, change, and learning processes. Overviews literature on policy determinants and typologies, policy subsystems, innovation and diffusion, agenda setting, implementation, problem definition and social construction, policy design, institutional analysis, and policy and democratic values.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Public Policy

**PSCI 7062 (3) The Politics of Ethnicity**
Explores the political aspects of pluralism, ethnonationalism, separatism, and related phenomena. Examines theories of ethnic mobilization, conflict,and accommodation in the context of political development and nation building. Includes cross-polity comparisons and case studies of multiethnic societies in the developed and developing world.
**Requisites:** Restricted to graduate students only.
**Recommended:** Requisite at least one course in comparative politics.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Comparative

**PSCI 7071 (3) Seminar: An Introduction to the Rule of Law**
Introduces students to debates about the role of institutions, particularly but not exclusively legal institutions, in placing limits on the state and fostering the rule of law. What is law? Why do courts exist and what is their role in the state? What institutions are necessary to establish the rule of law? Why are institutions successful in some contexts and not others? Considers these questions by surveying classic and current research from American and comparative politics literatures on topics such as judicial independence, credible commitments, separation of powers and constitutional design.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7073 (3) Seminar: Global Political Economy**
Introduces graduate students to concepts, theories, and data used to study the global system from a political-economic framework. Examines world systems analysis, regime change theory, and dependency theory with respect to operation of the exchange and power relationship within the contemporary world system.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International Relations

**PSCI 7075 (3) Scope and Methods of Political Science**
Introduces students to research design, with a subsequent focus on professional development. Students learn about different styles of research, central methodological points surrounding (and differentiating) these styles, and standards for evaluating research, regardless of approach or content.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7085 (4) Introduction to Political Science Data Analysis**
Provides intensive experience with quantitative techniques commonly employed in political science research, covering basic inferential and descriptive statistics through multiple regression. Students undertake substantive research projects, requiring lab instruction in the use of the computer in quantitative applications of political science research.
**Requisites:** Restricted to Political Science (PSCI) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7091 (3) Politics of Social Movements**
Examines theoretical and empirical research on American social movements. Emphasizes the role of movements as political actors and their ability to bring about changes in public policy and national political institutions.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7095 (3) Advanced Political Data Analysis**
Provides advanced training in the statistical modeling of political relationships. Focuses on the properties and assumptions of the ordinary least squares regression model, building on material covered in PSCI 7085: Introduction to Political Science Data Analysis.
**Requisites:** Requires prerequisite course of PSCI 7085 (minimum grade B-). Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7108 (3) Special Topics**
Various topics not normally offered in the curriculum. Topics vary each semester.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General

**PSCI 7111 (3) Seminar: American Political Institutions**
Intensive examination of the structure and rules of different political institutions in the United States. Explores both the changing approaches to the study of American political institutions as well as many ofthe major research topics on the presidency, Congress, the judiciary, and the bureaucracy.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7114 (3) Survey of Historical and Contemporary Political Theory**
Examines major texts of Western political thought from the ancients through the 21st century. Introduces students to major schools of contemporary political theory, while situating these in their larger political context. Professionalizes students through presentations and research projects. Texts vary each semester.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Requisite some previous coursework in political theory or philosophy.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Political Theory

**PSCI 7115 (3) Qualitative Methods**
Develop proficiency in constructing research designs with qualitative methods. The goal is to understand and be able to justify research designs involving relatively small numbers of observations as good political science given the fact that such designs may limit our ability to generalize.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7116 (3) Context-Sensitive Research Methods**
Prepares students to conduct research on topics where data is not obvious or not easily available. Encompasses variations in context and setting as part of data observations. Methods include interviewing protocols, interpretive methods, cluster analyses, case study methodologies and textual analyses.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 5740
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Public Policy

**PSCI 7118 (3) Foundations of Environmental Justice**
Examines environmental justice movements, policies, institutions, objectives, and scholarship. Identifies factors that contribute to environmental inequality, and efforts to reduce it. Formerly offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** COMM 7118, ENVS 7118 and GEOG 7118
**Requisites:** Restricted to graduate students only.

**PSCI 7123 (3) Civil Conflict**
Surveys historical, theoretical, and empirical analyses of violent conflict behavior, including the causes and consequences of civil war, protests, insurgency, terrorism, revolution, and intervention.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International Relations

**PSCI 7124 (3) Contemporary Democratic Theory**
Surveys major schools of contemporary democratic theory and introduces students to current scholarly debates about democracy and democratic politics. Professionalizes students through class presentations and research projects. Specific controversies and texts vary each semester.
**Requisites:** Restricted to graduate students only.
**Recommended:** Requisite some previous coursework in political theory or philosophy.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Political Theory

**PSCI 7126 (3) Introduction to Public Policy**
Designed for graduate students specializing in the field of public policy in the political science program. Surveys a wide variety of approaches to the analysis and understanding of public policy. The course is not a survey of any particular set of substantiative policy areas but instead is intended as an examination of the enduring puzzles that analysts of public policy commonly confront, the kinds of research methodologies that they employ, and a selection of the techniques that they bring to bear on their research questions.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Public Policy

**PSCI 7131 (3) Political Psychology**
Focuses on the psychological roots of political behavior, including the origins of political beliefs, political decision-making processes, and the psychology of group interactions.
**Requisites:** Restricted to Political Science (PSCI) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7132 (3) Comparative Political Economy**
Explores the relationship between economics and politics in developed and developing countries. Gives students an historical overview of 20th century economic trends and covers scholarly approaches totopics such as political and economic institutions, economic ideas and interests, the political causes of growth and equality, globalization and the welfare state, and varieties of capitalism.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite PSCI 7012.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Comparative

**PSCI 7136 (3) Public Policy and Behavioral Science**
Public policy is usually designed with the assumption that we make optimal choices based on our own best interests. Findings from the behavioral sciences, however, challenge this traditional view and reveal that a wide array of factors influence our decisions. In this course, we will explore the gaps between how we assume individuals to behave and how people actually behave. With better knowledge of what motivates human behavior, we will examine and discuss how policy might be better designed and executed to improve outcomes in society.
**Requisites:** Restricted to graduate students only.

**PSCI 7143 (3) Strategic Choice of Political Conflict**
Explores the conditions under which political actors go to war, and the conditions under which they broker peace. Approaches political conflict from the perspective of strategic choice. Conflict is not an accident, but is the deliberate result of decisions by actors. Actors choose conflict when bargaining obstacles prevent them from reaching a peaceful agreement.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**PSCI 7145 (3) Advanced Game Theory**
Covers more advanced applications of game theory in political science. Equips students with the skills to design and solve models at a reasonably high level of complexity and generality, and to understand how to effectively make use of such models in their research.
**Requisites:** Requires prerequisite course of PSCI 7055 (minimum grade B-). Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7151 (3) American Subnational Politics and Government**
Provides a comprehensive overview of the issues and literature concerning American "Subnational" politics. Considers three bodies of literature: American federalism and intergovernmental relations, state politics, and urban/local politics. Also examines a number of policy issues.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7155 (3) Maximum Likelihood Estimation and Generalized Linear Models**
Introduces maximum likelihood estimation and extends the linear model to several "generalized linear models." Provides students with the skills to analyze and understand a broad class of outcome variables and data structures such as dichotomous outcomes, counts, ordered and unordered categorical outcomes and bounded variables. Also examines several special topics such as multilevel models, causal inference and missing data.
**Requisites:** Requires prerequisite courses of PSCI 7075 and PSCI 7085 and PSCI 7095 (all minimum grade B-). Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7165 (3) Experimental Methods**
Focuses on the design, implementation, and analysis of experiments in political science, including lab experiments, survey experiments, and field experiments.
**Requisites:** Restricted to Political Science (PSCI) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7171 (3) Seminar: Law and Democratic Governance**
Explores cutting-edge debates in election law. Studies different perspectives on the current controversies in the field, in addition to select opportunities to engage scholars directly about their work. Develops students' understanding of the law of democracy, exposing students to some of the best scholarship, and improving students' ability to evaluate and critique legal scholarship.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 8205
**Recommended:** Prerequisite PSCI 7011.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7172 (3) Comparative Political Institutions**
Institutional theory has burgeoned across the social sciences in the last three decades. This course aims to raise awareness and understanding of institutional theory in comparative politics, as compared to alternative approaches such as political economy, political behavior, etc., and to help students develop skills to communicate this awareness and understanding to other professional political scientists.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Comparative

**PSCI 7173 (3) The Politics of International Factor Flows**
Focuses on the second dimension of international trade: the politics of international factor flows. Economic globalization can be defined as the freer flow of (1) goods and services (i.e., international trade) and (2) factors of production (e.g., capital and labor) across national borders. Links these topics in International Political Economy to broader theories of International Relations, namely Institutionalism and Liberalism.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International Relations

**PSCI 7175 (3) Dissertation Seminar**
Help students make progress towards (1) in the short term: focusing in on a dissertation topic, crafting a dissertation prospectus, and identifying potential funding sources; and (2) in the long term: sending papers out for review, developing a package for the job market, and understanding the academic job market and the tenure process.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7181 (3) Immigration Law and Immigrants' Rights**
Addresses four broad questions: Who is a citizen of the United States? Who else can come to this country? When and why can noncitizens be forced to leave? Who has the authority to answer these questions? These questions prompt us to examine the history of U.S. immigration, the constitutional-statutory-regulatory framework that governs immigration and citizenship law and the federal agencies that administer it. Also addresses contemporary challenges to, and assertions of, immigrants' rights.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 7615
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7183 (3) International Cooperation**
Investigates the origins, forms and consequences of international cooperation. The course covers both theoretical material related to international cooperation and various related global issue areas; security, economy, environment and social welfare. For each issue area, the key theoretical debates, empirical findings, as well as central challenges and parameters that constrain international cooperation will be investigated.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International Relations

**PSCI 7185 (3) Political Network Analysis**
Explores all aspects of political network analysis including disciplinary background, theories and concepts, approaches and applications, data basics and measurement, and techniques of analysis. Data assignments use software such as UCINET and R. Introduces visualization software including NetDraw, NetworkX and Cytoscape.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7191 (3) Law and Politics Colloquium: Race in America**
A co-taught colloquium that exposes students to highly prominent scholars conducting research on current topics at the intersection of race, social science and the law, including racial profiling, hate crime and affirmative action. Students will complete a final paper satisfying the CU Law seminar requirement.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 8645
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7203 (3) Political Economy of International Migration and Policy**
Provides an overview of the seminal and cutting edge research on the political economy of international migration including both immigration and emigration. Covers a diverse set of international migration issues, including public attitudes toward immigration, special interest politics of immigration policy making and the dynamics between political institutions and international migration.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International Relations

**PSCI 7206 (3) Public Policy and the Governance of Natural Resources**
Addresses a basic empirical puzzle in comparative environmental policy: why are some governmental organizations able to create relatively functional governance arrangements for natural resources management, while many others fail to do so? More specifically, we will seek to understand the particular contextual conditions that make successful governance transformations more likely.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Public Policy

**PSCI 7222 (3) Comparative Political Behavior**
Provides an introduction to research on behavioral processes and outcomes using readings mainly from the sub-fields of American Politics and Comparative Politics. Geographic emphasis leans toward advanced democracies because this is how behavioral research has generally developed but will also explore works by developing country experts. The main goals are to help students become familiar with the existing literature and to help them explore several key debates in the field.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Comparative

**PSCI 7255 (3) Time Series and Pooled Time Series**
Time series models¿models which take advantage of variation over time in a single unit¿and pooled time series (sometimes called cross-sectional time series or time series cross-sectional) models¿which utilize variation across both time and spatial units¿are very common in political science. While these models offer substantial leverage over important social science problems that use purely cross-sectional data, there are a number of pitfalls that are necessary to avoid during estimation.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite students should have a background in advanced regression statistics (such as PSCI 7085, PSCI 7095 and PSCI 7155).
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7306 (3) Program Evaluation**
Focuses on applying the tools of causal inference and program evaluation to various policy issues. The course materials explore whether programs meet their desired goals. There are a number of ways in which the ¿effectiveness¿ of a program can be defined and measured. Empirical applications based on real-world data will be drawn from a wide range of policy areas, including education, welfare, unemployment, discrimination, health, immigration, the environment, and economic development. Previously offered as a special topics course.
**Grading Basis:** Letter Grade

**PSCI 7901 (1-3) Independent Study**
Not a free option; must be approved by the student's advisor and program chair. Does not count as seminar. Not more than 6 hours of independent study may be credited toward PhD degree in political science. Special independent study approval agreement form must be completed by student and signed by faculty advisor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 7902 (1-3) Independent Study**
Not a free option; must be approved by the student's advisor and program chair. Does not count as seminar. Not more than 6 hours of independent study may be credited toward PhD degree in political science. Special independent study approval agreement form must be completed by student and signed by faculty advisor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Comparative

**PSCI 7903 (1-3) Independent Study**
Not a free option; must be approved by the student's advisor and program chair. Does not count as seminar. Not more than 6 hours of independent study may be credited toward PhD degree in political science. Special independent study approval agreement form must be completed by student and signed by faculty advisor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International Relations

**PSCI 7904 (1-3) Independent Study**
Not a free option; must be approved by the student's advisor and program chair. Does not count as seminar. Not more than 6 hours of independent study may be credited toward PhD degree in political science. Special independent study approval agreement form must be completed by student and signed by faculty advisor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Political Theory

**PSCI 7905 (1-3) Independent Study**
Not a free option; must be approved by the student's advisor and program chair. Does not count as seminar. Not more than 6 hours of independent study may be credited toward PhD degree in political science. Special independent study approval agreement form must be completed by student and signed by faculty advisor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 7906 (1-3) Independent Study**
Not a free option; must be approved by the student's advisor and program chair. Does not count as seminar. Not more than 6 hours of independent study may be credited toward PhD degree in political science. Special independent study approval agreement form must be completed by student and signed by faculty advisor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Public Policy

**PSCI 7908 (1-3) Independent Study**
Not a free option; must be approved by the student's advisor and program chair. Does not count as seminar. Not more than 6 hours of independent study may be credited toward PhD degree in political science. Special independent study approval agreement form must be completed by student and signed by faculty advisor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General

**PSCI 8901 (1-3) Graduate Research Topic**
Provides an opportunity for independent research in a topic of special interest. Arrangements are made to suit the needs of each particular student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: American

**PSCI 8902 (1-3) Graduate Research Topic**
Provides an opportunity for independent research in a topic of special interest. Arrangements are made to suit the needs of each particular student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Comparative

**PSCI 8903 (1-3) Graduate Research Topic**
Provides an opportunity for independent research in a topic of special interest. Arrangements are made to suit the needs of each particular student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: International Relations

**PSCI 8904 (1-3) Graduate Research Topic**
Provides an opportunity for independent research in a topic of special interest. Arrangements are made to suit the needs of each particular student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Political Theory

**PSCI 8905 (1-3) Graduate Research Topic**
Provides an opportunity for independent research in a topic of special interest. Arrangements are made to suit the needs of each particular student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 8906 (1-3) Graduate Research Topic**
Provides an opportunity for independent research in a topic of special interest. Arrangements are made to suit the needs of each particular student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Public Policy

**PSCI 8908 (1-3) Graduate Research Topic**
Provides an opportunity for independent research in a topic of special interest. Arrangements are made to suit the needs of each particular student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General

**PSCI 8991 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 99.00 total credit hours.
**Additional Information:** Departmental Category: American

**PSCI 8992 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 99.00 total credit hours.
**Additional Information:** Departmental Category: Comparative

**PSCI 8993 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 99.00 total credit hours.
**Additional Information:** Departmental Category: International Relations

**PSCI 8994 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 99.00 total credit hours.
**Additional Information:** Departmental Category: Political Theory

**PSCI 8995 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 99.00 total credit hours.
**Additional Information:** Departmental Category: Empirical Theory and Research Methdology

**PSCI 8996 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 99.00 total credit hours.
**Additional Information:** Departmental Category: Public Policy

# Portuguese (PORT)

## Courses

**PORT 1010 (5) Beginning Portuguese 1**
Provides students with basic vocabulary and fundamentals of grammar through practice in speaking, listening comprehension, reading and writing, based on the Communicative Approach. Introduces the cultures of the Portuguese speaking world, with a focus on Brazil.
**Additional Information:** Departmental Category: Portuguese

**PORT 1020 (5) Beginning Portuguese 2**
Provides students with basic vocabulary and fundamentals of grammar through practice in speaking, listening comprehension, reading and writing, based on the Communicative Approach. Introduces the cultures of the Portuguese speaking work, with a focus on Brazil. Continuation of PORT 1010. Department enforced prerequisite: PORT 1010 (minimum grade C-).
**Additional Information:** Departmental Category: Portuguese

**PORT 2110 (3) Second-Year Portuguese 1**
Involves practice in speaking, listening comprehension, reading and writing at an intermediate level. Explores relevant topics of the Brazilian culture through different media. Besides introducing grammar topics corresponding to the intermediate level of the Portuguese languages, it includes grammar review (PORT 1010 and PORT 1020) and extra work on vocabulary acquisition. Department enforced prerequisite: PORT 1020 (minimum grade C-).
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Portuguese

**PORT 2120 (3) Second-Year Portuguese 2**
Includes practice in speaking, listening comprehension, reading and writing at intermediate level, based on the Communicative Approach. Includes grammar and extra work on vocabulary acquisition, both explored through literary texts by renowned authors of the Portuguese speaking world, with a focus on Brazilian literature.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Portuguese

**PORT 2350 (3) Portuguese for Romance Language Speakers**
Focusing on Brazilian Portuguese, this course constitutes an intensive introduction to Portuguese language for those who speak a Romance language. Comprehends basic vocabulary and fundamentals of grammar through practice in speaking, listening comprehension, reading and writing, based on the Communicative Approach. Uses different media to explore cultural aspects of the Portuguese speaking world.
**Recommended:** Requisite three semesters of college equivalent in any Romance language.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Portuguese

**PORT 2800 (3) Brazil: Past and Present**
Discusses contemporary Brazil through the lenses of its literary, as well as socio-political movements. Students acquire a broader perspective of the country's current dynamics based on the formation of its national identity from 1500 to today. History serves as background to analyze literature and arts and critically understand Brazilian culture. Taught in English. Does not count toward Portuguese minor or Spanish and Portuguese major.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 2800
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Portuguese

**PORT 3003 (3) Advanced Portuguese Language Skills**
Consists of an advanced language course focused on current socio-environmental issues in Brazil. Involves reading academic texts in different areas of study, writing essays, watching documentaries, conducting class presentations and discussions, and studying grammar and vocabulary in the context of a more sophisticated written Portuguese.
**Requisites:** Requires prerequisite course of PORT 2120 or PORT 2350 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Portuguese

**PORT 3170 (3) Lisbon as a Global City: Cosmopolitanism, Diversity, and Innovation**
Experience the city of Lisbon, Portugal, one of the oldest cities in the world. Known for its cosmopolitanism and cultural diversity since the Age of Discovery, Lisbon will be the center of our exploration of how multicultural heritage has created new social, economic and cultural dynamics that have molded the city as a singular destination to visit and to invest.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**PORT 3220 (3) Latin American Culture: Spanish America and Brazil**
Examines literary, artistic, and philosophical currents in Spanish America and Portuguese America (Brazil), from pre-Columbian times to the present. Taught in Spanish.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 3220
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Recommended:** Prerequisites PORT 2110 and PORT 2120.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Portuguese

**PORT 3230 (3) Transatlantic Relations in the Portuguese Speaking World**
Examines cultural movements in Brazil, Portugal and Portuguese-speaking Africa, from the 15th century period of Portuguese expansion to the postcolonial present. Includes articles on culture as seen through literary, artistic, historical and sociological lenses. Taught in Portuguese.
**Requisites:** Requires prerequisite courses of PORT 2110 and PORT 2120 and PORT 2350 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Portuguese

**PORT 3270 (3) Socio-Environmental Dynamics in Brazil**
Gives students the opportunity to immerse themselves in the language, culture and contemporary realities of rural Maranhao, Brazil. Explores some of the most pressing issues in Brazil today with a focus on sustainable development, environmental governance and social entrepreneurship.
**Requisites:** Requires a prerequisite course of PORT 2110 or PORT 2350 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Portuguese

**PORT 3800 (3) Indigenous Thought: Art, Literature and Political Engagement in Brazil**
Discusses art, literature, and political engagement of Indigenous populations in contemporary Brazil. With a Decolonial viewpoint, this course analyses a series of works by Indigenous authors that underscores their culture, identity, and political expression. By focusing on the significance of the first-person testimonies, students will become more familiar with the diversity of languages and traditions that are otherwise homogenized by the ideological frameworks of those (non-indigenous) occupying a place and space of power. Taught in English.

**PORT 4110 (3) Brazilian Literature**
Focuses on Brazilian literature through the lenses of literary and cultural studies. May address fiction, poetry and/or the relationship between literature and film. In addition to reading literary texts, students read academic essays.
**Equivalent - Duplicate Degree Credit Not Granted:** PORT 5110
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires a prerequisite course of PORT 2120 or PORT 2350 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Portuguese

**PORT 4150 (3) Literature of the Portuguese Speaking World**
Examines major works of Portuguese literature and/or Portuguese-speaking African literature through the lenses of cultural and literary studies. May address fiction, poetry, and/or the relationship between literature and cinema.
**Equivalent - Duplicate Degree Credit Not Granted:** PORT 5150
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of PORT 2120 or PORT 2350 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Portuguese

**PORT 4230 (3) Special Topics in Luso-Brazilian and/or African Literature**
Designed to examine intensively particular topics or issues concerning the literatures of Portugal, Brazil and/or the African countries of Portuguese colonization. Taught in Spanish.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 4230
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of PORT 3230 and SPAN 3100 (all minimum grade C-).
**Recommended:** Prerequisites SPAN 3120 and an additional course above SPAN 3000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Portuguese

**PORT 4840 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Portuguese

**PORT 5110 (3) Brazilian Literature**
Focuses on Brazilian literature through the lenses of literary and cultural studies. May address fiction, poetry and/or the relationship between literature and film. In addition to reading literary texts, students read academic essays.
**Equivalent - Duplicate Degree Credit Not Granted:** PORT 4110
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Portuguese

**PORT 5150 (3) Literature of the Portuguese Speaking World**
Examines major works of Portuguese literature and/or Portuguese-speaking African literature through the lenses of cultural and literary studies. May address fiction, poetry, and/or the relationship between literature and cinema.
**Equivalent - Duplicate Degree Credit Not Granted:** PORT 4150
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Portuguese

# Presidents Leadership Class (PRLC)

## Courses

**PRLC 1810 (3) Leadership Foundations and Applications I**
Introduces fundamental principles of leadership and ethics. Emphasizes application of the principles for self-development and organizational effectiveness.
**Requisites:** Restricted to students in the Presidents Leadership Class (PPLC) only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences

**PRLC 1820 (3) Leadership Foundations & Applications II**
Explores challenges to leadership at the community level such as drug abuse, poverty, decline of infrastructure, care of the aged, etc. Gives particular attention to the development of effective leadership responses to community difficulties at university, city, state, and national levels.
**Requisites:** Restricted to students in the Presidents Leadership Class (PPLC) only.
**Grading Basis:** Letter Grade
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences

**PRLC 2820 (3) Multilevel Issues in Leadership**
Studies multilevel issues that originate in organizational settings but carry community and global implications. Encourages students to fully explore the complexity and interrelatedness of issues with a special emphasis on leadership and ethical implications.
**Requisites:** Restricted to students in the Presidents Leadership Class (PPLC) only.

**PRLC 2930 (1-3) Leadership Internship**
Students analyze the leadership styles within a host organization, examine how successfully an organization fulfills its mission and further refine their own theories of what constitutes effective leadership. Students also complete a meaningful project over the course of the internship. Department enforced prerequisites: PRLC 1810 and PRLC 1820 and PRLC 2820.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**PRLC 3800 (3-4) Global Inquiry for 21st Century Leadership**
Introduces students to the ways in which leadership and sustainable development theory converge, challenges students to examine these issues in specific contexts around the world, and provides them with practical training in cross-cultural competency and leadership skills.
**Requisites:** Requires prerequisites PRLC 1810 (minimum grade C). Restricted to Presidents Leadership Class members.
**Recommended:** Prerequisites PRLC 1820, PRLC 2820 or ENLP 3100.
**Grading Basis:** Letter Grade

**PRLC 3810 (3) Global Issues in Leadership**
Examines the challenges to leadership posed by major global issues. Problems in the areas of human rights, hunger, disease, large-scale collective violence and environmental deterioration are explored with a special emphasis on the development of effective, long-term leadership strategies. Department enforced prerequisites: PRLC 1810 and PRLC 1820 and PRLC 2820.

**PRLC 4010 (3-4) 21st Century Leadership**
An advanced course that focuses on critical analysis of leadership principles and techniques. Designed to provide theoretical and hands-on experience for individuals who wish to function in leadership roles at high levels of competence in the workplace and in the civic arena.
**Requisites:** Requires prerequisite courses of PRLC 1810 and PRLC 1820 (all minimum grade C). Restricted to students in the Presidents Leadership Class (PPLC) only.

**PRLC 4081 (3) Icons of the American Republic**
Examines the founding period of the United States through the events, political concepts and individuals depicted in the art exhibited in the U.S. Capitol Building in Washington, D.C. The course includes a visit to the U.S. Capitol Building, the floor of the U.S. House of Representatives, the floor of the U.S. Senate, and an exploration of the legislative process.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite PSCI 1101 or PSCI 2012 or PSCI 2223 or PSCI 2004.
**Additional Information:** Departmental Category: American

# Psychology (PSYC)

## Courses

**PSYC 1001 (3) General Psychology**
Provides a foundation for engaging with scientific research on human behavior, and surveys the basic principles and theories of psychology. Topics include biological and hereditary influences on behavior; human perception, attention, learning, and memory; social influences; personality; psychiatric disorders and treatments.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
MAPS Course: Social Science

**PSYC 2012 (3) Biological Psychology**
Surveys biological bases of learning, motivation, emotion, sensory processes and perception, movement,comparative animal behavior, sexual and reproductive activity, instinctual behavior, neurobiology of language and thought, and neurophysiology and neuroanatomy in relation to behavior.
**Requisites:** Requires prerequisite PSYC 1001 (minimum grade C-).
**Additional Information:** GT Pathways: GT-SC2 -Natural Physicl Sci:Lec Crse w/o Req Lab
Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 2111 (4) Psychological Science I: Statistics**
Three hours of lecture and one two-hour lab per week. Introduces descriptive and inferential statistics and their roles in psychological research. Topics include correlation, regression, T-test, analysis of variance and selected nonparametric statistics.
**Requisites:** Requires prerequisite course of MATH 1011 or MATH 1150 or MATH 1212 or MATH 1300 or ECON 1078 or ECON 1088 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab
Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 2145 (3) Introductory Cognitive Psychology**
Introduces the study of human cognitive processes and covers perception, attention, memory, language, problem solving, reasoning, and decision making. Focuses on basic research and theory in cognitive psychology but also considers their implications for everyday applications such as effective learning and retention, multitasking, and eyewitness testimony.
**Requisites:** Requires a prerequisite course of PSYC 1001 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 2606 (3) Social Psychology**
Covers general psychological principles underlying social behavior. Analyzes major social psychological theories, methods, and topics, including attitudes, conformity, aggression, attraction, social perception, helping behavior, and group relations.
**Requisites:** Requires a prerequisite course of PSYC 1001 (minimum grade C-).
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 2700 (3) Psychology of Gender and Sexuality**
Examines psychological research on gender and sexuality as they intersect with race, class and other social categories. Points of emphasis include differences in cognition, attitudes, personality and social behavior. Conceptual themes include research methodologies, implicit and explicit attitudes, stigma and stereotypes. These elucidate such areas as close relationships, leadership, career success and mental health and happiness.
**Requisites:** Requires a prerequisite course of PSYC 1001 or WGST 2000 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**PSYC 3001 (4) Honors Research Methods Seminar**
Focuses on research design. Each student prepares an original, detailed research proposal, which can become the honors thesis. Open only to students who have been accepted into the psychology departmental honors program. Instructor consent required.
**Additional Information:** Arts Sciences Honors Course

**PSYC 3005 (3) Cognitive Science**
Introduces cognitive science, drawing from psychology, philosophy, artificial intelligence, neuroscience, and linguistics. Studies the linguistic relativity hypothesis, consciousness, categorization, linguistic rules, the mind-body problem, nature versus nurture, conceptual structure and metaphor, logic/problem solving and judgment. Emphasizes the nature, implications and limitations of the computational model of mind.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3702 and LING 3005 and PHIL 3310 and CSCI 3702 and SLHS 3003 and CSPB 3702
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 3102 (3) Behavioral Genetics**
This course introduces the basic principles of behavior genetics, the field of study that is interested in evaluating the different forces that shape individual differences. More specifically, the course will survey the evidence for genetic and environmental influences on a broad range of human behaviors, including psychopathology, personality, cognition, and substance use. This course also covers the different methods for evaluating these genetic and environmental contributions, including family-based designs that compare similarities across siblings, twins, and parents and their children, animal models of human behavior, and more recent genomic methods that measure our DNA. Lectures are largely about conceptually understanding findings from this field and the corresponding methods used to produce these findings. This course does not require a strong statistical or biological background to be successful or understand the material.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 3111 (4) Psychological Science 2: Research Methods in Psychology**
Provides a foundation in research methodology to give students the ability to design, conduct, analyze, and present (both verbally and in writing) an empirical study in psychology. Allows students to be effective producers and consumers of research.
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2111 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 3131 (3) Human Emotion**
Introduces students to a diverse array of theoretical and empirical issues related to the study of human emotion. Evolutionary theories of anger, love and disgust; emotion and morality; cultural and gender differences; emotion and the brain; relation between emotion and thinking; development of emotion; and abnormal emotions in mental illness.
**Requisites:** Requires a prerequisite course of PSYC 1001 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 3303 (3) Clinical Psychology: Psychological Disorders**
Examines etiological, theoretical, clinical,diagnostic, and experimental perspectives of major mental health disorders, with an emphasis on the main symptoms and diagnostic criteria associated with these disorders.
**Requisites:** Requires a prerequisite course of PSYC 1001 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 3456 (3) Psychology of Personality**
Offers a psychological study of structure, organization and development of the person as a whole. Analysis of major theories, methods and research, including topics such as emotion, motivation, temperament, inner experience, identity and the self, personality change and the influence of sociocultural context.
**Requisites:** Requires a prerequisite course of PSYC 1001 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 3511 (3) History of Psychology**
Includes outline of development of psychological theories since the Greek philosophers, the story of experimental psychology and its problems, and schools of psychological thinking. Students read original sources in English and English translations. Formerly PSYC 4511.
**Requisites:** Requires a prerequisite course of PSYC 1001 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**PSYC 3684 (3) Developmental Psychology**
In-depth consideration of human developmental processes across the life span. Includes coverage of the major topics in human development, such as physical, cognitive, social, emotional, and moral development.
**Requisites:** Requires prerequisite of PSYC 1001 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisites PSYC 2111 and PSYC 3111 (Both require minimum grade of C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Developmental

**PSYC 4001 (3) Honors Seminar 2**
Surveys contemporary issues, explores current controversies, and examines in detail selected topics in psychology. Open to juniors and seniors pursuing departmental honors.
**Additional Information:** Arts Sciences Honors Course

**PSYC 4011 (1-3) Senior Thesis**
Critically reviews some aspect of psychological literature, scholarly analysis of a major psychological issue, and/or empirical research project. See the psychology honors director for further information.
**Additional Information:** Departmental Category: General

**PSYC 4021 (3) Psychology and Neuroscience of Exercise**
Explores social, cognitive, psychobiological and behavioral aspects of exercise and other forms of physical activity. Examines how psychological and neuroscience research have been used to study how participation in regular physical activity affects mental health and how psychological and other variables influence participation in, adherence to, enjoyment of, and consequences of exercise and physical activity.
**Requisites:** Requires a prerequisite course of PSYC 2012 or NRSC 2100 or NRSC 2125 (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 4031 (3) Sport Psychology**
Explores the role psychological factors play in the participation in, performance in, and enjoyment of sport. Topics include the role of motivation, attention, arousal, psychological skills training, leadership, and teamwork in sport performance; the psychological variables influencing exercise addiction, overtraining, burnout, body image, and susceptibility to, and recovery from, athletic injuries; and competition, cooperation aggression, and moral behavior in sport.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: General

**PSYC 4101 (3) Honors Thesis 1**
Completing an Honors Thesis under the direction of the course instructor will be the focus of this course. Students will each conduct an original, empirical research project, including developing the research idea, collecting and analyzing data, and writing their thesis, as well as practice their oral defense. Students will additionally acquire applied experience in research methods, statistics, and data analysis.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of PSYC 2111 and PSYC 3111 (minimum grade C-). Restricted to students with 3.3 GPA or higher.
**Grading Basis:** Letter Grade

**PSYC 4114 (3) Adolescent Development and Learning for Teachers**
Examines current theory and research about adolescent learning and development and explore implications for secondary teaching. Topics include human diversity as a resource for learning, adversity and agency, connecting instruction to students' everyday lives, and the role of belonging and relationships in positive youth development. This course is appropriate for masters degree students.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4136 (4) Judgment and Decision Making**
Introduces the study of judgment and decision making processes (estimation, prediction and diagnosis, choice under certainty, and risky decision making) and the methods that have been developed to improve these processes (statistical modeling, decision analysis, and expert systems).
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2606 and PSYC 2111 and PSYC 3111 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Psychology (PSYC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4142 (3) Brain Injury, Plasticity and Recovery: From Neuron to Behavior**
Traumatic brain injury is prevalent in all aspects of society, with incidence rates varying according to age, gender, military affiliation and participation in certain sports. Delves into the full spectrum of consequences following injury, beginning with the individual neural cells in the brain through to the behaving individual. Covers strategies to improve functional recovery.
**Requisites:** Requires a prerequisite course of PSYC 2012 or NRSC 2100 or NRSC 2125 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) majors only.
**Recommended:** Prerequisite NRSC 4132.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 4145 (4) Advanced Cognitive Psychology**
Advanced course in human cognitive processes. Covers key aspects of cognition, such as perception, attention, learning, memory, language and thinking. Discusses major theories and ideas in terms of the research they have inspired. Emphasis varies with instructor. One lab per week and a research project is required.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 5145
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2145 and PSYC 2111 and PSYC 3111 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 4152 (4) Research Methods in Behavioral Genetics**
Analyze your own genome in this advanced course in behavioral genetics! Students will learn modern genomic analytic techniques by analyzing millions of single nucleotide polymorphisms across their own or a test genome (students' choice) and interpret results as they apply to complex traits, health conditions, ancestry, and relatedness. Students will also review primary-source research and reviews. Students learn and apply their analytic skills in laboratory practicals and demonstrate applied and theoretical knowledge in a cumulative paper.
**Requisites:** Requires prerequisite courses of PSYC 3111 and (EBIO 2070 or MCDB 2150 or PSYC 3102) (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 4155 (4) Cognitive Neuroscience/Neuropsychology**
Introduction to cognitive neuroscience and neuropsychology. Provides a survey of the neuropsychological underpinnings for a wide range of cognitive functions: vision, object recognition, attention, language, memory and executive function. One lab per week.
**Equivalent - Duplicate Degree Credit Not Granted:** NRSC 4155
**Requisites:** Requires a prerequisite course of PSYC 2111 and PSYC 3111 and (PSYC 2012 or NRSC 2100 or (NRSC 2125 and NRSC 2150)) (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 4165 (4) Psychology of Perception**
One lab, three lect. per week. Analyzes peripheral and central mechanisms involved in the transduction and interpretation of experience. Gives special attention to vision and audition; major theories in these areas are discussed in terms of research they have inspired.
**Requisites:** Requires a prerequisite course of PSYC 1001 and PSYC 2111 and PSYC 3111 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 4175 (4) Computational Cognitive Neuroscience**
Introduction to cognitive neuroscience (how the brain gives rise to thought) using computer simulations based on the neural networks of the brain. Covers a full range of cognitive phenomena including perception and attention, learning and memory, language, and higher-level cognition based on both large-scale cortical neuroanatomy and detailed properties of cortical neural networks. One lab per week.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 5175
**Requisites:** Requires prereq of PSYC 1001 and (PSYC 2012 or NRSC 2100 or NRSC 2125) and PSYC 2111 and PSYC 3111 (minimum grade of C-). Restricted to PSYC or NRSC majors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 4201 (3) Honors Thesis 2**
Completing an Honors Thesis under the direction of the instructor will be the focus of this course. Students will each conduct an original, empirical research project, including developing the research idea, collecting and analyzing data, and writing their thesis, as well as practice their oral defense. Students will additionally acquire applied experience in research methods, statistics and data analysis.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of PSYC 2111 and PSYC 3111 (minimum grade C-). Restricted to students with GPA of 3.3 or higher.
**Grading Basis:** Letter Grade

**PSYC 4220 (3) Language and Mind**
Studies topics such a speech perception, word recognition, sentence comprehension, language acquisition, bilingualism, reading and writing. Examines the role of language as a product and producer of the mind, studying interactions between language and cognition from an interdisciplinary perspective. Students will become familiar with the methods of psycholinguistics and design and conduct a psycholinguistic experiment on their own.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4220
**Recommended:** Prerequisites PSYC 1001 and LING 2000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4225 (4) Interdisciplinary Research Methods in Child Language Acquisition**
Explores fundamental issues in language acquisition cross-culturally, combining methods from Linguistics, Anthropology, Psychology and Computer Science. Students will explore theoretical issue using a hands-on approach that involves acquiring skills such as designing and conducting experiments, investigating corpus data, and computational modeling.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4225
**Requisites:** Requires a prerequisite course of PSYC 1001 or LING 2000 (minimum grade C).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4263 (3) Psychological Treatment: An Evidence-Based Approach**
Provides an intensive introduction to behavioral interventions for common mental health problems and the framework of evidence-based practice in psychology, including helping students to acquire, critically evaluate and communicate about clinical psychological science intervention research and become familiar with applied skills that are relevant to a broad range of clinical settings.
**Requisites:** Requires prerequisite courses of PSYC 2111 and PSYC 3111 and PSYC 3303 (all minimum grade C-)
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4332 (1) Found in Translation: TBI From Bench to Bedside to Community**
Traumatic Brain Injury (TBI) is prevalent in all aspects of society. Delves into all aspects of TBI, with particular emphasis on translational clinical neuroscience. That is, the movement of knowledge from bench, to bedside, to community. All of this knowledge resulting in better treatment of and outcome for those with TBI.
**Requisites:** Requires prerequisite courses of PSYC 2012 or NRSC 2100 or NRSC 2125 (minimum grade C-). Restricted to students with 57-180 units (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 4376 (4) Research Methods in Social Psychology**
Introduces the study of social psychological processes, emphasizing the social cognition perspective (e.g., stereotyping, person perception, theory of planned behavior) and the methods utilized in studying these processes. Students will complete research projects as part of the course.
**Requisites:** Requires prerequisite courses of PSYC 2606 and PSYC 2111 and PSYC 3111 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Psychology (PSYC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4377 (4) Research Methods in Positive Psychology**
This research methods course will examine the science of human flourishing from the viewpoint of experimental positive psychology. Empirical research methods will be examined in the context of nine factors related to human flourishing: signature strengths, savoring, gratitude, kindness, social connection, exercise, sleep, mindfulness, and nature. Students will apply course material in a class experiment with individual research reports and presentations as a cumulative course experience.
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2111 and PSYC 3111 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4378 (4) Research Methods in Conservation Psychology**
This course will examine the science behind how psychological processes influence behaviors that help or hurt the environment and how psychology can help encourage environmental conservation. Empirical research methods will be examined in the context of nine factors related to the human-nature connection: Environmental Attitudes & Values, Pro-environmental Behaviors, Social Influence & Environmental Action, Environmental Education & Communication, Human-Nature Relationships, Environmental Justice & Ethics, Psychological Impacts, Policy & Governance.
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2111 and PSYC 3111 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4399 (4) Qualitative Research Methods in Psychology**
In this Lab and Methods course, we will take a deeper dive into different types of qualitative research approaches, such as observation, interviewing, and multimodal (e.g., text, media) analysis, to learn how each method can help us investigate elements of the human experience that we might otherwise not be able to study. We will cover basic theoretical principles of qualitative inquiry and acquire a general understanding of how different qualitative methods work. Through discussions, critique, a student-created ¿mini study,¿ and lots of hands-on practice, you will explore different ways of investigating our world in a scientific, but non-statistical, way that accurately and ethically uplifts the voices of your study participants. The goal of this course is to help you develop skills in qualitative research that will serve you well as a researcher or practitioner in psychology.
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2111 and PSYC 3111 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4443 (4) Research Methods in Clinical Psychology**
Learn to evaluate research methods as they relate to etiology, assessment, and intervention of psychological disorders. Emphasizes the importance of using sound methodological strategies in both research and clinical settings.
**Requisites:** Requires prerequisite courses of PSYC 2111 and PSYC 3111 and PSYC 3303 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4526 (3) Social Neuroscience**
Develops greater knowledge of the general psychological principles underlying social behavior by using methods and theories from neuroscience. Students learn about common methods in human neuroscience and how they can be applied to better understand social behavior.
**Requisites:** Requires prerequisite courses of (PSYC 2012 or NRSC 2100 or NRSC 2125) and PSYC 2111 and PSYC 2606 and PSYC 3111 (all minimum grade C-). Restricted to students with 57-180 credits (junior or senior) Psychology (PSYC) or Neuroscience (NRSC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4541 (3) Special Topics in Psychology - Social Science**
Examines individual or social dimensions of human behavior. Students will develop expertise in basic theories, as well as in measurement techniques and data interpretation regarding issues of societal significance. Students will consider applications of that knowledge, ranging from the development of new theory to solving problems. Particular section content is determined by instructor. PSYC 4541 and/or PSYC 4551 may be taken 3 times with different topics, for a total of 9 credits
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2111 and PSYC 3111 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Psychology (PSYC) majors only.

**PSYC 4542 (3) Public Health Capstone Research Methods: Environmental Interventions to the Mental Health Epidemic**
This course will introduce students to interdisciplinary research methods in public health, with a focus on environmental interventions to address mental health. Robust data shows that spending time in nature can positively impact mental health. This course will teach students about the many phases of the scientific research process through doing; students will work in small groups to do their own research project throughout the semester on a pre-picked topic that can change from year to year.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 4542 and PBHL 4542
**Requisites:** Prerequisites: Restricted to Public Health majors or those pursuing the Public Health certificate. Also, must have taken one of the following: ANTH 4000, ECON 3818, GEOG 3023, IPHY 3280, MATH 2510, PSCI 2075, PSYC 2111, SOCY 2061, STAT 2600.
**Recommended:** Prerequisite Students who are interested in taking this course but do not meet these requirements must have instructor approval.

**PSYC 4543 (3) Clinical Neuropsychological Disorders**
Neuropsychological disorders are behavioral and cognitive expressions of underlying brain diseases or injury. The course will provide in-depth coverage from clinical perspectives of wide range of disorders caused by stroke, traumatic brain injury, degenerative diseases, and inflammatory diseases. Students will learn the various neurologic, neuroimaging and neuropsychological methods for assessing and diagnosing these disorders and will review specific illustrative cases.
**Requisites:** Requires prerequisite PSYC 1001 and (PSYC 2012 or NRSC 2100 or NRSC 2125) (all minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 4553 (3) Women's Mental Health: A Biopsychosocial Approach**
Provides a broad overview of current research and theory related to women's mental health, emphasizing topics and problems that are prevalent among or particularly relevant to women. Teaches students to develop a critical and integrative understanding women's mental health, including historical, social, cultural, biolotgical, behavioral, cognitive and emotional factors.
**Requisites:** Requires a prerequisite course of PSYC 3303 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Psychology (PSYC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4560 (3) Language Development**
Covers the development of language in childhood and into adult life, emphasizing the role of environment and biological endowment in learning to communicate with words, sentences, and narratives.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4560 and SLHS 4560
**Requisites:** Restricted to Psychology (PSYC) or Neuroscience (NRSC) majors only.
**Recommended:** Prerequisite PSYC 1001 and LING 2000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4606 (3) Advanced Topics in Social Psychology**
In-depth study of selected topics in social psychology. Particular section content each semester is determined by the instructor. May be repeated for a maximum of 6 credit hours, provided the topics vary.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2606 and PSYC 2111 and PSYC 3111 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Psychology (PSYC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4655 (4) Community-based Research and Design**
There is a growing recognition that in designing products, interventions, and systems, it is critical to involve the people who will be using those products, experiencing those interventions, and participating in those systems. The field of developmental psychology studies how people grow, change, and adapt over time. The fields of participatory and design research combine methods from different disciplines to guide design and implementation. In this course, you will collaborate with local community partners to design, prototype, implement, and refine a learning experience for young children. By the end of this class you will be able to combine theory- and evidence-based principles from cognitive development with methods and tools from community-based and participatory research to create and evaluate a design product.
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2111 and PSYC 2145 and PSYC 3111 (all minimum grade C-).
**Recommended:** Prerequisite PSYC 3684.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

**PSYC 4713 (3) Survey of Clinical Psychology**
Covers theories and practices relating to problems of ability and maladjustment. Diagnostic procedures and treatment methods with children and adults.
**Requisites:** Requires a prerequisite course of PSYC 3303 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Psychology (PSYC) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4733 (4) Psychological Testing and Assessment**
Provides an overview of issues central to testing and assessment of psychological constructs, including types of evaluation instruments currently in use inthe field, their applications and design.
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2111 and 3111 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4744 (4) Methods in Developmental Psychology**
Learn to critically read and form hypotheses from studies in the developmental literature, gain hands-on experience in testing children and in the design of methods to test children, evaluate experimental data and relate them to hypotheses, previous results and theory, and write so others can understand.
**Requisites:** Requires prerequisite courses of PSYC 1001 and PSYC 2111 and PSYC 3111 and PSYC 3684 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Psychology (PSYC) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**PSYC 4841 (1-6) Independent Study (Upper Division)**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Psychology (PSYC) majors only.

**PSYC 4911 (3) Teaching of Psychology**
Students receive concrete experience in teaching general psychology under supervision of a psychology faculty member. Alternative pedagogical strategies are discussed. Students must submit an application to the undergraduate advising center.
**Additional Information:** Departmental Category: General

**PSYC 4931 (1-6) Field Placement Internship**
Offers valuable volunteer experience through a supervised field placement. Provides hands-on insight into the decisions and issues that confront professionals in psychology and related fields.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Psychology (PSYC) majors only.
**Recommended:** Prerequisite completion of 15 or more hours of psychology course work.
**Additional Information:** Departmental Category: General

**PSYC 5052 (4) Behavioral Neuroscience**
This advanced course the anatomy and physiology of the central nervous system in detail, and applies that understanding to the visual, auditory, and sensorimotor systems, demonstrating how the anatomy and physiology of the nervous system can be used to explain behavior. The laboratory uses live animals and computer simulations.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 4052 and NRSC 4052 and NRSC 5052
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Biological

**PSYC 5082 (2-3) Seminar: Biological Psychology**
Special topics concerning biological bases of behavior.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires a prerequisite course of PSYC 4052 (minimum grade D-). Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Biological

**PSYC 5102 (3) Introduction to Behavioral Genetics**
Provides introduction to basic principles of genetics in the study of behavior, methods used to examine the influences of genes and environment on behavior and interpretation of studies using these methods.
**Requisites:** Restricted to Behavioral, Psychiatric and Statistical Genetics PhD students.
**Additional Information:** Departmental Category: Biological

**PSYC 5112 (2-3) Concepts in Behavioral Genetics**
Examines selected topics in greater detail than is possible in the graduate introductory course in behavioral genetics (PSYC 5102). Topics covered may include inheritance of behavioral characteristics from perspectives of pharmacogenetics, transmission genetics, biochemical genetics, and evolutionary genetics, as well as scientific integrity and the responsible conduct of behavioral genetic research.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Behavioral, Psychiatric and Statistical Genetics PhD students.
**Additional Information:** Departmental Category: Biological

**PSYC 5122 (3) Quantitative Genetics**
Surveys principles of genetics of quantitative characteristics. Topics include gene frequencies, effects of mutation, migration, and selection. Also looks at correlations among relatives, heritability, inbreeding, crossbreeding, and selective breeding.
**Requisites:** Restricted to Behavioral, Psychiatric and Statistical Genetics PhD students.
**Additional Information:** Departmental Category: Biological

**PSYC 5131 (3) Affective Science**
Core graduate course on affective science and fulfills APA Cognitive and Affective Aspects of Behavior Requirement. Introduces students to a diverse array of theoretical and empirical issues related to the study of human emotion. Evolutionary theories of emotions; cognitive and behavioral aspects of emotion; neurobiological mechanisms; development of emotion; and psychopathology and emotion.
**Requisites:** Restricted to Clinical Psychology PhD students.
**Additional Information:** Departmental Category: General

**PSYC 5145 (4) Advanced Cognitive Psychology**
Advanced course in human cognitive processes. Covers key aspects of cognition, such as perception, attention, learning, memory, language and thinking. Discusses major theories and ideas in terms of the research they have inspired. Emphasis varies with instructor. One lab per week and a research project is required.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 4145
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Experimental

**PSYC 5175 (4) Computational Cognitive Neuroscience**
Introduction to cognitive neuroscience (how the brain gives rise to thought) using computer simulations based on the neural networks of the brain. Covers a full range of cognitive phenomena including perception and attention, learning and memory, language, and higher-level cognition based on both large-scale cortical neuroanatomy and detailed properties of cortical neural networks. One lab per week.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 4175
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Experimental

**PSYC 5200 (3) Physiological Genetics and Genomics**
Covers fundamental concepts in molecular genetics/genomics with physiological applications. Topics include structure and function of nucleic acids, genome structure, genetic and genomic research tools, methods for identifying disease-causing mutations, regulation of gene expression, pharmacogenetics, gene therapy and ethical issues in modern genomics. First course of a 3-course series recommended for IBG students. Includes a recitation section.
**Equivalent - Duplicate Degree Credit Not Granted:** IPHY 4200 and IPHY 5200
**Requisites:** Restricted to Integrative Physiology (IPHY or C-IPHY) or Psychology (PSYC) graduate students only.
**Additional Information:** Departmental Category: General

**PSYC 5232 (2) Molecular Genetics and Physiology**
Covers fundamental mechanisms of gene action, including genome structure and regulation of gene expression. Discusses molecular techniques used to examine human genetic diseases. Emphasizes genetic diseases with behavioral, neurologic, and physiologic abnormalities.
**Requisites:** Requires a prerequisite course of PSYC 5200 or IPHY 5200 (minimum grade D-). Restricted to Behavioral, Psychiatric and Statistical Genetics PhD students. Restricted to graduate students only.
**Additional Information:** Departmental Category: Biological

**PSYC 5242 (3) Biometrical Methods in Behavioral Genetics**
Studies development of structural models appropriate to behavioral genetics and the estimation procedures necessary for their application.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Biological

**PSYC 5423 (3) Research Problems in Clinical Psychology**
Provides an overview of fundamental research methods relevant to clinical psychology, including literature synthesis, hypothesis formulation and study design, measure selection, and data analysis. Students will gain specific experience writing scientific papers and funding proposals.
**Requisites:** Restricted to Clinical Psychology PhD students.
**Additional Information:** Departmental Category: Clinical

**PSYC 5433 (3) Adult Psychopathology**
Intensively surveys major theories, research findings, and behavioral characteristics associated with deviant reaction patterns.
**Requisites:** Restricted to Clinical Psychology PhD students.
**Additional Information:** Departmental Category: Clinical

**PSYC 5453 (3) Developmental Psychopathology**
Examines the development of psychopathology across the lifespan, including etiological influences, neurobiological correlates, symptom presentation, and clinical diagnosis and intervention.
**Requisites:** Restricted to Clinical Psychology PhD students.
**Additional Information:** Departmental Category: Clinical

**PSYC 5541 (1-6) Special Topics in Psychology**
Studies and analyzes special interest topics from the broad and diversified field of psychology. Particular section content is determined by instructor. Instructor consent required for students outside of the department.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: General

**PSYC 5606 (3) Proseminar: Social-Personality Psychology**
Provides a thorough introduction to methods and theories in social psychology concerned with topics such as the self, social cognition, judgment and decision making, attitude formation and change, small group processes, inter-group relations, health and social psychology, and others.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Social Psychology PhD students.
**Additional Information:** Departmental Category: Social

**PSYC 5656 (3) Advanced Graduate Research Methods**
Provides training in the philosophical roots of empirical research, inference of causality, internal and external validity and reliability. These topics will be covered as they relate to a range of research designs including passive observational, experimental, quasi-experimental, meta-analytic and longitudinal. Additional topics include statistical inference and research ethics.
**Requisites:** Restricted to Social Psychology PhD students.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Social

**PSYC 5665 (2) Perception and Attention Proseminar**
Required proseminar for students in the Cognitive Psychology Ph.D. program. Provides an introduction to current thinking about sensory and perceptual processing, object recognition and attention. Students will read peer-reviewed journal articles and make class presentations on appropriate topics, including methods of data collection and analysis.
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Experimental

**PSYC 5685 (2-3) Research Methods Proseminar**
Main topic is research methods in cognitive psychology, with an emphasis on experimental methods. Skills and knowledge will be gained that are necessary to A) critically evaluate existing research and B) design, conduct, analyze and write up experimental studies. Required for graduate students in Cognitive Psychology.
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Experimental

**PSYC 5695 (2) Memory Proseminar**
Provides beginning Ph.D. students with a basic introduction to (primarily human) memory research. One of the six required proseminar for students in the Cognitive Psychology Ph.D. program. Includes consideration of experimental, theoretical, behavioral and cognitive neuroscience perspectives on memory. Instructor consent required for students outside of the department.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Experimental

**PSYC 5741 (4) General Statistics 1**
is part 1 of the 2-semester course sequence, PSYC 5741 and PSYC 5751. This course surveys probability and statistics in psychology, using the general linear model as a basic "recipe" for data analysis. After introducing a few powerful concepts that enable a range of questions to be asked, the course focuses on building and interpreting models using standard regression software. Restricted to Psychology and Neuroscience (PSYC & NRSC) graduate students. Instructor consent required for students outside of the department.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: General

**PSYC 5751 (4) General Statistics 2**
is part 2 of the 2-semester course sequence, PSYC 5741 and PSYC 5751. This course surveys probability and statistics in psychology, using the general linear model as a basic "recipe" for data analysis. After introducing a few powerful concepts that enable a range of questions to be asked, the course focuses on building and interpreting models using standard regression software.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: General

**PSYC 5761 (3) Structural Equation Modeling**
Provides training in the use of structural equation modeling, a class of analytic techniques that include the estimation of unobserved, or latent, constructs and an estimation of relationships among latent constructs.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Recommended:** Prerequisite successful completion of graduate level statistics.
**Additional Information:** Departmental Category: General

**PSYC 5771 (3) Bayesian Data Analysis**
This course is a practical introduction to using Bayesian methods to analyze data in R. After we develop our general Bayesian approach, with an emphasis on simulation rather than calculus, we will focus on applications from regression basics to advanced multilevel models. Students outside of the department may contact the instructor for permission to enroll.
**Requisites:** Requires prerequisite courses of PSYC 5741 and PSYC 5751 (min grade C-). Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.

**PSYC 5815 (2) Language Proseminar**
Introduction to research on human language. A required proseminar for Cognitive Psychology Ph.D. students. Covers research at the cognitive, neural, and computational levels. Addresses phenomena at the levels of phonology, grammar, and meaning. Emphasizes interrelationships between language and other domains of cognition (perception, memory, executive function).
**Repeatable:** Repeatable for up to 4.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Experimental

**PSYC 5825 (2) Executive Function Proseminar**
Provides beginning Ph.D. students with an introduction to the study of executive functions. Required proseminar for students in the Cognitive Psychology Ph.D. program. Includes consideration of working memory, inhibition, multi-tasking, monitoring, selection, lifespan changes and social/clinical applications at the cognitive, neural and computational levels.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Experimental

**PSYC 5835 (2) Thinking Proseminar**
Provides beginning Ph.D. students with a basic introduction to research on complex human cognition, including reasoning, problem solving, decision making, analogy, concept learning and knowledge representation. Includes consideration of theoretical, behavioral and cognitive neuroscience perspectives. One of six proseminar modules required of students in the Cognitive Psychology Ph.D. program.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Experimental

**PSYC 6200 (3) Issues and Methods in Cognitive Science**
Interdisciplinary introduction to cognitive science, examining ideas from cognitive psychology, philosophy, education, and linguistics via computational modeling and psychological experimentation. Includes philosophy of mind; learning; categorization; vision and mental imagery; consciousness; problem solving; decision making, and game-theory; language processing; connectionism. No background in computer science will be presumed.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 6402 and EDUC 6504 and LING 6200 and PHIL 6310 and SLHS 6402
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General

**PSYC 6603 (1) Professional Issues in Clinical Psychology**
Covers a range of topics important for professional development in clinical psychology, including preparation and delivery of research presentations, preparation of grant proposals/manuscripts and practicum experience (i.e., interviewing and assessment, treatment planning, intervention and documentation). Intended to prepare students for careers as research scientists and clinicians. Instructor consent required.
**Repeatable:** Repeatable for up to 10.00 total credit hours.
**Requisites:** Restricted to Clinical Psychology PhD students.
**Additional Information:** Departmental Category: Clinical

**PSYC 6605 (1) Cognitive Psychology Research Update**
Provides summaries of current research by graduate students and faculty members in the Cognitive Psychology program in the Department of Psychology and Neuroscience. Professional Development issues relevant to cognitive psychologists will also be discussed. Graduate students in all programs and advanced undergraduates welcome with instructor consent.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Psychology (PSYC) and Neuroscience (NRSC) PhD Students only.

**PSYC 6606 (1) Professional Issues in Social Psychology**
Covers a range of topics important for professional development in social psychology, including preparation and delivery of research presentations, preparation of grant proposals and manuscripts, and peer review of manuscripts. Intended to prepare students for careers as research scientists.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Social Psychology PhD students.
**Additional Information:** Departmental Category: Social

**PSYC 6761 (3) Topics in Advanced Structural Equations Modeling**
Covers topics in advanced structural equation modeling, including modeling with nonlinear observed variables, latent variable interactions, longitudinal models, mixture models and transition analysis. Other topics will be covered by request.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Recommended:** Prerequisite PSYC 5761.
**Additional Information:** Departmental Category: General

**PSYC 6831 (2) Interdisciplinary Social Science Professional Socialization**
Trains graduate students and provides professional socialization in interdisciplinary social science research. Open to all interested students, with programming provided by the Institute of Behavioral Science. Sessions include IBS-housed colloquia and workshops in professional socialization, technological tools, interdisciplinary research, ethics, grant writing, etc. Students workshop and submit a research paper.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 6851 and PSCI 6851
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**PSYC 6841 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General

**PSYC 6911 (1-3) Research Practicum**
Department consent required to enroll.
**Repeatable:** Repeatable for up to 18.00 total credit hours.
**Additional Information:** Departmental Category: General

**PSYC 6941 (1-3) Master's Candidate for Degree**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Pass/Fail

**PSYC 6951 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General

**PSYC 7012 (1-3) Research in Behavioral Genetics**
Individual research projects.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Behavioral, Psychiatric and Statistical Genetics PhD students.
**Additional Information:** Departmental Category: Biological

**PSYC 7102 (2-3) Seminar: Behavioral Genetics**
Intensive study of selected topics in behavioral genetics. Emphasizes recent research. Attention to both human and animal studies. Instructor consent required for students outside of the Behavioral, Psychiatric, and Statistical Genetics program.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Behavioral, Psychiatric and Statistical Genetics PhD students.
**Additional Information:** Departmental Category: Biological

**PSYC 7215 (3) Seminar: Experimental Psychology**
Advanced seminar dealing with different specialized topics, at the discretion of the instructor, in different years. Topics chosen are within the broad range of experimental psychology.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Experimental

**PSYC 7291 (3) Multivariate Analysis**
Familiarizes students with scientific concepts, matrix theory, and computer techniques of multivariate analyses for psychological research. Topics include cluster and factor analysis, multiple regression, and discriminant functions. Emphasizes research technology rather than mathematical theory.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: General

**PSYC 7315 (2) Advanced Research Seminar on Human Memory**
Addresses topics in the experimental psychology of human memory. Specific content varies from semester to semester. Both theoretical issues and contemporary empirical work will be reviewed. Each student will be required to engage in laboratory work outside of class, which will include an original experiment.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: Experimental

**PSYC 7415 (2) Cognitive Science Research Applications Seminar 1**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7412 and EDUC 6506 and LING 7415 and PHIL 7415 and SLHS 7418
**Requisites:** Requires a prerequisite course of CSCI 6402 or EDUC 6504 or LING 6200 or PHIL 6310 or PSYC 6200 (minimum grade B). Restricted to graduate students only.
**Recommended:** Prerequisite EDUC 6505.
**Additional Information:** Departmental Category: Experimental

**PSYC 7425 (2) Cognitive Science Research Applications Seminar 2**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7422 and EDUC 6516 and LING 7425 and PHIL 7425 and SLHS 7428
**Requisites:** Requires a prerequisite course of LING 7415 or PSYC 7415 or CSCI 7412 or EDUC 6506 (minimum grade B). Restricted to graduate students only.
**Additional Information:** Departmental Category: Experimental

**PSYC 7536 (1-3) Personality and Social Psychology**
Selected topics in the area of social-personality psychology. Students may register for more than one section of this course within the term and/or within their graduate career. These seminars may be on one of the following topics: stereotyping and prejudice, social neuroscience, person perception, social psychology and the self, health and social psychology, race and ethnic identity, or social cognition.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Social Psychology PhD students.
**Additional Information:** Departmental Category: Social

**PSYC 7663 (1) Intellectual Assessment Laboratory**
Practice administration of common intellectual and neuropsychological tests.
**Requisites:** Requires corequisite courses of PSYC 7683.
**Additional Information:** Departmental Category: Clinical

**PSYC 7673 (3) Adult Psychotherapy**
Provides an intensive introduction to the science and practice of psychological treatments for adult psychopathology. Will focus on selected treatments and address the relevant theoretical and empirical base for each approach and the specific principles and procedures utilized. Aim of course is for students to acquire both a scientific and applied knowledge of evidence-based practice in clinical psychology, with a focus on intervention for adult mental disorders. Instructor consent required for students outside of the Clinical Psychology program.
**Requisites:** Restricted to Clinical Psychology PhD students.
**Additional Information:** Departmental Category: Clinical

**PSYC 7683 (1-3) Intellectual Assessment, with Practicum, in Clinical Psychology**
Focuses on administering and interpreting objective test commonly used in clinical psychology practice. Includes case study approach and direct clinical experience.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Clinical

**PSYC 7693 (3) Personality and Psychopathology Measurement**
Covers theory and basic applications of psychological assessment, with an emphasis on measurement theory and the assessment of psychopathology and personality.
**Requisites:** Restricted to Clinical Psychology PhD students.
**Additional Information:** Departmental Category: Clinical

**PSYC 7703 (1-3) Seminar: Clinical Psychology**
Selected topics in the area of clinical psychology. Instructor consent required for students outside of the Clinical Psychology program.
**Repeatable:** Repeatable for up to 21.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Clinical Psychology PhD students.
**Additional Information:** Departmental Category: Clinical

**PSYC 7713 (1-3) Practicum in Clinical Psychology**
Provides direct clinical experience for clinical graduate students only.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Clinical Psychology PhD students.
**Additional Information:** Departmental Category: Clinical

**PSYC 7723 (1) Clinical Psychology Internship**
Students will enroll in this clinical psychology internship course while they are completing the required 1-year internship.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Clinical Psychology PhD students.

**PSYC 7775 (1) Topics in Cognitive Science**
Reading of interdisciplinary innovative theories and methodologies of cognitive science. Students participate in the LCS Distinguished Speakers series that hosts internationally recognized cognitive scientists who share and discuss their current research. Session discussions include analysis of leading edge and controversial new approaches in cognitive science. Restricted to students enrolled in LCS Cognitive Science Academic Programs.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7772 and EDUC 7775 and LING 7775 and PHIL 7810 and SLHS 7775
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Additional Information:** Departmental Category: Experimental

**PSYC 7793 (1-3) Child Assessment Practicum**
Allows students who have already learned adult assessment measures to broaden their knowledge and skills in order to complete psychoeducational evaluations with children. The course covers the background of common childhood disorders, general testing strategies with children, and specific test administration.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to Clinical Psychology PhD students.
**Recommended:** Prerequisite PSYC 7683.
**Additional Information:** Departmental Category: Developmental

**PSYC 8991 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
**Additional Information:** Departmental Category: General

# Quechua (QUEC)

## Courses

**QUEC 1010 (4) Beginning Quechua 1**
The course focuses on the development of written and oral communicative abilities in the Southern variety of Quechua through an interactive activity-based approach. Course includes an introduction to Andean Culture, and foundations on the sociocultural history of Quechua. Quechua is the most widely spoken indigenous language in South America, with an estimated 8-10 million speakers in Peru, Bolivia and Ecuador, Chile, Colombia, and Argentina. But decades of migration have brought Quechua to coastal cities and abroad, like New York, New Jersey and Chicago. Formerly LAMS 1010.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**QUEC 1020 (4) Beginning Quechua 2**
This course continues the study of the Southern variety of Quechua in Beginning Quechua 1. Quechua is the most widely spoken indigenous language in South America, with an estimated 8-10 million speakers in Peru, Bolivia and Ecuador, Chile, Colombia, and Argentina. Quechua is associated with people living in the Andes. But decades of migration have brought Quechua to coastal cities and abroad, like New York, New Jersey and Chicago. Quechua is more than a spoken language. Studying Quechua also provides a window into a rich indigenous culture, and alternative perspectives about space and time, family, relationships, society, and the natural world. Formerly LAMS 1020.
**Recommended:** Prerequisite QUEC 1010 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**QUEC 2010 (4) Intermediate Quechua 1**
This course continues the study of the Southern variety of Quechua in Beginning Quechua 2. Quechua is the most widely spoken indigenous language in South America, with an estimated 8-10 million speakers in Peru, Bolivia and Ecuador, Chile, Colombia, and Argentina. Quechua is associated with people living in the Andes. But decades of migration have brought Quechua to coastal cities and abroad, like New York, New Jersey and Chicago. Quechua is more than a spoken language. Studying Quechua also provides a window into a rich indigenous culture, and alternative perspectives about space and time, family, relationships, society, and the natural world.
**Recommended:** Prerequisite QUEC 1020 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

# Real Estate (REAL)

## Courses

**REAL 2010 (3) Introduction to Real Estate**
Surveys various real estate topic including acquiring and financing your home, real estate investments, managing real estate assets, development and construction and real estate sustainability. Covers techniques for estimating market values and presents metrics for evaluating real estate investment performance. Suited for anyone interested in buying, investing, managing or developing real estate. Counts as a business elective for Business students.
**Equivalent - Duplicate Degree Credit Not Granted:** BUSM 3050 or REAL 3000

**REAL 3000 (3) Principles of Real Estate**
An introduction to the vast business of real estate including foundational legal concepts, government regulation and land use, appraisal, brokerage, contracts and closings, mortgage loans and financing methods/ decisions, and investment analysis. Establishes the foundation for all other real estate courses and is a popular elective for all Leeds students. Instruction and course format are traditional lecture and conversational.
**Equivalent - Duplicate Degree Credit Not Granted:** BUSM 3050 or REAL 2010
**Requisites:** Requires prerequisite or corequisite course of BASE 2104 (minimum grade D-). Restricted to Business majors with 52-180 units completed.

**REAL 4000 (3) Real Estate Law**
Building upon the legal concepts and issues introduced in REAL 3000, this course involves a deeper study of the laws and legal issues impacting and governing real property rights and interests including the acquisition, ownership, possession, use and transfer of real property.
**Requisites:** Requires prerequisite course of REAL 3000 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**REAL 4100 (3) Real Estate Finance and Investment Analysis**
Covers: 1) traditional and alternative financing of residential and commercial real estate; 2) pro forma cash flows and valuation of income generating properties; 3) real estate decisions of non-real estate corporations; and 4) mortgage backed securities and real estate investment trusts (REITs).
**Requisites:** Requires prerequisite courses of REAL 3000 and FNCE 3010 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**REAL 4200 (3) Real Estate Technology**
This course has four objectives: 1) to understand the economic forces that bridge technology, entrepreneurship and real estate; 2) to investigate the short-, medium-, and long-run effects of technology on residential and commercial real estate; 3) to communicate this information to students in the Leeds School of Business; and 4) to give current students the technology skills necessary to immediately add value for their potential employers. Fall only.
**Requisites:** Requires prerequisite of REAL 3000 (minimum grade D-). Restricted to business majors with 52-180 units completed.

**REAL 4400 (3) Real Estate Economics**
The first half of the course is about urban economics. It covers the fundamental principles of market analysis, urban economics, and the reasons why households and firms chose to locate in cities. The second half of the course is about real estate markets. We extend our analysis of cities to the built environment itself, and to the operation residential and commercial real estate markets. The course also examines alternative techniques for estimating real property value.
**Requisites:** Requires prerequisite course of REAL 3000 and prerequisite or corequisite of REAL 4100 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**REAL 4810 (3) Real Estate Applied Practice**
Real Estate Applied Practice provides students the opportunity to take what they¿re learning in other real estate courses and see it applied in the context of the lifecycle of a real estate investment. Utilizing faculty and industry expert instruction together with hands-on exercises, students work through the major aspects of real estate practice including: (1) valuation and acquisition; (2) equity and debt financing sources and structure; (3) development and improvement strategies; (4) leasing, management and operation; and (5) marketing and disposition. The course is designed as an alternative or supplement to a real estate internship or practicum.
**Requisites:** Requires prerequisite course of REAL 3000 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.
**Grading Basis:** Letter Grade

**REAL 4820 (3) Topics: Real Estate Development**
Broadly looks at real estate development including: 1) what is real estate development, its nature and process; 2) the nature and role of the real estate developer; 3) the many aspects and components of real estate development; 4) the basic feasibility and analysis of a real estate development project. The course delivery utilizes a combination of lecture and discussion, guest speakers, real estate case analysis and small group presentations. Fall only.
**Requisites:** Requires prerequisite course of REAL 3000 (minimum grade D-). Restricted to Business (BUSN) majors with 52-180 units completed.

**REAL 4825 (3) Experimental Seminar**
Offered irregularly to provide opportunity for investigation of new frontiers in Real Estate.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**REAL 4850 (3) Senior Seminar in Real Estate**
As the capstone course for the Real Estate Emphasis, the course utilizes, integrates and builds upon the knowledge and skills students have learned and developed in other real estate courses. The objectives and methods of the course include: (1) an application and integration of the students¿ real estate knowledge and skills through real estate case analysis; (2) improved teamwork, public speaking and presentation skills through team analysis and presentation of real estate cases; and (3) study of current issues, including ethical issues, and any implications for the business of real estate. Instruction and course format include traditional lecture and conversational, small group work and instruction, team real estate case analysis and presentation, and industry guests.
**Requisites:** Requires prerequisite courses of REAL 3000, REAL 4100 or MSBC 5610 and REAL 4400 or MBAX 6630 (all minimum grade D-). Restricted to Business (BUSN) REAL majors with 90-180 units completed.

**REAL 4900 (1-3) Independent Study**
Intended for exceptionally well-qualified business seniors who desire to study an advanced topic. Must be in Real Estate Certificate Program. Instructor consent required.

**REAL 6820 (3-6) Graduate Seminar**
Experimental seminar offered irregularly to provide opportunity for investigation of new frontiers in real estate.

**REAL 6900 (1-3) Independent Study**
Requires consent of instructor under whose direction study is taken. Departmental form required.

# Religious Studies (RLST)

## Courses

**RLST 1620 (3) Religious Dimensions of Human Experience**
Surveys different approaches to the study of religion. Students will grow familiar with key thinkers, texts, and movements that shape how we understand religious phenomena. Students will also examine critiques of how religion is studied. In the end, students will have gained insight into significant aspects of religious life, belief, and practice that will empower them to navigate a world in which religion is increasingly relevant.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 1818 (3) Jewish History to 1492**
Focus on Jewish history from the Biblical period to the Spanish Expulsion in 1492. Study the origins of a group of people who call themselves, and whom others call, Jews. Focus on place, movement, power/powerlessness, gender, and the question of how to define Jews over time and place. Introduces Jews as a group of people bound together by a particular set of laws; looks at their dispersion and diversity; explores Jews' interactions with surrounding cultures and societies; introduces the basic library of Jews; sees how Jews relate to political power.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 1818 and JWST 1818
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**RLST 1820 (3) Religion and Politics in Ancient Egypt**
Studies the literature, politics, religions and other traditions of Ancient Egypt.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 1828 (3) Jewish History Since 1492**
Surveys the major historical developments encountered by Jewish communities beginning with the Spanish Expulsion in 1492 up until the present day. Studies the various ways in which Jews across the modern world engaged with the emerging notions of nationality, equality and citizenship, as well as with new ideologies such as liberalism, socialism, nationalism, imperialism and antisemitism.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 1828 and JWST 1828
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**RLST 1830 (3) Global History of Holocaust and Genocide**
Examines the interplay of politics, culture, psychology and sociology to try to understand why the great philosopher Isaiah Berlin called the 20th century, "The most terrible century in Western history." Our focus will be on the Holocaust as the event that defined the concept of genocide, but we will locate this event that has come to define the 20th century within ideas such as racism, imperialism, violence, and most important, the dehumanization of individuals in the modern world.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 1830 and JWST 1830
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**RLST 1850 (3) Ritual and Media**
Ritual continues to play an important role in contemporary societies in both religious and secular contexts. This course examines the elements and genres of ritual activity from African rites of passage to the Beijing Olympics, paying close attention to how the media documents, appropriates and transforms aspects of ritual.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 1900 (3) Introduction to the Hebrew Bible/Old Testament**
Examine the content of the Hebrew Bible and critical theories regarding its development. Explore the development of these texts, as well as their foundational role for rabbinic literature and the New Testament. Assess the enduring influence of the Hebrew Bible/Old Testament in world literature and culture (such as in art and music).
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 1900
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**RLST 1910 (3) Introduction to the New Testament**
Examine the background, content and influence of the New Testament books. Studies the diverse perspectives contained in the various books, as well as the process of canonization. Assess the influence of the New Testament on the development of Christianity as well as world (eastern and western) culture.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 1910
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 2100 (3) American Beliefs and Values**
An in-depth analysis of beliefs and values that have dominated American life in modern and postmodern eras, and of diverse belief and value systems that offer alternatives for the future. The analysis will be based on influential theories from the academic study of religion, and the course will give special attention to the influence of religious factors on secular American life.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 2200 (3) Religion and Dance**
Connecting dancing to religions across the globe demonstrates the near synonymy of the two in most cultures, the remarkable potential for dancing to articulate cultural identity, and finally that dancing is strongly connected to what distinguishes being human. Provides an enriched appreciation of dancing and the introduction to dancing in many cultures.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 2202 (3) Islam**
Introduces students to foundational Islamic concepts, texts, core practices, historical narratives and intellectual, spiritual and literary traditions. Topics covered include: the figure of Muhammad; the Quran; the emergence of distinct Muslim identities; Hadith; Sharia; Islamic theology; Islamic philosophy; science in Islamic civilization; Islamic mysticism; the impact of colonialism and modernity on the Muslim world; gender and sexuality; political Islam.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Diversity-U.S. Perspective

**RLST 2320 (3) The Muslim World, 600-1250**
Focusing on the history of the Muslim World in the age of the caliphates, this course takes an interdisciplinary, comparative approach to the development of Islamicate society, focusing on social structure, politics, economics and religion. Students will use primary and secondary sources to write a research paper, and make in-class presentations to cultivate critical thinking, research and writing skills.
**Equivalent - Duplicate Degree Credit Not Granted:** ARAB 2320
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Asia Content

**RLST 2400 (3) Religion, Ethics and Politics**
Explores the role of religion in today's world, focusing on debates around religion, ethics and politics. Examining diverse voices from Christianity, Judaism and other traditions, this course considers religion's role in debates about issues such as same-sex marriage, race, climate change, war, criminal justice, torture, sexual ethics, abortion and economic justice.
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 2500 (3) Religions in the United States**
Explores the development of various religions within the shaping influences of American culture, including separation of church and state, the frontier experience, civil religion, and the interaction of religions of indigenous peoples, immigrants, and African Americans.
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Ideals and Values
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**RLST 2600 (3) Judaism, Christianity, and Islam: Abrahamic Religions**
In Judaism, Christianity, and Islam, Abraham is described as a founding figure. In recent times, the label ¿Abrahamic Religions¿ has become increasingly important both as a way to describe the origins and beliefs of Judaism, Christianity, and Islam and as a means for finding common ground in political and religious discourse. Yet in each religion Abraham is also used in strikingly different ways and for distinct purposes. In this course, we will look at these three religious traditions and how each one imagines Abraham. In particular, the focus will be on how each religion uses Abraham to construct foundational stories of a special relationship to God, stories that ultimately serve to promote religious identity over time.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 2600
**Additional Information:** GT Pathways: GT-AH3 - Arts Hum: Ways of Thinking
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 2610 (3) Happiness and Nirvana: Enlightenment in Indian Religions**
Addresses religious and spiritual practices geared towards ideals of enlightenment across various religious traditions in India, including Buddhism, Hinduism, Jainism and Sikhism, in relation to different social groups historically. Examines the concept of happiness (sukh¿) and its connections to spiritual enlightenment.
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 2612 (3) Yoga: Ancient and Modern**
Addresses the history and philosophy of yoga, beginning from its earliest articulations in Vedic India 1200 BCE up to contemporary understandings of yoga. Examines yoga's historical evolution from a primarily mental practice to a bodily centered practice. Looks at the shifts yoga undergoes as it becomes popular in the modern West.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**RLST 2614 (3) Paganism to Christianity**
Offers a cultural history of Greek and Roman religion. Students read ancient texts in translation and use evidence from archaeology to reconstruct the shift from paganism to Christianity in antiquity. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 2610
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 2619 (3) Religion, Psychedelics, and Shamanism**
From ancient India¿s tradition of using the hallucinogenic plant Soma to Patañjali¿s early yoga tradition proposing herbs (o¿adhi) as a means to enlightenment to 21st century mestizo shamans in Peru offering ayahuasca medicine retreats¿the use of mind-altering hallucinogenic substances has played an expansive role in the generation of religious and mystical experience and the subsequent structure of religious praxis. This class focuses on tracing out the religious elements of this history.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 2620 (3) Religions of East Asia**
Introduces literature, beliefs, practices, and institutions of Taoism, Confucianism, Buddhism, and Shintoism in historical perspective.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 2650 (3) Meditation: Ancient and Modern**
Explores the roots of today's mindfulness movement in ancient forms of Buddhist meditation. Topics covered include the array of meditation techniques in Buddhism, colonial-period origins of lay meditation in Asia, Buddhism's transmission to North America and Europe in the 20th century, the emergence of secular forms of mindfulness, and scientific studies on mindfulness and compassion.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 2700 (3) Native American and Indigenous Religious Traditions**
Studies the religious lifeways of diverse Indigenous peoples in North America. The course considers how these religious lifeways facilitate healing, movements of social protest, and efforts for self-determination in response to ongoing forms of colonialism. Students will critically explore the impact of colonial structures on Native American religious traditions, such as missionization, and evaluate the meaning of decolonization as both a pathway and goal supporting Native liberation.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 2703
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**RLST 2800 (3) Women and Religion**
Examines roles of women in a variety of religious traditions including Judaism, Christianity, Hinduism, Buddhism, and goddess traditions.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 2800
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**RLST 2840 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.

**RLST 3000 (3) Christian Traditions**
Serves as an introduction to the academic study of Christianity, understood in its historical context, beginning with its most remote Mesopotamian origins and through to beginnings of the Protestant Reformation. Coverage is global, but "Western" Christian tradition are emphasized, as is the evolution of doctrine, ritual and institutions in relation to social, cultural and political factors.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3001 (3) Modern Christianity: Culture, Politics, Religion**
Studies development of various aspects of global Christian traditions from the Reformation to the present day, as expressed through scripture, theology, ritual, media, politics, ethics, popular culture, and the arts. Includes topics such as colonialism, modernism and liberalism, secularism, pluralism, ecumensim, globalization, and the impact of new technologies. Recommended perquisite: RLST 3000
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3010 (3) Religion and the Senses**
Expanding the five common senses so they are grounded on a more fundamental kinesthetic sense, that is, sense of movement, this course focuses on the study of religion and culture on all those marvelous richly and sensuously textured aspects of religious behavior: movement, experience, feeling, action, sensation, gesture, art, music, dancing, architecture, costume, food, and ritual.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3020 (3) Advanced Writing in Religious Studies**
Seminar for religious studies majors that emphasizes the development of writing skills for use inside as well as outside the academy. Writing assignments are focused on one or more core topics in religious studies.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Religious Studies (RLST) majors only.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Upper

**RLST 3040 (3) The Quran**
Examines how Christian constructions of religion and scripture have shaped Muslim understandings of the Quran and marginalized other views with a much longer history. Helps students appreciate how this process of marginalization is negotiated and explores the Quran from other perspectives including sound, performance, embodiment, and occultism. By highlighting marginalized approaches to the Quran, it promotes a better understanding of how social and religious differences are shaped by different political legacies. Previously offered as a special topics course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Asia Content

**RLST 3050 (3) Religion and Literature in America**
Studies religious dimensions of American culture through representative literature, beginning with the Puritans and focusing on diversity in the 19th and 20th centuries.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3060 (3) Fundamentalism and Islam**
Explores the global rise of fundamentalism, particularly Islamic fundamentalism. Students will analyze fundamentalism as a function of modernity, and in metaphysical rather than geostrategic or cultural terms. Students will examine the arguments of Muslim fundamentalists, and the counterarguments of their critics.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 3070 (3) Islamic Mysticism: Ibn Arabi, Rumi, and the Sufi Tradition**
Introduces students to the philosophical, literary, and musical traditions of Islamic Mysticism or Sufism. Figures covered include: Rumi, Hallaj, Ibn Arabi, Mulla Sadra, Ghazali, Hafez, Ibn al-Farid, Ghalib, and Nusrat Fateh Ali Khan. Students will learn how Islamic Mysticism differs across cultural contexts and how it compares to other mystical traditions.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3100 (3) Judaism**
Explores Jewish religious experience and its expression in thought, ritual, ethics, and social institutions.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3100
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 3110 (3) Of Jewish Legends, Folktales and the Supernatural**
Explores Jewish traditional legends, folktales and stories of the supernatural. Starts with Aggadic Talmud tales and Midrashic texts and focuses on later rabbinic and mystical texts and folktales ca 500-1900 C.E. from around the Jewish world with subjects ranging from didactic narratives extolling the virtues of the simple pure soul, to the horrors of a blood sucking vampiric outside world.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3110
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3120 (3) Radical Jews**
Explores major Jewish figures, and their cultural productions, who were radical in the challenges they posed and transformative in the effects they had on society. The figures we examine range from the Rabbis of the Talmud who revolutionized a sacrificial cult religion, to Western secularist Baruch Spinoza and American icons such as Allen Ginsberg, Gloria Steinem and Bob Dylan.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3120
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3150 (3) Jerusalem: The Holy City in History, Legend, and Religious Thought**
The history of Jerusalem and the stories that have given it prominence in the religious imagination continue to shape much of the world in which we live. In this class, we will survey approximately three millennia of the history of the city. We will ask methodological question, such as: What does it mean for a place to be conceived of as holy? How does this perceived holiness come about? What happens when holy places are destroyed and rebuilt? We will examine the biblical stories about Jerusalem not only as important sources themselves, but also for how they shape later religious traditions, specifically Judaism, Christianity, and Islam. As such, we will address what it means for the same place to be perceived as ¿holy¿ by differing, and often competing, groups. These contestations regarding Jerusalem will, then, allow us to engage issues of religious diversity and conflict both historically and in the present.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3150
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3200 (3) Yoga, Castes and Magic: Hindu Society and Spirituality**
Addresses yoga, religious asceticism and practices of magic in Hinduism from ancient India up to the modern period. Gives an overview of the variety of traditions in Hinduism, focusing on how spiritual practices affect social roles. Looks at how spritual practices approach happiness and social change, from ancient India¿s secret Upanisads through medieval mystic poets like Mirabai, through Gandhi in the 20th century, focusing on figures using mystical experience to overturn social and political powers.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 3202 (3) Women, Gender & Sexuality in Jewish Texts & Traditions**
Reads some of the ways Jewish texts and traditions look at women, gender and sexuality from biblical times to the present. Starts with an analysis of the positioning of the body, matter and gender in creation stories, moves on to the gendered aspects of tales of rescue and sacrifice, biblical tales of sexual subversion and power, taboo-breaking and ethnos building, to rabbinic attitudes towards women, sexuality and gender and contemporary renderings and rereadings of the earlier texts and traditions.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3201 and JWST 3202 and HEBR 3202
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**RLST 3300 (3) Foundations of Buddhism**
Introduction to Buddhist thought and practice in the variety of its historical and cultural contexts. The course begins with an exploration of narrative, cosmology, doctrine and ritual in early Buddhism and the Theravada of South and Southeast Asia. Through case studies, we then trace diverse conceptions of the Buddhist path in Tibet and East Asia where the Mahayana spread.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 3530 (3) Global Seminar: Jews and Muslims - The Multiethnic History of Istanbul**
Spend two weeks in Istanbul and examine Jewish-Muslim relations in a place that was for 500 years the crossroads of civilization. The only Muslim city in the 21st century with a large, thriving Jewish community, Istanbul models how people from different social classes, ethnicities and religious backgrounds can coexist.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3530 and JWST 3530
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**RLST 3550 (3) Tibetan Buddhism**
Explores Tibetan Buddhism through literature and film, including sacred biographies, treatises on the Buddhist path and films providing a visual window into Tibetan life worlds. We examine different kinds of Tibetan journeys: moving through the life cycle, treading the path of self-cultivation, embarking on solitary retreat, traversing from death to rebirth and traveling on pilgrimage and into exile.
**Equivalent - Duplicate Degree Credit Not Granted:** ASIA 3550
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3750 (3) Women in Buddhism**
Explores diverse representations of the female in Buddhist literature and the social realities of actual women in Asian historical contexts. Through case studies that traverse Buddhist Asia, we delve into monastic views of the female body, philosophical analyses of the emptiness of gender, idealized images of the feminine in Buddhist tantra, and contemporary issues such as the nun's revival moment.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3750
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 3800 (3) Chinese Religions**
Studies classical Confucianism, Taoism, Buddhism, and Neo-Confucianism within the historical context of Chinese culture.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 3801 (3) Muslims, Christians, Jews and the Mediterranean Origins of the West**
Provides a historical foundation for the study of western Modernity, including the Anglo-European and Islamic worlds. It focuses on the Mediterranean region in the long Middle Ages (650-1650), emphasizing the role of Christian, Muslim and Jewish peoples and cultures, in Europe, Africa and West Asia. The approach is interdisciplinary incorporating social, economic, cultural, literary and art history, combining lectures with discussions based around readings of contemporary documents and the analysis of contemporary artifacts.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3801
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3820 (3) Topics in Religious Studies**
Intensive study of a selected area or problem in religious studies.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 3850 (3) The Mediterranean: Religion Before Modernity**
Offers an innovative approach to the multifaceted history of Christian-Muslim-Jewish interaction in the Mediterranean. It eschews established paradigms (e.g., Europe, Islamic world) that distort our understanding of these and pushes students to reconsider the accepted paradigms of Western history. Students will reappraise assumptions regarding the nature of ethnic, religious, national and cultural identity, and their role in human history.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 3850
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**RLST 4030 (3) Religions in America**
Studies various religious movements in the U.S. and other parts of the Americas. Includes American religion and religions, religion and nationalism, revitalization and religion and Asian religions in America.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5030
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4050 (3) Topics in Christian Studies**
Studies a particular topic in Christian theology and culture such as early Christianity, medieval Christianity, Christianity in the United States, women and Christianity, liberation theologies, Christianity and literature, and modern Christian thought.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5050
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite 6 hours of RLST courses at any level or instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4170 (3) God and Politics**
Explores the relationship between religion and politics. Examining traditions such as Judaism and Christianity, this course considers diverse ways in which ancient, medieval and modern sources have imagined the role of religion in civic life. Some topics include the status of religious minorities, the nature of religious freedom and contemporary debates surrounding issues such as torture, sexuality and climate change.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5170 and JWST 4170
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4180 (3) Is God Dead?**
Explores debates about the following questions: does it make sense to believe in God? Should believing or not believing in God make a difference for how individuals behave? Examining ancient and modern views on the existence and nature of a higher power, this course considers topics including evil and suffering, religion and science and religion's role in politics.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5180 and JWST 4180
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4190 (3) Love and Desire**
Explores debates about the following questions: what and whom should humans and gods love, and what role should passions play in religion? Examining traditions such as Judaism and Christianity, this course considers diverse views on topics including religion and sexuality, the promise and perils of loving gods and humans, and the relationship between love, politics, and violence.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5190 and JWST 4190
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4200 (3) Topics in Hinduism**
Examines in depth central themes, schools of thought and movements in Hinduism, such as myth and ritual, renunciation, Vedanta, Tantra and Yoga.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5200
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite 6 hours of RLST courses at any level or instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 4250 (3) Topics in Buddhism**
Examines in depth central themes, schools of thought and movements in Buddhism, such as Theravada in Southeast Asia, Mahayana and Tantrayana thought, Zen and Buddhism in America. Department enforced prerequisite: RLST 2610 or RLST 2620 or RLST 3300 or instructor consent.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5250
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**RLST 4260 (3) Topics in Judaism**
Examines in depth central themes, schools of thought, and movements in Judaism, along with other traditions, across a range of historical periods.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5260 and JWST 4260
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4280 (3) Body and Magic in India**
Addresses ideas of the body and its use and functions within magic, particularly in Tantric traditions. Uses classical Hinduism and Tantra as a point of departure, focusing on subtle bodies and Tantric bodies and will also supplement this with writing about the body and its connection to mind in contemporary Western thought addressing the mind-body problem.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5280
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4300 (3) Topics in Native American Religions**
Examines a topic (varies at different offerings) focusing on religions of peoples indigenous to the Americas. May consider mythology; shamanism and medicine; trickster, clown and fool; crisis cult movements.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5300
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of RLST 2700 (minimum grade C-).
**Recommended:** Prerequisite 3 additional credit hours of RLST course work or instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4353 (3) Indigenous Traditions and Law: A Global Perspective**
Explores intersections of indigenous religions and law through historical and contemporary case studies. American Indian and Hawaiian contexts will be featured, as well as the study of the United Nations Declaration on the Rights of Indigenous Peoples and its recent implementation in places as diverse as Bolivia, Norway and Nagaland. Theoretical issues in the academic study of religion and ethnic studies will be emphasized.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5353 and ETHN 4353 and ETHN 5353
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**RLST 4450 (3) Religion and Nonviolence**
Studies theories of nonviolence developed by major thinkers and movements, especially in the U.S., in the context of their religious commitments and beliefs and their historical circumstances.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4610 (3) Topics in Islam**
A detailed exploration of diverse intellectual approaches to central questions in Islamic traditions. Department consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5610
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4650 (3) Islam in the Modern World**
Globally surveys Islam, covering religion and politics; Islam and the West; the Islamic revival and its varied forms in Iran, Indonesia, Libya and Pakistan; development and change; the status of women; media and academic stereotyping.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5650
**Recommended:** Prerequisite 6 credit hours of religious studies at any level or instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Asia Content

**RLST 4780 (3) New Religions of East Asia**
Explores the new religious movements of modern China, Japan and Korea, which have arisen over the last century due to the influence of the West and in response to the pressures of modernization. Previous coursework in religious studies or Asian languages and civilizations is recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5780
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4800 (3) Critical Studies in Religion**
Focuses on a current issue or area of research in the study of religion. Students analyze the way theories develop and learn to develop their own critical analysis. Topics vary, e.g., comparative kingship, colonialism, ritual theories, feminist analysis.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Religious Studies (RLST) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4810 (3) Honors Thesis**
Students write an honors thesis based on independent research under the direction of a faculty member. Required for students who elect departmental honors.
**Additional Information:** Arts Sciences Honors Course

**RLST 4820 (3) Interdisciplinary Seminar on Religion**
Variable topics in religion, drawing from a variety of disciplines and methodologies as they shed light on specific traditions and issues.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5820
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Requisite 6 credit hours of religious studies at any level or instructor consent.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4830 (3) Senior Majors Seminar**
Topics and instructors vary. Brings advanced majors together in order to focus their major experience onsignificant topics and issues of common interest.
**Requisites:** Restricted to students with 87-180 credits (Senior, Fifth Year Senior).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 4840 (1-6) Senior Independent Study**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.

**RLST 4850 (3) Gender in Hagiography**
Explores gendered ideals of sainthood in medieval hagiographic literature. We draw primarily from the lives of female mystics in Buddhist and Christian sources and also examine the construction of mendicant masculinities. Reading from an array of primary sources, we query the category of mysticism and ask why visionary experience has so often been gendered female.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 5850 and WGST 4850
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RLST 5030 (3) Religions in America**
Studies various religious movements in the U.S. and other parts of the Americas. Includes American religion and religions, religion and nationalism, revitalization and religion and Asian religions in America.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4030
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**RLST 5050 (3) Topics in Christian Studies**
Studies a particular topic in Christian theology and culture such as early Christianity, medieval Christianity, Christianity in the United States, women and Christianity, liberation theologies, Christianity and literature, and modern Christian thought.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4050
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite 6 hours of RLST courses at any level or instructor consent.

**RLST 5170 (3) God and Politics**
Explores the relationship between religion and politics. Examining traditions such as Judaism and Christianity, this course considers diverse ways in which ancient, medieval and modern sources have imagined the role of religion in civic life. Some topics include the status of religious minorities, the nature of religious freedom and contemporary debates surrounding issues such as torture, sexuality and climate change.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4170 and JWST 4170
**Requisites:** Restricted to graduate students only.

**RLST 5180 (3) Is God Dead?**
Explores debates about the following questions: does it make sense to believe in God? Should believing or not believing in God make a difference for how individuals behave? Examining ancient and modern views on the existence and nature of a higher power, this course considers topics including evil and suffering, religion and science and religion's role in politics.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4180 and JWST 4180
**Requisites:** Restricted to graduate students only.

**RLST 5190 (3) Love and Desire**
Explores debates about the following questions: what and whom should humans and gods love, and what role should passions play in religion? Examining traditions such as Judaism and Christianity, this course considers diverse views on topics including religion and sexuality, the promise and perils of loving gods and humans, and the relationship between love, politics, and violence.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4190 and JWST 4190
**Requisites:** Restricted to graduate students only.

**RLST 5200 (3) Topics in Hinduism**
Examines in depth central themes, schools of thought and movements in Hinduism, such as myth and ritual, renunciation, Vedanta, Tantra and Yoga.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4200
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite 6 hours of RLST courses at any level or instructor consent.
**Additional Information:** Departmental Category: Asia Content

**RLST 5210 (3) Advanced Readings in Sanskrit**
Requires at least two years of prior Sanskrit training. Students will read texts in the original. Class time is devoted to parsing out difficult grammatical structures, discussing the philosophical import of the readings and addressing the historical contexts that assist in interpreting the texts. The topic varies according to student interest.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of SNSK 2120 (minimum grade C-). Restricted to graduate students only.
**Additional Information:** Departmental Category: Asia Content

**RLST 5250 (3) Topics in Buddhism**
Examines in depth central themes, schools of thought and movements in Buddhism, such as Theravada in Southeast Asia, Mahayana and Tantrayana thought, Zen and Buddhism in America.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4250
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Asia Content

**RLST 5260 (3) Topics in Judaism**
Examines in depth central themes, schools of thought, and movements in Judaism, along with other traditions, across a range of historical periods.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4260 and JWST 4260
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**RLST 5280 (3) Body and Magic in India**
Addresses ideas of the body and its use and functions within magic, particularly in Tantric traditions. Uses classical Hinduism and Tantra as a point of departure, focusing on subtle bodies and Tantric bodies and will also supplement this with writing about the body and its connection to mind in contemporary Western thought addressing the mind-body problem.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4280
**Requisites:** Restricted to graduate students only.

**RLST 5300 (3) Topics in Native American Religions**
Examines a topic (varies at different offerings) focusing on religions of peoples indigenous to the Americas. May consider mythology; shamanism and medicine; trickster, clown and fool; crisis cult movements.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4300
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite 3 additional credit hours of RLST course work or instructor consent.

**RLST 5350 (3) Native American Religions: Regional Studies**
Studies religion(s) of a single native North American tribe or geographic region within context of history and culture of the tribe.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite 6 additional credit hours of RLST course work or instructor consent.

**RLST 5353 (3) Indigenous Traditions and Law: A Global Perspective**
Explores intersections of indigenous religions and law through historical and contemporary case studies. American Indian and Hawaiian contexts will be featured, as well as the study of the United Nations Declaration on the Rights of Indigenous Peoples and its recent implementation in places as diverse as Bolivia, Norway and Nagaland. Theoretical issues in the academic study of religion and ethnic studies will be emphasized.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4353 and ETHN 4353 and ETHN 5353
**Requisites:** Restricted to graduate students only.

**RLST 5610 (3) Topics in Islam**
A detailed exploration of diverse intellectual approaches to central questions in Islamic traditions. Department consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4610
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Grading Basis:** Letter Grade

**RLST 5650 (3) Islam in the Modern World**
Globally surveys Islam, covering religion and politics; Islam and the West; the Islamic revival and its varied forms in Iran, Indonesia, Libya and Pakistan; development and change; the status of women; media and academic stereotyping.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4650
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite 6 credit hours of religious studies at any level or instructor consent.
**Additional Information:** Departmental Category: Asia Content

**RLST 5780 (3) New Religions of East Asia**
Explores the new religious movements of modern China, Japan, and Korea, which have arisen over the last century due to the influence of the West and in response to the pressures of modernization. Previous coursework in religious studies or Asian languages and civilizations is recommended.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4780
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**RLST 5820 (3) Interdisciplinary Seminar on Religion**
Variable topics in religion, drawing from a variety of disciplines and methodologies as they shed light on specific traditions and issues.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4820
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**RLST 5840 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**RLST 5850 (3) Gender in Hagiography**
Explores gendered ideals of sainthood in medieval hagiographic literature. We draw primarily from the lives of female mystics in Buddhist and Christian sources and also examine the construction of mendicant masculinities. Reading from an array of primary sources, we query the category of mysticism and ask why visionary experience has so often been gendered female.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4850 and WGST 4850
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**RLST 6110 (3) Adv Tpcs: Chicana/o Studies: US/Mexico Borderlands**
Examines complex histories, cultural practices and liminal, 3rd spaces of the US and Mexico borderlands; racial and gender identities; community formations. Considers a range of autobiographic testimony narratives, films, social and legal studies, and theories of subjectivity that engage with the politics of representation vis a vis the criminalization of Chicana/o and ethnic youth, immigrants and those perceived to be immigrants.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 6110
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**RLST 6830 (3) Introduction to the Academic Study of Religion**
Introduction to the graduate academic study of religion through the exploration of contemporary models and issues that demonstrate the nature and future of the field. Students prepares a profile of intended area of research.
**Requisites:** Restricted to graduate students only.

**RLST 6840 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**RLST 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to graduate students only.

**RLST 6945 (1-4) Portfolio: Non-Thesis Option**
Course work finished or in the last semester.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**RLST 6950 (1-4) Master's Thesis**
**Requisites:** Restricted to graduate students only.

# Robotics (ROBO)

## Courses

**ROBO 5000 (3) Introduction to Robotics**
Introduction to Robotics prepares graduate students in the Robotics graduate program to be equipped with fundamental methods and tools in the field. This involves both a theoretical and a practical component, which are offered in a lecture and laboratory format.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5202
**Requisites:** Restricted to graduate students in the College of Engineering.

**ROBO 5008 (1) Introduction to Research**
This course is an introductory course that helps new graduate students become research productive early in their graduate careers. Important topics related to scientific research that are often not covered in other courses are formally covered here, including: literature organization and review, technical writing, oral/poster presentations, data handling, visualization and analysis, scientific ethics, program requirements and student resources.
**Requisites:** Restricted to ROBO-MS and ROBO-PHD students only.

**ROBO 5009 (1) Robotics Seminar**
Covers new and innovative topics in the robotics field through presentations by leading researchers, faculty, and current graduate students. Students will practice professional presentation skills and learn proper etiquette for participation in scientific research talks.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**ROBO 5302 (3) Advanced Robotics**
Exposes students to current research topics in the field of robotics and provides hands-on experience in solving a grand challenge program.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4302 and CSCI 5302
**Requisites:** Restricted to graduate students only. Prerequisite of CSCI 5202 or ROBO 5000.
**Recommended:** Prerequisite CSCI 3302 or instructor consent required.

**ROBO 6900 (1-6) Robotics Independent Study**
Provides credit for independent study for ROBO-MS and ROBO-PHD students.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to ROBO-MS and ROBO-PHD students only.

**ROBO 6930 (1-3) Robotics Internship**
Allows graduate students to receive academic credit for an internship experience in the field of robotics and adjacent disciplines. Students extensively document their internship and will be assessed over and above their basic internship responsibilities as appropriate for the learning outcomes of this course. Prior approval from the Robotics Program is required before students may enroll in this course.
**Requisites:** Restricted to ROBO-MS and ROBO-PHD students only.

**ROBO 6950 (1-6) Master's Thesis**
Research conducted on a specialized topic in robotics and overseen by robotics faculty.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to ROBO-MS students only.

**ROBO 7000 (1-4) Special Topics in Robotics**
Course material will cover current topics of interest in robotics.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students in the College of Engineering.

**ROBO 8990 (1-10) Doctoral Dissertation**
Doctoral-level research conducted on a specialized topic in robotics and overseen by robotics faculty.
**Repeatable:** Repeatable for up to 60.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to ROBO-PHD students only.

# Russian (RUSS)

## Courses

**RUSS 1010 (4) Beginning Russian 1**
For students with no previous training in Russian.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 1050
**Additional Information:** Departmental Category: Russian

**RUSS 1020 (4) Beginning Russian 2**
A continuation of RUSS 1010. Provides a basic introduction to Russian language and life. Covers the basics of Russian grammar; classroom activities develop speaking, reading and comprehension skills. Course will have midterm and final.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 1050
**Recommended:** Prerequisite RUSS 1010 (minimum grade C-).
**Additional Information:** Departmental Category: Russian

**RUSS 1050 (5) Intensive Beginning Russian**
Covers same material as RUSS 1010 and RUSS 1020 combined in one course. Focuses on acquiring basic grammar (all cases for nouns, adjectives and possessives, verb conjugations, in all three tenses), and ability to understand and speak basic everyday Russian. Develops basic reading and writing skills and provides exposure to the fundamentals of the Russian culture.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 1010 or RUSS 1020
**Additional Information:** Departmental Category: Russian

**RUSS 2010 (4) Second-Year Russian 1**
Review and continuation of basic skills learned in the first year: reading, writing, speaking, and oral comprehension. Department enforced prerequisite: RUSS 1020 or RUSS 1050 (minimum grade C-).
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Russian

**RUSS 2020 (4) Second-Year Russian 2**
Continuation of RUSS 2010. Department enforced prerequisite: RUSS 2010 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian

**RUSS 3000 (3) Advanced Conversation**
Enables students to speak and understand contemporary Russian. Discussion topics and source materials vary. Department enforced prerequisite: RUSS 2010 (minimum grade C-).
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian

**RUSS 3010 (4) Third-Year Russian 1**
Review of Russian grammar coordinated with reading, speaking, writing and understanding modern Russian. Uses some texts from modern Russian literature. Department enforced prerequisite: RUSS 2020 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian

**RUSS 3020 (4) Third-Year Russian 2**
Continuation of RUSS 3010. Department enforced prerequisite: RUSS 3010 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian

**RUSS 3060 (4) Advanced Russian for Heritage Speakers (Part 1)**
Enhances heritage student competence and performance in Russian language. Offers intensive review of Russian grammar and focuses on developing advanced reading, writing and translation skills. Readings are selected from a wide range of contemporary writings that reflect current issues in Russia.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4010 or RUSS 5010
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian

**RUSS 4010 (4) Advanced Conversation and Composition 1**
Review of all aspects of Russian grammar, with a focus on difficulties, vocabulary for communication at an advanced level and contextual usage. Includes intensive writing and editing of compositions on a variety of topics, reading of authentic Russian texts, interactive work with Russian media and fluent conversation in Russian that moves beyond functional proficiency. Department enforced prerequisite: RUSS 3020 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 3060 RUSS 5010
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Russian

**RUSS 4020 (4) Advanced Conversation and Composition 2**
Review of all aspects of Russian grammar, with a focus on difficulties, vocabulary for communication at an advanced level and contextual usage. Includes intensive writing and editing of compositions on a variety of topics, reading of authentic Russian texts, interactive work with Russian media and fluent conversation in Russian that moves beyond functional proficiency. Department enforced prerequisite: RUSS 4010 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4060 RUSS 5020
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Russian

**RUSS 4050 (4) Professional Russian**
Introduces stylistic and idiomatic forms of Russian used in business, politics, media and the Internet. Develops new vocabulary with a special focus on fluency of speech and written communication skills. Offers immersion into the world of contemporary Russian media, politics and culture. Formerly RUSS 3050.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 5050
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Recommended:** Prerequisite RUSS 3020.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Russian

**RUSS 4060 (4) Advanced Russian for Heritage Speakers (Part 2)**
Enhances heritage student competence and performance in Russian language. Offers intensive review of Russian grammar and focuses on developing advanced reading, writing and translation skills. Readings are selected from a wide range of contemporary writings that reflect current issues in Russia. Department enforced prerequisite: RUSS 3060 or RUSS 4010 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4020 or RUSS 5020
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Russian

**RUSS 4220 (3) Topics in Russian, East European and Eurasian Culture (in Russian)**
Selected topics in Russian, East European and Eurasian culture and society. Taught all or partly in Russian. Formerly RUSS 4220.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5220
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**RUSS 4230 (3) Russian Cultural Idioms**
Focuses on the critical analysis of the Russian cultural discourse through Russian idioms. Taught in Russian. Department enforced prerequisite: RUSS 2020 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 5230
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Russian

**RUSS 4850 (4) Russian Film and Society**
Examines topics in Russian film and TV series from sociohistorial and cultural perspectives, while simultaneously developing students' auditing, comprehension, and speaking skills in Russian language. Critical thinking and analytical approaches will be key to working through the course's material. Screenings, discussions, and written assignments are in Russian.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 5850
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite RUSS 2020.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Russian

**RUSS 5010 (4) Advanced Russian Seminar**
Review of all aspects of Russian grammar, with a focus on difficulties, vocabulary for communication at an advanced level and contextual usage. Includes intensive writing and editing of compositions on a variety of topics, reading of authentic Russian texts, interactive work with Russian media and fluent conversation in Russian that moves beyond functional proficiency.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4010
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian

**RUSS 5020 (4) Advanced Russian Seminar 2**
Review of all aspects of Russian grammar, with a focus on difficulties, vocabulary for communication at an advanced level and contextual usage. Includes intensive writing and editing of compositions on a variety of topics, reading of authentic Russian texts, interactive work with Russian media and fluent conversation in Russian that moves beyond functional proficiency.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4020
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian

**RUSS 5050 (4) Professional Russian**
Introduces graduate and advanced undergraduate students to various stylistic registers of Russian (business, politics, the Internet, TV, etc.). Develops new vocabulary and idiomatics, with a special focus on fluency of speech and written communication skills. Along with language training, the course offers an immersion into the world of contemporary Russian media, politics and culture. Taught in Russian.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4050
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Additional Information:** Departmental Category: Russian

**RUSS 5220 (3) Topics in Russian, East European and Eurasian Culture (in Russian)**
Selected topics in Russian culture and society. Taught all or partly in Russian. Formerly RUSS 5220.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4220
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**RUSS 5230 (3) Russian Cultural Idioms**
Analyzes Russian cultural discourse through Russian idioms. Taught in Russian. Formerly GSLL 5230.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4230
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian

**RUSS 5841 (3) History of Modern Russian Drama**
Examines Russian plays of the 20th and 21st centuries (from Chekhov to contemporary authors) in the context of the Western dramatic theory. Surveys most influential directorial styles from Stanislavsky's "method" to contemporary verbatim theatre. All readings are in English. Taught in English. Formerly GSLL 5841.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4841
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**RUSS 5850 (4) Russian Film and Society**
Examines topics in Russian film and TV series from sociohistorial and cultural perspectives, while simultaneously developing students' auditing, comprehension, and speaking skills in Russian language. Critical thinking and analytical approaches will be key to working through the course's material. Screenings, discussions, and written assignments are in Russian.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4850
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Recommended:** Prerequisites RUSS 2020 or equivalent.
**Additional Information:** Departmental Category: Russian

# Russian, East European and Eurasian Studies (REES)

## Courses

**REES 1112 (3) Astronauts and Astropolitics: Space Exploration from the Cold War to the Future of Innovation**
Surveys the history of space exploration to equip students with critical learning skills to understand current trends and future innovations in space tourism, medicine, commerce and law. This course examines the relationships between history, science, and politics of the Space Age, beginning with the early space flight pioneers and the Cold War¿s Space Race, and concluding with the current advances in humanity¿s interstellar aspirations. Taught in English. Formerly offered as a special topics course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**REES 2121 (3) Topics in Russian, East European and Eurasian Culture**
Selected topics in Russian, East European and Eurasian culture. No knowledge of Russian required. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**REES 2211 (3) Russian Culture and Art Under Tsars Great and Terrible**
Explores the cultural history of Russia from the 9th century through 1917. Using visual presentations and reading of primary sources, we will examine closely those rulers whose actions had a significant impact on the development of Russian life, art, and architecture, such as Ivan the Terrible, and Peter I and Catherine II, the ¿Greats.¿ No knowledge of Russian required. Taught in English.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 2221 (3) Introduction to Modern Russian and Soviet Culture**
Introduces students to major trends in Russian and Soviet culture from the 1890's to the present, through the study of literature, art, architecture, music and film in an historical context. Addresses such questions as: how have past events affected Russian and post-Soviet society? How can we use knowledge about the past to understand social and cultural forces today? Taught in English. Formerly RUSS 2221.
**Equivalent - Duplicate Degree Credit Not Granted:** LIBB 2100
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 2222 (3) Sports and the Cold War**
Explores the multiple connections between sports and international politics during the Cold War in the Post-War period. Examines how the issues of class, nation, ethnicity, and gender intersect with sports and international politics by studying cases from various sport events since 1945. Taught in English.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Russian Courses Taught in English

**REES 2231 (3) Fairy Tales of Russia and Ukraine**
Provides a general introduction to fairy tales including various theoretical approaches to classifying and interpreting them; introduces students to a wide selection of Russian and Ukrainian folk and fairy tales. Examines the cultural, social and political values they reflect, as well as the continuing influence of fairy tales and folk beliefs in Russian and Ukrainian literature, music, folk art, and film, and in the political propaganda of the 20th century. Taught in English.
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 2241 (3) Death and the Undead in Slavic and Nordic Cultures**
Focuses on the study of beliefs and practices related to the dead as represented in popular culture. This interdisciplinary course will introduce students to representations of the vampire/revenant and other denizens of the undead in Icelandic sagas, Russian epic song, folktales, folklore, literature, and film from the medieval period through contemporary popular culture. Through close analysis of these various sources, this course will focus on the metaphoric usefulness of the ¿restless undead¿ in explaining its relentless appearance in cultural artifacts, and pursue the question of why the vampire will not ¿die,¿ but instead continues to appeal to modern and post-modern imaginations. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** SCAN 2241
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 2261 (3) Madness and Gambling: Russian Short Stories of Life on the Edge**
Traces themes of love, death, madness, gambling addiction, and other extreme emotional experiences within Russian short story form. Students will learn to make large-scale observations about cultural patterns and major artistic movements of Russia in the nineteenth to twenty-first centuries by reading classic short works by Pushkin, Gogol, Dostoyevsky, Tolstoy, Turgenev, Chekhov, Platonov, Shalamov, Ulitskaya, Petrushevskaya, among others. All readings will be in English. No knowledge of Russian required. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 2271 (3) Space, Invention, and Wonder in Fairy Tales, Literature and Film**
Explores the themes of space, invention, technology and wonder in fairy tales from Italian, Russian, French, German, and Spanish traditions in order to compare their transformation in different national and historical settings. Students analyze the intersection of fairy tales and science in literature and film. Counts for the Space Minor. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**REES 2311 (3) Energy Cultures: Oil, Coal, and Atoms in Modern Literature and Film**
Explores the concept of energy and its influence in world culture from the 19th century to the present, paying particular attention to how writers and filmmakers from the United States, Russia, and elsewhere have responded to the accelerating production and consumption of fossil fuels and nuclear power. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 2311 and HUMN 2311
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**REES 2471 (3) Women in Russian Culture: From Folklore to the Nineteenth Century**
Explores the changing role and cultural images of women as reflected in Russian folklore, historical documents, costumes, icons, paintings and literature from medieval times to 19th century. Focuses on the way Russian women have transgressed boundaries of patriarchy and secured powerful positions in society and culture. Taught in English. Formerly RUSS 2471.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 2501 (3) Russia Beyond the Headlines: Media, Politics, Culture, and Environment**
Explores Russia¿s role in global politics and culture through the analysis of Russia¿s diverse media spheres. Focusing on the key players who shape and transform our understanding of contemporary Russian society, we will examine such topics as protest, diversity, environmental activism, Internet, mass- and counter-culture, and fashion, among many others. Formerly RUSS 2501.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Russian Courses Taught in English

**REES 3121 (3) Topics in Russian, East European and Eurasian Culture**
Selected topics in Russian, East Europeanand Eurasian culture. No knowledge of Russian required. Taught in English.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**REES 3221 (3) Space Race in Russian and American Culture**
Explores facts and fantasies of American and Soviet cultural narratives accompanying the Space Race, focusing on the production of recorded history as a process of mythmaking during the Cold War. Ponders the significance of presenting astronauts as national heroes and constructing national identities around the triumphs and failures of the competing space programs in science, art, music, film, and journalism. Formerly RUSS 3221.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 3231 (3) Laughter in Slavic Cultures**
Examines forms, genres and social functions of laughter in Slavic cultures (Russian, Polish, Czech, Serbian and others) and provides an introduction to literature and film of Eastern Europe. All readings are in English. Taught in English. Formerly RUSS 3231.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 3241 (3) Red Star Trek: Russian Science Fiction Between Utopia and Dystopia**
Examines Russo-Soviet science fiction in literature and film. Within this popular genre, writers conceive and criticize social utopias, thus creating works situated between the poles of utopia and dystopia. Through discussions of Soviet and post-Soviet science fiction the course introduces a Russo-Soviet "alternative modernity" and studies its historical development. All readings are in English. Taught in English. Formerly RUSS 3241.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 3251 (3) Arctic Thrillers: Environment, Landscape and Literature of the Far North**
Explores 19th- and 20th-century Russian and Nordic literature, film and television with a special emphasis on the role of extremes of geography and climate and physical space on the development of plot and character. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** SCAN 3251
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**REES 3301 (3) Russia, Eastern Europe and Eurasia Today through Film and TV**
Introduces post-Soviet culture through films and TV shows. The course will expose students to the diversity of contemporary Russian, East European and Eurasian life and cinematic production. Among the themes and materials discussed will be gender and sexuality, regional cinema, the documentary turn, ecology, migrants on screen, changing visions of Russia¿s historical role and position, and others. No knowledge of Russian is required. Taught in English. Formerly RUSS 3301.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 3333 (3) Spies Like Us: Espionage in the Culture of the Cold War and Beyond**
Explores the figure of the spy in Western and Soviet/post-Soviet imagination of the Cold War period and after. Focuses on the constructions and transformations of the "enemy" concept in modern and post-modern societies. Taught in English. Formerly RUSS 3333.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 3601 (3) Russian Culture Past and Present**
Russian culture from the ninth century to the present. Focuses on interdisciplinary exploration of literature, folklore, art, architecture and music through study abroad in St. Petersburg. Taught in English. Offered abroad only. Formerly RUSS 3601.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 3701 (3) Slavic Folk Culture: Ideals and Values in the Contemporary World**
Explores contemporary Slavic and American folk practices and investigates the possible origins and consequences of such practices. Focuses upon the value systems these practices represent, and ways that core values help to define identities and cultures. Topics include folk religion, magic, healing, life cycle and calendar rituals and folk music. Taught in English. Formerly RUSS 3701.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 3705 (3) Crimes of Passion: Gender and Sexual Politics in Tolstoy's Russia**
Examines the historical evolution of gender and sexual politics and the status of women in the late Imperial Russian culture, with particular attention to the writings of Leo Tolstoy and his masterpiece Anna Karenina. Topics-based survey considers debates around marriage, sexuality and gender equality through analysis of primary text by Tolstoy and his contemporaries, as well as secondary materials in gender studies, literary criticism and intellectual history. Taught in English. Formerly RUSS 3705.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Russian Courses Taught in English

**REES 3900 (1-6) Independent Study**
Formerly RUSS 3900.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Russian

**REES 3930 (1-6) Russian, East European and Eurasian Studies Internship**
Provides an academically supervised opportunity for upper-division students to earn credit while working for public or private organizations. Students apply skills and knowledge earned in the major, and supplement their work experience through directed readings and assignments. Formerly RUSS 3930.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Russian, East European and Eurasian Studies (REES) majors only.
**Additional Information:** Departmental Category: Russian

**REES 4120 (3) Russia after Communism: Post-Soviet Politics and Culture**
Explores the process of the re-invention and re-shaping of the Russian national identity after the collapse of the communist society. Topics will include the formation of neoconservative and neo-imperialist agenda (Ukraine crisis), growth of the anti-western attitudes and the protest movement against Putin's politics. Taught in English. Formerly RUSS 4120.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5120
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Russian Courses Taught in English

**REES 4210 (3) Topics in Russian, East European and Eurasian Culture**
Selected topics in Russian, East European and Eurasian Cultures. No knowledge of Russian required. Taught in English. Formerly RUSS 4210.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5210
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4211 (3) History of Russian and Soviet Cinema**
Explores groundbreaking works of Russian and Soviet cinema in historical context and with an emphasis on the connections between politics and cinematic form. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 4211 and REES 5211 and ARTF 5211
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4221 (3) Stalinism: Culture and Society**
Examines Soviet society and culture of Stalin period (1929-1953). The Great Terror, communist ideology, shady, commercial practice, political intrigues and show trials, as well as many other aspects of Stalinism will be discussed. Course materials include historical studies, documents, memoirs, diaries, novels and films of or about the period. Taught in English. Formerly RUSS 4221.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 5221
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4251 (3) Russian and Soviet Queer Culture**
Explores the contributions to Russian/Soviet literature, film, and the performing arts by such LGBTQ cultural icons as Nikolai Gogol, Marina Tsvetaeva, Sergei Eisenstein, and Pyotr Tchaikovsky. The course also surveys the history of social and legal restrictions on non-heteronormative behaviors in Russia from the medieval period to the present, with an emphasis on the emergence of LGBT rights activism and the reactionary rise of homophobia as a tool of nationalist politics in Putin¿s Russia. Taught in English. Formerly RUSS 4251.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5251
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**REES 4301 (3) American-Russian Cultural Relations**
Surveys the development of American-Russian cultural relations from the second half of the 18th century to the present. Examines the character and significance of Russian-American relations in social, intellectual, artistic, and other spheres from a comparative perspective. Taught in English. Formerly RUSS 4301.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5301
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Russian Courses Taught in English

**REES 4321 (3) Mythological Russia and Ukraine**
Examines folklore, popular culture, and everyday life in contemporary Russia and Ukraine to reveal beliefs, ideals, and ideologies. Subjects include witchcraft, shamanism, healing, death, remembrance, nostalgia, collective memory, obscenity. Students will learn to analyze artifacts, photographs, interviews, memoirs, songs, stories, and rituals. Taught in English. Formerly RUSS 4321.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5321
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**REES 4431 (3) Dostoevsky**
Focuses on close reading of major novels and other works by Dostoevsky, one of the most important psychological novelists in modern literature, a profound religious thinker and the greatest crime novelist in the world. Taught in English. Formerly RUSS 4431.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5431
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4441 (3) Tolstoy**
Examines the development of Tolstoy's thought and literary style through study of one of his novels and short works from different periods of Tolstoy's writing. Taught in English. Formerly RUSS 4441.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5441
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4451 (3) Chekhov**
Analyzes the life and creative works of the author of some of the funniest and some of the gloomiest stories in Russian literature. Examines Chekhov's major plays that laid the foundation for modernist theatre. Taught in English. Formerly RUSS 4451.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 5451
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4471 (3) Women in 20th-21st Century Russian, East European and Eurasian Cultures**
Examines issues facing women in 20th-21st century Russia, East Europe, Caucasus and Central Asia, based on study of current events, history, literature, posters and film. Studies images of women as Amazons and rebels, salon hostesses and poets, New Soviet Women and women in combat, prostitutes and mothers. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4471 and REES 5471
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Russian Courses Taught in English

**REES 4481 (3) Rogues to Revolutionaries: Russian Rebels, Past and Present**
Explores the tradition of dissent and opposition in Russian culture, from the medieval period to present, approaching forms of rebellion (religious, political, social, aesthetic) in historical context. This survey in intellectual history will trace this phenomenon across historical documents, literary texts, film, and the fine and performing arts, pairing these primary materials with readings in Russian history. Taught in English. Formerly RUSS 4481.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5481 IAFS 3621
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4811 (3) Seeds of Revolt: 19th-Century Russian Literature**
Explores Russian literature of the 1800s, a remarkable period in literary and political history that witnessed the emergence of nationalism, socialism, and feminism. Reading classic texts by Dostoevsky, Tolstoy and Chekhov alongside lesser-known works that speak to urgent social issues of our own time (identity, class disparity, environmental degradation, and the struggle for civil rights), students will learn interpretive skills that are relevant to a wide range of disciplines today. No knowledge of Russian culture required. Taught in English. Formerly RUSS 4811.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4821 (3) 20th-Century Russian Literature and Art**
Interdisciplinary course emphasizing the influence of literature and art in 20th century Russian literature. Follows the changing cultural landscape from the time when Russia was in the vanguard of modern European literature to the period of Stalinism. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** HUMN 4821 and REES 5821
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4831 (3) Contemporary Russian Literature**
Acquaints students with the most representative works of Russian writers after the collapse of the Soviet regime. Examines the relationships between ideological concepts and aesthetics, and the treatment of moral and social issues in recent literary works. All readings are in English. Taught in English. Formerly RUSS 4831.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5831
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4851 (3) Critical Thinking: Russian Film and Society**
Through structured discussions, selected readings and written assignments, examines topics in Russian film from socio-historical and cultural studies perspectives. Taught in English. Formerly RUSS 4851.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5851
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4861 (3) Absurd and Supernatural in Russian Literature**
Studies themes of grotesque, bizarre, surreal, absurd, supernatural and fantastic in Russian short stories and novels of the 19th and 20th centuries. Discusses works by Pushkin, Gogol, Dostoevsky, Kharms, Bulgakov, Sinyavsky, Petrushevskaya and Pelevin within the contexts of Russian folklore, Freud and Jung's interpretations of jokes and dreams, and Romanticism. Taught in English. Formerly RUSS 4861.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 5861
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Russian Courses Taught in English

**REES 4871 (3) Understanding Ukraine: Culture, Diversity, Conflict**
Introduces students to Ukraine¿s cultural diversity and orients them in the history of the country at the heart of contemporary world politics. This course will provide students with a necessary historical frame for understanding current and war-time cultural debates about Ukraine¿s contested heritage and future. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3622 RUSS 5871

**REES 4900 (1-6) Independent Study**
Formerly RUSS 4900.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Russian

**REES 5110 (3) Slavic Culture and Society**
Examines important ideologies and myths in Slavic societies, with emphasis on contemporary movements and their reinterpretation of history. Acquaints students with major tools for study of cultures of Eastern Europe and the post-Soviet states: research methods, bibliography, transliteration, critical thinking and writing skills. Required for Russian MA. Taught in English. Formerly RUSS 5110.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5120 (3) Russia after Communism: Post-Soviet Politics and Culture**
Explores the process of the re-invention and re-shaping of Russian national identity after the collapse of Communism. Topics will include the formation of a neoconservative and neo-imperialist agenda (as demonstrated by the Ukraine crisis), the growth of anti-Western attitudes, and the anti-Putin protest movement. Taught in English. Formerly RUSS 5120.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4120
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5210 (3) Topics in Russian, East European and Eurasian Culture**
Selected topics in Russian, East European and Eurasian culture. No knowledge of Russian required. Taught in English. Formerly RUSS 5210.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4210
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5211 (3) History of Russian and Soviet Cinema**
Surveys Russian cinema in historical and cultural context from early 20th century to the present. Taught in English. Formerly RUSS 5211.
**Equivalent - Duplicate Degree Credit Not Granted:** ARTF 5211 and REES 4211 and CINE 4211
**Requisites:** Restricted to graduate students only.

**REES 5221 (3) Stalinism: Culture and Society**
Examines Soviet society and culture of the Stalin period (1929-1953). The Great Terror, Communist ideology, commercial practices, political intrigues and show trials, as well as many other aspects of Stalinism will be discussed. Course materials include historical studies, documents, memoirs, diaries, novels and films of or about the period. Taught in English. Formerly RUSS 5221.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4221

**REES 5251 (3) Russian and Soviet Queer Culture**
Explores the contributions to Russian/Soviet literature, film, and the performing arts by such LGBTQ cultural icons as Nikolai Gogol, Marina Tsvetaeva, Sergei Eisenstein, and Pyotr Tchaikovsky. The course also surveys the history of social and legal restrictions on non-heteronormative behaviors in Russia from the medieval period to the present, with an emphasis on the emergence of LGBT rights activism and the reactionary rise of homophobia as a tool of nationalist politics in Putin¿s Russia. Taught in English. Formerly RUSS 5251.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4251

**REES 5301 (3) American-Russian Cultural Relations**
Surveys the development of American-Russian cultural relations from the second half of the 18th century to the present. Examines the character and significance of Russian-American relations in social, intellectual, artistic, and other spheres from a comparative perspective. Taught in English. Formerly RUSS 5301.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4301
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5321 (3) Mythological Russia and Ukraine**
Examines folklore, popular culture, and everyday life in contemporary Russia and Ukraine to reveal beliefs, ideals, and ideologies. Subjects include witchcraft, shamanism, healing, death, remembrance, nostalgia, collective memory, obscenity. Students will learn to analyze artifacts, photographs, interviews, memoirs, songs, stories, and rituals. Taught in English. Formerly RUSS 5321.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4321
**Recommended:** Prerequisite prior experience with folklore or Russian studies.

**REES 5352 (3) Russian Novel: Theory and Practice**
Examines the Russian novel and its evolution as well as Western and Russian theories of the novel as they engage and reflect upon the claims of modernity. Taught in English. Formerly RUSS 5352.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5431 (3) Dostoevsky**
Focuses on close reading of major novels and other works by Dostoevsky, one of the most important psychological novelists in modern literature, a profound religious thinker and the greatest crime novelist in the world. Taught in English. Formerly RUSS 5431.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4431
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5441 (3) Tolstoy**
Examines the development of Tolstoy's thought and literary style through study of one of his novels and short works from different periods of Tolstoy's writing. Taught in English. Formerly RUSS 5441.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4441
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5451 (3) Chekhov**
Analyzes the life and creative works of the author of some of the funniest and some of the gloomiest stories in Russian literature. Examines Chekhov's major plays that laid the foundation for modernist theatre. Taught in English. Formerly RUSS 5451.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4451
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5471 (3) Women in 20th-21st Century Russian, East European and Eurasian Cultures**
Examines issues facing women in 20th-21st century Russia, based on study of current events, history, literature, posters and film. Studies images of women as Amazons and rebels, salon hostesses and poets, New Soviet Women and women in combat, prostitutes and mothers. Taught in English. Formerly RUSS 5471.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4471 and WGST 4471
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5481 (3) Rogues to Revolutionaries: Russian Rebels, Past and Present**
Explores the tradition of dissent and opposition in Russian culture, from the medieval period to present, approaching forms of rebellion (religious, political, social, aesthetic) in historical context. This survey in intellectual history will trace this phenomenon across historical documents, literary texts, film, and the fine and performing arts, pairing these primary materials with readings in Russian history. Taught in English. Formerly RUSS 5481.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4481 IAFS 3621
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5821 (3) 20th Century Russian Literature and Art**
Interdisciplinary course emphasizing the influence of literature and art in 20th century Russian literature. Follows the changing cultural landscape from the time when Russia was in the vanguard of modern European literature to the period of Stalinism. Taught in English. Formerly RUSS 5821.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4821 AND HUMN 4821
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5830 (3) Topics in Literature and History**
Taught in English. Formerly RUSS 5830.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5831 (3) Contemporary Russian Literature**
Acquaints students with the most representative works of Russian writers after the collapse of the Soviet regime. Examines the relationships between ideological concepts and aesthetics, and the treatment of moral and social issues in recent literary works. All readings are in English. Taught in English. Formerly RUSS 5831.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4831
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5851 (3) Critical Thinking: Russian Film and Society**
Through structured discussions, selected readings and written assignments, examines topics in Russian film from socio-historical and cultural studies perspectives. Taught in English. Formerly RUSS 5851.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4851
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5861 (3) Absurd and Supernatural in Russian Literature**
Studies themes of grotesque, bizarre, surreal, absurd, supernatural and fantastic in Russian short stories and novels of the 19th and 20th centuries. Discusses works by Pushkin, Gogol, Dostoevsky, Kharms, Bulgakov, Sinyavsky, Petrushevskaya and Pelevin within the contexts of Russian folklore, Freud and Jung's interpretations of jokes and dreams, and Romanticism. Taught in English. Formerly RUSS 5861.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4861
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian Courses Taught in English

**REES 5871 (3) Understanding Ukraine: Culture, Diversity, Conflict**
Introduces students to Ukraine¿s cultural diversity and orients them in the history of the country at the heart of contemporary world politics. This course will provide students with a necessary historical frame for understanding current and war-time cultural debates about Ukraine¿s contested heritage and future. Taught in English. Degree credit not granted for IAFS 3622.
**Equivalent - Duplicate Degree Credit Not Granted:** RUSS 4871
**Requisites:** Restricted to graduate students only.

**REES 5900 (1-6) Independent Study**
See department for registration information. Department enforced requisite: graduate standing. Formerly RUSS 5900.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Russian

**REES 6940 (1-3) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree. Formerly RUSS 6940.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian

**REES 6950 (1-6) Master's Thesis**
Formerly RUSS 6950.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Russian

# Sanskrit (SNSK)

## Courses

**SNSK 1010 (3-4) Introductory Sanskrit 1**
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Additional Information:** Departmental Category: Sanskrit

**SNSK 1020 (3-4) Introductory Sanskrit 2**
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Requires prerequisite course of SNSK 1020 (minimum grade C-).
**Additional Information:** Departmental Category: Sanskrit

**SNSK 2110 (3-4) Intermediate Sanskrit 1**
Continued study of the grammar of classical Sanskrit and translation of selected readings from the literature.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Requires prerequisite course of SNSK 1020 (minimum grade C-).
**Additional Information:** Departmental Category: Sanskrit

**SNSK 2120 (3-4) Intermediate Sanskrit 2**
Continuation of SNSK 2110.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Requires prerequisite course of SNSK 2110 (minimum grade C-).
**Additional Information:** Departmental Category: Sanskrit

# Scandinavian (SCAN)

## Courses

**SCAN 1202 (3) Tolkien's Nordic Sources and the Lord of the Rings**
Examines the Nordic aspect of J.R.R. Tolkien's work, especially The Lord of the Rings. Concentrates on the Nordic saga tradition, mythology, folklore and fairy tales Tolkien used as his sources. Students will explore the transformations of these sources from prehistoric times to contemporary cinematic adaptations, while paying special attention to cultural appropriations, national revisions and political alterations. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 1900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Nordic Studies Courses Taught in English

**SCAN 2201 (3) Introduction to Modern Nordic Culture and Society**
Provides a comprehensive introduction to modern Nordic culture and society. Surveys the history of Nordic countries and examines their culture using art, architecture, literature, and film. Studies social issues, environmental concerns, and political patterns. In profiling aspects of culture and society unique to Nordic countries, students arrive at a conception of a collective Nordic identity. Taught in English.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 2202 (3) The Viking Age**
Examines the social, political, technological, spiritual, and artistic background to the Viking Age, asking how Scandinavian society functioned in the Viking Age, why the Scandinavian expansion occurred, and what its lasting effects have been on the global stage. Taught in English.
**Additional Information:** Arts Sci Core Curr: Historical Context
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 2241 (3) Death and the Undead in Slavic and Nordic Cultures**
Focuses on the study of beliefs and practices related to the dead as represented in popular culture. This interdisciplinary course will introduce students to representations of the vampire/revenant and other denizens of the undead in Icelandic sagas, Russian epic song, folktales, folklore, literature, and film from the medieval period through contemporary popular culture. Through close analysis of these various sources, this course will focus on the metaphoric usefulness of the ¿restless undead¿ in explaining its relentless appearance in cultural artifacts, and pursue the question of why the vampire will not ¿die,¿ but instead continues to appeal to modern and post-modern imaginations. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 2241
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**SCAN 2900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3020 (3) Advanced Readings in Scandinavian**
Develops the type of advanced reading knowledge of the four closely related Scandinavian languages (Swedish, Danish and the two Norwegian standards) that will prepare students for their senior thesis and for possible graduate work. Readings will help students see relationships and connections operating across national and linguistic borders within the Nordic region. Department enforced prerequisites: NORW 2120 and NORW 3900 or SWED 3900 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Norwegian
Departmental Category: Swedish

**SCAN 3101 (3) Global Seminar: Identity, Arts & Ethics in Contemporary Norway**
Explores contemporary Norwegian society from an interdisciplinary, global perspective. Norway is recognized throughout the world for a high standard of living, ethical business culture, and rich art, literature, and cinema. We will examine how Norwegian society has adapted to its recent transformation from being one of the poorest countries in Europe to being one of the richest in the world. Offered through Education Abroad. Taught abroad only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**SCAN 3102 (3) Global Seminar: Scandinavian Witchcraft and Magic in Iceland**
Examines witchcraft and magic in the broad perspective of Scandinavian cultural history. Explores folk culture and customs of Scandinavia's Viking Age and medieval past including visits to historical sites in Iceland. Offered through Education Abroad. Taught abroad only.

**SCAN 3110 (3) Topics in Contemporary Nordic Society and Culture**
Provides insight into cultural adaptations, political struggles and social transformations taking place in the contemporary Nordic world. Subjects treated vary according to current developments in the region, student interest and faculty availability.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3201 (3) Contemporary Nordic Society and Culture**
Explores contemporary Nordic culture and society with special focus on Iceland. Emphasis is on the relationship between historical, geographic, artistic, and political forces in Iceland and their effects on culture and society. Provides insight into the life and attitudes of contemporary Icelanders and stresses their place in the global culture of today. Taught in English.
**Recommended:** Prerequisite SCAN 2201.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3202 (3) Old Norse Mythology**
Presents Old Norse mythology as it is represented in medieval Nordic literature. Discusses strategies for analyzing Old Norse mythology as medieval literature that reflects social narratives in Scandinavia in the period 500-1300 AD. Interprets and contextualizes Old Norse mythology in relation to its codification in literature. Students will gain insight into the historical development and the complexity of transmission of Old Norse mythology in medieval literature and its subsequent reception in the global public. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3203 (3) 19th & 20th Century Nordic Literature**
Examines the Nordic region's influence on social realism, expressionism, and postwar literature, including such themes as women in society, nature and industrialization, and identity and angst. May include works by Ibsen, Strindberg, Dinesen, and Nobel Prize winners Lagerlof, Hamsun, Undset, and Lagerkvist. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3204 (3) Medieval Icelandic Sagas**
Advanced introduction to medieval Icelandic saga with readings in the family, outlaw, skald, and legendary sagas as well as the main scholarly approaches to this unique literature. Topics include honor, blood feud, fate, sexuality/gender, oral composition, and legend. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3205 (3) Scandinavian Folk Narrative**
Introduces the rich tradition of Scandinavian oral narrative. Looks at relationships between the various genres of oral narrative and their historical, social, and cultural contexts. Genres studied may include ballad, fairy tale, rural legend, and urban legend. Explores various interpretive methodologies. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3206 (3) Nordic Colonial History and Legacy**
Examines Nordic colonial enterprise and the relationship between the Scandinavian center and colonial peripheries from the Arctic to the Caribbean, Africa, and India. Studies colonial and postcolonial cultures, and postcolonial criticism and theory. Taught in English.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3207 (3) Beyond Middle Earth: Tolkien¿s Nordic Sources II**
Explores beyond The Lord of the Rings and reads Tolkien¿s sources for material in the Silmarillion as well as his re-imaginings of Nordic literature such as The Legend of Sigurd and Gudrun, The Story of Kullervo, and Old English elegiac and battle poems. Students will apply source criticism to Tolkien¿s inspirations, to his academic work and works of fiction. Students will gain insight into Tolkien¿s goals in his re-working of sources, and consider how Tolkien¿s work re-contextualizes the original texts for his contemporaries and for modern society. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**SCAN 3208 (3) Women in Nordic Society: Modern States of Welfare**
Examines the role and status of women and marginalized social classes in the Nordic countries, whose societies have been heralded as egalitarian models since the twentieth century. Texts include a variety of media, from literature to sociological works to artifacts of political and popular culture. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3208
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3209 (3) Contemporary Nordic Literature and Film**
Advanced introduction to contemporary Nordic literature and film. Readings/screenings of recent translated Nordic texts and films, presenting a broad spectrum of contemporary issues, along with current critique and theoretical approaches. Topics: history, culture, translation, gender/sexuality, nationalidentity, minority issues, etc. Taught in English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3251 (3) Arctic Thrillers: Environment, Landscape and Literature of the Far North**
Explores 19th- and 20th-century Russian and Nordic literature, film and television with a special emphasis on the role of extremes of geography and climate and physical space on the development of plot and character. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 3251
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**SCAN 3301 (3) Radical Nationalism in Contemporary Northern Europe**
Examines the current rise of National Socialists, white supremacists, ethnic separatists, anti-Islam activists and social and cultural ultraconservatives in northern Europe. Treats extremist nationalism as a social, cultural, aesthetic, intellectual and political movement. Consults scholarship from sociology, criminology and political science, as well as music, literature, art and film. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3630
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3302 (3) Witchcraft and Magic in Scandinavia**
Investigates witchcraft and magic in Scandinavian cultures from the Viking Age to the Burning Age. The class examines witchcraft and magic in the broad perspective of Scandinavian cultural history, tracing traditions of magic from the earliest sources in runes to film and literature in the modern era. We will investigate the styles of magic and cultural attitudes to it in Iceland, Norway, Denmark, and Sweden.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**SCAN 3303 (3) Contemporary Norse Paganism**
This course introduces to the contemporary neopagan movement in North America known as Norse paganism or Ásatrú. It surveys the historical development of the movement, its attachment to Scandinavian pre-history, and the major socio-cultural components of its identity constructions. We will investigate the movement's attitudes and conceptualizations of modern Nordic-based spirituality in light of gender, race, ethnicity, and its ecosocial ethoses.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**SCAN 3506 (3) Scandinavian Drama**
Examines the many contributions of Scandinavian dramatists to world theater from the 18th century to the present. With emphasis on Holberg, Bjornson, Ibsen, Strindberg, and Bjorneboe, surveys Enlightenment comedy, national romanticism, realism, naturalism, symbolism, expressionism, and Brechtian epic theater. Taught in English.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3631 (3) Arctic Society and Culture**
Investigates representations of the Arctic in literature, art, cinema, media and scientific, and geographical writing over the past century and a half, spanning material from North America, Britain, continental Europe and the Nordic region. Interpretive approaches include ecocriticism; post-colonialism; literary studies; indigenous studies; visual, film and media theory; Cold War studies.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3631
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Nordic Studies Courses Taught in English

**SCAN 3632 (3) Scandinavia and the European Union**
Examining the role that the EU plays in the Nordic region, this course is an introduction to the complex relationship between the Nordic nation states and the European project. We explore how the EU is perceived in the Nordic countries and investigate why the Nordic region is reluctant in its relation to the European Union.
**Equivalent - Duplicate Degree Credit Not Granted:** IAFS 3632

**SCAN 3900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Nordic Studies Courses Taught in English

# Sewall Residential Academic Program (SEWL)

## Courses

**SEWL 1020 (1-3) Topics-Social Sciences 1**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**SEWL 2000 (3) America, the Environment, and the Global Economy**
Examines the debate over globalization and the global environmental crisis. Does increasing global economic development threaten to undermine the environment? What role should America play in the development of a sustainable economy?
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 1002
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences

**SEWL 2020 (1) Civic Engagement**
Explores the concept of citizenship through readings, discussion, and service-learning. Working with Sewall faculty mentors, students discuss citizenship and related topics and learn concretely about aspects of the larger community by choosing a local community organization, becoming actively involved in its programs, and presenting their work at a culminating symposium.
**Repeatable:** Repeatable for up to 4.00 total credit hours.

# Social Sciences (SSCI)

## Courses

# Sociology (SOCY)

## Courses

**SOCY 1001 (3) Introduction to Sociology**
Examines basic sociological ideas including social relations, social interaction, social structure, and social change. Examples are drawn from societies around the world.
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology
MAPS Course: Social Science

**SOCY 1004 (3) Deviance in U.S. Society**
Examines the social construction of deviance in the U.S., the process of acquiring a deviant identity and managing deviant stigma, and the social organization of deviant act, lifestyles, relationships and careers.
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Deviance and Criminology

**SOCY 1006 (3) The Social Construction of Sexuality**
Discusses the social determinants of sexuality. Analyzes the economic, psychological, and cultural influences on human sexuality. Interactional perspective of human sexuality is presented.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 1006
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Sex and Gender

**SOCY 1016 (3) Sex, Gender, and Society 1**
Examines status and power differences between the sexes at individual and societal levels. Emphasizes historical context of gender roles and status, reviews major theories of gender stratification.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 1016
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Sex and Gender

**SOCY 1021 (3) United States Race and Ethnic Relations I**
Examines how concepts of race and ethnicity have manifested historically and manifest currently in U.S. society. Covers foundational concepts such as prejudice, discrimination, and privilege. Also addresses the structural causes and consequences of race and ethnicity in various aspects of U.S. society, such as the housing market, the criminal justice system, and education.
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: General Sociology

**SOCY 1022 (3) Ethics and Social Issues in U.S. Health and Medicine**
Explores current ethical and policy issues in U.S. health and medical practices. Includes such issues as alcohol and drug abuse, organ transplants and substitutes, genetic engineering, contraception, abortion, occupational safety and health, and euthanasia.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Population and Health Issue

**SOCY 1841 (1-6) Independent Study in Sociology**
**Repeatable:** Repeatable for up to 7.00 total credit hours.
**Additional Information:** Departmental Category: General Sociology

**SOCY 2011 (3) Contemporary Social Issues and Human Values**
Explores contemporary societies on a global scale. Focuses on such issues as capitalism, socialism, race and ethnic problems, sex discrimination, poverty and the concentration of wealth, crime and deviance, human rights and human values, peace and war.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 2022 (3) Happiness in Society**
Examines the measurement, meaning, and causes of happiness and its relationship to social life in the contemporary United States as well as in other countries. Students will also learn about and critically evaluate existing strategies for enhancing happiness in their lives. Formerly offered as a special topics course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**SOCY 2031 (3) Social Problems**
Examines various social problems in the U.S. through a traditional sociological framework focused on race, class, and gender. Considers such problems as economic, racial, and gender inequality as manifestations of broader structural dynamics rooted in unequal relations of power. Addresses topics such as mass incarceration, poverty, segregation, drug use, immigration, and war and terrorism.
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 2034 (3) Drugs in United States Society**
Examines the relationship between drugs and social contexts. Lends insight into why people find consciousness alteration meaningful, what kinds of experiences and problems arise, and what types of social policies emerge to control drug use.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Deviance and Criminology

**SOCY 2044 (3) Crime and Society**
Explores issues related to crime, the criminal justice system, and crime-related public policy. It addresses what we know about crime and how we know it, how our society responds to crime, how the institutions designed to address crime (police, courts, corrections) function, and diversity in experiences with the criminal justice system.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 2044
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Deviance and Criminology

**SOCY 2061 (3) Introduction to Social Statistics**
Introduces students to quantitative analysis of social phenomena. Emphasizes understanding and proper interpretation of graphs; measures of central tendency, dispersion, and association; and the concept of statistical significance. Assumes students have only limited mathematical background.
**Additional Information:** Arts Sci Core Curr: Quant Reasn Mathmat Skills
Arts Sci Gen Ed: Quantitative Reasoning Math
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology
MAPS Course: Mathematics

**SOCY 2077 (3) Environment and Society**
Examines interactions between societies and their natural and built environments through the lens of inequality. Describes how environmental problems vary along, are shaped by, and exacerbate disparities along lines of race, socioeconomic status, and other forms of social status. Also examines collective efforts to address social and environmental problems.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment and Society

**SOCY 2080 (3) Sociology of the Helping Professions**
Investigates how today's helping professionals are trained and socialized to care for clients, the challenges they face in working within modern bureaucracies and with advanced technologies and the importance of inter-professional care.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 2091 (3) Topics in Sociology**
Variety of courses taught by visiting and regular faculty. See current departmental announcements for specific content. Students may receive credit for this course up to three times for different topics.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 2092 (3) Sex, Power and Reproduction**
Examines fertility, contraception and abortion with an emphasis on demographic trends, social stratification and policy impacts. Sociological, demographic and public health perspectives will be presented.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**SOCY 2150 (3) Gender, Race, and Chainsaws**
Practice fundamental skills of visual literacy with an emphasis on understanding the sociological importance of popular media¿s representation of different groups of people and the implications of these representations for social justice. We will analyze how historical and current social conditions influence the creation, distribution, and interpretation of visual media in our culture, focusing on films in the horror genre. Formerly offered as a special topics course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**SOCY 3001 (3) Classical Theory**
In-depth study of classical sociological theorists, particularly Marx, Durkheim, and Weber. Examines their roles in defining the discipline of sociology.
**Requisites:** Requires a prerequisite course of SOCY 1001 (minimum grade C-). Restricted to students with 27-180 credits (Sophomore, Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 3002 (3) Population and Society**
Examines population, its structure and processes, and its relationships to selected areas of the social structure. Examines Malthusian, neo-Malthusian, and Marxist perspectives.
**Requisites:** Restricted to Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Population and Health Issue

**SOCY 3011 (3) Contemporary Theory**
Continuation of SOCY 3001. In-depth study of modern and post-modern theories of the 20th century, including structural-functionalist, conflict, symbolic interactionist, feminist, and world system theories.
**Requisites:** Requires a prerequisite course of SOCY 3001 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 3012 (3) Gender and Development**
Provides a sociological perspective on gender, globalization, and economic development in the Global South. Examines a variety of topics, including feminist theories of development; poverty and inequality; women¿s work in the context of globalization; and women¿s activism and feminism(s).
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3012
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 3001.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Population and Health Issue
Departmental Category: Asia Content

**SOCY 3016 (3) Marriage and the Family in the United States**
Comparative and historical examination of marriage and the family within the U.S. Emphasizes changing family roles and family structures. Also considers alternatives to the nuclear family and traditional marriage exploring new definitions of family.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3016
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sex and Gender

**SOCY 3032 (3) Social Epidemiology**
Introduces students to social epidemiology. Identifies how social structures, institutions, norms, relationships, and neighborhood context affect health. Particular attention is paid to ways in which economic inequality, racism, and gender discrimination increase groups¿ risk of exposure to factors that undermine health.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 3041 (3) Self and Consciousness**
Explores human development from a psychosocial perspective, focusing on the interplay between psychological patterns and social forms. Issues such as self-image and social consciousness are studied within the larger context of individual and collective forces leading to transformation.
**Equivalent - Duplicate Degree Credit Not Granted:** INVS 3041
**Requisites:** Requires a prerequisite course of SOCY 3001 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 3042 (3) Topics in Population and Health**
A variety of courses in population and/or health will be taught, usually by visiting lecturers. See current departmental announcements for specific content.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of SOCY 1001 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Population and Health Issue

**SOCY 3044 (3) Race, Class, Gender, and Crime**
Overview of race, class, gender and ethnicity issues in offending, victimization and processing by the justice system. Examines women and people of color employed in the justice system.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 3044 and WGST 3044
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 1001 or SOCY 1004 or SOCY 1021 or SOCY 2044.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Deviance and Criminology

**SOCY 3045 (3) Sociology of Death and Dying**
Addresses sociological aspects of thanatology (the study of death and dying). Includes study of the social meaning of death and its normative treatment in western civilization, with a focus on the contemporary United States.
**Requisites:** Requires a prerequisite course of SOCY 1001 or SOCY 3001 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Population and Health Issue

**SOCY 3046 (3) Topics in Sex and Gender**
Faculty present courses based on their area of expertise and specialization in the field of sex and gender. Students should check current sociology department notices of course offerings for specific topics.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 3046
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sex and Gender

**SOCY 3052 (3) Medical Sociology**
Explores the role of medicine and medical systems in society. How does society shape health, how does health shape social position, and how do societies make sense of health and illness? Topics may include epidemiology, social demography of health, social stress, health behavior, experiences of illness and recovery, health care provision, and health care delivery systems.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Population and Health Issue

**SOCY 3141 (3) Social Movements and the Politics of Protest**
Considers theory and research about social movements and other forms of protest within and beyond the United States. Examines their impacts as well as factors shaping their success and failure, including leadership, ideology, recruitment, strategy, organizational dynamics, and broader social context.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 3151 (3) Self in Modern Society**
Explores how modern social institutions and culture shape our personal experiences, how personal experiences can affect the nature of those, institutions and culture, and how strategies can be developed for achieving balance between the individual and society.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 3001.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 3161 (3) Global Perspectives on Race and Ethnicity**
Explores various manifestations of race and ethnicity in different parts of the world. Includes in-depth coverage of various subtopics, such as racial and ethnic stratification, identity formation, social movements, politics, citizenship, and migration.
**Recommended:** Prerequisite SOCY 1021.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: General Sociology

**SOCY 3171 (3) Whiteness Studies**
Uses the conceptual framework of the sociology of race and ethnic relations to explore whiteness as a racial category that is centered and privileged in American society. Investigates the development of whiteness from past white supremacy, current colorblindness, to possible future multiculturalism. Analyzes the consequences of whiteness as a racial identity and a social structure.
**Requisites:** Requires a prerequisite course of SOCY 1001 (minimum grade D-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 3201 (3) Sociological Research Methods**
Introduces students to the logics and methods of sociological research. This requirement for majors teaches ways to answer sociological questions by collecting and analyzing different types of data. Students are trained in research ethics and learn how to collect their own data and conduct original sociological research. Collection and analysis of both qualitative and quantitative data are included.
**Requisites:** Requires prerequisite course of SOCY 2061 or ANTH 4000 or EBIO 4410 or ECON 3818 or GEOG 3023 or IPHY 2800 or IPHY 3280 or MATH 2510 or PSCI 2075 or PSYC 2111 or EDUC 4716 (minimum grade C-). Restricted to Sociology (SOCY) majors only.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: General Sociology

**SOCY 3301 (3) Survey Methods**
Teaches quantitative research methods and, particularly, methods of survey research. Topics include sampling, interviewing, schedule construction, data analysis, computer methods, index construction, and statistical analysis. Students participate in a survey project, design, collect data, and prepare a research paper on the basis of collected data.
**Requisites:** Requires prerequisite courses of SOCY 2061 and SOCY 3001 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: General Sociology

**SOCY 3314 (3) Violence Against Women and Girls**
Focuses on aspects of the victimization of women and girls that are "Gendered" - namely, sexual abuse and intimate partner abuse. Also explores the importance of race, class, and sexuality in gendered violence.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 3314 and WGST 3314
**Recommended:** Prerequisite SOCY 1016 or WGST 1016.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Deviance and Criminology

**SOCY 3401 (3) Field Methods**
Skill development prepares students to conduct qualitative sociological research. Emphasizes ethnographic techniques, including intensive interviewing, direct observation, coding, participant observation, and report writing. Students conceive and execute a field research project with data collection, analysis, and a report.
**Requisites:** Requires a prerequisite course of SOCY 3001 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: General Sociology

**SOCY 4000 (3) Gender, Genocide and Mass Trauma**
Studies the persistence of genocide and the effects of mass trauma on women and girls. Within the framework of political and social catastrophe, examines cataclysmic world events and the traumatic consequences for women of religious persecution, colonialism, slavery and the genocides of the 20th and 21st centuries.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4010
**Recommended:** Prerequisite SOCY 1016 or WGST 1016 or WGST 2000 or SOCY 3314 or WGST 3314.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Sex and Gender

**SOCY 4002 (3) Sociology of Aging**
Studies present and future roles of the aged in the family, the community, and the larger society. Considers economic, political, and health consequences of various retirement systems.
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Recommended:** Prerequisite SOCY 3001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Population and Health Issue

**SOCY 4004 (3) Advanced Topics in Criminology**
Variety of courses in criminology. See current departmental announcements for specific content.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 1001 or SOCY 1004 or SOCY 2044.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Deviance and Criminology

**SOCY 4007 (3) Global Human Ecology**
Examines global environmental issues using sociological perspectives. A variety of critical contemporary challenges are explored that link social and ecological processes. These include the social dimensions of climate change, inequitable distribution of pollution, the environmental aspects of population growth, and resource shortages. Policies and strategies for change are explored.
**Equivalent - Duplicate Degree Credit Not Granted:** SEWL 2000
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Environment and Society

**SOCY 4014 (3) Criminology**
Examines the scientific study of types of criminal behavior and explanations for criminal behavior, with special attention to social factors affecting criminal behavior.
**Requisites:** Requires a prerequisite course of SOCY 1001 or SOCY 1004 or SOCY 2044 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Deviance and Criminology

**SOCY 4016 (3) Sex, Gender and Society 2**
Studies status and power differences between the sexes at individual, group, and societal levels. Examines empirically established sex differences, and reviews biological, psychological, and sociological explanations for gender differences.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4016
**Requisites:** Requires a prerequisite course of SOCY 1016 or WGST 1016 or WGST 2000 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Sex and Gender

**SOCY 4017 (3) Animals and Society**
Examines the role of non-human animals in human society. Investigates the social construction of the human/animal boundary. Challenges ideas that animals are neither thinking nor feeling. Examines the many ways humans rely on animals. Considers the link between animal cruelty and other violence. Explores the moral status of animals.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment and Society

**SOCY 4018 (3) Sport in Society**
Investigates the world of sport via the social structures and processes that underlie this ubiquitous and much-pursued area of social life. Elucidates social dimensions of sport by highlighting and debating different theoretical and methodological dimensions of sociology of sport research. Examines demographics of sport, including gender, race, and sexual orientation, as well as inequalities within sport, along with the politics, economics, globalization, and commodification of sport.
**Recommended:** Prerequisites SOCY 1001 and SOCY 3001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**SOCY 4024 (3) Juvenile Justice and Delinquency**
Examines the history, incidence and prevalence of delinquent behavior among youth.
**Requisites:** Requires a prerequisite course of SOCY 1001 or SOCY 1004 or SOCY 2044 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Deviance and Criminology

**SOCY 4027 (3) Inequality, Democracy, and the Environment**
Focuses on the structural forces affecting environmental degradation and environmental behavior by examining the relationships between (a) inequality and democratic decision making and (b) undemocratic decision making; U.S. and corporate food and energy policy; and global environmental degradation. Focuses on the role that global inequality plays in fostering environmental degradation.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 4027
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment and Society

**SOCY 4030 (3) Sociology of Climate Change**
Examines the human drivers and causes of climate change, the health and security risks it creates and the efforts of societies to mitigate and adapt to its effects.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 4030
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment and Society

**SOCY 4031 (3) Social Psychology**
Studies individuals in social context. Reviews philosophical and sociological treatments of the relation between the individual and society. More specific topics include the socialization process,theories of human development and personality formation, language acquisition, conformity, aggression, sex differences in personality and gender identity, and the relation between attitudes and overt behavior.
**Requisites:** Requires a prerequisite course of SOCY 3001 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 4037 (3) Hazards, Disasters and Society**
Explores the societal dimensions of hazards and disasters, emphasizing disaster theory and research, and key issues in the sociological study of disasters, social vulnerability, and the impacts of disasters in the U.S. and worldwide.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 5037
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment and Society

**SOCY 4042 (3) Economic Sociology**
Defines relationship between economy and society; sociological approach to study of economic activity and organization; difference from the theoretical and methodological assumptions orienting the discipline of economics; tackles these questions in two ways: studies foundations as established in works of Smith, Marx, Weber, Polanyi, and Schumpeter, and considers current research in economic sociology, focusing on concepts of markets, networks, and embeddedness.
**Requisites:** Requires a prerequisite course of SOCY 1001 (minimum grade D-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Population and Health Issue

**SOCY 4047 (3) Topics in Environment and Society**
Variety of courses taught by visiting and regular faculty. See current departmental announcements for specific content.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment and Society

**SOCY 4052 (3) Social Inequalities in Health**
Focuses on social inequalities in health in both U.S. and international contexts. Reviews the link between health status and various types of social statuses, including but not limited to socioeconomic status, gender, race and ethnicity. Explanations for the relationships between these factors and various health outcomes are discussed. Focuses on multiple levels of analysis, from the physician-patient interactions to health care systems and social policies. Students have the opportunity to develop their own specific research interests in this field.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Population and Health Issue

**SOCY 4060 (2) Caring for Others**
Enables teachers to earn credit for the MOOC Caring for Society. This 2 credit course is an abbreviated version of the 3 credit course SOCY 4062 Suffering and Care in Society.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4062
**Grading Basis:** Letter Grade

**SOCY 4062 (3) Suffering and Care in Society**
Examines how modern societies understand and respond to the reality of human suffering, how care systems are organized, and the experiences of professional caregivers.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4060
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Population and Health Issue

**SOCY 4063 (3) Risk and Resilience in Society**
Explores the growing dangers of modern life and the ability of society and its members to recover from epidemics, terrorism, financial disasters, natural catastrophes and other harmful events. Special attention is given to the social (as opposed to the individual) sources of risk and resilience and their implications for the helping professions.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 4071 (3) Social Inequalities and Social Change**
Provides a sociological perspective on social inequalities in the United States, such as those pertaining to social class, race, ethnicity, sex, gender, sexuality, and age. Examines current data of patterns and trends of such inequalities, reviews scholarship on their roots, and critically evaluates social change efforts to redress them.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 5071
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 4081 (1-3) Sociology of Education**
Analyzes the school as a social organization. Among topics considered are power and control in the school; classroom interaction and its relation to learning and personality development in students; roles of educators; and reciprocal relations of school and community.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 4084 (3) Punishment, Law and Society**
Places the current state of punishment in the U.S. in historical and cross national context. Examines key features of penal systems and key sociological theories about the relationship between punishment and society.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 4084
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 1001 or SOCY 1004 or SOCY 2044.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Deviance and Criminology

**SOCY 4086 (3) Family and Society**
Studies the changing relationship between family and social structure. Examines variations in family organization and considers political, social, ideological, demographic, and economic determinants of family formation.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4086
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 3001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sex and Gender

**SOCY 4104 (3) The Death Penalty in America**
Examines the historical and international use of capital punishment, and then focuses on its use and status in the United States in this century, with a special look at Colorado. Critically examines the arguments for and against capital punishment. The inmates on death row and their families will be examined, as well as the needs of families of homicide victims.
**Requisites:** Requires a prerequisite course of SOCY 4014 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Deviance and Criminology

**SOCY 4117 (3) Food and Society**
Examines the food system along the lines of social justice and environmental sustainability. Investigates the institutional and cultural supports of major food system problems and contemporary efforts to address those problems, including the realms of food production, processing, distribution, marketing, policy, regulation, consumption, and activism.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Environment and Society

**SOCY 4121 (3) Sociology of Religion**
Examines complex interactions between religious and other social structures, such as the economy, government, and the family, and how globalization is affecting religious traditions across the globe. Includes discussion of how various religions are used or misused to justify terrorism and other acts of violence.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 3001.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 4131 (1-3) Advanced Topics in Sociology**
Variety of advanced specialty courses taught by visiting and regular faculty designed for upper division sociology majors. See current departmental announcement for specific content.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of SOCY 1001 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: General Sociology

**SOCY 4132 (3) Gender, Islam and Modernity**
Examines gender in contemporary Muslim societies, with emphasis on Asia and the Middle East. Explores issues such as veiling, feminism, sexuality, family, women's participation in politics and social movements.
**Requisites:** Requires prerequisite course of SOCY 1001 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**SOCY 4141 (3) The Social Psychology of Friendships**
Studies friendships between individuals and groups, applying social psychological theories of interaction and group processes. Examines the effects of hierarchies of status and power and of norms and social pressure on friendships. Attempts to answer questions like how social categories like gender, race, and class affect friendships, what are the unwritten rules of behavior among friends in different situations, and what happens when we violate them.
**Requisites:** Requires a prerequisite course of SOCY 1001 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: General Sociology

**SOCY 4160 (3) Designing Social Innovations**
One of the goals of higher education is to nurture innovative thinking and prepare professionals to solve society¿s most complex and pressing problems. Towards that end, this course reviews academic and practitioner literatures on the processes involved in designing social innovations.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 5160
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**SOCY 4161 (3) Executing Social Innovations**
Introduces students to the skills and strategies involved in developing a business plan for a social business or an organization wanting to increase its social impact.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**SOCY 4441 (3) Senior Honors Seminar 1**
Helps students design and initiate an honors thesis based on original sociological research.
**Requisites:** Requires prerequisite courses of SOCY 3001 and SOCY 3301 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sciences Honors Course Departmental Category: General Sociology

**SOCY 4451 (3) Senior Honors Seminar 2**
Helps students complete an honors thesis based on original sociological research. Emphasizes analyzing data, writing research reports, and presenting results.
**Requisites:** Requires prerequisite courses of SOCY 3001 and SOCY 3201 (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Arts Sciences Honors Course Departmental Category: General Sociology

**SOCY 4841 (1-8) Independent Study in Sociology**
Upper-division variable credit. Instructor consent required.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires a prerequisite course of SOCY 3001 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 4911 (1-3) Teaching Sociology**
Students participate in a teaching seminar under the supervision of a faculty member. Includes pedagogical strategies for implementing concrete educational goals and encouraging higher levels of creativity and analysis in a large, lower-division class. Emphasizes mentorship and personal development. Instructor consent required.
**Requisites:** Requires a prerequisite course of SOCY 1001 (minimum grade D-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 4923 (3-6) Animals and Society Certificate Internship**
Offers students applied learning opportunities to explore interests and clarify career goals associated with animal welfare. Students apply theory, acquire new skills, gain experience, and network with professionals. Internships integrate theory, knowledge, and practice through planned, supervised work experience.
**Recommended:** Prerequisite SOCY 4017 Animals and Society.
**Grading Basis:** Letter Grade

**SOCY 4931 (1-6) Internship in Sociology**
Provides an academically supervised opportunity for junior and senior sociology majors to work in public or private organizations to gain practical knowledge and experience, and allows students to make a connection between sociological theory and the "real world". Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires a prerequisite course of SOCY 3001 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Sociology (SOCY) majors only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 4932 (3) Internship in Care, Health and Resilience**
Provides an academically supervised opportunity for juniors and seniors interested in the helping professions to work in a job that provides them valuable hands-on experience, allows them to apply insights learned in their formal coursework and helps them make informed career choices upon graduation. This course cannot be applied to the SOCY major or minor requirements.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Population and Health Issue

**SOCY 4935 (3) Internship in Social Innovation**
Provides an academically supervised opportunity for juniors and seniors interested in social innovation to work in a job that provides them valuable hands-on experience, allows them to apply insights learned in their formal coursework and helps them make informed career choices upon graduation. This course cannot be applied to the SOCY major or minor requirements.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors) with a minimum GPA of 2.0.

**SOCY 5031 (3) Research Design**
Principles and practice of quantitative sociological research, including the nature of scientific explanation, the relationship between theory and research, research design, measurement issues, sampling, questionnaire construction, and statistical analyses. A key aspect of the course will be developing a quantitative research proposal that addresses a key empirical sociological question.
**Additional Information:** Departmental Category: General Sociology

**SOCY 5037 (3) Hazards, Disasters and Society**
Explores the societal dimensions of hazards and disasters, emphasizing disaster theory and research, and key issues in the sociological study of disasters, social vulnerability, and the impacts of disasters in the U.S. and worldwide.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4037
**Additional Information:** Departmental Category: Environment and Society

**SOCY 5071 (3) Social Inequalities and Social Change**
Provides a sociological perspective on social inequalities in the United States, such as those pertaining to social class, race, ethnicity, sex, gender, sexuality, and age. Examines current data of patterns and trends of such inequalities, reviews scholarship on their roots, and critically evaluates social change efforts to redress them.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4071
**Additional Information:** Departmental Category: General Sociology

**SOCY 5111 (3) Statistics 1: Introduction to Social Statistics**
Introduces statistical analysis in the social sciences. Introduces basic techniques of inferential statistics and several bivariate statistical techniques including t-test for the difference in means, chi-square independence, analysis of variance (ANOVA), correlation, and simple regression (OLS). Prepares students for the required course on multivariate regression techniques (Data 2).
**Requisites:** Restricted to Sociology (SOCY) graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 5160 (3) Designing Social Innovations**
One of the goals of higher education is to nurture innovative thinking and prepare professionals to solve society¿s most complex and pressing problems. Towards that end, this course reviews academic and practitioner literatures on the processes involved in designing social innovations.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4160
**Requisites:** Restricted to graduate students only.

**SOCY 5181 (3) Logics of Qualitative Inquiry**
A required first-year seminar that introduces the logics of qualitative inquiry in sociology. Introduces the history of qualitative epistemology. Considers the logic of common qualitative methodologies and qualitative research representations. Engages with the logics of inquiry in classic and more recent well regarded qualitative sociological works.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Sociology

**SOCY 5201 (3) Graduate Seminar in Sociological Theory**
Examines theoretical approaches to core issues and problems in sociology, including the nature of society, the relationship between society and the individual, the role of culture and social structure, the sources of social power, and the conceptual structure of sociological knowledge itself.
**Requisites:** Restricted to Sociology (SOCY) graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 5202 (3) Graduate Seminar in Contemporary Theory**
Examines selected sociological theories considered contemporary, including but not limited to cultural sociology, feminist theory, postcolonial thought, actor-network theory, microsociology, field theory, and poststructuralism. Discusses the formation of a sociological canon and the challenge of categorizing theory. Considers the process of theorizing as an acquired skill. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**SOCY 5350 (3) Comparison, Narrative, Meaning, and Method in Historical Sociology**
Examines the comparative, narrative, and interpretive methods historical sociologists use when investigating temporally unfolding social processes occurring in the recent or distant past. Through an introduction to the methodological literature and a close reading of exemplary historical research, students will learn to (a) critically evaluate historical sociological research and (b) design methodologically sophisticated historical research projects that address questions that most interest them, potentially incorporating ethnographic and/or quantitative methods into their research designs. Previously offered as a special topics course.
**Requisites:** Restricted to graduate students only.

**SOCY 5611 (3) Teaching in Sociology**
Learn how to teach sociology more effectively while developing a new content area and a clearer sense of the field. Choose a content area within sociology as the basis for planning a course and developing and practicing different teaching techniques. Department enforced prerequisite: enrollment in the Sociology graduate program.
**Additional Information:** Departmental Category: General Sociology

**SOCY 5750 (3) Climate Politics and Science-Policy**
Explores, understands and critically analyzes influences and trends in climate politics and science-policy. Course participants will gain an improved understanding of the myriad factors, pressures and processes that are involved in contemporary climate politics under-girding explicit policy proposals. Course participants will more capably identify consequential spaces of decision-making, recognize tractable places for change and fashion constructive strategies for their own research by way of best available evidence from work done in these areas. Overall, our attention to these course themes, concepts and case studies will help us to more capably understand, analyze and engage in the high-stakes 21st century arena of climate politics and science-policy. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVM 5750, GEOG 5750 and ENVS 5750
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**SOCY 5839 (3) Logics of Social Inquiry**
How do we make knowledge about the social world? This question encompasses at least two other sets of questions: epistemological questions about how we come to know things, and practical questions about how we go about answering questions once formulated. To develop a sociological imagination around these inquiries, this course exposes first-year sociology graduate students to different types of inquiries sociologists make and discusses the underlying logics of those inquiries. This course is not a survey of research methods, nor is it designed to train students in particular methods ¿ although students will learn about a range of approaches ¿ from ethnographic to survey to experimental. Instead, the course will expose students to different logics of discovery, the menu of sociological techniques, and how to assess the fit between question and method.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**SOCY 5841 (1-6) Independent Study in Sociology**
Graduate variable credit. Instructor consent required.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: General Sociology

**SOCY 5937 (1-6) Graduate Research Internship in Environmental Sociology**
Offers the opportunity for sociology graduate students specializing in environmental sociology to work with local governmental or non-profit organizations on research assignments. The research topic, academic reading list, and expectations for the final project will be developed collaboratively with a faculty sponsor and organizational representative.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Environment and Society

**SOCY 6004 (3) Topics in Criminology**
Variety of courses in criminology to be taught by visiting lecturers. See current departmental announcements for specific content.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Deviance and Criminology

**SOCY 6007 (3) Foundations of Environmental Sociology**
Provides overview of environmental sociological theory and research including topics such as: public environmental perception, concern, and knowledge; environmentalism as a social movement; environmental justice; energy, technology, and risk; human dimensions of environmental change; and natural hazards and disasters.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 6007
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Environment and Society

**SOCY 6012 (3) Population Issues, Problems, and Policies**
Presents contemporary perspectives on relations between population and society. Focuses on mortality, fertility, and migration, the major demographic areas, with reviews of specific demographic phenomena and controversies.
**Additional Information:** Departmental Category: Population and Health Issue

**SOCY 6016 (3) Topics in Sex and Gender**
Covers diverse specializations of faculty in the area of sex and gender. See current departmental announcements or online Schedule Planner for specific content.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Sex and Gender

**SOCY 6017 (3) Inequality, Democracy, and the Environment**
Focuses on the structural forces affecting environmental degradation and environmental behavior by examining the relationships between a) inequality and democratic decision making and b) undemocratic economic and political decision making, U.S. and corporate food and energy policy; and global environmental degradation. Focus will also be placed on the role that global inequality plays in fostering environmental degradation.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Environment and Society

**SOCY 6041 (3) Cultural Sociology**
Explores "the cultural turn" in sociology and related disciplines. Reviews basic themes in cultural studies: distinguishing "cultural" and "social"; narrative as catalyst between symbols and practices; cultural production processes; self as embodied; culture and power; methods and epistemological issues. Students present their own projects in class and as research papers.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 6111 (3) Stats 2: Statistic Analysis**
Introduces students to mainstream multivariate regression techniques used in the social sciences. The majority of the course focuses on the Ordinary Least Square model and on the extension of this model to nominal, ordinal and count dependent variables. Students analyze data of their choosing with statistical software packages including SPSS, SAS, and STATA. Department prerequisite: SOCY 5111 or equivalent.
**Requisites:** Restricted to Sociology (SOCY) graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 6121 (3) Qualitative Methods**
Training in the systematic observation of people in situations, finding them where they are, staying with them in a role acceptable to them that allows intimate observations of behavior. Students report their findings in ways useful to social science but not harmful to those observed.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 6821 (1-2) Graduate Sociology Forum 1**
Introduces first-year graduate students to the full range of substantive topics, research programs, and other projects in which graduate sociology faculty are engaged. Provides a forum in which issues of the discipline are presented and discussed. Features weekly presentations by graduate sociology faculty.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 6831 (1) Graduate Professional Seminar**
Offers guidance and instruction on topics related to advanced graduate study and academic life beyond graduation. Discussions will include writing journal articles; creating a vitae; writing dissertations; applying for grants and other sources of funding; the academic job search; and what to expect as a junior faculty member.
**Repeatable:** Repeatable for up to 2.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 6841 (1-6) Guided Research in Sociology**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 6851 (2) Interdisciplinary Social Science Professional Socialization**
Trains graduate students and provides professional socialization in interdisciplinary social science research. Open to all interested students, with programming provided by the Institute of Behavioral Science. Sessions include IBS-housed colloquia and workshops in professional socialization, technological tools, interdisciplinary research, ethics, grant writing, etc. Students workshop and submit a research paper.
**Equivalent - Duplicate Degree Credit Not Granted:** PSYC 6831 and PSCI 6851
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 6861 (1-2) Interdisciplinary Training in the Social Sciences Methods Course**
This is a new course number for a series of interdisciplinary graduate methods seminars created as part of the new Interdisciplinary Training in the Social Sciences program, which is co-funded by the Graduate School and the College of Arts and Sciences. These courses, which have rotating topics, train graduate students in qualitative and quantitative methods. CARTSS/IBS will arrange three one-credit advanced methods mini-courses each Spring semester. The mini-courses will be taught weekly (two hours per week) for five weeks. The courses will change each spring; topics include a wide variety of advanced statistical analysis methods, machine learning for social sciences, text analysis, experimental techniques, network analysis, survey design, interview protocols, etc. Open to all interested graduate students, with programming provided jointly by the Institute of Behavioral Science (IBS) and the Center to Advance Research and Teaching in the Social Sciences (CARTSS).
**Equivalent - Duplicate Degree Credit Not Granted:** LING 6861
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Grading Basis:** Letter Grade

**SOCY 6941 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: General Sociology

**SOCY 6951 (1-6) Master's Thesis**
**Additional Information:** Departmental Category: General Sociology

**SOCY 7002 (3) Social Disparities in Health**
Presents social disparities in health in their social context. Includes the sociology of health behavior; links between health status and social statuses including gender, race, ethnicity, and socioeconomic status; fundamental causes and other explanations for social disparities in health; environment and health; health insurance disparities; the physician-patient interaction and its consequences.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Population and Health Issue

**SOCY 7004 (3) Criminological Theory**
Examines the major criminological theories of the 18th through 21st centuries in Europe, Australia, and the U.S. Emphasizes the historical contexts and paradigms of knowledge influencing these theories.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Deviance and Criminology

**SOCY 7006 (3) Sociology of Sex and Gender**
Theoretical and empirical examination of sex stratification, sex role differentiation, and sex differences in socialization, personality, institutions, and culture.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Sex and Gender

**SOCY 7007 (3) Political Sociology**
This course is a graduate-level introduction to the field of political sociology, with a particular concentration on the Weberian, Marxist, and other critical traditions. The course deals with the relationship between state and society, the nature of power, the role of ideology, and the mechanisms of social transformation.

**SOCY 7008 (3) Race and Ethnicity**
The study of race and ethnicity is a core component of sociology. The field has two central concerns that are understanding the nature and persistence of racial/ethnic categories and documenting how these categories relate to systems of social stratification as well as political and economic dynamics. This graduate-level seminar will examine the major theoretical, substantive, and methodological issues surrounding these core concerns from a sociological perspective.

**SOCY 7012 (3) The Social Demography of Race**
Introduction to relevant, timely research within sociological and social demographic research on race and ethnicity. Specific areas will include conceptual/measurement issues; population size, growth, and migration; health and mortality; marriage, family, and fertility; socioeconomic context; and policy considerations. Course content will be structured around current empirical pieces in sociology literature with emphasis on methodological approach in analyses.
**Additional Information:** Departmental Category: Population and Health Issue

**SOCY 7014 (3) Gender, Race, Class, and Crime**
Examines crime and the criminal legal system practices through the lens of intersecting oppressions, particularly racism, sexism, heterosexism and classism.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 6014
**Additional Information:** Departmental Category: Deviance and Criminology

**SOCY 7017 (3) Population and Environment**
Reviews research on human-environment interactions, with a focus on ways in which demographic processes influence, and are influenced by, the environmental context. Specific topics include conceptual and analytical frameworks; methodologies; intervening factors shaping human dimensions of environmental change; and regionally-focused research.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Environment and Society

**SOCY 7024 (3) Punishment and Social Control**
Exploration of sociological perspectives on the criminal justice process. Considers organization of criminal law responses, including enforcing and sentencing. Race, class, gender, and age differences in treatment and sentencing are analyzed.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Deviance and Criminology

**SOCY 7026 (3) Feminist Research Methods**
Epistemological and methodological issues generated by feminist research and students' own projects.
**Additional Information:** Departmental Category: Sex and Gender

**SOCY 7034 (3) Capital Punishment in the United States**
Surveys the history and current status of capital punishment in the United States, with a critical examination of arguments both for and against the death penalty.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Deviance and Criminology

**SOCY 7036 (3) Feminist Theory**
Examines the main schools of feminist thought and their impact upon sociological theories. Also examines current feminist theoretical debates and their relevance to feminist sociology.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Sex and Gender

**SOCY 7111 (3) Data III--Advanced Data Analysis**
Denotes third graduate course in sequence of quantitative methods. Following basic inferential statistics (SOCY 5111) and multivariate regression analysis (SOCY 6111), students study advanced statistical techniques such as event history analysis, multilevel modeling, structural equation modeling, and latent class analysis.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires a prerequisite course of SOCY 6111 (minimum grade D-). Restricted to graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 7121 (3) Qualitative Analysis**
Drawing on data gathered through participation, observation and in-depth interviewing, students focus on developing theoretical analyses and exploring classical and post-modern ethnographic writing formats. Students present and revise their papers as well as review journal articles. Department enforced prerequisite: SOCY 6121.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 7131 (3) Seminar in Social Psychology**
Studies the individual in social context. Focuses on theoretical perspectives and substantive issues specific to sociological and social psychology, including socialization, the self, social roles, language, deviance, gender, collective behavior, group processes, attitudes and behavior, social norms,and conformity.
**Additional Information:** Departmental Category: General Sociology

**SOCY 7141 (3) Third-year Paper Seminar**
Guides graduate students through the creation of the required third-year paper and helps establish productive writing habits. Includes assigned readings, discussion, peer review, and specific tasks related to scholarly writing. Students will revise and defend the paper during the semester following the seminar. Department enforced prereqs., SOCY 5111 and SOCY 5201.
**Requisites:** Restricted to Sociology (SOCY) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: General Sociology

**SOCY 7171 (3) Special Topics**
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: General Sociology

**SOCY 8991 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Additional Information:** Departmental Category: General Sociology

# Spanish (SPAN)

## Courses

**SPAN 1000 (3) Cultural Difference through Hispanic Literature**
For freshmen only. Organized around the general topic of cultural differences. Focuses on a related issue such as gender or history articulated in the literature of Spain, Latin America, and the Hispanic United States. Taught in English; students read selected literary texts in English from the various traditions. Does not count towards the Spanish major.
**Requisites:** Restricted to students with 0-26 credits (Freshmen) only.
**Additional Information:** GT Pathways: GT-AH2 - Arts Hum: Lit Humanities
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 1010 (5) Beginning Spanish 1**
A beginning course that assumes no prior knowledge or experience with Spanish. A variety of language-teaching approaches are used to help students develop all four basic language skills: listening, speaking, reading and writing.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 1150
**Additional Information:** Departmental Category: Spanish

**SPAN 1020 (5) Beginning Spanish 2**
Continuation of SPAN 1010. Department enforced prerequisite: SPAN 1010 (min. grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 1150
**Additional Information:** Departmental Category: Spanish

**SPAN 1150 (5) Intensive First Year Spanish**
An intensive beginning course covering the same material as SPAN 1010 and 1020.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 1010 or SPAN 1020
**Additional Information:** Departmental Category: Spanish

**SPAN 2110 (3) Second-Year Spanish 1**
Grammar review. Emphasizes reading, writing, and speaking skills.
Department enforced prerequisite: SPAN 1020 (min. grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 2150
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Foreign Language
Departmental Category: Spanish

**SPAN 2120 (3) Second-Year Spanish 2**
Grammar review. Emphasizes reading, writing and speaking skills.
Department enforced prerequisite: SPAN 2110 (min. grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 2150
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 2130 (3) Spanish for Heritage Speakers in the United States I**
Designed to further the linguistic skills and repertoires of students who grew up hearing and/or speaking Spanish at home and/or in their communities. This course aims to support students¿ bilingual and biliteracy development, build students¿ confidence in using their language skills across personal and professional Spanish-speaking settings in the United States and beyond, and recognize the value of their linguistic and cultural backgrounds. This is the first of a two-course sequence.
**Requisites:** Requires prerequisite of SPAN 1020.
**Recommended:** Prerequisites Students must have experience in a Spanish-speaking or bilingual household, community, or environment (Spanish-speaking family members, dual immersion, extended stay in a Spanish-speaking country); and Students must score between 23-27 on the Placement Exam in Canvas.

**SPAN 2140 (3) Spanish for Heritage Speakers in the United States II**
Designed to further the linguistic skills and repertoires of students who grew up hearing and/or speaking Spanish at home and/or in their communities. This course aims to further students¿ bilingual and biliteracy skills developed in SPAN 2130 so that they may meet the demands of personal and professional Spanish-speaking settings locally and beyond, and recognize the value of their linguistic and cultural backgrounds. This is the second of a two-course sequence.
**Requisites:** Requires prerequisite of SPAN 1020.
**Recommended:** Prerequisites Students must have experience in a Spanish-speaking or bilingual household, community, or environment (Spanish-speaking family members, dual immersion, extended stay in a Spanish-speaking country); and Students must score at least a 28 on the Placement Exam in Canvas.

**SPAN 2150 (5) Intensive Second-Year Spanish**
Intensive review of grammar and other subjects covered in SPAN 2110 and SPAN 2120.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 2110 or SPAN 2120
**Requisites:** Requires prerequisite course of SPAN 1020 (minimum grade C-).
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Spanish

**SPAN 2450 (3) Catalan for Spanish Speakers**
Offers an intensive introduction to the Catalan language for those able to speak Spanish. By the end of the course students should be able to communicate well in all language-skills areas: listening comprehension, speaking, reading and writing. Students will also have gained a better understanding and appreciation of the singularity of Catalan.
**Recommended:** Prerequisite SPAN 3000 or placement or five semesters of college Spanish or department consent required.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3000 (5) Advanced Spanish Language Skills**
Moves students beyond the intermediate level toward an advanced command of Spanish with a focus on communication appropriate for academic research and professional interactions. Course activities focus on solidifying and deepening interpretive, interpersonal and presentational communication skills through close exploration of authentic texts and media and creation of both formal and informal writing and oral presentations. The course prepares students for continued study of literature, art, history, linguistics, culture, business, medical and other professional topics in Spanish. SPAN 3000 is one of the prerequisites for all upper-division Spanish courses except SPAN 3001.
**Requisites:** Requires prerequisite course of SPAN 2120 or SPAN 2150 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3001 (3) Spanish Conversation**
Emphasizes vocabulary acquisition and speaking fluency. This is an intermediate-level course intended for those who are learning Spanish as a second-language. Native speakers of Spanish who have pursued formal education in a Spanish speaking country will not be admitted to the course. Heritage speakers of Spanish (native speakers who have pursued formal education in a non-Spanish speaking setting) as well as students from bi-lingual K-12 programs must meet with the coordinator to determine appropriate class level. This is a 5th semester course offered at the same level as SPAN 3000. It is not part of a sequence and it does not serve as a prerequisite for any other course. This course does not count toward the Spanish major or minor.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 3002
**Requisites:** Requires prerequisite course of SPAN 2120 or SPAN 2150 (minimum grade C-).
**Additional Information:** Departmental Category: Spanish

**SPAN 3002 (3) Advanced Spanish Conversation**
Focuses on refining fluency in both informal and formal discourse through group discussions, class work and individual and group presentations in order to prepare students for communication in professional settings. To that end, the materials used in the course will emphasize themes and problems relevant to the contemporary Hispanic world. This course is designed for Spanish majors, minors and students seeking state certification as instructors of Spanish.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 3001
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3010 (3) Advanced Rhetoric and Composition**
Designed to refine expository and argumentative writing in Spanish, this course will center around four main areas of study: culture, linguistics, sociopolitical and economic reality, and literature and criticism. A multi-draft process-based approach will guide the writing and revision of essays. Additionally, there will be a focus on grammar and lexical issues that are the most challenging for students at the third-year level.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Upper
Departmental Category: Spanish

**SPAN 3030 (3) Professional Spanish for Business 1**
Develops advanced Spanish-language skills, trans-cultural knowledge, and regional, historical, and sociocultural understanding in order to expand the critical apparatus necessary for pursuing business-related professions in the Spanish-speaking world. Includes the study of essential business terminology and documents.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3040 (3) Professional Spanish for Business 2**
Complements SPAN 3030 with a focus on different business topics and countries. Emphasizes interpreting and elementary translation. Attention is given to the writing of resumes and application letters, as well s the entire job search process.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3050 (3) Spanish Phonology and Phonetics**
Designed to teach some of the methods, techniques, and tools of descriptive linguistics as they apply to articulatory phonetics. Students analyze important contrasts between sounds of Spanish and English bymeans of phonetic transcription.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Spanish

**SPAN 3060 (3) Spanish for Careers in Environmental Studies and Sustainable Development**
Provides advanced Spanish language competency and transcultural knowledge of issues pertaining to the environment, energy and sustainable development in the Spanish-speaking world. Students will develop a critical apparatus for analyzing, reading, listening, speaking and writing about the social, cultural and economic parameters of these countries and the U.S.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3070 (3) Spanish 21st Century Media Professions**
Develops advanced Spanish language skills, trans-cultural knowledge and regional and historical understanding necessary for using Spanish in media related professions. Examines the production, representations and cultural meaning of Hispanic and Latino media within the United States and globally, drawing on films, videos and readings in political economy, cultural studies, history and sociology. Students create five media products in Spanish.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3080 (3) Spanish Health Professions**
Develops advanced Spanish language competency and trans-cultural knowledge and skills for health related contexts both in the United States and abroad in order to develop a critical apparatus for analyzing, reading, listening, speaking and writing about health and understanding health fields in historical and sociocultural contexts of the Spanish speaking world.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3100 (3) Literary and Cultural Analysis in Spanish**
Fosters critical thinking and the ability to discuss texts from a historical, sociological, ideological and formalistic viewpoint. Analyzes literary and cultural expressions from Latin America, Spain and the US Latino traditions in different genres, ranging from fiction to poetry, and media from the written word to cinema and other visual arts.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3120 (3) Advanced Spanish Grammar**
Develops a deeper understanding of grammatical features of Spanish. Advancement of Spanish language skills and development of metalinguistic awareness is achieved through examination of grammar usage in both texts and spontaneous speech productions within communities.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3150 (3) Linguistic Analysis of Spanish**
Introduces students to fundamental areas of linguistic analysis with special attention paid to Spanish (and Portuguese). The structural systems of language will be introduced (principles of sound patterns, word formation, meaning, and sentence structure). Different types of language variation will be discussed (historical, social, regional).
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Spanish

**SPAN 3200 (3) Spanish Culture**
Examines historical bases of modern Spain's cultural and political currents. Department enforced prerequisite: SPAN 3000.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3215 (3) Urban History and Culture in the Spanish-Speaking World**
Understanding the complex history, social fabric, material life and cultural diversity of Latin American and Iberian cities is the goal of this course, which in its iterations will be devoted to analyzing and discussing different urban centers on either side of the Atlantic Ocean. Materials from a wide variety of media and genres such as literature, visual arts, historiography, and film, will be used. Taught in Spanish.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3220 (3) Latin American Culture: Spanish America and Brazil**
Examines literary, artistic, and philosophical currents in Spanish America and Portuguese America (Brazil), from pre-Columbian times to the present.
**Equivalent - Duplicate Degree Credit Not Granted:** PORT 3220
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3230 (3) Discovering Barcelona: Culture and Heritage**
Presents more than 2,000 years of Barcelona's cultural heritage in the city of Barcelona from the Romans to the present. Students read works by locals and foreign authors to understand how the city has been a hub of the European and Mediterranean cultures for centuries. A faculty sponsored Global Seminar to Barcelona, Spain, offered through the Study Abroad Program.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3240 (3) Catalan Culture 1: Nation and Art**
Introduces students to the literary, artistic and historical currents of Catalonia, an economically vibrant area of the Iberian Peninsula with 10 million people, its capital Barcelona, and a distinct culture and language. Examines national identity and major works from renowned Catalan artists, spanning architecture, painting and literature, like Dali, Gaudi, or Miro. Department enforced prerequisite: SPAN 3000.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3250 (3) Catalan Culture 2: Contemporary Trends and Barcelona**
Introduces students to the contemporary social and cultural trends of Catalonia, primarily in its capital of Barcelona. Examines current developments in fields such as theatre, art, fashion, cooking, urban design and/or architecture.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3260 (3) Late 19th and 20th Century Argentine Narrative**
Considers a series of late 19th and 20th century canonical works from several genres (poetry, short story, essay, and the novel). Students will acquire a specific knowledge of late 19th and 20th century Argentine literature, and its relationship to specific social actors and specific historical processes. A faculty-sponsored Global Seminar to Rosario, Argentina, offered through the Study Abroad Program.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3270 (3) Barcelona: Understanding Local and Immigrant Cultures**
Explores the history of Barcelona from an interdisciplinary, European perspective that emphasizes the city's cultural diversity and pluralism. A range of historical, literary, artistic, and sociological texts will be examined. Taught in Spanish. Offered through the Study Abroad Program.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Spanish

**SPAN 3280 (3) Introduction to Catalan Literature & Film**
Introduces students to the rich and diverse literary and film traditions of Catalonia, an economically vibrant area of the Iberian Peninsula with 10 million people and a distinct culture and language. Taught in Spanish.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3290 (3) Argentine Culture and History in a Latin American Context**
This course examines the historical trends in Latin America from 1880 to the present and compares and contrasts Argentina's unique cultural identity to the larger Latin American context. The course then considers how said history plays a role in the literary, artistic, philosophical and social currents (including identity issues related to race, ethnicity and gender) that shape contemporary Argentine culture.
**Requisites:** Requires prerequisite course of SPAN 3000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**SPAN 3310 (3) 20th Century Spanish Literature**
Surveys leading writers of Spain from 1898 until the present.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3340 (3) 20th Century Spanish American Literature**
Introduces contemporary Spanish American literature.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3700 (3) Selected Readings: Spanish Literature in Translation**
Introduces selected Spanish literature masterpieces. Taught in English. Does not count toward requirements for Spanish major or minor.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3800 (3) Selected Readings: Latin American Literature in Translation**
Introduces selected Latin American (Spanish and Portuguese) literature masterpieces. Taught in English. Does not count toward requirements for the Spanish major or minor.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 3900 (3) Cosmos Latinos: Hispanic Science Fiction and New Worlds**
Examines how Hispanic science fiction (from both Spain and Latin America) in literature and film portrays and addresses topics such as technological development, the exploration (and exploitation) of space, life in on other planets, alternative paradigms of modernity, and the cultural and social landscape of technologically saturated societies. Course taught in English. Does not count towards the requirements for the Spanish major or minor.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**SPAN 4060 (3) Problems of Translation for Professions in Spanish 1**
Develops skills in English-Spanish and Spanish-English translation and interpretation.
**Requisites:** Requires a prerequisite course of SPAN 3000 and SPAN 3010 or SPAN 3030 or SPAN 3040 or SPAN 3060 or SPAN 3070 or SPAN 3080 or SPAN 3120 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4070 (3) Problems of Translation for Professions in Spanish 2**
Presents documents from different professional areas (business, health, media and environmental studies and sustainable development) which are studied, prepared, translated and discussed in context in order to enable students to perform successfully in real translation situations.
**Requisites:** Requires a prerequisite course of SPAN 3000 and SPAN 3010 or SPAN 3030 or SPAN 3040 or SPAN 3060 or SPAN 3070 or SPAN 3080 or SPAN 3120 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4110 (3) Hispanic Women Writers**
Discusses the image of women in Spanish literature through the centuries using works by representative female writers.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4120 (3) Literature and Cinema in Spain and Latin America**
Studies film and fiction in different periods and about main topics of the Hispanic world. It will provide a historical and cultural overview, introduce students to film theory, narrative theory and the vocabulary associated with both, and integrate critical texts about all the material studied. Topics may vary each semester. This course will be taught entirely in Spanish.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4130 (3) The Power of Storytelling: Oral, Textual and Digital Narratives**
Examines the ways in which oral, textual and digital narratives have shaped, and continue to shape, our lives and the different communities we inhabit. Students consider stories from the Hispanic tradition produced in a variety of historical settings and across different media.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4150 (3) Major Works and Trends in Literature and Culture in Spain Up to 1700**
Examines major works and trends in literature, visual arts and/or other cultural expressions of Spain from its origins to the end of the Baroque period,
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4160 (3) Major Works and Trends in Literature and Culture in Spain: 1700-Present**
Examines major works and trends in literature, visual arts and/or other cultural expressions of Spain from 1700 to the present day.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4170 (3) Major Works/Trends in Literature and Culture in Latin America Up to the 19th Century**
Examines major works and trends in literature, visual arts and/or other cultural expressions of Latin America from the colonial period to the end of the 19th century.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4180 (3) Major Works and Trends in Literature and Culture in Latin America: 1900-Present**
Examines major works of literature, visual arts and/or other cultural expressions of Latin America from the beginning of the 20th century to the present day.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4215 (3) Spanish in the United States**
Describes the linguistic characteristics of U.S. Spanish, Spanish-English bilingualism and direct contact, including the study of borrowing, code switching, phonological and grammatical convergence, leveling, accommodation and attrition, among other linguistic phenomena. Discusses the relationships between language and identity, as well as the role of Spanish in U.S. education, media and social institutions.
**Requisites:** Requires a prerequisite course of SPAN 3000 or SPAN 3010 or SPAN 3050 or SPAN 3120 or SPAN 3150 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4220 (3) Special Topics in Spanish and/or Spanish American Literature**
Examines intensively particular topics or issues concerning Spanish and/or Spanish American literature selected by the instructor.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4230 (3) Special Topics in Luso-Brazilian and/or African Literature**
Designed to examine intensively particular topics or issues concerning the literatures of Portugal, Brazil and/or the African countries of Portuguese colonization. Taught in Spanish.
**Equivalent - Duplicate Degree Credit Not Granted:** PORT 4230
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of PORT 3230 and SPAN 3100 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4430 (3) Special Topics in Hispanic Linguistics**
Examines intensively particular topics or issues concerning Hispanic linguistics selected by the instructor.
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Requires a prerequisite course of SPAN 3000 or SPAN 3010 or SPAN 3050 or SPAN 3120 or SPAN 3150 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Spanish

**SPAN 4450 (3) Introduction to Hispanic Linguistics**
Introduces students to the main areas of inquiry within the field of Hispanic linguistics. Topics to be covered include speech and language, phonetics and phonology, morphology and syntax, semantics, linguistic change and variation and Spanish spoken in the United States.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5450
**Requisites:** Requires a prerequisite course of SPAN 3000 or SPAN 3010 or SPAN 3050 or SPAN 3120 or SPAN 3150 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Spanish

**SPAN 4620 (3) Cervantes**
Works of Cervantes.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4650 (3) Methods of Teaching Spanish**
Familiarizes students with second-language acquisition theories and current methodology and techniques in foreign-language teaching. The opportunities to observe Spanish classes, teach mini-lessons and perform volunteer work 2 hours a week in a local school or language program provide students with real-world teaching experience.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5650
**Requisites:** Requires a prerequisite course of SPAN 3000 and SPAN 3010 and SPAN 3002 or SPAN 3030 or SPAN 3040 or SPAN 3050 or SPAN 3150 or SPAN 3200 or SPAN 3220 or SPAN 3240 or SPAN 3250 or SPAN 3280 or SPAN 3310 or SPAN 3340 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Spanish

**SPAN 4660 (6) High School Spanish Teaching**
Part of supervised secondary school teaching required for state certification to teach Spanish. These hours do not count toward student hours in the major nor in the total departmental hours allowed.
**Requisites:** Requires prerequisite course of SPAN 4650 or SPAN 5650 (minimum grade D-).
**Additional Information:** Departmental Category: Spanish

**SPAN 4840 (1-3) Independent Study**
Departmental approval required.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Spanish

**SPAN 4930 (1-4) Languages Internship for Professions**
Participants interested in public service or management-oriented careers in government or business are able to work as interns in public sector agencies or in private industry, on campus, or abroad.
**Requisites:** Requires prerequisite course of SPAN 3100 (minimum grade C-).
**Recommended:** Prerequisites SPAN 3200 and an additional course above SPAN 3000.
**Additional Information:** Departmental Category: Spanish

**SPAN 4980 (1) Methods Language Learn/Pedagogy**
Required, intensive mini-course for Teaching Assistants in Spanish and Portuguese. Provides teachers with the opportunity to learn about language-learning theory and pedagogy.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 4990 (3) Spanish Honors Thesis**
Recommended restriction: 18 hours of upper-division Spanish, 3.00 GPA overall, and 3.50 GPA in Spanish.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite 18 hours of upper-division Spanish, 3.00 GPA overall, and 3.50 GPA in Spanish.
**Additional Information:** Arts Sciences Honors Course
Departmental Category: Spanish

**SPAN 5120 (3) Seminar: Spanish Literature and/or Spanish American Literature**
Selected topics in Spanish and/or Spanish American literature.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7120
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5130 (3) Seminar: Critical Approaches to Iberian & Latin American Literatures and Cultures**
An introductory study of theoretical approaches and critical analyses related to Iberian and Latin American literatures and cultures, with an emphasis on contemporary trends.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7130
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5140 (3) Seminar: Spanish Literature, Medieval Period**
Studies medieval works, authors and themes, with consideration of principal influences from other literatures. Reading in Old Spanish.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7140
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Spanish

**SPAN 5200 (3) Seminar: Spanish Literature, Renaissance and Baroque**
Treats various topics, as needs and resources dictate. Special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include Renaissance poetry in Spain, Cervantes, Don Quixote and Novelas ejemplares, picaresque novel and the Spanish comedia of the 17th century.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7200
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5210 (3) Seminar: Spanish Literature, 18th and/or 19th Centuries**
Treats various topics as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include romantic prose, poetry and theatre, realism and naturalism (prose narrative), 19th century poetry and 19th century theatre.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7210
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5220 (3) Seminar: Spanish Literature, 20th and/or 21st Centuries**
Treats various topics, as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include the generation of 1898, poetry of the 20th century, theatre of the 20th century, pre-Civil War novel, and post-Civil War novel.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7220
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5300 (3) Seminar: Spanish American Literature, Colonial Period and/or 19th Century**
Treats various topics, as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include pre-Columbian literature, colonial prose and narrative, colonial poetry, romantic novel, the realist and naturalist novel and short story, 19th-century poetry, and gaucho literature.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7300
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5320 (3) Seminar: Spanish American Literature, 20th and/or 21st Centuries**
Treats various topics, as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include modernism, theatre, the essay, the regional novel, the novel of the Mexican Revolution, the modern novel, contemporary theatre, and contemporary poetry.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7320
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5400 (3) Seminar: Spanish Phonology**
Topics within Spanish phonology are treated as needs and resources dictate. Gives special attention to different schools and contemporary theoretical developments. Representative topics might include generative phonology applied to Spanish, Spanish phonology for college teaching and different schools of Spanish phonology.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7400
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5410 (3) Seminar: Spanish Syntax**
Treats topics within Spanish syntax, each requiring a semester's study, as needs and resources dictate. Gives special attention to different schools and contemporary theoretical developments. Representative topics may include generative/transformational grammar applied to Spanish, fundamental problems in Spanish syntax and different schools of Spanish syntax.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7410
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5430 (3) Seminar: Hispanic Linguistics**
Studies a major topic from an area such as phonology, syntax, history of the Spanish language, Hispanic linguistics and literature, or applied Hispanic linguistics.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7430
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5440 (3) Seminar: Trends in Hispanic Linguistics**
Provides an overview of major trends and issues in Hispanic linguistics, including phonology, syntax, dialectology, sociolinguistics, discourse analysis, text linguistics, semiotics, history of the Spanish language, language acquisition and applied linguistics.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 7440
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5450 (3) Introduction to Hispanic Linguistics**
Introduces students to the main areas of inquiry within the field of Hispanic linguistics. Topics to be covered include speech and language, phonetics and phonology, morphology and syntax, semantics, linguistic change and variation and Spanish spoken in the United States.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 4450
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 5650 (3) Methods of Teaching Spanish**
Familiarizes students with current methodology and techniques in foreign language teaching. Peer-teaching coupled with opportunity to teach mini-lessons provide students with actual teaching experience in the foreign language classroom.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 4650
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 6840 (3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Spanish (SPAN) graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to Spanish (SPAN) graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 6950 (1-6) Master's Thesis**
**Requisites:** Restricted to Spanish (SPAN) graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7120 (3) Seminar: Spanish Literature and/or Spanish American Literature**
Selected topics in Spanish and/or Spanish American literature.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5120
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7130 (3) Seminar: Critical Approaches to Iberian and Latin American Literatures and Cultures**
An introductory study of theoretical approaches and critical analyses related to Iberian and Latin American literatures and cultures, with an emphasis on contemporary trends.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5130
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7140 (3) Seminar: Spanish Literature, Medieval Period**
Studies medieval works, authors and themes, with consideration of principal influences from other literatures. Reading in Old Spanish.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5140
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Spanish

**SPAN 7200 (3) Seminar: Spanish Literature, Renaissance and Baroque**
Treats various topics, as needs and resources dictate. Special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include Renaissance poetry in Spain, Cervantes, Don Quixote and Novelas ejemplares, picaresque novel and the Spanish comedia of the 17th century.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5200
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7210 (3) Seminar: Spanish Literature, 18th and/or 19th Centuries**
Treats various topics as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include romantic prose, poetry and theatre, realism and naturalism (prose narrative), 19th century poetry and 19th century theatre.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5210
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7220 (3) Seminar: Spanish Literature, 20th and/or 21st Centuries**
Treats various topics, as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include the generation of 1898, poetry of the 20th century, theatre of the 20th century, pre-Civil War novel, and post-Civil War novel.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5220
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7300 (3) Seminar: Spanish American Literature, Colonial Period and/or 19th Century**
Treats various topics, as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include pre-Columbian literature, colonial prose and narrative, colonial poetry, romantic novel, the realist and naturalist novel and short story, 19th-century poetry, and gaucho literature.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5300
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7320 (3) Seminar: Spanish American Literature, 20th and/or 21st Centuries**
Treats various topics, as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include modernism, theatre, the essay, the regional novel, the novel of the Mexican Revolution, the modern novel, contemporary theatre, and contemporary poetry.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5320
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7400 (3) Seminar: Spanish Phonology**
Topics within Spanish phonology are treated as needs and resources dictate. Gives special attention to different schools and contemporary theoretical developments. Representative topics might include generative phonology applied to Spanish, Spanish phonology for college teaching and different schools of Spanish phonology.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5400
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7410 (3) Seminar: Spanish Syntax**
Treats topics within Spanish syntax, each requiring a semester's study, as needs and resources dictate. Gives special attention to different schools and contemporary theoretical developments. Representative topics may include generative/transformational grammar applied to Spanish, fundamental problems in Spanish syntax and different schools of Spanish syntax.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5410
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7430 (3) Seminar: Hispanic Linguistics**
Studies a major topic from an area such as phonology, syntax, history of the Spanish language, Hispanic linguistics and literature, or applied Hispanic linguistics.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5430
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 7440 (3) Seminar: Trends in Hispanic Linguistics**
Provides an overview of major trends and issues in Hispanic linguistics, including phonology, syntax, dialectology, sociolinguistics, discourse analysis, text linguistics, semiotics, history of the Spanish language, language acquisition and applied linguistics.
**Equivalent - Duplicate Degree Credit Not Granted:** SPAN 5440
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 8840 (3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Spanish (SPAN) graduate students only.
**Additional Information:** Departmental Category: Spanish

**SPAN 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to Spanish (SPAN) graduate students only.
**Additional Information:** Departmental Category: Spanish

# Speech, Language and Hearing Sciences (SLHS)

## Courses

**SLHS 1010 (3) Disabilities in Contemporary American Society**
Addresses the issue that 50 percent of all individuals experience disability in their lifetime. Introduces students to the social, cultural, psychological, economic, political, legal, and health-care issues related to society and individuals with disabilities.
**Additional Information:** Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Didactic: All-Department

**SLHS 2000 (3) Introduction to Communication Disorders**
Surveys communication disorders, including hearing impairments, learning disabilities, and speech-language disorders, as well as an introduction to basic speech and hearing science.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Didactic: All-Department

**SLHS 2010 (3) Science of Human Communication**
Discusses how human communication (the process by which a thought is transmitted from the brain of a speaker to the brain of a listener) involves a complex interaction of acoustics, anatomy, physiology, neurobiology, and psychology.
**Additional Information:** Arts Sci Core Curr: Natural Science Non-Sequence
Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Didactic: All-Department

**SLHS 2305 (4) American Sign Language 1**
Introduces basic sign vocabulary, grammatical structures of ASL, and the culture of deaf people. Classes are taught using ASL without the use of spoken English.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: American Sign Language

**SLHS 2315 (4) American Sign Language 2**
Develops more complex vocabulary and grammatical structures, and an understanding of deaf culture. Classes are taught using ASL without the use of spoken English.
**Requisites:** Requires a prerequisite course of SLHS 2305 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: American Sign Language

**SLHS 2325 (4) American Sign Language 3**
Continuation of SLHS 2315. Covers ASL literature, advanced grammatical structures, idiomatic expressions, and deaf culture.
**Requisites:** Requires a prerequisite course of SLHS 2315 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: American Sign Language

**SLHS 2335 (4) American Sign Language 4**
Builds intermediate-level production and comprehension skills in American Sign Language (ASL). Students will expand ASL vocabulary and will learn complex grammatical structures through conversation, narration, and ASL literature. Instruction will include the history and culture of Deaf communities as well as culturally appropriate behaviors.
**Requisites:** Requires a prerequisite course of SLHS 2325 (minimum grade C-).

**SLHS 3000 (3) Deaf Studies**
This course explores perspectives on human rights and social justice of Deaf people as a cultural and linguistic minority. It examines the humanity, cultural identity and historical factors that have impacted Deaf people¿s lives, both positively and negatively. Topics include the history of American Sign Language, multi-identities, technology, educational institutions, medical perspectives, art, media, and literature created by and/or related to Deaf individuals.

**SLHS 3003 (3) Cognitive Science**
Introduces cognitive science, drawing from psychology, philosophy, artificial intelligence, neuroscience, and linguistics. Studies the linguistic relativity hypothesis, consciousness, categorization, linguistic rules, the mind-body problem, nature versus nurture, conceptual structure and metaphor, logic/problem solving and judgment. Emphasizes the nature, implications and limitations of the computational model of mind.
**Equivalent - Duplicate Degree Credit Not Granted:** INFO 3702 and LING 3005 and PHIL 3310 and PSYC 3005 and CSCI 3702 and CSPB 3702
**Recommended:** Prerequisites two of the following CSCI 1300 or LING 2000 or PHIL 2440 or PSYC 2145.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Natural Sciences
Arts Sci Gen Ed: Distribution-Social Sciences

**SLHS 3006 (3) Phonetics**
Focuses on production of speech sounds, transcribing speech using the International Phonetic Alphabet, analyzing the acoustic properties of speech sounds, understanding how speech sounds vary depending on the context. Provides a foundation for understanding normal and atypical speech development, atypical speech problems and patterns, regional and foreign accents, and speech recognition by computers.
**Requisites:** Requires a prerequisite course of LING 2000 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Didactic: Speech-Hearing Science

**SLHS 3014 (3) Hearing Loss Epidemiology**
Introduces students to basic epidemiological concepts related to hearing loss. Provides an overview of the hearing mechanism, assessment and identification of hearing loss, prevalence of hearing disorders, treatment and intervention. Noise pollution, aging and toxic agents are discussed. Focuses on risk factors for hearing impairment and comorbidities.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Didactic: Audiology

**SLHS 3106 (3) Hearing Science**
Focuses on the three main aspects of the hearing process: sounds in the environment (physical acoustics), sounds encoded within the auditory system (physiological acoustics) and perception of sound (psychological acoustics).
**Requisites:** Requires a prerequisite course of SLHS 2010 (minimum grade C-). Restricted to Speech, Language and Hearing Sciences (SLHS) undergraduate majors minors with a minimum of 27 credits (Sophomore), or SLHS master's students, or Audiology (AUDD) majors only
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Didactic: Speech-Hearing Science

**SLHS 3116 (3) Anatomy, Physiology, and Science of Speech**
Provides a basic understanding of the structural organization (anatomy), function (physiology), and neural controls of the structures used to produce speech, swallowing, respiration, and related behaviors in humans.
**Requisites:** Requires a prerequisite course of SLHS 2010 (minimum grade C-).
**Recommended:** Prerequisite SLHS 3106.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences
Departmental Category: Didactic: Speech-Hearing Science

**SLHS 4000 (3) Multicultural Aspects of Communication Differences and Disorders**
Examines perceptions and attitudes regarding differences in communication as a function of cultural-linguistic diversity. Discusses implications of differing verbal and nonverbal communication styles of various cultural groups in terms of professional responsibilities.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 4100 (1-3) Special Topics in Speech, Language, and Hearing Sciences**
Studies selected topics in speech, language, hearing sciences, communication disorders, and other professional issues.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 4502 (3) Language Disorders Across the Lifespan**
Provides students with an introductory understanding of the causes, characteristics, assessment and treatment of developmental and acquired language disorders in children and adults. Examines a variety of disorders including specific language impairment, learning disabilities, and language and cognitive disorders due to brain damage. Considers the challenge of identifying language disorders in children and adults from culturally and linguistically diverse backgrounds.
**Requisites:** Requires a prerequisite or corequisite course of SLHS 4560 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Didactic: Speech-Language Pathology

**SLHS 4512 (3) Speech Disorders Across the Lifespan**
Provides students with an introductory understanding of the causes, characteristics, assessment and treatment of speech disorders including those involving articulation, voice, resonance, and fluency. Examines a variety of disorders including stuttering, speech sound disorders, cleft lip and palate, vocal pathology, as well as dysarthria and apraxia due to stroke, trauma, and progressive neurological diseases.
**Requisites:** Requires a prerequisite course of SLHS 2010 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Didactic: Speech-Language Pathology

**SLHS 4560 (3) Language Development**
Covers the development of language in childhood and into adult life, emphasizing the role of environment and biological endowment in learning to communicate with words, sentences, and narratives.
**Equivalent - Duplicate Degree Credit Not Granted:** LING 4560 and PSYC 4560
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) undergraduate majors and minors, or SLHS master's students, or Audiology (AUDD) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Didactic: All-Department

**SLHS 4576 (3) Communication Neuroscience**
Provides an introduction to neuroscience with an emphasis on the systems that support human communication including speech perception and production, language, memory and cognition. Topic areas will include auditory processing, language, memory and motor systems. Development of brain systems and structures will be explored, as well as neurologically based disorders. Neuroscientific methods surveyed will include MRI, fMRI, EEG, MEG, NIRS, lesion studies and electrophysiology.
**Requisites:** Requires a prerequisite course of SLHS 2010 or NRSC 2100 (both minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**SLHS 4704 (3) Audiological Evaluation**
Studies basic principles and techniques of hearing evaluation, including pure-tone, speech, immittance, and advanced audiometry; hearing conservation in hospital, school, and industrial settings; and identification and evaluation of auditory pathologies. Required projects in screening and pure-tone audiometry.
**Requisites:** Requires a prerequisite course of SLHS 3106 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences Departmental Category: Didactic: Audiology

**SLHS 4714 (3) Audiological Rehabilitation**
Covers basic principles and techniques related to the habilitation and rehabilitation of individuals who are deaf or hard of hearing: amplification, speech, language, auditory, speech reading, and educational issues.
**Requisites:** Requires prerequisite courses of LING 3100 or SLHS 3006. Requires a prerequisite or corequisite course of SLHS 4704 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Didactic: Audiology

**SLHS 4849 (1-6) Independent Study for Undergraduates**
Instructor consent required.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Independent Study

**SLHS 4918 (2) Introduction to Clinical Practice**
Introduces students to the clinical processes and key components of assessment and interventions. Explores the applications of theoretical and scientific information to clinical settings. Students complete supervised observation of assessment and intervention with individuals with communication challenges.
**Requisites:** Requires a prerequisite course of SLHS 2000 (minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior) Speech, Language and Hearing Sciences (SLHS) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences Departmental Category: Practica

**SLHS 4938 (1-6) Internship: Speech-Language Intervention**
Provides a supervised clinical experience with children or adults who have communication challenges. Instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Practica

**SLHS 5012 (3) Evidence-based Practice and Research Methods**
Focuses on the knowledge of research methods and the application of research principles into clinical practice. In particular, covers quantitative research methods that are in speech-language pathology clinical settings. Will cover (1) clinical practice and research methods in speech, language and hearing sciences; (2) single-subject designs in clinical settings; (3) introduction to data collection, data organization and data analysis; (4) interpretation and presentation of clinical data. Formerly SLHS 5000.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5032 (3) Competencies and Strategies for the SLPA**
This course includes content regarding roles and responsibilities of the SLPA, Codes of Ethics and ethical issues, standard health precautions and infection control, health and safety policy and procedures, confidentiality (FERPA & HIPAA), culture of public schools, service delivery models, screening protocols, intervention processes and procedures, data collection and documentation, assistive technology, special populations and cultural-linguistic diversity, reflective practice and continuing professional growth. Students must be accepted in the SLPA certification program to enroll in this course.
**Requisites:** Requires a prerequisite course of SLHS 4918 (minimum grade D-).
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5112 (2) Clinical Practice I**
Provides entering graduate students a framework for beginning their clinical education and building the relationship of theory and research to current clinical practice in speech-language pathology. Key topics for exploration include contemporary professional issues, licensure, professionalism, ethics and ethical conduct, scope of practice, competency development, teaming and collaboration, accountability and multicultural issues. Formerly SLHS 5110.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5122 (1) Clinical Practice II: Assessment and Treatment Planning**
Explores critical elements associated with assessment and treatment planning in speech-language pathology. Topic areas include assessment style, interviewing, test selection and techniques of test administration. Diagnosis and treatment planning section includes differential diagnoses, ethics of diagnoses, goal writing and treatment rationale.
**Requisites:** Requires a prerequisite course of SLHS 5112 (minimum grade B). Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5132 (3) Clinical Practice II: Clinical Practice in Varied Work Settings**
Explores knowledge and skills specific to working in public school, medical, and private practice settings. Coursework will address required data collection, reporting, and accountability for specific work settings; aspects of billing, coding, and reimbursement where applicable; working effectively on interdisciplinary teams; supervision of support personnel; aspects of diversity, equity, and inclusion including cultural humility, responsiveness, and competence; overview of education and healthcare landscapes with implications for service delivery; service delivery models; and implementation of federal and state regulations and rules in different clinical settings.

**SLHS 5242 (3) Language Disorders in School Age Children**
Addresses the nature, assessment, and treatment of developmental language disorders in school age children.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite undergraduate background in SLHS.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5252 (3) Acquired Language Disorders in Adults**
Introduces the neural bases and medical etiologies of acquired language disorders in adults, explores the ways in which normal language processing may become disordered, and studies current methods of evaluation and treatment design.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Recommended:** Prerequisite undergraduate background in SLHS.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5262 (3) Dysphagia**
Provides students with background in the anatomical, physiological, and neurological bases of swallowing function and disorders across the lifespan. Etiological factors are presented, as well as various assessment tools and principles of treatment of swallowing disorders in children and adults.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5272 (1) Augmentative Alternative Communication: Theory and Use**
Provides an overview of the application of current technology to alternative/augmentative communication. Emphasizes assessment and intervention with nonverbal children and adults with need for alternative/augmentative communication systems. Presents various technological devices and systems. Addresses system selection, programming, development and integration of use in environmental contexts.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5282 (3) Acquired Cognitive Disorders**
Explores the theoretical and clinical management of acquired cognitive disorders that impact communication. Includes basic functional neuroanatomy.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5292 (3) Neurogenic Speech Disorders in Adults**
Presents the neural bases of normal and disordered speech motor control, teaches assessment and treatment of motor speech disorders in adults, and applies motor control research to clinical problems.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5302 (3) Speech Sound Disorders in Children**
Provides overview of phonological development, perception, and production. Presents factors related to articulation and focuses on critical evaluation of traditional and phonological based assessment and intervention procedures. Includes coverage of phonological awareness, metaphonological skills as related to literacy, as well as treatments and principles specific to children with motor speech disorders.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5312 (2) Aging and Communication**
Examines normal age-related changes to communication systems. Anatomic and physiological changes to the mechanisms of speech production, audition and the brain will be included, with a focus on the functional impacts of such changes for speech production and perception, cognition, language and social communication.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Grading Basis:** Letter Grade

**SLHS 5322 (2) Complex Medical Speech-Language Pathology Cases**
Expands upon the basic knowledge learned in SLHS 5252 (acquired language disorders), 5332 (voice disorders), 5282 (acquired cognitive disorders), 5262 (dysphagia), 5292 (neurogenic speech disorders) and 5362 (fluency disorders). Students will explore clinical management options for complex medical cases created by factors such as multiple and/or rare diagnoses, medical complications, socioeconomic factors and behavioral or personality issues.
**Requisites:** Requires prerequisite courses SLHS 5252 and SLHS 5332 and SLHS 5282 (all minimum grade B). Requires corequisite course SLHS 5292. Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5332 (3) Voice and Resonance Disorders**
Examines the anatomical and physiological bases for normal and disordered laryngeal and velopharyngeal function including functional, organic, and neurogenic voice disorders, and velopharyngeal insufficiency and incompetence. Emphasis on evidence-based assessment and treatment of individuals with voice and resonance disorders, including special populations.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5342 (2) Counseling in Speech-Language Pathology**
Designed to demonstrate the principles of counseling for individuals with communication disorders and their families throughout the client's lifespan. Counseling systems and techniques for specific communication disorders will be included. The course will focus on the basic theory of counseling and how counseling sills can be used in the treatment of various communication disorders. Provides an introduction to the basic counseling skills necessary to help speech-language pathologists achieve the greatest success possible when working with individuals exhibiting communication disorders.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5352 (3) Bilinguals with Communication Disorders**
Covers current empirical research regarding the linguistic and cognitive system of bilinguals with and without communication disorders. Address cross-cultural and cross-linguistic issues in selection and implementation of assessment and intervention procedures. Discuss various intervention strategies for working with bilinguals and their families.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5362 (3) Fluency Disorders**
Exploration of the nature, differential diagnosis and treatment of fluency disorders across the life-span. Students will develop the requisite skills and knowledge base to provide prevention, consultation, assessment and intervention for fluency disorders. Research bearing on affective, behavioral and cognitive components of stuttering will be reviewed, along with recent data on the neural bases of the disorder. A broad range of treatment approaches will be discussed and demonstrated.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5372 (1) Cleft and Resonance: Fundamentals for Evaluation and Treatment**
Provides an overview of fundamental awareness and knowledge of the etiology, development and treatment of children with cleft lip and palate and other disorders of resonance. It covers general parameters of care for speech language pathologists across various age groups (birth, toddler, preschool, and school age) with this population. Students will learn the methods for identifying and treating compensatory mis-articulation patterns and abnormal resonance patterns and the aspects of multidisciplinary team care for families and individuals with cleft lip and palate.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5555 (3) Advanced Topics in Social Communication: Autism Spectrum Disorders**
Students will acquire knowledge and skills in the appropriate selection, application and evaluation of interventions for children, adolescents and adults with autism spectrum disorders (ASD) and their families. Evaluation and diagnosis, including development of the IFSP and IEP, will be addressed.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5576 (3) Neuroanatomy and Neurophysiology of Communication**
Provides an introduction to the neuroanatomy and neurophysiology that collectively give rise to human communication including speech perception and production. We will consider how speech, language and hearing are represented in and controlled by the central nervous system and how neuropathologies affect processes of communication.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 5602 (3) Communication Challenges in Children: Birth to Six**
Emphasizes nature and profile of language and communication disorders affecting infants and young children. Facilitates integration of clinical and theoretical perspectives with specific approaches for family-centered assessment and intervention principles, models and techniques.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5612 (3) Language Learning Disabilities**
Expands upon the nature of Language Disorders in SLHS 5242 (School Age Language Disorders) including language-based difficulties in reading, written language and mathematical achievement, as well as deficits in executive functioning. Students will explore clinical management options through studies of intervention methods as well as through clinical case examples. Specifically, we will examine adaptive instruction and evidence-based intervention.
**Requisites:** Requires a prerequisite course of SLHS 5242 (minimum grade B).
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5622 (2) Advanced Topics in Learning Disabilities**
Expands upon the nature of Language Learning Disabilities learned in SLHS 5612 (Learning Disabilities) and SLHS 5242 (School Age Language Disorders) including language-based difficulties in reading, written language and mathematical achievement, as well as deficits in executive functioning. Students will explore clinical management options through studies of intervention methods as well as through clinical case examples. Specifically, we will examine adaptive instruction and evidence-based intervention.
**Requisites:** Requires prerequisite courses of SLHS 5242 and SLHS 5612 (all minimum grade B).
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5674 (2) Signals, Systems, and Calibration in Audiology**
Provides in-depth study of instrumentation used by audiologists for hearing aid evaluation and fitting, signal generation and modification, and signal measurement and calibration.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 5848 (1-4) Independent Study**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Practica

**SLHS 5849 (1-4) Independent Study 1, M.A.**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**SLHS 5859 (1-4) Independent Study 2, M.A.**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**SLHS 5898 (1-4) Practicum 1: Speech-Language-Learning Diagnosis, Assessment, and Intervention**
Offers on-campus and off-campus supervised clinical practice in diagnosis, assessment, and intervention of speech-language-hearing disorders in children and adults.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practica

**SLHS 5918 (1-3) Audiology Clinical Practicum: Lab**
Provides clinical training in the on site Speech, Language and Hearing Center in skills including audiology identification, evaluation and management for adults and children with hearing loss.
**Repeatable:** Repeatable for up to 16.00 total credit hours.
**Requisites:** Restricted to Speech, Language, and Hearing Sciences (SLHS) OR Audiology (AUDD) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practica

**SLHS 5928 (1-4) Audiology Clinical Practicum: Level 1**
Provides clinical training in an off-campus educational audiology facility in identification, evaluation and management for adults and children with hearing loss. Schedule is variable with a minimum requirement of 16 hours on rotation per week.
**Repeatable:** Repeatable for up to 15.00 total credit hours.
**Requisites:** Requires a prerequisite course of SLHS 5918 (minimum grade B). Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.

**SLHS 5930 (4) Speech Language Pathology Assistant Internship**
Placement for 15-18 hours per week for a total of 180 clock hours including a minimum of 50% supervised provision of 80 hours of direct intervention (in-person/virtual) with students on caseload. SLPA interns will complete tasks for mentor/supervisor including file reviews, scheduling, research of evidence-based practices, materials preparation, observation of intervention and IEP meetings, and provide other assistance as specified by mentor and within the scope of practice of an SLPA (Asha, 2013). Competency development and professional growth will be documented through midterm formal conferences and final semester ratings of specific competencies and completion of internship assignments. Students must be accepted into the SLPA certificate program to enroll in this course.
**Requisites:** Requires a prerequisite course of SLHS 4918 (minimum grade D-).
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 5938 (1-4) Audiology Clinic Practicum: Level 2 Educational**
Provides clinical training in an off campus educational audiology facility in identification, evaluation and management for adults and children with hearing loss. Schedule is variable with a minimum requirement of 16 hours on rotation per week.
**Repeatable:** Repeatable for up to 15.00 total credit hours.
**Requisites:** Requires prerequisite courses of SLHS 5918 and SLHS 6544 and SLHS 6614 (all minimum grade B). Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Practica

**SLHS 5948 (1-4) Audiology Clinic Practicum: Level 2 Medical**
Provides clinical training in an off campus medical audiology facility in identification, evaluation and management for adults and children with hearing loss. Schedule is variable with a minimum requirement of 16 hours on rotation per week.
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite courses of SLHS 5918 and SLHS 6544 and SLHS 6614 (all minimum grade B). Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 6000 (1-4) Advanced Topics in Speech, Language and Hearing Sciences**
Studies selected topics related to the theory and management of communication disorders, and theoretical/scientific information related to speech, language, and hearing.
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 6006 (3) Advanced Hearing Science**
Provides advanced study in hearing science, including physical, physiological, and psychological acoustics of both normal and impaired auditory systems. Department enforced prerequisite: graduate standing in SLHS; undergraduate course work in biology or anatomy.
**Additional Information:** Departmental Category: Didactic: Speech-Hearing Science

**SLHS 6100 (3) Research Methods Proseminar in Communication Sciences and Disorders**
This proseminar introduces foundational research principles and methods in speech, language, and hearing sciences, covering quantitative and qualitative designs, data collection, analysis, and ethics. Students will learn to critically evaluate research and apply methods to human communication science areas, including speech-language development, linguistics, communication behaviors, disabilities, multilingualism, and hearing loss. The course prepares students for advanced research and dissertation work in communication sciences.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**SLHS 6150 (3) Scientific Writing in Speech, Language, and Hearing Science**
This doctoral-level pro-seminar is designed to develop and refine scientific writing skills specific to the field of Speech, Language, and Hearing Science (SLHS). The course emphasizes the process of writing clear, concise, and well-structured scientific manuscripts, including research articles, grant proposals, and reviews. Students will practice writing and revising various sections of research papers and receive feedback through peer review and instructor guidance. Special attention is given to writing for specialized audiences in SLHS and addressing the challenges of communicating complex scientific information effectively.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade

**SLHS 6402 (3) Issues and Methods in Cognitive Science**
Interdisciplinary introduction to cognitive science, examining ideas from cognitive psychology, philosophy, education, and linguistics via computational modeling and psychological experimentation. Includes philosophy of mind; learning; categorization; vision and mental imagery; consciousness; problem solving; decision making, and game-theory; language processing; connectionism. No background in Computer Science will be presumed.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 6402 and EDUC 6504 and LING 6200 and PHIL 6310 and PSYC 6200
**Requisites:** Restricted to graduate students only.

**SLHS 6504 (1) Professional Ethics in Audiology**
Overview of ethics and ethical issues in the profession of audiology. Topics to be discussed include code of ethics by professions, approaches to analyzing ethical dilemmas, ethics in relationships with manufacturers, and ethical considerations inteaching, clinical practice and research.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite undergraduate background in SLHS.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 6514 (1) Professional Issues in Audiology**
Overview of professional issues related to the profession of audiology. Topics to be discussed include certification, licensure, professional associations, infection control, practice management, federal regulations related to audiology, professional communications and professional relationships.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Recommended:** Prerequisite undergraduate background in SLHS.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 6544 (3) Auditory Processes: Adult Assessment**
Advanced study on the current science surrounding hearing assessment of adults across the age span. Includes theoretical foundations and clinical applications.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 6554 (3) Auditory Processes: Child Assessment**
Provides advanced study in hearing assessment and management of children across the age span. Topics include epidemiological, medical, audiological, developmental, and habilitative aspects of normal and impaired hearing in children.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Recommended:** Prerequisite undergraduate background in SLHS.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 6564 (3) Auditory Processes: Neurodiagnostics**
Provides advanced study in the neural bases of hearing. Includes theoretical foundations and clinical assessment of neurological functioning in auditory systems with both normal and impaired function.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 6614 (3) Fundamentals of Amplification**
Discusses theoretical and clinical issues regarding the design, fitting, and evaluation of amplification technology for individuals with hearing loss. Includes the use of behavioral, psychological, electroacoustic, and physiological (real ear) measures in the selection and evaluation of digital and analog hearing aid technology.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 6642 (3) Development and Intervention in Childhood Hearing Loss**
Reviews development and intervention with children who are deaf and hard-of-hearing, birth through school age. Focuses on speech, auditory training, language, literacy and cognitive development. Formerly SLHS 6640.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Didactic: Speech-Language Pathology

**SLHS 6650 (3) Counseling and Multicultural Issues in SLHS**
Explores counseling theories and techniques following the diagnosis of a communication disorder across the life span. Considers issues related to grieving and mourning, parenting, disability, cultural customs, attachment, and relationships. Covers professional ethics and ethical responsibilities.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 6670 (3) Aging and Hearing Loss**
The course will address research and evidence-based practice regarding hearing loss in adults across the age span. Topics will include aural rehabilitation, co-morbidities associated with hearing loss (e.g., cognition and dementia; mental health; sensory-perceptual-motor skills; other health/medical conditions), and impacts of hearing loss on functioning, disability, health, and health services.
**Requisites:** Requires a prerequisite course of SLHS 6544 (minimum grade B). Restricted to graduate students only.
**Recommended:** Prerequisites SLHS 7418 and SLHS 7540.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 6918 (7) Practicum 2: Medical-Clinical Internship**
Gives an off-campus experience in a clinical or medical setting that provides in-depth practice in management of communication disorders of children and adults.
**Repeatable:** Repeatable for up to 14.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Practica

**SLHS 6928 (7) Practicum 2: Public School Internship**
Provides an off-campus supervised experience providing extended and in-depth practice involving school-age children in a school classroom.
**Repeatable:** Repeatable for up to 14.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Practica

**SLHS 6938 (1-10) Audiology Clinic Externship Educational**
Provides students with full time off campus experience in an educational audiology facility offering in-depth and advanced procedures for identification, evaluation and management of hearing loss in adults and children.
**Repeatable:** Repeatable for up to 21.00 total credit hours.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Practica

**SLHS 6940 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 6948 (1-10) Audiology Clinic Externship: Medical**
Provides students with full time off campus experience in a medical audiology facility offering in-depth and advanced procedures for identification, evaluation and management of hearing loss in adults and children.
**Repeatable:** Repeatable for up to 21.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 6950 (1-7) Master's Thesis**
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 7000 (3) Research Designs in Human Communication Sciences and Disorders**
Offers an advanced seminar in research designs for human behavior: efficacy, ethnographic, single-subject, quasi-experimental, and experimental designs. Designed to familiarize students with terminologies and research designs frequently used in speech-language-hearing areas.
**Recommended:** Prerequisite basic statistics.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 7200 (3) Business, Management and Ethics in Audiology**
Focuses on the business aspects of managing an audiology practice. Addresses developing a business plan, contracting for services, legal issues, financial reporting, budgeting, pricing, billing and reimbursement, regulatory issues, marketing, personnel management, risk abatement, and business ethics.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Recommended:** Prerequisite good standing in the SLHS graduate program or instructor consent will be required.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 7418 (2) Cognitive Science Research Applications Seminar 1**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7412 and EDUC 6506 and LING 7415 and PHIL 7415 and PSYC 7415
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite EDUC 6505.

**SLHS 7428 (2) Cognitive Science Research Applications Seminar 2**
Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7422 and EDUC 6516 and LING 7425 and PHIL 7425 and PSYC 7425
**Requisites:** Restricted to graduate students only.

**SLHS 7450 (3) Audiology Capstone Project**
Provides an individualized project for AUD, completed prior to initiation of final clinical year. May be in the form of research-based investigation, an evidence-based position paper, a clinical protocol based on peer-reviewed literature, a grant proposal, or another format approved by AUD committee. Project requires approved proposal by AUD committee andfocused study supervised by capstone advisor.
**Requisites:** Restricted to Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 7520 (3) Auditory Processes: Medical and Genetic Bases**
Discusses current developments in epidemiology, pathogenesis, and symptomatology of hearing loss. Investigates the genetic bases of hearing loss and deafness. Incorporates clinical decision theory in assessment and intervention. Explores cross-disciplinary topics from genetics, radiology, pharmacology, pathology, and otology.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 7530 (3) Auditory Processes: Theory and Application in the School Environment**
Focuses on application of routine audiological practices such as screening, assessment, rehabilitation, and instrumentation to children in educational settings. Emphasizes federal education regulations and pertinent case law.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 7540 (3) Auditory Processes: Physiology, Assessment, and Management of the Vestibular System**
Emphasizes current research on physiology of the vestibular system, including both structure and function. Considers the etiology of both peripheraland central pathologies of the vestibular system. Discusses ways to assess function of the vestibular system as well as theoretical and practical considerations of vestibular rehabilitation.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 7550 (3) Prevention of Hearing Loss from a Public Health Perspective**
Discusses the prevention of hearing loss from public health perspectives. Includes the effects of noise and other damaging agents on the auditory physiology. Discusses prevention, screening, identification, and management of occupational and recreational hearing loss. Considers noise measurement and monitoring. Addresses local, national and global initiatives and legislation regarding hearing health.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 7614 (3) Implantable Devices: Technology and Clinical Application**
Examines technological aspects and clinical applications of implantable prostheses such as cochlear implants, brainstem implants, hybrid cochlear implants, Baha devices and middle ear implants. Topics will include: history of implantable devices, anatomy and histopathology of the inner ear, speech processing in implants, mapping devices, candidacy criteria, behavioral and electrophysiologic techniques for assessment and outcomes in implanted children and adults.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Recommended:** Prerequisite good standing in the SLHS graduate program or instructor consent will be required.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 7640 (3) Communication Processes and Hearing Loss: Birth through Six**
Provides in-depth study of current research literature and its implications for clinical practice regardingdevelopment of communication processes in the firstsix years of life and impact of hearing loss. Investigates development of language, auditory perception, speech production, social-emotional abilities, and cognition.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 7714 (3) Advanced Topics in Amplification**
Discusses advanced issues in the design and fitting of hearing aid technology, including advanced signal processing, outcomes assessment, evidence-based practice and specialized fitting protocols for pediatric and geriatric populations. Current research is integrated with clinical cased studies to guide the development of evidence-based practice in hearing aid fittings.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Didactic: Audiology

**SLHS 7775 (1) Topics in Cognitive Science**
Reading of interdisciplinary innovative theories and methodologies of cognitive science. Students participate in the ICS Distinguished Speakers series that hosts internationally recognized cognitive scientists who share and discuss their current research. Session discussions include analysis of leading edge and controversial new approaches in cognitive science.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 7772 and EDUC 7775 and LING 7775 and PHIL 7810 and PSYC 7775
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Didactic: All-Department

**SLHS 7800 (1) Seminars in Audiology: Advanced Topics**
Graduate seminar exploring advanced topics in the field of audiology as they relate to diagnosis and (re)habilitation. Topics will include novel clinical issues and topics including tinnitus, intraoperative monitoring, pharmacology, hyperacusis/misophonia, auditory processing. Discussion of the evidence-based literature surrounding these advanced topics will be central to this seminar.
**Requisites:** Requires prerequisite course of SLHS 6544 (minimum grade B). Restricted to graduate students only.
**Grading Basis:** Letter Grade

**SLHS 7849 (1-4) Independent Study 1, PhD**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**SLHS 7859 (1-4) Independent Study 2, PhD**
**Repeatable:** Repeatable for up to 7.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Independent Study

**SLHS 7918 (3) Practicum 3: Clinical Supervision**
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Practica

**SLHS 8918 (3) Practicum 3: Classroom Instruction**
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Practica

**SLHS 8928 (3) Practicum 3: Research Coordination**
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Practica

**SLHS 8990 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Requisites:** Restricted to Speech, Language and Hearing Sciences (SLHS) or Audiology (AUDD) graduate students only.
**Additional Information:** Departmental Category: Didactic: All-Department

# Statistics (STAT)

## Courses

**STAT 2600 (4) Introduction to Data Science**
Introduces students to importing, tidying, exploring, visualizing, summarizing, and modeling data and then communicating the results of these analyses to answer relevant questions and make decisions. Students will learn how to program in R using reproducible workflows. During weekly lab sessions students will collaborate with their teammates to pose and answer questions using real-world datasets.
**Requisites:** Requires prerequisite or corequisite of APPM 1350 or APPM 1345 or MATH 1300 (minimum grade C-).
**Grading Basis:** Letter Grade

**STAT 3100 (3) Applied Probability**
Studies axioms, counting formulas, conditional probability, independence, random variables, continuous and discrete distribution, expectation, joint distributions, moment generating functions, law of large numbers and the central limit theorem.
**Equivalent - Duplicate Degree Credit Not Granted:** ECEN 3810 or MATH 4510 APPM 3570
**Requisites:** Requires a prerequisite or corequisite course of APPM 2350 or APPM 2340 or MATH 2400 (prereq minimum grade C-).

**STAT 3101 (1) Probability Workgroup**
Provides problem-solving assistance to students enrolled in STAT 3100 and APPM 3570. Student groups work in collaborative learning environment. Student participation is essential.
**Requisites:** Requires enrollment in corequisite course of STAT 3100 or APPM 3570.

**STAT 3400 (3) Applied Regression**
Introduces methods, theory, and applications of linear statistical models, covering topics such as estimation, residual diagnostics, goodness of fit, transformations, and various strategies for variable selection and model comparison. Examples will be demonstrated using statistical programming language R.
**Requisites:** Requires prerequisite STAT 2600 and STAT 3100 or MATH 4510 (all minimum grade C-). Requires corequisite APPM 3310.
**Grading Basis:** Letter Grade

**STAT 4000 (3) Statistical Methods and Application I**
Introduces exploratory data analysis, probability theory, statistical inference, and data modeling. Topics include discrete and continuous probability distributions, expectation, laws of large numbers, central limit theorem, statistical parameter estimation, hypothesis testing, and regression analysis. Considerable emphasis on applications in the R programming language.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5000
**Requisites:** Requires prerequisite APPM 1360 or MATH 2300 (both minimum grade C-).
**Grading Basis:** Letter Grade

**STAT 4010 (3) Statistical Methods and Applications II**
Expands upon statistical techniques introduced in STAT 4000. Topics include modern regression analysis, analysis of variance (ANOVA), experimental design, nonparametric methods, and an introduction to Bayesian data analysis. Considerable emphasis on application in the R programming language.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5010
**Requisites:** Requires prerequisite STAT 4000 (minimum grade C-).
**Grading Basis:** Letter Grade

**STAT 4100 (3) Markov Processes, Queues, and Monte Carlo Simulations**
Brief review of conditional probability and expectation followed by a study of Markov chains, both discrete and continuous time, including Poisson point processes. Queuing theory, terminology and single queue systems are studied with some introduction to networks of queues. Uses Monte Carlo simulation of random variables throughout the semester to gain insight into the processes under study.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4560 and APPM 5560
**Requisites:** Requires prerequisite courses of APPM 3570 or STAT 3100 or MATH 4510 (all minimum grade C-).

**STAT 4230 (3) Stochastic Analysis for Finance**
Studies mathematical theories and techniques for modeling financial markets. Specific topics include the binomial model, risk neutral pricing, stochastic calculus, connection to partial differential equations and stochastic control theory.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4530, APPM 5530 and STAT 5230
**Requisites:** Requires prerequisite courses of APPM 3310 and APPM 3570, or STAT 3100, or MATH 4510 (all minimum grade C-).

**STAT 4250 (3) Data Assimilation in High Dimensional Dynamical Systems**
Develops and analyzes approximate methods of solving the Bayesian inverse problem for high-dimensional dynamical systems. After briefly reviewing mathematical foundations in probability and statistics, the course covers the Kalman filter, particle filters, variational methods and ensemble Kalman filters. The emphasis is on mathematical formulation and analysis of methods.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5510, APPM 4510 and STAT 5250
**Requisites:** Requires prerequisite courses of APPM 3310 and (STAT 4520 or MATH 4520). All minimum grade C-.

**STAT 4350 (3) Applied Deep Learning 1**
Introduces students to state-of-the-art deep learning techniques employed in the industry. This course will focus on training neural networks and computer vision, including image classification and transformation, object detection, and facial recognition. Advanced topics will include domain adaptation and learning techniques. There will be an emphasis on reading current literature.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5350
**Requisites:** Requires prerequisite courses of APPM 3570 or STAT 3100 and STAT 3400 or STAT 4520 and APPM 4650 or APPM 4600 (all minimum grade C-).
**Recommended:** Prerequisite knowledge of Python is required, and familiarity with TensorFlow and PyTorch is a plus but is not a requirement.

**STAT 4360 (3) Applied Deep Learning 2**
Introduces students to state-of-the-art deep learning techniques employed in the industry. This course will focus on natural language processing, multimodal learning, generative and graph neural networks, speech and music recognition, and reinforcement learning. Students will learn software engineering techniques using Python. There will be an emphasis on reading current literature.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5360
**Requisites:** Requires prerequisite course of STAT 4350 (minimum grade C-).

**STAT 4400 (3) Advanced Statistical Modeling**
Introduces methods, theory and applications of modern statistical models, from linear to hierarchical linear models, to generalized hierarchical linear models, including hierarchical logistic and hierarchical count regression models. Topics such as estimation, residual diagnostics, goodness of fit, transformations, and various strategies for variable selection and model comparison will be discussed in depth. Examples will be demonstrated using statistical programming language R.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5400
**Requisites:** Requires prerequisite STAT 3400 and (STAT 4520 or STAT 5010) (all minimum grade C-).
**Grading Basis:** Letter Grade

**STAT 4430 (3) Spatial Statistics**
Introduces the theory of spatial statistics with applications. Topics include basic theory for continuous stochastic processes, spatial prediction and kriging, simulation, geostatistical methods, likelihood and Bayesian approaches, spectral methods and an overview of modern topics such as nonstationary models, hierarchical modeling, multivariate processes, methods for large datasets and connections to splines.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5430
**Requisites:** Requires prerequisite courses of STAT 3400 AND APPM 3310 (all minimum grade C-).
**Recommended:** Prerequisites STAT 4520 OR STAT 5520 OR MATH 4520 OR MATH 5520.
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**STAT 4520 (3) Introduction to Mathematical Statistics**
Examines point and confidence interval estimation. Principles of maximum likelihood, sufficiency, and completeness: tests of simple and composite hypotheses, linear models, and multiple regression analysis if time permits. Analyzes various distribution-free methods.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5520 and MATH 4520 and MATH 5520
**Requisites:** Requires prerequisites APPM 3570 or STAT 3100 or MATH 4510 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**STAT 4540 (3) Introduction to Time Series**
Studies basic properties, trend-based models, seasonal models modeling and forecasting with ARIMA models, spectral analysis and frequency filtration.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5540 and MATH 4540 and MATH 5540
**Requisites:** Requires prerequisite course of APPM 4520 or STAT 4520 or MATH 4520 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**STAT 4610 (3) Statistical Learning**
Consists of applications and methods of statistical learning. Reviews multiple linear regression and then covers classification, regularization, splines, tree-based methods, support vector machines, unsupervised learning and Gaussian process regression.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5610
**Requisites:** Requires prerequisite course of STAT 3400 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**STAT 4630 (3) Computational Bayesian Statistics**
Introduces Bayesian statistics, normal and non-normal approximation to likelihood and posteriors, the EM algorithm, data augmentation, and Markov Chain Monte Carlo (MCMC) methods. Additionally, introduces more advanced MCMC algorithms and requires significant statistical computing. Examples from a variety of areas, including biostatistics, environmental sciences, and engineering, will be given throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5630
**Requisites:** Requires prerequisite courses of (APPM 4560 or STAT 4100) and STAT 3400 and (STAT 4520 or MATH 4520) (minimum grade C-).
**Recommended:** Prerequisite prior programming experience.

**STAT 4640 (3) Capstone in Statistics and Data Science**
Course provides senior-level and graduate students the opportunity to apply the knowledge, skills, and abilities developed throughout the Statistics and Data Science major. Working in teams, students undertake a data-driven problem presented by domain experts from government, industry, or academia. The course provides valuable real-world experience for students intending to pursue graduate education or technical careers. Topics include team building, problem solving, research methods, project management, data ethics, and clear communication (oral, written, and visual).
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5640
**Requisites:** Requires prerequisite course of STAT 4400 or STAT 4610 (minimum grade C-)
**Grading Basis:** Letter Grade

**STAT 4680 (3) Statistics and Data Science Collaboration**
Educates and trains students to become effective interdisciplinary collaborators by developing the communication and collaboration skills necessary to apply technical statistics and data science skills to help domain experts answer research or policy questions. Topics include structuring effective meetings and projects; communicating statistics to non-statisticians; using peer feedback, self-reflection and video analysis to improve collaboration skills; creating reproducible statistical workflows; working ethically.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5680
**Requisites:** Requires a prerequisite course of STAT 4400 or STAT 4010 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**STAT 4690 (2) Advanced Statistical Collaboration**
Educates and trains students to become advanced interdisciplinary collaborators by developing and refining the communication, collaboration and technical statistics and data science skills necessary to collaborate with domain experts to answer research questions. Students work on multiple projects. Discussions center on technical skills necessary to solve research problems and video analysis to improve communication and collaboration skills.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5690
**Requisites:** Requires prerequisite course of STAT 4680 or STAT 5680 (minimum grade C-).
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Natural Sciences

**STAT 4700 (3) Philosophical and Ethical Issues in Statistics**
Introduces students to philosophical issues that arise in statistical theory and practice. Topics include interpretations of probability, philosophical paradigms in statistics, inductive inference, causality, reproducible, and ethical issues arising in statistics and data analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5700
**Requisites:** Requires prerequisites STAT 4520 or STAT 3400 or STAT 4000 (all minimum grade C-).
**Grading Basis:** Letter Grade

**STAT 4720 (1-3) Open Topics in Statistics and Data Science**
Provides a vehicle for the development and presentation of new topics that may be incorporated into the core courses in statistics and data science. Department enforced prerequisite: variable, depending on the topic, see instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5720
**Repeatable:** Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.

**STAT 4840 (1-3) Reading and Research in Statistics**
Introduces undergraduate students to research in statistics and data science. Department enforced prerequisite: variable depending on the topic.
**Repeatable:** Repeatable for up to 9.00 total credit hours.

**STAT 5000 (3) Statistical Methods and Application I**
Introduces exploratory data analysis, probability theory, statistical inference, and data modeling. Topics include discrete and continuous probability distributions, expectation, laws of large numbers, central limit theorem, statistical parameter estimation, hypothesis testing, and regression analysis. Considerable emphasis on applications in the R programming language.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4000
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites of APPM 1360 or MATH 2300 or equivalent.
**Grading Basis:** Letter Grade

**STAT 5010 (3) Statistical Methods and Applications II**
Expands upon statistical techniques introduced in STAT 4000. Topics include modern regression analysis, analysis of variance (ANOVA), experimental design, nonparametric methods, and an introduction to Bayesian data analysis. Considerable emphasis on application in the R programming language.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4010
**Requisites:** Requires prerequisite STAT 5000 (minimum grade C-)
**Grading Basis:** Letter Grade

**STAT 5100 (3) Markov Processes, Queues, and Monte Carlo Simulations**
Brief review of conditional probability and expectation followed by a study of Markov chains, both discrete and continuous time, including Poisson point processes. Queuing theory, terminology and single queue systems are studied with some introduction to networks of queues. Uses Monte Carlo simulation of random variables throughout the semester to gain insight into the processes under study.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4560, STAT 4100 and APPM 5560
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to that of APPM 3570 or STAT 3100 or MATH 4510, with a minimum grade of C-.

**STAT 5230 (3) Stochastic Analysis for Finance**
Studies mathematical theories and techniques for modeling financial markets. Specific topics include the binomial model, risk neutral pricing, stochastic calculus, connection to partial differential equations and stochastic control theory.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4530, APPM 5530 and STAT 4230
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to that of APPM 3310 and one of APPM 3570, STAT 3100 or MATH 4510; all with minimum grade of C-.

**STAT 5250 (3) Data Assimilation in High Dimensional Dynamical Systems**
Develops and analyzes approximate methods of solving the Bayesian inverse problem for high-dimensional dynamical systems. After briefly reviewing mathematical foundations in probability and statistics, the course covers the Kalman filter, particle filters, variational methods and ensemble Kalman filters. The emphasis is on mathematical formulation and analysis of methods.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 4510, STAT 4250 and APPM 5510
**Requisites:** Restricted to Graduate, Graduate Nondegree and non sponsored students only.

**STAT 5310 (3) Statistical Modeling for Data Science**
Introduces students to foundational concepts and techniques for statistical modeling in data science, including modern regression analysis, analysis of variance (ANOVA), experimental design, nonparametric methods, and generalized additive models. Considerable emphasis is placed on both theoretical results and applied data analysis.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisites coursework equivalent to (STAT 3100 or MATH 4510 or MATH 5510) and (STAT 4000 or STAT 5000 or STAT 4520 or STAT 5520), and previous programming experience in Python or R.

**STAT 5350 (3) Applied Deep Learning 1**
Introduces students to state-of-the-art deep learning techniques employed in the industry. This course will focus on training neural networks and computer vision, including image classification and transformation, object detection, and facial recognition. Advanced topics will include domain adaptation and learning techniques. There will be an emphasis on reading current literature.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4350
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisiteprobability (equivalent to APPM 3570), statistics (equivalent to STAT 3400), some familiarity with numerical analysis, solid knowledge of Python, and familiarity with TensorFlow and PyTorch is a plus but is not a requirement.

**STAT 5360 (3) Applied Deep Learning 2**
Introduces students to state-of-the-art deep learning techniques employed in the industry. This course will focus on natural language processing, multimodal learning, generative and graph neural networks, speech and music recognition, and reinforcement learning. Students will learn software engineering techniques using Python. There will be an emphasis on reading current literature.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4360
**Requisites:** Requires prerequisite course of STAT 5350 (minimum grade C-). Restricted to graduate students only

**STAT 5400 (3) Advanced Statistical Modeling**
Introduces methods, theory and applications of modern statistical models, from linear to hierarchical linear models, to generalized hierarchical linear models, including hierarchical logistic and hierarchical count regression models. Topics such as estimation, residual diagnostics, goodness of fit, transformations, and various strategies for variable selection and model comparison will be discussed in depth. Examples will be demonstrated using statistical programming language R.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4400
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to one of STAT 3400 or STAT 4010 or STAT 5010 and one of STAT 4520 or STAT 5520 or STAT 5530; all with a minimum grade of C-.
**Grading Basis:** Letter Grade

**STAT 5430 (3) Spatial Statistics**
Introduces the theory of spatial statistics with applications. Topics include basic theory for continuous stochastic processes, spatial prediction and kriging, simulation, geostatistical methods, likelihood and Bayesian approaches, spectral methods and an overview of modern topics such as nonstationary models, hierarchical modeling, multivariate processes, methods for large datasets and connections to splines.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4430
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to one of STAT 3400 or STAT 4010 or STAT 5010 and one of STAT 4520 or STAT 5520 or STAT 5530; all with a minimum grade of C-.

**STAT 5520 (3) Introduction to Mathematical Statistics**
Examines point and confidence interval estimation. Principles of maximum likelihood, sufficiency, and completeness: tests of simple and composite hypotheses, linear models, and multiple regression analysis if time permits. Analyzes various distribution-free methods. Department enforced prerequisite: one semester calculus-based probability course, such as MATH 4510 or APPM 3570.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4520 and MATH 4520 and MATH 5520
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to APPM 3570 or STAT 3100 or MATH 4510; minimum grade of C- for all.

**STAT 5530 (3) Mathematical Statistics**
Covers the theory of estimation, confidence intervals, hypothesis testing, and decision theory. In particular, it covers the material of APPM 5520 in greater depth, especially the topics of optimality and asymptotic approximation. Additional topics include M-estimation, minimax tests, the EM algorithm, and an introduction to Bayesian estimation and empirical likelihood techniques. Recommended Prerequisite is a one-semester calculus-based probability course such as MATH 4510 or APPM 3570.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 5520 or MATH 5520 or STAT 4520 or MATH 4520
**Requisites:** Restricted to graduate students only.

**STAT 5540 (3) Introduction to Time Series**
Studies basic properties, trend-based models, seasonal models modeling and forecasting with ARIMA models, spectral analysis and frequency filtration. Department enforced prerequisite: APPM 5520 or MATH 5520.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4540 and MATH 4540 and MATH 5540
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to STAT 4520 or MATH 4520 or STAT 5520 or MATH 5520; minimum grade of C- for all.

**STAT 5600 (3) Methods in Statistical Learning**
Provides an introduction to methods in the field of statistical learning. Topics include a review of multiple regression, assessing model accuracy, classification, resampling methods, model selection and regularization, nonlinear regression, tree-based methods, support vector machines and unsupervised learning. Involves hands-on data analysis using the R programming language.
**Requisites:** Requires prerequisite course of STAT 5010 (minimum grade C-). Restricted to MS-DS students.

**STAT 5610 (3) Statistical Learning**
Consists of applications and methods of statistical learning. Reviews multiple linear regression and then covers classification, regularization, splines, tree-based methods, support vector machines, unsupervised learning and Gaussian process regression.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4610
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to that of STAT 3400 or STAT 4010 or STAT 5010; minimum C- grade for all.

**STAT 5630 (3) Computational Bayesian Statistics**
Introduces Bayesian statistics, normal and non-normal approximation to likelihood and posteriors, the EM algorithm, data augmentation, and Markov Chain Monte Carlo (MCMC) methods. Additionally, introduces more advanced MCMC algorithms and requires significant statistical computing. Examples from a variety of areas, including biostatistics, environmental sciences, and engineering, will be given throughout the course.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4630
**Requisites:** Requires prerequisite courses of (STAT 5520 or MATH 5520 or STAT 5530) and (APPM 5560 or STAT 5100 or APPM 6550 or MATH 6550) (all minimum grade C-).
**Recommended:** Prerequisite prior programming and basic statistical modeling experience is required.

**STAT 5640 (3) Capstone in Statistics and Data Science**
Course provides senior-level and graduate students the opportunity to apply the knowledge, skills, and abilities developed throughout the Statistics and Data Science major. Working in teams, students undertake a data-driven problem presented by domain experts from government, industry, or academia. The course provides valuable real-world experience for students intending to pursue graduate education or technical careers. Topics include team building, problem solving, research methods, project management, data ethics, and clear communication (oral, written, and visual).
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4640
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite STAT 4400 or STAT 4610.
**Grading Basis:** Letter Grade

**STAT 5650 (3) Randomized Algorithms**
Investigates modern randomized methods that are used in scientific and numerical computing, in particular randomized matrix approximation methods. Other topics may include stochastic gradient methods and variance reduced versions, compressed sensing, and locality sensitive hashing.
**Equivalent - Duplicate Degree Credit Not Granted:** APPM 5650
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite APPM 4440 or equivalent.

**STAT 5680 (3) Statistical Collaboration**
Educates and trains students to become effective interdisciplinary collaborators by developing the communication and collaboration skills necessary to apply technical statistics and data science skills to help domain experts answer research questions. Topics include structuring effective meetings and projects; communicating statistics to non-statisticians; using peer feedback, self-reflection and video analysis to improve collaboration skills; creating reproducible statistical workflows; working ethically.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4680
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite undergraduate statistics courses equivalent to STAT 4400 (minimum grade C-) or STAT 4010 (minimum grade C-) or Instructor's approval.
**Grading Basis:** Letter Grade

**STAT 5690 (2) Advanced Statistical Collaboration**
Educates and trains students to become advanced interdisciplinary collaborators by developing and refining the communication, collaboration and technical statistics and data science skills necessary to collaborate with domain experts to answer research questions. Students work on multiple projects. Discussions center on technical skills necessary to solve research problems and video analysis to improve communication and collaboration skills.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4690
**Requisites:** Requires prerequisite course of STAT 4680 or STAT 5680 (minimum grade C-). Restricted to graduate students only.
**Grading Basis:** Letter Grade

**STAT 5700 (3) Philosophical and Ethical Issues in Statistics**
Introduces students to philosophical issues that arise in statistical theory and practice. Topics include interpretations of probability, philosophical paradigms in statistics, inductive inference, causality, reproducible, and ethical issues arising in statistics and data analysis.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4700
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite previous coursework equivalent to STAT 3400 or STAT 4000 or STAT 4520 or STAT 5000 or STAT 5520 or STAT 5530; minimum grade C- for all.
**Grading Basis:** Letter Grade

**STAT 5720 (1-3) Open Topics in Statistics and Data Science**
Provides a vehicle for the development and presentation of new topics that may be incorporated into the core courses in applied mathematics. Department enforced prerequisite: variable, depending on the topic, see instructor.
**Equivalent - Duplicate Degree Credit Not Granted:** STAT 4720
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

# Sustainability and Social Innovation Residential Academic Program (SSIR)

## Courses

**SSIR 1010 (3) Social Entrepreneurship & Sustainability**
Engages students in understanding, through critical thinking, problem solving, and collaborative projects, how different change models, including social entrepreneurship, can lead to sustainable outcomes. Based on a combination of lectures, exams, group work, exercises, readings, in-class discussion and analysis, and speakers, students develop skills to work collaboratively on a problem-oriented topic and present project to public audience at semester end.
**Requisites:** Restricted to Sustainability by Design Residential Academic Program (PSBD) or Sustainability and Social Innovation Residential Academic Program (PSEE) students only.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Social Sciences

# Swedish (SWED)

## Courses

**SWED 1010 (4) Beginning Swedish 1**
**Additional Information:** Departmental Category: Swedish

**SWED 1020 (4) Beginning Swedish 2**
Department enforced prerequisite: SWED 1010 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** SWED 1120
**Additional Information:** Departmental Category: Swedish

**SWED 1110 (4) Beginning Swedish 1 - Directed Independent Language Study**
Provides practical, communicative language skills for use in a variety of situations. Examines basic language structure and grammatical forms. Introduces students to Swedish history and contemporary culture and society.
**Additional Information:** Departmental Category: Swedish

**SWED 1120 (4) Beginning Swedish 2 - DILS**
Continuation of SWED 1110 DILS. Provides practical, communicative language skills for use in a variety of situations. Examines basic language structure and grammatical forms. Introduces students to Swedish history and contemporary culture and society. Department enforced prerequisite: SWED 1110 (minimum grade C-).
**Equivalent - Duplicate Degree Credit Not Granted:** SWED 1020
**Additional Information:** Departmental Category: Swedish

**SWED 1900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Swedish

**SWED 2010 (4) Intermediate Swedish 1 -DILS**
Continuation of SWED 1120 DILS. Provides practical, communicative language skills for use in a variety of situations. Examines basic language structure and grammatical forms. Introduces students to Swedish history and contemporary culture and society. Department enforced prerequisite: SWED 1120 (minimum grade C-).
**Additional Information:** Arts Sci Core Curr: Foreign Language
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Foreign Language
Departmental Category: Swedish

**SWED 2020 (4) Intermediate Swedish 2 - DILS**
Develops intermediate reading, writing, speaking and verbal comprehension skills. Uses the Directed Independent Language Study (DILS) model that combines in-class exercises and lectures with independent study. Reviews and continues content of SWED 2010. Directed independent language study course requires work outside of class. Department enforced prerequisite: SWED 2010 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Swedish

**SWED 2110 (4) Second-Year Swedish Reading and Conversation 1**
Provides practical, communicative language skills for use in a variety of situations. Examines basic language structure and grammatical forms. Introduces students to Swedish history and contemporary culture and society. Department enforced prerequisite: SWED 1010 or SWED 1110 (minimum grade C-).
**Additional Information:** GT Pathways: GT-AH4 - Arts Hum: Foreign Languages
Arts Sci Gen Ed: Foreign Language
Departmental Category: Swedish

**SWED 2120 (4) Second-Year Swedish Reading and Conversation 2**
Provides practical, communicative language skills for use in a variety of situations. Examines basic language structure and grammatical forms. Introduces students to Swedish history and contemporary culture and society. Department enforced prerequisite: SWED 1020 or SWED 1120 (minimum grade C-).
**Additional Information:** Departmental Category: Swedish

**SWED 3010 (3) Advanced Swedish 1-DILS**
Continuation of Intermediate Swedish 2. Provides advanced language skills for use in a variety of situations. Examines basic language structure and grammatical forms. Exposes students to historical and modern Swedish culture and society. Directed independent language study course, requires work outside of class. Department enforced prerequisite: SWED 2020 - DILS (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Swedish

**SWED 3020 (3) Advanced Swedish 2 - DILS**
Continuation of Advanced Swedish 1. Provides advanced language skills for use in a variety of situations. Examines basic language structure and grammatical forms. Exposes students to historical and modern Swedish culture and society. Directed independent language study course, requires work outside of class. Department enforced prerequisite: SWED 3010 - DILS (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Swedish

**SWED 3900 (1-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Swedish

# Technology, Cybersecurity & Policy (CYBR)

## Courses

**CYBR 4320 (3) Cybersecurity Network Analytics**
This Cybersecurity Network Analytics course takes a hands-on approach to detecting malicious activity within network traffic. The course will first introduce methodologies for analyzing cyber data. This knowledge will then be used practically, as the students will be given the chance to test out approaches on real traffic. At the conclusion, students will have both a theoretical understanding of cyber algorithms and their use in a real-world setting.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 5320
**Requisites:** Requires prerequisite course of CYBR 3300 or CSCI 3403 (minimum grade C-).
**Recommended:** Prerequisite C++ and Linux/Unix experience and knowledge of computer networking.

**CYBR 5000 (3) Seminar in Technology, Cybersecurity and Policy**
Introduces students to major topics and research at the interface of technology, cybersecurity, and policy by providing a weekly series of guest lectures with questions and discussion. These lectures will be followed by related readings, class discussions, and group work, which show the relationship of cybersecurity and new technology to policy.

**CYBR 5010 (3) Fundamentals of Data Communication**
Combining conceptual knowledge about data communications and core Internet technologies with hands-on labs that reinforce the conceptual knowledge, this course provides students with the ability to create innovative technology solutions in their discipline. Learning how the Internet works and being able to evaluate and operate an Internet network is a valuable skill; students in this course will have a competitive advantage in this foundational field.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5010
**Requisites:** Restricted to Technology, Cybersecurity and Policy MS Majors and Business Analytics MS Majors.

**CYBR 5020 (3) Fundamentals of Network Programming**
This course provides an immersion into the foundation theories of network programming and software development for emerging technologies. Students will gain direct experience with real-world programming lab experiments and demonstrations that will relate to the prolific increase of cross-discipline programming.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5020
**Requisites:** Restricted to Technology, Cybersecurity and Policy MS Majors.

**CYBR 5030 (3) Fundamentals of System Administration and Virtualization**
Introduces the basic use and administration of Unix and Linux systems. Topics include booting and system management, scripting, storage and logical volume management, filesystem configuration, account management and password security, process control, software installation, event logging and system auditing. Students will also develop familiarity with virtualization platforms such as VirtualBox and VMware to implement and test their system configurations.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5030 CSCI 5113 and CYBR 5113 and CSCI 4113
**Requisites:** Restricted to Technology, Cybersecurity and Policy MS Majors.

**CYBR 5113 (3) Linux System Administration**
Introduces Linux system administration and related topics. Includes hardware and software installation, storage management, configuration of user accounts and system services, development of automation and monitoring tools, and the provisioning of common network services. This laboratory focused course will provide significant exposure to the network security concerns of Internet connected hosts. Students will build a network of Linux servers from the ground up, using provided computing resources, and must maintain and secure these servers themselves. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5113 and CSCI 4113 CYBR 5030 and CSCI 5030
**Requisites:** Restricted to Technology, Cybersecurity and Policy (CYBR) graduate students only.
**Recommended:** Prerequisite CSCI 3753 (minimum grade B).

**CYBR 5200 (3) Introduction to Wireless Systems**
Overviews the distinctive characteristics of the wireless communications medium. Topics covered include: Analog signals, Antennas and Propagation, Digital Signals, Sampling, Quadrature Signals, Digital Modulation, SNR and SINR Concepts, Channel Models, Channel Statistics, and Link Budgets. The course includes an introduction to MIMO and beam-forming as implemented in modern communication systems. Software Defined Radio (SDR) is introduced to facilitate student hands-on learning of radio operation. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5200 and CSCI 4200
**Recommended:** Prerequisites CYBR 5010 and CYBR 5012.

**CYBR 5220 (3) Wireless Local Area Networks**
Emphasis on the IEEE P802.11 family of WLAN standards. Students learn the legacy versions of the standard (802.11DS/b), the current generation of WLAN systems (802.11a/g/n/ac), and will to analyze and critique upcoming versions (802.11ax/ba), and gain insight into proposals for new research in WLAN. Exposure to the interoperability and certification process for WLAN by the Wi-Fi Alliance, study the newest Wi-Fi Certified¿ programs, and will learn how to model and analyze WLAN traffic using industry standard tools.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5220 and ECEN 5122
**Requisites:** Requires prerequisite course of CYBR 5010 or CSCI 5010 or CSCI 5273 (minimum grade B).
**Recommended:** Prerequisite CYBR 5200 or CSCI 5220.

**CYBR 5230 (3) Wireless Systems Lab**
This Wireless Solutions Architecture course is designed to examine the core concepts of wireless architecture, design and implementation. The course will focus on architecting solutions unlicensed technology, specifically enterprise Wi-Fi networks. Students will learn how to design, implement, troubleshoot and operate enterprise wireless networks.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5230
**Requisites:** Requires prerequisite course of CYBR 5200 (minimum grade B).
**Recommended:** Prerequisite CYBR 5010.

**CYBR 5240 (3) Introduction to Blockchain**
Examines an emerging technology known as blockchain. Blockchain refers to the distributed and decentralized database technology behind popular cryptocurrencies such as Bitcoin and Ethereum. However, it can be used to record and transfer any digital asset, not just currency. This course explores the fundamentals of blockchain technology and its application from three key perspectives: policy and governance, technology, and application. Students gain an understanding of key concepts and how to apply them in the industry. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5240 and CSCI 4240
**Requisites:** Restricted to graduate students only.

**CYBR 5250 (2-4) Technology Law and Policy Clinic**
Features technology law advocacy before administrative, legislative and judicial bodies in the public interest. Formerly TLEN 5250. Instructor consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 7809
**Requisites:** Restricted to CYBR/TLEN graduate students.
**Grading Basis:** Letter Grade

**CYBR 5260 (3) Seminar: Law and Economics of the Information Age**
Examines basic regulatory and legal challenges of our information economy and digital age. Emphasizes the "networked" information industries, the proper role of "unbundling" policies to advance competition and how intellectual property and antitrust rules should be developed. Formerly TLEN 5260.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 8341
**Requisites:** Restricted to CYBR/TLEN graduate students.

**CYBR 5300 (3) Cybersecurity**
Introduces core concepts in cybersecurity including confidentiality, integrity, authentication, risk management, and adversarial thinking. The concepts will be applied to both traditional information technology (IT) systems and cyber physical systems (CPS). The course provides a cyber security foundation that will allow practitioners in other fields apply to understand cyber security trade-offs and will also provide interested students with a basis further study in cyber security. At the conclusion of the course, students should have a solid foundation in cybersecurity and hands-on experience.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5403
**Requisites:** Restricted to graduate students only.

**CYBR 5303 (1) Cybersecurity Club Companion Course**
Gives students hands-on experience applying practical security skills and adversarial thinking to real-world problems. Students will work in small teams on internal challenges, lab development, open source contributions, and will represent the university in larger teams for external challenges at the national and global level, such as those hosted by Collegiate Cyber Defense Competition (CCDC), Wicked6, DOE CyberForce, etc. Students will be expected to participate in both internal and external challenges, attend meetings, and present short presentations to the group when appropriate. Previously offered as a special topics course.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5303 and CSCI 4303
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Recommended:** Prerequisites CYBR 5300 or CSCI 5403 or CSCI 3403.

**CYBR 5320 (3) Cybersecurity Network Analytics**
This Cybersecurity Network Analytics course takes a hands-on approach to detecting malicious activity within network traffic. The course will first introduce methodologies for analyzing cyber data. This knowledge will then be used practically, as the students will be given the chance to test out approaches on real traffic. At the conclusion, students will have both a theoretical understanding of cyber algorithms and their use in a real-world setting.
**Equivalent - Duplicate Degree Credit Not Granted:** CYBR 4320
**Requisites:** Requires prerequisite courses CYBR 5300 or CSCI 3403 or CSCI 5403 or MSBX 5480 (minimum grade B).
**Recommended:** Requisite C++ and Linux/Unix experience and knowledge of computer networking.

**CYBR 5330 (3) Digital Forensics**
Learn how to identify, collect, examine, analyze, and present digital evidence and the legal challenges associated with conducting digital forensics investigations. Explore various file system types and structures. Learn how to recovery and extract potential evidence from deleted files and directories. Learn how to capture and profile data residing in live memory. Analyze running processes and recover memory artifacts. Learn about various methods data can be hidden on a computing devices, storage media, and within covert communications channels.
**Recommended:** Prerequisites CYBR 5300 or CSCI 3403 or CSCI 5403.

**CYBR 5340 (3) VOIP Network Design**
Focuses on VoIP network design and optimization. The emphasis is on the convergence of VoIP, PSTN and cell phone networks and signaling. Topics include voice processing as well as IP and SS7 signaling. In addition there will be a review of ISDN, DSL, Sonet, ATM, SIP and MPLS. There will be a case problem for sizing a VoIP network using silence suppression. Formerly TLEN 5340.
**Requisites:** Requires corequisite of CYBR 5001. Restricted to CYBR or BUSN graduate students.

**CYBR 5350 (3) Security Auditing and Penetration Testing**
This course is an introduction to the principles and techniques associated with security auditing and penetration testing. Topics covered include; planning, reconnaissance, scanning, enumeration, exploitation, post-exploitation, and reporting. Students discover how system vulnerabilities can be exploited. Students will develop an understanding of current cybersecurity issues and how user, administrator, and programmer errors can result in security breaches.
**Recommended:** Prerequisites CYBR 5300 or CSCI 3403 or CSCI 5403.

**CYBR 5400 (3) Principles of Internet Policy**
Engages in the critical strategic analysis and debate of controversial public policy issues raised by the Internet. Learn how to develop well-reasoned positions on the regulations applied to new Internet-based technologies and business models based on interdisciplinary frameworks that characterize the significant intersection of technology, economics, business, and public policy. Policy topics covered include Broadband as a Universal Service, Net Neutrality, Spectrum Management, Online Privacy, and Cybersecurity.

**CYBR 5410 (3) Telecommunications Law and Policy**
Examines laws governing telecommunications industries, including federal and state regulation and international aspects. Includes telephone, cable, satellite, cellular and other wireless systems and the Internet. Formerly TLEN 5240.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 7241
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to CYBR or BUSN graduate Students

**CYBR 5420 (3) Spectrum Management and Policy**
Studies how spectrum policy is developed and implemented. A general framework is developed for understanding telecommunications law and regulatory objectives. Specifically analyzes international and domestic dimensions of spectrum policy. Considers how economics, administrative processes and innovative technologies affects management of the spectrum. Formerly TLEN 5230.
**Requisites:** Restricted to graduate students only.

**CYBR 5505 (3) Leading Oneself**
Provides working engineers a background in leadership concepts and methods and enables students to develop practical leadership skills through numerous in-class exercises and experimentation based assignments. Topics include authentic leadership, motivating self and others, cultivating emotional intelligence, personal mastery, creating accountability, conflict resolution, leading change and organizational culture. Required for all Engineering Management degree students.
**Requisites:** Restricted to Leeds School of Business or College of Engineering graduate students only.

**CYBR 5510 (3) Technology: Commercial Strategy and Operations**
Working in groups of 2 to 4, students will leverage their technical skills to learn and apply commercial/business skills via the consideration of a hypothetical competitive technically-oriented business, including its strategy, long-term financial outlook, and operating platform. Upon successful course completion, students should expect to feel confident when speaking with (and ultimately moving into roles of) management and leadership, regarding all critical aspects of business, especially the creation of equity value through scale at pace, aligning interests of all key stakeholders. Open to undergraduates with instructor consent.
**Requisites:** Restricted to graduate students only.

**CYBR 5550 (3) Designing for Defense 1**
Designing for Defense/Hacking for Defense is a national service program running at leading research universities across the country. Interdisciplinary teams¿chosen by competitive selection¿work on real-world national security challenges, in close contact with national security agencies. Teams employ the Lean Launchpad entrepreneurship methodology to develop engineering and business concepts to solve real-world challenges for special operations forces, the intelligence community, and other government agencies. Winning teams are eligible for real-world capital investment. The first semester of a two-course sequence. Students take this course, ASEN/CSCI/CYBR 5550, and ASEN/CSCI/CYBR 5580 contiguously as the sequence spans the academic year.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 4550 and ASEN 5550 and CSCI 5550
**Grading Basis:** Letter Grade

**CYBR 5580 (3) Designing for Defense 2**
This course allows teams to continue their D4D journey from semester 1 guiding students in launching a business entity that will deploy agile development tools to refine and enhance their first semester MVP, seek funding for that development work, deliver a functioning solution to their sponsor, and extract real value for the members of the business unit.
**Equivalent - Duplicate Degree Credit Not Granted:** ASEN 5580 and CSCI 5580 and CSCI 4580
**Requisites:** Requires prerequisite course of ASEN 5550 or CSCI 5550 or CYBR 5550 (minimum grade B). Restricted to graduate students only.
**Grading Basis:** Letter Grade

**CYBR 5620 (3) Advanced Wireless Lab**
Provides a comprehensive, hands-on set of laboratory exercises for the teaching and demonstration of key technical skills required to understand, build, test, and analyze both analog and digital wireless communications concepts. In conjunction with lecture-based content to provide a solid foundation in digital communication theory, SDR-based laboratory exercises enable the synthesis of several fundamental concepts utilizing the latest, modern communications systems technologies.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5620
**Requisites:** Requires prerequisite course of CSCI 5200 or CYBR 5200 (minimum grade B).
**Recommended:** Prerequisites CYBR 5630 or CSCI 5630 and CYBR 5220 or CSCI 5220.

**CYBR 5630 (3) Wireless and Cellular Systems**
Studies technologies and architectures employed in modern cellular wireless systems. Major topics include radio propagation, multiple access techniques, analog and digital cellular telephony, and personal communications systems. Presents the necessary tools to understand the wireless industry, its technical details, and its business drivers. Topics include modeling, spectrum, weather, multipath, Doppler effect, and shadowing and covers important aspects of multiple access technologies such as CDMA and OFDMA. introduces modern radio standards including LTE.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 5630
**Requisites:** Requires prerequisite course of CSCI 5200 or CYBR 5200 (minimum grade B).

**CYBR 5830 (1-6) Special Topics**
Current topics in technology, cybersecurity and policy.
**Repeatable:** Repeatable for up to 18.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**CYBR 5910 (1-6) Independent Study**
Special projects agreed upon by student and instructor. Department consent required. Formerly TLEN 5920.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to CYBR/TLEN graduate students.

**CYBR 6940 (1) Master's Candidate for Degree**
This course is for TCP Master's students who are approved candidates to receive their degree.
**Requisites:** Restricted to CYBR/TLEN graduate students.

**CYBR 6950 (1-6) Master's Thesis**
Original and independent research conducted by a graduate student under the supervision of a faculty advisor. Formerly TLEN 6950.
**Requisites:** Restricted to CYBR/TLEN graduate students.

**CYBR 8990 (1-10) Doctoral Dissertation**
Investigates specialized topic or field in the area of telecommunications. Approved and supervised by faculty members. Formerly TLEN 8990.
**Requisites:** Restricted to CYBR/TLEN PhD students.

# Telecommunications (TLEN)

## Courses

**TLEN 5000 (3) Fundamentals of CyberSecurity for Leaders and Innovators**
Designed for students without a computer science background, this course introduces core concepts in cybersecurity including, confidentiality, authentication, risk management, and adversarial thinking. The concepts will be applied to both traditional information technology (IT) systems and cyber physical systems (CPS). At the conclusion of the course, students should have a solid foundation in cycbersecurity and hands-on experience.
**Requisites:** Not open to Computer Science (CSCI) majors.
**Grading Basis:** Letter Grade

**TLEN 5106 (3) International Deployment of Broadband Networks**
Evaluates the business potential for deploying fixed or mobile broadcast networks in an international context. Guides students to develop financial statements to evaluate the investment potential of the venture. Covers: strategy, market potential, sales channels, costs, regulatory and financial issues all in an international context. Project teams mimic the matrix structure of working teams in business context and present to an investor their recommendations.
**Requisites:** Restricted to students with 87-180 credits (Senior) or graduate students in the College of Engineering or Leeds School of Business only.

**TLEN 5150 (1) Managing Effectively in a Changing Telecommunications Environment**
Provides students with an opportunity to join international managers and policy makers from around the world in an intensive seminar focused on the challenges of managing in a telecommunications environment in an era of technological change. Guest lecturers provide an effective overview of the cutting-edge issues managers face in telecom and technology companies around the world.
**Equivalent - Duplicate Degree Credit Not Granted:** ATLS 5150

**TLEN 5190 (3) Standardization and Standards Wars**
Examines current issues and strategy in the standardization of telecommunications and information technologies. Covers topics on the importance of standards, government and private sector perspectives, and impact of information age technologies on standards development. Introduces students to relevance of antitrust and intellectual property law to the topic.

**TLEN 5245 (3) Introduction to Intellectual Property Law**
Provides an overview of our nation's intellectual property laws, including patent, copyright, trademark, trade secret and also discusses other assorted matters related to intellectual property, including licensing, competition policy issues and remedies.
**Equivalent - Duplicate Degree Credit Not Granted:** LAWS 6301
**Requisites:** Restricted to CYBR/TLEN graduate students.

**TLEN 5265 (3) Copyright**
Examines state and federal laws relating to the protection of works of authorship ranging from traditional works to computer programs. Studies the 1976 Copyright Act as well as relevant earlier acts. Gives attention to state laws, such as interference with contractual relations, the right of publicity, moral right, protection of ideas and misappropriation of trade values, that supplement federal copyright.
**Requisites:** Restricted to CYBR/TLEN graduate students.

**TLEN 5300 (1-3) Telecommunications Theory and Applications**
Examines the mathematical and physical theory of telecommunications. Deals with the fundamental concepts related to a wide range of topics including physical units, numbering systems, trigonometric functions, logarithms, indices, decibels, complexnumbers, calculus, elementary probability, and power circuit analysis.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.

**TLEN 5350 (3) Commercial Spaceflight Operations and Communications**
Aimed at a high level fundamental understanding of broadcasting, communication and navigation satellite systems. Topics include orbital mechanics, orbit selection, spacecraft subsystems, spacecraft and earth station configurations, propagation issues, link budgets, modulation and multiplexing techniques, multiple access schemes (FDMA, TDMA, CDMA), error control coding, satellite network architecture, and economic, regulatory and business issues in Geo, Meo, and Leo systems.
**Requisites:** Requires corequisite of TLEN 5330. Restricted to graduate students in TLEN or BUSN.

**TLEN 5430 (3) Data Communications 2**
Provides a detailed technical study of Internet and Internet-related protocols following a top-down approach through the protocol stack. Bit-level analysis of a large number of Internet and Internet-related protocols, including the study of classic protocol suite principles. Covers real time and near real-time data streaming, IP mobility, IPV6, and an introduction to Internet security.
**Requisites:** Requires prerequisite course of TLEN 5330 or CSCI 4273 or CSCI 5273 (minimum grade D-). Restricted to TLEN or CSCI or BUSN grad students, or TLEN BS/MS students (C-AMENTLEN; C-CSCITLEN; C-CSENTLEN; C-ECENTLEN).

**TLEN 5438 (3) Internet Lab**
Have you ever wondered how the Internet actually works? This course teaches students simple, hands-on understanding of the technical components and challenges of providing Internet Services to everyday users. This is the ideal course for technical or non-technical students who have a passion for the Internet or need to have a more detailed understanding of the Internet within their career.
**Grading Basis:** Letter Grade

**TLEN 5530 (3) Applied Network Security**
Examines the critical aspects of network security. a technical discussion of threats, vulnerabilities, detection, and prevention is presented. Issues addressed are cryptography, firewalls, network protocols, intrusion detection, security architecture, security policy, forensic investigation, privacy, and the law.
**Requisites:** Restricted to CSCI juniors and seniors, or TLEN or CSEN graduate students, or TLEN BS/MS students (C-AMENTLEN; C-CSCITLEN; C-CSENTLEN; C-ECENTLEN).

**TLEN 5540 (3) Network Security Laboratory**
Applies what students have learned in computer and network security foundations in a simulated network environment. Topics to be covered include: system hardening, firewalls, intrusion detection, vulnerability assessment, and investigation.
**Requisites:** Restricted to CSCI juniors and seniors, or TLEN or CSEN graduate students, or TLEN BS/MS students (C-AMENTLEN; C-CSCITLEN; C-CSENTLEN; C-ECENTLEN).
**Recommended:** Prerequisite TLEN 5530 and operating system experience.

**TLEN 5550 (3) Computer and Network Security**
Studies methods to protect information, and the ability to process and move information, from theft, misuse, tampering, destruction and unauthorized access. Introduces foundational topics of computerand network security, including security models, cryptography and authentication protocols.
**Equivalent - Duplicate Degree Credit Not Granted:** CSCI 6268
**Requisites:** Restricted to Engineering Graduate Students and TLEN BS/MS students (C-AMENTLEN; C-CSCITLEN; C-CSENTLEN; C-ECENTLEN).
**Recommended:** Prerequisites CSCI 5273 and significant experience in coding (C or C++) and some experience in networks and familiarity with TCP/IP, UDP and ICMP.

**TLEN 5700 (2) Research Methods**
Develop basic concepts and methods for pursuing quantitative and qualitative research. Students will develop a research proposal that will be completed in TLEN 5710 or as a Master's Thesis. Writing skills test required.
**Requisites:** Restricted to CYBR or BUSN graduate Students

**TLEN 5710 (1-3) Capstone**
Complete Capstone research project initiated in TLEN 5700.
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Requires prerequisite course of TLEN 5700. Restricted to TLEN or BUSN graduate students only.

**TLEN 5841 (3) Secure Web Application Development**
Learn to develop and protect secure applications for web and mobile. Students will develop in a production cloud environment mirroring industry trends. Techniques to resist attackers and increase situational awareness will be covered. The class culminates with an end of semester project applying secure coding techniques to build a secure web application from start to finish.
**Requisites:** Restricted to CSCI juniors and seniors, or TLEN or CSEN graduate students, or TLEN BS/MS students (C-AMENTLEN; C-CSCITLEN; C-CSENTLEN; C-ECENTLEN).
**Grading Basis:** Letter Grade

**TLEN 6438 (3) Internet Lab 2**
Builds on TLEN 5438 Internet Lab, and teaches students simple, hands-on understanding of the technical components and challenges of providing Internet Services to everyday users. This is the ideal course for students with a basic foundation of technology who have a passion for the Internet or need to have a more detailed understanding of network security and wireless networks within their career.
**Requisites:** Requires prerequisite TLEN 5438 (minimum grade B-).
**Grading Basis:** Letter Grade

**TLEN 7000 (1-6) Current Topics in Telecommunications**
Studies research topics of current interest in telecommunication and networking.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Requisites:** Restricted to CYBR/TLEN graduate students.

**TLEN 7001 (3) Interdisciplinary Telecom Analysis**
Examines a set of problems, research methodologies and analytical techniques that are common to the research, problem solving and analysis of information and communications technology development and deployment issues. Looks critically at the strengths, limitations and underlying assumptions of key research and analysis approaches that relate business, economic and policy objectives to current and future telecommunications development and deployment efforts.
**Requisites:** Restricted to CYBR/TLEN graduate students.
**Grading Basis:** Letter Grade

# Theatre (THTR)

## Courses

**THTR 1003 (3) Acting 1**
Introductory course designed to explore creativity, collaboration and communication in the craft of acting. Focuses on basic terms and concepts of psychological realism fundamental to the actors' process through solo work and ensemble exercises. Open to majors and non-majors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**THTR 1009 (3) Theatre and Society**
Explores the importance of telling (and listening) to stories from the stages of the world; in theatre we learn what people value in their time and place. Investigates the range of genres of theatre in today's society and how theatrical artwork is devised and presented. Ideal for non-majors.
**Additional Information:** GT Pathways: GT-AH1 - Arts Hum: Arts Expression
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Special Courses in Theatre

**THTR 1011 (3) Global Theatre 1: Live Performance to Shakespeare**
Travels across four continents exploring live performance from the beginning of recorded history to Shakespeare through various forms of theatrical storytelling including masked dramas, shadow puppets, kabuki, passion plays and commedia.
**Additional Information:** GT Pathways: GT-AH1 - Arts Hum: Arts Expression
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: History/Dramaturgy/Directing

**THTR 1019 (3) Script Laboratory: Text Analysis and Practice for the Theatre**
Introduces fundamental methods of text analysis for performance. Equips theatre makers with common vocabulary and concepts to more effectively communicate when collaborating with other artists. Provides tools for analyzing any narrative art form.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) Theatre (THTR or TBFA) majors only (excluding minors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Special Courses in Theatre

**THTR 1050 (3) Introduction to Stagecraft and Design**
Hands on project-based learning introducing the craft, principles, and practices of stagecraft and design. Students execute varied projects in topics including scenic, lighting, sound, and costume design as well as stage management, scenic construction, painting, props, sewing, hair and wigs, dyeing, and makeup. This course is ideal for those interested in theatre, film, dance, fine art, architecture, cosplay, fashion, engineering, and game design.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**THTR 1105 (3) Stage Technologies**
Introduces technical production elements and procedures, including materials, organizations, methods and equipment to realize theatrical scenery, properties, lighting and sound.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre Design and Technology

**THTR 1115 (3) Costume Technologies**
Introduces technical production elements and procedures including materials, organizations, methods and equipment to realize theatrical costuming and make-up.
**Requisites:** Restricted to students with 0-56 credits (Freshmen or Sophomore) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre Design and Technology

**THTR 1117 (2) Musical Theatre Studio I**
Explores creativity, collaboration, and communication in the craft of acting both in musical theatre and stage acting, specifically directed to the Musical Theatre degree student. Focuses on terms and concepts of psychological realism fundamental to the actors' process through solo work and ensemble exercises. Emphasis on developing a character through analysis and scene study. Various acting modalities will be introduced.
**Equivalent - Duplicate Degree Credit Not Granted:** PMUS 1117
**Grading Basis:** Letter Grade

**THTR 1217 (2) Musical Theatre Lab 2**
Focus on building terms and concepts introduced in THTR 1117. A more thorough emphasis is placed on developing character, utilizing analysis tools, and scene study of musical theatre works. Both lecture and performance-based class. Includes advanced repertoire and further song/monologue study in terms of crafting a character and building an arc for the character in a song and/or an identified specific moment.
**Requisites:** Restricted to BFA Musical Theatre and BM Musical Theatre students only.
**Grading Basis:** Letter Grade

**THTR 2021 (3) Global Theatre 2: Contemp Relevance and Resonance Forms of Pre-Colonial Modern Theatre and Performan**
This course explores world performance and theatre before and after European imperialism and settler colonialism, until 1850. By studying examples from Africa, Greece, Asia, India, Europe, and the Americas we will better understand the roots of theatre and performance today, and gain insight into epistemologies that might spur how to imagine into being a more equitable and sustainable world.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: History/Dramaturgy/Directing

**THTR 2035 (3) Design Fundamentals**
Introduces principles and techniques relevant to the expression of dramatic mood and idea through visual elements of the theatre, giving practice in conceptdevelopment, style selection, and rendering techniques in scenery and costume design.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre Design and Technology

**THTR 2043 (3) Voice and Movement for the Stage**
Natural resources of the human voice and body are studied as artistic resources for the performing artist. Designed to examine both the process and products of vocal and physical craft work. Please consult professor if you are interested in taking this class but do not fill the prerequisites.
**Requisites:** Restricted to Theatre (THTR, TBFA) or Dance (DNCE or DBFA) majors only (excluding minors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**THTR 2050 (2) Technical Theatre for Performance**
Hands on learning in an immersive environment, students are embedded into the Theatre and Dance department workshops and crews. Students gain direct experience in scenic construction, painting, props, costumes, stage lighting, media and projections, sound, and performance design as determined by the production season. This course is ideal for students interested in theatre, film, dance, performance art, design, and technical theater.

**THTR 2059 (3) Open Topics in Theatre and Drama**
Covers topics not otherwise listed in the curriculum. Topics for each semester are specified in the online schedule planner.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Special Courses in Theatre

**THTR 2105 (3) Introduction to Performance Design**
Introduces the creative/collaborative process of design for theatre and dance, including scenery, costume, lighting, and sound. Students create design projects and evaluate them with regard to artistic and practical concerns. Much of the course work is hands-on, experiential, and team-oriented.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre Design and Technology

**THTR 2117 (2) Musical Theatre Studio Class III**
Explores the creation of extended musical theatre performance using acting, movement and vocal techniques, with an emphasis on the ensemble. Topics: finding the arc of a role, staging techniques for small and large ensembles, rehearsal and performance skills for a range of contexts from summer stock to Broadway.
**Equivalent - Duplicate Degree Credit Not Granted:** PMUS 2117
**Requisites:** Restricted to College of Music undergraduates (MUSCU) and BFA Musical Theatre (TBFA-BFA) students only.
**Grading Basis:** Letter Grade

**THTR 2849 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 3005 (3) Costume Design 1**
Hands on studio course for students interested in theatre, dance, film, media studies, clothing, design, watercolor painting, psychology, sociology, history, art, art history, period styles, literature and cosplay. Students will learn, explore and practice literary analysis, character profiling, figure drawing, painting, fashion and clothing history and fabric selection to research, conceive, design and paint costume plates for several performance pieces over the course of the semester.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre Design and Technology

**THTR 3011 (3) American Musical Theatre History**
This course investigates diversity in American musical theatre through the disciplinary frameworks of critical race theory, intersectional feminism, the American Myth, Jewish and LGBTQIA+ theories, and music and performance theory. In addition to increasing students¿ knowledge, understanding, and appreciation of this uniquely American art form, this course encourages students to examine larger historical and/or political events and movements through the lens of the reception and development of musicals in a given time period.
**Recommended:** Prerequisite 3 credits in THTR, DNCE or MUSC.
**Additional Information:** Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: History/Dramaturgy/Directing

**THTR 3013 (3) Studio 1: Building a Character**
Students learn to deepen and develop their proficiency with specific acting techniques. Explores the craft elements of acting, as well as text analysis.
**Requisites:** Requires prerequisite course of THTR 1003 (minimum grad C-). Restricted to Theatre (TBFA) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**THTR 3015 (3) Scene Design 1**
Engages students in the creative process of creating spatial worlds for dramatic texts. Students learn to read and analyze scripts and scores, conceptualize and envision environments, express design ideas, draw, draft and build scale 3D models of stage sets.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre Design and Technology

**THTR 3020 (3) Filmmaking Abroad: Acting & Directing Internationally**
Offers an intensive three-week production seminar to realize a short narrative film. Students immerse themselves in a city abroad, in collaboration with fellow CU students and the host population, as they scout locations and film their projects. Requires production responsibilities on both sides of the camera. A Global Seminar offered during Maymester through CU International Education.
**Equivalent - Duplicate Degree Credit Not Granted:** CINE 3020
**Requisites:** Requires prerequisite course of CINE 3400 or THTR 1003 (minimum grade C-).

**THTR 3023 (3) Studio 2: Creating a Role**
Continued development of acting technique and tools for play analysis, with particular emphasis on scene study. Special attention will be given to the Master Teachers of Acting and their pedagogies.
**Requisites:** Requires prerequisite course of (THTR 1003 or PMUS 1117 or PMUS 1217) and THTR 3053 (all minimum grade C-) or Theatre (TBFA) majors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**THTR 3031 (3) Development of Theatre 3: 20th Century International Drama**
Introduces 20th century international drama. Discusses selected plays by major African, Asian, and European authors and explores different dramatic traditions and their increasing interactions throughout the 20th century.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: History/Dramaturgy/Directing

**THTR 3033 (1-3) Production Research and Practicum: Acting**
Allows students to undertake an acting project, either within the major season or approved departmental production. Requires detailed preparational research, rehearsal commitments, and public presentation of theories and concepts in practice. Following the performance, students present written reports and evaluations.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Performance

**THTR 3035 (1-2) Production Practicum**
Practical production projects within a designated area of technical theatre, design, stage management, normally related to the department's season.
**Repeatable:** Repeatable for up to 8.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Theatre Design and Technology

**THTR 3037 (2-3) Shakespeare Practicum**
Students are assigned to work with production artisans of the Colorado Shakespeare Festival. While there are many possible areas, production designs for each season determine the number of available positions. May substitute for two credits of THTR 3035.
**Requisites:** Requires prerequisite courses of THTR 1105 and THTR 1115 (all minimum grade C-).
**Additional Information:** Departmental Category: Shakespearean Production

**THTR 3043 (3) Advanced Voice for the Stage**
Continues the work begun in THTR 2043. Studies advanced vocal techniques with the goal of integrating these skills into the working process of the performing artist.
**Requisites:** Requires prerequisite course of THTR 1003 or PMUS 1117 or PMUS 1217 and THTR 2043 (all minimum grade C-). Restricted to Theatre (THTR or TBFA) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**THTR 3045 (3) Stage Management**
Covers stage management from the inception of a production concept through the process of mounting aproduction, focusing on the interrelationships of the various artists involved, management and scheduling of time, and the psychology of handling a wide range of personalities.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Theatre Design and Technology

**THTR 3053 (3) Acting 2**
Continuation of the techniques introduced in Acting 1 (THTR 1003). Emphasis is placed on monologues and scene study of contemporary plays. Basic technique in developing a character are explored.
**Requisites:** Requires prerequisite course of THTR 1003 or PMUS 1117 or PMUS 1217 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Performance

**THTR 3055 (3) Stage Lighting Design 1**
Hands on learning in a creative lab-based environment exploring introductory practices of performance lighting design. Ideal for students excited by storytelling, technology, creating moods, the science of the human eye, human perception, and for students studying theatre, film, dance, art, design, architecture, architectural lighting, and game design.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Theatre Design and Technology

**THTR 3075 (3) Sound Design**
Hands on practical and creative exploration of the theatrical sound design process. Students will expand their understanding of sound design in the theatre through explorations in audio tools and technologies, sound system design and application, live mixing and troubleshooting skills, and enhancing theatrical performances using sound as an artistic medium.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Theatre Design and Technology

**THTR 3085 (3) Fashion, Society and Decor**
Hands on survey course for students interested in history, art history, decorative arts, sociology, psychology, politics, fashion, costume design, theatre, film, dance, media studies and cosplay. Students will create research projects based in numerous historical eras stanning from Ancient Egypt, Roman and Greek civilizations to the palaces and opulence of the Baroque and Rococo eras. Students will explore the social and technological advances in fashion creation and manufacture during the Industrial Revolution and Victorian era to the technological advances of modern Haute Couture fashion and important fashion designers.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Theatre Design and Technology

**THTR 3117 (2) Musical Theatre Studio Class IV**
Explores the development of solo performance sets of songs in cabaret and small theatre venues incorporating a range of musical styles. Topics include: How to create an audition video, Commercial auditions, Conceive, construct and perform a cabaret and/or small theatrical event, and how to collaborate with a musical production team.
**Equivalent - Duplicate Degree Credit Not Granted:** PMUS 3117
**Requisites:** Restricted to College of Music undergraduates (MUSCU) and BFA Musical Theatre (TBFA-BFA) students only.
**Grading Basis:** Letter Grade

**THTR 3149 (1) Professional Orientation: Exploring Professional Potentials for THTR and DNCE Majors**
Explores and identifies a wide range of professional opportunities connected to personal strengths and interests in theatre and dance by studying current professional practices, trends and cross-disciplinary connections. Instructor will: provide information/learning needed from representative professionals; open avenues to find/create employment opportunities towards internship consideration/post-graduation; and mentor structured self-assessment/professional development.
**Requisites:** Restricted to Theatre (THTR or TBFA) or Dance (DNCE or DBFA) majors (excluding minors).
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 3213 (3) Improvisation I: Thinking On Your Feet**
Provides students with an introduction to several forms of improvisation, including short form, long-form, playback theatre and clown. A useful course for anyone interested in improving confidence with public speaking, communication and/or performance. Attendance and participation are mandatory.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Performance

**THTR 3849 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 4003 (3) Acting 3**
Continuation of the techniques explored in Acting 1 (THTR 1003) and Acting 2 (THTR 3053). Emphasis is placed on monologues and scene study of Shakespeare and other classical plays.
**Requisites:** Requires prerequisite course of THTR 1003 or PMUS 1117 or PMUS 1217 (minimum grade C-).

**THTR 4005 (3) Costume Design 2**
Advanced studio course building on experiences and techniques studied in THTR 3005, with additional emphases on portfolio quality painting/ rendering techniques, fabrics/ fabric manipulation and costume production technology as it affects and is affected by the designer and the creative impulse.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires prerequisite course of THTR 3005 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Theatre Design and Technology

**THTR 4013 (3) Studio 3: Acting Shakespeare**
In-depth study of Shakespearean texts from the perspective of their demands on the actor, including the conventions and performance styles of Elizabethan theatre.
**Requisites:** Requires prerequisite courses of (THTR 1003 or PMUS 1117 or PMUS 1217) or Theater BFA (TBFA) majors.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Performance

**THTR 4015 (3) Scene Design 2**
Advanced projects in theatrical scene design. Provides intensive practice in sketching, rendering, drafting and model-building. Emphasizes portfolio development and preparing the student designer for graduate training or professional work.
**Requisites:** Requires prerequisite course of THTR 3015 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Theatre Design and Technology

**THTR 4021 (3) Global Theatre and Performance 2: Contesting the Status Quo**
This course views theater and performance as social, political, or artistic critique, with emphasis on examples from the Americas after 1850. Students will learn how theater and performance has either challenged or reinscribed social, political, or artistic conventions by studying works of dramatists, the historical avant-garde, theorist-practitioners, and contemporary performance artists with marginalized identities from around the world.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: History/Dramaturgy/Directing

**THTR 4023 (3) Studio 4: Playing with Styles**
Studies selected styles of theatre performance such as Greek Drama, Comedy of Manners, Commedia dell'arte, Modern Realism, Theatre of the Absurd, and Non-Western Theatre, including vocal and physical style elements.
**Requisites:** Requires prerequisite courses of THTR 3013, THTR 3023 and THTR 4013 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**THTR 4025 (3) Costume Patterning and Construction**
Learn to pattern and make your own clothing and costumes. The course focuses on basic hand and machine sewing skills, flat patterning and draping techniques, all culminating in the production of a final project. This course is ideal for those interested in theatre, film, dance, fine art, architecture, cosplay, fashion, engineering, and game design.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 5025
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite THTR 1050.

**THTR 4029 (3) Performance and Community Engagement**
Engages students in the power of performance for effecting positive social change. Students research collaboratively to create performances and workshop experiences to intentionally author the future they want. Readings provide theoretical foundations that serve as the basis for creative work. Students engage in creative explorations. Open to all forms of performance.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Special Courses in Theatre

**THTR 4033 (3) Advanced Movement for the Stage**
Continues the work begun in THTR 2043 and explores a wide range of physical actor training methods and practices that support the fundamentals of mask training and mask performance for the actor. Students will experience each mask by gaining an understanding of its historical and performative relevance and directly bring into play the authentic life required of the specific mask. Department consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 5033
**Requisites:** Requires prerequisite course of THTR 2043 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**THTR 4035 (3) Scene Painting**
Exposes students to the crafts involved in painting large and colorful backgrounds for stage productions through hands-on projects. Introduces students to scenic art techniques such as layout, representational painting, trompe l¿oeil, faux finishing and related skills. Students are taught about proper tool use and care, paint products, and the profession.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre Design and Technology

**THTR 4039 (3) Musical Theatre Repertory**
Developed around the learning of complete scenes, songs and dances that are representative of the major periods and styles within musical comedy from the 1920s to the present. Emphasizes in-class performance. Admission by audition.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 5039
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Theatre (THTR, TBFA) or Dance (DNCE or DBFA) or Music (MUSA-BAMUS, MUSC-BMUS or MUSE-BMUE) majors only (excluding minors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Special Courses in Theatre

**THTR 4040 (3) Theatrical Tailoring -- Menswear**
Learn to pattern and make your own clothing and costumes. The course focuses on tailoring of menswear (trousers, vest/waistcoats and coats) using hand and machine sewing skills, flat patterning and draping techniques, all culminating in the production of a final project. Period of exploration will vary by semester. This course is ideal for those interested in theatre, film, dance, fine art, architecture, cosplay, fashion, engineering, and game design.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite THTR 1050.
**Grading Basis:** Letter Grade

**THTR 4046 (3) Costume Crafts**
Covers basic and advanced techniques in casting/molding, mask making, dyeing, painting, jewelry making, ventilating and wig style and millinery via a series of projects. Culminates in a final project encompassing all techniques. Instruction consent required. This course is ideal for those interested in theatre, film, dance, fine art, architecture, cosplay, fashion, engineering, and game design.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 5046
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite THTR 1050.

**THTR 4049 (1-4) Special Topics in Theatre**
Opportunity for students to explore, upon consultation with the instructor, areas in theatre that the normal sequence of offerings may not allow.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Special Courses in Theatre

**THTR 4051 (3) Playwriting**
Introductory course in craft of playwriting; primary focus on technique of developing short plays.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: History/Dramaturgy/Directing

**THTR 4055 (3) Stage Lighting Design 2**
Hands on learning in a creative lab-based environment exploring advanced practices of performance lighting design. Ideal for students excited by technology, working with computers, and complex systems. This course is excellent for students interested in design, lighting design, concert, festival, dance, and nightclub lighting design, all styles of kinetic art, music, storytelling, themed environments, and architecture.
**Requisites:** Requires prerequisite course of THTR 3055 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre Design and Technology

**THTR 4059 (3) Open Topics in Theatre and Drama**
Covers topics not otherwise listed in the curriculum. Topics for each semester are specified in the online Schedule Planner.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Special Courses in Theatre

**THTR 4061 (3) Directing**
Theory and practice of directing for the stage.
**Requisites:** Requires prerequisite courses of THTR 1003 or PMUS 1117 or PMUS 1217 or THTR 3053 (all minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: History/Dramaturgy/Directing

**THTR 4063 (3) Audition Techniques**
Prepares students for the demands of the acting profession. Trains students in various audition techniques including general auditions, prepared auditions, cold readings, on-camera auditions, andcommercial auditions. Shows how to prepare and perfect audition material in a professional and exemplary way. Discusses agents, casting directors, and the process of becoming a professional actor.
**Requisites:** Requires prerequisite course of THTR 1003 or PMUS 1117 or PMUS 1217 (minimum grade C-). Restricted to students with 27-180 credits (Sophomore, Junior or Senior) Theatre (THTR or TBFA) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**THTR 4065 (1-3) Advanced Design Projects.**
Practical course in the application of design theory.Students design major costume, lighting, or scenic elements in a season production. Design concept and process must be explained and defended.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**THTR 4073 (3) Performing Voices of Women**
Explores theories underlying the "feminine voice," varied perspectives in prose and poetry, ways of embodying these voices and perspectives in performance forms and ultimately the students' own voices through creation of autobiographical performance pieces (some to be presented for student audiences). Open to both men and women.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4073
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**THTR 4075 (1-3) Advanced Technical Projects**
Students assume responsibility, under faculty supervision, for planning and executing specific technical responses to a design concept in the department's season productions.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade

**THTR 4081 (3) Senior Seminar**
Intellectual and conceptual capstone course for departmental majors with separate sections for theatre and dance students. Course promotes integration of ideas regarding history, criticism, and theory in performance and production. All inquiry throughout the semester relates to the theme of creative process.
**Requisites:** Restricted to Theatre (THTR, TBFA) or Dance (DNCE or DBFA) majors only (excluding minors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: History/Dramaturgy/Directing

**THTR 4085 (3) Theatre Management**
Students will learn how arts companies are run and managed, how non profit boards function and more. We will discuss budgeting, season planning, grant writing, unions, marketing and development. The class will include a wide range of guest speaker experts in the industry.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre Design and Technology

**THTR 4095 (1-3) Special Topics in Theatre Design and Technology**
Intensive study of specialized topics in theatre technology and design. Topics and credits specified in the online Schedule Planner.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre Design and Technology

**THTR 4103 (3) Acting and Directing for the Camera**
Offers an intensive production workshop to prepare actors and directors to work collaboratively and effectively for the medium of the camera. Directing vocabulary, script interpretation, film terminology and acting techniques are applied. Explores situations in which actors and directors interact, from auditions to rehearsals to filming. Requires attendance, textbook readings, research and production responsibilities on both sides of the camera.
**Requisites:** Requires prerequisite course of THTR 1003 or PMUS 1117 or PMUS 1217 (minimum grade C-). Restricted to students with 27-180 credits (Sophomore, Junior or Senior) Theatre (THTR or TBFA) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**THTR 4105 (3) Theatre Make-Up Design**
Hands on studio course for students interested in theatre, film, television, entertainment, cosplay and fashion make-up styles and applications. Students will research and create various make-up designs and learn various make-up application techniques and products to conceive and create characters ranging from clowns to 17th, 18th and 19th period and historical styles and stages of old age and special effect make-up. Techniques include ombre blending, removing eyebrows, changes facial features, 3D prosthetics and latex, silicone and foam appliances in the creation of wounds, stages of healing and zombies.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Special Courses in Theatre

**THTR 4113 (3) Comedy Matters**
Examines the role of comedy in performance within various cultures through readings, viewings and a participatory exploration. We will analyze comedy within various societies to understand the underlying ideals and values. Throughout this investigation we will seek to understand what makes something comedic, why, for whom, for what purpose, when and under what circumstances.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 5113
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**THTR 4117 (1-3) Musical Theatre Lab 5: Senior Showcase Experience**
Research and identify material from a variety of mediums (theatre, film, television, web-based work, commercial) that best fit preferred performance type and style. Emphasis placed on topically/timely relevant material so that the student becomes most knowledgeable of current trends and practices. Prepared work will be presented at an organized showcase featuring agents, casting professionals and directors providing feedback for continued growth, learning and a new network of industry colleagues.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Recommended:** Prerequisites TBFA Acting students ¿ completion of Studios 1-4, for PMUS, BMMT and TBFA Musical Theatre students, completion of Labs 1-4, PMUS 1117, 1217, 2117, 3117.
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**THTR 4125 (3) Watercolor Illustration and Rendering Techniques**
Hands on studio course for the student interested in theatre, film, art and art history, scenic art, illustration, drawing, and painting. This course explores watercolor, gouache, pen and ink, chalk pastels, color pencils and multi-media painting techniques and approaches. Students will gain fluency in exploring, analyzing, and copying various paintings and illustration styles and approaches by famous Illustrators and artists to expand their skillset and painting techniques. Painting supplies must be supplied by the student.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 5125
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre Design and Technology

**THTR 4135 (3) Technical Production**
Examines the process of and technology for producing theatrical scenery on a limited production timeline.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Theatre Design and Technology

**THTR 4143 (3) Shakespeare in Community**
Surveys a growing field of arts practitioners who are intersecting Applied Theatre, Shakespeare and community in meaningful ways, including Shakespeare in Prisons, Shakespeare with Veterans and Shakespeare for Inclusive Audiences. Students will explore a variety of methodologies for teaching and practicing Shakespeare and create original work using Shakespeare as a lens for examining a particular theme, topic or social issue.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 5143

**THTR 4149 (1-3) Theatre Internship**
Provides opportunities for theatre majors to explore career opportunities in theatre fields other than, or in addition to, those with performance emphasis. Students apply knowledge and skills developed in their major studies to a practical work experience.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Recommended:** Requisite 30 credit hours in THTR.
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 4173 (3) Creative Climate Communication**
We generate multimodal compositions on the subject of climate change and engage with various dimensions of issues associated with sustainability. We work to deepen our understanding of how issues associated with climate change are or can be communicated, by analyzing previously created expressions from a variety of media (interactive theatre, film, fine art, television programming, blogs, performance art, for example) and then be creating our own work.
**Equivalent - Duplicate Degree Credit Not Granted:** ENVS 3173 and ATLS 3173
**Recommended:** Prerequisite ENVS 1000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Performance

**THTR 4175 (3) Conceptualization**
Fosters creativity and collaboration through a variety of diverse projects where students conceive of live, performative productions, events and experiences. Offers both individual and team exercises that stimulate visualization, expression, documentation and communication of creative ideas, including their overall scope, aesthetic, style, audience relationship and mode of presentation.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 5175
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Special Courses in Theatre

**THTR 4193 (1-3) Studio 5: Senior Project**
Students engage in a project or projects of their own undertaking that takes a broader experience to apply the craft utilizing self-initiative, collaborative approaches and public exhibition. Instructor consent required for non-BFA THTR performance majors.
**Equivalent - Duplicate Degree Credit Not Granted:** PMUS 4117
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Requires prerequisite course of THTR 3013 and THTR 3023 and THTR 4013 and THTR 4023 (all minimum grade C-).
**Additional Information:** Departmental Category: Performance

**THTR 4213 (3) Improvisation II: Advanced Improvisation**
Continues the student's study of improvisation as a collaborative art form. Whereas Improvisation I introduces students to a variety of techniques, forms and applications of improvisation, this course focuses specifically on long-form improvisation in performance. Previous experience with long-form improvisation is necessary to enroll in this course.
**Recommended:** Prerequisite course of THTR 3213 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Performance

**THTR 4555 (1-2) Production Studio**
Requires participation in a Theatre Department production assignment in the areas of design, technology, or management, as well as participation in a semester portfolio review. May be repeated upto 6 total credit hours.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Theatre (TBFA) majors only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Theatre Design and Technology

**THTR 4849 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 5011 (3) Seminar: Theory and Criticism**
Studies theories and criticisms of drama and theatrical performances from Plato to post-modernism.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: History/Dramaturgy/Directing

**THTR 5025 (3) Costume Patterning and Construction**
Includes techniques for the patterning and construction of contemporary and period costumes. Hands-on format covers techniques, materials and equipment particular to theatrical production. Grad section grading will include additional documentation components, beyond those in the undergrad section of the course.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4025
**Requisites:** Requires prerequisite courses of THTR 1105 and THTR 1115 (all minimum grade C-). Restricted to graduate students.
**Additional Information:** Departmental Category: Theatre Design and Technology

**THTR 5033 (3) Advanced Movement for the Stage**
Explores a wide range of physical actor training methods and practices that support the fundamentals of mask training and mask performance for the actor. Students will experience each mask by gaining an understanding of its historical and performative relevance and directly bring into play the authentic life required of the specific mask. Department consent required.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4033
**Requisites:** Restricted to graduate students only.

**THTR 5039 (3) Musical Theatre Repertory**
Developed around the learning of complete scenes, songs and dances that are representative of the major periods and styles within musical comedy from the 1920s to the present. Emphasizes in-class performance. Admission by audition.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4039
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 5046 (3) Costume Crafts**
Covers basic and advanced techniques in casting/molding, mask making, dyeing, painting, jewelry making, ventilating and wig style and millinery via a series of projects. Culminates in a final project encompassing all techniques. Instruction consent required. Formerly THTR 5045.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4046
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite THTR 1115 (minimum grade C-).

**THTR 5049 (3) Topics in Theatre Studies**
Provides an opportunity for an in-depth study of a particular topic in theatre (e.g., a historical period, a region, a group or artist, a theorist, a concept). Topic specified in the Online Schedule Planner.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 5065 (3) Theatrical Tailoring**
Explores classic and theatrical tailoring techniques and theories through the construction of classical men's wear: trousers, vest/waistcoats and coats. Student work with hand and machine sewing techniques, patterning skills and appropriate tailoring materials. Period of exploration will vary by semester. Grad section grading will include additional documentation components, beyond those in the undergrad section of the course.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Recommended:** Prerequisite THTR 1115.

**THTR 5067 (3) Teaching Shakespeare**
Provides students with pedagogies, lesson plans and exercises for making Shakespeare accessible for students of all ages and across multiple content. This online course may be taken as a standalone, 3-credit course or as part of the Graduate Certificate in Applied Shakespeare.

**THTR 5071 (3) Advanced Directing**
Advanced study of theory and practice of stage directing through examination of the work of leading directors, analysis of texts and classroom exercises. Instructor consent required.
**Additional Information:** Departmental Category: History/Dramaturgy/Directing

**THTR 5085 (3) Theatre Management**
Concentrates on theory and practice of management aspects of the performing arts, emphasizing theatre and dance. Includes marketing, budgeting, house and stage management, audience development, grant writing, unions and season development. Includes practical experience.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4085
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Theatre Design and Technology

**THTR 5105 (3) Theatre Make-Up Design**
Explores theatrical make-up styles and techniques from initial research through paper design to final make-up. Ranging from period styles to Byzantine mosaic, to clowns, to special effects (old age, wounds, stages of healing, zombies, etc.) Techniques include ombre blending, removing eyebrows, shrinking and enlarging features, creating 3D appliances and applying silicone and foam prosthetics.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4105
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 5113 (3) Comedy Matters**
Examines the role of comedy in performance within various cultures through readings, viewings and a participatory exploration. We will analyze comedy within various societies to understand the underlying ideals and values. Throughout this investigation we will seek to understand what makes something comedic, why, for whom, for what purpose, when and under what circumstances.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4113
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Performance

**THTR 5125 (3) Watercolor Illustration and Rendering Techniques**
Gain fluency in established techniques and styles of master illustrators and painters. Famous illustrations are technically analyzed and copied in this exploration of intent, process, technique and style. Other mediums incorporated include pastels, color pencils, pen and ink and gouache. Painting supplies must be supplied by the student.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4125
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: Theatre Design and Technology

**THTR 5143 (3) Shakespeare in Community**
Surveys a growing field of arts practitioners who are intersecting Applied Theatre, Shakespeare and community in meaningful ways, including Shakespeare in Prisons, Shakespeare with Veterans and Shakespeare for Inclusive Audiences. Students will explore a variety of methodologies for teaching and practicing Shakespeare and create original work using Shakespeare as a lens for examining a particular theme, topic or social issue.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4143
**Requisites:** Restricted to graduate students only.

**THTR 5175 (3) Conceptualization**
Fosters the student's creative and collaborative skills by introducing a variety of strategies and scenarios for conceiving live, theatrical productions, events and experiences. A project based curriculum offers several individual and team exercises in visualizing, documenting and communicating ideas for live performances, including their overall scope, aesthetic, style, audience relationship and mode of presentation.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4175
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 5213 (3) Improvisation I: Thinking On Your Feet**
Provides students with an introduction to several forms of improvisation, including short form, long-form, playback theatre and clown. A useful course for anyone interested in improving confidence with public speaking, communication and/or performance. Attendance and participation are mandatory.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Performance

**THTR 5849 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 6003 (1-3) Production Research and Practicum: Acting**
Allows students to undertake an acting project, normally within the major theatre season, that requires detailed preparatory research, testing of ideas, and public presentation. Students work under faculty supervision and prepare a written report and evaluation of the research, rehearsal, and performance process.
**Requisites:** Restricted to graduate students only.
**Recommended:** advanced studies in acting and advisor approval.
**Additional Information:** Departmental Category: Performance

**THTR 6005 (1-3) Production Research and Practicum: Designing**
Allows students to undertake a design project, normally within the theatre season, that requires detailed preparatory research, testing of ideas, and public presentation of theories and concepts in practice. Students work under faculty supervision, and prepare a documented written report and evaluation of the research, design, and realization process, as well as fully rendered designs and/or plots. Projects may be in costumes, lights, or scenery.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: Theatre Design and Technology

**THTR 6011 (3) Theatre and Performance Histories 1**
Studies the various histories of theatre and performance globally before colonialism, in context of contemporary work and the implications of this work through critical and scholarly responses to these performances.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: History/Dramaturgy/Directing
Departmental Category: Asia Content

**THTR 6041 (3) Theatre and Performance Histories 2**
Studies global histories of theatre and performance from colonization to the present, with particular attention paid to critical and theoretical responses to work from the period.
**Requisites:** Restricted to graduate students only.
**Additional Information:** Departmental Category: History/Dramaturgy/Directing

**THTR 6051 (1-3) Production Research and Practicum: Directing**
Advanced study of theory and practice of stage directing through examination of the work of leading directors, analysis of texts and classroom exercise. Instructor consent required.
**Additional Information:** Departmental Category: History/Dramaturgy/Directing

**THTR 6091 (1-3) Production Research and Practicum: Dramaturgy**
Students undertake a dramaturgical project, normally within the major season, requiring detailed preparatory research, testing of ideas, and public presentation of theories and concepts in practice. Students work under faculty supervision and prepare a documented written report of their project.
**Requisites:** Restricted to graduate students only.
**Recommended:** advanced course work in dramatic literature and advisor approval.
**Additional Information:** Departmental Category: History/Dramaturgy/Directing

**THTR 6849 (1-3) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 6949 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 6959 (1-6) Master's Thesis**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Additional Information:** Departmental Category: Special Courses in Theatre

**THTR 7004 (3-6) Colorado Shakespeare Festival Summer Immersion**
Immersive summer intensive designed to provide an in-depth study of Shakespeare with the Colorado Shakespeare Festival (CSF). Students learn from and engage with CSF company members and faculty from English and Theatre & Dance departments in a small group, experiential setting. Students attend plays, rehearsals and lectures, and explore acting, directing and pedagogy.
**Additional Information:** Departmental Category: Shakespearean Production

**THTR 8999 (1-10) Doctoral Dissertation**
All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.
**Repeatable:** Repeatable for up to 30.00 total credit hours.
**Additional Information:** Departmental Category: Special Courses in Theatre

**TDXD 5005 (3) Design Theory**
Interrogates the principals, theories and philosophies that scaffold successful and innovative design with specific application to the design of immersive and interactive experiences and across a range of commercial, performative and cultural contexts. Activities will clarify how the philosophies of design support the core story-telling and interactive elements of experience designs.
**Requisites:** Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Design: Technique

**TDXD 5105 (3) Collaboratory in Experience Design 1**
Addresses philosophies of storytelling through experience and the general concepts and aesthetics of Experience Design. The first in a two-part series, this course lays foundational principles focusing on the components of a live experience and how space, narrative and interaction affect the design from early conceptualization through implementation.
**Requisites:** Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Design: Process

**TDXD 5500 (3) Experience Design Atelier 1: Design Evolution and Expression**
Introduces students to various techniques for graphically representing design ideas using drawing and illustration techniques in order to augment and deepen the diverse skill sets of students in the class. The first in three-part sequence on graphic representation and expressive practices, students will learn how to work out design ideas through sketching, drawing, creating storyboards and collages.
**Requisites:** Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Design: Technique

**TDXD 5700 (3) Experience Design Atelier 2: Introduction to Design Graphics**
Introduces students to advanced techniques for representing design ideas in graphic form including commonly used software applications (Sketchup, Vectorworks, AutoCAD), scale modeling, mechanical drawing and rendering. The second in a three-part class sequence on graphic representation and expressive practices, this atelier will offer a range of exercises tailored to the skill level of individual students.
**Requisites:** Requires a prerequisite course of TDXD 5500 (minimum grade B-). Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Design: Technique

**TDXD 5805 (3) Professional Portfolio 1**
Focuses on selecting, organizing and developing a plan for presenting material that will eventually culminate in the completion of a competitive professional portfolio, a vital tool for gaining employment in the Experience Design industry. The first of a two-part credited final project, students begin the process to prepare their professional portfolio under the guidance of faculty and industry professionals.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Dsgn: Documentation

**TDXD 6105 (3) Collaboratory in Experience Design 2**
Introduces students to professional models of working in the Experience Design industry. The second in a two-part class sequence, students work collaboratively on industry case studies focusing on entertainment, education and cultural destination genres with input from outside professionals in the field.
**Requisites:** Requires a prerequisite course of TDXD 5105 (minimum grade B-). Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Design: Process

**TDXD 6210 (3) Storytelling for XD**
Explores multi-modal, expressive strategies for experimental storytelling and investigates the diverse languages of live experience. Students complete projects using varying modes of conveyance including physical and spatial action, filmic approaches, digital media and alternative methods. Students will discuss current trends in expressive methods and the nature of story.
**Requisites:** Restricted to Experience Design (TDXD) MFA students only.

**TDXD 6500 (3) Experience Design Atelier 3: Packaging the Design Presentation**
Investigates strategies for visually communication and "selling" design ideas in a compelling and well composed visual/aural presentation. The third in a three-part sequence on graphic representation and expressive practices, this class culminates I a final, comprehensive design project portfolio that follows current professional standards.
**Requisites:** Requires a prerequisite course of TDXD 5700 (minimum grade B-). Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Design: Technique

**TDXD 6555 (3) Experience Design Technology**
Explores established and cutting-edge technologies employed in visual, auditory, and interactive elements of designed environments and experiences. Develops an understanding of the function of these areas, the ways in which they facilitate a complete experience and examines new directions of experimentation in these fields. Elicits research, analysis, and development of new concepts in response to current practices and design problems.
**Requisites:** Restricted to Experience Design (TDXD) MFA students only.

**TDXD 6805 (3) Professional Portfolio 2**
Through editing materials collected in TDXD 5805, students will complete adaptable versions (hard copy, digital, web-based and presentations) of their professional portfolios. In this second of a two-part credited project, a committee comprised of faculty and industry professionals guide the completion of XD portfolios.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Requires a prerequisite course of TDXD 5805 (minimum grade B-). Restricted to Experience Design (TDXD MFA) students only.
**Additional Information:** Departmental Category: Experience Dsgn: Documentation

**TDXD 6849 (3-6) Independent Study**
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**TDXD 6901 (3) XD Implementation and Engineering**
Explores the realities and challenges of implementing themed entertainment design. Within the framework of project based case studies and a real work project, this course analyzes aspects of construction management, client management and approvals, scheduling, budgeting, value engineering, architecture and design.
**Requisites:** Restricted to Experience Design (TDXD MFA) students only.

**TDXD 6910 (3-6) The Experience Design Center**
Offers Experience Design students an opportunity to engage in and complete projects posed by industry professionals or non-profit partners seeking assistance with experiential projects in a professional, practicing lab/studio setting. The XD Center, house in a campus "maker-space," accepts design challenges and assignments that provide a realistic field experience for students.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to Experience Design (TDXD) MFA students only.

# Theatre and Dance (THDN)

## Courses

**THDN 5010 (3) Introduction to Performance Studies**
Introduces students to performance studies by surveying foundational concepts and recent scholarship in the field and by examining theoretical and methodological questions raised by performance practices. This interdisciplinary course provides students with the necessary vocabulary and research skills to continue to navigate the field of performance studies and the many academic fields it intersects with. Formerly THTR 5010.
**Requisites:** Restricted to graduate students only.

**THDN 5051 (3) Topics in Performance Studies**
Provides an opportunity for an in-depth study of a particular topic in performance studies (e.g., a historical period, a region, a practitioner, a theorist, a concept). Topic specified in the Online Schedule Planner.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: History/Dramaturgy/Directing

**THDN 5099 (3) Live Performance: Critical Curation**
Examines live arts curation and engages in both practical and theoretical investigations. Course observes how approach to curation requires changes in production practices as well as models of spectatorship. The course culminates in a student-directed creation of an original, team-based curatorial project. This course counts toward the Dance Seminar requirement.
**Recommended:** Prerequisite THTR 5010.
**Grading Basis:** Letter Grade

**THDN 6001 (1-3) Applied Performance Practicum**
Allows students to undertake an applied performance project with faculty guidance. This project may use performance as a tool towards achieving a community objective, to advance a social justice issue, or to contribute to the well-being or empowerment of community members. This practicum may include: needs assessment, preparatory research, design of project, workshop or public implementation/performance/installation/action, and assessment. Recommended: advisor approval. Additional Information: Departmental Category: Graduate Theatre and Performance Studies and Graduate Dance, as well as undergraduate Theatre & Dance.
**Repeatable:** Repeatable for up to 3.00 total credit hours. Allows multiple enrollment in term.

**THDN 6009 (2) Research and Teaching in Theatre, Dance and Performance Studies**
Provides an overview of resources, methodologies, and strategies for graduate teaching in the fields of theatre, dance, and performance studies. Students will be exposed to library and other resources available to them in the department and in the university, and will develop a research proposal for a project they plan to develop during their graduate studies.
**Requisites:** Restricted to THTR MA, THTR PhD or DNCE MFA students

# Thesis Music (TMUS)

## Courses

**TMUS 4403 (1-3) Special Studies Music History**
Offers advanced studies for special projects in selected areas. For undergraduate majors only.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**TMUS 4413 (1-3) Special Study Music Education**
Offers advanced studies for special projects in selected areas. For undergraduate majors only.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**TMUS 4423 (1-3) Special Study Music Theory**
Offers advanced studies for special projects in selected areas. For undergraduate majors only.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**TMUS 4433 (1-3) Special Study Choral**
Offers advanced studies for special projects in selected areas. For undergraduate majors only. See current online Schedule Planner for specific course number.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**TMUS 4443 (1-3) Special Study Keyboard**
Offers advanced studies for special projects in selected areas. For undergraduate majors only.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**TMUS 4453 (1-3) Special Study Conducting**
Offers advanced studies for special projects in selected areas. For undergraduate majors only.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**TMUS 4463 (1-3) Special Study Strings**
Offers advanced studies for special projects in selected areas. For undergraduate majors only.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**TMUS 4473 (1-3) Special Study Voice**
Offers advanced studies for special projects in selected areas. For undergraduate majors only.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**TMUS 4483 (1-3) Special Study Wind, Brass, Percussion**
Offers advanced studies for special projects in selected areas. For undergraduate majors only.
**Repeatable:** Repeatable for up to 12.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**TMUS 4493 (1-3) Special Studies Omnibus**
Offers advanced studies for special projects in selected areas. For undergraduate majors only.
**Repeatable:** Repeatable for up to 99.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to College of Music (MUSCU) undergraduate students only.

**TMUS 5504 (1-3) Special Study-Musicology**
Offers graduate studies for special projects in selected areas. For master's degree students only.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.

**TMUS 5514 (1-3) Special Study-Music Education**
Offers graduate studies for special projects in selected areas. For master's degree students only.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.

**TMUS 5524 (1-3) Special Study-Music Theory**
Offers graduate studies for special projects in selected areas. For master's degree students only.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.

**TMUS 5534 (1-3) Special Study-Choral**
Offers graduate studies for special projects in selected areas. For master's degree students only.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.

**TMUS 5544 (1-3) Special Study-Keyboard**
Offers graduate studies for special projects in selected areas. For master's degree students only.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.

**TMUS 5554 (1-3) Special Study-Conducting**
Offers graduate studies for special projects in selected areas. For master's degree students only.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.

**TMUS 5564 (1-3) Special Study-Strings**
Offers graduate studies for special projects in selected areas. For master's degree students only.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.

**TMUS 5574 (1-3) Special Study-Voice**
Offers graduate studies for special projects in selected areas. For master's degree students only.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.

**TMUS 5584 (1-3) Special Study-Wind/Percussion**
Offers graduate studies for special projects in selected areas. For master's degree students only.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.

**TMUS 5594 (1-3) Special Study-Omnibus**
Offers graduate studies for special projects in selected areas. For master's degree students only.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSCG) graduate students only.

**TMUS 6947 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to College of Music (MUSM or MUPC) graduate students only.

**TMUS 6956 (1-2) Master's Thesis**
**Requisites:** Restricted to College of Music (MUSM or MUPC) graduate students only.

**TMUS 6957 (1-2) Master's Thesis 2**
**Requisites:** Restricted to College of Music (MUSM or MUPC) graduate students only.

**TMUS 6958 (1-2) Master's Thesis 3**
Masters Thesis
**Requisites:** Restricted to College of Music (MUSM or MUPC) graduate students only.

**TMUS 6959 (1-3) Master's Thesis 4**
Master's Thesis
**Requisites:** Restricted to College of Music (MUSM or MUPC) graduate students only.

**TMUS 8019 (1) Precandidate for Doctor of Musical Arts**
Registration intended for students preparing for a recital, thesis/dissertation project, examination, or completion of degree.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.

**TMUS 8029 (1) Candidate for Doctor of Musical Arts**
Registration intended for students preparing for a recital, thesis/dissertation project, examination, or completion of degree.
**Repeatable:** Repeatable for up to 12.00 total credit hours.
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.

**TMUS 8119 (1-4) Composition Project 1**
Students compose works in a variety of genres, totaling at least 30 minutes of music. Students meet weekly with a composition teacher to discuss and develop their works.
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.

**TMUS 8129 (1-4) Composition Project 2**
Students compose works in a variety of genres, totaling at least 30 minutes of music. Students meet weekly with a composition teacher to discuss and develop their works.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Requires prerequisite course of TMUS 8119 (minimum grade D-). Restricted to Music (MUAD, MUED or MUSD) graduate students only.

**TMUS 8219 (1-3) Dissertation Project 1 (Solo Recital, Choral Concert, Composition)**
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.

**TMUS 8229 (1-3) Dissertation Project 2 (Solo Recital, Choral Concert, Composition, Vocal Pedagogy)**
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.

**TMUS 8239 (1-3) Diss Proj 3 (Chamber Music Recital, Vocal Pedagogy Project, Choral Project, Composition Recital)**
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.

**TMUS 8249 (1-3) Diss Proj 4 (Chamber Music Recital, Choral Project, Composition Recital, Wind/Percussion Practicum)**
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.

**TMUS 8259 (1-3) Dissertation Project 5 (Research Lecture)**
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.

**TMUS 8269 (1-3) Dissertation Project 6 (Research Lecture)**
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.

**TMUS 8279 (3) Performance Research Document 1**
**Repeatable:** Repeatable for up to 3.00 total credit hours.
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.

**TMUS 8289 (1) Performance Research Document 2**
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.

**TMUS 8299 (1) Performance Research Document 3**
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.

**TMUS 8309 (1) Performance Research Document 4**
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.

**TMUS 8319 (1-3) Repertoire Project**
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.

**TMUS 8329 (1-6) Document/Pedagogy Project**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.

**TMUS 8339 (1-6) Major Composition**
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Music (MUAD, MUED or MUSD) graduate students only.

**TMUS 8998 (1-10) PhD Thesis**
**Repeatable:** Repeatable for up to 10.00 total credit hours.
**Requisites:** Restricted to College of Music (MUED or MUSD) graduate students only.

# Tibetan (TBTN)

## Courses

**TBTN 1010 (4) Beginning Colloquial Tibetan 1**
Provides a thorough introduction to colloquial forms of Tibetan. Focuses on conversation practice, the acquisition of basic vocabulary and grammar in colloquial usage, learning the alphabet, and training in the skills of pronunciation, spelling and handwriting.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Tibetan

**TBTN 1020 (4) Beginning Colloquial Tibetan 2**
Provides a thorough introduction to colloquial forms of Tibetan. Continues the development of vocabulary and grammar begun in Tibetan I and expands the range of conversation topics. While students focus on oral and aural skills, they begin to learn to read and write modern Tibetan to produce an overall knowledge of the language.
**Requisites:** Requires prerequisite course of TBTN 1010 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Tibetan

**TBTN 1110 (3) Beginning Tibetan I - DILS**
Provides a thorough introduction to the colloquial Tibetan language, emphasizing speaking and listening in the Lhasa dialect. Trains students in basic conversations and the idiomatic and syntactical features of Tibetan through drills and dialogues.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**TBTN 1120 (3) Beginning Tibetan II - DILS**
Continuation of TBTN 1110; provides a thorough introduction to the colloquial and literary Tibetan language, emphasizing speaking and listening in the Lhasa dialect. Trains students in basic conversations and the idiomatic and syntactical features of Tibetan through drills and dialogues.
**Requisites:** Requires prerequisite course of TBTN 1110 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**TBTN 1210 (2) Modern Literary Tibetan I - DILS**
Provides a thorough introduction to the modern literary Tibetan, emphasizing reading and writing. Trains students in the Tibetan script, elementary grammar, and reading authentic materials, including Tibetan maxims, pop song lyrics, and children¿s stories.

**TBTN 1220 (2) Modern Literary Tibetan II - DILS**
Continuation of TBTN 1210; provides a thorough introduction to the modern literary Tibetan, emphasizing reading and writing. Trains students in the Tibetan script, elementary grammar, and reading authentic materials, including Tibetan maxims, pop song lyrics, and children¿s stories.
**Requisites:** Requires prerequisite course of TBTN 1210 (minimum grade C).

**TBTN 2010 (4) Intermediate Colloquial Tibetan 1**
Aims at increasing students' proficiency in colloquial forms of Tibetan. Expands knowledge of the vocabulary and grammar of spoken Tibetan and engages in more advanced conversation topics while also continuing to develop reading knowledge of modern Tibetan.
**Requisites:** Requires prerequisite courses of TBTN 1010 and 1020 (all minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Tibetan

**TBTN 2020 (4) Intermediate Colloquial Tibetan 2**
Aims at increasing students' proficiency in colloquial forms of Tibetan. Expands knowledge of the vocabulary and grammar of colloquial Tibetan and also continues to develop knowledge of reading and writing modern Tibetan.
**Requisites:** Requires prerequisite course of TBTN 2010 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Tibetan

**TBTN 2110 (3) Intermediate Tibetan I - DILS**
This DILS (Directed Independent Language Study) course on Intermediate Tibetan will introduce students to intermediate grammar, sentence construction, conversation topics, and readings in modern Tibetan. This will include introduction to Tibetan grammatical markers and particles, morphology, syntax, and vocabularies using a range of authentic materials.
**Requisites:** Requires prerequisite course of TBTN 1120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**TBTN 2220 (3) Intermediate Tibetan II DILS**
This DILS (Directed Independent Language Stud) course on Intermediate Tibetan will introduce students to intermediate grammar, sentence construction, conversation topics, and readings in modern Tibetan. This will include introduction to Tibetan grammatical markers and particles, morphology, syntax, and vocabularies using a range of authentic materials.
**Requisites:** Requires prerequisite course of TBTN 2120 (minimum grade C-).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**TBTN 3210 (4) Beginning Literary Tibetan 1**
Provides a thorough introduction to literary and colloquial forms of Tibetan. Focuses on the grammatical foundation of the language, the acquisition of basic vocabulary, and training in the skills of pronunciation, conversation, handwriting and spelling.
**Requisites:** Requires prerequisite course of TBTN 2020 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Tibetan

**TBTN 3220 (4) Beginning Literary Tibetan 2**
Continuation of TBTN 3210. Provides a thorough introduction to literary and colloquial forms of Tibetan. Continues the grammar and vocabulary work begun in Tibetan 1 by studying actual Tibetan text and moving to more advanced conversation topics. Students develop oral, aural and written skills to produce an overall knowledge of the language.
**Requisites:** Requires prerequisite course of TBTN 3210 (minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Tibetan

**TBTN 4210 (4) Intermediate Literary Tibetan 1**
Aims at increasing students' proficiency in literary and colloquial forms of Tibetan. Expands knowledge of the grammar and vocabulary of literary Tibetan through translating texts in a variety of genres and also continues to develop knowledge of spoken modern Tibetan.
**Requisites:** Requires prerequisite courses of TBTN 3210 and 3220 (all minimum grade C).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities Departmental Category: Tibetan

# Women and Gender Studies (WGST)

## Courses

**WGST 1006 (3) The Social Construction of Sexuality**
Discusses the social determinants of sexuality. Analyzes the economic, psychological and cultural influences on human sexuality. Interactional perspective of human sexuality is presented.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 1006
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Sociology

**WGST 1016 (3) Sex, Gender, and Society 1**
Examines status and power differences between the sexes at individual and societal levels. Emphasizes historical context of gender roles and status, reviews major theories of gender stratification.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 1016
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Sociology

**WGST 1250 (3) Introduction to World Literature by Women**
This course considers how literature represents gendered experiences across multiple countries and continents. Students will read fiction and poetry by women from South Asia, East Asia, Africa, Europe, and the Americas, that address questions of sexuality, marriage, and family, politics, labor, and justice at the intersections of gender, race, and nation.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 1250
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: English

**WGST 1270 (3) Introduction to American Literature by Women**
This course investigates how literature by women has shaped the United States over time, from Indigenous authors, to abolitionists, to suffragists, to feminists of various waves. With attention to intersections between class, race, and sexual orientation, students will consider what it has meant and still means to be a woman writer in the United States and will explore how women have engaged, subverted, and resisted ideas about gender.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 1270
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: English

**WGST 2000 (3) Introduction to US Gender, Race and Sexuality Studies**
Introduces students to the field of Women and Gender Studies. Examines gender issues in the United States from interdisciplinary, intersectional and transnational feminist perspectives across a range of US cultural contexts. Covers such topics as gender identity and performance, sexuality, reproductive justice, gendered violence, work and labor, imperialism and war, and the environment.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
MAPS Course: Social Science

**WGST 2020 (3) Femininities, Masculinities, Alternatives**
Examines the construction of gender and sexual identities in the modern world. Focuses on the role of social attitudes and material circumstances in shaping how individuals understand themselves and are understood by others, as well as the actions they take to accept, negotiate and resist these pressures.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**WGST 2030 (3) Introduction to Lesbian, Gay, Bisexual, and Transgender Studies**
Investigates the social and historical meanings of racial, gender, and sexual identities and their relationship to contemporary lesbian, bisexual, gay and transgender communities.
**Equivalent - Duplicate Degree Credit Not Granted:** LGBT 2000
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: LGBT Studies

**WGST 2050 (3) Gender, Sexuality, and Popular Culture**
Explores diverse cultural forms such as film, popular fiction and non-fiction, music videos, public art, websites, blogs and zines which are shaped by, and in turn shape, popular understandings of gender at the intersections of race, class, ability, religion, nation and imperialism.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**WGST 2100 (3) Gender and Sexuality in Ancient Greece**
Examines evidence of art, archaeology and literature of Greek antiquity from a contemporary feminist point of view. Focuses on women's roles in art, literature and daily life. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 2100
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Classics

**WGST 2110 (3) Gender and Sexuality in Ancient Rome**
Uses art, archaeology, and literature to study, from a contemporary feminist point of view, the status of women in works of Roman art and literature, the development of attitudes expressed toward them, and their daily life. No Greek or Latin required.
**Equivalent - Duplicate Degree Credit Not Granted:** CLAS 2110
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Classics

**WGST 2200 (3) Women, Gender, Literature, and the Arts**
Introduces the contributions of women to literature and the performing arts from a historical and cross-cultural perspective. Emphasizes representations of gender and sexuality, as well as the cultural contexts in which artworks are created. Stresses issues of structure, content, and style, along with the acquisition of basic techniques of literary and arts criticism.
**Recommended:** Prerequisite WGST 2000.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Core Curr: Literature and the Arts
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**WGST 2290 (3) Philosophy and Gender**
Analyzes critically the concepts of sex, gender, and their intersection with other aspects of identity, exploring how these impact the extent to which people face injustice because of their gender.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 2290
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Philosophy

**WGST 2500 (3) Gender, Race, Sex and the Body**
Studies the body as a site for the production of social difference, meaning and inequality. Focuses on the body as a conduit for political, social, and ethical dilemmas and conflicts. Examines a selection of these issues to help students understand what a body is, how bodily difference is constructed, and what this constructed difference signifies.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 2600 (3) Introduction to Global Gender, Race and Sexuality Studies**
Introduces students to the field of Women and Gender Studies. Examines gender issues globally from interdisciplinary, intersectional and transnational feminist perspectives across a range of global cultural contexts. Covers such topics as transnational feminism, colonialism and imperialism, indigenous feminisms, religion and politics, immigration and asylum, and climate change.
**Additional Information:** GT Pathways: GT-SS3 -Soc Behav Sci:Hmn Behav, Cult, Soc Frame
Arts Sci Core Curr: Contemporary Societies
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**WGST 2700 (3) Psychology of Gender and Sexuality**
Examines psychological research on gender and sexuality as they intersect with race, class and other social categories. Points of emphasis include differences in cognition, attitudes, personality and social behavior. Conceptual themes include research methodologies, implicit and explicit attitudes, stigma and stereotypes. These elucidate such areas as close relationships, leadership, career success and mental health and happiness.
**Recommended:** Prerequisite WGST 2000 or PSYC 1001.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**WGST 2800 (3) Women and Religion**
Examines roles of women in a variety of religious traditions including Judaism, Christianity, Hinduism, Buddhism and goddess traditions.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 2800
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Religioius Studies

**WGST 2850 (3) Sex, Religion, and Politics in US Healthcare**
Examines the roles of religion, gender, and sexuality in the politics of healthcare in the United States. Topics may include sexual health and education; debates over health and sexuality during the HIV/AIDS crisis; the expansion and contraction of access to birth control; public debates over abortion; debates over religion, politics, and healthcare for transgender people; and histories of religion, health, and race.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 2850
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WGST 3012 (3) Gender and Development**
Provides a sociological perspective on gender, globalization, and economic development in the Global South. Examines a variety of topics, including feminist theories of development; poverty and inequality; women¿s work in the context of globalization; and women¿s activism and feminism(s).
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 3012
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 3001.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sociology
Departmental Category: Asia Content

**WGST 3016 (3) Marriage and the Family in the United States**
Comparative and historical examination of marriage and the family within the U.S. Emphasizes changing family roles and family structures. Also considers alternatives to the nuclear family and traditional marriage exploring new definitions of family.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 3016
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 3001.
**Additional Information:** Arts Sci Core Curr: United States Context
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sociology

**WGST 3020 (3) Feminist Methods of Inquiry and Praxis**
Examines various research methods and approaches in the field of feminist studies. Students will gain practical experience to be able to write a proposal for a significant research project, informed by course readings and discussions.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3044 (3) Race, Class, Gender, and Crime**
Overview of race, class, gender and ethnicity issues in offending, victimization and processing by the justice system. Examines women and people of color employed in the justice system.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 3044 and SOCY 3044
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 1001 or SOCY 1004 or SOCY 1021 or SOCY 2044.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sociology

**WGST 3046 (3) Topics in Sex and Gender**
Faculty present courses based on their area of expertise and specialization in the field of sex and gender. Students should check current sociology department notices of course offerings for specific topics.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 3046
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sociology

**WGST 3100 (3) Feminist Theories**
Explores a variety of alternative systematic accounts of, and explanations for, gender inequities. Social norms of both masculinity and femininity are analyzed in relation to other axes of inequality such as class, sexuality, race/ethnicity, neocolonialism and the domination of nonhuman nature.
**Requisites:** Requires a prerequisite course of WGST 2000 or WGST 2020 or WGST 2050 or WGST 2600 (minimum grade C-). Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3110 (3) Feminist Practical Ethics**
Examines issues of public policy and personal ethics in light of the feminist commitment to gender justice. Readings for the course will present competing feminist points of view on topics such as: the environment, sex trafficking, immigration, abortion rights, the fashion and beauty industries, cosmetic surgery, food, and militarism. Contributes to an understanding of gender diversity from a U.S. perspective, fostering further insight into social, political, economic, and cross-cultural relations in America.
**Equivalent - Duplicate Degree Credit Not Granted:** PHIL 3110
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite WGST 2000 or WGST 2290 or PHIL 2290.
**Additional Information:** Arts Sci Core Curr: Ideals and Values
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**WGST 3135 (3) Chicana Feminisms and Knowledges**
Provides insight into the present socioeconomic condition of Chicanas and the concept of feminismo through interdisciplinary study of history, sociology, literary images and film portrayals.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 3136
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite ETHN 2001 or ETHN 2536.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Chicano Studies

**WGST 3174 (3) Sex, Power, and Politics: U.S. Perspectives**
Explores how norms of sex, gender, race and sexuality find expression in institutions and policies in ways that legitimize only certain individuals as political actors, certain identities as politically relevant, and certain relationships as important. Critically examines how norms may be exposed, resisted and changed by studying the politics of the women's, gay liberation and men's movements in the U.S.
**Equivalent - Duplicate Degree Credit Not Granted:** PSCI 3174
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite PSCI 2004 or WGST 2000 or LGBT 2000.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Science

**WGST 3200 (3) Religion and Feminist Thought**
Examines the origin of patriarchal culture in the theology and practices of Judaism and Christianity. Explores attitudes and beliefs concerning women as Judeo-Christian culture impacts gender roles and gender stratification through reading and discussion. Women's religious experience is studied from the perspective of feminist interpretations of religiosity.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3200
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WGST 3201 (3) Women, Gender & Sexuality in Jewish Texts & Traditions**
Reads some of the ways Jewish texts and traditions look at women, gender and sexuality from biblical times to the present. Starts with an analysis of the positioning of the body, matter and gender in creation stories, moves on to the gendered aspects of tales of rescue and sacrifice, biblical tales of sexual subversion and power, taboo-breaking and ethnos building, to rabbinic attitudes towards women, sexuality and gender and contemporary renderings and rereadings of the earlier texts and traditions.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 3202 and HEBR 3202 and RLST 3202
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective

**WGST 3208 (3) Women in Nordic Society: Modern States of Welfare**
Examines the role and status of women and marginalized social classes in the Nordic countries, whose societies have been heralded as egalitarian models since the twentieth century. Texts include a variety of media, from literature to sociological works to artifacts of political and popular culture.
**Equivalent - Duplicate Degree Credit Not Granted:** SCAN 3208
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Nordic (Formerly Scandinavian)

**WGST 3210 (3) American Indian Women**
Explores the experiences, perspectives and status of American Indian women in historical and contemporary contexts. Examines representations of Indigenous women in mainstream culture. Emphasizes the agency of American Indian women-their persistence, creativity and activism, especially in maintaining Indigenous traditions.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 3213
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2000 or WGST 2600 or ETHN 2001 or ETHN 1023.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**WGST 3220 (3) Women in Islam**
Examines the historical and contemporary relation between women, gender and Islamic cultures in different parts of the world. We will consider the role and rights of women in Islam, historical and literary representations of Muslim women, and the historically changing constructions of gender and sexuality in Muslim societies. In addition, we will critically explore the construction of Muslim women in western discourses, including liberal feminist discourse, and ask whether the representation of Muslim women in these discourses achieves or undermines ends that we might consider "Feminist". In attending to the wide range of Muslim women's lived experiences in Islamic communities and cultures, as well as the self-representations of Muslim women themselves, our readings will urge us to reexamine our presumptions about piety, secularism, modernity and feminism.
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Asia Content

**WGST 3250 (3) Disney's Women and Girls**
Examines the construction of gender, race, class, sexual orientation and disability in a selection of Disney's animated films. Cultivates skills of media literacy, exploring how mass media acts to enforce and maintain conventional gendered understandings of power, privilege and difference. Analyzes the political economy of the Disney phenomenon through a feminist lens.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3267 (3) Women Writers**
This course explores how women write about a range of issues, some explicitly gendered, such as desire, sexuality, marriage, and family, and others perhaps less so, such as politics, justice, race, and class. We¿ll consider how women think about their craft, how they approach questions of art and beauty, and whether we should consider writing by women a separate category. Students will examine a range of literature by women, aiming to be inclusive and intersectional.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 3267
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: English

**WGST 3300 (3) Gender, Sexuality and U.S. Law**
Contemporary and historic overview of U.S. courts' treatment of sex and gender. Using the case method, examines policy issues including, but not limited to: same sex marriage and civil unions; privacy; affirmative action; abortion; reproductive technologies; discrimination based on sex and sexual orientation in education and in the workplace.
**Equivalent - Duplicate Degree Credit Not Granted:** PSCI 3301
**Recommended:** Prerequisite WGST 2000 or PSCI 1101.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective
Departmental Category: Political Science

**WGST 3302 (3) Facilitating Peaceful Community Change**
Students gain knowledge and skills that enable them to become effective agents of community change. Focuses on understanding the processes of community building with a multicultural emphasis. Students are encouraged to apply their own life experiences and to examine themselves as potential change agents.
**Equivalent - Duplicate Degree Credit Not Granted:** INVS 3302
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3311 (3) Gender and U.S. Politics: Protest, Polls and Policy**
Provides an overview and critical examination of women as political actors within the United States. Students will examine the gendered components of citizenship, election, political office and public policy. Furthermore, students will explore the ways in which gender intersects with class, race, ethnicity, sexual orientation and other identities in U.S. politics.
**Equivalent - Duplicate Degree Credit Not Granted:** PSCI 3311
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3314 (3) Violence Against Women and Girls**
Focuses on aspects of the victimization of women and girls that are "Gendered" - namely, sexual abuse and intimate partner abuse. Also explores the importance of race, class and sexuality in gendered violence.
**Equivalent - Duplicate Degree Credit Not Granted:** ETHN 3314 and SOCY 3314
**Recommended:** Prerequisite SOCY 1016 or WGST 1016.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3400 (3) Gender, Personality, and Culture**
Explores the relationship among gender, culture and personality. Brings together the disciplines of psychology and sociology in the study of gender and personality formation through investigation of psychoanalytic theory and the social environment.
**Recommended:** Prerequisite WGST 2000 or WGST 2700.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3410 (3) Gender, Sexuality and Culture in the Modern Middle East**
Examines the issues of gender and sexuality in the modern Middle East and North Africa from the colonial period to the present, focusing on how feminist movements, Arab women's writing, and constructions of gender and sexuality have been shaped by local, national and international factors. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** ARAB 3410
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Arabic

**WGST 3500 (3) Global Gender Issues**
Introduces global gender issues, such as the gendered division of labor in the global economy, migration, women's human rights, environmental issues, gender violence in war, women in the military, nationalism and feminism and the representation of the Third World in the United States. Offers students the opportunity to broaden their perspectives beyond the borders of the United States.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2000 or WGST 2050 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Asia Content

**WGST 3505 (3) Historical and Contemporary Issues of African American Women**
Explores the social, economic, political, historical and cultural role of African American women from an interdisciplinary perspective. Special emphasis is placed on African American women's rich oral and literary tradition.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2000 or ETHN 1022 or ETHN 2001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3510 (3) Gender, Sexuality and Global Health**
Examines the intersections of gender, sexuality and health in global perspective. Explores how men's and women's health are shaped by gender and sexual relations in a wide range of social contexts, including South and Southeast Asia, Latin America, sub-Saharan Africa and the United States.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sociology

**WGST 3520 (3) Gender and Sexuality in Africa**
Examines the dramatic changes occurring across the continent of Africa that are currently reworking gender and sexuality. Foregrounds African conceptions of feminism, and explores a range contemporary issues, including gender & health, modern womanhood, new African masculinities, LGBTQ rights, and the gendered implications of environmental change.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Requisites WGST or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3600 (3) Latina/x Studies**
Drawing from work produced by and about Latinas/xs, discusses the social and cultural construction of race and ethnicity alongside gender and sexuality, the function of nationalism, the politics of migration and citizenship, Latina/x literary production and theory, historiographical trends, Latina feminist theory, activism and the academy, and Latina/x political organizing.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2000 or WGST 2050 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3601 (3) German Women Writers**
Explores writing by German/Austrian women from 1945 to the present, with special attention to the representation of the Holocaust, the continuation of avant-garde traditions, innovations in literary form and feminism. Visual arts, film and feminist theory will also be considered in their relation to literature. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 3601
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: German

**WGST 3610 (3) Gender, Race, Science and Technology**
Examines the role of science and technology in forming conceptions of race, gender and class, and vice-versa. Considers how some populations benefit from scientific knowledge-production while others are excluded or come to be its subjects. Students will explore this knowledge production through historical, anthropological, literary, and philosophical investigations of technology and scientific inquiry.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Requisites WGST 2000 or WGST 2050 or WGST 2500 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Arts Sci Gen Ed: Diversity-U.S. Perspective

**WGST 3620 (3) Women of Color and Activism**
Surveys the history of social activism in the United States by Women of Color with an emphasis on modes of social activism, issues that have organized specific communities of color, and issues that have crossed ethnic/racial boundaries. In order to offer students a historical understanding of how Women of Color have been marginalized, as well as how they have fought back against this marginalization, this course relies upon historical, sociological, and theoretical readings.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2000 or WGST 2020 or WGST 2050 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3640 (3) Black Feminist and Womanist Theories**
Examines theoretical and activist approaches concerning the oppression, agency, and liberation of Black girls, women, and femmes. Traces the development of Black feminisms and womanisms created, co-constructed, and advanced by Black women and femmes, including Black feminist thought, Africana womanism, intersectionality, Black trans feminism, hip hop feminism, pan-African feminism, and transnational Black feminism. Explores themes, assumptions, interventions, and variants of Black feminist and womanist theories and praxes.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2000 or WGST 2020 or WGST 2050 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3650 (3) Gender and Politics in Latin America**
Examines Latin American politics with particular focus on women's participation in social movements, war, revolution and elections. Compares women's and men's politics and activism and examines changing gender and sexuality policies, gender relations and the differential impact of political, economic, and social changes on men and women.
**Equivalent - Duplicate Degree Credit Not Granted:** PSCI 3052
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite WGST 2600 or PSCI 2012 or PSCI 3032.
**Additional Information:** Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Political Science

**WGST 3670 (3) Gender, Race, Sexuality and Global Migration**
Engages in an interdisciplinary study of the intersections of gender, race and sexuality that have created a multicultural, multiethnic and multiracial world. Focuses on the effects of political, economic, social and cultural forces on gender, race and sexuality in migrant communities.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Ethnic Studies

**WGST 3672 (3) Who Runs the World? Sex, Power, and Gender in Geography**
This course will examine how gender and sexuality is constructed locally, nationally, and globally, drawing on conversations about feminist pasts, presents, and futures. We will focus on how gender intersects with race, class, sexuality, ability, religion, ethnicity, and geopolitical location to structure the lived experiences of women across the globe. We will apply critical geographic perspectives to gender inequality, exploring the overlaps and differences in women¿s and LGBTQ+ struggles as they are shaped by ongoing socio-cultural, political, and economic conditions globally.
**Equivalent - Duplicate Degree Credit Not Granted:** GEOG 3672
**Recommended:** Prerequisite GEOG 1982 or GEOG 1992 or GEOG 2002 or GEOG 2412 or WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Geography

**WGST 3701 (3) Topics in U.S. Gender and Sexuality Studies (AH)**
Examines selected topics in women, gender and sexuality in the arts and humanities, from a U.S. perspective.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WGST 3702 (3) Topics in U.S. Gender and Sexuality Studies (SS)**
Examines selected topics in women, gender and sexuality in the social sciences, from a U.S. perspective.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3711 (3) Topics in Global Gender and Sexuality Studies (AH)**
Examines selected topics in women, gender and sexuality in the arts and humanities, from a global perspective.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WGST 3712 (3) Topics in Global Gender and Sexuality Studies (SS)**
Examines selected topics in women, gender and sexuality in the social sciences, from a global perspective.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors).
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 3750 (3) Women in Buddhism**
Explores diverse representations of the female in Buddhist literature and the social realities of actual women in Asian historical contexts. Through case studies that traverse Buddhist Asia, we delve into monastic views of the female body, philosophical analyses of the emptiness of gender, idealized images of the feminine in Buddhist tantra and contemporary issues such as the nun's revival moment.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 3750
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Religioius Studies
Departmental Category: Asia Content

**WGST 3767 (3) Feminist Fictions**
Examines a series of literary texts to consider how writers across the world have used fiction to creatively stage and reimagine gender and sexuality. Attends to the formal and narrative techniques by which these texts call attention to the fictionality, and thereby the creative malleability, of gender itself. Some cinematic and performance texts will also be included.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 3767
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: English

**WGST 3800 (3) Advanced Writing in Feminist Studies**
Offers expository writing and training in analytical and descriptive skills, structures or argument, critical thinking, the rhetoric of persuasion, and the development of a personal voice. Readings and papers focus on basic issues in gender studies.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Written Communication-Upper

**WGST 3930 (1-6) Women and Gender Studies Internship**
Provides field experience in local and national government and non-governmental agencies focusing on women and gender-related issues. Supervision by approved field instructors. Students must relate their academic experience to their field work experience though a portfolio and a final paper. Department enforced prerequisite: 6 hours of course work in Women and Gender Studies and 30 cumulative credit hours.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.

**WGST 3940 (1) Practicum in Women and Gender Studies**
Enriches the academic experience of majors and minors within Women and Gender Studies. Usually will combine readings from books with lectures and discussions, community outreach and in-house publications spanning the interdisciplinary focus of the department.
**Repeatable:** Repeatable for up to 4.00 total credit hours.
**Requisites:** Restricted to Womens Studies (WGST) majors or minors only.

**WGST 4001 (3) Advanced Topics in Gender and Sexuality Studies (AH)**
Provides an advanced interdisciplinary course organized around a specific issue in the arts and humanities relating to gender and sexuality.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 5001
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WGST 4002 (3) Advanced Topics in Gender and Sexuality Studies (SS)**
Provides an advanced interdisciplinary course organized around a specific issue in the social sciences relating to gender and sexuality.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 5002
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 4010 (3) Gender, Genocide and Mass Trauma**
Studies the persistence of genocide and the effects of mass trauma on women and girls. Within the framework of political and social catastrophe, examines cataclysmic world events and the traumatic consequences for women of religious persecution, colonialism, slavery and the genocides of the 20th and 21st centuries.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4000
**Recommended:** Prerequisite SOCY 1016 or WGST 1016 or WGST 2000 or SOCY 3314 or WGST 3314.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sociology

**WGST 4016 (3) Sex, Gender and Society 2**
Studies status and power differences between the sexes at individual, group and societal levels. Examines empirically established sex differences and reviews biological, psychological and sociological explanations for gender differences.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4016
**Requisites:** Requires a prerequisite course of SOCY 1016 or WGST 1016 or WGST 2000 (minimum grade D-). Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sociology

**WGST 4073 (3) Performing Voices of Women**
Explores theories underlying the "feminine voice," varied perspectives in prose and poetry, ways of embodying these voices and perspectives in performance forms and ultimately the students' own voices through creation of autobiographical performance pieces (some to be presented for student audiences). Open to both men and women.
**Equivalent - Duplicate Degree Credit Not Granted:** THTR 4073
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Theatre

**WGST 4086 (3) Family and Society**
Studies the changing relationship between family and social structure. Examines variations in family organization and considers political, social, ideological, demographic and economic determinants of family formation.
**Equivalent - Duplicate Degree Credit Not Granted:** SOCY 4086
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite SOCY 3001.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: Sociology

**WGST 4100 (3) Indigenizing Feminism: Literature, Art, Film**
Through analysis of literature and films by Indigenous and non-Indigenous writers and filmmakers, this course explores issues of gender in Indigenous communities in the Americas, gender and power distribution within Indigenous communities, related national and global politics, legal and economic systems, migration, and environmental issues, among other topics. This course also studies how colonization and the imposition of patriarchy has transformed Indigenous societies by diminishing the power, status, and material circumstances of Indigenous women.
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WGST 4200 (3) Religion and Reproductive Politics in the United States**
Focuses primarily on how Protestant, Catholic, and Jewish conversations about sexuality and reproduction have shaped access and attitudes towards reproductive health in the US over the course of the twentieth and twenty-first centuries.
**Equivalent - Duplicate Degree Credit Not Granted:** JWST 4200, WGST 5200 and JWST 5200
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-U.S. Perspective

**WGST 4277 (3) Special Topics in Women Writers**
This course focuses on a special topic or issue in works written by women. Topics vary by semester, and may focus on a particular historical period or literary genre. Students may consider writing by women as itself a genre, asking what unites these works in terms of both subject and style. Check department description for details.
**Equivalent - Duplicate Degree Credit Not Granted:** ENGL 4277
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WGST 4287 (3) Special Topics in Queer Literature**
This course will focus on a special topic in queer literature and non-normative genders and sexualities. Students will consider how literature reflects and represents understandings of sexuality, gender, desire, and more; the course may engage a variety of genres. Topics vary by semester. Check department description for details.
**Equivalent - Duplicate Degree Credit Not Granted:** LGBT 4287 and ENGL 4287
**Repeatable:** Repeatable for up to 9.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WGST 4300 (3) Sex, Power, Politics: International Perspectives**
Studies the commercial trade of sexual labor in the global economy, examining theories and assumptions about sexual-economic exchanges and gendered and racialized relations of power in the sex trade. Emphasizes prostitution.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite WGST 2600 or WGST 3100.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 4301 (3) Gender, Race and Immigration in Germany and Europe**
Introduces students to debates surrounding migration and race in contemporary Germany with comparisons to other European contexts. Emphasis on reading texts in context using tools of cultural studies, integrating analyses of gender, race, nation, and sexuality. Texts may include film, literature, television, social media, news media, political posters, etc. Topics include: race and racisms, Black and women of color feminisms, Roma feminisms, Muslim feminisms, notions of integration and citizenship, and more. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** GRMN 4301 and AHUM 4301 and GRMN 5301
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: German

**WGST 4331 (3) Gender, Race, Class, and Sexuality in Popular Culture**
Studies the construction, interconnections, and replications of gender, race, class and sexuality in popular culture and how these constructs become cultural norms and mores. Uses critical methods with a focus on producing responsible viewers and readers.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WGST 4400 (3) Critical Inquiries in Transgender Studies**
Examines theories, methods and debates in the emerging field of transgender studies. Drawing on interdisciplinary perspectives, this course examines transgender identities, communities and political movements in different historical and cultural contexts. Focuses on crosscutting issues that shape transgender subjectivities, with special attention given to how transgender movements negotiate race, class, sexuality, labor, culture and nation.
**Equivalent - Duplicate Degree Credit Not Granted:** LGBT 5400 and LGBT 4400 and WGST 5400
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Distribution-Social Sciences
Departmental Category: LGBT Studies

**WGST 4471 (3) Women in 20th-21st Century Russian, East European and Eurasian Cultures**
Examines issues facing women in 20th-21st century Russia, East Europe, Caucasus and Central Asia, based on study of current events, history, literature, posters and film. Studies images of women as Amazons and rebels, salon hostesses and poets, New Soviet Women and women in combat, prostitutes and mothers. Taught in English.
**Equivalent - Duplicate Degree Credit Not Granted:** REES 4471 and REES 5471
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Recommended:** Prerequisite lower level literature or culture course.
**Additional Information:** Arts Sci Core Curr: Human Diversity
Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: Russian

**WGST 4500 (3) Gender Politics and Global Activism**
Addresses the problems and challenges women face around the world and the ways in which women have mobilized to address them. Explores political activism at the local, national, regional and global levels. Focuses on different forms of activism, including strategies aimed at working with and within governmental institutions, as well as outside and against them.
**Equivalent - Duplicate Degree Credit Not Granted:** PSCI 4391
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Social Sciences

**WGST 4619 (3) Women in East Asian History**
Considers major issues in the history of women in East Asia (China, Korea, Japan) in the 17th through 20th centuries. Focuses on gender roles in Asian family, state and cultural systems. Topic varies in any given semester.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4619 and HIST 5619
**Requisites:** Restricted to students with 27-180 credits (Sophomores, Juniors or Seniors) only.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Arts Sci Gen Ed: Diversity-Global Perspective
Departmental Category: History
Departmental Category: Asia Content

**WGST 4636 (3) Lesbian and Gay History: Culture, Politics, and Social Change in the U.S.**
Considers current theoretical approaches to the history of sexuality and traces the changing meaning of same-sex sexuality in the U.S. through investigation of lesbian and gay identity formation, community development, politics, and queer cultural resistance.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4636 and HIST 5636
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Recommended:** Prerequisite HIST 1015 or HIST 1025 or LGBT 2000 or WGST 2000 or WGST 2600.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WGST 4640 (3) Women, Gender and War**
Study of how women experience war, how the structure, practice and memory of war, and the rights and obligations of military service (masculinity and femininity) are structured by the gender system.
**Equivalent - Duplicate Degree Credit Not Granted:** HIST 4640
**Recommended:** Prerequisite HIST 1015 or HIST 1020 or HIST 1025 or HIST 1123 or HIST 1628 or HIST 1708.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: History

**WGST 4800 (3) Senior Colloquium in Feminist Studies**
Provides students with the opportunity to actively reflect on their education and to complete a research project that incorporates an interdisciplinary and feminist approach to the study of gender, class, race, ethnicity and sexuality. Offered each spring.
**Requisites:** Requires prerequisite courses of (WGST 2000 or WGST 2600) and (WGST 3020 or WGST 3100) (all minimum grade C-). Restricted to students with 87-180 credits (Senior, Fifth Year Senior) Womens Studies (WGST) majors or minors only.

**WGST 4840 (1-6) Independent Study**
Department enforced prerequisite: over minimum GPA of 3.3.
**Repeatable:** Repeatable for up to 7.00 total credit hours.

**WGST 4850 (3) Gender in Hagiography**
Explores gendered ideals of sainthood in medieval hagiographic literature. We draw primarily from the lives of female mystics in Buddhist and Christian sources and also examine the construction of mendicant masculinities. Reading from an array of primary sources, we query the category of mysticism and ask why visionary experience has so often been gendered female.
**Equivalent - Duplicate Degree Credit Not Granted:** RLST 4850 and RLST 5850
**Grading Basis:** Letter Grade
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities
Departmental Category: Religioius Studies

**WGST 4950 (3) Honors Research**
For qualified Women and Gender Studies majors working on the research phase of departmental honors. Department enforced prerequisite: overall GPA of 3.3.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sciences Honors Course

**WGST 4999 (1-3) Senior Honors Thesis**
Qualified Women and Gender Studies majors may write an honors thesis, an in-depth research paper, on a topic of choice. Thesis hours available to majors only after successfully completing the research phase.
**Requisites:** Restricted to Womens Studies (WGST) majors only.
**Additional Information:** Arts Sciences Honors Course

**WGST 5001 (3) Advanced Topics in Gender ad Sexuality Studies (AH)**
Provides and advanced interdisciplinary course organized around a specific issue in the social sciences relating to gender and sexuality.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4001
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite WGST 2000 or WGST 2600.

**WGST 5002 (3) Advanced Topics in Gender and Sexuality Studies (SS)**
Provides an advanced interdisciplinary course organized around a specific issue in the arts and humanities relating to gender and sexuality.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 5002
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Recommended:** Prerequisite WGST 2000 or WGST 2600.

**WGST 5200 (3) Religion and Reproductive Politics in the United States**
Focuses primarily on how Protestant, Catholic, and Jewish conversations about sexuality and reproduction have shaped access and attitudes towards reproductive health in the US over the course of the twentieth and twenty-first centuries.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4200, JWST 4200, JWST 5200

**WGST 5400 (3) Critical Inquiries in Transgender Studies**
Examines theories, methods and debates in the emerging field of transgender studies. Drawing on interdisciplinary perspectives, examines transgender identities, communities and political movements in different historical and cultural contexts. Focuses on crosscutting issues that shape transgender subjectivities, with special attention given to how transgender movements negotiate race, class, sexuality, labor, culture and nation.
**Equivalent - Duplicate Degree Credit Not Granted:** WGST 4400 and LGBT 4400 and LGBT 5400
**Grading Basis:** Letter Grade
**Additional Information:** Departmental Category: LGBT Studies

**WGST 6090 (3) Feminist Theories**
Explores how feminist theorists have understood gender and how it interrelates to our understandings of race, ethnicity, sexuality, embodiment and knowledge. Meets the requirements for the WGST certificate.
**Requisites:** Restricted to graduate students only.

**WGST 6190 (3) Feminist Methodology**
Explores feminist methodology across a range of disciplines. Themes include experience and interpretation, the social position of the researcher, language and argument structure, knowledge and power, bias and objectivity, and the ethics and politics of research. Meets the requirements for the WGST certificate.
**Requisites:** Restricted to graduate students only.

**WGST 6290 (3) Special Topics in Gender and Sexuality Studies**
Offers interdisciplinary feminist perspectives on different special topics such as gender and war, gender and globalization, women's social movements, gender and citizenship, gender and collective memory, and cultural representations of gender and sexuality. Meets the requirements for the WGST certificate.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to graduate students only.

**WGST 6796 (3) Queer Theories**
Explores key concepts and debates in the field of queer theory with an interdisciplinary focus on crosscutting issues (aesthetic, cultural, legal, medical, political and social) that shape queer subjectivities, practices and relations.
**Requisites:** Restricted to graduate students only.

**WGST 6840 (1-3) Independent Study in Gender and Sexuality Studies**
Provides course credit for an independent directed research project or advanced reading program on an area of concentration within gender and sexuality studies. Requires an independent study agreement form completed by the student in collaboration with a WGST faculty advisor and signed by the faculty advisor. Requires approval by WGST graduate studies director.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**WGST 6949 (1) Master's Candidate for Degree**
Registration intended for students preparing for a thesis defense, final examination, culminating activity, or completion of degree.
**Requisites:** Restricted to Master of Arts in Gender and Sexuality Studies graduate students only. (GSXS-MA)

**WGST 6959 (1-6) Master's Thesis in Gender and Sexuality Studies**
Registration intended for students conducting a project of original research that culminates in a master¿s level thesis and oral defense. Required of every master¿s degree candidate under the thesis plan of study option.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Master of Arts in Gender and Sexuality Studies graduate students only. (GSXS-MA)

**WGST 6969 (1-6) Master¿s Practicum in Gender and Sexuality Studies**
Registration intended for students conducting paid or unpaid work at an agency, organization, or project relevant to gender and sexuality studies that culminates in a paper detailing and analyzing the work achieved and an oral defense. Required of every master¿s degree candidate under the practicum plan of study option.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to Master of Arts in Gender and Sexuality Studies graduate students only. (GSXS-MA)

# Writing and Rhetoric (WRTG)

## Courses

**WRTG 1100 (4) Extended First-Year Writing and Rhetoric**
Extended version of WRTG 1150 intended for students desiring more preparation and practice in college writing. Meets the same goals and fulfills the same requirements as WRTG 1150. Includes one-hour recitation for small group work. Focuses on rhetorical analysis, argument, inquiry and information literacy. Taught as a writing workshop, the course emphasizes practicing strategies for all phases of the writing process. For placement criteria, see the arts and sciences advising office.
**Repeatable:** Repeatable for up to 8.00 total credit hours.
**Additional Information:** GT Pathways: GT-CO2 - Communication
Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Lower
MAPS Course: English

**WRTG 1150 (3) First-Year Writing and Rhetoric**
Rhetorically informed introduction to college writing. Focuses on rhetorical analysis, argument, inquiry and information literacy. Taught as a writing workshop, the course emphasizes practicing writing strategies for all phases of the writing process. For placement criteria, see the arts and sciences advising office.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** GT Pathways: GT-CO2 - Communication
Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Lower
MAPS Course: English

**WRTG 1160 (3) CMCI First-Year Writing and Rhetoric**
Rhetorically informed introduction to college writing for CMCI students enrolled in CMCI 1040. Focuses on rhetorical analysis, argument, inquiry, and information literacy. Taught as a writing workshop, the course emphasizes practicing writing strategies for all phases of the writing process.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to College of Communication, Media, Design and Information (CMDI) undergraduate students only.
**Additional Information:** GT Pathways: GT-CO2 - Communication
Arts Sci Gen Ed: Written Communication-Lower

**WRTG 1250 (3) Advanced First-Year Writing and Rhetoric**
Advanced version of WRTG 1150 intended for more experienced writers, this course meets the same goals and fulflls the same requirements as WRTG 1150 but at a more challenging level. Focuses on rhetorical analysis, argument, inquiry, and information literacy. Taught as a writing workshop, the course emphasizes practicing writing strategies for all phases of the writing process. For placement criteria, see the arts and sciences advising office.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Additional Information:** GT Pathways: GT-CO2 - Communication
Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Lower
MAPS Course: English

**WRTG 1840 (1-3) Independent Study in Writing**
**Repeatable:** Repeatable for up to 8.00 total credit hours.

**WRTG 2000 (3) Information and Society**
In an information economy, few skill sets are as fundamental to our civic, economic, and environmental well-being as information literacy. This writing course will train students to produce, categorize, and analyze information in academic and real-world contexts. In addition to information literary, we will examine the writing thresholds and habits of mind conducive to the effective uses of information. Through extensive use of digital technologies, students will equally cultivate the skills of digital literacy.
**Recommended:** Prerequisite WRTG 1150 or equivalent.

**WRTG 2020 (3) Introduction to Creative Nonfiction**
Explores from both the reader's and writer's perspectives the forms of creative nonfiction, including personal essay and memoir. Students will read and write extensively within this genre, develop skill in revision and peer critique and learn how to submit work for publication. Does not fulfill core requirements. Department enforced prerequisite: WRTG 1150 or equivalent (completion of lower-division writing requirement).

**WRTG 2090 (3) Electives in Writing**
Explores a variety of academic and professional writing genres, ranging from research to technical writing, in intensive workshops. Students read and write extensively across genres. Check with program for semester offerings. Designed for self-motivated students in all majors. Does not fulfill core requirements. Department enforced prereq., WRTG 1150 or equivalent (completion of lower-division writing requirement)
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**WRTG 2095 (3) Ideas for Social Change**
Introduces key concepts and practices central to understanding historical and contemporary social movements in the U.S. Grounded in theories about discourse, bodies, culture, and power, the course is taught through various frameworks such as intersectionality, rhetoric, critical race theory, feminism, queer studies, decolonial studies, and/or LGTBQ+ studies. Students will discover, identify, and analyze social issues of significance to them; practice developing their own visions for social change; and present their visions in public-facing multi-modal genres. Formerly offered as a special topics course.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WRTG 2930 (1-6) Internship in Writing and Rhetoric**
Provides academically supervised opportunity for undergraduate students to engage in writing and rhetoric as a practical and productive art. Students may work in a variety of organizations (public/government/civic/private) on writing-intensive projects related to their career goals, and thereby connect classroom theory to real-world practice. Prior approval of PWR internship coordinator required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** This course is restricted to students with 30 credits (Sophomores) with a 3.0 cumulative GPA.

**WRTG 3007 (3) Writing in the Visual Arts**
Enables students in the arts to improve their writing skills through organization, presentation, critique and revision. Writing assignments include formal writing (analysis and argument), informal writing and grant proposals. Department enforced prerequisite: WRTG 1150 or equivalent (completion of lower-division writing requirement).
**Requisites:** Restricted to students with 57-180 credits (Junior or Senior) AAAH or FILM/FMST or AASA or AASF or THTR or TBFA or DNCE or DBFA or AMST or ARCH or ATLS or BASA or CLAS or DSGN or ETHN or JADV or MDST or RLST or TMEN or EDUC majors only.
**Additional Information:** GT Pathways: GT-CO3 - Communication: Advanced Writing Course
Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**WRTG 3010 (3) Technology, Rhetoric and the Self in Contemporary Life**
Weaves theories of rhetoric with theories of information, data, and technology to investigate how digital information systems mediate contemporary ways of knowing and being in everyday life. Through seminar discussions and a suite of public facing assignments, students will have opportunities to question their own roles in information networks, critique systems of power, and enter into contemporary debates about the overlaps of data, media, and ethics.
**Additional Information:** Arts Sci Gen Ed: Distribution-Arts Humanities

**WRTG 3020 (3) Topics in Writing**
Through sustained inquiry into a selected topic or issue, students will practice advanced forms of academic writing. Emphasizes analysis, criticism and argument. Taught as a writing seminar, places a premium on substantive, thoughtful revision. Department enforced prerequisite: WRTG 1150 or equivalent (completion of lower-division writing requirement).
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students w/ 57-180 credits (Jr or Sr) in AS (ARSCU), College of Media, Comm Info (CMCIU) or School of Ed (EDUCU) or Business (BUSNU) or Comp Sci Bachelor of Arts (CSEN-BA) or Prog in Env Design (ARPLU) or College of Music (MUSC) only.
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**WRTG 3030 (3) Writing on Science and Society**
Through selected reading and writing assignments, students consider ethical and social ramifications of science policy and practice. Focuses on critical thinking, revision, analytical writing, and oral presentation. Taught as a writing seminar, the course addresses communication with professional and non-technical audiences.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits in Engineering, MCDB, EBIO, GEOL, ASTR, IPHY, PHYS, MATH, ECON, BCHM, CHEM, PSYC, NRSC, EDUC, ATOC, GEOG, CSCI or Program in Env Des (ARPLU) majors only.
**Additional Information:** GT Pathways: GT-CO3 - Communication: Advanced Writing Course
Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**WRTG 3035 (3) Technical Communication and Design**
Rhetorically informed introduction to technical writing that hones communication skills in the context of technical design activities. Treats design as a collaborative, user-oriented, problem-based activity, and technical communication as a rhetorically informed and persuasive design art. Taught as a writing seminar emphasizing critical thinking, revision, and oral presentation skills. Focuses on client-driven design projects and effective communication with multiple stakeholders.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** GT Pathways: GT-CO3 - Communication: Advanced Writing Course
Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**WRTG 3040 (3) Writing on Business and Society**
Through selected reading and writing assignments, students examine ethical and social issues in the context of business decision-making processes. Focuses on critical thinking, revision, analytical writing and oral presentation. Taught as a writing seminar, the course emphasizes effective communication with professional and non-technical audiences. Department enforced prerequisite: WRTG 1150 or equivalent (completion of lower-division writing requirement).
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Core Curr: Written Communication
Arts Sci Gen Ed: Written Communication-Upper

**WRTG 3045 (3) Writing for Emerging Workplaces**
A rhetorically-informed professional writing course addressing key competencies needed in emerging workplaces. Intended for juniors and seniors from a wide range of majors who anticipate working in communication-intensive capacities. Taught as a writing seminar inspired by design thinking, with a focus on prototyping, revision, critical thinking, and collaborative engagement. Key topics: the future of work, rapid prototyping of career options, proposal writing, writing for policy debates, data analysis and visualization, report writing, and advanced oral presentation and multimedia skills. Satisfies A&S Upper-Division Written Communication requirement.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Written Communication-Upper

**WRTG 3070 (3) Advocating with Data**
Teaches how to use data and data-driven arguments to advocate for change on issues of concern. Via rhetorical and other critical frameworks, explores definitions of data and its relations to power, publics, and justice. Students will produce persuasive texts, including multimodal texts and data visualizations, intended for real-world advocacy and publication in a variety of media and genres. Taught as a writing workshop, with a focus on revision, critical thinking, and collaborative engagement.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).
**Additional Information:** Arts Sci Gen Ed: Written Communication-Upper
Arts Sci Gen Ed: Distribution-Arts Humanities

**WRTG 3090 (1-3) Open Topics in Writing: Advanced**
Advanced topics course providing intensive, specialized writing instruction in selected topics. Check with the program for semester offerings. Does not fulfill core requirements. Department enforced prerequisite: WRTG 3007 or WRTG 3020 WRTG 3030 or WRTG 3035 or WRTG 3040 or instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors).

**WRTG 3095 (3) Journal Publishing**
Offers hands-on publishing experience that enable students to hone multiple skills related to but not limited to writing, editing, and production. Students work on staff of two annual journals of creative nonfiction sponsored by the Program for Writing and Rhetoric, currently Hindsight and Changing Skies. Students collaborate with other staff members to bring a print issue from acquisitions through editing, into digital compositing and final proofreading, to print production and ¿launch¿ with public readings from both students and global writers. Students also gain experience publishing online-only features for both journals, videos, podcasts, and creative nonfiction in all its forms. This course may be repeated up to 6 total credit hours.
**Repeatable:** Repeatable for up to 6.00 total credit hours.

**WRTG 3400 (3) Race and Epistemic Justice**
This course will study the visual construction of race in the United States from the slavery era to the digital age. Through analyses of diverse media (photography, cinema, television, and digital platforms), we will interrogate testimony, witnessing, and visual self-creation as long-standing forms of political agency in the United States. Finally, we will test the hypothesis that epistemic justice ¿ equal treatment of one another as knowers and documenters ¿ is an inseparable component of racial justice.
**Equivalent - Duplicate Degree Credit Not Granted:** AHUM 3400

**WRTG 3840 (1-3) Independent Study**
Department enforced prerequisite: WRTG 3007 or WRTG 3020 or WRTG 3030 or WRTG 3035 or WRTG 3040 or instructor consent required.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.

**WRTG 3930 (1-6) Internship in Writing and Rhetoric**
Provides academically supervised opportunity for undergraduate students to engage in writing and rhetoric as a practical and productive art. Students may work in a variety of organizations (public/government/civic/private) on writing-intensive projects related to their career goals, and thereby connect classroom theory to real-world practice. Prior approval of PWR internship coordinator required.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** This course is restricted to students with 57 credits (Juniorss) with a 3.0 cumulative GPA.

**WRTG 4910 (1-3) Portfolio Curation in Writing and Rhetoric**
Provides academically supervised opportunity for undergraduate students to curate, reflect on and synthesize their learning over a range of courses through the production of an electronic portfolio. One credit hour required of students seeking the Interdisciplinary Writing Certificate. Approval of PWR Certificate coordinator required prior to registration.
**Repeatable:** Repeatable for up to 6.00 total credit hours.
**Requisites:** Restricted to students with 57-180 credits (Juniors or Seniors). Requires cumulative GPA of 3.0 or higher.

**WRTG 5050 (3) Graduate Studies in Writing and Rhetoric**
Special topics and methods course in composition theory, research and pedagogy. Topics vary by semester.
**Repeatable:** Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

**WRTG 5840 (1-3) Independent Study-Writing & Rhetoric**
Independent study.
**Repeatable:** Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
**Requisites:** Restricted to graduate students only.

# Yiddish (YIDD)

## Courses

**YIDD 1010 (4) Beginning Yiddish 1**
Introduces students to speaking, listening, reading, and writing skills in the historic language of Ashkenazic Jewry. Uses grammar as point of departure for development of oral skills.
**Additional Information:** Departmental Category: Yiddish

**YIDD 1020 (4) Beginning Yiddish 2**
Continuation of YIDD 1010. Department enforced prerequisite: YIDD 1010 (minimum grade C-).
**Additional Information:** Departmental Category: Yiddish

**YIDD 2010 (4) Intermediate Yiddish 1**
Review and continuation of skills begun in the first year: reading, writing, speaking and oral comprehension. Provides an intensive introduction to cultural and literary texts of central and eastern European Jewish culture. Department enforced prerequisite: YIDD 1020 (minimum grade C-).
**Additional Information:** Departmental Category: Yiddish

# FACULTY A-Z

To view faculty listed by department, visit the department's landing page in the catalog and look for the "Faculty" tab.

## A

Aaholm, Philip
Professor Emeritus: Music

Aaronson, Norman F. (https://experts.colorado.edu/display/fisid_100377/)
Professor Emeritus: School of Law
JD, Boston University

Abbott, Lois A.
Senior Instructor Emerita: Molecular, Cellular & Developmental Biology (MCDB)

Abbott, Lon D. (https://experts.colorado.edu/display/fisid_145044/)
Teaching Professor of Distinction: Geological Sciences; Faculty Director: International Education
PhD, University of California, Santa Cruz

Abdala-Mesa, Yohainna
Assistant Teaching Professor: Spanish and Portuguese
PhD, Université de Toulouse II Le Mirail (France)

Abdalati, Waleed (https://experts.colorado.edu/display/fisid_145800/)
Professor: Geography
PhD, University of Colorado Boulder

Abiragi, Anthony A. (https://experts.colorado.edu/display/fisid_147611/)
Assistant Teaching Professor: Program for Writing and Rhetoric
PhD, New York University

Ablowitz, Mark J. (https://experts.colorado.edu/display/fisid_100691/)
Distinguished Professor: Applied Mathematics
PhD, Massachusetts Institute of Technology

Acevedo-Muñoz, Ernesto R. (https://experts.colorado.edu/display/fisid_113061/)
Professor: Cinema Studies & Moving Image Arts
PhD, University of Iowa

Ackerman, John Martin (https://experts.colorado.edu/display/fisid_144951/)
Associate Professor: Program for Writing and Rhetoric; Professor: Communication
PhD, Carnegie Mellon University

Ackland, Len (https://experts.colorado.edu/display/fisid_103930/)
Professor Emeritus: Journalism
MA, Johns Hopkins University

Acuna, Daniel (https://experts.colorado.edu/display/fisid_172426/)
Associate Professor: Computer Science
PhD, University of Minnesota Twin Cities

Adams, Heather L. (https://experts.colorado.edu/display/fisid_143714/)
Associate Chair, Faculty Director, Senior Instructor: Leeds School of Business; Senior Instructor: Continuing Education & Professional Studies
PhD, University of Maryland, College Park

Adams, Sharon Mar (https://experts.colorado.edu/display/fisid_139709/)
Instructor: Farrand RAP

Adams, William (https://experts.colorado.edu/display/fisid_103612/)
Professor: Ecology and Evolutionary Biology
PhD, Australian National University

Adler, Edward Scott (https://experts.colorado.edu/display/fisid_108903/)
Dean: Graduate School; Professor: Political Science
PhD, Columbia University

Adler, Patricia A.
Professor Emerita: Sociology

Affrunti, Andrew J. (https://experts.colorado.edu/display/fisid_149937/)
Instructor: Mechanical Engineering
MSEE, University of Illinois at Urbana–Champaign

Agocs, Fruzsina
Assistant Professor: Computer Science
PhD, University of Cambridge

Aguliera, Arthur (https://experts.colorado.edu/display/fisid_164519/)
Assistant Professor: University Libraries
MLS, University of Washington

Ahmed, Alaa A. (https://experts.colorado.edu/display/fisid_144736/)
Professor: Mechanical Engineering; Assistant Professor: Biomedical Engineering
PhD, University of Michigan

Ahmed, Nisar R. (https://experts.colorado.edu/display/fisid_153237/)
Associate Professor, Associate Professor: Computer Science; Director: Aerospace Engineering Sciences
PhD, Cornell University

Ahn, Natalie (https://experts.colorado.edu/display/fisid_106044/)
Distinguished Professor: Biochemistry
PhD, University of California, Berkeley

Akos, Dennis M. (https://experts.colorado.edu/display/fisid_131119/)
Professor: Aerospace Engineering Sciences; Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, Ohio University

Albert, Michelle A. (https://experts.colorado.edu/display/fisid_134708/)
Associate Teaching Professor: Program for Writing and Rhetoric; Senior Instructor: Continuing Education & Professional Studies
MFA, Naropa Institute

Aldama, Arturo James (https://experts.colorado.edu/display/fisid_130739/)
Associate Professor, Chair: Ethnic Studies
PhD, University of California, Berkeley

Aldama, Dulce
Assistant Professor: University Libraries
PhD, University of Colorado

Alexander, Katherine Laura Bos (https://experts.colorado.edu/display/fisid_157674/)
Assistant Professor: Asian Languages and Civilizations
PhD, University of Chicago

Alhadeff, Albert (https://experts.colorado.edu/display/fisid_100711/)
Associate Professor: Art and Art History
PhD, New York University

Ali, Aun Hasan (https://experts.colorado.edu/display/fisid_155948/)
Assistant Professor: Religious Studies
PhD, McGill University

Ali, Hisham (https://experts.colorado.edu/display/fisid_168718/)
Assistant Professor: Aerospace Engineering Sciences
PhD, Georgia Institute of Technology

Alistar, Mirela (https://experts.colorado.edu/display/fisid_164177/)
Assistant Professor: ATLAS Institute; Assistant Professor: Computer Science; Assistant Professor: Biomedical Engineering; Assistant Professor: Creative Technology & Design
PhD, Technical University of Denmark

Allen, David (https://experts.colorado.edu/display/fisid_114466/)
Teaching Associate Professor: Psychology and Neuroscience; Lecturer: Continuing Education & Professional Studies
PhD, University of California, Los Angeles

Allen, Mary Ann (https://experts.colorado.edu/display/fisid_149077/)
Research Associate Professor: Biomedical Engineering
PhD, University of Colorado Boulder

Allmendinger, Katerina (https://experts.colorado.edu/display/fisid_165581/)
Teaching Assistant Professor: University Libraries
MLS, University of Denver

Alpern, Herbert P.
Professor Emeritus: Psychology and Neuroscience

Alpern, Tyler J. (https://experts.colorado.edu/display/fisid_115381/)
Senior Instructor: Libby Arts RAP
MFA, University of Colorado Boulder

Alston, Eric Christopher (https://experts.colorado.edu/display/fisid_158159/)
Scholar in Residence: Leeds School of Business
JD, University of Chicago

Amadei, Bernard (https://experts.colorado.edu/display/fisid_105978/)
Professor Emeritus: Civil, Environmental and Architectural Engineering
PhD, University of California, Berkeley

Ambler, Catherine
Assistant Teaching Professor: Engineering, Ethics & Society
PhD, Columbia University

Ambler, Wayne (https://experts.colorado.edu/display/fisid_127519/)
Associate Professor Emeritus: Engineering, Ethics & Society
PhD, Boston College

Ambrose, Kirk T. (https://experts.colorado.edu/display/fisid_115914/)
Professor: Art and Art History; Professor: Critical Media Practices; Professor: Classics; Faculty Director: Academic Affairs
PhD, University of Michigan Ann Arbor

Amerika, Mark (https://experts.colorado.edu/display/fisid_116523/)
Professor: Art and Art History; Faculty Director: College of Media, Communication & Information; Professor: Intermedia Art, Writing and Performance
MFA, Brown University

Amram, Tess
Teaching Assistant Professor: University Libraries
MLIS, Drexel University

Amy, Gary L.
Professor Emeritus: Civil, Environmental and Architectural Engineering

Anaya, S. James (https://experts.colorado.edu/display/fisid_157985/)
Distinguished Professor, Endowed/Named Professor: School of Law
JD, Harvard Law

Anderman, Elizabeth (https://experts.colorado.edu/display/fisid_144257/)
Senior Instructor, Associate Faculty Director: Farrand RAP
PhD, University of Colorado Boulder

Anderson, Brandon (https://experts.colorado.edu/individual/fisid_148082/)
Teaching Assistant Professor: Environmental Design
MArch, Texas Tech University

Anderson, Dana Z. (https://experts.colorado.edu/display/fisid_102371/)
Professor: Physics; Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, University of Arizona

Anderson, Fred W. (https://experts.colorado.edu/display/fisid_104273/)
Professor Emeritus: History
PhD, Harvard University

Anderson, Kenneth M. (https://experts.colorado.edu/display/fisid_113566/)
Chair, Professor: Computer Science; Faculty Director: College of Engineering and Applied Science
PhD, University of California, Irvine

Anderson, Robert S. (https://experts.colorado.edu/display/fisid_130117/)
Distinguished Professor: Geological Sciences
PhD, University of Washington

Anderson, Suzanne Prestrud (https://experts.colorado.edu/display/fisid_131099/)
Professor: Institute of Arctic & Alpine Research (INSTAAR); Professor: Geological Sciences
PhD, University of California, Berkeley

Anderson, Virginia D. (https://experts.colorado.edu/display/fisid_100365/)
Professor Emerita: History
PhD, Harvard University

Andersson, Krister Par (https://experts.colorado.edu/display/fisid_140076/)
Faculty Director, Professor: Institute of Behavioral Science (IBS)
PhD, Indiana University Bloomington

André, Quentin (https://experts.colorado.edu/display/fisid_166737/)
Assistant Professor: Leeds School of Business
PhD, INSEAD (France)

Andrews, Thomas G. (https://experts.colorado.edu/display/fisid_149881/)
Professor: History
PhD, University of Wisconsin–Madison

Angel, George
Lecturer: Engineering Management Program
BS, University of Albuquerque

Angiolillo, Albert
Assistant Teaching Professor: Integrative Physiology
MS, University of Colorado Boulder

Anseth, Kristi S. (https://experts.colorado.edu/display/fisid_103471/)
Distinguished Professor: Chemical and Biological Engineering; Distinguished Professor: Molecular, Cellular & Developmental Biology (MCDB); Associate Faculty Director: Biofrontiers Institute
PhD, University of Colorado Boulder

Antman, Francisca Marie (https://experts.colorado.edu/display/fisid_144606/)
Professor: Economics
PhD, Stanford University

Antoniak, Maria
Visiting Assistant Professor: Computer Science
Ph.D., Cornell University

Appelö, Daniel E. (https://experts.colorado.edu/display/fisid_159438/)
Assistant Professor Adjunct: Applied Mathematics
PhD, KTH Royal Institute of Technology (Sweden)

Appenzeller, William
Professor Emeritus: Leeds School of Business

Aragon, Manuel
Lecturer: Cinema Studies & Moving Image Arts
BFA, New York University

Arch, Joanna (https://experts.colorado.edu/display/fisid_147415/)
Professor: Psychology and Neuroscience
PhD, University of California, Los Angeles

Ardizzoni, Michela (https://experts.colorado.edu/display/fisid_145152/)
Associate Professor, Associate Chair: French & Italian; Associate Professor: College of Media, Communication & Information; Assistant Professor, Director: Media Studies
PhD, Indiana University Bloomington

Arehart, Joseph Hoberg (https://experts.colorado.edu/display/fisid_164349/)
Assistant Teaching Professor: Civil, Environmental and Architectural Engineering
BS, University of Colorado Boulder

Arehart, Kathryn H. (https://experts.colorado.edu/display/fisid_105561/)
Professor: Speech, Language and Hearing Sciences (SLHS)
PhD, University of Washington

Argrow, Brian M. (https://experts.colorado.edu/display/fisid_102860/)
Distinguished Professor, Director, Professor: Research & Engineering Ctr for Unmanned Vehicles (RECUV); Faculty Director: College of Engineering and Applied Science; Endowed/Named Professor: Aerospace Engineering Sciences
PhD, University of Oklahoma

Arias, Ernesto G.
Professor Emeritus: Environmental Design

Armstrong, David M.
Professor Emeritus: Ecology and Evolutionary Biology

Arnoult, Nausica Christine (https://experts.colorado.edu/display/fisid_164094/)
Assistant Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, Pierre and Marie Curie University (France)

Arp, Jared (https://experts.colorado.edu/display/fisid_168314/)
Teaching Assistant Professor: Environmental Design
BS, Metropolitan State University

Arquilla, Katya (https://experts.colorado.edu/display/fisid_173943/)
Assistant Professor: Aerospace Engineering Sciences
PhD, University of Colorado

Arthurs, Leilani A. (https://experts.colorado.edu/display/fisid_145087/)
Associate Professor: Geological Sciences
PhD, University of Notre Dame

Arya, Nidhi (https://experts.colorado.edu/display/fisid_150006/)
Teaching Assistant Professor: Asian Languages and Civilizations

Arya, Vischala (https://experts.colorado.edu/display/fisid_176850/)
Assistant Professor: Aerospace Engineering Sciences
PhD, Texas AM University

Asano, Yukiko (https://experts.colorado.edu/display/fisid_168457/)
Teaching Assistant Professor: Asian Languages and Civilizations
PhD, SUNY at Stony Brook

Ashby, Neil
Professor Emeritus: Physics
PhD, Harvard University

Ashcraft, Karen Lee (https://experts.colorado.edu/display/fisid_147453/)
Professor: Communication; Professor: Communication & Society RAP
PhD, University of Colorado Boulder

Ashraf, Asa
Associate Teaching Professor: Computer Science
MS, South Dakota State University

Asirvatham, Margaret (https://experts.colorado.edu/display/fisid_103670/)
Senior Instructor Emerita: Chemistry
PhD, Kansas State University

Atnally, Diane L. (https://experts.colorado.edu/display/fisid_113062/)
Associate Professor Emerita: Classics
PhD, University of Michigan Ann Arbor

Attwa, Mona Farrag (https://experts.colorado.edu/display/fisid_155976/)
Teaching Associate Professor: Asian Languages and Civilizations
MA, American University in Cairo (Egypt)

Auguiste, Reece Luke (https://experts.colorado.edu/display/fisid_149596/)
Chair, Associate Professor, Faculty Director: Critical Media Practices
PhD, University of Nottingham (England)

Aumentado, Jose
Lecturer: Physics
PhD, Northwestern University

Auslander, Bonnie (https://experts.colorado.edu/display/fisid_158273/)
Instructor: Leeds School of Business
MFA, University of Massachusetts

Austin, James R. (https://experts.colorado.edu/display/fisid_103455/)
Professor: Music Education; Professor: Music
PhD, University of Iowa

Auvinen, Karen Marie (https://experts.colorado.edu/display/fisid_106065/)
Lecturer: Continuing Education & Professional Studies; Instructor, Associate Faculty Director: Libby Arts RAP; Lecturer: Sewall RAP
PhD, University of Wisconsin–Milwaukee

Avila, Sara (https://experts.colorado.edu/display/fisid_165935/)
Instructor: Continuing Education & Professional Studies; Instructor: Economics
PhD, National University of Mexico

Axelrad, Penina (https://experts.colorado.edu/display/fisid_100792/)
Distinguished Professor, Endowed/Named Professor: Aerospace Engineering Sciences
PhD, Stanford University

Ayanzadeh, Ramen
Assistant Professor: Computer Science
PhD, University of Maryland

Aydin, Aysegul (https://experts.colorado.edu/display/fisid_143789/)
Associate Professor: Political Science
PhD, SUNY at Binghamton

Aydin, Halil (https://experts.colorado.edu/display/fisid_167398/)
Assistant Professor: Biochemistry
PhD, University of Toronto

Ayer, Steven
Associate Professor: Civil, Environmental and Architectural Engineering
PhD, Pennsylvania State University

# B

Babicz, Martin Charles (https://experts.colorado.edu/display/fisid_147676/)
Teaching Associate Professor: History; Instructor: Libby Arts RAP; Instructor: Communication & Society RAP; Senior Instructor: Sewall RAP
PhD, University of Colorado Boulder

Bacalzo, Dean (https://experts.colorado.edu/display/fisid_172805/)
Teaching Associate Professor: Environmental Design
MSD, Arizona State University

Bachtell, Ryan (https://experts.colorado.edu/display/fisid_146084/)
Associate Professor: Psychology and Neuroscience
PhD, Oregon Health Science University

Baggett, Lawrence W.
Professor Emeritus: Mathematics
PhD, University of Washington Seattle

Baiduc, Rachael (https://experts.colorado.edu/display/fisid_157676/)
Associate Professor: Speech, Language and Hearing Sciences (SLHS)
PhD, University of Washington

Bailey, Dominic (https://experts.colorado.edu/display/fisid_145110/)
Associate Professor: Philosophy; Associate Professor: Classics
PhD, University of Cambridge

Bailey, Karen (https://experts.colorado.edu/display/fisid_164881/)
Assistant Professor: Environmental Studies Program
PhD, University of Florida

Bailey Mollborn, Stefanie Faun (https://experts.colorado.edu/display/fisid_142921/)
Professor: Institute of Behavioral Science (IBS); Professor: Sociology
PhD, Stanford University

Baird, Vanessa Anne (https://experts.colorado.edu/display/fisid_115297/)
Associate Professor: Political Science
PhD, University of Houston-University Park

Baker, Daniel N. (https://experts.colorado.edu/display/fisid_103264/)
Director, Endowed/Named Professor: Research & Innovation Office; Distinguished Professor: Laboratory for Atmospheric and Space Physics (LASP); Distinguished Professor: Astrophysical and Planetary Sciences (APS); Distinguished Professor: Physics
PhD, University of Iowa

Baker, Kyri A. (https://experts.colorado.edu/display/fisid_159754/)
Associate Professor: Civil, Environmental and Architectural Engineering; Assistant Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, Carnegie Mellon University

Balaji, Rajagopalan (https://experts.colorado.edu/display/fisid_118480/)
Professor, Associate Chair: Civil, Environmental and Architectural Engineering; Professor, Chair: Environmental Engineering Program (EVEN)
PhD, Utah State University

Balch, Jennifer Kakareka (https://experts.colorado.edu/display/fisid_154464/)
Associate Professor: Geography; Faculty Director, Associate Professor: Cooperative Institute for Research in Environmental Sciences (CIRES)
PhD, Yale University

Balkin, David B. (https://experts.colorado.edu/display/fisid_105481/)
Professor: Leeds School of Business
PhD, University of Minnesota Twin Cities

Ballantine, John T. Jr. (https://experts.colorado.edu/display/fisid_102703/)
Senior Instructor: Leeds School of Business
JD, University of Colorado Boulder

Bally, John (https://experts.colorado.edu/display/fisid_105710/)
Professor Emeritus: Astrophysical and Planetary Sciences (APS); Professor: Center for Astrophysics & Space Astronomy (CASA)
PhD, University of Massachusetts at Amherst

Bamforth, Douglas (https://experts.colorado.edu/display/fisid_101027/)
Professor: Anthropology
PhD, University of California, Santa Barbara

Ban, Chunmei (https://experts.colorado.edu/display/fisid_165780/)
Associate Professor: Mechanical Engineering
PhD, SUNY at Binghamton

Bangs, F. Kendrick
Professor Emeritus: Leeds School of Business

Banic, Amy
Visiting Associate Professor: Computer Science

Banich, Marie (https://experts.colorado.edu/display/fisid_120646/)
Professor: Psychology and Neuroscience; Professor: Institute of Cognitive Science (ICS)
PhD, University of Chicago

Banks, Cynthia (https://experts.colorado.edu/display/fisid_158245/)
Instructor, Faculty Director: Leeds School of Business
MS, University of Colorado Denver

Baratta, Michael V. (https://experts.colorado.edu/display/fisid_149599/)
Assistant Professor: Psychology and Neuroscience
PhD, University of Colorado Boulder

Barger, Nichole Nannette (https://experts.colorado.edu/display/fisid_131398/)
Associate Professor, Associate Chair: Ecology and Evolutionary Biology
PhD, Colorado State University

Barham, Tania C.J. (https://experts.colorado.edu/display/fisid_140077/)
Associate Professor, Associate Professor: Economics; Faculty Director: Institute of Behavioral Science (IBS)
PhD, University of California, Berkeley

Barker, Lecia Jane (https://experts.colorado.edu/display/fisid_101367/)
Associate Professor: Information Science; Associate Professor: College of Media, Communication & Information
PhD, University of Colorado Boulder

Barkin, Sarah (https://experts.colorado.edu/display/fisid_156490/)
Assistant Teaching Professor: Program for Writing and Rhetoric
PhD, Syracuse University

Barlow, Lisa K. (https://experts.colorado.edu/display/fisid_100137/)
Senior Instructor: Baker RAP
PhD, University of Colorado Boulder

Barlow, Melinda B. (https://experts.colorado.edu/display/fisid_109696/)
Associate Professor: Cinema Studies & Moving Image Arts
PhD, New York University

Barnard, Holly Rene (https://experts.colorado.edu/display/fisid_147417/)
Associate Professor, Associate Professor: Institute of Arctic & Alpine Research (INSTAAR); Associate Chair: Geography
PhD, Oregon State University

Barnes, Frank S. (https://experts.colorado.edu/display/fisid_104148/)
Distinguished Professor Emeritus: Electrical, Computer and Energy Engineering (ECEE)
PhD, Stanford University

Barnett, Michael T. (https://experts.colorado.edu/display/fisid_116467/)
Instructor: Music; Instructor: Sewall RAP
DMA, University of Colorado Boulder

Barrett, Bridget (https://experts.colorado.edu/display/fisid_173429/)
Assistant Professor: Advertising, Public Relations and Media Design
PhD, University of North Carolina at Chapel Hill

Bartels, Justin P. (https://experts.colorado.edu/display/fisid_152074/)
Lecturer: Music

Barth, Daniel
Professor Emeritus: Psychology and Neuroscience

Barthelat, Francois (https://experts.colorado.edu/display/fisid_164866/)
Professor: Mechanical Engineering
PhD, Northwestern University

Bartlett, David
Professor Emeritus: Physics
PhD, Columbia University

Bartlett, Jamie Lynn
Lecturer: Farrand RAP; Lecturer: Honors RAP
PhD, University of Colorado Boulder

Barton, Taylor Wallis (https://experts.colorado.edu/display/fisid_157939/)
Associate Professor: Electrical, Computer and Energy Engineering (ECEE)
DSc, Massachusetts Institute of Technology

Bartos, Otomar J.
Professor Emeritus: Sociology

Basey, John M. (https://experts.colorado.edu/display/fisid_105539/)
Senior Instructor: Ecology and Evolutionary Biology
PhD, University of Nevada, Reno

Bashore, Kate (https://experts.colorado.edu/display/fisid_168644/)
Assistant Teaching Professor: Theatre and Dance
MFA, University of Tennessee - Knoxville

Bastias, Alfonso (https://experts.colorado.edu/display/fisid_143688/)
Assistant Teaching Professor: Computer Science
PhD, University of Colorado Boulder

Bates, Kelvin (https://experts.colorado.edu/display/fisid_173937/)
Assistant Professor: Mechanical Engineering
PhD, California Institute of Technology

Bateson, Regina
Assistant Professor: Political Science
PhD, Yale University

Batey, Robert T. (https://experts.colorado.edu/display/fisid_122668/)
Professor: Biochemistry
PhD, Massachusetts Institute of Technology

Bauer, Amy (https://experts.colorado.edu/display/fisid_148723/)
Senior Instructor, Faculty Director, Assistant Dean: School of Law
JD, College of William and Mary

Bay, R. Kōnane (https://experts.colorado.edu/display/fisid_172688/)
Assistant Professor: Chemical and Biological Engineering
PhD, University of Massachusetts at Amherst

Bayard de Volo, Lorraine M. (https://experts.colorado.edu/display/fisid_143611/)
Professor: Women and Gender Studies; Professor: Political Science
PhD, University of Michigan Ann Arbor

Beale, Paul D. (https://experts.colorado.edu/display/fisid_101602/)
Professor: Physics; Faculty Director: College of Arts and Sciences
PhD, Cornell University

Beard, Steven (https://experts.colorado.edu/display/fisid_168279/)
Teaching Assistant Professor: Political Science; Teaching Assistant Professor: International Affairs Program

Beaudry, Agnès (https://experts.colorado.edu/display/fisid_157677/)
Associate Professor: Mathematics
PhD, Northwestern University

Becher, Anne Helen (https://experts.colorado.edu/display/fisid_110035/)
Associate Teaching Professor: Spanish and Portuguese; Senior Instructor: Continuing Education & Professional Studies
MA, University of Colorado Boulder

Beck, Erik Richard
Instructor: Law Library
MS, University of Texas at Austin

Becker, Andreas (https://experts.colorado.edu/display/fisid_146675/)
Distinguished Professor: Physics; Faculty Director, Professor: JILA
Dr habil, Universite Laval (Canada)

Becker, Stephen R. (https://experts.colorado.edu/display/fisid_154263/)
Associate Professor: Applied Mathematics; Associate Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, California Institute of Technology

Becker, William
Scholar in Residence: Civil, Environmental and Architectural Engineering
PhD, The Johns Hopkins University

Bedard, Alfred J. Jr.
Associate Professor Adjunct: Integrated Teaching & Learning (ITL) Program

Beechy, Tiffany R. (https://experts.colorado.edu/display/fisid_149775/)
Professor: English; Faculty Director: Office of the Chancellor; Associate Faculty Director: Center for Humanities and the Arts
PhD, University of Oregon

Beer, Francis A. (https://experts.colorado.edu/display/fisid_100703/)
Professor Emeritus: Political Science
PhD, University of California Berkeley

Begelman, Mitchell C. (https://experts.colorado.edu/display/fisid_100446/)
Distinguished Professor: Astrophysical and Planetary Sciences (APS); Distinguished Professor: JILA
PhD, University of Cambridge (England)

Behzadan, Amir
Professor: Civil, Environmental and Architectural Engineering
PhD, University of Michigan Ann Arbor

Bei, Xiaoshu (https://experts.colorado.edu/display/fisid_165170/)
Assistant Professor: Leeds School of Business
PhD, Duke University

Bekoff, Anne (https://experts.colorado.edu/display/fisid_100613/)
Professor Emeritus: Integrative Physiology
PhD, Washington University

Bekoff, Marc
Professor Emeritus: Ecology and Evolutionary Biology

Belknap, Joanne Elizabeth (https://experts.colorado.edu/display/fisid_113617/)
Professor Emerita: Ethnic Studies
PhD, Michigan State University

Bell, Alan
Professor Emeritus: Linguistics

Benhalim, Rabea (https://experts.colorado.edu/individual/fisid_165324/)
Associate Professor, Faculty Director: School of Law
JD, University of Texas at Austin

Benim, W. Robert (https://experts.colorado.edu/display/fisid_167716/)
Assistant Teaching Professor: Applied Mathematics

Bennett, Douglas P. (https://experts.colorado.edu/display/fisid_149983/)
Instructor: Leeds School of Business
JD, George Washington University

Bennett, Huck (https://experts.colorado.edu/display/fisid_174352/)
Assistant Professor: Computer Science
PhD, New York University

Benoit, Roland
Associate Professor: Psychology and Neuroscience
PhD, University College London

Bentley, Francoise Judith Benay (https://experts.colorado.edu/display/fisid_143307/)
Lecturer: Continuing Education & Professional Studies

Bercovitz, Janet (https://experts.colorado.edu/display/fisid_159339/)
Professor: Leeds School of Business
PhD, University of California, Berkeley

Berg, Margaret H. (https://experts.colorado.edu/display/fisid_118371/)
Professor, Associate Dean: Music
PhD, Northwestern University

Bergen, Lori Ann (https://experts.colorado.edu/display/fisid_155986/)
Dean: College of Media, Communication & Information; Professor: Journalism
PhD, Indiana University Bloomington

Berggreen, Shu-Ling Chen (https://experts.colorado.edu/display/fisid_101636/)
Associate Professor: Media Studies; Lecturer: Continuing Education & Professional Studies
PhD, University of Tennessee-Knoxville

Bergner, Bruce Alan (https://experts.colorado.edu/display/fisid_113315/)
Associate Professor: Theatre and Dance
MFA, University of Illinois at Chicago

Bernardini, Giulia
Instructor: Libby Arts RAP
MA, University of Colorado Boulder

Bernstein, Asaf (https://experts.colorado.edu/display/fisid_157738/)
Assistant Professor: Leeds School of Business
BS, Harvey Mudd College

Bernstein, Giora
Professor Emeritus: Music

Bernstein, Robin Miriam (https://experts.colorado.edu/display/fisid_152968/)
Associate Professor: Institute of Behavioral Science (IBS); Associate Professor: Anthropology
PhD, University of Illinois at Urbana–Champaign

Bernthal, John Bradley (https://experts.colorado.edu/display/fisid_142379/)
Associate Professor, Faculty Director: School of Law; Faculty Director: Research & Innovation Office
JD, University of Colorado Boulder

Bernthal, Wilmar F.
Professor Emeritus: Leeds School of Business

Berry, Joseph (https://experts.colorado.edu/display/fisid_131839/)
Associate Professor: Physics
PhD, Pennsylvania State University

Berta-Thompson, Zachory (https://www.colorado.edu/aps/zachory-berta-thompson/)
Assistant Professor: Astrophysical and Planetary Sciences (APS); Assistant Professor: Center for Astrophysics & Space Astronomy (CASA)
PhD, Harvard University

Betterton, Meredith D. (https://experts.colorado.edu/display/fisid_125396/)
Professor: Physics; Professor: Molecular, Cellular & Developmental Biology (MCDB); Associate Professor: Materials Science & Engineering
PhD, Harvard University

Beylkin, Gregory (https://experts.colorado.edu/display/fisid_100437/)
Professor: Applied Mathematics
PhD, New York University

Bhagat, Sanjai (https://experts.colorado.edu/display/fisid_100789/)
Professor: Leeds School of Business
PhD, University of Washington

Bhaskar, Aditi
Associate Professor: Civil, Environmental and Architectural Engineering
Ph.D, University of Maryland, Baltimore County

Bhat, Yermal Sujeet (https://experts.colorado.edu/display/fisid_146506/)
Associate Teaching Professor: Applied Mathematics; Instructor: Miramontes Arts & Sciences Program (MASP)
PhD, University of Florida

Bhatia, Alpna (https://experts.colorado.edu/display/fisid_143993/)
Instructor: Continuing Education & Professional Studies; Instructor: Economics
PhD, University of Colorado Boulder

Bickers, Kenneth Norman (https://experts.colorado.edu/display/fisid_130482/)
Chair, Professor: Political Science
PhD, University of Wisconsin–Madison

Bickman, Martin (https://experts.colorado.edu/display/fisid_100230/)
Professor: English
PhD, University of Pennsylvania

Bidwell, Cinnamon (https://experts.colorado.edu/display/fisid_155117/)
Assistant Professor: Institute of Cognitive Science (ICS); Associate Professor: Psychology and Neuroscience
PhD, University of Colorado Boulder

Biegelsen, Casey (https://experts.colorado.edu/display/fisid_166072/)
Instructor: Leeds School of Business
MBA, University of Colorado Boulder

Bielefeldt, Angela R. (https://experts.colorado.edu/display/fisid_110322/)
Affiliate Professor: Integrated Design Engineering; Faculty Director: College of Engineering and Applied Science; Professor: Civil, Environmental and Architectural Engineering
PhD, University of Washington; P.E.

Bierbaum, Veronica (https://experts.colorado.edu/display/fisid_101124/)
Professor Emerita: Chemistry
PhD, University of Pittsburgh

Biernacki, Loriliai (https://experts.colorado.edu/display/fisid_115294/)
Professor: Religious Studies
PhD, University of Pennsylvania

Biggs, Betsey (https://experts.colorado.edu/display/fisid_158344/)
Assistant Professor: Critical Media Practices
PhD, Princeton University

Bilinski, Teresa (https://experts.colorado.edu/display/fisid_166076/)
Instructor: Ecology and Evolutionary Biology
PhD, University of Colorado Boulder

Billica, Nancy (https://experts.colorado.edu/display/fisid_114455/)
Instructor: Political Science
PhD, Harvard University

Billings, Stephen B. (https://experts.colorado.edu/display/fisid_157918/)
Associate Professor, Faculty Director: Leeds School of Business
PhD, University of Colorado Boulder

Bird-Arvidsson, Jennifer (https://experts.colorado.edu/display/fisid_147651/)
Associate Professor: Music
MM, University of Michigan Ann Arbor

Birks, John
Professor Emeritus: Chemistry

Bjerke, Maureen Ann (https://experts.colorado.edu/display/fisid_154820/)
Lecturer: Baker RAP

Black, John (https://experts.colorado.edu/display/fisid_126540/)
Associate Professor: Computer Science; Associate Professor: Mathematics
PhD, University of California, Davis

Blacklock, Jenifer L. (https://experts.colorado.edu/individual/fisid_159680/)
Faculty Director, Senior Instructor, Visiting Instructor: Mechanical Engineering
PhD, Wayne State University

Blair, Irene (https://experts.colorado.edu/display/fisid_107261/)
Professor: Psychology and Neuroscience
PhD, Yale University

Blanken, Peter David (https://experts.colorado.edu/display/fisid_114026/)
Professor: Geography
PhD, University of British Columbia (Canada)

Blechman, Elaine A.
Professor Emerita: Psychology and Neuroscience

Bliss, Anne
Senior Instructor Emerita: Program for Writing and Rhetoric
PhD, University of Colorado Boulder

Bloom, Frederic M. (https://experts.colorado.edu/display/fisid_151709/)
Professor, Endowed/Named Professor, Associate Dean: School of Law
JD, Stanford University

Bloomfield, Elisabeth Marie Arnould (https://experts.colorado.edu/display/fisid_125576/)
Associate Professor: French & Italian
PhD, University of California, San Diego

Blum, Arielle Melissa (https://experts.colorado.edu/display/fisid_154695/)
Lecturer: College of Engineering and Applied Science; Instructor: Electrical, Computer and Energy Engineering (ECEE)
MS, University of Colorado Boulder

Blum, Lauren W. (https://experts.colorado.edu/display/fisid_167200/)
Assistant Professor: Astrophysical and Planetary Sciences (APS); Assistant Professor: Laboratory for Atmospheric and Space Physics (LASP)
PhD, University of Colorado Boulder

Blumenthal, Thomas (https://experts.colorado.edu/display/fisid_143346/)
Professor, Visiting Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, Johns Hopkins University

Boardman, Alison Gould (https://experts.colorado.edu/display/fisid_141887/)
Associate Professor: School of Education
PhD, University of Texas at Austin

Boardman, Jason D. (https://experts.colorado.edu/display/fisid_125577/)
Professor: Sociology; Professor, Faculty Director: Institute of Behavioral Science (IBS)
PhD, University of Texas at Austin

Bock, Carl L.E. (https://experts.colorado.edu/display/fisid_105580/)
Professor Emeritus: Ecology and Evolutionary Biology
PhD, University of California-Berkeley

Bock, Jane H. (https://experts.colorado.edu/display/fisid_101979/)
Professor Emerita: Ecology and Evolutionary Biology
PhD, University of California-Berkeley

Bodisch, J. Robert
Colonel, Professor: Navy ROTC
M.A., Webster University; M.A., Naval War College

Bogatin, Eric (https://experts.colorado.edu/display/fisid_151431/)
Lecturer: Electrical, Computer and Energy Engineering (ECEE)
PhD, University of Arizona

Bohn, John (https://experts.colorado.edu/display/fisid_111716/)
Research Professor: JILA; Research Professor: Physics
PhD, University of Chicago

Boileau, Martin (https://experts.colorado.edu/display/fisid_113872/)
Professor, Chair: Economics
PhD, Queen's University (Canada)

Bolhari, Azadeh (https://experts.colorado.edu/display/fisid_167399/)
Associate Teaching Professor: Civil, Environmental and Architectural Engineering
PhD, Colorado State University

Bolton, Daniel Ryan (https://experts.colorado.edu/display/fisid_155168/)
Associate Teaching Professor: Physics
PhD, University of Washington

Bonde, Erik K.
Professor Emeritus: Ecology and Evolutionary Biology

Bone, Jennifer Emerling (https://experts.colorado.edu/display/fisid_158206/)
Instructor, Associate Chair: Leeds School of Business
PhD, University of Colorado Boulder

Boninger, Faith Gleicher (https://experts.colorado.edu/display/fisid_150087/)
Assistant Research Professor: School of Education
PhD, Ohio State University

Bonjack, Stephanie Marie (https://experts.colorado.edu/display/fisid_156290/)
Assistant Professor: University Libraries
MM, Northwestern University

Boonin, David (https://experts.colorado.edu/display/fisid_113100/)
Professor: Philosophy
PhD, University of Pittsburgh

Boord, Daniel Olin (https://experts.colorado.edu/display/fisid_134649/)
Professor Emeritus: Critical Media Practices
MFA, University of California, San Diego

Borden, Mark A. (https://experts.colorado.edu/display/fisid_148514/)
Professor: Mechanical Engineering; Associate Professor: Materials Science & Engineering; Associate Professor: Biomedical Engineering; Faculty Director: College of Engineering and Applied Science
PhD, University of California, Davis

Boromisza-Habashi, David (https://experts.colorado.edu/display/fisid_145833/)
Associate Professor: Communication
PhD, University of Massachusetts at Amherst

Bortz, David Matthew (https://experts.colorado.edu/display/fisid_143348/)
Professor: Applied Mathematics; Associate Professor: Computer Science
PhD, North Carolina State University

Bosanac, Natasha (https://experts.colorado.edu/display/fisid_158199/)
Assistant Professor: Aerospace Engineering Sciences; Assistant Professor: Colorado Center for Astrodynamics Research (CCAR)
PhD, Purdue University

Boss, Russel Wayne (https://experts.colorado.edu/display/fisid_105260/)
Professor, Chair: Leeds School of Business
PhD, University of Georgia

Boswell, Robert E. (https://experts.colorado.edu/display/fisid_100196/)
Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, University of Colorado Boulder

Bottan, Daria (https://experts.colorado.edu/display/fisid_168423/)
Senior Instructor: Economics
PhD, LUISS Guido Carli (Italy)

Bottenus, Nick (https://experts.colorado.edu/individual/fisid_165371/)
Assistant Professor: Biomedical Engineering; Assistant Professor: Mechanical Engineering
PhD, Duke University

Boulding, Carew Elizabeth (https://experts.colorado.edu/display/fisid_144417/)
Professor: Political Science; Faculty Director: Institute of Behavioral Science (IBS)
PhD, University of California, San Diego

Bourne, Lyle E. Jr.
Professor Emeritus: Psychology and Neuroscience

Bouvier, Claudia
Lecturer: Engineering Management Program
ME, University of Colorado Boulder

Bouwman, Jordy (https://experts.colorado.edu/display/fisid_167913/)
Assistant Professor: Chemistry
PhD, Leiden University (Netherlands)

Bowers, M. Deane
Professor: Museum and Field Studies; Professor, Chair: Ecology and Evolutionary Biology
PhD, University of Massachusetts Amherst

Bowman, Christopher N. (https://experts.colorado.edu/display/fisid_102043/)
Distinguished Professor: Chemical and Biological Engineering; Associate Faculty Director: College of Engineering and Applied Science; Distinguished Professor: Materials Science & Engineering
PhD, Purdue University

Bowman, William D. (https://experts.colorado.edu/display/fisid_105191/)
Professor, Associate Chair, Faculty Director: Institute of Arctic & Alpine Research (INSTAAR); Professor: Ecology and Evolutionary Biology
PhD, Duke University

Boyd, Iain (https://experts.colorado.edu/display/fisid_165828/)
Professor, Faculty Director: Research & Innovation Office; Endowed/Named Professor, Faculty Director: College of Engineering and Applied Science; Director, Endowed/Named Professor: Aerospace Engineering Sciences
PhD, University of Southampton (England)

Boyd, Samuel L. (https://experts.colorado.edu/display/fisid_155484/)
Associate Professor, Associate Chair: Religious Studies; Associate Professor: Jewish Studies
PhD, University of Chicago

Boyko, Marie (https://experts.colorado.edu/display/fisid_100073/)
Senior Instructor Emeritus: Integrative Physiology
MA, University of Colorado Boulder

Boykoff, Maxwell Thomas (https://experts.colorado.edu/display/fisid_147562/)
Associate Professor: Cooperative Institute for Research in Environmental Sciences (CIRES); Professor, Faculty Director: Environmental Studies Program; Associate Professor Adjunct: Geography
PhD, University of California, Santa Cruz

Bozic, Christy L. (https://experts.colorado.edu/display/fisid_155482/)
Instructor Adjunct: Engineering Management Program; Scholar in Residence: Undergraduate Education
PhD, Purdue University

Braaten, Melissa (https://experts.colorado.edu/individual/fisid_157744/)
Associate Professor, Associate Dean: School of Education
PhD, University of Washington

Bradley, Elizabeth (https://experts.colorado.edu/display/fisid_100546/)
Professor: Computer Science
PhD, Massachusetts Institute of Technology

Braider, Christopher (https://experts.colorado.edu/display/fisid_100300/)
Professor of Distinction Emeritus: French & Italian
PhD, Trinity College, Dublin

Brain, David A. (https://experts.colorado.edu/display/fisid_149098/)
Assistant Professor: Laboratory for Atmospheric and Space Physics (LASP); Associate Professor, Chair: Astrophysical and Planetary Sciences (APS)
PhD, University of Colorado Boulder

Branch, Melvyn C.
Professor Emeritus: Mechanical Engineering

Brancucci, Carlo
Lecturer: Electrical, Computer and Energy Engineering (ECEE)
PhD, Technische Universiteit Delft (Netherlands)

Brandemuehl, Michael J. (https://experts.colorado.edu/display/fisid_102573/)
Professor Emeritus: Civil, Environmental and Architectural Engineering
PhD, University of Wisconsin-Madison

Brasseur, James G. (https://experts.colorado.edu/display/fisid_156801/)
Research Professor: Aerospace Engineering Sciences
PhD, Stanford University

Braun, Joel D.
Captain, Assistant Professor: Army ROTC
MBA, Western International University

Bredeson, Garrett (https://experts.colorado.edu/display/fisid_154933/)
Assistant Teaching Professor, Associate Chair: Philosophy
PhD, Vanderbilt University

Breed, Michael D. (https://experts.colorado.edu/display/fisid_103631/)
Professor: Ecology and Evolutionary Biology; Faculty Director: College of Arts and Sciences; Faculty Director: Baker RAP
PhD, University of Kansas

Brennan, Christine (https://experts.colorado.edu/display/fisid_155861/)
Assistant Professor: Speech, Language and Hearing Sciences (SLHS)
PhD, Northwestern University

Briggs, Derek Christian Mauthner (https://experts.colorado.edu/display/fisid_129597/)
Professor: School of Education
PhD, University of California, Berkeley

Bright, Victor Mark (https://experts.colorado.edu/display/fisid_112696/)
Professor: Mechanical Engineering; Professor: Electrical, Computer and Energy Engineering (ECEE); Faculty Director: Research & Innovation Office
PhD, Georgia Institute of Technology

Brinkman, P. Delbert
Professor Emeritus: Journalism

Briscoe, Georgia K. (https://experts.colorado.edu/display/fisid_105331/)
Senior Instructor Emerita: School of Law
MA, University of San Diego

Brody, James M. (https://experts.colorado.edu/display/fisid_101948/)
Associate Professor: Music
MM, Indiana University Bloomington

Broering, Ellen (https://experts.colorado.edu/individual/fisid_167610/)
Instructor: Chemistry
PhD, University of Georgia

Broersma, Leslee (https://experts.colorado.edu/display/fisid_112749/)
Senior Instructor: Libby Arts RAP
MFA, University of Colorado Boulder

Bronstein, Albert (https://experts.colorado.edu/display/fisid_154916/)
Teaching Assistant Professor: Mathematics
PhD, University of Kentucky

Brooks, Cassandra (https://experts.colorado.edu/display/fisid_159275/)
Assistant Professor: Environmental Studies Program
PhD, Stanford University

Brooks, Shilo
Senior Instructor, Faculty Director: Engineering Leadership Program; Associate Faculty Director: College of Engineering and Applied Science
PhD, Boston College

Broussard, Josiane
Associate Professor Adjunct: Integrative Physiology

Brower, Timothy L.
Faculty Director: College of Engineering and Applied Science
PhD, Colorado State University

Brown, Benjamin P. (https://experts.colorado.edu/display/fisid_153758/)
Associate Professor: Astrophysical and Planetary Sciences (APS); Assistant Professor: Laboratory for Atmospheric and Space Physics (LASP)
PhD, University of Colorado Boulder

Brown, Daniel (https://experts.colorado.edu/display/fisid_152029/)
Senior Instructor: Leeds School of Business
D.Phil, Oxford University

Brown, Derek Philip (https://experts.colorado.edu/display/fisid_150027/)
Director: Undergraduate Education; Associate Teaching Professor: Atmospheric and Oceanic Sciences (ATOC)
PhD, University of Colorado Boulder

Brown, Esther Lynn (https://experts.colorado.edu/display/fisid_129298/)
Professor, Chair: Spanish and Portuguese
PhD, University of New Mexico

Brown, Ethan
Captain, Assistant Professor: Air Force ROTC
MS, Eastern Michigan University

Brown, Gordon E.
Professor Emeritus: Mathematics

Brown, Hank
Professor Emeritus: Political Science

Brown, Janice Carole (https://experts.colorado.edu/display/fisid_143612/)
Professor: Asian Languages and Civilizations
PhD, University of British Columbia (Canada)

Brown, Jed (https://experts.colorado.edu/display/fisid_153965/)
Associate Professor: Computer Science
DSc, ETH Zürich (Switzerland)

Brown, Marilyn Ruth (https://experts.colorado.edu/display/fisid_143782/)
Professor Emerita: Art and Art History
PhD, Yale University

Brown, Matthew C.
Instructor: Sociology; Instructor: Health Professions RAP
PhD, University of Colorado Boulder

Brown, Steven S. (https://experts.colorado.edu/display/fisid_119987/)
Professor Adjoint: Chemistry
PhD, University of Wisconsin–Madison

Brown, Susan Windisch
Assistant Professor Adjunct: Linguistics
PhD, University of Colorado Boulder

Browne, Eleanor Carol (https://experts.colorado.edu/display/fisid_156464/)
Associate Professor: Chemistry
PhD, University of California, Berkeley

Browsh, Jared Bahir (https://experts.colorado.edu/display/fisid_163451/)
Assistant Teaching Professor: Ethnic Studies
PhD, University of Colorado Boulder

Brubaker, Jed Richards (https://experts.colorado.edu/display/fisid_156193/)
Assistant Professor: Computer Science; Assistant Professor: Information Science
PhD, University of California, Irvine

Bruff, Harold (https://experts.colorado.edu/display/fisid_109137/)
Professor, Dean Emeritus: School of Law
JD, Harvard University

Brumbaugh, Justin J. (https://experts.colorado.edu/display/fisid_164025/)
Assistant Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, University of Wisconsin-Madison

Brunner, Ronald D.
Professor Emeritus: Political Science

Bruns, Carson J. (https://experts.colorado.edu/display/fisid_159851/)
Assistant Professor: ATLAS Institute; Assistant Professor: Mechanical Engineering; Assistant Professor: Creative Technology & Design; Assistant Professor: Biomedical Engineering
PhD, Northwestern University

Bruns, Steven M. (https://experts.colorado.edu/display/fisid_103483/)
Associate Professor: Music
PhD, University of Wisconsin–Madison

Brunt, Vienna E (https://experts.colorado.edu/display/fisid_158297/)
Assistant Professor Adjunct: Integrative Physiology
PhD, University of Oregon

Bryan, Angela (https://experts.colorado.edu/display/fisid_115216/)
Professor: Psychology and Neuroscience; Professor: Continuing Education & Professional Studies
PhD, Arizona State University

Bryan, Joseph Henry (https://experts.colorado.edu/display/fisid_145802/)
Associate Chair, Associate Professor: Geography
PhD, University of California, Berkeley

Bryant, Stephanie J. (https://experts.colorado.edu/display/fisid_111810/)
Professor: Chemical and Biological Engineering; Faculty Director: College of Engineering and Applied Science; Professor: Materials Science & Engineering
PhD, University of Colorado Boulder

Brylowe, Thora (https://experts.colorado.edu/display/fisid_156063/)
Associate Professor: English
PhD, Carnegie Mellon University

Buchanan, Angela S. (https://experts.colorado.edu/display/fisid_122671/)
Senior Instructor: Student Academic Services Center; Senior Instructor: Continuing Education & Professional Studies
MA, Ball State University

Buchman, Thomas A. (https://experts.colorado.edu/display/fisid_101677/)
Professor Emeritus: Leeds School of Business
PhD, University of Illinois at Urbana-Champaign

Buchwald, Robert (https://experts.colorado.edu/display/fisid_148439/)
Associate Faculty Director, Instructor: Honors RAP; Instructor: Ecology and Evolutionary Biology
PhD, University of Colorado Boulder

Buckner Inniss, Lolita
Dean, Distinguished Professor: School of Law
PhD, York University (Canada)

Buffa, Andrea (https://experts.colorado.edu/display/fisid_167152/)
Assistant Professor: Leeds School of Business
PhD, London Business School

Buffington, Robert Marshall (https://experts.colorado.edu/display/fisid_144975/)
Professor Emeritus: Women and Gender Studies; Professor Emeritus: History
PhD, University of Arizona

Bumbaca, Frederico (https://experts.colorado.edu/display/fisid_163475/)
Assistant Professor: Leeds School of Business
PhD, University of California, Irvine

Burba, Audrey (https://experts.colorado.edu/display/fisid_158272/)
Teaching Assistant Professor: Humanities; Assistant Teaching Professor: French & Italian
PhD, Emory University

Burdick, A. Jason (https://experts.colorado.edu/display/fisid_168868/)
Professor: Chemical and Biological Engineering
PhD, University of Colorado Boulder

Burge, Marjorie (https://experts.colorado.edu/display/fisid_166114/)
Assistant Professor: Asian Languages and Civilizations
PhD, University of California, Berkeley

Burger, Eric B. (https://experts.colorado.edu/display/fisid_143577/)
Associate Teaching Professor: Program for Writing and Rhetoric
PhD, University of Utah

Burgess, Matthew (https://experts.colorado.edu/display/fisid_164178/)
Assistant Professor: Environmental Studies Program
PhD, University of Minnesota

Burke, Robin D. (https://experts.colorado.edu/display/fisid_165005/)
Chair, Professor: Information Science; Professor: Computer Science
PhD, Northwestern University

Burleson, Grace
Visiting Assistant Professor: Mechanical Engineering
PhD, University of Michigan

Burns, Jack O.
Professor Emeritus: Astrophysical and Planetary Sciences (APS); Professor: Center for Astrophysics & Space Astronomy (CASA)
PhD, Indiana University Bloomington

Burns, Michael
Assistant Teaching Professor: Communication
PhD, North Dakota State University

Bustamante, Heidi Margarita (https://experts.colorado.edu/display/fisid_146491/)
Associate Teaching Professor: Integrative Physiology
MS, University of Colorado Boulder

Buttenfield, Barbara P. (https://experts.colorado.edu/display/fisid_107860/)
Professor Emerita: Geography
PhD, University of Washington

Byrd, Sigman M. (https://experts.colorado.edu/display/fisid_127494/)
Associate Teaching Professor: Program for Writing and Rhetoric
PhD, University of Utah

Byrne, James
Teaching Assistant Professor: Engineering, Ethics & Society
PhD, Princeton University

Byrnes, William (https://experts.colorado.edu/display/fisid_100643/)
Associate Professor Emeritus: Integrative Physiology
PhD, University of Wisconsin–Madison

# C

Caballero, Carlo (https://experts.colorado.edu/display/fisid_111681/)
Associate Professor: Music
PhD, University of Pennsylvania

Cacic, John D.
Captain, Assistant Professor: Army ROTC
MBA, Central Michigan University

Cadena, Brian C. (https://experts.colorado.edu/display/fisid_145740/)
Associate Professor: Economics; Assistant Professor: Institute of Behavioral Science (IBS)
PhD, University of Michigan Ann Arbor

Cai, Xiao-Chuan (https://experts.colorado.edu/display/fisid_100636/)
Professor Emeritus: Computer Science
PhD, New York University

Cain, Andrew J. (https://experts.colorado.edu/display/fisid_129296/)
Professor, Lecturer: Continuing Education & Professional Studies; Chair: Classics
PhD, Cornell University

Caine, T. Nelson (https://experts.colorado.edu/display/fisid_104285/)
Professor Emeritus: Geography
PhD, Australian National University

Cairney, John T.
Colonel, Chair, Professor: Army ROTC
MS, Air Force Institute of Technology

Calabrese, Andrew (https://experts.colorado.edu/display/fisid_101073/)
Professor: Media Studies; Associate Dean: College of Media, Communication & Information
PhD, Ohio State University

Calder, Jeremy (https://experts.colorado.edu/display/fisid_159936/)
Assistant Professor: Linguistics
PhD, Stanford University

Calkins, Michael Andrew (https://experts.colorado.edu/display/fisid_149720/)
Associate Professor: Physics
PhD, University of California, Los Angeles

Callier, Reina (https://experts.colorado.edu/display/fisid_156049/)
Instructor: Classics
PhD, University of Colorado

Calve, Sarah (https://experts.colorado.edu/individual/fisid_165779/)
Associate Professor: Biomedical Engineering; Assistant Professor: Mechanical Engineering
PhD, University of Michigan

Calvin, Inga E.
Lecturer: Baker RAP
PhD, University of Colorado Boulder

Cameron, Catherine M.
Professor Emerita: Anthropology

Cameron, Jeffrey C. (https://experts.colorado.edu/display/fisid_156473/)
Assistant Professor: Renewable & Sustainable Energy Institute (RASEI); Assistant Professor: Biochemistry
PhD, Washington University

Campbell, Kimberly D. (https://experts.colorado.edu/display/fisid_158160/)
Instructor: Leeds School of Business
PhD, Howard University

Campbell, Margaret Catherine
Professor Emerita: Leeds School of Business
PhD, Stanford University

Campeau, Serge (https://experts.colorado.edu/display/fisid_115395/)
Professor: Psychology and Neuroscience
PhD, Yale University

Campos, Paul F. (https://experts.colorado.edu/display/fisid_102518/)
Professor: School of Law
JD, University of Michigan Ann Arbor

Cantrell, Deborah Jane (https://experts.colorado.edu/display/fisid_144607/)
Professor, Faculty Director: School of Law
JD, University of Southern California

Cantrell, Melissa (https://experts.colorado.edu/display/fisid_159556/)
Assistant Professor: University Libraries
MA, University of Denver

Cao, Gang (https://experts.colorado.edu/display/fisid_157991/)
Professor: Physics; Professor: Materials Science & Engineering
PhD, Temple University

Cao, Guofeng (https://experts.colorado.edu/display/fisid_167522/)
Assistant Professor: Geography
PhD, University of California Santa Barbara

Carballo, Jeronimo Rafael (https://experts.colorado.edu/display/fisid_155949/)
Associate Professor: Economics; Assistant Professor: Institute of Behavioral Science (IBS)
PhD, University of Maryland, College Park

Carbone, Christopher (https://experts.colorado.edu/display/fisid_158166/)
Instructor: Leeds School of Business
MFA, University of Baltimore

Carey, Cynthia
Professor Emerita: Integrative Physiology

Carey, Frederick (https://experts.colorado.edu/display/fisid_159512/)
Assistant Professor: University Libraries
MLIS, University of Denver

Carlon, Nabilah
PhD,

Carlos, Ann M. (https://experts.colorado.edu/display/fisid_105534/)
Dean Emeritus: College of Arts and Sciences; Professor Emerita: Economics; Professor Emerita: History

Carlson, Lawrence E.
Professor Emeritus: Mechanical Engineering
D.Eng, University of California Berkeley

Carpenter, J. Harrison (https://experts.colorado.edu/display/fisid_115915/)
Senior Instructor: Ecology and Evolutionary Biology; Senior Instructor: Continuing Education & Professional Studies
MS, Michigan Technological University

Carpenter, Kristen Ann (https://experts.colorado.edu/display/fisid_147188/)
Professor, Endowed/Named Professor, Faculty Director: School of Law
JD, Harvard University

Carr, Julia Alice (https://experts.colorado.edu/display/fisid_143349/)
Professor: English; Professor: Intermedia Art, Writing and Performance
PhD, University of California, Berkeley

Carrico, Amanda R. (https://experts.colorado.edu/display/fisid_153054/)
Associate Professor: Environmental Studies Program
PhD, Vanderbilt University

Carroll, Clinton R. (https://experts.colorado.edu/display/fisid_154726/)
Associate Professor, Associate Chair: Ethnic Studies; Assistant Professor Adjunct: Geography
PhD, University of California, Berkeley

Carruth, Christopher (https://experts.colorado.edu/display/fisid_153706/)
Instructor: Information Science
MS, University of Colorado Boulder

Carson, Visda (https://experts.colorado.edu/display/fisid_158296/)
Instructor: Leeds School of Business; Faculty Director: International Education
MBA, University of Colorado, Leeds School of Business

Carter Carston, Ronald McKell (https://experts.colorado.edu/display/fisid_154921/)
Assistant Professor: Institute of Cognitive Science (ICS); Assistant Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, California Institute of Technology

Carthy, Nicholas R. (https://experts.colorado.edu/display/fisid_135356/)
Associate Professor: Music
BA, Guildhall School of Music, London (England)

Cartun, Ashley (https://experts.colorado.edu/display/fisid_157851/)
Associate Teaching Professor: School of Education
PhD, University of Colorado Boulder

Cartwright, Desmond S.
Professor Emeritus: Psychology and Neuroscience

Caruthers, Marvin H. (https://experts.colorado.edu/display/fisid_103328/)
Distinguished Professor: Biochemistry
PhD, Northwestern University

Cary, John R. (https://experts.colorado.edu/display/fisid_105901/)
Professor: Physics
PhD, University of California, Berkeley

Casagrand, Janet L. (https://experts.colorado.edu/display/fisid_100934/)
Associate Teaching Professor: Integrative Physiology
PhD, Case Western Reserve University

Casalaina-Martin, Sebastian Ben (https://experts.colorado.edu/display/fisid_145845/)
Professor, Chair: Mathematics
PhD, Columbia University

Casey, Emett
Lecturer: Cinema Studies & Moving Image Arts
BA, Chapman University

Cash, Webster C. Jr. (https://experts.colorado.edu/display/fisid_101759/)
Professor: Astrophysical and Planetary Sciences (APS); Professor: Center for Astrophysics & Space Astronomy (CASA)
PhD, University of California, Berkeley

Cassano, John J. (https://experts.colorado.edu/display/fisid_121781/)
Professor: Cooperative Institute for Research in Environmental Sciences (CIRES); Professor: Atmospheric and Oceanic Sciences (ATOC)
PhD, University of Wyoming

Castro, Francisco (https://experts.colorado.edu/display/fisid_147992/)
Senior Instructor: Mechanical Engineering
PhD, University of Colorado Boulder

Catabay, Keno
Assistant Professor: University Libraries
MLIS, Florida State University

Cateora, Phillip R.
Professor Emeritus: Leeds School of Business

Catlos, Brian Aivars (https://experts.colorado.edu/display/fisid_147829/)
Professor: Religious Studies; Professor: Humanities; Professor: History
PhD, University of Toronto

Cech, Thomas R. (https://experts.colorado.edu/display/fisid_103252/)
Distinguished Professor: Molecular, Cellular & Developmental Biology (MCDB); Distinguished Professor: Biochemistry
PhD, University of California, Berkeley

Celoza, Amelia (https://experts.colorado.edu/display/fisid_172038/)
Assistant Professor: Civil, Environmental and Architectural Engineering
Ph.D., University of Texas at Austin

Cha, Jennifer N. (https://experts.colorado.edu/display/fisid_151746/)
Professor: Biomedical Engineering; Professor: Chemical and Biological Engineering; Professor: Materials Science & Engineering; Endowed/Named Professor: College of Engineering and Applied Science
PhD, University of California, Santa Barbara

Chadwick, Jeffrey
Instructor: Honors Program
PhD, Purdue University

Chamberlin, H. Scott (https://experts.colorado.edu/display/fisid_105456/)
Professor: Art and Art History
MFA, New York State College of Ceramics at Alfred University

Chambers, Lee Virginia (https://experts.colorado.edu/display/fisid_106130/)
Professor Emerita: History
PhD, University of Michigan Ann Arbor

Chang, Bor-Yuh Evan (https://experts.colorado.edu/display/fisid_146087/)
Associate Chair, Associate Professor: Electrical, Computer and Energy Engineering (ECEE); Associate Professor: Computer Science
PhD, University of California, Berkeley

Chang, Philip C. (https://experts.colorado.edu/display/fisid_143541/)
Senior Instructor: Music
PhD, University of Rochester

Chang, Silva (https://experts.colorado.edu/display/fisid_145582/)
Teaching Professor: Applied Mathematics
MS, Yale University

Chapin, Violeta Raquel (https://experts.colorado.edu/display/fisid_147683/)
Associate Dean, Faculty Director: School of Law
JD, New York University

Chapman, Andrew David
Instructor: Libby Arts RAP; Instructor: Baker RAP; Lecturer: Communication & Society RAP

Chari, Mukund (https://experts.colorado.edu/display/fisid_159141/)
Assistant Professor: Leeds School of Business
PhD, University of Washington

Charlet, Caitlin (https://experts.colorado.edu/display/fisid_174564/)
Teaching Associate Professor: Environmental Design
MArch, Parson's School of Constructed Environments

Chaspari, Theodora (https://experts.colorado.edu/display/fisid_173681/)
Associate Professor: Computer Science
PhD, University of Southern California

Chaudhary, Sumeet (https://experts.colorado.edu/display/fisid_167980/)
Instructor: Electrical, Computer and Energy Engineering (ECEE)
PhD, University of Cincinnati

Chawla, Louise (https://experts.colorado.edu/display/fisid_143894/)
Professor Emerita: Environmental Design
PhD, CUNY System Office

Chellis, Matthew Wren (https://experts.colorado.edu/display/fisid_154415/)
Associate Professor: Music
MM, Manhattan School of Music

Chen, Lijun (https://experts.colorado.edu/display/fisid_149472/)
Associate Professor: Computer Science; Assistant Professor: Interdisciplinary Telecommunications
PhD, California Institute of Technology

Chen, Xudong (https://experts.colorado.edu/display/fisid_158323/)
Assistant Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, Harvard University, Cambridge, MA

Chen, Yongmin (https://experts.colorado.edu/display/fisid_108989/)
Professor: Economics
PhD, Boston University

Chen, Yueqi (https://experts.colorado.edu/display/fisid_171984/)
Assistant Professor: Computer Science
PhD, Pennsylvania State University

Chen, Zhe
Assistant Research Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, University of Colorado Boulder

Chernus, Ira R. (https://experts.colorado.edu/display/fisid_101043/)
Professor Emeritus: Religious Studies
Ph.D, Temple University

Chester, Lucy P. (https://experts.colorado.edu/display/fisid_126541/)
Associate Professor: International Affairs Program; Associate Professor: History
PhD, Yale University

Cheval, Melinda Kiger
Faculty Director: Communication & Society RAP; Associate Teaching Professor Emerita: Advertising, Public Relations and Media Design

Chi, Jocelyn T.
Assistant Professor: Applied Mathematics
PhD, North Carolina State University

Chin, Karen (https://experts.colorado.edu/display/fisid_122666/)
Professor: Museum and Field Studies; Professor: Geological Sciences
PhD, University of California, Santa Barbara

Chonchol, Michel
Professor Adjunct: Integrative Physiology
MD, Universidad Central de Venezuela, Caracas

Chong, Albert (https://experts.colorado.edu/display/fisid_100586/)
Professor: Art and Art History
MFA, University of California, San Diego

Chopra, Aidan
Lecturer: ATLAS Institute; Lecturer: Creative Technology & Design
MArch, Rice University

Chou, Chin-Wen
Lecturer: Physics
PhD, California Insitutute of Technology

Christie, Matt
Instructor: Art and Art History
MFA, Virginia Commonwealth University

Christoff, Lorna Colleen (https://experts.colorado.edu/display/fisid_146614/)
Instructor: Leeds School of Business
JD, University of Denver

Chu, Xinzhao (https://experts.colorado.edu/display/fisid_141893/)
Professor: Cooperative Institute for Research in Environmental Sciences (CIRES); Professor: Aerospace Engineering Sciences
PhD, Peking University (China)

Chuang, Angie (https://experts.colorado.edu/display/fisid_159485/)
Associate Chair, Associate Professor: Journalism
MA, Stanford University

Ciarlo, David Michael (https://experts.colorado.edu/display/fisid_149618/)
Associate Professor: History
PhD, University of Wisconsin–Madison

Ciota, Rebecca (https://experts.colorado.edu/display/fisid_167609/)
Librarian: School of Law
MLIS, University of Illinois at Urbana-Champaign

Ciplet, David (https://experts.colorado.edu/display/fisid_156064/)
Assistant Professor: Environmental Studies Program
PhD, Brown University

Clark, Alisha (https://experts.colorado.edu/display/fisid_164457/)
Assistant Professor: Geological Sciences
PhD, University of California-Davis

Clark, Noel A. (https://experts.colorado.edu/display/fisid_101947/)
Professor: Physics; Professor: Materials Science & Engineering
PhD, Massachusetts Institute of Technology

Clark, Patrick Ryan (https://experts.colorado.edu/display/fisid_156499/)
Assistant Professor, Instructor: College of Media, Communication & Information; Associate Chair: Critical Media Practices
MFA, San Diego State University

Clark, Torin K. (https://experts.colorado.edu/display/fisid_155959/)
Associate Professor, Assistant Professor: Biomedical Engineering; Associate Chair: Aerospace Engineering Sciences
PhD, Massachusetts Institute of Technology

Clauset, Aaron (https://experts.colorado.edu/display/fisid_147554/)
Professor: Computer Science; Associate Professor: Ecology and Evolutionary Biology; Associate Professor: Biofrontiers Institute; Associate Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, University of New Mexico

Clayton, S. Zachary
Assistant Professor Adjunct: Integrative Physiology

Cleland, Carol (https://experts.colorado.edu/display/fisid_105674/)
Professor: Philosophy
PhD, Brown University

Clelland, Jeanne Nielsen (https://experts.colorado.edu/display/fisid_113103/)
Professor: Mathematics
PhD, Duke University

Cline, Clinton C.
Professor Emeritus: Art and Art History

Cloud, Anya (https://experts.colorado.edu/individual/fisid_167400/)
Assistant Professor: Theatre and Dance
MFA, University of California San Diego

Clough, David Edwards (https://experts.colorado.edu/display/fisid_102332/)
Professor Emeritus: Chemical and Biological Engineering
PhD, University of Colorado Boulder

Cobin, Martin T.
Professor Emeritus: Theatre and Dance

Coddington, Jan
Lecturer: Physics
PhD, University of Colorado Boulder

Cogswell, Carol (https://experts.colorado.edu/display/fisid_141919/)
Research Professor: Electrical, Computer and Energy Engineering (ECEE)
MArch, University of Oregon

Cohen, Brianne Caitlin (https://experts.colorado.edu/display/fisid_159724/)
Assistant Professor: Art and Art History
PhD, University of Pittsburgh

Cohen, Grant
Lecturer: Political Science
PhD, University of Miami

Cohen, Ruscha (https://experts.colorado.edu/display/fisid_149781/)
Scholar in Residence, Director: ATLAS Institute; Scholar in Residence, Director: Creative Technology & Design
MS, University of Colorado Denver

Colley, Dawn (https://experts.colorado.edu/individual/fisid_149567/)
Assistant Teaching Professor: Program for Writing and Rhetoric; Instructor: Continuing Education & Professional Studies
PhD, University of Colorado Boulder

Collins, Allan C.
Professor Emeritus: Psychology and Neuroscience

Collins, Lauren (https://experts.colorado.edu/display/fisid_147078/)
Assistant Teaching Professor, Program Director: Center for Asian Studies
PhD, University of Denver

Collins, Richard B. (https://experts.colorado.edu/display/fisid_101884/)
Professor Emeritus: School of Law
LLB, Harvard University

Colunga, Eliana (https://experts.colorado.edu/display/fisid_129477/)
Associate Professor: Psychology and Neuroscience; Associate Professor: Computer Science
PhD, Indiana University Bloomington

Combes, Josh (https://experts.colorado.edu/display/fisid_166284/)
Assistant Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, Griffith University

Comerford, Julia M. (https://experts.colorado.edu/display/fisid_151471/)
Assistant Professor: Center for Astrophysics & Space Astronomy (CASA); Professor: Astrophysical and Planetary Sciences (APS)
PhD, University of California, Berkeley

Conlon, Joan Catoni
Professor Emerita: Music

Contreras, Ana (https://experts.colorado.edu/display/fisid_168932/)
Assistant Teaching Professor: School of Education
PhD, University of Colorado Boulder

Conway, Laura (https://experts.colorado.edu/display/fisid_167653/)
Teaching Assistant Professor: Cinema Studies & Moving Image Arts
M.F.A, University of Colorado Boulder

Conzelman, Caroline S. (https://experts.colorado.edu/display/fisid_145356/)
Instructor: Global RAP
PhD, University of Colorado Boulder

Cook, Lance
Lieutenant, Assistant Professor: Navy ROTC

Cook, Sherri M. (https://experts.colorado.edu/display/fisid_154773/)
Associate Professor: Civil, Environmental and Architectural Engineering; Assistant Professor: Environmental Engineering Program (EVEN)
PhD, University of Michigan Ann Arbor

Cook-Martin, David (https://experts.colorado.edu/display/fisid_165342/)
Professor: Sociology
PhD, University of California-Los Angeles

Cookson, John Anthony (https://experts.colorado.edu/display/fisid_152874/)
Associate Professor, Faculty Director: Leeds School of Business
PhD, University of Chicago

Cool, Alison Collier (https://experts.colorado.edu/display/fisid_154599/)
Assistant Professor: Anthropology
PhD, New York University

Coombs Esmail, Eric (https://experts.colorado.edu/display/fisid_158305/)
Assistant Professor, Faculty Director: Critical Media Practices
MFA, State University of New York at Buffalo

Cooper, John
Professor Emeritus: Physics
PhD, University of London

Cooper, Peter W. (https://experts.colorado.edu/display/fisid_134522/)
Senior Instructor: Music
BM, Northwestern University

Cooperstock, Andrew B. (https://experts.colorado.edu/display/fisid_115393/)
Professor: Music
DMA, Peabody Institute of Johns Hopkins University

Copley, Shelley (https://experts.colorado.edu/display/fisid_104067/)
Professor: Cooperative Institute for Research in Environmental Sciences (CIRES); Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, Harvard University

Corcoran, Jem (https://experts.colorado.edu/display/fisid_118142/)
Associate Professor Emeritus: Applied Mathematics
PhD, Colorado State University

Cordes, Dietmar (https://experts.colorado.edu/display/fisid_155229/)
Associate Professor Adjunct: Institute of Cognitive Science (ICS)

Cordova, James M. (https://experts.colorado.edu/display/fisid_146415/)
Associate Professor, Associate Chair: Art and Art History
PhD, Tulane University

Cornell, Eric (https://experts.colorado.edu/display/fisid_100112/)
Professor Adjoint: Physics
PhD, Massachusetts Institute of Technology

Corotis, Ross B. (https://experts.colorado.edu/display/fisid_100942/)
Professor Emeritus: Civil, Environmental and Architectural Engineering
PhD, Massachusetts Institute of Technology

Corradini, Luca (https://experts.colorado.edu/display/fisid_146380/)
Associate Professor, Visiting Associate Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, University of Padova (Italy)

Correll, Joshua (https://experts.colorado.edu/display/fisid_151728/)
Professor: Psychology and Neuroscience
PhD, University of Colorado Boulder

Correll, Mark R.
Professor Emeritus: Leeds School of Business

Correll, Nikolaus J. (https://experts.colorado.edu/display/fisid_147555/)
Associate Professor: Computer Science; Associate Professor: Electrical, Computer and Energy Engineering (ECEE); Faculty Director: College of Engineering and Applied Science
PhD, Ecole Polytech Federale de Lausanne (Switzerland)

Corwin, Lisa A. (https://experts.colorado.edu/display/fisid_157940/)
Assistant Professor: Ecology and Evolutionary Biology
PhD, University of California, Davis

Costain, Anne N. (https://experts.colorado.edu/display/fisid_101427/)
Professor Emerita: Political Science

Costain, Douglas
Senior Instructor Emeritus: Political Science

Couey, Stephanie
Assistant Teaching Professor: Program for Writing and Rhetoric
PhD, University of Colorado Boulder

Couture, Juliann Elizabeth (https://experts.colorado.edu/display/fisid_153757/)
Associate Professor: University Libraries
MA, University of Arizona

Covert, Herbert
Professor Emeritus: Anthropology; Faculty Director: Baker RAP
PhD, Duke University

Cowell, James Andrew (https://experts.colorado.edu/display/fisid_107090/)
Professor: Linguistics; Faculty Director: Native American and Indigenous Studies
PhD, University of California, Berkeley

Cowell, Rosie
Associate Professor: Psychology and Neuroscience
PhD, University of Oxford

Cox, Jeffrey N. (https://experts.colorado.edu/display/fisid_113253/)
Distinguished Professor: Humanities; Distinguished Professor: English
PhD, University of Virginia

Cox, Murray William (https://experts.colorado.edu/display/fisid_153192/)
Associate Teaching Professor: Computer Science; Senior Instructor: Engineering-Bold Center
PhD, Texas A&M University

Cox, Rachel (https://experts.colorado.edu/display/fisid_158450/)
Assistant Teaching Professor: Applied Mathematics
MS, University of Colorado Boulder

Cranmer, Steven (https://experts.colorado.edu/display/fisid_155051/)
Associate Professor: Laboratory for Atmospheric and Space Physics (LASP); Associate Professor: Astrophysical and Planetary Sciences (APS)
PhD, University of Delaware

Craven, Priscilla (https://experts.colorado.edu/display/fisid_108033/)
Teaching Professor of Distinction, Faculty Director: International Education; Senior Instructor: French & Italian
MA, University of Colorado Boulder

Crawley, Adam (https://experts.colorado.edu/display/fisid_172505/)
Associate Teaching Professor: School of Education
PhD, University of Georgia

Cremaschi, Alejandro M. (https://experts.colorado.edu/display/fisid_134168/)
Professor: Music
DMA, University of Minnesota Twin Cities

Crichlow, Gregory (https://experts.colorado.edu/display/fisid_142184/)
Teaching Professor: Environmental Design
M. Arch., University of Illinois at Chicago

Crimaldi, John P. (https://experts.colorado.edu/display/fisid_115733/)
Professor: Civil, Environmental and Architectural Engineering; Professor: Environmental Engineering Program (EVEN)
PhD, Stanford University

Crofton, Karen (https://experts.colorado.edu/display/fisid_164479/)
Scholar in Residence: Engineering Management Program
MBA, Rice University

Cropanzano, Russell Salvador (https://experts.colorado.edu/display/fisid_151710/)
Professor, Chair, Endowed/Named Professor: Leeds School of Business
PhD, Purdue University

Crow, Carolyn Alicia (https://experts.colorado.edu/display/fisid_163334/)
Assistant Professor: Geological Sciences
PhD, University of California-Los Angeles

Crumpacker, David W.
Professor Emeritus: Ecology and Evolutionary Biology

Cruz, Joelle (https://experts.colorado.edu/display/fisid_157594/)
Associate Professor: Communication
PhD, Texas A&M University

Cui, Longji (https://experts.colorado.edu/display/fisid_164283/)
Assistant Professor: Mechanical Engineering
ME, Beihang University (China)

Cuk, Tanja (https://experts.colorado.edu/display/fisid_159751/)
Associate Professor: Chemistry; Associate Professor: Renewable & Sustainable Energy Institute (RASEI)
PhD, Stanford University

Culp, Robert D.
Professor Emeritus: Aerospace Engineering Sciences
PhD, University of Colorado Boulder

Cumalat, John P. (https://experts.colorado.edu/display/fisid_105582/)
Professor: Physics
PhD, University of California, Santa Barbara

Cummings, Andrew (https://experts.colorado.edu/display/fisid_174362/)
Teaching Assistant Professor: Psychology and Neuroscience
PhD, University of Nevada Las Vegas

Cundiff, Milford F. (https://experts.colorado.edu/display/fisid_105396/)
Associate Professor Emeritus: Ecology and Evolutionary Biology
PhD, University of Colorado Boulder

Cunningham, Cory (https://experts.colorado.edu/individual/fisid_158270/)
Instructor: Leeds School of Business
PhD, University of Oklahoma

Curran, Timothy (https://experts.colorado.edu/display/fisid_118454/)
Professor Emeritus: Psychology and Neuroscience
PhD, University of Oregon

Curry, James H. (https://experts.colorado.edu/display/fisid_105730/)
Professor: Applied Mathematics; Associate Faculty Director: Interdisciplinary Telecommunications
PhD, University of California, Berkeley

Curry, Shannon (https://experts.colorado.edu/display/fisid_169552/)
Associate Professor: Astrophysical and Planetary Sciences (APS)
PhD, University of Michigan

Curtis, Ryan (https://experts.colorado.edu/display/fisid_164483/)
Teaching Associate Professor: Psychology and Neuroscience
PhD, University of Maryland College Park Campus

Cushing, Matthew
Director: School of Law
JD, University of Pennsylvania

Czubak, Magdalena (https://experts.colorado.edu/display/fisid_157955/)
Associate Professor: Mathematics
PhD, University of Texas at Austin

## D

D'Mello, Sidney (https://experts.colorado.edu/display/fisid_159117/)
Professor: Institute of Cognitive Science (ICS); Professor: Computer Science
PhD, University of Memphis

Dabove, Juan Pablo (https://experts.colorado.edu/display/fisid_125397/)
Professor: Spanish and Portuguese; Faculty Director: International Education
PhD, University of Pittsburgh

Daily, John W. (https://experts.colorado.edu/display/fisid_100131/)
Research Professor: Mechanical Engineering
PhD, Stanford University

Dall'Anese, Emiliano (https://experts.colorado.edu/display/fisid_158949/)
Assistant Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, University of Padova (Italy)

Dalton, Shamika (https://experts.colorado.edu/display/fisid_173969/)
Associate Professor: School of Law; Faculty Director: Law Library
JD, North Carolina Central University

Damrauer, Niels Harley (https://experts.colorado.edu/display/fisid_129797/)
Professor: Chemistry
PhD, University of California, Berkeley

Darling, Jeremiah K. (https://experts.colorado.edu/display/fisid_141767/)
Professor: Astrophysical and Planetary Sciences (APS); Professor, Faculty Director: Center for Astrophysics & Space Astronomy (CASA)
PhD, Cornell University

Darnell, Jerome C.
Professor Emeritus: Leeds School of Business

Dashti, Shideh (https://experts.colorado.edu/display/fisid_148493/)
Associate Professor: Civil, Environmental and Architectural Engineering; Faculty Director: College of Engineering and Applied Science
PhD, University of California, Berkeley

Datta, Subhendu K.
Professor Emeritus: Mechanical Engineering

Daugherty, Paul J. (https://experts.colorado.edu/display/fisid_128801/)
Senior Instructor: Journalism; Lecturer: Continuing Education & Professional Studies
MA, University of Colorado Boulder

Dauverd, Celine (https://experts.colorado.edu/display/fisid_145804/)
Associate Professor: History
PhD, University of California, Los Angeles

David, Emmanuel A. (https://experts.colorado.edu/display/fisid_146542/)
Associate Professor, Associate Chair: Women and Gender Studies
PhD, University of Colorado Boulder

Davies, Kendi F. (https://experts.colorado.edu/display/fisid_142304/)
Associate Professor: Ecology and Evolutionary Biology
PhD, Australian National Univ (Australia)

Davies, Shaun William (https://experts.colorado.edu/display/fisid_152995/)
Assistant Professor: Leeds School of Business
PhD, University of California, Los Angeles

Davis, John S. (https://experts.colorado.edu/display/fisid_115443/)
Professor, Dean: Music
DMA, University of Northern Colorado

Davis, Robert
Scholar in Residence: Civil, Environmental and Architectural Engineering
PhD, University of Colorado Boulder

Davis, Robert H. (https://experts.colorado.edu/individual/fisid_113653/)
Dean Emeritus: College of Engineering and Applied Science; Distinguished Professor: Chemical and Biological Engineering; Associate Faculty Director: Biomedical Engineering
PhD, Stanford University

Dawson, Edward E.
Lieutenant, Assistant Professor: Army ROTC
BS, The Citadel

Day, Heidi E.W. (https://experts.colorado.edu/display/fisid_116632/)
Teaching Professor of Distinction: Psychology and Neuroscience
PhD, University of Cambridge

Day, Robert E.
Professor Emeritus: Art and Art History

de Alwis, Lisa (https://experts.colorado.edu/display/fisid_152569/)
Teaching Assistant Professor: Engineering, Ethics & Society
PhD, University of Southern California

De Alwis, Senarath P. (https://experts.colorado.edu/display/fisid_103029/)
Professor Emeritus: Physics
PhD, University of Cambridge (England)

De Bartolome, Charles A.M. (https://experts.colorado.edu/display/fisid_101302/)
Professor Emeritus: Economics
PhD, University of Pennsylvania

de Gouw, Joost (https://experts.colorado.edu/display/fisid_105125/)
Professor, Associate Chair: Chemistry; Professor: Cooperative Institute for Research in Environmental Sciences (CIRES)
PhD, University of Utrecht (Netherlands)

de Lange, Marcel (https://experts.colorado.edu/display/fisid_140404/)
Teaching Professor: Environmental Design
MS, Delft University of Technology (Netherlands)

de Stecher, Annette W. (https://experts.colorado.edu/display/fisid_155095/)
Assistant Professor, Associate Chair: Art and Art History
PhD, Carleton University

Deagman Simonetta, Rachael Nicole (https://experts.colorado.edu/display/fisid_154125/)
Associate Teaching Professor: English
PhD, Duke University

Deca, Jan (https://experts.colorado.edu/display/fisid_155664/)
Lecturer: Physics
PhD, KU Leuven (Belgium)

DeDecker, Brian S. (https://experts.colorado.edu/display/fisid_143934/)
Senior Instructor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, Yale University

Dee, Laura (https://experts.colorado.edu/display/fisid_166130/)
Assistant Professor: Ecology and Evolutionary Biology
PhD, University of California, Santa Barbara

Deeley, Robin J. (https://www.colorado.edu/math/robin-deeley/)
Associate Professor: Mathematics
PhD, University of Victoria (Canada)

DeForest, Denise (https://experts.colorado.edu/display/fisid_158832/)
Instructor, Director for Academic Support: School of Law
JD, Georgetown University

Degrand, Thomas A. (https://experts.colorado.edu/display/fisid_102740/)
Professor: Physics
PhD, Massachusetts Institute of Technology

deGrazia, Janet (https://experts.colorado.edu/display/fisid_107661/)
Teaching Professor Emerita: Chemical and Biological Engineering
PhD, University of Colorado Boulder

Del Rio Flores, Antonio
Assistant Professor: Biomedical Engineering
PhD, University of California, Berkeley

DeLuca, Laura M. (https://experts.colorado.edu/display/fisid_101414/)
Instructor: Residential Acad Program-SSI; Instructor: Sewall RAP; Faculty Director: International Education
PhD, University of Colorado Boulder

Demaree, John D.
Professor Emeritus: Leeds School of Business

Demarest, Heather (https://experts.colorado.edu/display/fisid_159052/)
Assistant Professor: Philosophy
PhD, Rutgers University

Demmig-Adams, Barbara (https://experts.colorado.edu/display/fisid_105649/)
Professor: Ecology and Evolutionary Biology
Dr habil, University of Wurzburg (Germany)

Dennis, Tasshi
Lecturer: Physics
PhD, Rice University

Denny, Frederick M.
Professor Emeritus: Religious Studies

Depner, Christopher
Assistant Professor Adjunct: Integrative Physiology
PhD, Oregon State University

Derderyan, Svet (https://experts.colorado.edu/display/fisid_158226/)
Instructor: Political Science
PhD, University of North Carolina

Derricks, Veronica
Assistant Professor: Psychology and Neuroscience
PhD, University of Michigan

Desan, Mathieu (https://experts.colorado.edu/display/fisid_157678/)
Assistant Professor: Sociology
PhD, University of Michigan

Desautels-Stein, Justin Jacob (https://experts.colorado.edu/display/fisid_147370/)
Associate Professor: School of Law; Associate Professor: History
LLM, Harvard University; JD, University of North Carolina, Chapel Hill

DeShell, Jeffrey (https://experts.colorado.edu/display/fisid_118482/)
Professor: English
PhD, SUNY at Buffalo

DeSouza, Christopher A. (https://experts.colorado.edu/display/fisid_107460/)
Distinguished Professor: Integrative Physiology
PhD, University of Maryland, College Park

Dessau, Daniel S. (https://experts.colorado.edu/display/fisid_107532/)
Professor: Physics; Professor: Materials Science & Engineering
PhD, Stanford University

Detweiler, Corrella Scott (https://experts.colorado.edu/display/fisid_128240/)
Professor: Molecular, Cellular & Developmental Biology (MCDB); Faculty Director: Research & Innovation Office
PhD, University of California, San Francisco

Devendorf, Laura (https://experts.colorado.edu/display/fisid_158564/)
Assistant Professor: ATLAS Institute; Assistant Professor: Information Science; Assistant Professor: Creative Technology & Design; Assistant Professor: Intermedia Art, Writing and Performance; Assistant Professor: Computer Science
PhD, University of California, Berkeley

Devin, Richard
Professor Emeritus: Theatre and Dance

DeWitte, Sharon
Professor: Anthropology
PhD, Pennsylvania State University

DeWolfe, Oliver M. (https://experts.colorado.edu/display/fisid_142992/)
Professor: Physics
PhD, Massachusetts Institute of Technology

Dexter, Jason (https://experts.colorado.edu/display/fisid_164095/)
Assistant Professor: Astrophysical and Planetary Sciences (APS)
PhD, University of Washington Seattle

Dickey, Kimberly (https://experts.colorado.edu/display/fisid_115735/)
Professor: Art and Art History
MFA, New York State College of Ceramics at Alfred University

Dickson, Rebecca (https://experts.colorado.edu/display/fisid_105043/)
Associate Teaching Professor: Program for Writing and Rhetoric
PhD, University of Colorado Boulder

Diddams, Scott A. (https://experts.colorado.edu/display/fisid_148274/)
Professor: Physics; Visiting Professor, Professor Adjoint: Electrical, Computer and Energy Engineering (ECEE)
PhD, University of New Mexico

Diduch, Paul Jordan (https://experts.colorado.edu/display/fisid_154510/)
Teaching Associate Professor: Engineering, Ethics & Society
PhD, University of Dallas

Dietrich, Alex
Lecturer: Engineering Management Program
MBA, George Washington University

Dike, Steven (https://experts.colorado.edu/display/fisid_149880/)
Instructor, Instructor: History; Associate Faculty Director: Honors RAP
PhD, University of Colorado Boulder

DiLaura, David L.
Professor Emeritus: Civil, Environmental and Architectural Engineering

Dilling, Lisa
Professor, Professor: Cooperative Institute for Research in Environmental Sciences (CIRES); Associate Faculty Director: Environmental Studies Program
PhD, University of California, Santa Barbara

Dimidjian, Sona (https://experts.colorado.edu/display/fisid_140084/)
Professor: Psychology and Neuroscience
PhD, University of Washington

Dincao, Jose Paulo (https://experts.colorado.edu/display/fisid_143731/)
Assistant Research Professor: Physics
PhD, Univ of Sao Paulo (Brazil)

Ding, Xiaoyun (https://experts.colorado.edu/display/fisid_158563/)
Professor: Mechanical Engineering; Assistant Professor: Biomedical Engineering
PhD, Pennsylvania State University

Ding, Yifu (https://experts.colorado.edu/display/fisid_146088/)
Professor: Mechanical Engineering; Faculty Director: College of Engineering and Applied Science; Associate Professor: Materials Science & Engineering
PhD, University of Akron

DiStefano, Philip (https://experts.colorado.edu/display/fisid_101934/)
Dean Emeritus, Professor: School of Education
PhD, Ohio State University

Dmukhovskaya, Marina (https://experts.colorado.edu/display/fisid_166268/)
Instructor, Faculty Director: Journalism
MA, Indiana University Bloomington

Do, Ellen Yi-Luen (https://experts.colorado.edu/display/fisid_159925/)
Professor: ATLAS Institute; Professor: Computer Science; Professor: Creative Technology & Design
PhD, Georgia Institute of Technology

Doak, Daniel Forest (https://experts.colorado.edu/display/fisid_151963/)
Associate Faculty Director, Professor: Environmental Studies Program
PhD, University of Washington

Dockendorf, Matthew Paul (https://experts.colorado.edu/display/fisid_154511/)
Assistant Professor, Instructor: Music Education; Faculty Director: Music
DMA, Michigan State University

Dolan, Natalia Sue (https://experts.colorado.edu/display/fisid_147736/)
Associate Professor: University Libraries
MLS, University of Denver

Dommermuth, Emily (https://experts.colorado.edu/display/fisid_158089/)
Assistant Professor: University Libraries
MLIS, University of Denver

Donaldson, Zoe (https://experts.colorado.edu/display/fisid_157087/)
Assistant Professor: Molecular, Cellular & Developmental Biology (MCDB); Associate Professor: Psychology and Neuroscience
PhD, Emory University

Donato, Ruben (https://experts.colorado.edu/display/fisid_105537/)
Professor Emeritus: School of Education
PhD, Stanford University

Donavan, Janet Lynn (https://experts.colorado.edu/display/fisid_145270/)
Teaching Professor, Associate Chair: Political Science
PhD, University of Wisconsin–Madison

Donchez, Robert M. (https://experts.colorado.edu/display/fisid_101267/)
Senior Instructor, Faculty Director: Leeds School of Business
MBA, Fordham University

Donley, Elizabeth
Lecturer: Physics
PhD, Swiss Federal Institute of Technology

Donohew, Zachary (https://experts.colorado.edu/display/fisid_164033/)
Scholar in Residence: Leeds School of Business

Doostan, Alireza (https://experts.colorado.edu/display/fisid_147382/)
Professor: Aerospace Engineering Sciences; Assistant Professor: Center for Aerospace Structures (CAS); Endowed/Named Professor: College of Engineering and Applied Science
PhD, Johns Hopkins University

Doran, Kevin (https://experts.colorado.edu/display/fisid_133349/)
Assistant Research Professor: Renewable & Sustainable Energy Institute (RASEI)
JD, University of Colorado Boulder

Doty, Dawn (https://experts.colorado.edu/display/fisid_158312/)
Associate Teaching Professor: Advertising, Public Relations and Media Design; Lecturer: Continuing Education & Professional Studies
MA, Johns Hopkins University

Dougherty, Anne Margaret (https://experts.colorado.edu/display/fisid_101349/)
Associate Chair, Teaching Professor: Applied Mathematics; Endowed/Named Professor: College of Engineering and Applied Science
PhD, University of Wisconsin–Madison

Douglas, Marcia B. (https://experts.colorado.edu/display/fisid_122696/)
Professor, Professor: Continuing Education & Professional Studies; Associate Chair: English
PhD, SUNY at Binghamton

Douglass, Scot Ray (https://experts.colorado.edu/display/fisid_102347/)
Professor: Engineering, Ethics & Society; Faculty Director: Engineering Honors Program
PhD, University of Colorado Boulder

Dow, John O.
Associate Professor Emeritus: Civil, Environmental and Architectural Engineering

Dowell, Robin D. (https://experts.colorado.edu/display/fisid_147779/)
Associate Professor: Molecular, Cellular & Developmental Biology (MCDB); Associate Professor: Computer Science; Professor: Biomedical Engineering
DSc, Washington University

Downey, Liam C. (https://experts.colorado.edu/display/fisid_129297/)
Assistant Professor: Sociology
PhD, University of Arizona

Downton, James V.
Professor Emeritus: Sociology

Doyle, Damian P. (https://experts.colorado.edu/display/fisid_100290/)
Associate Teaching Professor: Program for Writing and Rhetoric
PhD, University of Colorado Boulder

Drake, David Francis (https://experts.colorado.edu/display/fisid_163641/)
Assistant Professor: Leeds School of Business
PhD, INSEAD (France)

Dreitlein, Joseph
Professor Emeritus: Physics
PhD, Washington University

Drumheller, John E. (https://experts.colorado.edu/display/fisid_103707/)
Senior Instructor: Music
DMA, University of Colorado Boulder

Drybread, Kristen (https://experts.colorado.edu/display/fisid_156523/)
Lecturer: Undergraduate Education; Lecturer: Continuing Education & Professional Studies; Lecturer: Libby Arts RAP; Lecturer: Anthropology

Dubin, Mark W.
Professor Emeritus: Molecular, Cellular & Developmental Biology (MCDB)

Dubson, Michael A. (https://experts.colorado.edu/display/fisid_102266/)
Teaching Professor of Distinction, Associate Chair: Physics
PhD, Cornell University

Dufour, Darna L. (https://experts.colorado.edu/display/fisid_100213/)
Professor Emerita: Anthropology
PhD, SUNY at Binghamton

Dukic, Vanja (https://experts.colorado.edu/display/fisid_148718/)
Professor: Applied Mathematics
PhD, Brown University

Dukovic, Gordana (https://experts.colorado.edu/display/fisid_147414/)
Professor: Chemistry; Associate Professor: Materials Science & Engineering
PhD, Columbia University

Dulock, Michael J. (https://experts.colorado.edu/display/fisid_144338/)
Associate Professor: University Libraries
MLIS, Drexel University

Duncan, Thomas R.
Professor Emeritus: Advertising, Public Relations and Media Design

Dunn, James M. (https://experts.colorado.edu/display/fisid_140593/)
Associate Professor: Music
MM, Arizona State University

Dupris, Joseph
Visiting Assistant Professor: Ethnic Studies
Ph.D., University of Arizona

Duren, Ron G. Jr. (https://experts.colorado.edu/display/fisid_157263/)
Teaching Associate Professor: Engineering Management Program
ME, University of Colorado Boulder

Duresse-Stimilli, Francoise
Associate Professor: Art and Art History
MFA, Temple University

Dusinberre, Edward (https://experts.colorado.edu/display/fisid_101358/)
Artist in Residence: Music
Diploma, The Juilliard School

Dusinberre, Elspeth Rogers Mcin (https://experts.colorado.edu/display/fisid_111649/)
Professor: Classics
PhD, University of Michigan Ann Arbor

Dutro, Elizabeth (https://experts.colorado.edu/display/fisid_141157/)
Professor, Associate Dean: School of Education
PhD, University of Michigan Ann Arbor

Dykes Jim (https://experts.colorado.edu/display/fisid_156791/)
Assistant Teaching Professor: Computer Science
MS, University of Colorado Boulder

Dyrness, Andrea E. (https://experts.colorado.edu/display/fisid_159487/)
Associate Professor: School of Education
PhD, University of California-Berkeley

# E

Eakin, Charles
Professor Emeritus: Music

Eargle, David (https://experts.colorado.edu/display/fisid_159053/)
Assistant Professor: Leeds School of Business
PhD, University of Pittsburgh

Eaton, Robert
Professor Emeritus: Integrative Physiology

Eaves, Joel David (https://experts.colorado.edu/display/fisid_147419/)
Professor: Chemistry
PhD, Massachusetts Institute of Technology

Eberle, Jaelyn J. (https://experts.colorado.edu/display/fisid_126544/)
Professor, Professor: Geological Sciences; Faculty Director: Museum and Field Studies
PhD, University of Wyoming

Echchaibi, Nabil (https://experts.colorado.edu/display/fisid_145054/)
Associate Chair: Media Studies; Lecturer: Continuing Education & Professional Studies
PhD, Indiana University Bloomington

Eckart, Dennis R.
Professor Emeritus: Political Science

Ecker, Robert R.
Professor Emeritus: Art and Art History

Eckert, Erika L. (https://experts.colorado.edu/display/fisid_101844/)
Associate Professor: Music
BM, University of Rochester

Edwards, Emily (https://experts.colorado.edu/display/fisid_153378/)
Senior Instructor, Associate Chair: Leeds School of Business
MBA, University of Colorado Denver

Egan, Kristen
Lecturer: Engineering Management Program
ME, University of Colorado Boulder

Eggert, Katherine (https://experts.colorado.edu/display/fisid_103618/)
Professor: English; Faculty Director: British and Irish Studies; Professor: Critical Media Practices
PhD, University of California, Berkeley

Ehly, Jeremy G. (https://experts.colorado.edu/display/fisid_149190/)
Teaching Associate Professor: Environmental Design
MArch, Illinois Institute of Technology

Ehringer, Marissa A. (https://experts.colorado.edu/display/fisid_126595/)
Associate Professor: Institute for Behavioral Genetics (IBG); Professor, Chair: Integrative Physiology
PhD, University of Colorado Denver

Eichen, Elliot
Research Professor: Computer Science
PhD, University of Arizona

Eichmann-Kalwara, Nickoal (https://experts.colorado.edu/display/fisid_158705/)
Associate Professor: University Libraries
MLS, Indiana University

El Helbawy, Mona
Associate Faculty Director, Associate Teaching Professor: Computer Science
PhD, University of Colorado Boulder

Ellingson, Erica (https://experts.colorado.edu/display/fisid_100118/)
Professor Emeritus: Astrophysical and Planetary Sciences (APS)
PhD, University of Arizona

Elliott, Delbert S.
Professor Emeritus: Sociology

Elliott, Jacqueline Michelle (https://experts.colorado.edu/display/fisid_140085/)
Associate Professor: Classics
PhD, Columbia University

Elliott, Peter D. (https://experts.colorado.edu/display/fisid_105048/)
Professor Emeritus: Mathematics
PhD, University of Cambridge (England)

Ellis, Jay (https://experts.colorado.edu/display/fisid_122674/)
Associate Teaching Professor: Program for Writing and Rhetoric
PhD, New York University

Elliston, Diane
Assistant Teaching Professor: Advertising, Public Relations and Media Design
MFA, Claremont Graduate University

Ellsworth, Michelle (https://experts.colorado.edu/display/fisid_112060/)
Distinguished Professor, Professor: Intermedia Art, Writing and Performance; Chair: Theatre and Dance; Distinguished Professor: Critical Media Practices
MFA, University of Colorado Boulder

Ellsworth, Oliver
Professor Emeritus: Music

Elmore, Peter Michael (https://experts.colorado.edu/display/fisid_103089/)
Professor: Spanish and Portuguese
PhD, University of Texas at Austin

Elmore, Vivian
Assistant Teaching Professor: Spanish and Portuguese
BA, Pontificia Universidad Católica (Perú)

Emerson, Cherriethel K.
Lecturer: Continuing Education & Professional Studies

Emerson, Lori Ann (https://experts.colorado.edu/display/fisid_145834/)
Associate Professor, Faculty Director: Intermedia Art, Writing and Performance
PhD, SUNY at Buffalo

Emery, Nancy Christine (https://experts.colorado.edu/display/fisid_156291/)
Assistant Professor: Ecology and Evolutionary Biology
PhD, University of California, Davis

Emery, William J. (https://experts.colorado.edu/display/fisid_106038/)
Professor Emeritus: Aerospace Engineering Sciences; Professor Emeritus: Environmental Engineering Program (EVEN)
PhD, University of Hawaii

Engel, Barbara A. (https://experts.colorado.edu/display/fisid_100574/)
Distinguished Professor Emerita: History

Engel, Mimi (https://experts.colorado.edu/display/fisid_159488/)
Associate Professor: School of Education
PhD, Northwestern University

Engel, Steven
Professor Emeritus: Leeds School of Business

England, Margaret Ann (https://experts.colorado.edu/display/fisid_142239/)
Clinical Professor: School of Law
JD, University of Denver

Englander, Janos (https://experts.colorado.edu/display/fisid_147333/)
Professor: Mathematics
PhD, Technion – Israel Institute of Technology

English, Michael D. (https://experts.colorado.edu/display/fisid_164260/)
Instructor, Associate Faculty Director: Peace and Conflict Studies
PhD, George Mason University

Enoka, Roger M. (https://experts.colorado.edu/display/fisid_110122/)
Professor: Integrative Physiology; Professor: Biomedical Engineering
PhD, University of Washington

Ergun, Robert E. (https://experts.colorado.edu/display/fisid_115912/)
Professor: Laboratory for Atmospheric and Space Physics (LASP); Professor: Astrophysical and Planetary Sciences (APS)
PhD, University of California, Berkeley

Erhard, Paul M. (https://experts.colorado.edu/display/fisid_100493/)
Professor: Music
DMA, The Juilliard School

Erickson, Robert W. (https://experts.colorado.edu/display/fisid_105514/)
Professor: Electrical, Computer and Energy Engineering (ECEE); Faculty Director: College of Engineering and Applied Science
PhD, California Institute of Technology

Ertimur, Yonca (https://experts.colorado.edu/display/fisid_151585/)
Professor, Associate Dean: Leeds School of Business
PhD, New York University

Escamilla, Kathy M. (https://experts.colorado.edu/display/fisid_109224/)
Professor Emerita: School of Education
PhD, University of California, Los Angeles

Espelie, Erin Marie (https://experts.colorado.edu/display/fisid_148671/)
Associate Professor, Associate Faculty Director: Center for Environmental Journalism; Associate Professor: Critical Media Practices; Assistant Professor: Intermedia Art, Writing and Performance; Chair: Cinema Studies & Moving Image Arts
MFA, Duke University

Espinosa, Joaquin Maximiliano (https://experts.colorado.edu/display/fisid_134378/)
Visiting Associate Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, Univ of Buenos Aires (Argentina)

Esposito, Larry Wayne (https://experts.colorado.edu/display/fisid_100502/)
Professor: Laboratory for Atmospheric and Space Physics (LASP); Professor: Astrophysical and Planetary Sciences (APS)
PhD, University of Massachusetts at Amherst

Evans, John A. (https://experts.colorado.edu/display/fisid_152970/)
Associate Professor, Associate Chair: Aerospace Engineering Sciences
PhD, University of Texas at Austin

Evans, Luke M. (https://experts.colorado.edu/display/fisid_156753/)
Assistant Professor: Ecology and Evolutionary Biology; Assistant Professor: Institute for Behavioral Genetics (IBG)
PhD, Northern Arizona University

Evans, Thomas
Assistant Professor: Environmental Engineering Program (EVEN)
PhD, University of Colorado Boulder

Evers, Neal (https://experts.colorado.edu/display/fisid_157360/)
Associate Director, Teaching Associate Professor: Environmental Design
MBA, University of Colorado Boulder

# F

Falconer, John L. (https://experts.colorado.edu/display/fisid_101426/)
Professor Emeritus: Chemical and Biological Engineering
PhD, Stanford University

Falke, Joseph J. (https://experts.colorado.edu/display/fisid_101970/)
Professor: Biochemistry
PhD, California Institute of Technology

Fantalis, Maryanne (https://experts.colorado.edu/display/fisid_156467/)
Teaching Associate Professor: Environmental Design
JD, Rutgers University

Farago, Claire Joan (https://experts.colorado.edu/display/fisid_101552/)
Professor Emerita: Art and Art History
PhD, University of Virginia

Farkas Roszell, Agnes (https://experts.colorado.edu/display/fisid_147915/)
Instructor: International Education
MA, Kossuth L. University (Hungary)

Farmer, G. Lang (https://experts.colorado.edu/display/fisid_100498/)
Professor: Geological Sciences; Faculty Director: International Education; Associate Dean, Professor: College of Arts and Sciences
PhD, University of California, Los Angeles

Farmer, James Clark (https://experts.colorado.edu/display/fisid_130603/)
Assistant Teaching Professor: Cinema Studies & Moving Image Arts
PhD, University of Iowa

Farnsworth, John A. (https://experts.colorado.edu/display/fisid_153255/)
Associate Professor: Aerospace Engineering Sciences
PhD, Rensselaer Polytechnic Institute

Farr, Elizabeth G. (https://experts.colorado.edu/display/fisid_101732/)
Professor Emerita: Music
DMA, University of Michigan Ann Arbor

Farrell, Caitlin (https://experts.colorado.edu/display/fisid_155193/)
Associate Research Professor: School of Education
PhD, University of Southern California

Farrelly, Raichle (https://experts.colorado.edu/display/fisid_166033/)
Senior Instructor, Lecturer: Linguistics
PhD, University of Utah

Farsi, Carla Emilia (https://experts.colorado.edu/display/fisid_101437/)
Professor: Mathematics
PhD, University of Maryland, College Park

Feeler, Jordan (https://experts.colorado.edu/display/fisid_166032/)
Instructor: Theatre and Dance
BFA, Webster University

Fejer, Andras (https://experts.colorado.edu/display/fisid_103923/)
Artist in Residence: Music
Diploma, Franz Liszt Academy of Music

Felderman, Melissa (https://experts.colorado.edu/individual/fisid_163478/)
Teaching Associate Professor: Environmental Design
MPS, New York University

Feldman, Andrea (https://experts.colorado.edu/display/fisid_101230/)
Teaching Professor of Distinction Emerita: Program for Writing and Rhetoric; Senior Instructor: Honors Program
PhD, University of Colorado Boulder

Felippa, Carlos A. (https://experts.colorado.edu/display/fisid_105701/)
Professor Emeritus: Aerospace Engineering Sciences
PhD, University of California, Berkeley

Fell, James E. Jr.
Lecturer: Continuing Education & Professional Studies
PhD, University of Colorado Boulder

Femrite, Andrew
Senior Instructor, Faculty Director: Electrical, Computer and Energy Engineering (ECEE)
BS, University of Colorado Boulder

Fenn, Elizabeth Anne (https://experts.colorado.edu/display/fisid_149896/)
Distinguished Professor Emerita: History
PhD, Yale University

Ferguson, Michaele L. (https://experts.colorado.edu/display/fisid_129299/)
Associate Professor: Political Science
PhD, Harvard University

Ferguson, Virginia L. (https://experts.colorado.edu/display/fisid_110131/)
Professor: Mechanical Engineering; Endowed/Named Professor: College of Engineering and Applied Science; Associate Professor: Materials Science & Engineering; Associate Professor: Biomedical Engineering
PhD, University of Colorado Boulder

Fernbach, Philip M. (https://experts.colorado.edu/display/fisid_149786/)
Associate Professor, Faculty Director: Leeds School of Business
PhD, Brown University

Ferrell, Tracy L. (https://experts.colorado.edu/display/fisid_101540/)
Associate Teaching Professor: Program for Writing and Rhetoric
PhD, University of Colorado Boulder

Ferris, Anna M. (https://experts.colorado.edu/display/fisid_116252/)
Associate Professor: University Libraries
MLS, Southern Connecticut State University

Ferris, David S. (https://experts.colorado.edu/display/fisid_116817/)
Professor: Humanities
PhD, SUNY at Buffalo

Ferry, Robert J. (https://experts.colorado.edu/display/fisid_104214/)
Associate Professor Emeritus: History
PhD, University of Minnesota Twin Cities

Fierer, Noah (https://experts.colorado.edu/display/fisid_142240/)
Professor: Cooperative Institute for Research in Environmental Sciences (CIRES); Professor: Ecology and Evolutionary Biology
PhD, University of California, Santa Barbara

Fiesler, Casey Lynn (https://experts.colorado.edu/display/fisid_155950/)
Assistant Professor, Associate Chair: Information Science; Associate Professor: Computer Science
PhD, Georgia Institute of Technology

Fiez, Terri S. (https://experts.colorado.edu/display/fisid_156578/)
Professor: Electrical, Computer and Energy Engineering (ECEE); Dean: Research & Innovation Office
PhD, Oregon State University

Figueroa, Nuris (https://experts.colorado.edu/display/fisid_167396/)
Assistant Professor: Physics
PhD, Sorbonne University (France)

Fileva, Iskra (https://experts.colorado.edu/display/fisid_154600/)
Associate Professor, Associate Chair: Philosophy
PhD, Boston University

Filipovic, Dejan S. (https://experts.colorado.edu/display/fisid_126278/)
Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, University of Michigan Ann Arbor

Fillman, Christy L. (https://experts.colorado.edu/display/fisid_145115/)
Senior Instructor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, University of Colorado Boulder

Fink, Robert
Professor Emeritus: Music

Finkelstein, Noah D. (https://experts.colorado.edu/display/fisid_129919/)
Professor: Physics; Faculty Director: OIT-Administration
PhD, Princeton University

Finlay, Jessica
Assistant Professor: Geography
PhD, University of Minnesota, Minneapolis

Fischer, Kate (https://experts.colorado.edu/display/fisid_155474/)
Instructor: Honors Program; Lecturer: Farrand RAP; Lecturer: Libby Arts RAP; Instructor: Honors RAP; Instructor: Miramontes Arts & Sciences Program (MASP); Lecturer: Academic Advising Center; Lecturer: Anthropology
PhD, University of Colorado Boulder

Fisher, Christina Marie (https://experts.colorado.edu/display/fisid_158798/)
Instructor: Leeds School of Business; Lecturer: Continuing Education & Professional Studies
MS, University of Delaware

Fisher, Jolene (https://experts.colorado.edu/display/fisid_158335/)
Associate Chair, Assistant Professor: Media Studies; Lecturer: Continuing Education & Professional Studies; Associate Professor: Advertising, Public Relations and Media Design
PhD, University of Oregon

Fitzgerald, Jennifer L. (https://experts.colorado.edu/display/fisid_140086/)
Professor, Chair: Political Science
PhD, Brown University

Fladd, Samantha G. (https://experts.colorado.edu/display/fisid_165651/)
Assistant Professor: Museum and Field Studies
PhD, University of Arizona

Flaxman, Samuel M. (https://experts.colorado.edu/display/fisid_145698/)
Associate Professor: Ecology and Evolutionary Biology
PhD, Cornell University

Fleming, Brian (https://experts.colorado.edu/display/fisid_154011/)
Assistant Research Professor: Astrophysical and Planetary Sciences (APS)
PhD, Johns Hopkins University

Fleshner, Monika R. (https://experts.colorado.edu/display/fisid_103304/)
Professor: Integrative Physiology
PhD, University of Colorado Boulder

Flores, Lisa A.
Associate Dean: College of Media, Communication & Information
PhD, University of Georgia

Flores, Nicholas E. (https://experts.colorado.edu/display/fisid_107603/)
Professor: Economics
PhD, University of California, San Diego

Floriano, Maureen (https://experts.colorado.edu/display/fisid_169506/)
Assistant Teaching Professor: Integrative Physiology
PhD, Case Western Reserve University

Flowers, Rebecca M. (https://experts.colorado.edu/display/fisid_144054/)
Professor: Geological Sciences
PhD, Massachusetts Institute of Technology

Fluri, Jennifer L. (https://experts.colorado.edu/display/fisid_154033/)
Chair, Professor: Geography; Professor: International Affairs Program
PhD, Pennsylvania State University

Fobes, Alexander S. (https://experts.colorado.edu/display/fisid_152512/)
Associate Teaching Professor: Program for Writing and Rhetoric
PhD, University of Colorado Boulder

Foley, Teresa E. (https://experts.colorado.edu/display/fisid_147351/)
Teaching Professor of Distinction: Integrative Physiology
PhD, University of Colorado Boulder

Fong, Judith Yem Siu (https://experts.colorado.edu/display/fisid_101120/)
Professor Emeritus: University Libraries
MA, University of California, Berkeley

Forbes, Jeffrey M. (https://experts.colorado.edu/display/fisid_100264/)
Professor Emeritus: Aerospace Engineering Sciences
PhD, Harvard University

Ford, William T. (https://experts.colorado.edu/display/fisid_102175/)
Professor Emeritus: Physics
PhD, Princeton University

Fornberg, Bengt (https://experts.colorado.edu/display/fisid_108048/)
Professor Emeritus: Applied Mathematics
PhD, University of Uppsala (Sweden)

Forsman, Charles S.
Professor Emeritus: Art and Art History

Foster, Suzanne R.
Professor Emeritus: Art and Art History

Fowler, John S.
Professor Emeritus: Integrative Physiology

Fox, Barbara (https://experts.colorado.edu/display/fisid_106066/)
Professor: Linguistics
PhD, University of California, Los Angeles

Fox, Jeffrey S. (https://experts.colorado.edu/display/fisid_105586/)
Professor: Mathematics
PhD, University of California, Berkeley

Fox, Jerome Michael (https://experts.colorado.edu/display/fisid_156682/)
Assistant Professor: Chemical and Biological Engineering; Assistant Professor: Biomedical Engineering
PhD, University of California, Berkeley

Frajzyngier, Zygmunt (https://experts.colorado.edu/display/fisid_104000/)
Professor: Linguistics
PhD, University of Warsaw (Poland)

France, Kevin Christopher (https://experts.colorado.edu/display/fisid_145201/)
Assistant Professor: Laboratory for Atmospheric and Space Physics (LASP); Associate Professor, Associate Chair: Astrophysical and Planetary Sciences (APS)
PhD, Johns Hopkins University

Francis, John A.
Instructor: School of Law
JD, University of Michigan Ann Arbor

Frangopol, Dan M.
Professor Emeritus: Civil, Environmental and Architectural Engineering

Franklin, Allan D. (https://experts.colorado.edu/display/fisid_100660/)
Professor Emeritus: Physics
PhD, Cornell University

Franklin, Trevor (https://experts.colorado.edu/display/fisid_175743/)
Teaching Assistant Professor: Chemical and Biological Engineering
PhD, Cornell University

Frederick, David M.
Professor Emeritus: Leeds School of Business: Leeds School of Business

Fredricksmeyer, Hardy (https://experts.colorado.edu/display/fisid_115446/)
Teaching Professor: Engineering, Ethics & Society; Senior Instructor: Farrand RAP
PhD, University of Texas at Austin

Fredrickson, Tammy L. (https://experts.colorado.edu/display/fisid_148888/)
Clinical Associate Professor: Speech, Language and Hearing Sciences (SLHS)
PhD, University of Colorado Boulder

Freund, Karl
Sergeant, Military Science Instructor: Army ROTC

Frew, Eric W. (https://experts.colorado.edu/display/fisid_134685/)
Professor: Aerospace Engineering Sciences; Professor: Computer Science; Faculty Director, Associate Chair: College of Engineering and Applied Science
PhD, Stanford University

Frey, Julia B.
Professor Emerita: French & Italian

Frey, Lawrence R. (https://experts.colorado.edu/display/fisid_125937/)
Professor Emeritus: Communication
PhD, University of Kansas

Friedel, Megan (https://experts.colorado.edu/display/fisid_163706/)
Assistant Professor: University Libraries
MS, Simmons College

Friedman, Naomi P. (https://experts.colorado.edu/display/fisid_109519/)
Associate Professor: Institute for Behavioral Genetics (IBG); Associate Professor: Psychology and Neuroscience
PhD, University of Colorado Boulder

Friedrich, Katja (https://experts.colorado.edu/display/fisid_133607/)
Professor: Atmospheric and Oceanic Sciences (ATOC)
PhD, Ludwig-Maximilians-Universität München (Germany)

Frongillo, Rafael M. (https://experts.colorado.edu/display/fisid_156416/)
Associate Professor: Computer Science
PhD, University of California, Berkeley

Frost, Steven (https://experts.colorado.edu/display/fisid_156502/)
Instructor: College of Media, Communication & Information; Instructor: Art and Art History; Instructor, Associate Chair: Media Studies
MFA, School of Art Institute of Chicago

Funk, Samantha
Assistant Professor: School of Law
JD, University of Michigan

Furman, H. Patrick
Professor Emeritus: School of Law
JD, University of Colorado Boulder

Furtak, Erin M. (https://experts.colorado.edu/display/fisid_144504/)
Professor: School of Education
PhD, Stanford University

Fydenlund, Shae
Teaching Assistant Professor: Center for Asian Studies
PhD, University of Colorado Boulder

# G

Gale, Kendra L. (https://experts.colorado.edu/display/fisid_125578/)
Instructor: Communication & Society RAP
PhD, University of Minnesota Twin Cities

Gallagher, Emily Anne (https://experts.colorado.edu/display/fisid_163544/)
Assistant Professor: Leeds School of Business
PhD, Paris School of Economics

Gallagher, Michael (https://experts.colorado.edu/display/fisid_151214/)
Lecturer: Physics
PhD, University of Colorado

Galm, John
Professor Emeritus: Music

Gangadharbatla, Harsha (https://experts.colorado.edu/display/fisid_153279/)
Professor: Advertising, Public Relations and Media Design; Faculty Director: Faculty Council, A&S
PhD, University of Texas at Austin

Ganguly, Suranjan (https://experts.colorado.edu/display/fisid_102045/)
Professor Emeritus: Cinema Studies & Moving Image Arts
PhD, Purdue University

Gao, Xun (https://experts.colorado.edu/display/fisid_174294/)
Assistant Professor: Physics
PhD, Tsinghua University (China)

Garbers, Patrick
Assistant Professor: Army ROTC
Contractor, U.S. Army; BS, Chapman University

Garcea, Robert L. (https://experts.colorado.edu/display/fisid_146103/)
Professor: Molecular, Cellular & Developmental Biology (MCDB)
MD, University of California, San Francisco

Garcia, Diego (https://experts.colorado.edu/display/fisid_156036/)
Professor: Leeds School of Business
PhD, University of California, Berkeley

Gardner, Ryan (https://experts.colorado.edu/individual/fisid_165331/)
Associate Professor: Music
DMA, Manhattan School of Music

Garland, Andrew B (https://experts.colorado.edu/display/fisid_159725/)
Assistant Professor: Music
MM, University of Cincinnati

Garnand, John J.
Professor Emeritus: Leeds School of Business

Garrity, Jane Marie (https://experts.colorado.edu/display/fisid_105467/)
Associate Professor: English
PhD, University of California, Berkeley

Gasiewski, Albin J. (https://experts.colorado.edu/display/fisid_142882/)
Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, Massachusetts Institute of Technology

Gasta, Mark (https://experts.colorado.edu/display/fisid_165314/)
Instructor: Leeds School of Business
PhD, Pepperdine University

Gautam, Sanjay Kumar (https://experts.colorado.edu/display/fisid_140614/)
Associate Professor: History
PhD, University of Chicago

Gayley, Antonia Hollis (https://experts.colorado.edu/display/fisid_144505/)
Associate Professor, Associate Chair: Religious Studies
PhD, Harvard University

Gazarik, Michael
Scholar in Residence, Director: Engineering Management Program
PhD, Georgia Institute of Technology

Ge, Shemin (https://experts.colorado.edu/display/fisid_101387/)
Distinguished Professor, Chair: Geological Sciences
PhD, Johns Hopkins University

Gebhardt, Karen (https://experts.colorado.edu/display/fisid_159742/)
Senior Instructor: Economics; Senior Instructor: Continuing Education & Professional Studies
PhD, Colorado State University

Geck, Francis J.
Professor Emeritus: Art and Art History

Geers, Thomas L.
Professor Emeritus: Mechanical Engineering

Gentry, Gregory R.
Associate Professor, Faculty Director: Music
DMA, University of Missouri–Kansas City

George, Steven (https://experts.colorado.edu/display/fisid_103289/)
Professor: Chemistry; Professor: Materials Science & Engineering
PhD, University of California, Berkeley

Gerber, Matthew Dean (https://experts.colorado.edu/display/fisid_129799/)
Associate Professor: History
PhD, University of California, Berkeley

Gerding, Erik F. (https://experts.colorado.edu/display/fisid_149723/)
Professor, Endowed/Named Professor: School of Law
JD, Harvard University

Gerke, Jennifer D. (https://experts.colorado.edu/display/fisid_135135/)
Associate Dean, Associate Professor: University Libraries
MLS, Indiana University at South Bend

Gerland, Oliver W. (https://experts.colorado.edu/display/fisid_101092/)
Associate Professor: Theatre and Dance; Associate Professor: Humanities
PhD, Stanford University

Gerren, Donna S. (https://experts.colorado.edu/display/fisid_108563/)
Teaching Professor Emerita: Aerospace Engineering Sciences
PhD, University of Kansas

Gerwig, Inger-Johanne
Senior Instructor Emerita: Germanic and Slavic Languages and Literatures

Ghobadi-Far, Khosro (https://experts.colorado.edu/display/fisid_174031/)
Assistant Professor: Aerospace Engineering Sciences
PhD, University of Newcastle

Gibert, John C. (https://experts.colorado.edu/display/fisid_101680/)
Professor: Classics
PhD, Harvard University

Gifford, Kevin K. (https://experts.colorado.edu/display/fisid_104361/)
Faculty Director, Research Professor: Computer Science
PhD, University of Colorado Boulder

Gilbert, Andrew
Teaching Assistant Professor: Humanities; Lecturer: Cinema Studies & Moving Image Arts
PhD, University of Colorado

Gilbert, Stacy (https://experts.colorado.edu/display/fisid_158706/)
Associate Professor: University Libraries
MLIS, University of North Carolina

Gill, Sam D. (https://experts.colorado.edu/display/fisid_103595/)
Professor Emeritus: Religious Studies
PhD, University of Chicago

Gillett, Bernard
Senior Instructor: Farrand RAP
MA, University of Colorado Boulder

Gillette, Jeff
Assistant Teaching Professor: Advertising, Public Relations and Media Design
MS, Virginia Commonwealth University

Gillman, Adrianna (https://experts.colorado.edu/display/fisid_165224/)
Associate Professor: Applied Mathematics
PhD, University of Colorado Boulder

Gimenez, Martha E.
Professor Emerita: Sociology

Giovannelli, Leland (https://experts.colorado.edu/display/fisid_100755/)
Teaching Professor Emerita: Engineering, Ethics & Society
PhD, University of Chicago

Gladstone, Jason Daniel (https://experts.colorado.edu/display/fisid_154914/)
Assistant Professor: English
PhD, Johns Hopkins University

Gladstone, Joe (https://experts.colorado.edu/display/fisid_166596/)
Assistant Professor: Leeds School of Business
PhD, University of Cambridge (England)

Glancy, Scott
Lecturer: Physics
PhD, University of Notre Dame

Glaser, Matthew A.
Professor Attendant Rank: Physics
PhD, University of Colorado Boulder

Gleason, Emily (https://experts.colorado.edu/display/fisid_164268/)
Teaching Professor, Faculty Director: School of Education
PhD, University of California, Berkeley

Gleeson, Todd T. (https://experts.colorado.edu/display/fisid_105480/)
Professor, Faculty Director: Health Professions RAP; Professor Emeritus: Integrative Physiology
PhD, University of California, Irvine

Glenn, Jason
Professor: Center for Astrophysics & Space Astronomy (CASA)
PhD, University of Arizona

Glenn, Wendy J. (https://experts.colorado.edu/display/fisid_159489/)
Professor: School of Education
PhD, Arizona State University

Glimp, David R. (https://experts.colorado.edu/display/fisid_143616/)
Associate Professor: English
PhD, Johns Hopkins University

Glover, Fred W.
Professor Emeritus: Leeds School of Business

Gluckstern, J.
Lecturer: Cinema Studies & Moving Image Arts
MFA, University of Colorado Boulder

Glusman, F. Jeff (https://experts.colorado.edu/display/fisid_172040/)
Assistant Teaching Professor: Aerospace Engineering Sciences
PhD, University of Colorado Boulder

Godley Christopher (https://experts.colorado.edu/display/fisid_172491/)
Assistant Teaching Professor: Computer Science
MS, University of Colorado Boulder

Godrick, Daniel (https://experts.colorado.edu/display/fisid_154955/)
Assistant Teaching Professor: Integrated Design Engineering
MS, University of Colorado Boulder; P.E.

Goeldner, Charles R.
Professor Emeritus: Leeds School of Business

Gold, Lawrence (https://experts.colorado.edu/display/fisid_100581/)
Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, University of Connecticut

Goldfarb, Kathryn Elissa (https://experts.colorado.edu/display/fisid_156471/)
Associate Professor: Anthropology
PhD, University of Chicago

Goldman, Mara Jill (https://experts.colorado.edu/display/fisid_143542/)
Associate Professor: Geography
PhD, University of Wisconsin–Madison

Goldman, Martin V. (https://experts.colorado.edu/display/fisid_100567/)
Professor Emeritus: Physics
PhD, Harvard University

Goldstein, Bruce (https://experts.colorado.edu/display/fisid_147755/)
Professor Emeritus: Environmental Design; Associate Professor: Institute of Behavioral Science (IBS)
PhD, University of California, Berkeley

Goldstein, Donna M. (https://experts.colorado.edu/display/fisid_100448/)
Faculty Director: Latin American Studies; Professor: Media Studies; Professor: Anthropology
PhD, University of California, Berkeley

Gómez, Leila Gabriela (https://experts.colorado.edu/display/fisid_133563/)
Professor: Women and Gender Studies
PhD, Johns Hopkins University

Goode, Bradley M. (https://experts.colorado.edu/display/fisid_134686/)
Associate Professor: Music
MM, DePaul University

Goodman, Nan (https://experts.colorado.edu/display/fisid_100633/)
Professor of Distinction: English; Professor: Jewish Studies
PhD, Harvard University

Goodrich, James (https://experts.colorado.edu/display/fisid_109239/)
Professor, Chair: Biochemistry
PhD, Carnegie Mellon University

Goodrich, Robert K.
Professor Emeritus: Mathematics

Goodrum, Paul M. (https://experts.colorado.edu/display/fisid_151965/)
Endowed/Named Professor: College of Engineering and Applied Science
PhD, University of Texas at Austin

Goodwin, Andrew Pratt (https://experts.colorado.edu/display/fisid_151595/)
Associate Professor: Chemical and Biological Engineering; Associate Professor: Materials Science & Engineering
PhD, University of California, Berkeley

Gooseff, Michael N. (https://experts.colorado.edu/display/fisid_155922/)
Faculty Director, Professor: Civil, Environmental and Architectural Engineering; Professor: Institute of Arctic & Alpine Research (INSTAAR); Professor: Environmental Engineering Program (EVEN)
PhD, University of Colorado Boulder

Gopinath, Juliet T. (https://experts.colorado.edu/display/fisid_147075/)
Professor: Electrical, Computer and Energy Engineering (ECEE); Professor: Physics; Faculty Director, Associate Professor: Materials Science & Engineering; Associate Professor: Biomedical Engineering; Endowed/Named Professor: College of Engineering and Applied Science
PhD, Massachusetts Institute of Technology

Gordon, Kenneth R.
Professor Emeritus: Leeds School of Business

Gorokhovsky, Alexander (https://experts.colorado.edu/display/fisid_126279/)
Professor: Mathematics
PhD, The Ohio State University

Gorokhovsky, Vladimir
Lecturer: Physics
PhD, Russian Academy of Sciences

Gorski, Jessica A. (https://experts.colorado.edu/display/fisid_144240/)
Instructor, Associate Faculty Director: Health Professions RAP
PhD, University of Colorado Boulder

Gort, Mileidis (https://experts.colorado.edu/display/fisid_157992/)
Professor, Associate Dean: School of Education
EdD, Boston University

Gough, Michael J.
Colonel, Chair, Professor: Army ROTC
MS, Naval Postgraduate School

Gough, Raina V. (https://experts.colorado.edu/display/fisid_149207/)
Instructor: Chemistry
PhD, University of Colorado

Grabowski, Alena Marie (https://experts.colorado.edu/display/fisid_149727/)
Associate Professor: Integrative Physiology; Associate Professor: Biomedical Engineering
PhD, University of Colorado Boulder

Graham, Larry
Professor Emeritus: Music

Grant, David R. (https://experts.colorado.edu/display/fisid_100868/)
Professor: Mathematics
PhD, Massachusetts Institute of Technology

Grant, Don Sherman II (https://experts.colorado.edu/display/fisid_154039/)
Professor: Sociology
PhD, Ohio State University

Graves, Philip E. (https://experts.colorado.edu/display/fisid_102050/)
Professor Emeritus: Economics
PhD, Northwestern University

Greaney, Patrick F. (https://experts.colorado.edu/display/fisid_122807/)
Professor: Germanic and Slavic Languages and Literatures; Professor: Humanities
PhD, Johns Hopkins University

Green, James C. (https://experts.colorado.edu/display/fisid_102344/)
Professor Emeritus: Astrophysical and Planetary Sciences (APS); Professor: Center for Astrophysics & Space Astronomy (CASA)
PhD, University of California, Berkeley

Green, Jeremy F. (https://experts.colorado.edu/display/fisid_113077/)
Associate Professor: English
PhD, University of Cambridge (England)

Green, Richard Mutegeki (https://experts.colorado.edu/display/fisid_129800/)
Professor: Mathematics
MA, Oxford University (England)

Green, Sally Edith (https://experts.colorado.edu/display/fisid_122076/)
Associate Teaching Professor Emerita: Program for Writing and Rhetoric
MA, University of Colorado Boulder

Greenan, LoriBeth
Assistant Teaching Professor: Advertising, Public Relations and Media Design
MS, New York University

Greenberg, Alan R.
Professor Emeritus: Mechanical Engineering

Greenberg, Edward S. (https://experts.colorado.edu/display/fisid_106090/)
Professor Emeritus: Political Science
Ph.D., University of Wisconsin- Madison

Greene, David Lee
Professor Emeritus: Anthropology

Greenwood, Emily (https://experts.colorado.edu/display/fisid_157375/)
Teaching Associate Professor: Environmental Design
MLA, University of Colorado Denver

Greenwood, Michael J. (https://experts.colorado.edu/display/fisid_102361/)
Professor Emeritus: Economics
Ph.D., Northwestern University

Gregorio, Alvin P. (https://experts.colorado.edu/display/fisid_143596/)
Associate Professor: Art and Art History
MFA, Claremont Graduate School

Gremban, Keith (https://experts.colorado.edu/display/fisid_166519/)
Research Professor: Aerospace Engineering Sciences
PhD, Carnegie Mellon University

Gries, Laurie Ellen (https://experts.colorado.edu/display/fisid_155951/)
Associate Professor, Faculty Director: Program for Writing and Rhetoric; Associate Professor: English
PhD, Syracuse University

Griffin, John David
Faculty Director: Conference on World Affairs
PhD, Duke University

Grisales, Juan
Teaching Assistant Professor: Environmental Design
MLA, Harvard University

Grochow, Joshua A. (https://experts.colorado.edu/display/fisid_158240/)
Associate Professor: Computer Science; Assistant Professor: Mathematics
PhD, University of Chicago

Grooms, Ian G. (https://experts.colorado.edu/display/fisid_155588/)
Associate Professor: Applied Mathematics
PhD, University of Colorado Boulder

Gross, David L. (https://experts.colorado.edu/display/fisid_103329/)
Professor Emeritus: History
Ph.D., University of Wisconsin-Madison

Gross, David Michael (https://experts.colorado.edu/display/fisid_109026/)
Senior Instructor, Faculty Director, Associate Chair: Leeds School of Business
PhD, University of Colorado Boulder

Gross, Mark D. (https://experts.colorado.edu/display/fisid_100095/)
Professor: ATLAS Institute; Director, Professor: Creative Technology & Design; Professor: Computer Science
PhD, Massachusetts Institute of Technology

Grotzinger, Andrew (https://experts.colorado.edu/display/fisid_167222/)
Assistant Professor: Psychology and Neuroscience
PhD, University of Texas at Austin

Grove, Vicki Jean (https://experts.colorado.edu/display/fisid_103689/)
Teaching Professor of Distinction: Germanic and Slavic Languages and Literatures
PhD, University of Colorado Boulder

Gruber, June L. (https://experts.colorado.edu/display/fisid_153634/)
Professor: Psychology and Neuroscience
PhD, University of California, Berkeley

Grulke, Boo (https://experts.colorado.edu/display/fisid_144824/)
Teaching Assistant Professor: Mathematics
DEd, University of Florida

Grunwald, Dirk C. (https://experts.colorado.edu/display/fisid_102261/)
Associate Chair, Professor: Computer Science; Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, University of Illinois at Urbana–Champaign

Guild, Nancy Ann (https://experts.colorado.edu/individual/fisid_111361/)
Professor Attendant Rank: Molecular, Cellular & Developmental Biology (MCDB)
PhD, University of Colorado

Guinn, Curry
Associate Teaching Professor: Computer Science
Ph.D, Duke University

Gulasekaram, Pratheepan (https://experts.colorado.edu/display/fisid_173498/)
Professor: School of Law
JD, Stanford University

Gumina, Deena (https://experts.colorado.edu/display/fisid_168202/)
Assistant Teaching Professor: School of Education
PhD, University of Colorado Boulder

Gunther, John G. (https://experts.colorado.edu/display/fisid_141165/)
Professor, Faculty Director: Music
PhD, New York University

Gupta, Ankur (https://experts.colorado.edu/display/fisid_165822/)
Assistant Professor: Chemical and Biological Engineering
PhD, Massachusetts Institute of Technology

Gupta, Mohit
Instructor Adjunct: Mechanical Engineering

Gupta, Vijay
Professor Emeritus: Civil, Environmental and Architectural Engineering

Gurantz, Oded (https://experts.colorado.edu/display/fisid_171734/)
Associate Professor: School of Education
PhD, Stanford University

Gurari Danna (https://experts.colorado.edu/display/fisid_104361/)
Assistant Professor: Computer Science
PhD, Boston University

Gurarie, Victor Vladimir (https://experts.colorado.edu/display/fisid_129918/)
Professor: Physics
PhD, Princeton University

Guruswamy, Lakshman (https://experts.colorado.edu/display/fisid_120000/)
Professor Emeritus, Professor: School of Law
PhD, University of Durham (England)

Gustafson, Karl E. (https://experts.colorado.edu/display/fisid_104877/)
Professor Emeritus: Mathematics
PhD, University of Maryland, College Park

Gutierrez, Gerardo (https://experts.colorado.edu/display/fisid_146867/)
Professor: Anthropology
PhD, Pennsylvania State University

Gutiérrez Lorenzo, Ambrocio (https://experts.colorado.edu/display/fisid_168627/)
Assistant Professor: Linguistics
PhD, University of Texas, Austin

Gutmann, Myron (https://experts.colorado.edu/display/fisid_154905/)
Professor Emeritus: Institute of Behavioral Science (IBS); Professor Emeritus: History
PhD, Princeton University

Gwozdz, Ronald Scott (https://experts.colorado.edu/display/fisid_144830/)
Instructor: Leeds School of Business
MBA, University of Colorado Boulder

Gyenis, Andras (https://experts.colorado.edu/display/fisid_167223/)
Assistant Professor: Physics
PhD, Princeton University

# H

Ha, Sangtae (https://experts.colorado.edu/display/fisid_153246/)
Associate Professor: Computer Science; Assistant Professor: Interdisciplinary Telecommunications
PhD, North Carolina State University

Hackett, Chelsea (https://experts.colorado.edu/display/fisid_148516/)
Assistant Teaching Professor: School of Education
PhD, New York University

Haig, Robin
Senior Instructor Emerita: Theatre and Dance

Hale, Benjamin Slater (https://experts.colorado.edu/display/fisid_141456/)
Associate Professor: Environmental Studies Program
PhD, SUNY at Stony Brook

Hale, Bobby L.
Captain, Assistant Professor: Army ROTC
MBA, Columbia Station University

Halek, Milan F.
Senior Instructor Emeritus: Civil, Environmental and Architectural Engineering

Hall, John L. (https://experts.colorado.edu/display/fisid_103891/)
Professor Adjoint: Physics
PhD, Carnegie Institute of Technology

Hall, Kira (https://experts.colorado.edu/display/fisid_123111/)
Professor, Associate Chair: Linguistics; Professor: Media Studies
PhD, University of California, Berkeley

Hall, Megan
Legal Writing Professor: School of Law
JD, University of Colorado Boulder

Hallowell, Matthew Ryan (https://experts.colorado.edu/display/fisid_146163/)
Professor: Civil, Environmental and Architectural Engineering; Faculty Director, Endowed/Named Professor: College of Engineering and Applied Science
PhD, Oregon State University

Hallstead, Susan Rita (https://experts.colorado.edu/display/fisid_125579/)
Associate Teaching Professor: Spanish and Portuguese
PhD, University of Pittsburgh

Halverson, Nils W. (https://experts.colorado.edu/display/fisid_134252/)
Professor: Astrophysical and Planetary Sciences (APS); Professor: Physics; Professor, Faculty Director: Center for Astrophysics & Space Astronomy (CASA)
PhD, California Institute of Technology

Hamilton, Andrew J.S. (https://experts.colorado.edu/display/fisid_101517/)
Professor, Chair: Astrophysical and Planetary Sciences (APS); Professor: Physics
PhD, University of Virginia

Hamilton, Fred A. Jr. (https://experts.colorado.edu/display/fisid_105243/)
Senior Instructor Emeritus: University Libraries
MS, University of Tennessee-Knoxville

Hamlington, Peter Edward (https://experts.colorado.edu/display/fisid_149800/)
Associate Professor, Chair: Mechanical Engineering
PhD, University of Michigan Ann Arbor

Hammer, Paul E.J. (https://experts.colorado.edu/display/fisid_146581/)
Professor: History; Faculty Director: College of Arts and Sciences
PhD, University of Cambridge (England)

Hammons, Christian Stanford (https://experts.colorado.edu/display/fisid_152915/)
Teaching Professor: Anthropology; Teaching Associate Professor, Associate Chair, Associate Faculty Director: Critical Media Practices
PhD, University of Southern California

Hampson, Gregory (https://experts.colorado.edu/display/fisid_166888/)
Scholar in Residence: Mechanical Engineering
PhD, University of Wisconsin–Madison

Hamza, Ahmed
Associate Teaching Professor: Computer Science
PhD, University of Portsmouth (England)

Han, Min (https://experts.colorado.edu/display/fisid_105512/)
Distinguished Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, University of California, Los Angeles

Han, Weiqing (https://experts.colorado.edu/display/fisid_115493/)
Professor: Atmospheric and Oceanic Sciences (ATOC)
PhD, Nova University

Hanna, Martha (https://experts.colorado.edu/display/fisid_104557/)
Professor Emerita: History; Faculty Director: Academic Affairs
PhD, Georgetown University

Hannigan, Michael P. (https://experts.colorado.edu/display/fisid_122655/)
Professor: Mechanical Engineering; Professor: Environmental Engineering Program (EVEN)
PhD, California Institute of Technology

Harrell, Nickholas Francis
Instructor: Law Library
JD, Lewis and Clark College

Harrington, Emily Marie (https://experts.colorado.edu/display/fisid_154601/)
Associate Professor, Associate Chair: English
PhD, University of Michigan Ann Arbor

Harris, Lorenzo R. (https://experts.colorado.edu/display/fisid_147634/)
Artist in Residence: Theatre and Dance

Harris, Michael William
Lecturer: Continuing Education & Professional Studies

Harrison, Jill Lindsey (https://experts.colorado.edu/display/fisid_149614/)
Associate Professor: Geography
PhD, University of California, Santa Cruz

Harsh, John R. (https://experts.colorado.edu/display/fisid_155406/)
Professor Adjunct: Integrative Physiology

Hartter, Joel N. (https://experts.colorado.edu/display/fisid_154043/)
Faculty Director, Professor: Environmental Studies Program; Associate Professor: Graduate School
PhD, University of Florida

Harvey, Lewis Orvis (https://experts.colorado.edu/display/fisid_101173/)
Professor Emeritus: Psychology and Neuroscience

Harvey, Pamela Ann (https://experts.colorado.edu/display/fisid_148012/)
Senior Instructor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, Tufts University

Hasan, Raza Ali (https://experts.colorado.edu/display/fisid_146167/)
Associate Teaching Professor: English
MFA, Syracuse University

Hasenfratz, Anna (https://experts.colorado.edu/display/fisid_102393/)
Professor: Physics
PhD, Lorand Eotvos University, Budapest (Hungary)

Hata, Kuniaki
Professor Emeritus: Music

Hauser, John (https://experts.colorado.edu/display/fisid_102555/)
Associate Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, University of California, Berkeley

Hauser, Thomas (https://experts.colorado.edu/individual/fisid_148662/)
Associate Professor Adjunct: Computer Science; Associate Professor Adjoint: University Libraries
PhD, Technische Universität München (Germany)

Hawk, Ashton Lewis (https://experts.colorado.edu/display/fisid_157915/)
Assistant Professor: Leeds School of Business
PhD, New York University

Hawkins, Paige
Assistant Teaching Professor: Speech, Language and Hearing Sciences (SLHS)
MA, Gallaudet University

Hayes, Bradley H. (https://experts.colorado.edu/display/fisid_159810/)
Associate Professor: Computer Science
PhD, Yale University

Hayes, Deborah
Professor Emerita: Music

Hayghe, Jennifer C. (https://experts.colorado.edu/display/fisid_155969/)
Associate Professor: Music
DMA, The Juilliard School

Hayman, Allison P. (https://experts.colorado.edu/display/fisid_156275/)
Associate Professor: Aerospace Engineering Sciences; Assistant Professor: Biomedical Engineering
PhD, Massachusetts Institute of Technology

Hayne, Paul (https://experts.colorado.edu/display/fisid_163352/)
Associate Professor: Astrophysical and Planetary Sciences (APS); Associate Professor: Laboratory for Atmospheric and Space Physics (LASP)
PhD, University of California, Los Angeles

Haynie, Hannah (https://experts.colorado.edu/display/fisid_166099/)
Assistant Professor: Linguistics
PhD, University of California, Berkeley

Hayward, Ryan (https://experts.colorado.edu/individual/fisid_166416/)
Endowed/Named Professor: Chemical and Biological Engineering
PhD, University of California Santa Barbara

Hayworth, Eugene H. (https://experts.colorado.edu/display/fisid_126313/)
Associate Professor Emeritus: University Libraries
MLS, Syracuse University

He, Chuan (https://experts.colorado.edu/display/fisid_124857/)
Associate Professor: Leeds School of Business
PhD, Washington University

Healy, Alice F. (https://experts.colorado.edu/display/fisid_100418/)
Distinguished Professor Emeritus: Psychology and Neuroscience
PhD, The Rockefeller University

Hearn, George (https://experts.colorado.edu/display/fisid_101059/)
Associate Professor: Civil, Environmental and Architectural Engineering
PhD, Columbia University

Heathwood, Chris (https://experts.colorado.edu/display/fisid_141144/)
Professor: Philosophy
PhD, University of Massachusetts at Amherst

Heckman, Christoffer (https://experts.colorado.edu/display/fisid_155294/)
Associate Professor: Computer Science; Assistant Professor: Electrical, Computer and Energy Engineering (ECEE); Faculty Director: College of Engineering and Applied Science
PhD, Cornell University

Heil, Leila (https://experts.colorado.edu/display/fisid_149780/)
Associate Professor: Music Education; Associate Professor: Music
PhD, University of Colorado Boulder

Heinz, Hendrik (https://experts.colorado.edu/display/fisid_156488/)
Professor: Chemical and Biological Engineering; Associate Professor: Materials Science & Engineering
PhD, ETH Zurich (Switzerland)

Heisler, Ruth E. (https://experts.colorado.edu/display/fisid_103195/)
Teaching Professor of Distinction: Integrative Physiology
MA, University of Colorado Boulder

Hekman, David R. (https://experts.colorado.edu/display/fisid_151359/)
Associate Professor: Leeds School of Business
PhD, University of Washington

Henao Cano, Valeria (https://experts.colorado.edu/display/fisid_173407/)
Teaching Assistant Professor: Environmental Design
MURP, University of Colorado Denver

Hendricks, Jennifer Susan (https://experts.colorado.edu/display/fisid_151111/)
Professor: School of Law
JD, Harvard University

Hendrickson, Susan Marie (https://experts.colorado.edu/display/fisid_145101/)
Senior Instructor: Chemistry
PhD, Colorado State University

Henningsen, Matthew Scott (https://experts.colorado.edu/display/fisid_156802/)
Assistant Teaching Professor: Program for Writing and Rhetoric; Lecturer: Farrand RAP
PhD, Marquette University

Henry, Markas (https://experts.colorado.edu/display/fisid_134379/)
Associate Professor: Theatre and Dance
MFA, University of Connecticut

Henze, Daven K. (https://experts.colorado.edu/display/fisid_144858/)
Professor, Associate Professor: Environmental Engineering Program (EVEN); Associate Chair: Mechanical Engineering
PhD, California Institute of Technology

Henze, Gregor P. (https://experts.colorado.edu/display/fisid_146496/)
Professor: Civil, Environmental and Architectural Engineering
PhD, University of Colorado Boulder

Her Many Horses, Ian (https://experts.colorado.edu/display/fisid_144780/)
Assistant Teaching Professor: School of Education
PhD, University of Colorado Boulder

Herland, Emmy (https://experts.colorado.edu/display/fisid_168686/)
Assistant Teaching Professor: Spanish and Portuguese
PhD, University of Washington

Herman, C.J. (https://experts.colorado.edu/individual/fisid_152265/)
Faculty Director, Associate Teaching Professor: Computer Science
BS, Stony Brook University

Hermann, Allen M.
Professor Emeritus: Physics
PhD, Texas AM University

Hermele, Michael Aaron (https://experts.colorado.edu/display/fisid_143370/)
Professor: Physics
PhD, University of California, Santa Barbara

Hernandez, Mark T. (https://experts.colorado.edu/display/fisid_107635/)
Professor, Professor: Environmental Engineering Program (EVEN); Lecturer: Civil, Environmental and Architectural Engineering; Faculty Director, Endowed/Named Professor: College of Engineering and Applied Science
PhD, University of California, Berkeley

Hernandez, Theresa D. (https://experts.colorado.edu/display/fisid_102953/)
Professor: Psychology and Neuroscience; Associate Dean, Professor: College of Arts and Sciences
PhD, University of Texas at Austin

Hernstrom, Ben
Lecturer: Cinema Studies & Moving Image Arts
MFA, University of Colorado Boulder

Herrero-Senés, Juan (https://experts.colorado.edu/display/fisid_147159/)
Associate Professor, Faculty Director: International Education; Associate Chair: Spanish and Portuguese
PhD, Universitat Pompeu Fabra (Spain)

Hersey, John K. (https://experts.colorado.edu/display/fisid_170139/)
Teaching Assistant Professor: Environmental Design
M.A., University of Massachusetts–Amherst; M.A., University of Maryland College Park Campus

Hersh, Orly M. (https://experts.colorado.edu/display/fisid_143580/)
Associate Teaching Professor: Program for Writing and Rhetoric; Associate Faculty Director: College of Media, Communication & Information
MA, Northern Arizona University

Hertzberg, Jean R. (https://experts.colorado.edu/display/fisid_105315/)
Professor: Mechanical Engineering; Associate Professor: Environmental Engineering Program (EVEN)
PhD, University of California, Berkeley

Herz, Zachary (https://experts.colorado.edu/display/fisid_165410/)
Assistant Professor: Classics
PhD, Columbia University; JD, Yale University

Herzfeld, Ute C. (https://experts.colorado.edu/display/fisid_106575/)
Research Professor: Electrical, Computer and Energy Engineering (ECEE); Research Professor: Computer Science
PhD, Johannes Gutenberg-Universität Mainz (Germany)

Hessel, Kurtis (https://experts.colorado.edu/individual/fisid_159325/)
Assistant Teaching Professor: Program for Writing and Rhetoric
PhD, University of Colorado Boulder

Hewitt, John K. (https://experts.colorado.edu/display/fisid_101035/)
Professor: Psychology and Neuroscience; Professor: Institute for Behavioral Genetics (IBG)
PhD, University of London

Heydt-Stevenson, Jillian (https://experts.colorado.edu/display/fisid_111683/)
Professor: English
PhD, University of Colorado Boulder

Hickcox, Abby Lynn (https://experts.colorado.edu/display/fisid_151860/)
Senior Instructor, Associate Faculty Director: Honors Program
PhD, University of Colorado Boulder

Hickerson Dominiski, Ruth (https://experts.colorado.edu/display/fisid_151159/)
Teaching Professor: Communication
PhD, University of Denver

Higashida, Cheryl A. (https://experts.colorado.edu/display/fisid_126280/)
Associate Professor: English
PhD, Cornell University

Higgins, Brian Edmund (https://experts.colorado.edu/display/fisid_156515/)
Instructor: Leeds School of Business
JD, University of Denver

Hildreth, Roudy (https://experts.colorado.edu/display/fisid_155457/)
Assistant Teaching Professor: School of Education
PhD, University of Minnesota

Hilger, Allison (https://experts.colorado.edu/individual/fisid_167224/)
Assistant Professor: Speech, Language and Hearing Sciences (SLHS)
PhD, Northwestern University

Hill, David
Professor Emeritus: School of Law
JD, University of Nebraska-Lincoln

Hill, Karl G. (https://experts.colorado.edu/individual/fisid_159803/)
Professor: Psychology and Neuroscience
PhD, Brandeis University

Hill, Robert Stephen (https://experts.colorado.edu/display/fisid_163943/)
Professor: Music
PhD, Harvard University

Hill, Scott Andrew
Lecturer: Continuing Education & Professional Studies
PhD, University of Massachusetts at Amherst

Hinckley, Eve-Lyn (https://experts.colorado.edu/display/fisid_147806/)
Associate Professor: Institute of Arctic & Alpine Research (INSTAAR)
PhD, Stanford University

Hind, Laurel (https://experts.colorado.edu/individual/fisid_165642/)
Assistant Professor: Biomedical Engineering; Assistant Professor: Chemical and Biological Engineering
PhD, University of Pennsylvania

Hindman, Bradley W. (https://experts.colorado.edu/display/fisid_103726/)
Assistant Research Professor, Lecturer: Astrophysical and Planetary Sciences (APS)
PhD, University of Colorado Boulder

Hinton, J. Kai
Lieutenant, Assistant Professor: Navy ROTC

Hintz, Saskia Barbara (https://experts.colorado.edu/display/fisid_144506/)
Teaching Professor of Distinction: Germanic and Slavic Languages and Literatures
PhD, New York University

Hirschberg, Dan (https://experts.colorado.edu/display/fisid_172774/)
Associate Teaching Professor: Center for Asian Studies
PhD, Harvard University

Hiura, Lisa (https://experts.colorado.edu/display/fisid_167644/)
Assistant Professor: Psychology and Neuroscience
PhD, Cornell University

Ho, Jennifer (https://experts.colorado.edu/display/fisid_165744/)
Professor: Ethnic Studies; Professor: Humanities; Faculty Director: Center for Humanities and the Arts
PhD, Boston University

Hobbs, Steven L. (https://experts.colorado.edu/display/fisid_143724/)
Associate Teaching Professor: Integrative Physiology
PhD, University of Colorado Boulder

Hodby, Eleanor R. (https://experts.colorado.edu/display/fisid_128058/)
Senior Instructor, Associate Teaching Professor: Physics
PhD, Oxford University

Hodge, Bri-Mathias (https://experts.colorado.edu/display/fisid_158358/)
Associate Professor: Electrical, Computer and Energy Engineering (ECEE); Associate Professor: Renewable & Sustainable Energy Institute (RASEI)
PhD, Purdue University

Hodge, Danielle (https://experts.colorado.edu/display/fisid_167427/)
Assistant Professor: Communication
PhD, University of Colorado Boulder

Hodges, Adam
Assistant Professor Adjunct: Linguistics
PhD, University of Colorado

Hodgkinson, Robert F. (https://experts.colorado.edu/display/fisid_153274/)
Associate Teaching Professor: Aerospace Engineering Sciences
MS, University of Colorado Boulder

Hoecker, Arne (https://experts.colorado.edu/display/fisid_152973/)
Associate Professor: Germanic and Slavic Languages and Literatures
PhD, Johns Hopkins University

Hoefer, Mark (https://experts.colorado.edu/display/fisid_154264/)
Professor: Applied Mathematics
PhD, University of Colorado Boulder

Hoeffer, Charles Albert (https://experts.colorado.edu/display/fisid_153384/)
Assistant Professor: Institute for Behavioral Genetics (IBG); Associate Professor: Integrative Physiology
PhD, University of Arizona

Hoehn, Alexander (https://experts.colorado.edu/display/fisid_104942/)
Associate Professor Adjunct: BioServe Space Technologies

Hoenger, Andreas (https://experts.colorado.edu/display/fisid_142883/)
Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, Universität Basel (Switzerland)

Hoenigman, Rhonda (https://experts.colorado.edu/display/fisid_152997/)
Associate Teaching Professor: Computer Science; Associate Dean: College of Engineering and Applied Science
PhD, University of Colorado Boulder

Hohlfelder, Robert
Professor Emeritus: History

Hoke, Charles (https://experts.colorado.edu/display/fisid_175280/)
Associate Teaching Professor: Aerospace Engineering Sciences
PhD, University of New South Whales

Holbert, Marianne Bellino (https://experts.colorado.edu/display/fisid_146986/)
Faculty Director: International Education; Teaching Professor: Environmental Design
MArch, Washington University

Holewinski, Adam P. (https://experts.colorado.edu/display/fisid_155859/)
Assistant Professor: Renewable & Sustainable Energy Institute (RASEI); Assistant Professor: Chemical and Biological Engineering; Assistant Professor: Materials Science & Engineering
PhD, University of Michigan Ann Arbor

Holland, Murray John (https://experts.colorado.edu/display/fisid_105126/)
Professor: Physics; Professor: JILA
PhD, Oxford University (England)

Holley, Richard A.
Professor Emeritus: Mathematics

Hollis, Deborah R. (https://experts.colorado.edu/display/fisid_100664/)
Professor: University Libraries
MLS, University of Arizona

Holman-Johnson, Leigh (https://experts.colorado.edu/display/fisid_141980/)
Associate Professor: Music
DMA, University of Colorado Boulder

Holzinger, Marcus J. (https://experts.colorado.edu/display/fisid_164054/)
Professor, Endowed/Named Professor: Aerospace Engineering Sciences
PhD, University of Colorado Boulder

Hoover, Stewart (https://experts.colorado.edu/display/fisid_104549/)
Professor: Media Studies; Faculty Director: Center for Media, Religion and Culture
PhD, University of Pennsylvania

Hopp, Toby (https://experts.colorado.edu/display/fisid_157745/)
Associate Professor: Advertising, Public Relations and Media Design
PhD, University of Oregon

Horanyi, Mihaly (https://experts.colorado.edu/display/fisid_102420/)
Professor: Laboratory for Atmospheric and Space Physics (LASP); Professor: Physics
PhD, Eötvös Loránd University (Hungary)

Hornstein, Seth D. (https://experts.colorado.edu/display/fisid_144237/)
Senior Instructor: Astrophysical and Planetary Sciences (APS)
PhD, University of California, Los Angeles

Hosek, Lauren (https://experts.colorado.edu/display/fisid_167102/)
Assistant Professor: Anthropology
PhD, Syracuse University

Hough, Loren Evan (https://experts.colorado.edu/display/fisid_144904/)
Associate Professor: Physics
PhD, University of Colorado Boulder

Howe, Charles W.
Professor Emeritus: Economics

Hrenya, Christine M.
Professor Emerita: Chemical and Biological Engineering
PhD, Carnegie Mellon University

Hsiao, Frank S.T.
Professor Emeritus: Economics

Hsu, Chun-ling
Instructor Emeritus: Asian Languages and Civilizations
MEd, University of Wisconsin–River Falls

Huang, Shu-Wei (https://experts.colorado.edu/display/fisid_159847/)
Assistant Professor: Electrical, Computer and Energy Engineering (ECEE); Assistant Professor: Materials Science & Engineering; Assistant Professor: Biomedical Engineering
PhD, MIT, Cambridge

Huang, Yu-Jui (https://experts.colorado.edu/display/fisid_157746/)
Assistant Professor: Applied Mathematics
PhD, University of Michigan Ann Arbor

Hubbard, Eleanor
Professor Emerita: Sociology

Huber, David
Professor: Psychology and Neuroscience
PhD, University of Indiana

Hubler, Mija H. (https://experts.colorado.edu/display/fisid_155134/)
Associate Professor: Civil, Environmental and Architectural Engineering
PhD, Northwestern University

Huemer, Michael (https://experts.colorado.edu/display/fisid_113081/)
Professor: Philosophy
PhD, Rutgers University–Newark

Hughes, Jonathan Edward (https://experts.colorado.edu/display/fisid_147335/)
Associate Professor, Associate Chair: Economics
PhD, University of California, Davis

Huibregtse Ketels, Brooke (https://experts.colorado.edu/display/fisid_159929/)
Teaching Assistant Professor: Psychology and Neuroscience; Lecturer: Continuing Education & Professional Studies
PhD, University of Colorado Boulder

Hulden, Mans (https://experts.colorado.edu/display/fisid_154602/)
Associate Professor: Linguistics
PhD, University of Arizona

Hulden, Vilja Paivikki (https://experts.colorado.edu/display/fisid_154910/)
Assistant Teaching Professor: History
PhD, University of Arizona

Humbert, J. Sean (https://experts.colorado.edu/display/fisid_156202/)
Endowed/Named Professor: College of Engineering and Applied Science; Professor, Associate Chair: Mechanical Engineering
PhD, California Institute of Technology

Hume, David
Lecturer: Physics
PhD, University of Colorado Boulder

Hunt, Peter (https://experts.colorado.edu/display/fisid_115394/)
Professor: Classics; Professor: History
PhD, Stanford University

Hunter, Lawrence (https://experts.colorado.edu/display/fisid_143568/)
Professor: Computer Science
PhD, Yale University

Hunter, Lori Mae (https://experts.colorado.edu/display/fisid_118372/)
Professor, Professor: Sociology; Faculty Director: Institute of Behavioral Science (IBS)
PhD, Brown University

Hurley, Kelly K. (https://experts.colorado.edu/display/fisid_105553/)
Associate Professor: English
PhD, Stanford University

Hussein, Mahmoud I. (https://experts.colorado.edu/display/fisid_144300/)
Professor, Professor: Physics; Faculty Director, Endowed/Named Professor: College of Engineering and Applied Science; Professor: Center for Aerospace Structures (CAS); Endowed/Named Professor: Aerospace Engineering Sciences
PhD, University of Michigan Ann Arbor

Hutchinson, Erin M (https://experts.colorado.edu/individual/fisid_167154/)
Assistant Professor: History
PhD, Harvard University

Hynek, Brian Michael (https://experts.colorado.edu/display/fisid_130622/)
Professor: Laboratory for Atmospheric and Space Physics (LASP); Professor: Geological Sciences
PhD, Washington University

Hynes, Dennis
Professor Emeritus: School of Law
LLB, University of Colorado Boulder

Hynes, James T.
Distinguished Professor Emeritus: Chemistry
PhD, Princeton University

# I

Ibacache, Kathia (https://experts.colorado.edu/display/fisid_164601/)
Assistant Professor: University Libraries
MLIS, San Jose State University

Ih, Su-Ion (https://experts.colorado.edu/display/fisid_141091/)
Associate Professor: Mathematics
PhD, Brown University

Ikenberry, David L. (https://experts.colorado.edu/display/fisid_149340/)
Professor: Leeds School of Business
PhD, University of Illinois at Urbana-Champaign

Irey, Charlotte York
Professor Emerita: Theatre and Dance

Irvine, Leslie Jane (https://experts.colorado.edu/display/fisid_113150/)
Professor: Sociology
PhD, SUNY at Stony Brook

Isaacs, Rachel (https://experts.colorado.edu/display/fisid_164240/)
Teaching Assistant Professor: Geography
PhD, Pennsylvania State University

Ishikawa, Yoshiyuki (https://experts.colorado.edu/display/fisid_102125/)
Professor: Music
DMA, University of Michigan Ann Arbor

Ito, Tiffany (https://experts.colorado.edu/display/fisid_113066/)
Professor: Psychology and Neuroscience
PhD, University of Southern California

Iwamasa, Ken
Professor Emeritus: Art and Art History

Iyasele, Abel
Teaching Assistant Professor: Information Science
MBA, University of Dundee (UK)

Iyer, Pooja
Assistant Professor: Advertising, Public Relations and Media Design
PhD, University of Texas at Austin

Iyigun, Fevzi Murat (https://experts.colorado.edu/display/fisid_118373/)
Professor: Economics
PhD, Brown University

Izraelevitz, Joe (https://experts.colorado.edu/display/fisid_166042/)
Assistant Professor: Electrical, Computer and Energy Engineering (ECEE); Assistant Professor: Computer Science
PhD, University of Rochester

Izaguirre, José G.
Assistant Professor: Communication
PhD, University of Illinois Urbana-Champaign

# J

Jacka, Jerry Keith (https://experts.colorado.edu/display/fisid_156067/)
Associate Professor: Anthropology
PhD, University of Oregon

Jackson, Betty R.
Professor Emerita: Leeds School of Business

Jackson, Dennis
Professor Emeritus: Music

Jacobs, Janet L. (https://experts.colorado.edu/display/fisid_100744/)
Professor: Women and Gender Studies; Director: Honors Program; Professor: Sociology
PhD, University of Colorado Boulder

Jacobs, Karen S. (https://experts.colorado.edu/display/fisid_100280/)
Associate Professor: English
PhD, University of California, Berkeley

Jacobson, Daniel (https://experts.colorado.edu/individual/fisid_167068/)
Professor: Philosophy
PhD, University of Michigan

Jahn Hall, Alexandra (https://experts.colorado.edu/display/fisid_155096/)
Assistant Professor: Institute of Arctic & Alpine Research (INSTAAR); Assistant Professor: Atmospheric and Oceanic Sciences (ATOC)
PhD, McGill University

Jahn, Jody L. (https://experts.colorado.edu/display/fisid_153426/)
Associate Professor: Communication
PhD, University of California, Santa Barbara

Jakosky, Bruce M.
Professor, Faculty Director: Laboratory for Atmospheric and Space Physics (LASP)
PhD, California Institute of Technology

James, Sarah Anne (https://experts.colorado.edu/display/fisid_151713/)
Associate Professor: Classics; Faculty Director: International Education
PhD, University of Texas at Austin

Jamieson, Sara Reed (https://experts.colorado.edu/display/fisid_147773/)
Senior Instructor: Communication & Society RAP; Faculty Director: College of Media, Communication & Information
PhD, University of New Mexico

Jamshidi, Maryam (https://experts.colorado.edu/display/fisid_173668/)
Associate Professor: School of Law
JD, University of Pennsylvania

Jankowski, James P.
Professor Emeritus: History

Jansen, Kenneth E. (https://experts.colorado.edu/display/fisid_147360/)
Professor, Professor: Computer Science; Endowed/Named Professor, Faculty Director: College of Engineering and Applied Science; Endowed/Named Professor: Aerospace Engineering Sciences
PhD, Stanford University

Jany, Berit (https://experts.colorado.edu/display/fisid_154411/)
Teaching Professor: Germanic and Slavic Languages and Literatures
PhD, The Ohio State University

Javernick-Will, Amy N. (https://experts.colorado.edu/display/fisid_146430/)
Professor: Civil, Environmental and Architectural Engineering; Endowed/Named Professor: College of Engineering and Applied Science; Associate Professor: Environmental Engineering Program (EVEN)
PhD, Stanford University

Jaworski, Taylor Allen (https://experts.colorado.edu/display/fisid_159798/)
Associate Professor: Economics; Associate Professor: History; Assistant Professor: Institute of Behavioral Science (IBS)
PhD, University of Arizona

Jayaram, Kaushik (https://experts.colorado.edu/display/fisid_165370/)
Assistant Professor: Mechanical Engineering; Assistant Professor: Biomedical Engineering
PhD, University of California-Berkeley

Jedamus, Paul E.
Professor Emeritus: Leeds School of Business

Jenkins, Jeff (https://experts.colorado.edu/individual/fisid_146511/)
Instructor: Music
Studied, Univeristy of North Texas

Jennings, Christina A. (https://experts.colorado.edu/display/fisid_143545/)
Professor: Music
MM, The Juilliard School

Jennings, Tracy M. (https://experts.colorado.edu/display/fisid_128765/)
Senior Instructor, Faculty Director: Leeds School of Business
PhD, University of Denver

Jensen, Howard G.
Professor Emeritus: Leeds School of Business

Jessor, Richard
Professor Emeritus: Psychology and Neuroscience

Jessup, Elizabeth R. (https://experts.colorado.edu/display/fisid_102065/)
Professor Emeritus: Computer Science
PhD, Yale University

Jesudason, Judith Packer (https://experts.colorado.edu/display/fisid_100338/)
Professor: Mathematics
PhD, Harvard University

Jimenez, Ralph (https://experts.colorado.edu/display/fisid_132670/)
Professor Adjoint: Chemistry
PhD, University of Chicago

Jimenez-Palacios, Jose Luis (https://experts.colorado.edu/display/fisid_125580/)
Professor: Cooperative Institute for Research in Environmental Sciences (CIRES); Distinguished Professor: Chemistry
PhD, Massachusetts Institute of Technology

Jobin, Nicole V. (https://experts.colorado.edu/display/fisid_103920/)
Senior Instructor: Sewall RAP
PhD, University of Colorado Boulder

Johanson, Luke
Captain, Assistant Professor: Army ROTC
MA, Northern Arizona University

Johnson, Andrew M. (https://experts.colorado.edu/display/fisid_149821/)
Associate Professor: University Libraries
MA, University of Wisconsin–Madison

Johnson, Gabriel
Lecturer: ATLAS Institute; Lecturer: Creative Technology & Design
PhD, Carnegie Mellon University

Johnson, Pieter T.J. (https://experts.colorado.edu/display/fisid_143590/)
Professor: Ecology and Evolutionary Biology
PhD, University of Wisconsin–Madison

Johnson, Stefanie Kathleen (https://experts.colorado.edu/display/fisid_153813/)
Associate Professor: Leeds School of Business
PhD, Rice University

Johnson, Thomas E. (https://experts.colorado.edu/display/fisid_104242/)
Professor: Institute for Behavioral Genetics (IBG); Professor Emeritus: Integrative Physiology
PhD, University of Washington

Jonas, David (https://experts.colorado.edu/display/fisid_107145/)
Professor: Chemistry
PhD, Massachusetts Institute of Technology

Jones, Carla Mae (https://experts.colorado.edu/display/fisid_134172/)
Professor: Anthropology
PhD, University of North Carolina, Chapel Hill

Jones, Craig H. (https://experts.colorado.edu/display/fisid_105590/)
Professor: Geological Sciences
PhD, Massachusetts Institute of Technology

Jones, Eric
Associate Professor: Anthropology
PhD, Pennsylvnia State University

Jones, Kevin Robert (https://experts.colorado.edu/display/fisid_102094/)
Associate Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, University of California, Berkeley

Jones, Matthew (https://experts.colorado.edu/display/fisid_144611/)
Professor: Psychology and Neuroscience
PhD, University of Michigan Ann Arbor

Jones, Stephen B. (https://experts.colorado.edu/display/fisid_101578/)
Assistant Dean: College of Media, Communication & Information; Assistant Dean, Senior Instructor Emeritus: Journalism
PhD, University of Utah

Jones, Stephen Graham (https://experts.colorado.edu/display/fisid_146498/)
Distinguished Professor: English
PhD, Florida State University

Jorde, Christopher
Teaching Assistant Professor: Political Science
PhD, University of Colorado Boulder

Joyce, Arthur A. (https://experts.colorado.edu/display/fisid_115421/)
Professor: Anthropology
PhD, Rutgers University–New Brunswick

Judd, Charles M.
Distinguished Professor Emeritus: Psychology and Neuroscience

Juhasz, Joseph
Professor Emeritus: Environmental Design

Junge, Harald Jobst
Assistant Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, Philipps-Universität Marburg (Germany)

Jupille, Joseph H. (https://experts.colorado.edu/display/fisid_140088/)
Professor: Political Science; Faculty Director: Academic Affairs; Faculty Director: Graduate School
PhD, University of Washington

Jurow, Aachey Susan (https://experts.colorado.edu/display/fisid_129478/)
Professor, Associate Dean: School of Education
PhD, University of California, Berkeley

# K

Kadia, Miriam L. Kingsberg (https://experts.colorado.edu/display/fisid_147112/)
Professor: History
PhD, University of California, Berkeley

Kaempher, William H.
Professor Emeritus: Economics

Kaffine, Daniel Thomas (https://experts.colorado.edu/display/fisid_153280/)
Professor: Economics
PhD, University of California, Santa Barbara

Kaiser, Roselinde H. (https://experts.colorado.edu/display/fisid_164070/)
Associate Professor: Psychology and Neuroscience
PhD, University of Colorado Boulder

Kaki, Gowtham (https://experts.colorado.edu/individual/fisid_167225/)
Assistant Professor: Computer Science
PhD, Purdue University

Kalisman, Hilary Falb (https://experts.colorado.edu/display/fisid_164096/)
Endowed/Named Professor: Jewish Studies; Assistant Professor: History
PhD, University of California, Berkeley

Kalwara, James (https://experts.colorado.edu/display/fisid_158919/)
Librarian: School of Law
MLS, Indiana University Bloomington

Kamal, Azza (https://experts.colorado.edu/display/fisid_174957/)
Teaching Associate Professor: Environmental Design
PhD, Cairo University (Egypt)

Kaminski, Margot E. (https://experts.colorado.edu/display/fisid_159595/)
Associate Professor, Faculty Director: School of Law
JD, Yale University

Kan, Pui Fong (https://experts.colorado.edu/display/fisid_145806/)
Professor: Speech, Language and Hearing Sciences (SLHS)
PhD, University of Minnesota Twin Cities

Kandra Hughes, Kelly
Teaching Assistant Professor: Psychology and Neuroscience
PhD, University of North Carolina at Chapel Hill

Kane, Nolan Coburn (https://experts.colorado.edu/display/fisid_151238/)
Associate Professor: Ecology and Evolutionary Biology
PhD, Indiana University Bloomington

Kanner, Michael David
Lecturer: Global RAP
PhD, University of Colorado Boulder

Kantha, Lakshmi H. (https://experts.colorado.edu/display/fisid_100231/)
Professor Emeritus: Aerospace Engineering Sciences
PhD, Massachusetts Institute of Technology

Kaplan, Frank L.
Professor Emeritus: Journalism

Kapteyn, Henry C. (https://experts.colorado.edu/display/fisid_115334/)
Professor: Physics; Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, University of California, Berkeley

Karimzadeh, Morteza (https://experts.colorado.edu/display/fisid_166081/)
Assistant Professor: Geography; Assistant Professor: Computer Science
PhD, Pennsylvania State University

Karnauskas, Kristopher Benson (https://experts.colorado.edu/display/fisid_155094/)
Associate Professor, Associate Professor: Cooperative Institute for Research in Environmental Sciences (CIRES); Associate Chair: Atmospheric and Oceanic Sciences (ATOC)
PhD, University of Maryland, College Park

Kaschube, Dorothea V.
Professor Emerita: Anthropology

Kasprzyk, Joseph R. (https://experts.colorado.edu/display/fisid_151506/)
Associate Professor, Associate Chair: Civil, Environmental and Architectural Engineering; Assistant Professor: Environmental Engineering Program (EVEN)
PhD, Pennsylvania State University

Kassianidou, Marina (https://experts.colorado.edu/display/fisid_157948/)
Assistant Professor: Art and Art History
PhD, Chelsea College of Arts (UK)

Kassoy, David R.
Professor Emeritus: Mechanical Engineering

Katz, Tami
Lecturer: Engineering Management Program
PhD, Colorado State University

Kaufman, Adam Micah (https://experts.colorado.edu/display/fisid_159513/)
Associate Professor Adjoint: Physics
PhD, University of Colorado Boulder

Kaufman, Dan (https://experts.colorado.edu/display/fisid_134174/)
Associate Professor: Philosophy
PhD, University of Massachusetts at Amherst

Kaufmann, Vyga G. (https://experts.colorado.edu/display/fisid_151089/)
Teaching Assistant Professor: Psychology and Neuroscience
PhD, University of Colorado Boulder

Kawakami, Kiyomi (https://experts.colorado.edu/display/fisid_163648/)
Teaching Assistant Professor: Asian Languages and Civilizations
MA, University of Wisconsin–Madison

Kay, Jennifer E. (https://experts.colorado.edu/display/fisid_153815/)
Associate Professor: Atmospheric and Oceanic Sciences (ATOC); Associate Professor: Cooperative Institute for Research in Environmental Sciences (CIRES)
PhD, University of Washington

Kay, Melanie
Instructor, Director for Daniels Fund Ethics Initiative: School of Law
JD, University of California, Berkeley

Kazachenko, Maria (https://experts.colorado.edu/display/fisid_160195/)
Associate Professor: Astrophysical and Planetary Sciences (APS); Assistant Professor: Laboratory for Atmospheric and Space Physics (LASP)
PhD, Montana State University

Kazmerski, Lawrence L. (https://experts.colorado.edu/display/fisid_156759/)
Professor Adjoint: Renewable & Sustainable Energy Institute (RASEI)

Kearnes, Keith (https://experts.colorado.edu/display/fisid_118457/)
Professor: Mathematics
PhD, University of California, Berkeley

Kearns, William
Professor Emeritus: Music

Keegan, Brian (https://experts.colorado.edu/display/fisid_158122/)
Assistant Professor: Information Science; Assistant Professor: Computer Science
PhD, Northwestern University

Keen, Richard A.
Instructor Emeritus: Atmospheric and Oceanic Sciences (ATOC)

Keister, Jay (https://experts.colorado.edu/display/fisid_115734/)
Associate Professor: Music
PhD, University of California, Los Angeles

Keller, Cynthia (https://experts.colorado.edu/display/fisid_159112/)
Teaching Associate Professor: University Libraries
MLS, Indiana University

Keller, Eric Robert (https://experts.colorado.edu/display/fisid_151647/)
Associate Professor: Electrical, Computer and Energy Engineering (ECEE); Associate Professor: Computer Science
PhD, Princeton University

Keller, John M. (https://experts.colorado.edu/display/fisid_163223/)
Senior Instructor: Astrophysical and Planetary Sciences (APS)
PhD, University of Arizona

Keller, Matthew C. (https://experts.colorado.edu/display/fisid_144507/)
Professor: Psychology and Neuroscience; Professor: Institute for Behavioral Genetics (IBG)
PhD, University of Michigan Ann Arbor

Keller, Wolfgang (https://experts.colorado.edu/display/fisid_141891/)
Professor: Economics
PhD, Yale University

Kelley, Rebecca
Captain, Assistant Professor: Army ROTC
MA, Purdue University

Kelly, Caitlin (https://experts.colorado.edu/display/fisid_155528/)
Instructor: Ecology and Evolutionary Biology; Instructor: Continuing Education & Professional Studies
PhD, University of Colorado Boulder

Kelly, Christine
Instructor Emeritus: Chemistry

Kelsey, Penelope M. (https://experts.colorado.edu/display/fisid_147607/)
Faculty Director: Native American and Indigenous Studies
PhD, University of Minnesota Twin Cities

Kelsie, Amber (https://experts.colorado.edu/display/fisid_171455/)
Assistant Professor: Communication
PhD, University of Pittsburgh

Kempf, Sascha (https://experts.colorado.edu/display/fisid_149628/)
Associate Professor: Laboratory for Atmospheric and Space Physics (LASP); Associate Professor: Physics
Dr habil, Technische Universität Braunschweig (Germany)

Kennedy, Heather (https://experts.colorado.edu/display/fisid_157932/)
Instructor, Scholar in Residence: Leeds School of Business
MA, University of Texas at Austin

Kennedy, John
Assistant Professor: Spanish and Portuguese
PhD, Cornell University

Kent, Susan K. (https://experts.colorado.edu/display/fisid_100080/)
Professor Emerita: History
PhD, Brandeis University

Keplinger, Christoph M.
Assistant Professor: Materials Science & Engineering
PhD, Johannes Kepler Universität Linz (Austria)

Ketels, Shaw L. (https://experts.colorado.edu/display/fisid_153682/)
Lecturer: Continuing Education & Professional Studies

Keyvani, Ehsan
Teaching Assistant Professor: Chemical and Biological Engineering
PhD, Northeastern University

Keziah, Brandon W.
Gunnery Sergeant, Assistant Instructor: Navy ROTC

Khan, Alia (https://experts.colorado.edu/display/fisid_158495/)
Associate Professor: Aerospace Engineering Sciences
PhD, University of Colorado Boulder

Khanal, Akhil
Instructor: Biochemistry
PhD, University of Delaware

Khedekar, Deepti (https://experts.colorado.edu/display/fisid_174027/)
Assistant Teaching Professor: Advertising, Public Relations and Media Design
PhD, University of Colorado Boulder

Khoshsokhan, Sina (https://experts.colorado.edu/display/fisid_167155/)
Assistant Professor: Leeds School of Business
PhD, Boston University

Khosla, Pooja (https://experts.colorado.edu/display/fisid_158916/)
Instructor: Sewall RAP
PhD, University of Colorado Boulder

Kiernan-Johnson, Derek Huntley (https://experts.colorado.edu/display/fisid_145008/)
Legal Writing Professor, Senior Instructor: School of Law
JD, University of Michigan Ann Arbor

Kilbane, Aimee (https://experts.colorado.edu/display/fisid_153823/)
Assistant Teaching Professor: French & Italian
PhD, University of California, Santa Barbara

Kilimnik, Chelsea (https://experts.colorado.edu/display/fisid_169111/)
Assistant Professor: Psychology and Neuroscience
PhD, University of Texas at Austin

Kilpatrick, Zachary Peter (https://experts.colorado.edu/display/fisid_155782/)
Associate Professor: Applied Mathematics
PhD, University of Utah

Kim, Albert E. (https://experts.colorado.edu/display/fisid_143740/)
Associate Professor: Institute of Cognitive Science (ICS); Associate Professor: Psychology and Neuroscience
PhD, University of Pennsylvania

Kim, Hun Shik (https://experts.colorado.edu/display/fisid_141126/)
Associate Professor: Journalism
PhD, University of Missouri–Columbia

Kim, Jin-Hyuk (https://experts.colorado.edu/display/fisid_149615/)
Associate Professor: Economics
PhD, Cornell University

Kim, Kwangmin (https://experts.colorado.edu/display/fisid_147160/)
Associate Professor: History
PhD, University of California, Berkeley

Kim, Sangbok (https://experts.colorado.edu/display/fisid_149220/)
Teaching Professor: Asian Languages and Civilizations
PhD, University of California, Los Angeles

Kim, Sewan (https://experts.colorado.edu/display/fisid_174402/)
Assistant Teaching Professor: Integrative Physiology
PhD, University of Colorado Boulder

Kim, Suyeon (https://experts.colorado.edu/display/fisid_153470/)
Instructor: Music
DMA, University of Texas at Austin

Kim, WooJim
Assistant Professor: Advertising, Public Relations and Media Design
PhD, University of Illinois at Urbana-Champaign

Kimball, Miles (https://experts.colorado.edu/display/fisid_157993/)
Professor: Economics
PhD, Harvard University

Kimbrough, Randle Keller (https://experts.colorado.edu/display/fisid_141167/)
Professor, Chair: Asian Languages and Civilizations
PhD, Yale University

King, D. Brett (https://experts.colorado.edu/display/fisid_103815/)
Teaching Professor of Distinction: Psychology and Neuroscience; Lecturer: Continuing Education & Professional Studies; Lecturer: Farrand RAP
PhD, Colorado State University

King, Joy K.
Associate Professor Emerita: Classics

King, Roger A.
Professor Emeritus: Computer Science

King, William M.
Professor Emeritus: Ethnic Studies

Kinney, Edward R. (https://experts.colorado.edu/display/fisid_101717/)
Professor: Physics
PhD, Massachusetts Institute of Technology

Kintsch, Walter
Professor Emeritus: Psychology and Neuroscience

Kirschling, Wayne (https://experts.colorado.edu/display/fisid_123149/)
Professor Emeritus: Engineering Management Program
DBA, University of Colorado Boulder

Kirshner, Benjamin R. (https://experts.colorado.edu/display/fisid_134707/)
Professor: School of Education
PhD, Stanford University

Kish, Jonathan (https://experts.colorado.edu/individual/fisid_153629/)
Assistant Teaching Professor: Applied Mathematics
PhD, University of Colorado Boulder

Kissler, Stephen
Assistant Professor: Computer Science
PhD, University of Cambridge

Kitching, John
Lecturer: Physics
PhD, California Institute of Techology

Kittel, Timothy (https://experts.colorado.edu/display/fisid_139473/)
Faculty Director: International Education

Kjolseth, J. Rolf
Professor Emeritus: Sociology

Klages, Mary K. (https://experts.colorado.edu/display/fisid_101897/)
Associate Professor: English
PhD, Stanford University

Klaus, David M. (https://experts.colorado.edu/display/fisid_107103/)
Professor Emeritus: Aerospace Engineering Sciences
PhD, University of Colorado Boulder

Kleeman, Faye Yuan (https://experts.colorado.edu/display/fisid_113313/)
Professor Emeritus: Asian Languages and Civilizations
PhD, University of California, Berkeley

Kleeman, Terry F. (https://experts.colorado.edu/display/fisid_114181/)
Professor Emeritus: Asian Languages and Civilizations; Professor: Religious Studies
PhD, University of California, Berkeley

Klees, Rita C. (https://experts.colorado.edu/display/fisid_145391/)
Associate Faculty Director, Scholar in Residence: Civil, Environmental and Architectural Engineering; Scholar in Residence: Environmental Engineering Program (EVEN)
PhD, University of Colorado

Kleiber, Holly (https://experts.colorado.edu/display/fisid_164035/)
Clinical Assistant Professor: Speech, Language and Hearing Sciences (SLHS)
MS, University of Washington

Kleiber, William Paul (https://experts.colorado.edu/display/fisid_151943/)
Associate Professor: Applied Mathematics
PhD, University of Washington

Klein, Jennifer Lynn (https://experts.colorado.edu/display/fisid_158332/)
Instructor: Economics; Instructor: Global RAP
PhD, University of California, Santa Barbara

Kline, Bruce Richard
Faculty Director: International Education
MA, Northwestern University

Klinger, Eric O. (https://experts.colorado.edu/display/fisid_139359/)
Faculty Director, Senior Instructor: Undergraduate Education
MA, New Mexico State University

Klymkowsky, Michael W. (https://experts.colorado.edu/display/fisid_101226/)
Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, California Institute of Technology

Knappe, Svenja A. (https://experts.colorado.edu/display/fisid_139588/)
Associate Research Professor: Mechanical Engineering
PhD, Rheinische Friedrich-Wilhelms-Universität (Germany)

Knight, Daniel
Associate Research Professor: Mechanical Engineering
PhD, University of Tennessee

Knight, Erik (https://experts.colorado.edu/individual/fisid_167412/)
Assistant Professor: Psychology and Neuroscience
PhD, University of Oregon

Knight, Jennifer Kirsten (https://experts.colorado.edu/display/fisid_101933/)
Associate Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, University of Michigan Ann Arbor

Knight, Tara (https://experts.colorado.edu/display/fisid_158318/)
Associate Professor: Critical Media Practices
MFA, University of California, San Diego

Knill, Emanuel
Lecturer: Physics
PhD, University of Colorado Boulder

Knipp, Delores Jane (https://experts.colorado.edu/display/fisid_147655/)
Research Professor: Aerospace Engineering Sciences
PhD, University of California, Los Angeles

Knowlton, Ginger (https://experts.colorado.edu/display/fisid_112458/)
Associate Teaching Professor: Program for Writing and Rhetoric
PhD, University of Denver

Knox, David Allen (https://experts.colorado.edu/display/fisid_158054/)
Assistant Teaching Professor: Computer Science
PhD, University of Colorado Health Sciences Center

Knudsen, Erik (https://experts.colorado.edu/display/fisid_172046/)
Associate Teaching Professor: Aerospace Engineering Sciences
PhD, University of Florida

Knuth, Shelley (https://experts.colorado.edu/display/fisid_147168/)
Assistant Professor Adjoint: University Libraries

Knutsen, Jeffrey S. (https://experts.colorado.edu/display/fisid_145534/)
Associate Teaching Professor: Mechanical Engineering
PhD, University of Colorado Boulder

Knutson, Joel P.
Major, Assistant Professor: Army ROTC
BA, Pacific Lutheran University

Ko, Hon-Yim
Professor Emeritus: Civil, Environmental and Architectural Engineering

Koberg, Christine S.
Associate Professor Emerita: Leeds School of Business

Koc, Ozlem (https://experts.colorado.edu/display/fisid_158324/)
Instructor: Leeds School of Business
PhD, Georgia State University

Koch, Jeremy (https://experts.colorado.edu/display/fisid_166589/)
Assistant Teaching Professor: Mechanical Engineering
PhD, University of Illinois

Koch, Tad H.
Professor Emeritus: Chemistry
PhD, Iowa State University

Kocher, Ruth Ellen (https://experts.colorado.edu/display/fisid_143618/)
Distinguished Professor: English; Professor: College of Arts and Sciences
PhD, Arizona State University

Kociolek, John Patrick (https://experts.colorado.edu/display/fisid_145728/)
Faculty Director, Professor: Museum and Field Studies; Professor: Ecology and Evolutionary Biology
PhD, University of Michigan

Kodish, Tamar
Assistant Professor: Psychology and Neuroscience
PhD, University of California Los Angeles

Kohlmeier, Carolyn (https://experts.colorado.edu/individual/fisid_158386/)
Teaching Associate Professor: Chemical and Biological Engineering
PhD, University of Colorado Boulder

Kolb, Burton A.
Professor Emeritus: Leeds School of Business

Kopeikin, Zak (https://experts.colorado.edu/display/fisid_167727/)
Assistant Teaching Professor: Philosophy
PhD, University of Colorado Boulder

Kopf, Sebastian H. (https://experts.colorado.edu/display/fisid_155295/)
Assistant Professor: Geological Sciences
PhD, California Institute of Technology

Korak, Julie A. (https://experts.colorado.edu/display/fisid_155070/)
Assistant Professor: Civil, Environmental and Architectural Engineering; Assistant Professor: Environmental Engineering Program (EVEN)
PhD, University of Colorado Boulder

Korbelik, Jennifer (https://experts.colorado.edu/display/fisid_165078/)
Assistant Teaching Professor: School of Education
MA, University of Denver

Korevaar, David J. (https://experts.colorado.edu/display/fisid_118374/)
Distinguished Professor: Music
DMA, The Juilliard School

Kornish, Laura Joyce (https://experts.colorado.edu/display/fisid_139966/)
Professor, Associate Dean: Leeds School of Business
PhD, Stanford University

Koschmann, Matthew A. (https://experts.colorado.edu/display/fisid_145807/)
Associate Professor: Communication; Associate Professor: Continuing Education & Professional Studies
PhD, University of Texas at Austin

Kosmenko, Kimberly
Instructor: Graduate School
MBA, University of Denver

Köster, Isabel (https://experts.colorado.edu/display/fisid_157946/)
Assistant Professor: Classics
PhD, Harvard University

Koster, Jean N.
Professor Emeritus: Aerospace Engineering Sciences
PhD, Karlsruher Institut für Technologie (Germany)

Kostoglodova, Elena Yurievna (https://experts.colorado.edu/display/fisid_100976/)
Teaching Associate Professor Emerita : Germanic and Slavic Languages and Literatures
PhD, University of Colorado Boulder

Kotys-Schwartz, Daria (https://experts.colorado.edu/display/fisid_144738/)
Teaching Professor: Mechanical Engineering; Faculty Director: College of Engineering and Applied Science
PhD, University of Colorado Boulder

Koval, Carl A.
Professor Emeritus: Chemistry
PhD, California Institute of Technology

Kowalchuk, Andrea (https://experts.colorado.edu/display/fisid_154509/)
Teaching Associate Professor: Engineering, Ethics & Society
PhD, University of Dallas

Kowalski, Adam (https://www.colorado.edu/aps/adam-kowalski/)
Associate Professor: Astrophysical and Planetary Sciences (APS); Assistant Professor: Laboratory for Atmospheric and Space Physics (LASP)
PhD, University of Washington

Kozar, Kenneth A.
Professor Emeritus: Leeds School of Business

Krakoff, Sarah A. (https://experts.colorado.edu/display/fisid_109697/)
Professor, Endowed/Named Professor: School of Law
JD, University of California, Berkeley

Kralj, Joel M.
Assistant Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, Boston University

Kram, Rodger (https://experts.colorado.edu/display/fisid_118476/)
Associate Professor Emeritus: Integrative Physiology
Ph.D. , Harvard University

Kramer, Amy
Lecturer: Engineering Management Program
JD, University of Colorado Boulder

Krantz, William
Professor Emeritus: Chemical and Biological Engineering

Krarti, Moncef (https://experts.colorado.edu/display/fisid_104154/)
Professor: Civil, Environmental and Architectural Engineering
PhD, University of Colorado Boulder

Kratzke, Peter J. (https://experts.colorado.edu/display/fisid_126546/)
Associate Teaching Professor Emeritus: Program for Writing and Rhetoric; Senior Instructor: Continuing Education & Professional Studies
PhD, University of Kentucky

Krauel, Javier (https://experts.colorado.edu/display/fisid_143248/)
Associate Professor: Spanish and Portuguese; Associate Professor: Humanities; Faculty Director: International Education
PhD, Duke University

Krauter, Kenneth S. (https://experts.colorado.edu/display/fisid_107978/)
Professor, Associate Chair: Molecular, Cellular & Developmental Biology (MCDB)
PhD, Yeshiva University

Krishnamurthy, Vivek (https://experts.colorado.edu/display/fisid_174200/)
Associate Professor: School of Law
JD, Yale University

Krizek, Kevin J. (https://experts.colorado.edu/display/fisid_145292/)
Professor: Environmental Design
PhD, University of Washington

Kroll, Paul W.
Professor Emeritus: Asian Languages and Civilizations

Krutz, Glen
Dean: College of Arts and Sciences; Professor: Political Science
, Texas AM University

Krywicki, Jarad (https://experts.colorado.edu/display/fisid_164243/)
Assistant Teaching Professor: Program for Writing and Rhetoric
PhD, University of Colorado Boulder

Kubitschek, Daniel (https://experts.colorado.edu/display/fisid_144283/)
Professional Research Assistant: Laboratory for Atmospheric and Space Physics (LASP)
PhD, University of Colorado Boulder

Kuchenrither, Richard D.
Scholar in Residence: Environmental Engineering Program (EVEN); Faculty Director: College of Engineering and Applied Science
PhD, University of Colorado Boulder

Kuchta, Robert (https://experts.colorado.edu/display/fisid_100844/)
Professor: Biochemistry
PhD, Brandeis University

Kuempel, Peter L.
Professor Emeritus: Molecular, Cellular & Developmental Biology (MCDB)

Kuester, Edward F.
Professor Emeritus: Electrical, Computer and Energy Engineering (ECEE)

Kugel, Jennifer F. (https://experts.colorado.edu/display/fisid_109472/)
Research Professor: Biochemistry
PhD, University of Colorado Boulder

Kuglitsch, Rebecca Zuege (https://experts.colorado.edu/display/fisid_152452/)
Associate Professor: University Libraries
MLS, University of Washington

Kuhn, Tim (https://experts.colorado.edu/display/fisid_118144/)
Professor: Communication
PhD, Arizona State University

Kunce, Catherine (https://experts.colorado.edu/display/fisid_120631/)
Associate Teaching Professor: Program for Writing and Rhetoric; Senior Instructor: Farrand RAP
PhD, University of Denver

Kunkel, Jerry W.
Professor Emeritus: Art and Art History

Kunz, P. Dale
Professor Emeritus: Physics
PhD, University of Washington

Kurnick, Sarah (https://experts.colorado.edu/display/fisid_155915/)
Associate Professor: Anthropology
PhD, University of Pennsylvania

Kuskin, William (https://experts.colorado.edu/display/fisid_143742/)
Chair, Professor: English; Associate Dean: College of Engineering and Applied Science
PhD, University of Wisconsin–Madison

Kuznetsov, Sergei Eugenievitch (https://experts.colorado.edu/display/fisid_113246/)
Associate Professor, Associate Chair: Mathematics
DSc, Vilnius State University (Lithuania)

Kwaramba, Marcia (https://experts.colorado.edu/display/fisid_164299/)
Scholar in Residence: Leeds School of Business
PhD, Monash University (Australia)

# L

Labbe, Nicole J. (https://experts.colorado.edu/display/fisid_157742/)
Assistant Professor: Mechanical Engineering
PhD, University of Massachusetts, Amherst

Labio, Catherine (https://experts.colorado.edu/display/fisid_147608/)
Associate Professor: English
PhD, New York University

Labrecque, Joseph (https://experts.colorado.edu/display/fisid_165806/)
Assistant Teaching Professor: Advertising, Public Relations and Media Design
MA, University of Denver

Lacerenza, Christina Noelle (https://experts.colorado.edu/display/fisid_159797/)
Assistant Professor: Leeds School of Business
PhD, Rice University

Lack, Jonathan
Scholar in Residence: Cinema Studies & Moving Image Arts
PhD, University of Iowa

Laguna, Manuel (https://experts.colorado.edu/display/fisid_102975/)
Professor, Faculty Director, Endowed/Named Professor: Leeds School of Business; Faculty Director: Office of the Chancellor
PhD, University of Texas at Austin

Lahijanian, Morteza Mehdi (https://experts.colorado.edu/display/fisid_164179/)
Assistant Professor: Aerospace Engineering Sciences; Assistant Professor: Computer Science
PhD, Boston University

Lambert, Joanna E. (https://experts.colorado.edu/display/fisid_156206/)
Professor: Environmental Studies Program
PhD, University of Illinois at Urbana–Champaign

Lamos, Steven Joseph (https://experts.colorado.edu/display/fisid_141169/)
Associate Professor, Faculty Director: Program for Writing and Rhetoric; Associate Professor: English
PhD, University of Illinois at Urbana–Champaign

Landgrave, Michelangelo
Assistant Professor: Political Science

Lange, Anja K. (https://experts.colorado.edu/display/fisid_104576/)
Faculty Director: International Education; Teaching Professor, Faculty Director: Engineering, Ethics & Society
PhD, University of Colorado Boulder

Lange, Rebecca
Colonel, Chair, Professor: Air Force ROTC
MPA, University of Oklahoma

Lansford, Edwin Tyler (https://experts.colorado.edu/display/fisid_147620/)
Senior Instructor: Classics
PhD, University of Washington

Larremore, Daniel B. (https://experts.colorado.edu/display/fisid_159893/)
Assistant Professor: Computer Science
PhD, University of Colorado Boulder

Larsen, Kai Rune (https://experts.colorado.edu/display/fisid_118160/)
Associate Professor, Faculty Director: Leeds School of Business
PhD, SUNY at Albany

Larson, Christine M. (https://experts.colorado.edu/display/fisid_159789/)
Assistant Professor: Journalism
PhD, Stanford University

Larson, Kristine M.
Professor Emerita: Aerospace Engineering Sciences
PhD, Scripps Institution of Oceanography

Lasser, Gregor (https://experts.colorado.edu/display/fisid_156178/)
Assistant Research Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, Technische Universität Wien (Austria)

Laurenzo, Tomas (https://experts.colorado.edu/display/fisid_168230/)
Associate Professor: Critical Media Practices
PhD, Universidad De La Republica (Uruguay)

Laurion, Henry R. (https://experts.colorado.edu/display/fisid_163642/)
Assistant Professor: Leeds School of Business
PhD, University of California, Berkeley

Law, Judith (https://experts.colorado.edu/individual/fisid_167501/)
Assistant Teaching Professor: Applied Mathematics
PhD, The University of Maryland, College Park

Lawrence, Dale A. (https://experts.colorado.edu/display/fisid_104057/)
Professor Emeritus: Aerospace Engineering Sciences; Faculty Director: Research & Engineering Ctr for Unmanned Vehicles (RECUV)
PhD, Cornell University

Lawrence, Stephen R. (https://experts.colorado.edu/display/fisid_102032/)
Associate Professor: Leeds School of Business
PhD, Carnegie Mellon University

Lawrence-Sanders, Ashleigh (https://experts.colorado.edu/display/fisid_169099/)
Assistant Professor: History
PhD, Rutgers University

Lawson, Angelica Marie (https://experts.colorado.edu/display/fisid_154727/)
Assistant Professor: Ethnic Studies; Assistant Professor: Cinema Studies & Moving Image Arts; Faculty Director: Native American and Indigenous Studies
PhD, University of Arizona

Lawson, Duane W.
Lieutenant, Assistant Professor: Army ROTC
BS, University of Florida

Layer, Ryan M. (https://experts.colorado.edu/display/fisid_163567/)
Assistant Professor: Biomedical Engineering; Assistant Professor: Computer Science
PhD, University of Virginia

Le, Hanh-Phuc
Assistant Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, University of California, Berkeley

Le Moine, Alexandra (https://experts.colorado.edu/display/fisid_168419/)
Assistant Teaching Professor: Aerospace Engineering Sciences
MS, University of Wisconsin

Leach, Chris (https://experts.colorado.edu/display/fisid_105152/)
Professor, Endowed/Named Professor: Leeds School of Business
PhD, Cornell University

League, Dustin R.
Lieutenant, Assistant Professor: Army ROTC
BS, University of Kansas

Leben, Robert R.
Research Professor Emeritus: Aerospace Engineering Sciences
PhD, University of Colorado Boulder

Lee, Jintae (https://experts.colorado.edu/display/fisid_115390/)
Associate Professor Emeritus: Leeds School of Business
PhD, Massachusetts Institute of Technology

Lee, Mi-Kyoung (https://experts.colorado.edu/display/fisid_141821/)
Associate Professor: Philosophy; Associate Professor: Classics
PhD, Harvard University

Lee, Minhyea (https://experts.colorado.edu/display/fisid_145209/)
Associate Professor: Physics; Assistant Professor: Materials Science & Engineering
PhD, University of Chicago

Lee, Rachel (https://experts.colorado.edu/display/fisid_142183/)
Teaching Associate Professor: Environmental Design
MArch, Tulane University

Lee, Sangwook
Assistant Professor: Advertising, Public Relations and Media Design
PhD, Pennsylvania State University

Lee, Sehee (https://experts.colorado.edu/display/fisid_144739/)
Professor: Mechanical Engineering; Professor: Materials Science & Engineering
PhD, Seoul National University (South Korea)

Lee, Seow Ting (https://experts.colorado.edu/display/fisid_157994/)
Professor: Advertising, Public Relations and Media Design
PhD, University of Missouri–Columbia

Lee, Yung-Cheng (https://experts.colorado.edu/display/fisid_103170/)
Professor Emeritus: Mechanical Engineering; Endowed/Named Professor: College of Engineering and Applied Science

Leeker, Eric
Lecturer: Engineering Management Program
MBA, Purdue University

Leeker, Jessica Rush (https://experts.colorado.edu/display/fisid_167166/)
Instructor Adjunct: Engineering Management Program
PhD, Purdue University

Lehman, Tamara (https://experts.colorado.edu/display/fisid_165649/)
Assistant Professor: Electrical, Computer and Energy Engineering (ECEE); Assistant Professor: Computer Science
PhD, Duke University

Lehnert, Doris Pridonoff
Professor Emerita: Music

Lehnert, Konrad W. (https://experts.colorado.edu/display/fisid_139785/)
Professor Adjoint: Physics
PhD, University of California at Santa Barbara

Lehnert, Oswald
Professor Emeritus: Music

Leibfried, Dietrich
Lecturer: Physics
PhD, Max-Planck Institute for Quantum Optics (Germany)

Leigh, Steven Robert (https://experts.colorado.edu/display/fisid_151706/)
Dean: College of Arts and Sciences; Professor: Anthropology
PhD, Northwestern University

Leinwand, Leslie Anne (https://experts.colorado.edu/display/fisid_107104/)
Distinguished Professor, Faculty Director: Molecular, Cellular & Developmental Biology (MCDB)
PhD, Yale University

Lekson, Steve
Professor Emeritus: Anthropology

Lemone, Margaret Anne
Professor Adjoint: Atmospheric and Oceanic Sciences (ATOC)

Leonardi, Bethy (https://experts.colorado.edu/display/fisid_151475/)
Associate Professor: School of Education
PhD, University of Colorado Boulder

Leong, Daphne (https://experts.colorado.edu/display/fisid_115747/)
Professor: Music
PhD, University of Rochester

Leslie, Grace (https://experts.colorado.edu/display/fisid_172297/)
Assistant Professor: ATLAS Institute; Assistant Professor: Creative Technology & Design
PhD, University of California San Diego

Lessley, Merrill J.
Professor Emeritus: Theatre and Dance

Lester, Alan P. (https://experts.colorado.edu/display/fisid_105385/)
Associate Professor, Lecturer: Continuing Education & Professional Studies
PhD, University of Colorado Boulder

Levine, Judah (https://experts.colorado.edu/display/fisid_100654/)
Professor Adjoint: Physics
PhD, New York University

Lewandowski, Heather Jean (https://experts.colorado.edu/display/fisid_111815/)
Professor, Associate Chair: Physics; Professor: JILA
PhD, University of Colorado Boulder

Lewis, Abbey (https://experts.colorado.edu/display/fisid_159174/)
Teaching Associate Professor: University Libraries
MLIS, Catholic University of America

Lewis, Barry L.
Professor Emeritus: Leeds School of Business

Lewis, Clayton H. (https://experts.colorado.edu/display/fisid_100307/)
Professor Emeritus: Computer Science
PhD, University of Michigan Ann Arbor

Lewis, Gary J. (https://experts.colorado.edu/display/fisid_145854/)
Professor: Music
MM, Texas Tech University

Lewis, Mary Beth (https://experts.colorado.edu/display/fisid_153829/)
Senior Instructor Emerita: Leeds School of Business
MBA, University of Pittsburgh

Lewis, Ryan C. (https://experts.colorado.edu/display/fisid_157865/)
Assistant Professor: Leeds School of Business
PhD, London Business School (England)

Lewis, William M. Jr. (https://experts.colorado.edu/display/fisid_102314/)
Professor: Cooperative Institute for Research in Environmental Sciences (CIRES); Professor: Ecology and Evolutionary Biology; Professor: Center for Limnology
PhD, Indiana University Bloomington

Lewon, Jennifer (https://experts.colorado.edu/display/fisid_147362/)
Clinical Associate Professor: Speech, Language and Hearing Sciences (SLHS)
MA, Northern Arizona University

Leyk, Stefan (https://experts.colorado.edu/display/fisid_145192/)
Professor, Associate Chair: Geography; Faculty Director: Institute for Behavioral Genetics (IBG)
PhD, University of Zurich (Switzerland)

Li, Baowen
Faculty Director: College of Engineering and Applied Science
PhD, Carl von Ossietzky Universität Oldenburg (Germany)

Li, Congming
Professor Emeritus: Applied Mathematics

Li, Jianghanyang (https://experts.colorado.edu/display/fisid_169049/)
Assistant Professor: Atmospheric and Oceanic Sciences (ATOC)
PhD, Purdue University

Li, Jingchun (https://experts.colorado.edu/display/fisid_157561/)
Assistant Professor: Museum and Field Studies; Assistant Professor: Ecology and Evolutionary Biology
PhD, University of Michigan

Li, Xiang (https://experts.colorado.edu/display/fisid_145009/)
Associate Professor: University Libraries
MS, University of Michigan Ann Arbor

Li, Xinlin (https://experts.colorado.edu/display/fisid_100016/)
Professor: Laboratory for Atmospheric and Space Physics (LASP); Professor: Aerospace Engineering Sciences
PhD, Dartmouth College

Li, Yingjie (https://experts.colorado.edu/display/fisid_164322/)
Teaching Associate Professor: Asian Languages and Civilizations
PhD, University of Kansas

Lichtenstein, Donald (https://experts.colorado.edu/display/fisid_101701/)
Professor, Chair: Leeds School of Business
PhD, University of South Carolina

Liel, Abbie B. (https://experts.colorado.edu/display/fisid_146431/)
Professor: Civil, Environmental and Architectural Engineering
PhD, Stanford University

Lightner, Michael R. (https://experts.colorado.edu/display/fisid_101723/)
Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, Carnegie Mellon University

Ligon, Dan (https://experts.colorado.edu/display/fisid_158313/)
Associate Teaching Professor: Advertising, Public Relations and Media Design
MFA, Brown University

Lillydahl, Jane
Professor Emerita: Economics

Lim, Sungyun A. (https://experts.colorado.edu/display/fisid_148726/)
Associate Professor, Associate Chair: History
PhD, University of California, Berkeley

Limerick, Patricia N. (https://experts.colorado.edu/display/fisid_105459/)
Professor, Faculty Director: Center of the American West; Professor: History; Professor: Critical Media Practices
PhD, Yale University

Lin, Hsiao-Ling (https://experts.colorado.edu/display/fisid_149958/)
Instructor: Music
DMA, Northwestern University

Lindberg, Case (https://experts.colorado.edu/display/fisid_154137/)
Teaching Professor: Environmental Design
PhD, Stanford University

Linden, Karl G. (https://experts.colorado.edu/display/fisid_143747/)
Professor, Chair: Civil, Environmental and Architectural Engineering; Endowed/Named Professor, Faculty Director: College of Engineering and Applied Science; Professor: Environmental Engineering Program (EVEN)
PhD, University of California, Davis

Lindquist, Thea L. (https://experts.colorado.edu/display/fisid_122803/)
Professor, Professor: History; Faculty Director: University Libraries
PhD, University of Wisconsin–Madison

Lindsay, William (https://experts.colorado.edu/display/fisid_168224/)
Assistant Teaching Professor: School of Education
PhD, University of Colorado Boulder

Lindsey, Daniel Seneca (https://experts.colorado.edu/display/fisid_156477/)
Assistant Teaching Professor: Applied Mathematics

Lineberger, William Carl
Distinguished Professor Emeritus: Chemistry
PhD, Georgia Institute of Technology

Linhart, Yan B.
Professor Emeritus: Ecology and Evolutionary Biology

Lininger, Katherine (https://experts.colorado.edu/display/fisid_163643/)
Assistant Professor: Geography
PhD, Colorado State University

Link, Christopher D. (https://experts.colorado.edu/display/fisid_109073/)
Associate Professor: Integrative Physiology
PhD, University of Massachusetts at Amherst

Linsky, Jeffrey
Professor Emeritus: Astrophysical and Planetary Sciences (APS)

Lionberger, Erin Leigh (https://experts.colorado.edu/display/fisid_167647/)
Instructor: Leeds School of Business
MS, South Dakota State University

Liotta, Jeanne M. (https://experts.colorado.edu/display/fisid_145808/)
Associate Professor, Associate Faculty Director: Cinema Studies & Moving Image Arts; Associate Professor: Art and Art History
BFA, New York University

Lisbon, Adam Harry (https://experts.colorado.edu/display/fisid_152869/)
Associate Professor: University Libraries
MS, SUNY at Albany

Litos, Michael (https://experts.colorado.edu/display/fisid_158137/)
Assistant Professor: Physics
PhD, Boston University

Litt, Jill S. (https://experts.colorado.edu/display/fisid_140636/)
Professor: Environmental Studies Program
PhD, Johns Hopkins University

Little, Katherine C. (https://experts.colorado.edu/display/fisid_149872/)
Professor: English; Professor: History; Professor: College of Arts and Sciences
PhD, Duke University

Littlejohn, Ray Lynn
Endowed/Named Professor: College of Engineering and Applied Science
PhD, University of Oklahoma

Liu, Liu (https://experts.colorado.edu/display/fisid_163568/)
Assistant Professor: Leeds School of Business
PhD, New York University

Liu, Xiaodong (https://experts.colorado.edu/display/fisid_144508/)
Professor: Economics
PhD, The Ohio State University

Liu, Xuedong (https://experts.colorado.edu/display/fisid_118458/)
Professor: Biochemistry
PhD, University of Wisconsin–Madison

Liu, Youjian (https://experts.colorado.edu/display/fisid_126283/)
Associate Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, Ohio State University

Livneh, Ben (https://experts.colorado.edu/display/fisid_151999/)
Assistant Professor: Cooperative Institute for Research in Environmental Sciences (CIRES); Associate Professor: Civil, Environmental and Architectural Engineering; Assistant Professor: Environmental Engineering Program (EVEN)
PhD, University of Washington

Lladser, Manuel E. (https://experts.colorado.edu/display/fisid_134170/)
Associate Professor: Applied Mathematics; Associate Professor: Computer Science
PhD, The Ohio State University

Loewenstein, Mark J. (https://experts.colorado.edu/display/fisid_102088/)
Professor, Endowed/Named Professor: School of Law
JD, University of Illinois at Urbana–Champaign

Lofquist, Mark
Assistant Research Professor: Computer Science
PhD, University of Colorado Boulder

Logan, Kelty Irene (https://experts.colorado.edu/display/fisid_147340/)
Associate Professor Emerita: Advertising, Public Relations and Media Design

Lojka, Jason
Lieutenant Colonel, Chair, Professor: Army ROTC
MS, Naval Postgrad School

Long, Chris Evin (https://experts.colorado.edu/display/fisid_155455/)
Professor: University Libraries
MA, Indiana University Bloomington

Long, Daniel R. (https://experts.colorado.edu/display/fisid_149910/)
Associate Teaching Professor: Program for Writing and Rhetoric
MA, University of Colorado Boulder

Long, Mary K. (https://experts.colorado.edu/display/fisid_109994/)
Teaching Professor: Spanish and Portuguese
PhD, Princeton University

Long, Rong (https://experts.colorado.edu/display/fisid_151301/)
Associate Professor: Mechanical Engineering
PhD, Cornell University

Lopez, Enrique J. (https://experts.colorado.edu/display/fisid_151426/)
Associate Professor, Faculty Director: School of Education
PhD, Stanford University

Lopez Jimenez, Francisco (https://experts.colorado.edu/display/fisid_157867/)
Assistant Professor: Aerospace Engineering Sciences
PhD, California Institute of Technology

Lord, Kimberly E.
Lecturer: Leeds School of Business

Losoff, Barbara Ann (https://experts.colorado.edu/display/fisid_106944/)
Associate Professor Emeritus: University Libraries
MLS, Emporia State University

Louie, Donna F. (https://experts.colorado.edu/display/fisid_110827/)
Instructor: Baker RAP; Instructor: Libby Arts RAP
PhD, University of Texas Health Science Center at San Antonio

Lovejoy, Henry Barrett (https://experts.colorado.edu/display/fisid_157679/)
Associate Professor: History
PhD, University of California-Los Angeles

Lovenduski, Nicole Suzanne (https://experts.colorado.edu/display/fisid_147557/)
Associate Professor: Atmospheric and Oceanic Sciences (ATOC); Associate Professor: Institute of Arctic & Alpine Research (INSTAAR)
PhD, University of California, Los Angeles

Lowry, Christopher (https://experts.colorado.edu/display/fisid_143371/)
Professor: Integrative Physiology; Faculty Director: Research & Innovation Office
PhD, Oregon State University

Luca, Oana (https://experts.colorado.edu/display/fisid_157952/)
Assistant Professor: Chemistry
PhD, Yale University

Lucas, Andrew James (https://experts.colorado.edu/display/fisid_164180/)
Assistant Professor: Physics
PhD, Harvard University

Ludlow, Andrew
Lecturer: Physics
PhD, University of Colorado Boulder

Luh, Kyle (https://experts.colorado.edu/display/fisid_166949/)
Assistant Professor: Mathematics
PhD, Yale University

Lundell, Albert T.
Professor Emeritus: Mathematics

Lundy, Tiel Louise (https://experts.colorado.edu/display/fisid_151085/)
Senior Instructor: Libby Arts RAP
PhD, University of Denver

Lv, Qin (https://experts.colorado.edu/display/fisid_145832/)
Professor, Associate Chair: Computer Science
PhD, Princeton University

Lynch, Carol B.
Professor Emeritus: Ecology and Evolutionary Biology

Lynch, G. Robert
Professor Emeritus: Integrative Physiology

Lynch, John G. (https://experts.colorado.edu/display/fisid_147448/)
Faculty Director, Professor, Associate Dean, Endowed/Named Professor, Distinguished Professor: Leeds School of Business
PhD, University of Illinois at Chicago

Lynch, Maureen Ellen (https://experts.colorado.edu/display/fisid_163404/)
Assistant Professor: Mechanical Engineering; Assistant Professor: Biomedical Engineering
PhD, Cornell University

Lyons, Colleen Scanlan (https://experts.colorado.edu/display/fisid_148419/)
Assistant Professor Adjunct: Anthropology
PhD, University of Colorado Boulder

# M

Macaluso, Gregg Richard (https://experts.colorado.edu/display/fisid_123302/)
Instructor Emeritus: Leeds School of Business
MS, University of California, Irvine

MacCurdy, Robert B. (https://experts.colorado.edu/display/fisid_163307/)
Assistant Professor: Mechanical Engineering; Assistant Professor: Computer Science; Assistant Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, Cornell University

Macdonald, Christine (https://experts.colorado.edu/display/fisid_105513/)
Associate Teaching Professor: Program for Writing and Rhetoric
PhD, University of Colorado Boulder

Macdonald, Robyn (https://experts.colorado.edu/display/fisid_165823/)
Assistant Professor: Aerospace Engineering Sciences
PhD, University of Illinois at Urbana-Champaign

Macfee, Raymond D. Jr.
Professor Emeritus: Leeds School of Business

Macias, Pamela
Assistant Teaching Professor: Speech, Language and Hearing Sciences (SLHS)
MA,

Maciszewski, Michael (https://experts.colorado.edu/display/fisid_153223/)
Instructor: Leeds School of Business
JD, University of Denver

MacLennan, Joseph E. (https://experts.colorado.edu/display/fisid_104854/)
Professor Attendant Rank, Professor: Materials Science & Engineering; Lecturer: Physics
PhD, University of Colorado Boulder

Macrae, Robert Eugene
Professor Emeritus: Mathematics

MacVarish, Brendan F.
Captain, Instructor: Navy ROTC

Madabhushi, Srikanth (https://experts.colorado.edu/individual/fisid_165826/)
Assistant Professor: Civil, Environmental and Architectural Engineering
PhD, University of Cambridge (England)

Madigan, Ann-Marie (https://experts.colorado.edu/display/fisid_158298/)
Associate Professor: Astrophysical and Planetary Sciences (APS)
PhD, Leiden University (Netherlands)

Maeda, Daryl Joji (https://experts.colorado.edu/display/fisid_141460/)
Professor: Ethnic Studies; Faculty Director: Academic Affairs; Professor: History; Dean: Undergraduate Education
PhD, University of Michigan Ann Arbor

Magnanini, Suzanne M. (https://experts.colorado.edu/display/fisid_118145/)
Associate Professor, Faculty Director: International Education; Chair: French & Italian
PhD, University of Chicago

Mah, John K. (https://experts.colorado.edu/display/fisid_164214/)
Associate Teaching Professor: Aerospace Engineering Sciences
MS, Stanford University

Mahan, Kevin H. (https://experts.colorado.edu/display/fisid_143975/)
Professor: Geological Sciences
PhD, University of Massachusetts at Amherst

Mahoney, Melissa J.
Teaching Professor: Chemical and Biological Engineering
PhD, Cornell University

Maier, Steven F.
Distinguished Professor: Psychology and Neuroscience
PhD, University of Pennsylvania

Main, Gloria L.
Professor Emerita: History

Majerfeld, Arnoldo
Professor Emeritus: Electrical, Computer and Energy Engineering (ECEE)

Maksimovic, Dragan (https://experts.colorado.edu/display/fisid_105609/)
Professor: Electrical, Computer and Energy Engineering (ECEE); Faculty Director, Endowed/Named Professor: College of Engineering and Applied Science
PhD, California Institute of Technology

Malaspina, David M. (https://experts.colorado.edu/display/fisid_148393/)
Assistant Professor: Astrophysical and Planetary Sciences (APS); Assistant Professor: Laboratory for Atmospheric and Space Physics (LASP)
PhD, University of Colorado Boulder

Malcolm, Karen L. (https://experts.colorado.edu/display/fisid_108575/)
Assistant Teaching Professor: Spanish and Portuguese
MA, University of Nebraska-Lincoln

Maldonado, Tammy A. (https://experts.colorado.edu/individual/fisid_104105/)
Assistant Teaching Professor: Integrative Physiology
PhD, University of Colorado Boulder

Malin, Jonathan (https://experts.colorado.edu/display/fisid_151714/)
Associate Professor: Music; Associate Professor: Jewish Studies
PhD, University of Chicago

Malitz, Jerome I.
Professor Emeritus: Mathematics

Maloy, Rebecca (https://experts.colorado.edu/display/fisid_125582/)
Professor, Endowed/Named Professor: Music; Faculty Director: Center for Medieval and Early Modern Studies
PhD, University of Cincinnati

Malville, J. McKim
Professor Emeritus: Astrophysical and Planetary Sciences (APS)

Manley, Kevin W. (https://experts.colorado.edu/display/fisid_142342/)
Teaching Associate Professor: Mathematics
PhD, University of Colorado Boulder

Mann, Ralph
Professor Emeritus: History

Manno, Jesse J. (https://experts.colorado.edu/display/fisid_120813/)
Senior Instructor: Theatre and Dance
BA, University of Colorado Boulder

Mansfeldt, Cresten (https://experts.colorado.edu/display/fisid_165411/)
Assistant Professor: Civil, Environmental and Architectural Engineering; Assistant Professor: Environmental Engineering Program (EVEN)
PhD, Cornell University

Mansfield, Richard (https://experts.colorado.edu/display/fisid_157743/)
Assistant Professor: Economics; Assistant Professor: Institute of Behavioral Science (IBS)
PhD, Yale University

Mansour, Nesrine
Assistant Professor: Environmental Design
PhD, Texas AM University

Manteuffel, Thomas A.
Professor Emeritus: Applied Mathematics

Mapel, David Reed
Professor Emeritus: Political Science

Marchitto, Thomas (https://experts.colorado.edu/display/fisid_128241/)
Professor: Institute of Arctic & Alpine Research (INSTAAR); Professor, Associate Chair: Geological Sciences
PhD, Massachusetts Institute of Technology

Marder Seth (https://experts.colorado.edu/display/fisid_167617/)
Professor: Chemistry; Professor: Chemical and Biological Engineering
PhD, University of Wisconsin-Madison

Margaret, Annie (https://experts.colorado.edu/display/fisid_159961/)
Associate Teaching Professor: Creative Technology & Design; Associate Teaching Professor: ATLAS Institute
PhD, Northwestern University

Marino, Alysia Diane (https://experts.colorado.edu/display/fisid_146427/)
Professor: Physics
PhD, University of California, Berkeley

Markle, Bradley R. (https://experts.colorado.edu/individual/fisid_167413/)
Assistant Professor: Geological Sciences
PhD, University of Washington

Marks, Alexia Brunet (https://experts.colorado.edu/display/fisid_147610/)
Associate Professor, Associate Dean: School of Law
PhD, Purdue University

Markusen, James R. (https://experts.colorado.edu/display/fisid_103187/)
Professor Emeritus, Distinguished Professor: Economics
PhD, Boston College

Marshak, Michael Pesek (https://experts.colorado.edu/display/fisid_156422/)
Assistant Professor: Renewable & Sustainable Energy Institute (RASEI)
PhD, Massachusetts Institute of Technology

Marshall, David B. (https://experts.colorado.edu/display/fisid_158629/)
Research Professor: Aerospace Engineering Sciences
PhD, Monash University (Australia)

Marshall, Nathan Thomas (https://experts.colorado.edu/display/fisid_156034/)
Assistant Professor: Leeds School of Business
PhD, Indiana University Bloomington

Marshall, Robert A. (https://experts.colorado.edu/display/fisid_155957/)
Associate Professor, Associate Chair: Aerospace Engineering Sciences
PhD, Stanford University

Marslett, Geoffrey C. (https://experts.colorado.edu/display/fisid_155970/)
Assistant Professor, Associate Chair: Cinema Studies & Moving Image Arts
MFA, University of Texas at Austin

Martin, Andrew (https://experts.colorado.edu/display/fisid_113238/)
Professor, Faculty Director: International Education; Faculty Director: A&S ASSETT; Chair: Ecology and Evolutionary Biology
PhD, University of Hawaii at Manoa

Martin, James H. (https://experts.colorado.edu/display/fisid_100495/)
Professor: Institute of Cognitive Science (ICS); Professor: Computer Science
PhD, University of California, Berkeley

Martin, Jennifer Mary (https://experts.colorado.edu/display/fisid_110125/)
Senior Instructor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, University of Washington

Paddack, Martin
Teaching Associate Professor: Environmental Design
MArch, The Catholic University of America

Martin, Wendy Lynn (https://experts.colorado.edu/display/fisid_154942/)
Teaching Associate Professor: Engineering Management Program; Endowed/Named Professor: College of Engineering and Applied Science
ME, University of Colorado Boulder

Martinez, Marayna
Assistant Professor: Political Science
PhD, Duke University

Martins-Filho, Carlos B. (https://experts.colorado.edu/display/fisid_147510/)
Professor: Economics
PhD, University of Tennessee, Knoxville

Martinsson, Per-Gunnar
Visiting Professor: Applied Mathematics

Martuscelli, Tania A. (https://experts.colorado.edu/display/fisid_148379/)
Associate Professor: Spanish and Portuguese
PhD, University of Massachusetts at Amherst

Mascarenhas, Angelo
Lecturer: Physics
PhD, University of Pittsburgh

Maskus, Keith E. (https://experts.colorado.edu/display/fisid_103414/)
Professor Emeritus, Distinguished Professor: Economics
PhD, University of Michigan Ann Arbor

Maslanik, James
Research Professor Emeritus: Aerospace Engineering Sciences

Mason, Patrick C. (https://experts.colorado.edu/display/fisid_101840/)
Professor Emeritus: Music
MM, University of Nebraska-Lincoln

Massey, Daniel
Endowed/Named Professor: College of Engineering and Applied Science; Faculty Director, Professor: Interdisciplinary Telecommunications
PhD, University of California, Los Angeles

Massey, Susan
Teaching Associate Professor: Environmental Design
MA, University of Michigan

Massey-Warren, Sarah (https://experts.colorado.edu/display/fisid_145057/)
Assistant Teaching Professor Emerita: Program for Writing and Rhetoric
PhD, University of Colorado Boulder

Masters, Ryan Kelly (https://experts.colorado.edu/display/fisid_152730/)
Associate Professor: Sociology; Associate Professor: Institute of Behavioral Science (IBS)
PhD, University of Texas at Austin

Masters, Sheldon (https://experts.colorado.edu/display/fisid_168570/)
Assistant Professor: Civil, Environmental and Architectural Engineering
PhD, Virginia Polytechnic Institute and State University

Mastronarde, David N.
Professor Attendant Rank: Molecular, Cellular & Developmental Biology (MCDB)
PhD, University of Colorado

Mathys, Peter (https://experts.colorado.edu/display/fisid_100084/)
Associate Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, ETH Zürich (Switzerland)

Matson, Zannah (https://experts.colorado.edu/display/fisid_173968/)
Assistant Professor: Environmental Design
MLA, Harvard Graduate School of Design

Matsumoto, Sarah (https://experts.colorado.edu/display/fisid_173769/)
Clinical Associate Professor: School of Law
JD, Seattle University

Matsunaga, Yumiko (https://experts.colorado.edu/display/fisid_149899/)
Teaching Professor of Distinction: Asian Languages and Civilizations
PhD, University of Wisconsin–Madison

Matsuo, Tomoko (https://experts.colorado.edu/display/fisid_145041/)
Associate Professor: Aerospace Engineering Sciences
PhD, SUNY at Stony Brook

Mattar, Karim (https://experts.colorado.edu/display/fisid_153056/)
Associate Professor: English
DPhil, Oxford Univ (England)

Matusik, Sharon Marie Frances (https://experts.colorado.edu/display/fisid_133564/)
Professor, Dean: Leeds School of Business
PhD, University of Washington

Maude, Daryl (https://experts.colorado.edu/display/fisid_175537/)
Assistant Professor: Asian Languages and Civilizations
PhD, University of California, Berkeley

Maurer, Christy (https://experts.colorado.edu/display/fisid_148831/)
Teaching Associate Professor: Communication
PhD, University of Colorado Boulder

Maute, Kurt (https://experts.colorado.edu/display/fisid_113875/)
Professor, Associate Dean, Professor: Materials Science & Engineering; Faculty Director: College of Engineering and Applied Science; Endowed/Named Professor: Aerospace Engineering Sciences
PhD, University of Stuttgart (Germany)

Maxwell, Christopher (https://experts.colorado.edu/display/fisid_164956/)
Instructor: Leeds School of Business
BS, Colorado State University

Mayer, Stephanie Susan (https://experts.colorado.edu/display/fisid_114948/)
Senior Instructor: Ecology and Evolutionary Biology
PhD, University of California, Berkeley

Mayer, Thomas
Professor Emeritus: Sociology

Mayr, Peter (https://experts.colorado.edu/display/fisid_155858/)
Associate Professor: Mathematics
PhD, Johannes Kepler Universität Linz (Austria)

Mazzeo, Robert (https://experts.colorado.edu/display/fisid_101031/)
Associate Professor Emeritus: Integrative Physiology
PhD, University of California, Berkeley

McAdam, Andrew Graham (https://experts.colorado.edu/display/fisid_166624/)
Associate Professor: Ecology and Evolutionary Biology
PhD, University of Alberta (Canada)

McAuliffe, Rik
Lecturer: Electrical, Computer and Energy Engineering (ECEE)

McCabe, J Terrence
Professor: Anthropology; Professor: Institute of Behavioral Science (IBS)
PhD, SUNY at Binghamton

McCain, Christy (https://experts.colorado.edu/display/fisid_145010/)
Associate Professor: Museum and Field Studies; Associate Professor: Ecology and Evolutionary Biology
PhD, University of Kansas

McCall, Raymond Jr.
Professor Emeritus: Environmental Design

McCarthy, Kevin
Professor Emeritus: Music

McClelland, Gary H.
Professor Emeritus: Psychology and Neuroscience

McCloskey, Adam (https://experts.colorado.edu/display/fisid_163644/)
Associate Professor: Economics
MA, Boston University

McClure, Linden
Professor Adjunct: Electrical, Computer and Energy Engineering (ECEE)

McCluskey, Alyssa
Lecturer: Engineering Management Program
PhD, University of Colorado Boulder

McConkey, Edwin H.
Professor Emeritus: Molecular, Cellular & Developmental Biology (MCDB)

McConnell, Katherine (https://experts.colorado.edu/display/fisid_147567/)
Scholar in Residence: Mechanical Engineering
EdD, University of Colorado Denver

McCorkle-Geng, Audra
Assistant Teaching Professor: Speech, Language and Hearing Sciences (SLHS)
MA, University of Northern Colorado

McCormick, Steven
Professor Emeritus: Applied Mathematics

McDaniel, Kami
Teaching Assistant Professor: University Libraries
MA, University of Colorado Boulder

McDevitt, Michael Joseph (https://experts.colorado.edu/display/fisid_122949/)
Professor: Journalism
PhD, Stanford University

McDonald, Courtney (https://experts.colorado.edu/display/fisid_164150/)
Associate Professor: University Libraries
MLS, University of Indiana

McDonald, Margaret M. (https://experts.colorado.edu/display/fisid_134703/)
Associate Professor: Music
DMA, University of California, Santa Barbara

McDonald, Robert (https://experts.colorado.edu/display/fisid_163978/)
Dean, Professor: University Libraries
MLIS, University of South Carolina

McGehee, Michael D. (https://experts.colorado.edu/display/fisid_163453/)
Professor: Chemical and Biological Engineering; Professor, Associate Faculty Director: Materials Science & Engineering; Professor: Physics
PhD, University of California, Santa Barbara

McGilvray, Dennis B.
Professor Emeritus: Anthropology

McGoodwin, James Russell
Professor Emeritus: Anthropology

McGranahan, Carole Ann (https://experts.colorado.edu/display/fisid_122673/)
Professor, Chair: Anthropology; Associate Professor: History
PhD, University of Michigan Ann Arbor

McGraw, Albert Peter (https://experts.colorado.edu/display/fisid_133262/)
Professor: Leeds School of Business
PhD, Ohio State University

McGuire, Vincent X.
Senior Instructor: Farrand RAP
PhD, University of Colorado Boulder

Mchenry, Charles
Professor Emeritus: Biochemistry
PhD, University of California, Santa Barbara

McIntosh, Betsy (https://experts.colorado.edu/display/fisid_160017/)
Assistant Teaching Professor: School of Education
PhD, University of Pennsylvania

McIntosh, J. Richard
Distinguished Professor Emeritus: Molecular, Cellular & Developmental Biology (MCDB)

McIntosh, Marjorie K.
Distinguished Professor Emerita: History

McIntyre, Joanne
Teaching Associate Professor: University Libraries
MLS, CUNY Queens College

McIver, John P.
Professor Emeritus: Political Science

McKee, Paul (https://experts.colorado.edu/display/fisid_154465/)
Associate Professor: Music
MM, University of Texas at Austin

McKenzie, Valerie J. (https://experts.colorado.edu/display/fisid_142951/)
Associate Professor, Associate Chair: Ecology and Evolutionary Biology
PhD, University of California, Santa Barbara

McKinney, Donald J.
Professor, Faculty Director: Music
DMA, University of Michigan Ann Arbor

McKinnish-Harllee, Terra (https://experts.colorado.edu/display/fisid_115558/)
Professor: Economics
PhD, Carnegie Mellon University

McKnight, Diane M. (https://experts.colorado.edu/display/fisid_110517/)
Professor: Institute of Arctic & Alpine Research (INSTAAR); Professor: Civil, Environmental and Architectural Engineering; Professor: Environmental Engineering Program (EVEN)
PhD, Massachusetts Institute of Technology

McLaughin, Jessica (https://experts.colorado.edu/individual/fisid_167401/)
Teaching Assistant Professor: Biomedical Engineering
PhD, Northeastern University

McLean, Polly E. (https://experts.colorado.edu/display/fisid_100614/)
Associate Professor: Media Studies
PhD, University of Texas at Austin

McLeod, Robert R. (https://experts.colorado.edu/display/fisid_107547/)
Professor: Electrical, Computer and Energy Engineering (ECEE); Endowed/Named Professor, Faculty Director: College of Engineering and Applied Science; Professor: Materials Science & Engineering; Professor: Biomedical Engineering
PhD, University of Colorado Boulder

McLure, Merinda (https://experts.colorado.edu/display/fisid_159239/)
Professor, Associate Faculty Director: University Libraries
MLIS, University of British Columbia Vancouver

McMahon, Jay W. (https://experts.colorado.edu/display/fisid_150062/)
Associate Professor: Aerospace Engineering Sciences
PhD, University of Colorado Boulder

McMahon, Kevin Christopher (https://experts.colorado.edu/display/fisid_143892/)
Senior Instructor: Leeds School of Business
MBA, Indiana University

McMurray, Allan
Professor Emeritus: Music

Mcnamara, Rich (https://experts.colorado.edu/display/fisid_167770/)
Lecturer: Applied Mathematics

McNeill, Nathan John (https://experts.colorado.edu/display/fisid_151518/)
Associate Teaching Professor: Mechanical Engineering; Faculty Director: College of Engineering and Applied Science
PhD, Purdue University

McNown, Robert F.
Professor Emeritus: Leeds School of Business; Professor Emeritus: Economics

McQueen, Matthew B. (https://experts.colorado.edu/display/fisid_143785/)
Professor Adjoint: Integrative Physiology
DSc, Harvard University

Medeiros, Daniel Meulemans (https://experts.colorado.edu/display/fisid_145697/)
Associate Professor: Ecology and Evolutionary Biology
PhD, California Institute of Technology

Medlin, James William (https://experts.colorado.edu/display/fisid_122699/)
Professor: Chemical and Biological Engineering; Endowed/Named Professor: College of Engineering and Applied Science; Professor: Materials Science & Engineering
PhD, University of Delaware

Mehta, Samira (https://experts.colorado.edu/display/fisid_165972/)
Assistant Professor, Director, Associate Professor: Women and Gender Studies; Associate Faculty Director: Jewish Studies
PhD, Emory University; MDiv, Harvard University

Meiss, James D. (https://experts.colorado.edu/display/fisid_103702/)
Professor: Applied Mathematics
PhD, University of California, Berkeley

Melbourne, Brett Andrew (https://experts.colorado.edu/display/fisid_144966/)
Associate Professor: Ecology and Evolutionary Biology
PhD, Australian National University

Melicher, Ronald W. (https://experts.colorado.edu/individual/deptid_10255/)
Professor Emeritus: Leeds School of Business: Leeds School of Business

Mendelson, Jay
Lecturer: Electrical, Computer and Energy Engineering (ECEE)

Mendoza Gutierrez, Natalie (https://experts.colorado.edu/display/fisid_159677/)
Assistant Professor: History
PhD, University of California, Berkeley

Meneghini-Stalker, Tamara L. (https://experts.colorado.edu/display/fisid_146090/)
Associate Professor: Theatre and Dance; Associate Professor: Music
MFA, Northern Illinois University

Menken, Jane A. (https://experts.colorado.edu/display/fisid_112411/)
Research Professor: Institute of Behavioral Science (IBS); Distinguished Professor: Sociology
PhD, Princeton University

Menn, Lise
Professor Emerita: Linguistics

Merrell, Jeffery C. (https://experts.colorado.edu/individual/fisid_156158/)
Senior Instructor: Leeds School of Business
PhD, University of Colorado Boulder

Merritt, Adrienne (https://experts.colorado.edu/display/fisid_168762/)
Assistant Professor: Germanic and Slavic Languages and Literatures
PhD, University of California, Berkeley

Mertens, William G. (https://experts.colorado.edu/display/fisid_105762/)
Senior Instructor: Economics; Lecturer: Continuing Education & Professional Studies; Instructor: CU at DC Internship
PhD, University of Colorado Boulder

Meyer, Elizabeth Jackson (https://experts.colorado.edu/display/fisid_156354/)
Professor: School of Education
PhD, McGill University (Canada)

Meyer, Francois Georges (https://experts.colorado.edu/individual/fisid_115559/)
Professor: Applied Mathematics
PhD, INRIA (France)

Meyer, G. Dale
Professor Emeritus: Leeds School of Business

Meyers-Denman, Christina Nicole (https://experts.colorado.edu/display/fisid_155857/)
Assistant Professor: Speech, Language and Hearing Sciences (SLHS)
PhD, University of Arizona

Michaelis-Cummings, Laura A. (https://experts.colorado.edu/display/fisid_105599/)
Professor, Professor: Classics; Chair: Linguistics
PhD, University of California, Berkeley

Michelsen, Hope (https://experts.colorado.edu/individual/fisid_165261/)
Associate Professor: Mechanical Engineering
PhD, Stanford University

Mihran, Richard
Professor Adjunct: Electrical, Computer and Energy Engineering (ECEE)

Mileti, Dennis S.
Professor Emeritus: Sociology

Milford, Jana B. (https://experts.colorado.edu/display/fisid_103268/)
Professor Emerita: Mechanical Engineering; Professor: Environmental Engineering Program (EVEN); Associate Faculty Director: College of Engineering and Applied Science

Milic, Ivan
Visiting Professor, Scholar in Residence: Laboratory for Atmospheric and Space Physics (LASP)
PhD, University of Belgrade (Yugoslavia)

Miller, Dale Lee (https://experts.colorado.edu/display/fisid_115748/)
Senior Instructor: Environmental Studies Program
MA, University of Colorado Denver

Miller, Gifford Hubbs
Professor, Faculty Director: International Education; Faculty Director: Institute of Arctic & Alpine Research (INSTAAR)
PhD, University of Colorado Boulder

Miller, Kay
Professor Emerita: Art and Art History

Miller, Olivia Chadha
Instructor: Honors RAP
PhD, SUNY at Binghamton

Miller, Shelly L. (https://experts.colorado.edu/display/fisid_110394/)
Professor: Mechanical Engineering; Professor: Environmental Engineering Program (EVEN)
PhD, University of California, Berkeley

Miller, Stanley
Professor Emeritus: Physics
PhD, University of California, Berkeley

Miller, Steve (https://experts.colorado.edu/display/fisid_166148/)
Assistant Professor: Environmental Studies Program
PhD, University of California, Santa Barbara

Min, Young Kyung (https://experts.colorado.edu/display/fisid_156466/)
Assistant Teaching Professor: Program for Writing and Rhetoric
PhD, University of Illinois at Urbana–Champaign

Minor, Vernon H.
Professor Emeritus: Art and Art History

Minton, Timothy K. (https://experts.colorado.edu/display/fisid_167230/)
Professor: Aerospace Engineering Sciences; Professor: Chemistry
PhD, University of California Berkeley

Miranda, Martina L. (https://experts.colorado.edu/display/fisid_140091/)
Associate Professor: Music Education; Associate Professor: Music
DMA, Arizona State University; PhD, Arizona State University

Mishev, Ilia Dimitrov
Instructor: Honors Program

Mishra, Shivakant (https://experts.colorado.edu/display/fisid_118376/)
Professor: Computer Science; Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, University of Arizona

Misri, Deepti (https://experts.colorado.edu/display/fisid_146428/)
Associate Professor: Women and Gender Studies
PhD, University of Illinois at Urbana–Champaign

Mitchell, Colin
Lecturer: Applied Mathematics

Mitchell, Dianne (https://experts.colorado.edu/display/fisid_165827/)
Assistant Professor: English
PhD, University of Pennsylvania

Mitrano, Peter P. (https://experts.colorado.edu/display/fisid_155075/)
Assistant Teaching Professor: Mechanical Engineering
PhD, University of Colorado, Boulder

Mitton, Jeffry B. (https://experts.colorado.edu/display/fisid_101058/)
Professor: Ecology and Evolutionary Biology
PhD, SUNY at Stony Brook

Miyake, Akira (https://experts.colorado.edu/display/fisid_107321/)
Professor: Psychology and Neuroscience
PhD, Carnegie Mellon University

Mizzi, Arthur
Assistant Research Professor: Mechanical Engineering
PhD, University of Colorado Boulder

Moddel, Garret (https://experts.colorado.edu/display/fisid_105440/)
Professor: Electrical, Computer and Energy Engineering (ECEE); Professor: Materials Science & Engineering
PhD, Harvard University

Mody, Bella
Professor Emeritus: Media Studies
PhD, Gujarat University, India; PhD, Gujarat University, India

Moeller, Paul D. (https://experts.colorado.edu/display/fisid_122618/)
Associate Professor, Faculty Director: University Libraries
MA, University of Iowa

Mohabir, Rajiv (https://experts.colorado.edu/display/fisid_173865/)
Assistant Professor: English
PhD, University of Hawai'i Manoa

Mohan, Taneesha
Teaching Assistant Professor: Geography
Ph.D., London School of Economics and Political Science

Mohr, Pete J. (https://experts.colorado.edu/display/fisid_155498/)
Senior Instructor: Leeds School of Business
MS, Colorado State University

Molas, Susanna
Assistant Professor: Psychology and Neuroscience
PhD, Pompeu Fabra University

Molenaar, Keith Robert (https://experts.colorado.edu/display/fisid_102373/)
Professor, Dean: Civil, Environmental and Architectural Engineering; Dean: College of Engineering and Applied Science
PhD, University of Colorado Boulder

Molnar, Alex John (https://experts.colorado.edu/display/fisid_148836/)
Research Professor: School of Education
MSW, University of Wisconsin-Milwaukee

Molnar, Peter Hale
Distinguished Professor: Cooperative Institute for Research in Environmental Sciences (CIRES)
PhD, Columbia University

Molotch, Noah Paul (https://experts.colorado.edu/display/fisid_139374/)
Associate Professor, Associate Professor: Geography; Faculty Director: Institute of Arctic & Alpine Research (INSTAAR); Faculty Director: The Center for Water, Earth Science, and Technology
PhD, University of Arizona

Monk, James Donald
Professor Emeritus: Mathematics

Monson, Russell K.
Professor Emeritus: Ecology and Evolutionary Biology

Montealegre, Jose Ramiro (https://experts.colorado.edu/display/fisid_100072/)
Professor: Leeds School of Business
DBA, Harvard University

Monteleoni, Claire Elizabeth (https://experts.colorado.edu/display/fisid_163979/)
Associate Professor: Computer Science
PhD, Massachusetts Institute of Technology

Montiegel, Kristella (https://experts.colorado.edu/display/fisid_172738/)
Assistant Professor: Communication
PhD, University of California, Los Angeles

Montoya, Celeste (https://experts.colorado.edu/display/fisid_144862/)
Associate Professor: Women and Gender Studies; Faculty Director: Miramontes Arts & Sciences Program (MASP)
PhD, Washington University

Montoya Castillo, Andres (https://experts.colorado.edu/display/fisid_167156/)
Assistant Professor: Chemistry
PhD, Columbia University In the City of New York

Moon, Katie Seoyeon (https://experts.colorado.edu/display/fisid_157680/)
Assistant Professor: Leeds School of Business
PhD, University of Maryland

Moore, A. Nathan (https://experts.colorado.edu/display/fisid_171850/)
Assistant Professor: Women and Gender Studies
Ph.D., University of Texas at Austin

Moore, Russell (https://experts.colorado.edu/display/fisid_105756/)
Professor: Integrative Physiology
PhD, Washington State University

Moorer, Daniel F. Jr. (https://experts.colorado.edu/display/fisid_151590/)
Scholar in Residence: Engineering Management Program; Endowed/Named Professor: College of Engineering and Applied Science
PhD, University of Colorado Boulder

Morehouse, Jordan (https://experts.colorado.edu/display/fisid_173434/)
Assistant Professor: Advertising, Public Relations and Media Design
PhD, University of North Carolina Chapel Hill

Morey, Edward R.
Professor Emeritus: Economics

Morgan, Walt
Commander, Associate Professor: Army ROTC
MA, Naval War College

Moriarty, Julia (https://experts.colorado.edu/display/fisid_165830/)
Assistant Professor: Atmospheric and Oceanic Sciences (ATOC); Assistant Professor: Institute of Arctic & Alpine Research (INSTAAR)
PhD, William & Mary/Virginia Institute of Marine Science

Moriarty, Sandra E.
Professor Emerita: Advertising, Public Relations and Media Design

Moritz, Marguerite J.
Professor Emerita: Journalism

Morley, Susan (https://experts.colorado.edu/display/fisid_116716/)
Senior Instructor: Leeds School of Business
JD, University of Colorado Boulder

Morris, Matthew R. (https://experts.colorado.edu/display/fisid_150037/)
Teaching Professor: Civil, Environmental and Architectural Engineering; Endowed/Named Professor: College of Engineering and Applied Science
MS, University of Colorado Boulder

Morrison, Rebecca E. (https://experts.colorado.edu/display/fisid_159999/)
Assistant Professor: Computer Science
PhD, University of Texas Austin

Mortimer, Mildred
Professor Emeritus: French & Italian

Morton, Yu Jade (https://experts.colorado.edu/display/fisid_159076/)
Professor, Endowed/Named Professor: Aerospace Engineering Sciences
PhD, The Pennsylvania State University

Moses, Michele S. (https://experts.colorado.edu/display/fisid_141025/)
Professor, Vice Provost: School of Education
PhD, University of Colorado Boulder

Moss, Scott A. (https://experts.colorado.edu/display/fisid_144741/)
Professor: School of Law
JD, Harvard University

Moteki, Mutsumi (https://experts.colorado.edu/display/fisid_100992/)
Professor: Music
DMA, University of Michigan Ann Arbor

Motte, Warren F. Jr. (https://experts.colorado.edu/display/fisid_100001/)
Distinguished Professor: French & Italian
PhD, University of Pennsylvania

Mountin, Zachary (https://experts.colorado.edu/display/fisid_165640/)
Clinical Associate Professor, Instructor Adjunct: School of Law
JD, University of Colorado Boulder

Moyen, Nathalie (https://experts.colorado.edu/display/fisid_113873/)
Professor, Chair: Leeds School of Business
PhD, University of British Columbia (Canada)

Mozer, Michael C. (https://experts.colorado.edu/display/fisid_105922/)
Professor: Institute of Cognitive Science (ICS); Research Professor: Computer Science
PhD, University of California, San Diego

Mueller, Christopher B. (https://experts.colorado.edu/display/fisid_103756/)
Professor: School of Law
JD, University of California, Berkeley

Mueller, Erick Michael (https://experts.colorado.edu/display/fisid_140940/)
Senior Instructor, Faculty Director: International Education; Faculty Director: Leeds School of Business
MBA, University of Colorado Boulder

Mueller, Karl Jules (https://experts.colorado.edu/display/fisid_107629/)
Professor: Geological Sciences
PhD, University of Wyoming

Mukherjee, Debanjan (https://experts.colorado.edu/individual/fisid_164181/)
Assistant Professor: Biomedical Engineering; Assistant Professor: Mechanical Engineering
PhD, University of California, Berkeley

Mukherjee, Mithi (https://experts.colorado.edu/display/fisid_123112/)
Associate Professor: History
PhD, University of Chicago

Muller, Brian H.F. (https://experts.colorado.edu/display/fisid_140230/)
Professor Emeritus: Environmental Design
PhD, University of California-Berkeley

Muller-Sievers, Helmut Heinz (https://experts.colorado.edu/display/fisid_147511/)
Professor: Germanic and Slavic Languages and Literatures; Faculty Director: Center for Humanities and the Arts; Professor: Classics
PhD, Stanford University

Munsat, Tobin Leo (https://experts.colorado.edu/display/fisid_134251/)
Professor, Faculty Director: Center for Integrated Plasma Studies (CIPS); Chair: Physics
PhD, Princeton University

Murnane, Margaret (https://experts.colorado.edu/display/fisid_115333/)
Distinguished Professor: Research & Innovation Office; Distinguished Professor: Physics; Distinguished Professor: Materials Science & Engineering; Distinguished Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, University of California, Berkeley

Murphy, Kieran Marcellin (https://experts.colorado.edu/display/fisid_152976/)
Associate Professor: French & Italian; Associate Professor: Humanities
PhD, University of California, Santa Barbara

Murray, Seth (https://experts.colorado.edu/display/fisid_148038/)
Teaching Assistant Professor: Engineering Management Program
ME, University of Colorado Boulder

Murray, Todd W. (https://experts.colorado.edu/display/fisid_146549/)
Professor, Faculty Director: College of Engineering and Applied Science; Professor: Materials Science & Engineering; Professor: Biomedical Engineering; Associate Chair: Mechanical Engineering
PhD, Johns Hopkins University

Musgrave, Charles Bruce (https://experts.colorado.edu/display/fisid_144977/)
Professor: Materials Science & Engineering; Endowed/Named Professor, Associate Dean: College of Engineering and Applied Science
PhD, California Institute of Technology

Musselman, N. Keith (https://experts.colorado.edu/display/fisid_151215/)
Assistant Professor: Geography
Ph.D, University of California- Los Angeles

Mycielski, Jan
Professor Emeritus: Mathematics

Myer, Tom R. (https://experts.colorado.edu/display/fisid_100922/)
Associate Professor: Music
MM, East Texas State University

Myers, Chris (https://experts.colorado.edu/display/fisid_167168/)
Professor: Biomedical Engineering
PhD, Stanford University

Myers, Seth G. (https://experts.colorado.edu/display/fisid_153207/)
Associate Teaching Professor: Program for Writing and Rhetoric
PhD, New Mexico State University

Myers, Skinner (https://experts.colorado.edu/display/fisid_168622/)
Assistant Professor: Cinema Studies & Moving Image Arts
M.A., Brooklyn College, City University of New York

# N

Nabity, James A. (https://experts.colorado.edu/display/fisid_153102/)
Associate Professor, Associate Chair: Aerospace Engineering Sciences
PhD, University of Colorado Boulder

Nagel, Robert (https://experts.colorado.edu/display/fisid_101312/)
Professor: School of Law
JD, Yale University

Nagle, James L. (https://experts.colorado.edu/display/fisid_126784/)
Professor: Physics
PhD, Yale University

Naidu, Supriya (https://experts.colorado.edu/display/fisid_166267/)
Assistant Teaching Professor: Computer Science
MS, University of Colorado Boulder

Nair, Devatha P.
Assistant Professor: Materials Science & Engineering
PhD, University of Colorado Boulder

Nakassis, Dimitri (https://experts.colorado.edu/display/fisid_154917/)
Distinguished Professor: Classics
PhD, University of Texas at Austin

Nam, SaeWoo
Lecturer: Physics
PhD, Stanford University

Nandkishore, Rahul Mahajan (https://experts.colorado.edu/display/fisid_156417/)
Associate Professor: Physics
PhD, Massachusetts Institute of Technology

Narasimhan, Bhuvaneswari (https://experts.colorado.edu/display/fisid_144863/)
Associate Professor: Linguistics
PhD, Boston University

Nath Sreesha (https://experts.colorado.edu/display/fisid_165807/)
Associate Chair, Assistant Teaching Professor: Computer Science
MS, University of Colorado Boulder

Nauman, Robert (https://experts.colorado.edu/display/fisid_106835/)
Senior Instructor: Art and Art History
PhD, University of New Mexico

Neff, Jason C. (https://experts.colorado.edu/display/fisid_117652/)
Professor: Environmental Studies Program; Faculty Director: Research & Innovation Office
PhD, Stanford University

Neil, Ethan (https://experts.colorado.edu/display/fisid_153411/)
Associate Professor: Physics
PhD, Yale University

Neil, Josh (https://experts.colorado.edu/display/fisid_152068/)
Senior Instructor, Faculty Director: Leeds School of Business
MS, Oklahoma State University

Nelson, Erica Lynn (https://experts.colorado.edu/display/fisid_166298/)
Assistant Professor: Astrophysical and Planetary Sciences (APS)
PhD, Yale University

Nelson, James E.
Professor Emeritus: Leeds School of Business

Nelson, Thomas Cavett (https://experts.colorado.edu/display/fisid_116011/)
Senior Instructor Emeritus: Leeds School of Business
PhD, University of Colorado Boulder

Neogi, Sanghamitra (https://experts.colorado.edu/display/fisid_156773/)
Associate Professor: Aerospace Engineering Sciences; Assistant Professor: Materials Science & Engineering
PhD, Pennsylvania State University

Nerem, R. Steven (https://experts.colorado.edu/display/fisid_118478/)
Professor, Director: Colorado Center for Astrodynamics Research (CCAR); Faculty Director: College of Engineering and Applied Science; Director: Aerospace Engineering Sciences
PhD, University of Texas at Austin

Nesbitt, David J. (https://experts.colorado.edu/display/fisid_100333/)
Professor Adjoint: Chemistry; Professor Adjoint: Physics
PhD, University of Colorado

Neu, Corey P. (https://experts.colorado.edu/display/fisid_156210/)
Endowed/Named Professor: College of Engineering and Applied Science; Professor: Mechanical Engineering; Associate Professor: Biomedical Engineering
PhD, University of California, Davis

Neupauer, Roseanna M. (https://experts.colorado.edu/display/fisid_134747/)
Professor: Civil, Environmental and Architectural Engineering; Professor: Environmental Engineering Program (EVEN)
PhD, New Mexico Institute of Mining and Technology

Nevelow Mart, Susan
Professor Emerita: School of Law
MLS, San Jose State University

Newberry, Patrick Thaxton (https://experts.colorado.edu/display/fisid_151925/)
Instructor: Baker RAP
MA, University of Colorado Boulder

Newbury, Nathan
Lecturer: Physics
PhD, Princeton University

Newlands, Carole E. (https://experts.colorado.edu/display/fisid_147504/)
Distinguished Professor: Classics
PhD, University of California, Berkeley

Newsom, Elia (https://experts.colorado.edu/display/fisid_172312/)
Assistant Teaching Professor: Program for Writing and Rhetoric
PhD, Wayne State University

Newton, Peter (https://experts.colorado.edu/display/fisid_154466/)
Assistant Professor: Environmental Studies Program
PhD, University of East Anglia (England)

Ngo Nyeck, Sybille
Assistant Professor: History
PhD, University of California, Los Angelos

Nguyen, Alexandra (https://experts.colorado.edu/display/fisid_145847/)
Associate Professor: Music
DMA, University of Rochester

Nichols, Harvey
Professor Emeritus: Ecology and Evolutionary Biology

Nichols, Lynn (https://experts.colorado.edu/display/fisid_103654/)
Senior Instructor Emeritus: Theatre and Dance
PhD, University of Colorado Boulder

Nicotra, Marco M. (https://experts.colorado.edu/display/fisid_164182/)
Assistant Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, Universite Libre de Bruxelles

Niederwieser, Tobias (https://experts.colorado.edu/display/fisid_164789/)
Assistant Research Professor: Aerospace Engineering Sciences
PhD, University of Colorado Boulder

Nielsen Katherine (https://experts.colorado.edu/display/fisid_172532/)
Assistant Teaching Professor: Computer Science
PhD, University of California, Los Angeles

Nigai, Sergey K. (https://experts.colorado.edu/display/fisid_159293/)
Assistant Professor: Economics
PhD, ETH Zurich

Nims, Abigail Andrews (https://experts.colorado.edu/display/fisid_152977/)
Associate Professor: Music
MM, Westminster Choir College

Niswander, Lee (https://experts.colorado.edu/display/fisid_160024/)
Chair, Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, Case Western Reserve University

Nixon, Sean (https://experts.colorado.edu/display/fisid_167600/)
Instructor: Applied Mathematics

Noble D., Richard
Research Professor: Chemistry
PhD, University of California--Davis

Nogueron-Liu, Silvia (https://experts.colorado.edu/display/fisid_155783/)
Associate Professor: School of Education
PhD, Arizona State University

Norcross, Alastair (https://experts.colorado.edu/display/fisid_144850/)
Professor: Philosophy; Faculty Director, Professor: Farrand RAP
PhD, Syracuse University

Nordvig, Mathias (https://experts.colorado.edu/individual/fisid_156587/)
Associate Teaching Professor: Germanic and Slavic Languages and Literatures
PhD, University of Aarhus (Denmark)

Norgaard, Rolf P. (https://experts.colorado.edu/display/fisid_102502/)
Teaching Professor of Distinction Emeritus, Associate Faculty Director: Program for Writing and Rhetoric
PhD, Stanford University

Norris, David O.
Professor Emeritus: Integrative Physiology

Norris, Jan Adam (https://experts.colorado.edu/display/fisid_101412/)
Teaching Professor: Applied Mathematics; Instructor Adjunct: Mechanical Engineering
PhD, University of Colorado Boulder

Norton, Helen Louise (https://experts.colorado.edu/display/fisid_144613/)
Professor: School of Law
JD, University of California, Berkeley

Nottoli, David (https://experts.colorado.edu/display/fisid_164356/)
Assistant Teaching Professor: Advertising, Public Relations and Media Design
MBA, University of Illinois at Urbana-Champaign

Novosel, Elizabeth (https://experts.colorado.edu/display/fisid_143082/)
Assistant Professor: University Libraries
MLS, University of Wisconsin–Milwaukee

Nowak, Kristen
Associate Professor Adjoint: Integrative Physiology

Nozik, Arthur (https://experts.colorado.edu/display/fisid_113395/)
Professor Emeritus: Chemistry
PhD, Yale University

Nugent, Teresa L. (https://experts.colorado.edu/display/fisid_101477/)
Associate Teaching Professor: English; Senior Instructor: Continuing Education & Professional Studies
PhD, University of Colorado Boulder

Nunziato, Joshua (https://experts.colorado.edu/display/fisid_164373/)
Instructor: Leeds School of Business
PhD, Villanova University

Nuttelman, Charles Raymond (https://experts.colorado.edu/display/fisid_142758/)
Teaching Professor: Chemical and Biological Engineering; Faculty Director: College of Engineering and Applied Science
PhD, University of Colorado Boulder

Nyeck, S.N. (https://experts.colorado.edu/display/fisid_169704/)
Associate Professor: Ethnic Studies
Ph.D., University of California-Los Angeles

Nytch, Jeffrey C. (https://experts.colorado.edu/display/fisid_147341/)
Associate Professor, Faculty Director: Music
DMA, Rice University

Nzinga, Kalonji (https://experts.colorado.edu/display/fisid_165958/)
Assistant Professor: School of Education
PhD, Northwestern University

# O

O'Brien, Jonathan (https://experts.colorado.edu/display/fisid_152072/)
Assistant Teaching Professor: Anthropology
PhD, University of Colorado Boulder

O'Harra, Katie
Teaching Assistant Professor: Chemical and Biological Engineering
PhD, University of Alabama

O'Loughlin, John (https://experts.colorado.edu/display/fisid_101339/)
Professor: Geography; Professor: Institute of Behavioral Science (IBS)
PhD, Pennsylvania State University

O'Neal, Shawn Trenell (https://experts.colorado.edu/display/fisid_165586/)
Teaching Assistant Professor: Ethnic Studies
M.A., University of Colorado Denver

O'Rourke, Sean Daniel (https://experts.colorado.edu/display/fisid_154418/)
Associate Professor: Mathematics
PhD, University of California, Davis

Oakes, Tim (https://experts.colorado.edu/display/fisid_109269/)
Faculty Director: International Education; Professor: Geography; Professor: Media Studies; Professor: Critical Media Practices
PhD, University of Washington

Ochieng, Omedi (https://experts.colorado.edu/display/fisid_170851/)
Associate Professor: Communication
PhD, Bowling Green State University

Oddie, Graham (https://experts.colorado.edu/display/fisid_104741/)
Professor: Humanities
PhD, University of London (England)

Odorizzi, Charles Gregory (https://experts.colorado.edu/display/fisid_118429/)
Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, University of California, San Diego

Oest, Donald G. (https://experts.colorado.edu/display/fisid_146623/)
Senior Instructor: Leeds School of Business
MBA, Fairleigh Dickinson University

Okigbo, Austin Chinagorom (https://experts.colorado.edu/display/fisid_151507/)
Associate Professor: Music
PhD, Indiana University Bloomington

Old, William (https://experts.colorado.edu/display/fisid_103039/)
Assistant Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, University of Colorado Boulder

Oliveras, Diana (https://experts.colorado.edu/display/fisid_107967/)
Instructor, Instructor: Health Professions RAP; Associate Faculty Director: Baker RAP
PhD, University of New Mexico

Olm, Matthew R. (https://experts.colorado.edu/display/fisid_174400/)
Assistant Professor: Integrative Physiology
PhD, University of California, Berkeley

Olson, Richard
Professor Emeritus: Psychology and Neuroscience

Olwin, Bradley Bruce (https://experts.colorado.edu/display/fisid_109888/)
Professor, Associate Chair: Molecular, Cellular & Developmental Biology (MCDB)
PhD, University of Washington

Onyejekwe, Osita Eluemuno (https://experts.colorado.edu/display/fisid_164235/)
Assistant Teaching Professor: Computer Science
PhD, Florida Institute of Technology

Opp, Mark R. (https://experts.colorado.edu/display/fisid_158898/)
Professor: Integrative Physiology
PhD, Washington State University

Ordaz, Jessica (https://experts.colorado.edu/display/fisid_159142/)
Assistant Professor: Ethnic Studies; Assistant Professor: History
PhD, University of California, Davis

Orian Peer, Nadav (https://experts.colorado.edu/display/fisid_165323/)
Associate Professor: School of Law
SJD, Harvard University

Orosz Hunziker, Flor (https://experts.colorado.edu/display/fisid_167648/)
Assistant Professor: Mathematics
PhD, Yale University

Ortega Guzmán, Élika (https://experts.colorado.edu/display/fisid_165171/)
Assistant Professor: Spanish and Portuguese
PhD, University of Western Ontario

Orth, James D. (https://experts.colorado.edu/display/fisid_152017/)
Assistant Research Professor, Instructor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, Mayo Graduate School of Medicine

Ortman, Scott Graham (https://experts.colorado.edu/display/fisid_152978/)
Associate Professor: Anthropology; Faculty Director: Institute of Behavioral Science (IBS)
PhD, Arizona State University

Osborn, Christopher (https://experts.colorado.edu/display/fisid_142982/)
Teaching Associate Professor: Cinema Studies & Moving Image Arts
MFA, University of Colorado Boulder

Osborne, Myles Gregory (https://experts.colorado.edu/display/fisid_145809/)
Associate Professor: History
PhD, Harvard University

Oscamou, Maribeth B. (https://experts.colorado.edu/display/fisid_159794/)
Associate Teaching Professor: Computer Science
MS, University of Colorado Boulder

Osipova, Anastasiya (https://experts.colorado.edu/individual/fisid_167066/)
Assistant Professor: Germanic and Slavic Languages and Literatures
PhD, New York University

Osnes, Mary Beth (https://experts.colorado.edu/display/fisid_102607/)
Professor: Theatre and Dance; Faculty Director: A&S ASSETT
PhD, University of Colorado Boulder

Osterman, Laura Olson (https://experts.colorado.edu/display/fisid_109800/)
Professor, Associate Chair: Germanic and Slavic Languages and Literatures
PhD, Yale University

Otero, Valerie K. (https://experts.colorado.edu/display/fisid_118377/)
Professor, Faculty Director: School of Education
PhD, University of California, San Diego

Overeem, Irina (https://experts.colorado.edu/display/fisid_125258/)
Associate Professor: Geological Sciences; Associate Professor: Institute of Arctic & Alpine Research (INSTAAR)
PhD, Delft University of Technology (Netherlands)

# P

Pace, Norman R.
Distinguished Professor Emeritus: Molecular, Cellular & Developmental Biology (MCDB)

Pacheco, Carmen Consuelo (https://experts.colorado.edu/display/fisid_148773/)
Scholar in Residence: Mechanical Engineering
MS, University of Arizona

Pacheco, Maria
Assistant Professor: Computer Science
PhD, Purdue University

Padgett, Adam
Assistant Teaching Professor: Program for Writing and Rhetoric
PhD, University of South Carolina

Pak, Ronald Y.S. (https://experts.colorado.edu/display/fisid_105977/)
Professor: Civil, Environmental and Architectural Engineering
PhD, California Institute of Technology

Palen, Leysia A. (https://experts.colorado.edu/display/fisid_114604/)
Distinguished Professor, Associate Chair: Computer Science; Faculty Director: College of Engineering and Applied Science; Professor: Information Science
PhD, University of California, Irvine

Palermo, Scott
Major, Assistant Professor: Army ROTC
MS, Webster University

Palmer, Alexandra
Assistant Teaching Professor: Political Science
PhD, University of Colorado Boulder

Palmer, Amy E. (https://experts.colorado.edu/display/fisid_141901/)
Professor: Biochemistry
PhD, Stanford University

Palmer, Deborah (https://experts.colorado.edu/display/fisid_157996/)
Professor: School of Education
PhD, University of California, Berkeley

Palmer, James
Professor Emeritus: Cinema Studies & Moving Image Arts
PhD, Claremont Graduate School

Palmer, Martha
Professor: Linguistics; Research Professor: Computer Science; Endowed/Named Professor: College of Engineering and Applied Science
PhD, University of Edinburgh (Scotland)

Palmer, Michael
Professor Emeritus: Leeds School of Business

Palo, Scott E. (https://experts.colorado.edu/display/fisid_109033/)
Professor, Professor: Colorado Center for Astrodynamics Research (CCAR); Endowed/Named Professor: College of Engineering and Applied Science; Professor: Electrical, Computer and Energy Engineering (ECEE); Endowed/Named Professor: Aerospace Engineering Sciences
PhD, University of Colorado Boulder

Pampel, Fred
Professor Emeritus: Sociology

Pang, Cecilia J. (https://experts.colorado.edu/display/fisid_129479/)
Professor: Theatre and Dance; Faculty Director, Associate Professor: Libby Arts RAP
PhD, University of California, Berkeley

Pann, Carter N. (https://experts.colorado.edu/display/fisid_141461/)
Professor: Music
DMA, University of Michigan Ann Arbor

Pao, Lucy Y. (https://experts.colorado.edu/display/fisid_107151/)
Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, Stanford University

Papp, Scott
Lecturer: Physics
PhD, University of Colorado Boulder

Pappas, Michael (https://experts.colorado.edu/display/fisid_171742/)
Professor: School of Law
JD, Stanford University

Papuzza, Antonio (https://experts.colorado.edu/display/fisid_145295/)
Senior Instructor: Leeds School of Business; Faculty Director: International Education; Lecturer: Continuing Education & Professional Studies
PhD, University of Florence (Italy)

Paradis, David (https://experts.colorado.edu/display/fisid_126959/)
Teaching Professor of Distinction, Lecturer, Associate Teaching Professor: Continuing Education & Professional Studies; Associate Teaching Professor: History
PhD, Emory University

Paradise, Alan (https://experts.colorado.edu/display/fisid_158849/)
Associate Teaching Professor: Computer Science
MS, Washington University in St. Louis

Pardi, Arthur
Professor Emeritus: Biochemistry
PhD, University of California, Berkeley

Parinandi, Srinivas C. (https://experts.colorado.edu/display/fisid_155589/)
Assistant Professor: Political Science
PhD, University of Michigan Ann Arbor

Park, Bernadette (https://experts.colorado.edu/display/fisid_103732/)
Professor Emeritus: Psychology and Neuroscience
PhD, Northwestern University

Park, Clara (https://experts.colorado.edu/display/fisid_163545/)
Assistant Professor: Political Science
PhD, University of California, Berkeley

Park, Kwang-Chun
Professor Emeritus: Aerospace Engineering Sciences
PhD, Clarkson College

Park, Soyeon (https://experts.colorado.edu/display/fisid_151944/)
Assistant Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, Mayo Graduate School of Medicine

Park, Won (https://experts.colorado.edu/display/fisid_122676/)
Professor, Associate Chair: Electrical, Computer and Energy Engineering (ECEE); Professor: Materials Science & Engineering; Associate Professor, Associate Chair: Biomedical Engineering
PhD, Georgia Institute of Technology

Packer, Richard C. (https://experts.colorado.edu/display/fisid_166139/)
Lecturer: Leeds School of Business

Parker, Roy Robert (https://experts.colorado.edu/display/fisid_151440/)
Distinguished Professor: Molecular, Cellular & Developmental Biology (MCDB); Distinguished Professor: Biochemistry
PhD, University of California, San Francisco

Parker, Scott E. (https://experts.colorado.edu/display/fisid_109685/)
Professor: Physics
PhD, University of California, Berkeley

Parkin, Don
Professor Emeritus: Leeds School of Business

Parson, Rahul Bjorn (https://experts.colorado.edu/display/fisid_156069/)
Professor Emeritus, Associate Chair: Chemistry
PhD, University of California, Berkeley

Parson, Robert (https://experts.colorado.edu/display/fisid_101032/)
Professor Emeritus, Associate Chair: Chemistry
PhD, University of Michigan Ann Arbor

Parsons, Amanda (https://experts.colorado.edu/display/fisid_169702/)
Assistant Professor: School of Law
JD, Yale University

Pasnau, Robert (https://experts.colorado.edu/display/fisid_115293/)
Professor: Philosophy; Faculty Director, Professor: Classics; Professor: Center for Western Civilization
PhD, Cornell University

Pasquesi, Kira (https://experts.colorado.edu/display/fisid_158236/)
Associate Teaching Professor: School of Education
PhD, University of Iowa

Patterson, Laura R. (https://experts.colorado.edu/display/fisid_146606/)
Instructor: Sociology
PhD, University of Colorado Boulder

Pearce, Chris (https://experts.colorado.edu/display/fisid_139688/)
Lecturer: Cinema Studies & Moving Image Arts
MFA, University of Florida

Pearce, Lonni Dee (https://experts.colorado.edu/display/fisid_134710/)
Associate Teaching Professor, Associate Faculty Director: Program for Writing and Rhetoric
PhD, University of Arizona

Peattie, Matthew
Associate Professor, Chair: Humanities
PhD, Harvard University

Peck, Janice Anne (https://experts.colorado.edu/display/fisid_106765/)
Professor Emerita: Media Studies; Associate Dean: College of Media, Communication & Information
PhD, Simon Fraser University (Canada)

Pedersen, Eric (https://experts.colorado.edu/display/fisid_159278/)
Assistant Professor: Psychology and Neuroscience
PhD, University of Miami

Pedersen-Gallegos, Liane G.
Instructor: Sociology
PhD, University of Colorado Boulder

Peek, Lori (https://experts.colorado.edu/display/fisid_158492/)
Professor, Faculty Director: Institute of Behavioral Science (IBS); Professor: Sociology
PhD, University of Colorado Boulder

Peffer, Melanie (https://experts.colorado.edu/display/fisid_165841/)
Instructor: Health Professions RAP

Pegelow Kaplan, Thomas (https://experts.colorado.edu/display/fisid_172194/)
Professor, Chair: History
Ph.D., University of North Carolina Chapel Hill

Peleg, Orit (https://experts.colorado.edu/display/fisid_159998/)
Associate Professor: Computer Science; Associate Professor: Physics
PhD, ETH Zürich (Switzerland)

Pellegrino, John (https://experts.colorado.edu/display/fisid_130902/)
Research Professor: Mechanical Engineering; Research Professor: Environmental Engineering Program (EVEN); Research Professor: Materials Science & Engineering
PhD, University of Colorado Boulder

Pembleton, Gary
Commander, Executive Officer, Associate Professor: Navy ROTC

Penn, Michelle (https://experts.colorado.edu/display/fisid_171985/)
Head of Library Services: School of Law
JD, Washington University in St. Louis

Penuel, William Richard (https://experts.colorado.edu/display/fisid_149719/)
Distinguished Professor: School of Education; Distinguished Professor: Institute of Cognitive Science (ICS)
PhD, Clark University

Pereira Da Costa, Hugo
Lecturer: Physics
PhD, Service de Physique Nucleaire du CEA (France)

Perepelitsa, Dennis V. (https://experts.colorado.edu/display/fisid_158294/)
Associate Professor: Physics
PhD, Columbia University in the City of New York

Peri, Alessandro (https://experts.colorado.edu/display/fisid_157820/)
Assistant Professor: Economics
PhD, Universidad Carlos III de Madrid

Perigo, Levi (https://experts.colorado.edu/display/fisid_155562/)
Scholar in Residence: Computer Science
PhD, Nova Southeastern University

Perkins, Katherine K. (https://experts.colorado.edu/display/fisid_124217/)
Professor Attendant Rank: Physics
PhD, Harvard University

Perkins, Mike
Lecturer: Electrical, Computer and Energy Engineering (ECEE)
PhD, Stanford University

Perkins, Thomas T. (https://experts.colorado.edu/display/fisid_124578/)
Professor Adjunct: Physics; Faculty Director: JILA; Professor Adjoint: Molecular, Cellular & Developmental Biology (MCDB); Associate Professor Adjoint: Materials Science & Engineering
PhD, Stanford University

Persons, Charles Howard (https://experts.colorado.edu/display/fisid_145012/)
Associate Professor: Theatre and Dance
MFA, Columbia University

Peters, Kevin
Professor Emeritus: Chemistry
PhD, Yale University

Peters, Sean (https://experts.colorado.edu/display/fisid_174034/)
Assistant Professor: Aerospace Engineering Sciences
PhD, Stanford University

Peterson, Loni
Assistant Teaching Professor: Advertising, Public Relations and Media Design
MA, University of Denver

Peterson, Patti H.
Professor Emerita: Music

Peterson, R. Jerome
Professor Emeritus: Physics
PhD, University of Washington

Pezzullo, Phaedra Carmen (https://experts.colorado.edu/display/fisid_156204/)
Professor: Communication; Faculty Director: College of Media, Communication & Information
PhD, University of North Carolina Chapel Hill

Pfeffer, Tad (https://experts.colorado.edu/display/fisid_100207/)
Professor: Institute of Arctic & Alpine Research (INSTAAR)
PhD, University of Washington

Pflaum, Markus Josef (https://experts.colorado.edu/display/fisid_144979/)
Professor: Mathematics
Dr habil, Humboldt University of Berlin (Germany)

Philips, Andrew Q. (https://experts.colorado.edu/display/fisid_159155/)
Associate Professor: Political Science
PhD, Texas A&M University

Phillips, Caleb Timothy (https://experts.colorado.edu/individual/fisid_152384/)
Assistant Professor Adjunct: Computer Science

Phillips, George H.
Professor Emeritus: History

Pielke, Roger A. Jr. (https://experts.colorado.edu/display/fisid_104166/)
Professor: Environmental Studies Program
PhD, University of Colorado Boulder

Pieplow, Kathryn
Senior Instructor Emerita: Program for Writing and Rhetoric
JD, University of South Dakota

Pieplow, Nathan D. (https://experts.colorado.edu/display/fisid_131512/)
Associate Teaching Professor: Program for Writing and Rhetoric; Instructor: Graduate School; Associate Faculty Director: Global RAP
MEd, University of Oregon

Pierotti, Chelsea (https://experts.colorado.edu/individual/fisid_155551/)
Teaching Assistant Professor: Psychology and Neuroscience
PhD, University of Northern Colorado

Pierpont, Cortlandt G.
Professor Emeritus: Chemistry
PhD, Brown University

Piestun, Rafael (https://experts.colorado.edu/display/fisid_118538/)
Professor: Physics; Professor: Electrical, Computer and Energy Engineering (ECEE); Professor: Biomedical Engineering
PhD, Israel Instit of Tech (Israel)

Pietri, Evava
Associate Professor: Psychology and Neuroscience
PhD, Ohio State University

Piket-May, Melinda J. (https://experts.colorado.edu/display/fisid_102097/)
Associate Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, Northwestern University

Pilewskie, Peter Andrew (https://experts.colorado.edu/display/fisid_134466/)
Professor, Professor: Atmospheric and Oceanic Sciences (ATOC); Faculty Director: Laboratory for Atmospheric and Space Physics (LASP)
PhD, University of Arizona

Pinkow, David
Professor Emeritus: Music

Pinter, Anthony (https://experts.colorado.edu/display/fisid_171867/)
Assistant Teaching Professor: ATLAS Institute; Assistant Teaching Professor: Creative Technology & Design
Ph.D., University of Colorado Boulder

Pinto, Leonard J.
Professor Emeritus: Sociology

Piras, Maria Cristina
Assistant Teaching Professor: Spanish and Portuguese
M.A, University of Colorado Boulder

Pitlick, John
Professor Emeritus: Geography

Pittenger, Mark A. (https://experts.colorado.edu/display/fisid_102007/)
Professor Emeritus: History
PhD, University of Michigan Ann Arbor

Pittman Wagers, Tina (https://experts.colorado.edu/display/fisid_117148/)
Emerita Teaching Professor of Distinction: Psychology and Neuroscience
PsyD, University of Denver

Pizzi, William
Professor Emeritus: School of Law
JD, Harvard University

Plagmann, Natalia (https://experts.colorado.edu/display/fisid_168526/)
Teaching Assistant Professor: Germanic and Slavic Languages and Literatures
PhD, Princeton University

Plank, D. L.
Professor Emeritus: Germanic and Slavic Languages and Literatures

Platter, Adele
Professor Emerita: Sociology

Pleszkun, Andrew R.
Professor Emeritus: Electrical, Computer and Energy Engineering (ECEE)

Plunkett, Chuck (https://experts.colorado.edu/display/fisid_164006/)
Instructor, Faculty Director: Journalism
MFA, University of Pittsburgh

Pois, Anne Marie
Senior Instructor Emerita: Women and Gender Studies

Policastri, Joan Frances (https://experts.colorado.edu/display/fisid_153867/)
Librarian: School of Law
MLS, University of Denver

Polizzi, Jade Venus (https://experts.colorado.edu/display/fisid_140368/)
Teaching Professor: Environmental Design
MArch, University of Colorado Denver

Pollock, Steven J. (https://experts.colorado.edu/display/fisid_101392/)
Professor: Physics
PhD, Stanford University

Polman, Joseph Louis (https://experts.colorado.edu/display/fisid_151296/)
Professor, Associate Dean: School of Education
PhD, Northwestern University

Polson, Peter G.
Professor Emeritus: Psychology and Neuroscience

Pontis, Lauren
Clinical Assistant Professor: Speech, Language and Hearing Sciences (SLHS)
AuD, University of Colorado Boulder

Popovic, Zoya (https://experts.colorado.edu/display/fisid_101494/)
Distinguished Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, California Institute of Technology

Potter, Hillary A. (https://experts.colorado.edu/display/fisid_124938/)
Associate Professor: Women and Gender Studies
PhD, University of Colorado Boulder

Potter, Jason (https://experts.colorado.edu/display/fisid_103972/)
Assistant Teaching Professor: Philosophy
PhD, University of Colorado Boulder

Potter, Thomas J.
Professor Emeritus: Art and Art History

Potts, Margaret Lee
Associate Professor Emerita: Theatre and Dance

Poulson, Barry
Professor Emeritus: Economics

Pourahmadian, Fatemeh (https://experts.colorado.edu/display/fisid_158562/)
Assistant Professor: Civil, Environmental and Architectural Engineering
PhD, University of Minnesota

Poveda, Jorge
Assistant Professor: Electrical, Computer and Energy Engineering (ECEE)

Pratt, Staci (https://experts.colorado.edu/display/fisid_172342/)
Librarian: Law Library
JD, Boston College

Price, John C. (https://experts.colorado.edu/display/fisid_101129/)
Professor Emeritus: Physics
PhD, Stanford University

Prieto, Andrés Ignacio (https://experts.colorado.edu/display/fisid_143948/)
Professor: Spanish and Portuguese
PhD, University of Connecticut

Pruitt, Kris
Associate Teaching Professor: Applied Mathematics

Psychogiou, Dimitra (https://experts.colorado.edu/display/fisid_158311/)
Assistant Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, ETH Zürich (Switzerland)

Pusateri, Christopher
Teaching Associate Professor: University Libraries
MLIS, University of Washington

Pyrooz, David C. (https://experts.colorado.edu/display/fisid_155784/)
Associate Professor: Sociology; Associate Professor: Institute of Behavioral Science (IBS)
PhD, Arizona State University

# Q

Qualley, Charles A.
Professor Emeritus: Art and Art History

Quan, Tracy (https://experts.colorado.edu/display/fisid_167169/)
Assistant Professor: Spanish and Portuguese
PhD, University of California-Davis

Quandt, Catherine Alisha (https://experts.colorado.edu/display/fisid_159414/)
Assistant Professor: Ecology and Evolutionary Biology
PhD, Oregon State University

Quigley, David Philp (https://experts.colorado.edu/display/fisid_164079/)
Assistant Teaching Professor: Computer Science
PhD, University of Colorado Boulder

Quinn, Jeanne (https://experts.colorado.edu/display/fisid_111658/)
Professor, Chair: Art and Art History
MFA, University of Washington

# R

Rabaka, Reiland (https://experts.colorado.edu/display/fisid_141463/)
Professor: Ethnic Studies; Professor: Humanities; Faculty Director: Graduate School
PhD, Temple University

Radelet, Michael L. (https://experts.colorado.edu/display/fisid_121802/)
Professor: Sociology
PhD, Purdue University

Radio, Erik (https://experts.colorado.edu/display/fisid_164804/)
Associate Professor: University Libraries
MS, University of Illinois at Urbana-Champaign

Radzihovsky, Leo (https://experts.colorado.edu/display/fisid_107484/)
Professor: Physics
PhD, Harvard University

Rafi, Melvin
Assistant Teaching Professor: Aerospace Engineering Sciences
PhD, Wichita State University

Raggio, Avedan (https://experts.colorado.edu/display/fisid_154482/)
Teaching Assistant Professor: Germanic and Slavic Languages and Literatures
MA, University of Colorado Boulder

Rahman, Shaily (https://experts.colorado.edu/display/fisid_168587/)
Assistant Professor: Geological Sciences
PhD, SUNY at Stony Brook

Raj, Rishi (https://experts.colorado.edu/display/fisid_108413/)
Professor: Mechanical Engineering; Professor: Materials Science & Engineering
PhD, Harvard University

Rajabi, Samira (https://experts.colorado.edu/display/fisid_165414/)
Assistant Professor: Media Studies
PhD, University of Colorado Boulder

Ramirez, Albert
Associate Professor Emeritus: Psychology and Neuroscience

Ramirez, Karen E. (https://experts.colorado.edu/display/fisid_116951/)
Senior Instructor: Miramontes Arts & Sciences Program (MASP)
PhD, University of Illinois at Urbana–Champaign

Ramirez, Walter
Professor Emeritus: Chemical and Biological Engineering

Ramsay, Arlan
Professor Emeritus: Mathematics

Ramsberger, Gail (https://experts.colorado.edu/display/fisid_100943/)
Associate Professor: Speech, Language and Hearing Sciences (SLHS)
ScD, Boston University

Ramsey, Carolyn (https://experts.colorado.edu/display/fisid_118536/)
Professor: School of Law
JD, Stanford University

Randall, Cora Einterz (https://experts.colorado.edu/display/fisid_102010/)
Distinguished Professor Emeritus: Atmospheric and Oceanic Sciences (ATOC); Distinguished Professor Emeritus: Laboratory for Atmospheric and Space Physics (LASP)
PhD, University of California, Santa Cruz

Randall, Erika Anne (https://experts.colorado.edu/display/fisid_144755/)
Professor: Theatre and Dance
MFA, The Ohio State University

Randolph, Theodore W. (https://experts.colorado.edu/display/fisid_101768/)
Professor: Chemical and Biological Engineering; Endowed/Named Professor: College of Engineering and Applied Science
PhD, University of California, Berkeley

Ranganath, Aditya (https://experts.colorado.edu/individual/fisid_167884/)
Teaching Assistant Professor: University Libraries
PhD, University of California, San Diego

Ranjbar, A. Marie (https://experts.colorado.edu/display/fisid_165964/)
Assistant Professor: Women and Gender Studies
PhD, Pennsylvania State University

Rankin, Daniel (https://experts.colorado.edu/display/fisid_156453/)
Associate Teaching Professor, Associate Teaching Professor, Associate Director: ATLAS Institute; Associate Director: Creative Technology & Design
MS, University of Colorado Boulder

Rankin, Patricia (https://experts.colorado.edu/display/fisid_105939/)
Professor Emerita: Physics
PhD, University of London (England)

Raschke, Markus B. (https://experts.colorado.edu/display/fisid_148716/)
Professor: Physics
PhD, Technische Universität München (Germany)

Rast, Mark Peter (https://experts.colorado.edu/display/fisid_142997/)
Professor: Laboratory for Atmospheric and Space Physics (LASP); Professor: Astrophysical and Planetary Sciences (APS)
PhD, University of Colorado Boulder

Ravishankar, G. Ravi (https://experts.colorado.edu/display/fisid_144567/)
Scholar in Residence, Faculty Director: Leeds School of Business
MBA, Massachusetts Institute of Technology

Raymond, Chase Wesley (https://experts.colorado.edu/display/fisid_158278/)
Associate Professor: Linguistics
PhD, University of California, Los Angeles

Readey, Michael J. (https://experts.colorado.edu/display/fisid_157363/)
Instructor Adjunct: Engineering Management Program; Endowed/Named Professor: College of Engineering and Applied Science
PhD, Case Western Reserve University

Reamon, Derek T. (https://experts.colorado.edu/display/fisid_120538/)
Teaching Professor: Mechanical Engineering; Senior Instructor: General Engineering; Faculty Director: College of Engineering and Applied Science
PhD, Stanford University

Reardon, Kevin Patrick (https://experts.colorado.edu/display/fisid_154925/)
Professor Adjunct: Astrophysical and Planetary Sciences (APS)

Rearick, David F.
Professor Emeritus: Mathematics

Reckwerdt, Eric
Assistant Teaching Professor: Computer Science
PhD, University of Hawaii Manoa

Reed, David P. (https://experts.colorado.edu/display/fisid_152458/)
Scholar in Residence: College of Engineering and Applied Science; Scholar in Residence: Computer Science
PhD, Carnegie Mellon University

Regal, Cindy Anne (https://experts.colorado.edu/display/fisid_144184/)
Professor: Physics; Associate Faculty Director: Research & Innovation Office
PhD, University of Colorado Boulder

Reger, Jeremy J. (https://experts.colorado.edu/display/fisid_156224/)
Assistant Professor, Faculty Director: Music
DMA, University of Michigan Ann Arbor

Regoli, Robert M.
Professor Emeritus: Sociology

Regueiro, Richard A. (https://experts.colorado.edu/display/fisid_134705/)
Professor, Associate Professor: Materials Science & Engineering; Associate Professor: Biomedical Engineering; Associate Chair: Civil, Environmental and Architectural Engineering
PhD, Stanford University

Reichenbach, Matt
Assistant Teaching Professor: Applied Mathematics
PhD, University of Nebraska Lincoln

Reid, Blake E. (https://experts.colorado.edu/display/fisid_152860/)
Associate Professor: School of Law
JD, University of Colorado Boulder

Reid, Colleen (https://experts.colorado.edu/display/fisid_157951/)
Assistant Professor: Geography; Assistant Professor: Institute of Behavioral Science (IBS)
PhD, University of California, Berkeley

Reilly, Kerry Anne (https://experts.colorado.edu/display/fisid_131502/)
Associate Teaching Professor: Program for Writing and Rhetoric
MFA, University of Iowa

Reinholtz, Nicholas S. (https://experts.colorado.edu/display/fisid_155180/)
Assistant Professor: Leeds School of Business
PhD, Columbia University

Reitzammer, Laurialan Blake (https://experts.colorado.edu/display/fisid_145810/)
Associate Professor: Classics
PhD, University of California, Berkeley

Rentschler, Mark E. (https://experts.colorado.edu/display/fisid_146091/)
Professor: Mechanical Engineering; Faculty Director: Research & Innovation Office; Associate Professor: Biomedical Engineering
PhD, University of Nebraska-Lincoln

Repenning, Alexander (https://experts.colorado.edu/display/fisid_104946/)
Professor Adjunct: Computer Science
PhD, University of Colorado Boulder

Requiro, David (https://experts.colorado.edu/display/fisid_155785/)
Assistant Professor: Music
MM, University of Michigan Ann Arbor

Resasco, Julian (https://experts.colorado.edu/display/fisid_153799/)
Assistant Professor: Ecology and Evolutionary Biology
PhD, University of Florida

Restrepo, Juan G. (https://experts.colorado.edu/display/fisid_145811/)
Associate Professor: Applied Mathematics
PhD, University of Maryland, College Park

Rexroth, Grace (https://experts.colorado.edu/display/fisid_167469/)
Assistant Teaching Professor: School of Education
PhD, University of Colorado Boulder

Rey, Ana Maria (https://experts.colorado.edu/display/fisid_146407/)
Associate Research Professor: JILA; Professor Adjoint: Physics
PhD, University of Maryland College Park Campus

Reynolds, Chandra
Professor: Psychology and Neuroscience
PhD, University of Southern California

Reynolds, Leslie Jean (https://experts.colorado.edu/display/fisid_153008/)
Senior Associate Dean, Professor: University Libraries
MLIS, University of Illinois at Urbana–Champaign

Reznicek, Birdie C. (https://experts.colorado.edu/display/fisid_149091/)
Instructor, Associate Chair: Leeds School of Business
MBA, Northwestern University

Reznik, Dmitry (https://experts.colorado.edu/display/fisid_147659/)
Professor: Physics; Associate Professor: Materials Science & Engineering
PhD, University of Illinois at Urbana–Champaign

Rezvani, Sheiva
Associate Teaching Professor, Associate Teaching Professor, Faculty Director: Creative Technology & Design; Faculty Director: ATLAS Institute
MA, New York University

Rhee, Soo H. (https://experts.colorado.edu/display/fisid_123401/)
Associate Professor: Psychology and Neuroscience
PhD, Emory University

Rhode, Matthew (https://experts.colorado.edu/display/fisid_165079/)
Assistant Teaching Professor: Aerospace Engineering Sciences
BS, University of Colorado

Rhodes, Harumi B. (https://experts.colorado.edu/display/fisid_155971/)
Associate Professor, Artist in Residence: Music
MM, New England Conservatory of Music

Rich, Kevin M. (https://experts.colorado.edu/display/fisid_157950/)
Associate Professor: Theatre and Dance
MFA, Yale School of Drama

Richardson, Emily (https://experts.colorado.edu/display/fisid_115007/)
Clinical Associate Professor: Psychology and Neuroscience
PhD, University of Iowa

Richey, Clyde W.
Professor Emeritus: Leeds School of Business

Richter, Antje (https://experts.colorado.edu/display/fisid_145310/)
Associate Professor: Asian Languages and Civilizations
Dr habil, University of Kiel (Germany)

Richter, Matthias Ludwig (https://experts.colorado.edu/display/fisid_144864/)
Associate Professor, Chair: Asian Languages and Civilizations
PhD, University of Hamburg (Germany)

Rickels, David Aaron (https://experts.colorado.edu/display/fisid_151424/)
Associate Professor: Music Education
DMA, Arizona State University

Rieker, Gregory Brian (https://experts.colorado.edu/display/fisid_151727/)
Associate Professor: Mechanical Engineering; Associate Faculty Director: Research & Innovation Office
PhD, Stanford University

Riester, Melissa
Major, Assistant Professor: Air Force ROTC
MA, St. Mary's University

Riffell, Daniel J. (https://experts.colorado.edu/display/fisid_154141/)
Associate Professor, Lecturer: Mechanical Engineering
MS, University of Colorado Boulder

Riggle, Gordon Grant
Lecturer: President's Leadership Class

Riis, Thomas L.
Professor Emeritus: Music; Lecturer: Continuing Education & Professional Studies

Rinaldo, Rachel Ann (https://experts.colorado.edu/display/fisid_156309/)
Faculty Director: Center for Asian Studies; Associate Professor: Sociology
PhD, University of Chicago

Ringgenberg, Ralph G.
Professor Emeritus: Leeds School of Business

Rinn, John (https://experts.colorado.edu/display/fisid_159338/)
Professor: Biochemistry; Endowed/Named Professor, Professor: Biofrontiers Institute
PhD, Yale University

Rios, Gabriela (https://experts.colorado.edu/individual/fisid_167679/)
Assistant Professor: Program for Writing and Rhetoric; Assistant Professor: English; Assistant Professor: Ethnic Studies
PhD, Texas AM University

Riosmena, Fernando (https://experts.colorado.edu/display/fisid_144419/)
Associate Professor: Institute of Behavioral Science (IBS); Associate Professor: Sociology
PhD, University of Pennsylvania

Riseman, Christina (https://experts.colorado.edu/display/fisid_164336/)
Clinical Assistant Professor: Speech, Language and Hearing Sciences (SLHS)
MA, University of Colorado Boulder

Ristovska, Sandra (https://experts.colorado.edu/display/fisid_159835/)
Assistant Professor: Media Studies
PhD, University of Pennysylvania

Ritzwoller, Michael H. (https://experts.colorado.edu/display/fisid_102264/)
Professor: Physics
PhD, University of California, San Diego

Rivas Rodríguez, José Javier (https://experts.colorado.edu/display/fisid_144516/)
Professor, Associate Chair: Spanish and Portuguese
PhD, Universidade de Santiago De Compostela (Spain)

Rivera, George F. Jr. (https://experts.colorado.edu/display/fisid_103055/)
Professor: Art and Art History
PhD, SUNY at Buffalo

Rivera, John-Michael (https://experts.colorado.edu/display/fisid_118393/)
Professor: Program for Writing and Rhetoric; Professor, Dean: English; Assistant Dean: College of Arts and Sciences; Professor: Humanities
PhD, University of Texas at Austin

Rivera, Michael (https://experts.colorado.edu/display/fisid_169859/)
Assistant Professor: Computer Science; Assistant Professor: Creative Technology & Design; Assistant Professor: ATLAS Institute
PhD, Carnegie Mellon University

Rivers, Ed (https://experts.colorado.edu/display/fisid_101652/)
Professor: Critical Media Practices
PhD, University of Oregon

Rivlin, Eyal Ofer (https://experts.colorado.edu/display/fisid_151100/)
Teaching Associate Professor, Endowed/Named Professor: Jewish Studies
MA, Naropa Institute

Robbins, M. Mikaela
Lieutenant, Assistant Professor: Navy ROTC
B.S., U.S. Naval Academy

Robbs, Brett
Professor Emeritus: Advertising, Public Relations and Media Design

Roberson, Lee Forrest (https://experts.colorado.edu/display/fisid_158380/)
Teaching Assistant Professor: Mathematics
PhD, University of Northern Colorado

Robertson, Benjamin John (https://experts.colorado.edu/display/fisid_146500/)
Assistant Professor: English
PhD, SUNY at Buffalo

Robertson, Scott H.
Professor Emeritus: Physics
PhD, Cornell University

Robichaux, Waldean
Professor Emeritus: Integrative Physiology

Robinson, Colene Flynn (https://experts.colorado.edu/display/fisid_140754/)
Clinical Professor: School of Law
JD, Loyola University of Chicago

Robinson, Janet Schwartzberg
Senior Instructor: Libby Arts RAP
MA, University of Colorado Denver

Rock, Steven Karl (https://experts.colorado.edu/display/fisid_113689/)
Associate Professor, Chair: Leeds School of Business
PhD, Pennsylvania State University

Rodd, Laurel Rasplica
Professor Emerita: Asian Languages and Civilizations

Rodgers, Timothy (https://experts.colorado.edu/display/fisid_155460/)
Instructor: Leeds School of Business
PhD, University of California, Santa Cruz

Rodriguez, Nancy (https://experts.colorado.edu/display/fisid_164028/)
Assistant Professor: Applied Mathematics
PhD, University of California-Los Angeles

Roeder, Matthew J. (https://experts.colorado.edu/display/fisid_120180/)
Associate Professor: Music Education; Associate Professor, Associate Dean: Music
DMA, University of Colorado Boulder

Rogers, Andrei
Professor Emeritus: Geography

Rogers, Charles (https://experts.colorado.edu/display/fisid_101331/)
Professor: Physics; Professor: Materials Science & Engineering
PhD, Cornell University

Rogers, Jonathan Lawrence (https://experts.colorado.edu/display/fisid_153009/)
Professor, Endowed/Named Professor: Leeds School of Business
PhD, University of Pennsylvania

Rogers, Richard G. (https://experts.colorado.edu/display/fisid_106129/)
Professor: Sociology; Professor: Institute of Behavioral Science (IBS)
PhD, University of Texas at Austin

Roithmayr, Daria
Professor: School of Law
JD, Georgetown University

Rolf, Esther
Assistant Professor: Computer Science
PhD, University of California Berkeley

Romanov, Artemi (https://experts.colorado.edu/display/fisid_100659/)
Professor: Germanic and Slavic Languages and Literatures; Faculty Director: International Education; Faculty Director: Global RAP
PhD, St. Petersburg University (Russia)

Romatschke, Paul (https://experts.colorado.edu/display/fisid_149870/)
Professor: Physics
PhD, Technical Univ of Vienna (Austria)

Romero, Brenda M. (https://experts.colorado.edu/display/fisid_106117/)
Professor Emerita: Music
PhD, University of California-Los Angeles

Roncone, Alessandro (https://experts.colorado.edu/display/fisid_164509/)
Assistant Professor: Computer Science; Faculty Director: College of Engineering and Applied Science
PhD, Istituto Italiano di Tecnologia (Italy)

Rood, David
Professor Emeritus: Linguistics

Root, David H. (https://experts.colorado.edu/display/fisid_159444/)
Assistant Professor: Psychology and Neuroscience
PhD, Rutgers University

Roque, Ricarose (https://experts.colorado.edu/display/fisid_158315/)
Assistant Professor: Information Science; Assistant Professor: Computer Science
PhD, Massachusetts Institute of Technology

Rosario-Franco, Marialis (https://experts.colorado.edu/display/fisid_172547/)
Assistant Teaching Professor: Astrophysical and Planetary Sciences (APS)
PhD, University of Texas at Arlington

Rosario-Ortiz, Fernando L. (https://experts.colorado.edu/display/fisid_146165/)
Director, Director, Professor: Environmental Engineering Program (EVEN); Professor: Civil, Environmental and Architectural Engineering; Associate Dean: College of Engineering and Applied Science
DEnv, University of California, Los Angeles

Rosner, Hillary (https://experts.colorado.edu/display/fisid_164326/)
Instructor: Journalism
MFA, New York University

Ross-Bryant, Lynn
Professor Emerita: Religious Studies

Rosse, Joseph G.
Professor Emeritus: Leeds School of Business: Leeds School of Business

Rossman, J. Matthew (https://experts.colorado.edu/display/fisid_156619/)
Assistant Research Professor: Integrative Physiology
PhD, University of Utah

Roth, Yumi J. (https://experts.colorado.edu/display/fisid_126287/)
Associate Professor: Art and Art History
MFA, SUNY College at New Paltz

Roudbari, Shawhin (https://experts.colorado.edu/display/fisid_153645/)
Associate Professor: Environmental Design
PhD, University of California, Berkeley

Rowe, K. Rachel (https://experts.colorado.edu/display/fisid_168365/)
Assistant Professor: Integrative Physiology
PhD, University of Kentucky

Rowland, Willard D.
Professor Emeritus: Media Studies

Rozenberg, Grzegorz (https://experts.colorado.edu/display/fisid_100478/)
Professor Adjoint: Computer Science

Ruben, Shalom D. (https://experts.colorado.edu/display/fisid_149492/)
Associate Teaching Professor: Mechanical Engineering
PhD, University of California, Los Angeles

Rudy, Jerry W.
Professor Emeritus: Psychology and Neuroscience
PhD, University of Virginia

Rueb, Teri Susan (https://experts.colorado.edu/display/fisid_163944/)
Professor, Chair: Critical Media Practices
PhD, Harvard University

Ruestow, Edward G.
Professor Emeritus: History

Rukamathu, Mark (https://experts.colorado.edu/display/fisid_174660/)
Teaching Associate Professor: Environmental Design
MArch, Harvard Graduate School of Design

Rumbles, Garry (https://experts.colorado.edu/display/fisid_147479/)
Professor Adjoint: Chemistry; Professor Adjoint: Materials Science & Engineering
PhD, University of London (England)

Runner, Meredith
Professor Emeritus: Molecular, Cellular & Developmental Biology (MCDB)

Rupert, Robert (https://experts.colorado.edu/display/fisid_139802/)
Professor, Chair: Philosophy; Chair: Faculty Council, A&S
PhD, University of Illinois at Chicago

Rupp, Travis (https://experts.colorado.edu/display/fisid_148747/)
Assistant Teaching Professor: Classics
MA, University of Colorado Boulder

Rutkovitz, Jared
Major, Assistant Professor: Air Force ROTC
MBA, Naval Postgraduate School

Ruzzene, Massimo (https://experts.colorado.edu/display/fisid_165832/)
Endowed/Named Professor, Associate Dean: College of Engineering and Applied Science
PhD, Politecnico Di Torino (Italy)

Ryan, Joseph N. (https://experts.colorado.edu/display/fisid_101037/)
Professor: Civil, Environmental and Architectural Engineering; Professor, Faculty Director: Environmental Engineering Program (EVEN)
PhD, Massachusetts Institute of Technology

Ryan, Kathleen Marie (https://experts.colorado.edu/display/fisid_148481/)
Associate Professor: Journalism
PhD, University of Oregon

Rybin Koob, Amanda (https://experts.colorado.edu/display/fisid_166576/)
Assistant Professor: University Libraries
MLIS, University of Denver

# S

Sabinson, Elena (https://experts.colorado.edu/display/fisid_173948/)
Assistant Professor: Environmental Design
PhD, Cornell University

Sable, Barbara Kinsey
Professor Emeritus: Music

Saccone, Max (https://experts.colorado.edu/display/fisid_175898/)
Assistant Professor: Mechanical Engineering
PhD, California Institute of Technology

Sacks, Elias R. (https://experts.colorado.edu/display/fisid_151425/)
Associate Professor: Religious Studies
PhD, Princeton University

Saddoris, Michael Paul (https://experts.colorado.edu/display/fisid_152979/)
Associate Professor: Psychology and Neuroscience
PhD, Johns Hopkins University

Safran, Rebecca J. (https://experts.colorado.edu/display/fisid_145518/)
Professor: Ecology and Evolutionary Biology
PhD, Cornell University

Safran, William
Professor Emeritus: Political Science

Said, Wadie
Professor: School of Law
JD, Columbia University

Salvinelli, Carlo (https://experts.colorado.edu/display/fisid_159846/)
Assistant Teaching Professor: Civil, Environmental and Architectural Engineering
PhD, Missouri University of Science and Technology

Salys, Rimgaila
Professor Emerita: Germanic and Slavic Languages and Literatures

Sama, Vicky
Scholar in Residence: Journalism
MA, University of Colorado Boulder

Sammakia, Tarek (https://experts.colorado.edu/display/fisid_101597/)
Professor Emeritus, Chair: Chemistry
PhD, Yale University

Samper, Jota (https://experts.colorado.edu/display/fisid_157949/)
Associate Professor: Environmental Design; Faculty Director: International Education
PhD, MIT-DUSP

Sampsel, Laurie (https://experts.colorado.edu/display/fisid_101802/)
Professor: Music
PhD, University of Pittsburgh

Sampson, John Franklin
Professor Emeritus: Art and Art History

Samuelson, Charlie (https://experts.colorado.edu/display/fisid_163645/)
Assistant Professor: French & Italian
PhD, Princeton University

Sancar, Fahriye Hazer
Professor Emeritus: Environmental Design

Sanchez, Sara (https://experts.colorado.edu/display/fisid_167959/)
Assistant Professor: Atmospheric and Oceanic Sciences (ATOC)
Ph.D., University of California- San Diego

Sanford, Jason Sidney (https://experts.colorado.edu/display/fisid_165067/)
Instructor: Critical Media Practices

Sankaranarayanan, Sriram (https://experts.colorado.edu/display/fisid_147413/)
Assistant Dean, Professor, Associate Chair: Computer Science; Endowed/Named Professor: College of Engineering and Applied Science; Professor: Electrical, Computer and Energy Engineering (ECEE); Associate Professor: Biomedical Engineering
PhD, Stanford University

Santiago Schwarz, Vanessa (https://experts.colorado.edu/display/fisid_163872/)
Assistant Teaching Professor: School of Education
PhD, University of Colorado Boulder

Santos, Jose R. (https://experts.colorado.edu/display/fisid_124623/)
Associate Teaching Professor: Computer Science
MS, University of Colorado Boulder

Saouma, Victor E. (https://experts.colorado.edu/display/fisid_100429/)
Professor Emeritus: Civil, Environmental and Architectural Engineering
PhD, Cornell University

Sasnett-Martichuski, Diane Kay (https://experts.colorado.edu/display/fisid_111599/)
Lecturer: Continuing Education & Professional Studies
PhD, Colorado State University

Saucedo, Raul (https://experts.colorado.edu/display/fisid_153759/)
Assistant Professor: Philosophy
PhD, Cornell University

Saul, Leif J. (https://experts.colorado.edu/display/fisid_116130/)
Associate Teaching Professor: Integrative Physiology
PhD, University of California, Berkeley

Saurini, Susanna (https://experts.colorado.edu/display/fisid_148725/)
Associate Teaching Professor: French & Italian
MA, University of L'Aquila

Sauther, Michelle Linda (https://experts.colorado.edu/display/fisid_107236/)
Professor: Anthropology
PhD, Washington University

Savage, Scott James (https://experts.colorado.edu/display/fisid_121239/)
Professor: Economics
PhD, Curtin University of Technology (Western Australia)

Sawchuk, Terry M.
Associate Professor Emeritus: Music
MM, University of Michigan Ann Arbor

Sawyer, Sara Lea (https://experts.colorado.edu/display/fisid_155218/)
Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, Cornell University

Saxby, Justin
Assistant Teaching Professor: English

Saxton, Richard W. (https://experts.colorado.edu/display/fisid_144756/)
Associate Professor: Art and Art History; Associate Professor: Critical Media Practices
MFA, Indiana University Bloomington

Scarborough, Rebecca (https://experts.colorado.edu/display/fisid_143741/)
Associate Professor, Associate Chair: Linguistics
PhD, University of California, Los Angeles

Scarritt, James R.
Professor Emeritus: Political Science

Schaal, David A. (https://experts.colorado.edu/display/fisid_114824/)
Associate Teaching Professor: ATLAS Institute; Associate Teaching Professor: Creative Technology & Design
MFA, University of Colorado Boulder

Schaberg, Petger J. (https://experts.colorado.edu/display/fisid_103135/)
Associate Teaching Professor: Program for Writing and Rhetoric
MA, University of Colorado Boulder

Schaetzel, Amanda E. (https://experts.colorado.edu/display/fisid_154385/)
Assistant Teaching Professor: Integrative Physiology
PhD, University of Colorado Boulder

Schattke, Rudolph
Professor Emeritus: Leeds School of Business

Schaub, Hanspeter (https://experts.colorado.edu/display/fisid_143818/)
Distinguished Professor, Endowed/Named Professor, Professor: Colorado Center for Astrodynamics Research (CCAR); Endowed/Named Professor: College of Engineering and Applied Science; Chair: Aerospace Engineering Sciences
PhD, Texas A&M University

Schaub, Kevin D. (https://experts.colorado.edu/display/fisid_144142/)
Senior Instructor, Faculty Director: Leeds School of Business
MBA, University of Colorado Boulder

Schauster, Erin E. (https://experts.colorado.edu/display/fisid_156310/)
Associate Chair, Associate Professor: Advertising, Public Relations and Media Design
PhD, University of Missouri–Columbia

Scheeres, Daniel J. (https://experts.colorado.edu/display/fisid_145035/)
Distinguished Professor, Endowed/Named Professor: Aerospace Engineering Sciences
PhD, University of Michigan Ann Arbor

Scheib, Jennifer G. (https://experts.colorado.edu/display/fisid_159887/)
Assistant Teaching Professor: Civil, Environmental and Architectural Engineering
MS, University of Colorado Boulder

Schell, Emily
Teaching Assistant Professor: Psychology and Neuroscience
PhD, Stanford University

Scherr, Timothy (https://experts.colorado.edu/display/fisid_156259/)
Senior Instructor: Electrical, Computer and Energy Engineering (ECEE); Associate Faculty Director: College of Engineering and Applied Science
MS, University of Utah

Schibli, Hisako (https://experts.colorado.edu/display/fisid_148621/)
Teaching Assistant Professor: Asian Languages and Civilizations
MA, University of Colorado Boulder; BA, Sophia University (Japan)

Schibli, Thomas Richard (https://experts.colorado.edu/display/fisid_143464/)
Professor: Physics; Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, Univ of Karlsruhe (Germany)

Schincariol, Marcelo Tadeu (https://experts.colorado.edu/display/fisid_148724/)
Associate Teaching Professor: Spanish and Portuguese
PhD, Universidade Estadual de Campinas (Brazil)

Schindler, Patricia A.
Senior Instructor Emerita: Germanic and Slavic Languages and Literatures

Schlag, Pierre J. (https://experts.colorado.edu/display/fisid_105653/)
Distinguished Professor, Endowed/Named Professor: School of Law
JD, University of California, Los Angeles

Schlosser, Sarah (https://experts.colorado.edu/display/fisid_159679/)
Teaching Associate Professor: Geography
MA, University of South Florida

Schmidt, Sebastian (https://experts.colorado.edu/display/fisid_140121/)
Associate Professor: Laboratory for Atmospheric and Space Physics (LASP); Associate Professor: Atmospheric and Oceanic Sciences (ATOC)
PhD, Leipzig University (Germany)

Schmidt, Steve (https://experts.colorado.edu/display/fisid_103713/)
Professor: Ecology and Evolutionary Biology
PhD, Cornell University

Schmidt, Wolfgang
Professor Emeritus: Mathematics

Schmiesing, Ann C. (https://experts.colorado.edu/display/fisid_106248/)
Professor: Germanic and Slavic Languages and Literatures
PhD, University of Cambridge (England)

Schnabel, Robert B. (https://experts.colorado.edu/display/fisid_100499/)
Professor, Faculty Director: Computer Science
PhD, Cornell University

Schneider, Nathan Todd (https://experts.colorado.edu/display/fisid_156512/)
Director, Associate Faculty Director: Media Studies
MA, University of California, Santa Barbara

Schneider, Nicholas M. (https://experts.colorado.edu/display/fisid_102620/)
Professor: Laboratory for Atmospheric and Space Physics (LASP); Professor: Astrophysical and Planetary Sciences (APS)
PhD, University of Arizona

Schnizer-Luger, Karoline (https://experts.colorado.edu/display/fisid_156579/)
Professor: Biochemistry
PhD, Univ of Basel (Switzerland)

Schoennagel, Tania (https://experts.colorado.edu/display/fisid_139625/)
Assistant Professor Adjunct: Geography

Schonberger, Bryce (https://experts.colorado.edu/display/fisid_167332/)
Assistant Professor: Leeds School of Business
PhD, University of Southern California

Schranz, Karoly
Senior Instructor: Music
Diploma, Franz Liszt Academy of Music

Schreüder, Willem A. (https://experts.colorado.edu/display/fisid_143834/)
Associate Professor Adjunct: Computer Science
PhD, University of Stellenbosch

Schulte, Stacey (https://experts.colorado.edu/display/fisid_146819/)
Teaching Professor: Environmental Design
MURP, University of Colorado Denver

Schulte-Pelkum, Vera (https://experts.colorado.edu/display/fisid_126623/)
Associate Research Professor, Lecturer: Geological Sciences
PhD, University of California-San Diego

Schultz, Kathy (https://experts.colorado.edu/individual/fisid_157988/)
Professor: School of Education
PhD, University of Pennsylvania

Schut, Joel
Instructor: Music
DMA, Michigan State University

Schütrumpf, Eckart E.W.
Professor Emeritus: Classics

Schwartz, Andrew Abraham (https://experts.colorado.edu/display/fisid_146092/)
Professor: School of Law
JD, Columbia University

Schwartz, Daniel K. (https://experts.colorado.edu/display/fisid_118479/)
Professor: Chemical and Biological Engineering
PhD, Harvard University

Schwartz, Trudy L. (https://experts.colorado.edu/display/fisid_108607/)
Teaching Professor, Associate Chair: Aerospace Engineering Sciences
MS, University of Colorado Boulder

Scornovacco, Karla
Assistant Teaching Professor: School of Education
PhD, University of Colorado Boulder

Scott, F. Wayne
Professor Emeritus: Music

Seals, Douglas R. (https://experts.colorado.edu/display/fisid_103375/)
Distinguished Professor: Integrative Physiology
PhD, University of Wisconsin–Madison

Sears, Curtis R. (https://experts.colorado.edu/display/fisid_145482/)
Senior Instructor, Endowed/Named Professor: Leeds School of Business
JD, University of Colorado Boulder

Sears, Kelly L. (https://experts.colorado.edu/display/fisid_154467/)
Associate Professor: Cinema Studies & Moving Image Arts
MFA, University of California, San Diego

Seastedt, Timothy
Professor: Institute of Arctic & Alpine Research (INSTAAR); Professor, Associate Chair: Ecology and Evolutionary Biology
PhD, University of Georgia

Seesholtz, John (https://experts.colorado.edu/display/fisid_163908/)
Associate Professor, Faculty Director: Music
DMA, University of North Texas

Segil, Jacob Lionel (https://experts.colorado.edu/display/fisid_155128/)
Instructor: General Engineering; Instructor: Engineering-Bold Center; Research Professor: Mechanical Engineering
PhD, University of Colorado Boulder

Segur, Harvey (https://experts.colorado.edu/display/fisid_102287/)
Professor Emeritus: Applied Mathematics
PhD, University of California, Berkeley

Selden, Karen E.
Faculty Director: Law Library
MLS, Simmons College

Selto, Frank
Professor Emeritus: Leeds School of Business

Semenoff, Emily (https://experts.colorado.edu/individual/fisid_164614/)
Teaching Assistant Professor: University Libraries
MLIS, University of Denver

Semsar, Katharine Anne (https://experts.colorado.edu/display/fisid_144750/)
Senior Instructor, Faculty Director: Miramontes Arts & Sciences Program (MASP)

Seney, Lauren P. (https://experts.colorado.edu/display/fisid_166534/)
Associate Director: Law Library
MSIS, University of Tennessee

Seno, Cosetta (https://experts.colorado.edu/display/fisid_144515/)
Associate Professor: French & Italian
PhD, University of California, Berkeley

Senseney, Christopher (https://experts.colorado.edu/individual/fisid_166693/)
Associate Teaching Professor: Civil, Environmental and Architectural Engineering
PhD, Colorado School of Mines

Sepulveda Arellano, Julio Cesar (https://experts.colorado.edu/display/fisid_154923/)
Associate Professor: Geological Sciences; Assistant Professor: Institute of Arctic & Alpine Research (INSTAAR)
PhD, University of Bremen (Germany)

Sepúlveda, Enrique (https://experts.colorado.edu/display/fisid_159858/)
Assistant Professor: Ethnic Studies
PhD, University of California, Davis

Serreze, Mark (https://experts.colorado.edu/display/fisid_106334/)
Distinguished Professor, Distinguished Professor: Geography; Faculty Director: National Snow & Ice Data Center (NSIDC); Faculty Director: Cooperative Institute for Research in Environmental Sciences (CIRES)
PhD, University of Colorado Boulder

Seward, Lori Elizabeth (https://experts.colorado.edu/display/fisid_113934/)
Faculty Director: International Education; Senior Instructor, Faculty Director: Leeds School of Business
PhD, Virginia Polytechnic Institute and State University

Sewell, CheyOnna M R
Instructor: Miramontes Arts & Sciences Program (MASP)
PhD, University of Missouri-Saint Louis

Shade-Johnson, Jaquetta
Assistant Professor: Program for Writing and Rhetoric; Assistant Professor: English
PhD, Michigan State University

Shaheen, Sean Eric (https://experts.colorado.edu/display/fisid_153664/)
Professor: Electrical, Computer and Energy Engineering (ECEE); Professor: Physics
PhD, University of Arizona

Shakiba, Maryam (https://experts.colorado.edu/display/fisid_172206/)
Assistant Professor: Aerospace Engineering Sciences
PhD, Texas AM University

Shalm, Lynden Krister (https://experts.colorado.edu/display/fisid_152367/)
Lecturer: Physics
PhD, University of Toronto

Shankman, Paul
Professor Emeritus: Anthropology

Shanmugaraj, Nisha (https://experts.colorado.edu/display/fisid_173859/)
Assistant Professor: English; Assistant Professor: Program for Writing and Rhetoric
PhD, Carnegie Mellon University

Shannon, Jennifer A. (https://experts.colorado.edu/display/fisid_147612/)
Associate Professor: Museum and Field Studies; Associate Professor: Anthropology
PhD, Cornell University

Shannon, Megan L. (https://experts.colorado.edu/display/fisid_154265/)
Associate Professor: Political Science
PhD, University of Iowa

Shannon, Robert J.
Senior Instructor Emeritus: Theatre and Dance

Sharma, Anu (https://experts.colorado.edu/display/fisid_143814/)
Professor, Associate Chair: Speech, Language and Hearing Sciences (SLHS)
PhD, Northwestern University

Sharma, Vijaya Raj
Instructor: Libby Arts RAP
PhD, University of Colorado Boulder

Shay, Erin J.
Assistant Professor Adjunct: Linguistics
PhD, University of Colorado

Shay, Robert S. (https://experts.colorado.edu/display/fisid_154671/)
Dean, Professor: Music
PhD, University of North Carolina Chapel Hill

Sheafor, Steve
Lecturer: Electrical, Computer and Energy Engineering (ECEE)
PhD, University of Illinois

Shear, Benjamin R. (https://experts.colorado.edu/display/fisid_157747/)
Assistant Professor: School of Education
PhD, Stanford University

Shear, Ted (https://experts.colorado.edu/display/fisid_166781/)
Assistant Teaching Professor: Philosophy
PhD, University of California-Davis

Shearston, Jenni
Assistant Professor: Integrative Physiology
PhD, Oregon State University

Sheehan, Anne (https://experts.colorado.edu/display/fisid_103645/)
Professor: Cooperative Institute for Research in Environmental Sciences (CIRES); Chair, Professor: Geological Sciences
PhD, Massachusetts Institute of Technology

Sheffield, Elisabeth Ann (https://experts.colorado.edu/display/fisid_123500/)
Professor: English
PhD, SUNY at Buffalo

Shell, Hanna Rose (https://experts.colorado.edu/display/fisid_163199/)
Associate Professor: Art and Art History; Professor: Cinema Studies & Moving Image Arts; Associate Professor: History; Faculty Director: College of Arts and Sciences
PhD, Harvard University

Shen, Jingshi (https://experts.colorado.edu/display/fisid_146414/)
Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, Columbia University

Shepard, James R.
Professor Emeritus: Physics
PhD, University of Colorado Boulder

Shepard, Lorrie A. (https://experts.colorado.edu/display/fisid_105949/)
Professor Emeritus: School of Education
PhD, University of Colorado Boulder

Shepherd Macklin, JulieMarie Anjali (https://experts.colorado.edu/display/fisid_153034/)
Instructor: Political Science; Instructor: President's Leadership Class
PhD, University of Colorado Boulder

Shepperd, Josh (https://experts.colorado.edu/display/fisid_167233/)
Assistant Professor: Media Studies
PhD, University of Wisconsin-Madison

Sher, Daniel (https://experts.colorado.edu/individual/fisid_100194/)
Professor, Dean Emeritus: Music
EdD, Columbia University

Sherwood, David
Associate Professor Emeritus: Integrative Physiology

Shi, Jia (https://experts.colorado.edu/display/fisid_143673/)
Associate Teaching Professor: Integrative Physiology
PhD, Boston University

Shi, Yuan (https://experts.colorado.edu/display/fisid_172193/)
Assistant Professor: Physics
PhD, Princeton University

Shields, C. Wyatt IV (https://experts.colorado.edu/individual/fisid_165173/)
Assistant Professor: Chemical and Biological Engineering; Assistant Professor: Biomedical Engineering
PhD, Duke University

Shih, Evelyn Ming Whai (https://experts.colorado.edu/display/fisid_163646/)
Assistant Professor: Asian Languages and Civilizations
PhD, University of California, Berkeley

Shin, Adrian (https://experts.colorado.edu/display/fisid_158138/)
Assistant Professor: Political Science
PhD, University of Michigan Ann Arbor

Shirts, Michael R. (https://experts.colorado.edu/display/fisid_156474/)
Professor: Chemical and Biological Engineering
PhD, Stanford University

Shiue, Carol Hua (https://experts.colorado.edu/display/fisid_141892/)
Professor: Economics; Professor: History
PhD, Yale University

Sholtes, Joel Stephen (https://experts.colorado.edu/display/fisid_164757/)
Assistant Teaching Professor: Civil, Environmental and Architectural Engineering
PhD, Colorado State University

Sholtes, Kari A. (https://experts.colorado.edu/display/fisid_164995/)
Assistant Teaching Professor: Civil, Environmental and Architectural Engineering
MS, University of North Carolina Chapel Hill

Shoup, Eileen
Lecturer: Cinema Studies & Moving Image Arts
MFA, University of Colorado Boulder

Shrikant, Natasha (https://experts.colorado.edu/display/fisid_157954/)
Associate Professor: Communication
PhD, University of Massachusetts at Amherst

Shriver, Scott Kennedy (https://experts.colorado.edu/display/fisid_158937/)
Assistant Professor: Leeds School of Business
PhD, Stanford University

Shukri, Salma Tariq (https://experts.colorado.edu/display/fisid_158219/)
Instructor: Leeds School of Business
PhD, University of Denver

Shull, J Michael
Professor Emeritus: Astrophysical and Planetary Sciences (APS); Professor: Center for Astrophysics & Space Astronomy (CASA)
PhD, Princeton University

Sideris, Sabrina (https://experts.colorado.edu/display/fisid_120493/)
Assistant Teaching Professor: School of Education; Instructor: INVST Community Studies
PhD, University of Denver

Sieber, Diane E. (https://experts.colorado.edu/display/fisid_101394/)
Associate Professor: Engineering, Ethics & Society
PhD, Princeton University

Siergiejczyk-Nicoll, Galina (https://experts.colorado.edu/display/fisid_148167/)
Teaching Assistant Professor: Germanic and Slavic Languages and Literatures; Instructor: Continuing Education & Professional Studies
PhD, University of Colorado Boulder

Sievers, Robert E. (https://experts.colorado.edu/display/fisid_102866/)
Faculty Director: Grad Sch-Environmental Prgm; Professor Emeritus: Chemistry
PhD, University of Illinois at Urbana–Champaign

Siewert, Sam
Associate Professor Adjunct: Electrical, Computer and Energy Engineering (ECEE)

Silleras-Fernández, Núria (https://experts.colorado.edu/display/fisid_147213/)
Professor: Spanish and Portuguese; Associate Professor: History; Professor: Humanities
PhD, Universitat Autònoma de Barcelona (Spain)

Silver, Daniel S. (https://experts.colorado.edu/display/fisid_115564/)
Professor: Music
MM, University of Michigan Ann Arbor

Silverstein, JoAnn (https://experts.colorado.edu/display/fisid_101482/)
Professor Emeritus: Civil, Environmental and Architectural Engineering; Professor: Environmental Engineering Program (EVEN)
PhD, University of California, Davis

Sim, Claude
Assistant Professor: Music
BM, Oberlin Conservatory

Simmonds, Raymond
Lecturer: Physics
PhD, University of California, Berkeley

Simon, Peter
Associate Professor Emeritus: School of Law
JD, University of California, Berkeley

Simonson, Peter D.
Professor Emeritus: Communication; Professor: Media Studies
PhD, University of Iowa

Simpson, Carl (https://experts.colorado.edu/display/fisid_159652/)
Assistant Professor: Geological Sciences; Assistant Professor: Museum and Field Studies
PhD, University of Chicago

Simpson, Michele D. (https://experts.colorado.edu/display/fisid_145311/)
Senior Instructor: Farrand RAP; Lecturer: Student Academic Services Center
JD, Indiana University

Singh, Chahat (https://experts.colorado.edu/display/fisid_175890/)
Assistant Professor: Mechanical Engineering
PhD, University of Maryland

Singh, Ravinder (https://experts.colorado.edu/display/fisid_112067/)
Associate Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, Baylor College of Medicine

Sinha, Vandna (https://experts.colorado.edu/display/fisid_165162/)
Associate Research Professor: School of Education
PhD, University of Denver

Sinkinson, Caroline B. (https://experts.colorado.edu/display/fisid_141709/)
Professor, Faculty Director: University Libraries
MLIS, Kent State University

Sirangelo, Mark (https://experts.colorado.edu/individual/fisid_164135/)
Entrepreneur in Residence: Aerospace Engineering Sciences
JD, Seton Hall University

Skerski, Jamie L. (https://experts.colorado.edu/display/fisid_149871/)
Teaching Professor: Communication; Lecturer: Continuing Education & Professional Studies
PhD, Indiana University Bloomington

Skewes, Elizabeth (https://experts.colorado.edu/display/fisid_122724/)
Associate Professor: Journalism; Faculty Director: College of Media, Communication & Information
PhD, Syracuse University

Skinner-Thompson, Jonathan (https://experts.colorado.edu/display/fisid_164900/)
Associate Professor: School of Law
JD, Duke University

Skinner-Thompson, Scott (https://experts.colorado.edu/display/fisid_159158/)
Associate Professor: School of Law
JD, New York University

Skodje, Rex T. (https://experts.colorado.edu/display/fisid_103448/)
Professor Emeritus: Chemistry
PhD, University of Minnesota Twin Cities

Skrla, Eric
Captain, Assistant Professor: Air Force ROTC
MA, University of Colorado Boulder

Slayden, David Lee (https://experts.colorado.edu/display/fisid_113297/)
Associate Professor: Advertising, Public Relations and Media Design; Faculty Director: College of Media, Communication & Information
PhD, Indiana University Bloomington

Slichter, Daniel
Lecturer: Physics
PhD, University of California, Berkeley

Sluiter, David
Professor Adjunct: Electrical, Computer and Energy Engineering (ECEE)
BS, Michigan Technological University

Tilton, Eric (https://experts.colorado.edu/display/fisid_126548/)
Professor, Associate Chair: Geological Sciences
PhD, University of California, Santa Cruz

Smalyukh, Ivan (https://experts.colorado.edu/display/fisid_144757/)
Professor: Physics; Professor: Materials Science & Engineering
PhD, Kent State University

Smith, Jeremy L. (https://experts.colorado.edu/display/fisid_118265/)
Professor: Music
PhD, University of California, Santa Barbara

Smith, Julie Scher (https://experts.colorado.edu/display/fisid_166064/)
Instructor: Leeds School of Business
MBA, University of Chicago

Smith, Marshall David (https://experts.colorado.edu/display/fisid_144719/)
Instructor: Farrand RAP

Smith, Stacey Dewitt (https://experts.colorado.edu/display/fisid_153407/)
Associate Professor: Ecology and Evolutionary Biology
PhD, University of Wisconsin–Madison

Smith, Wilson (https://experts.colorado.edu/display/fisid_166095/)
Professor: Chemical and Biological Engineering
PhD, University of Georgia

Smutzler, Natalie (https://experts.colorado.edu/individual/fisid_113933/)
Teaching Associate Professor: Psychology and Neuroscience
PhD, Indiana University Bloomington

Snell, Kathryn Elaine (https://experts.colorado.edu/display/fisid_155298/)
Associate Professor: Geological Sciences
PhD, University of California, Santa Cruz

Snow, Theodore P. Jr
Professor Emeritus: Astrophysical and Planetary Sciences (APS)

Snyder, Douglas J.
Instructor: Baker RAP
PhD, University of Colorado Boulder

Soares, Kristie (https://experts.colorado.edu/display/fisid_147081/)
Assistant Professor: Women and Gender Studies
PhD, University of California, Santa Barbara

Sohi, Seema (https://experts.colorado.edu/display/fisid_144616/)
Associate Professor: Ethnic Studies; Associate Professor: History
PhD, University of Washington

Sokhey, Anand Edward (https://experts.colorado.edu/display/fisid_147113/)
Professor: Political Science
PhD, The Ohio State University

Sokhey, Sarah Wilson (https://experts.colorado.edu/display/fisid_147614/)
Associate Professor: Political Science; Faculty Director: Institute of Behavioral Science (IBS)
PhD, The Ohio State University

Soltys, Michael A. (https://experts.colorado.edu/display/fisid_152021/)
Teaching Associate Professor: General Engineering; Teaching Professor, Associate Faculty Director: Integrated Design Engineering
PhD, University of Colorado Boulder

Somenzi, Fabio (https://experts.colorado.edu/display/fisid_103969/)
Professor, Associate Chair: Electrical, Computer and Energy Engineering (ECEE)
PhD, Politecnico Di Torino (Italy)

Somers, Nichelle
Lieutenant Colonel, Assistant Professor: Air Force ROTC
MA, University of Colorado, Colorado Springs

Song, Jeong-Hoon (https://experts.colorado.edu/display/fisid_154468/)
Associate Professor: Civil, Environmental and Architectural Engineering; Assistant Professor: Materials Science & Engineering
PhD, Northwestern University

Song, Yangwei (https://experts.colorado.edu/display/fisid_167159/)
Assistant Professor: Economics
PhD, University of Rochester

Songer, Anthony
Lecturer: Engineering Management Program
PhD, University of California Berkeley

Sorenson, Ralph Z.
Professor Emeritus: Leeds School of Business

Souder, Heidi L.
Instructor: Baker RAP
PhD, University of South Florida

Sousa, Marcelo Carlos (https://experts.colorado.edu/display/fisid_122806/)
Professor: Biochemistry
PhD, Univ of Buenos Aires (Argentina)

Southall, Lawrence (https://experts.colorado.edu/display/fisid_143027/)
Instructor: Theatre and Dance
MFA, University of Colorado Boulder

Sowah, Nii Armah (https://experts.colorado.edu/display/fisid_115125/)
Senior Instructor: Theatre and Dance
MA, Lesley College

Spanier, Nancy L.
Professor Emerita: Theatre and Dance

Sparks, Katie
Teaching Assistant Professor: University Libraries
MLS, Valdosta State University

Speck, Sloan G. (https://experts.colorado.edu/display/fisid_155972/)
Associate Professor: School of Law
LLM, New York University

Spencer, Doug (https://experts.colorado.edu/display/fisid_167579/)
Associate Dean, Associate Professor: School of Law
PhD, University of California-Berkeley

Spencer, Jonathan (https://experts.colorado.edu/display/fisid_164209/)
Teaching Professor: Theatre and Dance
MFA, Ohio University

Spencer, Robert L. (https://experts.colorado.edu/display/fisid_104362/)
Professor: Psychology and Neuroscience
PhD, University of Arizona

Spencer, Sabrina Leigh (https://experts.colorado.edu/display/fisid_154911/)
Associate Professor: Biochemistry; Associate Professor: Biomedical Engineering
PhD, Massachusetts Institute of Technology

Spera, Nicolo Ruggero Ferruccio (https://experts.colorado.edu/display/fisid_148406/)
Associate Professor: Music
DMA, University of Colorado Boulder

Spillman, Robert
Professor Emeritus: Music

Spinetto, Richard D.
Professor Emeritus: Leeds School of Business

Spires, David N.
Senior Instructor Emeritus: History

Sponheimer, Matthew James (https://experts.colorado.edu/display/fisid_129957/)
Professor: Anthropology
PhD, Rutgers University New Brunswick

Sprain, Leah M.H. (https://experts.colorado.edu/display/fisid_151292/)
Associate Professor, Faculty Director: Communication
PhD, University of Washington

Sprenger, Kayla (https://experts.colorado.edu/individual/fisid_165650/)
Assistant Professor: Biomedical Engineering; Assistant Professor: Chemical and Biological Engineering
PhD, University of Washington

Spriggs, Benjamin
Lecturer, Scholar in Residence: Electrical, Computer and Energy Engineering (ECEE)

Squillace, Mark S. (https://experts.colorado.edu/display/fisid_140895/)
Professor, Endowed/Named Professor: School of Law
JD, University of Utah

Sridharan, Vishnu
Assistant Professor: Philosophy
PhD, University of Southern California

Sriramesh, Krishnamurthy (https://experts.colorado.edu/display/fisid_163947/)
Professor: Advertising, Public Relations and Media Design
PhD, University of Maryland College Park Campus

Srubar, Wil V. III (https://experts.colorado.edu/display/fisid_153058/)
Professor: Civil, Environmental and Architectural Engineering; Assistant Professor: Materials Science & Engineering
PhD, Stanford University

St. John, Burton (https://experts.colorado.edu/display/fisid_163948/#teaching)
Faculty Director, Professor: Advertising, Public Relations and Media Design
PhD, Saint Louis University

Stade, Elisabeth Cote (https://experts.colorado.edu/display/fisid_147089/)
Associate Teaching Professor, Faculty Director: Computer Science
MA, University of Colorado Boulder

Stade, Eric (https://experts.colorado.edu/display/fisid_100456/)
Professor: Libby Arts RAP; Professor: Mathematics; Faculty Director, Professor: Sewall RAP; Faculty Director: College of Arts and Sciences
PhD, Columbia University

Staehelin, L. Andrew
Professor Emeritus: Molecular, Cellular & Developmental Biology (MCDB)

Staffel, Julia (https://experts.colorado.edu/display/fisid_163744/)
Associate Professor: Philosophy
PhD, University of Southern California

Stafford, Gabrielle Marks (https://experts.colorado.edu/display/fisid_115917/)
Legal Writing Professor, Senior Instructor: School of Law
JD, Boston University

Stafford, Todd (https://experts.colorado.edu/display/fisid_120676/)
Legal Writing Professor, Faculty Director, Senior Instructor: School of Law
JD, Duke University

Staley, Sara J. (https://experts.colorado.edu/display/fisid_155137/)
Assistant Professor: School of Education
PhD, University of Colorado Boulder

Stallard, Robert Forster (https://experts.colorado.edu/display/fisid_144455/)
Professor Adjoint: Institute of Arctic & Alpine Research (INSTAAR)

Stallings, Michael C. (https://experts.colorado.edu/display/fisid_108745/)
Professor: Institute for Behavioral Genetics (IBG); Professor: Psychology and Neuroscience
PhD, University of Southern California

Stalvey, Harrison Edward (https://experts.colorado.edu/display/fisid_158325/)
Teaching Assistant Professor: Mathematics
PhD, Georgia State University

Stanford-McIntyre, Sarah (https://experts.colorado.edu/display/fisid_163315/)
Assistant Professor: Engineering, Ethics & Society; Assistant Professor: History
PhD, University of Wyoming

Stange, Katherine E. (https://experts.colorado.edu/display/fisid_151508/)
Associate Professor: Mathematics
PhD, Brown University

Stanley, William J. (https://experts.colorado.edu/display/fisid_103616/)
Associate Professor: Music
DMA, University of Illinois at Urbana–Champaign

Stansbury, Jeffrey W.
Professor: Chemical and Biological Engineering; Associate Dean: Materials Science & Engineering
PhD, University of Maryland

Stanton, Christina (https://experts.colorado.edu/display/fisid_156456/)
Clinical Professor: School of Law
JD, University of Colorado Boulder

Stanton, William J.
Professor Emeritus: Leeds School of Business

Stark, Theodore (https://experts.colorado.edu/display/fisid_118462/)
Teaching Professor: Theatre and Dance
MFA, Boston University

Starn, Harry Mohr (https://experts.colorado.edu/display/fisid_160803/)
Senior Instructor, Faculty Director: Leeds School of Business
MS, University of Colorado Boulder

Steen, Sara
Associate Professor: Sociology
PhD, University of Washington

Steinbrenner, Julie E. (https://experts.colorado.edu/display/fisid_152041/)
Associate Teaching Professor, Faculty Director: College of Engineering and Applied Science; Associate Chair: Mechanical Engineering
PhD, Stanford University

Steinmetz, Branden (https://experts.colorado.edu/display/fisid_165415/)
Instructor, Faculty Director: Music
DMA, Michigan State University

Stempien, Jennifer (https://experts.colorado.edu/individual/fisid_143751/)
Associate Teaching Professor: Geological Sciences
PhD, Virginia Polytechnic Institute and State University

Stenson, Kevin M. (https://experts.colorado.edu/display/fisid_128676/)
Professor, Associate Chair: Physics
PhD, University of Wisconsin–Madison

Stephan, Andrew Perry (https://experts.colorado.edu/display/fisid_159297/)
Assistant Professor: Leeds School of Business
PhD, Northwestern University

Stephen, Ricardo Hugh (https://experts.colorado.edu/display/fisid_145994/)
Senior Instructor: Biochemistry
PhD, University of Colorado Boulder

Stephenson, Craig A. (https://experts.colorado.edu/display/fisid_144851/)
Senior Instructor: Leeds School of Business
PhD, University of Arizona

Sternovsky, Zoltan (https://experts.colorado.edu/display/fisid_115211/)
Professor: Aerospace Engineering Sciences; Associate Professor: Laboratory for Atmospheric and Space Physics (LASP)
PhD, Charles University (Czech Republic)

Steup, Matthias (https://experts.colorado.edu/display/fisid_157766/)
Professor: Philosophy
PhD, Brown University

Stevens, Charlene
Associate Professor: Art and Art History
MFA, Indiana University Bloomington

Stevens, John Richard (https://experts.colorado.edu/display/fisid_145848/)
Associate Professor, Chair: Media Studies
PhD, University of Texas at Austin

Stevens, Nancy
Professor: Anthropology
PhD, Stonybrook University

Stevenson, Amanda Jean (https://experts.colorado.edu/display/fisid_157687/)
Assistant Professor: Institute of Behavioral Science (IBS); Assistant Professor: Sociology
PhD, University of Texas at Austin

Stevenson, John A. (https://experts.colorado.edu/display/fisid_101656/)
Professor: English; Faculty Director: Center for Humanities and the Arts
PhD, University of Virginia

Stewart, Amanda (https://experts.colorado.edu/display/fisid_167417/)
Instructor: Sociology
PhD, University of Illinois at Chicago

Stewart, Jennifer
Assistant Teaching Professor: Program for Writing and Rhetoric
MA, Colorado State University

Stillman, Jamy A. (https://experts.colorado.edu/display/fisid_156381/)
Associate Professor: School of Education
PhD, University of California, Los Angeles

Stimilli, David (https://experts.colorado.edu/individual/fisid_134650/)
Associate Professor Emeritus: Germanic and Slavic Languages and Literatures
PhD, Yale University

Stites, Nick
Assistant Teaching Professor Adjoint: Integrated Design Engineering
PhD, Purdue University

Stitzel, Jerry A. (https://experts.colorado.edu/display/fisid_102954/)
Professor: Institute for Behavioral Genetics (IBG); Professor: Integrative Physiology
PhD, Johns Hopkins University

Stob, Nicole R. (https://experts.colorado.edu/individual/fisid_134529/)
Assistant Teaching Professor: Integrative Physiology
PhD, Colorado State University

Stock, David W. (https://experts.colorado.edu/display/fisid_113762/)
Associate Professor: Ecology and Evolutionary Biology
PhD, University of Illinois at Urbana–Champaign

Stocke, John T.
Professor Emeritus: Astrophysical and Planetary Sciences (APS); Professor Emeritus: Center for Astrophysics & Space Astronomy (CASA)
PhD, University of Arizona

Stodieck, Louis S. (https://experts.colorado.edu/display/fisid_105272/)
Research Professor: Aerospace Engineering Sciences; Research Professor, Faculty Director: BioServe Space Technologies
PhD, University of Colorado Boulder

Stoldt, Conrad R. (https://experts.colorado.edu/display/fisid_126290/)
Professor Emeritus: Mechanical Engineering; Professor: Materials Science & Engineering
PhD, Iowa State University

Stone, Lauren Shizuko (https://experts.colorado.edu/display/fisid_154888/)
Assistant Professor: Germanic and Slavic Languages and Literatures
PhD, New York University

Stowell, Michael (https://experts.colorado.edu/display/fisid_124136/)
Associate Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, California Institute of Technology

Stratford, Jennifer M. (https://experts.colorado.edu/display/fisid_157880/)
Teaching Associate Professor: Psychology and Neuroscience
PhD, Florida State University

Straub, Anthony (https://experts.colorado.edu/display/fisid_165027/)
Assistant Professor: Civil, Environmental and Architectural Engineering
PhD, Yale University

Strauch, Bret
Assistant Teaching Professor: Program for Writing and Rhetoric
PhD, Bowling Green University

Strayhorn, Joshua Aaron (https://experts.colorado.edu/display/fisid_152584/)
Associate Professor: Political Science
PhD, Emory University

Striphas, Theodore G. (https://experts.colorado.edu/display/fisid_156205/)
Associate Professor: Media Studies
PhD, University of North Carolina Chapel Hill

Strzepek, Kenneth M.
Professor Emeritus: Civil, Environmental and Architectural Engineering

Stubblefield, Elizabeth
Teaching Assistant Professor: Psychology and Neuroscience
PhD, University of Colorado Anschutz Medical Campus

Sture, Stein
Professor Emeritus: Civil, Environmental and Architectural Engineering

Stutzer, Michael J. (https://experts.colorado.edu/display/fisid_126711/)
Professor Emeritus: Leeds School of Business
PhD, University of Minnesota Twin Cities

Su, Stephanie Wenhui (https://experts.colorado.edu/display/fisid_164186/)
Assistant Professor: Art and Art History
PhD, University of Chicago

Su, Tin Tin (https://experts.colorado.edu/display/fisid_113847/)
Professor, Chair: Molecular, Cellular & Developmental Biology (MCDB)
PhD, Carnegie Mellon University

Suding, Katharine Nash (https://experts.colorado.edu/display/fisid_116718/)
Distinguished Professor: Institute of Arctic & Alpine Research (INSTAAR); Distinguished Professor: Ecology and Evolutionary Biology
PhD, University of Michigan Ann Arbor

Sue, Christina Alicia
Associate Professor, Associate Chair: Sociology; Faculty Director, Associate Professor: Honors RAP
PhD, University of California, Los Angeles

Sueoka, Noboru
Professor Emeritus: Molecular, Cellular & Developmental Biology (MCDB)

Suess, Wren (https://experts.colorado.edu/display/fisid_174290/)
Assistant Professor: Astrophysical and Planetary Sciences (APS)
PhD, University of California Berkeley

Sullivan, Jacquelyn F.
Faculty Director: College of Engineering and Applied Science
PhD, Purdue University

Sullivan, Jennifer (https://experts.colorado.edu/display/fisid_157727/)
Assistant Teaching Professor: School of Law
JD, Duke University

Summers, Scott R. (https://experts.colorado.edu/display/fisid_113151/)
Professor Emeritus: Civil, Environmental and Architectural Engineering; Professor: Environmental Engineering Program (EVEN)
PhD, Stanford University

Sumner, Tamara (https://experts.colorado.edu/display/fisid_105742/)
Professor: Institute of Cognitive Science (ICS); Professor: Computer Science
PhD, University of Colorado Boulder

Sun, Shuo (https://experts.colorado.edu/display/fisid_165715/)
Assistant Professor: Physics
PhD, University of Maryland College Park Campus

Sunberg, Zachary (https://experts.colorado.edu/individual/fisid_165833/)
Assistant Professor: Aerospace Engineering Sciences
PhD, Stanford University

Surden, Harry Adam (https://experts.colorado.edu/display/fisid_146083/)
Professor, Faculty Director: School of Law
JD, Stanford University

Sutter, Paul Shriver (https://experts.colorado.edu/display/fisid_147513/)
Professor: History
PhD, University of Kansas

Suzuki, Ryo (https://experts.colorado.edu/display/fisid_167629/)
Assistant Professor: ATLAS Institute; Assistant Professor: Creative Technology & Design
PhD, University of Colorado Boulder

Svoboda, John D. (https://experts.colorado.edu/display/fisid_154884/)
Lecturer: Engineering Management Program
MBA, University of California-Los Angeles

Swadener, Marc
Professor Emeritus: Music

Swan, Elizabeth
Assistant Teaching Professor: Program for Writing and Rhetoric
PhD, University of South Carolina

Swanson, Elizabeth (https://experts.colorado.edu/display/fisid_159726/)
Assistant Professor, Faculty Director: Music
DMA, Northwestern University

Swanson, Joel E. (https://experts.colorado.edu/display/fisid_134311/)
Assistant Professor: Intermedia Art, Writing and Performance; Assistant Professor: ATLAS Institute; Associate Professor: Engineering, Ethics & Society; Associate Professor: Creative Technology & Design
MFA, University of California, San Diego

Swanson, Juleah Ann (https://experts.colorado.edu/display/fisid_155854/)
Associate Professor: University Libraries
MLS, University of Washington

Swanson, Shawn (https://experts.colorado.edu/display/fisid_168257/)
Instructor: Economics
PhD, University of Colorado Boulder

Sweeney, Derek Michael (https://experts.colorado.edu/display/fisid_131083/)
Instructor: Ecology and Evolutionary Biology; Associate Faculty Director: International Education
MA, University of Colorado Boulder

Sweetman, Alex John (https://experts.colorado.edu/display/fisid_100531/)
Associate Professor: Art and Art History
MFA, SUNY at Buffalo

Sylvester, Roshanna (https://experts.colorado.edu/display/fisid_164037/)
Associate Professor: Engineering, Ethics & Society; Associate Professor: Critical Media Practices
PhD, Yale University

Symons, James M.
Professor Emeritus: Theatre and Dance

Syvitski, James P. (https://experts.colorado.edu/display/fisid_107424/)
Professor: Institute of Arctic & Alpine Research (INSTAAR)
PhD, University of British Columbia (Canada)

Szendrei, Agnes Erzsebet (https://experts.colorado.edu/display/fisid_130160/)
Professor Emerita: Mathematics
DSc, Hungarian Academy of Sciences (Hungary)

# T

Taatjes, Dylan J. (https://experts.colorado.edu/display/fisid_102436/)
Professor: Biochemistry
PhD, University of Colorado Boulder

Tabatabaie, Sara (https://experts.colorado.edu/display/fisid_164969/)
Teaching Assistant Professor: Environmental Design
Ph.D., University of Colorado Boulder

Talbot, Brian (https://experts.colorado.edu/display/fisid_147617/)
Associate Professor: Philosophy
PhD, University of Southern California

Tallman, Kathryn Wood (https://experts.colorado.edu/display/fisid_152383/)
Assistant Professor: University Libraries
MS, University of Illinois at Urbana–Champaign

Tan, Andrew Q. (https://experts.colorado.edu/display/fisid_167426/)
Assistant Teaching Professor: Integrative Physiology
PhD, Northwestern University

Tan, Wei (https://experts.colorado.edu/display/fisid_141464/)
Associate Professor: Mechanical Engineering; Associate Professor: Materials Science & Engineering; Associate Professor: Biomedical Engineering
PhD, University of Illinois at Chicago

Tashakori, Parisa (https://experts.colorado.edu/display/fisid_166723/)
Faculty Director, Assistant Teaching Professor: Advertising, Public Relations and Media Design
MA, Islamic Azad University (Iran)

Taylor, Allan R.
Professor Emeritus: Linguistics

Taylor, Bryan Copeland (https://experts.colorado.edu/display/fisid_107421/)
Professor: Communication; Faculty Director: College of Media, Communication & Information
PhD, University of Utah

Taylor, Edward V. (https://experts.colorado.edu/display/fisid_151510/)
Associate Teaching Professor: School of Education
PhD, University of California, Berkeley

Taylor, John
Professor Emeritus: Physics
PhD, University of California, Berkeley

Taylor, Robert H.
Professor Emeritus: Leeds School of Business

Taylor, Rodney L.
Professor Emeritus: Religious Studies

Taylor, Ronald G.
Professor Emeritus: Psychology and Neuroscience

Taylor, Ross (https://experts.colorado.edu/display/fisid_156501/)
Assistant Professor: Journalism
MS, Syracuse University

Taylor, Scott (https://experts.colorado.edu/display/fisid_156318/)
Assistant Professor: Ecology and Evolutionary Biology; Faculty Director: International Education; Faculty Director: Institute of Arctic & Alpine Research (INSTAAR)
PhD, Queen's University (Canada)

Taylor, William T. (https://experts.colorado.edu/display/fisid_165652/)
Assistant Professor: Museum and Field Studies; Assistant Professor: Anthropology
PhD, University of New Mexico

Techera, Ulises (https://experts.colorado.edu/display/fisid_163403/)
Associate Teaching Professor: Civil, Environmental and Architectural Engineering
PhD, University of Colorado, Boulder

Teitelbaum, Benjamin Raphael (https://experts.colorado.edu/display/fisid_151338/)
Associate Professor: Music; Assistant Professor: International Affairs Program
PhD, Brown University

Templeton, Alexis S. (https://experts.colorado.edu/display/fisid_141202/)
Professor: Geological Sciences
PhD, Stanford University

Tennant, Sherri
Clinical Assistant Professor: Speech, Language and Hearing Sciences (SLHS)
MS, University of Wisconsin Madison

Teufel, John D.
Lecturer: Physics
PhD, Yale University

Thaler, Eric R. (https://experts.colorado.edu/display/fisid_155505/)
Associate Teaching Professor: Applied Mathematics
PhD, University of Colorado Boulder

Thayer, Jeffrey P. (https://experts.colorado.edu/display/fisid_134469/)
Professor Emeritus, Endowed/Named Professor, Faculty Director: College of Engineering and Applied Science; Professor: Colorado Center for Astrodynamics Research (CCAR); Research Professor, Professor: Electrical, Computer and Energy Engineering (ECEE); Director: Aerospace Engineering Sciences
PhD, University of Michigan Ann Arbor

Theodore, Michael (https://experts.colorado.edu/display/fisid_113318/)
Associate Professor: Music; Associate Professor: Art and Art History; Associate Professor: Intermedia Art, Writing and Performance
PhD, University of California, San Diego

Thibodeau, Thomas G. (https://experts.colorado.edu/display/fisid_134750/)
Professor Emeritus: Leeds School of Business
PhD, SUNY at Stony Brook

Thiem, Franz Nathaniel (https://experts.colorado.edu/display/fisid_144618/)
Professor, Associate Chair: Mathematics
PhD, University of Wisconsin–Madison

Thieman Dino, Angela Lea (https://experts.colorado.edu/display/fisid_145591/)
Senior Instructor: College of Engineering and Applied Science; Teaching Professor: Engineering, Ethics & Society
PhD, University of Colorado Boulder

Thomas, Evan (https://experts.colorado.edu/display/fisid_163895/)
Professor, Assistant Professor: Civil, Environmental and Architectural Engineering
PhD, University of Colorado Boulder

Thomas, Gary E.
Professor Emeritus: Astrophysical and Planetary Sciences (APS)

Thomas, John (https://experts.colorado.edu/display/fisid_167167/)
Scholar in Residence: Engineering Management Program
PhD, Arizona State University

Thomas, Kyle (https://experts.colorado.edu/display/fisid_165253/)
Assistant Professor: Sociology
PhD, University of Maryland College Park Campus

Thomas, Susan
Professor, Faculty Director: Music
PhD, Brandeis University

Thomas-Ruzic, Maria L.
Senior Instructor Emerita: Linguistics

Thompson, James Karl (https://experts.colorado.edu/display/fisid_144585/)
Professor Adjoint: Physics
PhD, Massachusetts Institute of Technology

Thompson, Jane Ellen (https://experts.colorado.edu/display/fisid_103388/)
Senior Instructor Emerita: School of Law
JD, University of Denver

Thornton, Michael Robert (https://experts.colorado.edu/display/fisid_116318/)
Professor: Music
BM, Temple University

Thrall, Lloyd Gregory
Associate Faculty Director: Computer Science
MA, University of London (England)

Tiampo, Kristy F. (https://experts.colorado.edu/display/fisid_155908/)
Professor: Geological Sciences; Professor: Cooperative Institute for Research in Environmental Sciences (CIRES)
PhD, University of Colorado Boulder

Tice, Frances M. (https://experts.colorado.edu/display/fisid_156018/)
Assistant Professor: Leeds School of Business
PhD, Texas A&M University

Tierney, Kathleen Jane (https://experts.colorado.edu/individual/fisid_125978/)
Professor Emerita: Institute of Behavioral Science (IBS); Professor Emerita: Sociology
PhD, Ohio State University

Tietjen, Jill S.
Lecturer: College of Engineering and Applied Science

Timmer, Joseph (https://experts.colorado.edu/display/fisid_156565/)
Teaching Associate Professor: Mathematics
PhD, University of Southern California

Tir, Jaroslav (https://experts.colorado.edu/display/fisid_149842/)
Professor: Political Science
PhD, University of Illinois at Urbana–Champaign

Tisdale, Joany (https://experts.colorado.edu/display/fisid_172327/)
Assistant Teaching Professor: Integrated Design Engineering
PhD, University of Colorado Boulder

Tobey, Kathryn
Scholar in Residence: Engineering Management Program
ME, University of Colorado Boulder

Tolbert, Margaret A. (https://experts.colorado.edu/display/fisid_104976/)
Distinguished Professor: Cooperative Institute for Research in Environmental Sciences (CIRES); Distinguished Professor: Chemistry
PhD, California Institute of Technology

Tompkins, Elaine V.
Professor Emeritus: College of Media, Communication & Information

Tompkins, Phillip K.
Professor Emeritus: College of Media, Communication & Information

Toney, Michael (https://experts.colorado.edu/individual/fisid_167235/)
Professor: Physics; Professor: Chemical and Biological Engineering
PhD, University of Washington

Tong, Wenfeng (https://experts.colorado.edu/display/fisid_144520/)
Professor, Chair: Leeds School of Business
PhD, The Ohio State University

Toohey, Darin W. (https://experts.colorado.edu/display/fisid_110652/)
Professor: Global RAP; Professor: Atmospheric and Oceanic Sciences (ATOC); Faculty Director: Residential Acad Program-SSI
PhD, Harvard University

Toomre, Juri (https://experts.colorado.edu/display/fisid_100767/)
Professor, Professor Emeritus: Astrophysical and Planetary Sciences (APS)
PhD, University of Cambridge (England)

Toon, Owen Brian (https://experts.colorado.edu/display/fisid_110521/)
Professor: Laboratory for Atmospheric and Space Physics (LASP); Professor: Atmospheric and Oceanic Sciences (ATOC)
PhD, Cornell University

Torres-Machi, Cristina (https://experts.colorado.edu/display/fisid_159884/)
Assistant Professor: Civil, Environmental and Architectural Engineering
PhD, Universitat Politecnica de Valencia, Spain

Torriani, Chiara (https://experts.colorado.edu/display/fisid_132725/)
Associate Teaching Professor: French & Italian
PhD, Universita Statale Di Milano

Tracey, Michael (https://experts.colorado.edu/display/fisid_104259/)
Professor Emeritus: Media Studies; Lecturer: Continuing Education & Professional Studies
PhD, Univ of Leicester (England)

Tracy, John A.
Professor Emeritus: Leeds School of Business

Tracy, Karen (https://experts.colorado.edu/display/fisid_101190/)
Faculty Director: College of Media, Communication & Information
PhD, University of Wisconsin–Madison

Trager, Robert
Professor Emeritus: Media Studies

Travers, Art
Professor Emeritus: School of Law
LLB, Harvard University

Travis, William R. (https://experts.colorado.edu/display/fisid_101777/)
Associate Professor: Geography; Faculty Director, Associate Professor: Cooperative Institute for Research in Environmental Sciences (CIRES)
PhD, Clark University

Tripp, Erin Anne (https://experts.colorado.edu/display/fisid_152313/)
Associate Professor: Museum and Field Studies; Associate Professor: Ecology and Evolutionary Biology
PhD, Duke University

Trivedi, Ashutosh (https://experts.colorado.edu/display/fisid_156589/)
Associate Professor: Computer Science; Assistant Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, University of Warwick (UK)

Trnka-Amrhein, Yvona (https://experts.colorado.edu/display/fisid_159294/)
Assistant Professor: Classics
PhD, Harvard University

Trower, Lizzy (https://experts.colorado.edu/display/fisid_159463/)
Assistant Professor: Geological Sciences
PhD, Stanford University

Truelove, Yaffa Elane (https://experts.colorado.edu/display/fisid_159271/)
Assistant Professor: Geography; Assistant Professor: International Affairs Program
PhD, University of Cambridge (England)

Trujillo, Nicole (https://experts.colorado.edu/display/fisid_163424/)
Assistant Professor: University Libraries
MS, University of Strathclyde

Truong, Le Hoang (https://experts.colorado.edu/display/fisid_172198/)
Assistant Teaching Professor: Computer Science
PhD, University of Colorado Boulder

Tsai, Janet Yi-Jen (https://experts.colorado.edu/display/fisid_156447/)
Associate Teaching Professor, Lecturer: Integrated Teaching & Learning (ITL) Program; Associate Chair: Mechanical Engineering
PhD, University of Colorado Boulder

Tsai, Pei-San (https://experts.colorado.edu/display/fisid_115292/)
Professor: Integrative Physiology
PhD, University of California, Berkeley

Tsouhlarakis, Georgianna (https://experts.colorado.edu/display/fisid_165957/)
Assistant Professor: Art and Art History
MFA, Yale University

Tubbs, Robert
Associate Professor: Miramontes Arts & Sciences Program (MASP)
PhD, Pennsylvania State University

Tucker, Gregory E. (https://experts.colorado.edu/display/fisid_130605/)
Professor: Cooperative Institute for Research in Environmental Sciences (CIRES); Professor: Geological Sciences
PhD, Pennsylvania State University

Tucker, Kathryn
Clinical Assistant Professor: Speech, Language and Hearing Sciences (SLHS)
MA, University of Colorado Boulder

Tufo, Henry (https://experts.colorado.edu/display/fisid_127040/)
Professor: Computer Science
PhD, Brown University

Turetsky, Merritt (https://experts.colorado.edu/display/fisid_165975/)
Professor: Ecology and Evolutionary Biology
PhD, University of Alberta (Canada)

Turner, A. Kane
Lecturer: Engineering, Ethics & Society
PhD, University of Dallas

Tzavella-Evjen, Terpsichori H.
Professor Emerita: Classics

# U

Ullom, Joel
Lecturer: Physics
PhD, Harvard University

Ulmer, Keith A. (https://experts.colorado.edu/display/fisid_144871/)
Associate Professor: Physics
PhD, University of Colorado Boulder

Upadhyay, Nishant (https://experts.colorado.edu/display/fisid_166101/)
Assistant Professor: Ethnic Studies
PhD, York University

Urland, Geoffrey Raymond (https://experts.colorado.edu/display/fisid_151086/)
Lecturer: Continuing Education & Professional Studies
PhD, University of Colorado Boulder

Urrea, Gloria (https://experts.colorado.edu/display/fisid_165311/)
Assistant Professor: Leeds School of Business
PhD, Università della Svizzera italiana, Switzerland

Uzdensky, Dmitri Anatoljevich (https://experts.colorado.edu/display/fisid_147430/)
Professor: Physics; Faculty Director: Center for Integrated Plasma Studies (CIPS)
PhD, Princeton University

# V

Vaida, Veronica (https://experts.colorado.edu/display/fisid_100313/)
Professor Emeritus: Chemistry
PhD, Yale University

Valdovino, Luis Hector (https://experts.colorado.edu/display/fisid_101863/)
Professor: Art and Art History
MFA, University of Illinois at Urbana–Champaign

Valente-Quinn, Brian Dennis (https://experts.colorado.edu/display/fisid_155973/)
Associate Professor: French & Italian
PhD, University of California, Los Angeles

Valkovci, Mark
Lecturer: Economics
PhD, University of Colorado Boulder

Valladares, Michelle
Associate Research Professor, Associate Director: School of Education
PhD, University of California, Los Angeles

Van Atten, Bill
Lecturer: Engineering Management Program
MS, Johns Hopkins University

Van Blerkom, Jonathan (https://experts.colorado.edu/display/fisid_100545/)
Research Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, University of Colorado Boulder

Van Boven, Leaf D. (https://experts.colorado.edu/display/fisid_126291/)
Professor: Psychology and Neuroscience
PhD, Cornell University

Van Buskirk, Allison (https://experts.colorado.edu/display/fisid_159795/)
Assistant Teaching Professor: School of Education
MA, Naropa University

van de Lagemaat, Jao (https://experts.colorado.edu/display/fisid_148357/)
Assistant Professor: Materials Science & Engineering

Van Gerven, Dennis P.
Professor Emeritus: Anthropology

Van Hoye, Allan (https://experts.colorado.edu/individual/fisid_158902/)
Teaching Assistant Professor: University Libraries
MLIS, University of Denver

Van Nelson, Loredana Alina (https://experts.colorado.edu/display/fisid_142722/)
Associate Teaching Professor: French & Italian
PhD, University of Colorado Boulder

Van Schilfgaarde, Mark
Lecturer: Physics
PhD, Stanford University

Van Vliet, Willem K.T.
Professor Emeritus: Environmental Design

Van Vuuren, Sarel (https://experts.colorado.edu/display/fisid_124159/)
Associate Research Professor: Institute of Cognitive Science (ICS)
PhD, Oregon Graduate Institute of Science Technology

Van Wesep, Edward D. (https://experts.colorado.edu/display/fisid_154573/)
Associate Professor: Leeds School of Business
PhD, Stanford University

Van Zeghbroeck, Bart J. (https://experts.colorado.edu/display/fisid_104113/)
Professor, Faculty Director: College of Engineering and Applied Science; Associate Chair: Electrical, Computer and Energy Engineering (ECEE)
PhD, University of Colorado Boulder

Vance, Eric (https://experts.colorado.edu/display/fisid_158342/)
Associate Professor: Applied Mathematics
PhD, Duke University

Vance, Marina E. (https://experts.colorado.edu/display/fisid_158217/)
Assistant Professor: Mechanical Engineering; Assistant Professor: Environmental Engineering Program (EVEN)
PhD, Virginia Polytechnic Institute and State University

VandenBosch, Adrienne (https://experts.colorado.edu/display/fisid_173167/)
Teaching Assistant Professor: University Libraries
MLS, University of Denver

Vanderbeek, Greg (https://experts.colorado.edu/display/fisid_159741/)
Assistant Teaching Professor: Mechanical Engineering
MS, Colorado School of Mines

Vanderheiden, Steven Jon (https://experts.colorado.edu/display/fisid_144759/)
Professor: Political Science
PhD, University of Wisconsin–Madison

Vandermarliere, Sandrine (https://experts.colorado.edu/display/fisid_143482/)
Assistant Teaching Professor: French & Italian
PhD, University of Colorado Boulder

Vandersall, Amy L.
Professor Emerita: Art and Art History

Varanasi, Mahesh K. (https://experts.colorado.edu/display/fisid_103090/)
Professor: Electrical, Computer and Energy Engineering (ECEE); Professor: Mathematics
PhD, Rice University

Vargas, Edgar (https://experts.colorado.edu/display/fisid_174781/)
Assistant Teaching Professor: Spanish and Portuguese
PhD, University of Houston

Vargo, Christopher (https://experts.colorado.edu/display/fisid_158320/)
Associate Professor: Advertising, Public Relations and Media Design; Lecturer: Continuing Education & Professional Studies; Associate Professor: Leeds School of Business
PhD, University of North Carolina

Vàsconez, Sandra L. (https://experts.colorado.edu/display/fisid_144198/)
Teaching Professor: Civil, Environmental and Architectural Engineering
MA, University of Denver

Vasile, Olga (https://experts.colorado.edu/display/fisid_156596/)
Assistant Teaching Professor: French & Italian
MA, University of Notre Dame

Veblen, Thomas T. (https://experts.colorado.edu/display/fisid_105842/)
Distinguished Professor Emeritus: Geography
PhD, University of California, Berkeley

Velasquez, Alvara (https://experts.colorado.edu/display/fisid_172313/)
Visiting Assistant Professor: Computer Science
PhD, University of Central Florida

Velte, Ashlyn (https://experts.colorado.edu/individual/fisid_165254/)
Assistant Professor: University Libraries
MLIS, University of North Carolina at Chapel Hill

Vernerey, Divya E. (https://experts.colorado.edu/display/fisid_145131/)
Teaching Professor: Computer Science
PhD, Northwestern University

Vernerey, Franck J. (https://experts.colorado.edu/display/fisid_144760/)
Professor: Mechanical Engineering; Associate Professor: Materials Science & Engineering
PhD, Northwestern University

Veveer, Elaina
Assistant Teaching Professor: School of Education
MA, University of Colorado Boulder

Vigers, Alison Jane
Instructor, Associate Faculty Director: Health Professions RAP; Instructor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, University of Colorado Denver

Villanea, Fernando (https://experts.colorado.edu/individual/fisid_168227/)
Assistant Professor: Anthropology
PhD, Washington State University

Villanueva, Nicholas (https://experts.colorado.edu/display/fisid_158252/)
Assistant Professor, Associate Chair: Ethnic Studies; Faculty Director: International Education
PhD, Vanderbilt University

Voakes, Paul S.
Professor Emeritus: Journalism

Vodehnal, Carrie (https://experts.colorado.edu/display/fisid_158066/)
Instructor: Environmental Studies Program
PhD, Washington University in Saint Louis

Voeltz, Gia Kaarina (https://experts.colorado.edu/display/fisid_143587/)
Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, Yale University

Voida, Amy Kathryn Mitchell (https://experts.colorado.edu/display/fisid_155855/)
Associate Professor: Computer Science; Associate Professor: Information Science
PhD, Georgia Institute of Technology

Voida, Stephen A. (https://experts.colorado.edu/display/fisid_155856/)
Assistant Professor: Information Science; Associate Professor: Computer Science
PhD, Georgia Institute of Technology

Volkamer, Rainer (https://experts.colorado.edu/display/fisid_144988/)
Professor: Chemistry
PhD, University of Heidelberg (Germany)

Volpone, Sabrina D. (https://experts.colorado.edu/display/fisid_158941/)
Associate Professor: Leeds School of Business
PhD, Temple University

von der Nuell, Tobin D. (https://experts.colorado.edu/display/fisid_113896/)
Associate Teaching Professor: Program for Writing and Rhetoric
MA, University of Colorado Boulder

von der Wense, Katharina (https://experts.colorado.edu/display/fisid_166417/)
Assistant Professor: Computer Science
PhD, University of Munich (Germany)

Vossen, Thomas Wilhelmus (https://experts.colorado.edu/display/fisid_126642/)
Associate Professor: Leeds School of Business
PhD, University of Maryland, College Park

Vriend, Nathalie Maria (https://experts.colorado.edu/display/fisid_165036/)
Associate Professor: Mechanical Engineering
PhD, California Institute of Technology

## W

Waddell, Ethan
Assistant Professor: Asian Languages and Civilizations
PhD, University of Chicago

Wadsworth, Thomas Pearson (https://experts.colorado.edu/display/fisid_144382/)
Associate Professor, Lecturer: Continuing Education & Professional Studies; Chair: Sociology
PhD, University of Washington

Waggoner, Bo (https://experts.colorado.edu/individual/fisid_164188/)
Assistant Professor: Computer Science
PhD, Harvard University

Waggoner, Michael
Professor Emeritus: School of Law
LLB, Harvard University

Wagner, Jamie
Teaching Assistant Professor: University Libraries
MLS, University of Wisconsin

Wagner, Kelvin (https://experts.colorado.edu/display/fisid_105344/)
Professor: Electrical, Computer and Energy Engineering (ECEE)
PhD, California Institute of Technology

Wagner, Stephen R. (https://experts.colorado.edu/display/fisid_139773/)
Professor Attendant Rank: Physics
PhD, Johns Hopkins University

Walba, David M. (https://experts.colorado.edu/display/fisid_105830/)
Professor: Chemistry; Professor: Materials Science & Engineering
PhD, California Institute of Technology

Walczak, Maciej Andrzej (https://experts.colorado.edu/display/fisid_153323/)
Associate Professor: Chemistry
PhD, University of Pittsburgh

Walden, Glenda D. (https://experts.colorado.edu/display/fisid_105898/)
Senior Instructor: Sociology
PhD, University of Colorado Boulder

Waldman, Donald M.
Professor Emeritus: Economics

Walker, Deward E. Jr
Professor Emeritus: Anthropology; Professor Emeritus: Ethnic Studies

Walker, Melanie (https://experts.colorado.edu/display/fisid_101750/)
Associate Professor: Art and Art History
MFA, Florida State University

Walker, Michael Edward (https://experts.colorado.edu/display/fisid_155103/)
Instructor: Environmental Engineering Program (EVEN); Faculty Director: College of Engineering and Applied Science; Associate Teaching Professor: Mechanical Engineering
PhD, Illinois Institute of Technology

Walkes, Dan
Lecturer: Electrical, Computer and Energy Engineering (ECEE)

Walter, Douglas W. (https://experts.colorado.edu/display/fisid_101811/)
Professor: Music
DMA, Temple University

Walter, Martin E. (https://experts.colorado.edu/display/fisid_105263/)
Professor Emeritus: Mathematics
PhD, University of California, Irvine

Wanderer, Jules J.
Professor Emeritus: Sociology

Wang, Clare (https://experts.colorado.edu/display/fisid_165260/)
Associate Professor, Faculty Director: Leeds School of Business
PhD, University of Pennsylvania, The Wharton School

Wang, Mia (https://experts.colorado.edu/display/fisid_173497/)
Assistant Professor: Advertising, Public Relations and Media Design
PhD, University of Illinois at Urbana-Champaign

Wang, Xiang (https://experts.colorado.edu/display/fisid_145812/)
Associate Professor: Chemistry
PhD, Boston University

Wang, Xinyue (https://experts.colorado.edu/display/fisid_173884/)
Assistant Professor: Atmospheric and Oceanic Sciences (ATOC)
PhD, Purdue University

Wang, Xu (https://experts.colorado.edu/display/fisid_141619/)
Lecturer: Physics
PhD, University of Wisconsin-Madison

Wang, Yanwen
Assistant Professor: Leeds School of Business
PhD, Emory University

Wang, Zhiyi (https://experts.colorado.edu/display/fisid_167339/)
Assistant Professor: Leeds School of Business
PhD, National University of Singapore (Singapore)

Ward, Wayne Hinson (https://experts.colorado.edu/display/fisid_114680/)
Research Professor: Institute of Cognitive Science (ICS); Research Professor: Computer Science
PhD, University of Colorado Boulder

Wartell, Rebecca (https://experts.colorado.edu/display/fisid_164288/)
Teaching Assistant Professor: Jewish Studies
PhD, Monash University

Washburn, Brian R.
Lecturer: Physics
PhD, Georgia Institute of Technology

Waters, Brian Todd (https://experts.colorado.edu/display/fisid_155846/)
Assistant Professor: Leeds School of Business
PhD, University of California, Los Angeles

Waters, Keith John (https://experts.colorado.edu/display/fisid_107518/)
Professor: Music
PhD, University of Rochester

Watkins, Alexander Charlton (https://experts.colorado.edu/display/fisid_151514/)
Associate Professor: University Libraries
MLS, Pratt Institute

Watkins, Linda R. (https://experts.colorado.edu/display/fisid_101513/)
Distinguished Professor: Psychology and Neuroscience
PhD, Virginia Commonwealth University

Weaver, Benjamin
Assistant Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, University of Kansas

Weaver, Kay (https://experts.colorado.edu/display/fisid_167189/)
Chair, Professor: Advertising, Public Relations and Media Design
PhD, University of Stirling (Scotland)

Weaver, Zachary (https://experts.colorado.edu/display/fisid_166757/)
Assistant Teaching Professor: Creative Technology & Design; Assistant Teaching Professor: ATLAS Institute
MArch, Carnegie Mellon University

Webb, David C. (https://experts.colorado.edu/display/fisid_141204/)
Associate Professor: School of Education; Associate Professor: Mathematics
PhD, University of Wisconsin–Madison

Weber, Beverly Marie (https://experts.colorado.edu/display/fisid_144523/)
Chair, Professor: Germanic and Slavic Languages and Literatures; Professor: Jewish Studies
PhD, University of Massachusetts Amherst

Weber, Jorg Mathias (https://experts.colorado.edu/display/fisid_142930/)
Professor: Chemistry
PhD, University of Kaiserslautern (Germany)

Weber, Stephanie
Assistant Professor: Economics
PhD, Yale University

Wehner, Jeanne M.
Professor Emerita: Psychology and Neuroscience

Wei, William (https://experts.colorado.edu/display/fisid_100864/)
Professor: History
PhD, University of Michigan Ann Arbor

Weidman, Patrick D.
Professor Emeritus: Mechanical Engineering

Weimer, Alan W. (https://experts.colorado.edu/display/fisid_109152/)
Professor: Chemical and Biological Engineering; Endowed/Named Professor: College of Engineering and Applied Science; Professor: Materials Science & Engineering
PhD, University of Colorado Boulder

Weiser, Philip J. (https://experts.colorado.edu/display/fisid_114575/)
Adjunct Faculty, Dean Emeritus, Professor: School of Law
JD, New York University

Weiss, Jeffrey B. (https://experts.colorado.edu/display/fisid_102145/)
Chair, Professor: Atmospheric and Oceanic Sciences (ATOC)
PhD, University of California, Berkeley

Weiss, Meta (https://experts.colorado.edu/display/fisid_164484/)
Senior Instructor: Music
DMA, The Juilliard School

Welker, Cara (https://experts.colorado.edu/display/fisid_168549/)
Assistant Professor: Biomedical Engineering; Assistant Professor: Mechanical Engineering
Ph.D., Stanford University

Welner, Kevin G. (https://experts.colorado.edu/display/fisid_115565/)
Professor Emeritus: School of Education
PhD, University of California, Los Angeles

Welsh, Megan Elizabeth (https://experts.colorado.edu/display/fisid_153633/)
Associate Professor: University Libraries
MLIS, University of Denver

Wenger, Paula (https://experts.colorado.edu/display/fisid_113621/)
Associate Teaching Professor: Program for Writing and Rhetoric; Senior Instructor: Leeds School of Business
MA, Miami University–Oxford

Werner, LJ (https://experts.colorado.edu/display/fisid_154952/)
Scholar in Residence: Speech, Language and Hearing Sciences (SLHS)
MA, University of Colorado Denver

Werner, Walter Bradley (https://experts.colorado.edu/display/fisid_158225/)
Instructor, Faculty Director: Leeds School of Business
MBA, University of Chicago

Wertheimer, Michael
Professor Emeritus: Psychology and Neuroscience

Wessman, Carol A. (https://experts.colorado.edu/display/fisid_100909/)
Professor Emerita: Cooperative Institute for Research in Environmental Sciences (CIRES); Professor Emerita: Environmental Studies Program; Professor Emerita: Ecology and Evolutionary Biology
PhD, University of Wisconsin–Madison

Wesson, Marianne
Professor Emerita: School of Law
JD, University of Texas at Austin

West, Colin G. (https://experts.colorado.edu/display/fisid_163336/)
Associate Teaching Professor: Physics
PhD, Stony Brook University

Weston, Timothy B. (https://experts.colorado.edu/display/fisid_107605/)
Associate Professor: History; Faculty Director: International Education
PhD, University of California, Berkeley

Wetherbee, Charles Tyler
Associate Professor: Music
BM, Curtis Institute of Music

Wherren, Anna Katherine (https://experts.colorado.edu/display/fisid_173982/)
Librarian: Law Library
JD, New England School of Law

Whisman, Mark (https://experts.colorado.edu/display/fisid_113391/)
Professor: Psychology and Neuroscience
PhD, University of Washington

White, Cindy Hagemeier (https://experts.colorado.edu/display/fisid_107461/)
Associate Professor: Communication; Associate Dean: College of Media, Communication & Information
PhD, University of Arizona

White, James (https://experts.colorado.edu/display/fisid_102726/)
Professor: Institute of Arctic & Alpine Research (INSTAAR); Dean: College of Arts and Sciences; Professor: Environmental Studies Program
PhD, Columbia University

White, Philip (https://experts.colorado.edu/display/fisid_157730/)
Associate Professor: University Libraries
MLIS, University of North Carolina at Greensboro

White, Terrenda Corisa (https://experts.colorado.edu/display/fisid_152828/)
Associate Professor: School of Education
PhD, Teachers College at Columbia University

White, Timothy J. (https://experts.colorado.edu/display/fisid_163899/)
Professor, Endowed/Named Professor: College of Engineering and Applied Science; Professor: Materials Science & Engineering; Associate Chair: Chemical and Biological Engineering
PhD, University of Iowa

Whitehead, Deborah Faith (https://experts.colorado.edu/display/fisid_144239/)
Associate Professor, Chair: Religious Studies
ThD, Harvard University

Whitehead, Timothy Andrew (https://experts.colorado.edu/display/fisid_164364/)
Associate Professor: Chemical and Biological Engineering
PhD, University of California-Berkeley

Whiteley, Aaron (https://experts.colorado.edu/display/fisid_166299/)
Assistant Professor: Biochemistry
PhD, University of California, Berkeley

Whiteley, Alexandra (https://experts.colorado.edu/display/fisid_166300/)
Assistant Professor: Biochemistry
PhD, University of California, San Francisco

Whiting, Gregory L. (https://experts.colorado.edu/display/fisid_159727/)
Associate Professor: Mechanical Engineering; Associate Professor: Materials Science & Engineering
PhD, University of Cambridge (England)

Whitt, Jan
Professor Emeritus: Journalism; Lecturer: Continuing Education & Professional Studies
PhD, University of Denver

Wiedinmeyer, Christine
Research Professor: Mechanical Engineering
PhD, University of Texas at Austin

Wieman, Carl E. (https://experts.colorado.edu/display/fisid_105375/)
Faculty Director: Center for Science Education
PhD, Stanford University

Wiersma, Gabrielle Somnee (https://experts.colorado.edu/display/fisid_145475/)
Associate Professor: University Libraries
MLIS, University of Denver

Wiese, Annjeanette Michelle (https://experts.colorado.edu/display/fisid_146485/)
Teaching Associate Professor, Associate Chair: Humanities
PhD, University of Colorado Boulder

Wilcox, Bethany R. (https://experts.colorado.edu/display/fisid_156075/)
Assistant Professor: Physics
PhD, University of Colorado Boulder

Wilkerson, Donald (https://experts.colorado.edu/display/fisid_104406/)
Associate Teaching Professor: Physics
MA, University of Colorado Boulder

Wilkins, Helanius J. (https://experts.colorado.edu/display/fisid_155486/)
Assistant Professor, Associate Chair: Theatre and Dance
MFA, George Washington University

Willcutt, Erik G. (https://experts.colorado.edu/display/fisid_113861/)
Professor: Psychology and Neuroscience
PhD, University of Denver

William, Kaspar J.
Professor Emeritus: Civil, Environmental and Architectural Engineering

Williams, Christopher (https://experts.colorado.edu/display/fisid_105765/)
Research Professor: Aerospace Engineering Sciences
PhD, University of Colorado Boulder

Williams, Lawrence Edwin Jr. (https://experts.colorado.edu/display/fisid_145743/)
Associate Professor: Leeds School of Business
PhD, Yale University

Williams, Letitia S.
Senior Instructor Emerita: Theatre and Dance

Williams, Mark W.
Professor Emeritus: Institute of Arctic & Alpine Research (INSTAAR)

Williamson, James A.
Lecturer: Electrical, Computer and Energy Engineering (ECEE)

Willis, Erin (https://experts.colorado.edu/display/fisid_156068/)
Associate Professor: Advertising, Public Relations and Media Design; Faculty Director: Communication & Society RAP
PhD, University of Missouri–Columbia

Willis, John Matthew (https://experts.colorado.edu/display/fisid_140095/)
Associate Professor: History
PhD, New York University

Willis, Michael John (https://experts.colorado.edu/display/fisid_158345/)
Assistant Professor: Cooperative Institute for Research in Environmental Sciences (CIRES)
PhD, The Ohio State University

Wilson, Andrew
Lecturer: Physics
PhD, University of Otago (New Zealand)

Wilson, Andrew (https://experts.colorado.edu/individual/fisid_159824/)
Associate Teaching Professor: Program for Writing and Rhetoric; Associate Faculty Director: Global RAP
PhD, University of Florida

Wilson, James R.
Professor Emeritus: Psychology and Neuroscience

Wilson, John B.
Professor Emeritus: Art and Art History

Wilson, Terri Suzanne (https://experts.colorado.edu/display/fisid_155469/)
Associate Professor, Faculty Director: School of Education
PhD, Columbia University

Windell, John T.
Professor Emeritus: Ecology and Evolutionary Biology

Windell, Maria A. (https://experts.colorado.edu/display/fisid_154605/)
Associate Professor: English
PhD, University of Virginia

Wineland, David J. (https://experts.colorado.edu/display/fisid_119931/)
Professor Adjoint: Physics
PhD, Harvard University

Wing, Boswell A. (https://experts.colorado.edu/display/fisid_158302/)
Associate Professor: Geological Sciences
PhD, Johns Hopkins University

Wingate, Kathryn (https://experts.colorado.edu/display/fisid_164029/)
Associate Teaching Professor: Aerospace Engineering Sciences
PhD, University of Colorado Boulder

Wingo, Ajume (https://experts.colorado.edu/display/fisid_144391/)
Associate Professor: Philosophy
PhD, University of Wisconsin–Madison

Winkiel, Laura Ann (https://experts.colorado.edu/display/fisid_145813/)
Associate Professor, Associate Chair: English
PhD, University of Notre Dame

Winn, Daryl
Professor Emeritus: Leeds School of Business

Winston, Paul W.
Professor Emeritus: Ecology and Evolutionary Biology

Winters, Andrew (https://experts.colorado.edu/display/fisid_165835/)
Assistant Professor: Atmospheric and Oceanic Sciences (ATOC)
PhD, University of Wisconsin–Madison

Wise, Jonathan (https://experts.colorado.edu/display/fisid_151516/)
Associate Professor: Mathematics
PhD, Brown University

Wise, Matthew Eric (https://experts.colorado.edu/display/fisid_143977/)
Senior Instructor, Faculty Director, Associate Chair: Chemistry
PhD, University of Colorado Boulder

Wobbekind, Richard (https://experts.colorado.edu/display/fisid_100997/)
Associate Dean, Lecturer: Leeds School of Business
PhD, University of Colorado Boulder

Wolfe, Lynn Robert
Professor Emeritus: Art and Art History

Wolkowisky, Jay H.
Professor Emeritus: Mathematics

Wolzien, Charles
Professor Emeritus: Music

Womack, Mike Fitzgerald (https://experts.colorado.edu/display/fisid_148502/)
Associate Professor, Associate Chair: Art and Art History
MFA, Pratt Institute

Wood, Peter H. (https://experts.colorado.edu/display/fisid_151977/)
Professor Adjunct: History

Wood, Rachel
Assistant Teaching Professor: English

Wood, Tony (https://experts.colorado.edu/display/fisid_172396/)
Assistant Professor: History
Ph.D., New York University

Wood, William B. III
Distinguished Professor Emeritus: Molecular, Cellular & Developmental Biology (MCDB)

Woodman, Elizabeth A.
Professor Emerita: Art and Art History

Wright Jr., Kenneth P. (https://experts.colorado.edu/display/fisid_125586/)
Distinguished Professor: Integrative Physiology
PhD, Bowling Green State University

Wright, Nicole M. (https://experts.colorado.edu/display/fisid_153060/)
Associate Professor: English
PhD, Yale University

Wright, William
Assistant Teaching Professor: Computer Science
MS, Stanford University

Writer, Jeffrey Hawkins
Instructor: Environmental Engineering Program (EVEN)
PhD, University of Colorado Boulder

Wustrow, Eric A. (https://experts.colorado.edu/display/fisid_156419/)
Assistant Professor: Computer Science; Assistant Professor: Electrical, Computer and Energy Engineering (ECEE)
BE, University of Michigan Ann Arbor

Wuttke, Deborah S. (https://experts.colorado.edu/display/fisid_108412/)
Professor, Associate Chair: Biochemistry
PhD, California Institute of Technology

Wyrod, Robert (https://experts.colorado.edu/display/fisid_156319/)
Associate Professor: Women and Gender Studies; Associate Professor: International Affairs Program; Associate Professor: Center to Advance Research and Teaching in the Social Sciences (CARTSS)
PhD, University of Chicago

## X

Xi, Yunping (https://experts.colorado.edu/display/fisid_110518/)
Professor: Civil, Environmental and Architectural Engineering; Professor: Materials Science & Engineering
PhD, Northwestern University

Xiao, Jianliang (https://experts.colorado.edu/display/fisid_149777/)
Associate Professor: Mechanical Engineering; Assistant Professor: Materials Science & Engineering
PhD, Northwestern University

Xu, Nicole (https://experts.colorado.edu/display/fisid_172095/)
Assistant Professor: Mechanical Engineering; Assistant Professor: Biomedical Engineering
PhD, Stanford University

Xu, Ping (https://experts.colorado.edu/display/fisid_101140/)
Professor: Environmental Design
PhD, Harvard University

Xue, Ding (https://experts.colorado.edu/display/fisid_112336/)
Professor: Molecular, Cellular & Developmental Biology (MCDB)
PhD, Columbia University

# Y

Yaeger, Barbara Jean
Assistant Research Professor: Institute of Cognitive Science (ICS)
PhD, Oakland University

Yamashita, Masano (https://experts.colorado.edu/display/fisid_147343/)
Associate Professor, Associate Chair: French & Italian
PhD, New York University

Yang, Daniel
Professor Emeritus: Theatre and Dance

Yang, Ronggui
Professor: Materials Science & Engineering
PhD, Massachusetts Institute of Technology

Yannacito, Donald R. (https://experts.colorado.edu/display/fisid_103944/)
Senior Instructor Emeritus: Cinema Studies & Moving Image Arts
MA, University of Colorado Denver

Yao, Xin
Assistant Professor: Leeds School of Business
PhD, University of Washington

Yarus, Michael J.
Professor Emeritus: Molecular, Cellular & Developmental Biology (MCDB)

Yazzie, Melanie A. (https://experts.colorado.edu/display/fisid_143620/)
Professor: Art and Art History
MFA, University of Colorado Boulder

Ye, Jun (https://experts.colorado.edu/display/fisid_106154/)
Professor Adjoint: Physics
PhD, University of Colorado Boulder

Yeh, Emily Ting (https://experts.colorado.edu/display/fisid_130119/)
Professor: Geography
PhD, University of California, Berkeley

Yeh, Tom (https://experts.colorado.edu/display/fisid_151584/)
Associate Professor: Computer Science; Associate Professor: Biomedical Engineering
PhD, Massachusetts Institute of Technology

Yilmaz, Ovunc (https://experts.colorado.edu/display/fisid_167064/)
Assistant Professor: Leeds School of Business
PhD, University of South Carolina - Colombia

Yin, Xiaobo
Associate Professor: Materials Science & Engineering
PhD, Stanford University

Yonemoto, Marcia A. (https://experts.colorado.edu/display/fisid_107199/)
Professor, Faculty Director: Graduate Teacher Program; Chair: History
PhD, University of California, Berkeley

York, Jeffrey Glenn (https://experts.colorado.edu/display/fisid_148387/)
Associate Professor, Chair, Faculty Director: Leeds School of Business; Associate Professor: Environmental Studies Program; Associate Professor: Continuing Education & Professional Studies
PhD, University of Virginia

Youkey, David (https://experts.colorado.edu/display/fisid_105211/)
Assistant Teaching Professor: Philosophy; Lecturer, Instructor: Continuing Education & Professional Studies
PhD, University of Colorado Boulder

Young, Andrew P. (https://experts.colorado.edu/display/fisid_153434/)
Assistant Professor: Critical Media Practices; Lecturer: Continuing Education & Professional Studies
PhD, University of California, Los Angeles

Young, Morgan (https://experts.colorado.edu/display/fisid_159842/)
Assistant Teaching Professor: Advertising, Public Relations and Media Design
M.A., George Washington University

Young, Phoebe S.K. (https://experts.colorado.edu/display/fisid_147429/)
Professor: History
PhD, University of California, San Diego

Young, Wendy Mores (https://experts.colorado.edu/display/fisid_146942/)
Teaching Professor, Senior Instructor: Environmental Engineering Program (EVEN); Associate Chair: Chemical and Biological Engineering
PhD, University of Colorado Boulder

Yu, Liping
Assistant Research Professor: Research & Innovation Office; Assistant Research Professor: Materials Science & Engineering

Yuan, Lei (https://experts.colorado.edu/individual/fisid_167699/)
Assistant Professor: Psychology and Neuroscience; Assistant Professor: Computer Science
PhD, Northwestern University

Yulsman, Thomas (https://experts.colorado.edu/display/fisid_109386/)
Professor: Journalism; Faculty Director: Center for Environmental Journalism
MS, Columbia University

Yun, Donghyeon
Assistant Professor: Speech, Language and Hearing Sciences (SLHS)
PhD, Indiana University

# Z

Zable, Jack L.
Professor Emeritus: Mechanical Engineering

Zabotin, Nikolay
Research Professor: Electrical, Computer and Energy Engineering (ECEE)
DSc, Russian Academy of Science

Zabow, Gary
Lecturer: Physics
PhD, Harvard University

Zagona, Edith A. (https://experts.colorado.edu/display/fisid_106395/)
Research Professor: Center for Advanced Decision Support for Water and Environmental Systems (CADSWES); Faculty Director: College of Engineering and Applied Science
PhD, University of Colorado Boulder

Zagrodzki, Maciej
Associate Chair, Associate Teaching Professor: Computer Science
MSc, Colorado School of Mines

Zaharatos, Brian R. (https://experts.colorado.edu/display/fisid_156225/)
Teaching Professor, Faculty Director: Applied Mathematics
PhD, Colorado School of Mines

Zamani, Majid (https://experts.colorado.edu/individual/fisid_164967/)
Associate Professor: Computer Science
PhD, University of California, Los Angeles

Zamore, Shaz (https://experts.colorado.edu/display/fisid_166083/)
Assistant Teaching Professor: ATLAS Institute; Assistant Teaching Professor: Creative Technology & Design
PhD, University of Washington

Zarske, Malinda Schaefer (https://experts.colorado.edu/display/fisid_120823/)
Senior Instructor: General Engineering; Instructor: Engineering-Bold Center; Faculty Director, Teaching Professor: Integrated Design Engineering
PhD, University of Colorado Boulder

Zax, Jeffrey S. (https://experts.colorado.edu/display/fisid_100898/)
Professor, Associate Chair: Economics; Professor: Continuing Education & Professional Studies
PhD, Harvard University

Zechman, Sarah Louise Center (https://experts.colorado.edu/display/fisid_156016/)
Professor, Chair: Leeds School of Business
PhD, University of Pennsylvania

Zeiler, Thomas W. (https://experts.colorado.edu/display/fisid_101692/)
Professor: History; Faculty Director: International Education; Professor: International Affairs Program
PhD, University of Massachusetts at Amherst

Zender, Jaime (https://experts.colorado.edu/display/fisid_122563/)
Professor, Endowed/Named Professor, Chair: Leeds School of Business
PhD, Yale University

Zerella, Michael (https://experts.colorado.edu/display/fisid_151090/)
Instructor, Associate Faculty Director: Sewall RAP
PhD, University of Colorado Boulder

Zhai, John Z. (https://experts.colorado.edu/display/fisid_130604/)
Professor: Civil, Environmental and Architectural Engineering
PhD, Massachusetts Institute of Technology

Zhang, Dan (https://experts.colorado.edu/display/fisid_149619/)
Professor, Faculty Director: Leeds School of Business
PhD, University of Minnesota Twin Cities

Zhang, Huanan (https://experts.colorado.edu/display/fisid_167063/)
Assistant Professor: Leeds School of Business
PhD, University of Michigan Ann Arbor

Zhang, Rui (https://experts.colorado.edu/display/fisid_157866/)
Assistant Professor: Leeds School of Business
PhD, University of Maryland

Zhang, Wei (https://experts.colorado.edu/display/fisid_146429/)
Professor, Chair: Chemistry; Professor: Materials Science & Engineering
PhD, University of Illinois at Urbana–Champaign

Zhang, Xingtan (https://experts.colorado.edu/display/fisid_159295/)
Assistant Professor: Leeds School of Business
PhD, University of Pennsylvania

Zhang, Yida (https://experts.colorado.edu/display/fisid_158222/)
Associate Professor: Civil, Environmental and Architectural Engineering
PhD, Northwestern University

Zhang, Yide
Assistant Professor: Biomedical Engineering
PhD, University of Notre Dame

Zhong, Shijie (https://experts.colorado.edu/display/fisid_118396/)
Professor: Physics
PhD, University of Michigan Ann Arbor

Ziemann, Paul Jeffrey (https://experts.colorado.edu/display/fisid_153281/)
Professor: Chemistry; Professor: Cooperative Institute for Research in Environmental Sciences (CIRES)
PhD, Pennsylvania State University

Zikmund, Noah
Senior Instructor: Leeds School of Business
MBA, University of Tulsa

Zimmerman, Eric (https://experts.colorado.edu/display/fisid_122809/)
Professor: Physics
PhD, University of Chicago

Zunger, Alexander (https://experts.colorado.edu/display/fisid_149868/)
Research Professor: Renewable & Sustainable Energy Institute (RASEI); Research Professor: Materials Science & Engineering; Research Professor: Research & Innovation Office
PhD, Tel Aviv Univ (Israel)

# CATALOG ARCHIVE

## Current Information

If you're looking for information about the current or upcoming academic year, please refer to the CU Boulder catalog (http://catalog.colorado.edu) or the Continuing Education (https://ce.colorado.edu/) or Summer Session (https://www.colorado.edu/summer/) websites.

## Previous CU Boulder Catalogs

The following catalogs have been archived and are available in HTML or PDF format.

- 2024–25 CU Boulder Catalog (https://catalog.colorado.edu/archive/2024-2025/) (PDF (https://www.colorado.edu/registrar/node/3481/))
- 2023–24 CU Boulder Catalog (https://catalog.colorado.edu/archive/2023-2024/) (PDF (https://www.colorado.edu/registrar/media/1026/))
- 2022–23 CU Boulder Catalog (https://catalog.colorado.edu/archive/2022-2023/) (PDF (https://www.colorado.edu/registrar/media/967/))
- 2021–22 CU Boulder Catalog (https://catalog.colorado.edu/archive/2021-2022/) (PDF (https://www.colorado.edu/registrar/media/896/))
- 2020–21 CU Boulder Catalog (https://catalog.colorado.edu/archive/2020-2021/) (PDF (https://www.colorado.edu/registrar/media/822/))
- 2019–20 CU Boulder Catalog (https://catalog.colorado.edu/archive/2019-2020/) (PDF (https://www.colorado.edu/registrar/media/705/))
- 2018–19 CU Boulder Catalog (https://catalog.colorado.edu/archive/2018-19/) (PDF (https://www.colorado.edu/registrar/media/700/))
- 2017–18 CU Boulder Catalog (https://catalog.colorado.edu/archive/2017-18/) (PDF (https://www.colorado.edu/registrar/node/1866/attachment/))
- 2016–17 CU Boulder Catalog (https://catalog-archive.colorado.edu/2016-17/) (PDF (https://www.colorado.edu/registrar/media/663/))
- 2015–16 CU Boulder Catalog (https://catalog-archive.colorado.edu/2015-16/) (PDF (https://www.colorado.edu/registrar/media/219/))

To view older catalogs, please visit the Office of the Registrar's Schedule & Catalog Archive (http://www.colorado.edu/registrar/about/archive/) webpage.

# INDEX

## A


About CU Boulder ..... 17
About the Catalog ..... 18
Academic Advising ..... 22
Academic Calendar ..... 1895
Academic Calendar & Exams ..... 22
Academic Calendar & Exams ..... 1103
Academic Calendar & Exams ..... 1841
Academic Enrichment Programs ..... 1086
Academic Integrity ..... 24
Academic Integrity ..... 1104
Academic Integrity ..... 1827
Academic Integrity ..... 1841
Academic Integrity ..... 1895
Academic Offerings ..... 25
Academic Offerings ..... 1106
Academic Offerings ..... 1896
Academic Records ..... 26
Academic Records ..... 1107
Academic Records ..... 1842
Academic Records ..... 1896
Academic Standards & Advising ..... 1108
Academic Standards & Advising ..... 1898
Accounting - Master of Science (MS) ..... 1494
Accounting (ACCT) ..... 1924
Actuarial Studies and Quantitative Finance ..... 90
Actuarial Studies and Quantitative Finance - Certificate ..... 90
Administration ..... 18
Admission Requirements ..... 30
Admissions ..... 29
Admissions ..... 1109
Admissions ..... 1843
Admissions ..... 1899
Advanced Mechanics and Failure Analysis - Graduate Certificate ..... 1767
Advertising, PR and Media Design (APRD) ..... 1927
Advertising, Public Relations and Media Design ..... 695
Advertising, Public Relations and Media Design ..... 1507
Aerospace Engineering (ASEN) ..... 1936
Aerospace Engineering Sciences ..... 835
Aerospace Engineering Sciences ..... 1593
Aerospace Engineering Sciences - Bachelor of Science (BSAE) ..... 842
Aerospace Engineering Sciences - Doctor of Philosophy (PhD) ..... 1610
Aerospace Engineering Sciences - Master of Science (MS) ..... 1606
Aerospace Engineering Sciences - Professional Master of Science (MSAES) ..... 1609
Air Force Aerospace Studies - ROTC (AIRR) ..... 1951
Air Force Aerospace Studies (U.S. Air Force) ..... 1091
American Indian Law - Graduate Certificate ..... 1888
Animals and Society - Certificate ..... 581
Anthropology ..... 92
Anthropology ..... 1132
Anthropology - Bachelor of Arts (BA) ..... 102
Anthropology - Doctor of Philosophy (PhD) ..... 1140
Anthropology - Master of Arts (MA) ..... 1138
Anthropology - Minor ..... 104
Anthropology (ANTH) ..... 1952
Application Process ..... 34
Applied Computer Science - Post-Baccalaureate Bachelor of Science (BSACS) ..... 945
Applied Math (APPM) ..... 1965
Applied Mathematics ..... 105
Applied Mathematics ..... 846
Applied Mathematics ..... 1142
Applied Mathematics - Bachelor of Science (BSAM) ..... 854
Applied Mathematics - Doctor of Philosophy (PhD) ..... 1154
Applied Mathematics - Master of Science (MS) ..... 1150
Applied Mathematics - Minor ..... 116
Applied Mathematics - Professional Master of Science (MSAM) ..... 1152
Applied Public Writing - Micro-credential ..... 1908
Applied Shakespeare - Graduate Certificate ..... 1431
Arabic - Minor ..... 159
Arabic Languages (ARAB) ..... 1973
Architectural Engineering ..... 1614
Architectural Engineering - Bachelor of Science (BSARE) ..... 900
Architectural Engineering - Doctor of Philosophy (PhD) ..... 1623
Architectural Engineering - Master of Science (MS) ..... 1620
Architectural Engineering - Minor ..... 911
Architectural Engineering - Professional Master of Science (MSAE) ..... 1621
Architectural Engineering (AREN) ..... 1975
Architectural Lighting - Graduate Certificate ..... 1731
Architecture - Bachelor of Environmental Design (BEnvD) ..... 737
Architecture (ARCH) ..... 1981
Arctic Studies - Certificate ..... 340

Arduino - Design and Implementation Fundamentals - Micro-credential ..... 1908
Art and Art History ..... 118
Art and Art History ..... 1156
Art and Social Change - Certificate ..... 322
Art Film Studies (ARTF) ..... 1982
Art History - Bachelor of Arts (BA) ..... 137
Art History - Master of Arts (MA) ..... 1166
Art History - Minor ..... 141
Art History (ARTH) ..... 1984
Art Practices - Bachelor of Arts (BA) ..... 138
Art Practices - Bachelor of Fine Arts (BFA) ..... 140
Art Practices - Master of Fine Arts (MFA) ..... 1168
Art Practices - Minor ..... 142
Art Studio and Non-Studio (ARTS) ..... 1992
Artificial Intelligence - Graduate Certificate (Online) ..... 1684
Artist Diploma: Chamber Music Performance - Graduate Certificate .. 1805
Artist Diploma: Opera and Solo Vocal Performance - Graduate Certificate ..... 1805
Artist Diploma: Orchestral Performance - Graduate Certificate ..... 1806
Artist Diploma: Solo Instrumental Performance - Graduate Certificate 1806
Artist Diploma: String Quartet Performance - Graduate Certificate .... 1806
Artist Diploma: Vocal Coaching - Graduate Certificate ..... 1807
Arts Administration - Graduate Certificate ..... 1808
Arts Administration - Micro-credential ..... 1908
Arts & Humanities (AHUM) ..... 2006
Arts & Sciences ..... 71
Arts & Sciences ..... 1132
Arts and Sciences Courses (ARSC) ..... 2008
Arts of the Americas - Doctor of Philosophy (PhD) ..... 1172
Asian Languages and Civilizations ..... 142
Asian Languages and Civilizations ..... 1175
Asian Languages and Civilizations - Doctor of Philosophy (PhD) ..... 1181
Asian Languages and Civilizations - Master of Arts (MA) ..... 1179
Asian Studies ..... 162
Asian Studies ..... 1182
Asian Studies - Bachelor of Arts (BA) ..... 166
Asian Studies - Graduate Certificate ..... 1182
Asian Studies - Minor ..... 177
Asian Studies (ASIA) ..... 2011
Astrodynamics and Satellite Navigation Systems - Graduate Certificate ..... 1611
Astrophysical and Planetary Sciences ..... 178
Astrophysical and Planetary Sciences ..... 1184
Astrophysical and Planetary Sciences - Bachelor of Arts (BA) ..... 183
Astrophysical and Planetary Sciences - Doctor of Philosophy (PhD) .. 1188
Astrophysical and Planetary Sciences - Master of Science (MS) ..... 1188
Astrophysical and Planetary Sciences - Minor ..... 187
Astrophysical and Planetary Sciences (ASTR) ..... 2013
Asynchronous Teaching & Course Design: Foundations - Micro-credential ..... 1909
ATLAS (ATLS) ..... 2019
Atmospheric and Oceanic Sciences ..... 188
Atmospheric and Oceanic Sciences ..... 1190
Atmospheric and Oceanic Sciences - Bachelor of Arts (BA) ..... 193
Atmospheric and Oceanic Sciences - Doctor of Philosophy (PhD) .... 1196
Atmospheric and Oceanic Sciences - Graduate Certificate ..... 1196
Atmospheric and Oceanic Sciences - Master of Science (MS) ..... 1194
Atmospheric and Oceanic Sciences - Minor ..... 196
Atmospheric and Oceanic Sciences (ATOC) ..... 2029
Audiology - Doctor of Audiology (AuD) ..... 1411

## B

Baker Residential Academic Program (BAKR) ..... 2036
BCOR Applied Semester Experience (BASE) ..... 2036
Behavioral Genetics ..... 1197
Behavioral Genetics - Graduate Certificate ..... 1197
Biochemistry ..... 196
Biochemistry ..... 1199
Biochemistry - Bachelor of Arts (BA) ..... 200
Biochemistry - Doctor of Philosophy (PhD) ..... 1203
Biochemistry - Master of Science (MS) ..... 1203
Biochemistry - Minor ..... 203
Biochemistry (BCHM) ..... 2037
Biological Engineering - Bachelor of Science (BSBE) ..... 877
Biological Engineering - Doctor of Philosophy (PhD) ..... 1634
Biological Engineering - Minor ..... 883
Biological Engineering (BIEN) ..... 2042
Biomedical Engineering ..... 859
Biomedical Engineering ..... 1624
Biomedical Engineering - Bachelor of Science (BSBM) ..... 865
Biomedical Engineering - Doctor of Philosophy (PhD) ..... 1628
Biomedical Engineering - Graduate Certificate ..... 1766
Biomedical Engineering - Master of Science (MS) ..... 1628
Biomedical Engineering - Minor ..... 870
Biomedical Engineering (BMEN) ..... 2044

British and Irish Studies ... 204
British and Irish Studies - Certificate ... 204
Building Resilient Communities through the Outdoor Recreation Economy - Graduate Certificate ... 1258
Business ... 657
Business ... 1435
Business - Minor ... 680
Business Administration ... 665
Business Administration ... 1463
Business Administration - Bachelor of Science (BSBA) ... 671
Business Administration - Doctor of Philosophy (PhD) ... 1493
Business Administration - Master of Business Administration (MBA) ... 1486
Business Administration (BADM) ... 2049
Business Analytic Methods - Graduate Certificate ... 1503
Business Analytics - Master of Science (MS) ... 1495
Business Analytics - Micro-credential ... 1909
Business Core (BCOR) ... 2050
Business Environment and Policy (BPOL) ... 2051
Business Law (BSLW) ... 2053
Business Leadership - Certificate ... 680
Business Minor (BUSM) ... 2053
Business of Nonprofit (BUSO) ... 2055

## C

Campus ... 19
Care, Health and Resilience - Certificate ... 582
Career Services (CSVC) ... 2055
Caregiving and Collaborative Problem Solving - Micro-credential ... 1910
Catalog Archive ... 2834
Center for Western Civilization (CWCV) ... 2055
Center of the American West (CAMW) ... 2055
Central and East European Studies ... 205
Central and East European Studies - Certificate ... 205
Central and East European Studies (CEES) ... 2056
Chemical and Biological Engineering ... 871
Chemical Engineering ... 1629
Chemical Engineering - Bachelor of Science (BSCHE) ... 880
Chemical Engineering - Doctor of Philosophy (PhD) ... 1634
Chemical Engineering - Master of Science (MS) ... 1633
Chemical Engineering - Minor ... 884
Chemical Engineering (CHEN) ... 2056
Chemical Physics - Doctor of Philosophy (PhD) ... 1211
Chemistry ... 208
Chemistry ... 1205
Chemistry - Bachelor of Arts (BA) ... 213
Chemistry - Doctor of Philosophy (PhD) ... 1213
Chemistry - Master of Science (MS) ... 1211
Chemistry - Minor ... 216
Chemistry (CHEM) ... 2062
Chinese - Bachelor of Arts (BA) ... 154
Chinese - Minor ... 160
Chinese (CHIN) ... 2070
Cinema Studies - Bachelor of Arts (BA) ... 227
Cinema Studies - Minor ... 231
Cinema Studies & Moving Image Arts ... 217
Cinema Studies & Moving Image Arts - Bachelor of Fine Arts (BFA) ... 224
Cinema Studies & Moving Image Arts (CINE) ... 2075
Civil Engineering ... 1635
Civil Engineering - Bachelor of Science (BSCV) ... 904
Civil Engineering - Doctor of Philosophy (PhD) ... 1649
Civil Engineering - Master of Science (MS) ... 1649
Civil Engineering - Minor ... 912
Civil Engineering - Professional Master of Science (MSCVE) ... 1650
Civil Engineering (CVEN) ... 2082
Civil, Environmental & Architectural Engineering ... 885
Civil Rights and Racial Justice - Graduate Certificate ... 1889
Classics ... 231
Classics ... 1215
Classics - Bachelor of Arts (BA) ... 238
Classics - Doctor of Philosophy (PhD) ... 1222
Classics - Master of Arts (MA) ... 1220
Classics - Minor ... 241
Classics (CLAS) ... 2099
Climate Action for Business - Micro-credential ... 1910
Climate Justice Leadership Ally - Micro-credential ... 1910
Cognitive Science ... 242
Cognitive Science ... 1223
Cognitive Science - Certificate ... 242
Cognitive Science - Doctor of Philosophy (PhD) ... 1224
Cognitive Science - Graduate Certificate ... 1329
College of Communication, Media, Design & Information (CMDI) ... 2107
College of Engineering and Applied Science (COEN) ... 2109
College Teaching - Graduate Certificate ... 1772
College Teaching in Practice - Micro-credential ... 1910
Colleges & Schools ... 1132

Colleges, Schools & Programs ..... 71
Communication ..... 704
Communication ..... 1514
Communication - Bachelor of Arts (BA) ..... 708
Communication - Doctor of Philosophy (PhD) ..... 1520
Communication - Master of Arts (MA) ..... 1518
Communication - Minor ..... 710
Communication (COMM) ..... 2111
Communication, Media, Design & Information ..... 687
Communication, Media, Design & Information ..... 1507
Communication Residential Academic Program (COMR) ..... 2117
Comparative Literature (COML) ..... 2117
Computational Biology - Minor ..... 947
Computational Linguistics, Analytics, Search and Informatics - Master of Science (MS) ..... 1769
Computer Engineering - Minor ..... 978
Computer Science ..... 922
Computer Science ..... 1653
Computer Science - Bachelor of Arts (BA) ..... 937
Computer Science - Bachelor of Science (BSCS) ..... 941
Computer Science - Doctor of Philosophy (PhD) ..... 1683
Computer Science - Master of Science (MS) ..... 1672
Computer Science - Master of Science (MS) Online ..... 1674
Computer Science - Minor ..... 948
Computer Science - Professional Master of Science (MSCPS) ..... 1676
Computer Science (CSCI) ..... 2117
Computer Science Online (CSCA) ..... 2139
Computer Science Post-Baccalaureate (CSPB) ..... 2144
Continuing Education Catalog ..... 1826
Corporate Communication - Master of Arts (MA) ..... 1512
Courses A-Z ..... 1924
Creative Technology and Design ..... 949
Creative Technology and Design ..... 1685
Creative Technology and Design - Bachelor of Science (BSCTD) ..... 956
Creative Technology and Design - Doctor of Philosophy (PhD) ..... 1692
Creative Technology and Design - Minor ..... 958
Creative Technology and Design - Professional Master of Science (MS) ..... 1690
Creative Technology and Design - Traditional Master of Science (MS) 1692
Creative Writing - Master of Fine Arts (MFA) ..... 1243
Creative Writing - Minor ..... 284
Credit by Examination ..... 37
Credits & Grading ..... 50
Credits & Grading ..... 1110
Credits & Grading ..... 1843
Critical Ethnic Studies - Doctor of Philosophy (PhD) ..... 1265
Critical Ethnic Studies - Graduate Certificate ..... 1266
Critical Media Practices ..... 710
Critical Media Practices ..... 1520
Critical Media Practices (CMDP) ..... 2147
Critical Sports Studies - Certificate ..... 306
Critical Theory - Graduate Certificate ..... 1304
Cross-College Programs ..... 1099
CU Boulder Online Catalog ..... 1895
Cultivating Compassion and Dignity in Ourselves and Our Schools - Graduate Certificate ..... 1584
Culture, Language and Social Practice - Graduate Certificate ..... 1329
Curriculum and Instruction ..... 1567
Curriculum Emphasis in Social Responsibility (CESR) ..... 2153

## D

Dance - Bachelor of Arts (BA) ..... 614
Dance - Bachelor of Fine Arts (BFA) ..... 617
Dance - Master of Fine Arts (MFA) ..... 1422
Dance - Minor ..... 625
Dance (DNCE) ..... 2154
Danish (DANE) ..... 2162
Data Science ..... 1692
Data Science - Graduate Certificate ..... 1698
Data Science - Graduate Certificate (Online) ..... 1698
Data Science - Master of Science (MS) ..... 1693
Data Science - Master of Science (MS) Online ..... 1695
Data Science - Minor ..... 754
Data Science Online (DTSA) ..... 2163
Degree Requirements ..... 1113
DEI-Informed Dialogic Pedagogy - Micro-credential ..... 1911
Design for the Circular Economy - Graduate Certificate ..... 1740
Design for the Circular Economy - Graduate Certificate (Online) ..... 1738
Design Technologies - Certificate ..... 959
Designing and Executing Social Innovations - Micro-credential ..... 1911
Designing for Learning: Inquiry-Based Pedagogy for K–12 Educators - Graduate Certificate ..... 1585
Development Studies - Graduate Certificate ..... 1280
Digital Humanities - Graduate Certificate ..... 1773
Digital Humanities (DHUM) ..... 2169
Distance Education ..... 1117
Distributed Studies Program ..... 243

Doctoral Degree Requirements ..... 1114

# E

Earth Data Analytics - Foundations - Graduate Certificate ..... 1773
Ecology and Evolutionary Biology ..... 243
Ecology and Evolutionary Biology ..... 1226
Ecology and Evolutionary Biology - Bachelor of Arts (BA) ..... 254
Ecology and Evolutionary Biology - Doctor of Philosophy (PhD) ..... 1232
Ecology and Evolutionary Biology - Master of Arts (MA) ..... 1231
Ecology and Evolutionary Biology - Minor ..... 257
Ecology and Evolutionary Biology (EBIO) ..... 2169
Economics ..... 257
Economics ..... 1232
Economics - Bachelor of Arts (BA) ..... 265
Economics - Doctor of Philosophy (PhD) ..... 1237
Economics - Master of Arts (MA) ..... 1236
Economics - Minor ..... 266
Economics (ECON) ..... 2181
Education ..... 772
Education ..... 1547
Education - Curriculum and Instruction - Master of Arts (MA) ..... 1567
Education - Doctor of Philosophy (PhD) ..... 1577
Education - Learning Sciences and Human Development ..... 1569
Education - Minor ..... 808
Education Abroad ..... 1086
Education (EDUC) ..... 2190
Education Studies - Bachelor of Arts (BA) ..... 792
Educational Foundations, Policy and Practice ..... 1570
Educational Foundations, Policy and Practice - Master of Arts (MA) .. 1570
Electrical & Computer Engineering ..... 1699
Electrical & Computer Engineering - Doctor of Philosophy (PhD) ..... 1725
Electrical & Computer Engineering - Master of Engineering (ME) ..... 1716
Electrical & Computer Engineering - Master of Science (MS) ..... 1716
Electrical & Computer Engineering - Master of Science (MSECE) Online ..... 1717
Electrical & Computer Engineering - Professional Master of Science (MSECE) ..... 1721
Electrical & Computer Engineering (ECEN) ..... 2218
Electrical & Computer Engineering Online (ECEA) ..... 2240
Electrical and Computer Engineering - Bachelor of Science (BSEC) .... 970
Electrical, Computer & Energy Engineering ..... 959
Electrical Engineering - Bachelor of Science (BSEE) ..... 975
Electrical Engineering - Minor ..... 979
Elementary Education - Bachelor of Arts (BA) ..... 794
Embedded Systems Engineering - Graduate Certificate ..... 1731
Emergent Technologies and Media Art Practices - Doctor of Philosophy (PhD) ..... 1524
Emergent Technologies and Media Arts Practices - Graduate Certificate ..... 1525
Energy Engineering - Minor ..... 1033
Energy Engineering (ENEN) ..... 2251
Engineering & Applied Science ..... 829
Engineering & Applied Science ..... 1592
Engineering & Applied Science ..... 1726
Engineering and Applied Science ..... 981
Engineering Education - Doctor of Philosophy (PhD) ..... 1728
Engineering Entrepreneurship - Minor ..... 988
Engineering, Ethics & Society ..... 997
Engineering, Ethics & Society (ENES) ..... 2262
Engineering, Ethics and Society - Certificate ..... 1001
Engineering for Developing Communities (EDEN) ..... 2252
Engineering Honors (EHON) ..... 2252
Engineering Leadership - Certificate ..... 984
Engineering Leadership Program (ENLP) ..... 2252
Engineering Management ..... 986
Engineering Management ..... 1733
Engineering Management - Graduate Certificate (Online) ..... 1739
Engineering Management - Master of Engineering (ME) ..... 1736
Engineering Management - Master of Engineering (ME) Online ..... 1737
Engineering Management - Minor ..... 988
Engineering Management (EMEN) ..... 2253
Engineering Management in the Aerospace Industry - Graduate Certificate ..... 1741
Engineering Management Online (EMEA) ..... 2257
Engineering Physics ..... 989
Engineering Physics - Bachelor of Science (BSEP) ..... 994
English ..... 267
English ..... 1239
English - Bachelor of Arts (BA) ..... 281
English - Doctor of Philosophy (PhD) ..... 1247
English - Master of Arts (MA) ..... 1245
English - Minor ..... 284
English as a Second Language (ESLG) ..... 2279
English (ENGL) ..... 2265
Entrepreneurial and Small Business Management (ESBM) ..... 2280
Entrepreneurial Law - Graduate Certificate ..... 1890
Entrepreneurial Startup Skills - Micro-credential ..... 1911

Entrepreneurial Studies - Certificate ..... 682
Environment - Master of the Environment (MENV) ..... 1253
Environment and Sustainability (ENST) ..... 2280
Environmental Design ..... 721
Environmental Design (ENVD) ..... 2281
Environmental Engineering ..... 1742
Environmental Engineering - Bachelor of Science (BSEV) ..... 907
Environmental Engineering - Doctor of Philosophy (PhD) ..... 1748
Environmental Engineering - Master of Science (MS) ..... 1745
Environmental Engineering - Professional Master of Science (MSENV) ..... 1746
Environmental Engineering (EVEN) ..... 2289
Environmental Justice - Graduate Certificate ..... 1774
Environmental, Natural Resources and Energy Law - Graduate Certificate ..... 1891
Environmental Planning - Minor ..... 746
Environmental Product of Design (EPOD) ..... 2293
Environmental Products of Design - Bachelor of Environmental Design (BEnvD) ..... 739
Environmental Studies ..... 285
Environmental Studies ..... 1249
Environmental Studies - Bachelor of Arts (BA) ..... 291
Environmental Studies - Doctor of Philosophy (PhD) ..... 1261
Environmental Studies - Master of Science (MS) ..... 1255
Environmental Studies - Minor ..... 294
Environmental Studies (ENVS) ..... 2294
Equity, Bilingualism and Biliteracy ..... 1573
Equity, Bilingualism and Biliteracy - Master of Arts (MA) ..... 1574
Equity-Oriented Partnerships - Micro-credential ..... 1912
Ethnic Studies ..... 295
Ethnic Studies ..... 1262
Ethnic Studies - Bachelor of Arts (BA) ..... 304
Ethnic Studies - Minor ..... 306
Ethnic Studies (ETHN) ..... 2301
European Union Studies - Certificate ..... 444
Executive MBA (MBAE) ..... 2312
Experience Design (TDXD) ..... 2314
Exploratory Studies ..... 1034

## F

Faculty A-Z ..... 2747
Farrand Residential Academic Program (FARR) ..... 2315
Farsi (FRSI) ..... 2316
Finance - Master of Science (MS) ..... 1496
Finance (FNCE) ..... 2316
Financial Aid ..... 52
First Year Exploration (FYXP) ..... 2319
First Year Seminar (FYSM) ..... 2320
Food Engineering - Graduate Certificate ..... 1767
Foundations in Compassion & Mindfulness - Micro-credential ..... 1912
Foundations in High-Performance Computing - Micro-credential ..... 1913
Foundations in Research Skills for Community College - Micro-credential ..... 1913
Foundations in Science Communication for Community College - Micro-credential ..... 1913
Foundations in Sustainable Leadership - Micro-credential ..... 1914
Foundations of Integrated Water Resources Management for WaSH Professionals - Micro-credential ..... 1914
Foundations of Western Civilization - Certificate ..... 628
French - Bachelor of Arts (BA) ..... 316
French - Doctor of Philosophy (PhD) ..... 1270
French - Master of Arts (MA) ..... 1269
French - Minor ..... 321
French and Italian ..... 307
French and Italian ..... 1267
French (FREN) ..... 2320
Future Faculty Development - Graduate Certificate ..... 1775

## G

Gender and Sexuality Studies - Master of Arts (MA) ..... 1433
General Admission Information ..... 29
General Engineering (GEEN) ..... 2326
Geography ..... 323
Geography ..... 1273
Geography - Bachelor of Arts (BA) ..... 334
Geography - Doctor of Philosophy (PhD) ..... 1279
Geography - Master of Arts (MA) ..... 1278
Geography - Minor ..... 338
Geography (GEOG) ..... 2328
Geological Sciences ..... 343
Geological Sciences ..... 1282
Geological Sciences (GEOL) ..... 2342
Geology - Bachelor of Arts (BA) ..... 352
Geology - Doctor of Philosophy (PhD) ..... 1290
Geology - Master of Science (MS) ..... 1290
Geology - Minor ..... 356
Geophysics - Doctor of Philosophy (PhD) ..... 1291
Geophysics - Graduate Certificate ..... 1292

German (GRMN) ... 2356
German Studies - Bachelor of Arts (BA) ... 374
German Studies - Doctor of Philosophy (PhD) ... 1302
German Studies - Master of Arts (MA) ... 1298
German Studies - Minor ... 383
Germanic and Slavic Languages and Literatures ... 357
Germanic and Slavic Languages and Literatures ... 1292
Germanic and Slavic Languages and Literatures (GSLL) ... 2363
Girls on Rock: Science, Art and Wilderness Skills - Micro-credential ... 1914
GIS and Computational Science - Certificate ... 341
Global Business - Certificate ... 682
Global Engineering - Graduate Certificate ... 1652
Global Engineering - Minor ... 914
Global Environmental Affairs - Certificate ... 444
Global Gender and Sexuality Studies - Certificate ... 649
Global Studies Residential Academic Program (GSAP) ... 2363
Graduate Catalog ... 1103
Graduate School (GRAD) ... 2364
Graduate Teacher Education (GRTE) ... 2364
Graduate Teacher Licensure ... 1588
Graduation ... 56
Graduation ... 1117
Graduation ... 1844
Greek Language (GREK) ... 2364

## H

Health & Wellness ... 56
Health & Wellness ... 1118
Health & Wellness ... 1828
Health & Wellness ... 1845
Health Law and Policy - Graduate Certificate ... 1891
Healthcare Analytics - Graduate Certificate ... 1503
Hebrew and Israel Studies - Minor ... 457
Hebrew (HEBR) ... 2365
Higher Education - Master of Arts (MA) ... 1572
Higher Education Admission Recommendations ... 46
Hindi/Urdu - Minor ... 161
Hindi/Urdu (HIND) ... 2367
Hip-Hop Studies - Certificate ... 625
Hip-Hop Studies - Graduate Certificate ... 1431
History ... 386
History ... 1305
History - Bachelor of Arts (BA) ... 408
History - Doctor of Philosophy (PhD) ... 1314
History - Master of Arts (MA) ... 1313
History - Minor ... 410
History (HIST) ... 2368
Honors (HONR) ... 2394
Honors Program ... 411
Housing ... 60
Housing ... 1121
Housing ... 1846
Human Language Technology - Graduate Certificate ... 1331
Humanities ... 415
Humanities - Bachelor of Arts (BA) ... 422
Humanities - Minor ... 424
Humanities (HUMN) ... 2396
Hydrologic Sciences - Graduate Certificate ... 1775
Hydrology - Certificate ... 342
Hypersonics - Graduate Certificate ... 1612

## I

Inclusive and Special Education - Graduate Certificate ... 1585
Inclusive Research Mentoring - Micro-credential ... 1915
Inclusivity and Belonging in the Outdoor Recreation Economy - Graduate Certificate ... 1259
Indonesian (INDO) ... 2403
Information Management and Business Analytics (BAIM) ... 2404
Information Science ... 746
Information Science ... 1525
Information Science - Bachelor of Science (BS) ... 752
Information Science - Doctor of Philosophy (PhD) ... 1531
Information Science - Master of Science (MS) ... 1530
Information Science - Minor ... 755
Information Science (INFO) ... 2405
Innovating Happiness - Micro-credential ... 1915
Innovation and Entrepreneurship in Engineering - Graduate Certificate ... 1741
Integrated Design Engineering ... 1002
Integrated Design Engineering - Bachelor of Science (BSIDE) ... 1003
Integrated Project Delivery for Construction - Micro-credential ... 1915
Integrative Physiology ... 424
Integrative Physiology ... 1315
Integrative Physiology - Bachelor of Arts (BA) ... 431
Integrative Physiology - Doctor of Philosophy (PhD) ... 1319
Integrative Physiology - Master of Science (MS) ... 1319
Integrative Physiology (IPHY) ... 2413

Interdisciplinary Documentary Media Practices - Graduate Certificate 1525
Interdisciplinary Documentary Media Practices - Master of Fine Arts (MFA) 1523
Interdisciplinary Honors Studies - Certificate 414
Interdisciplinary Programs 1769
Interdisciplinary Quantitative Biology - Graduate Certificate 1777
Intermedia Art, Writing and Performance (IAWP) 2420
International Affairs 434
International Affairs - Bachelor of Arts (BA) 437
International Affairs - Graduate Certificate 1777
International Affairs - Minor 442
International Affairs (IAFS) 2420
International Business (INBU) 2423
International Law - Graduate Certificate 1892
International Media - Certificate 1099
Introduction to Environmental Data Science - Micro-credential 1915
Introduction to the Outdoor Recreation Economy - Graduate Certificate 1259
INVST Community Studies (INVS) 2424
Italian - Bachelor of Arts (BA) 319
Italian - Minor 321
Italian (ITAL) 2426

## J

Japanese - Bachelor of Arts (BA) 157
Japanese - Minor 161
Japanese (JPNS) 2430
Jewish Studies 445
Jewish Studies 1320
Jewish Studies - Bachelor of Arts (BA) 452
Jewish Studies - Graduate Certificate 1321
Jewish Studies - Minor 457
Jewish Studies (JWST) 2435
Journalism 756
Journalism 1533
Journalism - Bachelor of Arts (BA) 761
Journalism - Master of Arts (MA) 1538
Journalism - Minor 763
Journalism (JRNL) 2441
Just & Equitable Teaching - Micro-credential 1916
Juvenile and Family Law - Graduate Certificate 1893

## K

Korean (KREN) 2449
Korean Language and Culture - Minor 162

## L

Landscape Architecture - Bachelor of Environmental Design (BEnvD) 742
Landscape Architecture (LAND) 2451
Language Technology (LGTC) 2451
Latin American and Latinx Studies 458
Latin American and Latinx Studies - Certificate 459
Latin American Studies (LAMS) 2452
Latin Language (LATN) 2452
Law 1837
Law - Juris Doctor of Laws (JD) 1885
Law - Master of Laws (LLM) 1883
Law - Master of Studies in Law (MSL) 1884
Law School (LAWS) 2454
Leadership and Community Engagement - Bachelor of Arts (BA) 798
Leadership and Management - Graduate Certificate 1741
Leadership (LEAD) 2482
Leadership Studies - Minor 809
Leading a Sustainable Business in the Outdoor Recreation Industry - Graduate Certificate 1260
Leading for Change in Science Assessment Practice - Graduate Certificate 1586
Learning Sciences and Human Development - Master of Arts (MA) 1569
Lesbian, Gay and Bisexual Studies (LGBT) 2483
Lesbian, Gay, Bisexual, Transgender and Queer Studies 461
LGBTQ Studies - Certificate 462
Libby Residential Academic Program (LIBB) 2484
Libraries (LIBR) 2485
Library Research 1087
Lighting Design - Certificate 985
Linguistics 462
Linguistics 1322
Linguistics - Bachelor of Arts (BA) 468
Linguistics - Doctor of Philosophy (PhD) 1327
Linguistics - Master of Arts (MA) 1328
Linguistics - Minor 473
Linguistics (LING) 2486

## M

Management (MGMT) 2494
Marketing Analytics - Graduate Certificate 1504
Marketing Analytics - Master of Science (MS) 1498
Marketing (MKTG) 2496
Master of the Environment (ENVM) 2498
Master's Degree Requirements 1113

Materials Science & Engineering ..... 1017
Materials Science & Engineering - Minor ..... 1017
Materials Science and Engineering ..... 1748
Materials Science and Engineering - Doctor of Philosophy (PhD) ..... 1752
Materials Science and Engineering - Master of Science (MS) ..... 1751
Materials Science and Engineering (MSEN) ..... 2507
Mathematics ..... 474
Mathematics ..... 1332
Mathematics - Bachelor of Arts (BA) ..... 480
Mathematics - Doctor of Philosophy (PhD) ..... 1339
Mathematics - Master of Arts (MA) ..... 1338
Mathematics - Minor ..... 484
Mathematics (MATH) ..... 2508
MBA Advanced Electives (MBAX) ..... 2517
MBA Core (MBAC) ..... 2526
Mechanical Design and Product Development - Graduate Certificate . 1768
Mechanical Engineering ..... 1018
Mechanical Engineering ..... 1752
Mechanical Engineering - Bachelor of Science (BSME) ..... 1029
Mechanical Engineering - Doctor of Philosophy (PhD) ..... 1765
Mechanical Engineering - Master of Science (MS) ..... 1764
Mechanical Engineering - Professional Master of Science (MSME) ... 1764
Mechanical Engineering (MCEN) ..... 2528
Media and Public Engagement - Master of Arts (MA) ..... 1543
Media Production - Bachelor of Arts (BA) ..... 715
Media Production - Minor ..... 720
Media Research and Practice - Doctor of Philosophy (PhD) ..... 1538
Media Research and Practice - Doctor of Philosophy (PhD) ..... 1544
Media Research and Practice (MDRP) ..... 2546
Media Studies ..... 764
Media Studies ..... 1539
Media Studies - Bachelor of Arts (BA) ..... 768
Media Studies - Minor ..... 770
Media Studies (MDST) ..... 2546
Medieval and Early Modern Studies ..... 484
Medieval and Early Modern Studies - Certificate ..... 485
Medieval and Early Modern Studies (MEMS) ..... 2553
Micro-credential Programs Catalog ..... 1908
Middle and High School Teaching - Bachelor of Arts (BA) ..... 800
Military Science - Army ROTC (MILR) ..... 2554
Military Science (U.S. Army) ..... 1092
Molecular Biophysics - Graduate Certificate ..... 1204
Molecular, Cellular and Developmental Biology ..... 485
Molecular, Cellular and Developmental Biology ..... 1339
Molecular, Cellular and Developmental Biology - Bachelor of Arts (BA) . 495
Molecular, Cellular and Developmental Biology - Doctor of Philosophy (PhD) ..... 1343
Molecular, Cellular and Developmental Biology - Master of Arts (MA) . 1343
Molecular, Cellular and Developmental Biology - Minor ..... 498
Molecular, Cellular and Developmental Biology (MCDB) ..... 2555
MS Business Core (MSBC) ..... 2565
MS Business Electives (MSBX) ..... 2566
Museology - Graduate Certificate ..... 1349
Museum and Field Studies ..... 1344
Museum and Field Studies - Master of Science (MS) ..... 1347
Museum (MUSM) ..... 2569
Music ..... 1036
Music ..... 1039
Music ..... 1784
Music ..... 1786
Music - Bachelor of Arts in Music (BAMus) ..... 1052
Music - Bachelor of Music (BMus) ..... 1055
Music - Doctor of Philosophy (PhD) ..... 1803
Music - Master of Music (MMus) ..... 1797
Music - Minor ..... 1067
Music Education ..... 1070
Music Education ..... 1808
Music Education - Bachelor of Music Education (BMusEd) ..... 1081
Music Education - Master of Music Education (MMusEd) ..... 1817
Music Electives (MUEL) ..... 2591
Music Ensemble (EMUS) ..... 2593
Music Entrepreneurship - Certificate ..... 1067
Music (MUSC) ..... 2572
Music Technology - Certificate ..... 1068
Music Theory - Certificate ..... 1069
Music Theory - Graduate Certificate ..... 1808
Musical Arts ..... 1818
Musical Arts - Doctor of Musical Arts (DMA) ..... 1821

## N

Native American and Indigenous Studies - Certificate ..... 1100
Native American and Indigenous Studies - Graduate Certificate ..... 1778
Natural Sciences (NASC) ..... 2598
Naval Science - ROTC (NAVR) ..... 2598
Naval Science (U.S. Navy & U.S. Marine Corps) ..... 1094

Network Engineering - Master of Science (MSNE) ..... 1681
Neuroscience - Bachelor of Arts (BA) ..... 551
Neuroscience - Doctor of Philosophy (PhD) ..... 1383
Neuroscience (NRSC) ..... 2599
Neurosciences and Behavior - Certificate ..... 556
New Student & Family Programs ..... 57
New Student & Family Programs ..... 1118
Nordic Studies - Minor ..... 384
Norlin Scholars (NRLN) ..... 2603

## O

Oceanography - Graduate Certificate ..... 1197
Online Teaching Academy - Micro-credential ..... 1916
Operations and Information Management - Certificate ..... 685
Operations and Information Management (OPIM) ..... 2603
Operations Management (OPMG) ..... 2604
Organization Management (ORMG) ..... 2604
Organizational Leadership - Master of Science (MS) ..... 1770
Organizational Leadership (ORGL) ..... 2605
Outdoor Recreation Economy - Master of Science (MS) ..... 1257
Outdoor Recreation (OREC) ..... 2608

## P

Peace and Conflict Studies (PACS) ..... 2611
Peace, Conflict and Security - Certificate ..... 500
Peace, Conflict and Security Studies ..... 498
Performance Music (PMUS) ..... 2612
Personal Financial Planning - Certificate ..... 686
Philosophy ..... 500
Philosophy ..... 1350
Philosophy - Bachelor of Arts (BA) ..... 509
Philosophy - Doctor of Philosophy (PhD) ..... 1356
Philosophy - Master of Arts (MA) ..... 1354
Philosophy - Minor ..... 513
Philosophy (PHIL) ..... 2616
Photonics - Graduate Certificate ..... 1725
Physics ..... 514
Physics ..... 1357
Physics - Bachelor of Arts (BA) ..... 523
Physics - Doctor of Philosophy (PhD) ..... 1365
Physics - Master of Science (MS) ..... 1364
Physics - Minor ..... 527
Physics (PHYS) ..... 2627
Planning and Urban Design (PLAN) ..... 2636
Policies & Requirements ..... 73
Policies & Requirements ..... 662
Policies & Requirements ..... 688
Policies & Requirements ..... 773
Policies & Requirements ..... 831
Policies & Requirements ..... 1037
Policies & Requirements ..... 1547
Policies & Requirements ..... 1592
Policies & Requirements ..... 1785
Political Science ..... 528
Political Science ..... 1366
Political Science - Bachelor of Arts (BA) ..... 539
Political Science - Doctor of Philosophy (PhD) ..... 1373
Political Science - Master of Arts (MA) ..... 1373
Political Science - Minor ..... 541
Political Science (PSCI) ..... 2636
Population Studies - Graduate Certificate ..... 1281
Portuguese - Minor ..... 595
Portuguese (PORT) ..... 2652
Post-Baccalaureate ..... 814
Power Electronics - Graduate Certificate ..... 1732
Preprofessional Programs ..... 1089
Presidents Leadership Class ..... 1089
Presidents Leadership Class (PRLC) ..... 2654
Principles of College Teaching - Micro-credential ..... 1917
Programs of Special Interest ..... 776
Programs of Special Interest ..... 1548
Programs of Study ..... 90
Programs of Study ..... 665
Programs of Study ..... 695
Programs of Study ..... 777
Programs of Study ..... 835
Programs of Study ..... 1039
Programs of Study ..... 1132
Programs of Study ..... 1439
Programs of Study ..... 1507
Programs of Study ..... 1549
Programs of Study ..... 1593
Programs of Study ..... 1786
Programs of Study ..... 1854
Programs of Study ..... 1908
Project Leadership Skills for Quantum Workers - Micro-credential .... 1918

Project Management - Graduate Certificate ..... 1742
Psychology - Bachelor of Arts (BA) ..... 553
Psychology - Doctor of Philosophy (PhD) ..... 1384
Psychology - Master of Arts (MA) ..... 1383
Psychology and Neuroscience ..... 541
Psychology and Neuroscience ..... 1375
Psychology (PSYC) ..... 2655
Public Health ..... 556
Public Health - Bachelor of Arts (BA) ..... 557
Public Health - Certificate ..... 559
Public Health - Minor ..... 560
Public Lands and Natural Resources Policy - Graduate Certificate .... 1260

## Q

Quantitative Methods for Behavioral Sciences - Graduate Certificate . 1779
Quantum Engineering - Minor ..... 980
Quechua (QUEC) ..... 2664
Queer and Trans Studies - Minor ..... 645

## R

Radio Frequency Engineering for Aerospace - Graduate Certificate ... 1613
Real Estate - Master of Science (MS) ..... 1499
Real Estate (REAL) ..... 2665
Registration & Enrollment ..... 57
Registration & Enrollment ..... 1119
Registration & Enrollment ..... 1845
Registration & Enrollment ..... 1899
Religious Studies ..... 562
Religious Studies ..... 1385
Religious Studies - Bachelor of Arts (BA) ..... 569
Religious Studies - Master of Arts (MA) ..... 1387
Religious Studies - Minor ..... 571
Religious Studies (RLST) ..... 2666
Remote Sensing - Graduate Certificate ..... 1613
Research & Innovation ..... 20
Research and Evaluation Methodology ..... 1576
Research Communication & Presentation - Micro-credential ..... 1918
Research Data Foundations - Micro-credential ..... 1918
Reserve Officers Training Corps (ROTC) ..... 1091
Robotics - Doctor of Philosophy (PhD) ..... 1729
Robotics - Master of Science (MS) ..... 1726
Robotics (ROBO) ..... 2673
Russian, East European and Eurasian Studies - Master of Arts (MA) .. 1300
Russian, East European and Eurasian Studies - Bachelor of Arts (BA) .. 377
Russian, East European and Eurasian Studies - Minor ..... 384
Russian, East European and Eurasian Studies (REES) ..... 2676
Russian (RUSS) ..... 2674

## S

Sanskrit (SNSK) ..... 2682
Satellite System Design - Graduate Certificate ..... 1780
Scandinavian (SCAN) ..... 2682
Sewall Residential Academic Program (SEWL) ..... 2684
Signals and Systems - Minor ..... 980
Singing Health Specialist - Certificate ..... 1069
Social and Emotional Learning - Graduate Certificate ..... 1586
Social Innovation - Certificate ..... 583
Social Innovation - Graduate Certificate ..... 1781
Social Responsibility and Ethics - Certificate ..... 686
Social Sciences (SSCI) ..... 2684
Sociology ..... 571
Sociology ..... 1388
Sociology - Bachelor of Arts (BA) ..... 579
Sociology - Doctor of Philosophy (PhD) ..... 1393
Sociology - Master of Arts (MA) ..... 1393
Sociology - Minor ..... 581
Sociology (SOCY) ..... 2685
Solving Societal Problems - Micro-credential ..... 1919
Space - Minor ..... 1102
Space Weather and Applications - Graduate Certificate ..... 1782
Spanish - Bachelor of Arts (BA) ..... 592
Spanish - Doctor of Philosophy (PhD) ..... 1401
Spanish - Master of Arts (MA) ..... 1399
Spanish - Minor ..... 596
Spanish and Portuguese ..... 584
Spanish and Portuguese ..... 1395
Spanish (SPAN) ..... 2695
Speech, Language and Hearing Sciences ..... 596
Speech, Language and Hearing Sciences ..... 1402
Speech, Language and Hearing Sciences - Bachelor of Arts (BA) ..... 599
Speech, Language and Hearing Sciences - Doctor of Philosophy (PhD) ..... 1412
Speech, Language and Hearing Sciences - Master of Arts (MA) ..... 1409
Speech, Language and Hearing Sciences - Minor ..... 601
Speech, Language and Hearing Sciences (SLHS) ..... 2703
Speech-Language Pathology Assistant - Graduate Certificate ..... 1413
Sports Media ..... 771

Sports Media - Minor ... 772
Statistics - Minor ... 118
Statistics and Data Science - Bachelor of Arts (BA) ... 113
Statistics (STAT) ... 2711
STEM Education - Certificate ... 813
Strategic Communication - Bachelor of Science (BS) ... 701
Strategic Communication Design - Master of Arts (MA) ... 1513
Student Affairs ... 60
Student Affairs ... 1121
Student Affairs ... 1828
Student Affairs ... 1845
Student Conduct & Colorado Creed ... 61
Student Conduct & Colorado Creed ... 1121
Student Conduct & Colorado Creed ... 1829
Student Conduct & Colorado Creed ... 1847
Student Data Privacy ... 64
Student Data Privacy ... 1124
Student Data Privacy ... 1832
Student Data Privacy ... 1849
Student Data Privacy ... 1900
Student Finances ... 65
Student Finances ... 1125
Student Finances ... 1851
Student Finances ... 1902
Student Resources ... 63
Student Resources ... 1123
Student Resources ... 1831
Student Resources ... 1849
Supply Chain Analytics - Graduate Certificate ... 1505
Supply Chain Analytics - Master of Science (MS) ... 1500
Supply Chain Foundations - Graduate Certificate ... 1506
Sustainability and Social Innovation Residential Academic Program (SSIR) ... 2716
Sustainability Engineering - Minor ... 912
Sustainability Innovation - Micro-credential ... 1919
Sustainable Planning and Urban Design - Bachelor of Environmental Design (BEnvD) ... 744
Swedish (SWED) ... 2716

## T

Tax Emphasis - Graduate Certificate ... 1894
Taxation - Master of Science (MS) ... 1502
Teacher Leadership ... 1583
Teacher Leadership - Master of Arts (MA) ... 1584
Teacher Licensure Program ... 814
Teachers Leading Change - Graduate Certificate ... 1587
Teaching Culturally and Linguistically Diverse Students - Graduate Certificate ... 1587
Teaching English to Speakers of Other Languages - Graduate Certificate ... 1331
Teaching English to Speakers of Other Languages - Minor ... 473
Teaching International Students - Micro-credential ... 1920
Tech Frontiers - Data Science - Micro-credential ... 1920
Tech Frontiers - Machine Learning - Micro-credential ... 1920
Technology, Cybersecurity & Policy (CYBR) ... 2717
Telecommunications (TLEN) ... 2720
The CHANGE Collective - Micro-credential ... 1921
Theatre - Bachelor of Arts (BA) ... 619
Theatre - Bachelor of Fine Arts (BFA) ... 621
Theatre - Minor ... 625
Theatre & Dance ... 601
Theatre & Dance ... 1414
Theatre and Dance (THDN) ... 2731
Theatre and Performance Studies - Doctor of Philosophy (PhD) ... 1429
Theatre and Performance Studies - Master of Arts (MA) ... 1426
Theatre (THTR) ... 2721
Thesis Music (TMUS) ... 2731
Tibetan and Himalayan Studies - Certificate ... 178
Tibetan (TBTN) ... 2734
Transfer of College-Level Credit ... 48
Tuition Classification ... 68
Tuition Classification ... 1129
Tuition Classification ... 1833
Tuition Classification ... 1851
Tuition Classification ... 1904

## U

Undergraduate Catalog ... 22
Undergraduate Residential Programs ... 1096
Undergraduate Teacher Licensure ... 821
Universal Design for Learning - Micro-credential ... 1922
University of Colorado Boulder ... 16
University Policies ... 69
University Policies ... 1130
University Policies ... 1834
University Policies ... 1852
University Policies ... 1905
User Experience - Certificate ... 959

## V

Values-Based Leadership - Micro-credential ..... 1922

## W

Water Engineering and Management - Graduate Certificate ..... 1783
Western American Studies ..... 626
Western American Studies - Certificate ..... 627
Western Civilization Studies ..... 627
Women and Gender Studies ..... 629
Women and Gender Studies ..... 1432
Women and Gender Studies - Bachelor of Arts (BA) ..... 638
Women and Gender Studies - Graduate Certificate ..... 1435
Women and Gender Studies - Minor ..... 647
Women and Gender Studies (WGST) ..... 2735
Workplace Skills for Student Employees - Micro-credential ..... 1923
Writing - Certificate ..... 654
Writing and Public Engagement - Minor ..... 284
Writing and Public Engagement - Minor ..... 284
Writing and Rhetoric, Program for ..... 650
Writing and Rhetoric (WRTG) ..... 2743

## Y

Yiddish (YIDD) ..... 2746